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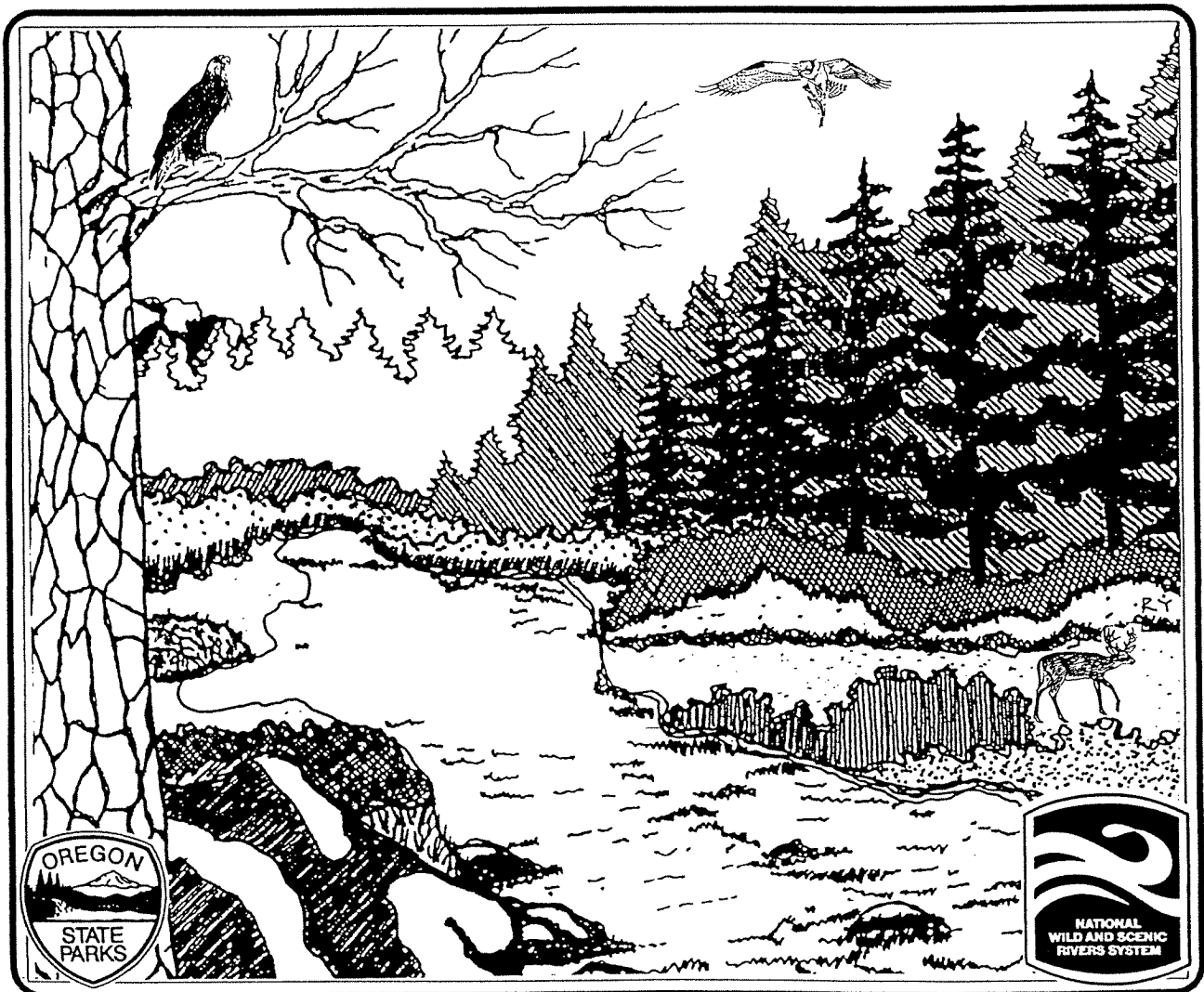
Forest Service
Pacific Northwest
Region



Upper Deschutes Wild and Scenic River

Record of Decision and Final Environmental Impact Statement

July 1996



MEMORIAL

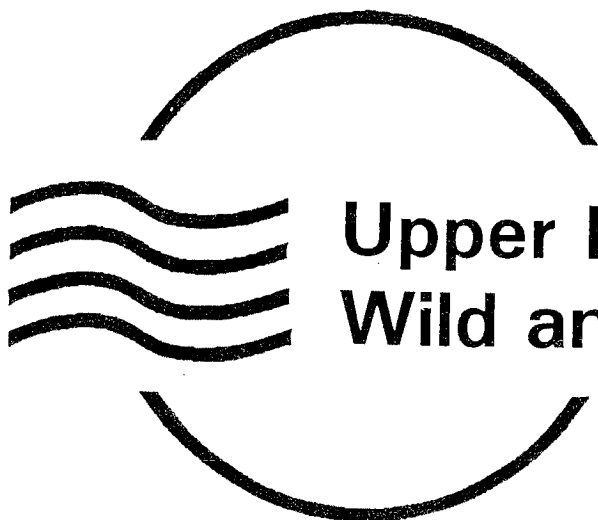
During the preparation of this plan, Tom Felando, a Forest Service hydrologist and a key contributor to the plan, died suddenly of a heart attack. He left behind a wife and two children.

Tom lived life with zest and passion. He fished, he played sports, he hiked and explored. He shared his joy for life with his family and friends. Tom always had a smile and a kind word for those he met.

Early in the planning process, Tom recognized the potential that water conservation held for returning water to the river, while continuing agricultural uses. He was an advocate for sound management, and building bridges between people to benefit the Deschutes River. His contributions and his caring will continue to live on through this plan, and through the people he touched during his life.

He will be greatly missed.





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Cooperating Agencies:

*U.S. Forest Service, Lead Agency
Confederated Tribes of the Warm Springs
Oregon State Parks & Recreation Department*

*Oregon State Marine Board
Oregon State Water Resources Department
Oregon Department of Fish and Wildlife*

*Oregon Department of Environmental Quality
Oregon Division of State Lands
North Unit Irrigation District*

*Central Oregon Irrigation District
Deschutes County
City of Bend*

*Bureau of Land Management
Bureau of Reclamation
Bureau of Indian Affairs*



THE CONFEDERATED TRIBES
OF THE WARM SPRINGS RESERVATION OF OREGON



Bureau of Land
Management



DIVISION OF
STATE LANDS



Record of Decision
for the
Upper Deschutes Wild and Scenic River
FEIS and Management Plan

Amendment #12
to the
Deschutes National Forest
Land and Resource Management Plan

Introduction

The Upper Deschutes Wild and Scenic River corridor is a block of land totaling approximately 17,000 acres. It begins just downstream of Wickiup Dam at the Wickiup gauging station (which is approximately 30 miles southwest of Bend, Oregon) and continues downstream to the Bend Urban Growth Boundary. The river is classified as Scenic and Recreation under the Wild and Scenic Rivers Act. The legislation designating the Upper Deschutes as part of the national Wild and Scenic River system requires the Forest Service to prepare a comprehensive management plan for the river corridor. This management plan was developed through preparation of the Upper Deschutes Wild and Scenic River Environmental Impact Statement (EIS). The Notice of Intent to prepare this EIS was published in the Federal Register on January 8, 1992. (57 FR 47836)

The Upper Deschutes River Wild and Scenic River and State Scenic Waterway Comprehensive Management Plan (hereafter called the Upper Deschutes River Plan) is an innovative concept in river management. It is the result of a collaborative effort between federal, tribal, state, and local governments to develop a common vision of future river management. A number of federal, tribal, state and local agencies have authority over or interests in land and water uses within the Upper Deschutes corridor (See FEIS Chapter 1). The Forest Service joined a collaborative effort to address management issues on the river. Once adopted by the cooperating agencies, the Upper Deschutes River Plan will provide management direction for a number of different river authorities.

This Record of Decision establishes the Upper Deschutes River Plan as management direction for the Deschutes National Forest by amending the Deschutes National Forest Land and Resource Management Plan (Forest Plan) to create a new management area, MA-17A. The Upper Deschutes River Plan is being adopted by many agencies; however, this decision applies only to that portion of the Plan which is under the jurisdiction of the Forest Service.

Forest Service Authority

As the federal agency designated to administer the Upper Deschutes Wild and Scenic River, the Forest Service is required to set resource management goals necessary to protect and enhance Outstandingly Remarkable Values and to manage federal land adjacent to the river. However, the Forest Service does not have exclusive jurisdiction over the Upper Deschutes River.

The Forest Supervisor has the authority to establish a boundary for the Upper Deschutes Wild and Scenic River and to select an alternative for managing those resources and activities which are under the jurisdiction of the Forest Service.

The Wild and Scenic River Act specifies that the Upper Deschutes River Plan shall be coordinated with resource management planning for affected adjacent Federal lands. The National Forest Management Act of 1976 required the preparation of Forest Plans to direct management of each National Forest. The 1990 Deschutes Land and Resource Management Plan (Forest Plan), as amended by the Regional Forester's Forest Plan Amendment #2 and Inland Native Fish Strategy, has served as interim management direction for the Upper Deschutes River corridor until the completion of this plan. The FEIS and ROD for the Upper Deschutes River amends the Deschutes National Forest Land and Resource Management Plan to create the Upper Deschutes River Management Area. The direction in the Upper Deschutes River Plan results from the extensive analysis and considerations documented in the accompanying Final Environmental Impact Statement (FEIS). This plan is based on Alternative 6 described in the FEIS.

The new management area direction will continue all current management direction and forest-wide standards and guidelines except where specifically amended by the plan. Standards and guidelines of the new management area will replace all other management area direction except as follows. Standards and guidelines for Old Growth, Bald Eagle and Pringle Falls Experimental Forest Management Areas will continue to apply unless they conflict with the standards and guidelines for the Wild and Scenic River. In the case of a conflict a site-specific analysis will determine whether the standards and guidelines for the W&S River Management Area could be amended and still protect and enhance river values as required by the Wild and Scenic Rivers Act.

If the Upper Deschutes River Plan does not speak to a particular issue, the river corridor will be managed in accordance with the laws, rules, and regulations pertaining to the National Forest System and the Deschutes National Forest, the State of Oregon, Deschutes County, and the City of Bend **to the extent that** such laws and regulations are consistent with the Wild and Scenic River Act.

All proposed projects must be tested for consistency with the Upper Deschutes River Plan during the site-specific analysis or permitting process. If a proposed project is found to be inconsistent, one of three choices must be made: change the project, drop the project, or amend the Upper Deschutes River Plan.

In many cases, one or more elements of the Upper Deschutes River Plan have the potential to affect plans and programs under the jurisdiction of authorities other than the Forest Service. Changes to these existing plans, policies, or programs are not within Forest Service jurisdiction and must be undertaken by proper authority.

The Upper Deschutes River Plan is an administrative agreement between the Forest Service and the cooperative agencies. All decisions described in this ROD which are outside of the Forest Service's authority to implement are recommendations to other agencies.

Each of the cooperators in this effort will be going through different processes in order to adopt the final management plan. For most of the public entities, that means going through a process to adopt specific ordinances, administrative rules, or regulations. Often, this will include an approval process by specific boards or commissions, and include public hearings. Specific actions which must be taken by other authorities to adopt the management plan are discussed in the Upper Deschutes River Plan.

Amendment to the Forest Plan

The Upper Deschutes River Plan complies with the National Environmental Policy Act. A draft environmental impact statement and management plan (DEIS) analyzing six different alternatives for future management was released for public review in October 1995. The Notice of Availability was printed in the Federal Register on October 27, 1995 (59 FR 1017). Comments were received on the draft EIS up to January 29, 1996 (See FEIS Appendix A). These comments resulted in changes to the draft preferred alternative and to the analysis. These changes are reflected in this decision and the final environmental impact statement (FEIS) on which it is based. This Record of Decision and the accompanying Final Environmental Impact Statement will amend the Deschutes National Forest Land and Resource Management Plan (Forest Plan).

Decisions and Recommendations

My decision is to select Alternative 6 as identified in the FEIS for the management of the Upper Deschutes Wild and Scenic River. The Upper Deschutes River Plan presents the selected alternative in a "Standard and Guideline" format consistent with the Deschutes National Forest Land and Resource Management Plan.

Alternative 6 is a modification of the Draft EIS Preferred Alternative and was prepared in response to public comments and new information. Substantive changes between the DEIS Preferred Alternative and Alternative 6 include:

- All-terrain vehicles (ATVs) would be permitted on roads which are not maintained for passenger vehicles because of a recent change in Oregon State law. As in the DEIS, ATVs would not be allowed on closed roads or off-road on public lands within the river corridor.

- Snowmobiles would be allowed only on designated routes on public lands in the river corridor.
- The fuel loading and snag and down log objectives have been refined with ranges for each Plant Association Group based on reevaluation of the objectives for each river segment. A photo series of natural forest residues aided in visually quantifying the objectives for fire, wildlife, and to meet urban interface concerns.
- The road to Tetherow boat ramp would remain open to motorized vehicles to provide for drift boat use in Segment 2B.
- Cardinal Bridge would remain open under permit to Sunriver Owner's Association. The bridge would provide access to the National Forest for hikers, bikers, and horseback riders. Motor vehicles could use the bridge if necessary in emergency situations. Road 4100-280 would be maintained for emergency and administrative use.
- Road 4370 would be gated and maintained for emergency and administrative use between Wyeth Boat Ramp and Haner Park.
- Road 4360 would remain open to motor vehicles, because it provides access to private lands. Roads between Road 4360 and the river would be closed to protect the riparian area.
- The experimental ramping rates would be used during spring start-up only until the flow reaches 800 cfs. Above that level of flow, the ramping rate has a much reduced influence on turbidity. This will allow a faster response to crop needs, especially in mid-season.

Key aspects of this decision include:

1. Management goals, objectives, and Standards and Guidelines for Management Area 17A - the Upper Deschutes Wild and Scenic River corridor.
2. Establishment of a legal boundary within which river values will be considered.
3. Establishment of a monitoring program.
4. Agreement to participate with and provide assistance to other governmental agencies within the corridor to protect and enhance river values consistent with the intent of the Wild and Scenic River Act.

The Upper Deschutes River Plan will be implemented over the anticipated ten to fifteen year life of this management plan. Many of the probable actions identified in the FEIS, especially those involving ground-disturbing activity, will require site-specific planning and environmental analysis, as required by NEPA prior to implementation. Other actions that do not require ground disturbance and that fall within existing Forest Service administrative authorities, can be implemented without further environmental documentation. Included within this group are actions such as use of concessionaires to operate campgrounds, changes from camping to day use in developed sites, enforcement of regulations, and monitoring of resource conditions and visitor activities. Implementation of actions associated with the Upper Deschutes River Plan are contingent on overall funding levels and Congressional priorities within the Forest Service budget.

Recommendations to other authorities

I recommend that those cooperators (FEIS) with the appropriate authority adopt relevant portions of Alternative 6 and the Adaptive Flow Management Strategy. The Private Land Use and Flow Options sections of the FEIS have provided the basis for my recommendation. The recommendations contained herein are within the scope of the Wild and Scenic Rivers Act and NEPA.

Reasons for the Decisions and Recommendations

I made these decisions and recommendations by weighing each of the alternatives against several factors. I reviewed the environmental consequences disclosed in the FEIS, and I evaluated how the alternatives and flow options responded to the mandate of the legislation and other applicable laws, public issues, the intergovernmental collaborative planning process, and management concerns. No single factor was predominant in making the decision. I considered and balanced all of the factors in selecting the alternative that I believe will provide the greatest net public benefit. Factors relating to the decision and recommendations and a discussion of each issue follow.

Response to Significant Issues

In the course of public involvement and coordination with other agencies, state and local governments, tribes, and irrigation districts, as well as within the Forest Service, these and other planning issues were identified. Several became significant issues that were used in designing alternatives. Each alternative responds to the significant issues in different ways. Improvement of the situations represented in the issues was a primary objective in this planning effort. I have selected the alternative that I feel offers the greatest improvement of the situations while also addressing other factors. Issues are seen and understood differently among individuals, and I have listened to and considered a range of viewpoints in deciding how to deal with these issues. I have carefully weighed all public comments received on the draft EIS. Appendix A of the final EIS has a summary of public comments and my responses to these issues. The significant issues are identified and discussed below.

Issues 1 and 2

How should water flows be managed to protect and enhance outstandingly remarkable river values and provide for out of stream uses consistent with Wild and Scenic River Act and applicable water laws?

What management strategies should be implemented to improve water quality in order to protect or enhance the Outstanding Remarkable Values consistent with the Wild and Scenic River Act and applicable water quality standards.

Water is perhaps the most important resource in any river management plan and the Upper Deschutes is no exception. Use of water from the Deschutes River for the irrigation of crops and livestock has been an important part of the Central Oregon economy since the turn of the century. Six irrigation districts divert water from near Bend for the irrigation of 115,000 acres, about 90 percent of the harvested cropland in the tri-county area. One irrigation district also generates hydroelectric power at their diversion. Recreation is an important part of the local economy, and recreational visitors to public lands along the Upper Deschutes River total about 170,000 annually.

Throughout the scoping process, resource professionals and the public repeatedly identified concerns over the quantity of water and the effect of water quantity on river values. The collaborative work of this planning process combines the efforts of resource professionals and water managers to develop an integrated adaptive approach to improving instream conditions while continuing to refine and quantify the relationships between water quantity and river values.

This adaptive management strategy focuses on five key processes:

1. Identification of a set of long-term resource condition goals which represent a healthy river ecosystem.
2. Identification of specific management practices which are reasonably expected to achieve those resource conditions.
3. Implementation of the practices as funding and conditions allow. Actively pursue implementing identified practices.
4. Monitoring of resource conditions to track long-term trends and the effectiveness of management practices that are put in place.
5. Adaptation of long-term goals and specific management practices as necessary based on results of monitoring, new information, or meaningful changes in conditions.

The FEIS and River Plan use this five step process as the basis for identifying specific management practices to serve as a target for initiating instream flow improvements. The resource condition goals and several management practices are common to all flow options considered. Perhaps the most controversial of these specific management practices and the one around which the six flow options revolved is the targeted instream flow levels.

The six flow options evaluated increased increments of wintertime instream flow and resource conditions expected to result from the long-term maintenance of those flows. The range of increments is a result of grouping, in a logical economic set, of certain conservation or water management strategies which could result in the amount of water savings needed to supply the instream flow with no harm to the water users' current supply levels.

This resulted in Option 5 being the preferred long-term target instream flow, because it provides the best approximation of conditions which current studies suggest will protect and enhance river values and may be achieved for a relatively reasonable economic cost. Based on the best current social and scientific information, I recommend that the adaptive management strategy be adopted as part of the cooperative Upper Deschutes River Plan with flow option 5 (target minimum flows - 300 cfs) selected as the preliminary long-term instream flow target.

The Forest Service will participate as an active cooperator in this adaptive flow management strategy by:

- Providing technical assistance for implementation.
- Monitoring water quality for effectiveness of specific management practices.
- Seeking funding for cooperative projects.
- Sharing in cooperative oversight of plan implementation.

Public comment on the DEIS which described the Adaptive Flow Management Strategy was generally favorable although there was skepticism concerning its achievability without affecting existing water rights and concern about the costs in relation to benefits. The basic premise of this strategy is that existing uses will not be harmed, and would in fact be enhanced by establishing goals which would be mutually compatible with all beneficial uses. The actual feasibility of achieving the targets is unknown. Ultimately, it will depend upon the ability and willingness of the water and river users to be committed to improving the current situation.

To try at this stage to determine the site-specific costs and benefits of any particular project would not be meaningful. However, sufficient information exists to demonstrate that certain levels of instream flow could be achieved without affecting water availability to users and that certain levels are more likely to present favorable conditions to river values. It is, in my opinion, sufficient information to establish long-term goals and targets under an Adaptive Flow Management Strategy.

Issues 3 and 4

What aquatic and riparian conditions are needed or are appropriate to protect and enhance the fishery and other outstanding remarkable values?

How should fish species be managed to protect and enhance the fishery and other outstanding remarkable values?

The Upper Deschutes has one of the state's best brown trout fisheries, and may have a distinguishable native rainbow trout population. Still, the public and resource management professionals agree that the fishing could be better. Habitat conditions, including the riparian

habitat are less than ideal. These resource conditions also affect other river values, including the scenic and water quality, amount and abundance of wildlife, and the evolution of the river channel.

Most key aspects of these issues were addressed in common across Alternatives 2-6. Based on what was heard during scoping, and the lack of comments on this issue during this comment period, little disagreement was expressed on either the nature of the problem or the methods by which it could be resolved. Reintroduction of large woody material, boulders, and gravel to improve the kinds of habitats available to attract and support larger fish populations was strongly supported by resource professionals and the public. In addition, this decision recognizes the importance of natural logjams to the dynamics of the river system and to the fisheries, and provides for the reasonable maintenance of those as they occur in a manner also consistent with resource protection and recreational goals.

The selected alternative also places an increased emphasis on restoring native riparian vegetation within the corridor. This is described more fully under issues 5 and 6.

My decisions in this plan focus on the habitat conditions which will protect and enhance the brown and native redband trout populations. The Oregon Department of Fish and Wildlife is preparing a more specific plan geared toward fish population management. I recommend to the State that a final plan be selected that will provide for the protection and enhancement of this outstandingly remarkable value.

Issue 5

How should vegetation be managed to protect and enhance the Outstandingly Remarkable Values and ensure public safety?

The wildlife and scenic values of the river are inherently tied to the conditions of the vegetation.

The forests along the Upper Deschutes River contain upland and riparian species dominated by ponderosa and lodgepole pine and interspersed with marshes, meadows and grasslands. This vegetative diversity is an essential component of the Outstandingly Remarkable wildlife, scenic and recreation values. *Artemisia ludoviciana estesii*, a sensitive plant species, is also present along the river and constitutes an Outstandingly Remarkable plant population. Riparian areas are scenic focal points and support a diverse and abundant bird population.

The condition of vegetation is affected by both natural and human caused disturbances. Natural disturbances, such as fire, wind, insects, and disease, perform integral functions in forest ecosystems. Since the turn of the century, the vegetation conditions of the upland and riparian areas have been affected by human disturbance that includes recreation use, removal of old growth ponderosa pine, grazing by livestock, and years of fire suppression. As a result, the structure and composition of forest communities have changed over the past 100 years.

Artemisia ludoviciana estesii finds its niche in the riparian zone, not far from the bank of the river. The population along the Upper Deschutes is small and because of the sites where it is located, it may be affected by changes in recreational activity or changes in the level of the river.

Private and public development within the forest and along the river have resulted in a conflict between the need to protect life and property from elements such as fire, smoke, and falling snags, and the positive role fire and snags play in the functioning of the ecosystem.

The selected alternative responds to the need to protect and restore sensitive riparian and streambank areas by placing an emphasis on review and revegetation of dispersed and developed recreation sites and reducing motorized access to sensitive areas. Approximately 41 miles of user-created roads and estimated 80-90 percent of existing dispersed campsites will likely be closed as a result of the goals, standards and guidelines included in this decision.

This part of my decision was responsible for approximately 30 percent of the comments on the DEIS. The comments were almost evenly split and were generally very strongly in favor of the strategy, or very strongly against it. Many people feel that reducing motorized access to the river in any way unfairly limits those with physical limitations from being able to enjoy a quality recreation experience. Other people agreed that reducing motorized uses in the riparian areas was important to protect that resource.

The nature of the soils of the Upper Deschutes make the streambank particularly sensitive to erosion. Riparian vegetation is difficult to establish and difficult to maintain with changes in flow level. The continued increases in the number of people who recreate within the river corridor make it clear that without some regulation on the use of this sensitive area, streambank conditions along the Deschutes will continue to deteriorate. The implementation of this decision will include an evaluation of sites to determine the extent of their impact on the streambank. Sites may remain as designated dispersed sites, may be relocated farther from the streambank, or may be eliminated entirely. Some sites, though it is expected to be few, may remain with reasonably close motorized access to allow for those with physical limitations to camp in their traditional ways. I do expect one of the consequences of this decision to be a reduction in dispersed overnight camping opportunities within the river corridor. However, direct access to the river will continue to be available to those with physical limitations even though it will be different from what is now available. This is described more fully under Issue 9.

Consistent with this approach to streambank protection on National Forest lands, recommendations to the state and county for emphasizing protection and restoration of native vegetation in conjunction with private land development is described under issue 10.

No substantive comments were received on the long-term goals for upland forest management which emphasize maintaining or developing high quality scenery and wildlife habitat. What comments were received supported taking an active management role to help achieve the long-term goals, and to address immediate problems such as the fuel loadings. This is the approach directed by the selected alternative.

Issue 6

How should wildlife and their habitat be managed to protect and enhance the Outstandingly Remarkable river values?

The selected alternative emphasizes restoring and protecting riparian vegetation, increasing old growth habitats and reducing human disturbances in sensitive habitat areas. Standards for acceptable fuel loadings for reduction of wildfire risk and snags and down wood for wildlife habitat have been combined to provide consistency. Goals and Standards and Guidelines to protect streambanks and riparian vegetation enhance wildlife habitat and reducing the amount of open road parallel to the river which intersect with known routes improve linkages between upland and riverine habitats. These benefits are expected to be particularly pronounced in sensitive habitat areas. Existing rules for land uses and development in Deschutes County also emphasize protection of important migration corridors by requiring clustering of developments and specialized fencing. No additional recommendations for development regulations concerning wildlife protection measures were recommended.

There were few comments from the public concerning this issue except where road closures were discussed. Some of the roads in sensitive habitat areas which were identified for closure did provide alternative or emergency access to residential properties. The selected alternative 6 was modified to allow for emergency access to these roads. Future site-specific analysis may identify opportunities to provide for alternate non-emergency access while still meeting resource goals.

Issue 7

How should the scenic resources along the Deschutes River be managed to protect and enhance the outstandingly remarkable scenic values in the river corridor?

Scenic values will be enhanced through Visual Quality Standards for National Forest lands, State Scenic Waterways Rules, and County Land Use Ordinances identified in Alternative 6. These all promote protection of healthy vegetation and restoration of riparian vegetation along the streambank and encourage development which blends or complements the natural landscape character.

There was little comment from the public concerning the goals or the proposed rules and county land use goals. These are dealt with in Issue 10.

Issue 8

How should cultural resource values be protected and enhanced?

Cultural resources along the river include prehistoric and historic archaeological sites (features associated with railroad logging and early twentieth century structures). They may also include traditionally hunted or gathered fish, game and plants, and areas used for ceremonial purposes. Current Forest Plan direction for management of cultural resources is fully consistent with the intent of the Wild and Scenic Rivers Act and other laws and regulations governing the Forest Service and recognized tribal trusts and will continue to be implemented unchanged as a result of this decision.

Issue 9

How should recreation opportunities and experiences be managed to protect and enhance the Outstandingly Remarkable River Values?

Recreational use within the river corridor was the issue closest to the hearts of most of the river users. One of the most constant refrains in the early scoping process was that the river was being "loved to death". People enjoy the wide variety of recreational opportunities available on and along the river but are concerned by resource damage and overcrowding.

The selected alternative responds to this issue in a variety of ways. First of all, it provides for a particular recreational emphasis within each of the segments of the river. This is reflected by the Recreational Opportunity Spectrum class, and the identified designed use levels. These use levels were estimated for key access points to provide a method of tracking total use levels within the corridor. After implementation, surveys and monitoring of resource conditions and recreational experiences will be implemented as programming permits to verify the compatibility of the use levels with desired recreational experience.

The selected alternative will provide a wide variety of recreational experiences. The number of developed sites with direct motorized access to the river for boating and fishing will be approximately the same as currently exist. Additional barrier-free access is planned at many sites where it does not now exist. In addition, some segments will emphasize non-motorized uses, which will provide a wider variety of experiences than currently exists..

The selected alternative provides for slightly higher use levels than are currently occurring within the corridor, and will therefore accommodate some level of the projected increases in use. Conversion of Besson, Slough, and Dillon Falls to day-use picnic areas will provide for a greater number of people to be able to visit the most scenic sections of the river, while still reducing the impact of those visits on the natural environments. Guided/outfitted use will continue to be provided at existing levels (equal to an average of the previous three year's use levels), and some additional opportunities will be available.

This decision will change the mix of recreation experiences, as mentioned before (issue 3). In Segments 2 and 3, the emphasis will be on developed overnight camping. Segment 4 will emphasize day use and non-motorized dispersed use. I believe this combination of uses and experiences will continue to provide an outstandingly remarkable recreational experience while protecting the natural resources of the river.

Issue 10

How can changes to existing uses on private lands be accommodated while protecting and enhancing other river values?

Alternative 6 includes proposed rules for the State Scenic Waterways and Deschutes County Ordinances to protect and enhance geologic values, water and scenic quality, vegetative diversity, and fish habitat by emphasizing restoration of riparian vegetation and development which blends with the natural landscape. Most importantly, it emphasizes partnerships with landowners and a coordinated approach for land managers to provide assistance to landowners.

Activities are encouraged which will protect private property while enhancing river values. Activities which are consistent with the goals in Alternative 6 are unlikely to have a direct or adverse impact on the free flowing character of the river.

Sewage disposal and its potential effects on water quality have been recognized and addressed by increasing interagency coordination of the water quality monitoring effort. Land acquisitions have also been identified as a strategy which could benefit water quality although no specific proposals have been developed.

Overall, the adopting these proposed rules will have a beneficial effect on the Wild and Scenic river values. Therefore, I recommend these rules be adopted by the State of Oregon and Deschutes County.

Issue 11

Where should boundaries be located to protect and enhance the outstandingly remarkable river values?

The Federal Wild and Scenic Rivers Act established an interim 1/4 mile boundary. The federal act requires the establishment of a permanent boundary that would protect and enhance Outstandingly Remarkable River Values. This permanent boundary must be locatable and encompass not more than an average of 320 acres per river mile.

The interim boundary provides different levels of protection for the Outstandingly Remarkable Values depending on whether the land is publicly or privately owned. The interim boundary includes a substantial amount of private land. This land contains a variety of residential and resort developments that are primarily regulated through state and county land use laws. Inclusion of this land within the Wild and Scenic River Boundary adds little

protection beyond that provided by existing state and local government regulation. On the other hand, Wild and Scenic River Status affords considerable protection for river values associated with publicly owned lands.

The Wild and Scenic River boundary identified in the FEIS does, in my opinion, meet the criteria set by the Wild and Scenic Rivers Act, and does not exceed an average of 320 acres per mile of river. It has been identified as a result of careful consideration of river values.

Few comments were received on the boundary proposed in the DEIS. Some minor changes were made, primarily on private lands. These changes were made to make the boundary easier to locate on the ground. This final boundary will be recommended to the United States Congress for inclusion in the records of the national Wild and Scenic Rivers.

Public Involvement

Initial Scoping

A concerted effort was made to involve everyone interested in the Upper Deschutes River in this extended planning process. As previously described, a cooperative agreement was formed with interested tribal, state, and local governments having jurisdiction on the river.

The Klamath Tribes and the Burns Paiute Tribes have interests associated with the Upper Deschutes River. Tribal Councils for both groups were offered the opportunity to have their representatives participate in the coordinated planning effort.

The Upper Deschutes River Citizen's Task Force, a community group, was assembled during the early planning phases to represent a wide variety of local issues about Deschutes River management. Participants were chosen on the basis of their ability and willingness to participate and represent the views, values, and opinions of specific user groups. The interdisciplinary team and its consultants met with the Task Force during the development of the issues and the alternatives. There was frequent consultation during the development of alternatives prior to the intergovernmental technical review during which a number of specific changes recommended by individuals on the Task Force were incorporated.

The Deschutes Basin Resource Committee is an independent group sponsored by Deschutes County which develops recommendations about water policies in the Deschutes River Basin for the Deschutes County Commissioners. Some of its members served with the Task Force or as consultants to the river planning team prior to the intergovernmental technical review. The Committee was briefed on the planning process and on the content of the plan as it progressed.

A series of public meetings were held in Central Oregon in November 1989 and August 1991 to invite comments on the issues. Periodic updates on the river planning process were provided through newsletters, and the quarterly publication of the Deschutes National Forest's Schedule of Proposed Action.

Public Comment on the DEIS and Draft Plan

Following the publication of the draft EIS in October 1995, the Forest Service held another series of public meetings in Central Oregon to discuss the draft plan. These meetings were held in November 1995 in Bend, LaPine, and Madras. The cooperating agencies made presentations on the draft EIS and plan, provided displays on the different alternatives and flow options, answered questions, and accepted comments. The draft EIS, the public meetings, and the opportunity to comment were the subjects of several news articles.

We received 96 comments during the formal comment period, including letters, faxes, telephone calls, and those from public meetings. Most of the comments (77%) came from Central Oregon. All of the comments originated in Oregon, Washington, or California. Many of the commentors from outside Central Oregon indicated that they own property in the vicinity of the river. Comments were received from individuals, environmental groups, recreation groups, a homeowner group, irrigation districts, businesses, and government agencies.

Recreation and flow issues brought the most comments. The status of Cardinal Bridge, a privately owned bridge in Segment 3, also brought many comments.

In response to public comments received between draft and final, the Preferred Alternative was modified to create Alternative 6.

Responses to the comments are included in Appendix A of the FEIS.

Alternatives Considered

A detailed description of each of these alternatives is in Chapter 2 of the FEIS. Mitigation measures have been developed through interdisciplinary efforts and incorporated into all the alternatives and the Standards and Guidelines. These mitigation measures are designed to protect and enhance Outstandingly Remarkable Values. All practical means to avoid or minimize environmental harm with the selected alternative have been adopted. Additional mitigation measures will be developed and implemented at the project level, tiered to and consistent with the measures described in the Upper Deschutes River Plan.

Alternative 1

This is the no action- no change alternative required by National Environmental Policy Act. Alternative 1 would continue management and development of the river on National Forest lands according to the direction of the August 1990 Deschutes Land and Resource Management Plan (Forest Plan) as amended by the Inland Native Fish Strategy. The current land use laws, policies, and directions established by the Deschutes County Comprehensive Plan and current State Scenic Waterway rules would apply on private lands. Of the 54 river miles, one mile is currently limited to non-motorized use.

Common to the Action Alternatives (2-6)

Many of the conditions needed to protect and enhance the Outstandingly Remarkable Values are common to the action alternatives (Alternatives 2-6). These include such actions as riparian area protection measures, fish habitat enhancement, and reduction in fuel loading with protection of snag/down log wildlife habitat.

Alternative 2

This alternative would emphasize natural processes and resource conditions. Some lodgepole pine stands would be left to natural processes of high intensity stand replacement fires and mountain pine beetle epidemics. Non-motorized and day-use recreation would be emphasized. The designed annual capacity would be the lowest of all the alternatives. This alternative would provide more picnic and trailhead sites, but fewer campsites and boat ramp sites than Alternative 1. Of the 54 river miles, 47 miles would be limited to non-motorized use. Guide/outfitter use of the river would be reduced from current levels by 50%.

Alternative 3

This alternative would emphasize active management of resource conditions to meet wildlife habitat and vegetation goals. The designed annual capacity would be increased somewhat over current levels. The mix of recreation types (developed and undeveloped) and access (motorized and non-motorized) would be similar to existing conditions with some additional resource protection measures. Except for an increase in trailhead sites, the number of recreation sites would be comparable to Alternative 1. Of the 54 river miles, 10 miles would be limited to non-motorized use. Some types of guided/outfitter use could increase somewhat over current condition.

Alternative 4

This alternative mixes active management of resources conditions to enhance scenic values with an emphasis on undeveloped recreation and non-motorized access. The designed annual capacity would be reduced somewhat from Alternative 1. The number of picnic and trailhead sites would increase, but the number of boat ramp sites would decrease from Alternative 1. Of the 54 river miles, 26 miles would be limited to non-motorized use. Guided/outfitter use would be reduced somewhat from current condition.

Alternative 5

This alternative mixes active management of resource conditions with an emphasis on developed recreation to provide the highest designed annual capacity of all alternatives. Additional camping, picnic, and trailhead sites would be provided. The number of boat ramp sites would be comparable to Alternative 1. Of the 54 river miles, five miles would be limited to non-motorized use. Guided/outfitter use could increase by 20% over current levels, and whitewater rafting in Segment 4 would operate under a common pool of permits.

Alternative 6

This is the alternative modified between draft and final EIS in response to public comments. It is a combination of goals and objectives from the other alternatives and would provide a variety of recreational opportunities. The designed annual capacity would increase somewhat over current condition and would be comparable to Alternative 3. The number of camping, picnic, and trailhead sites would increase. The number of boat ramp sites would be comparable to Alternative 1. Of the 54 river miles, 12 miles would be limited to non-motorized use. Existing guided uses would be held at existing levels (based on the average of the three years prior to plan adoption). Some new types of guided/outfitter use could be considered.

Environmentally Preferable Alternative

Previously in the Record of Decision, I have described the selected alternative and given the reasons for its selection. The National Environmental Policy Act also requires that one or more environmentally preferable alternatives be identified. "The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources." (Council on Environmental Quality, "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations" (40 CFR 1500-1508), Federal Register Vol. 46, No. 55, 18026-18038, March 23, 1981; Question 6a.)

All the alternatives would provide the protection to the environment required by the Wild and Scenic Rivers Act. Based on that criteria and the knowledge of the activities which have the greatest impact on the historic, cultural, and natural resources with the river corridor, Alternative 2 would be the environmentally preferable alternative. This alternative has the lowest use levels and the most restrictions on vegetation management. However, this alternative would not, in my opinion, best meet the intent of the Wild and Scenic Rivers Act, nor does it best promote the national environmental policy. The Wild and Scenic Rivers Act requires the Forest Service to manage the river to protect and enhance the Outstandingly

Remarkable Values. Alternative 2 would unduly limit reasonable access of much of the river corridor to those desiring or dependent on motorized access. Based on the analysis in the FEIS, this would not enhance the recreational values found to be Outstandingly Remarkable.

Alternative 6 provides for a wider variety of recreational experiences while protecting and enhancing other values as well. Alternative 2 would also restrict vegetation management activities to the point where the risk of major crown fires within the corridor would be extremely high. Crown fires of that intensity are likely to have a significant adverse impact on river values including scenic quality, water quality, recreational value, and wildlife habitat. These fires may also threaten public safety and private property as evidenced by the Pringle Falls fire in 1995. While wildfire suppression continues as a part of the national environmental policy, prudent vegetation management is critical to provide viable healthy ecosystems.

Implementation

The Upper Deschutes River Plan will be implemented through identification and scheduling of probable actions identified in the Plan or other actions which are identified to meet management goals and objectives. Priorities for projects and management activities are displayed in the Probable Actions section of the Plan. Individual projects will be subject to site-specific analysis in compliance with the National Environmental Policy Act. This process may result in a decision not to proceed with the proposed project, even if it is compatible with the Upper Deschutes River Plan. Other adjustment to probable actions may occur based on results of monitoring, budgets, and unforeseen events.

The cooperating agencies can identify the priorities of the probable actions based on proposed annual budgets or actual funds. As a result, projects and activities in individual years may differ from those projected in the Upper Deschutes River Plan.

Upon implementation of the Upper Deschutes River Plan, all projects will be in compliance with Plan direction. Subject to valid existing rights, all permits, contracts, cooperative agreements, and other instruments for the use and occupancy of Nation Forest System lands within the Upper Deschutes River corridor are to be consistent with management direction adopted by this Record of Decision.

Monitoring and Evaluation

Monitoring provides information on progress and results of implementation. It involves gathering data which can then be evaluated to determine whether conditions the intent of the Plan. It also provides the basis for assessing the need for adjustments to management and/or amendment of the Plan itself. The monitoring program adopted as part of my decision is discussed in detail in the Upper Deschutes River Plan.

Findings Required by Other Laws or Regulations

Consultation Required by the Endangered Species Act

Consultation on Alternative 6 in the FEIS was conducted with the Fish and Wildlife Service in accordance with the Endangered Species Act. The biological evaluation done for the FEIS found no effect on any listed species, and the Fish and Wildlife Service concurred with this evaluation.

Because this decision does not authorize any site-specific activities, potential effects on threatened, endangered or proposed species will be evaluated through consultation on a project level basis when site-specific information is available. The Upper Deschutes River Plan continues the Bald Eagle Management Area (BEMA) established along the river by the 1990 Deschutes Forest Plan.

Review by the Environmental Protection Agency

The Environmental Protection Agency (EPA) reviewed the Draft Environmental Impact Statement and raised no environmental objections.

Wild and Scenic Rivers Act and State Scenic Waterways Legislation

This Plan meets the intent and direction provided in the designating legislation.

Other Laws, Regulations, and Guiding Documentation

The Upper Deschutes River Plan complies with the Record of Decision for the Final Environmental Impact Statement for Managing Competing and Unwanted Vegetation, signed December 1988, and the requirements of the Mediated Agreement of May 1989. Unwanted vegetation will be treated using a variety of methods, including manual, mechanical, biological, burning, and herbicides. Projects will comply with the Mediated Agreement by following direction provided in the Region 6 Guide to Conducting Vegetation Management Projects in the Pacific Northwest Region.

Both prescribed fire and mechanical means will be used to restore ecological processes in appropriate parts of the Upper Deschutes River corridor. A site-specific analysis will determine the best treatment method(s), the size of the project, and other parameters, constraints or guidelines, consistent with the above direction.

I have considered the relevant laws and regulations including, but not limited to: the Clean Air Act as amended; the Clean Water Act; Protection of Wetlands Executive Order 11990; the Safe Drinking Water Act; the National Historic Preservation Act of 1966, as amended; the Archeological Resources Protection Act of 1979, the Native American Religious Freedom Act; and the National Forest Management Act of 1976. Furthermore, I have considered the effects disclosed in the FEIS and public comments received during the public involvement process. I have concluded that my decision, with the required mitigation measures, meets all applicable laws, regulations, and policies and is consistent with the purposes for which the Upper Deschutes Wild and Scenic River was designated and is being administered.

Effective Date and Implementation

This decision will be implemented no sooner than 30 days after the Notice of Availability appears in the Federal Register.

For More Information

If you would like more information about the Upper Deschutes River Plan or FEIS, or would like to review planning records, please contact:

Environmental Coordinator
Bend-Ft. Rock Ranger District
1230 NE Third Street, Suite A-262
Bend OR 97701
(541) 383-4769

Right to Administrative Review

I encourage anyone concerned about the Upper Deschutes River Plan or Environmental Impact Statement to contact me before submitting an appeal. It may be possible to resolve the concern or misunderstanding in a less formal manner.

This decision may be appealed in accordance with the provisions of 36 CFR 217 by filing two copies of a written notice of appeal within 45 days after publication of the legal notice in the Bulletin (Bend, Oregon). The appeal must be filed with the Reviewing Officer (Regional Forester).

For a period not to exceed 20 days following the filing of a first level Notice of Appeal, the Reviewing Officer shall accept requests to intervene in the appeal from any interested or potential affected person or organization (36 CFR 217.10(b)).

This decision may also be appealed in accordance with the provisions of 36 CFR 251 by filing a notice of appeal within 45 days after publication of the legal notice in the Bulletin (Bend, Oregon). The appeal must be filed with the Appeal Reviewing Officer (Regional Forester), and a copy of the notice of appeal must be sent to the Deciding Officer (Forest Supervisor). Potential intervenors must petition the Reviewing Officer to be granted intervenor status before the closing of the appeal record.

Regional Forester
Pacific Northwest Region
USDA Forest Service
PO Box 3623
Portland OR 97208-3623

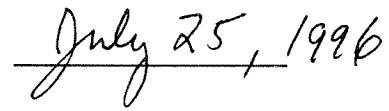
Forest Supervisor
Deschutes National Forest
1645 Highway 20 East
Bend OR 97701

No decision can be appealed by the same person under both 251 and 217 appeal regulations.

Any Notice of Appeal must include sufficient narrative evidence and argument to show why this decision should be changed or reversed (36 CFR 217.9 and 36 CFR 251.90).



Sally Collins
Forest Supervisor
Deschutes National Forest



Date

**Final Environmental Impact Statement
for the
Upper Deschutes River
Wild and Scenic River and State Scenic Waterways
Comprehensive Management Plan**

**Deschutes National Forest
Deschutes County, Oregon
August 1996**

Lead Agency: USDA Forest Service

Responsible Official:

Sally Collins, Forest Supervisor
Deschutes National Forest
1645 E. Highway 20
Bend, OR 97701

For more information, contact:

Mollie Chaudet
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1230 NE Third, Suite A-262
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(541) 383-4769

Abstract

This final environmental impact statement describes six alternatives for managing the Upper Deschutes Wild and Scenic River and State Scenic Waterway south of Bend, Oregon. This 54-mile segment of the Deschutes River, running from Wickiup Dam to the Bend Urban Growth Boundary, was designated a Wild and Scenic River by the U.S. Congress in 1988. The Upper Deschutes River was also designated a State Scenic Waterway by the State of Oregon.

Alternative 1 is the "No Action" alternative required by the National Environmental Policy Act. It would continue present management as directed by the 1990 Deschutes National Forest Land and Resource Management Plan (Forest Plan).

Alternative 2 is the most "primitive" alternative. It would emphasize non-motorized recreation and eliminate motorized use in many sections of the river.

Alternative 3 would focus on rehabilitation efforts and resource protection and enhancement, while keeping about the same mix of recreational opportunities as today.

Alternative 4 is similar to Alternative 3, but would emphasize undeveloped recreation and non-motorized use, and limit somewhat guided/outfitter use on the river.

Alternative 5 would increase developed recreational opportunities. It would provide the most "development" in the river corridor, and would accommodate the highest level of use of all the alternatives.

Alternative 6 is a combination of features from all the alternatives and modifications based on comments on the draft EIS from the public and the cooperating agencies. Alternative 6 is the Forest Service preferred alternative.

In addition to these "land-based" alternatives, there is a series of flow options, which outline choices for the amount of water flowing seasonally in the Deschutes River. The consequences of each of these alternatives and options are also displayed and evaluated.

HOW TO USE THIS DOCUMENT

Chapter 1 gives an overview of the reasons why the Forest Service and the cooperating agencies have prepared a management plan for the Upper Deschutes River. It presents the key issues in the river corridor. This chapter also presents the decisions made in adopting the plan, and how this plan blends with other agencies and authorities (Confederated Tribes of the Warm Springs Reservation, Oregon State Parks and Recreation Department, Oregon State Marine Board, Oregon Department of Fish and Wildlife, Deschutes County, and others).

Chapter 2 discusses the various alternatives for managing this wild and scenic river. The Forest Service uses an interdisciplinary process to design alternatives that meet varying goals and objectives. The agency is required by federal law to consider a range of reasonable alternatives before embarking on a course of action. Each alternative is described in detail, including its major emphasis and goals, as well as the alternative's key features. There are also some comparison charts to help the reader understand the differences among the alternatives.

Chapter 3 describes the existing condition of the wild and scenic river, from Wickiup Dam to the Bend Urban Growth Boundary. In this chapter, you will find information about wildlife, vegetation and scenery, river flows, fisheries, recreational uses and other key issues. This chapter forms a "backdrop" so that the reader may fully understand the nature of the river's ecosystems and the many activities currently occurring there.

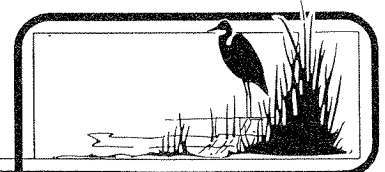
Chapter 4 outlines the environmental consequences for each of the alternatives and flow options. It analyzes what would happen to the river environment if each of the alternatives presented in Chapter 2 were implemented. The purpose of this chapter is to give the reader and the decision-makers a clear understanding of the projected environmental consequences for each choice of action, before a decision is made.

Chapter 5 describes the proposed rules for the State Scenic Waterway portion of the river. These are rules which mainly apply to private land development within ¼ mile of the river.

We hope this document is useful to you, and that you learn some new things by reading through it. Parts of this EIS are long and complex. Federal law requires the Forest Service to present and then thoroughly analyze various scenarios (alternatives) for management, so that the best possible decision can be made.

If you have a particular interest, please check the index for an easy reference guide. There is also a glossary and a list of acronyms.

Thanks for taking the time to learn and care about our scenic waterways, one of the key features of our unique Oregon heritage.



How This Document has Changed between Draft and Final

As a result of public comments and review by the coordinating agencies, changes and improvements have been made to the Environmental Impact Statement. The document has been changed to make reading and understanding easier. Information has been added and updated. Highlights of these changes are described below.

Changes in Chapter 1

- Language has been clarified in the water quality and fishery issue statements.
- A footnote has been added to the water quality issue statement regarding the Draft 1994/1996 List of Water Quality Limited Water Bodies.

Changes in Chapter 2

Changes in Alternative 1

- Individual developed site numbers have been corrected for Segments 3 and 4.
- A table showing existing guided/outfitted use has been added.

Changes Common to Alternatives 2-6

- Because of a recent change in Oregon State law, all-terrain vehicles (ATVs) would be permitted on roads which are open to the public and not maintained for passenger vehicles. ATVs would not be allowed off-road on public lands within the river corridor.
- A section on snowmobiles has been added to the document. Snowmobiles would be allowed only on designated routes on public lands in the river corridor. The primary intent of designated routes would be to provide access from private lands within the river corridor to public lands open to snowmobiling outside the corridor.
- The fuel loading and snag and down log objectives have been refined with ranges for each Plant Association Group based on reevaluation of the objectives for each river segment. A photo series of natural forest residues aided in visually quantifying the objectives for fire, wildlife, and to meet urban interface concerns. These new ranges are common to all action alternatives.

Changes to the Preferred Alternative

- The road to Tetherow boat ramp would remain open to motorized vehicles.
- Cardinal Bridge would remain open under permit to Sunriver Owner's Association, and Road 4100-280 would be maintained for emergency and administrative use.
- Road 4370 would be maintained for emergency and administrative use between Wyeth Boat Ramp and Haner Park.
- Road 4360 would remain open to motor vehicles.
- Individual developed site numbers have been corrected for Segment 4.
- Guided/outfitter use levels in Table 2- 10 have been corrected.
- Firewood gathering or cutting for camp use would be discouraged within 300 feet of the river.

Change Common to Flow Options 2-6

- The experimental ramping rates would be used at flow levels below 800 cfs. Above that level of flow, the ramping rate has a much reduced influence on turbidity. This will allow a faster response to crop needs, especially in mid-season.

Changes in Chapter 3

- Language has been clarified in fishery and vegetation (especially grazing).
- A section on existing travel restrictions has been added.

Changes in Chapter 4

- The effects analysis expanded to include ATVs/snowmobiles and changed to reflect changes in alternatives.

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List of Preparers

Those to Whom Copies of This FEIS Were Sent

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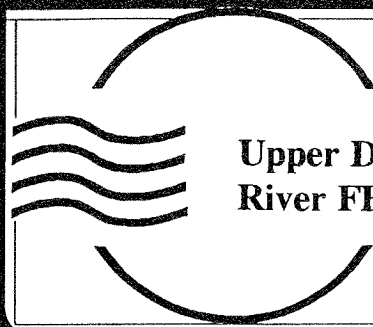
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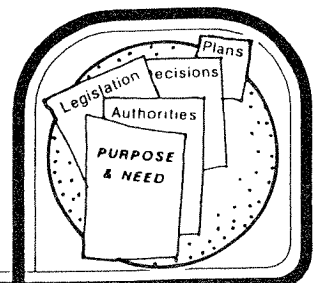
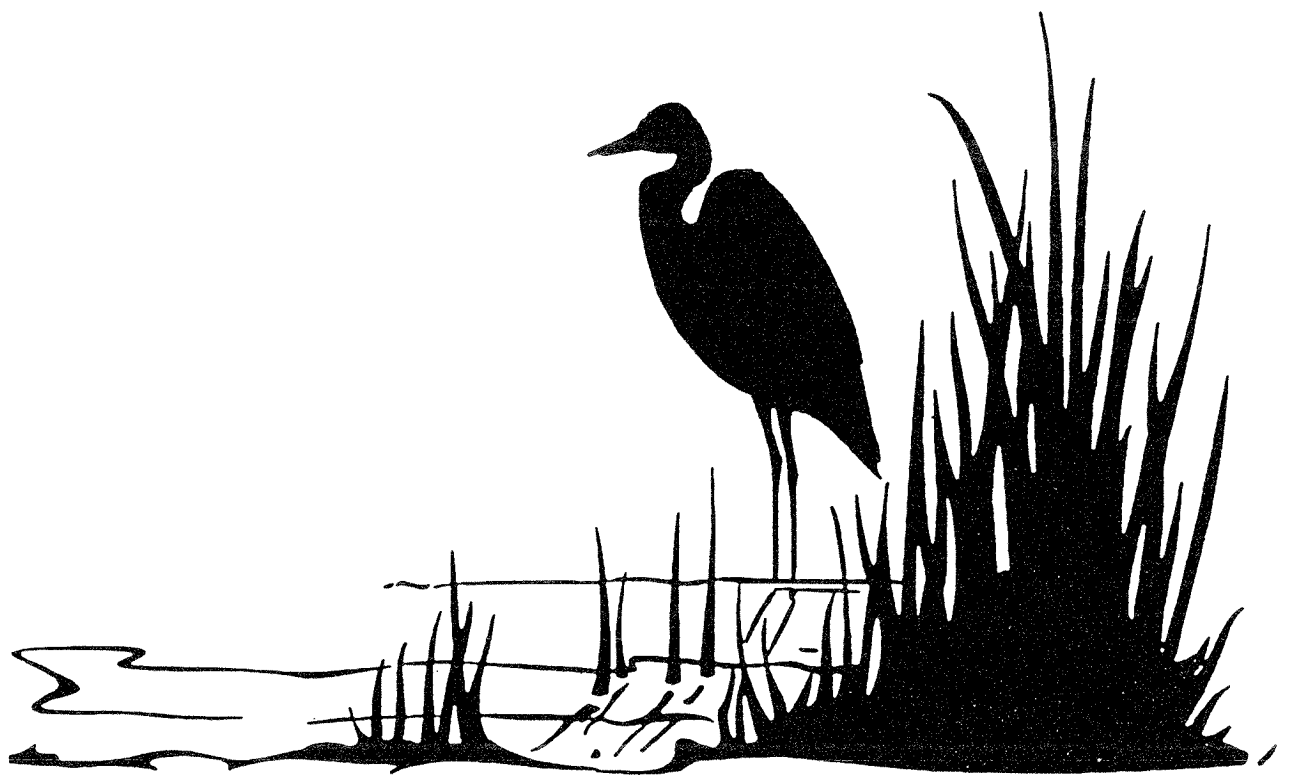
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Upper Deschutes
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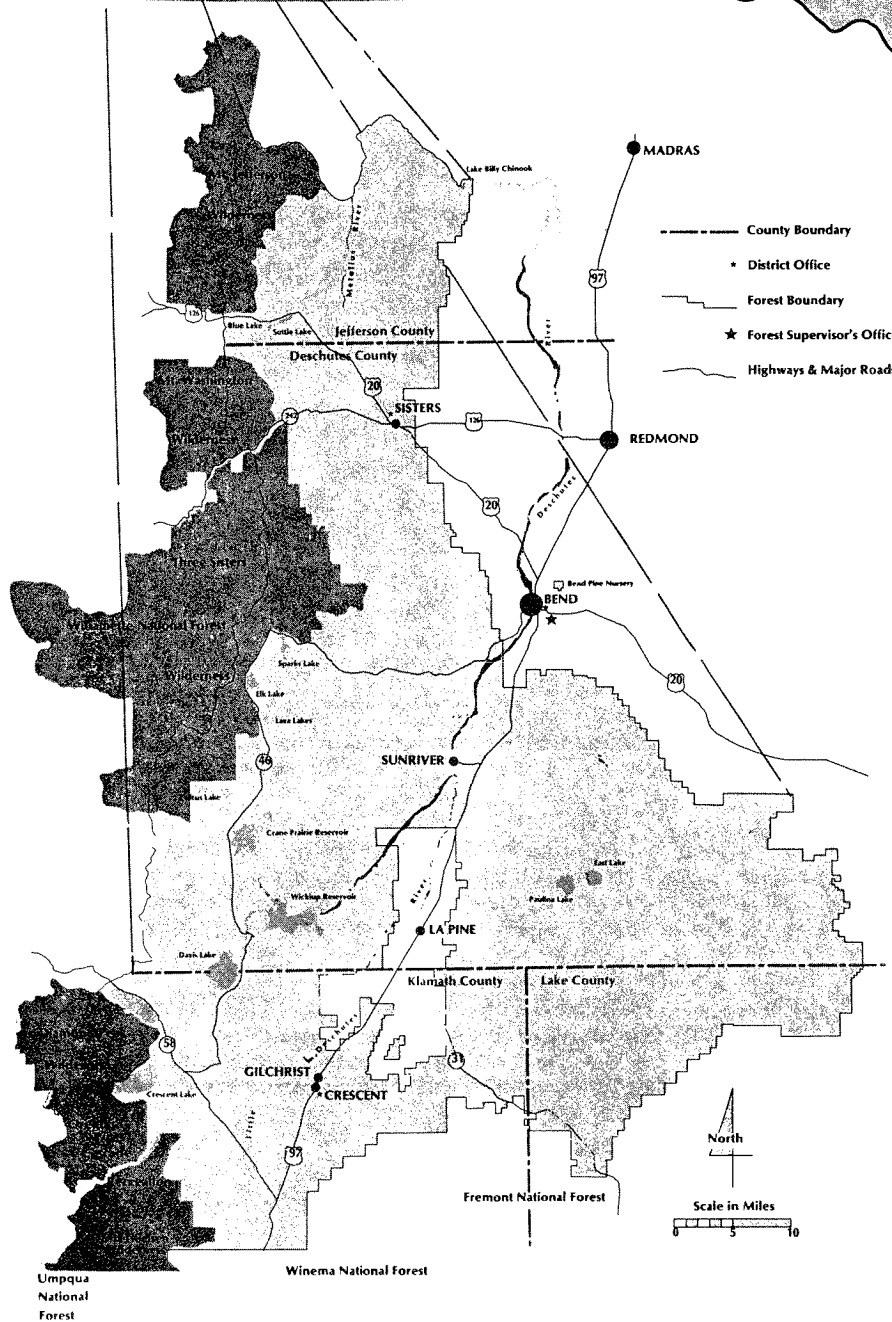
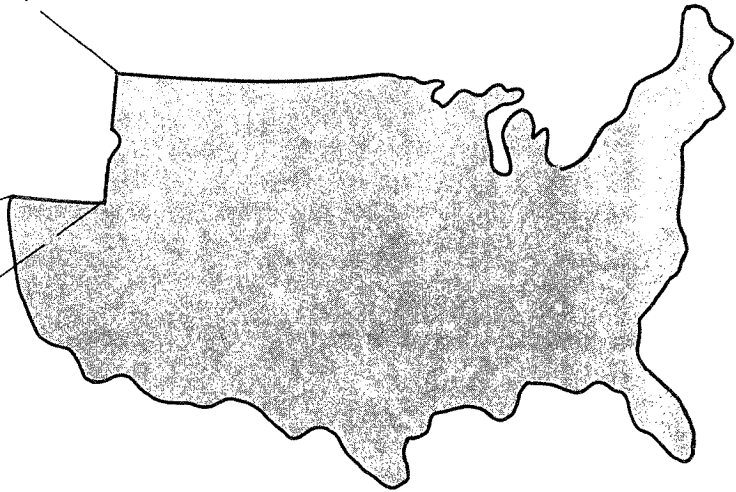
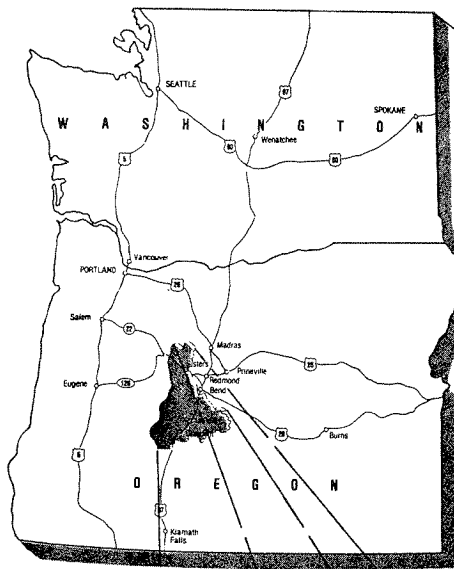
Chapter 1

Purpose and Need for Action



Deschutes National Forest

Location Map



Chapter 1

Purpose and Need for Action

Introduction

This chapter describes the purpose for the preparation of this document, the nature of the decisions to be made as a result of this document, and the significant issues which were identified concerning the management of the Upper Deschutes Wild and Scenic River and State Scenic Waterway.

Location

The Upper Deschutes River Wild and Scenic River and State Scenic Waterway is located entirely within Deschutes County, Oregon; and mostly within the boundaries of Deschutes National Forest.

This includes the 40.4-mile segment from Wickiup Dam to northern boundary of Sunriver at the southwest quarter of section 20, township 19 south, range 11 east ; the 11-mile segment from the northern boundary of Sunriver at the southwest quarter of section 20, township 19 south, range 11 east, to Lava Island; and the 3-mile segment from Lava Island to the Bend Urban Growth Boundary at the southwest corner of section 13, township 18 south, range 11 east; and the approximately 1-mile segment from the Bend Urban Growth Boundary to the COID diversion at the southwest corner of section 7, township 18 south, range 11 east of the Willamette Meridian.

Background of Upper Deschutes River Designation

Federal

In the mid-1980s, a proposal to develop a hydroelectric project on the Deschutes River near Benham Falls provoked strong response by a large number of people in central Oregon. They formed a coalition to protect the river's resource values. Advocacy by this group and others led to inclusion of the Upper Deschutes in the Omnibus Oregon Wild and Scenic Rivers Act of 1988 (Public Law 100-558).

This Act amended the Wild and Scenic Rivers Act of 1968 by adding 40 Oregon rivers, including the Deschutes River between Wickiup Dam and the Bend Urban Growth Boundary (the North Boundary of Deschutes National Forest), to the Federal Wild and Scenic River System. This portion of the river is referred to as the Upper Deschutes (Figure 1).

The 1988 Amendment divided the Upper Deschutes into three sections classified as either recreational or scenic. The 40.4-mile section from Wickiup Dam to the northern boundary of Sunriver and the three mile section from Lava Island to the Bend Urban Growth

Boundary were classified as a Recreational River. The Wild and Scenic River Act defines a Recreational river area as, "Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past." The upper section is primarily smooth water interrupted by one major rapid and one smaller rapid. Shorelines range from primitive to highly developed. Some reaches are bounded primarily by private land. There are extensive riparian habitat and wetlands in this segment. The lower section is characterized by extensive rapids. The east side of the river is privately owned with residences lining the rimrock above the river and a few adjacent to the river below the rimrock. The west side is primarily Forest Service land.

The relatively undeveloped but easily accessible 11 mile river section from the north boundary of Sunriver to Lava Island Camp was classified as a Scenic River. The Wild and Scenic River Act defines Scenic River areas as "Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads." Spectacular falls and rapids created by the intrusion of lava flows into the river channel, extensive riparian habitat, and varied wildlife populations delight the visitor in this segment of the river.

State

In 1987 the State of Oregon passed legislation designating most of the Upper Deschutes River that was subsequently included in the Federal Wild and Scenic River System as a State Scenic Waterway. The sections included are from the Wickiup Dam stream gauge to General Patch Bridge; and Harper Bridge to the north boundary of the Deschutes National Forest.

In 1988 a statewide ballot measure was passed to include the section from the north boundary of the Deschutes National Forest to the Central Oregon Irrigation District diversion structure as part of the State Scenic Waterway Program. This reach of the river is not within the Federally Designated Wild and Scenic River.

The sections of the Upper Deschutes designated a State Scenic Waterway have been classified to establish management objectives for portions of the river with different characteristics. The river between Wickiup Dam and the east boundary of Haner Park, the river where bounded by private land in the Pringle Falls area, the river between river mile 206.9 and General Patch Bridge, and the river from the north boundary of Deschutes National Forest to the Central Oregon Irrigation diversion are classified as Community River Areas in recognition of the private development adjacent to these portions of the river.

The section of the river between Harper Bridge and the north boundary of Deschutes National Forests is designated a Recreational River Area in recognition of the easy access to this area.

The section of the river from Wickiup Dam stream gauge downstream to General Patch Bridge is designated Scenic, except for those areas previously described as Community River Areas. This classification recognizes the undeveloped nature of the land bordering the river.

Except for the section of the river from the north boundary of Deschutes National Forest to the Central Oregon Irrigation diversion, all sections of the Upper Deschutes Scenic Waterway are administered according to guidelines provided by the Upper Deschutes Scenic Waterway Land Management Plan. The excepted section is managed on an interim basis.



Summary of the Outstandingly Remarkable Values and Special Attributes

The Federal Wild and Scenic River and State Scenic Waterway Acts establishes an overriding goal to protect and enhance the Outstandingly Remarkable Values for which the river was designated. Because Outstandingly Remarkable Values and Special Attributes refer to the same values for which the river has received national and state recognition, they are considered synonymous in this document. Table 1-1 shows the Outstandingly Remarkable Values by segment. A full discussion of the river values is included in Appendix C of the Management Plan.

Geologic Value

The geologic resource has been determined to be an Outstandingly Remarkable Value. It consists of two major features: the lava flows which have pushed the river west of earlier channels and created the stair step of falls and rapids, and the landforms created by the interaction of depositional and erosive actions. The river channel shape, size and rate of change are not an outstandingly remarkable value within themselves, primarily because the dynamics are so affected by human controlled flows.

Hydrologic Value

The hydrologic resource is a significant element of several Outstandingly Remarkable Values associated with the Upper Deschutes River. All river values are enhanced by an abundant, stable flow of clear, clean water.

Fishery Value

The brown trout fishery in Segments 2 and 3 is an Outstandingly Remarkable Value. The determination of value of the native redband rainbow trout population in Segment 4 has been deferred until a genetic study has been completed. Until that time the population is to be treated as an Outstandingly Remarkable Value.

Vegetative Value

Aquatic, riparian, and upland vegetation have a significant effect on all other river values. The vegetative resource is an Outstandingly Remarkable Value in Segments 3 and 4 because of *Artemisia ludoviciana* ssp. *estesii* (Estes wormwood), a Federal Category 2 Candidate for protection under the Endangered Species Act.

Wildlife Value

Wildlife populations in Segments 2 and 4 were determined to be Outstandingly Remarkable Values because of the populations of nesting bald eagles and ospreys in Segment 2 and the diversity of the bird population in Segment 4. Despite extensive private development in Segment 3, the wildlife habitat was considered to be significant because it provides important nesting habitat for birds and travel corridors for migrating game animals such as deer and elk.

Table 1-1**Outstandingly Remarkable Values by Segment**

| River Value | Segment 2 | Segment 3 | Segment 4 |
|--------------------|--------------------------|--------------------------|--------------------------|
| Geologic | Outstandingly Remarkable | Outstandingly Remarkable | Outstandingly Remarkable |
| Hydrologic | Significant | Significant | Significant |
| Fishery | Outstandingly Remarkable | Outstandingly Remarkable | Outstandingly Remarkable |
| Vegetation | Significant | Outstandingly Remarkable | Outstandingly Remarkable |
| Wildlife | Outstandingly Remarkable | Significant | Outstandingly Remarkable |
| Cultural | Outstandingly Remarkable | Outstandingly Remarkable | Outstandingly Remarkable |
| Scenic | Outstandingly Remarkable | Significant | Outstandingly Remarkable |
| Recreation | Outstandingly Remarkable | Outstandingly Remarkable | Outstandingly Remarkable |

Cultural Values

The Upper Deschutes River Corridor contains more than 100 known prehistoric sites which are eligible for inclusion in the National Register of Historic Places, making the prehistoric resources an Outstandingly Remarkable Value. Until further research on historic and traditional uses of the corridor is complete, they will also be treated as Outstandingly Remarkable Values.

Scenic Value

The mix of geologic, hydrologic, vegetative, and wildlife resources found along portions of Segments 2 and 4 of the Upper Deschutes make scenery an Outstandingly Remarkable Value. Although the level and proximity of private development intrudes on the scenic quality of Segment 3, the scenic value is still a significant element of the recreational value.

Recreational Value

Recreation is an Outstandingly Remarkable Value on the Upper Deschutes River because of the range of activities, the variety of interpretive opportunities, and the attraction of the river for vacationers from outside of the region.

Purpose and Need of Proposed Action

The purpose of the proposed action is to implement the direction of the Wild and Scenic River Act of 1968 as amended by the Omnibus Oregon Wild and Scenic Rivers Act of 1988 for the Upper Deschutes River. The Act requires the Forest Service to develop a comprehensive management plan for the Upper Deschutes River which will protect and enhance the Outstandingly Remarkable Values. The management plan establishes programmatic goals for desired resource conditions and standards and guidelines to provide direction for future management activities.

Proposed Action

In cooperation with the State of Oregon and other authorities, the Deschutes National Forest as the representative of the Secretary of Agriculture proposes a programmatic management plan for the Upper Deschutes River between Wickiup Dam and the COID diversion structure. This plan will protect and enhance the Outstandingly Remarkable Values and Special Attributes recognized by federal and state legislation.

The management plan does not provide site-specific analysis of the environmental effects of implementing specific actions. However, the cumulative impacts of the long-term goals and probable actions may have significant effects on the quality of the human environment. Therefore, in accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA) it is accompanied by an Environmental Impact Statement (EIS).

River Authorities

In addition to the Forest Service, a number of other governmental or quasi-governmental agencies have jurisdiction or an interest in the river corridor. Several have plans and programs which may be affected by the selection of a final management alternative. The following is a brief summary of the authorities who have jurisdiction over some aspects of river management.

US Government

The Department of Agriculture, through the Forest Service (USFS), manages all National Forest lands. The Forest Service is the federal agency charged with administering the Upper Deschutes Wild and Scenic River.

The Department of Interior, through the Bureau of Land Management (BLM), manages timber resources on their lands and lands leased to the State of Oregon in the LaPine State Recreation Area. The BLM manages locatable mineral claims on federal lands.

The Department of Interior, through the Bureau of Reclamation (BOR), manages the safety and maintenance of Wickiup Dam and coordinates water conservation practices with the state and irrigation districts.

The Department of Interior, through the Bureau of Indian Affairs, manages the trust responsibility between the US government and Sovereign Indian Tribes.

The Department of Defense, through the Army Corp of Engineers, issues and administers permits for fill and removal within the federally designated river corridor.

Tribal Governments

Portions of the Upper Deschutes Wild and Scenic River corridor are located within lands ceded to the U.S. Government as a result of an 1855 Treaty with the Confederated Tribes of the Warm Springs Reservation of Oregon. This includes lands along the river from the Bend Urban Growth Boundary to the 44th parallel. In addition, there are tribal interests in usual and accustomed places, as defined by the Treaty of 1855, on lands upriver from the 44th parallel. The Confederated Tribes of the Warm Springs Reservation hold an unquantified consumptive water right to waters of the Upper Deschutes River, the quantity of which is being negotiated at present with the State of Oregon and the federal government.

The Klamath Tribes retain off-reservation interests in portions of the Upper Deschutes corridor as well. This includes from the 44th parallel upstream to Wickiup Dam.

State of Oregon

The Water Resources Department allocates and manages water rights and instream flows.

The Department of Fish and Wildlife and the State Police manage fish and wildlife populations and enforce hunting and fishing regulations, respectively.

The Division of State Lands manages fill and removal authorizations and protection of wetlands.

The Parks and Recreation Department manages the State Scenic Waterways program.

The Department of Forestry administers the State Forest Practices Act for timber harvest on private lands within the corridor, and assists landowners in managing timber resources.

The Department of Environmental Quality manages water quality issues for point and nonpoint sources of pollution.

The Marine Board regulates motorized use on the river.

Deschutes County

The Deschutes County Commissioners, through the Planning and Development Department, manage land uses along the Upper Deschutes River outside of the city limits of Bend.

City of Bend

The City of Bend Commissioners through the Planning and Development Department manage land uses within the City limits.

Bend Urban Planning Commission reviews major land use applications within the Bend Urban Growth Area.

Irrigation Districts

Central Oregon irrigation districts hold water rights to natural and stored flows of the Upper Deschutes River and maintain diversion structures.

Combining Plans

The bed, banks, and waters of the Upper Deschutes River fall under the authority and/or jurisdiction of a variety of governmental bodies. The Federal Wild and Scenic Rivers Act of 1968 as amended includes specific direction for the administering agencies to develop cooperative planning and administrative agreements. (SEC. 3(d)1; SEC. 6(c); SEC. 10(e) SEC. 11(b); SEC. 12(c); SEC. 105 for the 1989 amendment). In addition, because of the intermingling of jurisdictions and authorities, no one agency has sufficient authority to independently implement a comprehensive management strategy for the Upper Deschutes Basin. Further, actions which may result from such a comprehensive management plan could affect downstream resources and authorities, and must be coordinated with those authorities to be successfully implemented.

Recognizing this need for interagency cooperation, the following authorities have participated in a cooperative planning effort with the intent of having one management plan all authorities can adopt: US Forest Service, Bureau of Land Management, Bureau of Indian Affairs, and Bureau of Reclamation, Confederated Tribes of the Warm Springs Reservation of Oregon, State of Oregon, Deschutes County, City of Bend, North Unit Irrigation District, and Central Oregon Irrigation District.

The Upper Deschutes Wild and Scenic River Management Plan for the Upper Deschutes will incorporate the final proposed rules for all sections of the Upper Deschutes designated State Scenic Waterway, including the reach from the north boundary of the Forest to the COID diversion structure which is outside of the federally designated Wild and Scenic River. Both State Scenic Waterway classifications and Wild and Scenic River classifications are displayed in Figure 2. Chapter 5 describes proposed state classifications and rules.

It will also serve as the guiding management direction for all other agencies with jurisdiction within the river corridor.

Decisions and Recommendations

Forest Service Decisions

As the federal agency designated to administer the Upper Deschutes Wild and Scenic River, the Forest Service is required to set resource management goals necessary to protect and enhance outstandingly remarkable river values and to manage federal land adjacent to the river. As established in the preceding section, however, the Forest Service does not possess exclusive jurisdiction over the Upper Deschutes River.

The Forest Supervisor has the authority to establish a boundary for the Upper Deschutes Scenic and Recreation River and to select a preferred and final alternative for managing those Upper Deschutes River resources and activities which are under the jurisdiction of the Forest Service. Those decisions which are subject to Forest Service authority will be made through the Record of Decision accompanying the Final Environmental Impact Statement.

Forest Service Recommendations

In many cases, one or more elements of the management plan have the potential to affect plans and programs under the jurisdiction of authorities other than the Forest Service. Changes to these existing plans, policies, or programs are not within Forest Service jurisdiction and must be undertaken by proper authority.

The final selected alternative will be an alternative which all authorities support and will take the appropriate steps to implement. All decisions which are outside of the Forest Service's authority to implement will be documented as recommendations to other agencies in the Record of Decision.

Other Decisions

Each of the cooperators in this effort will be going through different processes in order to adopt the final management plan. For most of the public entities, that means going through a process to adopt specific ordinances, administrative rules, or regulations. Often, this will include an approval process by specific boards or commissions, and include public hearings. Specific actions which must be taken to adopt the management plan are dependent upon the final decisions and will be discussed in detail in the Final Environmental Impact Statement.

Overview of Planning Process

After the passage of the Omnibus Oregon Wild and Scenic Rivers Act of 1988, Deschutes National Forest staff began to assemble information concerning the Upper Deschutes River. In order to begin to analyze available information and determine what additional information was needed an interdisciplinary planning team (IDT) was assembled. The core of the team consisted of Forest Service, Deschutes County, and Oregon State Parks and Recreation Department personnel.

In July of 1993, the agencies entered into an intergovernmental agreement to make the Upper Deschutes Wild and Scenic River Management Plan a joint management plan for all jurisdictions on the river. This agreement resulted in a technical and policy level review of the issues and alternatives being considered in this plan by the following authorities: US Forest Service, Bureau of Land Management, Bureau of Indian Affairs, and Bureau of Reclamation, Confederated Tribes of the Warm Springs Reservation of Oregon, State of Oregon, Deschutes County, City of Bend, North Unit Irrigation District and Central Oregon Irrigation District.

The development of the joint management plan is a multistage planning process ultimately leading to the publication of a Final Environmental Impact Statement and Comprehensive Management Plan for the Upper Deschutes Wild and Scenic River. The progress of this process is marked by the production of specific documents.

Preliminary Planning Documents

1. Resource Assessment
Revised Resource Assessment
2. Issue Assessment
3. An Evaluation of the Scenic Resources and Landscape Character
4. Instream Flow Assessment

Environmental Impact Statement Documents

1. Publication of Proposed Action in Federal Register
2. Draft EIS/Management Plan
3. Final EIS/Management Plan and Record of Decision (Summer 1996)

Preliminary Planning Documents

Resource Assessment (Appendix C of the Management Plan)

A draft resource assessment evaluating the significance of all river values was completed by the Interdisciplinary team in June 1990. It was distributed to interested members of the public and a "final" version, incorporating public comment, was completed in July of 1990. It was revised and updated in 1993 following additional data collection and public comment.¹

Issue Assessment

An issue is a question or concern about how the proposed action will affect river or other values. These questions or concerns are determined through a process called scoping. Scoping is the process of determining what issues must be addressed to develop and evaluate a reasonable range of alternatives which will meet the purpose and need of the proposed action. These issues are generated in three ways. First, the Wild and Scenic Rivers Act specifies concerns ranging from protecting and enhancing river values to protecting private property rights. Second, the Interdisciplinary Team may develop concerns or questions as they collect and analyze data. Third, interest groups or individuals may have questions and concerns about the consequences of possible actions.

¹ The headwaters of the Deschutes between Crane Prairie Reservoir and Little Lava Lake is eligible for Wild and Scenic River Status but has not yet been designated by Congress. This portion of the river was referred to as Segment 1 in the first work of the interdisciplinary team. A plan and analysis for this segment is not, however, included in this document.

Public meetings were held to identify concerns of neighbors and river users. The results of these meetings, meetings with the Upper Deschutes River Citizen's Task Force and various federal, state, and local agencies were summarized in an Issue Assessment, which was released in June 1991. These preliminary issues formed the basis for issue descriptions at the end of Chapter 1, and alternatives developed in Chapter 2 of this document.

An Evaluation of the Scenic Resources and Landscape Character

A detailed evaluation and report on the scenic values along the river was completed in 1990. The report served as the basis for the scenic issue description and helped to identify the lands visible from the river which were included within the proposed boundary.

Instream Flow Assessment

An instream flow assessment was completed in 1994 which identified resource conditions associated with specific instream flows. This assessment and other studies listed in Appendix H were used to develop Flow Options considered in this analysis.

Environmental Impact Statement Documents

Publication of Proposed Action in Federal Register

An initial proposed action was developed in response to the issues identified in the planning process. A description of that proposed action was published in the Federal Register January 8, 1992. The proposed action detailed in the Federal Register was refined during the analysis process and became Alternative 3 in this document (see Chapter 2).

Draft Environmental Impact Statement and Management Plan (DEIS)

In October 1995 a DEIS was published. It compared different management alternatives and flow options for the Upper Deschutes Wild and Scenic River and State Scenic Waterway and identified a preferred alternative and flow option. After publication of the DEIS, interested parties had until the end of January 1996 to comment. Public workshops held in November to provide opportunities for public comment.

Final Environmental Impact Statement (FEIS), Record of Decision (ROD) and Management Plan

This document is the FEIS. It reflects both public and agency responses to the DEIS. Comparisons in this document are based on any revisions to the DEIS. The Preferred Alternative from the DEIS has been modified and is now Alternative 6. Flow Option 5 was identified as the Preferred Option in the DEIS and remains essentially unchanged.

Accompanying this FEIS is a Record of Decision (ROD), the Forest Supervisor's decisions and recommendations for managing the Upper Deschutes River. The Upper Deschutes River Comprehensive Management Plan is a separate document which incorporates Alternative 6, the Adaptive Flow Management Strategy, and implementation and monitoring principles into an overall strategy for coordinated management of the river.

Consultation with Others

A concerted effort was made to involve everyone interested in the Upper Deschutes River in this extended planning process. As previously described, a cooperative agreement was formed with tribal, state, and local governments having jurisdiction on the river. In addition, others were contacted as described below.

Tribal Governments

The Klamath Tribes and the Burns Paiute Tribes have interests associated with the Upper Deschutes River. Tribal Councils for both groups were offered the opportunity to have their representatives participate in the coordinated planning effort.

Upper Deschutes River Citizen's Task Force

This community group was assembled during the early planning phases to represent a wide variety of local issues relating to Deschutes River management. Participants were chosen on the basis of their ability and willingness to participate and represent the views, values, and opinions of specific user groups. Participants are listed in Appendix C.

The interdisciplinary team and its consultants met with the Task Force during the development of the issues and the alternatives. There was frequent consultation during the development of alternatives prior to the intergovernmental technical review during which a number of specific changes recommended by individuals on the Task Force were incorporated.

Deschutes Basin Resource Committee

This is an independent group sponsored by Deschutes County which develops recommendations about water policies in the Deschutes River Basin for the Deschutes County Commissioners. Some of its members served with the Task Force or as consultants to the river planning team prior to the intergovernmental technical review. The Committee was briefed on the planning process and on the content of the plan as it progressed. Members are listed in Appendix D.

General Public: Public involvement occurred during open meetings and communication with individuals and representatives of many organizations and associations.

These public meetings were held to solicit comment on the management issues and other aspects of the plan:

| | |
|-------------------|------------------|
| November 7, 1989 | Bend, Oregon |
| November 9, 1989 | Sisters, Oregon |
| November 18, 1989 | Crescent, Oregon |
| August 13, 1991 | Bend, Oregon |
| August 16, 1991 | Bend, Oregon |

A publication called River News provided the general public with periodic updates of the planning process. It was issued on these dates:

October 1989

Spring 1990

June 1990

August 1991

Periodic updates on the river planning process were provided through letters to interested individuals maintained on our Deschutes River mailing list, through the quarterly publication of the Deschutes National Forest's Schedule of Proposed Action, and publication of "Current Events" newsletter in July 1995.

Identification of Issues

This section describes the significant environmental issues which were used to develop the proposed action and alternatives in Chapter 2. A significant issue is a question or concern which must be addressed by a resource goal or standard in the management alternatives. It is the expression of an environmental value, interest, opportunity, problem, or potential problem that will be addressed in this document.

| | |
|----------|---------------------------------|
| Issue 1 | Water Flows |
| Issue 2 | Water Quality |
| Issue 3 | Aquatic and Riparian Conditions |
| Issue 4 | Fishery |
| Issue 5 | Vegetation |
| Issue 6 | Wildlife |
| Issue 7 | Scenic Resources |
| Issue 8 | Cultural Resources |
| Issue 9 | Recreation |
| Issue 10 | Private Land |
| Issue 11 | Boundary |

The issue descriptions are divided into three parts. First is a brief description of the decision to be made in this management plan concerning that issue. Second is a brief summary of the issue, and third is a more detailed description of the issue.

Issue 1

How should water flows be managed to protect and enhance outstandingly remarkable river values and provide for out of stream uses consistent with Wild and Scenic River Act and applicable water laws?

Issue Summary

Regulation of the river by upstream dams has changed the flow pattern and affected other conditions in the Upper Deschutes River. These changes in flow impact fish and fish habitat, wildlife and wildlife habitat, recreation, and riparian vegetation as well as scenic and heritage values. Existing flow fluctuations also accelerate changes in streambank morphology in some reaches by increasing the number of meander cutoffs and increasing erosion rates on the outside of bends and increasing deposition on the inside of bends. Another effect of regulation is that dams prevent the downstream recruitment of gravels needed for successful spawning of brown and rainbow trout.

Present flow regimes do support a large agricultural production network, some recreational activities, and other water related social and economic activities. Diverted water has improved the quality of life and increased property values for those that receive it. Water diverted from the river also serves domestic, small municipal and small industrial water needs. Recreation opportunities and aquatic and wildlife habitats are also provided off stream by the storage and distribution system.

Issue Description

Concern about the flow regime and associated effects of regulation are based on the fact that the flow of the Upper Deschutes River has been highly regulated for agricultural use for over 65 years. Both natural and stored river flows have been allocated to irrigation districts by the State of Oregon (see Chapter 3). Most of the river flow above Wickiup Dam is stored from October through March, and released between April and October. Overall a concern has been expressed by both the public and resource specialists that the Outstandingly Remarkable Values are being degraded by the effects of the existing flow regime and will continue to degrade if the existing flow regime is maintained.

Under natural conditions the average river flow was 750 cfs (measured near Wickiup Dam) and it rarely ranged more than 300 cfs from that mean value. The river flow would be out of this range only during a short spring runoff season or in response to an extremely large runoff event. Regulated flows provides for the same average but the range now spans 20-1700 cfs. The following discussion provides a brief discussion of the effects of the existing flow regime on river values. More detailed discussion can be found in Chapter 3 and the Instream Flow Assessment.

Geologic Value - Flow fluctuations, increased velocity, and high flows for extended periods of time associated with the existing flow regime increase the rate at which the stream channel is formed and changes. The stream channel is adjusting to the new flow regime, increasing its capacity (dimensions) and altering its meander sequence (sinuosity), along with adjusting in channel material by the movement of large woody material and gravels to the river

margins. Streambanks are steepened, undercut, and removed more rapidly, especially along the outer curves of the river. This has increased the number of meander cutoffs (new river channels cut across bends in the river) on the river.

Hydrologic Value - Flow regimes affect water quality as well as quantity. The extreme low flows above Fall River during storage months (late October through mid-April) allows for a "piping" effect on the streambanks. The water stored in the floodplain/streambanks during the high flows migrates to the river channel during the low flow period. This return flow from streambank water storage loosens these fine grained soils (a type of piping or washing action). The continual supply of water and the prolonged exposure during below-freezing temperatures causes "frost heave", a condition that churns the friable ash soils that make up the channel.

Releases at the beginning of the spring irrigation season often increase flow rates in the Upper Deschutes above Fall River from 20 to 1000 cfs in less than 10 days. This erodes the churned up loose soil in the bed and banks of the stream. The result is approximately a greater than 300 percent increase in turbidity (decrease in water clarity), relative to background levels measured at Wickiup Dam outlet, for approximately 30 days. Peak turbidity far exceeds this increase but usually is sustained for only a day or so. After the first month of the irrigation season turbidity levels average about 100 percent greater than background levels until about August 1 when algae blooms in Wickiup begin to raise the turbidity levels of water released into the river. The algae blooms are associated with increased productivity (water temperatures and nutrients) within the reservoirs.

Fishery Value - Flow fluctuations affect fish habitat in both the summer and winter. The low winter flow greatly diminishes the size of wetted area and render fish cover near the banks unusable. This reduces available spawning habitat; increases competition for spawning areas; decreases winter temperatures; and concentrates fish in the few adequate pools, making the fish more vulnerable to predators and environmental accidents. Low water levels also decrease habitat for aquatic insects and invertebrates. As a result less food is available for fish.

High flows in the summer exceed preferred depths and velocities for early life-stages of fish and survival rates decline. The velocity and duration of the high flows push spawning gravel and large woody material onto stream margins where it is dewatered when flows are decreased in the winter.

Turbidity during the initial spring flush makes it difficult for fish to feed. Sediment derived from the adjusting stream channel is continually supplying fines which fills interspaces in spawning bed gravel, cobbles, and other structure and reduces the value of these habitats.

Vegetation Value - The amount and condition of aquatic and riparian vegetation are both affected by river flows. The duration and timing of flows and the amount of fluctuation can affect vegetation. Low flows during the winter perpetuate unstable streambank conditions. The timing and velocity of high flows during the spring and summer reduce the potential for new riparian growth on banks in the fluctuation zone. The long duration of high flows overrides the ability of existing vegetation to anchor banks.

Wildlife Value - Because of the effects of the existing flow regime on hydrological, fishery, and vegetation resources the quantity and quality of habitat for wildlife reproduction and foraging is reduced. Amphibians, reptiles, birds, mammals, and insects are directly or indirectly affected. The most dramatic effect is the flooding of occupied nests and dens when

the water level increases at the beginning of the irrigation season. Some burrowing mammals, such as beaver, avoid areas where flow fluctuations are the greatest. (Appendix F in the Management Plan lists species living along the river).

Cultural Value - The number and condition of prehistoric and historic sites and the traditional uses of an area can be affected by erosion. Streamside sites, important to all cultures, may be changed or destroyed. Flow factors which affect fishery, vegetative, wildlife, recreational or scenic values can also indirectly affect other uses within the river corridor.

Scenic Value - Low water during the storage season exposes the river channel and decreases the scenic quality. The river has an appearance of an estuary river at low tide, with significant exposure of stream bed and banks to the elements. Erosion of banks and inundation of the fluctuation zone during the growing season prevent vegetation from becoming established. This band of bare soil is a dominant visual characteristic in the upper reaches of the river during the storage season.

The bankfull condition during the irrigation season enhances the scenic quality by covering the bare banks while the increase in turbidity during much of this period lowers the scenic quality. Lower flows produce more pronounced visual contrasts and interactions with the geological formations in the various waterfall areas.

Recreation Value - Fluctuations in flow affect both the quality and duration of recreational activities associated with the river. Above the confluence with Fall River, low flows affect navigability during the storage months. Low flows reduce the excitement of whitewater rafting in the lower reaches of the river while the highest flows can make whitewater rafting unsafe. On the whole the existing regulation of the river enhances commercial rafting opportunities by providing flows ranging from 1500 to about 2200 cfs throughout the high use recreation season (Memorial Day to Labor Day weekends, approximately 100 days). Optimum flow conditions for rafting range from 1700 to 2100 cfs, measured at Benham Falls gauge. In comparison, unregulated flows would exceed 1500 cfs less than 30 days of the recreation season. Flow effects on the scenic and wildlife values also affect the quality of recreational values by providing a context or setting for recreational activities.

Off River Value - Present flow regime benefits economic, social, and wildlife conditions off river. About 115,600 acres have the right to divert up to 2833 cfs from the Upper Deschutes for irrigation. Since the average natural flow of the river at Bend is about 1400 cfs, these lands must store water during the winter to augment the natural flow during the summer. Because the storage sites are located above several important tributaries (Fall River, Spring River, and Little Deschutes), more than 90% of the storable water above these tributaries must be stored to significantly fulfill the storage rights.

Natural river flows and stored water in Wickiup and Crane Prairie Reservoirs are used to irrigate lands in Crook, Jefferson, and Deschutes Counties. Irrigation is a major factor in the agricultural economy, directly enhancing the quality of life in what would otherwise be an arid and far less productive countryside. The production of agricultural goods plus the economic benefits in 1991 was about \$60 million in the tri-county area. Property values and wildlife habitat are significantly enhanced in the area serviced by the water.

The water stored in Wickiup and Crane Prairie Reservoirs also provides a high quality fishery, varied recreational experiences, important wildlife wetland habitats, and important foraging areas for bald eagles and osprey.

Existing regulation affects the middle Deschutes between Bend and Lake Billy Chinook. Existing regulation provides about 50% of the natural flow during the storage season and about less than 5 percent of the natural flow during the irrigation season. The low summer flows restrict recreation activities, increase water temperatures to potentially lethal levels for trout, and increase riparian vegetation in this river stretch.

Issue 2

What management strategies should be implemented to improve water quality in order to protect or enhance the Outstanding Remarkable Values consistent with the Wild and Scenic River Act and applicable water quality standards.

Issue Summary

Turbidity level, a measure of water clarity, is increased as much as 30 fold a few miles below Wickiup dam when irrigation water is released in early spring. As the summer progresses, the turbidity decreases, but remains elevated over twice the background level of 1 Nephelometric Turbidity Unit (NTU) at the outlet of Wickiup Reservoir (Forest Service turbidity monitoring, 1991, 1992, 1993 data).

Turbidity also results when "algae bloom" develop in the reservoirs upstream from the Upper Deschutes Wild and Scenic River and are carried into the river through overflow. Algae blooms increase in the river also, becoming the dominant source of turbidity in the river by mid-summer and into the fall.

The suspended particulate matter and algae causing the turbidity during these periods also affect the aesthetic quality of the river. Secchi disk transparency, or measurement of visual depth, is reduced by approximately 34 percent average and ranges from 9 percent to 65 percent reduction of transparent stream depth during the high seasonal release period (Forest Service secchi disk monitoring 1991 data).

Studies indicate the wide seasonal fluctuations in flow from Wickiup Reservoir result in the impairment of recognized beneficial uses related to salmonid fish rearing, salmonid fish spawning, and resident fish and aquatic life beneficial uses (USDA Forest Service 1994b). These beneficial uses are included in the water quality standards for the Deschutes Basin. During the storage season the reduced stream flows limit the available feeding, resting, and hiding habitat for trout. Macroinvertebrate production and brown trout spawning habitat are also limited by reduced flows. The elevated flows during the irrigation season result in flow conditions and velocities which potentially affect spawning habitat and survival of juvenile fish.

The proximity of residential and commercial development near the river have the potential to increase the loading of pollutants such as phosphates, nitrates, biochemical oxygen demand, pesticides, sediments and fecal coliform bacteria. Functioning and/or failing septic systems located near the river have the potential of contributing many of these pollutants directly or indirectly through groundwater discharge into the river. Extensive future development along the river corridor of the Upper Deschutes and Little Deschutes Rivers will potentially impact these streams by contributing nutrients and other contaminants if septic systems are used for residential waste treatment. Forestry and agricultural practices,

recreation, and other human activities also have the potential to degrade water quality, It is not known at the present how these activities have influenced the quality of water in the Deschutes River.

Issue Description

As described in the review of the effects of flow on hydrological values, turbidity levels on the Upper Deschutes are elevated above the numerical state water quality standards for a period of about 2½ months (April-June) for the years surveyed. The state water quality standards define turbidity levels greater than 10 percent above background levels as a violation of the numeric standard for turbidity. As a result, the State of Oregon is proposing to list the Upper Deschutes River as water quality impaired for the numeric turbidity standard.

As described in Issue 1, the elevated turbidity levels are produced when piping and frost action loosens exposed channel materials during the storage season and the increased irrigation flows wash the materials down stream during the spring and early summer months. In addition, the prolonged bankfull flows cause accelerated erosion, as the river adjusts its capacity and sinuosity to the new flow regime.

A second source of turbidity is found in the reservoirs upstream from the Upper Deschutes Wild and Scenic River. As a result of the sunlight that reaches the unshaded waters of the lakes and warming of the still water, productivity (the growth of micro-organisms) flourishes. The millions of organisms cloud the water in what is frequently called "algae blooms". In mid-summer these clouds of organisms get washed down the river and become the dominant sources of the turbidity in the river. The turbidity is raised approximately 1-2 NTUs during this late season flush of algae.

Generally there exists a relationship between the elevated turbidity levels and the visual depth of the river. As the turbidity levels in the water increase, the transparency of the water decreases because of the opaque density of the suspended particulate matter in the water column. Secchi disk readings, the transparency of water measured in feet, indicate the visual depth of the river is reduced by approximately 34 percent average depth with a range of visual depth reduction between 9 percent and 65 percent during the period of high seasonal release from Wickiup Dam.

These factors contribute to the impairment of the aesthetic quality of the Upper Deschutes Wild and Scenic River during the seasonal elevated release of water from Wickiup Dam. The aesthetic quality is a recognized beneficial use in Oregon's water quality standards for the Deschutes Basin and is proposed for listing as water quality impaired for this designated beneficial use.

Seasonal winter storage and release during the irrigation season from Wickiup Reservoir results in the alteration of the physical and biological properties of the Upper Deschutes Wild and Scenic River. The winter storage results in significant reduction in winter time flows in the Upper Deschutes. These reduced flow volumes limit the available habitat for adult brown trout feeding space, available spawning areas, and macroinvertebrate production. The elevated flows during the irrigation season create high flow conditions and velocities which are potentially detrimental to spawning habitat and survival of juvenile fish.

As described in the review of the effects of flow on fisheries values, flow fluctuations affect fish habitat in both the summer and winter. The low winter flow greatly diminishes the size of the wetted area and render fish cover near the banks unusable. This reduces the

available spawning habitat; reduces intergravel flow for spawning and egg incubation; increases competition for spawning areas; decreases winter temperatures; and concentrates fish in the few adequate pools, making the fish more vulnerable to predators and environmental accidents. Low water levels also decrease habitat for aquatic insects and invertebrates. As a result less food is available to the fish.

High flows during the irrigation season cause a separate set of issues. This flow exceeds preferred depths and velocities for the early life-stages of fish resulting in reduced survival rates. The velocity and duration of the high flows push spawning gravel and large woody material onto stream margins where it is dewatered during the storage season. Turbidity (exceeding 3 NTUs) during the initial spring flush makes it difficult for fish to feed. Sediment derived from the adjusting stream channel during the period the releases from Wickiup exceed 1000 cfs is continually supplying fines which fills the interspaces in spawning bed gravel, cobbles, and other structure and reduces the value of these habitats for aquatic organisms.

The habitat conditions as described above impair salmonid fish rearing, salmonid fish spawning, and resident fish and aquatic life which are recognized beneficial uses in Oregon's water standards for the Deschutes Basin. Therefore, the State of Oregon proposes to list the Upper Deschutes Wild and Scenic River for the impairment of these beneficial uses.

River temperature could influence the distribution of fish species. Brown trout are more tolerant to water temperatures exceeding 65 degrees F. Rainbow and bull trout are very intolerant of water temperatures exceeding 65 degrees F. Bull trout egg survival is non-existent at 46-50 degrees F and optimal at 35-39 degrees F. Monitoring data from the last few years has found the maximum temperature of the Deschutes River to reach near 65 degrees F., being within the tolerance level for brown trout.

Dissolved oxygen (DO) levels in the river are critical for fish survival and spawning. Oregon's water quality standards provide for a dissolved oxygen standard on the basis of percent saturation of oxygen in water. The dissolved oxygen criteria for the Deschutes Basin include no less than 90 percent saturation at the seasonal low, and no less than 95 percent saturation in spawning areas during spawning incubation, hatching, and fry stages of salmonid fishes. The criteria for evaluating this standard defines the spawning period as November through May.

The dissolved oxygen levels in the river near Harper Bridge do not meet water quality standards for spawning DO saturation and 20 percent of samples do not meet DO saturation standards at other times of the year. The cause of the dissolved oxygen condition is unknown. The Upper Deschutes Wild and Scenic River is proposed for listing by the State of Oregon as water quality impaired for the numeric dissolved oxygen standards and related beneficial uses including: salmonid fish rearing, salmonid fish spawning, and resident fish and aquatic life.²

Community growth activities such as residential and other development have the potential to impact water quality by increasing levels of phosphorus, nitrogen, sediment, pesticides and fecal coliform inputs to the river. Forestry and agricultural practices,

² In the Draft 1994/1996 List of Water Quality Limited Water Bodies, 303 (d) (1) List the Upper Deschutes was considered water quality limited for the following parameters: Dissolved Oxygen (Annual), Habitat and Flow Modification, Sediment, Temperature (Summer), Turbidity (Spring/Summer).

recreation, and other human activities may also degrade water quality. The river has a finite capacity to naturally assimilate pollutants, still maintain its resource value, and comply with the state's water quality standards.

Indicators of water quality suggest the river's assimilative capacity may be exceeded at certain times. The preliminary data collected by DEQ concerning dissolved oxygen may be symptomatic of oxygen-demanding pollutants exceeding the river's capacity to replenish dissolved oxygen. Additionally, 15 percent of the phosphorus samples exceed phosphorus guidance criterion during these same seasons. Nitrogen levels are expected to further increase with future residential development along the river where septic systems are located in close proximity to the river. The Oregon Department of Environmental Quality plans to expand its existing monitoring effort of the Upper Deschutes Basin to better quantify water quality conditions. Pesticides, nitrates, and hydrocarbons were not monitored in surface waters but have been found in wells in the LaPine area.

Issue 3

What aquatic and riparian conditions are needed or are appropriate to protect and enhance the fishery and other Outstanding Remarkable Values?

Issue Summary

Aquatic habitat is influenced by the quantity and quality of river flow; the amount of spawning, rearing, and adult habitat (pools, riffles and glides); overwintering habitat; instream structural components (large woody material, boulders, rocks, cobble), river temperatures and aquatic vegetation. All these components have been altered by human activities, resulting in fish habitat quantity and quality below the river's potential.

Riparian habitat is influenced by the stability of the streambanks, rates of erosion, range of annual water fluctuation, types of streambank armoring, and human encroachment in the floodplain.

Scenic quality, recreation, geologic resources, and wildlife habitat are all influenced by the aquatic and riparian habitat conditions.

Issue Description

Virtually all fish habitat improvements, except those having to do with flows, involve instream structural components. These structures, and the material from which they are created, also protect and enhance other river values -- geologic, hydrologic, vegetation, wildlife habitat, and scenery. Instream structure provides important aquatic and riparian habitat and modifies flow velocities, scouring and deposition patterns which influence the geologic resource. Scenic quality is affected by the color, texture and patterns created by the interaction with the water.

The Upper Deschutes River has limited amounts of large woody material, boulders, rocks, rubble, and gravel. The reasons for this condition are: the construction of Wickiup dam has cut off the recruitment of gravels from the upper river; the blanket of Mazama ash has created deep deposits, covering most cobbles and rubble left by the last glacial episode; and trees have been removed from the river to facilitate rafting of logs and recreational boating.

Instream structural components may enter the river as a result of natural processes or can be placed in the stream by human hand or machinery. Natural recruitment and establishment depends on available sources, size and location, and fortuitous placement that enables material to stay in place despite the force of river flows. Reestablishment of material in the main streamcourse is hampered by high flows, which tend to move large woody material and gravel to the edges of the stream where they are of little value during low flow periods. Large woody material along the streamcourse is expected to become more available because erosion is undermining the root systems of many trees adjacent to the river. Upstream dams and soil composition restrict natural recruitment of gravel, cobble and rubble.

Instream structure can protect streambanks, by reducing velocities near the structures, and improve habitat for aquatic vegetation and insects. Fish habitat enhancements and restoration creates better fish and macroinvertebrate cover, protection from high velocity areas, more feeding areas, increased fish spawning gravel, and increased food production.

Riparian habitat is influenced by the stability of the streambanks, and rates of erosion along the river. Accelerated erosion destabilizes the stream channel and removes streamside vegetation. The river has increased approximately 20 percent in width over the last 45 years, converting some riparian habitat into seasonal aquatic habitat. Human encroachment in the floodplain and the types of streambank armoring have modified riparian conditions; in most cases to the detriment of aquatic and riparian habitat. Examples of modified conditions are concrete retaining walls instead of natural streambanks; removal of willow and mowing of riparian grasses; removal of natural vegetation to increase the view of the river; cutting out logs in the river to enhance the ease of boat travel in the river; etc. The range of annual water fluctuation determine the extent of the drawdown zone of the stream. The river during the storage season appears as an intertidal segment of river with large mud flats and banks exposed for up to 5 months of the year. Then during the irrigation season, the released volume of water exceeds bankfull discharge for nearly 90 days, flooding much of the lower elevation floodplain. This drawdown zone is not conducive to the establishment of vegetation.

Issue 4

How should fish species be managed to protect and enhance the fishery and other Outstanding Remarkable Values?

Issue Summary

Brown and rainbow trout are recognized as Outstandingly Remarkable Values of the Upper Deschutes River. Brown trout are the dominate fish species upstream of Benham Falls where glide habitat prevails and rainbow trout dominate downstream of Benham Falls to Bend where faster water conditions exist. Bull trout, an indigenous species, has been eliminated by habitat changes and passage barriers.

Issue Description

The concerns raised are the management of different species in the river and the influence of hatchery fish on the native populations.

Bull trout, rainbow trout, sculpin, and mountain whitefish were the indigenous species in the river. Brown trout were introduced into the river in the early part of this century. The brown trout have become the prevalent species in the river upstream of Benham Falls to Wickiup Reservoir. Habitat changes are the primary reason for this shift in species composition. The loss of large woody material, sedimentation of the gravels, reduced macroinvertebrate production and drift, altered velocity, and turbulence of the river have created habitat conditions more favorable to brown trout than rainbow trout. Rainbow trout dominate in the river at and below Benham Falls where higher velocities, flows, and riffle areas exist throughout the year.

Bull trout have disappeared from this river for the following reasons:

- 1) Modification of habitat, primarily creation of passage barriers and inundation of spawning areas;
- 2) Water temperature increases caused by impoundments;
- 3) Decreases in winter habitat;
- 4) Increased angler pressure and historic harvest; and
- 5) Competition with brown trout.

Native rainbow (redband) trout have declined in the river because of the following reasons:

- 1) Modification of habitat, primarily the loss of the key spawning sites which Wickiup now inundates;
- 2) Decrease in winter habitat;
- 3) Intergression with hatchery rainbow trout;
- 4) Competition with brown trout;
- 5) Removal of large woody material;
- 6) Increased angler pressure;

Brown trout were introduced in the early part of the 1900's. The aggressiveness of the fish to displace competing species, their inherent trait to become a fish eater at an early age, tolerance for a variety of habitat conditions, and the difficulty in catching (angling) this species all provide a competitive edge over other species.

Naturally producing populations of fish can be impacted by stocking of hatchery fish. These fish can introduce disease, compete for food and space with wild populations, and weaken the gene pool of similar species. However, hatchery fish become readily available for harvest by anglers in the areas where they are placed.

Some hatchery stocks of rainbow trout are highly susceptible to *C.shasta*, a parasitic fish disease. This disease is prevalent in the Deschutes River, and it is believed that the hatchery fish last less than 30 days before succumbing to the disease. With the few that may survive, the potential exists for them to hybridize with and alter the genetic component of the native population and may pass on genes that are less resistant to *C.shasta*.

The presence of large fish in the river attracts both anglers and observers of wildlife. The excitement of catching of a large fish (over 2 lbs) is a thrill for any angler, and when a rare specimen of a species is caught, it further enhances the experience. Both large bull and brown trout are considered a speciality species, which increases the thrill of angling and actually landing a large fish.

Increased populations of any species create benefits for predator species, because it is easier for the predator to obtain a meal. Elevated populations increase the opportunities for wildlife harvest and observation.

Issue 5

How should vegetation be managed to protect and enhance the Outstandingly Remarkable Values and ensure public safety?

Issue Summary

The forests along the Upper Deschutes River contain upland and riparian species dominated by ponderosa and lodgepole pine, interspersed with marshes, meadows and grasslands. This vegetative diversity is an essential component of the Outstandingly Remarkable wildlife, scenic and recreation values. *Artemisia ludoviciana estesi*, a sensitive plant species, is also present along the river and constitutes an Outstandingly Remarkable plant population. Riparian areas are scenic focal points and support a diverse and abundant bird population. Aquatic plants harbor macroinvertebrates, fish species, and numerous algal, insect and lower plant species that serve as food for larger forms of animal life.

The condition of vegetation is affected by both natural and human caused disturbances. Natural disturbances, such as fire, wind, insects, and disease, perform integral functions in forest ecosystems. Since the turn of the century, the vegetation condition of the forest has been affected by human disturbance that includes soil displacement and compaction, removal of old growth ponderosa pine, grazing by livestock, and years of fire suppression. As a result the structure and composition of forest communities are much different now than 100 years ago.

The *Artemisia ludoviciana estesii* finds its niche in the riparian zone, not far from the bank of the river. The population along the Upper Deschutes is small and because of the sites where it is located, it may be affected by changes in recreational activity or changes in the level of the river.

Private and public development within the forest and along the river have resulted in a conflict between the need to protect life and property from elements such as fire, smoke, and falling snags, and the positive role fire and snags play in the functioning of the ecosystem.

Issue Description

Vegetation along the Upper Deschutes River is part of a diverse and complex biological system. It serves many functions in the ecosystem as a whole and other functions that are particularly important to the Upper Deschutes Wild and Scenic River. These include providing food and shelter for wildlife and providing a variety of scenic backdrops that serve as either the focus of human attention or provide a background for recreational and domestic activity. These functions are described in the Wildlife, Scenic, and, to a lesser degree, Recreation issue descriptions.

Vegetation along the river and throughout the forest is subject to varying disturbances. Sources of disturbance include fire and fire suppression, logging and road building, insect and disease infestations, windstorms, livestock grazing, and recreational and residential use and development. Many disturbances, whether natural or human caused, have both positive and negative effects. Some disturbances that may have positive effects on the vegetation may have accompanying effects, costs, or risks that are unacceptable to society. Human attempts to manage vegetation have ranged from allowing natural disturbances (other than fire) to dominate the evolution of the ecosystems to intensively managing vegetation in order to maximize wood growth. Each of these extremes and choices in between create social, economic, and ecological conflicts.

Natural Disturbances

Natural disturbances, such as fire, wind, insects, and disease, perform integral functions in forest ecosystems.

Fire maintains ponderosa pine ecosystems, affects stages of plant development, and removes organic material from the surface layer of the soil while leaving necessary nutrients. Historically, ponderosa pine forests had frequent and light ground fires occurring every 8 to 15 years. These fires acted as a cleansing agent, burning and clearing the more fire susceptible lodgepole pine, and making room for ponderosa pine to continue occupying the site and growing to large diameters. Large, high intensity fires historically eliminated large areas of lodgepole pine while serving as rejuvenators of the same species. This resulted in generally younger stands of lodgepole than currently inhabit the corridor.

All trees compete for space, sunlight, soil, water, and nutrients. Ponderosa pine seedlings need a minimum amount of disturbed forest floor to become established. They require approximately ¼-½ acre of growing space for full sunlight and soil nutrients necessary for regeneration and survival. In order for ponderosa pine trees to grow large, 30 inches in diameter and over, they need space to grow, full sunlight, and adequate soil water and nutrients.

The process of stand development in ponderosa pine forests is a result of the shade intolerance of ponderosa pine, periodic good years for seedling establishment associated with years above normal precipitation, and frequent fire. Gaps in the forest, created by mortality of small groups of trees, allow the shade intolerant pine to become established when a good seed year and appropriate weather coincide. The stand of young trees will be protected from fire because of the lack of fuel on the ground, while the fire will burn under mature stands and eliminate any reproduction there. As trees in the opening continue to grow, they provide enough fuel to carry the fire and thin the stand.

Wind has an effect on the exchange of gases between plant and the environment, spreads seeds or pollen, affects the availability of moisture to plants, and affects root growth. Even seemingly catastrophic winds that break or blow down trees have positive effects. In these instances mature and over mature trees are culled, giving younger trees the space to grow and flourish. Windthrown trees can increase the fuel loadings and risk of insect infestation. Wind has been a major disturbance factor in the river corridor.

Insects and disease have always been part of the forest ecosystem. However in the past affected areas were typically smaller; disturbance events were of shorter duration; and the severity of effects was less than today. Because of their contribution to animal and plant habitat development, to biomass and nutrient recycling, and to patch and landscape diversity, historical effects of insects and pathogens were mostly beneficial and integral to fire adapted ecosystems.

Under these conditions mountain pine beetles normally attack low-vigor trees, especially those weakened by diseases, drought, or lightning strikes. Many pine stands now have more trees per acre than site resources can support and beetle populations explode by feeding on the dense growth of mature and over mature lodgepole pine that has expanded through much of the river corridor and adjoining forest. If beetle populations expand sufficiently, they may also attack young ponderosa pine.

Similarly the density of the forest promotes pathogens such as root disease and dwarf mistletoe to spread through the forest. Because of the existing condition of the forest, insects and disease now play much of the ecosystem role once played by wildfire.

Despite the long term role natural vegetative disturbance plays in maintaining the ecosystem there are significant concerns associated with allowing them to operate. Probably most significant is the concern for public safety and private property. Allowing these natural disturbances to occur unchecked involves significant risks that many people are unwilling to take. Another issue is aesthetics. Many people find burned or insect-infested forests objectionable.

Human Disturbance

Human disturbance (including fire suppression, logging, grazing by domestic animals, recreational and residential use and development, mechanical manipulation of vegetation, and the use of insecticides and herbicides) has moved the vegetation in the river corridor out of its historic range of variability.

Due to effective wildland fire suppression activities over the last 70 years, wildfire has not been a significant disturbance in the ecosystem. As a result, dense lodgepole stands have increased while stands of larger, open-grown ponderosa pine have decreased. Natural fuel loadings have increased the potential for high intensity landscape fires and decreased the potential for light ground fires.

In the absence of a fire regime, lodgepole pine, a very hardy pioneer species, can out compete and eventually replace the ponderosa pine giants, and shade-tolerant species such as white fir can grow under the large ponderosa pine. These dense stands of trees are stressed by competition for sunlight, water, and nutrients. Weakened trees are subject to insect and disease outbreaks, which further detract from the visual characteristics. The density of forest vegetation has been increased by the lack of naturally occurring frequent fires, and the selective cutting of ponderosa pine forests.

In the absence of fire, lodgepole pine can quickly become established in meadows and other open spaces.

Prescribed fire has been used to mimic the small, low intensity fires that in the past eliminated the understory vegetation which competes with large ponderosa pine. Prescribed fire can only be used when risk of escape is low. In many areas along the river, fuel densities preclude this option. Even when risk of escape is low, the smoke from prescribed burning may be unacceptable to some people.

As a result of removal of old growth ponderosa pine, the landscape has changed from older to younger stands, from complex to simple stands, and from contiguous to isolated patches. Widespread clearcutting of ponderosa pine in the 1920's and 30's has resulted in predominantly younger age classes in much of the forest. The shift from the historic range of variability has affected several characteristics of the forest landscape, notably stand age distribution, structural diversity, fragmentation. The consequences of this shift are most severe for species closely associated with old growth. Managed plantations with reduced structural diversity contain fewer species of birds, small mammals, and amphibians.

Grazing by domestic livestock has contributed to changes in the natural processes that affect vegetation. First, grazing has reduced the amount of grass available to facilitate the spread of low intensity wildfires. Second, in riparian areas, grazing can reduce the amount of streamside vegetation that would naturally protect stream banks. This eliminates natural streambank protection and can lead to the breakdown of streambanks which can affect water and scenic quality (see those Issues for elaboration).

Grazing can also reduce the threat of catastrophic wildfire by retarding the rate of spread at the earliest stages of a fire. This provides fire suppression crews more time in which initial attack techniques can effectively quell a blaze. Similarly grazing can provide some of the desired effects of low intensity wildfire and prescribed burns by eliminating some of the fine fuels and can do so without the smoke that accompanies fire.

Treatment of vegetation with mechanized equipment has been the primary tool used in accomplishing natural resource goals. Some of these efforts have resulted in unintentional removal and disturbance to vegetation and important ecological processes. It has also resulted in soil compaction and displacement. When soils are compacted, moisture retention is limited, the risk from root disease increases, and tree growth and vigor is retarded. Mechanical treatments also impact scenic quality.

Mechanized equipment associated with vegetation management displaces and compacts soil. Harvesting, thinning, and pruning can serve many of the same functions as small, low intensity wildfires without the risk of an escaped fire or the problem of smoke. But these techniques do not rapidly convert remaining organic debris to a high dose of useable nutrients as does fire. Manual (non-mechanized) treatment of vegetation generally does not cause soil compaction, but has physical and economic limitations.

Road building to facilitate vegetation management (and to provide recreation access) also affects long-term soil productivity by displacing, compacting, and puddling of the important soil horizons near the ground surface.

Recreational use and development generally affects a relatively small portion of the total acres of the forest. However, recreational use and development tend to be concentrated near water. The Upper Deschutes Wild and Scenic River is no exception with 19 developed sites ranging in size from an acre to nearly 20 acres and 129 dispersed sites ranging from an old fire ring camouflaged by duff to about 2 acres of barren compacted soil supporting only a few nail-riddled trees. All sites whether developed or dispersed are adjacent to the river. As a result of either development or use, vegetation is impacted or eliminated. In addition, certain desirable vegetative conditions, such as large snags, must be removed from developed sites in order to provide for public safety.

About a quarter of the land adjacent to the river is privately owned, most subdivided into small parcels intended for residential use. As a consequence natural patterns of vegetation have been supplanted by non-native plant species, structures, and roads. Some private land has been subjected to grazing with the same consequences described above or, in one instance, converted to a golf course which resulted in virtually a complete change in the vegetative composition of that parcel. Human disturbance of vegetation along the river has occurred for several reasons: For economic purposes (including logging, grazing, golf course construction, and subdivision development), for recreation, for residential purposes, and to restore historic vegetative conditions. Each disturbance has benefits and costs.

Artemisia ludoviciana estesii

A sensitive plant species exists along the Upper Deschutes River, *Artemisia ludoviciana* subspecies *estesii* Chambers. This plant, commonly called Estes wormwood or Estes mugwort, is a Federal Category 2 Candidate, and appears on the Region 6 Regional Forester's Sensitive Plant List of June 10, 1991. *Artemisia ludoviciana estesii* is endemic to Central Oregon, and is associated with Baltic rush, and silverweed cinquefoil.

Two issues concerning the *Artemisia ludoviciana estesii* must be addressed. The first is that two of the sites where it is known to be found along the Upper Deschutes may be affected by either recreational or grazing activity. Changes in either activity could impact these two populations. A second issue is whether changes in the flow regime may affect the *Artemisia ludoviciana estesii* population along the Upper Deschutes.

Urban Interface and Public Safety

Urban interface is a term used to describe geographical areas where residential developments and wildlands meet along a defined boundary. There is an extensive urban interface along the Deschutes River corridor. Along this interface the fuels are grass, brush, timber, and slash creating a high risk threat to human lives and property from a large uncontrollable wildfire. This represents a significant threat to public safety and river values. This problem continues to grow as the human population expands, people continue to develop homesites along the river and fuels continue to accumulate.

Issue 6

How should wildlife and their habitat be managed to protect and enhance the Outstandingly Remarkable river values?

Issue Summary

Wildlife is an Outstandingly Remarkable Value in Segment 2 because of the nesting populations of eagle and osprey and in Segment 4 because of the diversity of bird species.

The presence of wildlife is an important element of scenic quality and recreation. Because of the presence of a variety of large and small mammals and many birds wildlife is a significant value in Segment 3.

Three factors determine the wildlife population. First is the habitat conditions or the presence of food, cover, and other conditions that affect survival of a species. Second is the ability of wildlife to move to different areas within their range in order to utilize the required elements of habitat, either on a day to day or seasonal basis. Finally many wildlife species require freedom from disturbance, especially when nurturing young or during the winter when cold and lack of food can make living conditions marginal.

Habitat conditions along the river are affected by flow (see Issue 1); vegetative disturbance including natural disturbance factors such as fire, insects, and disease; and human caused disturbance such as forest management activities, residential development, recreational development, grazing, and road densities.

These same human caused disturbances have either altered or in some instances completely blocked major migration routes and daily travel routes linking key habitat elements.

Increases in human uses within the corridor increase the amount of disturbance experienced by wildlife during both winter and summer.

Management of habitat for wildlife can conflict with other goals. Habitat management which emphasizes cover conditions, insect and disease infestations, or dead trees can conflict with some vegetative, scenic and fire hazard reduction goals. Protecting wildlife from disturbance by imposing seasonal restrictions, area restrictions, and road closures can limit recreational use and access to the river corridor. Development restrictions designed to provide quality habitat, provide for movement of wildlife, and prevent disturbance of wildlife may limit the right of landowners to use their lands in certain ways.

Issue Description

The following description is categorized by the three major factors which affect wildlife within the Upper Deschutes Corridor - **habitat conditions, movement, and disturbance.**

Habitat Conditions

The Upper Deschutes River provides habitat for reproduction, rearing, foraging, and resting for a diversity of wildlife species. Habitat is typically the live and dead vegetative composition and includes elements of vertical and horizontal structure, density, diversity, and arrangement. Currently, ponderosa and lodgepole pine forests (upland vegetation); meadows, marshes and streamside vegetation (riparian vegetation), and lava flows provide important niches that promote diverse species on the river.

Upland Vegetation: A variety of characteristics within the ponderosa and lodgepole forests are needed to provide essential breeding, foraging, dispersal, and resting habitats for birds, mammals, reptiles, and amphibians. Thick ponderosa and lodgepole stands of small-sized trees are utilized by larger mammals to hide, cool off in the summer, maintain warmth in the winter and to give birth and rear young. These dense stands and multi-storied forested conditions provide dispersal and migratory habitat for a number of species. Open, single-storied large-tree dominated ponderosa pine forests provide habitat for a category of species. Large ponderosa and lodgepole pine trees provide nesting habitat for large raptors utilizing platform nests and the large bark provides nesting and roosting for birds and small mammals. Bark beetles and other insects present in endemic or epidemic levels throughout most of these communities provide an important food source for many woodpeckers. Dead standing trees provide breeding areas for cavity users and provide roosting habitat for bats under the loose bark. Trees with cavities adjacent to the river also provide important breeding areas for wood ducks. Upland meadows, young plantations and forested areas that have been thinned provide seeds and insects for small mammals and birds; and grasses, forbs, and shrubs for grazing and browsing animals. These species provide a prey base for predators.

Many of the habitats described above have been fragmented, reduced, or eliminated by insect infestations, windthrow, vegetative treatments, woodcutting, residential and resort development, and road construction. The removal of trees (snags, diseased, and green) have reduced snag habitat, vertical structure, and changed the wildlife species that occupy the sites.

Roads created by forest users or to implement vegetative treatments further fragment habitats. Openings created by tree removal in areas adjacent to the riparian areas have led to an increase in brown-headed cowbirds. The cowbirds lay eggs in other birds' nests. Because of the cowbird's short incubation period, size, and aggressiveness the other nestlings starve or are pushed out of the nest, reducing species density and diversity.

Fire suppression in the ponderosa pine type has reduced the amount of open-canopied single storied ponderosa pine forests and changed the vertical structure. Fire suppression has increased the lodgepole understory component and affected bitterbrush, grasses, and sedges. These plants become decadent and have reduced nutritional value for wildlife when not subject to occasional fire. As a consequence wildlife species utilizing the area have changed within the ponderosa pine habitats where fire has been aggressive fire suppression.

Activities that modify vegetation to protect and enhance wildlife habitat can conflict with other river values. Activities such as leaving down logs for small mammals often conflict with fuel reduction goals. Saving snags often conflicts with fuel reduction goals but provides forage and nesting for many cavity users. Maintaining thick stands of young trees for security areas for animals reduces the open stand feature for scenic quality objectives. Prescribed underburning results in blackened tree boles, dead young saplings and burned brush often creating short-term conflict with the scenic quality objectives.

Riparian Vegetation: Riparian Vegetation is a key habitat component for most wildlife species inhabiting the area around the Upper Deschutes. Riparian vegetation provides nesting and foraging habitat for many songbirds. Wet meadows provide habitats for reptiles, amphibians, rodents, and waterfowl. The wet meadows and marshes also provide foraging grounds for predators. Areas directly adjacent to the river provide thickets of dense, tall brush or stands of aspen, lodgepole, or ponderosa saplings. These habitats are used for breeding and rearing by elk and deer.

Riparian habitat is affected by several human caused conditions, including: regulated river flows (discussed in Flow Issue), residential development, recreational use and development, and grazing. This limits the usefulness of the affected habitat for many wildlife species. Consequently fewer species utilize the area which reduces species diversity.

Private land comprises approximately 4 percent of the land within segment 2, approximately 46 percent of the land in Segment 3, and approximately 11 percent of the land in Segment 4. Development of this private land has resulted in conversion of some of the privately owned riparian vegetation to domestic lawns, golf courses, residential structures, docks, fencing, concrete or rock walls, and several forms of Riprap in segments 2 and 3.

In developed sites and in heavily used dispersed areas, recreationists trample and break down vegetation when accessing the river. Repeated trampling kills vegetation and compacts soil. This reduces vegetation available for foraging and fragments nesting and foraging habitat in these areas.

Within the riparian area the Forest Service has three cattle allotments, horses are grazed at Sunriver resort, and private homeowners graze a variety of livestock. Grazing activities trim and/or remove the shrub components, reduce grass and grass-like species to near ground level, and promote grazing tolerant species to the detriment of grazing sensitive grass species. Grazing removes seed heads that provide food for songbirds and small mammals and reduces insect populations that also provide food for songbirds and small mammals. Stock trails, removal of forage, and wallows resulting from grazing and concentration of domestic animals in a limited area conflict with scenic quality objectives.

Lava Flows, Pressure Ridges and Rimrock: Lava, pressure ridges and rimrock provide specialized habitat for species such as rock wrens, canyon wrens, pikas, bobcats, and cougars.

Currently, there is no private or residential development on the major lava flows. Some recreational activities do occur on pressure ridges and rimrock features and rimrock is the preferred homesite of many landowners.

The lava flows have not been modified to any significant degree, modification to develop recreational facilities is likely and will conflict with the unique habitats for wildlife.

Movement

Movement can be defined as the ability of an individual or a species to travel within its home range or to disperse to new territories within the range of the species. Wildlife movement is altered or halted by physical blocks such as structures or fences and by habitat modification.

River corridors are important for the movement of a majority of wildlife species for juvenile dispersal and seasonal movements. Mammals, birds, amphibians and reptiles rely on riparian habitats and connective habitats adjacent to the river to disperse to new territories.

Residential development within Segment 3 has increased the concentration of east-west migration of deer and elk into the limited remaining undeveloped areas near the river. Current monitoring by Oregon Department of Fish and Wildlife has shown that the migration of deer has concentrated in Segment 2 because of lack of urban development. Segment 3 has enough urban development adjacent to the river and eastward that very little deer passage occurs. Segment 4 does not have much development adjacent to the river but urban development to the northeast and northwest of the segment and the Lava Butte lava flow impede deer movement. Migrating deer in Segment 4 utilize the southern edge of the lava flow as a travel corridor.

Disturbance

The value of upland and riparian habitat is reduced when subjected to intrusions that disturb wildlife. The more disturbance, the fewer species will use an area. Species that tolerate disturbance will continue to use such habitat areas. Species intolerant of disturbance will seek new habitats that are undisturbed. Disturbance is considered to be an unexpected occurrence that accelerates the heart rate and increases the adrenaline to respond to flight or fight reactions. The degree to which an animal might be affected is primarily determined by the timing, location, and duration of the disturbance. During winter or other critical times the calories expended as a result of this disturbance can reduce an animal's health and well-being. As temperatures become more extreme, animals attempt to reduce movement and remain in sheltered locations to lower the body's expenditure of energy. When animals are disturbed they not only expend energy with fight or flight syndrome but also in movement to escape if necessary, reducing the stores of energy they need for survival.

Residential development, recreational use and development, and open road use are the primary disturbance factors in the Upper Deschutes.

Residential areas along the river present a source of permanent disturbance. Pets such as cats and dogs pose problems to wildlife. Cats prey on many songbirds, ducklings, and small mammals reducing species density. Dogs, if allowed to run loose, chase wildlife and can team up into packs preying on deer and elk. Dogs also disturb animals by barking and initiating the animal's fight or flight syndrome. Motor vehicle traffic from residential areas pose a hazard to wildlife through disturbance and animal-vehicle collisions.

Recreational users primarily disturb wildlife by passing through an animal's territory. This kind of disturbance is generally short duration, but is often more surprising to the animal than a permanent disturbance. High levels of disturbance within close proximity to the animals reproduction and rearing sites often causes abandonment of young. High use of an areas of will displace species that have low tolerance to human activities.

Access by roads and trails is a major source of disturbance for wildlife. The extent, frequency and duration of disturbance will affect the animals ability to survive during stressful periods, cause abandonment of young and/or abandonment of habitats. Vehicular traffic on roads, whether it be cars, trucks, motorcycles, ATVs, snowmobiles, or mountain bikes all contribute to disturbing wildlife. Hikers, horseback riders and mountain bikers create the same type of disturbance to wildlife on trails. Winter recreation use has a high probability of disturbing wildlife when it occurs in key wintering areas. Disturbance under winter conditions can be critical. Road densities exceed desired levels for elk, deer and other species.

Use restrictions designed to protect and enhance effective wildlife habitat can limit recreational development or use opportunities within the corridor.

Issue 7

How should the scenic resources along the Deschutes River be managed to protect and enhance the outstandingly remarkable scenic values in the river corridor?

Issue Summary

The Upper Deschutes River has Outstandingly Remarkable scenery in Segments 2 and 4. This value is the result of congressional classification of the river as Scenic between the north boundary of Sunriver and Lava Island Falls, and the visual quality review in the Upper Deschutes River Resource Assessment. The Resource Assessment also found the scenic quality in Segment 3 to be a significant value.

Existing Scenic Integrity

Scenic integrity is based on the interrelationship of two concepts: Natural Appearing Landscape and Cultural Landscape. *Scenic integrity* is the degree to which natural elements and cultural (human caused) blend in a manner that is consistent with viewer expectations. Most people expect forests and grasslands to appear "natural" with limited or no human alterations. On the other hand most people also accept or even value the visual effects of some human actions within a scenic landscape as long as the effects do not deviate from the expected landscape image. For example, Benham Falls is dominated by natural features: rushing whitewater slamming against jagged black basalt, vibrant green ferns and moss clinging to vertical canyon walls, and a sub canopy of old growth ponderosa pine, other conifers, and quaking aspen that frames the scene. A scenic overlook constructed of native rock and rustic wood poles sits above the falls. Because the natural and cultural elements blend or mesh together the scenic integrity would be high. On the other hand if this site had a clear cut on one side of the canyon or a road scar adjacent to the site, the scenic integrity would be low. They are not part of the expected image.

Cultural landscapes can often overlay the Natural Appearing landscape in more significant ways than at Benham Falls, yet can still be part of the expected image. There are places where open green meadow consisting of saw grass, sedge and willow front the Deschutes River. The meadow is bordered by a mixed stand of ponderosa and lodgepole pine. Views of rugged snow capped mountains form a background. Residences are present but sit back into the forest blending in line, color, texture, and form with the landscape. This setting

has a high degree of scenic integrity because the development blends with the natural appearing landscape. But if the residential structures were located on and dominated the rivers edge; or the color of the houses were contrasting to the surroundings; or docks, retaining walls, and exotic vegetation ruled the riparian area the scenic integrity would be lower, a deviation from a persons expected image. Finally it is possible, if the setting is pastoral or includes historic structures that even contrasting development can meet viewer expectations.

It is estimated that about 20 percent of the river corridor shows some signs of deviation from a persons expected image. This may influence the experience of the river corridor user. Other examples of deviation that lower scenic integrity may include exposed or contrasting recreation development, motor vehicle traffic and the dust it creates, evidence of over grazing, evidence of logging practices, damaged vegetation, soil erosion, results of fire suppression, and impacts from fire.

The river channel and banks continue to be altered by a variety of nature and human caused processes (see issue #1) and development which may not be consistent with a person's expected image of a setting. Some developments that may affect the scenic integrity include: stream flow diversion structures, rip rap, concrete walls, docks, instream fish habitat structures, and other instream structures that in turn alter the geologic and hydrologic characteristics of the river.

Issue Description

The following describes the scenic integrity of each river segment. Landscape elements that do not match a person's expected image of quality scenery will be identified.

Segment 2

Valued Scenic Image: From Wickiup Dam to the La Pine State Recreation Area the viewshed from the river is predominantly restricted and narrow. There are foreground views up and down the river, many framed by thick stands of lodgepole pine and occasional open stands of ponderosa pine. In places 70 foot high cutbanks contrast with the more typical, heavily vegetated stands of lodgepole pine. Scenic vistas at Tetherow Meadows also offer an appealing contrast to the dense forested settings.

Image Deviations: Most deviations stem from flow regulation, development on private property, and recreation use and development.

- Riparian vegetation adjacent to glides and on the outside of bends is either narrow or nonexistent.
- In the winter mud flats, river banks devoid of vegetation, and high water marks, give the visual impression of a coastal/tidal flat. In the spring the water release causes foam, erosion, and turbidity.
- Vegetation condition has been altered by wildfire suppression, insect infestation, timber harvest, and thinning of precommercial trees. Stumps skid trails and landing areas influence foreground views in a few locations.
- Above Pringle Falls two parcels of land contain private homes perched on the river rim. Many have walkways and docks that impact the scenic integrity of the river setting.

- Pringle Falls itself is bounded on both sides by private land and private residences. The only public access for viewing the quarter mile of rapids is from the Road 43 bridge located at the upper end of the falls.
- Most roadways in this segment are not visible from the river. However vehicles on the roads paralleling the river and the dust that billows up behind them are noticeable from much of the river above Pringle Falls.
- Much of the vegetation has been impacted adjacent to developed and dispersed recreation sites. For example, near the dispersed sites in Tetherow Meadow the vegetation along the riverbank is tramped into the mud by early summer. At Pringle Falls Campground, user developed trails lead straight down the banks and have caused erosion.

Segment 3

Valued Scenic Image: Much of this segment the river meanders lazily around oxbows and through marshes. There are numerous wetlands along the river, and behind them you can see east into the Paulina Mountains, or west to the Cascades. Bates Butte is a frequently visible landmark in this section. In addition to the usual pine forested areas, there are abundant willows and marsh grass along the riverbanks.

Low flows in the winter during storage season are not as significant as in Segment 2 due to the increase in water provided by Fall River, Spring River, and the Little Deschutes River. In a typical winter storage season 75 to 85 percent of the channel is covered with water below these rivers, and bank exposure is minimal.

Some residences blend into the edge of the forest.

Image Deviations: About 75 percent of the land base in Segment 3 is in private ownership in a rural/urban setting. Human alterations, concentrations and scale often dominate and do not relate or compliment the "natural appearing" landscape. Specific deviations include:

- In some locations large multi-story homes with manicured lawns dominate natural appearing meadows associated with the riverscape. In other forested areas all the native vegetation between a home and the river has been cleared and replaced by a broad expanse of lawn.
- Some home owners have dredged channels through marshland for better river access while others have filled in wet areas.
- A variety of structures have been constructed at the confluence of the Little Deschutes River. Only a sparse vegetative screen or transition zone exists between the river and the golf course.
- Numerous roads, bridges and power lines have lowered the scenic integrity of the segment.
- After grazing, Abbot allotment looks like a mown lawn. Willows are hedged; banks and wet areas are degraded; and vegetation is churned and muddy.

Segment 4

Valued Scenic Image: This segment has the greatest "natural" diversity of land form, vegetative character, and water features in the Upper Deschutes corridor.

Stark volcanic lava flows, basaltic canyon walls, open meadows, old majestic ponderosa pine and quaking aspen set the stage for a dynamic and often times volatile river journey. The fluctuation of water quantity can appreciably change the character and mood of the setting. For example, when Benham Falls is at 400 to 600 cfs it is a series of pools connected by water flowing between rocks. When above 1300 cfs it is a raging torrent of whitewater pounding against volcanic rock. Between the series of falls in this segment are tranquil glides bounded by meadows, marshes and aspen thickets. Ponds and marshes along the river edge offer a wide range of habitat for wildlife and excellent opportunities for wildlife viewing.

The variety of the water character is matched by the variety of views ranging from marshes, rock features, and wildlife to views of Mt. Bachelor, Lava Butte and the snow capped high Cascades framed by old growth ponderosa and aspen. This is the first reach of river where the vertical and textural elements dominate the river setting.

Some recreation facilities are placed and function to compliment the natural setting. Site detailing reflects consistency, continuity, and harmony with the riverscape. Access to the river enhances recreation experience while protecting the scenic quality of the area. Some residences blend in form, color, texture, and line into the natural setting.

Image Deviations: This segment is close to the urban area of Bend, and thousands of people come to play along the river each year. Impacts of this use and development associated with agricultural needs and an expanding population has resulted in some deviations:

- Management of flow affects water conditions, riparian vegetation and wildlife (see Issue#1).
- Some recreation sites impact riparian and other vegetation. Vegetation has been beaten down, the soil has been exposed, and the banks are eroding adjacent to recreation facilities such as campgrounds, trails, view points, boating sites, picnicking areas, historic sites and interpretative displays.
- After grazing, Ryan Ranch Meadow looks like a mown lawn. Willows are absent; hairgrass plants are pulled out by the roots; and banks and wet areas are muddy and broken down. Barbed wire fencing is present adjacent to recreational facilities.
- Residential development in the lower part of this segment is visible from the river but generally natural vegetation dominates the landscape integrity.
- The flume carrying water for the Arnold Irrigation District and the diversion works near Lava Island Falls are visible from the river. The diversion works, however, are largely camouflaged by foliage in the spring, summer, and early autumn.
- The human caused Awbry Hall fire in 1991 burned much of the vegetation along about a mile of the lower portion of the river. Vegetation in this area is now dominated by standing snags and planted seedlings. The scale and evidence of fire deviates from people's expectations.

Issue 8

How should cultural resource values be protected and enhanced?

Issue Summary

Cultural resources include prehistoric and historic archaeological sites, features associated with railroad logging, and early twentieth century structures. They may also include traditionally hunted or gathered fish, game, plants, and areas used for ceremonial purposes. Historic or prehistoric sites along the river recognized as eligible to the National Register of Historic Places are Outstandingly Remarkable Values. Humans tend to use the same sites over time, especially when they occur near water, which can result in conflicts between protection of prehistoric and historic sites and current uses of the same sites. Changes in activities and resource utilization can also affect the availability of traditionally hunted or gathered fish, game, or plants within the river corridor.

Issue Description

Prehistoric and historic archaeological sites are important for the information they can provide concerning human activities over time, including such things as prehistoric land use patterns, cultural chronology, and responses to environmental changes such as volcanism. This information can be irretrievably lost if the vertical or horizontal provenance of sites are disturbed, or if cultural artifacts are removed from sites. Increasing amounts of use within areas not previously used or surveyed to determine whether sites exist can increase the potential for site disturbance and information loss. Location of sites can limit areas of development and use within the river corridor if funds are not available for information recovery from a site.

Activities which affect the availability of fish, plants, or animals within the river corridor can affect use of these traditional resources by American Indians. Activities which could affect the availability of these resources within the corridor could include vegetation management, access management, and recreation management. Ceremonial practices, while not known to occur at specific sites within the corridor, could be disturbed by other users.

Cultural resources often represent unique interpretive opportunities to share the information gained from site research with the public. Currently, only the rockshelter at Lava Island has interpretive signing. In order to protect the integrity of a site, it may only be interpreted following research and information recovery. Research and information recovery from known sites is limited by funding, regional priorities, and professional availability. Interpretation of known sites which have not been researched or from which information has not been recovered is limited by the need to protect those site locations from looters.

Issue 9

How should recreation opportunities and experiences be managed to protect and enhance the Outstandingly Remarkable River Values?

Issue Summary

Recreation is an Outstandingly Remarkable Value in all river segments based on the variety of recreational opportunities available and the quality and uniqueness of the recreational experiences. However, there is a concern that some recreational activities may conflict with the type of experience some people seek on the river. A second concern is that too many people using the river, regardless of the type of activity, may adversely affect river values. In other words there is a fear that recreational use on the river can result in the river being "loved to death." The essence of this issue is a vision of what kind of recreational experience a visitor can expect along the river and what effect recreation has on other river values.

Issue Description

What people experience along the river is dependent on the physical setting (what the area looks like), activity (what they and others are doing), and social controls (how much regulation, direction, protection).

The following detailed description of recreation issues focuses on describing the settings and the major categories of activities on or along the river. These major categories are: 1) Developed Uses - Camping and Day Use; 2) Dispersed Uses; 3) Boating; and, 4) Guided/Outfitter use and other special uses. Access to the river is a key factor affecting visitor's recreational experiences, and other Outstandingly Remarkable Values of the River.

Developed Camping and Day Use

There are 9 overnight campgrounds and 13 day use areas on the Deschutes National Forest within the river corridor. Total visits to these developed sites is estimated at about 55,000 annually. All developed facilities within La Pine State Recreation Area are near the river. This area accounts for about 50,000 visitor days per year.

The Forest Service campgrounds and day use areas are minimally developed, with picnic tables, vault toilets and fire pits. Currently Besson, Big River, Bull Bend, and Lava Island have barrier-free toilets. No site has barrier free campsites and view points. Of the developed sites, Big River, Bull Bend, and Pringle Falls charge camping fees. None of the sites have RV hookups. Most developed sites provide both day and overnight use, and boat launch sites.

These campgrounds and day use areas receive heavy use during the summer months and through big game and waterfowl hunting season. The overnight and day use sites closest to Bend receive the highest levels of use and are subject to an extremely high rate of vandalism, illegal "residential" occupancy, and resource damage. Similar trends are evidenced in the developed sites near other residential population centers along the river. Most of these sites also have moderate to heavy vegetation loss, soil compaction and erosion, and disturbance to cultural sites resulting from people camping and driving with little restriction within the developed sites.

La Pine State Recreation Area offers a more highly developed camping and day use experience with boat launch facilities, designated camping sites, flush toilets, showers, and full RV hookups and pads. La Pine State Recreation Area receives low to moderate levels of use during the summer months. It is closed during most hunting seasons.

Developed sites concentrate use which can reduce impacts associated with high levels of dispersed use. At the same time development increases impacts associated with the developed site itself.

Dispersed Recreation

All activities which occur outside of developed sites are considered to be dispersed recreation. On the Upper Deschutes this includes such diverse activities as camping, trail uses (which include mountain biking, hiking, and horseback riding), and other uses such as fishing, rock climbing, auto touring, and boating. There are no motorized trail activities permitted within the river corridor.

Dispersed recreation is favored by those who prefer a less regulated or managed experience. Dispersed recreation often emphasizes solitude, naturalness, and independence--qualities inconsistent with activities dependent upon developed facilities and which may result in large concentrations of people. In some cases, dispersed recreation can have the effect of reducing large concentrations of humans and their impacts. However, dispersed recreation can also damage geologic, hydrologic, fishery, vegetative, wildlife, cultural, and scenic resources.

Camping

Because of nearly unrestricted road access, dispersed camping is widespread on Forest Service land from Benham Falls picnic area to Wickiup Dam. People who enjoy the independence and relative solitude of dispersed camping along the river can easily drive to the area and use their vehicle for camping support. This has resulted in many user-created roads right to the edge of the river, and damage or removal of upland and riparian vegetation as a result of camping. Few people utilize watercraft to access dispersed camping.

Trail Use

Trail use is considered a dispersed use, even though the use may occur on trails which are constructed and maintained to specific standards. These developed trails contrast with user trails which have not been constructed or maintained to specific standards. Developed trails can protect and enhance river values by avoiding sensitive areas and being constructed to a standard which can withstand heavy use without unacceptable resource damage. User trails are often located in sensitive areas and, with heavy use, can multiply into a web of trails. This often results in damaging or eliminating vegetation, cultural, and other river resources.

Land-based developed trails can range from unregulated to very regulated. Currently, the developed trails in Segment 4 have informational and regulatory signs at the trailheads as well as directional and regulatory signposts and interpretive signs along the trail. User trails are generally unregulated and unsigned and allow for greater freedom and independence.

Demand for developed trails, especially between Bend and Sunriver, has increased in the last few years. Conflicts regarding trail use can arise between hikers, mountain bikers, and horseback riders when they share common trails. Separate trails for equestrian, hiking and mountain biking have been built in Segment 4 to reduce these conflicts, but result in a greater portion of the river corridor being affected by the trail system.

Across the river from Sunriver the special use permittee developed a horseback trail for day rides. This trail is not maintained and is open to mountain bikers and hikers as well as equestrians. User trails have been substantially reduced in segment 4, but remain, with the exception of the Big Tree trail in La Pine State Recreation Area, the only trails in segments 2 and 3.

Discussion of a public trail system that would cross private lands raises fears of vandalism and of a loss of privacy to private land owners.

Using the river as a trail is a concept which is gaining popularity. This concept requires that there be sufficient river access points and connections with land trails and camp sites to allow for continuous multi-day travel along the river without alternative transport needs.

Fishing

Recreational fishing for brown and rainbow trout occurs in all segments of the river. Anglers have created trails along the river for access to bank fishing. Flatwater sections of segment 4 are popular with people fishing after work. Segment 2 and 3 are frequently fished from a boat, or from the docks of private residents. Competition for fishing areas is relatively low except during very busy periods. Some people are concerned that the fish populations have declined due to recreational fishing over the years. All fishing is regulated by ODFW. Eliminating or enhancing access to the river affects how many people fish and where they fish.

Auto-touring

Road closure programs over the last several years have limited some access on publicly owned lands. Ease of access has allowed for much of the river to be seen and enjoyed from automobiles, and also allows for most of the river to be seen or visited in a relatively short amount of time. Well-roaded access provides the opportunity for more people to visit the river, including greater opportunities for those with limited mobility under their own power. High road densities and easy access can conflict with those desiring a higher degree of solitude, or more naturalness. High open road densities can also conflict with protection and enhancement of geologic, hydrologic, vegetative, wildlife and scenic values.

Rock Climbing

Rock climbing within Segment 4 is somewhat popular locally, primarily because of the closeness to Bend and ease of access. User trails which have been created to access the suitable rock climbing areas have the potential to damage vegetation and increase erosion along the steeper slopes.

Birdwatching, Wildlife Viewing

Both are done from existing trails.

Snowmobiles

Except for Segment 2A and the east side of the river in Segment 4A and 4B upstream from Newberry National Volcanic Monument, snowmobiling within the boundary of the Upper Deschutes Wild and Scenic River corridor is restricted to designated routes. Except for Segment 4, there are no designated routes at this time. When snow conditions permit, snowmobiling may occur in violation of existing regulations especially by residents living inside or near the Wild and Scenic River Boundary. Such use may result in disturbance of wildlife and non-motorized users within the river corridor.

Boating

Both motorized and non-motorized boating can occur on most of the Upper Deschutes. Currently there is no regulation of the numbers of non-commercial boaters on the river. The river is predominantly wide and slow-flowing, with 2 short stretches of whitewater in Segment 2 and more extensive stretches of whitewater in Segment 4. Boating in Segment 2, and that portion of Segment 3 above the confluence of Fall River and the Deschutes, is limited to the irrigation season because of low flow during the storage season. Even below Fall River use of motorboats may not be possible during the storage season due to low flows.

Motorized Boating

Much of the motorized boating originates from the river residential communities along the river. In 1988, the Oregon State Marine Board instituted a "Slow- No Wake, Maximum 5 MPH" rule from Wickiup to the National Forest boundary, and prohibited motorized use below the forest boundary in order to reduce the noise, erosion, and other impacts associated with high speeds and larger boats. Some have complained that the reduced speed limits have not been effective in reducing the wake-caused erosion, at least partially because the speed limit is not effectively enforced.

The presence of motorized boats on the river also affects the nature of the recreational experience. Motor boats can move easily up and down the river, expanding the river mobility of the user. The noise, fumes, and wake generated by motorized use is inconsistent with the expectations of river users seeking a primitive and quiet river experience. These same elements can disturb nesting wildlife.

Non-Motorized Boating

The predominant non-motorized boating/floating activities are canoeing and float tubing on the flatwater reaches of the river and whitewater rafting or kayaking in the Big Eddy reach of Segment 4.

Pringle Falls, Tetherow Log Jam, Benham Falls, Dillon Falls, and Lava Island Falls are not frequently run by whitewater enthusiasts. This is due to the extreme brevity of the rapids (Tetherow Log Jam) or the extreme danger of these whitewater sections of the river. However, because of the closeness to Bend, the increased popularity of whitewater boating, and improvements in technology and techniques, use of all whitewater sections of the river has substantially increased over the last 5 years. Areas previously considered unrunnable are increasingly being run by expert kayakers. As use increases impacts to riparian areas at

whitewater access points have also increased. Most whitewater activity takes place in the most scenic portions of the river. Because other activities focus on the same areas, there is a concentration of many activities in some of the most visually sensitive sections of the river.

Guiding, Outfitting, and Other Special Uses

Whitewater Rafting

There are 3 companies permitted to run guided trips on the Big Eddy run in Segment 4. In the late 1970's a carrying capacity was established for this section of the river with 75 percent of that capacity allocated to commercial use. During the rafting season (June to Sept) as many as 650 people per day may take the run from Aspen Camp to Lava Island Falls. This relatively short (2 hours) whitewater experience provides a unique opportunity to introduce people to whitewater rafting without requiring a large investment in time or money. Increasing use of these areas by non-commercial boaters has the potential to cause conflicts between commercial and non-commercial users.

The boating carrying capacity was established in order to create some sense of solitude for boaters. This recreational experience is not shared by those on the land trails, and the numbers and continuity of commercial rafters can conflict with those on the land seeking more solitude. On a busy day the support vehicles for the commercial rafters travel a nearly continuous cycle between Aspen Camp and Lava Island Falls. This creates dust and noise and can increase the difficulty of travel between those points for other vehicles.

There are requests to permit additional commercial whitewater uses which could increase the amount of whitewater experiences available to Bend visitors and educational and economic opportunities for the community, but could create additional impacts similar to those identified with current operations.

Flatwater Commercial Uses

There are commercial outfitter permits for a pontoon boat in Segment 4, canoe rentals in Segment 3 and 4, and fishing guide permits for the length of the river. The pontoon boat conducts short cruises from Dillon Falls Boat Ramp to below Benham Falls and back with meals served in Ryan Meadow. Canoe rentals are run between Sunriver and just upstream of Benham Falls Day Use Area and between Slough Camp and Dillon Falls. Up to 26,000 people annually rent canoes from Sunriver and Inn of the Seventh Mountain. There are no established allocations for commercial and non-commercial uses, except in the portion of Segment 4 between Aspen Camp and Lava Island Falls.

Land-based Commercial Uses

Horseback riding is the primary land-based commercial use along the river. Trails from the Inn of the 7th Mountain and Sunriver provide horseback riding opportunities for up to 10,500 people annually on Forest Service Land. Annually, another 6,000 people ride adjacent to the river on Sunriver property. Trails which are developed for this use are maintained by the permittee but are open to the general public for use. Commercial use of the trail system wears down and churns up trails more quickly than private use only because there are more users on the trails. This can create conflicts for some kinds of recreational experiences.

Other Special Uses

In addition to the above commercial uses, the river corridor has been the site of competitive equestrian, mountain biking, and running events. In 1994, Big Eddy Rapids was the site of a whitewater competition. Several groups also have special use permits to conduct educational or instructional activity on or along the river.

Public Safety and Emergency Services

As use increases on the river, the potential for accidents as a result of naturally occurring dangers increases as well. Dangers which exist on the river include such things as steep slopes and rock, poisonous plants, and whitewater rapids. The amount of danger, regulation, or independence of the user is an important factor in the recreational experience. Regulation may vary widely depending upon the management goal for an area. If this concept is not well understood by the users, there is the potential for people to enter into situations which are more dangerous than their expectations and for serious injury or death, to occur.

In addition to naturally occurring dangers, the use of firearms during hunting season poses a danger. This has been a problem in the past on the Upper Deschutes, especially where public and residential lands adjoin. Recently, portions of the river have been closed to hunting to reduce this problem.

Issue 10

How can changes to existing uses on private lands be accommodated while protecting and enhancing other river values?

Issue Summary

The Wild and Scenic River Act does not allow the federal government the ability to zone private land development. Approximately 23 percent of the land in the corridor is privately owned (See Table 2-1). Existing development is affected only by regulations in effect at the time of the development. Changes in existing development are subject to rules and regulations established by the City of Bend and Deschutes County zoning ordinances, the State Scenic Waterways program, and other federal, state and local agencies. These agencies regulate development through standards and provisions for building setbacks, conservation and access easements, parcel size, sewage disposal, landscape and design standards, wildlife areas and open space, fill and removal, timber harvest, and law enforcement. However, these

protective regulations do not apply to conditions existing at the time the regulations were instituted, but only apply to development with occurred after the regulations were in effect.

Development on private lands has changed the scenic character of the river corridor with a variety of structures, roads, utility corridors, the introduction of non-native landscaping and manicured lawns. Retaining walls, fences, docks, and other structures have been constructed along the streambank, in some cases altering wetlands and riparian areas. The 50 mile corridor contains ten subdivisions and several large single ownership properties. Most private lots are not serviced by community water or sewer systems. Individual septic systems may be creating a water quality problem.

Issue Description

Building Setbacks

Within Deschutes County, the minimum setback for dwellings, including additions and on-site sewage disposal (septic) systems, is 100 feet from the river. A property owner may be permitted to locate a dwelling within 100 feet only when a hardship is demonstrated (e.g. parcel size is too small to build outside the setback area) and a variance is granted. Designated floodplain areas may only be developed if an area large enough for a dwelling does not exist above the floodplain. All structures, including decks, must be set back at least 50 feet from the uppermost ledge or outcropping of rimrock above the Deschutes River. This setback may be reduced if the standards for an exception can be met. State Scenic Waterway regulations require that structures be located in such a way that topography and natural vegetation make them as inconspicuous as reasonably practicable.

Conservation and Access Easements

Outside of the Urban Growth Boundary, property owners are required to convey Conservation Easements when developing property along the river. Typically, the conservation easement extends ten feet landward of the high water mark of the river and does not include public access. The land owner retains ownership of the area included in the easement. If a setback less than 100 feet is approved, the entire area between the homesite and the river is included. The purpose of the conservation easement is protection of natural, scenic or open space values. Public access within the conservation easement along the river is usually required for larger projects such as the creation of a new subdivision. Development on existing parcels does not result in the granting of public access.

Parcel Size & Zoning

The one mile section within the Bend Urban Growth Boundary contains 316 acres of private land. There is no public land in this corridor. 255 acres are zoned "RL" for Urban Low Density Residential. This zone allows residential units on 110'x200' lots with private septic systems. 61 acres are zoned "RS" for Urban Standard Density Residential. This zone allows 60'x100' lots with city sewer. These zone designations allow planned unit developments, which could include golf courses and associated amenities such as club houses, restaurants, sales offices, pro shops, etc. The ordinance also allows such things as schools,

lodges and fraternal organizations, manufactured home subdivisions and parks, recreational facilities such as tennis clubs, swimming clubs, etc. Most commercial type developments such as retail stores, gas stations, motels and offices would not be allowed in this area.

There are 2983 parcels located within one-quarter mile of the Deschutes River between the Bend Urban Growth Boundary and Wickiup Reservoir. Development on these parcels is restricted by provisions in the county zoning ordinance. 2045 of these parcels are zoned Rural Residential, RR-10, where new parcels must be at least ten acres in size. However, most of these lots are located in subdivisions platted before the 10-acre minimum became effective in 1979 and are only 60'x100' in area. Only 13 parcels, all vacant, are equal or greater than 10 acres in size.

Of the 2045 parcels zoned RR-10 within the ¼ mile boundary, 1391 are vacant; 654 are developed, mostly with single family residences. 545 RR-10 parcels are located directly on the waterfront. 309 of these parcels are vacant, 236 are developed. Many parcels on the river are located partially or entirely within the "100-year" flood plain. Areas designated as flood plain are permitted to be developed only if there is insufficient area outside the flood plain to locate a dwelling.

Sewage Disposal

Within the Urban Growth Boundary, developed parcels that are not connected to a community sewerage facility are served by on-site disposal systems. Community sewerage systems include the City of Bend sewerage facility and the Juniper Utility facility that serves a series of subdivisions in southern Bend.

Outside the Urban Growth Boundary, developed parcels are generally served by on-site sewage disposal systems (See Issue #2). Exceptions are properties in the boundaries of the LaPine Sanitary District, Sunriver Utility, Oregon Water Wonderland Sanitary District, and River Meadows. There are also a couple of other small sanitary districts that utilize community drainfield systems. In cases where the parcel size prohibits on-site sewage disposal and treatment plants do not exist, property owners have chosen to purchase additional parcels further away from the river and pump their sewage to those areas. It should be noted that all of the community systems mentioned above dispose of their treated effluents through some means of land disposal. Some of these disposal systems are designed and constructed to assure that nutrients in the wastewater are used to fertilize crops which are harvested and removed from the system. Some are not and may have an impact on groundwater and surface water similar to that caused by individual on-site systems.

Individual on-site sewage disposal systems that serve individual houses or other development are sited strictly on the basis of the physical conditions of the particular lot. There is no consideration as to cumulative impacts of adjacent property. In addition, the systems are designed, constructed and operated to prevent direct and/or indirect exposure of raw or inadequately treated sewage to humans. They are also designed and constructed to control conventional pollutants that are associated with sewage; namely organic material and enteric bacteria. Properly functioning on-site systems that are sited, constructed, and operated in accordance with DEQ rules for on-site sewage disposal systems will effectively remove organic material and bacteria and will generally not pose an environmental or public health threat.

Approved on-site systems are much less effective for removing nutrients, particularly nitrate-nitrogen. The effect of nitrogen from on-site systems depends upon the density of development, groundwater conditions, and surface streams that may intercept groundwater or be recharged by groundwater flow. High nitrate levels in groundwater will affect its ability to be used as drinking water. High nitrate levels (or other nitrogen species) in surface waters may manifest themselves by stimulating nuisance algal growths and, if the nitrogen species is in the ammonia or organic form, causing dissolved oxygen depletion.

The potential for water quality problems in the Deschutes River and its upper tributaries depends upon the ability of the river to assimilate contaminants and still maintain its resource value. It also depends, of course, on the amount of contaminants that reach the river. The pathways for contaminants include the direct discharge of sewage into the river from failing septic systems or the discharge of treated sewage into ground water which eventually migrates to the river. Large residential and commercial developments near the river which rely on septic systems for waste treatment have the potential to contribute relatively large quantities of nutrients to the river irrespective of the type of septic system. The same effect can be realized from the cumulative impacts from multiple individual dwellings along the length of the river system.

One method of preventing nutrients from entering the river is the use of community waste treatment and disposal systems. These common waste treatment systems provide efficient and effective treatment for the home owners and, with proper design, minimize impacts on ground and/or surface water.

Landscape and Design Standards

Within the Urban Growth Boundary, all development within 100 feet of the ordinary high water mark of the Deschutes River is required to undergo design review with the Urban Growth Boundary Planning Commission. There is not a rimrock setback specified within the UGB. One of the problems with this ordinance is that the State Scenic Waterway on the south end of the UGB is within the canyon area of the river. The canyon walls extend in a horizontal distance further than 100 feet. The result is that the design review process would not apply to all property within this portion of the Scenic Waterway. The Planning Commission will be considering amendments to encompass design review within 300 feet of the ordinary high water mark of the river in 1995. The area within ¼ mile which is outside this 100/300 feet would still need review by State Parks and would undergo the review by the Urban Growth Boundary Commission.

Outside the Urban Growth Boundary, the Landscape Management (LM) combining zone includes all property within the river corridor presently included in the federal Wild and Scenic or the State Scenic Waterways designations. The boundary of this zone is one quarter mile landward from both sides of the Deschutes River. In the LM zone the county reviews new development to retain as much as possible of the existing tree and shrub vegetation which screens the development from the river. In addition, the county has the authority to require additional native landscape vegetation for screening. Currently, no regulation prohibits vegetation removal prior to permit application. The type of materials and colors proposed for new dwellings are also reviewed in the LM zone. Use of muted earth tones are recommended

and white, bright and reflective materials are prohibited. Structures are not permitted to exceed thirty feet in height, including chimneys or other projections from the roof, and exterior lights are required to be shielded so they are not directly visible from the river.

Within the State Scenic Waterway, no living tree can be removed prior to notification of Oregon State Parks and Recreation Department. Structures must be of such a design and be constructed of such materials as to be unobtrusive and compatible with the scenic qualities of the area. Finish colors must blend with the soils, rocks and vegetation indigenous to the area; white or bright colors and reflective materials are prohibited; except for large farm buildings, metal siding and roofing is not allowed; no structures may exceed 30 feet in height; construction sites must be left with little or no soil left exposed. Mobile homes, modular residences, house trailers, camping trailers, and motor homes are regulated under other guidelines.

Wildlife Areas and Open Space

The Upper Deschutes River corridor provides habitat for many and diverse species of wildlife. Most are supported for at least a portion of their life cycle by the river and adjacent riparian or upland vegetation. Private development as well as developed and dispersed recreation conflict with the needs of wildlife. Human occupation and activities within the corridor degrade the condition of wildlife habitat and disturb wildlife by blocking migration routes, eliminating food sources, and by harassment by domestic pets and people. Removal of native vegetation, armoring of riverbanks with foreign materials, building roads, and construction of fencing create some of these conflicts. A key concern is preserving the remaining limited habitat in segments which have significant amounts of developed land.

Outside of the Urban Growth Boundary, the Open Space and Conservation zone and the Bend/LaPine Deer Migration Corridor Wildlife Area (WA) zones are designated to protect open space and wildlife habitat and migration routes.

Six tracts of land within the river corridor are zoned Open Space and Conservation, including the LaPine State Recreation Area and lands managed by the USFS in Newberry Volcanic National Monument near Benham Falls. This zone is intended to protect areas of scenic and natural resources and conserve open space. Uses allowed outright are limited to farm use, museums and exhibits for public and non-profit agencies, and public wildlife reserves. Parks, picnic area, recreational areas, campgrounds, and utility facilities all require a conditional use permit. The minimum lot size for new parcels is 80 acres.

The Wildlife Area combining zone requires homesites to be clustered close together and that at least eighty percent of the property be retained as open space. In this zone new dwellings must generally be located within 300 feet of roads or easements unless the Oregon Department of Fish and Wildlife (ODFW) recommends that wildlife habitat and migration corridors will have equal or greater protection from a different development location. New fences must meet recommended ODFW specifications in order to allow wildlife passage. Fences that enclose less than 10,000 square feet adjacent to residences and livestock corrals are exempt from this requirement. Nearly all privately owned land in the corridor is within this combining zone. Significant Elk Habitat is designated on the west side of the Deschutes between Spring River and the Bend Urban Growth Boundary and on the east side of the river between Sunriver and Benham Falls.

The Sensitive Bird and Mammal Habitat Combining Zone (SBMH) protects the habitat area critical for the survival of certain birds and mammals. Only one nesting site, for osprey, is known to be located on private or state lands within the ¼ mile boundary. Development activities near inventoried nesting sites on private and state lands are prohibited during the identified time when nesting, strutting or hibernation occurs, unless ODFW determines that these sites will not be active during the proposed construction period. New roads, driveways and public trails need to be located as far as possible from these sites to buffer noise and visual impacts. Existing vegetation or other landscape features which obscure the view of these sites from the proposed development must be preserved.

Fill and Removal

The purpose of the Wild and Scenic River Act is to protect a variety of river values as well as preserve the free flowing character. The Act defines "free-flowing" as:

- "(b) "Free-Flowing, " as applied to any river or section of a river, means existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modifications of the waterway..."

The placement or removal of any amount of material, including vegetation removal, within ten feet of the banks of the river or in any wetland requires a Conditional Use Permit from either the City of Bend or Deschutes County. Exceptions include removal of diseased or damaged trees, normal pruning, and habitat enhancement projects endorsed by the Oregon Department of Fish and Wildlife.

Any activity that proposes removal, filling, or alteration of 50 cubic yards or more of material within the bed or banks of the waters of the State of Oregon requires a permit from the Division of State Lands (DSL). The Removal-Fill Permit requirements apply to the bankfull stage of rivers and lakes, and the line of non-aquatic vegetation of wetlands. Within State Scenic Waterways, DSL reviews all projects regardless of size and also requires approval from the State Land Board.

The United States Army Corps of Engineers regulates and enforces Section 404 of the Clean Water Act. Permits are required for removal/filling activities within waters of the United States. The Division of State Lands and the Corps of Engineers have developed a "joint permit application" allowing the applicant to complete one application to submit to the respective agencies for processing. However, the US Corps of Engineers must obtain a determination of "no adverse effect" on the free flowing character of the river from the United States Forest Service prior to issuance of these permits.

An unknown amount of the streambank along private land has been armored with rip rap and other materials. The effects to the free-flow character have not been assessed. The effects of individual armoring projects and the cumulative effects are a concern.

Timber Harvest

The Oregon Forest Practices Act provides for a set of rules establishing minimum standards which encourage and enhance the growing and harvesting of trees. At the same time, the act considers and protects other environmental resources - air, water, soil and wildlife. These rules apply only to lands under the jurisdiction of the Oregon Department of Forestry and on lands that are part of a forest "operations". This includes commercial woodcutting on classified forest lands.

General prescriptions for the Upper Deschutes River (where there is adequate conifer stocking) are: 1) Retain all understory vegetation within ten feet of the high water level; 2) Retain all trees within twenty feet of the high water level; 3) Retain all trees that lean over the channel and grow in the Riparian Management Area (RMA); 4) Retain all snags and downed wood in the channel and RMA; 5) Retain no fewer than forty live conifer trees (greater than eleven inches diameter at 4.5 feet) per 1000 feet of stream within the RMA; 6) Retain enough basal area within the RMA to meet the standard target (220 sq. ft. of basal area per 1000' of stream); or meet the active management target (200 sq. ft. of basal area per 1000' of stream). Active management is improvement of wildlife habitat within the stream.

Forest management within a designated Wild and Scenic River or State Scenic Waterway take into consideration the outstandingly remarkable values that may be influenced by the timber harvest. Consultation between the Department of Forestry, Oregon Department of Fish and Wildlife, US Forest Service, Oregon Parks and Recreation Department and the property owner ensue prior to the harvest commencing.

Enforcement

The City of Bend is limited to one Zoning Code Enforcement Officer and one Building Official responsible for the residential and commercial structures associated with a population of 28,000. Violations are dealt with on a complaint basis, with priorities of health and safety coming first. The state scenic waterway portion within the city UGB is minuscule compared to the rest of the city land base.

The majority of the river corridor falls within Deschutes County. This county is staffed by one Code Enforcement Officer that currently has a backlog of 400 complaints. These complaints are prioritized by 1) environmental health (offenses that create health hazards; septic systems; restaurant food poisoning; etc.), 2) river issues (fill & removal; setback violations; etc.), 3) zoning issues (illegal solid waste accumulation; illegal businesses; etc.), and 4) building issues (no permits; not building to code; etc.).

ODFW and the Oregon Parks and Recreation Department (OPRD) are mandated to protect river systems and the associated river resources but do not have the enforcement power to deal with violators directly in the form of issuing citations or assessing fines. In order to stop a violator, these agencies must rely on other state and local law enforcement officials. Because this is not their primary focus, these law enforcement officials do not have the time or training necessary to recognize or understand violations.

The permit requirements for the Federal 404 Clean Water Act and the State of Oregon Removal-Fill Law are different in many respects. This can be confusing to the applicant. Additionally, processing times for permits can vary presenting a problem for project planning. Limited staffing for both Federal and State permit programs results in a complaint generated enforcement program. Public awareness of permit requirements is poor; there is a need for a more extensive education program.

Issue 11

Where should boundaries be located to protect and enhance the Outstandingly Remarkable River values?

Issue Summary

The State Scenic Waterways Act establishes a ¼ mile boundary from the ordinary high water mark of a State Scenic Waterway. The Federal Wild and Scenic Rivers Act establishes an interim 1/4 mile boundary. The federal act requires the establishment of a permanent boundary that would protect and enhance Outstandingly Remarkable River Values. This permanent boundary must be locatable and encompass not more than an average of 320 acres per river mile.

The interim boundary contains substantially less than 320 acres per river mile because of the many meanders of the stream, and does not follow locatable surveyed lines, roads, or topographic features. It does not include important wildlife habitat, natural features, or special areas of importance to the river and river values.

The interim boundary includes a substantial amount of private land. This land contains a variety of residential and resort developments that are primarily regulated through state and county land use laws. Inclusion of this land within the Wild and Scenic River Boundary adds little protection beyond that provided by existing state and local government regulation. On the other hand, Wild and Scenic River Status affords considerable protection for river values associated with publicly owned lands.

Issue Description

Public lands

Public lands within the interim boundary are primarily National Forest lands. Forest lands are governed by the Deschutes Forest Land and Resource Management Plan (Forest Plan). The Forest Plan allocates lands to certain uses and establishes standards and guidelines for activities within those lands. The Upper Deschutes Wild and Scenic River Plan would amend the Forest Plan for the area within the Wild and Scenic River boundary.

The interim boundary begins at the outlet for Wickiup Dam. Activities that are necessary for the safety and maintenance of the dam are conducted between the outlet and the gauging station, approximately 1/8 mile downstream from the dam. Inclusion of this area within the permanent boundary would result in added bureaucratic costs with little added protection of river values.

Portions of Newberry National Volcanic Monument and Pringle Falls Research Natural Area are within the Interim Boundary. These areas are subject to laws and regulations which are either consistent with or more restrictive than the laws and regulations governing the Wild and Scenic River. Including either of these areas within the final boundary is not necessary to protect and enhance Outstandingly Remarkable River Values.

Several buttes lie outside the interim corridor and yet are dominant visual features. Wickiup and Bates Buttes also provide important bald eagle habitat. Portions of these buttes that are within the National Forest are currently designated Bald Eagle Management Areas.

Key elk habitat falls within and adjacent to the interim boundary

Private Lands

Private land within the Wild and Scenic River Boundary both restricts public management options and provides opportunities. Since private land is governed by private rights and state and local land use laws, federal management of private land and land use is limited. (See Land Use Issue.) As a result, the benefits of including private land within the boundary are limited. One important benefit is that federal assistance in the form of funding, equipment, tools, and other technical assistance is available to private landowners. In addition, private land or easements within the boundary may be purchased from willing sellers. Purchase of lands or easements can promote public recreation access on reaches of the river bounded by private property and protect important wildlife habitat and geologic, cultural, scenic and vegetative values which could be lost through land development.

Land Line Location

To be consistent with current management direction and reduce costs associated with boundary descriptions the final boundary should be easily locatable. Roads, existing boundaries of special management areas (e.g. RNAs and LaPine State Recreation Area), existing section and quarter section corners, and clearly visible geologic features are easily locatable and can either serve as a boundary or a reference point for a boundary.

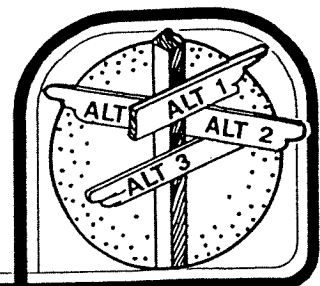
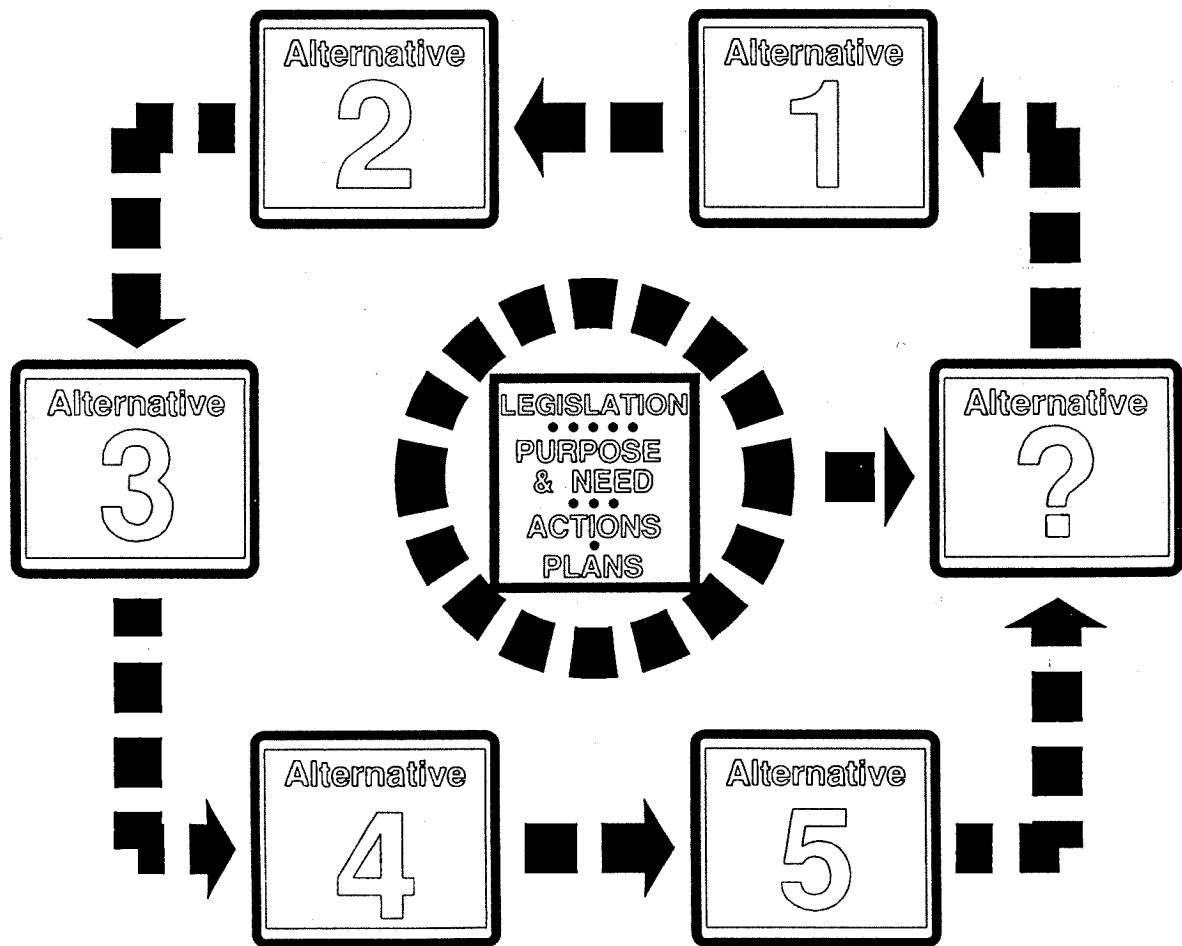
Planning Records

The complete planning record for this Final Environmental Impact Statement (FEIS) is available at the Bend/Ft. Rock Ranger District, 1230 NE Third Street, Suite A-262, Bend, Oregon 97701. Included in the planning record are such things as baseline data, maps, and studies used in preparing this document. All documents incorporated by reference are also part of the planning record. This planning record is available for public inspection and review.



Upper Deschutes River FEIS

Chapter 2 Alternatives



Chapter 2

Land-based Alternatives and Flow Options

Introduction

A range of alternatives was developed in accordance with the National Environmental Policy Act (NEPA) to represent different combinations of resource conditions and management actions which would address the issues described in Chapter 1. Six land-based alternatives and six flow options were developed to respond to these issues.

Land-based alternatives address the issues and conditions which are primarily controlled by actions which could be taken relatively independently of the river flows (See Issues 3-11). These include such things as on-river recreation use and development, wildlife habitat conditions, instream structure improvements, and private land development.

Flow options were developed specifically to look at the most feasible possibilities of increasing instream flows, the potential costs and probable actions which would be associated with those increases, and the relative benefits to Outstandingly Remarkable Values (See Issues 1 and 2).

Unlike the land-based alternatives (which in many cases can be implemented by a single agency and the effects realized almost immediately), changes in flows will only come about through long-term cooperative agreements and actions between the irrigation districts and state and federal agencies.

For these reasons, *land-based alternatives* and *flow options* were developed as separate packages to the extent possible. The alternative selected in the Record of Decision will combine a land-based alternative and a flow option. Land-based alternatives considered will be described first and Flow Options second. A summary table of how each alternative addresses the significant issues is included at the end of each of these sections.

For both land-based alternatives and flow-based options, the Alternative 1 and Option 1 provide the baseline description of existing conditions under current management. This is the "no action/no change" alternative which is required by NEPA.

Alternatives 2-6 and Options 2-6 are referred to as the "action" alternatives and options, because they would cause some change to occur from the existing management direction.

River Segments

Throughout this document the river is divided into several segments and subsegments. This division of the river occurred first during the preparation of the Resource Assessment (Appendix C in the Management Plan) in order to assist in identification of Outstandingly Remarkable Values. During alternative development, the river was further divided into subsegments in order to emphasize the unique characteristics of short stretches of the river. Table 2-1 gives a description of the location of each subsegment. A map of the subsegments is located in the map section at the back.

Table 2-1 Subsegment Locations

| Segment | Location | Acres (Approx.) | Acres by Ownership |
|---------|--|-----------------|--|
| 2A | Wickiup Dam to east end of Pringle Falls Campground | 4354 | National Forest: 4109 Private: 245 |
| 2B | East end of Pringle Falls CG to south boundary of LaPine State Recreation Area | 1655 | National Forest: 1567 State: 87 Private: 1 |
| 3A | South boundary of LaPine State Recreation Area to north boundary of LaPine State Recreation Area | 1691 | BLM: 78 State Rec. Area: 1144 ¹ Private: 469 |
| 3B | North boundary of LaPine State Recreation Area to General Patch Bridge | 1685 | National Forest: 908 BLM: 1 State: 243 County: 11 Private: 522 |
| 3C | General Patch Bridge to Harper Bridge | 1538 | National Forest: 76 Private: 1462 |
| 3D | Harper Bridge to north boundary of Sunriver | 2063 | National Forest: 1246 Private: 817 |
| 4A | North boundary of Sunriver to west end of Sunriver canoe takeout | 752 | National Forest: 750 Private: 2 |
| 4B | West end of Sunriver canoe takeout to south end of Slough Camp | 996 | National Forest: 996 |
| 4C | South end of Slough Camp to east end of Dillon Falls Campground | 657 | National Forest: 657 |
| 4D | East end of Dillon Falls to west end of Aspen Day-use Area | 332 | National Forest: 332 |
| 4E | West end of Aspen Day-use Area to north end of Lava Island Trailhead | 442 | National Forest: 442 |
| 4F | North end of Lava Island Trailhead to Bend Urban Growth Boundary | 514 | National Forest: 379 Private: 135 |
| 4G | Bend Urban Growth Boundary to COID Canal | 316 | Private: 316 |

1. The BLM leases land to the State of Oregon for LaPine State Recreation Area.

Land-Based Alternatives

As discussed in Chapter 1, land and water uses are governed by multiple federal, state, and local authorities. The land-based alternatives contained in this section are described with little distinction between the specific authorities which would implement individual elements of an alternative. As a result of the final decision, each agency would take whatever steps are necessary to implement their own decision (See Chapter 1). Specific discussion of the effects on other agencies, their plans, and policies is included in Chapters 1 and 4.

Except for the sections entitled "Private Land Use", the alternatives (unless otherwise noted) refer only to federal, state, and county lands.

Alternative Descriptions

This section describes the proposed action alternatives and includes the current management direction (Alternative 1). The action alternatives are described as follows:

- A description of **common** goals, objectives, and probable actions. These common goals are basic elements of all the action alternatives and address various aspects of the significant issues. In some cases, goals may be a continuation of existing management direction.
- A description of goals, objectives, and *probable actions* which **vary by alternative**. Each alternative will address certain aspects of the significant issues in different ways.
- Alternative 6 is a combination of goals, objectives and probable actions from the DEIS plus modifications based on comments about the DEIS. Alternative 6 is proposed for adoption in the final management plan.
- A comparison of issues by alternative is provided in Table 2-11.

Probable actions are called "probable" because their actual accomplishment is dependent upon budgets and national, regional, or local allocations of resources. Probable actions must also undergo additional decision processes according to the requirements of the appropriate agency. No site specific analysis is presented here.

Each of the significant issues is addressed according to a specific river value with the exception of the private land issue. Issues are addressed as follows:

Issue 1. *How should water flows be managed to protect and enhance outstandingly remarkable river values and provide for out of stream uses consistent with Wild and Scenic River Act and applicable water laws?* This issue is addressed in Flow Options.

Issue 2. *What management strategies should be implemented to improve water quality in order to protect or enhance the Outstanding Remarkable Values consistent with the Wild and Scenic River Act and applicable water quality standards.* This issue is addressed in Flow Options.

- Issue 3. *What aquatic and riparian conditions are needed or are appropriate to protect and enhance the fishery and other outstanding remarkable values?* This issue is discussed in sections on Geologic and Hydrologic Values.
- Issue 4. *How should fish species be managed to protect and enhance the fishery and other outstanding remarkable values?* This issue is addressed in the Land-based Alternatives in sections on Fishery Value.
- Issue 5: *How should vegetation be managed to protect and enhance the Outstandingly Remarkable Values and ensure public safety?* This issue is addressed in the Land-based alternatives in sections on Vegetation Value.
- Issue 6: *How should wildlife and their habitats be managed to protect and enhance the Outstandingly Remarkable river values?* This issue is addressed in the Land-based Alternatives in sections on Wildlife Value.
- Issue 7: *How should the scenic resources along the Deschutes River be managed to protect and enhance the outstandingly remarkable scenic values in the river corridor?* This issue is addressed in Land-based Alternatives in sections on Scenic Value.
- Issue 8: *How should cultural resource values be protected and enhanced?* This issue is addressed in Land-based Alternatives in sections on Cultural Resource Value.
- Issue 9: *How should recreation opportunities and experiences be managed to protect and enhance the Outstandingly Remarkable River Values?* This issue is addressed in Land-based Alternatives in sections on Recreation Value.
- Issue 10: *How can changes to existing uses on private lands be accommodated while protecting and enhancing other river values?* This issue is addressed in Land-based Alternatives in sections on Private Land Use.
- Issue 11: *Where should boundaries be located to protect and enhance the outstandingly remarkable river values?* This issue is addressed in Land-based Alternatives in sections on Boundary.

Alternative Summary

Alternative 1 is the no action- no change alternative required by National Environmental Policy Act. Alternative 1 would continue management and development of the river on National Forest lands according to the direction of the August 1990 Deschutes Land and Resource Management Plan (Forest Plan). The current land use laws, policies, and directions established by the Deschutes County Comprehensive Plan and current State Scenic Waterway rules would apply on private lands.

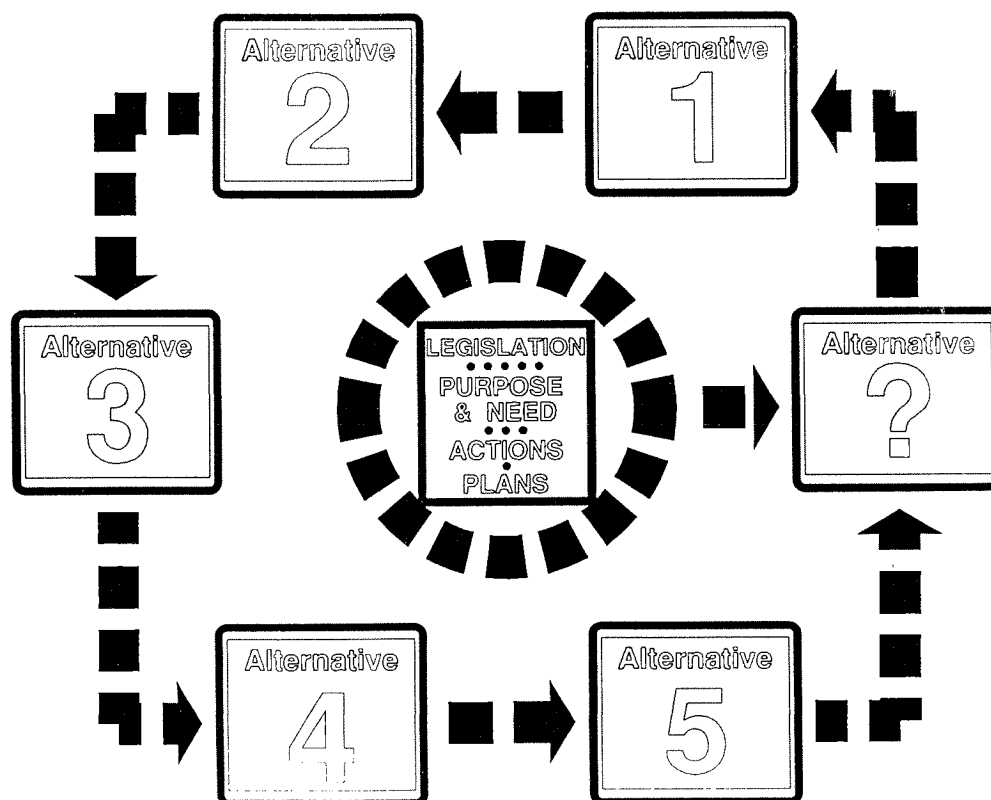
Alternative 2 emphasizes natural processes and resource conditions and undeveloped recreational settings. Non-motorized recreation and access is emphasized.

Alternative 3 emphasizes active management of resource conditions to meet wildlife habitat and vegetation goals. The mix of recreation types (developed and undeveloped) and access (motorized and non-motorized) would be similar to existing conditions with some additional resource protection measures.

Alternative 4 mixes active management of resources conditions to enhance scenic values, with an emphasis on undeveloped recreation and non-motorized access.

Alternative 5 mixes active management of resource conditions with an emphasis on developed recreation to accommodate the highest use levels of all alternatives. Additional developed facilities for day and overnight use would be provided.

Alternative 6 is a combination of goals and objectives from the other alternatives and modifications based on comments received on the draft EIS. This alternative is proposed to be adopted for the final management plan.



Alternative 1 - No Action/No Change

The description of Alternative 1 provides a summary of how the current management direction addresses the Outstandingly Remarkable Values and significant issues identified in Chapter 1. It is not intended to be a complete discussion of all laws, policies, or regulations which govern the Upper Deschutes River. Copies of the full documents are available by contacting the specific agency which has jurisdiction. The applicable Standards and Guidelines from the Forest Plan are found in Appendix G. State Scenic River rules are found in Chapter 5. Oregon State Marine Board regulations are found in Appendix F. Deschutes County regulations are found in Appendix E.

Alternative 1 would continue management and development of the river on National Forest lands according to the direction of the August 1990 Deschutes Land and Resource Management Plan (Forest Plan), as amended. The current land use laws, policies, and directions would apply on private lands.

All jurisdictions currently have management or regulatory requirements which address, to some extent, the significant issues which have been identified in Chapter 1. These are only briefly summarized here as they relate to the issues.

Goal: *To protect and enhance those Outstandingly Remarkable Values that qualified the Upper Deschutes for inclusion in the National Wild and Scenic River System.*

Geologic/Hydrologic Values

Land-based activities are conducted in a manner which will meet State water quality standards and not harm beneficial uses. This is accomplished through the use of general and project-specific Best Management Practices, which involve the use of specific measures to mitigate non-point sources of pollution.

Fishery Value

The State of Oregon through the Department of Fish and Wildlife and the Confederated Tribes of the Warm Springs Reservation of Oregon have cooperatively managed fish populations. Primary responsibility for management of fish habitat in the National Forest system rests with the Forest Service.

The Oregon Department of Fish and Wildlife, in consultation with the Confederated Tribes of Warm Springs and the Forest Service, is in the process of developing a fish management plan for the Upper Deschutes Basin. Streams, rivers, and lakes will be inventoried and classified based on their potential to provide habitat necessary to achieve the desired fishery objectives. This basin-wide recreation/fish population management plan would be developed to preserve the diversity and quality of fishing opportunities on the river. The plan will be used to evaluate the suitability of the habitat to sustain a fishery necessary to meet the recreational demands.

Current direction for the Forest Service to protect and enhance fishery value focuses on three habitat elements: protection of riparian habitat and streambank stability with project-specific management practices; improvement of instream habitat conditions through the addition of instream structure; and identification and acquisition of sufficient instream flows below Wickiup Dam to preserve the fish population (see Flow Option 1).

Vegetation Value

Vegetation management is governed by Forest-wide and Management Area standards and guidelines. Management Area standards and guidelines which apply to the Wild and Scenic River corridor are:

- Management Area 17 - Wild and Scenic Rivers

Other Management Area standards and guidelines which would apply are:

- Management Area 3 - Bald Eagle Habitat
- Management Area 16 - Pringle Falls Experimental Forest

A portion on the Newberry National Volcanic Monument also falls within the interim boundary.

The river classification of a river segment under the Wild and Scenic Rivers Act determines the kind of vegetation treatment and management goals allowed. In Scenic River segments (Segments 4A-E), the Forest Plan requires vegetation to be managed to appear natural and emphasize protection of riparian plant communities. A wide range of silvicultural practices are allowed provided that such practices are carried on in such a way that there is no adverse effect on the river and its immediate environment. In Recreational River segments (Segments 2, 3, and 4F), vegetation management activities are allowed under standard restrictions to protect the immediate river environment, water quality, scenic quality, fish and wildlife, riparian plant communities, and other values. Cutting and removal of trees in recreational segments is oriented towards enhancement of scenic, hydrologic, fisheries, recreational and/or wildlife values. (See Figure 1-2 for the location of scenic and recreational river segments.)

Currently, all removal of firewood from Deschutes National Forest land is limited to designated areas. The Forest Plan limits firewood gathering in intensive recreation areas to cleaning up residual wood materials resulting from management activities. Commercial firewood cutters may be used to accomplish specific recreation objectives.

Range management policies allow appropriate methods, such as grazing use by livestock or wild ungulates, prescribed fire, and mechanical or chemical treatments, for managing range vegetation to provide upward or stable vegetative trends, protection of the basic soil and water resources, and meet public needs for multiple resources. Riparian areas would be managed to maintain or enhance riparian dependent resources such as water quality, water quantity, fish habitat, wildlife and vegetation.

LaPine State Recreation Area - The State of Oregon leases land from the BLM for LaPine State Recreation Area. The trees within the Recreation Area are managed by the BLM as follows:

- No regularly scheduled timber harvest would occur.
- Visual resources would receive strong consideration within ¼ mile on each side of travel corridors into and within the park.
- Primarily dead trees would be harvested.
- Cutting areas would be shaped and designed to blend as closely as possible with natural terrain and landscape features.
- Natural seed tree regeneration would occur.
- Slash disposal outside the travel corridors would be by lopping and scattering. Within travel corridors, slash would be disposed of by burning, in accordance with state fire protection and air pollution regulations.

Wildlife Value

Current direction for the Forest Service to protect and enhance wildlife values is included in standards and guidelines designed to maintain specific snag or down log components, limit sizes of openings, establish forage to cover ratios, identify general road density goals, and limit motorized use in wintering areas. Special management areas have been established for bald eagle and osprey with specific vegetation management goals to provide for their nesting needs over time. Special management direction for wild and scenic rivers is also included to manage riparian areas for “watchable wildlife”, and to maintain snags and down logs within riparian zones. Hazard trees should be evaluated for their scenic, hydrologic, wildlife, and fisheries values as well as for any safety risk they pose. Desired target road density levels have been set at 1.5 miles per section for the Key Elk Habitat Areas and 2.5 miles per section elsewhere.

Scenic Value

A Visual Quality Objective of Retention applies in Scenic River segments; Partial Retention applies in Recreation River segments.

Visual Quality Standards

The USDA Forest Service has established a Visual Resource Management System to protect and enhance the scenic integrity of the landscape. Within the Upper Deschutes Wild and Scenic River three Visual Quality Standards guide management activity. **Retention** is a standard that requires management activities to be designed and located to blend into the natural landscape and not be visually apparent to the casual forest visitor. Dominant qualities of visual elements and principles not found in the characteristic landscape should not be evident in the management activity. **Partial Retention** provides that management activities may be evident to the casual forest visitor; however, the activity should remain subordinate to the visual strength and natural character of the landscape. **Modification** applies only to developed recreation facilities within the Upper Deschutes Wild and Scenic River. This standard provides that management activities may be visually apparent to the casual observer and may also become dominant in the landscape.

Cultural Resource Value

Management and protection of cultural resource values are prescribed by the National Historic Preservation Act, as amended, and the Archaeological Resources Protection Act. Traditional use of a portion of the corridor by the Confederated Tribes of the Warm Springs Reservation of Oregon was established by treaty.

Recreation Value

Current direction in the Forest Plan requires that recreation use and facilities be managed to feature a relatively natural environment, emphasizing day use and minimal development. Additional facilities may be developed but must be screened from the river. The Forest Plan does not speak to use levels on land or water. Current direction for water and land-based outfitter use levels or outfitter to non-commercial allocations have been determined by site-specific special use authorization decisions. Carrying capacities within the river corridor have not been identified in the Forest Plan. An ROS of Roaded Natural was identified as the desired recreational setting. Under Alternatives 2-6, ROS standards have been more fully developed to also reflect carrying capacities (see inset). Table 2-3 displays how the existing condition would compare to the other alternatives using these new standards rather than the Forest Plan standards.

Motorized access may be permitted, prohibited or restricted as necessary to protect river values.

Recreational Opportunity Spectrum

The Recreational Opportunity Spectrum (ROS) is a system used by many federal and state land management agencies to categorize different outdoor recreational settings. ROS also serves as a general guide to the kind and level of development which will occur within a given area and what visitors can expect in terms of the physical and social settings.

These standards were refined to be applicable to river corridors (USDA Forest Service, 1990) and were further refined for the Upper Deschutes and used to identify carrying capacities and land-based mixes of motorized and non-motorized uses. Carrying capacity for the river corridor varies by alternative, reflecting the mix of desired land-based social and physical settings.

The ROS classes used in the Upper Deschutes Wild and Scenic River Corridor are briefly described as follows:

- **Urban (U)** - *A high percentage of the land is privately owned. Public land has a high number of recreation sites per river mile. Encounters with many visitors and residents are expected.*
- **Rural (R)** - *About half of the land may be privately owned. Facilities (shelters, buildings, roads, campgrounds, parking lots, etc.) are present and visitors are likely to encounter many other people. Parts of the landscape have been modified, and the sights and sounds of other people will be readily evident.*
- **Roaded Natural (RN)** - *A small portion of land may be privately owned. The landscape appears natural, but roads and trails access the area, and some facilities are present. Visitors can expect less interaction with other people. Modifications to the landscape generally harmonize with the environment.*
- **Roaded Natural Non-Motorized (RNNM)** - *This is the same as Roaded Natural except that motorized road use is allowed only for administrative or emergency uses.*

The Forest Service uses Special Use Permits to authorize commercial activity, special events, road access to private land, or other forms of land occupancy on National Forest land. Outfitter and Guide permits are a form of Special Use Permit that includes such activities as rafting, fishing guides, and non-profit/educational activities such as nature study trips sponsored by schools, universities, or park and recreation districts (See Table 2-2).

Table 2-2 Existing Guided/Outfitted Use in Segments 3D and 4

| Use Type | Segment | Guide/Outfitter | Average Users/Year ¹ |
|----------------------------------|---------|-------------------------|---------------------------------|
| Canoe and other flat water craft | 3D - 4A | Sunriver ² | 23,200 |
| | 4C | Inn of the 7th Mountain | 1,600 |
| Patio Boats | 4C | Inn of the 7th Mountain | 600 |
| Horseback Riding | 3D - 4A | Sunriver | 1,600 |
| | 4E | Inn of the 7th Mountain | 6,100 |
| Whitewater Rafting | 4E | Inn of the 7th Mountain | 8,500 |
| | | Sun Country | 10,500 |
| | | Hunter Expeditions | 12,000 |

Notes:

1. Users/year is the average of the actual use reported by the outfitters for 1993-1995. Numbers were rounded up to the nearest 100.
2. Sunriver reported the number of flatwater craft rented each season rather than user numbers. To convert to users/year, Sunriver's estimates of 2.5 people per canoe, 3.5 people per raft, 1 person per 1 person kayak, and 2 people per 2 person kayak were used.

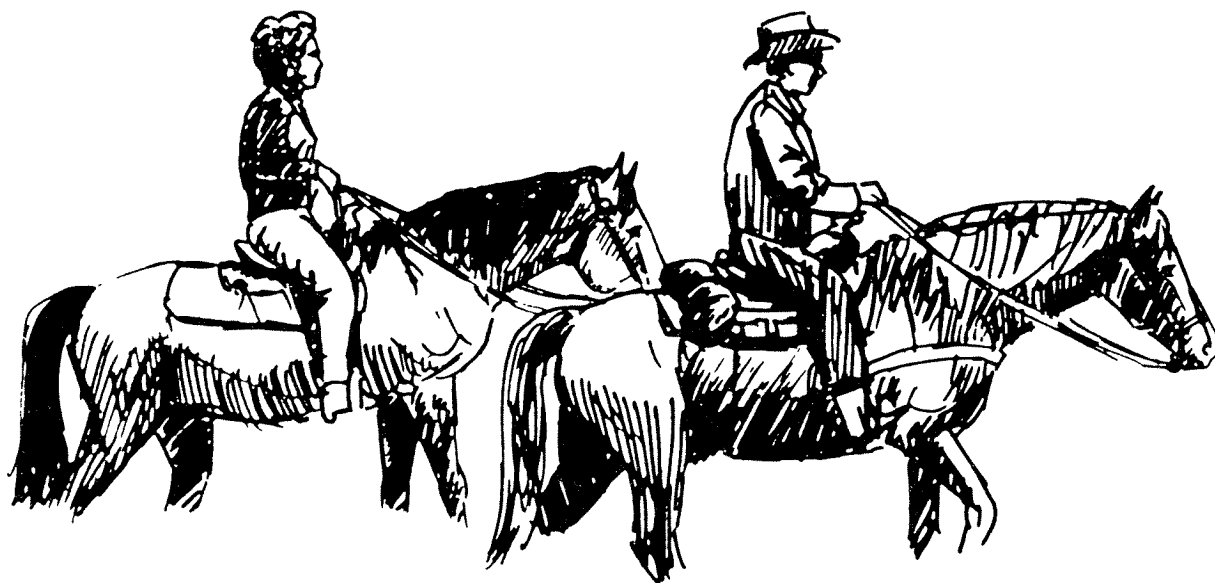


Table 2-3

Alternative 1 - Recreation

| Segment | ROS | River Use | Designed Annual Capacity ¹ | | Total # of Sites ² | |
|---------|----------------------------|---------------|---------------------------------------|------------------------|-------------------------------|-----------|
| | | | non-commercial | outfitter ³ | developed | dispersed |
| 2A | RN | Mixed | 24,000 | 300 | 47 | 41 |
| 2B | RN | Mixed | | | 21 | 17 |
| 3A | Urban | Mixed | 65,000 | 25,300 | 236 | - |
| 3B | Rural | Mixed | | | 19 | 3 |
| 3C | Urban | Mixed | | | - | - |
| 3D | Rural | Mixed | | | 11 | 18 |
| 4A | RN | Mixed | 33,000 | 63,900 | - | 11 |
| 4B | RN | Mixed | | | 25 | 15 |
| 4C | RN | Mixed | | | 17 | 6 |
| 4D | RN | Mixed | | | - | 2 |
| 4E | RN | Mixed | | | 28 | 13 |
| 4F | Rural | Mixed | | | 12 | 5 |
| 4G | State and Local rule apply | Non-motorized | | | - | - |

1. Use numbers are based on guided/outfitted use, recreation sites, and trail capacities. Trail or river users who cross segment boundaries are counted in each segment.

2. Includes individual campsites and individual parking spaces at boat ramps and trailheads

3. Actual use numbers for 1994. Includes non-profit/educational use.

Private Land Use

Setback Requirements (*Scenic and Riparian Values*)

- Within the Bend Urban Growth Boundary (UGB), the minimum setback for a structure is 40 feet. There is no rimrock setback.
- Within Deschutes County, the minimum setback for dwellings, including additions and on-site sewage disposal (septic) systems is 100 feet from the river. A property owner may be permitted to locate a dwelling within 100 feet only when a hardship is demonstrated. All structures, including decks, must be set back at least 50 feet from the uppermost ledge or outcropping of rimrock above the Deschutes River. Example: If the rimrock is 25 feet from the river, the setback would be 75 feet from the rimrock to total 100 feet from the river.
- State Scenic Waterway regulations require that structures be located in such a way that topography and natural vegetation make them as inconspicuous as reasonably practical.

Design review (*Scenic, Riparian, Vegetation Values*)

- Within the Urban Growth Boundary, developments within 100 feet of ordinary high water require city design review.
- Deschutes County regulations require design review for parcels within State Scenic Waterway or Federal Wild and Scenic River Boundaries. Design review for vegetation removal does not occur until an application for a building permit has been submitted.
- State Scenic Waterway regulations state that structures must be of such a design and be constructed of such materials as to be unobtrusive and compatible with the scenic qualities of the area. Additional vegetation may be required to screen structures, including sand filters. Finish colors must blend with the soils, rocks and vegetation indigenous to the area; white or bright colors and reflective materials are prohibited; no structures may exceed 30 feet in height; construction sites must be left with little or no soil left exposed. Mobile homes modular residences, house trailers, campers and motor homes are regulated under stricter guidelines. Metal siding and roofing is not allowed except on large farm buildings. Fences and agricultural buildings are not reviewed.

Fill and Removal (*Geologic, Hydrologic, Scenic, Free Flow Characteristics*)

- Throughout the river corridor, the placement or removal of any amount of material, including vegetation removal, within ten feet of the banks of the river or in any wetland requires a Conditional Use Permit from the City of Bend or Deschutes County.
- Any activity that proposes removal, filling or alteration of 50 cubic yards or more of material within the bed or banks of the waters of the State of Oregon requires a permit from the Division of State Lands (DSL). Within State Scenic Waterways, DSL reviews all projects regardless of size and also requires approval from the State Land Board. Some habitat enhancement projects sponsored by ODFW may be exempt from State Land Board review.
- All fill and removal activities within the Federally Designated Wild and Scenic River Corridor require a permit from the Army Corp of Engineers. Nationwide permits are not allowed within a Wild and Scenic River corridor. Permits are not issued for projects which would have a direct and adverse effect on the free flow characteristics or other river values. This determination is made by the Forest Service prior to permit issuance.

Land Acquisition (*Recreation, Scenic, Vegetation*)

- Public agencies may acquire lands from willing sellers. The State of Oregon may utilize condemnation proceedings only as a last resort in order to protect significant resource values.

Zoning (*Scenic, Vegetation, Water Quality*)

- Within the Bend Urban Growth Boundary, 255 acres are zoned "RL" for Urban Low Density Residential. This zone allows residential units on 110 ft. by 200 ft. lots with private septic systems. Sixty-one acres are zoned "RS" for Urban Standard Density Residential. This zone allows 60 ft. by 100 ft. lots with city sewer. Development is guided by provisions in the Bend Urban Area zoning ordinances.
- Public agencies may acquire conservation easements from willing owners for the protection of resource values. Deschutes County requires property owners to convey a conservation easement under specific conditions.

Floodplain Development (*Scenic, Vegetation, Water Quality*)

- Designated floodplain areas may only be developed if an area large enough for a dwelling does not exist elsewhere on the property, and special construction requirements must be met.

Interagency Cooperation

- Informal interaction occurs between the City, County, State, and Federal agencies to review vegetation removal activities on private land.
- An interagency team of Federal, State, County, and City representatives (the Deschutes River Stewardship Team) has been formed to assist private landowners in land use development activities and ensure a consistent approach to protecting and enhancing river values.

Forest Operations

With minor exceptions¹, all forest operations, including timber harvesting operations, must comply with the requirements of the Oregon Forest Practices Act (FPA). The Department of Forestry administers the Forest Practices Act on all private, state, city and county forestland. Forestland as applied by the FPA means land that is used for the growing and harvesting of trees, regardless of how the land is zoned or taxed or how any state or local statutes, ordinances, rules or regulations are applied. Forest operations include all commercial activities related to the growing and harvesting of trees, including commercial firewood cutting.

In addition to reforestation requirements, the act establishes standards for forest practices including timber harvesting, road building and maintenance, slash disposal, reforestation, and use of chemicals. Particular emphasis is placed upon operations conducted near streams. All operations must be conducted in a manner that protects water quality.

When conducting forest operations adjacent to the Upper Deschutes, riparian vegetation is required to be retained and protected. To ensure that proper planning takes place prior to the commencement of any forest operation, landowners/operators are required to "notify" the State Forester at least 15 days prior to commencing an operation. Notification is done on

¹ The possible exception occurs within urban growth boundaries where local government may elect to regulate forest operations instead of relying upon the Forest Practices Act.

forms available from the State Forester. In addition, prior to conducting any operation within 100 feet of the Upper Deschutes River, the landowner/operator is required to obtain written approval of a written plan.

For operations along the Deschutes, the following vegetation will normally be required to be retained within a riparian management area on each side of the river (usually 100 feet wide from the high water level):

1. All understory vegetation within ten feet of the high water level; and
2. All trees within 20 feet of the high water level; and
3. All trees leaning over the channel; and
4. All downed wood and snags; and
5. No fewer than 40 conifer trees greater than 11 inches dbh per 1000 feet of stream; and
6. 220 square feet of conifer basal area per 1000 feet of stream.

In addition to the Forest Practices Act, within State Scenic Waterways, Oregon Parks and Recreation Department (OPRD) has authority to administer the Scenic Waterways Act. The rules adopted by OPRD apply to all land within one-fourth of one mile of the bank of the Upper Deschutes. The scenic waterways rules apply to land management activities including activities related to timber harvest. OPRD review and clearance should be planned for forest operations conducted within or adjacent to State Scenic Waterways portions of the Deschutes River.

The OPRD review is conducted through a process known as "notification". The landowner/operator must file a form with OPRD entitled Notification of Intent to Make Improvements, Change Land Use, or Engage in Regulated Activities within the Oregon Scenic Waterway System. A supplemental form must also be filed when timber harvest is proposed. Forest operations are reviewed for their potential impact on the natural beauty of the waterway as viewed from the river. The notification process is an approval/denial function, not a permit process. Approval or denial is issued in a letter rather than a permit. There are currently no filing or processing fees to go through the notification process.

The focus of the State Scenic Waterway Program is management by negotiation and compromise. Thus, if forest operations are planned in the State Scenic Waterways portion of the Deschutes, early contact with OPRD is advised to ensure that the project will adequately consider the Scenic Waterway Program.

Boundary

By Congressional designation, the interim boundary would be established 1/4 mile on either side of the river.

Common to Alternatives 2-6

Under all alternatives, current management direction (Alternative 1) would continue unless specifically changed by this plan.

Goal: *Protect and enhance Outstandingly Remarkable Values, including resources which are significant elements of those values.*

For some values or resources, the conditions required to achieve this overriding goal are generally accepted, so there is no difference between the “action” alternatives. These “common to all” goals and probable actions are designed to provide baseline protection and enhancement of river values consistent with the Federal and State mandates.

Geologic and Hydrologic Values

Under all action alternatives, the Outstandingly Remarkable geologic features would be maintained free of obtrusive development and protected from accelerated erosive activity or other damage resulting from land-based development.

Development of facilities and instream structural additions would be permitted where Outstandingly Remarkable Values would not be adversely affected. Instream channel structure would be improved through the addition of rubble, cobbles, and boulders. Streambank protection techniques would emphasize use of native vegetation and bioengineering techniques. Hardening of banks would not be permitted if such activities would adversely affect free flowing or other river values. Utilization of native vegetation, woody debris, and other techniques which mimic natural stream dynamics would be encouraged.

Water quality, as it is affected by land-based activities or instream structure, would be protected by the use of project-specific Best Management Practices and by improvement of riparian conditions through modification of river access points (also see Vegetation section). Except where needed for access to developed sites, local roads within 100 feet of the river would be obliterated or closed to motor vehicle travel.

New flood control and hydroelectric developments would be prohibited. New water diversions would be prohibited unless a substantial benefit to river values is demonstrated. Routine maintenance of existing developments would be permitted; these activities would be designed to minimize long-term effects to river values. Habitat improvement structures such as screening devices may be permitted if benefits are established.

The location of claims under current mining laws would be continued (no locatable mineral are known to be present within the corridor); mineral leasing and the disposal of saleable minerals would only be allowed if such activities would protect and enhance Outstandingly Remarkable Values.

Probable Actions

- Road relocation or closures and revegetation.
- Redesign river access at Lava Island, Aspen, and Meadow Picnic Area to delineate access areas and move traffic back from the river.
- Rehabilitate/revegetate streambanks (see Vegetation section).
- Improve instream structure (see Fishery probable actions).

Fishery Value

Current management of fish populations through the development of Oregon Department of Fish and Wildlife Basin Management Plan would continue. Federal, State, and Tribal parties would work in coordination with the Oregon Department of Fish and Wildlife to ensure that the provisions of the Upper Deschutes Wild and Scenic River Plan and the Deschutes Basin Plan are consistent. Cooperative agreement between Federal, State, and Tribal governments would continue to provide management to protect and enhance habitat for self-sustaining populations of brown and native trout with representation of juvenile, sub-adult and adult age categories. Management would provide good habitat conditions consisting of spawning and incubation conditions, cover, food supply, and protection through appropriate fishing regulations.

All alternatives would restore woody material and gravel, cobble, and boulder substrate to the river to improve fish habitat. This material may be anchored, where necessary to meet project objectives or avoid safety hazards, in a manner which would meet scenic quality standards and not adversely affect free flow or other river values. This material would be placed at locations and at levels which would mimic natural conditions. Target levels for placed material (woody and rubble) would be 50-100 pieces/mile. Site-specific analysis will determine the actual number of pieces in a specific reach of the river. The order of priority for habitat improvement activities is Segment 2, 3, then 4. Up to one percent of the streambed would be covered with suitable spawning gravel in each segment.

The natural introduction and redistribution of wood in the river may result in log jams, which inhibit navigability but may provide excellent fish habitat. In all alternatives, the presence of wood, including logjams, would be considered an important natural component of the river ecosystem and left without human disturbance wherever possible. However, some circumstances would require review and possible manipulation or removal of wood. These include, but are not limited to:

- 1) life-threatening navigational barriers,
- 2) situations creating adverse impacts on river values,
- 3) situations requiring portages which would have an adverse impact on river values or involve crossing private property,
- 4) situations causing an undue hazard to public safety, capital investments, or private property,
- 5) maintenance of continuous safe navigability for motor craft in segments where motorized boating is permitted. Where only non-motorized boating is permitted, naturally occurring logjams may frequently limit navigation and require portages.

Under all action alternatives, logjams would be manipulated the minimum necessary to eliminate hazards in these situations.

Probable Actions

- Large woody material and rubble substrate (basketball to 55 gal. drum size rock) would be introduced for fish habitat. Gravels would be introduced to enhance fish spawning.

Vegetation Value

Native riparian vegetation would be healthy and dominate the periodically inundated and saturated areas within the river corridor. Riparian areas would be managed to support riparian dependent species, act as effective filters of overland flows, eventually provide a natural source of woody material to the river system, buffer effects of floods and currents to streambanks, provide a dominant element of the scenery as viewed from the river, and provide wildlife habitat. The populations of *Artemisia ludoviciana estesii*, a species found in riparian habitat, would be maintained or improved through protection of riparian areas.

Riparian vegetation would be protected and enhanced by eliminating roads and dispersed recreation sites which affect the ability of the riparian area to perform these functions or to support riparian-dependent species. Dispersed recreation sites within 300 feet of the river would be reviewed for impacts on water quality, riparian vegetation, and wildlife. Sites would be modified or closed if necessary to reduce those impacts. Dispersed sites would be permitted only where designated.

Developed recreation sites would be reviewed to determine if effects to riparian vegetation could be reduced or eliminated. These sites would be redesigned to direct use of riparian areas to specific locations, using appropriate protection methods to minimize loss of vegetation, streambank degradation or soil compaction. To the extent possible, existing developed sites would be redesigned to minimize impact to riparian areas. When locating new facilities, placement in riparian areas would be avoided.

Dispersed activities (including camping and trail use) would be managed to avoid adversely impacting riparian values. Dispersed sites would be permitted only where designated. Trail locations would continue to be designed to minimize adverse effects on riparian vegetation, streambank stability, and soils.

Standing dead and down trees within Riparian Habitat Conservation Areas (as defined by the Inland Native Fish Strategy) would be maintained to provide streambank structure, future fishery habitat, and wildlife habitat unless such trees are determined to be an unacceptable safety hazard. Hazard trees would be felled and used to meet goals for down logs for wildlife habitat or placed in the river for fish habitat.

Meadow restoration would primarily be achieved using prescribed burning or hand tools to remove encroaching vegetation. Other methods which would achieve objectives may be permitted if they would have no adverse effects on Outstandingly Remarkable Values.

Noxious weeds in riparian and upland vegetation types would be controlled using prevention, biological, mechanical, or chemical methods (consistent with Regional direction) where such activities would not adversely affect river values.

Upland vegetation would continue to be dominated by ponderosa and lodgepole pine. The forest would be characterized by disturbances which mimic the effects of periodic occurrence of small, low intensity fires, to perpetuate a mosaic of stand structures and ages and reduce the risk of high intensity fires. This mosaic would provide wildlife with thermal and breeding cover, dispersal habitats, and connection to water sources.

Ponderosa pine or other species suitable for eagle or osprey nesting would be managed to provide trees which are 20 inches or larger in diameter. Prescribed fire would be used at locations, scale, intensity, and frequency which would mimic pre-suppression historical averages for the watershed, where such fires would not have long-term adverse effects on other river values or cause undue risk to public health and safety or private property. In some cases, mechanical pre-treatment of fuels would be required to safely utilize underburning.

Standing dead trees would be maintained at levels sufficient to provide suitable habitat for blackbacked and three-toed woodpeckers and other management indicator species (see Forest Plan). Removal of dead vegetation following catastrophic events such as insect, disease, or fire could be permitted if a long-term benefit to Outstandingly Remarkable Values was demonstrated. Hazard trees within developed sites and along system roadways would continue to be managed according to current management direction. Wildfire suppression activities would continue with prompt, appropriate action taken to reduce spread of fire and threat to resource values. Some fuel reduction activities (pre-treatments) could be permitted (if such activities would not adversely affect Outstandingly Remarkable Values) to assist in the safe use of prescribed fire and adjacent to private inholdings to reduce the threat of fire spreading to federal, state, or county lands and elsewhere. Target fuel loading levels would vary by Plant Association Group (PAG), as shown in Table 2-4.

Table 2-4
Target Fuel Loading
by Plant Association Group

| PAG | tons/acre |
|----------------------|------------------|
| ponderosa pine | 10-15 |
| mixed conifer (dry) | 12-24 |
| lodgepole pine (dry) | 8-12 |
| lodgepole pine (wet) | 12-24 |

In river segments with a Visual Quality Standard of Retention (Segments 4A-4E), grazing utilization standards would not exceed 10 percent (\pm 5 percent) of current year's production of shrub species and 5 percent (\pm 5 percent) of current year's production of key grasses and grasslike species. Along river segments with a Visual Quality Standard of Partial Retention (Segments 2, 3, and 4F), grazing would not exceed 20 percent (\pm 5 percent) of current year's production for shrub species and 20 percent (\pm 5 percent) of current year's production for key grasses and grasslike species.

Current management goals for special management areas (Pringle Falls Experimental Forest and Bald Eagle Management Areas) would continue under all alternatives to the extent that accomplishment of such goals would not adversely effect Outstandingly Remarkable Values.

Interpretive signing would be designed to encourage ecosystem protection.

Probable Actions

- Shrub and grass components would be regenerated and rejuvenated.
- Invasive vegetation would be removed to protect or restore meadow integrity.
- Vegetation would be managed to protect and enhance Outstandingly Remarkable Values.
- The amount and distribution of natural fuel loads would be reduced.
- Noxious weeds would be controlled.

- Hazard trees within campgrounds and along roads would be felled and/or removed.
- 80-90 percent of existing dispersed sites would be closed.
- Wampus Campground would be closed.
- Big Eddy, Lava Island, Aspen, Dillon Falls, Meadow Picnic Area and Slough developed sites would be rehabilitated by planting native vegetation, placing barricades, and designating parking.
- Current grazing uses would be redesigned to meet Visual Quality Standards.
- Interpretive signing would be added.

Wildlife Value

Management activities would maintain Outstandingly Remarkable wildlife populations and diversity of species within the corridor. Songbirds would predominate in areas adjacent to the river. Eagle, osprey, and great blue heron would continue to dwell along the river. Wildlife dispersal and travel would be facilitated by the arrangement and connectivity of suitable habitat. Trails and facilities will be designed to provide screening of raptor nesting and elk calving and deer fawning sites to avoid or reduce disturbance to wildlife in sensitive habitat areas. Road densities would be managed to improve habitat effectiveness. Special management standards directed by the Forest Plan for bald eagle and key elk habitat would continue. Seasonal closure of Tumalo deer winter area would continue. As directed by the Forest Plan, motorized activities would be restricted in areas adjacent to nests of golden eagles, redtail hawk, osprey, northern goshawk, sharp-shinned hawk, great gray owl, and great blue heron. Unique habitats (large rock outcroppings, lava flows, wetlands, etc.) would be identified and avoided, where possible, when siting new recreation sites and trails.

Snags and down logs would be managed to provide for ecosystem needs and reduce the risk of high intensity fires which could adversely affect long-term river values. Target levels for snags and down log habitat are shown in Table 2-5. The actual size and distribution of snags and down log habitat would be determined by fuel planners and biologists based on site-specific analysis.

Firewood cutting for home use would not be permitted within the corridor, except if site-specific analysis demonstrated benefits to the Outstandingly Remarkable Values. Firewood gathering or cutting for camp use would be discouraged within 300 feet of the river.

Wildlife interpretation would focus on habitat protection, species that wildlife viewers would have a high likelihood of seeing, educating the public in the importance of wetlands, meadows, snags, and other unique habitats.

Table 2-5

**Snags and Down Logs
by Plant Association Group**

| PAG | feet²/acre |
|----------------------|------------------------------|
| ponderosa pine | 900-1300 |
| mixed conifer (dry) | 1100-2100 |
| lodgepole pine (dry) | 700-1000 |
| lodgepole pine (wet) | 1000-2150 |

Probable Actions

- Roads would be closed in sensitive habitat areas.

Scenic Value

Under all alternatives, the scenic integrity would be protected and enhanced by blending natural and cultural elements of the landscape to be consistent with the expected physical and social setting of the designated Recreation Opportunity Spectrum (ROS). Visitors would expect to see more signs of human activities in Rural and Urban ROS classifications and less in Roaded Natural.

Except for developed sites, segments with Scenic River classification would be managed to meet a Visual Quality Standard (VQS) of Retention, and segments with Recreational River classification would be managed to meet a VQS of Partial Retention. In all alternatives, segments with a Recreation Opportunity Spectrum classification of non-motorized would be managed to meet a VQS of Retention. Developed sites would be managed to meet a VQS of Modification or higher. River access would enhance the recreational experience while protecting scenic qualities. Site developments would blend in to the landscape to the extent possible. Visual Quality Standards would not apply to private land.

Developed and dispersed recreation sites would be designed and managed to minimize visibility from the river.

New transmission, gas or water lines would be discouraged. Where no reasonable alternative exists, adverse effects to scenic quality would be minimized by using existing rights-of-way and structures or burying lines.

Probable Action

- Developed and dispersed sites would be modified to improve screening from river.

Cultural Resource Value

As directed by the Forest Plan, the known prehistoric properties along the river would be managed under provisions provided in the National Historic Preservation Act, the Deschutes National Forest Land and Resources Management Plan, and the Programmatic Memorandum of Agreement between the Forest Service, ACHP, and SHPO. Sites would be in one of three conditions: undisturbed, inventoried and interpreted, or inventoried but uninterpreted. Native American Indian interests and treaty rights would continue to be protected under existing laws and regulations.

Probable Actions

- Inventory, evaluation, and mitigation would occur as part of site-specific projects.

Recreation Value

Under all alternatives, a variety of recreational activities would be provided within a predominantly natural setting without adversely affecting other river values.

Use Levels

Under all alternatives, the issue of total use levels is addressed with a common strategy. Federal, state, and local governments have limited opportunities to control use levels within the Upper Deschutes river corridor because of the proximity of Bend, resorts, and extensive private inholdings along the river. Designed annual use levels have been developed for this plan as the basis for federal and state agencies to plan site developments at a level expected to be consistent with resource protection and desired recreational experiences. The Recreational Opportunity Spectrum Standards and resource protection needs would determine the total number, location, and development levels of recreation sites (including day-use areas, trailheads, overnight camps, and boat ramps). Changing the number of individual recreation sites and manipulating outfitter use levels are the only reasonable methods of addressing concerns about total use levels. Use levels would be monitored to determine whether resources are protected and total use is appropriate to the desired recreational setting in each segment.

Developed and Dispersed Sites

The Recreational Opportunity Spectrum Standards and resource protection needs would determine the total number, location, and development levels (for developed sites) of recreation sites (including day-use areas, trailheads, overnight camps, and boat ramps).

Development of new campgrounds, picnic areas, or other developed sites would only occur if use levels indicate additional developed site capacity is needed. Expansion of existing facilities would be considered before development of new facilities. New developments would be designed to minimize disturbance of wildlife and move use away from sensitive riparian areas to the extent possible while still providing access to the river at designated locations. Barrier-free facilities would be provided in accordance with applicable federal, state, and local laws and regulations.

All dispersed and developed sites within 300 feet of the river would be reviewed to determine effects on river values. Based on this review, the sites would be modified to reduce risk of resource damage, provide for public needs, improve sanitation and safety, and improve vegetation screening. Modifications may include revegetation, redesign with site protection measures, relocation, or closure as necessary to mitigate adverse effects on river values.

LaPine State Recreation Area would continue to be managed according to the Master Plan. Some new facilities could be provided, including cabins and primitive boat-in camp sites. The undeveloped boat ramp at the bridge would be retained.

Dispersed Use

Class I, II, and III all-terrain vehicles would be allowed on roads as provided by ORS 821.020; no off-road use would be allowed on public lands within the river corridor.

Snowmobiles would be permitted on designated routes only. The primary intent of designated routes would be to provide access from private lands within the river corridor to public lands open to snowmobiling outside the corridor.

Horses would be permitted only on designated trails. Bicycles would be permitted on trails unless otherwise designated; no off-road/off-trail use would be allowed on public lands within the river corridor. Trails would be designed to provide screening of raptor nesting, elk calving, and deer fawning sites to avoid or reduce human disturbance of wildlife in sensitive habitat areas.

Boating

Below Aspen river access, only non-motorized boating would be permitted.

In Segment 2, the road between Wyeth Boat Ramp and Pringle Falls Campground would be kept open to maintain motorized access around private lands for portage of Pringle Falls.

Special Uses

Special uses that are consistent with, complement, or support the goals of the river plan and would not adversely impact other river uses would be considered. They may be appropriate if they promote stewardship, protect resources, aid in controlling use, and respond to demonstrated needs.

Educational programs which promote understanding of river ecosystems would be given preference when issuing new special use permits. Applicants for guide/outfitter special use authorization would provide the Forest Service with a needs assessment prior to application for special use authority.

Special events (activities which are limited in frequency or non-reoccurring) could be permitted if they would not last more than three consecutive days, would be consistent with desired recreation experience and resource conditions of the segment, and would have no long-

River Travel

Motorized river travel is regulated by the State Marine Board. Throughout the alternatives, motorized and non-motorized river uses were integrated with land-based ROS classes to provide a consistent recreational setting on and off the river, utilize existing developed facilities, and minimize administration difficulties.

River segments where motorized boating would be permitted are referred to as mixed use segments, because non-motorized boating would also be allowed and may be the primary use.

term adverse effects on river values. The size of such events would not exceed 100 participants in Roaded Natural segments and 150 participants in Rural and Urban segments. The anticipated number of spectators and their potential impacts must be considered in the permitting process and could result in denial of use.

Commercial rafting, canoe outfitting, and guided horseback riding represent a significant amount of the use in the segments where they are permitted. The need for these current uses was determined when the uses were authorized and will be continued in all alternatives at some level.

Under all alternatives, uses would remain predominantly non-commercial in Segment 2.

Access to private land across National Forest land would continue to be allowed through the special use process according to existing laws and regulations.

Other Recreation

Interpretive programs would be developed to improve public awareness and understanding of the importance of complex ecosystems and other river values. The size or type of program would vary with the recreational setting of each segment.

A "No Shooting Area" currently exists along approximately 12 river miles within Segment 3. A Deschutes County advisory board reviews the closure on a periodic basis and considers the need to balance public safety and legitimate hunting activities in areas of suitable habitat. The closure is modified as conditions, particularly residential development, change. This closure would be continued in all alternatives and updated when changed by the advisory board. Figure 2-1 shows exact areas affected by the closure as of publication date.

Probable Actions

In all segments:

- Existing facilities would be reconstructed or replaced with barrier-free facilities at developed sites with barrier-free access.
- All individual developed and dispersed sites would be designated.
- Some existing trails would be obliterated, relocated or redesigned.

Segment 2

- A take out/portage trail around Tetherow logjam would be developed.

Segment 3

- Barrier-free fishing from the historic General Patch Bridge would be developed.
- A trail with trailhead parking and day-use picnic area would be developed in the area between Spring River and Road 40 to interpret ecosystem interactions.
- The undeveloped boat ramp at Harper Bridge would be replaced with safer public access which would protect riparian and other values.
- Besson Camp would be converted to day use.

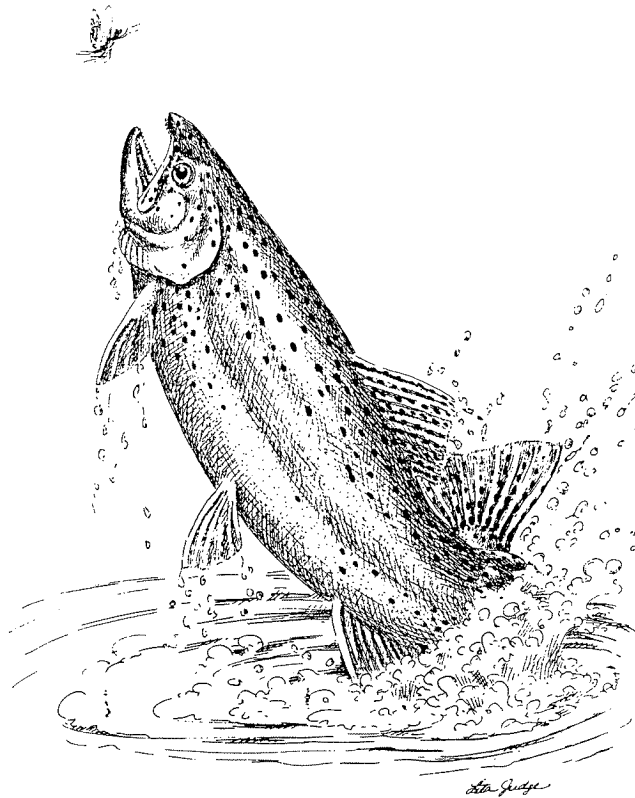
Segment 4

- A new road to Benham Falls Overlook would be constructed.
- All existing developed sites and most dispersed sites would be limited to day use with an increased level of site protection to accommodate expected increases in use.

- Aspen, Benham Falls Overlook, Dillon Falls, and Big Eddy would have barrier-free trails and restrooms added.
- Except for Roads 9702-600 and 9702-621 (Benham Butte River Access) and 9702-650 (private land access), all roads west of 9702-600 and 9702-620 would be closed to public travel.
- Trailhead parking would be developed in Segment 4A.

Administrative

Restrictions on motorized use (on and off river) would not apply to emergency or administrative use. When being converted to non-motorized access, roads to developed boat ramps would be closed rather than obliterated to maintain emergency or administrative access.



DESCHUTES RIVER NO SHOOTING CORRIDOR

Deschutes County law and a Deschutes National Forest order restrict use of firearms along segments of the Deschutes River marked on this map as a "No Shooting Area". Firing any kind of firearm is prohibited in no shooting areas except by a peace officer acting in the line of duty or by a person acting to defend life or property. Hunters may not shoot firearms while hunting within no shooting areas.

No shooting areas include the beds and banks of the Deschutes River, islands and lands within 150 yards of the ordinary high water mark of the river.


No shooting areas are posted with signs on both sides of the river. However, shooters are responsible for determining whether or not they are within a restricted area before they shoot. Public cooperation in maintaining posted signs is appreciated.

Lands within subdivisions west of the Deschutes River between Harper Bridge and General Patch Bridge are also closed to shooting.

Violation of no shooting restrictions is a Class A infraction, punishable by a fine of up to \$600.

 NO SHOOTING AREA

 BOAT RAMP

 DESCHUTES NATIONAL FOREST BOUNDARY

NO SHOOTING AREAS BY RIVER MILE

| FROM RIVER MILE | TO RIVER MILE |
|-----------------------|---------------------|
| 185.45 | 187.70 |
| 190.74 | 191.52 |
| 191.88 | 192.40 |
| 192.75 | 198.94 |
| 199.49 | 200.00 |
| 200.15 | 200.60 |
| 201.21 | 201.93 |
| 202.88 | 203.07 |

RIVER MILE REFERENCE POINTS

| | |
|---|--------|
| North Sunriver Border: | 185.45 |
| (north edge of No Shooting Corridor) | |
| Cardinal Bridge: | 186.93 |
| Spring River: | 190.58 |
| Harper Bridge: | 191.73 |
| Little Deschutes River: | 192.55 |
| General Patch Bridge: | 199.15 |
| River Forest Acres Border: | 203.07 |
| (south edge of No Shooting Corridor) | |

Note: River Miles are determined with reference to USGS Quadrangle maps.

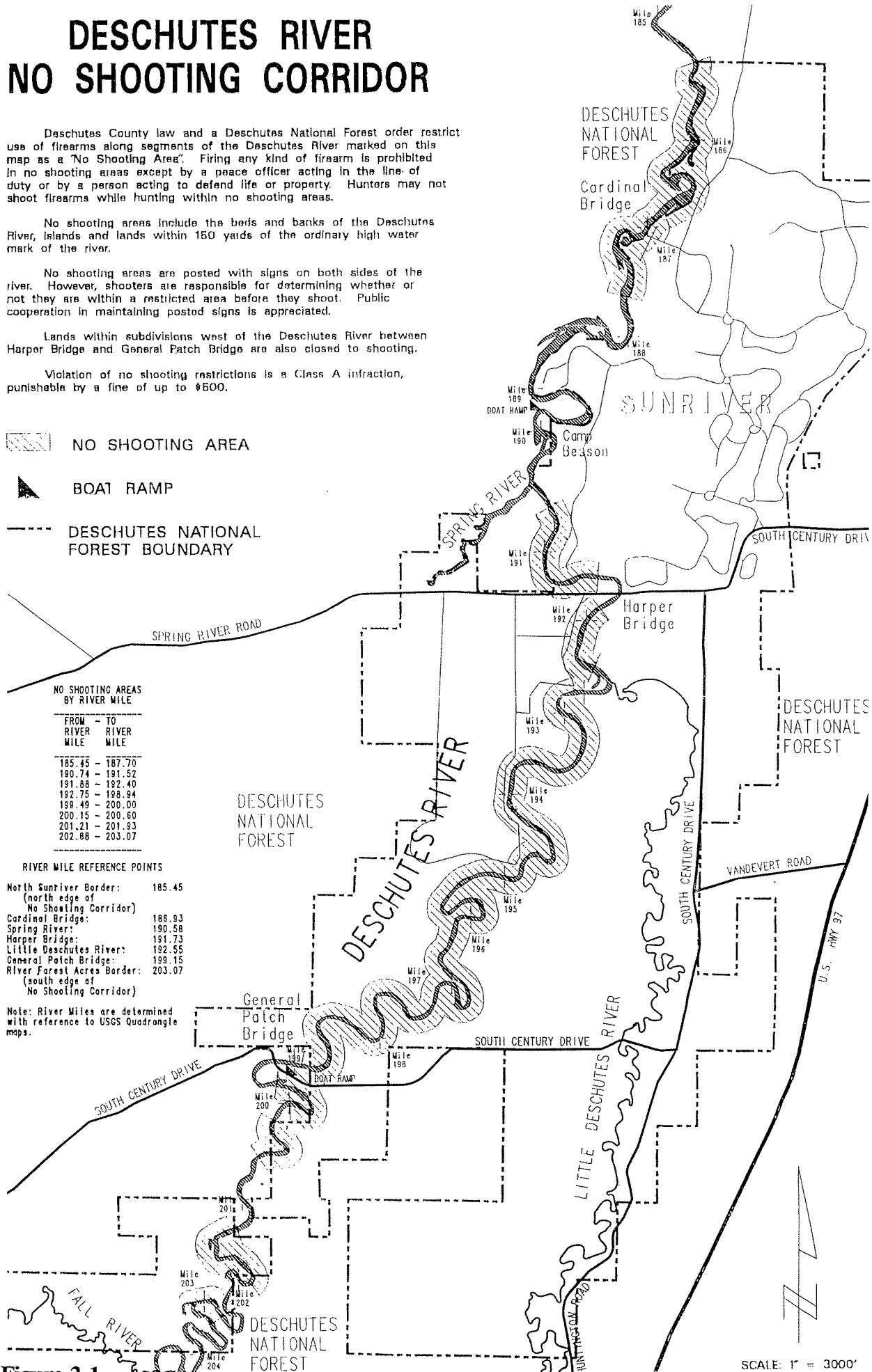


Figure 2-1

Private Land Use

Unless otherwise noted in specific alternatives, all current land use regulations administered by the Oregon Department of Parks and Recreation, Division of State Lands, Oregon Department of Forestry, USDA-Forest Service, and Army Corps of Engineers would continue.

Design Review

All river management agencies would encourage the protection and restoration of native riparian and upland vegetation. Existing tree and shrub cover on undeveloped lots within Landscape Management (LM) zones would be retained until landscape management review is completed. Native vegetation between the structure and the river would be retained except for fire hazard reduction or health and safety.

The Oregon Department of Parks and Recreation would provide for additional design review of fences and agricultural buildings within the State Scenic Waterway.

The Division of State Lands would review fill and removal projects between General Patch Bridge and Harper Bridge with the same bioengineering standards as the State Scenic Waterway segments.

The current exceptions process would be continued in all alternatives.

Fill and Removal

Bioengineering would be the preferred first step in streambank stabilization proposals. Concrete walls or other hard technology would be permitted only if the applicant could demonstrate that use of natural systems would not be feasible and the hardened structure would not adversely affect free flow or other river values.

Land Acquisition

Appropriate members of the Deschutes River Stewardship Team would develop criteria to identify and acquire, from willing sellers, lands or easements for conservation or access. Acquisition could be through purchase, trade or donation. Lands which are undeveloped within scenic areas, provide important riparian or fishery habitat, protect or enhance key wildlife habitat, or provide public access to the river would be considered.

Interagency Cooperation

The Forest Service, Bureau of Land Management, Oregon Department of Parks and Recreation, Oregon Department of Forestry, Deschutes County, and the City of Bend would continue their cooperative partnership as the Deschutes Stewardship Team. The mission of this team is to assist landowners in appropriate development practices which will protect and enhance river values and simplify the overlapping permitting processes.

The Team would explore the feasibility of developing a joint permit for all land development, and fill and removal projects within the Wild and Scenic and State Scenic river boundaries.

A cooperative monitoring effort between the Forest Service, Oregon Department of Environmental Quality, and Deschutes County would be designed to monitor the potential cumulative effects of on-site septic systems on water quality.

Probable Actions

- A river stewardship educational program would be developed.
- To enforce rimrock setbacks in the non-intensively developed areas within the City and Urban Growth Boundary, rimrock within 300 feet of the river would be mapped as recommended by the Deschutes Basin Resource Committee.
- Deschutes County ordinances would be developed to include design review before any vegetation removal activities on private land within the Federal Wild and Scenic River boundary and State Scenic Waterway boundary.
- The undeveloped boat ramp at Harper Bridge would be replaced with safer public access which would protect riparian and other values.
- State Scenic Waterway rules would be changed to include fences and agricultural buildings in design review.

Boundary

The State Scenic River boundary remains $\frac{1}{4}$ mile on either side of the river and covers the same segments described in Chapter 1.

A common Wild and Scenic River boundary that protects and enhances river values was identified for all action alternatives. The following criteria were used in developing the proposed boundary:

- Land necessary to protect and enhance river values was included.
- Land necessary to protect and enhance river values but already under protection comparable to and consistent with the Wild and Scenic River Act (such as Newberry National Volcanic Monument and Pringle Falls Research Natural Area) was excluded.
- Private land outside the area visible from the river was excluded whenever practical.
- Private lands were included in the boundary where uses of such lands could have a direct and adverse effect on river values.
- A $\frac{1}{8}$ mile buffer between Wickiup Dam and the boundary was allowed for required maintenance activities.
- The boundary is locatable on existing roads or section, quarter section, or sixteenth section lines.
- The area inside the boundary cannot exceed 320 acres per river mile. (The proposed boundary contains approximately 309 acres per river mile.)
- When roads within private property or between National Forest and private property provide the reference point for the Wild and Scenic River boundary, the centerline of the road shall constitute the boundary.
- When power lines provide the reference point for the boundary, the inside (closest to the river) perimeter of the power line right of way would be the boundary.
- When roads within the forest provide the reference point for the boundary, a line approximately 30 feet from the centerline and opposite from the primary land within the boundary would be the boundary.

Alternative 2

Goal: *Promote the most primitive, undeveloped resource conditions and recreation experience possible while maintaining non-motorized, water-based recreational opportunities and motorized access on primary arterial roads.*

Vegetation

The vegetation and landscape would be natural appearing, and natural ecological processes (fire, insects, etc.) would play a dominant role in shaping future vegetative conditions. Use of prescribed fire would create small ($\frac{1}{4}$ to $\frac{1}{2}$ acre) openings which would perpetuate a desired mosaic or break up large areas of uniform forest structure. Only those treatments included in Common to Alternatives 2-6 would be used.

Probable Actions

- See Common to Alternatives 2-6

Wildlife

Wildlife disturbance would be reduced by closing additional roads in sensitive habitat areas (see Alternative 2 map). Management of total recreation use levels, and conversion or relocation of developed overnight camps to alternative day-use areas would further reduce disturbance to wildlife.

Probable Actions

- Roads in sensitive habitat areas (see Alternative 2 map) would be closed or obliterated. Also see Recreation Opportunity Spectrum.
- Road 4370 between Wyeth Camp and Haner Parks and Road 4360 within Segment 2B would be closed.

Recreation

Recreational activities, use levels, and motorized use would be managed as shown in Table 2-6. Low development level recreation sites would be maintained, interspersed with long stretches of trail systems. Recreation emphasis would be on non-motorized day-use experiences both on and off the river. Motorized access to some existing developed sites would be eliminated. Only day use would be permitted in developed sites between Harper Bridge and COID canal. Land travel would be non-motorized in segments 2B, 4A, 4C, and 4D. Motorized travel on the river would be eliminated except between General Patch and Harper Bridges (Segment 3C). Outfitted use would be reduced by about half from existing conditions in Segments 3 and 4.

The emphasis within **Segment 2** would be on non-motorized uses. All river use would be non-motorized. Some existing local roads would be converted to trails. Access roads to private lands would be located outside of the river corridor boundary where possible. No dispersed sites would be designated at Tetherow Meadow.

Segment 3 would retain its dominant rural-urban qualities. LaPine State Recreation Area would continue to provide highly developed recreation.

Segment 4 would emphasize non-motorized use and access. Motorized access to developed sites, boat ramps or launch facilities would be reduced with some roads being converted to barrier-free trails. Campgrounds would be eliminated or converted to day-use sites. Hiker, biker, and horse uses would be separated on exclusive use trails on the Deschutes River trail system. Motorized support shuttles, launch times and use times would be designed to minimize adverse effects to other river values and disturbance to other recreationists (on and off river).

Probable Actions

Segment 2

- Road 4370 between Wyeth Camp and Haner Park would be closed.
- Access to Bull Bend Campground and boat ramp would be converted from motorized (road) to non-motorized (trail). The total number of campsites would be reduced by approximately ten and five parking sites at the boat ramp would be eliminated. Closed sites would be revegetated.
- Access to Tetherow Boat Ramp would be non-motorized.
- All roads in Segment 2B would be closed to motorized travel. Certain roads would be gated to provide administrative or emergency access.
- Trailhead facilities would be developed
 - 1) near the junction of Road 4360 and Road 4360-200,
 - 2) at the junction of Road 4330-600 & 4330-900,
 - 3) where Road 4330-900 meets the proposed boundary near SE corner of segment,
 - 4) where Road 4360 meets the proposed boundary.
- River use would be changed to non-motorized only.
- There will be no designated snowmobile routes in Segment 2B.
- No guided/outfitted use permitted.

Segment 3

- Besson Campground and motorized access to boat ramp would be eliminated. A replacement day-use/trailhead facility would be developed on the bench above the river.
- Roads north of Besson Camp area would be closed and/or obliterated. Appropriate roads would be converted to trails.
- Motorized travel on river would be permitted only in Segment 3C.
- Road access to Cardinal Bridge (4100-280) would be eliminated and cooperative efforts to remove the bridge would be encouraged.

Segment 4

- Access to Slough Camp and Dillon Falls would be converted from roads to barrier-free trails. Existing parking areas would be eliminated and revegetated. Trailhead facilities would be developed near the junction of Roads 4120 and 4100-100.
- Access to Big Eddy would be converted from roads to trails. Existing parking area would be revegetated. Trailhead parking facilities would be developed at the junction of Roads 4120 and 4120-500.

- Motorized access to approximately four dispersed sites in Segment 4F would be converted to trail access.
- In the Deschutes River Trail System, the "primary hiker" section would be changed to "exclusive hiker" use.
- Existing water and land-based outfitters use authorization would be reduced to approximately ½ their current use levels. Shuttles would be eliminated in early morning and after 3:30 pm. Reduce size and numbers of parties and shuttles.



Table 2-6

Alternative 2 - Recreation

| Segment | ROS | River Use | Designed Annual Capacity ¹ | | Total # of Sites ² | |
|---------|------------------------------|---------------|---------------------------------------|------------------------|-------------------------------|-----------|
| | | | non-commercial | outfitter ³ | developed | dispersed |
| 2A | Roaded Natural | Non-Motorized | 12,000 | 300 | 33 | 4 |
| 2B | Roaded Natural Non-motorized | Non-Motorized | | | - | 2 |
| 3A | Urban | Non-Motorized | 61,900 | 12,000 | 236 | - |
| 3B | Rural | Non-Motorized | | | 19 | 1 |
| 3C | Urban | Mixed | | | - | - |
| 3D | Rural | Non-Motorized | | | 11 | 4 |
| 4A | Roaded Natural Non-motorized | Non-Motorized | 16,200 | 32,000 | 5 | 1 |
| 4B | Roaded Natural | Non-Motorized | | | 19 | 2 |
| 4C | Roaded Natural Non-motorized | Non-Motorized | | | 8 | 1 |
| 4D | Roaded Natural Non-motorized | Non-Motorized | | | - | - |
| 4E | Roaded Natural | Non-Motorized | | | 10 | 1 |
| 4F | Rural | Non-Motorized | | | 12 | 1 |
| 4G | Urban | Non-Motorized | | | - | - |

1. Use numbers are based on guided/outfitted use, recreation sites, and trail capacities. Trail or river users who cross segment boundaries are counted in each segment.

2. Includes individual campsites and individual parking spaces at boat ramps and trailheads.

3. Includes non-profit/educational use.

Private Land Use

Setbacks and design review requirements for private land developments would be increased from current levels to promote high quality scenery, fisheries, and wildlife habitat. State, County, and Urban Area land use regulations would be changed to increase protection of native vegetation for screening, height, setback and design review requirements in order to enhance scenic and other river values.

Setbacks

In Deschutes County outside the Urban Growth Boundary, a 200 foot setback would be required on properties that are large enough to support a 200 foot setback. The existing 100 foot setback would be required on properties not large enough to support a 200 foot setback. The exceptions process would be maintained. The land acquisition program would also consider purchase of land which could not meet setback requirements. Within the Urban Growth Boundary, a 50 foot rimrock setback would be required.

Design Review

The State Scenic Waterway Program would adopt setback regulations consistent with Deschutes County.

Within the UGB and Deschutes County, native vegetation would be retained on the entire parcel except that which must be removed for the siting of the structure, fire hazard reduction or health and safety.

In State Scenic Waterway segments, the structure height would not exceed tree line as seen from the river, and no metal siding or roofing would be allowed, except on large farm buildings.

Probable Actions

- State Scenic Waterway rules would be changed to limit structure height to tree line and increase river setback to 200 feet.
- Deschutes County ordinances would be changed to require native vegetation be retained on the entire parcel except that which must be removed for the siting of the structure, fire hazard reduction or health and safety.

Alternative 3

Goal: *Improve current resource conditions while maintaining a wide range of recreational experience levels and activities.*

Vegetation

This alternative would emphasize more active management of resource conditions using a wide range of vegetation management practices to maintain or improve scenic qualities and wildlife habitat. Management activities would emphasize increasing the amount and distribution of large old-growth ponderosa pine forests. Use of prescribed fire to perpetuate this condition would be prevalent but not exclusive. Management activities away from the river foreground would be more noticeable than in Alternative 2.

Probable actions

- Vegetation management activities in addition to those specifically associated with prescribed burning.
- Creation of openings of ¼ to 5 acres in ponderosa pine and 10-20 acres in lodgepole pine.

Wildlife

Wildlife habitat management would be emphasized in Segment 2. No additional road closures over those Common to Alternatives 2-6 would be proposed.

Probable Actions

- Interpretive signing would be added near high-use recreation areas.

Recreation

With the exception of dispersed camping with motorized access, recreation activities and use levels would remain comparable to existing conditions with site numbers reflecting little change. Total use would be managed to levels shown in Table 2-7. Motorized access would be maintained to all existing developed sites except Tetherow Boat Ramp. Development of overnight areas upstream from Harper Bridge would be emphasized. Recreational developments would generally require more site protection than in Alternative 2. Motorized use would be allowed on the river in most segments. Existing outfitter use would remain comparable to existing levels with an upper limitation designed to provide a high quality recreation experience for both land and water-based non-commercial users. In segments where guided/outfitter uses are not now permitted, new uses could be allowed up to 10 percent of the designed annual capacity for that segment, provided the use meets the guidelines described in Common to 2-6.

Segment 2 would provide a mixture of motorized and non-motorized uses on the river. An additional developed campground could be developed in Segment 2A on the east side of the river. Boat/hike/bike-in dispersed sites would be designated between Pringle Falls Campground and Tetherow logjam.

Segment 3 would provide motorized river use and developed facilities. Total site numbers in this segment would be increased. Total use levels would be increased by increased site capacities, as well as continued private land developments. A multiple-use trail would be constructed to link Besson Camp with the Deschutes River Trail System near Benham Falls Overlook (Seg. 4). Six to ten dispersed camp sites with motorized access would be designated off Road 4100-280.

Segment 4 would emphasize day use. Some overnight boat-in/hike-in only opportunities would be available. Some segments would be limited to non-motorized use. Existing developed overnight sites would be converted to day use with an increased level of site protection to accommodate continued increases in uses. Multiple or primary use of the Deschutes River Trail System would be promoted and the trail would be extended. Additional water-based outfitter permits would be available for Big Eddy (Segment 4E) for activities which are consistent with ROS class and do not increase shuttle impacts. A maximum of five people at one time with a total of five persons per day would be allowed. Between July 1 and Labor Day, this use would be limited to before 10 AM and after 3 PM. Additional water-based outfitter permits would be available for below Meadow Picnic Area for activities which are consistent with ROS class and do not increase shuttle impacts, maximum 10 people at one time with a total of 1500 per year.

Some motorized access routes would be improved.

Probable actions

Segment 2

- A campground of Development Level 3 and up to 13 sites would be constructed between Road 44 and the river in Seg. 2A as needed.
- Sites in Pringle Falls Campground (Dev. level 4) would be improved and increased in number (up to 13) as needed.
- All roads in Segment 2B would be closed to motorized travel.
- Motorized river travel would not be permitted from Pringle Falls Campground to Tetherow logjam (Segment 2B).
- New guided/outfitted use authorization would be permitted in accordance with established standards (see Common to Alternatives 2-6); not to exceed 10 percent of the designed annual use level of the segment.

Segment 3

- The Big River complex would be modified to protect the riparian area and provide separate day-use, camping, and boat ramp facilities.
- The Deschutes River Trail would be extended from near Benham Falls Overlook to the end of 4100-240 spur near Besson Camp. Trailhead parking would be built at the south terminus of the extended Deschutes River Trail.
- New guided/outfitted use authorization would be permitted in Segments 3A, 3B, and 3C in accordance with established standards (see Common to Alternatives 2-6).

Segment 4

- The parking area at Big Eddy River Access would be surfaced and parking sites designated.
- The Deschutes River Trail would be extended from near Benham Falls Overlook to the end of 4100-240 spur near Besson Camp (Segments 3 and 4). This would be a multiple use trail.
- Use along the Deschutes River Trail would remain "primary user designated" until resource conditions and/or user conflicts are determined to be unacceptable.
- Motorized river travel would not be permitted from Dillon Falls to the COID diversion.

Private Land Use

Setback Requirements

Setbacks on private land use in Deschutes County would be 100 feet as described in Alternative 1. Within the Urban Growth Boundary, setbacks would be 40 feet with no rimrock setback.

Design Review

Within the Urban Growth Boundary and Deschutes County, all native vegetation between the structure and river would be retained except that which must be removed for fire hazard reduction or health and safety. State Scenic Waterway regulations would allow metal roofing and siding which meet design review requirements. Height of structures within the State Scenic Waterway boundary would not exceed 30 feet.

Probable Actions

- Change State Scenic Waterway rules to allow metal roofing and siding which meet design review requirements.

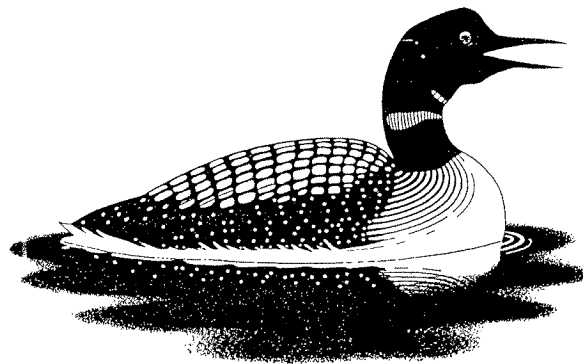


Table 2-7

Alternative 3 - Recreation

| Segment | ROS | River Use | Designed Annual Capacity ¹ | | Total # of Sites ² | |
|---------|------------------------------|--------------------|---------------------------------------|------------------------|-------------------------------|-----------|
| | | | non-commercial | outfitter ³ | developed | dispersed |
| 2A | Rural | Mixed | 19,000 | 3,800 | 67 | 4 |
| 2B | Roaded Natural Non-Motorized | Mixed ⁴ | | | - | 20 |
| 3A | Urban | Mixed | 67,000 | 38,500 | 236 | 1 |
| 3B | Rural | Mixed | | | 34 | 1 |
| 3C | Urban | Mixed | | | - | - |
| 3D | Rural | Mixed | | | 26 | 4 |
| 4A | Roaded Natural | Mixed | 29,500 | 66,500 | 5 | 1 |
| 4B | Rural | Mixed | | | 30 | 2 |
| 4C | Roaded Natural | Mixed | | | 8 | 1 |
| 4D | Roaded Natural Non-Motorized | Non-Motorized | | | - | - |
| 4E | Rural | Non-Motorized | | | 20 | 2 |
| 4F | Rural | Non-Motorized | | | 12 | 1 |
| 4G | Urban | Non-Motorized | | | - | - |

1. Use numbers are based on guided/outfitted use, recreation sites, and trail capacities. Trail or river users who cross segment boundaries are counted in each segment.

2. Includes individual campsites and individual parking spaces at trailheads and boat ramps.

3. Includes non-profit/educational use.

4. Only non-motorized use above Tetherow logjam.

Alternative 4

Goal: *Promote improved resource conditions and provide for more primitive experience on some segments of the river while maintaining existing developed uses in others.*

Vegetation

High quality scenery and wildlife habitat would be provided through active management of vegetation using a wide range of management practices. Upland vegetation management would primarily focus on reducing risks to scenic and other values from catastrophic fire and insect/disease infestation.

Probable Actions

- Vegetation management activities: thinning, burning, pruning, etc.
- Creation of openings of ¼ to 5 acres in ponderosa pine and 10-20 acres in lodgepole pine.

Wildlife

Wildlife disturbance would be reduced by closing roads in sensitive habitat areas (see Alternative 4 map). Management of total recreation use levels, and conversion or relocation of developed overnight camps to alternative day-use areas would further reduce disturbance to wildlife.

Probable Actions

- Road 4370 would be closed or obliterated between Wyeth Camp and Haner Park. Road 4370-100 would be reconstructed to provide motorized access to Bull Bend Campground.

Recreation

This alternative would provide for a variety of recreational experiences by concentrating undeveloped recreation in some segments and developed recreation in other segments. Motorized access would be provided to new and existing developed sites, except Tetherow Boat Ramp. Both motorized and non-motorized on-river uses would be allowed. Overall, existing guided/outfitted use would be capped at approximately 75 percent of current use levels; however, some new opportunities would be provided. In segments where guided/outfitter uses are not now permitted, new uses could be allowed up to 10 percent of the designed annual capacity for that segment, provided the use meets the guidelines described in Common to 2-6.

Segment 2 would provide non-motorized boating throughout and non-motorized land travel in Segment 2B (see Table 2-8). Developed sites would be maintained with motorized access, with no new site developments. Land based or non-motorized water-based outfitter guide uses would be permitted in accordance with developed standards (see Common to Alternatives 2-6). Dispersed campsites would have hike-in/boat-in access.

Segment 3 would provide a mix of motorized and non-motorized land and water recreation opportunities, with an emphasis on dispersed recreation and day-use activities. Motorized and non-motorized use would be permitted on river throughout the segment. Motorized access would be provided to designated dispersed camping areas as well as day-use areas. Besson would be day use only. Additional day-use facilities would be developed at Big River while maintaining overnight opportunities. Additional trails and trailhead facilities would be provided to link to the Deschutes River Trail System.

Segment 4 would provide primarily non-motorized, dispersed and day-use recreational opportunities. Hike-in or boat-in dispersed camping would be permitted, no motorized overnight camping would be permitted. All existing developed camping facilities would be converted to day use, with some sites converted to non-motorized access only. Trail users would be separated according to use types (hiker/biker/horse) between Meadow and Benham Trailheads to avoid conflicts and provide an increased sense of solitude. Motorized river use would be permitted upstream of Benham Falls Bridge.

Probable Actions

Segment 2

- Motorized access to Bull Bend campground would be provided by construction of access road off of Road 43 that does not parallel the river. Developed trailhead facilities would be constructed to provide non-motorized access to the areas affected by Road 4370 closure.
- All roads in Segment 2B would be closed to motorized travel.
- Tetherow Meadow would be closed to dispersed camping.
- On river, motorized travel not permitted from Pringle Falls to LaPine State Recreation Area.
- New guided/outfitter uses could be allowed up to 10 percent of the designed annual capacity for segment, provided the use meets the guidelines described in Common to 2-6.

Segment 3

- The Big River complex would be modified to protect the riparian area and provide separate day-use, camping, and boat ramp facilities.
- Besson Campground and motorized access to boat ramp would be eliminated. A replacement day-use/trailhead facility would be developed on the bench above the river.
- Trailhead parking would be provided at south terminus of Deschutes River Trail.
- Existing guided/outfitted uses would be capped at 75 percent of current use levels.
- Motorized access to Cardinal Bridge would be eliminated and cooperative efforts to remove the bridge would be encouraged.

Segment 4

- Slough Camp and Dillon Falls would be converted to day-use, with Slough Camp emphasizing wildlife viewing. Access to both areas would be converted from roads to barrier-free trails. Existing parking areas would be eliminated and revegetated. Trailhead facilities would be developed near the junction of Roads 4120 and 4100-100.
- Access to Big Eddy would be converted from roads to trails. Existing parking area would be revegetated.

- The “primary hiker” portion of Deschutes River Trail System would be changed to “exclusive hiker” from Meadow Picnic Area to Benham Falls.
- Deschutes River Trail would be extended as in Alternative 3.
- New whitewater opportunities would be permitted at Big Eddy and Meadow Picnic Area as in Alternative 3.
- Existing guided/outfitted uses permitted at 75 percent of current levels.

Table 2-8 Alternative 4 - Recreation

| Segment | ROS | River Use | Designed Annual Capacity ¹ | | Total # of Sites ² | |
|---------|------------------------------|--------------------|---------------------------------------|------------------------|-------------------------------|-----------|
| | | | non-commercial | outfitter ³ | developed | dispersed |
| 2A | Roaded Natural | Non-Motorized | 18,000 | 1,800 | 60 | 4 |
| 2B | Roaded Natural Non-Motorized | Non-Motorized | | | - | 2 |
| 3A | Urban | Mixed ⁴ | 67,000 | 24,000 | 236 | - |
| 3B | Rural | Mixed | | | 34 | 1 |
| 3C | Urban | Mixed | | | - | - |
| 3D | Rural | Mixed | | | 26 | 4 |
| 4A | Roaded Natural Non-Motorized | Mixed | 23,000 | 48,000 | 5 | 1 |
| 4B | Roaded Natural | Mixed ⁵ | | | 19 | 2 |
| 4C | Roaded Natural Non-Motorized | Non-Motorized | | | 8 | 1 |
| 4D | Roaded Natural Non-Motorized | Non-Motorized | | | - | - |
| 4E | Roaded Natural | Non-Motorized | | | 11 | 2 |
| 4F | Rural | Non-Motorized | | | 12 | 1 |
| 4G | Urban | Non-Motorized | | | - | - |

1. Use numbers are based on guided/outfitted use, recreation sites, and trail capacities. Trail or river users who cross segment boundaries are counted in each segment.

2. Includes individual campsites and individual parking spaces at boat ramps and trailheads

3. Includes non-profit/educational use.

4. Non-motorized use above LaPine State Recreation Area boat ramp/bridge

5. Closed to motorized use below Benham Falls bridge.

Private Land Use

Setbacks

The setback on private land in Deschutes County would be 100 feet. Within the Urban Growth Boundary, the setback would be 40 feet with no rimrock setback.

Design Review

State Scenic Waterway regulations would allow metal roofing and siding that meets design standards. Height of structures within the State Scenic Waterway boundary would not exceed 30 feet.

Within the UGB and Deschutes County, all native vegetation would be retained on the entire parcel except that which must be removed for the siting of the structure, fire hazard reduction or health and safety.

Probable Actions

- State Scenic Waterway rules would be changed to allow metal roofing and siding that meets design standards.
- Deschutes County ordinances would be changed to require native vegetation to be retained on the entire parcel except that which must be removed for the siting of the structure, fire hazard reduction or health and safety.



Alternative 5

Goal: *Provide the most highly developed recreational settings possible while protecting river values.*

Vegetation

This alternative would emphasize more active management of resource conditions using a wide range of vegetation management practices to maintain or improve scenic qualities and wildlife habitat.

Probable actions

- Vegetation management activities in addition to those specifically associated with prescribed burning.
- Creation of openings of ¼ to 5 acres in ponderosa pine and 10-20 acres in lodgepole pine.

Wildlife

Wildlife habitat would be actively managed to emphasize connective, security and dispersal habitat and to reduce risk of fires adjacent to developed areas. Disturbance factors would be the highest of the "action" range of alternatives, but would be reduced from existing condition because of road closures common to Alternatives 2-6 and restrictions on dispersed camping.

Probable Actions

- Interpretive signing would be added near high-use recreation areas.

Recreation

More motorized access would be provided than other action alternatives, but total mileage of open roads would still be less than the existing condition. Motorized boating would be allowed on all of the river except below Aspen River Access. Motor vehicle access to the river would be provided from all existing sites. Additional developed sites and outfitter opportunities would be provided. Total use levels would be managed according to Table 2-9. New developments would emphasize comfort of users and protection of resources over solitude and naturalness of setting.

Segment 2 would provide mixed motorized and non-motorized boating opportunities. Existing overnight facilities would be upgraded and up to three additional overnight campgrounds would be developed as needed to accommodate increases in use. Dispersed boat-in or hike-in overnight camping would be permitted at Tetherow meadow in designated sites. Closed roads would be converted to multiple-user trails with parking areas and trailheads to link developed sites with LaPine State Recreation Area trail systems. In segments where guided/outfitter uses are not now permitted, new uses could be allowed up to 20

percent of the designed annual capacity for that segment, provided the use meets the guidelines described in Common to 2-6.

Segment 3 would provide motorized river use and developed facilities. Total use levels would be increased by increasing site capacities. A multiple-use trail would be constructed to link Besson Camp with the Deschutes River Trail System near Benham Falls Overlook (Seg. 4). Existing outfitter uses could be increased to levels not exceeding 120 percent of current use levels.

Segment 4 would provide a combination of overnight and expanded day-use recreation opportunities. Hike-in or boat-in dispersed overnight facilities would be developed as use levels and needs arose. Deschutes River Trail System would continue to have a "primary" trail designation from Meadow Picnic Area to Benham Falls. A multiple-use trail system would be developed to link up with the Bend trail system to the north. A surfaced, primary bike trail would be constructed from Bend Urban Growth Boundary to Sunriver. Permits would be required for all on-river use between Aspen and Lava Island (Seg. 4E). Permits would be allocated on a first-come, first-serve basis with no preference given to educational groups. Outfitters would be allowed to apply on behalf of clients. Existing outfitter use opportunities in the remainder of Segment 4 could be increased to levels not exceeding 120 percent of current use levels.

Probable Actions

Segment 2

- A six site campground would be constructed adjacent to Tetherow Boat Ramp.
- A ten site campground would be constructed off of Road 4360.
- A fifteen site campground would be constructed between Road 44 and the River.
- Pringle Falls Campground would be upgraded to Development Level 4 and up to seven campsites would be added.
- Develop trail system utilizing closed and abandoned roads to link new campgrounds with Pringle Falls and La Pine State Recreation area.
- Guided/outfitted use permitted at a level not to exceed 20 percent of non-commercial capacity.

Segment 3

- Trail, facility, and site development would be the same as Alternative 3.

Segment 4

- A twelve site picnic area would be constructed west of Benham Butte River Access.
- A ten site picnic/day-use area would be constructed on Forest Service land west of Urban Growth Boundary with access road.
- Benham Falls, Slough Camp, Dillon Falls, Aspen River Access, Big Eddy River Access, Lava Island, and Meadow Picnic Area facilities to be developed as in Alternative 3.
- Roads to Benham Falls and Meadow would be surfaced.
- A new 12 site campground would be developed between Aspen Day-use Area and Big Eddy.
- A trail (with adjacent five space trailhead parking) would be constructed connecting the new picnic area with Meadow Picnic Area.

- A surfaced, primary bike trail would be constructed from Bend Urban Growth Boundary to Sunriver.
- Additional water-based outfitter permits would be available for lower Benham Falls not to exceed 3600 users per year.
- Additional water-based outfitter permits would be available for below Meadow Picnic Area for activities which meet special use criteria and do not increase shuttle impacts, maximum 10 people at one time with a total of 1500 per year.

Private Land Use

Private land use would be managed for a moderate level of scenic quality with an increase in city, county, and state emphasis on maintenance of native vegetation.

Setback Requirements

The setback requirement would be 100 feet from the river in Deschutes County. Within the Urban Growth Boundary the setback would be 40 feet with no rimrock setback.

Design Review

State Scenic Waterway regulations would allow metal roofing and siding. Height of structures within the State Scenic Waterway boundary would not exceed 30 feet. Native vegetation between the structure and the river would be retained except for fire hazard reduction or health and safety.

Probable Actions

- State Scenic Waterway rules would be changed to allow metal roofing and siding which met design standards.



Table 2-9

Alternative 5 - Recreation

| Segment | ROS Standard | River Use | Designed Annual Capacity ¹ | | Total # of Sites ² | |
|---------|----------------|--------------------|---------------------------------------|------------------------|-------------------------------|-----------|
| | | | non-commercial | outfitter ³ | developed | dispersed |
| 2A | Rural | Mixed | 23,000 | 4,600 | 65 | 4 |
| 2B | Rural | Mixed | | | 20 | 2 |
| 3A | Urban | Mixed | 69,000 | 44,000 | 236 | - |
| 3B | Rural | Mixed | | | 34 | 1 |
| 3C | Urban | Mixed | | | - | - |
| 3D | Rural | Mixed | | | 22 | 4 |
| 4A | Rural | Mixed | 51,000 | 120,000 | 17 | 1 |
| 4B | Rural | Mixed | | | 30 | 2 |
| 4C | Rural | Mixed | | | 16 | 1 |
| 4D | Roaded Natural | Mixed | | | - | - |
| 4E | Rural | Mixed ⁴ | | | 42 | 2 |
| 4F | Urban | Non-Motorized | | | 28 | 1 |
| 4G | Urban | Non-Motorized | | | - | - |

1. Use numbers are based on guided/outfitted use, recreation sites, and trail capacities. Trail or river users who cross segment boundaries are counted in each segment.

2. Includes individual campsites and individual parking spaces at boat ramps and trailheads.

3. Includes non-profit/educational use.

4. Closed to motorized use below Aspen Day-use Area.

Alternative 6

The Alternative 6 combines various elements of Alternatives 2-5 and includes all elements common to the action alternatives.

Vegetation

This alternative would emphasize more active management of resource conditions using a wide range of vegetation management practices to maintain or improve scenic qualities and wildlife habitat. Management activities would emphasize increasing the amount and distribution of old-growth ponderosa pine forest. Prescribed fire and other vegetation management techniques would be used to perpetuate this condition. Openings would be created ranging from ¼ to 5 acres in ponderosa pine and 10-20 acres in lodgepole pine.

Probable actions

- Vegetation management activities would occur in addition to those specifically associated with prescribed burning.

Wildlife

Wildlife habitat management would favor "watchable wildlife" near concentrated use areas. Additional roads would be closed in sensitive habitat areas.

Probable Actions

- Road 4370 would be closed between Haner Park and Bull Bend Campground. Road 4370-100 would be reconstructed to provide motorized access to Bull Bend Campground.

Recreation

Recreation activities and use levels would remain comparable to existing conditions with site capacities reflecting some expansion. Total use would be managed to levels shown in Table 2-10. Motorized access would be maintained to all existing developed sites. Downstream from Harper Bridge, all campgrounds would be converted to day-use areas. Development of new overnight areas farther from Bend would be emphasized. Use of the existing Deschutes River Trail by both hikers and bikers would be allowed until resource conditions or user conflicts are determined to be unacceptable.

Outfitter use would remain comparable to existing levels and would be designed to provide a high quality recreation experience for both land and water based users. No additional authorization for existing guide/outfitter use would be considered in Segments 3D or 4 (existing levels are shown in Table 2-2), except as noted below. Guided/Outfitted use in segments where it does not currently occur could be considered, but would not exceed 10% of the designed annual capacity. Cardinal Bridge would remain open under a special use permit to Sunriver Owners Association. Road 4100-280 would be gated above the meadow and maintained for emergency access.

Motorized use would continue on the river in most segments. Only non-motorized boating would be permitted from Pringle Falls Campground to LaPine State Recreation Area bridge/boat ramp (Segments 2B-3A) and from Aspen Camp to COID diversion (Segments 4E-4G).

Segment 2 would provide a mixed river use in Segment 2A and non-motorized use in Segment 2B. An additional developed campground would be provided on the east side of river if use levels indicate the need. Boat/hike/bike-in dispersed sites would be designated between Pringle Falls Campground and Tetherow logjam. New Guided/Outfitted use authorization would be permitted in Segment 2, not to exceed 2,000 users/year as shown in Table 2-10.

Segment 3 would provide mixed river use and developed overnight and day-use facilities. Total use levels in this segment would be increased. Public boat launching facilities would be located at LaPine State Recreation Area, Big River, Besson, and Harper Bridge (expected to be moved and upgraded). A multiple-use trail would be constructed to link Besson Camp with the Deschutes River Trail System near Benham Falls Overlook (Seg. 4). Up to six dispersed sites would be designated. New guided/outfitted use authorization would be permitted in Segments 3A, 3B, and 3C in accordance with established standards (see Common to Alternatives 2-6). New Guided/Outfitted use authorization would be permitted in Segment 3A-C, not to exceed 4,700 users/year as shown in.

Segment 4 would emphasize day use. Some dispersed overnight opportunities (boat-in/hike-in only) in designated sites would be available. Some segments would be limited to non-motorized use. One additional day-use area would be developed as needed on the east side of the river west of the Benham Butte River Access. A surfaced, primary bike trail would be constructed from Bend Urban Growth Boundary to Sunriver. Some motorized access routes would be improved.

In addition to current permits, new water-based, non-rafting outfitter permits could be considered for Big Eddy (Segment 4E) for activities which are consistent with ROS class and do not increase shuttle impacts. A maximum of five people at one time (with a total of five persons per day) would be allowed. Between July 1 and Labor Day, this use would be limited to before 10 AM and after 3 PM.

Additional water-based, non-rafting outfitter permits could be considered for below Meadow Picnic Area (Segment 4F) for activities which are consistent with ROS class and do not increase shuttle impacts. A maximum of 10 people at one time (with a total of 1500 users per year) could be allowed.

Probable actions

Segment 2

- A campground (Dev. level 3) would be constructed in Seg. 2A if use levels indicate the need.
- Sites in Pringle Falls Campground (Dev. level 4) would be improved and up to six additional sites provided as needed.
- Road 4370 would be closed, gated, and maintained for emergency and administrative access between Wyeth boat ramp and Haner Park. Road 4370-100 would be reconstructed to provide motorized access to Bull Bend Campground.

- Within Segment 2B, spur roads between Road 4360 and the river would be closed. Motorized access would be maintained to Tetherow Boat Ramp via Roads 4330-600 and 4330-900
- Within Segment 2B, trailhead facilities would be constructed for the areas affected by road closures.

Segment 3

- The Big River complex would be modified to protect the riparian area and provide separate day-use, camping, and boat ramp facilities. Number of campsites would increase.
- Besson Camp would become a day-use area (5-10 sites) with boat ramp.
- The Deschutes River Trail would be extended from near Benham Falls Overlook to the end of 4100-240 spur near Besson Camp.
- Four to six dispersed sites would be designated on the bench above the river off the 4100-286 road in Segment 3D.

Segment 4

- A 12 site picnic area would be developed west of the Benham Butte River Access.
- The parking area at Big Eddy would be improved, restroom facilities constructed, and trails constructed.
- A surfaced, primary bike trail would be constructed from Bend Urban Growth Boundary to Sunriver.
- The Deschutes River Trail would be extended from near Benham Falls Overlook to the end of 4100-240 spur near Besson Camp. Trailhead parking would be built at the south terminus of Deschutes River Trail.



Table 2-10

Alternative 6 - Recreation

| Segment | ROS Standard | River Use | Designed Annual Capacity ¹ | | Total # of Sites ² | |
|---------|----------------|----------------------------|---------------------------------------|------------------------|-------------------------------|-----------|
| | | | non-commercial | outfitter ³ | developed | dispersed |
| 2A | Rural | Mixed | 20,000 | 2,000 | 71 | 4 |
| 2B | Roaded Natural | Non-Motorized | | | 20 | 2 |
| 3A | Urban | Mixed ⁴ | 68,000 | 31,000 | 236 | 1 |
| 3B | Rural | Mixed | | | 34 | 1 |
| 3C | Urban | Mixed | | | 0 | - |
| 3D | Rural | Mixed | | | 31 | 4 |
| 4A | Roaded Natural | Mixed | 44,000 | 66,500 | 22 | 1 |
| 4B | Rural | Mixed | | | 30 | 2 |
| 4C | Roaded Natural | Mixed | | | 22 | 1 |
| 4D | Roaded Natural | Mixed | | | - | - |
| 4E | Rural | Non-Motorized ⁵ | | | 30 | 2 |
| 4F | Rural | Non-Motorized | | | 12 | 1 |
| 4G | Urban | Non-Motorized | | | - | - |

1. Use numbers are based on guided/outfitted use, recreation sites, and trail capacities. Trail or river users who cross segment boundaries are counted in each segment.

2. Includes individual campsites and individual parking spaces at boat ramps and trailheads.

3. Includes non-profit/educational use.

4. Only non-motorized use above LaPine State Recreation boat ramp/bridge.

5. Mixed use above Aspen River Access

Private Land Use

Setback Requirements

Setbacks on private land would be 100 feet in Deschutes County and 40 feet within the Urban Growth Boundary as described in Alternative 1. There would be no rimrock setback within the Urban Growth Boundary.

Design Review

Within the Urban Growth Boundary and Deschutes County, native vegetation on a parcel could only be removed for siting of structure, fire hazard reduction or health and safety. State Scenic Waterway regulations would allow metal roofing and siding. Height of structures within the State Scenic Waterway boundary would not exceed 30 feet.

Probable Actions

- State Scenic Waterway rules would be changed to allow metal roofing and siding which meet design standards.



Table 2- 11 Comparison of Alternatives by Issues

| Issue Indicator | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 | Alternative 6 |
|--|--|---|---|---------------|---------------|---------------|
| Geology and Hydrology | | | | | | |
| See riparian and fishery issues and Flow Options | Best Management Practices for protection of water quality | Geologic and hydrologic processes protected and enhanced by riparian protection measures, streambank revegetation and reduction of erosion sources. | | | | |
| Fishery | | | | | | |
| | Habitat projects occur as opportunities arise. | Habitat protected and enhanced for brown and native trout. Woody material, gravel, and rubble restored in river to mimic natural conditions. | | | | |
| Vegetation | | | | | | |
| Vegetation Goals | Vegetation managed to appear natural or near-natural and emphasize protection of riparian plant communities. | Riparian - Support dependent species, protect streambanks, protect water quality, enhance scenery. Ponderosa pine type - Dominated by large trees to enhance wildlife habitat and enhance scenic quality. Disturbance levels and stand structure mimic historic range of variability. Lodgepole pine type - Small to moderate scale disturbances to maintain moderate levels of risk of catastrophic loss and maintain cover and dispersal areas for wildlife | | | | |
| Vegetation treatment | Mechanical methods and prescribed fire permitted, wide variety of silvicultural practices allowed | Prescribed fire and mechanical pretreatment or reduction of fuels for prescribed fire to reduce fuel loads within critical areas. Removal of dead material permitted if to protect and enhance Outstandingly Remarkable Values. Meadow restoration permitted. Noxious weeds controlled using methods which would not adversely affect Outstandingly Remarkable Values. | | | | |
| | | Natural processes emphasized, prescribed burning and mechanical treatment of fuels permitted which protect soils. | Mechanical methods and prescribed fire permitted, wide variety of silvicultural practices allowed | | | |
| Road Closures | Road closures to meet Forest Plan std. as opportunities arise. | Closure or obliteration of roads within 100 feet of the river unless road leads to a developed site or provides legal land access. | | | | |

| Issue Indicator | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 | Alternative 6 |
|--|--|--|---|---------------|---------------|---------------|
| Vegetation, continued | | | | | | |
| Developed Recreation Sites | Periodic maintenance may provide riparian protection. | All developed sites reviewed. Modifications as needed to protect/rehabilitate riparian areas. | | | | |
| Dispersed Camp Sites | User created sites, no riparian protection. | All dispersed sites reviewed, then rehabilitated/relocated/closed as necessary to protect riparian areas. Estimated 80% of current dispersed sites would be closed. All dispersed sites would be designated and monitored. | | | | |
| Trails | Trail use only as designated. Mitigate riparian damage. New trails would avoid riparian areas. | | | | | |
| Snags and down logs | Evaluated on case-by-case basis. | Maintained on site for wildlife habitat or used for fishery habitat, stream structure improvement. Removal permitted if necessary for safety or to meet fuel loading targets. | | | | |
| Fuel loading (tons/acre) | 0-50 tons/acre | varies by Plant Association Group (PAG) ponderosa pine PAG: <15 tons/acre mixed conifer (dry) PAG: 12-24 tons/acre lodgepole pine (dry) PAG: < 12 tons/acre lodgepole pine (wet) PAG: 12-24 tons/acre | | | | |
| Wildlife | | | | | | |
| Habitat Conditions | See Vegetation section. | | | | | |
| Movement | Roads and other conditions have impaired dispersal. | Vegetation would be managed to facilitate species dispersal and migration needs across the river corridor and between the riparian and upland areas. Recreation uses would be managed to minimize habitat fragmentation. Road that parallel the river would be closed. | | | | |
| Disturbance | No specific road closures. | Restricted motorized use within riparian areas (See Vegetation section) and sensitive habitat areas. | | | | |
| Wildlife Trees and Logs | size and number of trees and logs varies by species | varies by Plant Association Group (PAG) ponderosa pine PAG: <1300 ft/acre mixed conifer (dry) PAG: 1100-2100 ft/acre lodgepole pine (dry) PAG: <1000 ft/acre lodgepole pine (wet) PAG: 1000-2150 ft/acre | | | | |
| Openings created by vegetation treatment | would not exceed 40 acres except to treat beetle-killed lodgepole pine. | natural processes (wildfire, insects, etc.) would determine size of openings | ¼ to 5 acres in ponderosa pine and mixed conifer stands. 10 to 20 acres in lodgepole pine. | | | |

| Issue Indicator | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 | Alternative 6 |
|---------------------------------------|---|---|----------------|---|--|-------------------|
| Scenery | | | | | | |
| VQS by subsegment | All segments classified as Scenic River would meet VQS of retention. All segments classified as Recreational River would meet VQS of Partial Retention. | | | | | |
| | No change to Recreational River segments | Recreational River segments with ROS class of RNNM would meet VQS of Retention. This would upgrade Segment 2B to Retention. | | | Same as Alt. 1 | Same as Alt. 2-4. |
| Recreation | | | | | | |
| Trail miles by type | | | | | | |
| primary hiker | 4.8 | 1.7 | 6.3 | 1.7 | 7.3 | 6.3 |
| exclusive hiker | 0.4 | 8.5 | 0.4 | 8.4 | 0.4 | 0.4 |
| primary horse | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 |
| primary bike | 1.5 | 1.5 | 1.5 | 1.5 | 12.8 | 12.8 |
| multiple use | 3.9 | 11.8 | 17.7 | 19.8 | 13.5 | 17.3 |
| Horse Travel | No restrictions unless conflicts or resource damage reach unacceptable level. | Prohibited on hiker only portion of River Trail | Same as Alt. 1 | Prohibited on River Trail | Allowed on River Trail, but prohibited on new surfaced trail | Same as Alt. 1. |
| Bicycle Travel | No restrictions unless conflicts or resource damage reach unacceptable level. | Prohibited on River Trail | Same as Alt. 1 | Prohibited from River Trail where alternative routes exist. | Same as Alt. 1 | Same as Alt. 3. |
| Individual Developed Recreation Sites | See Table 2-12. | | | | | |
| Dispersed Recreation Sites | | | | | | |
| with road access | 86 | 4 | 6-10 | | | |
| hike-in/boat-in | 57 | 25 | 25 | | | |

| Issue Indicator | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 | Alternative 6 |
|--|--|--|---|---|--|-----------------|
| Recreation, continued | | | | | | |
| Guided/Outfitted whitewater uses | Limited to rafting in Seg. 4E; 31,000+ guests/season, capped at 50,000 guests/season | Limited to rafting in Seg. 4E; capped at 50% of current use ^{1,2} | Rafting: in Seg. 4E capped at current use. ¹ Other whitewater use: in Seg. 4E, 5 users/day; in Seg. 4F, 20 users/day ² | Rafting limited to Seg. 4E, capped at 21,000 guests/season. ¹ Other whitewater use: same as Alt. 3. ² | In Segment 4E , common pool of 50,000 permits for all users. Rafting and other whitewater use in Seg. 4B capped at 3600 users/season. ² Other whitewater use in Seg. 4F: same as Alt. 3. | Same as Alt. 3. |
| Guided/Outfitted flatwater use non-motorized | Limited to Seg. 3D, 4A, and 4C; 24,000 guests/season; no cap. | Limited to Seg. 3D, 4A, and 4C; capped at 50% of current level. ¹ | In Seg. 3D, 4A, and 4C, use capped at current level. ¹ In Seg. 2, 3A, 3B and 3C, outfitted use allowed up to 10% of non-commercial use level. | In Seg. 3D, 4A, and 4C; capped at 75% of current level. ¹ In Seg. 2, 3A, 3B and 3C, outfitted use allowed up to 10% of non-commercial use level. | In Seg. 3D, 4A, and 4C; capped at 120% of current level. ¹ In Seg. 2, 3A, 3B and 3C, outfitted use allowed up to 20% of non-commercial use level. | Same as Alt. 3. |
| Guided/Outfitted river use motorized | Limited to Seg. 4B and 4C; 1,178 guests/season | None | Capped at current level. ¹ | None | Capped at 120% of current level. ¹ | Same as Alt. 3. |
| Guided/Outfitted horse | approx. 8,000 guests/season, no use cap | capped at 50% of current use ¹ | capped at current use level ¹ | capped at 75% of current use ¹ | capped at 120% of current use ¹ | Same as Alt. 3. |

| Issue Indicator | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 | Alternative 6 |
|--|--|---|---|----------------|----------------|---|
| Private Land Use | | | | | | |
| County Setback Requirement | river setback 100 ft. rimrock setback 50 ft. | river setback 200 feet where landbase allows, rimrock setback 50 ft. | river setback 100 ft. rimrock setback 50 ft. | | | |
| UGB setback requirement | 40 feet, no rimrock setback | 50 foot rimrock setback | Same as Alt. 1 | | | |
| State Scenic Waterway Setback requirement | none, vegetation screening required | river setback 100 feet | | | | |
| Native vegetation | County and UGB: Native vegetation between structure and river would be retained except for fire hazard reduction or health and safety. | County and UGB: Native vegetation could be removed for siting of structure, fire hazard reduction, health and safety. | Same as Alt. 1 | Same as Alt. 2 | Same as Alt. 1 | County and UGB: Native vegetation could be removed for siting of structure, fire hazard reduction, health and safety. |
| State Scenic Waterway landscape and design standards | Height of structure not to exceed 30 feet. Metal siding and roofing are not allowed. | Height of structure not to exceed tree line as seen from river. Same as Alt. 1 | Same as Alt. 1 Metal siding and roofing allowed. | | | |

1. Current use calculated as the average use over the three years prior to plan implementation.
2. Other restrictions apply. See alternative descriptions for details.

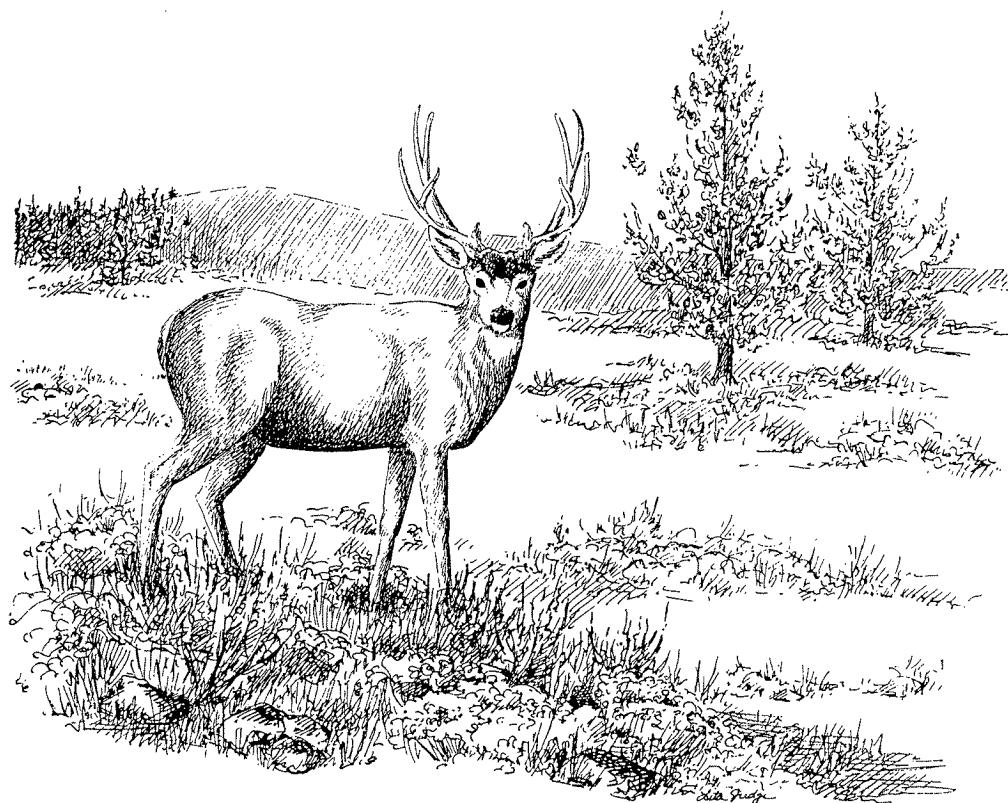


Table 2-12

Developed Recreation Sites by Alternative

| Segment | Developed Area | Area Type | Individual Sites | | | | | |
|---------|------------------------------|------------|------------------|-------|-------|-------|-------|-------|
| | | | Alt.1 | Alt.2 | Alt.3 | Alt.4 | Alt.5 | Alt.6 |
| 2A | Tenino | Boat ramp | 10 | 10 | 10 | 10 | 10 | 10 |
| | Wampus | Campground | 2 | - | - | - | - | - |
| | Bull Bend | Campground | 14 | 4 | 14 | 14 | 14 | 14 |
| | | Picnic | 2 | - | 2 | 2 | 2 | 2 |
| | | Boat ramp | 5 | - | 5 | 5 | 5 | 5 |
| | Wyeth | Campground | 4 | 4 | 4 | 4 | 4 | 4 |
| | | Boat ramp | 5 | 5 | 5 | 5 | 5 | 5 |
| | Pringle Falls | Campground | 6 | 6 | 13 | 6 | 13 | 13 |
| | New Campground | Campground | - | - | 12 | - | 12 | 12 |
| | Trailheads | Trailhead | - | 10 | - | 15 | - | 6 |
| 2B | Tetherow | Boat ramp | 4 | - | - | - | 4 | 4 |
| | | Campground | - | - | - | - | 6 | - |
| | New Campground | Campground | - | - | - | - | 10 | - |
| | Trailheads | Trailhead | - | 20 | 20 | 20 | 10 | 15 |
| 3A | LaPine State Recreation Area | Campground | 145 | 145 | 145 | 145 | 145 | 145 |
| | | Picnic | 80 | 80 | 80 | 80 | 80 | 80 |
| | | Boat ramp | 6 | 6 | 6 | 6 | 6 | 6 |
| | | Trailhead | 5 | 5 | 5 | 5 | 5 | 5 |
| 3B | Big River | Campground | 13 | 13 | 28 | 28 | 28 | 28 |
| | | Boat ramp | 6 | 6 | 6 | 6 | 6 | 6 |
| 3D | Spring River Interpretive | Picnic | - | 5 | 5 | 5 | 5 | 5 |
| | | Trailhead | - | 5 | 5 | 5 | 5 | 5 |
| | Besson | Campground | 7 | - | - | - | - | - |
| | | Picnic | - | 7 | 7 | 7 | 7 | 7 |
| | | Boat ramp | 4 | 4 | 4 | 4 | 4 | 4 |
| | Trailheads | Trailhead | - | - | 10 | 10 | 10 | 10 |

| | | | | | | | | |
|----|-----------------------|------------------|-----|-----|-----|-----|-----|-----|
| 4A | Benham Butte | River Access | - | 5 | 5 | 5 | 5 | 5 |
| | | Picnic | - | - | - | - | 12 | 12 |
| | | Trailhead | - | 5 | 5 | 5 | 5 | 5 |
| 4B | Benham Falls | Picnic | 4 | 4 | 4 | 4 | 4 | 4 |
| | | Boat ramp | 6 | 5 | 6 | 5 | 6 | 6 |
| | Benham Falls Overlook | Trailhead | 6 | 4 | 6 | 4 | 6 | 6 |
| | Trailheads | Trailheads | 10 | 6 | 14 | 6 | 14 | 14 |
| 4C | Slough | Campground | 4 | - | - | - | - | - |
| | | Picnic | 1 | 4 | 4 | 4 | 4 | 4 |
| | | Boat ramp | 4 | - | 4 | - | 4 | 4 |
| | | Trailhead | 3 | - | 3 | - | 3 | 3 |
| | Dillon Falls | Campground | 4 | - | - | - | - | - |
| | | Picnic | - | - | 4 | - | 4 | 4 |
| | | Boat ramp | 4 | - | 4 | - | 4 | 4 |
| | | Trailhead | 3 | - | 3 | - | 3 | 3 |
| | New Trailheads | Trailhead | - | 8 | - | 8 | - | - |
| 4E | Aspen | River Access | 4 | 4 | 6 | 5 | 6 | 6 |
| | | Trailhead | 4 | - | 4 | - | 4 | 4 |
| | Big Eddy | River Access | 7 | - | 7 | - | 7 | 7 |
| | | Trailhead | 3 | - | 3 | - | 3 | 3 |
| | Lava Island | River Access | 7 | 5 | 7 | 3 | 7 | 7 |
| | | Trailhead | 3 | - | 3 | - | 3 | 3 |
| | New Campground | Campground | - | - | - | - | 12 | - |
| | New Trailhead | Trailhead | - | 5 | - | 5 | - | - |
| 4F | Meadow | Picnic | 9 | 9 | 9 | 9 | 9 | 9 |
| | | Trailhead | 3 | 3 | 3 | 3 | 3 | 3 |
| | New Area near UGB | Picnic | - | - | - | - | 10 | - |
| | | Trailhead | - | - | - | - | 6 | - |
| | Totals | Campground Total | 198 | 172 | 216 | 197 | 244 | 216 |
| | | Picnic | 96 | 109 | 115 | 111 | 137 | 127 |
| | | Boat ramp | 54 | 36 | 50 | 41 | 54 | 54 |
| | | River Access | 18 | 14 | 25 | 13 | 25 | 25 |
| | | Trail Head | 40 | 71 | 84 | 86 | 88 | 85 |
| | | Total | 406 | 402 | 490 | 448 | 548 | 507 |

Table 2-13 Comparison of Recreational Opportunity Spectrum and River Use ¹

| Seg | Alternative 1 | | Alternative 2 | | Alternative 3 | | Alternative 4 | | Alternative 5 | | Alternative 6 | |
|-----|---------------|-----------|---------------|-----------|---------------|--------------------|---------------|--------------------|---------------|-----------------|---------------|--------------------|
| | ROS | River Use | ROS | River Use | ROS | River Use | ROS | River Use | ROS | River Use | ROS | River Use |
| 2A | RN | Mixed | RN | NM | Rural | Mixed | RN | NM | Rural | Mixed | Rural | Mixed |
| 2B | RN | Mixed | RNNM | NM | RNNM | Mixed ³ | RNNM | NM | Rural | Mixed | RN | NM |
| 3A | Urban | Mixed | Urban | NM | Urban | Mixed | Urban | Mixed ⁴ | Urban | Mixed | Urban | Mixed ⁴ |
| 3B | Rural | Mixed | Rural | NM | Rural | Mixed | Rural | Mixed | Rural | Mixed | Rural | Mixed |
| 3C | Urban | Mixed | Urban | Mixed | Urban | Mixed | Urban | Mixed | Urban | Mixed | Urban | Mixed |
| 3D | Rural | Mixed | Rural | NM | Rural | Mixed | Rural | Mixed | Rural | Mixed | Rural | Mixed |
| 4A | RN | Mixed | RNNM | NM | RN | Mixed | RNNM | Mixed | Rural | Mixed | RN | Mixed |
| 4B | RN | Mixed | RN | NM | Rural | Mixed | RN | NM ⁵ | Rural | Mixed | Rural | Mixed |
| 4C | RN | Mixed | RNNM | NM | RN | Mixed | RNNM | NM | Rural | Mixed | RN | Mixed |
| 4D | RN | Mixed | RNNM | NM | RNNM | NM | RNNM | NM | RN | Mixed | RN | Mixed |
| 4E | RN | Mixed | RN | NM | Rural | NM | RN | NM | Rural | NM ⁶ | Rural | NM ⁶ |
| 4F | Rural | Mixed | Rural | NM | Rural | NM | Rural | NM | Urban | NM | Rural | NM |
| 4G | Urban | NM | Urban | NM | Urban | NM | Urban | NM | Urban | NM | Urban | NM |

NM = Non-Motorized RN = Roaded Natural RNNM = Roaded Natural Non-Motorized

1. The entire river is closed to water-skiing and personal watercraft by Marine Board Rule. Where open to motorized use, operation is limited to a slow-no-wake speed of 5 miles per hour.

In segments where mixed use is allowed, non-motorized use may be the predominant use.

3. Only non-motorized use above Tetherow logjam.

4. Only non-motorized use above LaPine State Recreation Area bridge/boat ramp.

5. Only non-motorized use below Benham Falls bridge.

6. Mixed use allowed above Aspen River Access.

Table 2-14 Comparison of Designed Annual Capacity ¹

| Segment | Alternative 1 | | Alternative 2 | | Alternative 3 | | Alternative 4 | | Alternative 5 | | Alternative 6 | |
|-----------------------|---------------|------------------------|---------------|------------------|---------------|-----------|---------------|-----------|---------------------|-----------|---------------|-----------|
| | non-com. | outfitter ² | non-com. | outfitter | non-com. | outfitter | non-com. | outfitter | non-com. | outfitter | non-com. | outfitter |
| 2 | 24,000 | 300 ⁵ | 12,000 | 300 ⁵ | 19,000 | 1,900 | 18,000 | 1,800 | 23,000 | 4,600 | 20,000 | 2,000 |
| 3 | 65,000 | 25,300 | 61,900 | 12,000 | 67,000 | 31,000 | 67,000 | 24,000 | 69,000 | 44,000 | 68,000 | 31,000 |
| 4 | 33,000 | 63,900 | 16,200 | 32,000 | 29,500 | 66,500 | 23,000 | 48,000 | 51,000 | 70,000 | 44,000 | 66,500 |
| | | | | | | | | | 50,000 ⁶ | | | |
| Subtotal ³ | 122,000 | 66,000 | 89,200 | 32,300 | 115,500 | 76,200 | 108,000 | 56,000 | 143,000 | 94,800 | 132,000 | 76,300 |
| | | | | | | | | | 50,000 | | | |
| Total ⁴ | 188,000 | | 121,500 | | 191,700 | | 164,000 | | 287,800 | | 208,300 | |

1. Designed Annual Capacity for non-commercial use is based on trail and recreation site capacity. For outfitted use (includes non-profit/educational use), the designed annual capacity is dependent on the use level allowed by the alternative. Estimates of actual use range between 177,000 for 1990 and 126,000 for 1994. Differences are more likely the result of different methodologies rather than an actual decline in use.
2. These numbers are actual use numbers reported by outfitters in 1994.
3. Outfitted users that cross segment boundaries are counted in each segment. These duplicate counts have been subtracted from subtotals and totals.
4. Totals rounded up to the next 100.
5. Currently (Alt. 1) and in Alt. 2, only non-commercial guided/outfitted use would occur in Segment 2.
6. How the common pool of permits for Big Eddy (Segment 4E) would split between non-commercial and guided/outfitter use is unknown.

Note: For segments where guided/outfitted use is not now authorized, the numbers in this table are estimated upper limits. Need for a guided/outfitted use would have to be demonstrated before it would be authorized.

Monitoring

See the section on monitoring in the Upper Deschutes River Plan.

Alternatives Considered But Eliminated from Detailed Study

The following elements of alternatives were considered by the Interdisciplinary Team, but not included in the alternatives considered in detail.

Fishery

Several methods of adding spawning gravel and large woody material into the river were considered. One technique would involve depositing a large group of trees (20-200) or large quantity of gravel in the river at one location and allowing water flows to do the distribution. Although this technique would incur low initial costs, the desired distribution of the materials would not be achieved. The resulting logjams could create unacceptable navigation hazards, risks to private property, and adversely affect other river values. As a consequence, depositing large quantities of structural material in one location was eliminated from further consideration.

The suitability of reintroducing historic species (such as bull trout) was not explored in detail at this time. Because of the elevated water temperature in the reservoirs, the water temperatures in the river would be too high to provide a competitive edge for bull trout over the rainbow and brown trout.

Vegetation and Wildlife

An early proposal for managing vegetation was based on fuel loading and risk of wildfire, disease, and insect infestation. This proposal was eliminated from further consideration because it did not address protecting and enhancing Outstandingly Remarkable Values.

Alternatives 2-6 would close or obliterate all user and Forest development roads leading to dispersed sites within Streamside Management Areas and Riparian Areas as defined in the Forest Plan. The Interdisciplinary Team found that the protection of these areas were essential to the protection and enhancement of the Outstandingly Remarkable Values within the Upper Deschutes Wild and Scenic River Corridor. Less comprehensive actions, such as responding to resource damage on a case by case basis or hardening of dispersed sites, would not provide the level of protection and enhancement required and were eliminated from further consideration.

Recreation

Elimination of motorized boating on the entire river between Wickiup and Bend was proposed. Between General Patch Bridge and Harper Bridge, 95 percent of the land within the Wild and Scenic River Boundary is privately owned, and much is highly developed. Many of the residents have constructed boat docks and routinely motor up and down the river in their boats. Because of the development that characterizes this segment and the common use of motorboats by residents, eliminating motorized boating was dropped from further consideration.

A proposal to eliminate commercial use from the river and public lands adjacent to the river was considered but eliminated from further consideration. Existing outfitters fill a bonafide need and provide demonstrated benefits to the public. Elimination of this opportunity for the public to enjoy a highly technical but thrilling experience would unduly impact the Outstandingly Remarkable Recreation Value of the river.

Keeping Besson open as a campground was considered; however, this site is entirely within a riparian area, and residential camping is a continuing problem in the area. To reduce resource impacts, Besson would become a day-use area under all alternatives. Additionally, Besson would be moved out of the riparian area in two alternatives.

A trail running the full length of the river was proposed. The action alternatives propose extensive conversion of roads to trails and development of new trails. The amount of private development in Segment 3 precludes building a public trail reasonably close to the river in some locations or at reasonable cost. As a consequence a trail running the full length of the Upper Deschutes River was eliminated from further consideration.

Off-road use of All-Terrain Vehicles (ATVs) on the public lands within the corridor was considered. The powerline corridor on the west side of the river, which is used by ATV riders, is outside of the corridor under all alternatives. In general, Forest Service roads open to the public but not maintained for passenger car traffic would be open for ATV use. Because of the high use of trails within the corridor by hikers, horseback riders, and mountain bikers, the potential for conflicts with ATV use is high. The fragile nature of the riparian habitat and some of the plant and wildlife species present are also concerns. For these reasons, off-road use of ATVs on public lands within the Wild and Scenic River corridor was not considered in detail.

Private Land Use

Land Use Zones and Overlays

Deschutes County land use zones and zone overlays were examined closely to determine whether they seemed to be sufficient to protect and enhance river values. Much of the land along the river was platted prior to the adoption of Deschutes County's current land use zones. This had resulted in numerous small parcels and the potential for dense development in some areas along the river. Current land use zones and overlays provide for maintaining the rural residential character of the area (no commercial zoning is included), minimum 10 acre parcels on newly platted properties, clustering of dwellings, and maintenance of open space. Zone RR10/Wildlife Combining Zone were designed to protect and enhance vegetative, scenic and wildlife values. Therefore, no additional zoning or overlay requirements were pursued in this plan.

Floodplain Development Requirements

Deschutes County currently requires residences to be built out of the designated 100-year floodplain of the Upper Deschutes River unless the landowner is precluded from doing so by the approved placement of an on-site septic system or other "hardship" condition. If the landowner cannot avoid building within the floodplain, then special building requirements ensure the building would not adversely affect the ability of the river to fill its floodplain. These requirements were considered reasonable to protect the free flow character of the river while still allowing for reasonable development of private lands. Therefore, no other floodplain development requirements were considered.

Conservation Easements

Property owners must convey a conservation easement to Deschutes County as a condition of approval of land use actions on properties adjacent to the Deschutes River. This easement generally encompasses property within ten feet of the ordinary high water mark of the river. In the case of setback exceptions, this easement will encompass all property between the structure and the river. In special circumstances, the conservation easement can contain requirements for limited access. This program is a valuable way to protect and enhance scenic and vegetative values. Therefore, no additional conservation easement requirements for land development were considered. Additional programs to acquire conservation easements through a "willing seller" program are considered in Common to Alternatives 2-6.



Flow Options

Introduction

The river values are all somewhat affected by the amount of instream flow in the Upper Deschutes River. However, defining the relationships between instream flows and resource conditions is not an exact science. As discussed in Chapter 1, activities such as the addition of woody material, revegetation of streambanks, use of septic systems, and control of other non-point sources of pollution also contribute to the resource conditions in the river channel, but are not considered in the following discussion of flow options. These conditions affect resource conditions, which could in turn affect the amount of instream flows needed to accomplish desired resource conditions.

This section presents a range of instream flows. Each flow option and its relationship to instream resource conditions will be discussed in terms of the following indicators:

- Minimum/maximum flows below Wickiup Dam
- Average irrigation season water velocity
- Rate of fluctuation (ramping rate)
- Maximum winter channel exposure
- Percent of fish habitat potential
- Number of days of navigable whitewater and portion of the river navigable by canoe year round
- Fishery and recreation conditions at reservoirs
- Effects on instream flow conditions below Bend

Since the construction of Wickiup Dam, there has been concern and controversy over the amount of instream flow which is maintained in the Upper Deschutes River. This has manifested itself in a number of instream flow studies, recommendations, and decisions (see Appendix H). These studies and flow recommendations have typically centered on one or more flow-dependent resource needs. Oregon water law has historically determined that irrigation needs are the dominant "beneficial use." However the values held by the public today now appear to favor a greater desire to preserve and protect the integrity of natural river systems. Insufficient legal, institutional, and economic incentives currently exist to foster the reallocation of water from irrigation to meet instream needs.

The following flow options considered irrigation needs, fishery, and other river values. The flow-dependent resource needs, storage-dependent water rights², off-stream or downstream resource needs, and the costs associated returning instream flows to the Upper Deschutes during the winter were all considered during their development. Analysis of resource needs dependent upon instream flows was conducted in the Instream Flow

² Wickiup and Crane Prairie Reservoirs have a combined capacity of 250, 000 acre-feet and are filled during the winter months under authority of their 1913 storage rights. According to Oregon law, these rights are superior to all other water rights on the Upper Deschutes during the winter months.

Assessment (USDA 1994b). Data concerning offstream use was provided by the State Watermaster. Cost estimates of increasing instream flow were provided by the Bureau of Reclamation.

The flow options proposed in this document require actions that would protect the delivery of water for offstream use in addition to augmenting instream flow during the storage season. Flow options 2-6 require incremental increases in winter instream flows that, in turn, produce incremental changes to the Outstandingly Remarkable Values. The options include strategies for implementing a minimum flow without reducing the availability of water for agriculture and other offstream and downstream uses.³ **These options were developed jointly by irrigation district managers, state and federal agencies, and tribal representatives and would be implemented cooperatively as water availability permits.**

Option 1 Existing Condition

Current flows are managed primarily for beneficial off-stream uses. Minimum flows are set at 20 cfs below Wickiup Dam. No maximum flow limitations are in effect, except those which result from distribution needs and system capabilities. Peak flows have exceeded 2100 cfs. See the Flow section in Chapter 4 for permitted and actual ramping rates.

Under Option 1, maximum winter channel exposure is approximately 57 percent with average annual velocities of 2.8 feet per second (fps). There is strong evidence linking exposed channel in the winter to high springtime turbidity level. Fish habitat conditions are at less than 25 percent of their potential due to reduced channel space available during the winter storage season.

Option 1 provides approximately 170 days of prime whitewater from April to October (a minimum flow of 1500 cfs at Benham Falls). The river is navigable by canoe year round downstream from Spring River. Down river (Middle and Lower Deschutes Rivers) effects of minimum and maximum flows from Wickiup are obscured by inflows from tributaries below Wickiup Dam and irrigation withdrawals directly below Bend during irrigation season.

Common to Options 2-6

The common goal of all flow options is to support off-stream beneficial uses and improve instream beneficial uses of the waters of the Deschutes. This includes providing a quantity of instream water which would protect and enhance:

1. The geologic value by moving the erosion rates in the stream channel and streambanks closer to a natural range of variability;
2. Hydrologic value by improving clarity, dissolved oxygen, and other water quality parameters;

³ An analysis of costs and benefits for implementing the minimum flows is provided in Chapter 4.

3. The fishery value by providing an improved quality and quantity of habitat year round;
4. The wildlife value by providing favorable streamflow year round to improve prey base for eagles and osprey, and improve waterfowl, songbird, and furbearer habitat.
5. The scenic value by changing the character of the winter scenery to avoid the impression that the tide has gone out;
6. The recreation value by providing an opportunity to navigate the river year round and maintain the thrill of rafting the Big Eddy reach (in segment 4) during the summer.
7. Aquatic and riparian vegetation to protect the river channel from erosion, and provide cover and food for fish, macroinvertebrates, and other types of animal life.
8. Aquatic resource conditions to perpetuate viable populations of aquatic organisms.

Adaptive Flow Management Strategy

An adaptive management approach would be used to achieve the desired resource conditions. Land-based actions would be implemented to protect and enhance river values including, but not limited to: restoration and improvement of riparian habitat on public and private lands and improvement of fishery habitat and channel conditions through addition of instream structure. The focus of the flow options would be to increase minimum flow during the storage season and to experiment with the rate flow is changed at the beginning and ending of the irrigation season. The key element of the Adaptive Flow Management Strategy is monitoring to establish baseline conditions and subsequent monitoring to determine the impacts of actions on both instream and offstream values. Evaluation of the impacts can result in adjustments to the Management Plan.

The first element of the Adaptive Flow Management Strategy would be the creation of an implementation team with irrigation district and intergovernmental representation. This team would be chartered to:

- 1) develop a schedule of actions for achieving short-term incremental increases in instream flow (Options 2-6);
- 2) develop and implement an active program of obtaining technical assistance and financing to pursue conservation practices identified for the Preferred Option (5), lease purchases, or transfers of water rights;
- 3) develop specific projects and programs that would provide for more instream flow and more reliable supply for offstream users;
- 4) present projects and programs to the public and legislative bodies whose approval would be necessary to implement projects and programs;
- 5) develop a monitoring plan to assess the short and long-term efficacy of incremental changes over both the short term and long term.

Water Quantity and Quality Management Strategies

The instream flow for each option is a target which would be achieved in increments. The methods available to increase instream flows in the Upper Deschutes without affecting the amount of water available to users are limited. The goal of enhancing instream flows would not be achieved by taking water away from existing users. *Enhancing the instream flows would only occur to the extent the irrigation districts' ability to deliver irrigation water is maintained, if not enhanced.* Water savings that would provide for enhanced instream flows would be achieved as a result of voluntary and cooperative implementation of water conservation measures, downstream and/or offstream storage and voluntary sale or lease of water rights. Options 2-6 vary in the extent and combination of actions that would be implemented.

For all flow options, water quality management strategies were included. These are specific flow or other management practices which would be used to ensure protection of water quality from non-point sources of pollution. These practices would be identified and monitored by the federal and state governments to determine their effectiveness. Water quality management strategies related to flows include minimum winter flows, maximum summer flows, and ramping rates. Streambank vegetation, instream habitat, and other instream structural improvements are discussed under Alternatives 2-6.

Water Forecasting

Storage season water releases would continue to be adjusted based on projected winter inflows. Accurate forecasting may contribute substantially to the availability of sustainable winter releases. Under all options, a focused effort to improve forecasting technology would be pursued.

Water Conservation Methods⁴

The water conservation targets assume use of the Oregon Conserved Water statute, or similar mechanism and a split of conserved water whereby 50 percent is available to increase stream flow. The actual "yield" of conserved water will depend on financing source, legal mechanism for allocating the conserved water, and the water right from which the conserved water comes.

Delivery System - Currently, substantial leakage occurs from the irrigation delivery system. Canal lining or other methods to improve the efficiency of the system would, under current legislative guidelines, result in a portion of the saved water being assigned for instream flows.

⁴ The Bureau of Reclamation is completing a study on water conservation methods which will be available in September 1996.

On-Farm Conservation - Many farms use gravity irrigation systems. It is estimated that use of sprinkler systems could increase on-farm efficiency by up to 10 percent. Other improvements to on-farm water management practices could further increase on-farm efficiency. Such improvements could increase water availability for instream uses while protecting farm production in water-short years.

Water Leasing/Acquisition

Water right leasing, purchase, and transfer (either the water rights only or land with water rights) have been used successfully by the Oregon Water Trust to increase instream flows. The amount of water available through leasing or acquisition is dependent on the willingness of existing water right holders to put their land out of production on a temporary or permanent basis and the availability of funds to lease or acquire those rights.

Downstream/Offstream Storage

Some additional water for wintertime instream releases below Wickiup could be provided by increasing the capacity of existing offstream storage (Haystack Reservoir) or developing new storage facilities.

Ramping Rates

The ramping rate is the change in the rate at which water is released from storage into the river. For releases from Wickiup Dam, ramping rate is measured at the Wickiup gauge by the change in river level over a given time period.

Because springtime turbidity levels and fish habitat conditions are believed to be tied to ramping rates, cooperators would experiment with ramping rates when adequate water is available. Unless carefully planned, ramping rate modifications have the potential to impact water users by releasing more water than can be used for irrigation and reducing the amount of water available for irrigation in the future.

The initial ramping rates proposed for all flow options (0.1 ft/4 hrs. rising and 0.2 ft/12 hrs. falling) are initial estimates of rates which could be expected to: 1) reduce turbidity levels in the spring, 2) reduce stranding of small fish and macroinvertebrates in the dewatered areas in the fall, 3) have a low potential for adverse impacts on irrigators. These rates would be used at flow levels below 800 cfs at Wickiup gauge. Above 800 cfs, the ramping rate has less influence on turbidity (USDA Forest Service 1994b). Ramping rates would be monitored and adjusted as needed to reduce turbidity during release and avoid abandonment of fish and macroinvertebrates during drawdown. Numeric water quality standards and instream beneficial uses would be monitored.

These rates are estimates of changes that could be implemented during a good water year. Ramping rates based on these initial estimates may be modified as a result of monitoring turbidity levels and other resource conditions.

Option 2

Under Option 2, target minimum flows would be set at 50 cfs below Wickiup Dam. Maximum flow limitations would be 1650 cfs. Maximum winter channel exposure would be approximately 45 percent with average annual velocities of 2.7 feet per second. Fish habitat conditions would be less than 68 percent of potential.

Option 2 would provide approximately 160 days of navigable whitewater from April to October (a minimum flow of 1500 cfs at Benham Falls). The river would be navigable by canoe year round downstream from the Little Deschutes.

How instream flow would be achieved: Approximately 21,600 acre-feet of water would be saved through water conservation strategies if only half that amount of water would be provided for instream flows. Cost of achieving this flow would average about \$17 per acre-foot. Water leasing could be used instead of or in combination with conservation.

Option 3

Under Option 3, target minimum flows below Wickiup Dam would be set at 100 cfs for 90 percent of the time. Maximum flows would be 1600 cfs. Maximum winter channel exposure would be approximately 45 percent with average annual velocities of 2.6 fps. Fish habitat conditions would be 72 percent of potential.

Option 3 would provide approximately 150 days of navigable whitewater from April to October (a minimum flow of 1500 cfs at Benham Falls). The river would be navigable by canoe year round downstream from Fall River.

How instream flow would be achieved: Approximately 57,300 acre-feet of water would be saved through water conservation strategies if only half that amount of water would be provided for instream flows. Cost of achieving this flow would average about \$18 per acre-foot. Water leasing could be used instead of or in combination with conservation.

Option 4

Under Option 4, target minimum flows below Wickiup Dam would be set at 200 cfs for 90 percent of the time. Maximum flow limitations would be 1500 cfs. Maximum winter channel exposure would be approximately 30 percent with average annual velocities of 2.5 fps, resulting in reduced springtime turbidity levels. Fish habitat conditions would be 80 percent of potential.

Option 4 would provide approximately 140 days of navigable whitewater from April to October (a minimum flow of 1500 cfs at Benham Falls). The river would be marginally navigable by canoe year round above Fall River.

How instream flow would be achieved: Approximately 133,000 acre-feet of water would be saved through water conservation strategies if only half that amount of water would be provided for instream flows. Cost of achieving this flow would average about \$30 per acre-foot. Water leasing and downstream storage could be used instead of or in combination with conservation.

Option 5

Under Option 5, target minimum flows below Wickiup Dam would be set at 300 cfs for 90 percent of the time. Maximum flows would be 1400 cfs. Maximum winter channel exposure would be approximately 24 percent with average annual velocities of 2.4 fps. Fish habitat conditions would be 85 percent of potential.

Option 5 would provide approximately 115 days of navigable whitewater from April to October (a minimum flow of 1500 cfs at Benham Falls). The river would be navigable by canoe year round up to Wickiup.

How instream flow would be achieved: Approximately 200,000 acre-feet of water would be saved through water conservation strategies if only half that amount of water would be provided for instream flows. Cost of achieving this flow would average about \$38 per acre-foot. Water leasing and downstream storage could be used instead of or in combination with conservation.

Option 6

Under Option 6, target minimum flows below Wickiup Dam would be set at 500 cfs for nine out of ten years. Maximum flows would be 1200 cfs. Maximum winter channel exposure would be approximately 17 percent with average annual velocities of 2.2. Fish habitat conditions would be 95 percent of potential.

Option 6 would provide approximately 90 navigable whitewater days from April to October. The river would be navigable by canoe year round up to Wickiup.

How instream flow would be achieved: Approximately 314,000 acre-feet of water would be saved through water conservation strategies if only half that amount of water would be provided for instream flows. Cost of achieving this flow would average about \$60 per acre-foot. Approximately 44,000 acre-feet of water would have to be acquired through leasing or other methods.

Preferred Option

Option 5 is the preferred option and would set a goal of 300 cfs for minimum flow. This is the same goal the State of Oregon set when it granted an instream water right for the river below Wickiup Dam in 1983. Achieving this minimum flow will be difficult, because the existing irrigation uses of the river have water rights which must be respected. The Wild and Scenic Rivers Act does not preempt these rights.

Using combinations of conservation, water right leasing or purchase, and management improvements, Option 5 would be achieved incrementally by setting Option 2 as the first goal, then Option 3, then Option 4, and finally Option 5.

As provided by Section 13 of the Wild and Scenic Rivers Act, the preferred flow option is designed to improve water quality and Outstandingly Remarkable Values by making more water available for instream uses without adversely affecting the existing rights of irrigation districts.

Monitoring

See the section on monitoring in the Upper Deschutes River Plan.

Considered But Eliminated from Further Study

An Alternative involving the restoration of natural flow to the river was initially considered but eliminated from further study. Initial review indicated the cost of implementation would be too great, would have dramatic impacts on recreational use patterns, and would require the elimination of Wickiup and Crane Prairie Reservoirs, actions that are outside the scope of this plan.

The Upper Deschutes Instream Flow Assessment proposed a ramping rate of 1" per day. This would require anticipating irrigation demand by at least 30 days. Such a gradual increase in flow would lose enough water to provide an instream flow of about 200 cfs during the entire storage season and would also be lost for irrigation needs without dramatic increases in downstream or offstream storage. As a consequence this ramping option was eliminated from further study.

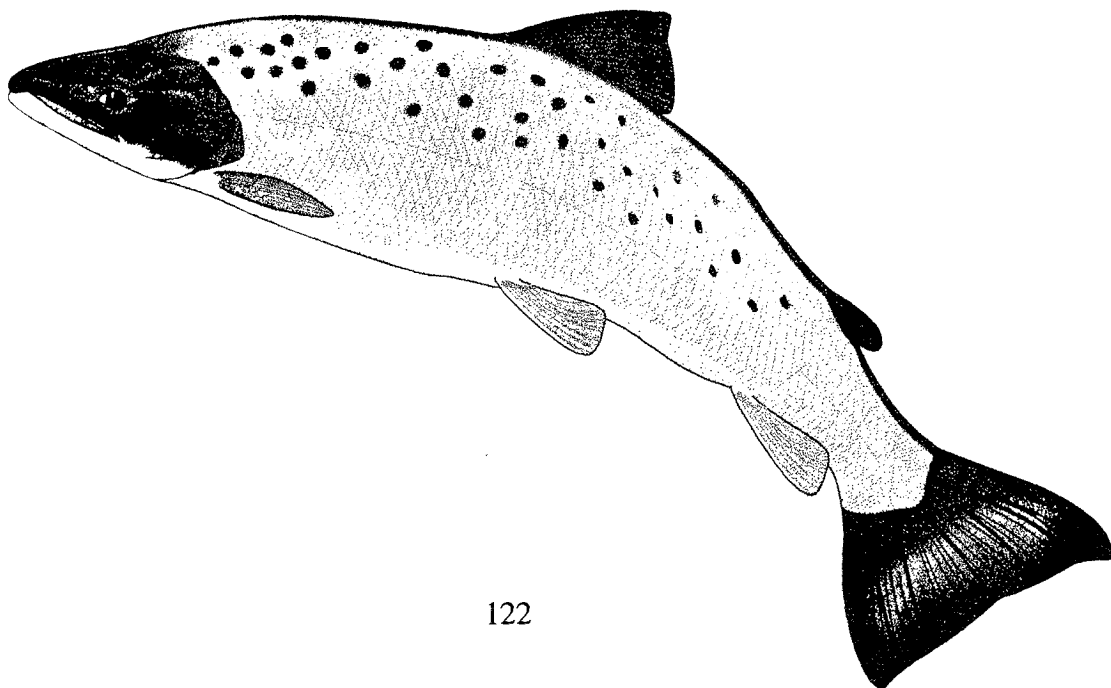


Table 2-15

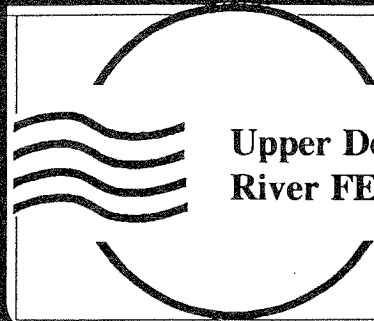
Flow Option Comparison/Selected Indicators¹

| | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 | Option 6 |
|-------------------------|------------------------------------|---|---|--------------------------------------|--------------------------------------|---|
| Flow Indicators | | | | | | |
| Minimum ² | 20 cfs | 50 cfs | 100 cfs for 90 % of time ³ | 200 cfs for 90% of time ³ | 300 cfs for 90% of time ² | 500 cfs for 90% of time ² |
| Maximum | no limitation | 1650 cfs | 1600 cfs | 1500 cfs | 1400 cfs | 1200 cfs |
| Ramping Rate | Legal Target | | | | | |
| Rising Rate | 1.0 ft/hr .5 ft/ day | 0.1 ft/4 hr | 0.1 ft/4 hr | 0.1 ft/4 hr | 0.1 ft/4 hr | 0.1 ft/4 hr |
| Falling Rate | 1.0 ft/hr | 0.2 ft/12 hr | 0.2 ft/12 hr | 0.2 ft/12 hr | 0.2 ft/12 hr | 0.2 ft/12 hr |
| Flow effects | | | | | | |
| Maximum channel exposed | 57 % | 45 % | 39 % | 30 % | 24 % | 17 % |
| Segment 2 | | | | | | |
| Av. Storage Flow | 180 cfs | 180 cfs | 180 cfs | 200 cfs | 300 cfs | 500 cfs |
| Av. Irrig. Flow | 1300 cfs | 1300 cfs | 1300 cfs | 1280 cfs | 1180 cfs | 980 cfs |
| Segment 3 | | | | | | |
| Av. Storage Flow | 330 cfs | 330 cfs | 330 cfs | 350 cfs | 450 cfs | 650 cfs |
| Av. Irrig. Flow | 1450 cfs | 1450 cfs | 1450 cfs | 1430 cfs | 1330 cfs | 1130 cfs |
| Segment 4 | | | | | | |
| Av. Storage Flow | 815 cfs | 815 cfs | 815 cfs | 835 cfs | 935 cfs | 1135 cfs |
| Av. Irrig. Flow | 1860 cfs | 1860 cfs | 1860 cfs | 1840 cfs | 1740 cfs | 1540 cfs |
| Velocity | 2.8 fps | 2.7 fps | 2.6 fps | 2.5 fps | 2.4 fps | 2.2 fps |
| Water Quality | | | | | | |
| Peak Turbidity | continued spikes of high turbidity | slight reduction in high turbidity spikes | slight reduction in high turbidity spikes | reduction in high turbidity spikes | reduction in high turbidity spikes | greatest reduction in high turbidity spikes |
| Water Temperature | | | | | | |
| Maximum | Trend to increase extreme | Long-term increase initially moderated | Long-term increase initially moderated | Maintained moderated | Decrease moderated | Decrease moderated |
| Minimum | | | | | | |

| | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 | Option 6 |
|---|------------------------------|--------------------------------------|----------------------------|--|---------------|---------------|
| Fish Habitat ⁴ | < 25 % | < 68 % | 72 % | 80 % | 85 % | 95 % |
| Pool Depths (ft) | < 7 | < 7 | < 7 | < 7 | > 7 | > 7 |
| Spawning Gravel | | | | | | |
| % fines | above 35 % | about 30 % | about 28 % | about 25 % | about 25 % | about 20 % |
| % available | < 25 % of potential | 50 % | 60 % | 90 % | 95 % | 77 % |
| # days flows equal or exceed 1500 cfs at Benham Falls ⁵ | 170/yr | 160/yr | 150/yr | 138/yr | 115/yr | 91/yr |
| Portion of river navigable by canoe (flatwater) yr round ⁶ | downstream from Spring River | downstream from the Little Deschutes | downstream from Fall River | downstream from Fall River, marginally navigable above | up to Wickiup | up to Wickiup |

Notes:

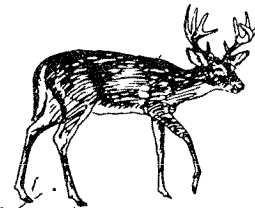
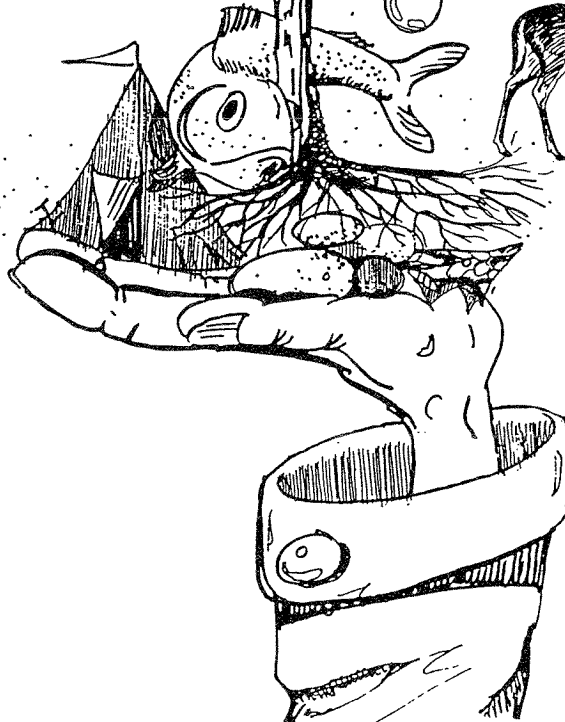
1. Flow indicators represent target flows that implementation would directly control. Flow effects represent some of the key predicted consequences of implementing the target flows. These predicted effects served as the basis for determining the degree to which the Issues discussed in chapter one are resolved. The full analysis is in Chapter 4 and served as the basis of selecting the Alternative 6.
2. Flow as measured at Wickiup gauge.
3. 90% of the time means that on the average 9 out of 10 years the minimum flow would be maintained in the river in winter.
4. Percent of potential.
5. Indicates flow judged to provide an acceptable whitewater rafting experience.
6. Indicates flow needed to provide enough water to easily avoid hitting bottom while canoeing.



Upper Deschutes
River FEIS



Chapter 3 Affected Environment



Chapter 3

Affected Environment

Introduction

The utilization of river resources is not limited to a narrow corridor surrounding the river. Consequently the Affected Environment also includes uses and dependent activities that may take place many miles from the Upper Deschutes. This chapter includes a description of these aspects of the Affected Environment, as well as river values, by expanding the discussion found in the Resource Assessment beyond the limits of the river corridor.

History of Land and Water Uses

Situated between the snowcapped, moisture-collecting Cascades and the high desert, the Upper Deschutes River basin has been a home to humans as well as diverse plant and animal life since prehistoric times. Evidence from nearby Newberry Crater indicates that humans inhabited the region at least 10,000 years ago as did mastodons, camels and other now extinct species. The myriad of volcanoes, cinder cones, and lava flows document the sometimes violent natural events the earliest people experienced.

The geologic evolution of the region has been constant and rapid. Periods of mountain building and river moving volcanic activity have been interspersed with periods of erosion and sedimentation associated with glaciation and stream runoff. The combination of volcanic and glacial activity and the sedimentary deposits from both has created the largely spring fed drainage of the Upper Deschutes. The crystalline hues of Blue Lagoon in the headwaters, consistent water temperatures, the bluffs and extensive riparian areas between Wickiup and Sunriver, and the rugged Benham and Dillon Falls are features today that are the products of natural processes of the past. Because of the storage of water for irrigation, one natural feature no longer evident is the remarkably limited seasonal fluctuation of river flows.

The combination of hydrologic and geologic conditions established a diverse riverine habitat. Cold, clean water with limited fluctuation promoted a riparian habitat of rich streamside vegetation, providing food and shelter for insects, fish, and small mammals and birds. Larger mammals and birds also relied on the abundant food supply found in the river environment.

The lack of definitive archaeological findings and clear descriptions of Native American Indian land use practices in the early historic period makes determination of the effects of their activities difficult. However, recent findings strongly suggest that pre-historic American Indian populations were much higher than commonly believed.

The arrival of the first immigrant American explorers heralded the beginning of an era in which the resources of the region were utilized differently.

The Federal portion of the western half of the Upper Deschutes corridor was included in an administrative withdrawal enacted in 1883 and called the Cascade Range Forest Reserve. The withdrawal was made under authority of the Forest Reserve Act which was passed that same year. The balance of the Corridor was withdrawn under this same act by President Theodore Roosevelt in 1903. The Deschutes National Forest proper was created in 1908.

The Upper Deschutes River flows through the Pringle Butte unit of the Pringle Falls Experimental Forest. The site was first selected in 1914 by Thornton T. Munger, the first Director of the Pacific Northwest Research Station (then Experiment Station), but formal establishment occurred later on May 20, 1931. The Pringle Butte unit also includes two Research Natural Areas (RNAs). This Experimental Forest is the site of some of the earliest forest management and silviculture research in the Pacific Northwest, and research in ecosystem structure and function and demonstration of management techniques continues today. (Youngblood, 1995)

The River is Altered to Water a Desert

Bend, metropolis of the Deschutes River basin, had its start as an irrigation town. Alexander M. Drake, hearing of irrigation possibilities in the Upper Deschutes country, came west in a horse-drawn covered wagon to look over the situation. He found the present Bend site (then called Farewell Bend) ideal for the diversion of the river flow. He parked his wagon near the river bank and built a mountain lodge that faced the swift-flowing stream.

Even before Drake the irrigation potential of the Deschutes was tapped. In 1893 the Three Sisters Irrigation Ditch Company (now the Tumalo Irrigation District) developed a system to divert water from Tumalo Creek and moved it in canals to croplands surrounding Laidlaw (present day Tumalo). Two ranchers named Swalley filed for water to irrigate their ranches in 1892. By 1904 parties involved in this claim organized as the Deschutes Reclamation and Irrigation Company (later as Swalley Irrigation Company). Between 1901 and 1905 Drake's Pilot Butte Development Company and precursors of the Arnold Irrigation District and Lone Pine Irrigation District were formed.

The earliest water rights were acquired by individual settlers who claimed land under the Homestead Act and water under the common law. Later, more extensive development was based on the Carey Act adopted by Congress in 1893. This act provided for the separation from the public domain of large tracts of land in central Oregon which were reserved for development by irrigation companies.

Further development of the Deschutes basin was undertaken by the State of Oregon and the U.S. Reclamation Service in 1913. At the request of the Reclamation Service, the State Engineer withdrew from further appropriation all of the unallocated waters of the Upper Deschutes for use in the Deschutes Project. Almost all of the irrigated lands in Central Oregon came into private ownership via the Carey Act or the Deschutes Project.

Crane Prairie Reservoir and Wickiup Reservoir were constructed or reconstructed by the Reclamation Service (later the Bureau of Reclamation) and received their water rights from the water withdrawn by the State Engineer in 1913. These reservoirs, plus Crescent Lake Reservoir, influence and partially control the flow of the river downstream to Bend, where the majority of the water is diverted by six irrigation districts for use in Deschutes, Crook, and

Jefferson Counties. These districts irrigate about 115,000 acres of farm and residential land, which produced about \$60 million of agricultural goods plus other economic benefits in 1991. About 1000 acres of farm land receive irrigation water from the Little Deschutes River in the vicinity of LaPine.

As late as 1916 no conflict was perceived between the withdrawal of water from the channel and instream needs. In 1915 Essie McGuire noted the benefits of irrigation: "I wish you could see McGregor's place [the only one irrigated]. It consists of about two hundred acres---all under cultivation and as level as a floor---with just here and there a juniper tree out in the big fields. I thought to-day that I had never seen a more beautiful picture than the immense field of alfalfa in which we played ball. The alfalfa is up about four inches and it looks like an enormous green lawn.... All the stock was turned on it. Away back near the other end of it were the horses --- about ten I guess; then scattered over the whole thing were pigs and chickens and great white geese and some turkeys...and then the water ran through the irrigation ditches, and the sky was blue and the sun shone brightly over the whole thing. You can't imagine how pretty it was."

Just a year later Warden W.O. Hadley noted: "The Deschutes River, I think is the best trout stream in Oregon. I will go further in my claims for this wonderful stream and its tributaries and say that if it is not already, it soon will be the best trout stream in the United States. This stream has a steady flow of good cold water and only varies a few feet from extreme high to low water." (Oregon Sportsman, 1916)

Warden Hadley apparently was not aware that virtually all of the flow of the Upper Deschutes had been reserved for off stream use. To implement the use of the reserved water would require the storage of winter flows. Toward this end two large reservoirs, both in the Deschutes National Forest, were constructed south of Bend. One is in the Crane Prairie Basin, where early-day stockmen grazed their cattle, and the other is at Wickiup, where a 200,000-acre foot lake was created for the North Unit Irrigation District by the U.S. Bureau of Reclamation.

Today there is consensus that the considerable benefits of diversion for irrigated agriculture and other off stream uses are not without costs. As one participant in a May 1985 Workshop on the Upper Deschutes Stated, "When Wickiup Dam was put in ... we all like to have irrigation water and everything, but we're all paying for it. Yet, had we known what we know now, we may not have used the river for an irrigation ditch, and we may not have those manmade flow regimes that we have now. But I think--and I pointed this out to FERC (Federal Energy Regulatory Commission)--I told them that actually, for the last 40 plus years, practically all the effort and money that's gone into the fisheries and wildlife has been an unsuccessful attempt to mitigate ... the demands put on by irrigation..."

Several years of drought have created a crisis for farmers. Irrigators dependent upon stored flows either run out of water before the end of the season or experience severe restrictions. Even farmers with rights to natural flows receive less than their adjudicated rights. When reservoirs are drawn down to critically low levels it is necessary to store as much water possible during the next storage season. As a result only the legal minimum release is likely to occur during the storage season. This situation is likely to diminish habitat for many aquatic and riparian dwelling and dependent species of plants and animals.

Uses on and Adjacent to the River

Today the river between Wickiup Dam and Bend serves predominately recreational and residential needs. The once dominant timber and agricultural uses have given way to play and those who seek the ambiance of a riverine environment for their residence. Virtually all private land, roughly one-third of the land within the proposed combined areas of the Wild and Scenic River and State Scenic Waterway, adjacent to the river is subject to development either as a destination resort or for residential purposes. Most forest land remains undeveloped but signs of past timber harvest remain evident. Development on public lands is largely limited to recreational development such as campgrounds, picnic areas, boat ramps, and trails.

The area surrounding the Deschutes River is varied. Mt. Bachelor, a popular ski area, lies 15 miles west of the River, and draws hundreds of thousands of visitors each winter. The high Cascade lakes near Mt. Bachelor also draw thousands of visitors who come from all over the Northwest during the summer to swim, boat, waterski, picnic, sail, fish and windsurf. To the east of the river is the Great Basin stretching away toward eastern Oregon, Idaho, and Nevada.

Most of the Deschutes National Forest land around the river is in General Forest or Scenic Views Management Areas. Timber harvest, if compatible with other values, is allowed in these management areas.

Deschutes County is the fastest growing county in Oregon, and one of the fastest growing in the entire Western U.S. The abundant sunshine, recreational opportunities, clean air and water all attract people to come, settle, work, and play. This growth trend is expected to continue, at least for the foreseeable future. The communities of Bend, LaPine, and Sunriver are close to the River, and local residents share this popular recreation area with visitors from all over the world. There is an increasing demand for outdoor recreation of all types, and the Deschutes River is viewed as a prime destination. The Deschutes National Forest in recent years has received as many as 10 million visitors in a single year.

Resource Descriptions

Geologic Description

The Upper Deschutes River has a long history shaped by volcanism, glaciation, and tectonism. Newberry Volcano and the Cascade Range have flooded the area repeatedly with lava and other volcanic deposits, and great ice age glaciers have discharged large volumes of water, sand, and gravel into the river. Like human cultures adapting to new landscapes, the Deschutes River has adapted to a rapidly changing volcanic and glacial landscape.

The Upper Deschutes River as we know it was shaped mostly by four events: the growth of Newberry Volcano, widespread sinking in the La Pine Basin, glacial and post glacial deposition of sediments, and the growth of the Mt. Bachelor chain of volcanoes. Early in the half-million year history of Newberry Volcano, the Deschutes River was located several miles east of Benham Butte and Bend. But as Newberry Volcano grew, lava pushed the river to the west to its present location. At the same time, hundreds of square miles slowly sank

about a half mile in the general area of La Pine, Crescent, Wickiup Reservoir, and Mt. Bachelor. Simultaneously during the Ice Ages, lake and river sediments filled the sinking area.

During this period the Deschutes River was significantly different. Fed by numerous meandering tributaries, the river flowed in shallow meanders across the sediments. The seasonal range of flow rates was much greater than today even with the present-day flow control by dams. Water from glaciers carried considerable silt, sand, and gravel especially during spring and summer. The present river channel above Sunriver either did not exist or was completely buried under broad sheets of sand and gravel. The abrasive action of sand and gravel carried by the river in the waning years of the last ice age are seen in remarkable rock sculptures wherever lava forms the river bed. The smooth shapes, arches, and deep rounded pits at Pringle Falls are good examples.

About 15,000 years ago volcanic activity formed a 20 mile long, north-south chain of volcanoes with Mt. Bachelor at its north end. Lava from this chain buried 100 square miles of the sediments, and replaced a gentle landscape of lakes and lazy rivers with mountains. Today, the Deschutes River must first flow south around this volcanic chain before heading north towards its rendezvous with the Columbia River.

Since the conclusion of the Ice Ages and the Mt. Bachelor volcanic period, the river has eroded and deepened a meandering channel through the layered sediments of the La Pine Basin. The sediments hold keys to the geologic history of Central Oregon. These sediments of mostly silt, sand, and diatoms make up the channel banks of the Deschutes River from Wickiup Dam to Benham Falls. Dozens of layers of volcanic ash within the sediments record nearby eruptions and promise to provide a major source of information and geologic understanding.

The sediments have also recorded changes in the earth's magnetic field during the time the sediments slowly accumulated. A group from the University of Hawaii has been studying paleomagnetism recorded in the riverbank sediments below Pringle Falls while the United States Geological Survey has been studying volcanic ash in the same area. The research can only be accomplished near Pringle Falls because the depth of the Deschutes River channel in this location exposes the greatest depth of La Pine basin sediments. This basic research is expected to add to knowledge about explosive volcanism in the Cascade Range and in the western United States. The research is also intended to expand knowledge of how the earth's magnetic field changes with time.

The springs that provide most of the water for the Deschutes River, including the sources of Spring and Fall Rivers, are the result of past volcanic lava flows and the sedimentation from explosive volcanic events and glacial activity. The generally high permeability of volcanic rocks allows rain and melting snow to easily sink into the ground and trickle downward to the water table. The sediments of the La Pine Basin play a primary role in the occurrence of springs because they have very low permeability. Ground water flowing through adjacent permeable volcanic rocks rises to the surface behind the dam of sediments and spills out as numerous, scattered springs.

The most recent fundamental change to the Upper Deschutes River came 6200 years ago from the eruption of the Lava Butte Lava Flow from Newberry Volcano. The lava built a high dam against Benham Butte and denied the river its old channel east of the butte. Water backed up behind the lava dam nearly to Pringle Falls until the new lake topped and flowed

through a low saddle at Benham Butte. Thus began Benham Falls and a new channel of the Deschutes River. Below Benham Falls, the new channel followed the west edge of the lava to Lava Island Falls. Above Benham Falls, the old channel, 60 feet deeper than the present channel, slowly filled with sediment.

Human interaction with the Upper Deschutes River has changed since construction of Crane Prairie and Wickiup Dams. Primary interactions are the dramatic change of flow regime below Wickiup Dam, alteration of vegetation along the channel and banks from Wickiup to Benham Falls, and major increase in recreation use.

The peak discharge below the Wickiup Dam site has increased by 50 percent while the duration of flows equal to or greater than pre-regulation peak flows has increased by several thousand percent since Wickiup Dam has been in service. As a result the channel of the Upper Deschutes (especially from just below the confluence of Fall River upstream to Wickiup dam) is currently undergoing a period of rapid change. Evidence of such change, gathered by comparing photographs, includes a 20 percent increase in the width of the channel between 1943 and 1991 and an increase in the number of meander cutoffs from 2 to 12 from 1943 to 1991.

In some rivers, the geologic processes result in hard bedrock channels or channels lined with large boulders resistant to erosion. In the Deschutes River channel between Wickiup Dam and Fall River the sediments deposited from volcanic activity and the washing down of glacial debris are relatively fine and provide little natural resistance to the erosive forces present. This natural lack of resistance is exacerbated by flows that exceed those that occurred prior to regulation.

The removal of large woody material from the channel to promote transportation of saw logs to mills early in this century compounded the natural lack of resistance to erosion. When abundant, large woody material plays an important role in controlling the stream energy.

The high, regulated flows of irrigation season coincide with the growing period of streambank vegetation. The high flows during the growing period makes the establishment or reestablishment of vegetation an unlikely proposition and hinders one of the primary natural means of stabilizing the river channel. The existing rate of bank erosion has resulted in property owners attempting to arrest the accelerated erosion by placing rip-rap along cutbanks to prevent the loss of riverfront property.

Alteration of the river from this interaction of human-controlled flow and other human-caused changes ranks with geologic and atmospheric events of the past including the last of the ice age, the eruption of Mt. Mazama, and the rare great storms of the past. The substantially increased range of the flow regime due to irrigation storage and release has accelerated the rate of many natural processes in the river channel. The ecosystem is currently adjusting to the new flow regime. These adjustments have physical and biological consequences. Specific long-term (centuries) effects of the present, controlled flow regime and greatly increased recreation use are largely unknown, but it is clear that many natural processes will operate at an accelerated pace.

Events in geologic history and currently active processes have created the existing landforms between Wickiup and Bend. In Segments 2 and 3, the Deschutes River is an outstanding example of a river adjusting to its Ice Age and volcanic past. A diversity of outstanding river-made landforms record these great adjustments. At the present time the

artificial flood stages resulting from irrigation releases have accelerated lateral erosion on the outside banks of bends in the river and increased deposition on the inside of river bends. Because these flows remain within the river channel or spill into undeveloped sloughs, there are no dramatic or catastrophic events commonly associated with flood events.

As a result of past and ongoing processes outstanding examples of the following landforms are dispersed throughout segments 2 and 3:

- Meander valleys
- Active meander channels with meander scarps, point bars, and terraces
- Cutoff and abandoned meanders with oxbow lakes and meander scars
- Erosional and depositional terraces
- Terrace developed from eruption of Lava Butte lava flow, e.g. the Great Meadow at Sunriver
- Valley and channel slopes in a variety of materials and stages of development

The landforms in Segment 4 of the Deschutes River are mostly the result of the Lava Butte lava flow. Benham Falls and the downstream falls and rapids were created when the river found a new channel through a saddle in Benham Butte. Below Benham Falls the major features include:

- Wetlands and meadows that formed behind lava dams, e.g. Ryan Ranch Meadow
- Slackwater sections that formed behind lava dams, e.g. Aspen Camp section
- Whitewater rapids and falls flowing over lava dams, e.g. Lava Island Falls and Big Eddy Rapids
- Dillon Falls where the river flows over an ancient fault scarp.

Below Aspen Camp, the channel walls of the Deschutes River display layers of pumice, ash, and tuff that record violent eruptions in the Broken Top area which long ago affected the character of the Deschutes River. Ancient river channels join with the Deschutes and record the flow of melt water from vanished Cascade glaciers.

Summary

The land forms associated with the Upper Deschutes provide a dramatic window into the geologic past. The river provides a textbook example of the effects of the interaction of volcanism, climate changes, and the power of water in shaping the landscape. Ongoing research is of international significance. The opportunities for further research and interpretation are virtually limitless due to the accessibility of the river to both professional researchers and recreationists.

Hydrologic Description

Flow Character: Natural Flow

The most significant natural determinant of the hydrological characteristics of the Upper Deschutes is groundwater inflow. As discussed in the review of the geological resource, the subsurface flows travel in large quantities and at relatively rapid rates. As a consequence, the Upper Deschutes has relatively few tributaries. The headwaters of the Deschutes, Fall River, and Spring River all originate from large springs which are relatively rare hydrological resources. These large springs offer clear, cold, high quality waters which moderate winter temperatures in the Deschutes and offer important spawning areas for brown trout.

Because the Upper Deschutes Basin drainage is largely spring fed, it has a very stable natural hydrologic regime in which daily, monthly, and even annual fluctuations in water flows are minimal compared to rivers dominated by surface runoff. In a 1914 U.S. Reclamation Service report describing the water resources of the Deschutes River, the authors reported: "The flow of the Deschutes River is one of the most uniform of all streams in the United States, not only from month to month, but also from year to year. The normal minimum flow during the irrigation season is between 1,500 and 1,600 cubic feet per second (cfs) at Bend. The extreme minimum is usually in midwinter when it occasionally drops, for a few days only, from 1,100 to 1,200 cfs."

Regulated Flow

The irrigation season extends from April 1 through October 31. Water rights of irrigation districts vary and maximum demand is from May 15 through September 15. Rights above the natural river flow must be satisfied by drawing water stored in reservoirs. Historically, natural stream flow satisfies water rights through 1905 in typical water years. Water diversions above this level are obtained from water stored in Crane Prairie (COID and Arnold) and Wickiup (North Unit) reservoirs. Water allocated totals nearly 520,000 acre-feet or 5 acre-feet for each acre of ground irrigated.

Six irrigation districts divert water near Bend to irrigate 115,000 acres in Jefferson, Crook, and Deschutes Counties. They are, in order of water right priority:

1. Swalley: Deschutes County. Maximum diversion, 120 cfs. Total withdrawal, 43,321 acre-feet. 1899 water right.
2. Central Oregon Irrigation District (COID): Deschutes and Crook Counties. Maximum diversion, 989 cfs. Total withdrawal, 348,488 acre-feet. 1900 water right.
3. Crook County Improvements District (Lone Pine Irrigation District): Crook County. Maximum diversion, 38.8 cfs. Total withdrawal, 14,112 acre-feet. 1900 water right (10,500 acre-feet stored in Crane Prairie Reservoir).
4. Arnold: Deschutes County. Maximum diversion, 150 cfs. Total withdrawal, 68,033 acre-feet. 1905 water right (13,500 acre-feet stored in Crane Prairie).
5. Tumalo: Deschutes County. Maximum diversion, 9.5 cfs. Total withdrawal, 4,032 acre-feet.
6. COID: Maximum diversion, 401 cfs. Total withdrawal, 97,868 acre-feet. 1907 water right (26,000 acre-feet stored in Crane Prairie Reservoir).
7. Tumalo: Total withdrawal, 35,000. 1911 water right (water stored in Crescent Lake).

8. North Unit: Jefferson County. Maximum diversion, 1,100 cfs. Total withdrawal, 262,500 acre-feet (water stored in Wickiup Reservoir).

In addition to these offstream water rights, Oregon Water Resources Department has water rights (under the authority of Oregon Revised Statutes 537.346) to maintain instream flows for the purpose of protecting aquatic life and minimizing pollution. These instream water rights include 300 cfs between Wickiup Dam and the confluence of the Little Deschutes River and 660 cfs between Spring River and the North Unit Canal Dam in Bend. Because these instream water rights are junior to offstream water rights, they have little impact on river management.

The relationship between maximum allowable diversion as specified by the water rights structure and actual diversions made by irrigation districts depends on both water availability and demand. When a district does not use all of its entitlement this water becomes available to the district next in priority. Specific flow levels at which allowed use begins, consequently, can fluctuate for year to year, month to month, and even daily.

A minimum release of 20 cfs from Wickiup Reservoir is required and elevation of the river below the Wickiup gauge must not change more than six inches in an hour.

As a result of water storage and diversion for irrigation, the stable natural flows of the Upper Deschutes have been replaced by lower flows during the winter storage months and higher flows during the summer irrigation season. This difference is most significant between Wickiup Dam and Fall River and is moderated as tributaries and springs augment the flow of the main stem between Fall River and the North Boundary of Sunriver. These differences can be illustrated by comparing regulated and lightly regulated flows at Wickiup Dam and at Benham Falls in Figures 1 and 2 and noting the influences of tributaries and springs between these two locations (The river was regulated by Crane Prairie reservoir as early as 1922; its capacity is 55,000 acre-feet of water. Wickiup began influencing the river in 1945 and it has the capacity of 200,000 acre-feet. The mean flow from Crane Prairie is approximately 210 cfs where the mean flow at the outlet of Wickiup is approximately 750 cfs).

Flows released out of Wickiup are increased by Fall River which adds 90 to 160 cfs (usually from 140 to 160), from the Little Deschutes which adds 5 to 3,500 cfs (usually from 140 to 350 cfs) and by Spring River and associated springs adding from 180 to 210 cfs. Differences in flows between Wickiup Dam and Benham Falls are the product of these inputs.

COMPARISON OF REGULATED AND UNREGULATED FLOWS AT WICKIUP DAM by Comparing pre 1942 flows with post 1942 flows.

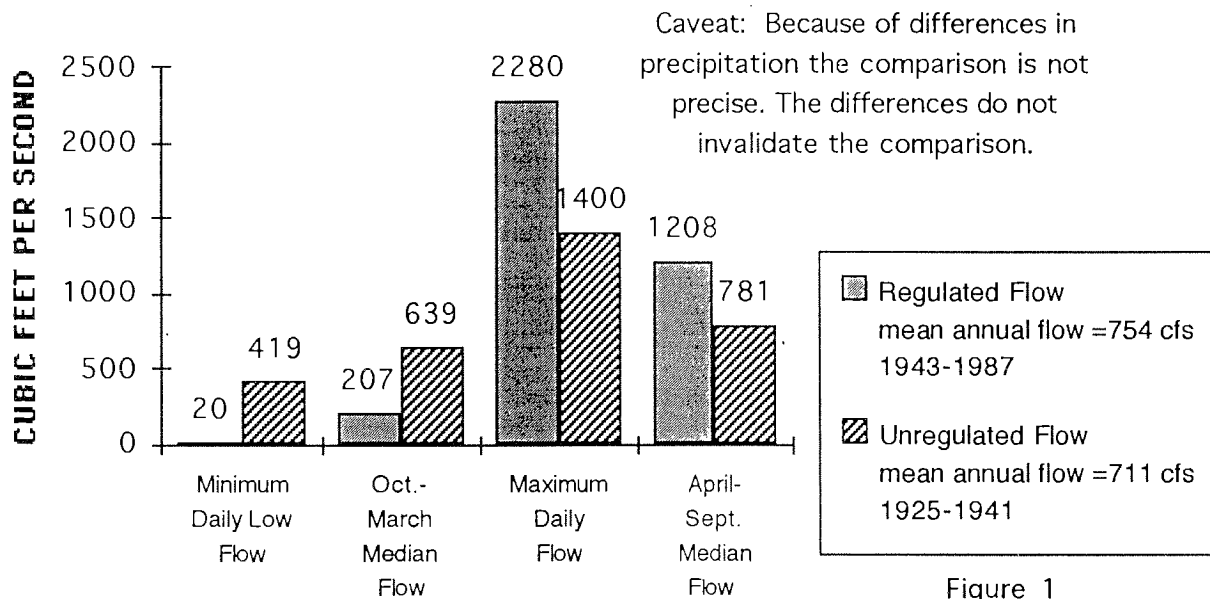


Figure 1

COMPARISON OF REGULATED AND UNREGULATED FLOWS AT BENHAM FALLS by comparing pre 1942 flows with post 1942 flows.

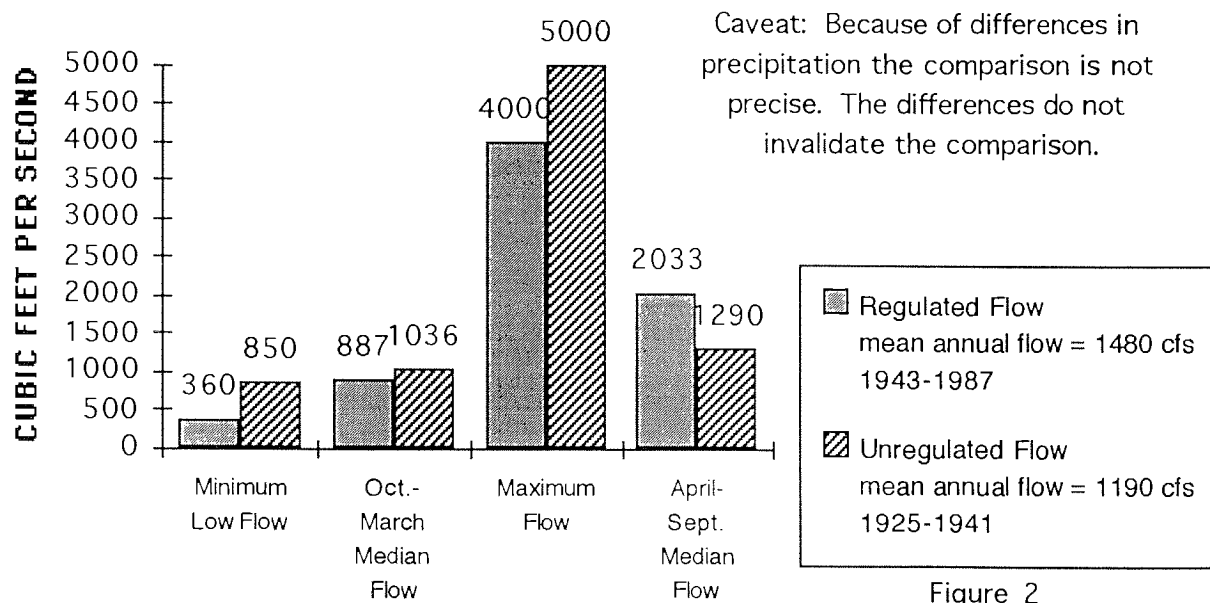


Figure 2

Flows significantly modified by regulation contribute to accelerated erosion, decrease in wildlife habitat, decrease in scenic quality during the winter, and degradation of fish habitat (USDA Forest Service 1994b, Gillham 1991, Cameron and Major 1987). This results from the wide variation in seasonal flows. During the storage season the minimum flow is less than 5 percent and the mean flows less than 20 percent of the unregulated flows between Wickiup Dam and Fall River. Differences during the irrigation season, though statistically less dramatic, are nonetheless significant. Between Wickiup Dam and Fall River normal high regulated flows exceed normal high unregulated flows by 50 percent while mean regulated flows exceed unregulated flows by 60 percent. The relationship between regulated and unregulated flows also occurs downstream, though to a lesser degree.

Peak flow events have been reduced in magnitude by the ability to reduce flows out of Wickiup Dam when the Little Deschutes is at flood stage.

Despite significant changes in flow, the regulated Upper Deschutes still provides water necessary to support aquatic and riparian life, to support seasonally pleasing scenic conditions, and to support and in some cases enhance recreational activities.

Because of irrigation season diversions and winter storage, flows below Bend are now less than natural flows all year. Irrigation season flows are less than 50 cfs while winter flows are roughly half of the calculated natural flow and virtually the same as recorded at Benham Falls.

Table 3-1
Comparison of Regulated and Unregulated¹ Seasonal Flows by Segment
(1943-1987)

| Segment | Storage Season (Nov.-Mar.) | | Irrigation Season (Apr.-Oct.) | |
|--------------------|----------------------------|----------|-------------------------------|------------|
| | Minimum | Median | Median | Maximum |
| Segment 2 | | | | |
| regulated | 20 cfs | 130 cfs | 1175 cfs | > 2100 cfs |
| unregulated | 470 cfs | 660 cfs | 730 cfs | |
| Segment 4 | | | | |
| regulated | 360 cfs | 830 cfs | 1900 cfs | > 3000 cfs |
| unregulated | 850 cfs | 1100 cfs | 1210 cfs | |

1. Because no unregulated flows actually occurred during this time, unregulated flows were based on comparison of water releases and change in water storage in Wickiup and Crane Prairie Reservoirs.

Comparison of Regulated and Unregulated Flows by Segment

Segment 2 - Wickiup to South Boundary of La Pine State Park

The minimum release from Wickiup reservoir has been as low as 10 cfs in the winter, and average 20 cfs in low water years. The median flow of 130 cfs (1943-1987) has been measured during the winter storage season. The maximum release during the summer irrigation season has exceeded 2100 cfs, with a median flow of 1175 cfs. Under this flow regime, flow exceeds 1270 cfs approximately 66 days a year. The 1270 cfs value is significant because it is equivalent to a pre-regulation 25 year high flow event.

Under unregulated conditions, the minimum low flow at the Wickiup site would be approximately 470 cfs. The median winter (Nov-Mar) flow would be approximately 660 cfs and the median irrigation season (Apr-Oct) flow would be approximately 730 cfs.

Segment 3 - South Boundary of La Pine State Park to North Boundary of Sunriver

Flows in this reach of the river are augmented by partially regulated flows from the Little Deschutes, and natural flows from the Fall River and Spring River complexes. Regulated flows of the Upper Deschutes at the beginning of the segment range from a winter low of 28 cfs to a summer high of 2200 cfs, with a winter median of 130 cfs, and a summer median of 1175 cfs. Inflow from the Little Deschutes generally ranges between 140-350 cfs. Inflow from Fall River generally ranges between 140-160 cfs, and inflow from the Spring River complex generally ranges between 180-210 cfs.

Segment 4 - North Boundary of Sunriver to Bend Urban Growth Boundary

The minimum flow measured at the Benham gauge site is 360 cfs in the winter, with a median flow of 830 cfs (1944-1987) measured during the winter storage season. The maximum flow in the summer irrigation season has exceeded 3000 cfs, and the measured median flow is 1900 cfs. The annual median flow is 1400 cfs (1944-1982). Under this flow regime, the high flows exceed 1600 cfs approximately 40 percent of the time; 2000 cfs 28 percent of the time, and 2400 cfs 13 percent of the time. Except for unusual winter weather events high flows occur during the irrigation season. Due to a combination of a largely unregulated flow on the Little Deschutes and the ability to regulate the flow out of Wickiup 25 year high flow events are no more likely to occur under irrigation driven flow regimes than under the natural flow regime in this segment.

Under unregulated conditions, the minimum low flow at the Benham gauge site would be approximately 850 cfs. The median storage season (Nov-Mar) flow would be approximately 1100 cfs and the median irrigation season (Apr-Oct) flow would be approximately 1210 cfs. The median peak irrigation season (mid-May - mid-Sept) flow would be 1340 cfs. Under this flow regime, the high flows exceed 1470 cfs approximately 30 percent of the time and 1510 cfs 20 percent of the year.

Ground Water

Even before Crane Prairie Dam was built, water was lost into fractured lavas under Crane Prairie at about 10 cfs. The average seepage loss from the reservoir is 4,900 acre-feet per month (about 82 cfs). When the reservoir is close to capacity, loss may exceed 10,000 acre-feet per month.

The average loss from seepage at Wickiup Reservoir is about 70 cfs (4,200 acre-feet per month) and, in good water years when the reservoir is maintained at higher than normal levels, the loss can be as high as 90 cfs (5,400 acre-feet per month).

An estimated 1,122,000 acre-feet of ground water passes through the region annually. As much as 350,00 acre-feet may be the result of conveyance loss from canals. In most areas this recharge has little impact on users of groundwater. However, several areas have a "perched" water table. In these areas, domestic wells are dependent upon recharge from leakage from irrigation canals (King 1992).

Water Quality

Ongoing DEQ and Forest Service monitoring indicates that two water quality parameters, turbidity and dissolved oxygen, do not consistently meet DEQ standards on the Upper Deschutes.

Turbidity, a measure of water clarity, is most affected by the regulation of flows and the growth of micro-organisms in the reservoirs upstream. From spring until midsummer, water quality is very good as it leaves Wickiup Reservoir, but deteriorates rapidly in the first few miles below the dam. The turbidity level is increased as much as 30 fold when irrigation water is released in early spring (USDA Forest Service unpublished data). Turbidity decreases as the summer progresses. Once flows initially reach 800 cfs, peak turbidity levels range between two to five times background level until the end of July, when background levels actually exceed downstream turbidity levels.

The elevated turbidity from the initial irrigation release until midsummer is largely a result of the large fluctuation in flow levels. During the storage season little water is released from upstream reservoirs, leaving much of the channel exposed. Frost action loosens the exposed channel and bank material, which is eroded by the increased flow in the spring. The absence of large woody material contributes to the erosion rate.

While reservoirs can decrease turbidity by trapping sediment, the Upper Deschutes River reservoirs contribute to mid and late-season turbidity by enhancing the growth of micro-organisms (primary productivity). Sunlight warms the still, unshaded water of the reservoirs, and micro-organisms flourish. The millions of organisms cloud the water in what is frequently called "algae blooms". In mid-summer these clouds of organisms begin to get washed down the river and become the primary cause of turbidity in the river.

As a result of erosion, the turbidity level does not meet the State water quality standard, which defines a water quality violation for turbidity as an increase in excess of 10 percent over background.

Septic systems in areas with high water tables may lead to pollution problems in the river. Low levels of dissolved oxygen in the river during the summer suggests bacteria from septic systems may already impact the river.

Summary

The river environment has been significantly altered over the last 100 years. Manipulation of flow patterns for irrigation has affected both water quality and quantity. The existing water quality and quantity in the Upper Deschutes River still supports a remarkably diverse ecosystem. However, the river now lacks many of the hydrologic qualities for which it was once famous. The former clarity and uniformity of flow are no longer present. Flow fluctuations, along with significant changes in the timing of flows, have contributed to increased streambank erosion and decreased water quality. This relationship is particularly true in Segment 2.

Fishery Description

Historical Condition

Habitat

The stable flows and excellent water quality combined with access to spawning gravel (in the area now inundated by Wickiup and upstream) produced high quality fish habitat for the indigenous cold-water species found in all river segments. Streamflows maintained an average pool depth of greater than 7 feet; 0.9 feet of water covered over 98 percent of the spawning gravel area; 95 percent of the streambed was covered with water to maintain aquatic insect production; and abundant large woody material provided fish and aquatic insect habitat. The exact amount of large woody material which was historically in the stream is unknown.

Populations

Though historical information is limited, it is believed that the original fish were rainbow trout, bull trout, mountain whitefish, and sculpins while anadromous fish runs were stopped at a series of falls below Bend. The barriers also prevented immigration of other species such as squawfish and suckers. Information on relative composition and density of the various populations is limited, but given the high quality habitat and anecdotal references, it is thought that populations were high. For example, in 1907 it was reported that anglers caught 3,000 trout from the Deschutes for a community fish fry.

Present Conditions

Today it is unlikely that the above feat could be replicated. The composition of the trout population is different and numbers appear to be significantly reduced if creel census is any indicator. The number of fish harvested in the past, the construction of Crane Prairie and Wickiup Dams and subsequent regulation of flow, introduction of exotic species, large woody

material removal, and other human caused developments have had a significant impact on the fish population and habitat in the Upper Deschutes. Impacts have been greatest in Segment 2 immediately below Wickiup Dam, with lesser impacts as one moves downstream.

The bull trout is no longer present due to changes in habitat conditions. Brown trout have become the prevalent species in the river upstream of Benham Falls to Wickiup Reservoir. According to ODFW personnel the brown trout population in segments 2 and 3 represents the best riverine population in Oregon in terms of numbers of large resident fish. It is one of the better riverine populations in the Pacific Northwest.

Fishery habitat on the Upper Deschutes is now different for several reasons. Water quantity fluctuates to a much greater extent than before. Low flows in the river during the storage season increases competition among trout, concentrates trout (making them more susceptible to predators and environmental accidents), and limits useable spawning and cover opportunities. The construction of Wickiup Dam cut off access to the primary spawning gravel utilized by trout inhabiting the river above Pringle Falls. Though believed always to be limited and of poor quality, spawning gravels below Wickiup Dam became even more restricted when the construction of the dam limited the recruitment of gravel from upstream sources. Gravel recruited from the stream banks below Wickiup Dam is limited, of poor quality (small size), becomes highly embedded with fines, and is usually pushed toward the margins during high flows. Consequently there isn't much gravel, the gravel present is of poor quality, and most of it is unavailable to fall spawning brown trout.

Not all changes have occurred because of changes in the river flow regime. The removal of large woody material to facilitate transportation of saw logs in the past and to enhance navigation in the present has eliminated cover for trout and critical habitat for macroinvertebrates. In portions of the river naturally lacking rock outcroppings or rubble substrates large woody material is likely to be the only source of cover for aquatic life ranging from tiny insects to 30 inch long brown trout. Development of private land and recreation sites has eliminated some riparian habitat. Recreation activity has resulted in boat wakes which accelerate erosion on the streambanks. Trampling of streambanks causes gradual destruction of riparian habitat critical to trout fry and the organisms upon which they feed.

It is likely that areas used for procurement of fish by Native American Indians occur along the river. However, no specific sites where this activity occurred have been identified to date.

Habitat and Population by Segment

Segment 2 - Wickiup Dam to South Boundary of La Pine State Park

Habitat

The flow dependent effects described above are magnified in Segment 2 because Wickiup Dam regulates at least 98 percent of the water that would naturally flow through the segment. Additional effects include low winter flows which result in extremely cold water temperatures with the river frequently freezing over completely. The freezing eliminates habitat for fish and aquatic invertebrates. It also may cut off flow through redds. These low winter flows maintain 0.9 (the minimum for optimal brown trout spawning) feet of water over

only 10 percent of the spawning gravel area and much of the spawning gravel is dry. Consequently when it is time for the brown trout to spawn there is no water over most of the remaining spawning gravels. In the few locations where the gravel is submerged, the low flow, combined with the flat gradient and high sedimentation, does not allow sufficient intergravel flow for the buried eggs to survive (ODFW unpublished data). It is also suspected that ice scouring may destroy redds.

In this segment storage flows concentrate fish in a few, generally coverlets, pools where they are vulnerable to predation. Trout prefer to overwinter in the interspaces of bottom substrate or near woody material concentrations. However rock substrate is naturally limited in this segment and where it does exist its value as cover is frequently reduced as spaces between the rocks have filled with sediment. High flows, whether natural or regulated, aggravate the lack of cover by pushing much of the remaining large woody material into stream margins. During high flow this large woody material can provide cover for fish. However during the storage season when releases from Wickiup Dam are decreased the large woody material in the margins becomes dry. Consequently many aquatic organisms must semiannually redistribute themselves, and find themselves in winter pools which lack adequate cover.

Shutting down flows in early October also strands small fish and aquatic invertebrates, such as insects, crayfish, freshwater shrimp and snails in shallow pools, side channels, and on dewatered woody material where they soon perish. This yearly die off probably accounts for the low macroinvertebrate density and diversity compared with other rivers and streams on the Deschutes National forest (Aquatic Biology Associates 1991). Low flows also reduce velocity and consequently reduce insect drift, lowering the availability of food for fish. Regardless of the cause, the growth and survival rates of fry and juvenile trout are likely to be reduced because of the dependence of trout on macroinvertebrates for food.

The drawdown area of exposed channel is also uninhabitable by aquatic vegetation that provides cover for both invertebrates and fish. Ultimately the drawdown of the river forces all aquatic organisms to exist in a habitat only a fraction its original size.

The drawdown area affects even the river that remains inundated all year because it is the source of most of the turbidity that accompanies irrigation releases in the spring and summer. High concentrations of suspended sediments are detrimental to macroinvertebrates and make it difficult for trout to find and consume this important food source. The sediments released from the drawdown area also become trapped in the small amount of spawning gravel that remains covered by water during the spawning and incubation periods and consequently the survival rate of eggs is less than in more favorable circumstances.

Fish Populations

Species present include brown trout, rainbow trout, mountain whitefish, kokanee salmon, coho salmon, sculpin, tui chub and threespined stickleback. The native bull trout disappeared sometime in the 1950 to 1960 period. They were cut off from spawning and rearing areas by Wickiup Dam, subjected to overfishing, exposed to severe competition from the introduced brown trout, and subjected to serious habitat loss by flow fluctuations. The rainbow trout, whitefish and sculpins are the only three remaining indigenous species. Given

the few resident rainbow present in this segment and the frequent planting of catchable hatchery rainbow trout it is unclear whether a remnant population of the native "redband" rainbow trout remains.

The brown trout were introduced in the 1920's or 1930's and are now the dominant trout species. A partial ODFW inventory indicated a good population of older, large browns with fish captured up to 12 pounds. A partial inventory recorded 9 fish greater than 12 inches and 2 greater than 20 inches per mile surveyed.

Approximately 15,000 legal rainbow are stocked into this segment every summer. It appears that the hatchery fish are caught, migrate downstream or eventually die from the disease *Ceratomyxa shasta* (indigenous species, coho, and kokanee are resistant to this disease). Consequently there is almost no carry-over from one year to the next.

The native whitefish is very abundant. ODFW have not inventoried whitefish during their surveys, but estimate whitefish make up at least 90 percent of the fish biomass.

The kokanee and coho salmon are transient outmigrants from Wickiup Reservoir. ODFW surveys noted both juvenile and mature adult kokanee but only immature coho. Thousands of these species emigrate out of Wickiup Reservoir each summer as the pool recedes. This emigration is exaggerated during years with extensive reservoir drawdown. By spring these species are absent from the river indicating they moved out of the river or failed to survive. The small juvenile salmon no doubt provide considerable forage for the larger brown trout. The chub and stickleback are illegal introductions that play a minor role in the river's ecology.

Fishing Success: There is no recent comprehensive estimate of the number of anglers or the size of the catch available. An extensive 1967 ODFW survey found that 252 wild brown trout were caught by anglers. Four of the fish exceeded 20 inches and 88 were more than 12 inches in length. Angler access is good and there are a number of campgrounds near the river. The fish of choice is the stocked rainbow. Turbid water from the initial irrigation releases discourages fishing and limits angler success.

In 1990, a two fish bag limit on brown trout was implemented. Prior to that, the limit was five trout of at least six inches per day (one fish larger than 20 inches). The protective regulation was designed to reduce the take of brown trout and was a response to general complaints that the quality of brown trout fishing is declining. There is no bag or size limit on whitefish.

Segment 3 - South Boundary of La Pine State Park to North Boundary of Sunriver.

Habitat

Despite flows augmented by Fall River, the Little Deschutes, and Spring River the irrigation driven flows increase variation in water flow volume when compared with pre-regulation flows. The results appear to be more turbidity, flow fluctuations, and icing which combine to seriously degrade the fish habitat relative to unregulated flows. There are limited overhanging banks and overhanging vegetation in this segment.

There are some differences in habitat conditions when compared with Segment 2. The addition of tributary flows moderates some of the low winter flow impacts. Spawning gravels are limited in quantity and quality, but higher flows do facilitate better oxygen supply to

buried eggs. Fall River and Spring River provide about one mile of high quality spawning habitat as a result of the addition of spawning gravels. Large woody material has been placed to restore habitat in the lower mile of Fall River.

Pools are more abundant and deeper and provide improved low flow sanctuaries for larger adult fish than in segment 2. There is more large woody material inundated and providing fish cover, even at the lowest flows. In several locations, this material has been deliberately placed in the stream for bank protection. In the lower half of this segment, lava flows provide rubble, cobble and boulder substrate that are important juvenile rearing and overwintering areas.

Several reaches of this segment are heavily developed for homesites. Some bank protection measures, such as concrete and plank bulkheads have greatly reduced shoreline fish and aquatic invertebrate habitat. In other cases, loosely placed large, rock riprap has improved juvenile fish habitat.

The dissolved oxygen (DO) levels in the river near Harper Bridge do not meet water quality standards for spawning DO saturation and 20 percent of samples do not meet DO saturation standards at other times of the year. The cause of the dissolved oxygen condition is unknown. The flow regimes from the reservoirs somewhat control this condition; however, the existing data are not sufficient to conclude the problem is specifically related to the flow regimes and /or other activities within the watershed.

Although the habitat remains inferior to that which was produced by a natural flow regime, the tributary spawning areas and the juvenile winter habitat provided by the lava flows have somewhat relieved two critical limiting factors, compared to conditions in Segment 2.

Fish Populations

The species composition is identical to that of Segment 2 with the potential addition of a few brook trout which may drop out of Fall River and Spring River. The bull trout has disappeared for much the same reason as described for Segment 2. However, Fall River and Spring River still could provide a suitable bull trout spawning and juvenile rearing habitat.

As in Segment 2, the brown trout is the dominant trout species. However, corresponding to the improved habitat the population exceeds that found in Segment 2. The ODFW survey recorded ten fish/mile greater than 12 inches and three fish/mile that exceeded 20 inches. The lack of holding areas during the low flow periods and possibly being preyed upon by larger fish may account for the younger age classes being poorly represented in the population. An extended drought cycle resulting in an increased range in flow extremes may have also contributed to poor survival rates in the younger age classes over the past several years.

Peak spawning ground counts for Fall River in 1989 and 1990 recorded 138 fish and 146 redds in 1990 and 78 fish and 253 redds in 1989. Peak spawning occurs in early November and it is expected that redd counts increase as the remaining fish complete spawning.

The Spring River surveys concentrated on fish because spawning is so concentrated in the tenth of a mile of available habitat that an accurate redd count is impossible. Counts in 1990 and 1989 found 111 and 118 fish. Redd counts from late 1960's and early 1970's indicate fewer fish were using the area. Additional spawning gravel was added in late 1980's.

Brown trout also attempt to spawn in the few suitable areas in the mainstem Deschutes. The success of these efforts is unknown and they are of minor importance compared with tributary spawning. Size of spawning fish observed in the tributaries ranged from 10 to 26 inches.

Like Segment 2, this reach has a very low gradient and is not preferred rainbow trout habitat. The rainbow trout population is low and most fish are small. They are more numerous below Sunriver where lava flows provide some good habitat. None of the fish captured were greater than ten inches and most were less than six inches.

This section is stocked with about 10,000 legal sized rainbow each year. As in Segment 2, the stocked fish are either caught, emigrate downstream, or die of *Ceratomyxa shasta*.

In recent years, volunteer conservation groups released approximately 50,000 to 100,000 rainbow fry in Segment 3 at River Mile 190 and River Mile 205. The survival and contribution of these fish is unknown.

Populations of other fish species is similar to that for Segment 2.

Fishing Success: Bank access is not as good for anglers as in Segment 2 because of the amount of private land. There are only two small Forest Service campgrounds and La Pine State Park at the upper end of the segment.

Many of the residences along the river have docks and boat fishing is popular. Rental canoes are available at Sunriver. The desired species is probably stocked rainbow but this is also the most popular segment for brown trout. One group of two anglers reported catching around 300 brown trout in 1990. Angling regulations are similar to Segment 2.

Segment 4 - North Boundary of Sunriver to COID Diversion

Habitat

From a fisheries perspective, there is an improvement in habitat condition in this segment. Below the confluence of Spring River icing problems are reduced. Lava flows, boulders, and rubble armor a considerable portion of the streambed and banks from the high flows of the irrigation season.

The base minimum flows of 500 to 700 C.F.S. are adequate to provide good fish habitat. The prevalent lava flow geology has created a high gradient system with abundant cover found in the boulder and cobble substrate. This same substrate is also good habitat for aquatic invertebrates. The higher flows provide deeper pools and considerable turbulence, both which provide fish cover. The base flows also provide a large, permanent living space for all aquatic organisms.

Although the augmented winter flows dampen the flow fluctuations, the magnitude of the variation still creates serious effects on the aquatic eco-system. Gravel and woody material are pushed into stream margins by the high flows, then de-watered by the irrigation flow cutoff. Aquatic organisms, including fish, are trapped inside channels and backwaters as the flows rapidly recede.

Spawning gravel is very limited and generally found only in small pockets. It is likely that this segment has always been deficient in gravel due to the "Benham Falls Dam" created by early lava flows. The gravel deficiency and the impacts associated with the fluctuating flows are most likely the factors limiting fish production.

Fish Populations

The same fish species inhabit this segment as in Segment 2. A major difference between species is that the brown trout has gradually been displaced by the rainbow as the dominant trout in the reach below Benham Falls. The causes of this transition are not clear. Generally, brown trout will prevail in a stream where both species occur. There is little spawning gravel in this segment and even less for a fall spawning species such as brown trout. Other than spawning gravel, the habitat appears suitable to sustain a brown trout population.

The high gradient habitat found in much of this segment is preferred by rainbow trout. The population density appears to be high but with the great majority fish less than 12 inches in length and a few fish up to 18 inches. There is a possibility that the rainbow trout population is a remnant population of the native "redband" rainbow trout. The Oregon Department of Fish and Wildlife is scheduled to conduct a genetic study to determine the origins of the existing rainbow trout population.

The Segment 2 discussion of other fish species is appropriate for this segment. The Central Oregon Irrigation District diversion trap counts provide documentation of the tremendous number of kokanee that move through the river after leaving Wickiup Reservoir. In 1990, an estimated 28,000 moved through the bypass trap and into the canal (Campbell and Craven 1991). Because some kokanee were diverted into the river and others never entered the canal the number moving through this segment could be several times the number counted in the diversion trap.

Downstream Movement of Fish: Bypass trapping and canal samples indicate that large numbers of rainbow trout are emigrating out of this segment.

It is believed that many fish pass through screens (designed to keep fish in the river) and into the irrigation canal. In an 1990 inventory, 528 wild rainbow, 616 whitefish, and 10 brown trout were captured from a 90 yard pool in the canal and below the fish screen. The rainbow were between 2 and 13 inches but most were smaller than 5 inches.

This inventory followed shutdown of canal flows, which leaves a series of isolated pools that eventually dry up. It is not known if the results are typical of conditions in the entire 45 mile canal system.

In addition, it is likely a substantial number of fish simply move downstream past the diversion.

Fishing Success: There is no precise record of the amount of fishing or fishing success in this segment of the river. However, an angler who caught 255 rainbow in 1990 reported 20 percent between 12 and 17 inches. He averaged 16 trout per two hour visit, but this is not considered representative of all anglers.

Access is good along the west bank but lava flows and private lands limit access along the lower four miles of the east bank. Primary access for boats is limited to the upper two miles although boats can be launched between major rapids in lower reaches.

Summary

Despite less than ideal habitat the introduced brown trout population remains one of the best in the Northwest in terms of numbers of large fish. In the higher gradient portions of the river in segment 4 there is an abundant population of rainbow trout. Whether the rainbow is a remnant of the native redband or the progeny of introduced hatchery fish is unknown at this time. The native bull trout is now extirpated from the Upper Deschutes. The most numerous species present is the native mountain white fish that has less demanding reproductive requirements than the brown, rainbow, and bull trout. The sculpin, a non-game species is also present in the river. The non-native fish, other than the brown trout, present in the river apparently have little impact on indigenous species and probably provide forage for the population of large brown trout.

Vegetation Description

Vegetation along the Upper Deschutes includes conifer stands dominated by mature ponderosa pine, lodgepole thickets, lush wet marshes in the summer, aquatic vegetation that thrives in the water, expansive dry meadows, and even domestic lawns and gardens.

This vegetation is characterized broadly by its location (aquatic, riparian, or upland), the nature of the disturbances which would naturally shape the growth and development of the vegetation, the likely response of the vegetation to disturbance, and the combination of species represented. These characteristics link certain vegetation into what is called a *plant association group* (PAG). Table 3-3 displays the approximate acreage of each plant association group within the river corridor.

Plant association groups are further defined according to which stage in their natural succession they might be. This is called a structure class. There are five structure classes which are used to determine the overall vegetative composition of a particular plant association group. Some plant association (such as mixed conifer) will also vary in what part they play in the natural succession of the plant association group. Successional stages are generally referred to as either pioneer, mixed, or climax.

Historically, the amount of a plant association group in any particular successional stage was determined by the intensity, extent and frequency of the natural disturbances to which it was subjected. This structural composition is known as the Historic Range of Variability. Table 3-2 displays the current structure of the plant association groups within the river corridor compared to what the structure might have been had natural disturbances occurred.

Much of the natural vegetation immediately adjacent to the river has been subjected to the effects of flow fluctuation, recreational use, residential development, timber management, and grazing. Timber harvest has occurred in each segment. Most of the mature ponderosa pine and the older, dead, and dying lodgepole pine infested by the mountain pine beetle have been harvested. Some of the harvested areas have been planted. Other areas have been precommercially and commercially thinned.

Few areas resemble historic conditions. This is due, to a great extent, to the exclusion of fire by humans. Several areas within the river corridor do contain remnant forests of large trees.

The lodgepole pine stands have as many or more large trees than existed historically. However, much of this area has incurred heavy mortality (especially to the large trees) in the recent mountain pine beetle epidemic.

The occurrence of noxious weeds is an increasing problem along certain portions of the river. Noxious weeds are non-native plants with potential to spread aggressively, reducing or even eliminating habitat for native plants. Spotted knapweeds are now spreading along major roads and on a number of private lands; of particular concern are the areas surrounding bridges. Bull thistle occurs sporadically on banks all along the river's length. Canada thistle and reed canary grass have been found in moist meadow areas.

Aquatic Vegetation

Aquatic vegetation provides food and/or cover for lifeforms ranging from tiny macroinvertebrates to amphibians, birds, and mammals. While the historic distribution of aquatic vegetation has not been determined, the most abundant species present is the Andian watermilfoil (*Myriophyllum elatinoides*), an introduced species. The dominance of this species and the presence of other exotic species suggests that aquatic vegetation is significantly different than conditions present before the arrival of immigrant Americans. The existing flow fluctuation has also created an area barren of vegetation within the stream channel, because the habitat is no longer suitable for either aquatic or riparian vegetation (USDA Forest Service 1994b).

Riparian Vegetation

Riparian communities are found along the length of the Deschutes River. Springs and seeps provide other areas where small populations of water-loving species occur. The wetlands/riparian areas are associated with a combination of the following: stands of lodgepole pine and ponderosa pine as an overstory; a shrub understory of spiraea, snowberry, alder, or willow; and a herbaceous layer of forbs and sedges. There are several large willow/sedge meadows scattered within the reaches. In addition to meadow, the lodgepole (wet) plant association group is also included in the riparian classification. This plant association will typically be associated with high water tables or partially or frequently inundated soils. Approximately 1,850 acres of meadow and 5,070 acres of lodgepole (wet) habitat occur along the Deschutes River above Bend.

Riparian plant associations are determined by the elevation of landforms to the surface or subsurface water. They are essentially communities requiring or tolerating free or unbound soil conditions more moist than normal during the growing season (Kovalchik 1987).

While they may occupy a small amount of land, riparian/wetlands are extremely important. They provide important habitat for approximately four-fifths of the area's wildlife, fish and other aquatic organisms, and forage for domestic animals.

When streams flow over their banks, riparian areas moderate flood peaks and increase ground-water recharge. The conditions of riparian/wetlands are also important for scenic, water quality and property values.

Vegetation in riparian areas has been trampled or eliminated by recreational use, including hiking, biking, and vehicle traffic. Several campgrounds have been built along the river, and roads parallel the river on both sides throughout most of Segment 2, resulting in

heavy recreational use and the destruction of wetland/riparian resources. Livestock grazing along the river at Tetherow Meadow, Abbot Meadow, and Ryan Ranch Meadow has resulted in trampled grasses and overpruned willows. Regulation of the water from Wickiup has resulted in the reduction of riparian vegetation at the outside bends of the river and an increase in the width of the point bars and associated vegetation on the inside of the bends. In Segment 3, there has been some development within the wetlands/riparian areas associated with the private lands. Several slough areas have been dredged to provide boat access to the river, and numerous docks have been built.



Table 3-2

Current and Historic Range of Variability

| Plant Association Group | Structure Class | | | | | | | | | |
|--------------------------------|------------------|-------------------------------|--------------------------------|-------------------------------|------------------------|-------------------------------|--------------------------|-------------------------------|----------------------------------|-------------------------------|
| | Grass/Forb/Shrub | | Seedling/Sapling ≤ 4.9" dbh | | Pole 5.0 - 8.9" dbh | | Small 9.0 - 20.9" dbh | | Medium/Large 21.0 - 47.9" dbh | |
| | Current Value | Historic Range of Variability | Current Value | Historic Range of Variability | Current Value | Historic Range of Variability | Current Value | Historic Range of Variability | Current Value | Historic Range of Variability |
| Lodgepole pine (wet) | | 0-60 % | | 0-60 % | | 10-80 % | | 0+ -80 % | | 0+ % |
| FS | 4 % | | 5 % | | 31 % | | 9 % | | 2 % | |
| All | 6 % | | 9 % | | 50 % | | 25 % | | 3 % | |
| Ponderosa pine (wet) and (dry) | | 5-30 % | | 5-30 % | | 3-21 % | | 20-50 % | | 20-50 % |
| FS | 4 % | | 6 % | | 50 % | | 23 % | | 7 % | |
| All | 4 % | | 6 % | | 54 % | | 26 % | | 8 % | |
| Lodgepole pine (dry) | | 0+ -50 % | | 0+ -50 % | | 0+ -80 % | | 0+ -30 % | | 0+ -10 % |
| FS | 3 % | | 5 % | | 38 % | | 20 % | | 5 % | |
| All | 8 % | | 7 % | | 50 % | | 30 % | | 6 % | |
| Mixed conifer pioneer species | | 1-7 % | | 2-14 % | | 5-21 % | | 12-40 % | | 15-42 % |
| FS | 2 % | | 16 % | | 39 % | | 13 % | | 2 % | |
| All | 2 % | | 16 % | | 39 % | | 13 % | | 2 % | |
| mixed/climax species | NA | NA | | 1-10 % | | 3-19 % | | 6-30 % | | 5-28 % |
| FS | | | | | | | 42 % | | | |
| All | | | | | | | 42 % | | | |

CV Current Values (The top number is for Forest Service ownership. The bottom number is for all ownerships within the corridor.)

HV Historic Range of Values-percent and acres (All ownerships)

^L Historic variation for ponderosa pine and mixed conifer Plant Association Groups was estimated from the Ochoco Viable Ecosystems Guide (draft) April 1994. Historic variations for lodgepole pine were developed using the concepts of succession and disturbance described in the Deschutes National Forest Watershed Evaluation & Analysis for Viable Ecosystems (WEAVE).

Table 3-3

Approximate Acres by Plant Association Group

| Plant Association Group | Segment 2 | | Segment 3 | | Segment 4 | |
|-------------------------|-----------|-------------|-----------|-------------|-----------|-------------|
| | FS Lands | Other Lands | FS Lands | Other Lands | FS Lands | Other Lands |
| Riparian | | | | | | |
| Meadow | 90 | 0 | 430 | 1,250 | 80 | 0 |
| Lodgepole Pine (wet) | 1,430 | 100 | 640 | 2,610 | 290 | 0 |
| Upland | | | | | | |
| Ponderosa Pine | 2,200 | 140 | 1,070 | 220 | 2,470 | 130 |
| Lodgepole Pine (dry) | 1,060 | 4 | 90 | 620 | 630 | 2 |
| Mixed Conifer (dry) | 880 | 1 | 0 | 0 | 40 | 0 |

Note:

The vegetation within the wild and scenic river corridors was mapped from the Deschutes National Forest Soil Resource Inventory (SRI). This inventory identified the potential vegetative condition that a particular soil type is capable of supporting. It assumes that the current vegetative characteristics on the landscape have been developing under climatic climax regimes and not historic fire climax regimes.

Upland Vegetation - Ponderosa Pine

Ponderosa pine associations typically contain understories of bitterbrush, manzanita, fescue, squirreltail and forbs.

Many of the large trees within the corridor were harvested in the early 1900's. Ponderosa pine seedlings became established in the harvested areas and are now pole-sized. Only small patches of old growth structure remain in the corridor. With fire suppression, older stands are developing heavy understories that historically did not exist except in small patches that were bypassed by fire.

Natural disturbance agents include fire, insects, disease and windthrow. In ponderosa pine, low to moderate fires occur at a combined return interval of 7 to 38 years. Stand replacement fires occur every 80 to 300 years with patch size varying from 100 to over 1000 acres. Frequent small, low intensity fires occur fairly frequently from lightning strikes on the buttes which are dominated by ponderosa pine. Insect infestations are caused by the pine engraver (*Ips pini*), mountain pine beetle (*Dendroctonus ponderosae*), and western pine beetle (*Dendroctonus brevicomis*). The pine engraver typically infests stands 40 to 50 years old in dense thickets. Mountain pine beetle concentrates on stands approximately 80 years of age, killing the largest trees in poor sites and killing the understory in good sites.

Lodgepole Pine

Lodgepole pine (dry) associations are upland habitats that develop understories of bitterbrush, squirreltail and needlegrasses. Lodgepole pine is a short-lived tree species. The oldest known stands average about 170 years old. As lodgepole pine forests approach maturity and assume old-growth characteristics, a number of natural forest pathogens and pests often become serious problems. Consequently, species composition changes would reduce the total amount of lodgepole within the corridor in favor of increasing ponderosa pine to historic range. Old-growth lodgepole pine with fully developed old-growth characteristics may only exist for a short time before falling prey to insects or disease. (Hopkins 1993).

In the dry plant association group, fewer infestations occur because the fire frequency usually prevents the trees from reaching the age or size which is susceptible to attack. (USDA Forest Service 1994a). The lodgepole dry plant association group has replacement events at 20 to 30 year intervals and which involve 50-1000 acres.

In lodgepole pine, fires tend to be stand replacement events ranging from 50-1000 acres and occurring every 80 to 150 years. Not all fires in lodgepole are stand replacement. Multi-aged stands are created by low intensity fires at the same fire cycle interval as stand replacement.

Mixed Conifer Species - Including Old Growth

Mixed conifer (dry) plant associations usually have an understory of snowbrush and manzanita. Typically, historic stands would have been dominated by pine and Douglas fir and have a minor component of white fir; however, a dense understory of white fir has developed since fire has been suppressed.

Fires in mixed conifer Plant association group are typically low intensity, occur at intervals of 30-50 years, and affect 50 to 150 acres. Stand replacement fire intervals occur every 75 to 150 years over 500-1000 acres. Within the river corridor, insects have historically been a minor problem within this plant association group. (USDA Forest Service 1994a).

Fire, Disease, and Insect Infestation

Historically, the Deschutes River has been a natural fuelbreak for many large wildfires. which typically burned with low intensity. However, harvest activities have removed forest canopy, changing the moisture regime adjacent to riparian areas, and fire suppression has allowed a build up of fuels. Where large areas of continuous high fuel hazards exist, high intensity wildfires could burn across the riparian area destroying extensive patches of vegetation and organic matter. The riparian area would become subject to bank and surface erosion without the stabilizing and filtering effect provided by riparian vegetation.

Lower intensity fires can actually increase riparian vegetation. Many of the deciduous species found on these wet sites resprout following fire, and some put up new sprouts for each burned plant, increasing plant density. Because relatively little is known about specific interactions between riparian habitats and fire in this area, further research is needed to determine the effects of burning in riparian areas.

The presence of dead wood (snags, downed logs, etc.) in the forest provides necessary habitat for some wildlife, supports a wide variety of beneficial fungal species, and provides

organic inputs for soils. Dead wood is supplied by dead trees or dead parts of trees and other dead woody vegetation. Dead wood is used up through decomposition processes or it can be rapidly consumed by fire or removed for utilization as wood products or fuelwood. Because of past fire suppression there has been a buildup of large woody material in many areas within the river corridor. Most areas have abundant amounts of dead trees and downed logs. In these areas the amounts are considered in excess of those that occurred historically and the amounts are above the desired level from a fire risk (fuels) perspective. Exceptions include the black bark ponderosa pine stands that have been thinned and areas of blowdown lodgepole pine that has been salvaged. These areas do not contain large amounts of dead and down wood and snags. Prior to the arrival and settling of the area by immigrant Americans most areas along the river probably did not support an accumulation of large dead woody material because fires consumed it. For reasons such as wildlife habitat enhancement it is often considered desirable to have a sustained amount of snags and downed logs over the landscape that may be in excess of historical levels.

Endemic or moderate to low levels of insect and disease activity are considered natural, even beneficial. A variety of root and stem rots occur in populations of all tree species along the river. The overall occurrence of root and stem rots is at low levels. Dwarf mistletoe and western gall rust are probably the most widespread diseases and they occur most frequently in lodgepole pine. Neither of these diseases pose serious overall threats. Like all diseases that can kill or weaken trees, however, they may pose hazards to people or property due to falling trees and branches. It is believed that many tree and other plant diseases may occur above historical levels due to past fire suppression activities.

Pandora moth is a defoliator of pine trees. The defoliation is often severe and obvious to the forest visitor but trees are rarely killed by the insect. Ponderosa pine and lodgepole pine, especially around Sunriver, have been infested in recent years. The area defoliated by the moth increased in 1992 over that defoliated in 1990. Pandora moth outbreaks are cyclic and the typical outbreak lasts about seven years. This would indicate that the current pandora outbreak should be near its end.

Mountain pine beetle is by far the most prominent of all local forest insects. (Western pine beetle was also important historically but its occurrence has lessened with a decrease in the number of large ponderosa pine). Mountain pine beetle occurs in both lodgepole pine and ponderosa pine forests. Lodgepole pine is preferred over ponderosa pine by the mountain pine beetle. Beetle populations are always present but generally remain at low levels until conditions are right for an epidemic outbreak. Optimum conditions for an outbreak include large areas of trees stressed by competition and/or drought, and a high percentage of large trees (greater than 9 inches dbh).

Mountain pine beetle epidemics are known to have occurred in the past. There is documentation of an outbreak in the 1920's and more recently a widespread outbreak occurred over much of Central Oregon beginning about 1970. This outbreak peaked in the mid 1980's and beetle populations have declined substantially from those levels.

Much of the medium-sized ponderosa pine that seeded in after logging or large scale fires earlier this century was recently thinned to reduce susceptibility to the mountain pine beetle. It was feared that the mountain pine beetle would move from lodgepole pine into the ponderosa pine. Recent evidence is that the strategy may have been effective with insect activity mainly occurring in unthinned areas. Although mountain pine beetle epidemics have

occurred historically it is believed that the most recent epidemic may have been more severe than typical epidemics of the past. The hypothesis is that fire suppression has led to large areas of lodgepole pine with a high percentage of large trees that were stressed from competition for limited water availability. The lingering drought in the later part of the 1980's may also have contributed to the length of the epidemic.

Overview of Vegetation by Segment

Segment 2

From Wickiup Reservoir to a little beyond Pringle Falls, the vegetation in the corridor is defined by dense stands of lodgepole pine and occasional ponderosa pine which is in the climax state in the pumice/ash deposits. Some lodgepole pine has been harvested or thinned. Wet meadows occupy the inside of oxbows while areas devoid of vegetation are common where cutbanks occur.

Vegetation below Pringle Falls to the south boundary of La Pine State Recreation Area is similar to that found upstream except that it is characterized by a multilayered forest. This forest consists of mature ponderosa interspersed with mature and immature lodgepole and an occasional fir on the slopes with riparian vegetation bordering the river. Vegetative disturbance is evident in Tetherow Meadow and is the result of grazing and recreational use in riparian areas and motor vehicle travel across dry meadows.

Elk populations within the Fall River Key Elk Habitat Area (see Forest Plan) are increasing and utilizing more forage annually.

Range: The Tetherow Meadow cattle allotment contains 244 acres (82 acres primary and secondary range, 162 acres unsuitable). The meadow is moist to wet and classified as a riparian area.

The cattle allotment has not been active since 1989 because of resource damage associated with grazing. The allotment was stocked at 66 AUMs between June 15 and October 15 (25 pairs for 2 months). Monitoring identified a downward trend with plant vigor decreasing and undesirable plant species increasing. Streambank degradation exceeded standards. Utilization was 70 percent of the current year's growth on shrubs and 60 percent on key grasses and grasslike species. An Environmental Assessment is currently underway to determine if continued grazing is feasible and, if so, at what level.

Fire and Disease: Fire hazard from fuels is based on fuels type, vegetative type, and tons per acre. It ranges from low to a high risk (the drier sites).

The danger of a disease and insect epidemic is variable in this segment. In the areas that have been thinned or harvested, the risk is low. In dense, unmanaged stands, risk is high.

Segment 3

Private land bounds both sides of significant portions of this segment of the river. The lodgepole pine dominated vegetation community has been altered by the nearly continuous construction of golf courses, houses, roads, power lines, boat docks, lawns, fences, and the other amenities of subdivisions.

In this segment the native vegetation patterns vary and are in accordance with the changing landforms: On the upper elevations and slopes, ponderosa pine; on the wetter areas

and cold sinks, lodgepole pine; and in the marsh and river's edge, willows and marsh grasses. Between the Foster Ranch Bridge and north of the confluence of Fall River, a distance of about 2 air miles (but 4 river miles), most development is located on the bluff above the meander valley. Within the meander valley is an expanse of relatively undisturbed riparian habitat about 1/4 mile wide divided by the meanders of the Upper Deschutes. From below Fall River to the confluence of the Little Deschutes the riparian habitat is a more narrow strip before widening out to the broad expanse of Sunriver Meadow. Between General Patch and Harper Bridges 96 percent of the land is privately owned. Private development has affected native vegetation to a greater degree in this segment than in any other. When native vegetation is present it is mature and, when left undisturbed, in dense stands of mixed conifer with lodgepole pine dominant.

Range: The Abbot cattle allotment consists of two pasture units located along the river adjacent to Sunriver. The Besson unit is located north of Besson Camp and the Spring River unit is between Spring River and the Deschutes River. The allotment contains 355 acres (70 acres primary range, 236 acres secondary range, and 49 acres unsuitable). The majority of the allotment is moist to wet meadow which is classified as a riparian area. A small portion of the allotment is in stands of lodgepole pine.

In 1991 the grazing capacity was reduced to 83 AUMs (21 pairs for 3 months) because of resource damage. The Spring River unit exceeds streambank undercut profile standards and approximately 20 percent of the streambank is degraded. Monitoring shows 100 percent utilization of the current year's growth on shrubs and 55 percent on key grasses and grasslike species. Plant vigor for both shrub and meadow grass and grasslike species is in a downward trend. An Environmental Assessment is currently underway to determine if continued grazing is feasible and, if so, at what level.

Some grazing by domestic livestock also occurs on private land in this segment.

Fire and Disease: There is a high danger of fire in the interface zone between private land and National Forest land because of dense, brushy stands. In other portions of this segment, fuel hazard varies from low to high.

The danger of a disease and insect epidemic is also variable. Where there has been substantial manipulation of vegetation, the risk is low. Where there are dense, brushy stands, the risk is high.

Segment 4

In this segment the vegetation consists of riparian shrubs and marsh grasses associated with the wetlands and lodgepole pine in the wetter areas of the terraces and sinks. Ponderosa pine is dominant on the slopes and in the higher elevations with alder and quaking aspen growing adjacent to the river.

On the east side of the river, a portion of the river corridor is located in the Newberry National Volcanic Monument. From Benham Falls to Lava Island Falls the Lava Butte lava flow reaches the river and dominates the opportunities for vegetative growth. Here, too, ponderosa pine dominates the vegetation with alder and quaking aspen growing adjacent to the river. Because of the maturity, consistency in distribution, and lack of obvious management vegetation appears natural and relatively undisturbed.

The west side of this segment receives intense day and overnight use with both riparian and upland species suffering from trampling and soil compaction where access to the river is

easy. A user trail system has developed on the west bank of the river which has damaged or destroyed some vegetation.

Within this segment is a concentration of sloughs on both sides of the river. Based on comparison of photographs taken in 1943 and 1991 it is evident that riparian vegetation has decreased within some of these sloughs. Apparently this is due to the greater fluctuation that now occurs in the river. Some sloughs that in the past contained at least a few inches of water year around now range from having no water for 6 months to having over 2 feet of water for a period of 6 months. Under these conditions it is difficult for some native riparian species to survive. The effects of flow on sloughs may have been modified by the construction of levees between some sloughs and the river.

A 1915 map of the region (Deschutes County Historical Society) labels what is now called Ryan Ranch Meadow, "The Tules". What once was a slough, inundated most if not all of the year has been drained by ditches and cutoff from high flows by the construction of a levee. These past actions plus the grazing of cattle are likely to have affected plant species composition in Ryan Ranch Meadow.

Elk populations within the Ryan Ranch Key Elk Habitat Area are increasing and utilizing more forage annually.

Range: The Ryan Ranch Meadow cattle allotment consists of 75 acres of moist to wet meadow (75 acres primary range) which is classified as a riparian area. In 1991 the grazing capacity was reduced to 40 AUMs from June to mid September (13 head for 3 months) because of resource damage. Monitoring has shown a downward trend in plant vigor on native species such as tufted hairgrass. Undesirable plant species are increasing. Young willows (about one foot in height) are found prior to cattle grazing along the river, but only stubbed shoots are found after grazing. No mature willows are found within the allotment but are present adjacent to the pasture. An Environmental Assessment is currently underway to determine if continued grazing is feasible and, if so, at what level.

Fire and Disease: The Awbrey Hall Fire of 1990 swept across the river burning a portion of the pole size ponderosa pine. Fir danger in the segment remains high. Potential for insects and disease is moderate to high.

Threatened and Endangered Plants

In the summer of 1993 an extensive biological survey was conducted along the Upper Deschutes River, and found Estes wormwood, *Artemisia ludoviciana* subspecies *estesii* Chambers. This plant is a Federal Category 2 Candidate (indicating that more study is needed) for protection under the Endangered Species Act. *Artemisia ludoviciana estesii* was found in very small numbers at three spots within the river corridor. Its habitat in these areas is the upper margin of the marshy zone of the river shore. Associates include *Salix geyeriana*, *Juncus balticus* (Baltic rush), *Poa palustris*, *Potentilla anserina* (silverweed cinquefoil), and *Scirpus microcarpus*. Previously, *Artemisia ludoviciana estesii* was known only from farther downstream on the Deschutes River, between Cline Falls and Lower Bridge. The new localities extend the range of this subspecies approximately 20 air miles upstream from Cline Falls.

Plant Resources of Possible Importance to Native American Indians

No unique plant communities of cultural value to Native American Indians are known to occur along the Upper Deschutes. It is likely that areas where plants such as pinenuts, tule reeds, and various berries were gathered or processed do exist within the river corridor.

The following list is composed of plant resources found along the Upper Deschutes River exploited by Native American inhabitants of Central Oregon. It is derived from Couture 1978; Hunn 1981, 1982; Hunn and French 1981; Kelly 1932; Murdock 1958; Ray 1942; Stewart 1941.

Resource:

- kause/biscuit root (*Lomatium* spp.)
- wild onion (*Allium* spp.)
- ponderosa pine (*Pinus ponderosa*) -(seeds and bark)
- chokecherry (*Prunus virginiana*)
- service berry (*Amelanchier alnifolia*)
- bulrush/tule (*Scirpus validus*)
- wild carrot (*Perideridia* spp.)
- yellow cress (*Arabis* spp.)
- rabbit brush (*Chrysothamnus nauseosus*)
- cattail/bulrush (*Typha latifolia*)
- sage brush (*Artemisia tridentata*)
- clover (*Trifolium* spp.)
- squaw current (*Ribes cereum*)
- quaking aspen (*Populus tremuloides*)
- blazing star (*Mentzelia* spp.)
- wild mint (*Mentha arvensis*)
- wild rose hips (*Rosa* sp.)
- willow/dog wood (*Salix* sp.; *Cornus* sp.)
- yellow bell (*Fritillaria pudica*)
- yarrow (*Archillea millefolium*)

Summary

The Vegetative Resource on the Upper Deschutes is important as an element of the geologic, wildlife, scenic, and recreational values. The presence of the *Artemisia ludoviciana estesii*, an Federal Category 2 Candidate species, is a unique element of the Vegetative Resource found in Segments 3 and 4. Finally there are many plant species in the Upper Deschutes corridor that are known to have been used by prehistoric Native American Indians. Some continue to be used by present day Native American Indians.

Wildlife Description

Many species of wildlife can be found along the Upper Deschutes. These include almost all of the Forest Plan Management Indicator Species (MIS): Peregrine falcon, northern bald eagle, northern goshawk, three-toed woodpecker, American marten, osprey, woodpeckers, elk, and mule deer. The river is outside of the historic range of the northern spotted owl, the only MIS not found within the river corridor. Management Indicator Species are important because their populations are believed to be influenced by forest management activities and may serve as population and habitat trend indicators for many other wildlife species that utilize the same habitat types.

Sensitive species that may be found along the river are greater sandhill cranes, long-billed curlew, Pacific western big-eared bat, and Preble's shrew. The greater sandhill crane was a regular visitor to Ryan Ranch Meadow until the habitat was altered by draining the meadow and constructing a levee to keep high flows from flooding the meadow.

A multitude of birds reside all year or seasonally along the river corridor. These include about ten species of woodpeckers; ruffed grouse; twenty-nine species of waterfowl, including ducks, coots, geese, and swans; and 72 species of other birds. In addition four pairs of bald eagles and fifteen pairs of osprey nest near the Deschutes River.

Over 68 species of small mammals, including shrews, chipmunks, beaver, bats and mink, inhabit the river corridor. Big game such as bear, elk, and deer reside near the river during the summer and some even remain along the Deschutes above Bend during the winter.

Habitat

Wildlife habitat on the Upper Deschutes is largely the product of the condition and interaction of geologic, hydrologic, and vegetative resources. The mixture of wet marshes, dry meadows, willow clumps, aspen clumps, alder, lodgepole pine and ponderosa pines creates a mosaic of different habitats along the river. Many species of wildlife require more than one of the habitat types found along the river. For many species the river corridor contains only a portion of their habitat needs.

Riparian Habitat

The riparian areas on the forest represent less than one percent of forest habitats yet contains 128 different species identified within the forest. Riparian habitat on the Upper Deschutes consists of wet and dry land near and affected by the river. Vegetation in riparian areas consists of water dependant and tolerant species such as sedges, rushes, cattails, and willows. These species of vegetation, in turn, provide food and cover for many small mammals, songbirds, waterfowl, amphibians, and reptiles.

Riparian habitat exists in each segment of the river. Fluctuation of river level, however, places limits on the productivity of wet riparian habitat because the dewatering of this vegetation community eliminates an essential element for many riparian inhabiting species and results in the death of many individual animals from micro-organisms to amphibians. Dens of bank dwellers become accessible to predators, thus increasing the mortality rate of such species as beaver and muskrat. Even the abundant flows of spring creates problems when

increasing flow floods waterfowl nests and beaver and muskrat dens. Predators may also be adversely affected if flooding of nests and dens reduce the amount of prey.

Flow related problems in riparian habitat are most significant in Segment 2 where the flow fluctuation is most pronounced and is reduced in Segments 3 and 4 with the augmented flow from Fall River, the Little Deschutes, and Spring River. However, the seasonal dewatering of much of the riparian habitat limits the productivity in these segments as well. Within Segment 4 dry areas are being inundated with water during the summer season. Conversion of plant species may be occurring.

The productivity of riparian habitat is affected by the presence of recreational users and user trails. The presence of people can affect the behavior of wildlife by interrupting normal feeding, resting, and breeding patterns. People can also destroy habitat by trampling vegetation and breaking down riverbanks.

Wildlife species compete directly with domestic livestock for forage in some areas. This competition has occurred in the past at Tetherow Meadow and is presently occurring at Ryan Ranch Meadow and near Sunriver.

Finally, the construction of a dike to prevent the flooding of Ryan Ranch Meadow plus the earlier digging of ditches to drain the meadow has affected the species composition and character of the meadow.

Dry, subirrigated meadows (such as the upland portions of Tetherow Meadow) differ from wet marshy meadows because free water is seldom associated with them. Vegetation includes bluegrass and hair grass. Animals which depend upon dry meadows for food and cover include shrew, mice, and some songbirds. Predators utilizing dry meadows as a dinner table include hawks, owls, coyote, and fox and their diet consists of rodents, reptiles, and amphibians.

Forest Habitat

Some forest habitat is associated with both wet and dry riparian vegetation. When this occurs additional cover is available for ruffed grouse and raccoons. Nesting habitat is also available for species such as woodducks, heron, and bald eagles which feed in riparian areas but require trees for nesting.

Forest habitat on the Deschutes is characterized by extensive stands of young ponderosa and lodgepole pine stands which have been thinned and a few stands of old-growth ponderosa pine interspersed with dense lodgepole thickets.

Old growth stands provide food and shelter for marten, woodducks, white-headed woodpecker, and ash-throated flycatchers. The thickets are important sources of shelter and thermal cover for songbirds and big game. Thinned stands provide forage for towhee, kingbird, robins, and chipping sparrows.

These forest habitats are distributed throughout each of the segments except where interrupted by subdivisions. The interruption is most significant in Segment 3 where more than half of the river corridor is privately owned. Development on private property has fragmented and eliminated much of the forested habitat along this segment. This area has historically been a major migration corridor for deer. The development has forced the deer into using other segments of the river or trying to work their way through the developments.

In Segment 4 from the Benham Falls Bridge to Lava Island Falls, the river corridor on the east side of the Deschutes is part of the Newberry National Volcanic Monument. Habitat in this area is dominated by the Lava Butte lava flow. It is characterized by occasional trees and openings and provides a unique habitat for such species as pika and marmot.

Aquatic Habitat

Fish constitute an important food source for river otters, mink and birds such as bald eagles, osprey, and kingfishers. Vegetarian species such as plovers, sandpipers, killdeer feed on aquatic vegetation while waterfowl depend largely on aquatic vegetation but may also feed on aquatic wildlife when the opportunity arises. The existing flow regime limits productivity as described in the discussion in hydrology and fisheries. The existing flow regime also restricts the ability of species dependent upon fish to spot their prey because of the restricted visibility resulting from the turbidity of the water during the early irrigation season.

Key Elk Habitat

Riparian areas adjacent to forested uplands provide a combination of succulent forage and cover. The Deschutes Land and Forest Management Plan recognizes two Key Elk Habitats adjacent to the river. The Fall River elk area lies between Fall River and Pringle Falls on both sides of the river. Ryan Ranch Elk Habitat spans from Sunriver to the Inn of the Seventh Mountain. Though the river corridor consists of only a portion of the habitat utilized by elk, it is an important element because of the reliable water supply, important food sources available in wet and dry meadows, and secure calving areas in thickets and on vegetated islands surrounded by lava flows on the east side of the river in segment 4. Elk along the Deschutes River winter either west of the Cascade range or in these key habitat areas.

Travel Restrictions

Travel restrictions on National Forest land along the river are in place to protect wildlife and sensitive resources, reduce erosion, and reduce conflicts between recreational users. The four restriction areas (5, 7, 9, and 12) vary only slightly. Area 5 is the largest and most wide-spread. Areas 7 and 12 are in Segment 2 in the Pringle Falls Experimental Forest. Area 9 is in Segment 4. The slight variations in travel restrictions cause confusion for both recreationists and enforcement personnel.

Table 3-4 Existing Travel Restrictions¹

| Area | Winter Road Restrictions | Off-Highway Vehicles | Over-the-snow Vehicles | Bicycles | Horses |
|------|---|---|---------------------------------|----------------------------|---------------------------------|
| 5 | None | On designated routes only; Off-road use prohibited. | On designated routes only. | On designated routes only. | Allowed |
| 7 | None | On designated routes only; Off-road use prohibited. | On designated routes only. | On designated routes only. | Allowed except in closed areas. |
| 9 | Road use restricted 12/1 to 3/31, except on designated roads. | On designated routes only; Off-road use prohibited. | On designated routes only. | Allowed | Allowed |
| 12 | None | On designated routes only; Off-road use prohibited. | Allowed except in closed areas. | On designated routes only. | Allowed |

Note:

1. On the 1995-1996 Travel Map, a small portion of Area 2 (no travel restrictions) is shown in Segment 3. However, Forest Plan Standards and Guidelines for Management Area 17 (Wild and Scenic Rivers) do not provide opportunities for OHV use on other than system roads in areas of concentrated recreation use or where sensitive resource values would be affected. The inclusion of Area 2 in the river corridor is considered an error.

Wildlife by Segment

Segment 2

Segment 2 has been designated outstandingly remarkable for wildlife due to the number of bald eagle and osprey nests that occur along this reach. Large ponderosa pine trees adjacent to the river provide ideal roosting and nesting opportunities.

Aquatic Habitat: Marshes are wet during the irrigation season, from April through September. Most of them are then dry from October through March. The rapid reduction in flow at the end of the irrigation season and periodically during the irrigation cycle creates a hostile environment for species with limited mobility while the continuous low flows of the storage season simply provides for less useable habitat for aquatic species.

Foraging: The foraging seasons of heron, bittern, rails, and other species that rely on the wet habitats for frogs, salamanders, aquatic invertebrate and aquatic insects are limited to the irrigation season.

Water turbidity caused by increased flows at the beginning of the irrigation season may limit the success of fish-eating birds during their reproduction period. This includes osprey, bald eagles, kingfishers, cormorants, and mergansers.

Nesting/Denning: Osprey are concentrated around Wickiup and Crane Prairie Reservoirs. Some birds displaced from the reservoirs may be occupying habitat along the Deschutes River below Wickiup and Fall River. This trend may be increasing the number of nesting pairs along the Deschutes and Fall Rivers.

Snags and wildlife trees in the corridor are adequate for primary and secondary cavity nesters.

Marten and ruffed grouse are found along this segment. Critical nesting habitat for ruffed grouse has been reduced by timber harvest and recreation. Marten utilize mature and old growth stands along the river.

The fluctuation of the river impacts various bank dwellers along the river. As a result beaver and muskrat are absent because low flows expose dens and bank-dwellings to predators or and high flows flood them. The nests of waterfowl are often flooded, reducing reproduction.

Key Elk Habitat Areas: The Fall River corridor is important elk habitat, used year round for calving, rearing and wintering. It is concentrated between Fall River Falls and Pringle Falls on both sides of river in Segments 2 and 3.

Wildlife Migration: The river corridor is an important travelway for deer and elk moving from winter to summer range and back again. The limited private and public development and the numerous dispersed recreation sites do not appear to significantly affect travel routes at this time in Segment 2.

Special Ecosystems: Meadows (wet & dry) and wet marshes are considered important habitats. Tetherow Meadows is a series of wet and dry meadows along the river. Large portions of the meadow are currently being entered by off road vehicles, which damage vegetation, compact soils, and increase erosion.

Wet marshes have become established on oxbows where the river channel has meandered; sedges and cattails grow on deposited sediments. Vegetation in some of the drier marshes is trampled in the summer by fisherman.

Human Conflicts With Wildlife: There are five developed recreation sites and many dispersed camping sites along this river segment. Campers have destroyed or degraded much of the riparian and upland vegetation. On some sites, regeneration is not possible because of compacted soils. Wildlife is flushed from foraging sites, expending energy needed for other survival activities. People in vehicles and on foot create disturbance in key areas, meadows, wet marshes, and springs. Tetherow meadow is an important example of this problem. Because of human disturbance in the summer, elk stay away from the river during the day, moving in to drink and forage at dawn and late in the evenings. Roads contribute to this problem. Open road density currently exceeds 2.5 miles per square mile. Because of this, habitat effectiveness for mammals and birds is substandard.

Segment 3

Segment 3 has more riparian habitat and more development along the river than Segment 2. Flows augmented by tributaries improve riparian and aquatic habitat in Segment 3 over those conditions found in Segment 2. On the other hand, the extensive private development within the corridor has limited the amount of upland habitat while affecting streamside habitat.

Because of the augmentation of water from the Little Deschutes, Fall, and Spring Rivers flows fluctuate less widely than in Segment 2.

Signs of beaver have been found along this segment and increase in downstream reaches. Ruffed grouse persist in this segment even though much of its habitat has been lost.

Key Elk Habitat: This segment contains portions of both the Fall River and Ryan Ranch Key Elk Habitat Areas.

Human Conflicts with Wildlife: The large percentage of private land in this segment has increased human/wildlife conflicts. Habitat along the river has been modified heavily or even eliminated through development. The extent of developed land in Segment 3 limits travel corridors and cover while increasing the probability of harassment of wildlife by domestic pets. Most deer avoid this segment or go around the residential areas to avoid being chased or harassed by dogs. Despite these problems, existing habitat remains important as migration corridors for deer and elk.

Permits issued by the Forest Service allow spraying of Biological Treatment (BT) specific to mosquitos. This spraying has reduced mosquito populations, which are a food base for fish and many insectivores (birds and small mammals).

The current open road density exceeds 2.5 miles per square mile; habitat effectiveness for mammals and birds is substandard.

Livestock grazing in Besson Meadows has reduced riparian vegetation along the river, displacing the small mammals and songbirds normally found there. Use of Besson Meadow by elk has been reduced by recreation use and grazing use by domestic livestock, which occurs during calving season. Cattle allotment fencing is an obstacle and has the potential to cause injuries, especially to young elk.

Both fluctuations in river flow during nesting times and the harassment of young by motorboats are problems for waterfowl.

Segment 4

This segment is rated as outstandingly remarkable for wildlife because of the diversity of bird species along the river and the quality of elk habitat.

Habitat for aquatic and foraging species is improved over that available in Segment 2. Beaver, muskrat and some otter are found along this segment but they are scarce because of fluctuations in the river level.

Ponds and backwater wetlands, particularly in the area around Benham Falls, are extremely important to wildlife. More than 150 swans have been observed at one time near Benham Falls and many ducks and geese use these wetlands.

Stable water levels are required in sloughs and backwater areas during the nesting season. Fluctuating water levels may flood nests or expose them to predators (Deschutes County/City of Bend 1986).

The draining of Ryan Ranch Meadow and the construction of a dike between the meadow and the river dried out the meadow and substantially altered the habitat. It can no longer support sandhill cranes, great blue herons, rails and waterfowl.

Elk Habitat: Elk winter along the Deschutes River from Slough Camp to the Inn of the Seventh Mountain. This area has been designated as the Ryan Ranch Key Elk Habitat Area. Ryan Ranch supports a resident herd of 75 animals in the summer and more in the winter. Its usefulness has been reduced by livestock grazing, which occurs during calving season, and recreation use. Cattle allotment fencing around Ryan Ranch Meadow is an obstacle and has the potential to cause injuries to young elk.

Segment 4 is used for deer migration but not as much as Segment 2. Animal migration has been affected in Segment 4 by development and recreation.

Wildlife of cultural value to Native American Indians may occur along the Upper Deschutes, although no traditional use areas where wildlife was hunted or processed have been identified.

Summary

Though the existing flow regime limits suitable habitat for several species, diverse habitats are found in each segment of the river. The extent of developed land in Segment 3 limits travel corridors and cover while increasing the probability of harassment of wildlife by domestic pets. Despite these problems existing habitat remains significant as travel corridors for migrating game animals such as deer and elk.

Because of the number of nesting bald eagles and osprey the wildlife population in Segment 2 is considered to be of regional significance and consequently is an Outstandingly Remarkable Value. Wildlife in Segment 4 is an Outstandingly Remarkable Value due to the great diversity of bird species found within that segment.

Cultural Resource Description

Prehistoric Sites

The Upper Deschutes River corridor was a focal point of activity during the prehistoric period. Evidence from test excavations and information noted in site records clearly shows that people have used the river area intensively for at least 6000 years. Data from nearby areas has confirmed that human occupation of Central Oregon began as early as 13,000 years ago. There are more than 100 known prehistoric sites near the river which are eligible for inclusion on the National Register of Historic Places. Open-air lithic scatters (debitage), characterized by the presence of obsidian or other stone waste flakes left from the manufacture and maintenance of projectile points, knives, scrapers, etc., are the most common archaeological site along the Upper Deschutes River. These flakes, along with other artifacts which may be present, offer material which can be used to assess technology, trade patterns, chronology, and site functions. In the past these sites were most often described as "seasonal hunting camps" with little attention paid to other possible functions. Recent testing along the river has shown that many of these sites are much more complex than previously thought. Consequently, their research potential has increased considerably.

In addition to the open-air lithic scatters, a rockshelter site exists near the river. This site was of particular importance because its shelter preserved materials that would have been lost in an open site. In 1981 excavations at Lava Island Rockshelter uncovered a bark-lined storage pit with remnant pine seed remains and fragile bone fragments. In addition, more than 8000 stone tools anddebitage were recovered. Analysis of these materials suggest the shelter was used for at least 2000 years. A complete recovery of all cultural material was conducted at the site because of vandalism concerns, but the site has provided an excellent interpretation opportunity. It is one of only a handful of interpreted cultural resource sites on the Deschutes National Forest, and the only one within the Upper Deschutes River corridor.

In the most recent pre-immigrant American era the river was inhabited by a number of different groups. There is uncertainty as to the cultural boundaries of the peoples who inhabited the area. Ethnographic accounts indicate that gathering and hunting peoples belonging to as many as four language groups may have utilized the area in prehistoric times. These include the Molalla, Sahaptin, Northern Paiute, and the Klamath. These groups moved with the seasons in order to take advantages of different food sources available at specific times in specific locations. The Sahaptin and Klamath speakers were semi-nomadic (logistically mobile) gatherers and hunters who lived in larger bands and typically occupied permanent winter villages. It is generally believed that their seasonal rounds pattern led them from their winter villages located at lower elevations along permanent streams, to the outer regions of their territory during warmer months in search of those resources not available nearer home. The Molalla and Northern Paiute were more nomadic (residentially mobile) peoples who would typically congregate at particular times of year in variant locations; for much of the year however, they dispersed into smaller, more mobile and resource efficient units.

Recent studies indicate that the ethnographically recorded activities and populations of Native American Indians may not accurately reflect pre-contact conditions. National and regional studies suggest that prehistoric populations may have been much higher than previously estimated. These populations may have practiced a much more sedentary lifestyle than that recorded ethnographically. Prehistoric Native American Indian cultures present on the Upper Deschutes may have been much more active in the management of natural resources than their historic activities suggest. Higher populations on the Columbia Plateau would have required high levels of organized resource procurement. The population crash precipitated by Euro-American contact effectively destroyed these cultures. The societies recorded by early immigrant Americans in the 19th century were probably very different from those that existed only 200 years earlier.

The archaeological sites on the river offer an exceptional opportunity to study these fully prehistoric settlement/subsistence patterns in Central Oregon, including the use of riverine vs. non-riverine environments. They also provide an opportunity to study the effects of volcanic activity on settlement and subsistence. Two major volcanic events affected those people occupying the Deschutes corridor. The first of these was the eruption of Mount Mazama about 6900 years ago. This eruption was catastrophic and may have forced adaptational changes on the local populations. The pumice soils left from the Mazama eruption are significantly different from the underlying paleosol and this provides an identifiable "demarcation" line for separating occupation periods into pre- and post- Mazama chronologies. In addition, the eruption of Lava Butte, about 6200 years ago, had a major impact on the location of the river and on the environment surrounding it. One example of this is the meadow which exists today at Ryan Ranch. Prior to the Lava Butte eruption, the river occupied a channel well away from this future meadow. After the eruption and during the period in which the river was forging a new channel, a lake formed here. The lake existed for many years before filling with sediments; these sediments eventually left a marsh which existed until the historic period when ditches were dug to drain the marsh and a dike was built to prevent water from leaving the channel. This and other lakeshore environments created specific resource areas that are not in existence today. An understanding of the human reaction to these environmental changes is critical to understanding the prehistoric record. In addition, careful examination of the old versus new river channels in relation to site location

will provide excellent clues to the locations of sites which predate the Mount Mazama eruption; these sites then will offer opportunity to find evidence of use along the river well beyond the known 6000 years.

The Deschutes River corridor was used by Native American Indians until immigrant American settlement disrupted the pattern of use. John C. Fremont notes in his 1845 journal that his group encountered bands of both Nez Perce (Sapahatin speakers) and Paiute camped around what is known today as the Great Meadow at Sunriver. Although this area is private property, a Forest Service archaeologist, in cooperation with the Nature Center at Sunriver, was able to do partial surveys of the area in the early 1980s. This survey confirmed that heritage properties do exist in that area.

The river offered many resources favored by humans and the attraction to its banks is clearly evident. Although evidence suggests that anadromous fish species could not migrate to the Upper Deschutes, resident populations of fish would have been available to aboriginal peoples. Elk, bighorn sheep, and antelope would also have been available. In addition to large and small animals, resources invaluable to gathering peoples such as, edible roots and bulbs, and a variety of material for baskets, mats, and clothing should have been abundant.

Historic Sites

The known historic properties within the river corridor reflect a variety of activities which include trapping, irrigation, homesteading, and logging. Most of this activity has left little material remains; that which is most evident is associated with the Shevlin Hixon/Brooks Scanlon railroad logging era (approximately 1915 - 1950s).

The early fur trapping era has left little material evidence but we do know from the journals of Nathaniel Wyeth that he traveled the Upper Deschutes in the winter of 1834-35 in search of fur bearers. His journals are specific enough that we can trace his progress and can pinpoint locations where he camped on his trek. His journals also offer excellent views of the environment through which he was passing and are an exceptional opportunity for interpretation of this early Euro-American history.

Other than Wyeth's journals, information on the earliest use of the river by Euro-Americans is scant. Once settlement began the indications are that the river did not have the same focus for early settlers as it did for the prehistoric peoples. Water however, was critical to settlement in Central Oregon and irrigation canals diverted water throughout the area for farming and development. Later use (mid-1910s) seems to have focused on grazing in areas such as Ryan Ranch and on logging.

Railroad logging has left both large and small trash scatters associated with camps and railroad grades used for shipping logs to the mill. These sites are the second most numerous site types (after lithic scatters) on the river. The system of grades and associated trash scatters have not been fully recorded and an evaluation of their Register status has not been completed.

In addition, we have limited structural remains of a World War II army training base which stretched along a portion of the river. Known physical remains of Camp Abbot are scant. The one known intact structure is the Officer Quarters, a building located on private property within the Sunriver complex. The building, known today as the Great Hall at Sunriver, is used

for many private and public functions. Several bunkers are also known to exist. More extensive survey is needed to fully record the remains of this camp before a formal evaluation of significance can be made.

Traditional Use

It is evident that the Upper Deschutes River has been used by Native American Indians for many thousands of years. Gathering was the primary economic activity for the groups who are known to have used the area and the river, lakes, and marshes that offered abundant plant resources for the people. Resources such as bulbs, tubers, berries, grasses, pinenuts, and tules, were vital to their subsistence. Large and small land animals, fish, and waterfowl would have rounded out their subsistence needs. In a 1991 visit to portions of the river, Verbena Green, an Elder from the Warm Springs Reservation, identified a number of plant and animal resources which are still available today.

Additional consultation with members of the tribal groups will allow us more insight into the continuing importance of the Upper Deschutes River as an area of cultural use by Native American Indians.

Summary

As noted earlier, there are more than one hundred known prehistoric sites near the river which are eligible for inclusion in the National Register of Historic Places. The Upper Deschutes River Corridor provides a unique opportunity to investigate prehistoric land use patterns, cultural chronology, and responses to environmental changes such as volcanism. Indications are that the area has been used by more than one group of native peoples; for some it was an area of primary resource exploitation, for others, a travel and/or trade corridor. The remains of these activities have a great potential to add to a regional data base that will allow a more comprehensive view of the past.

The known historic sites within the river corridor provide a glimpse of times and technologies gone by. Yet little research has been done on the historic properties along the river. Intensive field survey is needed to identify and record historic properties and, extensive archival research is needed to augment the field data.

Similarly our knowledge of traditional uses remains incomplete.

Scenic Resource Description

An imaginary trip down the Deschutes from Wickiup to Bend is necessary to fully appreciate the Scenic Resource. We will travel in a vessel capable of negotiating virtually impassable falls so that we will not have to portage as would a real voyager. Throughout this 50 mile adventure you will see lodgepole and ponderosa forests; lush wetland and riparian areas; steep, raw cut banks; campgrounds, boat ramps; whitewater and smooth, flat sections of river. You will also travel through eleven subdivisions that have been developed to various standards. Yet the development of the river corridor is not complete. The level of development you see today will greatly differ from what will be seen in the future.

Segment 2

After carrying our vessel down to the river for our mid summer trip we notice the river is full to the top of the banks and clear and fast as it roars out of Wickiup Dam. As we float down the river the 70 foot high cut banks topped by cinnamon barked ponderosa pines loom above us on one side of the river while lush marsh grass populated with redwinged blackbirds grow on the other side. We surprise mallard ducks and Canada geese as we round hairpin turns. Low lying areas are populated by lodgepole thickets that provide cover for large and small mammals that are often visible early and late in the day near the river. Occasionally we hear and see automobiles and trucks on the roads paralleling the river but because we are lower the roads themselves are seldom visible.

Soon we enter a stretch of the river bounded by private property with houses, stairways down the banks providing access to docks, and even a power line crossing over the river. Below this stretch of the river the meanders become more pronounced, we pass larger marshes, note nests containing young osprey in the broken tops of large ponderosas and see their parents resting in a nearby tree. We are fortunate to observe a kingfisher dive and emerge with a 6 inch whitefish.

The river makes almost a complete circle around the perimeter of Bull Bend Campground. The raw banks just upstream of the campground suggest that the narrow isthmus connecting the campground to the main bank has a relatively short life expectancy.

As we make that observation we note also that the water is now a murky green as the high flow has mined and then transported sediments from the eroding banks.

As we pass the white and green buildings of the Pringle Falls Experimental Station the pace of the river picks up and we are sucked into the whitewater of Pringle Falls, a half mile of rapids flowing through an outcropping of lava in what is otherwise a landscape created by the river cutting through sedimentary deposits. Public access to these rapids is limited to a view downstream from the Road 43 bridge which crosses the river near upper end of the rapids. Private land bounds both sides of the rapids with houses on both banks from the bridge to the lower end of the rapids. A small private footbridge crosses the river about half way down the rapids.

Floating past Pringle Falls Campground we enter an area burned by a human-caused wildfire in September 1995. Little evidence of human presence is evident. In reality, roads lead to the bluffs adjacent to the river. At Tetherow meadow we disembark to stretch our legs and are intrigued with the unique combination of wet marsh, dry meadow, and mature Ponderosa. Tracks of elk and coyote give testimony to the popularity of the meadow for these

species. A pile of cans and broken bottles left in the fire ring constructed in what is now crushed and pulverized grass only a few feet from the riverbank give unwanted testimony to the use of this area by people. The track of the road providing access to this site cuts a scar across the middle of the dry portion of the meadow.

The remainder of the trip to La Pine State Recreation Area repeats many of the same experiences we've had except evidence of human activity is present only at Tetherow Boat Ramp and a couple of user roads which have erased some vegetation from the upper margins of the river bank. The sight of a lunker brown trout rolling on the surface for an unseen tidbit reminds us that we forgot our fishing rod.

Segment 3

Soon, passing under a powerline heralds our entrance to La Pine State Recreation area and its 225 camp and picnic sites. Past the developed portion of the recreation area we pass Dead Slough, an old oxbow of the river that the main flow now shortcuts. Soon we enter an area of extensive marshland created by the deposition of sediments into what was once a lake created when lava, which poured out of Lava Butte about 6,000 years ago, dammed the river. Though much of the foreground is natural, houses on the bluffs remind us that much of the next 20 miles of the river is bordered by private property. This area provides one of the few distant viewsheds found along the river. The remaining snow on Mt. Bachelor and other Cascade peaks contrast with the blue sky and green vegetation. We continue to hear songbirds and flush waterfowl on our journey downstream. But we also hear the barking of dogs and the starting of cars. Where the riparian area bordering the river narrows, houses are built closer to the river and docks and decks and lawns replace native vegetation. At one point a house is actually constructed over the river on pilings. The remainder of Segment 3 continues the pattern of intermingling of lush riparian habitat with subdivisions and private lands.

Big River Campground and boat ramp intrude somewhat into riparian areas. Development is nearly continuous downstream from Big River. Wetland areas occasionally breakup the vision of houses, docks, and retaining walls. Near Harper Bridge we encounter the first significant blocks of undeveloped land in several miles. On the east side of the river is Sunriver and on the west side is the Deschutes National Forest. On the Sunriver side a steady stream of bicyclists peddle near the river on an asphalt bike path. We can also see an airport frequented by aircraft ranging from small private planes to corporate jets. On the forest side, Besson Camp is filled with tents and recreation vehicles. Several anglers are trying their luck. Downstream, development is limited to the Sunriver side. Soon we pass under Cardinal Bridge which provides foot access to public lands and can serve as an emergency escape route for vehicles. Expansive houses and condominiums are visible until we reach the north boundary of Sunriver.

Segment 4

Except for two small parcels we leave private property behind as we pass the north boundary of Sunriver and begin our journey through Segment 4 of the river. Though the meanders continue there are no more oxbows. Now the river seems to nudge against the hillsides to the west. The river flows east for a couple of miles to circumvent Benham Butte. Then on the east bank and in the river we note old pilings, the remains of a dock used to take logs out of the river so they could be loaded onto trains for the last part of their journey to the

mill. We know that this site is also confirmation that the land to our right is part of Newberry National Volcanic Monument. Soon the Benham Falls picnic area and bridge come into sight. The bridge is a large wooden footbridge constructed where the logging trains used to cross the river. Now a trail begins at the footbridge. It is possible to take the trail that utilizes the old railroad grade to spectacular Benham Falls and, by following the Deschutes River Trail, walk all the way to Meadow Camp near the lower end of the Wild and Scenic River Corridor.

Passing the bridge and logjam immediately above it we can hear the rumble of a passing train on the tracks hidden in the lava flow not far away. We note several people walking on the trail/railroad grade. Wet marshy areas again become prevalent but now on the west the hillside rises over 200 feet above the river and to the east raw lava rock interlaced with veins of vegetation dominate midrange views. Cattails dominate the riparian vegetation and the diverse landscape is home to more species of songbirds, waterfowl, and raptors than we can name. A half mile north of the bridge the riparian area narrows between the hillside on the left bank and the lava on the right bank. An ominous roar reaches our ears just as our eyes perceive a dead end in the river. Then we realize that river is making a right turn into a maelstrom of whitewater. Given the protection of our magical vessel we have the luxury to be able note that the north slope combined with the spray of the falls has created a micro climate which includes firs and ferns as well as large ponderosa pines spared by loggers of past decades. We also note the rock wall and wood rail overlook from which people using more mundane means of transport can view Benham Falls.

Below Benham Falls the river stairsteps between flatwater and rapids created when lava flows temporarily dammed the river or squeezed the river into the smaller hills and plains to the north of Benham Butte and west of the river. The landscape continues to be dominated by the dramatic contrast of lava flows interspersed with sparse vegetation (which also includes some large old growth Ponderosa) on the east side of the river with the gentle rolling terrain covered with mostly second growth black bark ponderosa pine on the west bank. At one point a huge osprey nest is visible in the top of an isolated old ponderosa snag in the middle of the lava flow to the east of the river.

The dominance of the natural landscape is periodically interrupted by dust and pulverized vegetation, restrooms and picnic tables, and campers found at the Slough Camp, Dillon Falls, Aspen Camp, and Lava Island Falls developed recreation sites.

From Lava Island Falls downstream to the Bend Urban Growth Boundary the pattern of flat water alternating with whitewater rapids continues with the rapids becoming the more dominant feature. At Lava Island Falls the presence of human activity becomes progressively more prevalent. The first feature is the Arnold Irrigation District Flume which carries water withdrawn from the river above Lava Island Falls. Just downstream from the beginning of the flume the rimrock on the east side of the river becomes blanketed with residences all the way to the Bend Urban Growth Boundary. Across the river from Meadow Camp and above the rimrock, residences are partially screened by lodgepole and ponderosa pine trees. Below the rimrock, several homes are clearly visible. Several more are under construction or are under permit for construction.

On the west rimrock the first development that comes into view is the Inn of the Seventh Mountain and then the simultaneous presence of the Inn golf course development and

Meadow Camp Picnic Area. East of the picnic area the Awbrey Hall Fire burned down to and jumped across the river in 1990. The blackened trunks and barren limbs of the trees within the fire are visible reminders of a fire that destroyed over 30 homes.

The downstream edge of the fire roughly marks the beginning of private land on the left bank of the river. The private land boundary is also the Bend Urban Growth Boundary which marks the boundary of the Federally Designated Wild and Scenic River. The last mile of the river flows within the State Scenic Waterway. This reach is characterized by whitewater rapids interspersed with pools. Even from the river, houses on the rimrock are visible with one house sited between the rimrock and the river.

Despite the apparent ease of our imaginary voyage the vast majority of river users would be required to make several significant portages. Even an expert would require several days to complete this fifty mile trip.

It is important to note that it is often easier to walk down the river from Wickiup Dam to Fall River than to paddle when flows are reduced during the storage season. During this period the scenic quality of the river is vastly different. Though the water is usually clear there simply is not much of it. The reduced water level exposes as much as 3 vertical feet of raw streambanks.

Though the scenic quality of the corridor from the perspective of the river user is of primary importance perhaps as many people view the river from bridges and other motor vehicle accessible access points. Bridges, parallel roads, and roads accessing developed and dispersed recreation sites provide a multitude of viewing opportunities to visitors in the upper portion of the river. In much of Segment 3 road access is limited to bridges as private property limits access for the general public. Downstream from Sunriver public access points are limited by the number of roads provided across public land and in the lower sections by private property. Virtually all of the falls on the river can be viewed after a short walk from a parking area. Many riparian areas can be viewed from automobiles while other require a trip across the river in a canoe, raft or small boat.

Summary

The scenic value of the Deschutes River is primarily within the foreground landscape as viewed from the river, trails along the river, and access roads to the river. The elements of the foreground making the Deschutes River unique are diverse changes as it flows through a variety of landforms and geographical features, many flowering and other riparian plant species, rugged lava flows and rimrock, and abundant wildlife such as eagle and osprey as well as furbearers and larger mammals. Mature stands of ponderosa pine visible from the river and access roads create an important element of the viewing experience on the river.

The river flows through areas that are natural in appearance yet evidence of urban life and development are visible throughout most of the private lands that have been subdivided. Reduction of stream flows during winter has diminished scenic values even more by exposing and undercutting streambanks.

Other features surrounding the river are snow-capped peaks, ridges, and volcanic features which have been featured in regional and national publications, numerous commercials, films, and television series have showcased the scenes found along this river. The diverse environmental setting and unusual features attract visitors regionally.

Recreation Description

Vacationers and residents alike fish, hike, whitewater raft, canoe, bike, camp, picnic, hunt, photograph scenery, watch wildlife, and ride horses along the Upper Deschutes. These activities are widely publicized and promoted throughout the region and beyond by local businesses and other organizations.

Many visitors are attracted to the accommodations and activities provided by Sunriver and The Inn of the Seventh Mountain. These resorts provide opportunities for their guests to engage in most of the above described activities while also providing first class accommodations near the Deschutes River. On the other end of the scale is the more primitive and isolated recreation experience available on the east side of the river in the Newberry National Volcanic Monument. A significant portion of the use of the river from Sunriver downstream results from public use of licensed outfitter guides. Table 3-5 compares the number of people utilizing outfitter guides in 1989, 1991 and 1993 for the most popular activities.

Table 3-5

Guided/Outfitter Use

| | 1989 | 1991 | 1993 |
|----------------------|--------|--------|--------|
| Rafting | 27,179 | 31,450 | 28,249 |
| Canoeing | 10,478 | 20,780 | 24,566 |
| Other Boating | 1,616 | 1,429 | 1,213 |
| Stables | 9,271 | 10,362 | 7,179 |

From 1985, the first year for which whitewater rafting records are complete, through 1989 the amount of commercial use increased from 21,355 to 27,179 with each successive year showing an increase.

Several applications have been received for additional commercial guide services on the river between Wickiup Dam and Sunriver.

Recreation Use by Segment

Segment 2 (Wickiup Dam to La Pine State Recreation Area)

Several recreational activities are popular within this segment of the river. Flow-related activities include camping, picnicking, and sightseeing with camping and day-use being the predominant activities. Flow-dependent recreation includes fishing and flatwater boating that usually occur April through October. Angling use has been estimated to be 1,555 angler days on this segment of the river. Motor boating is frequently associated with angling. Total boating (motorized boats, non-powered canoes, kayaks and rafts) use is estimated at 950 boater days per year. Four boat ramps provide access for boaters along this segment of the river. Camping opportunities include 2 campgrounds equipped with firepits, picnic tables, and vault toilets. Parallel and spur roads provide access to numerous dispersed sites along the river.

The river below Wickiup Dam is a popular canoeing area. The entire segment can be run in open canoes except for the portage at Pringle Falls (class 4 whitewater). Experienced canoeists may run the short rapids at Tetherow log jam (class 2-3 whitewater, depending on flow level) while novices are likely to portage. The undeveloped portage can be difficult depending on flow conditions. Below Tetherow, the river is smooth flowing.

Most of Segment 2 is closely paralleled by roads or is accessed by spur roads. At the same time, except for two subdivisions and a pair of bridges the segment appears relatively unaffected by human impacts. On many weekdays throughout late spring, summer, and early autumn a float or canoe trip from Pringle Falls Campground to La Pine State Recreation Area, can result in the illusion of remoteness and solitude. On weekends other river users and bank based recreationists can be expected.

Boating activity is largely limited to the irrigation season due to the low flow. Use in this segment is also limited by access problems due to snow conditions in the winter.

Analysis of data collected in 1990 compares the types of activities occurring in this segment: camping - 50 percent, sightseeing - 7 percent, boating - 9 percent, fishing - 15 percent, hunting - 2 percent, and horseback riding - 1 percent. An estimated 10,368 people utilized the recreation sites surveyed.

Segment 3 (La Pine State Recreation Area to north boundary of Sunriver)

This segment of the river provides a rural setting for recreation experiences. There are many residential developments as well as bridges, power lines, and roads visible from the river. Access to the river is from Road 200, Big River campground and boat ramp, Harper Bridge, and Besson campground and boat ramp. Numerous hiking, biking, and horse trails across from Sunriver have impacted sensitive meadow and riparian vegetation areas. Canoeing, fishing, and wildlife viewing are popular recreation activities with public access provided at several boat ramps on public lands.

The largest developed camping and day-use area adjacent to the river is LaPine State Recreation Area with 140 campsites (many with electricity, water, and sewage hookups) and 80 picnic sites. It also has an undeveloped canoe launching area and a trail to "Big Tree," the largest ponderosa pine in Oregon. LaPine State Recreation Area is a convenient takeout or launch point for float trips.

Private land recreation use includes use of boating docks and activities by Sunriver residents and others. A bicycle path follows the river in the Sunriver area with picnic spots and river access points available. Data from a 1992 use study conducted by Sunriver indicates as many as 158,000 bicycle user trips occur along this stretch of the river.

Predominant flow related activities are day use and camping which occur May through October. Year-round use is dependent upon the amount of snow which limits access from nearby destination resorts, Bend, and Highway 97.

Flow dependent activities are boating and angling. Both motorized and non-motorized boating are popular. Most of the motorized boating is in small, light craft on smooth flowing stretches of the river. Bank and boat angling are also popular. An estimate of 1,790 angler days in the Segment 3 is low because observations were limited to Forest Service land adjacent to the river. Canoeing and other flatwater craft make up a large percentage of boating use. In 1994, the Sunriver marina canoe rentals accounted for over 22,530 visits.

Commercial canoeing from Sunriver occurs during the spring and summer months. All commercial guide permits are restricted to current levels. Non-commercial water activities include canoeing, rafting, and motor boating. The majority of the boating originates at La Pine State Recreation Area, Sunriver, and residential areas along the river. Access is also available at the Big River and Besson Camp campgrounds and boat ramps and Harper Bridge.

In Segment 3 the river user is seldom out of sight and sound of other people, residences, or other forms of development. It is not possible to create a sense of solitude for more than a few minutes during the late spring, summer, and early autumn period. Even with development on bluffs above the river some stretches of undeveloped riparian habitat adjacent to the river provide "islands" of refuge for both the recreationist and wildlife.

Analysis of data collected in 1990 plus commercial use statistics and data from the 1992 bicycle study indicate the following proportions of recreational activity in this segment: sightseeing - 1 percent, boating (all types of watercraft including commercial canoe) - 8.6 percent, camping - 25 percent, fishing - 1 percent, hiking/biking - 63 percent, picnic - 1 percent, commercial horseback riding - 1 percent, and hunting - unknown. The combined use from all sources indicates an estimated 251,000 people per year utilizing this segment of the river though the duration of a visit for over 60 percent of this total (primarily Sunriver cyclists) may be ½ hour or less.

Segment 4 (north boundary of Sunriver to COID Diversion)

From the north boundary of Sunriver to the Benham Falls Day-use Area (within Newberry National Volcanic Monument), the river is flat water. The most popular uses are fishing, canoeing, and flatwater rafting. Most canoe and raft use originates at the Sunriver Marina (about 23,000 users per year).

From Benham Falls to the COID diversion, the river becomes punctuated with falls and rapids created by the Lava Butte Lava flow. Kayaks are the most popular watercraft for the more challenging sections of the river between Benham Falls and Lava Island Falls. At Benham Falls the river changes abruptly from class I canoe water to a maelstrom of whitewater as it plunges through a series of lava formations.

The most popular stretch of whitewater is the quarter mile long Big Eddy rapids which is a class III whitewater run between Aspen Camp and Lava Island Rapids. This two mile stretch between put in and take out is run by over 30,000 adventure-seeking vacationers and residents utilizing one of three commercial rafting services with permits for this segment of the river. Whitewater rafting on this segment is dependent upon irrigation-driven flows to provide the thrills these users seek. Natural flows would provide the desired experience only a few days a year.

Most flatwater boating in this section occurs from Slough Camp to the landing at Dillon Falls camp. An easy canoe trip with large sloughs for side trips is available in this stretch of water. The Inn of the 7th Mountain outfits about 1,000 canoes per year on this short reach of the river. The landing at Dillon Falls has a boat ramp and signs warning the danger of Dillon Falls which is a class V drop followed by a class IV series of cascades for about half a mile. The Inn of the Seventh Mountain also operates a pontoon boat from the Dillon Falls Boat ramp to the base of the rapids below Benham Falls and back.

At Meadow Camp, a popular day use recreation area, the river becomes calm, with a short class I canoeing stretch. Below this area, a demanding kayak run is used by local residents.

In addition to the use of watercraft on the river popular uses on this segment include fishing, camping, hiking, biking, horseback riding, picnicking, and sightseeing. For bikers, hikers, horseback riders, and anglers user trails exist along the entire length of the west side of the river. This multiple use has created a web of user trails. The River Trail now provides a travel route between Benham Falls and Meadow designed primarily for hikers. Interpretive signs have been constructed at the trailhead and at viewpoints overlooking the river and geologic features. A separate network of equestrian trails utilized primarily by an outfitter guide operating out of the Inn of the Seventh Mountain has also been constructed.

From the North Boundary of Sunriver to Lava Island Falls the river corridor is dominated by the natural landscape. Exceptions include power lines crossing the river, 2 private residences, development related to monitoring flow, recreational development, dispersed recreation sites, spur roads, abandoned railroad grades and other remains of past logging activity. These developments and the presence of other visitors make it impossible to sustain a sense of remoteness and solitude.

Analysis of data collected in 1990 and more recent commercial use data indicates the following proportions of use in this segment: commercial rafting - 45 percent, commercial pontoon boat - 2 percent, noncommercial boating and rafting 3 percent, commercial horseback riding - 11 percent, camping - 6 percent, picnic - 7 percent, sightseeing -11 percent, hiking/horseback riding - 4 percent, biking - 3 percent. It is probable that in the interim between the collection of the data and the present that the proportion of use by mountain bikers has increased within Segment 4. An estimated 70,000 visits occur within this segment each year.

The dramatic backdrop of Lava Butte Lava Flow; falls and rapids; abundant wildlife; the heritage resources of Lava Island Rockshelter, railroad grades, and other evidence of past logging activity provide outstanding opportunities for interpretation of cultural and natural history.

Use Allocation

In 1981 an allocation system was established for the segment of river from Aspen Camp to the Lava Island takeout. Launches have been limited to four boats per hour per operator. Permits have been limited to three Outfitter-guide Permittees per year.

The estimated maximum capacity reflects a 75 percent to 25 percent split between commercial and non-commercial floaters, the latter being unregulated at this time. The desired maximum level of social encounters are attained if no more than four boats per hour per operator are launched. The allocation system was developed by referencing 2 concerns: A desired experience level (each raft would ideally be out of sight of other rafts) and the economics of providing a guided rafting experience.

Since 1991, the allocation system has allowed each outfitter up to 6 rafts per hour and a half which results in a launch of up to 6 rafts every half hour rather than the original 4 rafts every 20 minutes. This reduces the number of start times along with the number of shuttle trips and allows more time between launches for non-commercial rafters.

In 1991 approximately 36,000 guests and guides rafted down this reach. About $\frac{3}{4}$ of those trips were during July and August. The current system could allow up to 53,568 guest trips between the 4th of July and Labor Day with about 18 launches per day (6 per outfitter). As a practical matter the early morning and late afternoon trips are seldom fully booked while the mid day trips are frequently full. Any use over the assigned 21,000 is at the discretion of the District Ranger.

Summary

From fishing to biking and hiking and whitewater rafting the Upper Deschutes provides the opportunity for vacationers and residents to engage in a wide range of outdoor activities in settings that range from natural appearing to nearly suburban.

Social and Economic

The designated Wild and Scenic River portion of the Upper Deschutes River extends from Wickiup Dam to the Central Oregon Irrigation District diversion just south of the City of Bend. This entire stretch lies within Deschutes County. However, water diverted from the river is used for irrigation in portions of Jefferson and Crook counties. While management decisions may have economic consequences for people outside the area, these three counties feel the largest impact. In addition to irrigation, local residents also benefit from the close proximity to the recreational opportunities and other amenities provided by the river. Of the three counties, Deschutes County receives the most benefit of recreational use of the Upper Deschutes.

Twenty-five percent of a national forest's annual receipts are distributed to the counties where the forest is located. Receipts from timber sales, recreation fees, special use permits and other uses are pooled; 25 percent of the total is then distributed among the counties on the basis of the proportion of the forest's total acreage within each county (the formula has varied recently based on Congressional mandate).

The affected social environment is described under three headings: 1) a brief overview of population and employment characteristics; 2) a summary of irrigated agricultural production from the three county area; and 3) a discussion of the social and economic significance of river-related recreation.

General Population and Employment Characteristics

The Center for Population Research and Census at Portland State University estimates the 1992 population of Oregon as 2,979,000. Oregon's population has grown at an annual rate of just over two percent (2 percent) since the 1990 U.S. census. The growth rate is about twice that of the national average and is a continuation of rapid growth experienced in the latter part of the 1980's.

Deschutes County is one of the most populous counties east of the Cascades with a population growing at nearly twice the state's rate for the past five years. The climate, clean environment, and recreational amenities provided by the Central Oregon region are major reasons.

Bend is the largest community in the area with a population of about 28,000 (1994 estimate). Bend has a varied economy with a diversity of manufacturing and non-manufacturing industries, and a growing tourism industry.

The community of Redmond is the second largest city in the county with a population of about 10,000. In the past Redmond has been a center for agriculture and manufacturing, but tourism and service-related industries are growing in importance. The Redmond Airport is the hub of passenger and air cargo service in Central Oregon.

Sisters is the smallest incorporated community in Deschutes County with a population of about 800. The community's economy is organized around the tourist industry, along with ranching and farming.

The unincorporated portion of Deschutes County has a population of about 50,000 people. Sunriver and LaPine are the unincorporated communities closest to the River. LaPine is located on Highway 97 about 30 miles south of Bend. Sunriver, a recreation-oriented planned development, is located about 15 miles south of Bend.

The City of Madras, with a population of approximately 4000, is the county seat of Jefferson County. Madras acts as the service center for agriculture in Jefferson County and western Crook County, including areas served by irrigation water from the Upper Deschutes.

Table 3 - 6

Tri-County Population Trend 1980 - 1990

| Area | 1980 Population | 1990 Population | Percent Increase |
|------------------|--------------------|--------------------|---------------------|
| Deschutes County | 62,142 | 74,958 | 20.6 |
| Crook County | 13,091 | 14,111 | 7.8 |
| Jefferson County | 11,599 | 13,676 | 17.9 |
| State of Oregon | 2,632,633 | 2,842,321 | 9.8 |

Source: U.S. Bureau of the Census, Population Characteristics, 1990.

Table 3 - 7**Number of Jobs by Economic Sector for 1992 - Three County Area**

| Economic Sector | Jobs | % of Total |
|---|-------|------------|
| Trade | 11862 | 29% |
| Government | 7320 | 18% |
| Transportation, Communication and Utilities | 1440 | 3% |
| Construction and Mining | 2410 | 6% |
| Finance, Insurance and Real Estate | 2830 | 7% |
| Services and Misc. | 7320 | 18% |
| Lumber & Wood Products | 5640 | 14% |
| Other Manufacturing | 2540 | 6% |
| Total Wage & Salary Employed | 41362 | 100% |

Table 3-7 shows employment by major economic sectors in the three county area for the year 1992. The economic sectors that contributed the highest number of jobs in the area of influence were trade (29 percent), government (18 percent), services (18 percent) and lumber and wood products (14 percent).

Since 1985, the lumber and wood products and government sectors have declined as a percent of the total labor force while visitor and trade-related businesses have increased. While the wood products and lumber sector declined in percent of total employment, the number of people employed in the sector has remained approximately the same, contrary to regional trends. The increase in wood products remanufacturing (millwork, specialty products) accounts for most of this difference.

As the state and national population continue to grow, tourism and visitor-related business should also increase. Recent data has shown that while the area's population has grown rapidly, jobs created have generally been at the low end of the wage scale. In 1991, Deschutes County had an average per capita income of \$16,946, 97 percent of the state average and 89 percent of the national average.

Land Ownership

The proposed boundary of the Upper Deschutes Wild and Scenic river encompasses about 16,700 acres. Over 11,500 acres fall under the jurisdiction of the United States Department of Agriculture (USDA) Forest Service, almost 1,500 acres are managed by Oregon State Parks and Recreation Department, 10 acres are owned by Deschutes County, and over 3,600 acres are owned by private interests.

Agriculture

While the designated portion of the river lies entirely within Deschutes County, river water is also used to irrigate crops in Jefferson and Crook Counties. This tri-county area is involved in Upper Deschutes River management decisions.

Use of water from the Deschutes River for the irrigation of crops and livestock has been an important part of the Central Oregon economy since the turn of the century. Six irrigation districts divert water from near Bend for the irrigation of 115,000 acres, about 90 percent of the harvested cropland in the tri-county area. In the period from 1979 to 1984, this land generated approximately \$36,000,000 of agricultural products per year or \$96,000,000 of direct and indirect income per year. This irrigated land produces peppermint, potatoes, small grains, and alfalfa. Water is also used to raise cattle, sheep, and horses.

Grazing has occurred on 674 acres in three cattle allotments along the river, Tetherow Meadows, Abbot, and Ryan Ranch. The authorized carrying capacity is 189 animal unit months (AUMs). An unused sheep allotment is also located in the river corridor.

These allotments are in riparian areas, primarily meadowlands. Grazing capacity is 25 pairs of cattle for two months on the Tetherow Meadows Allotment, 21 pairs for three months on the Abbot Allotment, 13 head for three months on the Ryan Ranch Allotment.

In 1995, the one Forest Service permittee paid \$193.20 to run cattle on Abbot and Ryan Ranch Allotments. Tetherow Allotment was vacant.

Deschutes County: Total agricultural sales in 1991 was \$37.1 million. The \$30.8 million in livestock transactions was divided between llamas, \$11.3 million; \$9.5 million, horses; and cattle and calves, \$7.5 million. Livestock sales ranked 10th in the state.

Most of the \$3.4 million in hay and forage production in 1991 was alfalfa (\$2.9 million). Potatoes (\$690,000) and peppermint oil (\$1.2 million) were also significant.

Jefferson County: The total value of crops on farms irrigated by Deschutes River was \$30.7 million in 1990, 79 percent of county total.

Crook County: Total agricultural sales totaled \$33.1 million in 1991; \$19.8 livestock and \$13.3 million crops.

Recreation

A 1987 market analysis and study reported that visitors spent \$98 million in Deschutes County annually, with \$8 million directly spent on recreation. By 1991 visitor expenditures had nearly doubled to \$179 million and recreation-related expenditures were almost \$14 million.

Recreational visitors to the Upper Deschutes River total about 170,000 annually. This number does not include visits to private lands.

While a dollar value is difficult to place on general visitation, exact figures are available for guided/outfitted use of the river corridor. Table 3-8 shows use and revenues from guided/outfitted uses on the Upper Deschutes, including whitewater rafting, horseback riding, canoeing, dinner floats, and photography rafting trips. Although fishing guide permits allow use of the Upper Deschutes, very little guided fishing occurs there.

Table 3-8 Guided/Outfitted Use - Gross Revenue

| Year | Total Users | Gross Revenue |
|------|-------------|---------------|
| 1989 | 60,400 | \$1 million |
| 1990 | 59,500 | \$1.1 million |
| 1991 | 70,000 | \$1.1 million |
| 1992 | 63,400 | \$1.3 million |
| 1993 | 62,800 | \$1.4 million |
| 1994 | 65,000 | \$1.4 million |

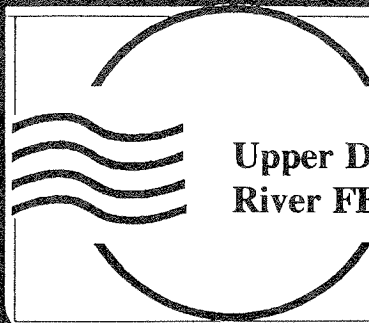
Source: Deschutes National Forest, permittee data

While the specific economic impact of river related recreation cannot be established, Table 3-9 shows estimates of travel-related expenditures, employment, and payroll for Deschutes Counties in 1989. Travel expenditures were estimated to be more than \$149 million. Approximately 2,88 jobs with a payroll of more than \$27 million were generated.

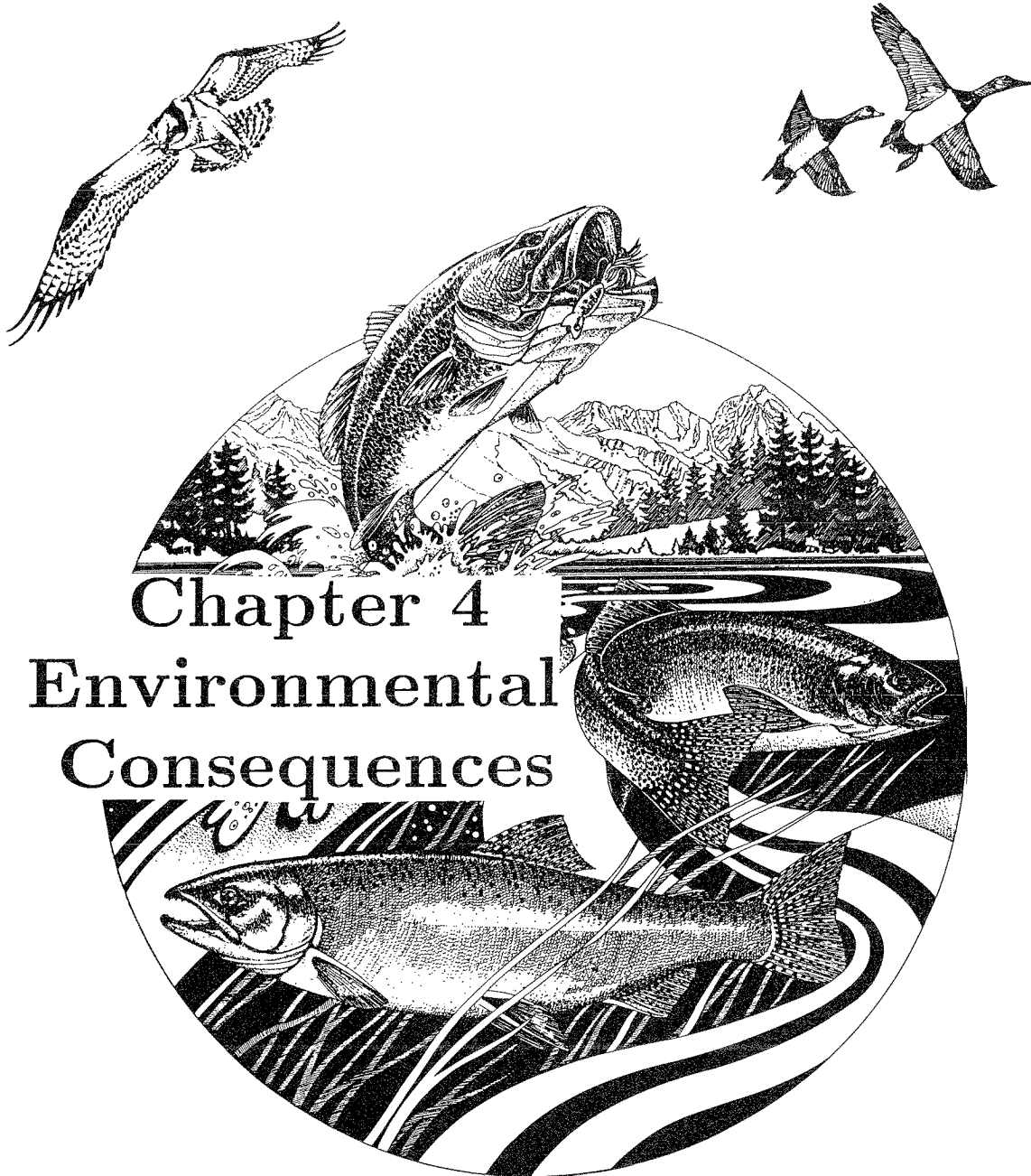
**Table 3-9 Estimated Travel Related Expenditures, Jobs, and Payroll
Deschutes County, 1989**

| Business | Travel Expenditures (in thousands) | Jobs | Payroll (in thousands) |
|-----------------------|---------------------------------------|-------|---------------------------|
| Accommodations | \$40,412 | 942 | \$9,277 |
| Eating, Drinking | \$34,554 | 1,068 | \$8,555 |
| Food Stores | \$14,904 | 146 | \$1,715 |
| Ground Transportation | \$21,989 | 117 | \$1,885 |
| Recreation | \$12,126 | 331 | \$3,083 |
| Retail Sales | \$25,802 | 261 | \$2,878 |
| Total | \$149,786 | 2,866 | \$27,392 |

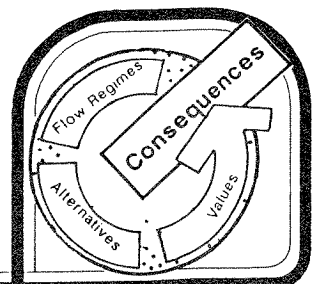
Source: State of Oregon, The Economic Impact of Travel and Visitor Volume in Oregon, 1989, Oregon Department of Economic Development, Tourism Division. Prepared by Dean Runyan Associates, Portland, Oregon.



Upper Deschutes
River FEIS



Chapter 4 Environmental Consequences



Chapter 4

Environmental Consequences

Introduction

This chapter outlines the environmental consequences of the different alternatives and flow options for managing the Upper Deschutes Wild and River Corridor. The chapter is organized by river values (issues) in the same order as the rest of the document: geology, hydrology, fishery, vegetation, wildlife, scenery, cultural resources, recreation, and private land use.

Under each value (issue) heading, an analysis of the effects of the land-based alternatives on that value are disclosed. Each of the alternatives describes programmatic management to protect and enhance river values and probable actions which are likely to occur as a result of implementing that programmatic direction. This analysis is organized to display how implementing programmatic direction would affect each of the river values. For instance, analysis of the environmental consequences to the Geologic and Hydrologic Values includes the effects management of the geologic, hydrologic, fishery, scenic, cultural, vegetative and recreation values would have on the Geologic and Hydrologic Values. The exception, as in the alternatives, is the effects of private land management. For each value or issue the analysis starts by describing the general way that value could be affected by each alternative, (e.g. activities, which affect the conditions of the stream channel and water quality); the general effects of the alternatives on the value (e.g. recreation use is concentrated around water bodies and can create a source of erosion), and finally the specific way in which a value would be affected by one or more of the alternatives (e.g. Alternative 2 would reduce total recreational use levels).

The effects discussed here include direct, indirect, and cumulative effects, effects on other ecosystem components, and mitigation measures. After the discussions of all the issues, there are separate sections on other environmental effects and incomplete/unavailable information.

In order to complete a reasonable analysis of the effects of the alternatives, the Forest Service interdisciplinary team relied on some assumptions. These are listed as part of the description for each resource.

Geologic and Hydrologic Values

Geologic and hydrologic values are directly affected by the condition of the stream channel and water quality.

Water quality in streams, wetlands/riparian areas, and floodplains is a reflection of overall watershed conditions. Water quality refers to its physical and chemical make up. A healthy watershed condition will produce excellent water quality. Since riparian/wetlands, and streams are the conduits for water movement throughout the watershed, stream channel condition is an important indicator of watershed health and reflects the quality of the aquatic resource. Channel conditions are represented by the physical structure of the stream substrate, streambank vegetation, streambank stability and chemical make up of the water. Land management activities may alter natural processes and affect both water quality and stream channel condition. The influences of land management activities on water quality and stream conditions, and how it impacts the beneficial uses of water is addressed in this section.

Some disturbances of soil and vegetation affect water quality and stream channel condition. Activities that disturb, expose, and/or compact soils and channelize water can produce erosion, and possibly cause soil to enter streams as sediment. Most of these activities produce short term, local effects.

Although riparian vegetation occupies only a small part of the overall acreage of the river corridor, these areas constitute an important element in the natural maintenance of water quality and streambank stability. The vegetation acts as a sponge to absorb nutrients and sediment. The roots of riparian vegetation help to stabilize streambanks and adjacent slopes. Vegetative screening maintains low water temperatures by shading streams from solar radiation.

Activities that affect geologic and hydrologic values include flow regulation (see flow options), fisheries habitat enhancement activities, vegetation/streambank restoration activities, and recreation and private property development. Consequences of these activities are best assessed in terms of overall watershed and river condition as reflected in water quality, streambank stability, and wetlands/riparian quality.

Monitoring indicates that the primary direct effect on geologic and hydrologic values results from the flow regime. Effects of the existing flow regime are discussed in detail the Resource Assessment (Appendix C in the Management Plan), Chapter 1, Chapter 3, and under the Effects of Flow Options section of this chapter. The degree to which actions proposed under the land-based alternatives such as streambank revegetation, road and recreation site closures or modifications, and the addition of instream structure as a part of fishery habitat enhancement would directly effect these values is uncertain. It is certain that there would be some indirect effects from these activities which could eventually contribute to the improvement of stream channel conditions and water quality, though these effects are expected to be minor in comparison to the effects of instream flows.

Monitoring also indicates that the increase in private land development has contributed to the rise in the amount of pollutants within the river. Under all alternatives, monitoring would continue to identify specific causal agents. Cooperative private and agency activities to reduce potential pollution sources would continue but would be unlikely to measurably effect the amount of pollutants which may be currently entering the stream from existing septic systems.

Assumptions

- Recreational use will continue to increase, creating localized problems with streambank trampling and introduction of small amounts of sediment into the river.
- Non-commercial use levels are largely determined by the amount of motorized access and the number of recreation sites, these factors are used as predictors of non-commercial use levels. Guided/outfitted use is controlled through special use permits. As a result, the upper levels of guided/outfitted use can be more precisely determined, and guided/outfitted use is counted separately from non-commercial use.
- Development on private land will continue to occur until all the buildable lots are occupied. Groundwater monitoring by DEQ in the early 1980's and in 1993 have found high levels of nitrates in wells in the La Pine Basin near the Upper Deschutes River. The cause is suspected to be the numerous septic systems in the area. While introduction of nitrates into the river via seepage from septic systems has not been confirmed the potential is great. Because more private development will result in more septic systems, the potential for water quality degradation likely to increase. (DEQ 1994)

Effects of Geologic/Hydrologic Management on Geologic/Hydrologic Values

Alternatives 2-6 are expected to include some road closures adjacent to the streambank and redesign and revegetation of river access points. These activities would reduce the potential for erosion and soil entering the river. See the section on Effects of Vegetation Management on Geologic/Hydrologic Values for more detail.

Effect of Fisheries Management on Geologic/Hydrologic Values

Alternative 1: Current management direction of fishery habitat enhancement activities would not change under this alternative. Currently, there are no specific goals for addition of instream structural elements, although a cooperative program is in place and specific needs are identified.

Alternatives 2-6: The primary effects on geologic and hydrologic values from fishery management would come from the active placement of instream habitat improvement structures and the amount of logjams which would be allowed to accumulate naturally within the river corridor. The amount of instream structure changes how and whether sediment is deposited and can change the nature of the hydrologic dynamics. Generally, the effects of placement of instream structures under all alternatives would be to reduce the velocity of flows against streambanks, change scour and pool configuration and to aid in the deposition of sediments in areas where existing erosion is greatest. These effects may not necessarily occur when large woody material falls into the stream and is transported on its own. Under these situations, the velocity of the flow and size of the material would determine its ultimate placement. Minor effects to streambanks and changes in hydrologic characteristics as a result

of this natural placement would remain unaltered by management unless one of the conditions outlined in Chapter 2 "Common to 2-6" were identified. Alterations of the material would be the minimum needed to resolve the problem, and most of the manipulated material would likely remain within the river system, if not in the same configuration.

Alternatives would vary as to whether or not naturally occurring river-spanning logjams would be allowed to remain. Under alternative 2, up to 47 miles of river could eventually achieve such a condition, with 10 miles in Alternative 3, 27 in Alternative 4, 6 miles in Alternative 5, and 14 miles in Alternative 6. The probability of the river channel actually reaching a condition where all or part of these available miles were spanned by logjams is dependent upon numerous outside factors and cannot be predicted at this time.

Effects of Vegetation and Wildlife Management on Geologic/Hydrologic Values

Alternative 1: Existing Management would continue conditions or trends identified in the Affected Environment.

Alternatives 2-6: The riparian areas would be managed to maintain or enhance the riparian dependent resources. All activities would be conducted to benefit the Outstandingly Remarkable Values and other values associated with the Deschutes River and its immediate environment. Closing roads that now provide access to dispersed sites adjacent to the river in order to protect riparian habitat would allow revegetation, a reduction in the rate of erosion, and less sediment being introduced into the river. These sites constitute a relatively small proportion of the banks of the river, and the improvement in the vegetative condition would be unlikely to measurably affect water temperatures or reduce sediment. The probability that other pollutants would be introduced into the river would be reduced because of the increased infiltration capability of the riparian vegetation.

Effects of Scenery Management on Geologic/Hydrologic Values

Planting vegetation to screen recreation sites from view from the river would occur under all action alternatives and may help stabilize the riverbank. See the section on Effects of Managing Recreation on Geologic/Hydrologic Values. Changing grazing levels to meet Visual Quality Standards would occur under all action alternatives. A lower grazing level would reduce impacts to streambanks and could result in improved water quality. See the section on Effects of Managing Vegetation on Vegetation.

Effects of Cultural Resources Management on Geologic/Hydrologic Values

Surveys would have no measurable effects on geologic/hydrologic values. Site-specific analysis would be done on any activities which would have potential impacts.

Effects of Recreation Management on Geologic/Hydrologic Values

Recreation use is concentrated around water bodies; over 50 percent of all recreational use and over 90 percent of developed recreational sites are associated with water features.

In streamside locations, recreational use can compact soil, trample vegetation, and breakdown streambanks. This results in reduced infiltration and increased channelization of water and increased potential for eroded soil to enter streams as sediment, which could affect turbidity and total suspended solids, important parameters of water quality. The extent to which these effects would occur is dependent upon level and type of use and level and type of development. Of these, level of use is the most significant for predicting effects. The higher the use level, the greater the potential for effects.

Level and Type of Use

One person visiting a spot on the riverbank would probably have little effect, but as more people visit the same location the potential for adverse effects increases. How visitors arrive and their type of recreational activity may also increase the potential for adverse effects.

At low use levels, dispersed camping can have minimal effects on streambank stability and water quality factors. Sites are generally selected because of ease of access to the site and to the river. As use levels increase, existing sites may expand to accommodate more people and gear, the areas become barren of vegetation, and trails to the river widen. New sites are created when existing sites are filled. Access may be created (user-created roads) to a new site without regard for potential resource damage. Dispersed sites have no provision for sanitation. High levels of dispersed camping use can create sanitation problems and significant stretches of compacted and denuded riverbanks.

The motorized access to the river could cause, both directly and indirectly, compaction of soil, trampling of vegetation, and breakdown of streambanks. Motorized use itself compacts soil, crushes vegetation, and can breakdown streambanks. Ease of motorized access increases use levels and the potential for effects linked to use.

Recreation use which includes motorized access or boating can introduce pollutants into the water through fuel spills which have the potential to affect water quality. The more users, the more likely that water quality could be compromised. Similarly the more miles of river open to motorized boating the more of the river that would be susceptible to fuel spills and leakage.

Level and Type of Development

Level of development refers to improvements or facilities which provide for a higher use level. These facilities include campgrounds, picnic areas, boat ramps, restrooms, and parking areas. Developed sites provide protection of geologic and hydrologic values by concentrating use in one area and providing higher levels of control and site protection measures than in undeveloped areas along the streambanks. Restrooms reduce the potential for water pollution from uncontrolled waste deposits along the streambanks.

Site hardening and protection measures include designation of campsites, parking, trails, and boat launch areas. Careful location of these areas would limit damage to vegetation and reduce the potential for sediment to be introduced into the river.

Concentrating use can cause relatively permanent vegetative alterations, especially a reduction in down logs and shrubs. If site protection measures are not well designed and maintained, concentrating use could increase the potential for the breakdown of streambanks and stream sedimentation in these areas.

Types of development vary in their potential effects on geologic and hydrologic values. The longer the typical stay, the higher the potential for effects; therefore, developed campgrounds would have a higher potential for effects than developed day-use areas. Developments which must be close to the river, such as boat ramps, would have a higher potential for effects than developments which can be located away from the river, such as trailheads.

Impacts associated with guided use are similar to developed sites in terms of concentrating use and site protection measures.

All alternatives vary in terms of level and type of use and level and type of development. However, quantitative data to measure differences in sediments introduced into the river as the result of these variations is not available, so the alternatives must be compared by their relative potential for effects.

As use levels or frequencies increase, all alternatives would result in continued increases in site protection measures based on site-specific analysis of effects on river values. All alternatives would reduce the existing potential for impacts. All alternatives would protect launching and landing sites through vegetation condition goals. Standards and guidelines would restrict unavoidable impacts to the smallest area practical for the level of use.

The alternative with the greatest potential for adverse impacts to the geologic/hydrologic values is Alternative 5. Alternatives 1, 3, 4, and 6 would have moderate potential for impacts. Alternative 2 would have the lowest potential for adverse impacts.

Table 4-1 Changes Affecting Geologic/Hydrologic Values

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Alt. 6 |
|---|---------------|---------------|---------------|---------------|---------------|---------------|
| Change in Total Designed Annual Capacity | 0 % | - 35 % | + 2 % | - 13 % | + 53 % | + 11 % |
| Miles of river open to motorized boating | 52 | 7 | 44 | 27 | 48 | 40 |
| Miles of road closed to protect riparian and sensitive habitat | 0 | 26 | | | | |
| River access points (developed and dispersed) | 52 | 13 | 21 | 15 | 24 | 22 |

Effects of Private Land Use on Geologic/Hydrologic Values

Under all alternatives, use of standard, gravity septic tank and drainfield systems would continue (where soil conditions meet current standards) pending changes in existing septic standards. Because these systems do not remove some nutrients or dissolved inorganic compounds (such as nitrate-nitrogen), continued use of these systems could result in a measurable reduction of water quality.

Other sewage disposal systems may be more effective for protecting water quality in the Deschutes River. Sand filter systems reduce the amount of nitrate-nitrogen contaminants by about half. These systems are less likely to result in measurable reductions in water quality. Community sewage collection, treatment, and disposal system using septic tanks, collection pipes, conventional secondary treatments, and land application of treated effluent are generally the most effective in removing conventional pollutants. The likelihood of these community systems being used is low because of the expense and land base required to operate them. Additional impacts relating to septic system malfunctions, inadequate soils to treat the septic tank discharge, and handling of hazardous materials have the potential to reduce water quality.

When development is immediately adjacent to the river there is increased risk of reducing water quality.

Alternative 1: Design review of vegetation removal is tied to building permit application. Vegetation removal, which could increase sedimentation of the river, could occur before application for a permit. (See Effects on Private Land.)

Alternatives 1 and 3-6: Building setback would be 100 feet from the river.

Alternative 2: The building setback would be increased to 200 feet on properties which are large enough to support such a setback. The increase in setback distance would reduce potential for sedimentation of the river.

Alternatives 2-6: No vegetation removal would be allowed before design review. This would provide protection for native vegetation and reduce potential for sedimentation of the river.



Fishery Value

The capability of streams to rear and support trout and char is primarily influenced by six factors: 1) pool volume and depth, 2) stream flow; 3) water quality, 4) amount and quality of spawning gravels, 5) habitat complexity (large woody material and rubble substrates), and 6) amount of fishing pressure (Instream Flow Assessment).

The primary determinant of the fishery is the flow regime (Instream Flow Assessment). Activities performed to restore/stabilize the streambanks, introduce structure and gravel, and reduce pollution are secondary when compared to the impacts associated with the management of flow to provide irrigation water. These effects on fisheries associated with flow are described in the flow options. The following discussion focuses on the effects of the alternatives on the fishery without changing flow conditions.

Large woody material and other structures in the river provide feeding, resting, and hiding areas for fish and macroinvertebrates upon which the fish feed. Recreation use can affect the fishery both indirectly by how it can affect water quality and directly by how fishing pressure can affect the fish population.

Assumption

- Changes in water quality and streambank conditions will cause corresponding changes to the fishery.

Effects of Geologic/Hydrologic Management on Fishery Value

All alternatives would have the potential for direct and indirect effects on potential sources of non-source pollutants and consequently indirect effects on the fishery. The effects of these actions are described in the Effects of Geologic/Hydrologic Management on Geologic and Hydrologic Values.

Effects of Fishery Management on Fishery Value

Alternative 1: Management of fish habitat would continue under Forest Plan direction. Management of the fish populations is dependent upon the outcome of the Deschutes Basin Management Plan now under development by the Oregon Department of Fish and Wildlife.

Common to Alternatives 2-6: The addition of rubble and gravel substrates would benefit all of the aquatic resources. Spawning habitat is limiting in the river, so any level of addition of gravels would benefit the fishery. Small fish (<8" in size) prefer cobble to rubble substrate along with the complexity that wood and aquatic vegetation provide. Many aquatic macroinvertebrates favor gravel to cobble substrate as a home. The amount of additional

gravel and rubble to be introduced into the river is low, possibly modifying 1-5 percent of the habitat in the river. The reason for not aggressively introducing gravel and rubble substrates in the river is that it was never naturally abundant.

Fifty to 100 pieces of large woody material per river mile would be added to maintain or enhance the fish and aquatic resources. This would provide for good fish and aquatic habitat. Logjams and complex wood gatherings provide cover and respite from high flow velocity, and create feeding stations. When these conditions, along with favorable water quality conditions (Also see Flow Options), exist the habitat would be elevated from good to excellent. The portion of the river on which large, river spanning logjams would be allowed to occur would vary by alternative, with Alternative 2 having the largest portion (approximately 47 miles), followed by Alternative 4 (approximately 27 miles), Alternative 6 (approximately 14 miles), Alternative 3 (approximately 11 miles), and Alternative 5 (approximately 4 miles). The number and size of logjams which would actually occur is unknown.

Effects of Vegetation and Wildlife Management on the Fishery Value

The effects of managing vegetation on the fishery are linked to the fishery via the effects of managing vegetation on geologic and hydrologic values and on the recreation value.

The reduction in access and individual dispersed sites along the river that occurs in Alternatives 2-6 would reduce potential for pollution, protect streambank vegetation from trampling, and reduce fishing pressure. Healthy riparian habitat adjacent to the river would be a source of nutrients for inhabitants of the river. These effects would likely accelerate the response of fish populations to the habitat enhancements resulting from direct management of fish habitat, but how much is unknown.

Effects of Scenic and Cultural Resources Management on the Fishery Value

Scenic and cultural values are primarily managed by establishing standards which other activities must meet. Under all alternatives, scenic quality standards or cultural site protection could affect the exact location of introduced large woody material, cobble and gravel by restricting the kinds of equipment which would be used or how or where equipment would access the river. Depending upon flow velocities, size of material, and desired placement, introduced material would need additional cabling or anchoring. This activity could also be limited by the visual quality standards. Placement of fish habitat improvement structures would use natural native materials (except for anchoring devices) and would mimic natural gatherings and would generally be expected to meet Visual Quality Standards with little to no effect on meeting fishery goals.

Effects of Recreation Management on Fishery Value

Management of recreation results in both direct and indirect effects on the fishery. The direct effect is the amount of fishing pressure that results from the amount of access, the number of river miles open to mixed (both motorized and non-motorized) river travel, and the amount of guided fishing. The primary indirect effect of recreation management is the effect on water quality which was discussed in the section on Geologic/Hydrologic Values. Access determines how much of the river is within easy reach of anglers. As a rule the more difficult it is to get to a reach of the river the less fishing will occur. Similarly by closing parts of the river to motorized travel some anglers, who rely on motorboats will be excluded from the parts of the river closed to motorized use. Fishing pressure would, as a consequence be reduced. If guided fishing increases the effectiveness of anglers may increase and as a consequence reduce the numbers of fish. In the past at least one homeowner utilized a motorboat to fish from his property near the Bend Urban Growth Boundary to the base of Lava Island. This use is no longer occurring.

Alternative 1: Continuing existing management would maintain conditions and trends identified in Chapter 3 (2 miles closed to motorized river travel).

Alternatives 2-6: Closing the river below Aspen to motorized travel would have little impact on existing use patterns. Most of this reach of the river is not suitable for motorized travel. The primary effect would be that anglers who now use motorboats for fishing as far as about 0.5 mile downstream would no longer be able to do so. As a result fishing pressure would be reduced on this short reach of the river.

Providing barrier-free fishing access from General Patch Bridge would not significantly increase the pressure on the fishery.

Alternative 2: The same closures would make access more difficult and consequently reduce fishing pressure. Closing all but one segment of the river to motorized river travel (47 miles closed) would reduce fishing pressure in non- motorized segments and increase fishing pressure in the mixed use Segment 3C. Less fishing pressure would allow the populations to build up/respond to the habitat enhancement.

Restrictions on guided/outfitted use would have the effects on water quality described in the Effects of Recreation Management on Geologic/Hydrologic Values. Limits on guided fishing would limit future increases in fishing pressure.

Alternative 3: This alternative would have indirect effects that would result from changes in water quality described in the Effects of Recreation Management on Geologic/Hydrologic Values by Alternative 3. The reduced motorized access would reduce fishing pressure in Segment 2B. This Alternative would close Segment 2B to motorized river travel from Pringle Falls Campground to Tetherow Boat Ramp. Though motorized boating would be permitted below Tetherow Boat Ramp it is not expected that many motorboats would be encountered due to the distance from the undeveloped La Pine State Recreation Area Boat Ramp. Segments 4D and 4E would also be closed to motorized travel on the river. These closures (10 miles total) would result in reduced fishing pressure in the segments where they occur and could displace anglers to other locations and consequently increase fishing pressure elsewhere along the river and to other bodies of water.

Restrictions on guided/outfitted use would have the effects on water quality described in the Effects of Recreation Management on Geologic/Hydrologic Values. Guided fishing could increase in the future and result in future increases in fishing pressure.

Alternative 4: The road closures in Segments 2B and 4C would make access more difficult and consequently reduce fishing pressure in the segments where such closures would occur. These closures could motivate anglers to fish other locations and consequently increase fishing pressure elsewhere along the river and on other bodies of water.

Twenty-seven miles of river would be closed to motorized river travel. Segments 2A and 2B would be closed to motorized river travel. This would impact anglers who now travel up and down the river in motor boats when fishing. It would require users to set up shuttles in order to fish. In these segments fishing pressure would be reduced as a result of making the logistics of fishing trips more difficult.

The closure of Segment 4 downstream from the Benham Falls Bridge to motorized river travel would have the same effects described in Alternative 2 for these segments. Users dependent upon motorized river travel would be displaced out of these segments and are likely to cause increased fishing pressure on other segments of the river or other bodies of water.

Restrictions on guided/outfitted use would have the effects on water quality described in the Effects of Recreation Management on Geologic/Hydrologic Values. Guided fishing could increase in the future and result in future increases in fishing pressure.

Alternative 5: About 6 miles of river would be closed to motorized river travel. This alternative would have the same effects as described for Common to 2-5 except that maintaining motorized access to Tetherow Boat Ramp would result in more fishing activity than would result from the closure provided in Alternatives 2-4.

Alternative 6: This Alternative would close about 14 river miles to motorized river travel. Segment 2B would be closed to motorized river travel as in Alternative 4 and with the same effects. Maintaining access to Tetherow Boat Ramp but limiting river travel to non-motorized travel would slightly reduce the amount of fishing in Segment 2B compared to existing level. The river between the west boundary of La Pine State Recreation Area and the Recreation Area bridge would also be closed to motorized river travel. This closes about a mile of the river in Segment 3A to motorized travel. Segments 4F and 4G and most of Segment E would be closed as in Alternative 5 and would have the effects described for common to 2-5. Fishing pressure on these reaches of the river would be reduced. Guided fishing could increase in the future and result in future increases in fishing pressure.

Effects of Private Land Use on Fishery Value

The primary effects of private land use on fishery are described in the section on Geologic/Hydrologic Values and relate to the amount of streambank altered for development and effects of land use activities on water quality (See Private Land Use).

Under all action alternatives, all cooperating agencies would adopt an active program to promote revegetation techniques (includes soil bioengineering) for streambank stability improvements. Where possible, assistance with removal of structures or materials which do not encourage natural deposition of sediments or natural vegetation of streambanks would be provided. Existing concrete walls or abutments would be replaced with native vegetation as

these structures deteriorate. Revegetation of streambanks and removal of concrete walls within the stream channel would increase the amount and improve the condition of riparian vegetation which would benefit geologic, hydrologic, and fishery.

Vegetation Value

Effects of Geologic/Hydrologic Management on Vegetation Value

Road Closures

Road closures in riparian areas, redesign and revegetation of river access points, and revegetation of streambanks would reduce the potential for erosion and soil entering the river and improve the health of the riparian ecosystem. See the section "Revegetation Activities" for more detail.

Effects of Fishery Management on Vegetation Value

Fishery management activities would affect vegetation by removing trees or snags from riparian or upland areas to place them on the banks or bed of the river. General effects of cutting and removing vegetation are discussed in the section Effects of Vegetation Management on Vegetation Value.

Placement of woody material and accumulation of logjams in the river would help to revegetate streambanks and would eventually lead to establishment of new vegetation in the floating islands of logs. This would increase the amount of riparian and aquatic vegetation in the corridor.

Effects of Vegetation Management on Vegetation Value

Management activities can affect the species composition, density, health, growth rate, and age of the forest. The activities can also affect the forest's vertical structure (canopy layers of trees, shrubs, grasses and herbaceous plants in a given location) and horizontal structure (spatial arrangement of plant species, density, and age over the landscape). Vegetation management activities described for a particular alternative may affect the characteristics of the site either by altering the biological features or by physically altering the site itself through erosion or soil compaction.

Prescribed burning or cutting and removing vegetation may have noticeable effects on the forest ecosystem. However, activities which may involve little alteration of present forest conditions, such as fire suppression and recreation management, can also have effects which may not be as direct or evident.

Due to the nature of the analysis process and the interrelationships that exist between various forest components (for example, vegetation size/structure and wildlife habitat for selected species or vegetation management for visual quality), many of these effects are covered in other parts of this chapter.

The extent of the direct and indirect effects of the alternatives on vegetation depends almost entirely on the type, size, location, and timing of the management activities. These variables would be determined by the alternative selected and site-specific analysis done when an activity is proposed.

Under all alternatives, acres to be treated under applicable systems would be managed on a watershed basis, and identified by site-specific analysis. Special emphasis within the corridor would be on scenic and wildlife habitat goals or to reduce risk of natural disturbances occurring outside of the scale and intensity which would protect and enhance these values.

The management activities described in this section are those which would be expected to take place under one or more of the alternatives. A site-specific analysis may find that small amounts of other types of management treatments may be warranted.

Vegetation treatment emphasis in the action alternatives would be on revegetating riparian areas; moving the vegetative size, composition and structure closer to the Historic Range of Variability; and reducing fuel loads.

Assumptions

- In order to facilitate the comparison between alternatives for risks from wildfire, it is assumed that local firefighting forces are staffed at present levels and that there would be an available and fully staffed Regional firefighting force (i.e., air tankers, crews, overhead, etc.).
- No lands within the Wild and Scenic river corridor would be included in the Deschutes National Forest timber base.

Revegetation Activities

The objective of all revegetation activities is to introduce desired species into areas where the vegetation has been removed or damaged in order to enhance ecological or aesthetic values or to prevent soil erosion. General effects of these activities may include changing species composition or diversity, decreasing erosion potential and helping to maintain long-term soil productivity.

Natural regeneration of plants by seed or vegetative sprouting maintains the presence of existing plant species and species diversity. Planting of vegetation can replenish or restore diversity that has been diminished.

Revegetation activities often begin with site preparation to expose mineral soil, to remove competing and unwanted vegetation, or break up compacted soil (especially for closed roads and sites that previously were subject to heavy recreational use). The objective is to provide an environment conducive to the establishment, survival and growth of the new vegetation. Site preparation would involve mechanical treatment, prescribed burning, or a combination of these methods.

Mechanical site preparation would involve either the use of hand tools or heavy machinery to remove existing vegetation and accumulated organic matter. A direct result of the practice is a reduction of the existing vegetation and increased opportunity for survival and growth of species that benefit from these conditions. If improperly conducted, it can lead to soil damage or displacement, loss of soil nutrients, and reduced site productivity.

Alternative 1: Riparian vegetation has been eliminated by trampling and soils compacted in areas of heavy recreation use. Riparian areas affected by developed and dispersed recreational sites (not including trails) on Forest Service land make up approximately 17 of the 108 miles of river edge. Increasing riparian vegetation degradation is expected with increasing recreational use of dispersed sites along the river. Developed sites would continue to be revegetated as budgets allow.

Alternatives 2-6: Dispersed and developed sites would be reviewed for their effects on the geologic, hydrologic, and vegetation values. Approximately 80 percent of the dispersed sites would be expected to be closed and revegetated. Developed sites would be reviewed and measures would be taken to reduce impacts on the riparian areas. These measures (including designation of campsites and parking sites, closure of individual campsites, addition of barriers, designation of trails, and relocation of parking areas and river access) would result in promotion of vegetation growth in areas now subject to trampling and a resulting reduction in erosion.

Roads closures which are done by obliteration and revegetation would also reduce erosion. The method of road closure would be determined by site-specific analysis, so the amount of obliteration and revegetation is currently unknown.

Historic Range of Variability

The corridor consists of six basic plant association groups (PAGs): meadows, ponderosa pine (dry), ponderosa pine (wet), lodgepole (dry), lodgepole (wet) and mixed conifer (dry). Very little ponderosa pine (wet) occurs in the river corridor, so this group was combined with ponderosa pine (dry) for this analysis. Riparian vegetation includes the plant association groups "meadow" and lodgepole pine (wet). The other plant association groups occur in upland areas.

In the action alternatives, common goals for vegetative species mix, age class and structure are based on the "Historic Range of Variability". The Historic Range of Variability represents an estimation of a mix of forest species and successional stages which will sustain a variety of natural disturbance factors without destruction of the system as a whole. This concept recognizes the role of natural disturbances in maintaining healthy ecosystem processes. The Historic Range of Variability is not a return to historic conditions. (See the Vegetation section in Chapter 3 for more information on Historic Range of Variability).

However, strict adherence to a set of conditions which could require large-scale, stand replacement disturbances within the river corridor is not intended, even though these conditions may have been part of the historic disturbance regimes. Short-term losses and potential long-term effects on Outstandingly Remarkable Values from such levels of disturbance would not be consistent with protection and enhancement of those values in the context of this corridor.

Alternative 1 would permit a wide variety of management practices if those activities did not adversely affect Outstandingly Remarkable Values and met scenic quality. The Forest Plan does not address Historic Range of Variability, although subsequent amendments have established interim standards and guidelines for timber harvest activities which consider the Historic Range of Variability.

Alternatives 2-6: All action alternatives would use some treatments to move the vegetative size, composition and structure closer to the Historic Range of Variability.

Alternative 2 would utilize prescribed burning (with pretreatment of fuels where necessary) and natural processes to move plant vegetative size, composition and structure closer to the Historic Range of Variability.

Alternatives 3-6 would use a wide variety of management practices to move vegetative size, composition and structure closer to the Historic Range of Variability if those activities did not adversely affect Outstandingly Remarkable Values and met scenic quality. These activities could include, but are not limited to, prescribed burning, pretreatment of fuels, thinning, and regeneration techniques.

Prescribed Burning and Fuel Reduction

Fuel treatment methods used to reduce hazards include one or a combination of the following: manual methods (cutting, scattering, pulling, piling), biological methods (grazing), mechanical methods (clearing, crushing, chipping, discing, piling, chopping), and prescribed burning (broadcast, underburning, jackpot, pile burning).

The objectives of piling, crushing or otherwise rearranging vegetation include lowering the hazard of wildfire by reducing or rearranging woody fuel. Fuels buildup can be a result of past fire suppression, residue resulting from vegetation management treatments, or vegetation killed by insects or disease. If improperly conducted (especially with mechanical methods), treatment can lead to compacted or displaced soils, nutrient loss, and reduced site productivity. If piles are subsequently burned, soil structure can be destroyed or damaged, further reducing site productivity. Mechanical treatments can also disturb soil by removing protective duff layers causing surface erosion and further loss of soil productivity.

Fire hazard and risk are important terms to understand in the context of wildfire prevention. Hazard is a rating assigned to a fuel (such as pine needles, twigs, logs, and brush) defined by: the kind, volume, arrangement, condition and location (reflecting its susceptibility to ignition), the wildfire behavior and severity it would support and/or the suppression difficulty it represents. Hazard ratings are relative rankings that range from very low (green grass and conifer litter) to extreme (cured grass and heavy slash).

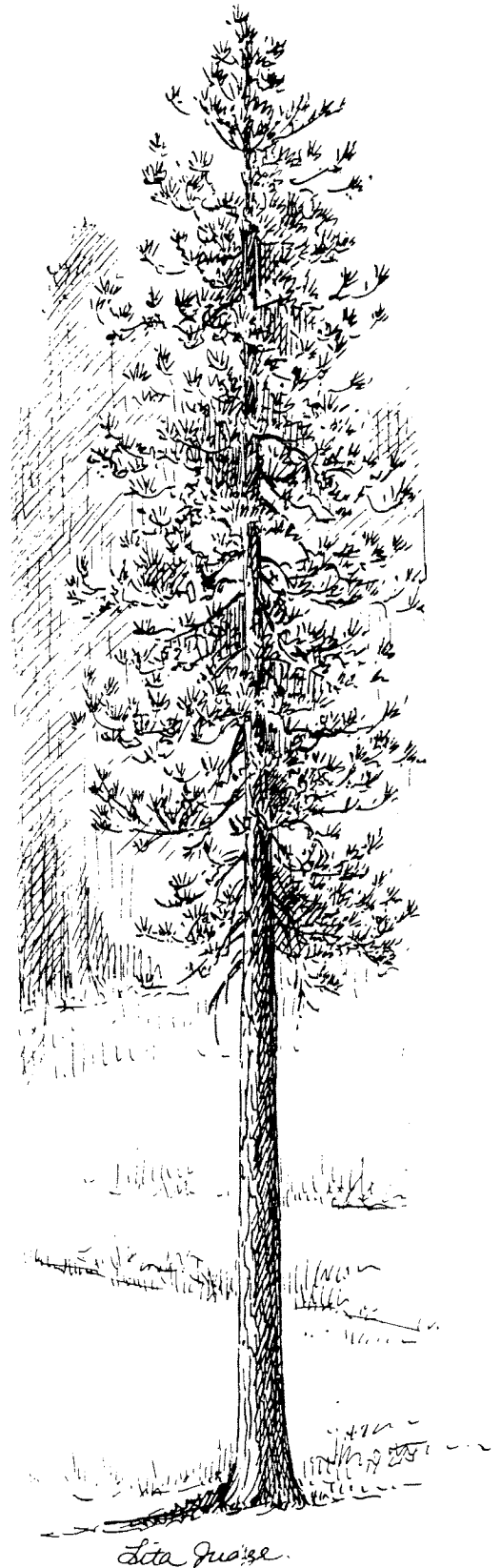
Risk levels are indices used to give an overall picture of risk by combining information about the presence of a causative agents such as lightning, campfires or chainsaws with the existing level of fuel hazard, and the values to be protected from destruction by fire. If there is continuing high risk, the only alternative to prevent or to minimize the effects of wildfire is to reduce the hazard.

Hazard reduction is planned treatment or manipulation of fuels or naturally-growing vegetation for the purpose of reducing the rate of spread (how fast it burns) and fire intensity (how hot it gets).

Some serious conditions can arise when high hazard areas are not treated. Instead of low-damage, stand-maintenance fires, fires become severe, high damage, stand replacement fires. Species are converted from fire-resistant species to fire-intolerant species. Fires are more difficult and costly to control, cause an increased danger to firefighters, pose an increased threat to wildland/urban interface values, and increase the potential for higher particulate matter emissions as fuel loads and understory vegetation increase.

Prescribed burning can be an effective strategy for reducing fuel loads. Unlike wildfire, which tends to occur when fuels are dry, conditions are selected to be cool and moist, which results in relatively low-intensity fires. Prescribed fires can frequently be designed so they do not burn hot enough to kill large trees of many species and do not consume all of the available fuels. They also burn more efficiently, with less smoldering than wildfires, so prescribed fires produce only about $\frac{1}{4}$ as much smoke per acre.

Wildfires usually start in fine fuels (less than $\frac{1}{4}$ " diameter). Removing twigs and small branches less than one inch (1") in diameter from the forest floor significantly reduces fire hazard. The ability to remove only these fine and intermediate fuel classes is an advantage prescribed fire has over other fuel reduction methods. Prescribed fires can be designed to consume these fine fuels, leaving the larger fuel unburned. Although fire can be used to achieve these objectives, caution must be used in re-introducing fire in forest stand types where heavy fuel loads and multi-storied canopies (ladder fuels) have developed due to the absence of fire. These heavy fuel loads may need to be manually or



mechanically manipulated first, so prescribed fire objectives can be met. In addition, several successive burns of low intensity may be needed to reduce the surface fuels to acceptable levels before using fire on a larger scale.

Prescribed fire can be used to regulate stand composition, reduce plant competition and modify vegetation patterns over the landscape. Natural fuels or fuels resulting from human activities, such as cutting vegetation can be burned. Natural fuels include those created by blowdown and insect mortality. Burning methods include broadcast, jackpot, underburning, and burning of piles. Burning can take place in cut-over areas, natural stands, or meadows. Objectives vary and may include any or all of the following: to lower hazard of wildfire by reducing fuel and creating natural barriers; to reduce or discourage growth of competing vegetation; to increase sunlight and nutrients for desired trees or forage species; to aid tree planting or establishment of natural regeneration; to reduce low growing vegetation and slash; to provide a seed bed with higher levels of available nitrogen; to preserve or enhance natural processes in ecosystems; to restore and maintain rangelands; and to create varied habitats with mosaics of burned and unburned areas.

Burning has the following effects on vegetation (although the effects are highly dependent on the environmental conditions of the site and the plant community that exists prior to the fire):

- encourages or discourages establishment of target plant species;
- may damage or kill target or nontarget plant species;
- alters microclimate and may alter macroclimate, which affects plant survival and growth;
- changes the amount and availability of nutrients for plants;
- reduces risk of wildfire or the difficulty of suppressing wildfires, which can have a major effect on vegetation;
- creates smoke which adds to carbon dioxide levels, affecting macroclimate and microclimate, plant growth and survival;
- frequent, repeated burning, even at low intensities, may have a negative impact on site quality.
- Prescribed fire can be used as a tool to thin forest vegetation (especially ponderosa pine), or invigorate shrubs.

Cutting or Removing Vegetation

Cutting and removing vegetation has the following direct and indirect effects on forests and plant diversity: changes plant species composition and age distribution; changes amount and arrangement of organic material such as logs, and branches; alters existing vegetative composition and structure; alters nutrient cycling and availability to plants and increases growth rates on remaining plants; alters a "natural"-appearing condition; changes the risk and incidence of tree-root disease, insects, and other diseases which affect vegetation; alters microclimate and will increase surface winds, possibly increasing tree windthrow; changes wildlife and domestic grazing patterns which in turn affects grass, forb and shrub consumption; disturbs soil which affects erosion potential, compaction, and nutrient availability for plants and plant growth; may alter macroclimate; increases or decreases fire hazard and ability to control fires that could destroy vegetation; may alter the amount and

species of soil microbes and fungi and the processes they sustain. Under Alternatives 1, 3, 4, 5, and 6, thinnings, sanitation treatments, and regeneration treatments could be used to move vegetation characteristics closer to the Historic Range of Variability.

Thinnings and Sanitation Treatments

Thinning reduces competition for light, water, and nutrients, and generally removes trees that are suppressed or weakened, leaving the best trees in an enhanced growing condition. Stand density is decreased and diversity within the stand can be diminished. Thinning often results in an increase in the average size of the residual trees and makes a stand more resistant to insect and disease attacks and losses.

Sanitation cutting is the removal of trees that are dead, dying, damaged, or deteriorating, as well as those susceptible to insect attack. When this is done before the wood loses its commercial value, it is called salvage cutting. Sanitation and salvage treatments decrease the amount of dead and down trees in the forest, reducing this aspect of forest diversity.

Both thinning and sanitation treatments can cause damage to residual trees by mechanical wounding either from equipment or falling trees. Improper equipment selection or poor project design can compound these problems.

Regeneration Techniques

Even-aged and uneven-aged regeneration treatments are silvicultural techniques which remove all or a portion of the trees to establish a new stand through natural regeneration or planting. Regeneration harvesting provides growing space and reduces competition for sunlight, water, and nutrients. Regeneration occurs within a short amount of time and creates a new even-aged stand of trees. Even-aged practices favor the establishment of trees such as ponderosa pine and lodgepole pine which do not tolerate much shade.

In even-aged regeneration treatments such as shelterwood and seed tree methods, the trees to be harvested are removed in two or more harvest operations. After the first harvest, a shelterwood would typically have 15 to 20 trees per acre, and a seed tree would typically have seven trees or less per acre. After reproduction is established, the second harvest occurs. In both types of treatments, some trees are often reserved (never removed) to provide for future wildlife habitat.

Even-aged stands have trees of approximately the same age and have a single canopy layer. Structural diversity resulting from even-aged harvesting methods will be less than for uneven-aged harvesting; however, overall diversity can be increased by creating mosaics of even-aged stands of varying ages and sizes. Lodgepole pine stands are a good candidate for even-aged management within the river corridor. Shelterwood harvesting with reserve trees is the most likely even-aged regeneration method to be used.

The shift to early successional stages following even-aged management will increase the grass, forb and shrub components of the stand. Understory vegetation ingrowth is usually less with the shelterwood regeneration methods than with clearcutting, because the amount of solar radiation passing through the canopy to the ground is moderated, and trees left on site provide competition. The amount of forage and browse available to wildlife decreases as the trees grow and the canopy closes, reducing the amount of sunlight available to the vegetation below.

Uneven-aged regeneration treatments include harvesting single trees or small groups of trees to create a desired distribution of age classes across the stand. Uneven-aged harvest treatments have more frequent entries with fewer trees per acre being harvested during each entry than even-aged harvest treatments. Regeneration is a continuing process with each entry and may occur naturally or by planting. In uneven-aged stands, three or more age or size classes are represented and may occur as scattered individuals or in small groups.

Single tree selection tends to favor species such as white fir which tolerate shade. Shade intolerant species, such as pines, will decline over time unless treatments such as group selection and planting occur to ensure their continued presence. Damage to the residual stands similar to that described for thinning can occur with uneven-aged harvesting methods.

Multiple canopy layers that result from uneven-aged treatments can contribute to the spread of tree diseases such as dwarf mistletoe and root diseases. This can also occur with seed tree and shelterwood methods when diseased trees are left in the overstory.

Due to the reduced light and changes in microclimates associated with the residual canopy in an uneven-age stand, forage and browse production is limited for wildlife. Group selection patches will generally produce more forage and browse than single tree selection areas, but less than even-aged stands.

Artificial regeneration (planting) provides the most control over the timing and composition of future vegetation. With natural regeneration there is less control over species composition and stocking (numbers). For example, in tree species, many years may pass before weather and other growing conditions coincide to allow for good natural regeneration. Vegetation that is planted rather than naturally regenerated is frequently more uniform in size, age, and spacing.

It is generally believed that genetically diverse populations are best able to withstand certain catastrophic events and that they exhibit other desirable traits. Selection of desirable individuals to provide seed is an important consideration with natural regeneration. For tree species, uneven-aged management with natural regeneration favors inbreeding while even-aged management favors outcrossing (parent plants are not closely related). In coniferous species, inbreeding can reduce growth rates in subsequent regeneration.

Effects by Alternative

Riparian Vegetation

Riparian areas along the river include those areas defined as Riparian Habitat Conservation Areas by the Inland Native Fish Strategy (USDA Forest Service 1995). Management activities in these areas are subject to specific standards and guidelines to protect riparian-dependent resources.

Most of the riparian area in the river corridor is in the lodgepole pine (wet) plant association group. This PAG is currently within the Historic Range of Variability for all structure classes (see Table 3-2). The vegetative condition of the small diameter class of 9.0 to 21.9" is approaching the upper limit of the historic range. Including non-Forest Service land, the percentage is currently 29 percent, while the HRV is 0-30 percent.

Alternative 1: Riparian vegetation would be managed to benefit riparian dependent species. Under the current direction a variety of management activities would likely occur. Within the riparian areas, only revegetation and hazard tree removal (in developed sites and along roads) have occurred since the designation of the Wild and Scenic River in 1988.

Lodgepole pine would continue to encroach on meadows. Although a variety of treatments could occur under this alternative, none are currently planned.

Alternative 2: Lodgepole pine (wet) plant association group would be left to natural processes of high intensity stand replacement fires and mountain pine beetle epidemics. Typically the lodgepole (wet) plant association group would develop high density stands which would shade out understory vegetation. As the trees matured (approximately 80 years) they would become susceptible to mountain pine beetle attack which would reduce the basal area 30-30 percent (USDA Forest Service 1994a). The resulting increase in fuels would eventually lead to a high intensity stand replacement wildfire which would start the cycle over again. This would provide a "boom and bust" cycle of understory vegetation and fuel loading. Natural disturbances such as wildfire and mountain pine beetle epidemics could be larger in scale than in the other alternatives.

Alternatives 2-6: Under these alternatives, hand removal of vegetation encroaching on meadows would enhance habitat for meadow dependent wildlife species.

Alternatives 3-6: Management activities, including prescribed burning and cutting and removing vegetation, would focus on keeping the small (9.0-21.9") diameter class of lodgepole pine within its HRV to prevent conditions conducive to epidemic levels of mountain pine beetle. This would result in a mosaic of vegetation sizes and a more stable level of understory and fuel loading. Natural disturbances would tend to be smaller in scale than in Alternative 2.

Upland Vegetation: ponderosa pine

Much of the ponderosa pine within the corridor is comprised of even-aged stands of small- to medium-sized trees less than 18 inches in diameter. In the absence of low intensity fire, stands that are currently dominated by ponderosa pine would tend to slowly become dominated by shade-tolerant species such as white fir. Stands of ponderosa pine with heavy understories of fir are susceptible to stand replacement fires, insect and disease infestation. In the ponderosa pine plant association group, the pole size class is 25 percent greater than its Historic Range of Variability. The medium/large size class is well below its Historic Range of Variability by as much as 22 percent (including non-Forest Service acres). See Table 3-2.

Under all alternatives, existing old-growth management areas would be managed as directed by the Forest Plan to perpetuate or enhance their present characteristics which may include multiple canopy layers, down logs, snags, shrub component, etc. Standards and Guidelines allow vegetation manipulation and prescribed burning as needed to achieve or perpetuate old-growth characteristics.

Alternative 1: Vegetation would be managed to appear natural. A wide range of silvicultural practices could be allowed. Areas of high fuel loads or dense understories would have the potential for natural disturbances of larger scale than in Alternatives 2-5.

Common to Alternatives 2-6: Vegetation management activities are designed to restore "historic," fire-based forests within the river corridor. These treatments would also reduce fuel loading.

Management activities would facilitate growth of the small diameter class to increase the number of acres in the medium/large size class. Initial entries in stands of medium-sized pine would resemble thinnings to increase vigor and diameter growth.

The action alternatives would maintain large tree components consistent with overall watershed, scenic, and old-growth habitat goals. To meet these goals, reductions in existing forest densities would have to occur in some areas through either natural or human caused disturbances. Reduction in stand densities would increase the growth rate and reduce risk of wildfire, insects, and disease.

Where cover and connectivity habitat areas are desired, forest densities would not be reduced, and trees would be of smaller average diameter. These stands would be more susceptible to wildfire, insects, and diseases.

Difference between Alternative 2 and Alternatives 3-6: Vegetation management in Alternative 2 would be accomplished through prescribed burning to create small openings and reduce fuel loads. Alternatives 3-6 could use a wide range of silvicultural practices. Accomplishment of objectives would probably take longer in Alternative 2 than in the other action alternatives, because prescribed burning would be limited by weather conditions.

Upland Vegetation: lodgepole (dry)

The lodgepole pine (dry) plant association group is currently within the Historic Range of Variability for all structure classes as defined by the Historic Range of Variability Table. The vegetative condition of the small diameter class of 9.0 to 21.9" is approaching the upper limit of the historic range. Including non-Forest Service land, the percentage is currently 30 percent with a Historic Range of Variability is 0-30 percent. Management activities would focus on keeping this diameter class within its Historic Range of Variability to prevent conditions conducive to epidemic levels of mountain pine beetle.

Alternative 1: Many lodgepole pine trees were killed in the recent mountain pine beetle epidemic. Without vegetation management, lodgepole pine forests will exist on a boom and bust cycle due to mountain pine beetle epidemics and fire. At any given time, one could expect very little lodgepole pine old-growth because of insects.

Wildfires or insect infestations would open up the maturing stands, greatly increasing shrubs, grasses and other herbaceous plants. In these open areas, lodgepole pine seedlings would regenerate and eventually crowd out the understory vegetation. The maturing lodgepole would create dense, even-aged stands. The threat of insect epidemics and wildfire would increase as the stand ages. This cycle would continue under this alternative.

Alternatives 2-6: Where appropriate, lodgepole pine (dry) plant association group would have fuels pretreatment to allow low intensity fires. Fires here would have to be cooler than in mixed conifer and ponderosa pine plant association groups. The potential for stand replacement fires and mountain pine beetle epidemics would still exist, but the number of acres in a highly susceptible condition at any one time will be lower in these alternatives than in Alternative 1. Restoration and other activities will also reduce heavy fuel loads which have resulted from mountain pine beetle mortality combined with past fire suppression.

Alternative 2: Prescribed burning would be limited by weather conditions and the need to pretreat fuels in some areas. Reaching objectives would likely take longer than in Alternatives 3-6.

Alternatives 3-6: Objectives could be reached faster, because the wider range of methods available. Mechanical methods would be more likely to provide desired characteristics such as snags or downed wood that might otherwise be consumed by fire.

Upland Vegetation: mixed conifer

The mixed conifer dry plant association group is outside its Historic Range of Variability in all structure classes except the grass/forb/shrub stage. The vegetation within the seedling/sapling stage is just above the Historic Range of Variability by 2 percent. The pole size class is above its Historic Range of Variability by 11 percent. The small diameter class is below its Historic Range of Variability by 5 percent. When analyzed in conjunction with the medium/large structure class, it can be seen that the vegetative condition in these 2 classes is well below Historic Range of Variability.

Alternative 1: Forests of mixed species that include ponderosa pine and lodgepole pine but which are dominated by true fir would gradually exclude the shade-intolerant species (ponderosa pine and lodgepole pine) in the absence of disturbance such as fire or cutting. Understory vegetation associated with these stands would continue to decline. The potential for severe insect infestations would increase along with increased plant competition, and stand replacement wildfires would become more likely as fuels continue to build up. Such events would greatly increase the open areas conducive to shrubs, grasses and other herbaceous plants, and lead to the eventual replacement by lodgepole pine.

Alternatives 2-6: Management activities would focus on reducing the number of acres in pole size class to within its Historic Range of Variability. Management activities would focus on increasing the number of acres of vegetation within the small and medium/large classes. The pole size structure class would be managed to provide for future replacements in the next 2 larger classes. With the small amount of available vegetation to grow into larger trees, management activities would be very carefully planned.

Other Activities

The following activities would have effects generally in common across the alternatives.

Fire Suppression

Forest fires have been a natural part of the ecosystem of the Pacific Northwest for thousands of years. Prior to fire suppression activities, an average of 800,000 acres burned annually in the region. Wildland fires, along with volcanism and natural hydrocarbon emissions from vegetation, were dominant sources of natural air pollution.

Fire suppression would continue to occur under all alternatives because of hazards to human life, health, and property.

In the absence of prescribed burning, fire suppression allows fuels to build up, and seedlings of shade-tolerant species grow under the canopy of mature trees. These smaller trees provide "ladder" fuels and increase the chances of high intensity wildfire. Fuels treatment and prescribed burning would reduce these effects.

When a wildfire occurs, emphasis would be placed on human safety and protection of structures. Potential impacts on resources would be evaluated on an incident basis to determine appropriate fire suppression activities.

Treatments to Control Noxious Weeds

Noxious/exotic weed populations, including spotted and diffuse knapweed, Dalmatian toadflax, cheatgrass, and Canadian thistle are known to occur in the river corridor. Seeds of undesirable exotic plants may be introduced into an area by natural means (wind, water and wildlife), vehicles (especially those used off paved roads), livestock, and recreationists. All alternatives would treat a small, but currently unknown, acreage to reduce or remove known populations of these plant species. Treatments could include hand pulling, cutting, biological controls, and the use of herbicides. It is anticipated that the use of these measures within the river corridor would be limited. An increase of native plant communities would be expected after treatment.

Protection of Threatened, Endangered and Sensitive Plants

No known populations of Threatened and Endangered plants exist within the river corridor. All alternatives would protect and enhance *Artemisia ludoviciana estesii*. Current monitoring activities would continue. Surveys to locate new plant populations would generally be limited to areas where projects with a potential for disturbance are planned. In alternatives where there are potentially ground-disturbing activities, the likelihood of finding additional populations would increase.

Natural Disturbance

All alternatives would provide for the continuation of natural disturbances including appropriate levels of insect, disease, and areas with little or no visible vegetation management activities. Wildfire would not be allowed under any alternative. Prescribed fire would be in all (including prescribed natural fire). They have the effect of maintaining "natural appearing" forest conditions and contribute to forest diversity. In these areas, trees would tend to become larger and older, and more snags would be present. Stands of mixed species would tend to slowly change from those dominated by early successional, shade-intolerant species (including ponderosa pine or lodgepole pine) to shade-tolerant species (such as white fir). Wildfire could inhibit succession to tolerant species. The management of these areas would tend toward long-term, stable communities unless the areas are influenced by fire, major windstorms, insect and disease outbreaks, or other natural disasters. Catastrophic events could result in major changes to species composition, age, structure, organic material and soil productivity. In the absence of such major disturbances this condition would maintain or increase the genetic and species diversity and amount and arrangement of organic materials on a given site; increase the average age of vegetation and risk from wildfire, and decrease the ability to control fires.

Insects and Disease Occurrence - Endemic or moderate to low levels of insect and disease activity are considered natural, even beneficial. Forest insects and disease-causing agents utilize trees and plants for part of their life cycle, and may, however, interfere with the growth, development, or form of the affected plant. Forest insects and diseases have a significant effect on the forest ecosystem. At high levels, these agents can threaten long or short-term resource management objectives for an area. Bark beetles, defoliators, root and stem diseases and dwarf mistletoes are the insects and disease agents of greatest importance.

The mountain pine beetle is believed to be the agent with the greatest potential for impacting vegetation within river corridor. Vegetation management activities can both increase or decrease insect and disease risk. Chapter 4 of the Environmental Impact Statement for the Forest Land and Resource Management Plan for the Deschutes National Forest discusses in great detail the interaction of management activities, vegetation and forest insect and disease levels.

Epidemic levels of mountain pine beetle and western pine beetle are known to have occurred historically. Forest diseases have also been present but were believed to have been kept under control by fire. It is believed that insect epidemics and disease levels have increased in size and severity because of conditions created by fire exclusion. The presence of the western pine beetle may have actually declined as the number of large ponderosa pine have declined. The overall level of stem and root diseases may have increased because of increased exposure to mechanical wounding during timber harvest or from recreation activities. These diseases along with dwarf mistletoe also have become more prominent with the continued exclusion of fire.

Common to All Alternatives: Under these alternatives, the levels of forest diseases may increase slowly in the absence of wildfire. Insect activity would also increase as recently-thinned ponderosa pine stands begin to close and are stressed by competition or drought. As lodgepole pines become larger in diameter and competitive stress between trees increases, a food base would develop for future mountain pine beetle epidemics. As the number of large ponderosa pine trees increases, western pine beetle may become more prominent over the long term.

If left untreated and without the re-introduction of a sanitizing agent such as fire or thinning, dwarf mistletoe is expected to increase slowly but substantially. With the spread of this disease there would be decreased growth, higher levels of mortality and deformities in future regeneration.

Defoliators should not increase under these alternatives. However, an increase in host species (white fir) for the spruce budworm could lead to localized infestations.

Effects of Wildlife Management on Vegetation Value

Snag and Down Log Habitat

Snag management involves leaving standing dead trees or creating snags from living trees for wildlife habitat. Snags and down logs increase forest diversity and assist in maintaining long-term site productivity; however, they also contribute to increased fuel loading. Snags and down logs provide homes and foraging areas for primary and secondary

cavity nesters, mammals, amphibians, reptiles, and insects. Based on the examination of soil profiles and historical accounts, large accumulations of downed wood are thought to be uncommon in both ponderosa pine and lodgepole pine forests.

Alternative 1: Current standards for snags and down logs would continue. These standards are equivalent to a fuel loading of 2.8 tons per acre and were based only on nesting and denning habitats. The distribution of snags and down log habitat is uneven with fuel loadings currently ranging from 0-50 tons per acre. The large area of medium-sized, relatively young ponderosa pine stands found in the corridor contain the smallest amounts of both snags and downed woody material of any forest type. Lodgepole pine stands have high numbers of snags and down logs as a result of mountain pine beetle infestation, however, in some areas these materials have been removed through salvage or firewood cutting. Developed campgrounds and heavily-used dispersed sites typically have low levels of down log habitat, because this material has been used for firewood.

Alternatives 2-6: Snags and down logs would be managed to provide habitat for more species and more even distribution of habitat. Prescribed fire would kill some trees and provide some snags and down logs, but fires could also consume much of the dead organic material that existed prior to burning.

Managing for Big Game Hiding and Thermal Cover

Managing for maintaining or increasing the cover for deer and elk decreases individual tree growth and vigor when trees are left in conditions with high densities to provide hiding or thermal cover. The production of understory vegetation also tends to be reduced in these areas and the susceptibility of these stands to insects and diseases increases.

Under all alternatives, some areas will be managed to provide hiding and thermal cover.

Creation of Habitat Improvement Structures

Under all alternatives habitat improvement activities could occur. Habitat improvements could include, but are not limited to, water developments, protective fencing, flooding, wetland creation, and nesting structures. This type of activity can change microclimate in the case of flooding. Habitat improvement structures can concentrate wildlife or domestic grazing animals, which increases consumption of vegetation, damage to vegetation, and nutrients available for vegetation growth.

Effects of Recreation Management on Vegetation Value

Providing new or improved recreation facilities such as parking areas, toilets, signs, campgrounds, interpretive facilities, and boat ramps involves cutting and removal of vegetation and construction of various buildings, concrete footings, sign posts, pavement or other permanent vegetation replacements. Construction, maintenance and use remove or damage vegetation in popular high-use areas, change species composition, and concentrate people in certain areas, which may compact soil and disturb vegetation. Air pollution from vehicle emissions could also impact vegetation. Increases in vandalism and damage to vegetation are associated with developed and dispersed recreation sites.

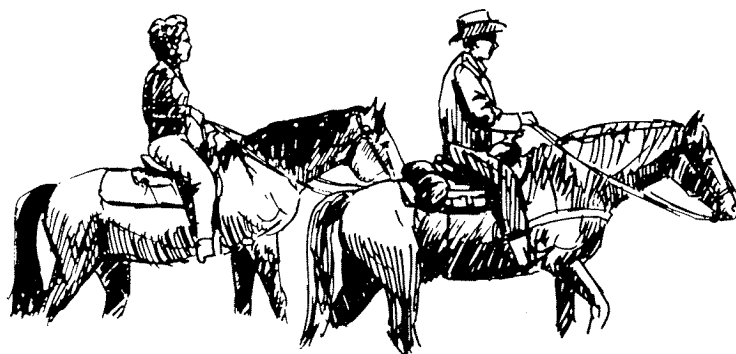
Conversion of overnight sites to day-use sites, conversion of roads to trails, reducing motorized access within the corridor and reducing the total level of use within the corridor would benefit the revegetation and restoration of riparian vegetation within the corridor.

Construction, maintenance, or closure of roads and trails sometimes require heavy equipment (tractors, trucks, and earth movers) to develop stable surfaces capable of supporting vehicles, horses, people, and equipment. Such activities remove vegetation temporarily or permanently from roadways, trails, and landings; provide access which allows for more options in carrying out vegetation management activities; increase access for illegal vegetation removal activities such as firewood or Christmas tree theft; may add to the visual sensitivity of an area which limits the treatments that can be considered in carrying out vegetation management activities; may impair visual quality; and increase the risk of human-caused fire starts but increase accessibility for fire control. These activities would occur to some extent under all alternatives.

Under all action alternatives, construction of the Spring River Trail, a portage around Tetherow Logjam, and construction of a new road to Slough/Benham Falls Overlook would result in vegetation being cut and removed on a permanent or semi-permanent basis.

Alternatives 2 and 4 would reduce use levels and motorized access below the existing condition. Total site numbers would be reduced in all segments, with Segments 2 and 4 receiving the greatest changes. Construction of trailhead parking facilities to provide access to areas closed to motorized travel and replacing the existing Besson campground with a new picnic area in a new location would result in little long-term net change to the amount of vegetation affected. The amount of vegetation would likely be reduced immediately following closure of one area and after construction of the new area until the closed area was revegetated.

Alternatives 3, 5, and 6 could require construction of additional recreational facilities including campgrounds, picnic areas, trailheads, and trails. Alternative 5 would also likely require the addition of a new river access below Benham Falls in order to accommodate additional guided whitewater boating. Any construction would directly remove vegetation but may also protect vegetation by designating travel routes. Alternative 5 would represent the greatest modification of vegetation for recreational facilities, with Alternative 6 and Alternative 3 having less net loss of vegetation.



Effects of Scenic Management on Vegetation

Visual Resource Management

Visual management generally maintains or adds to the structural diversity at a landscape level. Management to achieve visual diversity can result in a range of stand tree ages and sizes with natural to altered appearances. Managing to obtain certain visual objectives can slow the growth of vegetation. Meeting short-term visual objectives could decrease the overall health and vigor of vegetation. Generally, forests with high visual quality objectives (Retention or Partial Retention) would tend toward larger trees and climax successional stages. Where visual objectives call for large trees, the general effect could be to broaden plant diversity at the landscape level in terms of age and size distribution, and result in species shifts to more shade-tolerant species such as white fir, and increases in forest insects and diseases associated with these species.

Effects of Special Uses on Vegetation Value

Miscellaneous Forest Products

Gathering of miscellaneous forest products (including firewood) would be permitted only when these activities would benefit Outstandingly Remarkable Values.

On the Deschutes National Forest, firewood for home use may be cut only in designated areas. Firewood for use while camping may be gathered except where posted otherwise. The effects of firewood cutting and gathering are the same as discussed under cutting and removing vegetation.

The gathering of conifer boughs, leaves, cones, fungi, etc., may have the kinds of effects that are similar to those as discussed under cutting and removing vegetation. The effects of gathering conifer boughs, leaves and cones would generally be smaller in magnitude than for other vegetation treatments. The effects of gathering fungi are not well understood. However, it is known that fungi play beneficial roles in the decomposition of organic material and that mycorrhizal fungi, associated with plant roots, increase the availability of water and nutrients to the host plant.

Grazing

Grazing or browsing by both wildlife and livestock can affect the amount, species composition, and condition of grasses, forbs, and shrubs, as well as coniferous and hardwood trees. It can act to increase, decrease, or have few effects on forest diversity. Plant species preferred by grazing animals generally decrease in abundance, leaving growing space available for less-preferred species, including noxious/exotic weeds. The impact of grazing on vegetation is generally small, site-specific, and not predictable over a large area. In areas where animals sometimes congregate, such as riparian areas, the impacts of grazing can be magnified. Grazing activity may encourage early successional stages of vegetation, affects species composition, can increase or reduce species diversity and the vigor of grasses and forbs, provides fertilizer in high use areas, damages or removes existing vegetation often

leaving roots intact, and may introduce undesirable or exotic species. In some cases grazing by domestic livestock has been used successfully as a tool to achieve vegetation management objectives.

Alternative 1: Livestock grazing would continue under current utilization standards with heavy use of the riparian areas. Grazing within riparian areas would continue to suppress willows and other riparian vegetation. Cattle would continue to break down river banks to access water and succulent vegetation. Grasses and grasslike vegetation could be heavily utilized in some areas allowing very little biomass to accumulate on the ground.

There are three existing cattle and horse allotments that are partially located within the proposed boundary. Most of the allotment acreage is in riparian areas. Tetherow Meadows Allotment (currently inactive) in Segment 2 currently allows 66 Animal Unit Months (AUM). This is equivalent to 25 cow/calf pairs for 2 months. Abbot Allotment in Segment 3 currently allows 83 AUM. This is equivalent to 21 cow/calf pairs for 3 months. Ryan Ranch Allotment in Segment 4 currently allows 40 AUM. This is equivalent to 13 cow/calf pair for 3 months.

Alternatives 2-6: To meet Visual Quality Standards and protect and enhance Outstandingly Remarkable Values, grazing activities would likely be redesigned with reductions in use levels or modification of grazing systems. Environmental Assessments for each allotment are currently in progress and will determine grazing capacity, season, etc. The following are preliminary estimates of grazing capacity:

Tetherow Meadows Allotment - 19 AUM.

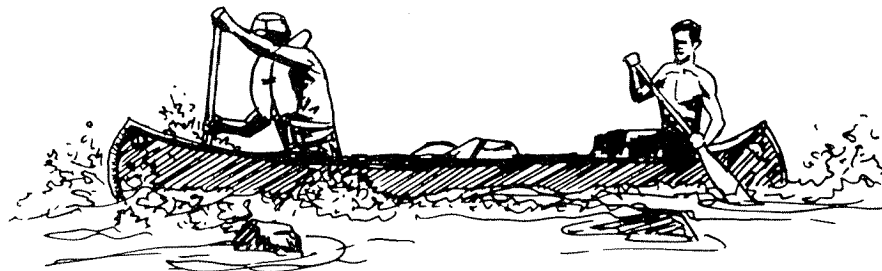
Abbot Allotment - 16 AUM.

Ryan Ranch Allotment - 1 AUM.

With these new standards, willows and other riparian vegetation would have very little cropping. Utilization of grasses and grasslike vegetation would not be apparent to the casual observer, and biomass would accumulate on the ground. The new grazing standards would result in reduced erosion potential along streambanks, an increase in habitat for wildlife species dependent on meadows and streambanks, an increase in fine fuels in late summer, an increase in plant abundance and diversity, and a possible reduction in noxious weeds.

Effects of Private Land Use on Vegetation Value

See effects on Private Lands.



Wildlife Value

The different alternatives would affect the amount and quality of wildlife habitats, the diversity and arrangement of these habitats, and eventually, the variety and populations of wildlife within the Upper Deschutes river corridor. Changes in vegetation and differences in human presence and activities are the primary ways the alternatives affect wildlife.

A biological evaluation of the effects of programs outlined in these alternatives indicate that, given the standards established to protect and enhance outstandingly remarkable wildlife species, no threatened, endangered, or sensitive wildlife species would be adversely affected. Beneficial effects to habitat conditions are expected under all alternatives. Beneficial effects could be expected to be greatest under Alternatives 2, 4, with 6, 3 and 5 following.

The U.S. Fish and Wildlife Service was formally consulted regarding proposed management strategies for listed species identified in the Forest Plan. Their April 7, 1982 Biological Opinion concluded that conservation of the bald eagle and peregrine falcon would be promoted with implementation of this proposed plan. The Wild and Scenic River Plan for the Deschutes River is consistent with the Forest Plan as amended by the Inland Native Fish Strategy, so another formal consultation was not necessary.

Assumptions

- Habitat availability is a limiting factor for a species.
- Changes in species composition and numbers may occur over time with changes in human activities within the corridor.
- Wildlife dispersal, whether by adults relocating from habitat loss, or by offspring looking for their first territory, would not be impeded by land management activities occurring outside suitable habitat.
- Because of the mountain pine beetle epidemic, nearly all lodgepole pine habitat is severely fragmented.
- Recreational demands along the river would continue to increase as populations grow.
- Roads which are closed to motor vehicles and converted to trails are still a source of disturbance to wildlife. These trails are expected to have a lower level of disturbance than open roads. The actual level of disturbance would depend on amount, frequency, and season of use.
- Residential development is expected to continue on private lands. As undeveloped lands are converted to residential landscapes, wildlife species may be displaced from their foraging areas, reproductive areas, and migration routes.

Effects of Geologic/Hydrologic Management on Wildlife Value

Road closures and revegetation done to protect geologic and hydrologic values would reduce disturbance of wildlife, reduce fragmentation of habitat, and improve quality and amount of habitat. Road closures are covered in the section Effects of Wildlife Management on Wildlife Value. Revegetation is covered in the effects of Vegetation on Wildlife Value.

Effects of Fishery Management on Wildlife Value

Under Alternatives 2-6, improvement in fish habitat and resulting increases in fish populations may result in increased numbers of osprey and bald eagles. See the section on Effects of Fishery Management on Fishery Value.

Effects of Vegetation Management on Wildlife Value

Vegetation succession, insect and disease activity, and wildfires, among other disturbances, are natural causes of change, which result in modification of plant species composition and habitat components (snags, canopy cover, etc.). Over a small area, the effects of these changes to a single species may be neutral. For example, an area of dense forest with little understory vegetation would provide hiding cover for mule deer but provide little forage. If a high intensity fire burned through the area, forage would be plentiful, but little hiding cover would be available. When hiding cover and forage availability are considered over a larger area, the effects of the wildfire on deer may be more evident.

Differences between bird species associated with campgrounds and those found in forest sites appear to be related to the differences in vegetation available for nesting, cover, and foraging (Blakesley et al. 1988). Vegetation densities (trees and shrubs), number of snags, and amount of down logs are all typically lower in and around campgrounds than non-campground sites.

Vegetation management can be used to imitate natural changes to provide missing habitat components. Depending on location and extent, vegetation management can improve forage quantity and quality, or lessen security or thermal cover for big game.

Habitat conditions beneficial to one species may be detrimental to other species. For example, thinning a dense mixed conifer forest would improve habitat for bluebirds, but would degrade nesting habitat for goshawks.

Habitat Composition and Structure

Under all alternatives, stands of young trees would develop into old growth stands over the long term, changing the species that utilize the stands from early and mid-seral species to late seral species. See Table 3-2 for stand composition information. Wildlife that depend on early to mid-seral structures would find this habitat in openings.

Alternative 1: Habitat restoration or enhancement would occur through vegetation management activities, wildfires, or prescribed fires. A variety of habitat types would be present. Lodgepole pine would continue to encroach upon meadows, reducing nesting habitat for songbirds and reducing foraging habitat for species such as the great gray owl and great blue heron.

Alternatives 2-6: Lodgepole pine encroaching on meadows would be removed and willow regeneration encouraged to improve foraging and nesting habitat for meadow dependent species. Some areas of priority would include: Slough Meadow, Ryan Ranch, Besson Meadow, wet areas along Spring River, Tetherow Meadow, Dillman Meadow, and along some small feeder streams. The areas treated could total 100-200 acres over 30 years.

Underburning, where feasible, would be used to regenerate/rejuvenate shrub and grass components, which would improve forage and nesting habitats.

Alternative 2: Natural ecological processes and prescribed fire would shape future vegetative conditions. The cycle of forest succession and replacement would be controlled by fire, insects and disease, and weather. The amount of a particular habitat type could fluctuate greatly over time.

Alternatives 3, 5 and 6: Habitat restoration or enhancement would occur through vegetation treatments, wildfires, or prescribed burning. The vegetation treatment priority would be areas of high fuels and high fire risks. This would include lodgepole pine stands, ponderosa pine stands with understories of mixed conifer, the urban interface, and areas of high recreational use. Although these treatments may improve habitat conditions, the locations probably would not be areas most used by wildlife. Fluctuation in amount of a particular habitat type would be less than in Alternative 2.

Alternative 4: Habitat restoration or enhancement would occur through vegetation treatments, wildfires, or prescribed burning. Wildlife habitat objectives would be the priority for vegetation treatments. Priority treatments would be understory thinning or removal in mixed conifer stands and ponderosa pine stands. These treatments would emulate natural fire and encourage larger trees for eagle and osprey. The mosaic design of treatments would retain patches of hiding cover for deer, elk, and other animals. Fluctuation in amount of a particular habitat type would be similar to Alternatives 3 and 5.

Distribution and Size of Openings

Alternative 1: Openings could exceed 40 acres in size in lodgepole pine, if necessary to treat stands killed by mountain pine beetle. In other species, openings would not exceed 40 acres. Uniform structural conditions created by vegetation treatments generally would not exceed 100 acres in size.

Alternative 2: Openings would be determined by natural disturbance processes, prescribed fire, and meadow restoration and could vary greatly in size, number, and location over time.

Alternatives 3-5: The small, scattered openings created by vegetative treatment would provide replacements for older trees as they eventually die. Over the long term, the continual availability of large tree habitat would result in an increase of species associated with older seral stages, including flammulated owls, white-headed woodpeckers, brown creepers, and flycatchers. The increased canopy closure resulting from the smaller opening size would slightly reduce nutrient quality of the forage for deer. However, this would be somewhat offset by the regeneration of shrubs and forbs resulting from underburning.

Effects of Wildlife Management on Wildlife Value

Snags and Down Logs

Snag use by wildlife depends on tree species, diameter, height, hardness, and surrounding environment. Large-diameter trees provide more area for nest-chamber development and better resist the forces of wind and gravity than thinner trees. Tall trees provide more surface area for habitat than shorter ones, but that surface also increases wind exposure. New or charred snags are often too hard for woodpeckers to excavate until sapwood or heartwood rot begins. A snag surrounded by forest canopy will be used by different wildlife species, and stand longer than one in an opening.

An increase in snag and down log habitat would result in an increase in population and diversity of cavity nesters, small mammals, and insects which provide the prey base for other animals.

The number of acres with a shortage of snags and down logs is currently unknown. However, stands of blackbark ponderosa pine typically have low levels of snags and down logs, and stands of lodgepole pine typically have high levels.

Alternative 1: Firewood cutting for home use could be allowed in designated areas only. Numbers of snags and quantities of down logs would continue to decrease through firewood gathering in areas in or adjacent to recreation sites, resulting in reduced snag habitat, log habitat, and nutrient cycling. In some areas, the level of snags and down logs may exceed what is necessary or desirable for habitat and would be a fuel loading concern. In other areas, snag and down log habitat would be minimal.

Alternatives 2-6: See Table 2-4 for target levels for snags and down log habitat. Under all action alternatives, firewood cutting for home use would not be permitted unless site-specific analysis could demonstrate benefits to the river values. Firewood gathering for camp use would be discouraged within riparian habitat conservation areas, but permitted elsewhere. The amount of down logs and snag habitat available would increase in riparian areas.

Areas of blackbark ponderosa pine would not meet target levels for snags and down logs in the short term, but would increase with vegetation treatments over time. Untreated or inaccessible areas of lodgepole pine would probably meet or exceed target levels.

These alternatives would provide a moderate amount of habitat and a more uniform distribution of habitat than Alternative 1.

Roads and Trails

Over 2,000 mule deer cross the river corridor when migrating between summer and winter ranges. Most of segment 3 is privately owned, and residential development of the area is expected to continue. Most deer will avoid traveling through residential areas or heavily used recreation areas, because of the high level of human activity. In Segment 4, deer must travel between residential development on the north and south and massive lava flows through the middle. Relatively undeveloped, Segment 2 is a vital corridor for migrating deer.

Roads that parallel the river can have more effect on wildlife movement than roads that approach the river perpendicularly. Parallel roads must be crossed, putting the animals at risk of collision with motor vehicles and also requiring them to abandon cover to move to and from water. Roads perpendicular to the river can often be avoided by wildlife.

Only a small portion of Key Elk Habitat Areas lie within the river corridor, roads closures would not significantly change the number of miles of road within the entire Key Elk Habitat Areas. Within the Key Elk Habitat Areas, road densities would continue to exceed the current road management objectives of 0.5-1.5 miles per square mile under all alternatives.

One contributor to high road densities is the frequent use of roads as reference points for the Wild and Scenic River Boundary. However even excluding such roads from within the boundary would still not meet road management objectives.

Alternative 1: Under this alternative, no additional protection measures are provided for migrating deer. Existing road density is approximately 6.2 miles/square mile with roughly 29 miles of road parallel to the river on Forest Service land. No improvement would occur in fragmented habitat.

Alternatives 2-6: Within the Key Elk Habitat Areas, expected road closures would provide reduced disturbance and increased protection to elk in the long term. Because the majority of the Key Elk Habitat Area is outside the river corridor, road closures within the corridor would have little impact on the overall road density.

Under all action alternatives, fragmentation and disturbance would be reduced over time through closure and revegetation of roads and dispersed sites. Road density would exceed the Forest Plan target of 2.5 mi./mi.². The majority of closures important for wildlife are included in the approximately 25 miles of road closed under Alternatives 2-6. Closure of about 1.5 miles of road 4120-100 that travels around the west end of Ryan Ranch Meadow. And about 1 mile of road 4100-200 through the meadow north of Besson Camp would facilitate movement of wildlife to and from the river. The highest priorities for wildlife among the closures which vary by alternative are included below.

Alternatives 2 and 4: Approximately 17 additional miles of road would be closed in these alternatives. About 3.6 miles of Road 4370 (Priority 1) in Segment 2A and all roads in segment 2B would be closed. Some would be converted to trail. These closures would benefit elk calving and foraging habit, and ruffed grouse, waterfowl and bald eagle nesting habitat. Road closure and trail conversion on the east side of the river in Segment 2B (priority 3) would benefit bald eagles. Road densities would be about 3.7 miles per square mile.

Alternative 3: Approximately 10 additional miles of road would be closed in this alternative. All roads in segment 2B would be closed and converted to trail. These closures would benefit elk calving and foraging habit, and ruffed grouse, waterfowl and bald eagle nesting habitat. Road density would be about 4.1 miles per square mile.

Alternative 5: No additional miles of road would be closed in this alternative. Road density would be about 4.7 miles per square mile.

Alternative 6: The effects of Alternative 6 would be the same as Alternative 4 except that roads 4360 (.8 miles) and 4330-600/4300-900 (.5 miles to Tetherow Boat Ramp) would remain open in Segment 2B. In Segment 4A a short stretch of road would be developed if a new day use facility is developed to the west of the Benham Butte River Access site. Road density would be about 3.9 miles per square mile.

Effects of Scenic and Cultural Resource Management on Wildlife Value

Managing for large trees will benefit birds, such as osprey and bald eagles, which require large trees for nesting and perching. Alternatives 2-6 would provide abundant nesting and roosting trees over the long term. Limitations on tree densities to meet visual quality standards could reduce the rate of growth for younger age classes with subsequent indirect reduction in older age classes. See the section on Effects of Vegetation Management on Vegetation Value for more information.

No measurable effects are expected as a result of Cultural Resource management.

Effects of Recreation Management on Wildlife Value

Human use of an area has the potential to disturb many wildlife species. Unintentional disturbance is probable the primary way that recreation activities have an impact on wildlife (Knight and Cole 1991). Effects of human presence and activities on wildlife vary with the level, predictability, and location of human presence; the sensitivity of the species; the time of year; the quality of habitat; the previous experience of the individual animal; and the nutritional condition of the individual animal.

Fragmentation of habitat by recreation sites, roads, and trails hinders dispersal of juveniles, movement of wildlife within their territories, and migration between winter and summer ranges. Some species impacted include great gray owl, great horned owl, goshawk, fox, deer, and elk.

Disturbance can be unintentional or intentional (i.e., harassment). Unintentional disturbance may include such things as attempting to photograph wildlife, naturalists viewing nesting birds, or hikers crossing an animal's territory. Unintentional disturbance is probably the primary means by which nonconsumptive recreation activities impact wildlife. Harassment can cause wildlife to expend critical energy during winter periods when food sources are scarce or, in extreme cases, abandon or abort young during reproductive periods.

Any disturbance during the breeding season may affect an individual's productivity while disturbance outside of the breeding season may affect the individual's ability to forage and, therefore, its survival.

Open roads benefit some wildlife-associated activities like hunting or bird-watching but the associated disturbance may have a negative impact on wildlife. Sensitive species like goshawk, elk, and eagle avoid use of otherwise suitable habitat adjacent to traveled roads (Brown 1985; Pedersen 1978). If roads are closed to motor vehicles, wildlife may relocate back into areas where recreationists are infrequent visitors.

Although all-terrain vehicles (ATVs)¹ are currently prohibited off-road on public lands within the Wild and Scenic river corridor, some off-road encroachment from adjacent private land has occurred. ATV use is a source of disturbance to wildlife, especially during the critical periods of reproduction and winter stress. In all alternatives, motor vehicle use on public lands within the proposed boundary would be limited to system roads. Snowmobiles would be permitted to utilize designated routes between private property and land outside the river corridor. The effect of limiting motor vehicles to roads and snowmobiles to designated routes would be to reduce the number of locations where wildlife could be disturbed by motorized travel.

Trail use (hiking, biking, and horseback riding) is also a source of disturbance to wildlife. The disturbance level would depend on the amount, frequency, and season of use. When roads are converted to trails, the disturbance level would probably drop, but how much is unknown. Trail use is typically low during migration season, so the disturbance levels from a road converted to trail would be expected to be similar from a road closed. Because on-trail use would be more predictable, it would be expected to cause a lower level of disturbance than off-trail use (MacArthur et al. 1982).

Recreation Developments

Alternative 1: Except where inaccessible by vehicles, dispersed recreation sites would remain scattered along the entire river.

Alternatives 2-6: Approximately 80 percent of the dispersed sites near the river would be closed and revegetated, reducing the level of disturbance to wildlife and eventually increasing the area used for fawning, calving, and nesting. Dispersed camping would occur only in designated sites, which would make the location of disturbance more predictable and probably more acceptable to wildlife than in Alternative 1. Designated sites would be chosen to minimize effects on wildlife and other resources. New developments would be designed to minimize disturbance of wildlife.

Recreational Use Levels

Changes in behavior and use of areas by wildlife have been identified in areas of increased human activity. In general, birds appeared to increase the size of their home ranges during periods of human activity (Andersen et al. 1990). This results in longer travel for foraging which can leave juveniles unprotected from the elements and predators for a longer time. Other animals relocate to areas of less human disturbance as recreation pressure increases. Species that tolerate human activity would thrive (i.e. chipmunks, gray jays, crows, and ground squirrels). Individuals of some species have also demonstrated greater

¹Licensed street legal machines may travel on any road open to the public within the Wild and Scenic River Boundary.

adaptability to human presence, such as the osprey nesting at Dillon Falls and Crane Prairie.

The frequency of disturbance can influence wildlife responses (Belanger and Bedard 1989, Bunnell et al. 1981, van der Zande and Vos 1984). If recreational disturbance alters animal populations, then the dynamics of a wildlife community may be altered.

As recreation use increases, nesting, perching, and foraging habitat could become limiting on some segments of the river, especially for bald eagles. Bald eagles nest in Segments 2 and 3, which have lower recreational use levels than Segment 4. The whitewater and heavy recreational use in Segment 4 may limit foraging habitat for eagles.

Osprey nesting within the river corridor have probably developed a tolerance to human activities and are unlikely to be affected by use levels considered here.

In Segment 2, the lowest designed annual capacity would occur in Alternative 2 followed by Alternatives 4, 3 and 6, 1, and 5.

In Segment 3, the lowest designed annual capacity would occur in Alternative 2 followed by Alternatives 1, 4, 3 and 6, and 5.

In Segment 4, the lowest designed annual capacity would occur in Alternative 2 followed by Alternatives 4, 1 and 3, 6, and 5.

Effects of Special Uses on Wildlife Value

Livestock Grazing

Tetherow allotment is currently vacant. Use in Abbot and Ryan allotments is heavy. Heavy use of the riparian area by livestock reduces or eliminates the habitats for some wildlife species. Vegetation which conceals rodents or ground-nesting birds may be consumed or trampled. Some competition for forage and space will take place between livestock and big game. Elk may alter their use patterns in some areas with the introduction of livestock each season. Also see the section on Special Uses in Vegetation.

Alternative 1: Livestock would continue to trim or eliminate meadow grass and shrubs, reducing nesting and foraging habitat for songbirds.

Alternatives 2-6: Under the grazing utilization standards common to the action alternatives, willows and other shrubs would become evident in the meadows within the two to three years.

Effects of Private Lands on Wildlife Value

Under all alternatives, development would continue to reduce suitable habitat on private lands. Fencing and other blockages to wildlife migration would be limited by design review requirements in the wildlife combining zone (See Appendix E, Deschutes County Regulations). Maintenance and restoration of riparian and other native vegetation would improve habitat for songbirds and other human tolerant bird species.

Scenic Value

Standards that would protect and enhance scenic quality are applied to all actions that are designed to protect and enhance other Outstandingly Remarkable River Values. As a result the desired scenic condition impacts every action that is taken to protect and enhance Outstandingly Remarkable River values.

The key to the desired scenic condition is maintaining scenic integrity. As described in Chapter 1 scenic integrity means that the natural and cultural elements of the landscape “blend in a manner that is consistent with viewer expectations.” Natural elements include rivers, streams, vegetation, and natural landforms. There are two perspectives from which natural elements may be evaluated. First is the overall appearance and the extent that the landscape appears to be modified. The second perspective notes that some natural elements (including buttes, skylines, canyon walls, waterfalls, rapids and marshland) are notable because they provide form, contrast, or unique interaction of natural elements that are recognized as having unique or special esthetic appeal. Cultural elements include not only development such as structures, roads, campgrounds, cleared and tilled fields but also actions that may modify natural elements such as clearing underbrush, pruning and thinning trees, and human caused fires.

The distinction between “natural” and “cultural” elements is not always clear. In some instances the visual impact of human caused events is the same as or little different than natural events.

Scenic integrity has both static and dynamic dimensions. The first dimension corresponds to a snapshot view of any viewshed from a given point. From this point the blending of natural and cultural elements can be assessed. Where natural elements are dominant there is a concern that cultural elements do not “stand out.” Where the river flows through private land a concern to maintain scenic integrity remains though scenic integrity in this instance may involve a higher level of development and intrusion upon the natural landscape characteristics than would be acceptable on public land.

The second dimension of scenic integrity involves changes in the viewshed as one moves through the River corridor. A dramatic example would be an outpost of civilization surrounded by wilderness. If one remains stationary, yet near the outpost, it is not visible and has no impact on one’s experience. Similarly if one remains in the outpost the accouterments of civilization may be appropriate. If on the other hand one has been traveling through the wilderness for days and came upon the outpost unexpectedly it could grate on one’s sensibilities. Along the Upper Deschutes River it is possible to travel only a couple of miles without viewing some type of human development. The sudden change from an apparently natural landscape to a landscape that includes a house and a boat dock can clash with one’s expectations. Recreation sites located along the river may cause similar reactions.

Many actions designed to protect and enhance outstandingly remarkable values have the potential disrupt the line, form, color, and texture associated with the natural landscape. The activities which would have the greatest potential to affect scenic integrity are vegetation and recreation management.

Reducing or increasing facilities, recreation uses, access road and trail systems in all proposed alternatives could affect scenic integrity.

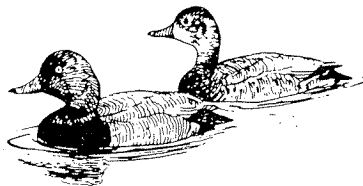
Assumptions

- Dramatic changes in development or vegetation may occur within a given visual quality standard.
- Campgrounds, boat ramps and associated facilities may meet a lesser standard (modification) than the segment as a whole.
- The primary and most sensitive viewing area is within 1/4 mile of the foreground areas. These are areas being seen by most of the general public as they travel along the access roads, trails, river travel ways, and recreating on the numerous adjacent recreation facilities. The river corridor viewshed would be managed to be consistent with the alternative 6, which took into account the need to meet essential requirements of scenery, fish, wildlife, vegetation, recreation and other river values.
- The secondary sensitive viewing areas would be the middleground (1/4 mile to 5 miles) and background (5 miles to infinity). These areas would be seen from various points along the river and from certain recreation sites.

Effects of Geologic/Hydrologic Management on Scenic Value

Alternative 1: Existing management would continue the trends identified in the Upper Deschutes River Resource Assessment and Chapter 3.

Alternatives 2-6: Road closures and revegetation and modifications of developed access in Segment 4 would not have a noticeable effect on turbidity levels at existing flow levels. As a consequence no alternative would noticeably improve the visual appearance of the water. These activities would reduce the visibility of recreational developments and substantially increase the natural elements of the landscape.



Effects of Fishery Management on Scenic Value

Alternative 1: Existing management would continue the trends identified in the Upper Deschutes River Resource Assessment and Chapter 3.

Alternatives 2-6: Introduction of structural materials such as large woody material, cobbles, boulders, and gravel would meet visual quality standards of each segment. In each segment the introduction of large woody material would be noticeable but would appear natural. Where anchoring of large woody material is necessary, it would be done in a manner which would meet the visual quality standards and would generally enhance the natural landscape. Within segments closed to motorized river travel river spanning logjams could develop. Logjams in the river provide visual diversity in the form, line, and other elements. Soil would accumulate and vegetation eventually would grow adding color and textural elements within the corridor. The number of segments affected would vary by alternative (see effects of Fishery Management on Recreation) but the overall visual quality would not vary.

Effects of Vegetation and Wildlife Management on Scenic Value

Effects of Managing Vegetation and Wildlife are considered together because actions taken to protect and enhance wildlife involve actions that affect vegetation as a significant element of wildlife habitat.

Alternative 1: Existing management would continue the trends identified in the Upper Deschutes River Resource Assessment and the Affected Environment described in this document.

Alternatives 2-6: Road closures and the closure of Wampus Camp would have the immediate effect of eliminating motor vehicle access to many locations where such vehicles are now visible from the river. Many of these sites would be eliminated and revegetated. These actions, coupled with the elimination of motorized access would reduce trampling of streambanks that resulted from people walking between the river and the sites and would result in longer term effect of the filling in of trails to the river with vegetation. This would reduce the visual impact of past human activity on the riparian areas adjacent to the river. Redesign and revegetation of existing developed access points would also reduce the visual impacts of these access points.

Vegetation management would vary in terms of both extent and methods. However, the specific effects cannot be determined because the specific locations or treatment methods of management actions have not been determined. It should be noted that the amount of vegetation affected under any alternative is small (less than 1 percent of vegetation would be treated per year for any alternative) and that only actions for which the noticeable effects would be visible for less than 3 years would be undertaken. Scenic quality would be high throughout the corridor. Differences resulting from the alternatives are predicted to be negligible for the river corridor as a whole.

Alternatives 2 and 4: Closure of Besson Campground and Boat Ramp would reduce the amount of human activity and recreation development that is visible from the river. Given the amount of private development that is visible near Besson this change would not alter the visual quality of this general area.

Alternative 5: Visual Quality would be determined by the Common to 2-5 effects described above. The Visual quality standard for this segment would remain Partial Retention.

Effects of Scenery Management on Scenic Value

Visual Quality Standards (VQS's) of Retention Foreground for Scenic Rivers and Partial Retention Foreground for Recreation Rivers have been established for lands managed by the Forest Service that are adjacent to a Wild and Scenic River. Except for one segment of the river these standards would be applied across all alternatives consistent with the designation of Scenic or Recreation. Under all alternatives, segments classified as Recreation which are also designated as Roaded Natural Nonmotorized under the Recreation Opportunity Spectrum would have a Visual Quality Standard of Retention. This would result in a classification of Retention for Segment 2B in Alternatives 2-4. Compared to Partial Retention a landscape meeting the standards of Retention would have less development and whatever development occurs would be less evident. For all alternatives the Visual Quality Standards apply only to Federal land and only from a static perspective.

Effects of Recreation Management on Scenic Value

Alternative 1: Existing management would continue the trends identified in the Upper Deschutes River Resource Assessment and Chapter 3.

Alternatives 2-4: Managing Segment 2B as non-motorized would eliminate motorized access to the river in this segment. As a result vegetation would become reestablished and over the long term the visual impacts associated with motorized travel would disappear. The Visual Quality Standard for this segment would be upgraded to Retention.

Alternatives 2-5: Trail, trailhead parking, and picnic area associated with the interpretive site to be developed between Spring River and Road 41 would not be visible from the river. This site is a relatively small undeveloped area surrounded by private property that would be subject to varying degrees of development. Though some aspects would be visible from land based approaches the design and color of the facilities would blend in with the setting. Barrier free trail design and site protection measures could result in modification of trail surfacing in order to accommodate river and trail use levels without adversely affecting other river values.

Alternative 2: Closing Road 4370 between Wyeth Camp and Haner Park would reduce the number of motor vehicles and accompanying clouds of dust that are visible from the river. Reduction in the number of sites at Bull Bend Campground and elimination of motorized vehicles from the campground would reduce the visibility of human activity and positively impact the dynamic dimension of scenic integrity in Segment 2A. New trailhead parking would not be visible from the river. Road closures north of Besson would reduce the number of motor vehicles and accompanying clouds of dust that are visible from the river. Elimination of motorized access to Slough and Dillon Falls developed recreation areas would reduce the evidence of human activity in Segment 4C.

Alternative 3: Development of new campground and expansion of Pringle Falls Campground in Segment 2A and expansion of Big River Campground and day use facilities in Segment 3D would create developed sites that would meet the standard of modification. This would affect the scenic quality from some view points but as a new development either distance or use of vegetative screening and site design would protect the views from the river. Changes to Big River Campground would take place in an area adjacent to or near highly developed private land. As a result any changes visible from the river would not be inconsistent with viewer expectations. This recreational development, visually, would play much the same role as a park in an urban setting. Surfacing Big Eddy parking area and constructing barrier-free restrooms would not impact scenic quality from the river. These developments would be visible from other viewpoints. Both developments would constitute a modification. However color and design would allow the facilities to blend into the setting. The surfaced parking would serve to better define the parking area and would reduce motor vehicle incursions onto vegetation adjacent to the existing parking area. As a result, the condition of the vegetation and scenic quality would improve. Increase in the number of users resulting from new guided use at Big Eddy and Meadow would not be sufficient to impact vegetation to the degree that changes would be visible.

Alternative 4: As in Alternative 2, closing Road 4370 between Wyeth Camp and Haner Park would reduce the number of motor vehicles and accompanying clouds of dust that are visible from the river. Unlike Alternative 2 motorized access to Bull Bend Campground would be maintained and the impact on scenic quality would be the same as the existing condition. New trailhead parking would not be visible from the river. Effects of eliminating Besson are the same as described in Effects of Managing Vegetation and Wildlife on Scenic Quality for Alternative 2 and 4. Effects of closing Slough, Dillon Falls, and Big Eddy day use areas to motorized access would, in conjunction with revegetation of the adjacent parking areas, reduce evidence of human activity near the river. New trailhead parking would not be visible from the river and would occur where roads and motor vehicles have established impacts. New guided use at Big Eddy and Meadow would have the same effects as described for Alternative 3.

Alternative 5: This alternative would have the same effects as noted for Common to 2-5 and Alternative 3 with the following additions.

In Segment 2B most development associated with the construction of three new campgrounds would not be visible from the river. Some sites in the Campground adjacent to Tetherow Boat Ramp would be visible from the river. Permanent facilities such as restrooms, tables, and fire rings would be mostly screened from view from the river while tents and automobiles are likely to be visible and to interrupt the dynamic dimension of scenic integrity

in this segment. Tetherow Boat Ramp and campground would probably be the only point in Segment 2B where users of motor vehicles would have access to the river. The product of a logjam, the rapids provide an interesting view for sightseers.

In Segment 4A parts of the picnic area west of the Benham Butte Canoe takeout would be visible from the river. Most developments would be screened from view and since the picnic area is adjacent to the canoe takeout it would not affect the dynamic dimension of scenic integrity.

In Segment 4B new commercial whitewater boating opportunities would require design and construction of approach routes, put-ins and take-outs in order to protect vegetation and Scenic Quality. Otherwise increasing use would trample vegetation, create new user trails, and increase width of existing developed trails. Without the suggested mitigation these effects would be visible to people utilizing the trail network in this vicinity.

The new campground that would be located in Segment 4E would not be visible from the river. It would be visible from trails and roads in the area. Design standards would result in facilities blending into the landscape in a manner consistent with the high use level of this alternative.

The new picnic and day use area that would be constructed in Segment 4F near the Bend Urban Growth Boundary would not be screened from the river in the short term, because the trees that had been present were killed by the Awbrey Hall Fire. Over the long term planting and natural revegetation would eventually screen the facilities from the river. For the same reasons discussed above facilities associated with this area would be evident from approaches by trail and road. Again, long term planting and natural revegetation would eventually screen the facilities from these viewpoints. Because of the proximity to a highly developed urban area the facilities would not be inconsistent with the viewer's expectations.

The new surfaced bicycle trail would be visible from intersections with roads and other trails. Though clearly a modification, the color of the surfacing could blend with the surrounding soils. It is expected that the increased capacity of a wide trail capable of allowing 2 way traffic would reduce damage to vegetation and resulting erosion by reducing reliance on user trails. As a result Scenic Quality would be improved despite expected increases in use levels.

Surfacing roads to Slough, Benham Falls overlook, and Meadow would reduce the amount of dust that accompanies motor vehicle travel on these roads.

Alternative 6: Alternative 6 would have the same effects on scenic quality as described for Alternative 3. Because motorized access to Tetherow Boat Ramp would be maintained, the visual effects for this area would be similar to those described for Alternative 5 even though a formal campground is not planned for development.

The new picnic and day use area that would be constructed in Segment 4F near the Bend Urban Growth Boundary would not be screened from the river in the short term, because the trees that had been present were killed by the Awbrey Hall Fire. Over the long term planting and natural revegetation would eventually screen the facilities from the river. For the same reasons discussed above facilities associated with this area would be evident from approaches by trail and road. Again, long term planting and natural revegetation would eventually screen the facilities from these viewpoints. Because of the proximity to a highly developed urban area the facilities would not be inconsistent with the viewer's expectations.

The new surfaced bicycle trail would be visible from intersections with roads and other trails. Though clearly a modification, the color of the surfacing could blend with the surrounding soils. It is expected that the increased capacity of a wide trail capable of allowing 2 way traffic would reduce damage to vegetation and resulting erosion by reducing reliance on user trails. As a result Scenic Quality would be improved despite expected increases in use levels.

Effects of Private Land Use on Scenic Value

Standards for maintaining scenic integrity on private lands have been established by state, county, and city governments and exist in the form of setback, design and review, and fill and removal regulations.

Common to All Alternatives: Under all alternatives, the visual elements would continue to change abruptly between forest and subdivision along the river. Colors of new development must blend with the environment. Existing development would be exempt from new standards. Exceptions to setback restrictions could be allowed if a lot would be unbuildable as a result of restriction.

Alternative 1: The existing rules provide for river and rimrock setbacks except there is no rimrock setback within the Bend Urban Growth Boundary. Native vegetation is protected, with exceptions, between structures and the river, height of structures are limited to 30 feet and metal siding, and roofing are not allowed. New development meeting these restrictions would blend into the setting and exhibit a higher level of scenic integrity than many existing structures.

Alternative 2: In this alternative, setback requirements, vegetation management, and design standards for new development would be more stringent than existing restrictions. Most rimrock level construction would not be visible from the river. There would be a high level of vegetative screening between structures and the river. Construction would not exceed the height of treeline when viewed from the river. Metal siding and roofing would not be permitted. As a result new construction would blend into the landscape and would exhibit a higher level of scenic integrity than existing restrictions would promote.

Alternatives 3 and 5: These alternatives would have the same effects as Alternative 1. Though metal siding and roofing would be permitted standards for color and texture would not change the impact on scenic quality when compared with existing standards.

Alternatives 4 and 6: This alternative would have the same effects as Alternative 3 with the additional vegetative screening standard provided by Alternative 2. This Alternative then would provide a slightly higher level of scenic integrity than Alternatives 3 and 5 and the same level of scenic integrity as Alternative 2 in areas regulated by the county and a lower level of scenic integrity than Alternative 2 within the Bend Urban Growth Boundary.

Cultural Resource Value

Appropriate archaeological techniques and methods are employed for inventory, testing, evaluation and mitigation of archaeological resources. Each cultural resource site, property or district, depending on its size and its potential to answer specific research questions, is mitigated by different methods. Even though the full scope of cultural resources along the river is unknown, the recorded cultural resources are representative of the general resource base. Preservation in place, and adaptive reuse of historic properties, is often the preferred method of treatment for cultural resource properties.

Each alternative will apply historic preservation laws, regulations and policies. These laws, regulations and policies dictate inventory, evaluation, preservation and protection of the cultural resources that have the potential to be affected by management activities; as well as evaluating sites for their eligibility to the National Register of Historic Places and avoiding or mitigating adverse effects to eligible and potentially eligible properties.

The general public is genuinely interested in cultural resource protection and preservation. Cultural resource management would continue to involve volunteer groups and individuals interested in participating in the investigation of these resources. The Forest Service's Passports in Time program provides an excellent venue through which to facilitate this participation.

Although alternatives have varying levels of potential effects to cultural resources, the standards for treatment are the same. Cultural resource investigations will be conducted for all proposed activities which have the potential to affect cultural resources. Historic and archaeological properties will be evaluated for their eligibility to the National Register of Historic Places and plans will be prepared to ensure their protection by preservation or treatment through data recovery.

All actions will comply with federal historic preservation laws and direction, including Executive Order 11593, the National Historic Preservation Act, the Archaeological Resources Protection Act, the American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act and their implementing regulations.

Management of cultural resources located within the Upper Deschutes Wild and Scenic River corridor consists of four main components: 1) Cultural resource location and identification; 2) Determination of eligibility to the National Register of Historic Places; 3) Protection, preservation or mitigation of effects on cultural resources; and 4) Interpretation of cultural resources for the benefit of all.

Although none of the alternatives proposes site-specific activities or undertakings, the direct effects to cultural resources are related to the proposed levels of recreational use and related activities under each alternative. The types of impacts from these activities and uses are predictable, however the location and extent are unknown until site-specific projects are proposed.

Direct effects on cultural resources are related to the type and extent of land-disturbing activities undertaken such as road construction and closures, wildlife habitat improvements, vegetation manipulation, trail construction, building maintenance, campground placement, boat ramps, and other recreational developments and activities. Alternatives calling for more recreational developments and more intensive management such as Alternatives 3 and 5 would have the greatest potential for directly and/or indirectly affecting cultural resources.

Geomorphic features that favor recreational sites and road and trail construction, such as flat areas near water, are also likely to be cultural resource sites. Features that attract people today are the same ones that attracted people in the past.

Indirect effects also occur when peoples' activities cause landscape changes that expose cultural resources. An example is recreational activities and river level fluctuations that destabilize the banks. Natural effects include wind and water erosion, rodent activity, tree throws and frost heave. Effects to cultural resources can result from both sources and from the interaction between the two. Alternative 5 includes the highest level of land disturbance and poses the greatest threat of direct and indirect effects.

All alternatives would require consideration of cultural resources when a site-specific project is determined to have the potential to effect the characteristics which make them eligible to the National Register of Historic Places. Alternatives 3, 4 and 5, with higher levels of ground-disturbing activities (new trails, facilities, etc.) would increase the need to complete the required cultural resource work.

In summary, all of the alternatives emphasize cultural resource protection by identifying opportunities for the development of site management or treatment plans in areas of high recreational use, such as campgrounds and other facilities. Proposed activities can affect or damage a site, but they can also provide a vehicle for learning about the resource. While mitigation of adverse effects through data recovery is an option, it is not always prudent to use this method at all sites. Some sites would be left for future research and interpretation.

Effects to American Indian Cultural Practices

Special consideration and requirements may be needed for cultural resources, based on consultation with American Indians and Tribes, such as with the Confederated Tribes of the Warm Springs Reservation of Oregon, the Burns Paiute Tribe, and the Klamath Tribes. The American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act and the National Historic Preservation Act all call for consultation measures in order to preserve and protect religious sites. Thus far, no sites have been specifically identified as having religious significance or use.

Effects on Other Values

A large number of significant cultural resources are located along the Upper Deschutes River. Cultural resources are an issue to many people who are concerned about the resource and how it is being protected. The more land areas that are open for development or use, the more challenging it becomes to manage these resources.

The main effects to other values resulting from cultural resource management are: limitations to management actions because of higher costs, especially for evaluation and mitigation; project delays in order to address cultural resource concerns; and sometimes

project cancellation due to high costs to mitigate effects or to avoid a site. These measures can affect vegetation treatment, silvicultural practices, road construction, vegetation or wildlife enhancement, such as spring development, or recreational development. Historic and archaeological properties also enhance the natural river setting. They provide the public with a tangible experience of the landscape as it was in the past, and evoke stimulating questions for interpretation.

Recreation Value

This section analyzes the effects of the alternatives on the recreation value of the river. Management actions that affect recreation have two general goals. The first is to protect and enhance recreational activity on and along the river. The second is to protect and enhance other river values. Sometimes the two goals may conflict. For example, high levels of a highly valued recreational activity can result in damage to vegetation and disturbance of wildlife. Alternatives may then involve restricting the activity, allowing the activity to occur and accepting damage to the other values as an unavoidable effect, or allowing the activity but developing a means of mitigating the undesirable affects on the other values. The alternatives provide a range that includes the existing condition and trends that would be projected given existing management practices; reduction in recreational uses; and increased uses with additional mitigation measures to protect other river values.

Assumptions

- Under all alternatives total use levels were based on ROS standards developed to provide a desired physical and social setting. These projected use levels were then used to determine size and numbers of campgrounds, boat ramps, trailheads, and day-use areas. The designed annual capacities reflect the estimated number of people who would use these areas on an annual basis. It is expected that the designed annual capacity would not be exceeded on a yearly basis.
- Existing Oregon State Marine Board regulations for motorized use on the river would continue in those segments where motorized use is allowed.

Effects of Geologic/Hydrologic Management on Recreation Value

The effects of managing geologic and hydrologic values on recreation are described in the section Effects of Vegetation and Wildlife Management on Recreation Value.

Effects of Fishery Management on Recreation Value

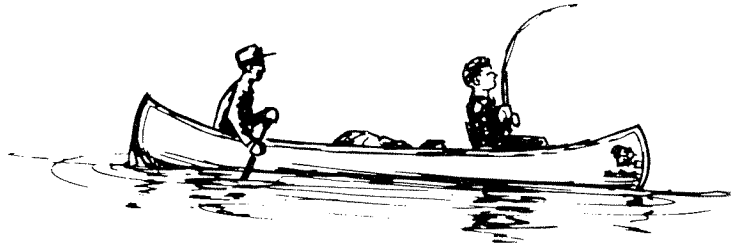
Since managing the fishery (other than providing adequate flow) primarily involves providing cover or structure there are two expected effects. The first would be improved fishing resulting from improved fish populations. The second would be the impact the structure would have on river travel.

Alternative 1: Existing recreation opportunities would be maintained. Trends identified in the Instream Flow Assessment and the Upper Deschutes Resource Assessment would continue.

Alternatives 2-6: Fishing success would improve proportionally to increases in fish population which would result from introduction of large woody material, cobbles, and gravel into the river. With increasing success, more people would fish the Upper Deschutes. Large woody material is likely to build up into logjams, affecting navigation. If a logjam were to constitute an unacceptable hazard or adversely affect river values, it would be modified or removed. Partial logjams could also occur. The presence of these and isolated pieces of large woody material could also create potential hazards that would require increased attention by boaters.

Reaches closed to motorized travel could have river spanning logjams that would require a portage and may effectively eliminate use of drift boats or other boats of similar size. The number of miles per alternative that would be subject to river spanning logjams is described in the Effects of Fish Management on the Fishery Value. Where logjams are allowed to block navigation, portage trails may need to be designated. A designated trail would be designed and located to protect river values and would have less impact than a user trail.

Under all alternatives, a portage would be constructed around Tetherow logjam, and roads between Wyeth Boat Ramp and Pringle Falls Campground would remain open to motorized use to provide a portage around Pringle Falls. Maintenance of these portages would provide the opportunity to utilize the river as a trail between Tenino Boat Ramp and Benham Falls Boat Ramp. Below Benham Falls use of the river as a trail would require more portage than river trail.



Effects of Managing Vegetation and Wildlife on Recreation Value

Actions intended to protect and enhance riparian and upland vegetation, soil condition, and reduce disturbance to wildlife would have important effects on camping, road, and trail use of the river corridor. Riparian areas are popular with recreationists. In the past, few restrictions have been placed use in these key areas.

Standards for vegetation and wildlife management can impact where a site can be located, how the site may be accessed, and how an area would be managed to protect vegetation and wildlife. In turn these standards can impact users by reducing motorized access, closing popular sites, and regulating activity and freedom of movement.

Management actions affecting recreation that vary by alternative include road closures, relocation or elimination of sites, and designation of uses.

Developed Recreation

Developed recreation generally refers to activity that occurs in developed areas other than trails that have been improved or developed to meet user needs. Examples of developed recreation sites along the Upper Deschutes Wild and Scenic River include or could include campgrounds, picnic areas, boat ramps, trailhead parking areas, and scenic overlooks.

Alternative 1: Existing policy responds to damage to vegetation within developed sites on a case by case basis. Continuation of existing management would provide most of the same opportunities as the existing condition.

Alternatives 2-6: New facilities would be screened from the river. Wampus Campground would be closed permanently, resulting in a reduction of 2 sites and one undeveloped river access point.

Managing developed sites to minimize damage to riparian and upland vegetation by designating sites, site hardening, barriers, signs and closing sites within campgrounds when the sites are in riparian areas would either have no effect on recreation or, in the case of closing sites near water, affect those users who desire to camp near water.

Redesign and revegetation of popular river access points in Segment 4E would channel users to designated pathways and launch sites. By moving parking away from the river at these sites launching would be less convenient for users.

Alternatives 2 and 4: Closure and relocation of Besson to move use out of the riparian area and sensitive wildlife habitat area would reduce public opportunities to recreate near the river between Spring River and Benham Butte River Access. Boaters would no longer have motorized access to Besson Boat Ramp until additional facilities were developed to replace the undeveloped river access at Harper Bridge. This would mean no public access to the river between General Patch Bridge (Big River Boat Ramp) and Benham Butte River Access. Motorized access would be limited to Big River and Benham Falls Boat Ramps.

Road closures in Segment 4 would result in trail access to the river which would effectively eliminate boat launching at Dillon Falls and Slough.

Alternative 2: Closing Road 4370 would eliminate motorized access to Bull Bend Campground and Boat Ramp. The quarter mile walk into the campground would effectively close the campground to most picnickers, most tent campers, and all campers dependent on recreational vehicles and trailers. Walk-in and boat-in campers would have more privacy and a greater sense of seclusion than at present.

Dispersed Recreation

Dispersed recreation refers to activity that takes place in settings or areas not specifically developed for recreational use. One exception to this is trail use. Dispersed recreation may be dependent on or enhanced by developed facilities such as boat ramps and trailheads as described above. Some dispersed recreation activities include fishing, hunting, camping, picnicking, various types of boating, and sightseeing.

Dispersed Sites

Alternative 1: No change would be expected for the over 140 existing dispersed sites along the river. The number of sites and the type of access is shown in Table 4-2. In areas with large numbers of sites close together, recreationists do not find the solitude usually expected from dispersed camping.

Table 4-2 Existing Dispersed Sites by Primary Access

| Segment | Sites with Motorized Access | Sites with non-Motorized or River Access | Total Dispersed Sites |
|--------------|-----------------------------|--|-----------------------|
| 2 | 51 | 5 | 56 |
| 3 | 21 | 6 | 27 |
| 4 | 14 | 46 | 60 |
| Total | 86 | 57 | 143 |

Alternatives 2-6: Changes expected to be necessary to protect and enhance geology, hydrology, vegetation, and wildlife would have a dramatic effect on dispersed recreation. Motorized access to about 60 dispersed sites would be eliminated. Changes in access are represented in Table 4-3.

Table 4-3**Access to Existing Sites Resulting from Closures Common to 2-6**

| Segment | Sites with Motorized Access | Sites with Non-Motorized or River Access | Total Dispersed Sites |
|---------|-----------------------------|--|-----------------------|
| 2 | 3 | 53 | 56 |
| 3 | 7 | 20 | 27 |
| 4 | 10 | 50 | 60 |
| Total | 20 | 123 | 143 |

Existing sites would be redesigned, relocated, or eliminated if they adversely impact geologic, hydrologic, vegetation, or wildlife values. It is estimated that no more than 20 percent of existing dispersed sites would remain following the review process. The estimated number of dispersed sites that would remain are represented in Table 4-4.

Table 4-4

**Estimated Remaining Dispersed Sites
Common to Alternatives 2-6
by Primary Access**

| Segment | Sites with Motorized Access | Sites with Non-Motorized or River Access | Total Dispersed Sites |
|---------|-----------------------------|--|-----------------------|
| 2 | 1 | 11 | 12 |
| 3 | 4 | 4 | 5 |
| 4 | 2 | 10 | 12 |
| Total | 7 | 25 | 32 |

Vegetation restoration activities, including the elimination and rehabilitation of dispersed sites, would increase the natural appearance of the recreational settings, resulting in a more pleasing recreational experience for most users. Those people who use the remaining sites and those using the river would experience more solitude because there would be fewer people, fewer sites, and remaining sites would be designated and located to maximize screening from the river. The reduction in the number of sites would result in more competition for the remaining sites. It is likely that there would be increased demand for dispersed camping near the river corridor, especially in areas near water.

Recreational Use of Roads

Alternative 1: Roads may be closed when damage to vegetative resources becomes evident and there is no overriding need to keep the road open. No specific road closures are planned under this alternative. Maintenance of seasonal wildlife closures for motorized vehicles would continue to protect wildlife during the winter. Current policy could maintain or reduce existing access.

Alternatives 1,3, and 5: These alternatives would maintain motorized access to Cardinal Bridge via Road 4100-280 on the west side of the river. The bridge would remain closed to motorized vehicles (except for emergency use). The bridge would provide Sunriver residents access to Forest Service land for both recreational use and as an emergency escape route. Recreational use would remain high across from Sunriver.

Alternatives 2 and 4: Closure of Road 4100-280 and elimination of Cardinal Bridge would eliminate the easiest recreational access between Sunriver and the west side of the River. Recreational use across from Sunriver would be reduced greatly. These closures would also eliminate a potential evacuation route for residents of Sunriver.

Alternatives 2-6: Closing of roads that now provide access to dispersed sites near the river would limit access opportunities for individuals with limited mobility. This would also reduce opportunities for motorized access to dispersed campsites and casual boat launch areas along the river. The effects of this change would be most dramatic in Segment 2. Some people may decide to use the developed facilities, paying the fees, and accepting the change. Others may go where they could have a similar dispersed camping opportunity near water. This would tend to increase the amount of dispersed camping impacts at the reservoirs, headwaters of the Deschutes, and other nearby lakes. Some portion of these displaced users may also create illegal dispersed campsites in closed areas. Such actions would increase the need for law enforcement.

Maintenance of seasonal wildlife closures for motorized vehicles would continue to protect wildlife during the winter. Closure of Road 4100-100 to protect elk habitat adjacent to Ryan Ranch Meadow would eliminate existing motorized access to Slough and Benham Falls Overlook. A new road would be constructed to access Slough and Benham Falls Overlook.

Alternative 2: Closure of Road 4370 between Wyeth Boat Ramp and Haner Park would eliminate motorized access parallel to about six miles of the Upper Deschutes. This would result in less motorized traffic being visible from the river and require as much as two miles of non-motorized travel on closed roads to reach some existing dispersed sites adjacent to the river. People dependent upon motorized access would not be able to access this side of the river while people preferring more solitude would encounter fewer people. Fishing pressure from the bank would be reduced.

Alternatives 3, 5, and 6: A new road would be constructed to access Dillon Falls and Slough.

Alternatives 4 and 6: Closure of Road 4370 between Wyeth Boat Ramp and Haner Park would eliminate motorized access parallel to about six miles of the Upper Deschutes. This would reduce the amount of motorized traffic visible from the river. Non-motorized travel required to reach dispersed sites would not exceed 1 ¼ miles because motorized access

to Bull Bend would be maintained. People dependent upon motorized access would not be able to access most of this side of the river. Fishing pressure from the bank would be reduced.

Alternative 6: Preserving Cardinal Bridge but gating Road 4100-280 near the Wild and Scenic River Boundary would retain emergency access for vehicles and recreational access for hikers, bikers, and equestrians. Vehicles would no longer be able to access the meadow north of Besson for recreational purposes, resulting in a reduction in dispersed camping, picnicking, and casual parties and their associated litter. Roads 4370 and 4300-100 would be maintained for administrative and emergency access.

Trails

Under all alternatives, user trails which are inappropriately located would continue to be closed or obliterated. This would reduce the ability of recreationists to access the river or upland areas indiscriminately.

Alternative 1: Continued use of existing trails would maintain recreational opportunities for hikers, mountain bikers, and equestrians using their own stock. Trail relocations are undertaken in response to identified resource damage and documented disturbance of wildlife.

Alternatives 2-6: Relocation of developed trails would both inconvenience and benefit the user. Trails would typically be moved to higher and drier ground, resulting in fewer views of riparian areas and water and, perhaps fewer mosquitoes for trail users.

Interpretive Signing

Alternative 1: Location and messages on signs depends on specific project needs.

Alternatives 2-6: Use of interpretive signing to inform users about the need to protect plants and wildlife would have some effect in all action alternatives. The measure would generally be effective but would not prevent instances of damage. There could also be some dissatisfaction among users who do not like being restricted. Signs may also conflict with some individuals' expected experience and the overall scenic quality by introducing line and form that is not part of the natural setting. Generally, signs would be located in developed sites or along trails.

Effects of Recreation Management on Recreation Value

The goal of recreation management is to provide a range of recreation experiences consistent with the setting and user expectations. Management includes decisions concerning where activities may take place (choosing sites), what type of activities may take place (recognizing legitimate uses and developing sites or facilities that enhance those uses), and how much activity may take place and still provide the desired recreation experience. Sometimes when activities may take place must be decided in order to prevent conflicts between different types of users.

Because different users have different expectations recreation management can create what is perceived as winners and losers. It does so by providing for one desired recreation experience in a manner that may reduce or eliminate the possibility of attaining another desired recreation experience.

A conflict exists between those who prefer non-motorized experience and those that prefer to use motorized transportation either on the ground or on the river. Many non-motorized users feel that the presence of motorized use detracts from their desired experience. In contrast most motorized users do not feel that the presence of non-motorized users detract from their experience. In addition motorized users have trouble understanding the problem non-motorized users have with motorized use since there is nothing to prevent the non-motorized users from engaging in their desired activity when motorized use is permitted.

A second issue is concerned with the different consequences of day use and overnight use. Overnight use provides an opportunity for the user to spend more than a few hours along the river. For people who travel long distances the opportunity to camp is virtually the only way that some areas can be enjoyed. Conversion of all sites to day use would preclude the use of developed sites by those who desire to camp and would also preclude the use of campground hosts as a means of maintaining facilities and monitoring activities at recreation sites.

Day use facilities are favored by local users who spend a day or part of a day along the river. When sites are not differentiated between camping and day use it may be difficult for people "out for the day" to find a vacant developed site for a picnic. Eliminating overnight use provides users a greater opportunity for finding unoccupied sites for picnics and other day uses. These sites have been popular locations for persons illegally residing on the forest lands. Residents disproportionately impact recreation sites because they take up space otherwise available for recreational use and they frequently create problems associated with improper disposal of wastes. By eliminating overnight camping the job of law enforcement officers is simplified because they do not have to make the legal distinction between camping and residing on Forest Service Land in these campgrounds.



Developed Recreation

The following discussion describes the effects developed recreation has on the recreational experience. Table 4-5 displays the number and type of developed recreation sites by alternative.

Campgrounds

Alternative 1: Currently, 198 developed individual campsites are located within the river corridor, with 145 located within La Pine State Recreation Area and the remainder located in eight Forest Service Campgrounds. Wampus is temporarily closed.

Alternatives 2-6: Permanent closure of Wampus Camp in Segment 2 would reduce the number of sites by two. This could displace users to other developed sites. The most significant impact would be on individuals who regularly camp at this area. They would be required to seek a new location for their recreation experience. Any facilities associated with Besson or those that would replace Besson would be open for day use only. Slough and Dillon Falls Campground would be closed to overnight camping. These closures would eliminate approximately 15 campsites. Except for Alternative 5, these closures would reduce overnight camping opportunities by requiring overnight users from Bend to travel at least ½ hour longer to access campgrounds along the river than present.

Alternative 2: The elimination of Bull Bend Campground plus the closures common to 2-5 would result in the availability of approximately 170 developed campsites in this alternative, a decrease of about 15 percent. The existing number of sites in Bull Bend would not be needed because the campground would not be accessible to motorized vehicles. Implementing this closure would eliminate camping that now totals at least 1200 user days per year. This alternative provides no new opportunities for camping in developed sites. This would result in a decreased capacity of about 4500 visits in developed campgrounds.

Alternatives 3 and 6: Under Alternatives 3 and 6, there would be a total of 6 developed campgrounds with approximately 218 campsites. This would be an increase of approximately 20 sites, an increase of approximately 10 percent over the existing condition. These additional sites would partially offset the loss of developed camping in Besson, Slough, and Dillon Falls campgrounds, and could partially offset the loss of dispersed sites associated with managing vegetation and wildlife along the river that is common to Alternatives 2-5.

This alternative would concentrate overnight camping in the upper reaches of the river while providing only day use in Segment 4.

Alternative 4: In Alternative 4, there would be a total of 5 developed campgrounds with approximately 198 sites. This would maintain the existing number of developed campsites although campsites would be distributed from Segment 3B upstream and no developed campsites between Big River and Bend. Despite maintaining the same number of campsites as currently exist, it is anticipated that vacancy rates will significantly decrease due to increases in population and the projected elimination of a large number of dispersed sites adjacent to the river. As a result of these conditions, conflicts between users are likely to occur more frequently than at present.

Alternative 5: This alternative would increase the developed campgrounds to 9. The number of campsites on the river would be increased to approximately 246, which is 24 percent more than the existing condition. It would involve all expansion and new

development in Alternative 3 plus adding 2 new campgrounds in Segment 2B and one new campground in Segment 4E. The new camping facilities would still not equal the number of dispersed sites projected to be eliminated to protect and enhance vegetation and wildlife.

This alternative would provide more developed campsites than any other alternatives and would increase opportunities for overnight camping by increasing the number and distribution of sites along the river.

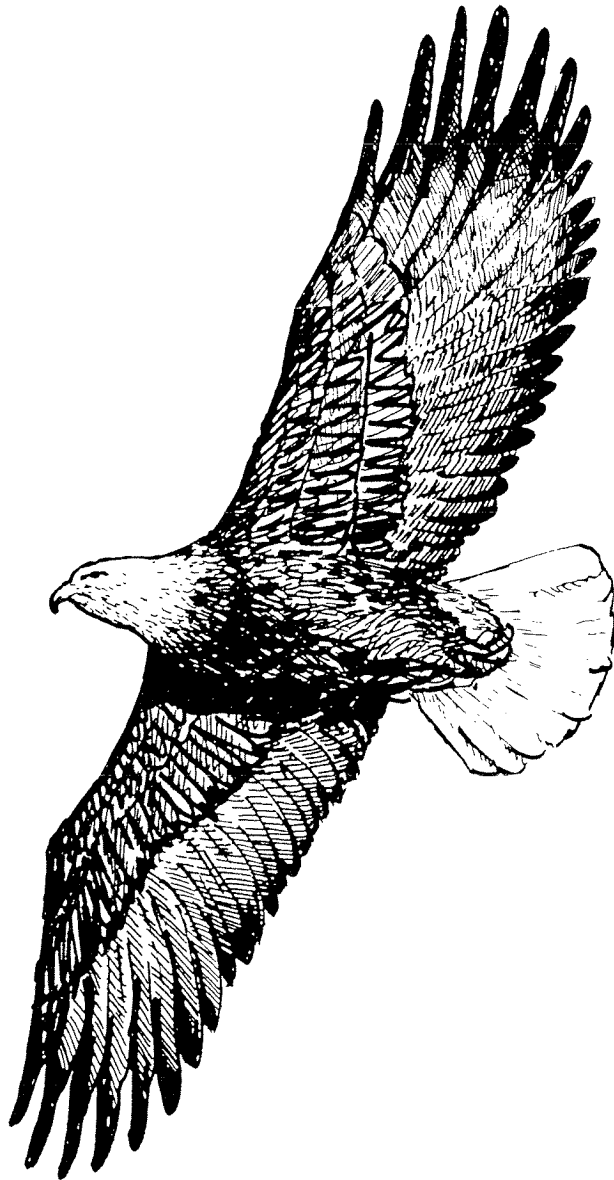


Table 4-5

Developed Recreation Sites (estimate)

| Segment | Developed Area | Area Type | Individual Sites | | | | | |
|---------|------------------------------|------------|------------------|-------|-------|-------|-------|-------|
| | | | Alt.1 | Alt.2 | Alt.3 | Alt.4 | Alt.5 | Alt.6 |
| 2A | Tenino | Boat ramp | 10 | 10 | 10 | 10 | 10 | 10 |
| | Wampus | Campground | 2 | - | - | - | - | - |
| | Bull Bend | Campground | 14 | 4 | 14 | 14 | 14 | 14 |
| | | Picnic | 2 | - | 2 | 2 | 2 | 2 |
| | | Boat ramp | 5 | - | 5 | 5 | 5 | 5 |
| | Wyeth | Campground | 4 | 4 | 4 | 4 | 4 | 4 |
| | | Boat ramp | 5 | 5 | 5 | 5 | 5 | 5 |
| | Pringle Falls | Campground | 6 | 6 | 13 | 6 | 13 | 13 |
| | New Campground | Campground | - | - | 12 | - | 12 | 12 |
| 2B | Tetherow | Trailheads | - | 10 | - | 15 | - | 6 |
| | | Boat ramp | 4 | - | - | - | 4 | 4 |
| | | Campground | - | - | - | - | 6 | - |
| | New Campground | Campground | - | - | - | - | 10 | - |
| | Trailheads | Trailhead | - | 20 | 20 | 20 | 10 | 15 |
| 3A | LaPine State Recreation Area | Campground | 145 | 145 | 145 | 145 | 145 | 145 |
| | | Picnic | 80 | 80 | 80 | 80 | 80 | 80 |
| | | Boat ramp | 6 | 6 | 6 | 6 | 6 | 6 |
| | | Trailhead | 5 | 5 | 5 | 5 | 5 | 5 |
| 3B | Big River | Campground | 13 | 13 | 28 | 28 | 28 | 28 |
| | | Boat ramp | 6 | 6 | 6 | 6 | 6 | 6 |
| 3D | Spring River Interpretive | Picnic | - | 5 | 5 | 5 | 5 | 5 |
| | | Trailhead | - | 5 | 5 | 5 | 5 | 5 |
| | Besson | Campground | 7 | - | - | - | - | - |
| | | Picnic | - | 7 | 7 | 7 | 7 | 7 |
| | | Boat ramp | 4 | 4 | 4 | 4 | 4 | 4 |
| | | Trailheads | - | - | 10 | 10 | 10 | 10 |

| | | | | | | | | |
|----|-----------------------|------------------|-----|-----|-----|-----|-----|-----|
| 4A | Benham Butte | River Access | - | 5 | 5 | 5 | 5 | 5 |
| | | Picnic | - | - | - | - | 12 | 12 |
| | | Trailhead | - | 5 | 5 | 5 | 5 | 5 |
| 4B | Benham Falls | Picnic | 4 | 4 | 4 | 4 | 4 | 4 |
| | | Boat ramp | 6 | 5 | 6 | 5 | 6 | 6 |
| | Benham Falls Overlook | Trailhead | 6 | 4 | 6 | 4 | 6 | 6 |
| | Trailheads | Trailheads | 10 | 6 | 14 | 6 | 14 | 14 |
| 4C | Slough | Campground | 4 | - | - | - | - | - |
| | | Picnic | 1 | 4 | 4 | 4 | 4 | 4 |
| | | Boat ramp | 4 | - | 4 | - | 4 | 4 |
| | | Trailhead | 3 | - | 3 | - | 3 | 3 |
| | Dillon Falls | Campground | 4 | - | - | - | - | - |
| | | Picnic | - | - | 4 | - | 4 | 4 |
| | | Boat ramp | 4 | - | 4 | - | 4 | 4 |
| | | Trailhead | 3 | - | 3 | - | 3 | 3 |
| | New Trailheads | Trailhead | - | 8 | - | 8 | - | - |
| 4E | Aspen | River Access | 4 | 4 | 6 | 5 | 6 | 6 |
| | | Trailhead | 4 | - | 4 | - | 4 | 4 |
| | Big Eddy | River Access | 7 | - | 7 | - | 7 | 7 |
| | | Trailhead | 3 | - | 3 | - | 3 | 3 |
| | Lava Island | River Access | 7 | 5 | 7 | 3 | 7 | 7 |
| | | Trailhead | 3 | - | 3 | - | 3 | 3 |
| | New Campground | Campground | - | - | - | - | 12 | - |
| | New Trailhead | Trailhead | - | 5 | - | 5 | - | - |
| 4F | Meadow | Picnic | 9 | 9 | 9 | 9 | 9 | 9 |
| | | Trailhead | 3 | 3 | 3 | 3 | 3 | 3 |
| | New Area near UGB | Picnic | - | - | - | - | 10 | - |
| | | Trailhead | - | - | - | - | 6 | - |
| | Totals | Campground Total | 198 | 172 | 216 | 197 | 244 | 216 |
| | | Picnic | 96 | 109 | 115 | 111 | 137 | 127 |
| | | Boat ramp | 54 | 36 | 50 | 41 | 54 | 54 |
| | | River Access | 18 | 14 | 25 | 13 | 25 | 25 |
| | | Trail Head | 40 | 71 | 84 | 86 | 88 | 85 |
| | | Total | 406 | 402 | 490 | 448 | 548 | 507 |

Picnic Areas

Alternative 1: Existing opportunities would be maintained.

Alternatives 2-6: In Segment 3, increased picnic opportunities would be provided adjacent to proposed interpretive trail between Spring River and Road 41 and by converting Besson to day use. In Segment 4, Slough and Dillon Falls would become picnic areas, increasing opportunities for picnicking.

Alternatives 5 and 6: New picnic area in Segment A would increase opportunities for picnics along the river.

Alternative 5: Construction of new picnic areas in Segment 4A and 4F would provide additional day use opportunities.

Trailhead Parking

Trailhead parking is a developed area designed to enhance dispersed uses such as hiking, horseback riding, and mountain biking. Parking areas make dispersed uses more convenient for users. (Also see the section on Trail Use.)

Alternative 1: This alternative would maintain the existing level of trailhead parking. It is likely to be inadequate for future needs

Alternatives 2-6: Development of trailhead parking in Segment 2A would enhance non-motorized use of roads closed to motorized river travel. Trailhead parking would be convenient for users of a new interpretive trail to be developed between Spring River and Road 41.

Alternative 2: Trailhead parking in Segment 2B would enhance non-motorized use of existing and Common to 2-5 roads closed to motorized use by allowing non-motorized users to park off the road when utilizing network of closed roads for access to the river or simply as a walking, riding, or biking route.

Alternatives 2-4: Development of trailhead parking in Segment 2B would enhance non-motorized use of roads closed to motorized travel Common to 2-5 as well as previously closed roads.

Alternatives 2 and 4: Trailhead parking in Segments 2A and 4C would enhance non-motorized recreational opportunities in these segments.

Alternative 5: Trailhead parking near Bend Urban Growth Boundary would make biking and hiking more convenient for users.

Boat Ramps

As with trailheads, boat ramps are designed to protect other resource values and enhance dispersed uses. Boat ramps make dispersed uses such as canoeing, rafting, and fishing and sightseeing from motorboats and drift boats more convenient for users. Boat ramps are necessary for launching boats from trailers. River access points are designed for smaller craft, such as canoes or rafts, which are carried to the bank. Easy access can lead to higher levels of use, reduce the sense of solitude, and increase fishing pressure.

Alternatives 1, 5, and 6: These alternatives would maintain existing developed boating access. Tetherow Boat Ramp would have to be repaired in order to be safe for trailer use. Except for the reach between Pringle Falls and Tetherow Logjam all flatwater reaches of the river would have developed boat ramp access.

Alternatives 2-4: Motorized access to Tetherow Boat Ramp in Segment 2B would be eliminated. This boat ramp would no longer serve its intended function. As a result, access for boating would be more difficult. Removal of the broken concrete pad now present and revegetation of the area would make this site more consistent with the desired recreation experience for these alternatives. This would enhance opportunities for those who prefer relatively secluded and non-motorized river trips through natural appearing areas.

Alternatives 2 and 4: Motorized access to Slough and Dillon Falls Boat Ramps in Segment 4C would be eliminated. These boat ramps could no longer serve their existing function. As a result access for boating would be more difficult. This would enhance opportunities for those who prefer relatively secluded and non-motorized river trips. Such trips would require carrying boats 200 yards to ¼ mile.

Alternative 2: Bull Bend Boat Ramp would not be accessible. This would require boaters putting in at Tenino to float all the way to Wyeth Camp. Short, partial day trips on the river would be more difficult to make.

River Access

Access to developed recreation sites would remain the same as present with the same effects except as follows:

Alternatives 2 and 4: Motorized access to Big Eddy, Dillon Falls, and Slough camp would be eliminated. These closures would require walks of a few yards to about ½ mile to access the river. This would make transporting small watercraft to the water more difficult at these locations.

Alternatives 2, 3, 4: Motorized access Tetherow Boat Ramp would be eliminated. This would require rafters and canoeists to put in several miles upstream at Pringle Falls Camp Ground and many would have to portage around Tetherow Rapids in order to reach the reach between Tetherow Boat Ramp and Lapine State Recreation Area.

Alternatives 2-6: Motorized access would increase with the addition of an interpretive trail and picnic area near Harper Bridge.

Alternative 2: Motorized access to Bull Bend would be eliminated. This would require most boaters to put their canoe, drift boat, or raft in at Tenino Boat Ramp and to take out at Wyeth Boat Ramp, a trip of about 8 miles. This closure would also enable boaters to utilize Bull Bend Campground in relative solitude.

Alternative 5: Motorized access would increase access would result from the development of picnic areas in Segments 4A and 4F.

Hazard Trees

Under all alternatives, developed sites would continue to be reviewed for safety hazards in a manner consistent with the Forest Plan.

Treatment options could limit user access to portions of the developed area. Falling hazard trees would increase user safety in developed areas. Stumps and open spaces resulting from falling trees would have unavoidable effects on visual quality.

Dispersed Recreation

Dispersed Camping

The amount of dispersed camping that would be permitted is primarily a function of the effects of camping on geologic/hydrologic, vegetation, and wildlife values. Except as provided below the effects of management decisions on dispersed camping are described under the Effects of Vegetation and Wildlife Management on Recreation Value.

Alternative 1: Existing management direction on Forest Service land provides virtually unrestricted dispersed camping opportunities in Segments 2, 3 and the upper portion of Segment 4. With this freedom of opportunity occurs a reduction in opportunities for solitude as many of the choice locations have several sites closely spaced much like a developed campground but without the benefit of restrooms. Heavily utilized sites can have sanitation problems, and possibly become health hazards.

Alternatives 2-6: In all segments, identification of appropriate dispersed sites would increase opportunities for non-motorized users to camp free of disturbance. Establishing 3 to 4 designated sites with trail or boat access in Segment 3D and/or Segment 4 would provide camping opportunities in relatively primitive settings. These few sites would not offset the dispersed sites that will no longer be accessible to motor vehicles due to road closures common to Alternative 2-6. If these sites prove to be popular there may be competition for sites with some users hiking or boating into a site finding the site occupied.

Alternatives 3, 5, and 6: Providing dispersed camping with motorized access to a few designated sites along Road 4100-200 in Segment 3 would provide a remnant of the existing opportunities for motorized users.

All-Terrain Vehicle (ATV) Use

Until recently, non-street-legal all-terrain vehicles (ATVs) were not allowed on any highway, including all forest roads, in Oregon. Because of a recent change in Oregon State law, Class I, II, and III ATVs (as defined by the State of Oregon) are now permitted on roads which are open to the public and not maintained for passenger vehicles (Non-Highway Safety Act roads). These roads are designated with a seven digit number, such as 4300-100. The Forest Service can close roads to specific uses by posting signs designating what use is or is not allowed.

Under all alternatives, Class I, II, and III ATVs (as defined by the State of Oregon) would be permitted on Non-Highway Safety Act roads which are open to the public and not specifically closed to ATVs.

Alternative 1: Motorized travel could be permitted, prohibited or restricted as necessary to protect river values. Opportunities for off-highway vehicle (ATVs and snowmobiles) on other than system roads would not be provided in areas of concentrated recreation use or where sensitive resource values would be adversely affected. In the past, this direction for the river corridor has resulted in travel restrictions being applied on a case by case basis, resulting in confusion for both users and enforcement personnel. In the majority of the river corridor, use by motorized vehicles, over-the-snow vehicles, and bikes is restricted to designated routes and prohibited off-road/off-trail. The Bend District Travel Map for 1995-96 had an error in Segment 3B, showing an area with no restrictions on any type of use.

Alternatives 2-6: ATV use would be permitted only on Non-Highway Safety Act Roads which are open to the public and not specifically closed to ATVs. As a practical matter this would limit ATV use to a few open spur roads between the river and arterials that parallel the river, so little use by ATVs would be expected. In areas where private land adjoins Forest Service land, ATV riders may use these roads to access areas where ATV use is permitted. Users seeking escape from noise would be able to do so by hiking or biking on trails and closed roads away from open roads and developed recreation facilities. Roads could be closed to ATV use if safety or other concerns arise.

Snowmobile Use

Alternative 1: Except for a portion of Segment 2A, a portion of Segment 3B, and the east side of the river between Sunriver and Newberry National Volcanic Monument (in Segments 4A and 4B), snowmobiling within the boundary of the Upper Deschutes Wild and Scenic River is restricted to designated routes. Except in Segment 4, no designated routes currently exist. Residents living inside or near the Wild and Scenic River Boundary, use snowmobiles for recreation or, in heavy snowfall years, for transportation to a main road. Some use may be occurring in areas with use restrictions and result in disturbance of wildlife wintering along the river.

Alternatives 2-6: In these alternatives, snowmobile use would be allowed only on designated routes. The primary intent of these designated routes would be to provide access from private lands within the river corridor across Forest Service land to areas where snowmobiling is permitted. This would allow residents living within the river boundary to ride from their property but would not draw more recreational use into the river corridor.

Roads

Alternative 1: Roads would be managed in accordance with the Forest Plan. Because no actions are planned at this time, so existing access to developed and dispersed recreation sites is expected to be maintained in the short term. Long term effects on recreation are unknown.

Alternatives 2-6: The new road constructed between Road 41 and Benham Falls Overlook would maintain motorized access to Slough and Benham Falls Overlook that would otherwise be lost as a result of the closure of Road 4100-100 to enhance wildlife habitat. While the relocation would maintain access to both developed sites, the new route would make travel between Dillon Falls and Benham Falls slightly more time consuming and less convenient.

Alternatives 2-4: Segment 2B would be managed as non-motorized. This eliminates public travel on Roads 4360, 4330-600, 4300-900. As a result people dependent upon motorized access could not approach the river. For those who can walk, ride a horse, paddle and transport a canoe or raft these closures would provide several miles of relatively primitive river travel with few sights and sounds associated with civilization.

Alternative 4: In Segment 2, reconstructed roads between Road 43 and Bull Bend would maintain motorized access to Bull Bend that otherwise would be lost by closing Road 4370 between Wyeth Boat Ramp and Haner Park. While maintaining access, the relocation

of the access route would make sightseeing less convenient and would encompass fewer views of the river than the existing route that parallels the river.

Alternative 5: New road to new picnic area near the Bend Urban Growth Boundary would increase access to the river. It is likely that this road would become part of a shuttle route for whitewater boaters floating the reach downstream from Meadow Picnic Area.

Surfacing roads to Benham Falls Overlook and Meadow Day Use Area would make the drive to these locations more pleasant by creating a smooth, dust free roadway. Destination areas would also have lower levels of dust. Depending on road design a smooth surfaced roadway may increase speeds and subsequently increase the probability of motor vehicle accidents.

Alternative 6: In Segment 2B, motorized travel would be permitted on 4360, 4330-600, and part of 4300-900. Keeping road 4360 open would provide a needed through traffic route on the northwest side of the river yet still require walks of $\frac{1}{8}$ to 1 mile to access the north side of the river. Keeping 4330-600 and part of 4300-900 open will maintain public access to Tetherow Boat Ramp. This access will enable driftboaters to use this segment of the river and canoists and rafters to float or paddle the reach below the boat ramp without having to portage around logjam or run the short rapids just upstream from the boat ramp. This would facilitate shorter float trips than would be possible if these roads were closed. These open roads would also provide an access point for those dependent upon motorized travel. These few open roads would not significantly affect the non-motorized character intended for this segment of the river.

Trail Use

Trail use along the Upper Deschutes involves foot travel, equestrian travel, and bicycle travel. Trails include narrow "user-created" trails, designated trails constructed to standards for specific uses, and closed roads that have been designated as multiple use trails. The combination of different trail origins, designs, and types of users has the potential to create both conflict between users and hazardous conditions. A properly designed trail system can enhance the experience of users by providing trails that provide views, meanders, and grades appropriate to the intended use and separating types of uses that are likely to result in conflicts. Existing or new trails would meet design standards for one of four use categories: equestrian, foot travel, bicycle travel, and multiple user type. Actual trail use may include types of use other than those for which the trail was designed. This problem can be dealt with by constructing separate trails for different types of users and/or designating trails as being open to particular uses. Each alternative varies according to the number of trail miles, miles of trails designated for an exclusive use (no other use allowed), miles of trails designated for a primary use (other uses permitted), miles of trails designated for multiple user types, and miles of barrier-free trails.

Table 4-6

Open Road Converted to Trail in Segment 2

| | Alternative 1 | Alternative 2 | | Alternative 3 | | Alternative 4 | | Alternative 5 | | Alternative 6 | |
|------------------------------|---------------|---------------|-----|---------------|-----|----------------|-----|---------------|----|---------------|-----|
| Roads to Trails in Segment 2 | Roads | Roads | Mi | Roads | Mi | Roads | Mi | Roads | Mi | Roads | Mi |
| | None | 4370 | 4.4 | | | | | | | | |
| | | 4360 | 1.1 | 4360 | 1.1 | | | | | | |
| | | 4330-600 | .2 | 4330-600 | .2 | Same as Alt. 2 | | None | | | |
| | | 4330-900 | 1.8 | 4330-900 | 1.8 | | | | | 4330-900 | 1.6 |
| | | 4330-500 | 1.1 | 4330-500 | 1.1 | | | | | 4330-500 | 1.1 |
| Total | | | 8.6 | | 4.2 | | 8.6 | | 0 | | 2.7 |

Tables 4-6 and 4-7 describe the changes to trails by alternative. These changes would result in an increase of 13 to 26 miles of trail depending on the alternative.

New trail development in Segment 2 would be the result of converting closed roads to trails. Trail development in Segments 3 and 4 would result from conversions of existing open roads to trails, conversion of closed roads to trails, conversion of railroad grades to trails, and the development of new trails where appropriate. These alternatives would provide more solitude, less noise, and less dust for non-motorized users. Though non-motorized access would be barrier-free, people dependent on motorized access would no longer have access to these sites.

In all action alternatives, barrier-free trails constructed near Spring River and Road 41, Benham Falls Overlook, Dillon Falls, and Big Eddy would increase barrier-free trails by about ½ mile for foot travelers and persons with impaired mobility. These trails would provide users with the opportunity to visit the river and extensive riparian habitat free of the noise and sight of motor vehicles.

Alternative 1: Developed trails adjacent to the river are concentrated in Segment 4. The trail system consists of a hiker trail with other uses allowed, a bike trail on closed roads, and a horse trail which allows other uses but receives almost exclusively horse use. The hiker trail receives approximately half bike and half hiking use with a small amount of horse use. This trail is along, and closest to, the river and therefore is the most desirable from a scenic standpoint. It is also desirable for mountain bikers as a single track trail. The effects of the existing management of types of trail use are measured mostly by the number of people and types of use on a particular trail system and the resulting conflicts between users. The most significant impact of the existing trail system on the recreational experience is the number of minor conflicts between mountain bikers and hikers on the hiker trail of the Deschutes River Trail system. Use is growing and the trail is being used more and more by mountain bikers. The ratio of bikers to hikers is growing gradually. This trend is expected to continue. The horse trails are primarily used by outfitters. The primary effect is the dust created by horse use where trails are close to popular recreation sites.

Table 4-7

**Deschutes River Trail System
Harper Bridge to Bend Urban Growth Boundary**

| Alternative | Trail Miles by Type of Use | | | | | | | New Trails or Existing Trails Affected By Alternatives |
|---------------|----------------------------|---------------|---------------|--------------|--------------|--------------|-------|---|
| | Exclusive Hiker | Primary Hiker | Primary Horse | Primary Bike | Multiple Use | Barrier Free | Total | |
| Alternative 1 | .4 | 4.8 | 14 | 1.5 | 3.9 | 0 | 24.6 | None |
| Alternative 2 | 8.5 | 1.7 | 14 | 1.5 | 3.2 | 2.1 | 28.9 | Primary Hiker Trail between Meadow Picnic Area and Benham Falls Trailhead would be designated exclusive Hiker use. Barrier-free trails constructed near Spring River and Rd. 41 (1 mi.), Benham Falls Overlook (.1), Slough (.2), Dillon Falls (.2) and Big Eddy (.2). Four miles of roads to trails conversions. |
| Alternative 3 | .4 | 6.3 | 14 | 1.5 | 13.5 | 1.5 | 35.7 | Existing trails same as Alternative 1. Multiple use trail developed between Benham Falls and Besson. Barrier-Free trails constructed near Spring River and Rd. 41, Benham Falls Overlook, Dillon Falls, and Big Eddy. Three miles of roads to trails conversions. |
| Alternative 4 | 8.5 | 1.7 | 14 | 1.5 | 11.2 | 2.1 | 36.9 | Same as Alternative 3 except primary hiker trail between Meadow Picnic Area and Benham Falls Trailhead would be designated exclusive use and a barrier-free trail would be constructed to provide access to Slough. Four miles of roads to trails conversions. |
| Alternative 5 | .4 | 7.3 | 14 | 12.8 | 13.5 | 11.5 | 48 | Same as Alternative 3 plus new primary bike, surfaced trail developed between Bend Urban Growth Boundary and Sunriver and new primary hiker trail between new picnic are/trailhead and Meadow Picnic area. |
| Alternative 6 | .4 | 6.3 | 14 | 12.8 | 10.8 | 11.5 | 44.3 | Same as Alternative 3 plus new primary bike, surfaced trail, developed between Bend Urban Growth Boundary and Sunriver. |

Alternative 2: Alternative 2 would provide 37.5 miles of trail, about 13 miles more than the existing condition. In addition to effects of trail development common to Alternatives 2-6, hikers, equestrians, and bikers would be able to follow the meanders of a closed Road 4370 as it parallels the river without encountering the dust that now engulfs non-motorized users who are willing to share the road with motor vehicles. Converting access to Slough, Dillon Falls, and Big Eddy from road to trail would provide opportunities for short walks out of sight of motor vehicles. Inconvenience to users dependent upon motorized travel would be small because distances from parking to the area would be less than 200 yards and would be barrier-free. Changing the "primary" foot trail between Meadow Picnic Area and Benham Falls Overlook to "exclusive" foot use would help to separate potential conflicting uses but could be difficult to enforce. The mountain biking population that uses the river trail now would be required to use the bike route rather than the hiking trail. This would provide the hiker with more solitude than in the existing condition. Given the recent history of mountain biking in the area it would be expected that even with clear signing some mountain bikers would continue to use the hiker designated trail unless there was a significant enforcement effort. Reduced motor vehicle access to the area would reduce overall hiker and biker use because of the long distance from other trailheads to this area.

Alternatives 3-6: Extending the Deschutes River Trail from Benham Falls to Besson would open about 8 miles of trail for hiking, biking, and horseback riding. The trail route would primarily follow closed roads and abandoned railroad grades. This trail would increase recreational opportunities and has the potential to disperse some use from the existing trails system, potentially reducing conflicts by decreasing trail encounters.

Alternative 3: Almost 40 miles of trail would be provided. The hiking trails would continue to allow bikes and hikers using the hiker trail, with the percentage of bikes versus hikers increasing gradually as well.

Alternative 4: This alternative would provide over 45 miles of trail. This would include the same trails as Alternative 3 and include converting Road 4370 to a trail, changing the primary foot trail between Meadow Picnic Area and Benham Falls Overlook to exclusive foot use, and converting access to Slough, Dillon Falls, and Big Eddy from road to trail.

Alternative 5: This alternative would increase trail miles to 48. The surfaced trail between the Bend Urban Growth Boundary and Sunriver would have direct benefits to bikers by providing an alternative route and point to point access. Hikers would experience indirect benefits to the degree to which the new trail would draw bikers off the primary foot trail. The new trail between the new picnic area near the Bend Urban Growth Boundary and Meadow Day Use Area would provide increased opportunities for trail users.

Alternative 6: This alternative would result over 51 miles of trail being available for recreational use. In Segments 3 and 4, Alternative 6 would include the same trails as Alternative 3 with the addition of a surfaced bicycle trail between the Bend Urban Growth Boundary and Sunriver.

Boating

Boating would be affected by other actions to protect and enhance other river values or to provide for different mixes of recreation experiences. Actions intended to protect and enhance other river values would generally impact river access points where riparian vegetation has been adversely affected by heavy use. Actions designed to provide a desired recreation experience would generally involve decisions concerning on river use of a segment (non-motorized or mixed use), and whether access to the river would be motorized or non-motorized.

The effects of creating non-motorized river segments where the entire river is motorized at this time would depend on the user. Motorized users would be more restricted by alternatives which would require different restrictions by river segment. In areas that become non-motorized, the motorized user would be able to move only in certain directions from access points. They would be shut out of areas where they have traditionally been able to go. This could result in hard feelings and animosity. If such feeling were converted to actions other than accepting non-motorized use as an option or using a different area there could arise a need for more law enforcement. Displacing users to other waters could increase use both on open reaches of the Upper Deschutes but also on other water bodies in the area.

The primary effect on the non-motorized user would be an increased experience of solitude, less noise, and less potential conflict with motorized users when they are utilizing non-motorized reaches of the river. These experiences would be magnified because most travel in non-motorized segments of the river would be downstream thus eliminating the most common source of on river contact with other users, upstream motorized travel.

Increased travel restrictions would require users to learn new regulations and restrictions after implementation.

There would be varied effects on river uses such as fishing. Fishing pressure would be greater in areas remaining motorized as more use would be concentrated in those areas. Fishing pressure in non-motorized areas would be reduced due to fewer people and less fishing. In alternatives with less motorized boating fishin pressure would be reduced, fishing success would increase, but fewer people woul fish those segments closed to motorized river travel.

Type of Use

Type of use refers to whether motorized use is permitted. When motorized use is permitted it is referred to as mixed use because non-motorized use would also be allowed. A foldout map illustrates where the river segments are located and whether they are motorized or non motorized. The Table 4-8 compares the total number of miles open to mixed use and non-motorized use by Alternative. It is expected that those alternatives with low levels of mixed use would result in the greatest amount of displacement to other areas while the alternatives with larger amounts of mixed use would have the greatest disparity with the desired experience of the non-motorized user.

Table 4-8**River Use by Alternative
(Miles)**

| Use Type | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 | Alternative 6 |
|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Mixed Use | 53 | 7 | 44 | 28 | 49 | 42 |
| Non-Motorized | 1 | 47 | 10 | 26 | 5 | 12 |

Alternative 1: By Oregon State Marine Board regulations, motorized river travel would be permitted in all segments except Segment 4G. Use of jet skis and traveling at speed sufficient to create a wake would continue to be prohibited.

Alternatives 2-6: Use of jet skis and motorized travel that causes a wake would continue to be prohibited. This would continue to reduce the conflicts formerly associated with the lack of regulation of river travel. Closing the river below Aspen to motorized travel would have little impact on existing use patterns. Most of this reach of the river is not suitable for motorized travel. The primary effect would be that anglers who now use motorboats for fishing as far as about ½ mile downstream would no longer be able to do so. There would be some difficulty in enforcing this closure because motorized boats could put in at Aspen but would only be permitted to utilize the motor when operating between the boat ramp and the base of Dillon Falls. The falls, not regulations, would determine the limits of motorized travel upstream.

Alternative 2: Alternative 2 would provide for motorized use only in segment 3C where private land is predominant (about 6 river miles). The effects of restricting motorized use on the river would be most significant in Alternative 2. The motorized users who currently use the river would be forced to go somewhere else to use their motorized craft. This would put additional pressure on adjacent water bodies potentially causing increased congestion in those areas. Displaced users could be inconvenienced and dissatisfied. The effects on the areas receiving the extra use would be an increased rate of degradation and potential dissatisfaction of users due to the possible overcrowding.

Alternative 3: This Alternative would close Segment 2B to motorized river travel from Pringle Falls Campground to Tetherow Logjam. At present little motorized travel occurs in this reach of the river because there are no boat ramps between Pringle Falls and Tetherow Logjam. Though motorized boating would be permitted below Tetherow Boat Ramp, it is not expected that many motorboats would be encountered. This is due to the distance from the undeveloped La Pine State Recreation Area Boat Ramp and the fact that there would be no motor vehicle access to Tetherow Boat Ramp. Segments 4D and 4E would be closed to motorized travel on the river. This would impact a few anglers who now fish the river after putting in at Aspen.

This Alternative would be the easy for users to understand and for enforcement to occur because motorized users could travel either upstream or down stream from boat ramps open to users of motor powered boats and the limits of motorized travel would be determined by natural barriers such as falls, unnavigable rapids, and logjams.

Alternative 4: Segments 2A and 2B would be closed to motorized river travel. The closing of Segment 2A to motorized river travel would impact anglers who now travel up and down the river in motor boats when fishing. It would require users to set up shuttles in order to fish or float. Recreational use by land owners would be affected by their inability to use motorboats they now own except to float downstream and then to be shuttled back over land. The closure of the river to motorized river above the boundary between Segments 2B and 3A would be difficult to enforce due to the relative remoteness of the boundary.

The closure of Segment 4 downstream from the Benham Falls Bridge to motorized river travel would have the same effects described in Alternative 2 for these segments. The natural barricade and the blanket closure downstream would be easy to understand and enforce.

Alternative 6: All of Segment 2B would be closed to motorized river travel as in Alternative 4 and with the same effects. The river between the west boundary of La Pine State Recreation Area and the Recreation Area bridge would also be closed to motorized river travel. This closes about a mile of the river in Segment 3A to motorized travel. Over 40 miles of the river would remain open to mixed river travel. This Alternative would change current motorized use patterns at two boat ramps. In Segment 3A users would only be permitted to use motors downstream from the LaPine State Recreation Area Bridge, which is located immediately upstream of the boat ramp. Motorized users using the undeveloped access point at Aspen would face the same restrictions as in Alternative 1.

Guided/Outfitted Recreation

Guided/outfitted use provides recreational users the opportunity to participate in activities for which the user has neither the necessary equipment nor skills. On the Upper Deschutes Guided/outfitted services enable the average visitor to ride horses, float on flat water, or plunge through whitewater rapids in safety and without the expense of owning a horse, raft, kayak, canoe or boat. Guided/outfitted use also has the potential to teach new skills or impart knowledge to users. Where outfitter/guides operate, guided groups can be monitored and impacts controlled more easily than independent unguided users; however, they also attract and cycle more people through an area in a given amount of time. This higher use level can significantly change the recreational experience of others in the area.

The alternatives determine where and when guided outfitted recreation may occur and how many people would be able to utilize guided or outfitted services. The alternatives also establish criteria for determining what types of guided or outfitted activity may occur on or adjacent to the river. Different combinations of these elements would affect recreational opportunity differently.

Needs Assessment

Beginning with the 1982 Upper Deschutes Recreation Plan, the need for guided/outfitted services along the Upper Deschutes has been recognized. The five components of needs assessment have been addressed in this FEIS.

1. **Agency mission:** When Congress designated the Upper Deschutes a Wild and Scenic River, the mission of the Forest Service as the lead agency responsible for the management of the Wild and Scenic River became to protect and enhance the Outstandingly Remarkable Values (ORVs). Recreation is one of those ORVs. However, the Forest Service may not develop recreational opportunities to the detriment of other ORVs (also see Chapter 1). If guided/outfitted services are determined to protect and enhance ORVs, then it is the responsibility of the Forest Service to supervise such activities in a manner that both protects and enhances ORVs and provides for the economic viability of the service (USDA Forest Service 1996).
2. **Opportunities:** Both the Forest Service and potential permittees have recognized the potential for new guided/outfitted services along the Upper Deschutes. These services have not been analyzed in detail. Criteria, emphasizing education, interpretation, stewardship, and impact on other users have been established as guides for evaluating new guided/outfitted proposals. Developing new guided or outfitting services would provide access to new reaches of the river for those who do not have either the equipment or skill to access the river on their own (also see Chapter 2).
3. **Land capability:** The description of the Affected Environment (Chapter 3) and the Environment Consequences (Chapter 4) suggested that existing whitewater guided/outfitted use levels have had serious impacts on streamside areas. A similar problem has existed at the Benham Butte River Access. It is believed that existing use levels can be maintained and other resource values protected if planned site modifications are made.
4. **Social capacity:** Social capacity has been an ongoing concern with existing Guided/outfitted use. Due to its proximity to the City of Bend and the Inn of the 7th Mountain, the area in which whitewater rafting occurs is subject to large numbers of users. As a result visitors expect high levels of social contact. None the less, whitewater rafting is organized in a manner designed to minimize congestion and to avoid a continuous parade of rafts down the river. In areas where guided/outfitted use does not currently occur, tying new uses to the non-commercial designed annual capacity would ensure that social contacts would not dramatically increase as the result of burgeoning guided/outfitted activity. Guided horseback riding has intermittent impacts on other visitors. Most of these impacts have been mitigated by developing separate trail systems (which are open to other users but primarily designed for

equestrian use. The remaining impact is the dust created by strings of horses in areas where other trails intersect the equestrian trails or other uses occur near equestrian trails. (Also see Chapter 2).

5. Demand/Supply: The demand for existing guided/outfitted services has been established for over 15 years. The demand for new guided/outfitted services is less certain. However, prospective outfitter/guides have proposed services such as whitewater kayaking instruction and flatwater interpretive excursions. At this time whitewater kayaking instruction is limited to a single class per year offered by Central Oregon Community College. No individual instruction is available in the Central Oregon area. At this time there are no guided outfitted services other than fishing guide service available on the Upper Deschutes upstream from Sunriver. As a result people without equipment and appropriate skill levels do not have access to these types of recreation.

Effects by Use Type

Whitewater Boating

Whitewater boating would continue at some level under all alternatives. The amount of guided uses allowed would be reduced under some alternatives. Some alternatives would allow for increases in guided whitewater boating opportunities.

Reductions in use levels would be unlikely to meet future demands, and may not meet existing demands. Reductions in the use levels would be likely to raise the cost per trip to the user.

Decisions on whether or not increased uses would be authorized would be based on demonstrated bona-fide needs and site-specific analysis to determine whether such uses could be supported without adversely affecting river values.

Alternative 1: Guided whitewater boating in the Big Eddy reach has stabilized at about 30,000 guests over the past five years under the existing program. Because the existing system has precluded new guided/outfitted services opportunities for learning new skills have been limited. There is increasing use of the Big Eddy reach (Segment 4E) by non-commercial whitewater kayakers. If conflicts continue to increase the Allocation System for the Big Eddy Reach would be reviewed. Under the existing allocation system white water rafting could increase to about 50,000 visits per year. The maintenance of the existing system would not address existing demand for new white water guided/outfitted opportunities such as permits for kayaking instruction. Presently the only kayaking instruction available locally is a single class offered once a year through Central Oregon Community College.

Common to 2-5: Redesign and revegetation of popular river access points in Segment 4E would direct users to designated pathways and launch and takeout sites. These guidelines could reduce the number of boats which would access the river at one time which could reduce the efficiency of existing service.

Alternative 2: Guided whitewater rafting would be restricted to Aspen to Lava Island in Segment 4E. Guided whitewater boating would be reduced to approximately half the

existing level by reducing the number of trips and the number of people who would go on each trip. This would reduce the number of people who could experience such a trip. By reducing the number of people on the river at one time, the experience would be more private. Many people desiring to experience such a trip would not be able to do so, and others would be forced to make the trip at an inconvenient time. The reduction in use would reduce conflicts with non-commercial kayakers. Because no new guided outfitted use would be permitted opportunities users to develop new skills or acquire new knowledge would remain limited.

Alternatives 3-6: Additional whitewater uses could be authorized which met existing standards in Segment 4E and 4F. Given the standards and expected needs, this use is unlikely to be whitewater rafting. More likely, this use would be kayaking or other small whitewater craft. These new white water uses could provide the opportunity for usees to acquire new skills. New flat water use is expected to be mostly educational in nature but would be for-profit rather than non-profit. Additional development of river access points in Segment 4E and 4F could be required.

If approved, guided kayaking and other types of whitewater use would meet a demand that has not been filled locally. This could create some conflict with rafters moving through the same whitewater, because kayakers tend to go through whitewater segments slower, "playing as they go." Big Eddy would be likely place for this to occur. However, because of restrictions that would be placed on guided kayaking such conflicts would likely be rare.

Alternatives 3 and 6: Guided whitewater boating would be capped at the same level as present in Segment 4E. This is sufficient to meet existing demand, but if demand increases the number of users would not be allowed to increase. As a result it could be projected that sometime in the future demand for guided whitewater rafting would not be met.

Alternative 4: Capping guided whitewater boating at 75 percent of existing use would not meet existing demand for rafting services. Conflicts with non-commercial kayakers would be reduced.

Alternative 5: Guided and non-commercial boating would be governed by a common pool permit system in Segment 4E. The impacts of such a system on the recreational user is unknown because the details of the system remain to be developed.

Alternative 5 would allow for additional guided use from below Benham Falls to the Dillon Falls Boat Ramp. This additional use would require construction of new river access facilities and parking below Benham Falls Overlook to accommodate the increased use. Construction of these facilities would encourage private users to put in at the same site and would result in additional increases in whitewater boating use in that segment.

Flatwater Boating

Flatwater guided/outfitted recreation can be categorized as either non-motorized or motorized use. Non-motorized use would be canoeing and other types of water based tours such as wildlife viewing, etc. Guided tours provide user with the opportunity to acquire new knowldge. Guided and liveried canoe trips are currently offered between Slough and Dillon Falls (Segment 4C) and between the Sunriver Marina and Benham Butte River Access (Segments 3D and 4A). Guided motorized use is limited to a sightseeing patio boat trip between Dillon Falls Boat Ramp and the base of the rapids below Benham Falls (Segment 4C).

No flatwater guided/outfitted use occurs outside of these segments except an occasional guided fishing trip and a few non-profit canoe trips. The expected flatwater experience is different from the expected whitewater experience. Many flatwater users are after a quiet, solitary experience (though some are members of groups with a "party atmosphere"), whereas the whitewater user is expecting action, thrill and noise.

Alternative 1: Existing flatwater use is primarily regulated by determining the number of watercraft that may be rented. Requests from special use permittees for additional watercraft suggest that the demand for rental may be approaching the availability of watercraft. No guided/outfitted use is permitted outside of the areas described above.

Alternative 2: Flatwater use would be limited to approximately half of existing use levels. As a result there is likely to be unmet demand for this type of activity. Those users who would rent a canoe would find substantially fewer people paddling along side. No new flatwater uses would be permitted. As a result opportunities to acquire knowledge about the river habitat would be limited.

Alternatives 3 and 6: These alternatives would maintain existing use levels. However if demand were to increase with increases in population the number of rentals would not be allowed to increase in order to provide the desired recreation experience. As a result, expected future demand for outfitted flatwater boating would not be fully met. Guided/Outfitted uses would be considered in segments where they are not now permitted at a level not to exceed 10 percent of designed annual capacity. This level of use would permit new guided/outfitted opportunities without guided/outfitted use dominating the river. As a result opportunities to acquire knowledge about the river habitat would be increased.

Alternative 4: Existing flatwater use would be limited to 75 percent of existing use levels. As a result there is likely to be unmet demand for this type of activity. Those users who would manage to rent a canoe would find substantially fewer people paddling along side and upstream and downstream. As a result demand for outfitted flatwater boating would be unmet. Guided/Outfitted uses would be permitted in segments where they are not now permitted at a level not to exceed 10 percent of non-commercial capacity. This level of use would permit new guided/outfitted opportunities without guided/outfitted use dominating the river. As a result opportunities to acquire knowledge about the river habitat would be increased.

Alternative 5: This alternative would allow existing outfitted boating to increase up to 120 percent of existing use. If demand were to increase with increases in population beyond this increase the number of rentals would not be allowed to increase further. Guided/Outfitted uses would be permitted in segments where they are not now permitted at a level not to exceed 20 percent of non-commercial capacity. This level of use would permit new guided/outfitted opportunities without guided/outfitted use dominating the river. As a result opportunities to acquire knowledge about the river habitat would be increased.

Horseback Riding

Land based commercial recreation consists of horseback riding in Segments 3D and 4F. The guided horse use in both segments is limited to designated trail systems. These trails receive a small portion of use from bikes and hikers as well. Horse use tends to have significant impacts, including cupping and trenching of the trails. The permittees are required

to maintain the designated trails. This requires raking in of berms, clearing trails of blowdown, and maintenance of drainage. The trails are on old roads in some cases, but mostly on trail.

Alternative 1: Existing use level is determined by demand and the permittee's ability to meet the demand. People who desire to ride horseback can almost always do so. Near Lava Island parking area high levels of use cause periodic clouds of dust to engulf other users. For the most part however equestrian trails are separate from other uses and guided use does not adversely affect the enjoyment of most other users.

Alternative 2: By reducing use to 50 percent of existing level this alternative would reduce recreational opportunities for those who want to ride horseback. Effects associated with use levels would be reduced accordingly.

Alternative 3 and 6: By capping use at existing levels this alternative would limit impacts on other users to existing levels. If demand for horseback riding increases it would not be met.

Alternative 4: By reducing use to 75 percent of existing level this alternative would reduce recreational opportunities for those who want to ride horseback and reduce impacts on other users.

Alternative 5: This alternative would allow an increase of up to 120 percent of existing use if standards were met. This increase would meet some projected use demands. Problems associated with dust could be expected to increase.

Non-profit Use

Non-profit guided/outfitted use would be provided by a nonprofit organization (such as a school, museum, recreation district) and typically be educational in nature. The providers may charge as much or more for the service as other guide/outfitters. This type of use could involve either land-based or water-based recreation.

All Alternatives: Both whitewater and flatwater use would continue in all alternatives at existing levels. It generally involves less than 300 users per year.

Alternatives 2-6: In segments where other Guided/Outfitted activity now occurs non-profit use could continue to take place at existing levels. Where guided/ outfitted use does not now occur, non-profit guided use could take place but would be included within the overall cap for guided/outfitted use within the segment. There is a small chance that for-profit and non-profit operators could begin to compete if guided/outfitted use caps were approached. However, given the existing low level of non-profit use with virtually no restriction on the amount that could occur, such a scenario is unlikely.

Special Events

A special recreation event is one sponsored by a group for a specific purpose. It usually entails 25 or more people and a charge for the event is required. These events may or may not be competitive in nature (race).

Alternative 1: Decisions concerning permitting special events are made on a case by case basis.

Alternatives 2-6: In all alternatives special events would be limited in size and scope. Restricting events to a 3 day limit and to 100 participants in segments classified as Roaded Natural and to 150 participants in segments classified Rural or Urban is expected to prevent long-term damage to River Values. This protocol would limit the number of events and would decrease the impact on the trails.

Carrying Capacity

Carrying capacity is defined as the type and level of visitor use that can be accommodated without substantially diminishing the quality of the recreation experience or the physical environment.

For all action alternatives, the carrying capacity was initially determined by developing ROS standards (see Appendix E of the Management Plan). These standards, which vary by segment and by alternative, set a relative density of use per river segment which could be expected to provide for a specific physical and social setting. These densities determine the total use level for the Upper Deschutes Wild and Scenic River, which sets the carrying capacity.

Federal, state, and local governments have limited opportunities to control use levels within the Upper Deschutes river corridor because of the proximity of Bend, resorts, and extensive private inholdings along the river. Changing the number of individual recreation sites and manipulating outfitter use levels are the only reasonable methods of addressing concerns about total use levels.

For all action alternatives, this approach to establishing carrying capacity is reflected in the annual designed capacity of recreational facilities and the total commercial use which would be authorized within the corridor.

Alternative 1: Under Alternative 1, carrying capacity for the river corridor as a whole has not been determined. A formula for determining the carrying capacity on water in Segment 4E has been established. To compare this alternative with others, the designed annual capacity was calculated at 188,000. This is based on an estimate of actual number of sites. Actual use of the area has been tracked using a variety of methods since 1990. With no additional outfitter use authorized, the highest actual use figures are about 6 percent below the designed annual capacity.

Alternatives 2-6: Under all action alternatives, reducing the numbers of dispersed recreation sites is expected to reduce the total use within the corridor by about 26,000.

Under all alternatives, development of additional facilities in LaPine State Recreation Area are expected but would not appreciably change the current annual designed capacity.

Alternative 2: Under this alternative, annual designed capacity would be approximately 35 percent below current conditions, and approx 31 percent below the highest estimate of actual annual use.

Alternative 3: Under this alternative, annual designed capacity would be approximately 9 percent above current conditions, and approx 13 percent above the highest estimate of actual annual use.

Alternative 4: Under this alternative, annual designed capacity would be approximately 13 percent below current conditions, and approx 7 percent below the highest estimate of actual annual use.

Alternative 5: Under this alternative, annual designed capacity would be approximately 53 percent above current conditions, and approx 63 percent above the highest estimate of actual annual use.

Alternative 6: Under this alternative, annual designed capacity would be approximately 14 percent above current conditions, and approx 20 percent above the highest estimate of actual annual use.

Use Allocations

Alternative 1: Currently there are no specified use allocations between outfitters and non-commercial users except in Segment 4E (the Big Eddy reach). Special use authorizations are required for all outfitter services which use Forest Service facilities or lands for river access. Non-commercial users are regulated only through the limitations on access.

Alternatives 2-6: *Except for Segment 4E* - Non-commercial use levels would be regulated by designed annual site capacities, which would vary by alternative. Levels of commercial use also vary by alternative, and would continue to be regulated by special use authorizations.

In segments where current outfitter uses have been established those uses would be continued at some level under all alternatives. Variations in these use levels were based on relative variations in non-commercial use levels set by ROS standards. In segments where outfitter use is not currently specifically authorized, no decision would be made on whether or not a specific kind of outfitted or guided use would be permitted (except non-profit educational), but upper limits on the amount of guided/outfitted use which would be considered would be established only as a frame of reference to be considered in future decisions where bona fide needs were identified. Cost of administration of this system is relatively low and is highly convenient for most users. If actual use levels approach designed annual capacities under a specific alternative, additional analysis to determine limits of acceptable change would occur.

Alternative 5: *Segment 4E only* - Whitewater users, both non-commercial and outfitter, would be required to obtain a permit from a common pool. Use allocations by this method could tend to favor the outfitters. The average length of stay for a single trip would be approximately two hours, resulting in a need to regulate individuals and launch times on an extremely intensive schedule.

Private Land Use

This section evaluates the effects of the land-based alternatives on private lands. The alternatives 2-5 propose a limited variety of changes to existing land use regulations concerning setbacks, design reviews, timber harvest, and fill and removal activities which could affect how lands are developed in the future. These activities are governed by state, county, and by the Bend Urban Planning Commission regulations (in segment 4G). These are detailed in the issue description in Chapter 1. Actions proposed within the alternatives would strengthen or improve current regulations concerning the visibility of structures, maintenance of native vegetation, and revegetation of eroding streambanks.

Effects of Managing River Resources on Private Property

Managing river resources has the potential to affect access to private property, privacy of the resident, stability of private streamside lands, and the activities residents can engage in directly from their property.

Alternatives with probable actions which would have the potential for effects on private property are discussed below.

Vegetation and Wildlife

Alternatives 1: No Change.

Alternatives 2-6: Closure of roads accessing riparian areas on Forest Service land would increase privacy on private lands across the river from such access points.

Alternatives 2 and 4: Elimination of Cardinal bridge would eliminate direct foot, bike, equestrian, and emergency access between Sunriver and the west side of the river. Harper Bridge would still provide access but would be less convenient than Cardinal Bridge. The recreational experience would also be different, because Harper Bridge carries motor vehicle traffic. Recreational use of the west side of the river would be expected to decrease in this segment, and private land owners on the east side may have increased privacy.

The closure of Road 4370 between Haner Park and Wyeth Camp would require residents on the northwest side of the river to use an alternate and slightly longer route.

Alternative 6: The closure of Road 4370 between Haner Park and Wyeth Camp would require residents on the northwest side of the river to use an alternate and slightly longer route. Emergency access would be permitted over Roads 4370 and 4300-100.

Cardinal Bridge would remain open under permit to the Sunriver Owners Association, and Road 4100-280 would be maintained for emergency use. Direct access would continue for hikers, bicyclists, equestrians, and emergency traffic from Sunriver.

Recreation

Boating

Alternative 1: This alternative would continue existing motorized boating opportunities.

Alternative 2: Under this alternative, motorized boating would be limited to Segment 3C. Owners of property outside of Segment 3C could not operate motor boats on the river directly from their property. Erosion caused by the wakes of motorboats would be eliminated in all but Segment 3C. Motorized boating could be concentrated in this segment, and riverfront properties may have increased erosion caused by motorboat wakes.

Alternative 4: Motorized boating would be allowed between LaPine State Recreation Area boat ramp and Benham Falls Bridge. Owners of property within Segment 2A could not operate motorboats directly from their property. Erosion caused by motorboats would be eliminated in Segment 2A.

Alternatives 3, 5, 6: Owners of property along the river would have the same access to motorized river travel as at present except that in Segment 3 they could not use motorized boats above the La Pine State Recreation Area Bridge. Because motorized use would be permitted on all reaches of the river bounded by private property, no change would be expected on private properties in the rate of erosion associated with motorized boating.

Guided /Outfitted Use

The most significant impact of guided/outfitted use on the private land owner is a reduced level of privacy associated with increased numbers of recreational users.

Alternative 1: The majority of guided/outfitted use in the river corridor occurs away from private land. Only at Sunriver do significant amounts of guided/outfitted use occur adjacent to private land. Uses include horseback riding and flatwater canoe, raft, and kayak rentals. Horseback riding on forest service land has virtually no impact on private landowners because it occurs across the river and some distance from residences. Existing flat water rental does affect the privacy of a few residents downstream from Sunriver.

Alternative 2: Property owners in Segments 2,3, and 4 would experience no change.

Alternative 3-6: Owners of property adjacent to the river could be affected by more river travelers as the result of the potential for increased guided/outfitted travel.

Developed Sites and Trails

New development on Forest Service land adjacent to private property could result in increased use levels which could disturb adjacent property owners. Alternatives 1 and 2 would not increase the potential for disturbance. Alternatives 3 and 6 would increase the potential for disturbance in the vicinity of Pringle Falls and Big River Campgrounds. Alternative 4 would increase the potential for disturbance in the vicinity of Big River Campground. Alternative 5 would increase the potential for disturbance in the vicinity of Pringle Falls and Big River Campgrounds and near the Urban Growth Boundary where a new picnic area would be developed.

Setbacks

River Setbacks

River setbacks are designed to protect and enhance geologic, hydrologic, vegetative, and scenic values. Effects on these values are generally proportional to the distance of the setback from the river, the condition of the streambank and the vegetation between the development and the structure. Usually, the greater the setback, the less the potential impact on streambank stability, water quality, or riparian and upland vegetation, and the greater the potential for having the development screened or filtered from views along the river.

There would be no change to existing developments under any of the alternatives. Reconstruction or new construction would be the only activities affected by these alternatives.

Deschutes County

Alternative 1, 3-5: Under these alternatives, new developments would continue with a 100 foot setback requirement on those lands with river frontage. Setback exceptions could be expected for hardship cases (those cases where development cannot meet septic and other property setback requirements and still meet river setbacks). Under current regulations, out of an estimated 848 river front properties, approximately 290 of those properties are currently undeveloped. Estimates are that only about 4 of those properties would qualify for and likely be granted a setback exception. Setback exceptions approval would usually include a vegetative conservation easement for the area between the dwelling and the river, and may often require additional plantings (usually of native vegetation) between the structure and the river. The remaining estimated 286 of the undeveloped properties could be expected to be built at least 100 feet from the river.

Alternative 2: Alternative 2 would require a 200 foot setback for any future residential development along the river. Over 70 of the approximately 290 properties within the river corridor could be eligible for setback exceptions based on lot size. This larger setback could result in an increase in exception requests and an increase in workload for government agencies without netting a substantial difference in the numbers of dwellings which would be set further than 100 feet from the river. Under this alternative, properties which qualified for a hardship exception would become higher priority for public acquisition. Conservation easements granted as a condition of exception could increase in size under this alternative, up to 200 feet.

Bend Urban Growth Boundary (Segment 4G - State Scenic Waterway only)

Under all alternatives the current UBG Planning Commission rules of a minimum of 40 feet from the river would continue.

Rimrock Setbacks

Rimrock setbacks are designed to protect and enhance scenic values, and often benefit geologic, wildlife, and vegetation values. Setback of development from these formations typically would result in less potential impacts to the geologic integrity of the formation and the unique habitats for both plants and animals which they often provide. Generally, the greater the setback the more likely the rock formation would be viewed as a natural part of the landscape and the more pleasing to viewers on the river.

Deschutes County

All Alternatives: None of the alternatives would change the existing 50 foot rimrock setback required by the county. Currently, the rimrock formation along the river has not been mapped. Locations are established during designedreview. Definitions within the comprehensive plan limit the designation of rimrock to a specific geologic formation. This definition does not apply to lands which have steep banks which are not rimrock, or those minor rimrock formations which may have a mantle of soil on top of them. This could result in those formations which do not meet the definition having development closer than 20 feet from the edge. This would increase the potential visibility of the structures, and the likelihood that development of the structures would result in reducing or eliminating unique elements of the geologic structure and plant and animal habitats.

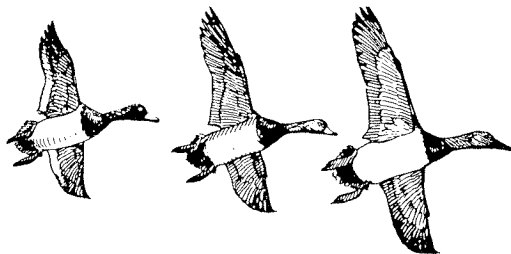
Bend Urban Growth Area (Segment 4G only)

Alternative 1: Under this alternative, no minimum setbacks are required.

State Scenic Waterway

Alternative 1: State Scenic Waterway rules require that new development in this area be screened from the river by topography or vegetation. This generally results in development which blends to the extent possible with the natural environment. Without any minimum setback, geologic, hydrologic, and vegetative values are less likely to be protected in the case of a development proposal.

Alternatives 2-5: State Scenic Waterway rules would be changed to require a rimrock setback requirement of a minimum of 50 feet under Alternative 2, and 20 feet in Alternatives 3-5. The potential for direct effects on geologic values and unique habitats from commercial or residential development would be less than under current trends in those locations where a development was screened from the river but still on a rimrock formation. Alternative 2 would provide the greatest protection, but could make approval of a building plan more difficult to attain.



Design Review

Design reviews are established to protect and enhance vegetative and scenic values. The amount of native riparian, wetland, and upland vegetation which is retained during development is generally increased as a result of the design review process. Building design reviews typically result in developments which blend cultural elements of the landscape with natural elements.

Currently, and under all proposed alternatives design reviews and approvals are conducted as a part of the building permit process by the State in segments 2, 3A, 3B and 3D, and 4; by the Bend Urban Planning Commission and the City of Bend Planning Commission in Segment 4G; and by the County all along the river. These reviews are coordinated with the Forest Service and other affected agencies.

Deschutes County and State Scenic Waterway

Alternative 1: Current development regulations for both the State and County include maintaining native vegetation between the structure and the river wherever and whenever possible. Removal of commercial forest products under the State Forest Practices Act (SFPA) is included in design reviews by the State in all but segment 3C. (See Timber Harvest for other requirements). Within segment 3C, virtually all of the privately owned land grows trees which could be commercially sold. If sold, cutting and removal of the product would be subject to SFPA rather than design review by the County unless maintenance of the vegetation was a condition of an existing land use permit by the County. Where maintenance of the vegetation was a condition of development, that vegetation would remain except where removal was necessary to enhance the health of the vegetation or reduce fire risk.

Current State Scenic Waterway rules and Deschutes County regulations have height and color requirements designed to blend the structure with its natural surroundings. This requirement, when combined with the setback and maintenance of native vegetation, generally results in protection of the scenic integrity while continuing reasonable development.

State Scenic Waterway rules currently prohibit use of metal roofing without going through the exceptions process. This rule was put in place at a time when metal roofing materials would result in strong contrasting elements in the landscape. Since that time, materials have changed. Currently, color and reflective elements of metal roofing materials are such that exceptions are regularly granted while still meeting goals of the Scenic Waterway program.

Current State Scenic Waterway rules do not require design review for fencing or agricultural buildings within the State Scenic Waterway. This has resulted in and has a high potential to result in future structures which do not blend in with the cultural landscape, and which are not consistent with the construction and design standards of residential development within the area.

Alternatives 2-5: Under all action alternatives, fences and agricultural buildings would be subject to design review under the State Scenic Waterways Act. This would reduce the potential for construction of large square-footage structures or unsightly fences without the same level of consideration for river values as residential structures.

Alternatives 3-5: Under all action alternatives except Alternative 2, metal siding and roofing would be allowed outright under State Scenic Waterway rules if it met design requirements for color and reflectivity. This would improve the structure's ability to resist fire in an area with a substantial fire hazard. This action would also streamline the design review process by eliminating the need to get special approval for the use of these materials. Since this approval is currently routinely granted, it would reduce the workload associated with the design review process without reducing the scenic integrity of the development.

Alternative 2, 4, and 6: Under these alternatives, native vegetation would be maintained on all lands within the river corridor regardless of development proposals unless vegetation removal is conducted under the rules of the State Forest Practices Act, or except as needed to reduce hazards, improve vegetative health, or for immediate siting needs of a proposal for development. This would generally result in less vegetative modifications in upland vegetation over the current requirements.

Alternative 2 would continue the current practice of review of all metal roofing or siding proposals to insure it would meet the goals of the program. The effects of this would be the same as under Alternative 1.

Timber Harvest

State Forest Practices Act

Under all alternatives, commercial timber harvest conducted under the State Forest Practices Act would continue unaltered. Under current regulations, within all but segment 3C, the State Scenic Waterway review and approval is required, although not interrelated. Within segment 3C, other agencies have an opportunity to comment on proposed harvest within 100 feet of the river, but any modifications of a specific harvest activity which was above what is required in the Act would only be accomplished through cooperative efforts with landowner. Harvest and removal activities associated with changes in zoning from forest uses do not have to meet the requirements of the SFPA, and would be subject to county regulations. Under current county regulations, complete removal of all vegetation on a property could occur if the property was not proposed for specific development.

Under State Forest Practices activities, water quality and fishery values are protected by basal area retention requirements within 100 feet of the river. Although not specifically designed to protect scenic values, in most cases the amount of vegetation retained within the 100 feet would screen the removal of vegetation from the lands away from the river.

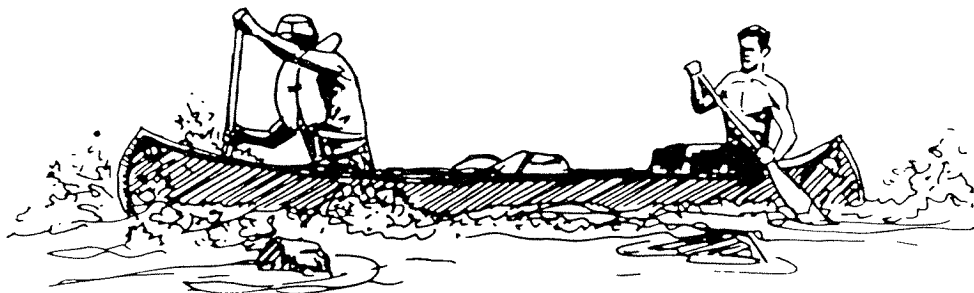
State Scenic Waterway

Under all alternatives, State Scenic Waterway review and approval within all but segment 3C would also be required before commercial harvest could occur on private lands. The review is designed to ensure that removal of other than dead, dying, or diseased trees are screened from the view of the river or from developed sites within the river, and riparian vegetation is protected.

Fill and Removal and Fishery Habitat Enhancement

The primary effects on land management or use within a Wild and Scenic River Corridor occurs to lands immediately adjacent to the river. Those activities which are most likely to be affected, especially on private lands, are fill and removal activities within the bed and banks of the river. Generally speaking, within a federally designated river, water resource projects (which are most often fill and removal activities) which would have a direct and adverse effect on the values for which the river were established would not be permitted by the Corps of Engineers or any other federal agency. If a similar activity is upstream, downstream, or on a tributary of the river outside of the actual boundary, such activities would only be permitted if they did not unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area on the date of designation. These differences in review standards allow for a greater level of protection of river values for activities which could occur within the boundary than outside of the boundary, and could potentially have greater restrictions on the kinds of fill activities which could take place on private lands. This inclusion would be unlikely to affect fishery or other instream enhancement activities.

Under all alternatives, all cooperating agencies would pursue an active program to promote revegetation techniques (includes soil bioengineering) for streambank stability improvements in combination with placement of boulders, cobbles, or large woody material for fishery enhancement activities. Where possible, assistance with removal of structures or materials which do not encourage natural deposition of sediments or natural vegetation of streambanks would be provided. Over time, as existing concrete walls or abutments deteriorate, they would be replaced with native vegetation, increasing the channel stability and improving the free flowing characteristics of the river. Revegetation of streambanks and removal of existing rip-rap within the stream channel would increase the amount and improve the condition of riparian vegetation which would have indirect benefits to geologic, hydrologic, fishery, and scenic values (see Vegetation). The increase in natural instream structure provided by the addition of cobbles, boulders, or large woody material would benefit the geologic, hydrologic, and fishery values. (See Fishery).



Boundary

This section describes and compares the potential environmental consequences of implementing the interim and proposed boundary for the Upper Deschutes Wild and Scenic River. Under all alternatives, the State Scenic Waterway boundary would remain 1/4 mile on either side of the river. This would be the same as the interim federal boundary with the exception of Segment 3C (which is only federally designated) and Segment 4G (which is only in the State designation). Effects on lands within the State Scenic Waterway boundary are covered in under the section on Effects on Private Lands.

Under all alternatives, proposed changes to the interim boundary were made to provide additional protection to outstandingly remarkable river values, or to exclude lands which would have little effect on river values.

On National Forest lands, the changes in land management allocations between the interim and proposed boundary are discussed under Consistency With Other Plans and Policies. For private lands, the proposed boundary would result in a net reduction of nearly 400 acres which would be excluded from the Wild and Scenic River corridor. This change would primarily be the result of excluding areas not seen from the river. (See Maps 1 and 2 and Table 2-1.)

Overall, the interim boundary would include about 230 acres per river mile, while the proposed boundary would include 309 acres per river mile. The maximum acres which can be included in the boundary is 320 per river mile. The proposed boundary would include more state and federal acres designed to respond to actual or potential needs to protect and enhance specific river values.



Social and Economic Effects of Alternatives

The land-based alternatives would affect the social and economic settings of local communities primarily through the level and type of recreation each provides. Other resource objectives such as fish and wildlife habitat improvement would affect communities directly through creation of jobs and indirectly through their influence on recreation.

In addition to visitors' recreation expenditures discussed under economic impacts, some employment opportunities would also be provided by recreation site work and management activities to improve fish and wildlife habitat. Much of this work would be accomplished through contracts, generating employment opportunities in the private sector. The actual amount of work would depend on budgets, and many of the activities would be the same in all alternatives. Based on proposed trail, road, and recreation site changes which vary by alternative, Alternative 5 would have the highest level of work, followed by Alternatives 4, 3, then 2. Some level of activities would occur under Alternative 1 as opportunities occur, but nothing is currently planned.

The effects of the alternatives on local communities are assessed based on the potential social effects resulting from implementation of probable actions in terms of economic impacts resulting from recreationists' expenditures, National Forest payments to counties and quality of life for local residents. The effects of the flow options are discussed in the section on flow options.

Assumptions

Projected use in developed recreation was analyzed using two different assumptions for growth rates: 1) assuming a trend of two percent growth per year (based on statewide population trends) and 2) assuming a trend of 7.3 percent growth per year (based on a synthesis of local studies by Runyan and Associates (1991), and ECO Northwest (1989).

Reductions in allowed use levels for guided/outfitted recreation could cause price increases for those services as fixed overhead costs must be covered by fewer customers.

The economy during this time period would be relatively static and made up of existing industries similar to today.

Communities closest to the river would be most affected by changes in recreation use of the river corridor.

Geologic/Hydrologic/Vegetation/Wildlife

Closure of dispersed sites would have the greatest potential social impacts. It is likely that such actions would cause dissatisfaction among people who have traditionally used particular locations. Expressions of this dissatisfaction may range from increased vandalism of Forest Service facilities to creation of new dispersed sites to registering complaints at Forest offices or with Forest personnel. These reactions can be expected to occur most frequently during the first through third outdoor recreation season immediately following the closure and reduced as time goes on.

There is the potential that closure of dispersed sites would have some cumulative adverse economic effects. A perception could develop that so few areas are available on Federal lands near the river for undeveloped recreational experiences that visits to the area for this purpose would decrease. However, with the variety of recreational opportunities in the Central Oregon area, no measurable impact is likely.

Redesigning or relocating of existing developed trails or elimination of user trails would cause minor inconvenience and dissatisfaction among some people who have been using the old trail locations. Learning new trail routes would be viewed as an obstacle by some. Trail reconstruction that moves trails out of riparian areas would reduce the recreational and scenic experience for some. Others would appreciate the benefits to other values the relocation would create.

Use of prescribed fire has a high potential for social impacts. People often fear property damage to adjacent private land during prescribed burns, and the smoke generated may be perceived as representing an unwarranted health risk and/or as degrading visual quality.

Recreation

Non-commercial Recreation

Expenditures by visitors to the river corridor are important contributions to the area's economy. However there is no model to predict the actual percent of total recreation dollars is actually spent by river users. Whether expenditures increase or decline in the future, and the magnitude of the change, largely depends on visitation levels and recreational opportunities (including capacity of recreational facilities). Visitors to the Deschutes River from out of the Central Oregon area often come to enjoy a variety of recreational opportunities in the area and not just the river. Locals tend to use the river corridor more as a destination on a daily or overnight visit. No model exists to predict the actual percentage of total recreation dollars that are spent as a result of the river alone. Predicting future visitation levels is difficult because it depends on a number of factors (e.g. population change, changing preferences, the overall level of economic prosperity, and the amount of other recreational opportunities available).

Central Oregon offers a wide variety of recreational pursuits for visitors and residents of the area. This analysis assumes that this variety will continue to draw recreationists to the area. Population in the Northwest and the region have grown at a steady pace for over a decade, contributing to increases in all forms of recreational activity (SCORP 1991).

Alternative 1: Because no changes in current recreation policies are proposed under this alternative, no immediate direct economic effect would be expected from its implementation. However, use levels would be expected to continue increasing without a coordinated recreation policy under this alternative. Current use levels are estimated to be very near the design capacity of about 122,000 visits per year. Recreationists may eventually perceive the area to be overused and chose to vacation elsewhere in Central Oregon.

Alternatives 2 and 4: These alternatives would have the lowest designed annual capacity (89,200 and 108,000 annual visits, respectively) and would be a reduction from the existing design capacity. The amount the economy of the area would be impacted is difficult to determine, but a slight decrease could be expected.

Alternative 3: This alternative would provide for a small decrease in designed annual capacity (to 115,500), so a small decrease in visitors' contributions to the local economy would be expected.

Alternative 5: This alternative would increase the designed annual capacity for non-commercial recreation by about 43,000. Visitors' contributions to the local economy would be expected to increase over the current level. Some recreationists may go elsewhere, feeling the river corridor is too crowded or overdeveloped.

Guided/Outfitted Recreation

Guided/outfitted recreation in the river corridor generates over \$1 million in gross revenues (USDA Forest Service 1992) and provides seasonal jobs for whitewater guides, horseback riders, canoe outfitters, and related support staff. Fishing guide permits allow use on the Upper Deschutes, but use numbers are currently low. The alternatives provide a range of levels of outfitted uses from reductions of up to 50 percent of existing use levels, to increases of up to 120 percent of existing uses. The relationship between current overall revenues and incomes to the use levels for existing guides and outfitters described in the alternatives is unknown at this time. It cannot automatically be assumed that a reduction in those use levels would result in a proportional reduction in either revenue to the government or income to the outfitters. To a certain point, because of the supply to demand ration, prices could be raised which would equal the revenues expected in Alternative 4. Alternative 3 would maintain existing levels of revenue, and Alternative 5 could be expected to increase existing levels of revenue and income.

Alternative 1: Under this alternative, all existing guided/outfitter uses would continue under current management direction. No new uses would be authorized. Current uses include whitewater boating (rafting), flatwater boating (canoe, patio boat, and motor boating/fishing) and horseback riding. Total Guided/Outfitted use is currently 66,000.

Alternative 2: This alternative would have the lowest level of guided/outfitted recreation, a reduction of 50 percent from current levels. Total Guided/Outfitted could not exceed 32,300 visits. The direct economic effects of these changes would be felt primarily by the businesses providing these services. Prices would be expected to rise because overhead costs would be spread over fewer customers. With demand for this experience higher than the permitted use level, the increase in price would be accepted by most recreationists, but could be out of reach for some. The reduction in user numbers would also affect jobs available for guides. These seasonal positions could be reduced in number, hours, or season duration.

Alternatives 3 and 6: In this alternative, existing guided/outfitted permits would be capped at existing levels. Some new permits for whitewater use could be authorized in this alternative, increasing total user numbers and increasing job opportunities for guides and instructors. Total Guided/Outfitted could not exceed 76,300 visits.

Alternative 4: This alternative would cap existing guided/outfitted use at 75 percent of current use while providing for new non-rafting use in Segments 4E and 4F and new flatwater uses upstream from Harper Bridge. Total guided/outfitted use would be about 56,000 visits annually. Prices for guided rafting would probably rise, although probably not as much as in Alternative 2. Job opportunities for some raft guides would decrease in number, hours, or season duration, while opportunities for other whitewater guides or instructors would increase. The total net use level would show a net increase in outfitter job opportunities..

Alternative 5: In this alternative, a common pool of 50,000 permits would be available for all whitewater users (guided/outfitted and non-commercial) in Segment 4E. The percentage of these permits used with a guide/outfitter could vary depending upon the permit allocation system used. This uncertainty could cause difficulties for guided/outfitted services in determining hiring levels. Prices may drop as whitewater outfitters try to market their services. New whitewater use (rafting or other) would be allowed in Segment 4B, and non-rafting whitewater use would be allowed in Segment 4F. Other outfitted use could increase up to 120 percent of existing uses. Total guided/outfitted use could reach as high as 132,300 visits. Under this alternative, outfitters would likely have increases in job opportunities.

Payments to Counties

The Forest Service pays 25 percent of receipts to counties in lieu of property taxes. Receipts from outfitter/guide permits are subject to this payment; however, campground fees are not. Fee campgrounds along the river are operated by concessioners. Under this system, campers pay county room tax. Higher levels of guided/outfitted use and campground use would provide increased revenues to the county.

Quality of Life

The Upper Deschutes Wild and Scenic River corridor contributes to the quality of life of local residents by providing a variety of amenities, nearby recreation opportunities, educational opportunities through interpretive programs, and employment and income from the recreation trade. None of the alternatives varies enough from Alternative 1 (No Action) to greatly alter community character, but each modifies the physical environment, amenities or economic conditions for some local residents and visitors as described below.

As population pressure on limited natural resources increases, regulation of activities result. Implementation of all alternatives would increase the amount of regulation within the corridor. Increased regulation of recreation on the Deschutes through implementation of Alternatives 2-6 has the potential to contribute to a general perception that use of Federal lands is increasingly restricted. The Deschutes National Forest has recently implemented a number of regulatory changes that would tend to contribute to this perception. Regulations establishing specified wood cutting areas, off-highway vehicle restrictions, new regulations contained in the Newberry National Volcanic Monument Plan, restrictions on numbers of users in wilderness areas, cave management regulations and an active road closure program have all been implemented over the last three years.

Congestion- U.S. Highway 97 is the major road artery providing access to the Upper Deschutes. Between 1985 and 1989, traffic counts on this stretch of Highway 97 showed an increase of just over 6 percent per year. It is likely that traffic and congestion will increase regardless of the alternative selected.

Property Values - It is hard to estimate the overall impact of the alternatives on the value of property located in or near the river corridor. Effects on property values of decisions made as a result of this plan are unknown and cannot be predicted based on current data. Given the magnitude of changes proposed by the alternatives, measurable effects are not expected. Current trends in Central Oregon indicate land values are continuing to rise due to a variety of other influences. The direction and degree of change in property values would depend on proximity to the river, and whether prospective buyers view changes brought about by the alternative as positive or negative. The development of the river plan would give property owners a clearer picture of the recreation activities and developments which will occur near their property.

Mitigation

Mitigation measures are actions intended to compensate for or minimize the adverse effects of allowed activities and are intended to protect the Outstandingly Remarkable Values of the Upper Deschutes River. Some possible mitigation measures, which have proved to be effective in reducing or eliminating adverse effects associated with some of the probable actions suggested in the alternatives, are listed below.

Prescribed Fire

- Prescribed fire operations will usually occur from late fall through late spring, when fuels are relatively moist and air circulation tends to be good. Such conditions insure very low smoke emissions that are quickly diluted and dispersed.
- All prescribed burning will be managed to comply with the Oregon State Smoke Management Plan, the Oregon State Implementation Plan, the Deschutes National Forest Land and Resource Management Plan, and the Final Environmental Impact Statement for Managing Competing and Unwanted Vegetation (USDA Forest Service 1988). Smoke production and dispersion from prescribed fires will be monitored. If adverse impacts occur or are predicted to occur, the firing operations will be suspended. Smoke to downwind communities (e.g. Bend, La Pine, or Sunriver) and to popular recreational areas (including nearby Class I (i.e., clean air) Wilderness Areas) will be controlled by burning only when unstable air conditions are carrying smoke away from these sensitive sites.
- All prescribed fires must have a written, site-specific burn plan approved in advance. The plan includes clearly defined resource objectives and measures to protect the site and the environment. Through the proper burn prescription, which specifies weather,

fuel moisture, and fuel loading criteria, the fire can be kept under control, produce the desired results, and minimize effects to air quality.

- To limit consumption of down logs and protect soil and duff layer, burning can be done at the highest possible fuel moisture.
- Some methods to reduce smoke from prescribed fire include extensive utilization of forest residues prior to burning, rapid fire ignition, burning only when optimum atmospheric conditions exist, and not allowing material to continue smoldering after it burns. Ignitions would also be coordinated with managers of surrounding lands to avoid overloading local air masses.
- Other measures can substantially reduce other negative environmental impacts of prescribed burning. Avoid burn piles or the burning of high concentrations of fuel on sensitive soils. Locate piles on adjacent sites, crush with machinery, jackpot or underburn at light or moderate intensities. Avoid burn piles on steep slopes. Consider machine crushing, jackpot or underburning at light or moderate intensities to leave large woody debris intact and protect against future soil displacement through erosion. Arrange fuel treatments to maximize effectiveness and minimize undesirable effects. This measure is very effective where it can be applied. Protect riparian vegetation and reduce sedimentation into lakes and streams by leaving an unburned buffer. This measure is effective in reducing sedimentation and protecting vegetation. Timing to achieve the proper fuel moisture, weather and fire behavior can reduce scorch heights and mortality to standing live trees. This measure is effective, however, isolated scorching and mortality would still occur. Pull fuels away from areas that require protection during prescribed burning. Snags, downed wood and live trees can best be protected in this manner and scorch heights can be reduced. Crushing of fuels can also reduce scorch heights and mortality to live trees. The measure is very effective. Burning prescriptions should be designed to limit disturbance to soil litter and duff deposits to the amount necessary to achieve the burning objectives. The measure is effective but results can be expected to be variable.

Use of Mechanized Equipment for Treating Vegetation and Fuels

- The choice of appropriate mechanized equipment for felling, skidding, utilization and other vegetation management practices would be made as needed to reduce physical damage to sites or loss of desirable residual vegetation. Such measures are effective in reducing damage but would not eliminate it.
- Slopes over 30 percent are considered sensitive to soil displacement, gouging and mixing during use of ground based equipment. Consider using aerial or cable systems that suspend at least one end of logs where fuels are heavy or yarding distances are long. Measures are effective in reducing undesirable effects.
- Designate travel routes for heavy machinery involved in vegetation management activities to avoid sensitive areas such as sandy swales between basalt ridges, areas with high water tables or fine textured soils and to minimize the area impacted. Measures are very effective but complete avoidance may not be possible.

- Consider seasonal restrictions on machinery operation to periods of time when soils are dry, frozen or covered with snow to minimize compaction and surface disturbance. Measures are considered very effective.
- In areas suitable for the use of mechanical tree harvesters care should be taken to minimize the amount of area traveled over by the machine. Consider the use of boom types of machinery to reduce damage to soils. Measures are effective in reducing damage but not eliminating it.
- Machine piling of slash during fuels treatment operations should be limited to situations where no other alternative method would accomplish the objective. Machine piling should be especially limited on slopes exceeding 30 percent. Impacts of machine piling can be minimized by piling only concentrations to break up fuel continuity or by piling over frozen ground. Measures are effective in reducing damage where they can be applied.
- Mechanical soil tillage is justified to restore soil following detrimental disturbance due to compaction but is not always effective (e.g. in areas of very rocky soils or soils that are continually wet). The most effective approach is to avoid damage initially.
- Use low impact, manual methods including handtools to achieve objectives of fuel reduction or vegetation management in sensitive areas. Effects would be substantially ameliorated.

Maintenance of Plant Diversity

- The mixture of species to be seeded or planted would be planned to preserve plant diversity. Adequate measures would be taken to insure regeneration success to the degree necessary to meet management objectives. The measure is effective where the knowledge of plant establishment and growth requirements are known. It would vary by species and site conditions.
- Forests and other vegetation communities remain healthier when species are grown where they are ecologically adapted. The measure is effective to the extent that knowledge of plant requirements are known. It would vary by species.
- The degree and arrangement of various successional stages found within a given old-growth area should support vegetation representing mid, late, and very late (decadent) conditions to provide for biodiversity, in addition to providing for the management of the old-growth tract over long periods of time. The measure would generally lower the risk of catastrophic consequences from uncontrollable environmental disturbances such as those from wildfire or insects and diseases.
- Prescribe activities that would provide for the enhancement and long-term maintenance of unique plant communities. The measure is effective to the extent that plant requirements are known. This would vary by species.
- The use of natural regeneration is encouraged over planting where feasible. Natural regeneration cannot always be assured. Effectiveness would vary with plant species and site conditions.

- Prevent further encroachment of undesirable exotic plant species by promptly establishing native plant species in disturbed areas. Monitor infestation areas and control noxious weeds annually. Clean equipment to avoid the inadvertent spread of noxious weeds from one area to another.
- Survey areas for threatened, endangered or sensitive plant species, prior to ground disturbing activities. The measure is very effective when conducted properly.
- Use appropriate animal damage control measures to prevent unacceptable impacts to forest vegetation. Effectiveness varies depending on the vegetation and damaging agent.

Recreation Activities

- Avoid high levels of trail or facility development in or near riparian areas. Design facilities and trails to channel visitors away from important or sensitive plant habitats. The measure would substantially reduce impacts but would not prevent individuals from entering these areas on occasion.
- Provide information to visitors through interpretive signing or other means about protecting threatened and endangered plants and sensitive plant habitats.
- Prohibit dispersed camping in wetlands. The method would ameliorate but would not eliminate effects.
- To reduce potential for recreation use to increase the amount of noxious weeds, require recreationists to stay on designated trails and roads.

Wildlife

- To reduce disturbance and impacts to habitat, close or obliterate roads not required to access developed sites, private property, administrative sites, and designated dispersed sites. Road closure is very effective in reducing disturbance to wildlife.
- Existing shrubs and saplings should be maintained in campgrounds and any future campground development and maintenance should retain a diversity of shrub species interspersed throughout the campsites.
- Buffers will be used to avoid human-raptor conflicts during the nesting period, both on trails and roads. Trails would be designed to avoid nesting raptor sites where possible. This measure is effective in reducing disturbance to raptors, but would not eliminate it.

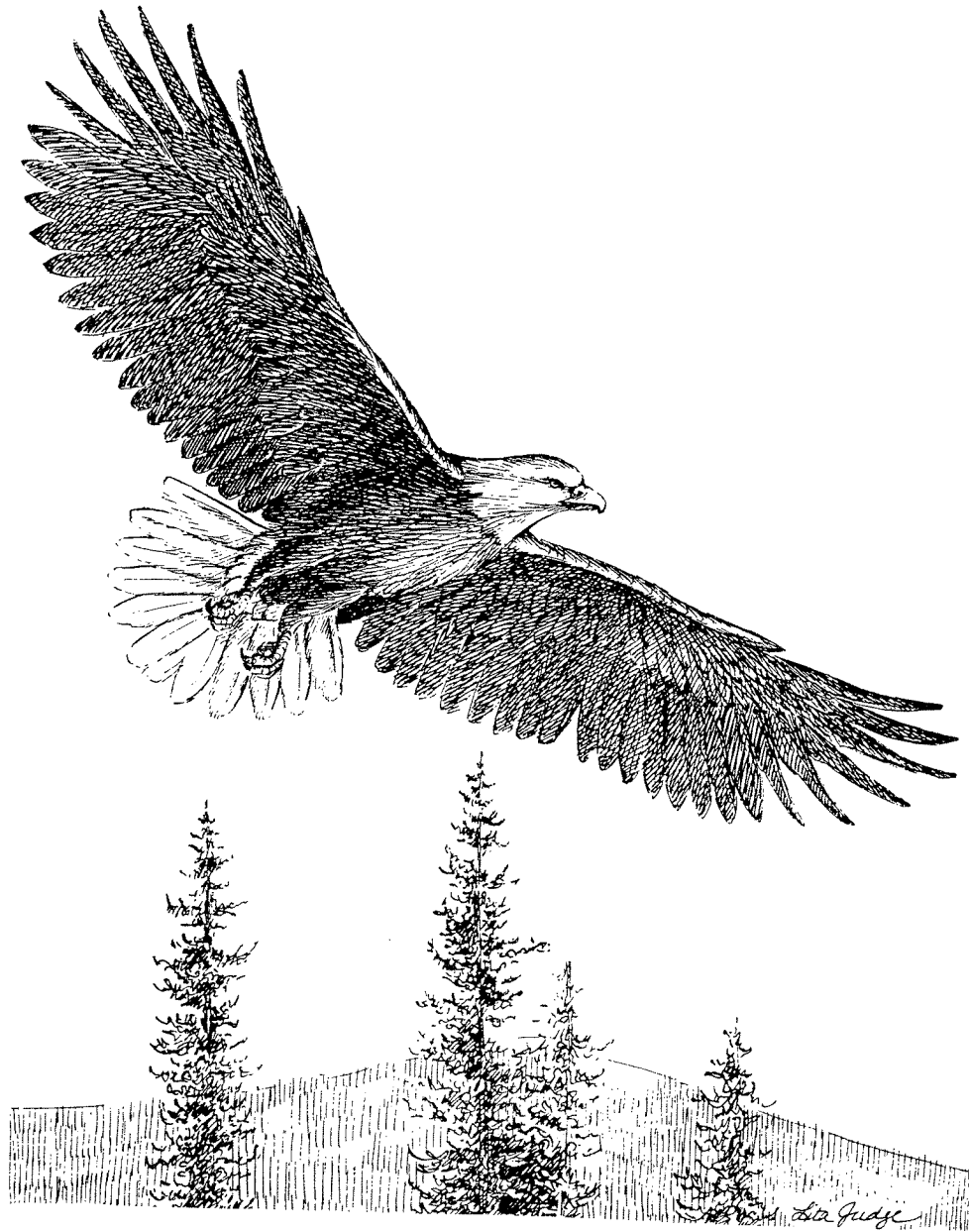
Cultural Resources

Mitigation minimizes the effects to cultural resources caused by human activities and natural degradation. A mitigation method's effectiveness is in part due to the resources value, uniqueness, potential for information and interpretive opportunities. Data recovery for example, is not appropriate for a site whose value lies in its location, such as a site of religious value to American Indians. Mitigation methods do not differ by alternative.

Mitigation methods include but are not limited to: redesign of a proposed project, site avoidance, data recovery, adaptive reuse, installation of protective barriers such as fill, relocation of a resource and/or documentation. Mitigation measures are site specific and based on consultation with the State Historic Preservation Officer and the Advisory Council

on Historic Preservation when a property is eligible to the National Register of Historic Places; and when appropriate, consultation with American Indian Tribes. Cultural resources represent different values to Indian people, the scientific community, and the general public. Whether the effects to a cultural resource are caused by direct, indirect or cumulative effects, the effects may not be entirely mitigated through any measures.

Mitigation of adverse effects to significant cultural resources, such as data recovery, will ultimately allow for implementation of proposed projects while increasing our understanding of pre-history and archaeological data. Although mitigation by data recovery is the controlled and scientific retrieval of information about a site, it still involves the destruction of at least a portion of a cultural resource site.



Environmental Consequences of Flow Options

This section analyzes the effects of the six flow options on the Outstandingly Remarkable River Values and other instream and offstream values. Included in the options is Option 1, the existing condition or no change option. It is examined in order to provide a base for comparison of the effects of options 2-6. Option 5 is the preferred option.

The relationship between flow and instream and offstream values has been documented in the Upper Deschutes River Instream Flow Assessment², a landscape analysis (Gillham 1991), the Upper Deschutes River Resource Assessment, and Chapter 3 of this document. The effects projected for the Flow Options are based on the information in these documents, information gleaned from other documents, and the best professional judgement of the specialists working on this project.

The existing regulated flow regime has increased the range of fluctuation and the frequency of significant changes in river level on a yearly, monthly, and daily basis for the entire river. Below the confluence of the Little Deschutes, potentially high flows resulting from a 50 or 100 year flood event have been moderated by the ability to regulate flow out of Wickiup Reservoir.

These documents also note that several effects result from fluctuation in general and fluctuation that results from river regulation in particular. The range of fluctuation caused by the reduction of flows during the winter storage season and increased flows during a spring and summer release season include:

- Increased rate of change in channel morphology characterized by:
 - Steep unstable cutbanks on the outside of bends
 - More rapid creation of point bars on the inside of bends
 - More rapid creation of meander cut offs
 - Widening of channel
- These changes in channel morphology release sediment into the river and result in:
 - High levels of turbidity (Impacts water quality)
 - Filling of interspaces of cobble and gravel bottoms with fines
- Other effects of high flows include:
 - Large areas within the river in which water velocity is too high to support resident aquatic populations.
 - Wide range of flatwater and whitewater boating opportunities
 - Visual Effects:
 - River appears full
 - Water not clear

²The Instream Flow Assessment was the result of an analysis of an Instream Flow Incremental Methodology study (Hardin-Davis 1991) and data collected and analyses conducted by a private consultant (Century West 1978), the Forest Service, Oregon Department of Fish and Wildlife, and the U.S. Geological Survey. Past flow recommendations see (Appendix H) were reviewed and considered as well.

- Provision of water for irrigation
- Low flows found on the Upper Deschutes during the storage season result in the following:
 - Exposed channel subject to frost action and piping that loosens bed material that becomes sediment when river rises.
 - Insufficient or no water over spawning gravel
 - Susceptibility to pollution
 - Low water temperatures
 - Reduced aquatic vegetation
 - Reduced biomass transfer
 - Diminished habitat for aquatic life
 - Limited boating opportunities
 - Storage of water for irrigation season
- There are also effects resulting from range, timing, and rate of fluctuation:
 - Flooding of nests and dens adjacent to or in the riverbank when water rises rapidly in the spring
 - Stranding of fish and macroinvertebrates when water level drops

Assumptions

- Effects of flow are analyzed independently of any effects that might result from land based alternatives.
- Unless otherwise noted, flows refer to the amount of water released from Wickiup Dam
- Unless otherwise noted, effects are for the river between Wickiup Dam and Fall River.
- Effects noted between Wickiup Dam and Fall River would occur to a lesser extent below Fall River unless otherwise noted.
- Downstream from Fall River effects of Flow Options, though significant, are buffered due to the additional year around flow provided Fall River, the Little Deschutes River, and Spring River and associated springs.
- The flow regime is the most important element that affects flow dependent values and resources (water quality, fishery, aquatic and riparian dependent vegetation, wildlife, and macroinvertebrates)
- Increased storage season flow would increase dissolved oxygen level by increasing the churning action of the river and by diluting oxygen-depleting pollutants.
- Ramping rates would affect turbidity levels.
- Effects of incremental flow changes on channel conditions could take a decade or more to become evident.
- All existing water rights of irrigators would be honored. Implementation of any but the existing flow regime (Option 1) would require cooperation between the appropriate state and federal agencies and irrigation districts.

- Water for flow and irrigation improvements would result from irrigation conservation. The analysis assumes using Oregon's conserved water statute and a 50/50 split between streamflow and irrigation use of saved water. In other words, when water is saved through conservation, half the water is returned to the stream and the other half is available for irrigation. Therefore, twice the amount of water must be conserved in order to provide the desired instream flow level. If future allocation of conserved water was based on other than a 50/50 split, the amount of water required could be different. Savings from natural flow and storage were not distinguished.
- If the technology for delivery of water improves, less water may be withdrawn from the river in order to deliver sufficient water to meet existing water rights of irrigators and actually improve the reliability of the water supply.
- Wickiup and Crane Prairie Dams would remain in place and a pool maintained to provide for recreational and fishery values.
- Total annualized costs for all elements that comprise the increments needed to meet the water savings were calculated on the following basis:
Canal lining and piping - 30 years at 7.75 percent
Offstream storage - 50 years at 7.75 percent
On-farm - 20 years at 7.75 percent

Effects of Flow Options on River Values

Table 2-15 in the Flow Options section of Chapter 2 displays two types of indicators of flow options. The first are those indicators that would be directly manipulated by regulation of flow through Wickiup Dam. These indicators include minimum flow, maximum flow, and the rate of fluctuation or ramping rate. When flows are consistent with the parameters of each Flow Option certain effects are predicted. These include the minimum channel covered during low flow periods; water quality indicators such as dissolved oxygen, turbidity level, and water temperatures; the velocity of the river; certain fish habitat conditions including percentage of aquatic habitat useable by fish, amount of fine material in gravel, and the amount of gravel available for spawning; and the number of days flows meet or exceed a desired level. The values of these indicators vary by Option. By analyzing the values and combinations of values the degree to which each option protects and enhances Outstandingly Remarkable River Values and other instream and offstream values can be estimated.

The average flow noted for Option 1 in the table does not give the reader a sense of the frequency the minimum flow occurs. It occurs virtually every storage season for at least a few days and when drought years are linked the minimum flow occurs virtually every day. During "normal" and above "normal" precipitation years storage season flow may average over 350 cfs. Such years skew the average flow figures.

Effects of Flow Options on Geologic Value

Channel Morphology

Channel morphology has been changing at an accelerated rate as a result of the erosive mechanisms that are associated with the existing flow regime (Cameron and Major 1987). Until the river channel is altered to efficiently handle the long period of high flow that occurs each year, approximately 15 percent of the banks of the river would remain raw and eroding, the river would continue to get wider and shallower, meander cutoffs would become the dominant channel, and abandoned oxbows would become slackwater sloughs. While the latter two conditions occurred prior to regulation (Dead Slough being a prime example), evidence (Cameron and Major 1987) suggests that the rate of occurrence is much higher than occurred when the river was subject to more stable natural flows. Most of these effects take place above Benham Falls where the bed materials of the river are primarily sedimentary deposits.

There are several areas in Segment 4 where the natural geological conditions have been modified by the creation of dikes to contain flow within the river and to prevent seepage losses of irrigation water before it is diverted from the river. These dikes have prevented the natural changes in the channel and flooding of areas once subjected to flooding at least part of the year. The present condition would continue to exist under all flow options.

Option 1: Channel morphology would continue to change at an accelerated rate. The proportion of channel exposed during low flows would be 57 percent. The velocity of the river would be reduced 2.8 feet per second.

Option 2: The proportion of channel exposed during low flows would drop to 45 percent. The velocity of the river would be reduced to 2.7 feet per second which would still be a powerful erosive force. The reduction in the amount of the bed and banks subjected to the dual action of freeze-thaw activity and the sediment transporting capability of high flow would be reduced by over 20 percent. However, this is unlikely to represent a substantial reduction in the rate of erosion. As a consequence the effects on channel morphology for Option 2 would be similar to the effects of Option 1.

Option 3: The proportion of channel exposed during low flows would be approximately 39 percent. Though the velocity of the river would be reduced to 2.6 feet per second it would remain a powerful erosive force. The amount of the bed and banks subjected to the dual action of freeze-thaw activity would be reduced approximately 30 percent from existing condition. However, this is unlikely to represent a substantial reduction in the rate of erosion. As a consequence, the effects described for Option 3 would be similar to the effects of options 1 and 2.

Option 4 would slow the rate in which the channel of the Upper Deschutes River is changing. The proportion of channel exposed during low flows would be reduced to 30 percent. The amount of the bed and banks subjected to the dual action of freeze-thaw activity would be significantly reduced, down approximately 47 percent from existing condition. The velocity of the river would be reduced to 2.5 feet per second. A measurable reduction in the amount of sediment would be expected under these conditions. As a consequence channel morphology would continue to change at a rate higher than occurred prior to regulation but at a rate reduced from the existing condition.

Option 5: The proportion of channel exposed during low flows would be reduced to 24 percent. The amount of the bed and banks subjected to the dual action of freeze-thaw activity would be significantly reduced, down approximately 58 percent from existing condition. The peak velocity of the river would be reduced to 2.4 feet per second. A significant reduction in the amount of sediment would be expected under these conditions. As a consequence channel morphology would continue to change at a rate higher than occurred prior to regulation but at a rate significantly reduced from the existing condition.

Option 6: The proportion of channel exposed during low flows would be reduced to 17 percent. The peak velocity of the river would be reduced to 2.2 feet per second. The reduction in the amount of the bed and banks subjected to the dual action of freeze-thaw activity would be significantly reduced, down approximately 70 percent. As a consequence the channel would, over the long term, become narrower than at present and develop characteristics similar to what were present prior to regulation. Average high flows would be higher than if the river were to remain unregulated. Peak flows would be lower due to the cap on the maximum flow that could be released out of Wickiup Dam during the irrigation season and the ability to withhold some water during high flow events on the Little Deschutes.

Effects of Flow Options on Hydrologic Value

Water Quality

This section describes the extent to which water quality would be likely to be affected by the water quantity and ramping rates expected under each flow option.

Option 1: Water quality would continue existing trends and patterns as described in the Upper Deschutes Instream Flow Assessment, The Upper Deschutes River Resource Assessment, and Chapter 3 of this document.³

Options 2-6: Water quality would show some level of improvement in some indicators used in this analysis (increased amount of channel covered, etc.). Measurable effects to numerical water quality standards would be unlikely until Option 5 (preferred option) were achieved. Option 6 would be likely to fully meet or exceed current numerical standards. Other effects to instream beneficial uses are discussed later in this section

What follows is a more detailed description of the estimated effects of each flow option on those indicators which affect water quality: turbidity, temperature, dissolved oxygen, and assimilation of pollutants.

³ In the Draft 1994/1996 List of Water Quality Limited Water Bodies, 303 (d) (1) List the Upper Deschutes was considered water quality limited for the following parameters: Dissolved Oxygen (Annual), Habitat and Flow Modification, Sediment, Temperature (Summer), Turbidity (Spring/Summer).

Turbidity

No systematic data concerning turbidity levels in the Upper Deschutes above the confluence of the Little Deschutes River prior to the construction of Wickiup Dam is known to exist. However it is known that the flow above the confluence of the Little Deschutes was much more stable than the existing regulated flow. Based on the observation that turbidity levels drop to background levels after a period of relatively stable flow, this analysis assumes that peak turbidity levels were lower prior to regulation than at present. It is also assumed that a flow regime with a reduced range of fluctuation would also have lower levels of turbidity (USDA Forest Service 1994b). The fact that 3 studies (Cameron and Major 1987; Century Testing 1978; and USDA Forest Service 1994b) have determined that erosion rates on the Upper Deschutes have increased significantly and one study (Cameron and Major 1987) suggests that most sediment would be transported in suspension also suggests that turbidity levels would be higher now than prior to regulation. Thus Cameron and Major (1987) noted,

Prior to Wickiup Dam river discharge ... had a markedly less pronounced variation in stage. Accentuated seasonal fluctuation of stage subsequent to dam operation has resulted in a broad streamside zone between high and low stage that is barren of the protective plant cover needed for bank stabilization...

In many areas, this barren zone is typified by fine-grained deposits that are easily erodible... Specific estimates of erosion rates for this material were not made during this investigation. However, frost heave was observed to be an active process that disaggregates bank material to a depth of about 0.5 inches. The loosened material is susceptible to erosion by streamside activity (such as human and animal traffic) during times of low water and by river currents and wave activity, especially boat wake (Garvin, 1977), during times of high water. However, the competence of the river, even during low flows, is sufficient to transport fine material beyond the study reach. Because it is easily transportable and relatively fine-grained, erosion of material from riparian areas would probably increase river turbidity.

The above quotation identifies several mechanisms of erosion which could contribute to turbidity levels in addition to those directly attributable to flow fluctuation (frost heave and erosion and transportation of sediment by high water flows). The Deschutes National Forest Hydrologist and the Upper Deschutes Instream Flow Assessment (USDA Forest Service 1994b) have concluded that boating and other recreation uses have had a minor role in overall erosion rates based on a lack of correlation between peak periods of boating and other forms of recreation and turbidity levels on the river. More extensive studies of another river (Klingeman, Cordes, Nam, 1993) and the Lower Deschutes (Klingeman, Matin, and Huang, 1990) arrived at similar conclusions. In addition to the wide range of flows, a rapidly increasing flow (ramping rate). Erosion of the streambanks during the summer removes riparian vegetation and prevents reestablishment of new vegetation, contributing to turbidity levels. Turbidity resulting from primary productivity in upstream reservoirs would continue under all options.

In addition to the wide range of flows a rapidly increasing ramping rate at the beginning of the irrigation season increases short term turbidity levels. The initial, experimental ramping rate for rising flows equals 0.1 feet per 4 hours while the ramping rate for falling flows equals 0.2 feet per 12 hours. These rates compare with the existing ramping target of about 6 inches per hour with a single adjustment per day.

If the existing target for upward ramping of flow (less than 6 inches of rise per hour with a single adjustment per day) is regularly met (see box), implementation of the proposed standard would not measurably reduce the peak spring turbidity levels compared to the existing condition. Peak turbidity levels would be lower under Flow Options 2-6 compared to when these existing targets are exceeded. Examination of flow and turbidity level indicates that once the flow reaches a level of 800 cfs early in the irrigation season that turbidity levels are not likely to reach extremely high levels during the remainder of the irrigation season.

The Forest Hydrologist estimated the following incremental effects of each of the flow options when combined with the experimental ramping rate

Option 1: Peak turbidity would continue to be over 25 NTU. Water quality would continue to be below DEQ standards. Erosion of streambanks would continue.

Option 2: Peak turbidity would drop as a result of less of the channel being subject to frost action, a base flow that is twice as large as the existing flow, and a lower ramping rate. Water quality would continue to be below the DEQ standard. Erosion of streambanks would continue.

Option 3: Peak turbidity would continue to drop as a result of less of the channel being subject to frost action, a base flow that is five times as large as the existing base flow, and a lower ramping rate. Water quality would continue to be below the DEQ standard. Erosion of streambanks would continue.

Option 4: Peak turbidity would continue to drop as a result of less of the channel being subject to frost action, a base flow that is 10 times as large as the existing base flow, and a lower ramping rate. Water quality would continue to be below the DEQ standard. Lower peak and average flow during the irrigation season might allow a limited amount of new riparian vegetation to become established, so erosion would occur at a lower rate.

Option 5: Peak turbidity would continue to drop as a result of less of the channel being subject to frost action, a base flow that is 15 times as large as the existing base flow, and a lower ramping rate. Turbidity level would continue to exceed the DEQ standard. Lower peak and average flow during the irrigation season might allow a limited amount of new riparian vegetation to become established, so erosion would occur at a lower rate.

Understanding Existing Flow Management.

Given existing standards for flow management it is possible for the river to rise from a minimum flow to a maximum flow in 3 hours and from maximum flow to minimum flow in 3 hours. **In practice flow is not managed to this standard.** According to the watermaster's office, the target for the ramping rate is less than 6 inches per hour with a of a net change in volume limited to about 200 cfs per day. With this target there generally is only a single adjustment in flow per day. Only a few times over the past 10 years have adjustments to flow exceeding the target ramping rate been required to meet changes in demand during the critical period when flow has not yet exceeded 800 cfs early in the irrigation season.

Option 6: Peak turbidity would continue to drop as a result of less of the channel being subject to frost action, a base flow that is 25 times as large as the existing base flow, and a lower ramping rate. Turbidity level would be expected to meet the DEQ standard. The more stable flow regime and lower peak and average flow during the irrigation season would allow new riparian vegetation to become established, so erosion would occur at a lower rate.

Water Temperature

Rivers which are wide and shallow typically have low winter water temperatures and high summer water temperatures.

Option 1: The river would continue to get wider and shallower resulting in lower winter water temperatures and higher summer temperatures.

Option 2-3: Because existing trends in shaping the channel would not be stopped it is expected that summer water temperatures would continue to increase. The increase in minimum flow during the storage season would maintain or slightly increase water temperature initially but as the channel increases in width storage season temperatures would drop.

Option 4: Because existing trends in shaping the channel would be slowed it is expected that water temperatures would improve as the desired flow was achieved. The increase in minimum flow during the storage season would increase water temperature initially but as the channel increases in width gradual decreases in water temperature would occur during the storage season. There is some risk that water temperatures would increase during the irrigation season over the long term if the channel were to continue to increase in width.

Option 5: Because existing trends in shaping the channel would be slowed it is expected that water temperatures would improve as the desired flow is achieved. The increase in minimum flow during the storage season would increase water temperature. During the irrigation season water temperatures would remain at a level that would support all aquatic populations.

Option 6: Because existing trends in shaping the channel would be reversed water temperatures would improve as the desired flow is achieved. The increase in minimum flow during the storage season would increase water temperature. Initially water temperatures during the irrigation season would increase. Over the long term as the channel narrows and more vegetation grows along the banks water temperature would decrease.

Disolved Oxygen

DEQ water quality monitoring has intermittently collected dissolved oxygen samples that have not met water quality standards at both Harper Bridge and Benham Falls monitoring sites. At the same time dissolved oxygen levels in water samples out of Wickiup have been excellent. It is suspected that the samples not meeting standards are the result of pollutants introduced downstream that consume dissolved oxygen. While increased storage season flow could possibly resolve the problem during the storage season, reduced flows during the irrigation season will not resolve this problem.

Assimilation of Pollutants

Any increase in storage season flow will increase the capability of the river to assimilate pollutants. On the other hand reduction of irrigation season would reduce the ability of the river to assimilate pollutants. However the significance of the changes are quite different. For example the Flow Option 6 would increase minimum storage season flow 15 times over the present minimum flow while the corresponding reduction in the average maximum flow would be about 20%. Because dissolved oxygen is not only a product of volume but also dependent upon temperature actual irrigation season dissolved oxygen level will be dependent on water temperature, amount of water, and the amount of pollutant introduced.

Effects of Flow Options on Fishery Value

The Flow regime is an important determinant of the width and depth of the river, the rate of erosion of the channel and streambanks, water quality, and the location of large woody in the channel. Depth is important both as a provider of cover but also a requirement of successful spawning. Inadequate depth may render spawning gravels unusable or downward fluctuations after spawning may expose eggs to the air. A deep, relatively narrow channel helps to maintain water temperature at a level suitable for trout. Relatively stable flow or a decreased range of flows reduces the rate of channel and streambank erosion. Streambank erosion is important to trout because erosion, especially in the Upper Deschutes is likely to introduce fine materials that may embed spawning gravel and consequently block intergravel flow of oxygen, a necessary element for eggs to survive and develop. High rates of erosion, then are not desirable if the goal is to protect and enhance trout populations in the Upper Deschutes. When river flow fluctuates dramatically large woody material, an source of cover and protection from the current, is likely to be pushed toward the margins of the river where it cannot provide cover for trout when the flow drops.

The channel will continue to become wider and shallower, erosion of banks will continue to add fine sediments and reduce hiding cover for fish, and large wood and gravel will continue to be pushed to the river margins. Without changes in the flow regime, the fishery is expected to decline over time.

Option 1: In the professional judgement of ODFW fisheries biologists and the forest hydrologist the status of the fishery as an Outstandingly Remarkable Value is threatened by geologic and hydrologic changes that are forecast under the present flow regime. This option Would continue trends described in the Upper Deschutes Instream Flow Assessment, the Upper Deschutes River Resource Assessment, and Chapter 3 of this document. As the river becomes wider and shallower pool depths would become shallower and consequently provide less cover and protection from predators. Spawning habitat for brown trout would be reduced below the existing condition as the water levels over the gravel would become reduced. The habitat for aquatic invertebrates would be reduced because the shallower water would be more subject to freezing. The freezing would also subject more of the spawning gravel to ice scour. Overall winter water temperatures would decrease as the river becomes wider and shallower. In the summer shallower water would be more subject to warming than the under the existing channel configuration.

The effects of maintenance of existing flow conditions would be similar to existing condition for springtime turbidity and percentage of fines in spawning gravels.

Options 2-6: The proposed falling rate would reduce the potential for stranding of fish and macroinvertebrates over existing ramping practices by requiring smaller increments of change than Option 1.

Option 2 would result in some improved indicators but would not significantly improve the Fishery Value over the existing condition.

The increased depth that would result from the increased minimum flow would initially provide increased cover and protection. If trends in channel morphology continue this flow option would eventually result in less depth, i.e. cover than presently exists. Similarly habitat for aquatic invertebrates initially would be increased corresponding to the increased flow. The widening of the channel would eventually reduce macroinvertebrate habitat because the shallower water would be more subject to freezing. The freezing would also subject more of the spawning gravel to ice scour. Over the long term winter water temperatures would decrease as the river becomes wider and shallower. In the summer shallower water would be more subject to warming than with the existing channel configuration.

The effects of implementing these flow conditions would result in values similar to existing condition for springtime turbidity and percentage of fines in spawning gravels. The sediment load would fill in about 30 percent of the interspaces in the rock and gravel containing eggs from spring spawning rainbow trout thereby suffocating the eggs. In the short term spawning habitat for brown trout would be increased. However over the long term the widening of the channel would cause the river to become shallower thus reducing the availability of gravel for spawning to less than the existing condition because the water level over the gravel would be reduced. Flow level would result in 50 percent of potential spawning habitat being available for the fall spawning brown trout (this does not account for the quality of the habitat, but rather the amount of gravels which would be available at a suitable depth and velocity of water flowing over them). The overall fish habitat is estimated to be less than or equal to 68 percent of potential.

Option 3 would result in some improved indicators but would not significantly improve the Fishery Value over the existing condition.

Increased minimum flow would initially provide increased depth of pools and increased cover for fish. However, the continuation of trends in channel morphology would eventually result in less depth, i.e. cover, than presently exists. Similarly habitat for aquatic invertebrates initially would increase corresponding to the increased flow. The widening of the channel would eventually reduce macroinvertebrate habitat because the shallower water would be more subject to freezing. The freezing would also subject more of the spawning gravel to ice scour. Over the long term winter water temperatures would decrease as the river becomes wider and shallower. In the summer shallower water would be more subject to warming than the under the existing channel configuration.

The effects of implementing new flow conditions would result in values similar to existing condition for springtime turbidity and percentage of fines in spawning gravels. The sediment load would fill in about 28 percent of the interspaces in the rock and gravel containing eggs from spring spawning rainbow trout thereby suffocating a large proportion of the eggs. In the short term spawning habitat for brown trout would be increased. However

over the long term the widening of the channel would cause the river to become shallower thus reducing the availability of gravel for spawning to less than the existing condition because the water level over the gravel would be reduced. Flow level would result in 60 percent of potential spawning habitat being available for the fall spawning brown trout (this does not account for the quality of the habitat, but rather the amount of gravels available at a suitable depth and velocity of water flowing over them). The overall fish habitat is estimated to be about 72 percent of potential.

Option 4 would result in some improved indicators but would not significantly improve the Fishery Value over the existing condition.

Initially increased minimum flow would provide increased depth of pools and increased cover for fish. However, the continuation of trends in channel morphology would eventually reduce depth, i.e. cover, but probably not to existing condition. Similarly habitat for aquatic invertebrates initially would increase as a result of the increased flow. The widening of the channel would eventually reduce macroinvertebrate habitat because some of the shallower water would be more subject to freezing. Habitats and fish population would probably remain above the existing condition. The freezing would also subject more of the spawning gravel to ice scour. Over the long term winter water temperatures would decrease but not to the existing condition as the river becomes wider and shallower. Lower irrigation season flow would not raise water temperatures to the point that fish populations would be adversely affected.

The effects of these flow conditions would result in lower values compared to the existing condition for springtime turbidity and percentage of fines in spawning gravels. The sediment load would fill in about 25 percent of the interspaces in the rock and gravel containing eggs from spring spawning rainbow trout. Successful incubation of eggs and emergence of the alevin would increase. In the short term spawning habitat for brown trout would be increased. Over the long term the widening of the channel would cause the river to become shallower and reduce the availability of gravel for spawning. Spawning habitat would not be reduced to the existing level. Flow level would result in 90 percent of potential spawning habitat being available for the fall spawning brown trout (this does not account for the quality of the habitat, but rather the amount of gravels available at a suitable depth and velocity of water flowing over them). The overall fish habitat is estimated to be about 80 percent of potential.

Option 5 would result in some improved indicators and would significantly improve the Fishery Value over the existing condition.

Increased minimum flow would provide increased depth of pools and increased cover for fish. Similarly habitat for aquatic invertebrates would increase as a result of the increased flow. There would be more suitable habitat and the fish population would probably remain above the existing condition. Winter water temperatures would remain above the existing condition. Lower irrigation season flow would not cause water temperatures to increase to the level that fish populations would be adversely affected. Increased streamside vegetation associated with lower peak flows would shade the river and aid in maintaining the water temperature within the desired range.

The effects of implementing new flow conditions would result in lower values compared to the existing condition for springtime turbidity and percentage of fines in spawning gravels. The sediment load would fill in about 25 percent of the interspaces in the rock and gravel containing eggs from spring spawning rainbow trout. Successful incubation of eggs and emergence of the alevin would increase. Spawning habitat for brown trout would be increased. Flow level would result in 95 percent of potential spawning habitat being available for the fall spawning brown trout (this does not account for the quality of the habitat, but rather the amount of gravels available at a suitable depth and velocity of water flowing over them). The overall fish habitat is estimated to be about 85 percent of potential.

Option 6 would result in improved indicators and would significantly improve the Fishery Value over the existing condition.

Increased minimum flow would provide increased depth of pools and increased cover for fish. Similarly habitat for aquatic invertebrates would increase as a result of the increased flow. Habitats and fish population would probably remain above the existing condition. Winter water temperatures would remain above the existing condition. Lower irrigation season flow would not cause water temperatures to increase to the level that fish populations would be adversely affected. Increased streamside vegetation associated with lower peak flows would shade the river and aid in maintaining the water temperature within the desired range. Increased streamside vegetation associated with lower peak flows would shade the river and aid in maintaining the water temperature within the desired range.

The target flow conditions would reduce spring time turbidity and percentage of fines in spawning gravels over the existing condition. The sediment load would fill in about 20 percent of the interspaces in the rock and gravel containing eggs from spring spawning rainbow trout. Success rate for incubation of eggs and emergence of the alevin would increase to about 50 percent. Spawning habitat for brown trout would be increased. Flow level would result in 77 percent of potential spawning habitat being available for the fall spawning brown trout (this does not account for the quality of the habitat, but rather the amount of gravels available at a suitable depth and velocity of water flowing over them). The overall fish habitat is estimated to be about 95 percent of potential.

Effects of Flow Options on Vegetation Value

Flow affects vegetation by affecting the erosion rate of streambanks. Low flow during the winter and high flow during the irrigation season results in seasonal erosive factors of frost heave and during the storage season and inundation during the irrigation season that in combination undermines the soil under vegetation near the river. Because high flow is much more powerful than lower flows extended period of maximum flow also undermines vegetation and prevents new vegetation from becoming established. Finally the alternating of high and low flow cycles every 6 months creates a band in the riparian area that is not well suited to vegetation growth.

Little is known about the specific habitat needs of the *Artemisia ludoviciana estesii* other than its association with riparian habitat. It is unknown what the effects of maintaining or changing the flow regime would have on the three known populations along the Upper Deschutes River.

Dikes which were built to prevent seepage loss have altered vegetative species composition in some areas (Ryan Ranch Meadow being the primary example) and would remain under all flow options.

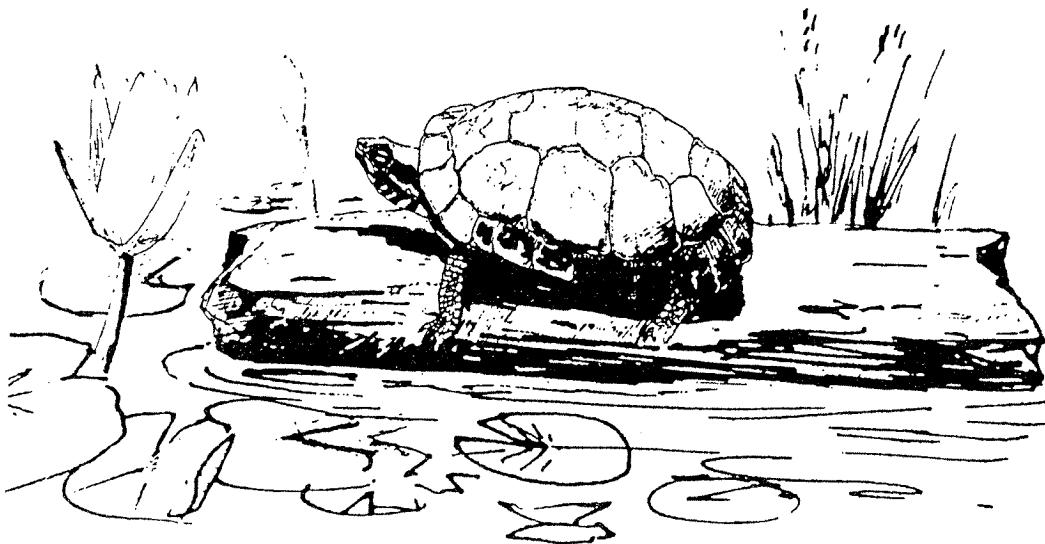
Options 1-3: Flow conditions would continue to eliminate vegetation on the outside of bends and create new opportunities for riparian growth on the inside of bends. Aquatic vegetation would continue to cover about the same proportion of the channel as the existing condition.

Options 4-6: Aquatic and riparian plants would cover more area than described for Option 1.

Option 4: Flow conditions would continue to eliminate vegetation on the outside of bends and create new opportunities for riparian growth on the inside of bends. Along relatively straight glides riparian vegetation is likely grow down the banks.

Option 5: Flow conditions would continue to eliminate vegetation on the outside of bends and create new opportunities for riparian growth on the inside of bends. Along relatively straight glides riparian vegetation is likely grow down the banks. Aquatic vegetation would cover more of the channel than the existing condition. Vegetation in sloughs adjacent to the river would benefit from higher low flows

Option 6: Flow levels would reduce the erosion rate on the outside of bends and promote the establishment of vegetation on banks that are now rapidly eroding. Establishment of vegetation would add to the stability of streambanks. Lower rate of erosion on the outside of bends would result in less deposition on the inside of bends. As a result new riparian growth on the inside of bends would occur at a much lower rate. Along relatively straight glides riparian vegetation is likely to grow down the banks. Vegetation in sloughs adjacent to the river would benefit from higher low flows and a reduced range of flows.



Effects of Flow Options on Wildlife Value

Aquatic species depend on biomass transfer of vegetation into the water for a source of food. The distance between vegetation and the water edge determines whether the biomass transfer is direct (falling in the water) or indirect (dependent on wind, tributaries, etc.)

During the winter storage season, the distance between the vegetation and water would increase when flows drop. Up to 57 percent of the channel would be exposed during the winter in Alternative 1.

Table 4-9 Maximum Percent of Channel Exposed during Storage Season

| | Opt.1 | Opt.2 | Opt.3 | Opt.4 | Opt.5 | Opt.6 |
|-------------------------|-------|-------|-------|-------|-------|-------|
| Maximum Channel Exposed | 57% | 45% | 39% | 30% | 24% | 17% |

Aquatic plants provide fish cover and forage areas, but are restricted to the portion of the riverbed inundated year round. If flow levels vary widely, as in Options 1 and 2, the potential for fish cover and forage areas would be very low. In Options 5 and 6 the fluctuation in flows would be moderated and potential for fish cover and forage areas would be improved.

Population levels of aquatic species that live in the wet areas also fluctuate with the water levels. Currently, marshes go from dry during the storage season to wet or flooded during the irrigation season. Migrating shorebirds and wading birds must rely on other areas (reservoirs) for foraging areas when the wet shallows along the river are limited. This situation would continue in Options 1 and 2. Under Options 3, 4, 5, and 6 some additional marshes and sloughs would remain moist or wet year around. Option 3 would have the least additional water while option 6 would have the most. Populations of aquatic species would be more stable in those marshes that are flooded or wet year round.

Birds of prey are also impacted by the fluctuation in flow levels. Low winter seasonal flows limit fishing habitat for avian predators. Higher winter flows during the winter would maintain a prey base for avian predators by increasing fishing habitat and habitat for wintering waterfowl. A high percentage of the bald eagles winter diet is waterfowl.

Avian predators (i.e. osprey, bald eagles, kingfisher, mergansers, cormorants) have more difficulty hunting when water turbidity is high. Turbidity is increased when flow level rises for the irrigation season, so options which reduce the differences between summer and winter flow levels would benefit these birds.

Wildlife species which nest or den along the river are also affected by the fluctuation in flows levels. Waterfowl and songbirds attempting to nest along the edge of the river are washed away with the rise of irrigation flows. Habitat for waterfowl, songbirds and mammals that require reproductive areas in vegetation at or near water edges would continue to be the

limiting factor for those species. Mammals, such as the beaver are unable to burrow dens due to irrigation flows flooding out the burrow. Beaver are not present within segment 2, with a few being found in segment 3.

Effects of Flow Options on Scenic Value

Options 1-3: While the course of the river and vegetation would undergo change over time the overall scenic quality of the river would be similar to that of existing flow patterns.

Option 4: The increase in flow during the storage season would be visually apparent when compared to Option 1. Some of the muddy channel bottom would still be exposed, however. Growth of new riparian vegetation would improve the scenic quality of the river.

Option 5-6: The increase in flow would be visually apparent when compared to Option 1. Virtually all of the channel bottom would be covered by water. Growth of new riparian vegetation would improve the scenic quality of the river.

Effects of Flow Options on Cultural Resource Value

Options 1-3: The high rate of change in channel morphology could expose an unknown number of cultural sites and result in loss of information concerning the sites and early inhabitants along the river. Trends in aquatic and riparian dependent resources could reduce opportunities for traditional American Indian activities.

Option 4-6: The projected rate of change in channel morphology would reduce the rate that cultural sites are destroyed as the result of erosion. Aquatic and riparian resource conditions opportunities would improve over Option 1, resulting in increased opportunities for traditional American Indian activities.

Effects of Flow Options on Recreation Value

Different recreational activities are protected and enhanced by different flows (USDA Forest Service 1994b). Flat water canoeing and rafting require about 250 cfs out of Wickiup Dam in Segments 2A, 2B, and 3A. Motorized boating in these segments requires about 500 cfs being released out of Wickiup Dam. Fall river, the Little Deschutes, and Spring River augment downstream flow. As a consequence below Fall River flatwater boating is progressively less dependent upon releases from Wickiup Dam. White water kayaking in the Big Eddy reach (Seg. 4) requires a minimum of 900 cfs while whitewater rafting requires a minimum of 1300 cfs and requires a range of 1500-2,000 cfs to provide the "splash" that guided users prefer (personal communications with guides).

Changing flows would have the general effect of increasing opportunities for flat water users once the minimum flow out of Wickiup Dam reaches 200 cfs (Option 4). Any increase in minimum flow would, however, result in a reduction in irrigation season flow that is likely

to have an impact on the white water rafting experience. Implementing flow options 2-6 would have incremental impacts on irrigation season flow. As a result the number of days during which flows exceed 1500 cfs would be reduced with each increment. Given the average flow over the course of the irrigation season it is likely that most of the flow that would be less than 1500 cfs at the Big Eddy reach would occur outside of the peak tourist season and consequently would have little impact on either individual users or the holders of special use permits. At lower flows the frequency of brushes with rocks creates additional wear on equipment.

Canoes and motorboats are used for fishing, hunting, and scenery and wildlife viewing. Segments useable for these boats are limited by flow levels during the storage season, but the number of boaters who would use the river during the winter is probably small. Fishing success is most dependent on fish habitat which is discussed in the section on Effects of Flow Options on Fishery Value.

Option 1: Most recreational activity dependent upon the flow would be maintained at existing levels. Flow in Segment 4, location of most whitewater use, exceeds 1500 cfs for 170 days during the irrigation season.

Option 2: Most recreational activity dependent upon the river would be maintained at existing levels. A minimum flow of 50 cfs and long term average low flow of 100 cfs would effectively preclude canoeing above Fall River during the storage season. The river flow measured at Benham Falls would exceed 1500 cfs for 160 days a year. While this is a reduction of 10 days for this flow level it is sufficient to encompass nearly all commercial whitewater rafting that now occurs.

Option 3: Most recreational activity dependent upon the river would be maintained at existing levels. A minimum flow of 100 cfs would preclude canoeing above Fall River during the storage season. The long term average low flow of 150 cfs would provide marginal canoeing above Fall River during the storage season. The river flow measured at Benham Falls would exceed 1500 cfs for 150 days a year. This would be a reduction of 20 days from the existing condition. It is sufficient to encompass nearly all commercial whitewater rafting that now occurs.

Option 4: Most recreational activity dependent upon the river would be maintained at or above existing levels. A minimum flow of 200 cfs would provide marginal canoeing above Fall River during the storage season. Canoeing could occur without obstruction between Fall River and Benham Falls Picnic Area during the entire year.

The river flow measured at Benham Falls would exceed 1500 cfs for approximately 138 days a year. While this is a reduction of about one month from the existing condition it would affect less than 5 percent of users given present use patterns. Such a flow would not necessarily cause a reduction in commercial use levels because use levels could increase during periods when flows were more desirable. Commercial whitewater trips have occurred in the past when flows were as low as 1300 cfs.

Option 5: Most recreational activity dependent upon the river would be maintained at existing levels. A minimum flow of 300 cfs would allow flatwater canoeing on the entire river all year long except for falls and rapids. Motorboats could operate on flatwater reaches downstream from the confluence of the Little Deschutes during the entire year.

The river flow measured at Benham Falls would exceed 1500 cfs for 115 days a year. This is a reduction of about two months from the existing condition. This condition would probably affect less than 10 percent of users given present use patterns. Such a flow would not necessarily cause a reduction in commercial use levels because use levels could increase during periods when flows were more desirable. In addition commercial whitewater trips have occurred in the past when flows were as low as 1300 cfs. Fishing success would be likely to increase if changes in channel morphology and water quality were to impact the fishery as predicted.

Option 6: Most recreational activity dependent upon the river would be maintained at levels. A minimum flow of 500 cfs would allow flatwater canoeing and motorized boating on the entire river except for falls and rapids.

The river flow measured at Benham Falls would exceed 1500 cfs for 91 days a year. This is a reduction of about 2 1/2 months from the present condition. It would probably affect less than 15 percent of users given that most use occurs during June through August, the period during which flow would be maintained at its highest level. Under alternatives 3, 5, and 6 such a flow would not necessarily cause a reduction in commercial use levels because use levels could increase during periods when flows were most desirable. In addition commercial whitewater trips have occurred in the past when flows were as low as 1300 cfs.

Effects of Flow Options on Private Land

Private lands would be most affected by those elements described under effects of flow on Geologic, Recreation, and Scenic Values.

Accelerated rates of erosion leads to river front property owners desiring to fortify streambanks. Low flows show bare and eroding banks most often to the people who reside along the river. Generally, effects of flow options would be most noticeable on lands in segment 2, with proportional effects on Segments 3 and 4.

Effects of Flow Options on Middle Deschutes River

Any increase in instream flows during the storage season would be likely to increase winter flows in the Middle Deschutes except in Flow Options 4-6, where a portion of winter flows would likely be diverted to a reregulation reservoir.

During the irrigation season flow downstream from Bend would not be affected by implementation of any Flow Option. However downstream benefits would not be precluded.

The amount and effect of increases in the Middle Deschutes would be dependent upon the methods of implementation and the total storage and irrigation needs.

Effects of Flow Options on Reservoirs

Under Options 2-6 adjustments to flow would occur as the result of conserving water. As a consequence drawdown of reservoir would not be as great during the irrigation season than is presently the case. More water could be released during the storage season yet the pools at Wickiup and Crane Prairie Reservoirs would continue to provide fishery and recreation values at current levels. Under Options 4-6, additional offstream reregulation reservoirs would likely be needed to meet North Unit Irrigation District needs. Costs of this activity are reflected in Table 4-10. Recreation values would likely increase but exact environmental effects and tradeoffs are currently unknown.

Effects of Flow Options on Off-Stream Values

Changes in flow management of the Upper Deschutes have potential social and economic impact. These effects would result with economic costs associated with implementing the conservation leasing and water transfer strategies, and the social costs involved in changing traditional behaviors.

Table 4-10

| Summary of Costs and "Water Savings" Needed to Meet Flow Options | | | | |
|---|------------------------------------|---|--|--|
| Flow Option | Wickiup Flow Goal (cfs) | Total "Water Saved" in Acre-feet | Total Investment Cost (dollars) | Total Annual Cost (dollars) |
| 2 | 50 | 22,000 | 2,550,000 | 355,000 |
| 3 | 100 | 57,000 | 8,305,000 | 1,005,000 |
| 4 | 200 | 133,000 | 35,055,000 | 3,940,000 |
| 5 | 300 | 200,000 | 64,165,000 | 7,530,000 |
| 6 | 440 | 314,000 | 158,960,000 | 18,525,000 |

Notes:

1. This is the reduction in seepage by lining canals, creating off-stream storage, or reduced application from conversions to sprinkler irrigation necessary to provide instream flow given 50 percent split with irrigation.
2. Sum of costs to construct the various improvements needed to meet the water savings shown in column 3.
3. Total annualized costs for all elements that comprise the increments needed to meet the water savings shown in column 4. Insufficient water is available from structural measures and a 50 percent split of saved water between irrigation and streamflows to meet the 500 ft³/s flow goal. Meeting the goal will require changing the split of conserved water, purchasing water rights, or adopting water management actions which would primarily be on-farm.

Irrigation

Water availability for irrigation districts would not be changed under any option. Under all options, conservation of water is expected to result in a higher dependability because the conservation measures would require less water withdrawn from the river. This would make the overall irrigation system less sensitive to drought conditions.

This analysis is based primarily on data gathered and modeled by the Bureau of Reclamation through their on-going Deschutes Basin Conservation Studies. This model predicts the savings in instream flows by reducing losses in the irrigation distribution system and on-farm uses first and utilizing additional off stream storage as a final method of achieving target instream flows. However, the relationship of water conservation to instream flows under current Oregon statutes is complex. In practice, decisions concerning where and how to get the most instream flow for the dollars expended would have to consider the seniority of a water right as well as where the greatest overall savings of water might be found.

The Bureau of Reclamation estimates the direct costs of implementing water saving measures to meet each of the incremental flow options. Total costs of Options 2-6 ranged from \$2.5 million to \$150 million over the next twenty years. See Table 4-10.

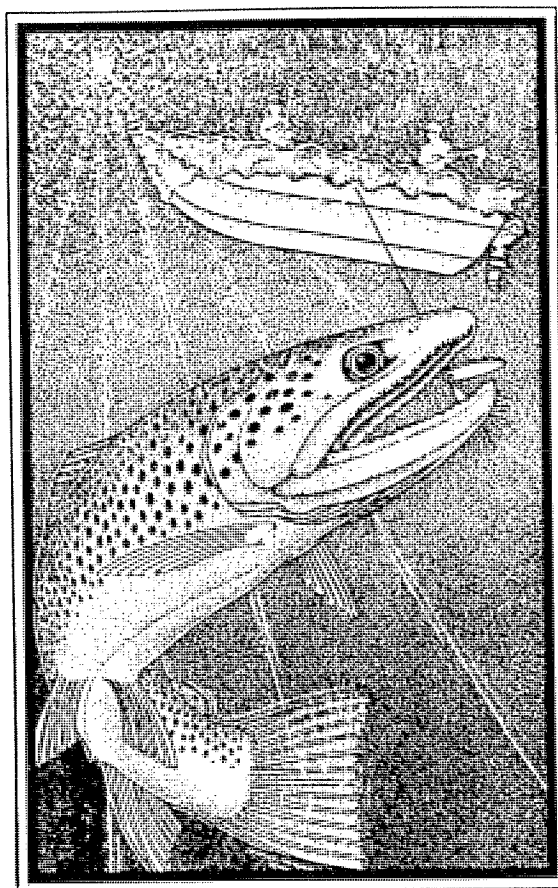
Costs associated with implementation are based on first taking those actions which are most likely to achieve the highest gross saving. This results in relatively low cost per acre foot for initial increments of water savings with higher per acre foot or cfs costs for subsequent increments. Table 4-10 describes the total and annual investment cost associated with each flow option.

Most water conservation measures would involve construction activity and purchase of materials and goods that would result in employment opportunities and other economic benefits to local communities. Under this analysis, irrigators could market up to 50 percent of the saved water for other irrigation uses which could stimulate other economic development.

Water leasing provides flexibility to the agricultural user but does not provide the compounded economic benefits of agricultural production.

Although no site-specific actions to achieve the water savings analyzed under each option have yet been developed, changes in irrigation district operations and by individual irrigators would be necessary to meet any of the action options. This raises the possibility that water users would perceive changes they are asked to make as a sacrifice on their part to achieve goals they do not agree with or consider less important than the benefits derived from existing water uses and delivery methods. There is also the potential that off stream water users would feel that their economic interests may be being adversely affected for what they perceive as benefits to non-locals (recreationists). Conflict may also arise between local rural populations and local urban residents if off stream users feel they are being forced to make changes in their water use pattern to meet the recreational or aesthetic demands of the larger, more politically influential urban population.

Changes in irrigation districts' operations made to improve instream flow would have economic effects over the next twenty to fifty years as canal lining, on-farm distribution improvement, and possibly reregulating reservoir construction occurred. These water conservation measures would provide significant benefits to irrigators by providing more water during dry years due to the increased efficiency of the delivery system. Some instream flow could be added through leasing or selling of water rights at an estimated cost of \$30 to \$35 per acre foot per year. Leasing, however, would not provide the benefits to irrigators that conservation measures would during dry years. An established leasing plan could, however, create a higher demand than currently exists and consequently could raise the cost of leased water substantially. The extent to which economic and social effects actually are realized would depend on methods used and funding sources found. This plan does not address those site-specific elements. Figure 4-1 displays the cost of incremental water savings for each flow option. Figure 4-2 show the estimated annual cost of each increment.



Cost Per Acre Foot of Water

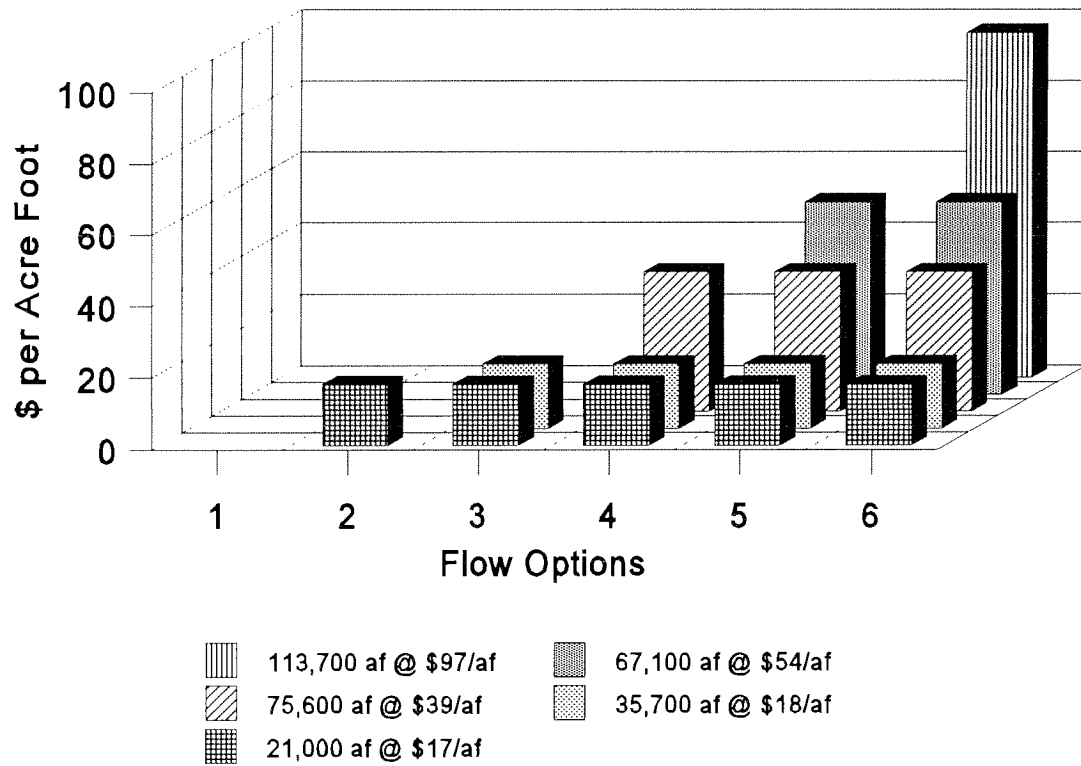


Figure 4-1

Annual Cost of Flow Options

(Beyond Maintenance of Existing Systems)

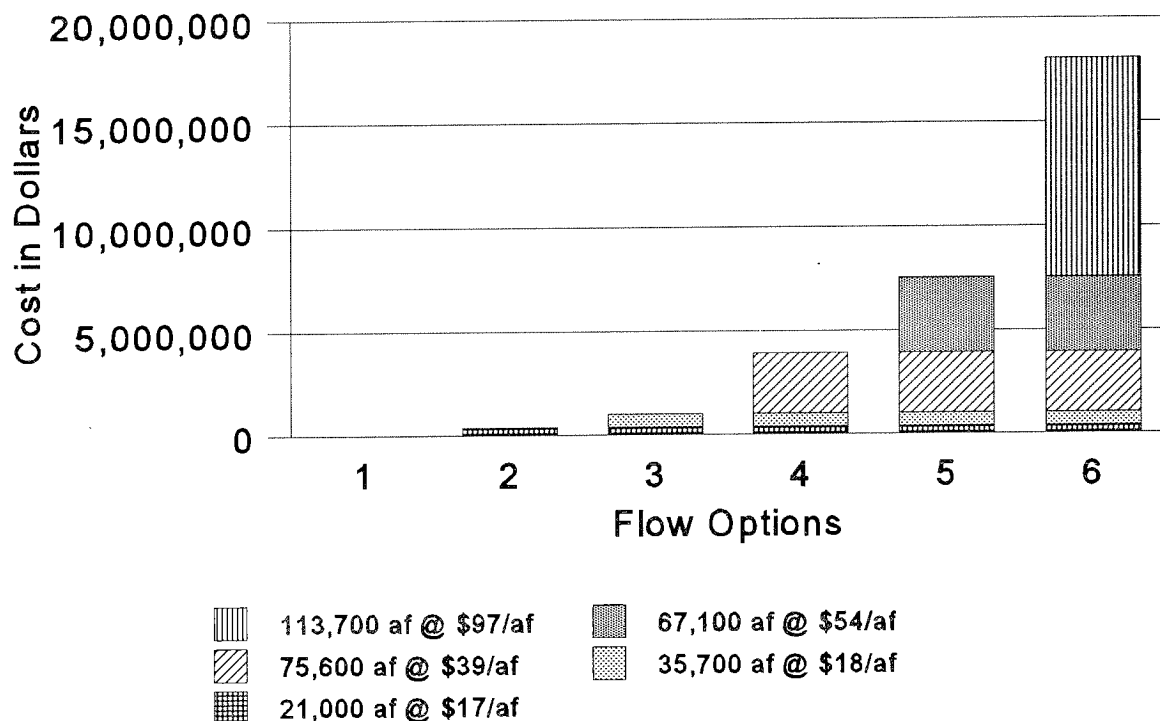


Figure 4-2

Option 1: Irrigation needs would be provided at the same level as present with all water rights filled on average in 8 out of 10 years.

Option 2: Irrigation needs would be met with a slight improvement to a minority of districts. Water could be made available for this flow by lining canal and lateral sections to the extent necessary to save approximately 21,600 acre-feet of water. Cost would be less than \$17.00 per acre-foot per year.

Option 3: Water could be made available by lining and piping canal and lateral sections to the extent necessary to save 57,000 acre-feet of water. Cost of measures to achieve this water would be about \$17 per acre-foot for the first 22,000 acre-feet and \$18 per acre foot for the next 35,700 acre-feet.

Option 4: Water could be made available for this flow by lining and piping canal and lateral sections and developing two reregulating reservoirs. It would be necessary to save 133,000 acre-feet of water in order to provide the desired instream flows. Cost would be about \$30 per acre-foot per year for all conserved water. However the additional increment of 75,600 acre-feet of conserved water over Option 3 would cost \$39 per acre foot.

Option 5: Water could be made available for this flow by the actions described for options 2-4, additional lining and piping of canal and lateral sections, and developing on farm improvements. It would be necessary to save over 200,000 acre-feet of water in order to provide the desired instream flows. Cost would be about \$38 per acre-foot per year for all conserved water. However the last increment of 67,000 acre-feet of conserved water would cost \$54 per acre foot per year.

Option 6: Water could be made available for this flow by the actions described for options 2-5, additional lining and piping of canal and lateral sections, and additional off-stream and re-regulation storage. These measures could conserve as much as 313,745 acre-feet or sufficient water to provide a minimum flow of 440 cfs during the storage season. If all of the 313,745 acre-feet were the result of conservation measures, an additional 43,200 acre-feet would have to be obtained through purchase or lease of water rights in order to achieve the target flow of 500 cfs during the storage season. Cost of the conserved water would be about \$59 per acre-foot per year. However the last increment of 113,720 acre-feet of conserved water would cost \$97 per acre foot per year but total project costs would be \$194 per acre foot of water that would actually be provided for instream flow. An established leasing plan could create a higher base demand than currently exists and consequently could raise the cost of leased water over these estimates.

Canal Systems

Reducing the amount of leakage in the irrigation distribution system is certain to reduce the amount of water which contributes to the ground water system in the areas traversed by the canals. According to a BOR report (1992) there are several perched or elevated aquifers in the region that are dependent upon recharge from canal leakage. Wells that tap the perched aquifers may be affected by reduced canal leakage. Riparian areas and created wetlands adjacent to the canals and their associated wildlife habitat would most likely be reduced or eliminated.

Property Values

Irrigated property values could be reduced by implementation of lease transfer or purchase of water rights if the land was to be taken out of agricultural production. At this time, too little is known about the potential effects of this program in the Deschutes Basin to reliably predict effects of implementation of the flow options on property values or acres which could be affected.

Mitigation

The methods for implementing new instream flow standards are intended to minimize impacts on offstream use. It is likely that artificial riparian areas associated with leakage in existing irrigation systems may be affected. One means of mitigating such effects is for water users to use a portion of their allocation to preserve artificially developed riparian areas.

Combined Effects of Flow Options and Alternatives

The cumulative effects of combining the land-based alternatives and the flow options would depend upon the particular combination. Generally speaking, flow alternatives would be expected to be implemented slowly over 20 years or more. The beneficial effects associated with these increments would also be slow to be realized. Effects of the land-based alternatives were analyzed as though no changes in the flows would be realized, thereby giving a "worst case analysis" in the evaluation of the potential adverse effects of combining land-based alternatives and flow-based options. Implementation of any of the flow options when combined with any of the land-based alternatives would benefit flow-dependent resources.

The addition of cobbles, gravel, and large woody material into the stream channel is common to land-based alternatives 2-6. These actions are intended to improve fishery habitat directly and, indirectly, fish populations. The actions would also multiply the positive effects on the fishery that generally occur as the minimum flow increases and maximum flow decreases from Option 1 to Option 6. Placement of these materials would increase the quality of spawning gravel, cover for all life stages of trout, and provide respite from high velocity flow. Introduction of these materials would improve the habitat value for all flow levels beyond that projected by the limited analysis of flows.

Incomplete/Unavailable Information

Predictions of effects were made with the most current information available. The following information is either unavailable or incomplete.

No data exist on structure loading (fish habitat) in the Upper Deschutes River prior to irrigation use of the river.

The actual amount of reduction in pool habitat from natural condition as a result of the existing flow regime is unknown.

Information is unavailable on the phenology and habitat requirements for *Artemisia ludoviciana estesii*. Further studies on this species are needed to determine measures for protection and enhancement.

Many species of wildlife are migratory and winter off the Forest or have extensive home ranges that include a significant amount of non-Forest Service land. Because land management practices outside the control of the Forest Service can also influence species viability, the relationship between local and offsite practices and resulting population status is often difficult to document or quantify.

Habitat relationships are little understood for dozens of wildlife species found within the river corridor. This is especially the case for nongame species like the reptiles, amphibians, bats, rodents, and passerine birds.

For some species, the effect of habitat loss in adjacent areas of the state, in combination with local losses, is unknown.

The cumulative effects of on-site septic systems on water quality within the Upper Deschutes River corridor area are not fully known. A DEQ (1994) study found nitrates in are present in groundwater.

Turbidity levels and rate of sediment transport prior to regulation of the river is not know. Available evidence suggests that the levels of both parameters were lower prior to regulation than after regulation.

Other Environmental Effects

Short-term Use Versus Long-term Productivity

Short-term use of the land includes the day-to-day and even year-to-year activities that visitors and government workers undertake while in the river corridor. It includes both activities that physically remove resources from the land, such as fishing, hunting, and pine cone gathering as well as activities that simply occur on the land or water, such as scenery viewing, boating, hiking, photography and bike riding. Short-term actions also include management activities like maintenance.

Long-term productivity refers to the land's continuing ability to produce for future generations the things people consume (such as fish, wildlife, water, and plant products) as well as the amenities they enjoy (like scenery, wildlife watching, and recreation opportunities). The land's ability to produce these things depends on our ability to manage it and use it in a way that does not impair soil productivity, air quality or water quality to the point that habitat is irretrievably lost; alter the natural landscape beyond its ability to recover; or change geologic features to the extent that they lose identity.

In designating the Upper Deschutes as a Wild and Scenic River, Congress recognized its Outstandingly Remarkable Values. Alternatives are based on ensuring the river's continuing capability to provide these values over the long term.

- ▶ The continued build-up of natural fuels within the river corridor increases the risk of catastrophic wildfire, which in turn could affect our long-term ability to maintain the ecological, botanical, scenic, and recreational values for which it was established (all alternatives).

- ▶ Increasing access to the river corridor with new roads, trails, campsites and facilities would affect long-term soil productivity through loss of vegetation and soil compaction. Over the long term, increased access could reduce wildlife habitat for some species as a result of more disturbance.
- ▶ Short-term use of prescribed fire and mechanical treatments to reduce natural fuels and move ponderosa pine stands toward an old-growth condition would change wildlife habitats over both the short and long term. Habitat components such as hiding cover for deer would decrease. On the other hand, habitat would increase for species that thrive in fire-based ponderosa pine ecosystems, such as white-headed woodpecker and flammulated owls (all alternatives).
- ▶ Increasing use levels within the river corridor could affect water quality of the river over the long term. Increases in accidental boat fuel spills and/or pollution of the river from careless camping practices could all contribute to a long-term decrease in water quality.

Unavoidable Adverse Effects

Implementing any alternative would result in some adverse environmental effects that cannot be avoided. Standards and guidelines and mitigation measures are intended to keep the extent and duration of these effects within acceptable levels, but adverse effects cannot be completely eliminated. The following adverse environmental consequences are associated to some extent with all alternatives.

Recreation: Loss or reduction of some opportunities because of development and/or management for other kinds of recreation opportunities or other resource objectives.

Vegetation and Plant Habitats: Reduction of some vegetation and plant habitats as a result of road, trail, or facility development, recreational use, wildfires, and/or vegetation treatments.

Reduction of habitat for some plant species as a result of ecological changes resulting from non-native species.

Roads and Facilities: Deterioration of roads, trails, and facilities resulting from more visitors and higher use levels.

Fire: Increase in fire hazard from increasing vegetation, coupled with higher levels of recreational use.

Fish and Wildlife: Reduction in habitat for some species as a result of vegetation treatments and construction of trails, roads, or facilities.

Displacement of wildlife when their habitat is disturbed by recreation use, vegetation treatments, or trail, road, and facility development.

Cultural Resources and Geology: Inadvertent or deliberate destruction of geologic features or cultural sites by visitors.

Scenery: Short-term reduction in scenic quality as the result of vegetation treatments, road, trail, or facility construction, or wildfires.

Air Quality: Short-term reductions in air quality from dust, smoke and vehicle emissions resulting from construction of trails, roads, or facilities; vegetation treatments; recreational use; and wildfires.

Water Quality: Potential for inadvertent spills of motor-vehicle fuel and oil affecting water quality.

Research and Monitoring: Some reduction in scenic quality or recreation opportunities resulting from research or installation of monitoring equipment.

Irreversible or Irretrievable Resource Commitments

The term "irreversible resource commitments" describes the loss of future options. It relates primarily to nonrenewable resources, such as minerals or cultural resources, or to factors, such as soil productivity that are renewable only over long periods of time. Some examples of irreversible commitments include disturbance of archaeological sites, loss or destruction of significant geologic features, or the loss of critical habitats.

"Irretrievable resource commitments" applies to the loss of production, harvest, or use of natural resources. For example, some or all of the timber production from an area is lost irretrievably while an area is serving as a winter sports site. Other examples of irretrievable resource commitments could include the loss of developed recreation opportunities in areas where wildlife habitat is the emphasis, or conversely, the loss of wildlife habitat opportunities in highly developed recreation areas. The production or use lost is irretrievable, but the action is not irreversible.

A programmatic plan such as this one does not make decisions on any irreversible or irretrievable commitment of resources. Ground-disturbing activities which would be done to achieve the goals of this plan would require a site-specific decision making such commitments. The resource commitments likely to result from implementation of this plan are described below.

Irreversible Resource Commitments

All the alternatives would contain standards and guidelines designed to protect resources that could be irreversibly affected. Nevertheless the potential for some irreversible loss remains, with the primary ones noted below:

- ▶ Soil-disturbing activities related to recreation uses and development, and vegetation treatments could result in the loss of soil productivity and cultural resources, in all alternatives.
- ▶ Use of fossil fuels by workers in managing the river corridor and by visitors to the river corridor is an irreversible resource commitment. Alternatives which encourage higher levels of roaded access and visitation, would cause more fossil fuel consumption.
- ▶ Contamination of surface water and/or groundwater is an irreversible commitment that is more likely under those alternatives promoting higher levels of recreation use

- Inadvertent or deliberate destruction of unique geologic features or cultural resources is an irreversible commitment also more likely under alternatives that promote higher levels of recreation use.

Irretrievable Resource Commitments

All alternatives would eventually involve irretrievable resource commitments. They are unavoidable because managing resources for any given purpose necessarily precludes the opportunity to use those resources for other purposes. The major irretrievable resource commitments are listed below.

Recreation: Managing areas of the river corridor for developed (and to some extent, dispersed) recreation would reduce opportunities to manage them for wildlife and/or plant habitat. Managing some parts of the river corridor wildlife and soil protection precludes opportunities to manage them for some types of dispersed recreation. Managing parts of the river corridor for non-motorized forms of recreation would preclude opportunities for motorized recreation in these areas. Increasing guided/outfitted recreation in some parts of the river corridor may reduce opportunities for self-guided recreation in those same areas.

Vegetation and Plant Habitats: Managing some areas of the river corridor to encourage open stands of old-growth ponderosa pine reduces opportunities in these areas to provide certain wildlife habitat components such as deer browse and hiding cover.

Managing some areas to reduce fire risk reduces some scenic quality and wildlife habitat components, such as dead/downed wood and deer hiding cover.

Managing some areas in the river corridor to provide protection for riparian areas reduces some recreational opportunities such as hiking.

Managing areas of the river corridor to provide certain vegetation or habitats reduces some recreational opportunities associated with facilities such as developed campgrounds.

Roads and Facilities: Building additional trails, roads, and facilities precludes opportunities to provide vegetation and wildlife habitat on these sites.

Fish and Wildlife: Managing wildlife habitats to favor certain wildlife species may reduce habitat opportunities for other species.

Managing areas to provide wildlife habitat for sensitive and/or easily disturbed species reduces both developed and dispersed recreation opportunities in those areas.

Consumers, Minorities and Women

The primary effect of the alternatives on consumers, minorities, and women would be through changes in job, outdoor recreation, and educational opportunities provided by interpretive programs. Job opportunities would include Forest Service and other agency jobs, jobs created by management activities such as road construction or campground improvement, and jobs created in response to river corridor recreational outputs, payments to counties, and other expenditures. Forest Service policies ensure employment and contracting opportunities for people without regard to race, color, religion, national origin, sex, age or physical/mental

disability. Although these policies would continue under all alternatives, the number of agency and contracting jobs would vary with program emphases and associated funding levels on the river corridor.

Recreation opportunities and educational opportunities available through interpretive programs on National Forest lands are also available to people without regard to race, color, religion, national origin, sex age or physical/mental disability. The types, amounts and locations of various recreation opportunities in the river corridor would vary depending on the alternative implemented.

Consistency With Other Plans and Policies

Plans and policies of various federal, state, county and city agencies were reviewed for consistency with alternatives described in this EIS. All alternatives were determined to be consistent with the 1980 Resource Planning Act and the National Clean Air Act.

The following plans and policies are addressed more specifically:

Deschutes National Forest Land and Resource Management Plan (USDA Forest Service 1990)

The 1990 Deschutes Land and Resource Management Plan (Forest Plan), as amended by the Regional Forester's Forest Plan Amendment #2 and Inland Native Fish Strategy, has served as interim management direction for the Upper Deschutes River corridor until the completion of the Upper Deschutes River Plan. The FEIS and ROD for the Upper Deschutes River would amend the Deschutes National Forest Land and Resource Management Plan to create the Upper Deschutes Wild and Scenic River Management Area (17A). This will be Amendment 12 to the Forest Plan.

Management on National Forest lands within the interim and proposed boundaries of the Upper Deschutes Wild and Scenic River corridor is determined by the legislative direction in the Act, Forest-wide standards and guidelines, and specific Management Area standards and guidelines. Certain activities within the corridor could also be subject to amendments to the forest plan from the Decision Notice for the Revised Continuation of Interim Management Direction Establishing Riparian Ecosystem and Wildlife Standards for Timber Sales (Regional Forester's Forest Plan Amendment #2) and the Inland Native Fish Strategy.

The following list describes the Management Areas within the interim boundary.

Interim boundary (Alternative 1) acres

Management Area 2 - Research Natural Areas (Pringle Falls)

Management Area 3 - Bald Eagle

Management Area 15 - Old Growth

Management Area 16 - Experimental Forest (Pringle Falls)

The interim boundary also includes a portion of the Newberry National Volcanic Monument which is now subject to the direction of the Newberry National Volcanic Comprehensive Management Plan.

Proposed boundary (Alternatives 2-6)

Under all action alternatives the Deschutes National Forest Plan would be amended to include a new Management Area. This Management Area would be called the Upper Deschutes Wild and Scenic River. This Management Area would replace portions of the following existing management areas:

Management Area 8 - General Forest

Management Area 9 - Scenic Views

Management Area 17 - Wild and Scenic Rivers

The new management area would overlay the following existing management areas:

Management Area 3 - Bald Eagle

Management Area 15 - Old Growth

Management Area 16 - Experimental Forest (Pringle Falls)

The new management area direction would continue all current management direction and forest-wide standards and guidelines except where specifically amended by the alternatives considered in this EIS. Standards and guidelines of the new management area would replace all other management area direction except as follows. Standards and guidelines for Old Growth, Bald Eagle and Pringle Falls Experimental Forest Management Areas would continue to apply unless they conflicted with the standards and guidelines for the Wild and Scenic River. In the case of a conflict a site-specific analysis would determine whether the standards and guidelines for the W&S River Management Area could be amended and still protect and enhance river values as required by the Wild and Scenic Rivers Act.

No significant changes to the total level of goods and services projected by the Forest Plan would be expected under any of the action alternatives.

Newberry National Volcanic Monument Comprehensive Management Plan (1994)

The NNVM Comprehensive Management Plan establishes management direction for resources within the Monument boundary which is consistent with the intent of the Wild and Scenic Rivers Act within the river corridor. Actions taken which would be consistent with that plan would also be consistent with this plan. All alternatives considered in this plan are consistent with the NNVM Comprehensive Management Plan.

Air and Water Quality

Oregon Department of Environmental Quality: DEQ establishes standards which must be met to be consistent with the Clean Water and Clean Air Act.

Implementation of all land-based alternatives would be consistent with the policies of the Oregon Department of Environmental Quality for protection of air and water quality. Section 13 (a) of the Wild and Scenic Rivers Act states that "The head of any agency administering a component of the national wild and scenic rivers system shall cooperate with

the Administrator, Environmental Protection Agency and the appropriate State water pollution control agencies for the purpose of eliminating or diminishing the pollution of waters of the river." This section of the Wild and Scenic Rivers Act is a reaffirmation of Section 313(a) of the Clean Water Act.

The Upper Deschutes River Plan establishes Standards and Guidelines for land based activities on National Forest lands and property standards for private property development, and an adaptive flow management strategy for protecting and improving water quality. It also identifies a continued coordinated effort between federal and state agencies for monitoring and improving water quality and further quantifying potential water quality problems. This management plan is expected to meet DEQ's requirements for a TMDL plan for non-point sources of pollution.

Plant/Fish/Wildlife Habitat

No actions are proposed in the alternatives that would conflict with plant, fish, or wildlife habitat management plans of the U.S. Fish and Wildlife Service, Oregon Department of Fish and Wildlife (ODFW), the Oregon Natural Heritage Program, or the Deschutes National Forest Land and Resource Management Plan. Existing populations of all proposed, endangered, threatened and sensitive plant species would not be jeopardized in compliance with Forest Service policy (FSM 2670).

Oregon Department of Fish & Wildlife: All alternatives would meet ODFW goals by maintaining special habitats. Seasonal closures in the Tumalo deer winter range and standards for fishery improvement and key elk areas meet with ODFW. The "No Shooting Area" in Segment 3 is continued in all alternatives. Hunting is permitted elsewhere in the river corridor in concurrence with ODFW objectives.

U.S. Fish and Wildlife Service Recovery Plans: Bald Eagle - All alternatives would meet recovery plan objectives of protecting important foraging and nesting areas. All alternatives would emphasize protection and enhancement of existing bald eagle habitat.

Cultural Resources

All actions would comply with federal historic preservation law and regulations, including Executive Order 11593, the National Historic Preservation Act of 1966, the American Indian Religious Freedom Act, the Archaeological Resources Protection Act of 1979, the Native American Graves Protection and Repatriation Act, and the Archaeological and Historic Preservation Act (16USC469).

State Comprehensive Outdoor Recreation Plan (SCORP) & Recreational Needs Bulletin

The State Comprehensive Outdoor Recreation Plan (SCORP 1991) is prepared every six years by the Oregon Department of Parks and Recreation. It includes a supplemental Recreational Needs Bulletin. These documents report current and projected supply and demand information for a variety of outdoor recreation activities. These activities are classified according to the ROS system and profiled across the different regions of the state. SCORP is one of the most comprehensive and reliable sources of information dealing with future demand for recreation activities and settings in the river corridor.

SCORP data was integrated into the planning process during alternative development. All alternatives in this EIS provide varying amounts of rural, roaded natural, and roaded natural non-motorized ROS classes.

State Scenic Waterway Program

Proposed rules for State Scenic Waterways to implement the preferred Alternative are in Chapter 5. All proposed rules are consistent with goals of the State Scenic Waterways Program.

LaPine State Recreation Area Plan

Nothing in this plan would preclude continued implementation of the LaPine State Recreation Area Plan.

Oregon State Marine Board

Communication with the Marine Board indicates that Alternatives 3 and 5 would meet Marine Board boating facility management objectives. Alternatives 2, 4, or 6 would require the Marine Board to change rules to designate several miles of the river for non-motorized travel. All alternatives would comply with motorized boating speed limits established by the Oregon State Marine Board.

Oregon State Forest Practices Act

Protective measures for streams and soils within the river corridor are generally more restrictive than required by the Oregon Forest Practices Act. This plan does not propose of changes to the Oregon State Forest Practice Act.

County Plans

County comprehensive plans must address 19 goals established by the Land Conservation and Development Commission (LCDC). The alternatives in this EIS were compared to the LCDC-approved comprehensive plan for Deschutes County. The uses and activities proposed in the alternatives were generally consistent with county goals. Since the county plan has been found by LCDC to comply with the statewide goals, consistency with the statewide goals is assumed.

Some changes to land use regulations would occur under all action alternatives. Under all alternatives, minor modifications to emphasize revegetation of streambanks over other methods of fill would be necessary. Alternative 2 would require additions of new setback requirements, while all alternatives would require changes to design review regulations.

The LCDC has left some provisions of the statewide planning goals to be administered by state agencies rather than local governments. These provisions are discussed below.

The Forest Practices Act administered by the Oregon Department of Forestry (Goals 5 and 17 and ORS 527.610 and 527.730)

All practices used to implement the alternatives would meet or exceed the Forest Practices Act.

Fish and Wildlife policies administered by the Oregon Department of Fish and Wildlife (Goals 16, 17, and 18 and ORS 496.012 to 496.162 and ORS 506.105 to 506.201)

All alternatives contain provisions to provide for the habitat needs of species identified on the state of Oregon Threatened and Endangered Species list.

Air and Water Pollution Control statutes administered by the Oregon Department of Environmental Quality (Goal 6 and ORS 468.275 to 468.345 and ORS 468.700 to 468.775)

The Forest Service complies with these requirements by obtaining permits and providing data as needed. For example, any burning conducted as a part of implementing an alternative would be authorized by DEQ. Any pollution control facilities would be operated according to DEQ standards and new facilities would be approved by DEQ before construction.

Fill and Removal administered by the Division of State Lands (Goals 16, 17 and 18 and ORS Chapters 274, 517, and 541)

Any fill and removal operations conducted within the river corridor would meet DSL requirements.

Regulation of water withdrawals administered by the Department of Water Resources (ORS Chapters 536 and 543)

Forest Service water use would comply with applicable Department of Water Resource requirements.

Energy Requirements of the Alternatives

Each of the alternatives would result in the consumption of fossil fuels and electricity. Some of this consumption would occur through activities carried out to manage the resources of the river corridor (for example, vehicles and equipment used for vegetation treatments, facility maintenance and/or construction, and road maintenance/construction). Another source of energy consumption would be the fuel and electricity used by visitors to the river corridor.

Under all alternatives, energy consumption would be expected to increase over present levels. This increase would be lowest for Alternative 2, which has the lowest level of designed use, provides the least roaded access, and provides for an intermediate level of vegetation treatments. Alternative 5, which has the highest level of designed use and expands developed facilities, would likely result in the highest increase of energy consumption over present levels.

Effects on Prime Farmlands, Forest Lands, and Rangeland

Prime Farmland: The USDA Soil Conservation Service has defined prime farmlands as: Land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage and oilseed crops and is available for these uses. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. The final environmental impact statement for the 1990 Forest Plan for the Deschutes National Forest concluded that no prime farmlands are found within the boundaries of the Forest. Therefore, Upper Deschutes Wild and Scenic River corridor, contains no prime farmlands.

Prime Forest Land: Prime Forest Land has been defined primarily in terms of its ability to grow wood. The definition states: Prime timberland is land that has soil capable of growing wood at the rate of 85 cubic feet or more/acre/year (at culmination of mean annual increment) in natural stands and is not in urban or built-up land uses or water. Generally speaking, this is land currently in forest, but does not exclude qualifying lands that could realistically be returned to forest. Delineation of these lands will be in accordance with national criteria.

Under this definition, none of the forested land within the river corridor would qualify as prime forest land.

Rangeland: Prime rangeland is defined as: Rangeland which, because of its soil, climate, topography, vegetation, and location, has the highest quality or value for grazing animals. The (potential) natural vegetation is palatable, nutritious, and available to the kinds of herbivores common to the area. While used for grazing at the present time, this land is not defined as "prime" rangeland.

Effects on Wetlands and Flood Plains

Wetlands: Wetlands are those areas that are inundated by surface or ground water with a frequency sufficient to support and, under normal circumstances, do or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas, such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds.

Under all alternatives, these areas would receive special attention because of their habitat values. Recreation use in all action alternatives would be designed to minimize impacts to these areas. No facility development or other management activities would be permitted to reduce the wetlands acreage now present.

Flood Plains: The term "flood plain" means the lowland and relatively flat areas adjoining inland and coastal waters, including flood prone areas of offshore islands, including, at a minimum, those that are subject to a one percent or greater chance of flooding in any given year.

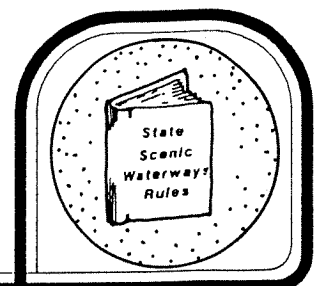
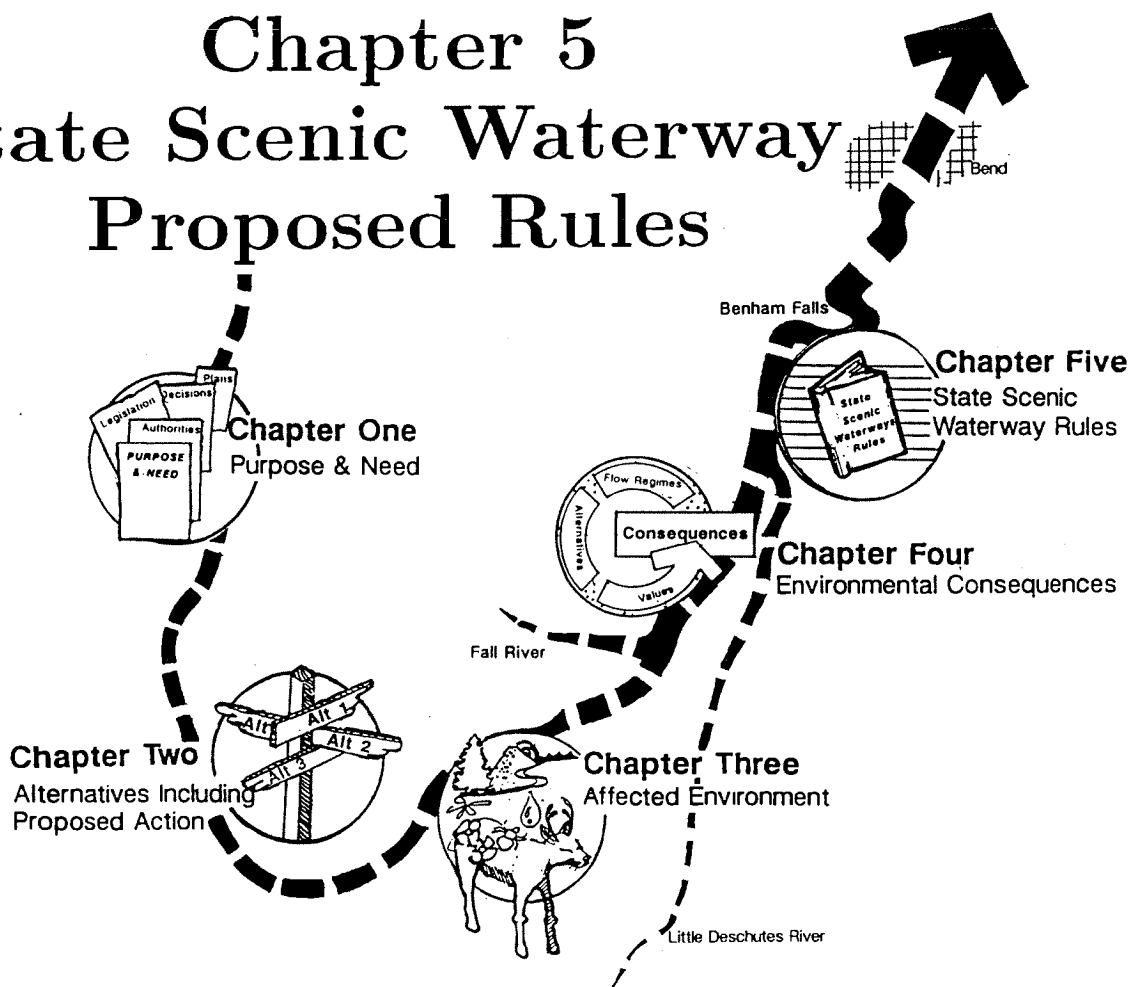
Effects on all flood plans within the Deschutes National Forest were analyzed in the 1990 Forest Plan. This EIS tiers to that analysis, which found that no significant adverse effects within areas of flood plains were anticipated (see USDA Forest Service 1990 p. 4-35).





Upper Deschutes River FEIS

Chapter 5 State Scenic Waterway Proposed Rules



Chapter 5

Oregon Scenic Waterway Program

A. Background

The Oregon Scenic Waterway Act was established by a ballot initiative in 1970. The original Oregon Scenic Waterways system created by the Act included 496 free-flowing miles of six rivers.

Rivers can be added to the system through designation by the Governor or the legislature. Such actions have added significant mileage of five rivers, as well as Waldo Lake, to the Scenic Waterways system since passage of the original Act.

Rivers can also be added to the system by the citizens of Oregon. In 1988, Oregon voters passed the Oregon Rivers Initiative (Ballot Measure #7), which added 573 river miles to the system. These additions included the segments of the Upper Deschutes River from Little Lava Lake to Crane Prairie Reservoir, and from the Bend south urban growth boundary to the Central Oregon Irrigation District diversion. There are now one lake and segments of 19 rivers (1,148 miles), in the State Scenic Waterways system.

B. Program Goals

The scenic waterway program promotes cooperative protection and wise use of rivers in the system by all agencies (federal, state and local), individual property owners and recreation users. Five general program goals include:

1. To protect the free-flowing character of designated rivers for fish, wildlife and recreation. No dams, reservoirs, impoundments or placer mining activities are allowed on scenic waterways.
2. To protect and enhance scenic, aesthetic, natural, recreation, scientific, fish and wildlife values along scenic waterways. New development or changes of existing uses proposed within a scenic waterway are reviewed before they may take place.
3. To protect private property rights. The Act discourages unsightly structures or inappropriate development that could be a nuisance to neighboring landowners and/or even depreciate property values. It prohibits pollution and the disturbance of adjacent surface lands by placer mining. It also prohibits public use of private property without explicit consent of the landowner.
4. To promote expansion of the scenic waterway system. The Act sets up a process for adding new rivers to the system and establishes criteria for candidate rivers.
5. To encourage other local, state and federal agencies to act consistently with the goals of the program. Oregon State Parks reviews plans and decisions made by other agencies to ensure consistency with the scenic waterways program.

C. Administration

Scenic waterways are administered under the authority of the Oregon State Parks and Recreation Commission (ORS 390.805 to ORS 390.925). Administrative rules (OAR 736-40-005 to 736-40-040) have been adopted to govern the program (see Appendix _). In addition to the general rules governing the program, specific rules are generated for management of each river segment in the system. These rules are created through the management planning process, and tailored to the actions necessary to maintain the existing character of the designated river corridor.

The Act and the Commission's rules require the evaluation of proposed land use changes within one-quarter mile from the ordinary high water line, on each side of the river, for their potential impacts on the special attributes of the river. Property owners wanting to build roads or houses, extract minerals and aggregate, harvest timber, or other similar projects, must provide written notification to the Oregon State Parks and Recreation Department. Parks evaluation of the project will be coordinated with other natural resource agencies (federal and state) having regulatory responsibility and with the local jurisdiction. Parks relies on its river classification and administrative rules for each segment of the scenic waterway to determine whether the proposed project is incompatible or inconsistent with the designated classification. State Parks will work with the landowner to reach a resolution of conflicts. Where such resolution cannot be reached, the Commission must decide within one year of the original notification whether to pay the property owner for the land or the development rights. If the Commission does not decide within one year to acquire the land or development rights, then the landowner may proceed in accordance with the original development proposal.

Other local, state, and federal agencies must comply with the scenic waterway law and rules. Parks coordinates the program with other state and federal agencies to assure their actions are compatible with scenic waterway Act, administrative rules and resource management plans.

D. The Management Planning Process

The goal of the scenic waterway management planning process is to develop a comprehensive and workable management plan which will protect or enhance the special attributes of the designated river corridor. Primary emphasis is the protection of aesthetic, scenic, fish and wildlife, scientific, and recreational features.

The intent is to maintain the existing scenic condition of the area, without "turning back the clock" on existing land uses. The mechanisms for protection and enhancement include:

River Classification - Within the management plan, scenic waterways are classified into one or more of six possible classifications, according to the character of the landscape and the amount and type of development.

Administrative Rules - Once the classifications are set, specific guidelines for new development are established as land management rules.

Other Management Recommendations - These are suggestions for actions to protect corridor values. Implementation could be through the State Parks Department, other state agencies, federal agencies or local agencies, organizations or persons.

E. Scenic Waterway Classification

Under Oregon law (ORS 390.845 - Functions of the department; use of adjacent lands), the scenic waterway program is administered by the State Parks and Recreation Commission, and staffed the Oregon State Parks and Recreation Department. The Parks Department is required to protect the aesthetic, scenic, fish and wildlife, scientific and recreation features based on special attributes of each river. The Parks Department strives to protect special attributes of the river while recognizing existing land uses and management practices on adjacent lands.

In order to define and achieve management goals, the river is classified into one or more of six possible classifications according to the present level of land development, committed land uses, or landscape alterations. Once the classifications are set, appropriate guidelines for new development or landscape alterations are established as rules. The major aim of the program is to maintain the existing scenic condition of the river.

The following are existing land use and land alteration conditions usually associated with each of the six river classifications; and how each kind of classification should be administered (managed) in scenic waterways:

1. **Natural River Areas** are generally inaccessible except by trail or river, with primitive or minimally developed shorelands. Preservation and enhancement of the primitive character of these areas is the goal of this and the next two classifications.
2. **Accessible Natural River Areas** are relatively primitive, undeveloped areas with access by railroad or lightly traveled road.
3. **Natural Scenic View Areas** are designated where one riverbank is inaccessible, undeveloped or primitive in character while the opposite bank is accessible and developed.
4. **Scenic River Areas** may be accessible by roads, but are largely undeveloped and primitive except for agriculture and grazing. River segments considered "Scenic" are managed to maintain or enhance their high scenic quality, recreation value, fishery and wildlife habitat. The intent is to preserve their largely undeveloped character while allowing continued agricultural land use.
5. **Recreational River Areas** are readily accessible by road or railroad, with some agricultural, commercial and/or residential development along the banks; the river may have undergone some impoundment or diversion in the past. River segments considered "Recreation" are managed to allow continuance of compatible river-oriented public outdoor recreation opportunities, to the extent that these do not substantially impair the natural beauty of the scenic waterway or diminish its aesthetic, fish and wildlife, scientific and recreational values.

6. **River Community Areas** are river segments where the density (residential tract or platted subdivision) of existing structures or other developments precludes application of a more restrictive classification. River segments considered "Community Areas" are managed to allow development that is compatible with county zoning and blends into the natural character of the surrounding landscape. This also means protecting riparian vegetation, and encouraging activities that enhance the landscape.

The rules established for each river classification generally allow some new construction and continued use of existing structures and improvements. Though some improvements require notification, review and approval, many others do not. For example, notification and approval is not generally needed for construction of new fences; maintenance of farm buildings, fences or outbuildings; laying of irrigation lines; crop rotation; removal of danger trees; construction of grain storage facilities under certain conditions; maintenance of existing residences and outbuildings; minor residential remodeling; construction of garage adjacent to existing homes; certain changes in homesite landscaping; maintenance of roads and bridges; and firewood cutting for personal use.

Mining, road building, construction of most new structures, placement of mobile homes, land clearing and timber harvest are examples of activities requiring approval. River classifications and the associated rules or guidelines determine how the natural and scenic beauty of the river will be maintained.

F. Upper Deschutes Scenic Waterway Land Management Program

Classifications

The Little Lava Lake to Crane Prairie segment is not included in this plan. The entire segment is in public ownership, is recognized as a State Scenic Waterway and has values which make it eligible for consideration as a Wild and Scenic river. A Management Plan will be developed for this segment once a federal study has concluded whether the segment is suitable for Wild and Scenic designation.

The Oregon State Parks and Recreation Department proposes to apply three classifications to given segments of the Upper Deschutes Scenic Waterway. Classification locations and explanations for why each is applied to river segments are provided below:

1. **River Community Areas**

- A. Those related adjacent lands made up of the residential tract of homes, cabins, and similar dwellings along the river extending downstream of the Wickiup Dam stream gauge at about river mile 226.4 approximately two miles to about river mile 224.5, known as the Wickiup Community Area.

B. Those related adjacent lands made up of residential tracks along the river in approximately river mile 217.5 of Pringle Falls within the northeast quarter of Section 23, Township 21 South, Range 9 East, of the Willamette Meridian, extending downstream approximately seven-tenths of a mile (0.7) to about river mile 216.8, known as Pringle Falls Community Area.

C. Those related adjacent lands within platted residential tracks known as Oregon Water Wonderland Unit 1, River Forest Acres and Deschutes River Homesites, Unit 8 Part 1 and Unit 6 situated along the river extending downstream approximately five miles from about river mile 204 to about river mile 199 or the General Patch Bridge (Deschutes County Road - FAS 793), known as the General Patch Community Area.

Explanation: In 1985 the Oregon Legislature directed the then Department of Transportation, Parks and Recreation Division to study the Deschutes County portion of the Deschutes River for eligibility as a State Scenic Waterway. The study was completed and given to the 1987 Legislature for approval. These segments of river were found to meet the qualifications for designation as an Oregon Scenic Waterway, with the classification of "River Community", and the Legislature designated it as such.

D. The segment of the scenic waterway beginning at the south City of Bend Urban Growth Boundary at about river mile 172 downstream approximately one mile to the Central Oregon Irrigation diversion at about river mile 171, known as the South Bend Community Area.

Explanation: This segment of river was designated an Oregon Scenic Waterway by voters initiative in 1988. The current Wild and Scenic River Study concluded that due to the high amount of private property, subdivisions, development and current zoning, this segment meets the qualifications for "River Community".

Management Goal: Allow development that is compatible with Deschutes County and City of Bend land use planning and zoning ordinances and ensure that any new developments are unobtrusive.

2. **Recreational River Area**

The segment of the scenic waterway beginning at Harper Bridge (Deschutes County Road - FAS 900) at approximately river mile 190.6 and extending downstream approximately five miles to the point at which the river intersects the Deschutes National Forest Boundary in Section 20, Township 19 South, Range 11 East, of the Willamette Meridian, at approximately river mile 184.8.

Explanation: In 1985 the Oregon Legislature directed the then Department of Transportation, Parks and Recreation Division to study the Deschutes County portion of the Deschutes River for eligibility as a State Scenic Waterway. The study was completed and given to the 1987 Legislature for approval. This segment of river were found to meet the qualifications for designation as an Oregon Scenic Waterway, with the classification of "Recreational", and the Legislature designated it as such.

Management Goal: Preserve the area's recreational quality and ensure that any new developments blend into the natural character of the surrounding landscape.

3. **Scenic River Area**

A. The segment of the scenic waterway beginning at the Wickiup Dam stream gauge at about river mile 226.4 and extending downstream about 28 miles to the General Patch Bridge (Deschutes County Road -FAS 793) at about river mile 199 with the exception of the Wickiup Community Area (about river mile 226.4 to about river mile 224.5), Pringle Falls (about river mile 217.5 to about river mile 216.5) and General Patch (about river mile 204 to about river mile 199) as River Community Areas.

B. The segment of the scenic waterway extending from the Deschutes National Forest boundary in Section 20, Township 19 South, Range 11 East, of the Willamette Meridian, to the Bend Urban Growth Boundary at River Mile 172.

Explanation: In 1985 the Oregon Legislature directed the then Department of Transportation, Parks and Recreation Division to study the Deschutes County portion of the Deschutes River for eligibility as a State Scenic Waterway. The study was completed and given to the 1987 Legislature for approval. These segments of river were found to meet the qualifications for designation as an Oregon Scenic Waterway, with the classification of "Scenic", and the Legislature designated it as such.

Management Goal: Preserve the area's scenic quality and ensure that all new developments blend into the natural character of the surrounding landscape.

Land Management Rules

1. River Community Areas

- A. The Wickiup Community Area
- B. The Pringle Falls Community Area
- C. The General Patch Community Area
- D. The South Bend Community Area;

Rule: Within these areas, all new structures, improvements and development shall be in compliance with the Land Management Rules as described in OAR 736-40-035 and OAR 736-40-040(1)(f), and be consistent with applicable City of Bend and Deschutes County land use and development regulations. Natural evergreen vegetation shall be maintained between the improvements and the river. Improvements needed for public recreation use or resource protection shall be designed to blend with the natural character of the landscape.

All structures shall be set back a minimum of 20 feet from rimrock, where this feature exists and 100 feet from the ordinary high water line of the Deschutes River.

New bridges will not be permitted. Maintenance, repair and replacement of existing bridges shall be consistent with OAR 736-40-035 (6) & (7), Deschutes County and City of Bend land use and development regulations, and Oregon Division of State Lands regulations.

New commercial public service facilities, including but not limited to resorts, hotels, motels, lodges, recreational vehicle parks, convenience stores, and gas stations, shall be screened from view from the river by topography and/or evergreen vegetation.

2. Recreational River Areas

The river from Harper Bridge downstream to the boundary of the Deschutes National Forest in Section 20, Township 19 South, Range 11 East;

Rule: Within these areas, all new structures, improvements and development shall comply with the Land Management Rules as described in OAR 736-40-035 and OAR 736-40-040(1)(c)(B), and be consistent with applicable Deschutes County land use and development regulations.

New structures and improvements shall be set back a minimum of 100 feet from the ordinary high water line of the river. A set back of 20 feet or more is required from the edge of the rim rock (where this feature exists). The exact distance for the above setbacks will be determined on a case by case basis and will be dependent on existing terrain, existing vegetation, height of proposed structure, and applicable county setback requirements.

New structures shall be finished in colors and tones that blend with the surrounding landscape. For the purposes of this rule, landscape includes indigenous vegetation, soils, and rock material. Natural evergreen vegetation shall be maintained between the structures and the river. The establishment of additional vegetative screening (preferably native vegetation) may be required to further mitigate the visual impact of the structure as seen from the river.

Roads, mines and similar forms of development shall be set back from the river consistent with county zoning and land development requirements and be screened from view from the river by topography, or by existing or established evergreen vegetation.

New bridges will not be permitted. Maintenance, repair and replacement of existing bridges shall be consistent with OAR 736-40-035 (6) & (7), Deschutes County land use and development regulations, Oregon Division of State Lands regulations, and USFS Wild & Scenic River regulations.

New commercial public service facilities, including but not limited to resorts, hotels, motels, lodges, recreational vehicle parks, convenience stores, and gas stations, shall be screened from view from the river by topography.

New utility facilities shall share land and air space with existing utilities, road rights-of-way and/or river crossings. Upgrades to existing utility facilities will be permitted. River crossings for new utility facilities will not be permitted.

Improvements needed for public recreation use or resource protection must be designed to blend with the natural character of the landscape.

3. **Scenic River Area**

The river from the Wickiup Dam Stream Gauge downstream to General Patch Bridge;

The river from the boundary of the Deschutes National Forest in Section 20, Township 19 South, Range 11 East to the Bend Urban Growth boundary at river mile 172;

Rule: Within these areas all new structures, improvements and development shall comply with the Land Management Rules as described in OAR 736-40-035 and OAR 736-40-040(1)(b)(B) and be consistent with applicable Deschutes County land use and development regulations.

New structures and improvements shall be set back a minimum of 100 feet from the ordinary high water line of the river. A set back of 20 feet or more is required from the edge of the rim rock (where this feature exists). The exact distance for the above setbacks will be determined on a case by case basis and will be dependent on existing terrain, existing vegetation, height of proposed structure, and applicable county setback requirements.

New structures shall be finished in colors and tones that blend with the surrounding landscape. For the purposes of this rule, landscape includes indigenous vegetation, soils, and rock material. Natural evergreen vegetation shall be maintained between the improvements and the river. The establishment of additional vegetative screening (preferably native vegetation) may be required to further mitigate the visual impact of the structure as seen from the river.

New bridges will not be permitted. Maintenance, repair and replacement of existing bridges shall be consistent with OAR 736-40-035 (6) & (7), Deschutes County land use and development regulations, Oregon Division of State Lands regulations, and USFS Wild & Scenic River regulations.

New commercial public service facilities, including but not limited to resorts, hotels, motels, lodges, recreational vehicle parks, convenience stores, and gas stations, shall be screened from view from the river by topography.

New utility facilities shall share land and air space with existing utilities, road rights-of-way and/or river crossings. Upgrades to existing utility facilities will be permitted. River crossings for new utility facilities will not be permitted.

Roads, mines and similar forms of development shall be screened from view from the river by topography.

Improvements needed for public recreation use or resource protection shall be designed to blend with the natural character of the landscape.

Other Management Recommendations

1. Public agencies should develop and install small interpretive signs in key areas within the river corridor.
2. Public or private agencies shall not modify existing or construct new structures within the high water channel unless they enhance river related resources and comply with the free-flow standards.

3. Managing agencies should identify areas which are in need of riparian vegetation protection and restoration and assist landowners in finding ways to protect and restore these areas.
4. Public agencies should provide for and post standardized, well designed, boundary signs distinguishing private lands from public lands where trespass has been identified as a continual problem.
5. The Deschutes National Forest should provide the Oregon State Parks and Recreation Department draft plans, environmental assessments or environmental impact statements on activities that may affect the Upper Deschutes River Scenic Waterway.
6. The State Parks Department will seek the cooperation of all local, state and federal agencies in meeting the objectives of this program and complying with the State Scenic Waterway Act and State Park Commission rules.

Appendix A

Comments on the DEIS

The Council on Environmental Quality Regulation (Section 1503.4) for implementing the provisions of the National Environmental Policy Act directs the Forest Service to respond to public comments on the draft Environmental Impact Statement. The Forest Service can respond by modifying the alternatives, developing new alternatives, improving the analyses, making factual corrections, or explaining why comments do not warrant further agency response. The number and content of comments on a particular issue can be used as a barometer for the intensity of concern surrounding various issues; however, the Forest Service does not consider this a voting process. All comments were considered and analyzed regardless of numbers.

The draft EIS and management plan for were published in October 1995 and distributed to an extensive mailing list of individuals and organizations. The official notice of availability was published in the Federal Register on October 27, 1995. The public had 90 days to review the document and provide comments. We received 96 responses by mail, public meeting, fax, and telephone. Many of the responses contained comments on more than one issue.

Table A-1

| Origin of Comments | Number |
|---------------------------|--------|
| Central Oregon | 74 |
| Other Oregon | 15 |
| Washington and California | 7 |
| Total | 96 |

Origin and Profile of Responses

The majority (77%) of the responses were from central Oregon, which includes all of Deschutes, Jefferson, and Crook Counties, and the northern portion of Klamath County. All of the responses originated in Oregon, Washington, or California. Many of the commentors from outside central Oregon indicated that they own property in the vicinity of the river. See Table A-1 for the number of comments from each area.

The number of responses from different types of respondents is shown in Table A-2. Individuals made up the largest group of commentors. Four comments were submitted by environmental groups,

Table A-2

| Type of Respondents | Number |
|-----------------------------|--------|
| Individuals | 72 |
| Environmental Groups | 4 |
| Recreation Groups | 2 |
| Homeowner Group | 1 |
| Irrigation Districts/Groups | 6 |
| Businesses | 5 |
| Government Agencies | 5 |
| Media | 1 |
| Total | 96 |

including Sunriver Environmental Committee, Trout Unlimited, Oregon Natural Desert Association, and WaterWatch. Recreation groups that commented included Blue Ribbon Coalition and Central Oregon Paddlers Club. Sunriver Owners Association was the only homeowners group which commented. Four letters were received from irrigation districts or groups, including Arnold Irrigation District, Deschutes Basin Alliance, and Central Oregon Water Users. Some irrigators responded as businesses or individuals. Businesses which commented included Madras Farms Company, Harris Farms, Bend Outdoor Center, and Hickman, Williams, Inc. Five comments were submitted by government agencies, including Bureau of Land Management, Department of Interior-Regional Environmental Officer, Bureau of Reclamation, Pacific Northwest Research Station, and the Environmental Protection Agency. An editorial from *The Bulletin* was the media comment.

The number of comments received in each subject area (Table A-3) shows the level of concern about that issue. Each response was counted once for each subject area mentioned. For example, 41 of the 96 responses mentioned recreation. Some of those same responses addressed other issue categories, for example flows, and were counted again in those categories. Therefore, the total of the table on Subject of Comments exceeds 96 responses.

Summary of Comments

The flows were a concern of 31 commentors. Concerns included the source of funding for improvements to the irrigation system, how these improvements would be done, the availability of water for irrigators, the speed of implementation, the cooperative approach to implementation, the preferred flow level, ramping rates, and the effects of canal lining on riparian areas and groundwater.

Water quality brought six comments including a request for more soil information, erosion concerns, and concern about the high level of human fecal waste along the river.

Aquatic and riparian habitat was mentioned by 12 commentors who had concerns including river morphology changes, grazing, dikes, the effects of large woody material and rubble on navigation and the ability of the river to carry irrigation water. One letter asked for clarification in the document and had suggestions for the monitoring plan.

The fishery was a concern of four commentors. Changes in stocking and fishing regulations were requested and clarifications were requested.

Table A-3

| Subject of Comments | Number |
|------------------------------|--------|
| Flows | 31 |
| Water Quality | 6 |
| Aquatic and Riparian Habitat | 12 |
| Fishery | 4 |
| Vegetation | 11 |
| Wildlife | 2 |
| Scenic Quality | 1 |
| Recreation | 41 |
| Cardinal Bridge | 36 |
| Private Land Use | 6 |
| Boundary | 2 |
| Miscellaneous | 18 |

Vegetation concerns were included in eleven responses. Concerns included grazing, logging, forest health and planting.

Recreation concerned 41 commentors. Subjects included off-road vehicles, motorized boating and enforcement of speed limits, hunting, trails, road access, camping, use levels, guided/outfitted use, and special events.

Cardinal Bridge was the subject of 36 responses including one from the Sunriver Owners Association. Several commentors included a copy of that letter with their own letter.

Private land use brought responses from six commentors. Concerns included development close to the river, land acquisition to preserve waterfowl hunting, allowing metal roofs, and river front walls.

Two commentors requested adjustments to the boundary.

Comments on the document overall, requesting clarification or correction of specific sentences or paragraphs, and miscellaneous comments were submitted by 18 commentors.

Response to Comments

Many letters had comments on more than one aspect of the plan. The comments were sorted by issue, and teams from the coordinating agencies considered each comment, made changes to the document as necessary, and wrote responses to the comments. To avoid repetition, the teams grouped comments which were essentially the same and provided a single response. A complete file of comments is available at Bend-Ft. Rock Ranger District, 1230 NE 3rd, Suite A-262, Bend, Oregon, 97701.

The number preceding each comment is for planning record tracking purposes.

Flow

Comment (1, 2, 4-6, 9-16, 23, 32-35, 38, 39, 43, 88, 288, 289) Numerous comments concerned the feasibility of implementing the preferred flow option without reducing availability of water for off-stream uses, the cost of necessary improvements and who would pay, and the time line of implementation.

Response Under the adaptive flow management strategy, the goal of enhancing the instream flows would only occur to the extent the irrigation districts' ability to deliver irrigation water is maintained, if not enhanced (See FEIS, Chapter 2 and River Plan, Adaptive Flow Management Strategy). An implementation team with irrigation district and intergovernmental representation would develop specific projects and programs that would provide for more instream flow and more reliable supply for offstream users. No changes in winter flows would occur until these projects and programs are shown to be effective. The team would also pursue technical assistance and financing for these conservation practices. The time lines given in the document are estimates of the time necessary to implement these changes, not mandates.

Comment (290, 291) Some respondents expressed a concern that flow options could be interpreted to require mandatory implementation and consequently would supersede existing water rights.

Response The EIS emphasizes the voluntary and cooperative process of implementation and the honoring of existing water rights. Chapter 2 notes that flow "...options...would be implemented cooperatively as water availability permits" and "The goal of enhancing the instream flows would only occur to the extent the irrigation districts' ability to deliver irrigation water is maintained, if not enhanced." In Chapter 4, two of the basic assumptions of the analysis of environmental consequences are that "existing water rights of irrigators would be honored" and "the implementation of any but the existing flow regime would require cooperation between the appropriate state and federal agencies and irrigation districts."

Comment (24, 41, 42) ...By tying streamflow improvements exclusively to voluntary measures requiring millions of dollars to implement, the Plan stakes the fate of the Upper Deschutes on some very uncertain contingencies. ...would like to see a cooperative approach succeed in addressing streamflow problems on the Upper Deschutes. But that approach has little chance of success without reliable, adequate funding for water conservation measures and water rights acquisitions.; ...the Plan provides little assurance that substantial improvements can actually be made.; It is difficult to agree with the preferred alternative because there are so few specifics available for achieving minimum flow.

Response The management plan is intended to set *long-term programmatic goals* for many aspects of river management. Identifying goals is the first step in getting them implemented. The cooperative implementation strategy was grounded on the philosophy of the Wild and Scenic Rivers Act, a belief that cooperation would be more effective than regulation or litigation, and the recognition that offstream use of the river is legitimate and beneficial to society.

Comment (295) A formal cost benefit analysis should precede choice of flow options.

Response Cost benefit analysis would not be appropriate at this time. The plan is a programmatic document that establishes resource goals and identifies a strategy for achieving those goals. One key element of the strategy is an adaptive management plan for implementing changes in the flow. These changes are expected to improve channel stability and aquatic and riparian habitat. These improved conditions would, in turn, protect and enhance Outstandingly Remarkable River Values such as fishery, scenery, wildlife, and recreation. The adaptive management plan will rely primarily on water conservation measures to return flow to the river. The conservation measures would be implemented as a series of projects. Each project would be subject to individual analysis of the costs and benefits.

Comment (25) The Plan assumes a 50/50 split of conserved water between an irrigation district and instream flows, but that may be a faulty assumption.

Response The actual split of conserved water may vary between conservation projects and cannot be currently projected. As described in the Flow section of Chapter 4, the 50/50 split is an assumption used in the analysis of environmental consequences in order to compare the options. "If future allocation of conserved water was based on other than a 50/50 split, the amount of water required could be different."

Comment (295A) EIS should consider whether money spent on implementing flow options would be more effectively spent elsewhere.

Response The FEIS proposes and analyzes other actions to improve the fishery and prevent erosion. Several actions such as adding structural material to the river, encouraging bioengineering where streambank stability is an issue, and protecting riparian and streamside habitat are included in the action alternatives. However, the hydrologist, fisheries biologists, wildlife biologists, and landscape architects participating in the plan have concluded that the greatest benefit to river resources would be derived by increasing minimum flows. Monitoring during the course of implementation would evaluate the effectiveness of these actions and serve as a means of determining if adjustments to the plan are needed.

Comment (296, 297A) The basis for selecting the Preferred Flow Option is not clear.

Response As described in Chapter 1, Issue 1, all river values can be affected by flow. In addition to erosion rates and turbidity, fish habitat, scenery, riparian vegetation, and recreation were also considered. The effects of flow options on these values is analyzed in Chapter 4. Criteria for selection of the Preferred Option included a description of resource conditions expected to protect and enhance river values and flows that are technologically achievable at a reasonable cost.

Comment (297) There is a concern that the criteria for choosing the various flow options does not meet NEPA requirements.

Response NEPA does not specify how the range of alternatives is to be selected. An interagency, interdisciplinary team selected a range of flow options that provided reasonable increments between the existing flow regime and a nearly natural flow regime. The flow options were selected as possible flows that, when combined with the land based alternatives, could possibly achieve the desired resource conditions. The desired conditions involve both those associated with Outstandingly Remarkable River values and providing water from the Upper Deschutes for offstream use. As such the flow options represent a reasonable range of alternatives as required by NEPA (40CFR1502.14(a)). Differences in the effects of flow options are described in Chapter 4, Environmental Consequences. This analysis was based on the Instream Flow Assessment and a landscape analysis (Gillham, 1991). The Instream Flow Assessment was the result of an analysis of an IFIM (Hardin-Davis, 1991) and data collected and analyses conducted by private consultants, the Forest Service, and other federal agencies. Past flow recommendations either did not evaluate all of the values requiring consideration or did not utilize methods of study, such as an IFIM or the landscape analysis, utilized to collect data for this EIS. As a consequence these recommendations were reviewed but not relied upon by this EIS.

Comment (35) Alternatives [Options] 2 to 6 relating to the higher stream flows are so far from today's practices that one wonders why they are in the plan in the first place.

Response Conservation studies and models developed by the Bureau of Reclamation demonstrate a real water savings which could be achieved through the methods identified in the Adaptive Flow Management Strategy. Each flow option was derived by identifying a set of possible actions which the interagency team felt were reasonable combinations of relative costs for measurable instream benefits. While the costs are recognized as high, they seem to be technologically feasible.

Comment (299A) What evidence supports the assertion "that flow modification from the reservoirs 'contribute to accelerated erosion, decrease in wildlife habitat, decrease in scenic quality during the winter and degradation of fish habitat ...?'"

Response The effects of the existing flow regime are documented in the Instream Flow Assessment and a landscape analysis (Gillham, 1991). The Instream Flow Assessment was the result of an analysis of an IFIM (Hardin-Davis, 1991) and data collected and analysis conducted by private consultants, the Forest Service, and other Federal Agencies.

Comment (50, 53) We do not feel confident that a predictive tool is available to estimate changes to river morphology at any of the flow options. We think that there is intuitive reason to suggest that increasing base winter flows and thereby reducing peak irrigation season flows will induce the river into another geomorphic configuration. Such a change would, for the "short term," increase or maintain high levels of erosion.; As your document suggests, the river should narrow with reduced peak flows. This would increase water depth at a given flow level above what it is today. The river may also revert to a more sinuous morphology, and that would result in increased aquatic habitat as the river would lengthen. Changes would likely result in greater improvement than is suggested by the model used for the document.

Response Figures in the Flow Option Comparison table (Table 2-15) in Chapter 2 that relate to changes in channel morphology are based on best professional judgement. That judgement considered frost heave on the exposed channel during the storage season and the extended period of high flows as the primary mechanisms for change in channel morphology. While reduced irrigation season flow and increased storage season flow would create new patterns of erosion, erosive forces would be less powerful than for existing patterns. As a consequence it is predicted that rates of erosion, especially erosion that would widen the river and make the river more shallow would decrease.

Comment (23) Minimum and maximum flows are not workable - minimum flow of 1400 cfs is not adequate to insure crop production at peak growing - maximum flow reduces water availability for fish and wildlife at site and cannot meet irrigation demand on irrigation projects - cost involved is too great for small return.

Response The *maximum* flow of 1400 cfs and *minimum* flow of 300 cfs are long-term targets which would be attained through water conservation measures, downstream and/offstream storage and voluntary sale or lease of water rights. No changes in flows would occur until water conservation projects are in place and shown to be effective.

It is unclear what site the commentor is concerned about. Once conservation measures are in place, less water would be needed for diversion during the summer and the reservoirs

would be drawn down less than at present. Less water would be required to fill the reservoirs during the winter. This reduction of fluctuation of water level in the reservoirs would improve the reservoirs' fishery. Analysis of data provided by the Upper Deschutes Instream Flow Study and the 1989-90 Deschutes River Stream Survey resulted in the conclusion that minimum flows during storage season are a limiting factor for fish population in the Upper Deschutes River.

Also see the responses to comments 1, 24, 295, and 35.

Comment (11, 46) Two commentors were concerned that Arnold Irrigation District was not represented on the planning team.

Response Representation on the planning team was the choice of the irrigation districts. Arnold Irrigation District has commented on the plan.

Comment (17) ... I prefer Option #3. I do think it's important to maintain an in stream river flow that is more than a trickle (ie: below Bend on the Riverhouse Run during the summer).

Response Flow Option 5 better achieves the desired mix of resource conditions and recreation opportunities. This plan does not address flows below Bend.

Comment (26-29) Several commentors preferred Option 6. Reasons included water quality, channel degradation, Diack flows, fishery values, and streamside vegetation.

Response Based on the expected relationship between wintertime channel exposure, Option 5 would meet water quality standards. Option 6 would be better in restoring fishery values; however, Flow Option 5 (Preferred) is expected to achieve a better mix of flow dependent resource goals. Diack flow constitutes the minimum instream flow that must be achieved in order for allocation of new offstream water rights. If Option 6 were achieved then an additional 100 cfs could be allocated to offstream use and as a result reduce minimum flow to 400 cfs. The choice of the Preferred Flow Option was grounded on extensive analysis of available information concerning both instream and offstream benefits and feasibility. Option 6 would cost almost 2½ times as much as Option 5.

Comment (2, 18-22) Six commentors favored enhancing flows. Reasons included reduced erosion, improved winter scenery, improved fish and wildlife habitat.

Response Under the Preferred Option, the cooperative agencies would work to enhance the flows of the Upper Deschutes river.

Comment (30, 273) I propose letting our river run as she was meant to.; I regret that careful consideration was not given to removing Wickiup Dam altogether.

Response The Wild and Scenic River Act does not eliminate existing water rights. Under all flow options, these rights would be maintained. Because flows in excess of the natural summer flow have been allocated, some water rights rely on stored winter flows. Maintaining these water rights precludes eliminating Wickiup Dam and returning to a natural flow regime. See the section Considered But Eliminated from Further Study in Chapter 2.

Comment (6, 36) By far, the most innovative and constructive element of this document is the discussion of managing the flows in the Deschutes River under a variety of options. The treatment of this subject is acceptably thorough, however, it might benefit from a more complete treatment of an option which reduces traditional fluctuations and relies on a constant flow throughout the year.; Develop a reservoir...down river to serve the irrigation system. The stored water should be reserved for prime time end of season farming.

Response Meeting irrigation needs and providing constant instream flow would require more or larger downstream sites than are known to exist. As part of the implementation, additional suitable sites would be sought. Options 4, 5 (Preferred), and 6 would involve developing downstream storage.

Comment (7, 8, 25, 44, 48) Several commentators suggested methods of conservation and which might be the most cost effective, including concrete ditch lining, wheel lines, water right leasing and acquisition, and monitoring.

Response The intent of the plan is a cooperative effort for multiple benefits. Specific methods for financing and implementation would be determined by the multi-agency implementation team.

Comment (57) We would also like to suggest that the dikes above Benham falls be repaired and maintained. According to the State Watermaster between 25 and 50 cfs could be conserved. ...The Forest Service could take on this responsibility. Perhaps a cost sharing plan could be worked out between the Forest Service and the Districts.

Response Even though the Adaptive Flow Management Strategy identified a specific set of conservation methods to be pursued, it is not meant to exclude others which could also help achieve the resource goals identified in the plan. The interagency team will work with irrigation districts to examine the opportunities for cost sharing to implement projects which would help achieve those goals.

Comment (31, 37) Would support (in Salem) changes in water laws; We would like to suggest that one way which might put more water back into the river, is to make it easier to transfer water on an interim basis to instream use. Perhaps the districts, or individual water rights holders, could lease water back to the river on an annual basis to conservation groups.

Response Facilitating the transfer of water rights through sale or lease is one action that would be considered to provide more instream water. As discussed in the Adaptive Management section of Chapter 2, one of the responsibilities of the Implementation Team would be to present projects and programs to the public and legislative bodies whose approval would be necessary to implement projects and programs. One program would be to facilitate transfer of water rights from willing participants.

Comment (40) Perpetuation and enlargement of the Upper Deschutes River Technical Committee is heartily encouraged to continue to facilitate the acquisition of flows and to explore the most expeditious response to problems caused by current irrigation demands.

Response The Upper Deschutes Coordination Group would continue to meet under all action alternatives. One purpose of this group would be to ensure that progress is made toward achieving the goals of the plan. This would include coordinating the establishment of an

institutional framework to lead and direct actions to achieve the goals identified in the Adaptive Flow Management Strategy.

Currently a great many committees or consortiums are in existence or are being developed to deal with water issues over a larger area than just the Upper Deschutes River. One of the goals of the Coordination Group would be to utilize, to the extent possible, the committees currently existing. Integrating the goals of this Adaptive Flow Management Strategy into broader basin goals would provide a framework for building broad-based community support and improving the field of funding sources.

The technical team which developed the flow options would also continue to meet to facilitate implementation of the Adaptive Flow Management Strategy. The purpose of this team would be to develop a schedule of actions for achieving short-term incremental increases in instream flow; develop an inventory of specific projects and programs that might provide for more instream flow and more reliable supply for offstream users; and monitor the progress and effectiveness of the strategies in achieving the resource condition goals.

Comment (43) ...canal lining is mentioned in all but one option, and cost estimates are presented. As an engineer that has prepared hundreds of cost estimates, I know that an estimate has little or no value unless it relates to a plan that can be quantified. Where do these numbers come from?

Response Cost estimates for water conservation measures were based on appraisal level cost estimates prepared by the Bureau of Reclamation. The estimates were based on mapping, surveys, water loss estimates, and construction cost estimates for lining and piping canals and laterals for six irrigation districts.

Comment (45) ...lining of canals will have negative impacts on the riparian zones along the canal banks. ...the big pine trees die when a canal is piped. ...Killing the trees will alter the landscape and devalue property.

Response The plan recognizes that this could be a consequence of implementing water conservation measures (FEIS, Chapter 4). The extent to which this effect would actually result from a specific project or group of projects is unknown at this time.

Comment (47) ...USGS tells me that lining of canals will reduce artificial recharge of the ground-water system. How much, is not known because their estimates are not complete. ...The groundwater system is a significant part of the environment. Finalizing this Environmental Impact Study before the USGS is done with their hydro geologic study would not seem prudent.

Response The Oregon Department of Water Resources estimates, based on spring outflow on the Middle Deschutes and Lower Crooked River, that about 2 million acre feet pass through the ground water aquifer that is subject to artificial recharge by leakage from the distribution system. Estimates of loss due to leakage equals about 250,000 acre feet per year or about 12½ % of the total estimated volume of the groundwater. Because leakage would not be completely eliminated and recharge would continue through irrigation, artificial recharge would not be completely eliminated. Water that is leaked results in loss of beneficial uses in the river.

Comment (277) Realistically, in order to maintain and replace portions of the diversion facility our district will continue to need stable and timely access to our works. As well, until such time as the permanent diversion is completed on the west side of Mini-Lava Island, we will require reasonable access from the west in order to install and dismantle our splash dam when made necessary by low flows in the river. We believe that our existing easements have priority over all other uses and we will certainly act to maintain our easements in all instances.

Response The Wild and Scenic Rivers Act recognizes existing water rights. Under all alternatives, routine maintenance of all existing developments and access for maintenance and operation would be permitted.

Comment (281) The major flaw of this process is the artificial division of the Deschutes River into three management plans which are mutually exclusive. Your establishment of an "Upper Deschutes River Advisory Team" to simultaneously address low summer flows below Bend and low winter flows above Bend would be welcome leadership in this morass of jurisdictions. The Deschutes River Chapter of Trout Unlimited would like to participate on this team.

Response The creation of a team to deal with flow issues for both the Upper Deschutes and Lower Deschutes is outside the congressional mandate for this plan. However, the conservation measures, downstream/off stream storage, and acquisition of water rights for instream use that would be required to implement the Preferred Flow Option must also occur in order to increase irrigation season flows in the Middle Deschutes. Currently a great many committees or consortiums are in existence or are being developed to deal with water issues over a larger area than just the Upper Deschutes River. One of the goals of the Upper Deschutes Coordination Group would be to utilize, to the extent possible, the committees currently existing. Integrating the goals of this Adaptive Flow Management Strategy into broader basin goals would provide a framework for building broad-based community support and improving the field of funding sources. (See the section How This Plan Works in the Management Plan.)

Water Quality

Comment (38, 39, 283, 299) Some respondents were concerned that modifying the ramping rate would neither improve resource conditions above or below Bend nor could off stream users adapt to the requirements of a more gradual ramping rate.

Response Forest Service turbidity studies reviewed in the Upper Deschutes Instream Flow Assessment document a relationship between increased flow in the irrigation season and elevated turbidity levels. It is believed that a combination of higher minimum flows and a slower increase in flow at the beginning of the irrigation season would reduce peak turbidity when flow is increased from as low as 20 cfs to about 800 cfs (Figure 3 on p.11 of IFA). As part of the Adaptive Flow Management Strategy the cooperators have agreed to experiment with the rate of increase of flow early in the irrigation season. The initial target is .1 ft per 4 hours. The experimenting would initially be conducted only when water supplies are abundant so the amount of water available to irrigators would not be adversely affected. Changes in ramping would be integrated with canal management to minimize affects on the

Middle Deschutes River below Bend. Depending on the results of the experimental ramping rate new ramping rates could be adopted that require adjustments in early season operations of the irrigation districts or the old ramping rate standards could be continued as part of the adaptive management plan. Whatever the case, permanent adjustments would be dependent upon the approval of the irrigation districts as part of the cooperative nature of this plan.

Comment (284, 299B) There is a concern that the information available is insufficient to determine the effects of regulation on water quality. Primary concern is that there is no baseline data concerning turbidity levels prior to regulation.

Response No systematic data concerning turbidity levels in the Upper Deschutes above the confluence of the Little Deschutes River prior to the construction of Wickiup Dam is known to exist. However it is known that the flow above the confluence of the Little Deschutes was much more stable than the existing regulated flow. Based on the observation that turbidity levels drop to background levels after a period of relatively stable flow, we can infer that peak turbidity levels were lower prior to regulation than at present. More generally it may be concluded that a flow regime with a reduced range of fluctuation would also have lower levels of turbidity (IFA, p.11). The fact that 3 studies (Cameron and Major, 1987; Century Testing, 1978; and USFS, 1994) have determined that erosion rates on the Upper Deschutes have increased significantly and one study (Cameron and Major, 1987) suggests that most sediment would be transported in suspension also suggests that turbidity levels would be higher now than prior to regulation. Thus Cameron and Major (1987) noted,

Prior to Wickiup Dam river discharge ... had a markedly less pronounced variation in stage. Accentuated seasonal fluctuation of stage subsequent to dam operation has resulted in a broad streamside zone between high and low stage that is barren of the protective plant cover needed for bank stabilization...

In many areas, this barren zone is typified by fine-grained deposits that are easily erodible... Specific estimates of erosion rates for this material were not made during this investigation. However, frost heave was observed to be an active process that disaggregates bank material to a depth of about 0.5 inches. The loosened material is susceptible to erosion by streamside activity (such as human and animal traffic) during times of low water and by river currents and wave activity, especially boat wake (Garvin, 1977), during times of high water. However, the competence of the river, even during low flows, is sufficient to transport fine material beyond the study reach. Because it is easily transportable and relatively fine-grained, erosion of material from riparian areas would probably increase river turbidity.

The above quotation identifies several mechanisms of erosion which could contribute to turbidity levels in addition to those directly attributable to flow fluctuation (frost heave and erosion and transportation of sediment by high water flows). The Deschutes National Forest Hydrologist and the Upper Deschutes Instream Flow Assessment (April 1991:12-16) have concluded that boating and other recreation uses have had a minor role in overall erosion rates based on a lack of correlation between peak periods of boating and other forms of recreation and turbidity levels on the river. More extensive studies of another river (Klingeman, Cordes, Nam, 1993) and the Lower Deschutes (Klingeman, Matin, and Huang, 1990) arrived at similar conclusions.

Comment (292, 293) The DEIS suggest that the hydrologic resource of the Upper Deschutes is either an Outstandingly Remarkable Value or a significant element of several other Outstandingly Remarkable Values that are "protected and enhanced by an abundant, stable flow of clear, clean water." Elsewhere, however, the DEIS notes that the State of Oregon is proposing to list the Upper Deschutes River as water quality impaired for the numeric turbidity standard and for dissolved oxygen levels. The DEIS also states that "indicators of water quality suggest that the river's assimilative capacity may be exceeded at certain times" These statements do not state accurately the water quality parameters of concern reflected in the Oregon Department of Environmental Quality draft list of water quality limited streams.; The final EIS should be updated to incorporate whatever decision is ultimately made by the DEQ and approved by EPA regarding the list of streams that actually are water quality limited in Oregon.

Response The listing of a stream or river as water quality limited is a separate process. Whether or not the Upper Deschutes is listed as water quality limited will not affect this decision. It is the intent of the cooperators to implement actions that would ensure resource conditions that would support Outstandingly Remarkable Values associated with the Upper Deschutes.

In the Draft 1994/1996 List of Water Quality Limited Water Bodies, 303 (d) (1) List the Upper Deschutes was considered water quality limited for the following parameters: Dissolved Oxygen (Annual), Habitat and Flow Modification, Sediment, Temperature (Summer), Turbidity (Spring/Summer). Also see the response to comment 294.

Comment (294) "The hydrologic resource should not be treated as an Outstandingly Remarkable Value, ... or a component of any other Outstandingly Remarkable Value because the Upper Deschutes River may not presently 'possess' unimpaired water quality."

Response The Upper Deschutes River Resource Assessment (Appendix C of the Management Plan) does not identify hydrologic resource as an Outstandingly Remarkable Value. However, the quantity and quality of the water obviously affects all the other river values to varying degrees (see EIS, Chapter 1, Issue 2 and Instream Flow Assessment). Improving current conditions will therefore help to protect and enhance the Outstandingly Remarkable Values.

Comment (294A) "The Forest Service's duty under the Wild and Scenic Rivers Act is to 'cooperate' with ODEQ for the purpose of eliminating or diminishing the pollution of waters of the river."

Response The Adaptive Flow Management Strategy is a cooperative agreement between many agencies including Oregon Department of Environmental Quality and the Forest Service (see EIS, Chapter 1, Combining Plans) The Forest Service is responsible only for implementing those portions of the plan over which it has control. In terms of water quality this would involve developing Best Management Practices for Forest Service projects which could affect water quality and implementing actions which would reduce sources of potential erosion such as revegetating stream banks, adding structure to the channel, or eliminating campsites immediately adjacent to the river on Forest Service Land. The Forest Service is also required to cooperate with DEQ by monitoring and providing data on water quality.

Comment (294B) Can't non-flow "measures currently in effect address some of the water quality problems ...?"

Response Elements of the Inland Native Fish Strategy and the Eastside Ecosystem Management Strategy such as standards for large woody material, riparian buffers and upland vegetation will be implemented (FEIS, Chapter 2, Common to Alternatives 2-6) but are not judged to be sufficient to achieve the desired condition for river values without changes in flow. For example Cameron and Major, 1987 noted: "Accentuated seasonal fluctuation of stage subsequent to dam operation has resulted in a broad streamside zone between high and low stage that is barren of the protective plant cover needed for bank stabilization.

Comment (298) There is a concern that data analyzed is not representative of long term flow levels because of the extended period of drought the Upper Deschutes drainage has experienced.

Response The number of drought years that has occurred since the beginning of the operation of Wickiup is significant and has had significant impacts on both river values and offstream agricultural economy. Data collected over the past 10 years has provided both offstream users and resource professionals with the opportunity to study and understand the effects of a worst case scenario. Implementation of conservation measures can protect and enhance both instream values and agricultural production during critical periods.

Comment (303) What is the relationship of the Wild and Scenic River plan to the Clean Water Act?

Response Section 13 (a) of the Wild and Scenic Rivers Act states that "The head of any agency administering a component of the national wild and scenic rivers system shall cooperate with the Administrator, Environmental Protection Agency and the appropriate State water pollution control agencies for the purpose of eliminating or diminishing the pollution of waters of the river." This section of the Wild and Scenic Rivers Act is a reaffirmation of Section 313(a) of the Clean Water Act.

Comment (285, 303A) There is a concern that participation in the plan by DEQ and EPA and the determination of DEQ that the Upper Deschutes is a Water Quality Limited Body, and EPA participation may lead to mandatory standards or actions that could harm water users if water quality were to be the major impetus in the EIS.

Response Water quality is an important issue addressed by the Flow Options in the Upper Deschutes Wild and Scenic River Plan (FEIS, Chapter 2). However, the overall goal is to protect and enhance a variety of resource values, including fishery, vegetation, wildlife, scenery, and recreation, that are dependent upon water quantity and quality. Specific water quality parameters are projections based on the overall cumulative effects on resource conditions of the preferred flow option and other probable actions such introduction of structural materials and riparian restoration projects. DEQ, as a cooperator in the management plan, has agreed to all of the goals, objectives, and processes of the plan, including, as stated in the FEIS,

"The goal of enhancing the instream flows would only occur to the extent the irrigation district's ability to deliver irrigation water is maintained, if not enhanced. Water savings for instream uses as described in these options would only occur through

voluntary and consensual measures such as conservation practices and water transfers from willing sellers."

It is the intent of the cooperators (including DEQ) that good faith attempts to implement the plan and monitor the effects of implementation would be sufficient to meet the requirements of DEQ and the EPA. The EPA reviewed the Draft EIS and had no comments. Any impacts on irrigators would be with their consent and will be unknown until specific projects are proposed and analyzed.

Comment (304) Some parties expressed a concern that because DEQ intends to use the Upper Deschutes EIS and Management Plan as the basis of preparing a Total Maximum Daily Load Allocation (TMDL) and best management practices that proposed changes in flow would "cease to be voluntary and instead will become new prescriptive regulatory controls."

Response As a cooperator, DEQ agrees that the cooperative Adaptive Flow Management Strategy will meet their requirements for a TMDL plan. DEQ agrees that water quality strategies identified in the Adaptive Flow Management Strategy, including the voluntary aspects, would meet their requirements for best management practices. The Management and Monitoring Plan describes both the processes that would be taken to satisfy DEQ requirements and the data to be gathered and analyzed as part of the monitoring component of the plan. See also response to comments 290 and 291.

Comment (49) No soils section in the Environmental Consequences chapter (some references in geology...)

Response The Upper Deschutes Wild and Scenic River EIS is tiered to the 1990 Deschutes Land and Resource Management Plan (Forest Plan) as amended which provides detailed soils information. Because soils was not an issue in the selection of an alternative, only general information on soils was included in this document.

Comment (52) We personally remove a large amount of garbage left by campers in an effort to keep the forest clean. However, the great amount of human fecal waste that is left along the bank of the river poses a health threat that the Forest Service needs to curtail.

Response Under the action alternatives, the closure of many dispersed sites and addition of toilet facilities at trailheads should reduce this problem.

Aquatic and Riparian Habitat

Comment (300) There is a concern that assessment of impacts was not done to professional standards because the methodology for studying impacts of flow on aquatic habitat was inadequately documented.

Response Effects of Flow Options on the fishery was based on the analysis in the Instream Flow Assessment. The Instream Flow Assessment was the result of an analysis of an IFIM (Hardin-Davis, 1991) and data collected and analysis conducted by private consultants, the Forest Service, and other Federal Agencies. References to these studies have been added to the FEIS.

Comment (306) If the Upper Deschutes now provides an Outstandingly Remarkable Fishery what additional benefits are needed?

Response: In the professional judgement of ODFW fisheries biologists and the Forest Hydrologist the status of the fishery as an Outstandingly Remarkable Value is threatened by hydrologic changes that are forecast under the present flow regime. The channel will continue to become wider and shallower, erosion of banks will continue to add fine sediments and reduce hiding cover for fish, and large wood and gravel will continue to be pushed to the river margins. Without changes in the flow regime, the fishery is expected to decline over time. Data supporting this conclusion is presented in the Instream Flow Assessment and Chapters 3 and 4 of the FEIS.

Comment (54) I would especially commend you on your plans to close off secondary and spur roads that lead to dispersed campsites on the river's verge. This is an important first step to restoring the river's riparian integrity. ...Also important to overall river health is restoration of these beat-down, degraded riparian areas. ...Also helpful would be a forest order declaring it unlawful to camp within a hundred feet of water anywhere in the Deschutes National Forest.

Response Under all action alternatives (2-6), restoration of riparian areas would occur, and all recreation sites within 300 feet of the river would be reviewed and actions taken as necessary to protect river values. A complete closure to camping within 100 feet of the river may not be appropriate in all cases.

Comment (55, 56, 95) Three commentors requested that grazing be eliminated from the river corridor to improve fish habitat and bank stabilization.

Response The Wild and Scenic Rivers Act does not preclude grazing. Elimination of grazing is a site specific decision, and environmental assessments of Abbot, Tetherow and Ryan allotments are currently in progress.

Comment (286) Can "re-establishment of woody material ... minimize the effect of flow fluctuations on fish ...?

Response The Instream Flow Assessment suggests (pp. 21-22) that placement of large woody material would improve some habitat conditions but would not provide all elements required to achieve desired condition. (also see response to comment 295A)

Comment (80) ...your description of circumstances requiring the possible manipulation or removal of wood would benefit from greater specificity in describing "situations creating adverse impacts on river values."

Response Predicting all situations is impossible. Under all action alternatives, logjams would be reviewed on a case-by-case basis. The presence of wood, including logjams, would be considered an important natural component of the river ecosystem and left without human disturbance wherever possible.

Comment (58-59) Two commentors were concerned about navigation lanes through fish habitat projects and other woody material in the river.

Response All fish habitat projects on the Upper Deschutes River would be designed to maintain navigation lanes; however, trees which naturally fall into the river may block

navigation lanes in segments closed to motorized boating. In segments open to motorized boating, a navigation lane would be maintained. Life-threatening navigational barriers would be manipulated or removed as necessary in all river segments. Logjams are discussed in the Common to Alternatives 2-6 section of Chapter 2.

Comment (60, 62) Two commentors favored "streambed enhancement such as riparian vegetation, boulder placement or gravel placement" as long as these changes do "not impair the ability of the channel to carry the required amount of water for irrigation needs."

Response Streambed enhancement projects would be done with the intent of changing the configuration of the riverbed and not to change the capacity of the river.

Comment (61) ... I am in full support of improving fish habitat and bank stabilization....

Response Under all alternatives fish habitat improved through addition of large woody material and rubble. Bank stabilization projects would be done using bioengineering unless these natural systems were demonstrated to be unfeasible and that a hardened structure, such as a rock wall, would not adversely affect free flow or other river values.

Comment (64) The discussions regarding gravel withdrawal by reduced flows (& sedimentation/cementing) might benefit from recognition that juvenile salmonids use this habitat as protection from predation. A better case for the significance of well aerated gravel as primary substrate for the production of macroinvertebrates should probably be made.

Response The discussion of gravel has been improved in the FEIS, Chapter 3.

Comment (65) Discussion of dissolved oxygen is a bit confusing. How is a standard for DO partially met?

Response The discussion of dissolved oxygen standards has been improved in the FEIS, Chapter 1, Issue 2.

Comment (66) ...it [discussion of issue 3] might benefit from the addition of "good" riparian and aquatic conditions as well as some discussion of what level (numeric) of structure loading the Deschutes may have experienced in pre-irrigation days (which would incidentally be before significant use of the river to transport logs).

Response Good habitat is discussed in Affected Environment (Chapter 3). No data on pre-irrigation structure loading exist, therefore any numeric discussion would be speculative.

Comment (68) The document's discussion of Geologic, Hydrologic and fishery Values could benefit from a description of the loss of pool habitat as a result of sedimentation. ...the structures normally found in pools which provide interstitial partitioning of the habitat are buried. ...Because of this loss of pool quality, juveniles especially become more susceptible to predation and the impact of low winter flows.

Response The actual amount of reduction in pool habitat as a result of the flow regime is unknown.

Comment (69) I looked through the document for the average width of the river, number and quality of pools, square feet of available gravel, pool/riffle ratio, percent of actively eroding banks, and did not find them.

Response This information is included in the *Instream Flow Assessment, April 1994* which is available for review in the planning record.

Comment (70, 76) The document's constant and exclusive association of gravel and spawning brown trout is unsettling. Native gravel spawning fish are also adversely impacted by loss of wetted gravel. ...Nowhere in this plan is there any discussion of the impact of benthic conversion from open graveled to cemented gravel/fines dominated substrate on the hyporheic zone.

Response Much of the discussion deals with brown trout and rainbow trout populations, because they are considered Outstandingly Remarkable Values of the Upper Deschutes River. The discussion in the FEIS has been broadened to include other species. A discussion of the effects of sediment on fish habitat is in the Issue 1 section of Chapter 1, and more detailed discussion is available in the Upper Deschutes Instream Flow Assessment.

Comment (71) ...your management might be more realistic if spawning gravel targets were tailored to the river type of each segment. If Segments 1 & 2 and 4 and the "Middle Deschutes River" were migratorially connected as a result of proper management of a whole river, gravel targets might be set based on fish population targets, stream morphological targets, or some other measurable parameters.

Response Monitoring will determine if spawning gravel targets are appropriate. Providing for fish migration between the Middle Deschutes River and the Upper Deschutes River is beyond the scope of this document.

Comment (72) ...the recommendation of 50-100 pieces of large woody material per mile as target values for this major river seem to be woefully inadequate. ...However, it may be better to establish the gradient-determined potential of stream morphological units per segment and set targets based on NTU, JTU or secci plate measurements; pool/riffle; number of pools of different dimensions; square yards of available gravel; cubic yards of available interstitial juvenile salmonid habitat; square yards of different substrate constituencies; linear measurements of stable banks; or some other set of measurable targets which are dependent on the effect of structures.

Response The recommendation of 50-100 pieces of large woody material per mile is more than required by the Inland Native Fish Strategy. Actual numbers of pieces in a particular reach of the river would be determined by site-specific analysis. Adequacy of large woody material levels would be determined through long-term monitoring.

Comment (73) The strategic and periodic use of fish or macroinvertebrate surveys would serve a useful monitoring purpose...

Response Refer to the monitoring section of the Management plan for a complete listing of elements that will be monitored.

Comment (74) It would be advisable to include a program of sediment monitoring in areas proposed for the introduction of gravel and rubble to determine beforehand whether gravel placed at proposed sites would become buried -- or swept into an area where it would become buried by silt.

Response Sediment monitoring is included in the monitoring plan.

Fishery

Comment (77, 78, 301) Description of the Fishery lacks supporting scientific data; ...brook trout dropping out of Spring and Fall Rivers is mentioned. I don't believe it.; ...the discussion of numbers and sizes of fish per mile in Segment 2 is not accurate.

Response The EIS notes that fish population information is based on partial inventories. The ODFW surveys are all that is available other than anecdotal comparisons of past and present fish populations. The ODFW surveys were not intended to arrive at a highly accurate estimate of the fish population in the Deschutes River above Bend, but were rather intended to indicate relative abundance and size ranges. Cost and limited personnel prohibit more accurate estimates of the population. The statement from Chapter 3, "...the potential addition of a few brook trout which may drop out of Fall River and Spring River" is based on anecdotal information.

Comment (301A) Conclusion that "the primary determinant of the fishery is the flow regime" is inadequately documented.

Response The conclusion that the "primary determinant of the fishery is the flow regime" is based on analysis of data generated by the IFIM and the 1989-1990 Deschutes River Stream Survey.

Comment (305) There is a concern that the fishery management objectives in the plan may be inconsistent with the yet to be completed Upper Deschutes River Subbasin Fisheries Plan.

Response ODFW concludes, based on review of drafts, that the fish management objectives in the Upper Deschutes River Subbasin Fisheries Plan will be consistent with management objectives in the Wild and Scenic River plan.

Comment (75) I urge: stocking of hatchery rainbows with their high C. shasta disease level be discontinued; reduce limits via "barbless-release" or slot limits as necessary to restore an attractive brown trout fishery which maintains a balanced mix of fish of all sizes/ages; restrict a reasonable portion of [Segments] 2A-2B to fly fishing only (like the Fall River); Seriously attempt to reintroduce self-sustaining populations of Redband (consider the attraction of the Redband on the Lower Deschutes) and bull trout (water temperatures should not be too high if Flow Option 6 is achieved as I have urged).

Response Stocking, regulations, and populations will be addressed in the ODFW Upper Deschutes River Subbasin Fisheries Management Plan.

Comment (79) ...In addition to the 15,000 rainbow supplemented intentionally, there is doubtlessly a constant invasion of rainbow, brook trout, brown trout and whitefish from the unscreened gates of Wickiup. No wonder the native redbands in section 2 are in trouble.

Response Stocking will be addressed in the ODFW Upper Deschutes River Subbasin Fisheries Management Plan.

Comment (81) It is unlikely that brown trout have replaced bull trout as expressed on p. 135 and elsewhere. Brown trout now survive where bull trout are extinct, but this is more likely circumstantial than causal. There is a certain element of bull trout fanciers that would take extreme umbrage to the suggestion that this European import is in any way equivalent to the native post glacial coldwater grizzly.

Response Issue 4 in Chapter 1 of the FEIS notes that "Bull trout, rainbow trout, sculpin, and mountain white fish were the indigenous species in the river. ...The brown trout have become the prevalent species in the river upstream of Benham Falls to Wickiup Reservoir. Habitat changes are the primary reason for this shift in species composition." The discussion in Chapter 3 has been clarified.

Comment (82) I suspect that the influence of *C. Shasta* on the native rainbow population was not a factor in its decline because natives are known for their resistance to this myxosporidian.

Response This clarification was made in the FEIS.

Comment (83) The discussion of the loss of bull trout in the Upper Deschutes should probably be expanded by at least passing mention of the pre-irrigation mass destruction of bull trout at the Pringle Falls trap.

Response This has been added to the document.

Comment (6, 11, 16, 23, 63, 287) Several commentors were concerned about flow changes impacting the fisheries at the reservoirs.

Response Increasing winter flows will be based on conservation (reducing the amount of water diverted) rather than drawing down the reservoirs. Because less water would be required for diversion during the summer, the reservoirs would be drawn down less than at present. Less water would be required to fill the reservoirs during the winter. This reduction of fluctuation of water level in the reservoirs would improve the reservoirs' fishery. However, no changes in winter flows would occur until water conservation projects are in place and shown to be effective.

Comment (272) We feel that the loss of water in the Deschutes River from the Columbia Southern Canal diversion greatly hinders fish habitat in the upper Deschutes.

Response The Columbia Southern Canal draws water from Tumalo Creek which flows into the Deschutes River below Bend. Therefore, the Columbia Southern Canal does not affect the Upper Deschutes River.

Vegetation

Comment (84) prefer more emphasis on primitive restoration

Response It is unclear whether the commentor desires restoration of primitive conditions or use of primitive methods for restoration. The plan emphasizes restoration of old-growth and riparian areas. Methods used for restoration would be determined by site-specific analysis before each project begins.

Comment (85, 86, 89) One commentor requested more information about how grazing is currently impacting the area and the effects of changing the level, timing, or location of grazing.

Response More details on grazing have been added to the vegetation section of each chapter; however, changing levels, timing, or location of grazing is a site specific decision, which is not covered in detail in this programmatic document. This document establishes Standards and Guidelines for activities to meet specific resources objectives. A site-specific environmental analysis which examines current conditions and effects of changing grazing is in progress for each allotment.

Comment (88) It is stated that *Artemisia ludoviciana estesii* may be affected by grazing, but this is not later discussed in the Environmental Consequences chapter.

Response *Artemisia ludoviciana estesii* is discussed in the section Protection of Threatened, Endangered, and Sensitive Plants in the Environmental Consequences chapter (Chapter 4).

Comment (90) [In Affected Environment] the emphasis is on trees, with little mention of understory shrubs and grasses.

Response Understory shrubs and grasses are included in the vegetation list in the Management Plan.

Comment (91, 96) We believe the damage to the river bank itself comes from the use of cattle in the area. We have seen a great deal of damage caused by the trampling of vegetation and soil when cattle are near the river.; Without question it is the grazing along the banks of the river that is responsible for the major damage to both the natural quality of the river and its aquatic life.

Response Damage to riverbanks and vegetation caused by grazing is discussed in the vegetation and wildlife issues in Chapter 1 and in Chapter 3. Effects of grazing are being analyzed in Environmental Assessments for each allotment.

Comment (92) Logging should be absolutely banned in the river corridor (2,000 feet either side) except as necessary for maintenance of target fuel levels for safety. How could you justify logging roads when you have just closed recreational roads?

Response Under all action alternatives, removal of hazard trees and reduction of fuel levels would occur. Alternative 2 prohibits any other logging. The other alternatives reflect active management to achieve desired vegetative conditions and long-term fuel reductions. New roads which might be needed to remove this material would be temporary. Existing closed

roads may be needed to access the area. Options to allow recreational use on these roads during this time could be considered.

Comment (93) I believe we should espouse the concept of ecosystem management where the active concepts of maintaining Forest Health and Diversity of the Ecosystem are paramount to provide habitat etc., and beauty of the vegetation within the ¼ mile on each side of the river. An active statement that would permit periodic (timely logging) and various planting of trees etc. that would enhance the long term productivity and diversity of the ecosystem is needed.

Response Active management of the ecosystem to maintain these characteristics is included in all alternatives except Alternative 2.

Comment (94) I would hope the Final, in discussing vegetation management - will specifically acknowledge that utilization of trees for personal (firewood, posts, etc.) or commercial products is a useful and cost effective means to accomplish certain objectives.

Response Personal-use firewood cutting typically leaves a high fuel loading, and without close monitoring and labor intensive protective measures, can result in indiscriminate loss of valuable wildlife habitat. Scenic quality is also affected by the many user-created roads through the forest and highly visible stumps. Firewood cutting for home use would not be permitted within the corridor, unless site-specific analysis demonstrates benefits to the Outstandingly Remarkable Values.

Comment (97) The discussion of the vegetation resource in Affected Environment would benefit from borrowing from or elaborating on the discussions under Environmental Consequences. Otherwise, a professional writer might be given the task of making this section more understandable and less despairing.

Response This discussion has been improved.

Comment (98) We would like to see the Forest Service do more in the way of planting ponderosa trees. We are losing too many of these beautiful trees to disease and lightning.

Response Planting of ponderosa pine would be included in the restoration activities which are a part of all alternatives.

Comment (99) Attractive elements of the Preferred Alternative are fire suppression near the urban interface.....

Response Wildfire suppression would occur throughout the corridor under all alternatives. Additional emergency access is also provided to private lands.

Wildlife

Comment (100) Please provide details as to how these activities [grazing] are impacting elk, so that when alternatives are discussed there is an understanding of what is needed.

Response More details have been added to Affected Environment (Chapter 3).

Scenic

Comment (102) Actually people should expect to see what they see. They can of course go to Disney Land where such images are built especially for that purpose.

Response Visual Quality Standards do not apply to private land. State Scenic Waterways rules and Deschutes County regulations apply to private lands.

Recreation

Comment (103) Bull Bend boat ramp has wrong symbol on the "Alt. 2-5 and preferred" map. Needs boatramp symbol, has camping only.

Response This map shows only the elements which are common to all action alternatives. Under Alternative 2, Bull Bend would not have a boat ramp, so a boat ramp symbol is not shown on this map.

Land-based Motorized Use

Comment (104) Restricting motorized use in areas where red tailed hawks nest is an unnecessary plan since there has been a mating pair of hawks for several years not more than 25 yards from the most popular motorcycle staging area on the forest.

Response Individual birds vary in tolerance to disturbance. Research shows that reducing disturbance is a necessary precaution to protect active nest sites. The Forest Plan Standards and Guidelines require such precautions.

Comment (105) We have current wildlife studies available to the agency providing positive information regarding motorized recreation and wildlife activities, I hope these studies will be referred to in the planning process.

Response These studies have been reviewed and are part of the planning record.

Comment (106) This management plan should be used to assess a motorized trail system on the Bend Ranger District.

Response A motorized trail system on the Bend Ranger District is beyond the scope of this document.

Comment (107) All terrain vehicles come each winter to cut cookies in the gravel bars

Response Under all action alternatives, off-road use of All Terrain Vehicles (Class I, II, and III) would be prohibited on public land.

Comment (108) Opportunities should be provided for motorized recreationists.

Response Until recently, Oregon State law prohibited use of non-street legal all-terrain vehicles (ATVs) on any forest roads. The recent change allows ATV use on non-highway safety act roads (those open to the public, but not maintained for passenger car travel). Under all alternatives, ATVs would be allowed on level II forest roads unless specifically restricted.

Because of the high potential for conflicts with other recreationists, the fragile nature of the riparian areas, and some of the plant and animal species present, off-road use by ATVs would be prohibited on National Forest land within river corridor.

Under all alternatives, snowmobiles would be allowed only on designated routes on National Forest land within the river corridor. The primary intent of these designated trails is to provide access from private lands within the river corridor to public lands outside the corridor where snowmobiling is allowed. The existing closure areas protecting elk and other wildlife which winter along the river would continue under all alternatives.

Under Alternative 6 (selected alternative), motorized boating would be allowed on 42 miles of the 54 miles of the Upper Deschutes River.

Comment (109) We have been snowmobiling around the trails here near our house for 10 yrs. Now you're trying to take my snowmobiling privileges away from me... Everyone in our neighborhood either walks the trails around here or use ATV vehicles around the area.

Response Snowmobile and off-highway vehicle use on private lands is not addressed by this plan. The discussion of winter recreation has been expanded and improved in the FEIS. Also see the response to the previous comment.

Motorized Boating

Comment (110) The use of motor boats has already almost been eliminated by the 5 mile speed limit. You cannot go up stream at one MPH without making a wake. It is unfortunate that some people want everything eliminated except their particular pursuit of entertainment.

Response Under Alternative 6, 42 miles of the river would be open to motorized boating. Only 12 miles would be closed to motorized boating.

Comment (111) Do not agree with boat restriction ... There is so little boat ... traffic that it is difficult to see the need for any regulations imposing restrictions. This seems to be regulating for the sake of regulating.

Response The level of use varies in each segment, but 16,000 boats are estimated to launch from Forest Service boat ramps and river access points annually. No estimates are available for boats launching from private lands. Regulations on boating already exist on the Upper Deschutes. Only 12 miles of the 54 river miles would be closed to motorized boating. This would have the dual purpose of providing a unique, almost semi-primitive recreational

experience to the Upper Deschutes River, and providing for the maintenance of near-natural instream structure. Also see the responses to the other comments on boating.

Comment (112) This area [2B] should also remain open to motorized boating.

Response Leaving Segment 2B open for motorized boating was considered in Alternatives 1, 3, and 5. In Alternative 6, Segment 2B is closed to motorized boating to provide for non-motorized boating in a segment with limited motor vehicle access.

Comment (114-116, 121) Four commentors requested a size limit on boats to reduce bank damage caused by wakes.

Response Given the size of boats which fit on the Upper Deschutes, the size of wake is more influenced by boat handling than boat size.

Comment (117-120, 126, 135-138, 141) Seven commentors supported the restrictions on motorized boating in the Preferred Alternative or requested additional segments be closed to motorized boating with bank disturbance given as the principal reason. Three commentors were against any restrictions.

Response The Wild and Scenic River legislation does not require boating to be non-motorized. Alternative 6 allows a range of boating types. Segments with private land and established use by motorized boats would remain open to motorized boating (42 miles). Segments 2B, 4F, 4G, and portions of 3A and 4E would be closed to motorized boating (12 miles).

Comment (122, 128) ...propose a boat river use fee so that the Department of Fish and Wildlife can assign more officers to the most used and abused areas.

Response A use fee, similar to that used on the Lower Deschutes, is an option to improve enforcement. This suggestion has been passed along to the enforcement agencies.

Comment (124, 125, 131) Several comments reflected a concern about the effects of wakes caused by motorized boating on streambank erosion.

Response Studies on the Deschutes and other rivers confirm that motorized boating does have an impact on streambank erosion. Quantifying the impact has been problematic. The State Marine Board has imposed a "no wake"/5 mph speed limit in order to address this issue and safety concerns. The Marine Board also eliminated use of personal watercraft (such as jet skis) on the river. Because the significance of motorized boating for erosion of the streambank has not been quantified and the professional judgement of the forest hydrologist concludes the flow regime is a far greater force in streambank erosion, restrictions on motorized travel was not included in Alternative 6 as a means of reducing streambank erosion.

Comment (113, 127) There needs to be a workable definition of "wake"

Response A "no wake" speed is 5 mph or less, relative to the current.

Comment (123, 129, 130, 132, 139-140) Six commentors requested that the 5 mph speed limit for boats be more aggressively enforced.

Response The need for more enforcement is recognized. As the management plan is implemented, the cooperating agencies will develop ways to increase enforcement (see Upper Deschutes River Plan, How This Plan Works).

Comment (133) Any additional launch facilities, such as at Harper Bridge, should be optimized for non-motorized, non-trailer craft.

Response Additional launch facilities, like all probable actions, would undergo a more specific analysis once an actual location is proposed. The design of facilities would be determined at that time.

Comment (134) Harper Bridge boat access [is] always going to be a problem unless fill is used in wetlands on either the NW or SW side of the bridge.

Response Filling of wetlands is not a favored solution to this problem. An alternate location for boat access is being sought.

Hunting/Shooting

Comment (142-143) One commentor was concerned with the apparent lack of etiquette shown by waterfowl hunters.

Response Hunter etiquette is covered in hunter education classes provided by Oregon Department of Fish and Wildlife.

Comment (101, 144) Suggest no shooting outside of hunting season; Eliminate shooting of firearms within the ¼ mile protective area on both sides of the river. I am a hunter, but every year I see songbirds and small mammals being killed by irresponsible would-be hunters with .22's along the river. If you are going to protect wildlife in the river corridor and [prevent] an accident waiting to happen to humans, the shooting should stop along the ¼ mile river corridor. This would also eliminate some of the poaching of larger game animals in this area.

Response A shooting closure currently exists for portions of the river. This closure takes into consideration the need to balance public safety and legitimate hunting activities in areas of suitable habitat. The closure is reviewed on a periodic basis and modified to take into account changing conditions, particularly residential development.

Comment (145) While I concur in management practices that respond to increasing habitat for wildlife, I believe historic uses should be recognized. Specifically, are the uses of the river for waterfowl hunting.

Response This plan places no new restrictions on hunting in the river corridor.

Trails

Comment (146, 151) Trails - horse, hiker and bike should provide for access on both sides of the river and loop trips from Sunriver, Inn of the 7th Mountain, Bend, etc.

Response Alternative 6 would provide trails on both sides of the river, and loop opportunities are available from many locations using trails or roads. A lava flow and private land preclude building a trail along portions of the river.

Comment (149) If an east bank trail is built to terminate at Sunriver (as shown on plan maps) we reserve the right to limit entrance to Sunriver to owners and their guests.

Response The plan has no intention of providing access through private lands.

Comment (150) Trail down east side of river in Seg. 3 appears to be on private land.

Response The trail would stay on public lands. As with all projects, site-specific analysis would be done and actual trail location would be determined at that time.

Comment (147-148, 152-155) Seven commentors supported the additional trails and trail improvements in the Preferred Alternative.

Response Alternative 6 would increase trails from current levels (24.6 miles) to approximately 47 miles, including development of a multiple use trail between Benham Falls and Besson Camp and a primary bike trail between Bend Urban Growth Boundary and Sunriver. Alternative 6 also provides for barrier-free trails at Benham Falls Overlook, Dillon Falls, Big Eddy, and near Road 41 and Spring River.

Road Access

Comment (156) Adoption of the preferred alternative would also result in closure of the 4370 road west of the river ... which would create major access problems [to Pringle Falls Experimental Forest].

Response Administrative and emergency use would be allowed on closed roads under all alternatives.

Comment (157) We would like to see a trail with no motorized vehicles allowed the length of the upper Deschutes. The trail from Benham Falls to Bend is a good example.

Response A trail running the full length of the river was considered, but the amount of private land in Segment 3 precludes building a public trail reasonably close to the river in some locations or at reasonable cost. See the section Alternatives Considered But Eliminated from Detailed Study in Chapter 2.

Comment (158, 159, 167-169, 171, 172) Seven commentors agreed with closing roads in riparian areas. Reasons included protecting the riparian areas and improving scenic quality. **Response** Approximately 28 miles of roads would be closed in all the action alternatives. Under Alternative 6, approximately 13 additional miles of road would be closed. These closures would protect and enhance riparian areas and wildlife habitat and improve scenic quality of the river corridor. Access would be maintained to developed sites.

Comment (160) Continue to allow access from Spring River Road along most of the west side road for fishing access, but close it off short of the Cardinal Bridge so vehicles cannot park or camp in the meadow or open areas near the bridge to protect vegetation and river views.

Response Alternative 6 would maintain access to Besson (which becomes a day-use area). The road through the meadow north of Besson would be closed to protect sensitive wildlife habitat and protect riparian values.

Comment (161-162) Two commentors opposed closure of the road to Tetherow boat ramp, stating a need for this river access point.

Response Based on comments on the draft document, Alternative 6 (the modified Preferred Alternative) would allow motor vehicle access to Tetherow boat ramp. This change would provide access for drift boaters to this segment of the river.

Comment (163-166) Four commentors requested that Road 4300-100 remain open as an access route to Haner Park for residents and emergency vehicles.

Response Road 4300-100 is an unimproved dirt road which goes through sensitive wildlife habitat along Dilman Meadow and joins with Road 4370. The road use permit for Haner Park does not include Road 4300-100. The Forest Service is not obligated to maintain this road for access to Haner Park, because other roads can be used to access Haner Park. Roads 4370 and 4300-100 will be maintained for administrative and emergency access. General access to Haner Park on the west side of the Deschutes would be by the Wickiup Dam road.

Comment (169, 170, 180, 181) Four commentors requested a marked evacuation route from Cardinal Bridge through the forest.

Response The Preferred Alternative has been modified and would keep Cardinal Bridge as an emergency exit for Sunriver. A gated, designated road (Road 4100-280) would be maintained to provide emergency access from Sunriver to Road 41.

Comment (173-175, 177-179) Six commentors were against road closures. Reasons included reduction in opportunities for the physically challenged and in fishing and hunting.

Response Under Alternative 6, road access will be maintained to all existing developed sites. Bridge crossings and Roads 44 and 4360, which parallel the river, would also provide close access. Under all action alternatives, existing facilities would be reconstructed or replaced with barrier-free facilities at developed sites. Barrier-free fishing would be developed at the historic General Patch Bridge. Benham falls Overlook, Dillon Falls, and Big Eddy would have barrier-free trails and restrooms added. Under Alternative 6, 11.5 miles of barrier-free trails would be constructed, and 71 miles of road on Forest Service land would remain open.

Comment (176, 188) Two commentors did not want motorized access to dispersed sites eliminated.

Response Under all action alternatives, many dispersed sites would be revegetated, relocated, or closed to mitigate adverse effects on river values. Because of road closures to protect the riparian areas, most remaining dispersed sites would be accessible by trail or boat. Under Alternative 6, a few dispersed sites with motorized access would be designated along Road 4100-286 away from the river.

Comment (274) Lately there has been a blatant disregard for the elderly, handicapped and young children when these so called scenic, wilderness, etc. programs are implemented.

Response Under all action alternatives, existing facilities would be reconstructed or replaced with barrier-free facilities at developed sites. Barrier-free fishing would be developed at the historic General Patch Bridge. Benham falls Overlook, Dillon Falls, and Big Eddy would have barrier-free trails and restrooms added. Under Alternative 6, 11.5 miles of barrier-free trails could be constructed, 507 developed sites with motorized access would be provided, and 71 miles of road would be open on Forest Service land.

Camping

Comment (182) Better signing to prevent camping in unauthorized areas

Response Site-specific analysis would determine various ways to designate areas open or closed to camping. One of these ways could be signing.

Comment (183, 184) ...siting a campground between the two RNA units would seem to increase the problem of maintaining the integrity of unique RNA resources.; I oppose constructing a new campground between Road 44 and the river and also the addition of six sites in Pringle Falls Campground (where a number of campsites were just closed this summer). I visit Wyeth, Bull Bend and Pringle Falls Campgrounds regularly, and I have never seen them more than half full. While I recognize that closing the dispersed campgrounds will increase use of the developed ones, there is no justification for increasing capacity until it is demonstrated that is required. Then, expand existing campgrounds -- don't build new ones.

Response The location of any new facilities or expansion of existing facilities would be subject to site-specific analysis which would be done when the need for increased capacity is documented. Recent campsite designation at Pringle Falls Campground has eliminated some campsites for reasons including riparian protection and proximity to residential areas. The closure of dispersed sites to protect riparian areas is expected to increase the use of developed campgrounds. Development of new facilities would only occur if use levels indicate additional developed site capacity is needed and increasing that capacity would be compatible with the ROS classification of the segment. Expansion of existing developed campgrounds would be considered before development of new campgrounds. Also see the section Actions Common to Alternatives 2-6 in Chapter 2 and the Standards and Guidelines for Forest Service Activities in the Management Plan.

Comment (185-187) Three commentators supported closing dispersed campsites to protect riparian areas. One of these commentators suggested prohibiting camping within 200 feet of shoreline.

Response Under Alternatives 2-6, restoration of riparian areas would occur, and all recreation sites within 300 feet of the river would be reviewed and actions taken as necessary to protect river values. A complete closure to camping within 200 feet of the river may not be appropriate in all cases.

Comment (189, 190) I am concerned of reports I've read that the unimproved campsites may be closed. The upper Deschutes from Wickiup Dam to Pringle Falls offers a unique opportunity for those who wish a wilder experience than improved campsites can provide, yet not as remote as other people might want. ...Erosion seems minimal and plants thrive in and around the campsites, and fishing continues to be good right by camp. Please keep some of these areas open.; Do not agree with ...camping restrictions... There is so little...camping activity that it is difficult to see the need for any regulations imposing restrictions. This seem to be regulating for the sake of regulating.

Response Under all action alternatives, each dispersed site within 300 feet of the river would be evaluated and measures taken to mitigate adverse effects to river values. Closure of a site could be necessary to protect river values. Sites which remain open would be designated and may be accessible by trail or boat.

Comment (191-194) Four commentators supported converting campgrounds between Harper Bridge and Benham Falls to day-use areas. Reasons included riparian area protection, unattended campfires, reduction in user conflicts, and control of residential camping.

Response Under Alternative 6, developed sites downstream of Harper Bridge would be converted to day-use areas.

Comment (195) Camp Besson is a nice place to camp and is not a problem. The Rangers would just have to enforce the camping limit better.

Response Besson would become a day-use area under all action alternatives. This change, along with road closures, would increase protection of the riparian area and reduce the problem of residential camping in the area.

Comment (196) Eliminate campfires for the whole area.

Response Campfires could be temporarily prohibited in the entire area if fire danger was extreme. During periods of high fire danger, campfires are restricted to developed sites with approved fire rings. The risk of a forest fire from developed sites is low because of the low levels of fuels. A total ban on campfires is considered unnecessary.

Comment (197) Overnight camping should be disallowed unless significant improvements are made to campgrounds. (199) ...I like camping knowing there's no public showers or bathrooms because it wouldn't be true camping [with them].

Response Development levels of the campgrounds are discussed under Probable Actions in Chapter 2. Under all alternatives, the campgrounds would remain relatively primitive. Development levels are defined in the glossary.

Comment (198, 199) Two commentors were concerned about the possibility of camping fees.

Response Whether or not camping fees would be charged is dependent on the ability of the Forest Service to keep campgrounds at required health and safety standards within budget levels. If not, other solutions must be sought, such as user fees or closure of the campgrounds. Future budget levels are outside the scope of this document.

Comment (200, 201) Campgrounds should be designated and regulated.; Attractive elements of the Preferred Alternative are ...consolidation and upgrade of designated campgrounds, removal of undesignated campgrounds

Response Under all action alternatives, all developed and dispersed campsites would be designated.

Comment (202) I would like clarification of development plans for the Big River Group Camp on the West side of the river at General Patch Bridge. I would prefer to move group camping to the East side of the river and convert the West side area to day use only, because of its proximity to the River Meadows residential area.

Response Modifications to the Big River complex would depend on site-specific analysis, which would be done at a future date.

General Use

Comment (203, 204) One commentor was concerned that this plan was designed to bring more people into the area for recreation, creating an unnecessary enforcement problem. Another commentor was concerned that the river corridor needs all the protection it can get from the ever-expanding demands of a burgeoning human population.

Response The plan is not designed to bring more people into the area, but it does recognize that the number of people using the area will continue to increase with increasing populations in Central Oregon. The plan is designed to protect and enhance the river values.

General Boating

Comment (205, 206) Limit boat launch sites to avoid bank erosion.

Response Under all action alternatives, developed boat launching sites would be reviewed and actions taken as necessary to reduce impacts to river values. Under Alternative 6, the closure of spur roads and some roads parallel to the river would reduce the amount of boat launching done at "casual" launch sites.

Guided/Outfitted Recreation

Comment (207) Section 4 is the part of the river that the general public and potential clients have the most need for access. I think the public should not be restricted from use of public lands/waterways in order to accommodate commercial outfitters. I also feel that the new outfitters should have the same access right as the existing ones, if not more, as the existing ones have been privileged for ten plus years. That means that requiring new outfitters to have to cater to “hours of before 10 am and after 3 pm” is not right. I think that if a new outfitter is providing a new and different service that the public wants (other than rafting) then the public should be able to enjoy or partake of that on their own schedule.

Response The public is not restricted from areas where outfitters are allowed under any alternative. New outfitted/guided trips would be considered where or when they would not impact Outstandingly Remarkable Values given the existing condition. Protection of river values includes recreation; however, the primary purpose of limiting the number of users at Big Eddy (Segment 4E) during peak hours is to provide the recreational experience desired by recreationists both on and off river, so new guided/outfitted use of this segment would be limited to before 10 am and after 3 pm.

Special Events

Comment (208) For special events, I feel that the preferred alternative is good but has some limitations. I don't think it is right to limit an event to a certain number of people as to control the public involvement. This is what a special event is all about.

Response Special events, like other activities, could be permitted if there are no adverse effects to Outstandingly Remarkable Values. Under all action alternatives, special events would normally not exceed 100 *participants* in segments with an ROS classification of Roaded Natural and 150 *participants* in segments with an ROS classification of Rural or Urban. These limitations are a level of use expected to be consistent with the desired recreational experience of other users and have no long-term adverse effects on river values. Site-specific analysis may determine actual number of participants should be higher or lower. The anticipated number of spectators and their potential impacts would also be considered in the permitting process and could result in denial of use.

Private Land Use

Comment (209) Condemn private property that has been developed too close to the river frontage.

Response The Wild and Scenic Rivers Act discusses when condemnation of private lands is appropriate. The Act specifically prohibits condemnation of private lands if 50% or more of the acreage inside the boundary is owned by the federal government. More than 50% of the property within the boundary of the Upper Deschutes Wild and Scenic River is owned by the federal government.

State Scenic Waterway rules allow condemnation only when a violation of scenic waterway regulations have occurred and negotiations with the land owner have failed. Development that exists at the time a river is designated as a state scenic waterway is allowed to continue.

The FEIS and Management Plan both address acquisition of key properties from willing sellers.

Comment (210) I would rather see conservation efforts directed towards preserving the lands from residential development. I know private rights are difficult to overcome. However, land purchases at critical locations (along the ponds) will go far to preserving the waterfowl hunting along the river. An easy start would be to curtail the proliferation of cabin leases along the Upper Deschutes just below Wickiup Reservoir.

Response The Common to All Action Alternatives section of Chapter 2 discusses the acquisition of key properties from willing sellers for the purposes of conservation. The cabins below Wickiup Dam are on private land and are not under a federal lease program.

Comment (211) The river front land owner must understand his part by being ever aware of a stewardship interest in the river.

Response The FEIS and Management Plan discuss the continued partnership of federal, state and local agencies in the promotion of river stewardship. In all action alternatives, this partnership (the Upper Deschutes River Stewardship Team) would continue and be a forum for landowners to get information and assistance in the protection of their riverfront properties.

Comment (255) I favor the more restrictive land use provisions of Alternative 2 except that metal roofs of approved design and color should be permitted because of the high fire danger in this area.

Response More restrictive private land uses were considered in Alternative 2. Metal roofs of approved design and color would be allowed in Alternative 6.

Comment (256) no building of homes, motels etc. next to the river. We have to have some areas of this land of ours that remains natural like it was intended to be.

Response Design review and development standards for private lands are outlined in Chapter 2. Chapter 5 outlines the regulations for the State Scenic Waterway. These proposed rules require that commercial facilities are screened from view from the river by topography and/or evergreen vegetation. Appendix E of the FEIS outlines Deschutes County Regulations and specific rules for housing and commercial development.

Comment (51, 257) Riverbank erosion cannot be controlled without mans intervention in some form. We need a standard set, for rock walls and I feel that caged river rock has held up well where ever it has been used and lends itself to natural barrier growth of tree, willow, grasses etc. Do not eliminate river front walls entirely.

Response The section Common to All Action Alternatives in Chapter 2 states that bioengineering would be the preferred first step in streambank stabilization proposals. Concrete walls or other hard technology would be permitted only if the applicant could demonstrate that use of natural systems would not be feasible and the hardened structure would

not adversely affect free flow or other river values." Human intervention is not precluded in this plan.

Comment (212-253) Many commentors requested Cardinal Bridge remain in place to provide pedestrian, horse, and bicycle access to the National Forest and to provide an emergency access route. Several people liked its rustic character.

Response Alternative 6 would keep Cardinal Bridge in place under special use permit to the Sunriver Owners Association. Road 4100-280 would be gated above the meadow and maintained to provide emergency access from either side of the river.

Comment (278) Soon there won't be a forest at all. But a resort or a row or street of cabins.

Response Development on private land in the river corridor is determined by State Scenic Waterway rules and Deschutes County ordinances.

Boundary

Comment (254, 258) Would increase boundary to east just north of Harper Bridge. Would support planting and muted tones to airport. Meadow lines in Sunriver will be redrawn to east.

Response Changing the federal Wild and Scenic Boundary would not change the land management of private lands within this area. The State Scenic Waterway boundary is 1/4 mile from the bank of the river. The State Scenic Waterway rules of land management, Division of State Lands, US Army Corps of Engineers, Oregon Department of Forestry and Deschutes County regulations govern the development activities of these private lands. State Scenic Waterway and County regulations govern finish colors of structures and landscaping.

Overall

Comment (260) There is information under the issues that should really be carried forth into the other chapters, especially Affected Environment and Environmental Consequences.

Response The document has been reviewed and rewritten to ensure that issues are covered in all chapters.

Comment (261) The plan can and should address protecting existing resources. ...But to attempt to change these resources to what they were 100 years ago borders on the ludicrous....

Response No attempt is being made to return to the past. Instead, the plan attempts to anticipate the future.

Comment (262) I believe the preferred alt. is correct only on areas 2B and 4D. All other areas I would like to see alt. 2 applied.

Response It is unclear what aspects of the Preferred Alternative the commentor dislikes.

Comment (263, 271) Scale down this upper Deschutes plan to fit the need based on a 4 month seasonal uses in those areas most needed. Your study sounds like a 100 year plan for the area that you can't possibly fund in that time frame.; The ambiguous statements in this book leave too much open to the interpretation of some government official.

Response This plan is a programmatic document which sets broad direction and guidelines for the future of the river corridor. It outlines areas where recreational developments could occur. Actual accomplishment of these "probable actions" is dependent on budgets and site-specific analysis.

Comment (264, 266) Two commentors preferred Alternative 1, the no action alternative. Their reasons included the federal deficit, less development, and costs of implementation.

Response Alternative 1 would continue management and development of the river on National Forest Lands according to the August 1990 Forest Plan which states that it "will serve as an interim management direction until formal river corridor management plans are completed and the Forest Plan is amended to include the appropriate direction." Current Forest Plan direction would allow for moderate size campgrounds, public information centers and administrative headquarters. All alternatives are dependent on budgets and site-specific analysis.

Comment (265) The current land use laws, policies and directions established by the Deschutes County Comprehensive Plan and current State and Scenic Waterway rules are restrictive enough for anyone to deal with.

Response State and local regulations apply to private lands regardless of the development of this management plan. The 1988 designation of the Upper Deschutes as a Wild and Scenic River required the development of a management plan that ensures actions on public lands will protect or enhance the outstandingly remarkable values of this river.

Comment (267-270) Four commentors supported the Preferred Alternative and Option because they would benefit fish, wildlife, and scenery while recognizing the needs of the general public.

Response The plan is designed to protect and enhance the Outstandingly Remarkable Values, including recreation, while recognizing water rights.

Comment (276) The "outstandingly and Remarkable" term is being used as [a] tool to generate emotion about the values of the river.

Response Congress used the term in the Wild and Scenic Rivers Act, which states "...certain selected rivers of the Nation...with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values...". This plan uses the term to be consistent with the Act.

Comment (280) By improving access we will only create overcrowding. ...This plan is a high maintenance plan. ...I do like the multiple use aspect of this alternative.

Response Alternative 6 provides a range of access opportunities which vary by Segment.

Comment (282) I was delayed in receiving copies of the summary and draft because of the shutdown. The issues in the plan are complex and require study. Extending the public input period one month to compensate for the shutdown and holiday distractions would be greatly appreciated and lend to more constructive comments.

Response The Draft Environmental Impact Statement had a 90 day comment period ending January 29, 1996.

Comment (3, 67, 87, 275) The Forest Service received many comments that suggested better wording of specific sentences or paragraphs and pointed out missing information on the maps and in the document.

Response In response to these comments and review by the cooperating agencies, the document has been updated, language has been clarified, and information added. Thanks to everyone who took the time to review and respond to the draft.

Thank you for your interest in the Upper Deschutes River!

Prineville District BLM Review of the
USFS Upper Deschutes Wild and Scenic River
Management Plan and Draft EIS

PAGE COMMENTS

PURPOSE AND NEED

- 13-49 There is information under the issues that should really be carried forth into the other chapters, especially Affected Environment and Environmental Consequences. Its not enough to just mention this information under issues.
- 27 It is stated that *Artemisia ludoviciana estesii* may be affected by grazing, but this is not later discussed in the Environmental Consequences chapter.
- many Who did the drawings? Give credit to the artists when appropriate (besides clip art). Be cautious about copyright law. Another comment: Its great to see illustrations of more than just white males, but it appears contrived in this document since the only minorities shown are blacks. Any chance you can find some clip art showing native americans, mexicans, or asians? Also; It can be confusing when the same drawing appears in several places ("where did I read about instream flow, wasn't it near the raccoon?").

ALTERNATIVES

- 57 Alt. 1 Vegetation: No mention of grass management or grazing.
- 64 Starting on this page a lot of projects are discussed. It would be a good idea to mention that most of these activities would be subject to site-specific environmental analysis.
- 66 Last paragraph: "The forest would be characterized by disturbances which mimic..." What do you have in mind? The public would probably like to have this spelled out.
- 66-67 No mention of grass management or grazing.
- 67 First statement under probable actions: Why is Regenerated capitalized but rejuvenated isn't? Also, what does this mean and how will it be done?
- 67 Third statement under probable actions has a word missing after "would." Also, which vegetation would be removed? Trees, shrubs, grass, weeds? Might want to spell it out so that it doesn't sound like it would be done at the expense of non-tree vegetation or ecosystem management.

- 67 Fifth statement under probable actions: "Forest densities would be reduced." What does this mean? What objectives does it accomplish? To what level would densities be reduced? Would all densities be manipulated or just the really high ones?
- 67 Seventh statement under probable actions: Define "local roads," or just say roads.
- 68 Please explain this a little more. VQSR for grazing? Why is this information only listed in the Scenic section? It should be under Vegetation as a minimum, and perhaps there should be a section on Livestock Grazing. The reader needs to have an understanding of where grazing currently occurs, and at what levels it is occurring. This information needs to be provided up front, instead of having only parts of it discussed in a dozen different places throughout the document.
- 75 Alt. 2, Vegetation: How is this different from Common to alts 2-5? No mention of targets for down woody debris in alts 2-5.
- 99 Table starting on this page is misleading. For example, for vegetative goals, there is nothing under alt 1, and the same goals are listed under alts 2 through preferred. The public is receiving a false view of the no action if stuff that's under 2 through preferred is actually true for alt 1 as well. Some readers will rely mainly on this table, so the details should be accurate.
- 99 Grazing alternatives should be displayed in this table.
- 100 Last one in alt 2 is hard to compare to the others. What would "natural processes" mean on the ground, in contrast to other actions?
- 101 Bicycle travel: Alt 1 says No restrictions unless damage; Alts 2 through preferred lists specific closures. Are these specific closures in response to damage? If so, how is this different than the no action. Wouldn't closures be allowed under either alternative? (There are other examples of this throughout the table).

AFFECTED ENVIRONMENT

- 121 Chapter is missing heading, also missing word "scenic" in first sentence.
- 121-124 In the section on "Uses on the River," recreation is discussed but there is no mention that this use is not without costs. In sharp contrast, the following section "The River is Altered" goes into great detail about how costly irrigation has been. There is a quote in this section from a workshop participant that should probably be omitted so as not to appear to be presenting a biased view.
- 145 Upland Vegetation: The emphasis is on trees, with little mention of understory shrubs and grasses.
- 148-150 There is mention here of grazing, but its hard to pull out. Also, there needs to be more information about

how the grazing is currently impacting the area.
Percent utilization of grasses? Riparian vegetation?
Any monitoring that indicates trend?
156 "Spraying has reduced mosquitos." AND other insects,
with an anticipated impact on animal species (specify?)
that rely on insects for food.
156 Second full paragraph states the Deschutes River
corridor was used by native Americans until immigrant
American settlers disrupted the pattern of use. Sounds
a little euphemistic. Disrupted? We should probably
recognize here that many were killed, the remainder
removed to reservations, etcetera.
156 The last sentence in the last paragraph states: "Its
usefulness has been reduced by livestock grazing and
recreation." Please provide details as to how these
activities are impacting elk, so that when alternatives
are discussed there is an understanding of what is
needed. Also, please put all the grazing stuff in one
place so it can be analyzed more easily.
172 There's more information on grazing here. Pull it all
together in one place.

ENVIRONMENTAL CONSEQUENCES

175 No soils section in the Environmental Consequences
chapter (some references in geology...).

204 Grazing is given its own category, but under Special
Uses? The references to grazing here are too vague to
be useful. Think about adding season of grazing use
(you can't realistically predict effects without it).
You talk about how grazing generally decreases the
abundance of preferred species (What is a preferred
species? Preferred by who? A cow, a bird, a
recreationist, or a forester?). Need to know season of
use and intensity, and whether pasture is riparian,
upland or a combination, before we can predict whether
species will decline, and if so, which species.

204 You state that grazing encourages early successional
stages of vegetation. Not necessarily. Grazing can be
managed so that it increases or decreases successional
stage. Also, what does successional stage have to do
with anything discussed so far in this document? Are
there objectives to "increase successional stage?" The
stage needs to be set. Also, this section needs to be
clearer and list in more detail the expected impacts of
reducing grazing.

204 It is extremely difficult to follow grazing through the
document. It is buried in different places in each
chapter.

204 Under alt 1: "Continue under current utilization
standards, etcetera." First of all, current levels of
grazing (and all of both paragraphs under this alt)
should have been laid out in the Affected Environment
chapter. Secondly, this alternative seems to say that
under current management, we have to continue allowing

- heavy grazing. Is this actually the case? Or is there flexibility in the current management to allow for changing season of use, fencing out riparian areas, or other such manipulations? If so, the choices displayed in this section are misleading.
- 204-205 The range of alternatives for grazing is not very creative. How about analyzing some of the following, so that the public can truly see the impacts of different alternatives:
- change season of use
 - change allotment or pasture boundaries
 - allow for periodic deferment or rest
 - eliminate grazing entirely
- Its hard to come up with reasonable alternatives when you don't know what the existing environment is (there was no mention of condition of grasses and shrubs in the uplands - why are we prescribing change if we don't know what damage is occurring?).
- 213 Much of the information under the Livestock Grazing section here really should have been in the Affected Environment chapter instead.
- 254 The effect of decreasing AUMs is not addressed (though it was mentioned in the Affected Environment chapter on page 172). Several ranching families will be impacted.

APPENDIX, PREPARERS, GLOSSARY AND INDEX

- Appx. E The title says "Species Living along the River." What you mean is "Animal Species." Another suggestion would be to expand the appendix to include a list of plants, too (and not just trees!). Also, please define the columns in the table, especially "Special Habitats." Do these habitats include an understory component?
- List of
Preparers Notably missing is a plant specialist (botany, range, ecology). This helps explain why the vegetation and grazing sections are so weak. Also missing is any BLM employee on the List of other Contributors (yet the BLM is listed as a Cooperation Agency just inside the front cover).
- Glossary Omit Animal Month, Primary Range and Secondary Range (I don't think these terms were used in the EIS). Was forb mentioned in the document? If so, add it to glossary.
- Index Its great to see an index in an EIS. Can it be expanded a little more?

Arnold Irrigation District



**910 SE Wilson A 5
Bend Oregon 97702**

**Phone (503) 382-7664
Fax (503) 385-0335**

January 17, 1995

Sally Collins, Supervisor
Upper Deschutes Wild and Scenic River
Deschutes National Forest
1645 Highway 20 East
Bend, Oregon 97701

Dear Ms Collins:

After having reviewed the Draft Environmental Impact Statement for the Upper Deschutes Wild and Scenic River, Arnold Irrigation District has a number of concerns, comments and observations.

Our district's entire diversion facility -- berm, headworks, and main flume are located in Segment #4. Realistically, in order to maintain and replace portions of the diversion facility our district will continue to need stable and timely access to our works. As well, until such time as the permanent diversion is completed on the west side of Mini-Lava Island, we will require reasonable access from the west in order to install and dismantle our splash dam when made necessary by low flows in the river. We believe that our existing easements have priority over all other uses and we will certainly act to maintain our easements in all instances.

Additionally, we are concerned about the ramp rate of discharge proposed in the Impact Statement. Our concern is both about the water that will be wasted and the drastic fluctuations that will result below Bend.

As regards conservation on the part of the districts in order to reduce diversion needs, Arnold already has a certain amount of experience in this area. During the 1995 irrigation season, our district was able to reduce its withdrawals from the river by a significant amount (the water used and the water left in storage can be verified by contacting the State Watermaster and requesting figures for the 1995 season -- it is our intention to continue to improve upon these figures in the future). We were able to do this partly because of a crash reconstruction program which, among other things, placed measuring devices on our users' deliveries and placed measuring stations at the confluences of our laterals. Using these new constructions, our district enforced a set of stringent and unpopular regulations on our users. By measuring and managing the water everywhere in the system we hoped to be able to deliver fairly and equitably to all our users. As well, we hoped to conserve our storage water in Crane Prairie until we absolutely needed it. Both the reconstruction and the management programs were costly and difficult. Our district had the specter of collapse as motivation. Conservation was a happy by-product.

In this regard, we have some doubts about the 1-3 year time-table put forth in the DEIS. Altering current flow patterns without internal conservation programs in the irrigation districts would seriously disrupt their

capacity to operate. Arnold's example is a good one, but very limited. We are a small district, with approximately 800 users, and we had to do what we did in order to survive.

We would like to suggest that one way which might put more water back into the river, is to make it easier to transfer water on an interim basis to instream uses. Perhaps the districts, or individual water rights holders, could lease water back to the river on an annual basis to conservation groups.

We would also like to suggest that the dikes above Benham falls be repaired and maintained. According to the State Watermaster between 25 and 50 cfs could be conserved. Such savings would be the equivalent of 17 to 34% of Arnold's total rights. The Forest Service could take on this responsibility. Perhaps a cost sharing plan could be worked out between the Forest Service and the districts.

Over all, we feel that the river can serve many priorities -- irrigation and other economic concerns such as sports, recreation and preservation of natural resources; but a balance needs to be maintained and goals need to be realistic.

For the Board of Directors,

A handwritten signature in black ink, appearing to read 'Kim Fowler', written over a horizontal line.

Kim Fowler,
Operations Manager



IN REPLY REFER TO:

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
500 NE Multnomah Street, Suite 600
Portland, Oregon 97232-2036

DEC 13 1995
RECEIVED

December 11, 1995

ER 95/750

Molly Chaudet
Wild and Scenic River Plan, Bend Ranger District
U.S. Forest service
1230 NE 3rd Street
Bend, Oregon 97701

Dear Ms. Chaudet,

The Department of the Interior (Department) has reviewed the Draft Environmental Impact Statement/Management Plan for the Upper Deschutes Wild and Scenic River, Deschutes County, Oregon. The Department does not have any comments to offer.

We appreciate the opportunity to comment.

Sincerely,

For Charles S. Polityka
Regional Environmental Officer

File Code: 1920
Route To: 4060

Date: January 22, 1996

Subject: Review of Upper Deschutes Wild and Scenic River Draft EIS

To: Forest Supervisor, Deschutes NF

We recently received a copy of the Draft EIS for the Upper Deschutes Wild and Scenic River. Because the Pringle Falls Experimental Forest (PFEF) falls within the proposed new Wild and Scenic river boundary changes, the PNW Station is very much concerned about how research activities at the PFEF might be impacted by the proposed changes in land use.

The complete Management Plan and Draft EIS (DEIS) contains many maps depicting various alternatives. But none of these maps show PFEF boundaries! A further concern is that the PNW Station, as a formal partner in management of the PFEF, was not consulted in the process of developing the DEIS.

PFEF was formally established by the Chief of the Forest Service on May 20, 1931, as a center for silviculture, forest management, and insect and disease research in pine forests east of the Oregon Cascade Range. It continues to be a valuable site for investigating the processes that regulate or influence the structure, composition, and pattern of forests, and the management options for maintaining diverse, healthy, and productive forest ecosystems. Scientists from at least three research stations, and faculty and graduate students from many universities are actively pursuing studies at PFEF. Many of these studies are long-term, and represent truly unique data bases for assessing long-term ecological change.

The management plan and DEIS evaluates a number of alternatives that address eleven issues, ranging from water flow and water quality, to scenic and cultural resources. The preferred alternative, in general, upgrades developed recreation sites along the river, reduces access to dispersed recreation sites, specifies the amount of down woody material to be manipulated for fish habitat improvement, and adds acres to the river corridor for resource protection.

Within PFEF, the preferred alternative potentially impacts about 2,700 acres inside the river corridor. Adoption of the preferred alternative would also result in closure of the 4370 road west of the river and reduce access to several dispersed camping sites along the 44 road on the east bank, which would create major access problems. Access to Bull Bend Campground will require reconstruction of an existing low-grade road to the west. Additionally, the preferred alternative includes a new campground just south of Bull Bend, immediately between two established Research Natural Area (RNA) units.

These proposed actions under the preferred alternative represent a threat to the integrity of PFEF and will significantly reduce opportunities for continued research, as well as seriously impacting existing work. The 2,700 acre corridor seems excessive because it serves to add acres for resource protection of the river from an area that contributes little to river protection: the proposed corridor extend one mile west of the river on a flat supporting old growth lodgepole pine and more than one mile to the east beyond Pringle Butte. Neither area was addressed in the EIS as being critical to protection of the river resource. This kind of restriction runs counter to the intent of experimental forest establishment. Finally, siting a campground between the two RNA units would seem to increase the problem of maintaining the integrity of unique RNA resources.

Because PFEF represents one of the few remaining areas for manipulative research, we would hope that options for future research will be maintained. The value of PFEF for supporting forest research should be balanced carefully against non-aquatic resource values in the river corridor.

We suggest that the boundary of the Wild and Scenic Management Area within PFEF be maintained at its present half-mile wide interim corridor, roughly along the 4370 and 44 Roads. Finally, we propose that the new campground be located outside PFEF to minimize potential conflicts.

Andrew Youngblood, Research Forester at the Bend Forestry Sciences Laboratory, is the PNW Station scientist responsible for coordinating research activities at PFEF. He has thoroughly reviewed the Draft EIS and will serve as the Station's primary contact on the issue. George Moeller, Deputy Station Director in Portland, will serve as the Station Headquarters contact on matters related to the issue.

We sincerely hope that the above comments will be taken into consideration in resolving a final alternative for the Wild and Scenic River Plan, and look forward to further dialogue on this issue.

/s/ George H. Moeller (for)
THOMAS J. MILLS
Station Director

cc:
Wild and Scenic River Plan, Bend RD
G.Moeller
S.Greene:CFSL
H.Gucinski:CFSL
J.Sedell:CFSL
G.Dateman:CFSL
C.Peterson:PFSL
A.Youngblood:BFSL



United States Department of the Interior

BUREAU OF RECLAMATION

Lower Columbia Area Office
1503 NE 78th Street, Suite 15
Vancouver, Washington 98665-9667

IN REPLY REFER TO:

LCA-6100

ENV-6.00

JAN 9 - 1996



MEMORANDUM

To: State Director, Bureau of Land Management
1515 SW 5th Avenue, Portland, OR 97203

From: Eric Glover
Acting Area Manager

Subject: Bureau of Reclamation Comments - Upper Deschutes Wild and Scenic River
Management Plan and Draft Environmental Impact Statement

The Bureau of Reclamation (Reclamation), as a cooperating agency under CEQ regulations (CEQ 1501.6) implementing the National Environmental Policy Act, has prepared the enclosed comments on the Upper Deschutes Wild and Scenic River Management Plan and Draft Environmental Impact Statement (DEIS). Our comments focus largely on those sections of the DEIS that relate to the series of flow options presently under consideration.

Thank you for the opportunity to comment. You may contact me at our Lower Columbia Area Office, phone (360) 576-8587, if you have any questions.

Enclosure

Upper Deschutes Wild and Scenic River Management Plan

Bureau of Reclamation Draft Environmental Impact Statement Comments

Page 111, third paragraph, last sentence -- This sentence implies that decision makers have arbitrarily decided that irrigation needs will take precedence over instream flows. The State of Oregon (Oregon) made that decision when it issued Reclamation with a right to store water in Wickiup Reservoir. The studies and recommendations to which this paragraph refer post-date the granting of a storage right. The reasons for the studies and recommendations are varied, but they were probably undertaken because the public did not understand the degree to which water withdrawals are known to adversely affect multiple river values; in-river uses of water are recognized today as having importance; and social values about preserving natural river systems have changed.

Despite the current thinking which favors a more balanced use of the water resources, the rights granted by Oregon which reflected publicly acceptable values at the time, and the resultant economic investments made by people exercising those rights often stand in the way of quickly changing water allocations. We suggest that you change the last sentence to read something like this: "Oregon water law has historically determined that irrigation needs are the dominant "beneficial use." However, the values held by the public today now appear to favor a greater desire to preserve and protect the integrity of natural river systems. However, insufficient legal, institutional, and economic incentives currently exist to foster the reallocation of water from irrigation to meet instream needs."

Page 112, third paragraph, first sentence -- We suggest that you rework the first sentence as follows: "... velocities of 2.8 feet per second (fps). There is strong evidence linking exposed channel in the wintertime to a high springtime turbidity"

Page 113, third paragraph, second sentence -- We suggest changing this sentence as follows: "Improved forecasting may contribute to the availability of"

Page 113, fifth paragraph -- We suggest adding these thoughts to the end of the paragraph: "Other improvements to on-farm water management practices could further increase on-farm efficiency on many farms. Such improvements could increase water availability for instream uses while protecting farm production in water-short years."

Page 114, third paragraph, second sentence -- We suggest the following editorial change: "... be used to protect water quality" In addition, we do not understand the use of the phrase "non-point sources of pollution" in this sentence. We understand that the issue involves processes that effect erosion, sediment transport, and turbidity. These are related and do not include other water quality parameters. We think the phrase is misleading in that the reader may assume problems with nutrients, bacteria, trace elements, or the like.

Page 114, fourth paragraph -- We suggest the following wording of this one sentence paragraph: "The ramping rate is the rate of change in water releases from storage into the river and is measured at the Wickiup gauge by the change in river level over a given time period."

Page 114, fifth paragraph, first sentence -- We suggest modifying the first sentence as follows: "... channel erosion, and fish habitat conditions is uncertain, but there is sufficient evidence to indicate that attenuating ramp rates may substantially improve river resource conditions and changing operations on a trial basis may be warranted."

Page 114, fifth paragraph, second sentence -- We suggest the following language change: "... potential to adversely impact water users...."

Page 114, fifth paragraph, third sentence -- We suggest the following changes: "... Water distribution currently is on demand and is generally managed to minimize water releases when it is not needed by the users. This operation conserves storage water."

Page 115, second paragraph -- This paragraph refers to the establishment of an implementation team. This group, if under the direction of a Federal agency, would result, we believe, in a group that would need to comply with the Federal Advisory Committee Act (FACA). We understand that the Administration is resisting new FACA committees and is actively seeking to reduce the numbers of existing committees. We think that this implementation team should work under the behest of the State of Oregon through its Parks and Recreation Department.

Page 115, first "bullet", add a new second sentence -- The Bureau of Reclamation shall also be included in the memorandum of agreement as it retains title to Wickiup Dam and it has the right to store water.

Page 116 -- We suggest adding an introductory paragraph before the options that reads something like the following. We think that this is a better location for the idea than later in the document. "The water conservation targets assume use of the Oregon Conserved Water Statute, or similar mechanism, and a split of conserved water whereby 50 percent is available to increase stream flows. The actual "yield" of conserved water will depend on financing source, legal mechanism for allocating the conserved water, and the water right from which the conserved water comes."

Page 116 and Page 117 -- We suggest deleting the phrase "...to achieve an increase of half that amount of water instream flows ..." from the first sentence of the third paragraph in each option.

Page 264, first "bullet", second line -- We suggest the following editorial change: "...Steep, unstable cut banks...."

Page 265, first "bullet," third item -- We are unsure what the phrase "Susceptibility to pollution" means. Is there some other type of water quality parameter involved than sediment? If not, this should be dropped. If so, it needs to be defined.

Page 265, "Assumptions," sixth "bullet" --This should read "... flow-dependent values and" We also believe that water quality affects uses such as aquatic life, and it should not be listed as a value.

Page 265, last "bullet" --This is the definition that we suggested placing before the "options." You may or may not need it here.

Page 266, third "bullet" --We suggest the following revision: "... for all elements that"

Page 266, first paragraph, first sentence --We believe that the reference should be to table 2-12.

Page 266, last paragraph --We offer the following general comments: Empirical studies show that stream morphology reaches an equilibrium with time. A stream's morphology depends on peak flows and substrate (soils). A stream's morphology will vary naturally with cyclical changes in instream flow and flood events.

The upper Deschutes River was likely in equilibrium before construction of the dams. Operation of the dams have resulted in higher peak flows as water is released for irrigation. This has reduced the number of meanders in the upper river and increased the number of abandoned oxbows and slack water sloughs. It is not known if the river has reached a new equilibrium based on the current operations.

The issue of equilibrium is important in assessing the effect of the flow options. At some level of decreased maximum flows, the river should begin returning to the pre-development morphology. This means that increased winter flow and reduced summer flow would begin a new period of erosion, degradation, and aggradation in the upper river. This could mean no immediate improvement in sedimentation while the river seeks a new equilibrium.

Without a good model for flow-related changes to stream morphology, we don't know how you can discuss the effect except in general terms. The present analysis seems presumptuous.

In general, decreasing peak flows should increase meanders and narrow the natural channel. This will result in more aquatic habitat and, most likely, more surface area for recreation. Negative effects could include localized erosion to stream banks on private and public land.

Page 267, second full paragraph, second sentence --We suggest the following changes: "The average velocity of the river is 2.8 feet per second." Further, we do not know if the channel morphology will continue to change at an accelerated rate. Do you have any relationship between the average velocity and any of the erosion parameters? If not, you need to be careful in presenting causal relationships without predicating them with the statement that such expected effects are based upon professional judgement. Table 2-12 implies that you have a known physical relationship between velocity and sedimentation. You should present and explain that relationship in this section of effects.

Page 269, first paragraph, first sentence --You refer to the “legally defined ramping rate.” You should present a citation so everyone knows who sets the standard.

Page 269, general -- Please refer to the above discussion regarding morphology. We do not feel confident that a predictive tool is available to estimate changes to river morphology at any of the flow options. We think that there is intuitive reason to suggest that increasing base winter flows and thereby reducing peak irrigation season flows will induce the river into another geomorphic configuration. Such a change would, for the “short term,” increase or maintain high levels of erosion.

Page 273, option 5 -- As your document suggests, the river should narrow with reduced peak flows. This would increase water depth at a given flow level above what it is today. The river may also revert to a more sinuous morphology, and that would result in increased aquatic habitat as the river would lengthen. Changes would likely result in greater improvement than is suggested by the model used for the document.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

January 25, 1996

Reply to
Attn of: WD-126

REF: 95-095-AFS

Sally Collins, Forest Supervisor
Deschutes National Forest
1645 East Highway 20
Bend, Oregon 97701

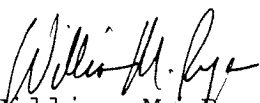
Dear Ms. Collins:

The Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (EIS) prepared for the proposed **Upper Deschutes Wild and Scenic River Management Plan** in accordance with our responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act.

Our review has revealed no potential environmental impacts that would require substantive changes to the proposal. As a consequence, we are assigning a Lack of Objections (LO) rating to the proposal. An explanation of the EPA rating system is enclosed for your reference. This rating will be published in the Federal Register.

Thank you for providing the opportunity to review the draft EIS. Should you have any questions about our review, please feel free to contact me at (206) 553-8561.

Sincerely,


William M. Ryan
Environmental Review Team

Enclosure



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DAVID C. GLENN
EDWARD E. SITES
DONALD V. REEDER

BOYD OVERHULSE
1934-1988 (Deceased)
SUMNER C. RODRIGUEZ
1949-1986 (Retired)

CERTIFIED MAIL/RRR #P 039 774 063

February 27, 1996

United States Deschutes W&S River Plan
Bend/Fort Rock Ranger District USFS
1230 NE Third St Ste A 262
Bend OR 97701

FEB 28 1996

RE: UPPER DESCHUTES WILD AND SCENIC RIVER PLAN

Please be advised that I represent the North Unit Irrigation District. This letter will serve as written comments on behalf of the North Unit Irrigation District regarding the proposed Upper Deschutes Wild and Scenic River Plan.

I am enclosing a copy of the August 3, 1992 comments that I submitted at the time the initial written comments were requested and this letter incorporates the August 3, 1992 letter.

Gale Achterman is providing written comments on behalf of the other Deschutes Basin Alliance which represents the interest, among others, of North Unit Irrigation District. My comments will be directed to those items that she is not addressing.

The Deschutes plan and draft environmental impact statement (DEIS) at Page 114, discusses specific ramping rates for all flow options, and states that in fact, it has a "low potential for adverse impacts on irrigators." This is not entirely true, on account of North Unit Irrigation District once the system in operation, can regulate flows. However, when the water is released in the spring, weather conditions such as excessive wind and heat in the Jefferson County area can stress crops at certain developmental stages. It is virtually impossible to plan for Spring weather conditions in Central Oregon for it can change without much warning.

The difficulty is that it takes 36 hours for delivery of the water from Wickiup to Bend and 12 hours from Bend to deliver the water onto the project. If North Unit was unable to deliver the water in a timely manner, beyond this 48 hour window, even another 24 hours may cause a crop failure.

Certain conclusions were drawn about water quality impact, especially turbidity. (DEIS at 133, 268-70). The concern is that there is an assumption that the Forest Service testing is sufficient to determine turbidity as well as the historical profile of the turbidity in the Deschutes Basin. The soils in the Upper Deschutes Basin may be of a type or quality that may have caused significant turbidity in a free flowing river prior to the reservoir system. The question that is not answered is what was the water quality before the reservoirs were constructed.

The concern is if water quality will be the major impetus in the environmental impact statement, then the Department of Environmental Quality and the Environmental Protection Agency should cooperate with the irrigation districts in a manner that will not harm the delivery of water to their respective projects.

In regards to the effects of the flow regimen on fish, woody material has been removed from the river and it has just recently been understood that woody material is necessary to re-establish fish habitat. Perhaps re-establishment of woody material will minimize the effect of flow fluctuations on fish in the Deschutes River below Wickiup Reservoir.

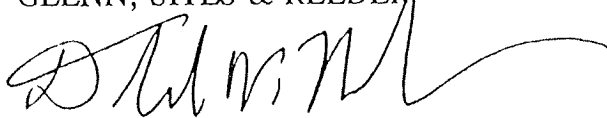
Without including Wickiup and Crane Prairie Reservoirs, the fisheries are limited. These two reservoirs provide recreational benefit for the public which may surpass the recreation in the section of the upper Deschutes that is the wild and scenic segment. Loss of fisheries and recreation due to loss of storage in the reservoirs is not fully documented. Water releases from storage at levels stated in the alternatives will cause the fisheries in Wickiup reservoir to suffer because of low levels or an empty condition at the end of the irrigation season. Recovery of the fisheries in the reservoir will be slower than under the current flow regulation.

North Unit Irrigation District further has concerns that a reader of the DEIS may have the concept that the goals of the flow alternatives are a guaranteed amount of water in a specific amount of time. Any conservation measures need to be proven as water savings practices before stored water is released.

Water supplies are beyond the control of any agency and when conditions change, the water users should not have to bear the burden of the entire loss. Releases should be controlled by the projected supply and demand and the weather conditions. If not, then the North Unit recommends that in order to protect its supply of water, that the plan must be geared towards the worst drought conditions. The plan states discharges to be released with a set amount that is conserved. If we begin another drought cycle there is no guarantee that the reservoir will fill to North Units requirements. The burden of a short year is born solely by the water users if there is no flexibility built into the flow alternatives.

Sincerely,

GLENN, SITES & REEDER



DONALD V. REEDER

DVR:bab

cc: Chuck Schonneker

NUID

bab\ dvr\USW&S

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1934-1966 (Deceased)
SUMNER C. RODRIGUEZ
1949-1986 (Retired)

August 3, 1992

CERTIFIED MAIL NO. P 319 719 493
Return Receipt Requested
(Also Sent First Class Mail)

United States Forest Service
Deschutes National Forest
1645 Highway 20
Bend, OR 97701

Re: Upper Deschutes Wild and Scenic River Plan

Please be advised that I represent North Unit Irrigation District. This letter will serve as written comments on behalf of the North Unit Irrigation District regarding the proposed Upper Deschutes Wild and Scenic River Plan.

My client requests that there be no change in the present flow regimen and that you adopt Alternative No. 1, which is, to my understanding, the status quo.

Perhaps a look at the history of storage above Bend is needed in order for you to understand the historical perspective of storage rights in the Deschutes Basin.

In 1913, by legislative act, the waters of the Deschutes River were withdrawn from appropriation, subject to a study of the most economical and beneficial use. The Oregon State Engineer was given the right to make allotments for use in accordance with a study that was to be made by the United States government in conjunction with the State of Oregon. Subsequently the State Engineer made an award of 400,000 acre feet of storage at Benham Falls for the use of the Jefferson Water Conservancy District, now "North Unit Irrigation District".

In 1936, a report came from the Bureau of Reclamation to the effect that Benham Falls would not be feasible as a reservoir, but 180,000 acre feet could be stored at Wickiup. A plan was developed to reduce the irrigable acreage in the North Unit Irrigation District from 96,000 acres to something less than 50,000 acres. That report was widely publicized and disclosed that the entire flow of the Deschutes River above Wickiup would be required to take care of existing rights and provide 180,000 acre feet of storage at Wickiup, and also there would be a shortage in Wickiup for the years of below normal flow in the Deschutes River which would

Letter to U.S. Forest Service
August 3, 1992
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frequently occur.

There was a meeting in Spokane, Washington in 1937 at which there were representatives from the North Unit Irrigation District, Central Oregon Irrigation District, Arnold Irrigation District, Lone Pine Irrigation District and Tumalo Irrigation District. The Commissioner of Reclamation and the Oregon State Engineer were also present. An inter-district compact was entered into at that meeting, dividing up the storable water above Wickiup, six-sevenths (6/7) to Wickiup and one-seventh (1/7) for Crane Prairie. A form of contract was entered into and approved by the Commissioner of Reclamation, the State Engineer and the irrigation districts. The meeting in Spokane as well as the results of that meeting were given wide publicity at the time.

Two years later, construction of a new dam in Crane Prairie was initiated. The dam was constructed and completed at great costs to the irrigation districts lying south of Crooked River. Following the construction of Crane Prairie Dam, the Bureau of Reclamation built the Wickiup Reservoir and a system to irrigate lands in Jefferson County. The Wickiup Reservoir was constructed to be filled under the 400,000 acre foot allotment awarded for a reservoir at Benham Falls.

In 1947, a demand was made by certain interests for a minimum flow of 250 second feet below Wickiup. It was determined however, that to meet such a demand between 30,000 and 40,000 acres of irrigable land would have to go out of production.

Thereafter this demand led to a contested hearing before the Oregon State Engineer, and a finding which is part of the Wickiup storage certificate. Enclosed you will find a copy of the Findings and Order which was a result of a 1954 study and set the water release at 20 cubic feet per second. At the time the Oregon Fish and Wildlife Department (fka the Oregon Game Department), appealed this matter before the State Engineer and asked for 200 feet below Wickiup, 500 feet below Benham Falls and 200 feet below Bend.

As you will note from the Findings and Order, the State Engineer reviewed the evidence and determined that there would have only been two years out of 10 through the study period from 1924 to 1934 in which Wickiup and Crane Prairie Reservoirs would have been filled. The contested hearing lead to a decision of a 20 cubic feet per second release and a 200,000 acre feet storage certificate at Wickiup.

Realistically, even with the flows requested by the Oregon Fish and Wildlife Department, it would put the North Unit Irrigation District out of business, destroy the farming economy in Jefferson County, and place at risk the established economic, cultural and

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Letter to U.S. Forest Service
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Page -3-

aesthetic values of Jefferson County. A 700 to 800 cubic feet per second release would be disastrous.

The thrust of my argument is that these issues have already been adjudicated through extensive studies. It is unfortunate that the Bureau of Reclamation was not included in the study stage of this river plan. Storage studies are an important component of your plan and must be used in order to weigh the detrimental effects to any of the other alternatives.

If new diversion flows are required, and the North Unit Irrigation District were required to release only a maximum of 900 cubic feet per second during the irrigation season, then the other water districts have priority rights to take up to 1,200 acre feet at their diversion sites. This would leave no stored water for the North Unit Irrigation District to divert and therefore, even in a normal water year, no water could be delivered to the North Unit Irrigation system. Normal discharges of 1,500 to 1,600 acre feet in May and June allow only 400 feet to be delivered to the North Unit Irrigation system with the other water being taken by the other irrigation districts. Even in normal years, North Unit Irrigation District would be unable to service its farmer customers.

A required discharge in the non-irrigation season of 700 cubic feet per second equates to 1,388.45 acre feet release per day. Since the North Unit Irrigation District is allowed to store for 152 days, they would have to release 211,044.40 acre feet. Wickiup Reservoir's capacity is 200,000 acre feet, and Crane Prairie Reservoir's capacity is 55,000.000 acre feet. All of the irrigation districts would be affected by such a release. In a good year Wickiup would be unable to store any water and Crane Prairie would be able to store a moderate amount. In a bad year, both reservoirs would be drained prior to the start of the irrigation season. Therefore, this would affect North Unit Irrigation District, Central Oregon Irrigation District, Arnold Irrigation District and Lone Pine Irrigation District.

Although I am not an expert in limnology, I did take a beginning limnology class which included stream morphology. It appears that if 15 per cent of the Deschutes River stream bank is actually eroding on a per year basis, it would create another Wickiup Reservoir in width. Perhaps I am misinterpreting the table, however, if there is a 15 per cent erosion rate, the river below Wickiup should be four times as wide as it is now.

What are the effects of your alternatives to Jefferson County? Property and farm values in Jefferson County would diminish. Schools, hospitals, banks, Farm Credit Association, Farmers Home Administration, are all dependent upon a viable farming community.

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August 3, 1992
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With diminished water availability there would be a change in crop mix and rotation. This year, with the limited amount of water in the North Unit Irrigation District, almost 50 per cent of the land is now idle. Some very profitable and needed crops for our national economy, are grown in Jefferson County, such as: mint (for oil); carrot seed; garlic seed; and potato seed, which need a sufficient and regular supply of water in order for companies to desire to contract with the farmers in the North Unit Irrigation District.

The North Unit Irrigation District requests that a meeting be held by the United States Forest Service in Jefferson County to inform Jefferson County and the North Unit Irrigation District's water users, of your study and of the proposed alternatives.

Sincerely,

GLENN, SITES & REEDER

DONALD V. REEDER

DVR:klf

Encls.

cc: H. V. Schonnek
North Unit Irrigation District

GLENN, SITES & REEDER
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CENTRAL OREGON IRRIGATION DISTRICT

MUNICIPAL CORPORATION OF THE STATE OF OREGON

2598 N. HWY. 97

REDMOND, OREGON 97756

(541) 548-6047 • (541) 389-2851 • (541) 447-8933
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Upper Deschutes W&S River Plan
Bend/Ft. Rock RD, USFS
1230 NE Third Street - Suite 262
Bend, OR 97701

Thank you for the opportunity to comment on the Upper Deschutes Wild and Scenic River Management Plan (the "Management Plan") and Draft Environmental Impact Statement (the "DEIS"). The Central Oregon Irrigation District (COID), along with the Deschutes Basin Alliance (DBA), which includes Swalley Irrigation District, Arnold Irrigation District, Tumalo Irrigation District, and the North Unit Irrigation District, offers the following comments:

1. Protection of Existing Water Rights.

The COID and members of the DBA will continue to work closely with the Forest Service to develop innovative approaches to flow management in the Upper Deschutes River basin, but it is worth emphasizing that the DEIS is absolutely correct when it notes that "existing irrigation uses of the river have water rights which must be respected. The Wild and Scenic Rivers Act does not preempt these rights." DEIS at 118.

Section 13(b) of the Wild and Scenic Rivers Act, 16 U.S.C. section 1284(b), makes it clear that vested water rights are property rights that cannot be taken without payment of compensation. The Senate Report for the Omnibus Oregon Wild and Scenic Rivers Act of 1988, which added parts of the Deschutes River to the Wild and Scenic River System, underscores this view:

"The Committee [on Energy and Natural Resources] reiterates that section 6(f) [sic] of the Wild and Scenic River Act is Intended to preserve the status quo with respect to the law of water rights. No change is intended in S. 2148. All existing water rights are expected to be fully protected by the provisions of the act." S. Rep. No. 100, 100th Cong., 2d Sess 14 (1988). (emphasis added)

The Committee went on to quote from the report of the former Senate Committee on Interior and Insular Affairs, which accompanied the original Wild and Scenic Rivers Act:

“The establishment of a National Wild and Scenic Rivers System is not intended to affect or impair any prior valid water right vested under State or Federal law.” S. Rep. No. 100 at 14 (quoting Sen. Rep. 90-491). 1

Recognizing this point, the DEIS correctly states that as “provided by Section 13 of the Wild and Scenic Rivers Act, the preferred flow option is designed to improve water quality and Outstandingly Remarkable Values by making more water available for instream uses without adversely affecting the existing rights of irrigation districts.” (DEIS at 118.) Elsewhere the DEIS correctly concludes that “[w]ater availability for irrigation districts would not be changed under any option.” (*Id.* at 279.) The final management plan and environmental impact statement (“FEIS”) should continue to stress that the approved management plan will not affect existing water rights.

The DEIS states at one point that “changes in irrigation district operations and by individual irrigators would be necessary to meet any of the action options.” (DEIS at 280.) While this is true as a practical matter, the FEIS should make it clear that the Forest Service neither intends, nor has the authority, to compel the irrigation districts or individual irrigators to take conservation measures, change operations or otherwise incur costs to achieve the minimum or maximum flows contemplated by the Preferred Option or any of the other options discussed in the DEIS. The irrigation districts do, of course, plan to cooperate with the Forest Service on a voluntary and consensual basis in achieving these goals.

The COID and the DBA urges the Forest Service to commit itself, in the final EIS and the record of decision, to fully meet the intent of the Wild and Scenic Rivers Act and the Omnibus Oregon Wild and Scenic Rivers Act to protect the District’s existing water rights. The Forest Service should state expressly that it will not support any mandatory regulations proposed by other agencies to restrict the District’s water rights, designed, in whole or in part, to meet the objectives of the Upper Deschutes Wild and Scenic River Management Plan.

2. Water Quality.

The DEIS suggest that the hydrologic resource of the Upper Deschutes is either an Outstandingly Remarkable Value (“ORV”) or a significant element of several other ORVS that are “protected and enhanced by an abundant, stable flow of

1

Likewise, Representative Aspinall responded as follows to a question about the effect that the Wild and Scenic Rivers Act would have on state rights acquired before the passage of the act: “Enactment of the bill would not in any way affect or impair any valid or existing water rights perfected under state law.” 114 Cong Rec 26594 (1968).

clear, clean water.” (Id. at 4.) Elsewhere, however, the DEIS notes that the State of Oregon is proposing to list the Upper Deschutes River as water quality impaired for the numeric turbidity standard and for dissolved oxygen levels. (Id. at 17-19.) The DEIS also states that “[i]ndicators of water quality suggest that the river’s assimilative capacity may be exceeded at certain times.” (Id. at 19.) These statements do not state accurately the water quality parameters of concern reflected in the Oregon Department of Environmental Quality (DEQ) draft list of water quality limited streams.

The final EIS should be updated to incorporate whatever decision is ultimately made by the DEQ and approved by EPA regarding the list of streams that actually are water quality limited in Oregon. As discussed below, the COID and DBA have significant questions about the legal authority for several of the water quality standards as applied by DEQ in preparing its draft list and the data supporting the listings.

The hydrologic resource should not be treated as an ORV, nor should it be deemed a component of any other ORV, because the Upper Deschutes River may not presently “possess” unimpaired water quality. Sec 16 U.S.C. section 1271. The Oregon Department of Environmental Quality (“ODEQ”) is charged with protecting water quality in the Upper Deschutes River and the Forest Service’s duty under the Wild and Scenic Rivers Act is to “cooperate” with ODEQ “for the purpose of eliminating or diminishing the pollution of waters of the river.” 16 U.S.C. section 1283(c). The Management Plan should avoid treating water quality as an ORV so that the plan does not inadvertently put the Forest Service in the business of doing something more than or different from what the ODEQ chooses to do to maintain water quality in the upper Deschutes River basin under the Clean Water Act.

The COID and the DBA believes that other management measures currently in effect will address some of the water quality problems identified in the DEIS. The DEIS should address the anticipated effectiveness of these measures in addressing arguably poor water quality conditions, before adopting additional expensive measures in the Management Plan. These other measures should include the Inland Native Fish Strategy adopted by the Forest Service on August 21, 1995 and the Eastside Ecosystem Management Strategy.

3. Flow Regime Analysis.

According to the DEIS, the additional water required to meet the minimum and maximum flow objectives of the Preferred Option will be generated through conservation measures such as lining irrigation ditches, switching from gravity to

sprinkler irrigation and possibly constructing reregulating reservoirs. Under current Oregon law, 75 percent of any water "saved" through such conservation measures may be kept by the irrigator, while the other 25 percent must be returned for instream flows, unless a greater instream allocation is required because the project was paid for by public funds. ORS 537.455-.500.

The Preferred Option would increase the winter minimum flows to 300 cfs (90 percent of the time) and decrease the summer maximum flows to 1400 cfs. The Forest Service estimates that the total cost of the irrigation-related improvements required to save the needed amount--200,000 acre feet of water per year--will be more than \$64,000,000. (DEIS at 279) The discussion of the Preferred Option does not, however, include any cost benefit analysis. The benefits identified for the Preferred Option are presumed to be "significant" but are not quantified. (See id. at 264-84.) The DEIS should analyze whether the costs of the Preferred Option are worth its anticipated benefits. This is especially true since the DEIS recognizes that the existing flow regime actually enhances recreational activities in some cases. Similarly, the DEIS should consider whether any of that money might be more effectively spent elsewhere (e.g., on habitat improvement, erosion prevention or other programs).

The DEIS also does not offer a solid basis for choosing the Preferred Option instead of Option 4. Option 4 would require only 133,000 acre feet per year of conserved water and would cost roughly one-half as much as the Preferred Option. (Id. at 297.) There does not appear to be too much difference between these two options in terms of their ability to decrease erosion and turbidity.

The DEIS states that Option 4 would result in fish habitat reaching 80 percent of its potential, while that figure would be increased to 85 percent under the Preferred Option. The Preferred Option would improve water clarity by perhaps 10 percent to 15 percent more than Option 4 would. In sum, based on the estimates set forth in the DEIS, the Preferred Option may enhance the river's various ORVs at an overall level 5 percent to 10 percent greater than under Option 4, but would cost nearly twice as much. The DEIS must fully evaluate the environmental consequences of the alternatives to provide a clear basis for choices among them. 40 CFR sections 1502.14 and 1502.16. One of the critical issues here is determining what the minimum and maximum flow levels should be. There is no discussion in the DEIS explaining the basis for the flows proposed in each alternative beyond the brief discussion of past instream flow studies contained in Appendix I. This does not meet NEPA requirements. It contains no explanation of the jump from 200 cfs to 300 cfs in instream flows recommended by the Oregon Department of Fish and Wildlife (ODFW) between 1967 and 1970. Without a thorough analysis of the basis for past instream flow studies and use of current test methods in instream flow evaluation, the Forest Service may have erred in locating the

point of diminishing returns related to flow alternatives. Option 4 ought to be examined more closely based upon more thorough analysis and studies.

4. Comments on Factual Statements.

Separate comments may be submitted by the individual District members of the Deschutes Alliance on specific factual clarifications that should be made in the DEIS. Some common concerns are contained here.

A. Water Quality. The Districts are concerned that much of the data analyzed on water quality are not representative of the River. They were collected during a severe drought period. The Turbidity Monitoring Study cited in the DEIS was done in 1991-1993, some of the lowest flow periods on record in the Deschutes. Little or no consideration appears to have been given to whether these data are, in fact, representative of the River's water quality.

Similarly, what are the citations or references supporting the statement made at page 114 that the ramping rates included for all options will reduce turbidity. Also, what are the citations supporting the statement on page 131 that flow modifications from the reservoirs "contribute to accelerated erosion, decrease in wildlife habitat, decrease in scenic quality during the winter, and degradation of fish habitat with a corresponding decrease in fish populations." Further, we believe that some further additional discussions should be included regarding historical (pre reservoir) water quality conditions, including turbidity.

B. Fisheries. The District also share a concern that assessment of impacts on fish habitat were not done in accordance with professional protocols required for aquatic habitat evaluation on rivers affected by dams. There is not even a citation in the DEIS explaining what habitat and biological evaluation methods were used, beyond the very general descriptions of past instream flow studies contained in Appendix I. The COID and DBA strongly recommends that the Forest Service conduct the equivalent of an EPA Use Attainability Analysis and/or a new instream flow study using the incremental Instream Flow Methodology adopted by the U.S. Fish and Wildlife Service to evaluate the true biological condition of the river before adopting an alternative or even a study, based on the Forest Service Method (G.W. Swank and R.W. Phillips, Instream Flow Methodology for the Forest Service in the Pacific Northwest Region(1976)) that will cost twice as much as Option 4 and gain only a 5 percent improvement in aquatic habitat. See e.g. Technical Support manual for Conducting Use Attainability Analysis (USEPA, 1989e). We need to justify the increased expense of the

The Description of the fishery in Chapter 3 of the DEIS is especially void of supporting scientific data. Most of the references are to unnamed "ODFW surveys" and unspecified ODFW unpublished data. There is no evidence that any of this survey work or data has been reviewed or meets generally accepted quality assurance standards. There are also few, if any, citations to support the repeated conclusion that "The primary determinant of the fishery is the flow regime." See for example page 182.

Under 40 CFR section 1502.24 the Forest Service is required to insure "the professional integrity, including scientific integrity of the discussions and analyses in environmental impact statements." This requires the Forest Service to "identify any methodologies used" and to "make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement." This requirement is not met in this DEIS, devoid as it is of citations to technical references supporting its conclusory statements on impacts of flow regimes on water quality and fish and wildlife.

5. Relationship to Other Actions.

A. Clean Water Act. The DEIS does not contain an adequate explanation of the interrelationship of the Wild and Scenic River Management Plan to the Clean Water Act. The very process of preparing the Plan has resulted in serious potential regulatory consequences for Alliance members. The draft Plan itself has been relied upon by the DEQ as a basis for listing this segment of the Deschutes as a Water Quality Limited Water Body under Section 303(d) of the Clean Water Act for turbidity and for habitat and flow modification. As discussed in the enclosed comments submitted to DEQ on behalf of the Oregon Water Resources Congress and the 303(d) Coalition, and included by reference in these comments, listing of the Upper Deschutes under Section 303(d) may have serious regulatory consequences for Alliance members. These impacts should be described in detail in the DEIS.

The COID and the DBA understands from discussions with DEQ and a memorandum dated June 28, 1995 from Bruce A. Hammon of DEQ to Mollie Chaudet of the Forest Service that DEQ intends to use the Upper Deschutes Management Plan and the EIS as the basis for preparing a Total Maximum Daily Load Allocation ("TMDL") for the Upper Deschutes in order to comply with Clean Water Act requirements. As part of the TMDL process, the Alliance has been advised that DEQ intends to develop best management practices (BMPs) for water quality consistent with the Management Plan. The Forest Service legally is required to meet state water quality standards and comply with adopted BMPs. The Alliance is extremely concerned that because of this rela-

tionship between the Management Plan and DEQ's proposed use of it as the TMDL to develop BMPs, the changes in flow regime envisioned by the Plan will cease to be voluntary and instead will become new prescriptive regulatory controls. Until this concern is thoroughly addressed by the Forest Service and DEQ in the EIS and concerns of COID and DBA members about the significance of the Management Plan in light implementation should also address how DEQ plans to use the Plan to develop a TMDL. Will additional data be gathered and analyzed? How will load allocations be done for nonpoint sources?

B. Fish Management Plan. The DEIS states at page 56 that a fish management plan for the upper Deschutes is only now being developed, yet throughout the DEIS, statements are made about fishery management objectives of managing for self-sustaining populations of brown and native trout (see page 65 for example). Target levels for large woody debris are then stated. There is no discussion in the DEIS of what flows are needed to achieve the stated (but apparently not officially adopted) fishery management objectives, except to the extent that the list of instream flow studies included in Appendix I is thought to do so. As noted above, the information in Appendix I does not meet NEPA requirements.

The Upper Deschutes is acknowledged in the DEIS to be providing an outstanding angling experience now. The fishery is a recognized outstandingly remarkable value based upon the resource assessment contained in Appendix A. The preferred alternative, if fully implemented, would result in significant funds being expended over time to modify the flow regime in the river in large part to improve fishery habitat. The DEIS should contain thorough documentation of the fishery and angling benefits that will result from such significant expenditures. What additional values, beyond the already "outstandingly remarkable" fishery values, are going to be achieved? How has this been determined scientifically? The DEIS is deficient without such a discussion. If a new fishery management plan is being developed, this plan should be delayed until that plan establishes clear, measurable, scientifically supported flow objectives correlated to quantifiable fish and habitat benefits.

The COID and the DBA appreciates the opportunity to comment on the DEIS and is committed to continuing to work with the Forest Service and other agencies to develop a plan that will protect the outstanding values of the Upper Deschutes.

In general, we are reluctant to allow many of the assumptions included in the DEIS to be advanced as fact without further research and verification.

Upper Deschutes W&S River Plan
February 28, 1996
Page 8

The COID and DBA members will continue their commitment to addressing water quality and quantity issues on the Upper Deschutes River. However, it is important that we are clear that we are concerned about any attempt to impose non voluntary practices.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ron Nelson".

Ron Nelson, Secretary-Manager

cc: COID Board of Directors
DBA Members

RN:dd

Appendix B

Coordination Group

| | |
|-------------------|---|
| Steve Moser | Oregon Division of State Lands |
| Paul Donheffner | Oregon State Marine Board |
| Chip Dale | Oregon Department of Fish and Wildlife |
| Bob Main | Oregon Water Resources Department |
| Brian Cunningham | Confederated Tribes of the Warm Springs Reservation |
| Peter Green | Govenor's Forest Policy Team |
| Steve Brutscher | Oregon Parks and Recreation Department |
| Jan Houck | Oregon Parks and Recreation Department |
| James Kenna | Bureau of Land Managment |
| Jim Eisner | Bureau of Land Managment |
| Jody Calica | Confederated Tribes of the Warm Springs Reservation |
| Jim Noteboom | Confederated Tribes of the Warm Springs Reservation |
| Chuck Kimbol, Sr. | Klamath Tribes |
| Elwood Miller | Klamath Tribes |
| Chuck Schonneker | North Unit Irrigation District |
| Ron Nelson | Central Oregon Irrigation District |
| John Keys III | Bureau of Reclamation |
| Eric Glover | Bureau of Reclamation |
| Dave Leslie | Deschutes County |
| Anita Powell | City of Bend |
| Gerald Henrikson | Bureau of Indian Affairs |
| Bruce Hammon | Oregon Department of Environmental Quality |
| Walt Schloer | Deschutes National Forest |
| Mollie Chaudet | Deschutes National Forest |

Appendix C

Appendix C

Upper Deschutes Wild and Scenic River Task Force

David Bayles
Chuck Burley
Jim Bussard
Brad Hunter
Tim Koger
Craig Lacy
Tim Lillebo

Bob Main
Ron Nelson
Bruce Ronning
Eric Schulz
Scott Stuemke
Shirley Walton

Appendix D

Appendix D

Deschutes Basin Resource Committee Members

Charlie Brown
Irrigation

Jim Bussard
Business

Claire Kunkel
ODFW

Bob Main
Water Resources

Jim Mann
Resource

James Noteboom
Public

Chuck Schonkeker
Irrigation District

Chris Babcock
Non-consumptive Water
Resource User

Appendix E

Chapter 18.48

OPEN SPACE AND CONSERVATION OS&C ZONE

Sections:

- 18.48.010 Purpose
- 18.48.020 Uses Permitted Outright
- 18.48.030 Conditional Uses Permitted
- 18.48.040 Dimensional Standards
- 18.48.050 Setbacks
- 18.48.060 Limitations on Conditional Uses

In an OS&C Zone, the following regulations shall apply:

18.48.010 Purpose.

The purpose of the Open Space and Conservation Zone is to protect designated areas of scenic and natural resources; to restrict development in areas with fragile, unusual or unique qualities; to protect and improve the quality of the air, water and land resources and to plan development that will conserve open space. (Ord. 93-043 § 6, 1993)

18.48.020 Uses Permitted Outright.

The following uses and their accessory uses are permitted outright: (Ord. 91-020 § 1, 1991)

- A. Farm use as defined in ORS 215.203(2).
- B. Public and non-profit agencies, museums and exhibits on lands where an exception has been granted in accordance with OAR Chapter 660, Division 4.
- C. Public wildlife reserve or management area, not including structures. (Ord. 94-041 § 1, 1994)

18.48.030 Conditional Uses Permitted.

The following uses may be allowed subject to Chapter 18.128 of this title: (Ord 91-038 § 1, 1991)

- A. Private parks, picnic areas or hunting and fishing preserves.
- B. Public parks and recreational areas

owned and operated by a governmental agency or non-profit community organization.

- C. Utility facility except landfills.
- D. Water supply and treatment facility.
- E. Excavation, grading and fill and removal within the bed and banks of a stream or river or in a wetland subject to Sections 18.120.050 and 18.128.040(W).
- F. Campground. (Ord 94-041 § 1, 1994; Ord. 91-038 § 1, 1991)

18.48.040 Dimensional Standards.

In an OS&C Zone, the following dimensional standards shall apply:

- A. The minimum lot size is 80 acres.
- B. Building Height. No building or structure shall be erected or enlarged to exceed thirty (30) feet in height, except as allowed under Section 18.120.040. (Ord. 94-041 § 1, 1994; Ord. 92-055 § B, 1992)

18.48.050 Setbacks.

- A. Minimum setbacks shall be 60 feet from an arterial or collector street or road right-of-way and 20 feet from a street within a platted and recorded subdivision.
- B. The setback from a perennial stream or lake ordinary high water mark shall be a minimum of 200 feet, and from an intermittent stream channel, 100 feet. (Ord. 91-020 § 1, 1991)
- C. Each side setback shall be a minimum of 15 feet, except on a corner lot it shall be 30 feet from the street side.
- D. The setback from the north lot line shall meet the solar setback requirements in Section 18.116.180. (Ord. 83-037 § 13, 1983)
- E. Rimrock Setback. Setbacks from rimrock shall be as provided in Section 18.116.160. (Ord. 86-053 § 10, 1986)
- F. In addition to the setbacks set forth herein, any greater setbacks required by applicable building or structural codes adopted by the State of Oregon and/or the County under Chapter 15.04 of this title shall be met. (Ord. 94-008 § 28, 1994)

18.48.060 Limitations on Conditional Uses.

The following limitations shall apply to a conditional use in an OS&C Zone:

A. An application for a conditional use in an OS&C Zone may be denied if, in the opinion of the Planning Director or Hearings Body, the proposed use is not related to or sufficiently dependent upon the recreational resources of the area.

B. The proposed use shall not significantly increase fire hazard or significantly increase risks to fire suppression personnel. The Planning Director or Hearings Body may require establishment and maintenance of fire breaks, the use of fire resistant materials in construction and landscaping, or attach other similar conditions or limitations that will reduce fire hazards or prevent the spread of fire to surrounding areas.

C. The Planning Director or Hearings Body may limit changes in the natural grade of land, or the alteration, removal or destruction of natural vegetation to prevent or minimize erosion, pollution or degradation of the natural attractiveness of the area.

D. An application for a conditional use in an OS&C Zone shall be denied if, in the opinion of the Planning Director or Hearings Body, the proposed use would exceed the carrying capacity of the area or would be detrimental to the natural features or resources of the area.

E. An application for a conditional use in an OS&C Zone shall be denied if not in compliance with the Comprehensive Plan.

F. An application for a conditional use shall be denied if the proposed use would force a significant change in, or significantly increase the cost of accepted farming or forest practices on agriculture or forest lands.

G. Where the proposed use is adjacent to forest zoned land, a written statement recorded with the deed or written contract with the county or its equivalent shall be obtained from the land owner which recognizes the right of adjacent and nearby land owners to conduct forest operations

consistent with the Forest Practices Act and Rules for uses authorized in OAR 660-06-025(4)(e), (1), (r), (s) and (v). (Ord. 94-041 § 1, 1994; Ord. 91-020 § 1 1991)

Chapter 18.60

RURAL RESIDENTIAL - RR-10 ZONE

Sections:

- 18.60.010 Purposes
- 18.60.020 Uses Permitted Outright
- 18.60.030 Conditional Uses Permitted
- 18.60.035 Destination Resorts
- 18.60.040 Yard and Setback Requirements
- 18.60.050 Stream Setback
- 18.60.060 Dimensional Standards
- 18.60.070 Limitations on Conditional Uses
- 18.60.080 Rimrock Setback

In an RR-10 Zone, the following regulations shall apply:

18.60.010 Purposes.

The purposes of the Rural Residential Zone are to provide rural residential living environments; to provide standards for rural land use and development consistent with desired rural character and the capability of the land and natural resources; to manage the extension of public services; to provide for public review of non-residential uses; and to balance the public's interest in the management of community growth with the protection of individual property rights through review procedures and standards.

18.60.020 Uses Permitted Outright.

The following uses and their accessory uses are permitted outright. (Ord. 91-020 § 1, 1991)

A. A single-family dwelling, or a manufactured home subject to Section 18.116.070. (Ord. 91-005 § 30, 1991)
(Subdivisions. . . repealed and renumbered by Ord. 91-005 § 31, 1991)

B. Utility facilities necessary to serve the area including energy facilities, water supply and treatment and sewage disposal and treatment.

C. Community center, if shown and approved on the original plan or plat of the

development.

D. Agricultural use as defined in this title. (Ord. 94-008 § 12, 1994)

E. Class I and II road or street project subject to approval as part of a land partition, subdivision or subject to their standards and criteria established by Section 18.116.230.

F. Class III road or street project. (Ord.93-043 § 8, 1993)

G. Non-commercial horse stables as defined in this title, excluding horse events. (Ord. 94-008 § 12, 1994)

H. Horse events, including associated structures, involving:

- (1) Fewer than 10 riders;
- (2) 10 to 25 riders, no more than two times per month on non-consecutive days; or
- (3) More than 25 riders, no more than two times per year on non-consecutive days.

Incidental musical programs are not included in this definition. Overnight stays by participants, trainers or spectators in RVs on the premises is not an incident of such horse events. (Ord. 94-008 § 12, 1994)

18.60.030 Conditional Uses Permitted.

The following uses may be allowed subject to Chapter 18.128 of this title: (Ord. 91-038 § 1, 1991)

(Mobile home subdivision ... repealed and renumbered by Ord. 91-005 § 32, 1991)

(Mobile home as a single-family dwelling ... repealed and renumbered by Ord. 91-005 § 32, 1991)

A. Public park, school, playground, recreation facility or community center owned and operated by a government agency or nonprofit community organization.
(Destination resort deleted by Ord. 92-004 § 10, 1992)

B. Dude ranch.

C. Home occupation. (Ord. 91-020 § 1, 1991)

D. Personal-use landing strip for airplanes and helicopter pads, including associated hangar, maintenance and service

facilities. A personal use landing strip as used in this section means an airstrip restricted, except for aircraft emergencies, to use by the owner and, on an infrequent and occasional basis, by invited guests. No aircraft may be based on a personal use landing strip other than those owned or controlled by the owner of the airstrip. Exceptions to the activities permitted under this definition may be granted through waiver action by the Aeronautics Division in specific instances. A personal use landing strip lawfully existing as of September 1, 1975, shall continue to be permitted subject to any applicable regulations of the Aeronautics Division. (Ord. 91-038 § 1, 1991; Ord. 91-020 § 1, 1991)

E. Planned development.

F. Cluster development.

G. Recreation-oriented facility requiring large acreage such as off-road vehicle track or race track, but not including a rodeo grounds. (Ord. 94-008 § 13, 1994)

H. Landfill when a written tentative approval by Department of Environmental Quality (DEQ) of the site is submitted with the application. (mining mineral resources for personal on-site use ... repealed by Ord. 90-014 § 22, 1990)

I. Cemetery.

J. Time-share unit or the creation thereof. (Ord. 83-033 § 5, 1983)

K. Hydroelectric facility, subject to Sections 18.116.130 and 18.128.040(V). (Ord. 86-018 § 13, 1986)

L. Bed and breakfast inn. (Ord. 91-038 § 1, 1991)

M. Golf course. (Ord. 91-038 § 1, 1991)

N. Excavation, grading and fill and removal within the bed and banks of a stream or river or in a wetland subject to Sections 18.120.050 and 18.128.040(W). (Ord. 91-038 § 1, 1991)

O. Church. (Ord. 91-038 § 1, 1991)

P. Public uses.

Q. Semi-public uses. (Ord. 93-043 § 8A, 8b, 1993)

R. Commercial horse stables. (Ord. 94-008 § 13, 1994)

18.60.035 Destination Resorts.

Destination resorts may be allowed as a conditional use, subject to all applicable standards of the DR zone. (Ord. 92-004 § 11, 1992)

18.60.040 Yard and Setback Requirements.

In an RR-10 zone, the following yard and setbacks shall be maintained.

A. The front setback shall be a minimum of 20 feet from a property line fronting on a local street right-of-way, 30 feet from a property line fronting on a collector right-of-way and 50 feet from an arterial right-of-way. (Ord. 91-020 § 1, 1991)

B. There shall be a minimum side yard of 10 feet for all uses, except on the street side of a corner lot the side yard shall be 20 feet. (Ord. 91-020 § 1, 1991)

C. The minimum rear yard shall be 20 feet.

D. The setback from the north lot line shall meet the solar setback requirements in Section 18.116.180. (Ord. 83-037 § 16, 1983)

E. In addition to the setbacks set forth herein, any greater setbacks required by applicable building or structural codes adopted by the State of Oregon and/or the County under Chapter 15.04 of this title shall be met. (Ord. 94-008 § 21, 1994)

18.60.050 Stream Setback.

To permit better light, air, vision, stream or pollution control, protect fish and wildlife areas and to preserve the natural scenic amenities and vistas along streams and lakes, the following setback shall apply:

A. All sewage disposal installations, such as septic tanks or septic drainfield, shall be set back from the ordinary high water mark along all streams or lakes a minimum of 100 feet, measured at right angles to the ordinary high water mark. In those cases where practical difficulties preclude the location of the facilities at a distance of 100 feet and the County Sanitarian finds that a closer location will not endanger health, the Planning Director or

Hearings Body may permit the location of these facilities closer to the stream or lake, but in no case closer than 25 feet.

B. All structures, buildings or similar permanent fixtures shall be set back from the ordinary high water mark along all streams or lakes a minimum of 100 feet measured at right angles to the ordinary high water mark. (Ord. 91-020 § 1, 1991)

18.60.060 Dimensional Standards.

In an RR-10 Zone, the following dimensional standards shall apply:

A. Lot Coverage. The main building and accessory buildings located on any building site or lot shall not cover in excess of thirty percent of the total lot area.

B. Building Height. No non-agricultural building or structure shall be erected or enlarged to exceed thirty (30) feet in height, except as approved under Section 18.120.040. (Ord. 92-055 § 4, 1992)

C. Minimum lot size shall be 10 acres, except planned and cluster developments shall be allowed an equivalent density of one unit per 7.5 acres. Planned and cluster developments within one mile or an acknowledged urban growth boundary shall be allowed a five-acre minimum lot size or equivalent density. For parcels separated by new arterial rights-of-way, an exemption shall be granted pursuant to Section 18.120.020. (Ord. 93-034 § 1, 1993; Ord. 92-055 § 11, 1992)

18.60.070 Limitations on Conditional Uses.

The following limitations shall apply to uses allowed by Section 18.60.030:

A. The Planning Director or Hearings Body may require establishment and maintenance of fire breaks, the use of fire resistant materials in construction and landscaping, or may attach other similar conditions or limitations that will serve to reduce fire hazards or prevent the spread of fire to surrounding areas.

B. The Planning Director or Hearings

Body may limit changes in the natural grade of land, or the alteration, removal or destruction of natural vegetation in order to prevent or minimize erosion or pollution. (Ord. 91-020 § 1, 1991)

18.60.080 Rimrock Setback.

Setbacks from rimrock shall be as provided in Section 18.116.160. (Ord. 86-053 § 13, 1986)

Chapter 18.84

LANDSCAPE MANAGEMENT COMBINING - LM ZONE

Sections:

| | |
|-----------|------------------------------|
| 18.84.010 | Purpose |
| 18.84.020 | Application of Provisions |
| 18.84.030 | Uses Permitted Outright |
| 18.84.040 | Uses Permitted Conditionally |
| 18.84.050 | Use Limitations |
| 18.84.060 | Dimensional Standards |
| 18.84.070 | Application |
| 18.84.080 | Design Review Standards |
| 18.84.085 | Imposition of Conditions |
| 18.84.090 | Setbacks |
| 18.84.100 | Septic Permits |

In any Landscape Management Combining Zone, the requirements and standards of this chapter shall apply in addition to those specified in this title for the underlying zone. If a conflict in regulation or standards occurs, the provision of this chapter shall govern. (Ord. 92-034 § 2, Exhibit A, 1992)

18.84.010 Purpose.

The purposes of the LM Zone are to maintain scenic and natural resources of the designated areas and to maintain and enhance scenic vistas and natural landscapes as seen from designated roads, rivers or streams. (Ord. 92-034 § 2, Exhibit A, 1992)

18.84.020 Application of Provisions.

The provisions of this chapter shall apply to all areas within one-quarter mile of roads identified as landscape management corridors in the Comprehensive Plan and the county zoning map. The provisions of this chapter shall also apply to all areas within the boundaries of a state scenic waterway or federal wild and scenic river corridor and all areas within 660 feet of rivers and streams otherwise identified as landscape management corridors in the Comprehensive Plan and the county zoning map. The distance specified above shall be measured horizontally from the

centerline of designated landscape management roadways or from the nearest ordinary high water mark of a designated landscape management river or stream. The limitations in this section shall not unduly restrict accepted agricultural practices. (Ord. 92-034 § 2, Exhibit A, 1992)

18.84.030 Uses Permitted Outright.

Uses permitted in the underlying zone with which the LM Zone is combined shall be permitted in the LM Zone, subject to the provisions in this chapter. (Ord. 92-034 § 2, Exhibit A, 1992)

18.84.040 Uses Permitted Conditionally.

Uses permitted conditionally in the underlying zone with which the LM Zone is combined shall be permitted as conditional uses in the LM Zone, subject to the provisions in this chapter. (Ord. 92-034 § 2, Exhibit A, 1992)

18.84.050 Use Limitations.

A. Any new structure or substantial alteration of a structure requiring a building permit, or an agricultural structure within an LM Zone shall obtain site plan approval in accordance with this chapter and Chapter 18.124, Site Plan Review, prior to construction. As used in this chapter, substantial alteration consists of an alteration which exceeds 25% in the size or 25% of the assessed value of the structure.

B. Structures which are not visible from the designated roadway, river or stream and which are assured of remaining not visible because of vegetation, topography or existing development are exempt from the provisions of Section 18.84.080 (Design Review Standards) and Section 18.84.090 (Setback Standards). An applicant for site plan review in the LM Zone shall conform with the provisions of this chapter, or may submit evidence that the proposed structure will not be visible from the designated road, river or stream. Structures not visible from the designated road, river or stream must meet setback

standards of the underlying zone. (Ord. 92-034 § 2, Exhibit A, 1992; Ord. 91-020 § 1, 1991)

18.84.060 Dimensional Standards.

In an LM Zone, the minimum lot size shall be as established in the underlying zone with which the LM Zone is combined. (Ord. 92-034 § 2, Exhibit A, 1992; Ord. 91-020 § 1, 1991)

18.84.070 Application.

An application for site plan approval for development in the LM Zone shall be submitted to the Planning Division. The site plan application shall include the following:

- A. A plot plan, drawn to scale, showing:
 - a. Location and dimensions of existing and proposed structures.
 - b. Setbacks from lot lines (and river and rimrock, if present).
 - c. Existing and proposed access.
 - d. Existing and proposed exterior lighting.
- B. A drawing of the proposed structure elevations showing:
 - a. Exterior appearance.
 - b. Height, dimensions.
 - c. Siding and roofing material and color.
- C. Location and size of windows, including skylights.
- D. A landscape plan drawn to scale, showing:
 - a. Location, size and species of existing trees six inches in diameter or greater, or existing shrub vegetation higher than four feet, between the proposed development and the designated landscape management road, river or stream. Where a significant amount of vegetation exists, a landscape plan may be accepted which generalizes and explains how the existing trees and shrubs provide screening.
 - b. Proposed location and species of introduced vegetation which will screen the proposed development from the designated landscape management road, river or stream. (Ord. 93-043 § 12, 1993; 92-034 § 2, Exhibit

A, 1992)

18.84.080 Design Review Standards.

The following standards will be used to evaluate the proposed site plan:

A. Except as necessary for construction of access roads, building pads, septic drain-fields, public utility easements, parking areas, etc., the existing tree and shrub cover screening the development from the designated road, river or stream shall be retained. This provision does not prohibit maintenance of existing lawns, removal of dead, diseased or hazardous vegetation; the commercial harvest of forest products in accordance with the Oregon Forest Practices Act or agricultural use of the land.

B. It is recommended that new structures and additions to existing structures be finished in muted earth tones that blend with and reduce contrast with the surrounding vegetation and landscape of the building site.

C. No large areas, including roofs, shall be finished with white, bright or reflective materials. Roofing, including metal roofing shall be non-reflective and of a color which blends with the surrounding vegetation and landscape.

D. Subject to applicable rimrock setback requirements or rimrock setback exception standards in Section 18.84.090, all structures shall be sited to take advantage of existing vegetation, trees and topographic features in order to reduce visual impact as seen from the designated road, river or stream.

E. Structures shall not exceed 30 feet in height measured from the natural grade on the side(s) facing the road, river or stream. Within the LM Zone along a state scenic waterway or federal wild and scenic river, the height of a structure shall include chimneys, antennas, flag poles or other projections from the roof of the structure. This section shall not apply to agricultural structures located at least 50 feet from a rimrock.

F. New residential or commercial driveway access to designated landscape management roads shall be consolidated wherever

possible.

G. New exterior lighting, including security lighting, shall be sited and shielded so that it is directed downward and is not directly visible from the designated road, river or stream.

H. The Planning Director or Hearings Body may require the establishment of introduced landscape material to screen the development, assure compatibility with existing vegetation, reduce glare, direct automobile and pedestrian circulation or enhance the overall appearance of the development while not interfering with the views of oncoming traffic at access points or views of mountains, forests and other open and scenic areas as seen from the designated landscape management road, river or stream. Use of native species shall be encouraged. (Formerly Section 18.84.080(C))

I. No signs or other forms of outdoor advertising that are visible from a designated landscape management river or stream shall be permitted. Property protection signs (no trespassing, no hunting, etc.) are permitted.

J. A conservation easement as defined in Section 18.04.030, "Conservation Easement," and specified in Section 18.116.220, shall be required as a condition of approval for all landscape management site plans involving property adjacent to the Deschutes River, Crooked River, Fall River, Little Deschutes River, Spring River, Squaw Creek and Tumalo Creek. Conservation easements required as a condition of landscape management site plans shall not require public access. (Ord. 93-043 § 12A, 12B, 1993; 92-034 § 2, Exhibit A, 1992; Ord. 91-020 § 1, 1991)

18.84.085 Imposition of Conditions.

The standards of this chapter may be met by the imposition of conditions drawn to ensure that the standards will be met. (Ord. 92-034 § 2, Exhibit A, 1992)

18.84.090 Setbacks.

A. Except as provided in this section, minimum setbacks shall be those established

in the underlying zone with which the LM Zone is combined.

B. Road Setbacks. All new structures or additions to existing structures on lots fronting a designated landscape management road shall be set back at least 100 feet from the edge of the designated road unless the Planning Director or Hearings Body finds that:

a. A location closer to the designated road would more effectively screen the building from the road or protect a distant vista; or

b. The depth of the lot makes a 100-foot setback not feasible; or

c. Buildings on both lots abutting the subject lot have front yard setbacks of less than 100 feet and the adjacent buildings are within 100 feet of the lot line of the subject property, and the depth of the front yard is not less than the average depth of the front yards of the abutting lots.

If the above findings are made, the Planning Director or Hearings Body may approve a less restrictive front yard setback which will be appropriate to carry out the purpose of the zone.

C. River and Stream Setbacks. All new structures or additions to existing structures shall be set back 100 feet from the ordinary high water mark of designated streams and rivers or obtain a setback exception in accordance with Section 18.120.030. For the purpose of this section, decks are considered part of a structure and must conform with the setback requirement.

The placement of on-site sewage disposal systems shall be subject to joint review by the Planning Director or Hearings Body and the Deschutes County Environmental Health Division. The placement of such systems shall minimize the impact on the vegetation along the river and shall allow a dwelling to be constructed on the site as far from the stream or lake as possible. Sand filter systems may be required as replacement systems when this will allow a dwelling to be located further from the stream or to meet the 100-foot setback requirement. (Formerly Section 18.84.080(E))

D. Rimrock Setback. New structures (including decks or additions to existing structures) shall be set back 50 feet from the rimrock in an LM Zone. An exception to this setback may be granted to as close to 20 feet of the rimrock pursuant to the provisions of subsection (E) of this section.

E. Rimrock Setback Exceptions. An exception to the 50-foot rimrock setback may be granted by the Planning Director or Hearings Body, subject to the following standards and criteria:

a. An exception shall be granted when the Planning Director or Hearings Body finds that:

1. A lesser setback will make the structure less visible or completely screened from the river or stream; or

2. The subject lot or parcel was a lot of record prior to the adoption of this ordinance; or

3. Dwellings (including decks) on both lots or parcels abutting the subject lot within 50 feet of the rimrock and the adjacent buildings are within 100 feet of the lot line of the subject property; or

4. Adherence to the 50-foot setback would prevent the structure from being sited on the lot.

b. A dwelling qualifying for a rimrock setback exception under the criteria set forth above shall be located as follows:

1. The structure shall be designed and sited to minimize the visual impact when viewed from the ordinary high water mark on the far side of the river. This shall be determined by viewing the property from the ordinary high water mark immediately across from the center of the river frontage on which the structure is proposed with like evaluations being made 300 feet upstream and downstream on either side of that point over the entire length of river frontage on which the structure is proposed.

2. Existing trees and shrubs which reduce the visibility of the proposed structure shall be retained.

3. The height of the structure shall not

exceed the setback from the edge of the rimrock.

4. No structure (including decks) shall be located closer than 20 feet from the edge of the rimrock unless the Planning Director or Hearings Body finds that the lesser setback will make the structure less visible or the structure is completely screened from the river or stream.

5. Where multiple non-agricultural structures are proposed on a lot or parcel, the structures shall be grouped or clustered so as to maintain a general appearance of open landscape for the affected area. This shall require a maintenance of at least 65% open space along rimrocks within subject lots or parcels.

F. Scenic Waterways. Approval of all structures in a state scenic waterway shall be conditioned upon receipt of approval of the State Parks Department. (Ord. 92-034 § 2, Exhibit A, 1992)

18.84.100 Septic Permits.

Prior to the issuance of a permit for any on-site sewage disposal system that is to be located within 200 feet of a river or stream in a landscape management corridor, a Landscape Management Site Plan shall be approved in accordance with this chapter. (Ord. 92-034 § 2, Exhibit A, 1992; Ord. 90-020 § 1, 1990)

CHAPTER 18.88

WILDLIFE AREA COMBINING WA ZONE

Sections:

- 18.88.010 Purpose**
- 18.88.020 Application of Provision**
- 18.88.030 Uses Permitted Outright**
- 18.88.040 Uses Permitted Conditionally**
- 18.88.050 Dimensional Standards**
- 18.88.060 Siting Standards**
- 18.88.070 Fencing Standards**

In any zone which is a Wildlife Area Combining Zone (WA), the requirements and standards of this chapter shall apply in addition to those specified in this title for such underlying zone. If a conflict in regulations or standards occurs, the provisions of this section shall govern except that the larger minimum lot size shall always apply. (Ord. 93-043 § 13, 13A, 1993)

18.88.010 Purpose

The purpose of the Wildlife Area Combining Zone is to conserve important wildlife areas in Deschutes County; to protect an important environmental, social and economic element of the area; and to permit development compatible with the protection of the wildlife resource.

18.88.020 Application of Provisions

The provisions of this section shall apply to all areas identified in the Comprehensive Plan as a winter deer range, significant elk habitat, antelope range or deer migration corridor. Rural service centers are exempt from the provisions of this title.

18.88.030 Uses Permitted Outright

In a zone with which the WA Zone is combined, the uses permitted outright shall be those permitted outright by the underlying zone.

18.88.040 Uses Permitted Conditionally

A. Except as provided in Section B, in a zone with which the WA Zone is combined, the conditional uses permitted shall be those permitted conditionally by the underlying zone subject to the provisions of the Comprehensive Plan, Section 18.128 of this title and other applicable sections of this title.

B. The following uses are not permitted in the WA zone as conditional uses:

1. Golf course, not included in a destination resort;
2. Commercial dog kennel;
3. Church;
4. Public school or private school; (Ord. 94-053 § 1, 1994)
5. Bed and breakfast inn;
6. Dude ranch;
7. Playground, recreation facility or community center owned and operated by a government agency or a non-profit community organization;
8. Timeshare unit;
9. Veterinary clinic; (Ord. 94-053 § 1, 1994)
10. Fishing lodge.

C. An application for a destination resort, or any portion thereof, in a Wildlife Area Combining Zone shall not be accepted pending completion of the County's Goal 8 destination resort mapping process.

18.88.050 Dimensional Standards

In a WA Zone, the following dimensional standards shall apply:

A. In the Tumalo, Metolius, North Paulina and Grizzly deer winter ranges designated in the Comprehensive Plan Resource Element, the minimum lot size for new parcels shall be 40 acres except as provided in section "D".

B. In areas designated as significant elk habitat in the Comprehensive Plan Resource Element, the minimum lot size for new parcels shall be 160 acres.

C. In areas designated as antelope range in the Comprehensive Plan Resource Element,

the minimum lot size for new parcels shall be 320 acres.

D. Residential land divisions, including partitions, in deer winter range where the underlying zone is RR-10 or MUA-10, shall not be permitted except as a planned development or cluster development conforming to the following standards:

1. The minimum area for a planned or cluster development shall be at least 40 acres.

2. The planned or cluster development shall retain a minimum of 80 percent open space and conform with the provisions of Sections 18.128.040(P) or (Q).

3. Notwithstanding the provisions of Title 18.128.040(P) or (Q), or Title 18.60.060(C), the total number of residences in a cluster development may not exceed the density permitted in the underlying zone.

E. Residential land divisions, including partitions, in the Bend/La Pine Deer Migration Corridor where the underlying zone is RR-10 shall not be permitted except as a cluster development conforming to the following standards:

1. The minimum area for a cluster development shall be at least 20 acres.

2. The cluster development shall retain a minimum of 80 per cent open space and conform with the provisions of Section 18.128.040(P) or (Q).

3. Notwithstanding the provisions of Title 18.128.040(P), or Title 18.60.060(C), the total number of residences in the cluster development may not exceed the density permitted in the underlying zone.

18.88.060 Siting Standards

A. Setbacks shall be those described in the underlying zone with which the WA Zone is combined.

B. New dwellings shall be located within 300 feet of public roads or easements or private roads or easements existing as of August 5, 1992 unless it can be found that:

1. Habitat values (i.e., browse, forage, cover, access to water) and migration corridors are afforded equal or greater

protection through a different development pattern; or,

2. The siting within 300 feet of such roads or easements would force the dwelling to be located on irrigated land, in which case, the dwelling shall be located to provide the least impact on wildlife habitat possible considering browse, forage, cover, access to water, migration corridors, and minimizing length of new access roads.

18.88.070 Fence Standards

The following fencing provisions shall apply as a condition of approval for any new fences constructed as a part of development of a property in conjunction with a conditional use permit or site plan review.

A. New fences in the Wildlife Area Combining Zone shall be designed to permit wildlife passage. The following standards and guidelines shall apply unless an alternative fence design provides equivalent wildlife passage is approved by the County after consultation with the Oregon Department of Fish and Wildlife:

1. The distance between the ground and the bottom strand or board of the fence shall be at least 15 inches.

2. The height of the fence shall not exceed 48 inches above ground level.

3. Smooth wire and wooden fences that allow passage of wildlife are preferred. Woven wire fences are discouraged.

B. Exemptions:

1. Fences encompassing less than 10,000 square feet which surround or are adjacent to residences or structures are exempt from the above fencing standards.

2. Corrals used for working livestock. (Ord. 92-042 § 1, 1992)

Chapter 18.96

FLOOD PLAIN - FP ZONE

Sections:

- 18.96.010 **Purposes**
- 18.96.020 **Designated Areas**
- 18.96.030 **Uses Permitted Outright**
- 18.96.040 **Conditional Uses Permitted**
- 18.96.050 **Prohibited Uses**
- 18.96.060 **Limitations on Conditional Uses**
- 18.96.070 **Application for Conditional Use**
- 18.96.080 **Criteria to Evaluate Conditional Uses**
- 18.96.085 **Elevation Certification**
- 18.96.090 **Yard and Setback Requirements**
- 18.96.100 **Stream Setback**
- 18.96.110 **Dimensional Standards**
- 18.96.120 **Warning and Disclaimer of Liability**
- 18.96.130 **Use Variances**

18.96.010 **Purposes.**

The purposes of the Flood Plain Zone are: to implement the Comprehensive Plan Flooding Section; to protect the public from the hazards associated with flood plains; to conserve important riparian areas along rivers and streams for the maintenance of the fish and wildlife resources; and to preserve significant scenic and natural resources while balancing the public interests with those of individual property owners in the designated areas. (Ord. 88-030 § 4, 1988)

18.96.020 **Designated Areas.**

The areas of special flood hazard identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance Study for Deschutes County, Oregon and Incorporated Areas" dated August 16, 1988, with accompanying Flood Insurance Rate Maps is hereby adopted by reference and incorporated herein by this reference. The Flood Insurance Study is on file at the Deschutes County Community Development Department. (Ord. 95-022 § 1, 1995)

The Flood Plain Zone shall include all areas designated as "Special Flood Hazard Areas" by the Flood Insurance Study for Deschutes County. When base flood elevation data has not been provided in the Flood Insurance Study, the Planning Division will obtain, review and reasonably utilize any base flood elevation or floodway data available from federal, state or other sources, in determining the location of a flood plain or floodway. (Ord. 95-022 § 1, 1995; Ord. 88-030 § 4, 1988)

18.96.030 **Uses Permitted Outright.**

The following uses and their accessory uses are permitted outright: (Ord. 91-020 § 1, 1991)

A. Agricultural use conducted without establishing or utilizing a structure. For purposes of this paragraph, a "structure" does not include a boundary fence as long as such fence is designed to impede as little as possible the movement of floodwaters and flood-carried material.

B. Management, propagation and harvesting of a forest product.

C. Open space.

D. Portions of a residential use that do not contain structures, such as lawn, garden or play areas. (Ord. 88-030 § 4, 1988)

E. Class I and II road or street project subject to approval as part of a land partition, subdivision or subject to the standards and criteria established by Section 18.116.230.

F. Class III road or street project. (Ord. 93-043 § 15, 1993)

18.96.040 **Conditional Uses Permitted.**

The following uses may be allowed subject to applicable sections of this title: (Ord. 93-002 § 4, 1993; Ord. 91-038 § 1, 1991)

A. A roadway, bridge or utility structure, except a landfill, that will not impede the waters of a base flood subject to Chapter 18.128 of this title.

B. Incidental storage of material or equipment that is either not subject to damage by flood, or is mobile and readily removable from the area within time available after flood

warning. If such material is not readily removable, it shall be anchored to prevent flotation and shall not obstruct water flow. Material or equipment stored shall include only items which will not create a hazard to the health or safety of persons, property, animals or plant life should the storage area be inundated.

C. Single-family dwelling, or a manufactured home subject to Section 18.116.070, on an individual lot. In addition to the other requirements of this Chapter, single family dwellings proposed to be sited in areas of the flood plain zone designated "Agriculture" on the Comprehensive Plan Map may be approved only as uses identified by Sections 18.16.030(A), (B), (D) or (E) and subject to the applicable provisions of Chapter 18.16 governing those uses. In addition to the other requirements of this Chapter, single family dwellings proposed to be sited in areas of the flood plain zone designated "Forest" on the Comprehensive Plan Map may be approved only as uses identified by Sections 18.36.030(Y), 18.040.030(X) or 18.040.030(Y) and subject to the applicable provision of Chapters 18.36 and 18.40 governing those uses. (Ord. 93-045, § 1, 1993; Ord. 91-005 § 37, 1991; Ord. 89-009 § 3, 1989)

D. Agricultural accessory buildings.

E. Hydroelectric facilities subject to Section 18.116.130 and 18.128.040(V).

F. Excavation, grading and fill and removal within the bed and banks of a stream or river or in a wetland subject to Section 18.120.050 and 18.128.040(W). Excavation, grading and fill within any area of special flood hazard identified in Section 18.96.020 of this title. (Ord. 95-022 § 1, 1995; Ord. 93-045 § 1, 1993)

G. Recreational uses requiring only structures having an insignificant effect on flood waters, such as golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, boat launching ramps, swimming areas, wildlife or nature preserves and hunting or fishing areas subject to Section 18.128, except in areas designated "Forest" or

"Agriculture" on the Comprehensive Plan Map. (Ord. 93-045 § 1, 1993; Ord. 93-002 § 4, 1993).

H. Subdividing or partitioning of land, any portion of which is located in a flood plain, subject to the provisions of this title and Deschutes County Code Title 17, the Subdivision/Partition Ordinance. (Ord. 95-022 § 1, 1995; Ord. 93-002 § 4, 1993; Ord. 88-030 § 4, 1988)

I. Expansion or substantial improvement of an existing dwelling, agricultural related structure or accessory building.

J. A boat dock or pier, either individual or community, on private property which lies in the following areas:

a. On the Deschutes River between river miles 226.4 and 224.5. This area is identified in the Scenic Waterway Management Plan as the Wickiup River Community Area;

b. On the Deschutes River between miles 217.5 and 216.5. This area is identified in the Scenic Waterway Management Plan as the Pringle Falls River Community Area; and

c. On the Deschutes River between river miles 207 and 192. This area is identified in the Scenic Waterway Management Plan as River Community Areas and Recreational River Area respectively. (Ord. 89-009 § 4, 1989)

K. Those recreational uses described in Section 18.36.030, "F-1 - Conditional Uses," having an insignificant effect on flood waters where the subject Flood Plain-zoned site is designated by the Comprehensive Plan Map as "Forest" and is adjacent to land zoned F-1. (Ord. 93-045 § 1, 1993)

L. Those recreational uses described in Section 18.040.030, "F-2 - Conditional Uses," having an insignificant effect on flood waters where the subject Flood Plain-zoned site is designated by the Comprehensive Plan Map as "Forest" and is adjacent to land zoned F-2." (Ord. 93-045 § 1, 1993)

18.96.050 Prohibited Uses.

Marinas, boat slips and boat houses on private property. (Ord. 89-009 § 5, 1989)

18.96.060 Limitations on Conditional Uses.

The following limitations shall apply to all uses allowed by Section 18.96.040, above:

A. No new construction of a dwelling (including manufactured housing), accessory structure or farm use structure[,] shall be allowed in the floodway of any river or stream except for replacement in conformance with the applicable provisions of this chapter of a dwelling lawfully in existence as of the effective date of Ordinance 88-030. (Ord. 92-010 § 1, 1991)

B. No new construction of a dwelling (including manufactured housing), accessory structure or farm use structure[,] shall be located in the flood plain unless it can be demonstrated by the applicant that no alternative exists on the subject property which would allow the structure to be placed outside of the flood plain.

C. No subdivision or partition shall be allowed which creates the potential for additional residential dwellings in the flood plain.

D. All necessary State and Federal permits shall be obtained. (Ord. 95-022 § 1, 1995; Ord. 93-002 § 5, 1993; Ord. 91-020 § 1, 1991)

18.96.070 Application for Conditional Use.

All records of any application for a conditional use permit and all certification of elevations shall be maintained in the records of the Community Development Department for public inspection. An application for a conditional use permit in the Flood Plain Zone shall, at a minimum, contain the following information: (Ord. 95-022 § 1, 1995)

A. A detailed explanation of why it is necessary to conduct the proposed use in the Flood Plain Zone. Where base flood elevation data is not available from the Flood Insurance Study or from another authoritative source, it shall be generated and submitted with the application for subdivision

proposals and other proposed developments which contain at least 50 lots or five acres (whichever is less). (Ord. 95-022 § 1, 1995)

B. A site plan, drawn to scale and accompanied by drawings, sketches and descriptions which describe and illustrate the proposed use. This site plan shall include, at a minimum, existing and proposed site contours in relation to the base flood elevation, existing and proposed structures, drainage facilities, and an explanation of how erosion will be dealt with during and after construction of the use. (Ord. 91-020 § 1, 1991)

C. The location of the property relative to the channel of the river or stream. (Ord. 91-020 § 1, 1991)

D. The location of existing and proposed diking or abutments, if any.

E. The elevation of the lowest habitable floor and of any basement floor for any dwelling unit or structure. (Ord. 95-022 § 1, 1995)

F. The elevation to which the structure is to be floodproofed, if applicable. (Ord. 95-022 § 1, 1995)

G. Elevations on the site plan shall be established by a licensed surveyor or engineer, and shall be in relation to mean sea level.

H. Certification by a registered professional engineer or architect that the floodproofing methods for any structure meet the floodproofing criteria established by the Federal Emergency Management Agency and the applicable standards in this chapter. (Ord. 95-022 § 1, 1995; Ord. 91-020 § 1, 1991)

I. A description of the extent to which a watercourse will be altered or relocated as a result of the proposed development and an explanation of how the flood carrying capacity within the altered or relocated portion of any watercourse will be maintained. (Ord. 95-022 § 1, 1995)

J. All other elements or information which will assist in the evaluation of the proposed development and conformance with the applicable criteria.

(Ord. 95-022 § 1, 1995; Ord. 93-043 § 15A, 1993; 88-030 § 4, 1988)

**18.96.080 Criteria to Evaluate
Conditional Uses.**

A. A conditional use permit in a Flood Plain Zone shall not be approved unless all standards established by the Federal Emergency Management Agency and this title are addressed and findings made by the Hearings Body that each of the standards and criteria are satisfied.

B. A conditional use permit shall be based upon findings which relate to the property and existing and proposed structure(s). They shall not pertain to the property owner, inhabitants, economic or financial circumstances.

C. All structures in the flood plain shall meet the following standards.

a. Anchoring.

i. All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure.

ii. All manufactured homes must be anchored to prevent flotation, collapse or lateral movement, and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors (see FEMA's "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques, on file with the Planning Division).

b. Construction Materials and Methods.

i. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

ii. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

iii. Electrical, heating, ventilation, plumbing and air-conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

c. Utilities.

i. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.

ii. New and replacement sanitary systems shall be designed to minimize or eliminate infiltration of floodwaters into the system and discharge from the system into flood waters.

iii. On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

D. Subdivision and Partition Proposals.

a. All subdivision and partition proposals shall be consistent with the need to minimize flood damage.

b. All subdivision and partition proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage.

c. All subdivision and partition proposals shall have adequate drainage provided to reduce exposure to flood damage.

E. Review of Building Permits. Where elevation data is not available either through the Flood Insurance Study or from another authoritative source, applications for building permits shall be reviewed to assure that proposed construction will be reasonably safe from flooding. The test of reasonableness is a local judgment and includes use of historical data, high water marks, photographs of past flooding, etc., where available. (Failure to elevate at least two feet above grade in these zones may result in higher insurance rates).

F. Specific Standards. In the Flood Plain Zone, the following requirements must be met:

a. Residential Construction.

i. New construction, including replacement and substantial improvement of any residential structure shall have the lowest floor of the entire structure, including basement, elevated at least one (1) foot above base flood elevation. (Ord. 93-002 § 6, 1993)

ii. Fully enclosed areas below the lower floor that are subject to flooding are prohib-

ited unless they are designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following criteria:

1. A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.

2. The bottom of all openings shall be no higher than one foot above grade.

3. Openings may be equipped with screens, louvers or other coverings or devices, provided that they permit the automatic entry and exit of floodwaters.

- b. Non-Residential Construction. New construction and substantial improvement of any commercial, industrial or other non-residential structure shall either have the lowest floor, including basement, elevated at least one (1) foot above the level of the base flood elevation, or, together with attendant utility and sanitary facilities, shall:

- i. Be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water.

- ii. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

- iii. Be certified by a registered professional engineer or architect that the design and methods of construction are subject to accepted standards of practice for meeting provisions of this subsection, based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the county as set forth in 18.96.070(H), above.

- iv. Non-residential structures that are elevated, but not floodproofed, must meet the same standards for space below the lowest floor as described in Section 18.96.080(F), above.

- v. Applicants for floodproofing non-residential buildings shall be notified that

flood insurance premiums will be based on rates that are one foot below the floodproofed level (e.g., a building constructed to the flood level will be rated as one foot below that level.) (Ord. 93-002 § 7, 1993)

- c. Manufactured Homes. All manufactured homes to be placed or substantially improved shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is at least one (1) foot above the base flood elevation. Such manufactured homes shall be securely anchored to an adequately anchored foundation system subject to the provisions of Section 18.96.080(C)(a), above. (Ord. 93-002 § 8, 1993; Ord. 88-039 § 4, 1988)

- d. Docks, Piers and Walkways.

- i. No individual boat dock or pier shall be allowed on any lot with less than two hundred (200) feet of river frontage.

- ii. No community boat dock or pier shall be allowed on any lot with less than one hundred (100) feet of river frontage.

- iii. No individual boat dock or pier shall be more than 20 feet in length or more than 8 feet in width. The total surface area shall not exceed 160 square feet.

- iv. No community boat dock or pier shall be more than 20 feet in length. The total surface area shall not exceed 320 square feet.

- v. A boat dock or pier shall not extend into or over the water more than 20 feet as measured from the ordinary high water mark (OHM), or 5% of the distance between the ordinary low water mark (OLM) on each river or stream bank measured at right angles to the shoreline, whichever is less, unless it can be shown that a greater extension:

1. is necessary to allow access to the OHM;

2. will not increase flood hazard; and

3. will not cause the deterioration or destruction of marine life or wildlife habitat. When the lines of ordinary high or low water cannot be determined by survey or inspection, then such lines shall be determined by a registered professional engineer using the annual mean high or low water for the preceding year, using data from the State of Oregon

Watermaster.

vi. Individual boat docks and piers shall have a minimum 5 foot setback from adjoining property boundaries projected over the water surface.

vii. Dock, pier and walkway structures shall not be covered or enclosed.

viii. All materials used in dock, pier or walkway construction must be in compliance with all DEQ and EPA regulations.

ix. Docks, piers and walkways shall use either pilings or styrofoam floats if such floats are fully enclosed and sealed.

x. Docks, piers and walkways shall not impede water movement or cause deposition on waterway beds.

xi. Docks, piers and walkways containing concrete or wood preservatives shall be fully cured or dried prior to placement in the water.

xii. No walkway shall be more than 4 feet in width. The length of the walkway shall be no more than the minimum required to allow access to a dock.

xiii. Walkways shall include at least one handrail if the structure is elevated 30 inches or more from ground level.

xiv. All docks, piers and walkways shall meet the test of non-interference with navigation.

e. **Parking Facilities.** No parking facility shall be located within 20 feet (measured at right angles) of the ordinary high water mark (OHM). (Ord. 89-009 § 7, 1989)

G. **Floodways.** In floodways the following provisions shall apply:

a. **Encroachments,** including fill and removal, replacement of a dwelling lawfully in existence on the effective date of Ordinance 88-030 and other development are prohibited unless certification by a registered professional engineer is provided demonstrating that the proposed encroachments will not result in any increase in flood levels during a base flood discharge.

b. The applicant must demonstrate that all necessary state and federal permits have been or can be obtained and that all other

applicable sections of this title have been satisfied.

c. Replacement of a dwelling shall not increase the square footage or footprint of the structure by more than 20% of the square footage of such dwelling as of the effective date of Ordinance 88-030.

d. No replacement of a dwelling shall be allowed if the use of the pre-existing dwelling has been abandoned or otherwise terminated for a period of over one (1) year. (Ord. 93-043 § 15B, 1993; 93-002 § 9, 1993)

18.96.085 Elevation Certification.

Elevation of all new construction, including replacement and substantial improvements, relative to mean sea level of the lowest floor shall be documented before the framing inspection with a survey certified by a State of Oregon registered professional engineer or land surveyor. (Ord. 95-022 § 1, 1995; Ord. 93-002 § 10, 1993)

18.96.090 Yard and Setback Requirements.

In an FP Zone, the following yard and setback requirements shall be maintained:

A. The front setback shall be a minimum of 20 feet from a property line fronting on a local street, 30 feet from a property line fronting on a collector and 50 feet from an arterial.

B. There shall be a minimum side yard of 10 feet for all uses.

C. The minimum rear yard shall be 20 feet.

D. The setback from a north lot line shall meet the solar setback requirements in Section 18.116.180.

E. The minimum yard setback for a non-farm use from the property line adjacent to a farm use not owned by the applicant shall be 100 feet. (Ord. 88-030 § 4, 1988)

F. In addition to the setbacks set forth herein, any greater setbacks required by applicable building or structural codes adopted by the State of Oregon and/or the County under Chapter 15.04 of this title shall

be met. (Ord, 94-008 § 25, 1994)

18.96.100 Stream Setback.

To permit better light, air, vision, stream and pollution control, to protect fish and wildlife areas and to preserve the natural scenic amenities along streams and lakes, the following setbacks shall apply:

A. All sewage disposal installations such as septic tanks or septic drainfields shall be setback from the ordinary high water mark along all streams or lakes a minimum of 100 feet, measured at right angles to the ordinary high water mark. In those cases where practical difficulties preclude the location of the facilities at a distance of 100 feet, and the County Sanitarian finds that a closer location will not endanger public health or safety, a setback exception may be permitted to locate these facilities closer to the stream or lake, but in no case closer than 25 feet.

B. All structures, buildings or similar permanent fixtures shall be set back from the ordinary high water mark along all streams or lakes a minimum of 100 feet measured at right angles from the ordinary high water mark. (Ord. 91-020 § 1, 1991; Ord. 88-030 § 4, 1988)

18.96.110 Dimensional Standards.

In an FP Zone, the following dimensional standards shall apply:

A. Lot Coverage. The main building and accessory buildings located on any building site or lot shall not cover in excess of thirty (30) percent of the total lot area.

B. Building Height. No non-agricultural building or structure shall be erected or enlarged to exceed thirty (30) feet in height, except as approved under Section 18.120.040. (Ord. 92-055 § 8, 1992)

C. Minimum lot size shall be 10 acres for all areas which have received an exception to the Statewide Planning Goals for resource uses. Areas which have not received an exception to the Statewide Planning Goals shall have a minimum lot size of 80 acres.

18.96.120 Warning and Disclaimer of Liability.

The degree of flood protection required by this title is considered reasonable for regulatory purposes and is based upon scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This title shall not create liability on the part of Deschutes County, any officer, agent or employee thereof, or the Federal Insurance Administration, for any flood damages that result from reliance on this title or any decision lawfully made hereunder. (Ord. 88-030 § 4, 1988)

18.96.130 Use Variances.

Use variances or variances to the standards established by Sections 18.96.060 and 18.96.080 shall not be allowed. (Ord. 88-030 § 4, 1988)

Chapter 18.120

EXCEPTIONS

Sections:

- 18.120.010 Nonconforming Uses
- 18.120.020 Nonconforming Lot Sizes
- 18.120.030 Exceptions to Yard Requirements
- 18.120.040 Building Height Exceptions
- 18.120.050 Fill and Removal Exceptions

18.120.010 Nonconforming Uses.

Except as otherwise provided in this title, the lawful use of a building, structure or land existing on the effective date of this title or any amendment thereto may be continued although such use or structure does not conform with the standards for new development specified in this title. A nonconforming use or structure may be altered, restored or replaced subject to this section. No nonconforming use or structure may be resumed after a one-year period of interruption or abandonment unless the resumed use conforms with the provisions of this title in effect at the time of the proposed resumption.

A. Expansion or Replacement of a Nonconforming Structure.

a. Non-Conforming Structure. For the purposes of this section, a nonconforming structure is one that was lawfully established and violates current setbacks of this title but conforms with respect to use.

b. Replacement or Expansion without Additional Encroachment in Setback Area. A nonconforming structure may be replaced with a new structure of the same size on the same footprint as the pre-existing nonconforming structure or may be expanded with an addition that does not project into the setback area at any point along the footprint of the structure, subject to all other applicable provisions of this title.

c. Replacement or Expansion with

Additional Encroachment in Setback Area. Replacement or expansion of a nonconforming structure that would involve an additional projection into the front, side or rear yard setback area at any point along the footprint of the existing or pre-existing structure may be allowed provided such additional projection into the setback area (1) does not exceed 900 square feet; (2) does not exceed the floor space of the existing or pre-existing structure; (3) does not cause the structure to project further toward the front, side or rear property lines than the closest point of the existing or pre-existing structure; and (4) meets the variance approval standards set forth in Section 18.132.025(A)(a), (b), (c) and (d). Such replacements or expansions must conform with all other applicable provisions of this title.

B. Verification of Nonconforming Use. Upon application the Planning Division will verify whether or not a use constitutes a valid nonconforming use in accordance with the provisions of this section and applicable state law. Verification of the existence of a nonconforming use is required prior to or concurrent with any application to alter or restore the use. The burden of proof shall be on the applicant to demonstrate its lawful existence. The applicant shall demonstrate all of the following:

a. The nonconforming use was lawful on the effective date of the provisions of this title prohibiting the use.

b. The nonconforming use was actually in existence on the effective date of the provisions of this title prohibiting the use, or had proceeded so far toward completion that a right to complete and maintain the use would be vested.

c. The nonconforming use has not been interrupted for a period in excess of one year or was never abandoned.

C. Maintenance of a Nonconforming Use. Normal maintenance of a verified nonconforming use or structure shall be permitted. Maintenance does not include alterations which are subject to paragraph (E)

below.

D. Restoration or Replacement of a Nonconforming Use. A verified nonconforming use may be restored or replaced if all of the following criteria are met:

a. Restoration is necessary by fire, natural disaster or other casualty.

b. The nonconforming use is restored or replaced on the same location and is the same size or smaller than it was prior to the damage or destruction.

c. The restoration or replacement of the nonconforming use is commenced within one year of the damage or destruction.

E. Alteration of a Nonconforming Use. Any alteration to a nonconforming use permitted under this section shall also be subject to all applicable provisions of this title, including site plan review. Alteration does not include expansion of a use or structures associated with that use or a change in use.

a. The alteration of a nonconforming use shall be permitted when necessary to comply with any lawful requirement.

b. In all cases other than that described in (a) above, alteration of a nonconforming use or any physical improvements may be permitted by the Hearings Officer when both of the following criteria are met:

1. The alteration is necessary to reasonably continue the nonconforming use.

2. The alteration will have no greater adverse impact on the neighborhood.

F. Procedure.

a. Except as set forth in Subsection F(b) and F(c) of this section, any application for verification of a non-conforming use shall be processed in conformance with Deschutes County Uniform Development Procedures Ordinance.

b. Applications to expand, alter, restore or replace a nonconforming use shall in all cases be subject to a public hearing consistent with the requirements of Title 22, the Deschutes County Uniform Development Procedures Ordinance. (Ord. 91-038 § 1, 1991)

c. After a decision has been rendered on

an application for a verification of a non-conforming use (including any appeals provided for under Title 22 and under state law), the applicant shall not be entitled to reapply under Section 22.28.040 for another verification determination involving the same use of the property. (Ord. 93-043 § 20, 1993)

18.120.020 Nonconforming Lot Sizes.

A. Any parcel of land or portion thereof which is to be dedicated to a public or other entity for a road, canal, railroad, utility or other public use shall be exempt from the minimum lot size requirements set forth by this title. (Ord. 87-015 § 2, 1987)

B. Whereas land sections in the county are affected by survey adjustments, minimum requirements relative to lot sizes, where applicable, shall be considered as standard metes and bounds land section division, i.e., 160 acres, 80 acres, 40 acres, 20 acres, etc.; lot sizes, therefore, may be reasonably smaller than set forth by this title if a total section acreage reduction is due to a survey adjustment or other man-made barriers over which the applicant has had no control.

C. Any lot that is smaller than the minimum area required in any zone may be occupied by an allowed use in that zone provided that:

a. The lot or parcel is a lot of record, as defined in Section 18.04.030, "Lot of Record."

b. The use conforms to all other requirements of that zone.

c. If there is an area deficiency, residential use shall be limited to a single dwelling unit.

d. All necessary permits are obtained. (Ord. 87-015 § 1, 1987)

D. Lots or parcels within the Rural Residential Zone (RR-10) that are separated by an arterial right-of-way created after June 30, 1993, shall be exempt from the minimum lot dimension of ten (10) acres in size. Such parcels may be partitioned only as separated by the right-of-way and shall not be smaller than one acre. (Ord. 93-034 § 2, 1993)

18.120.030 Exceptions to Yard Requirements.

The following exceptions to yard requirements are authorized for a lot in any zone:

A. If there are buildings on both lots adjoining an intervening lot that are within 100 feet of the intervening lot, and the buildings have front yards of less than the required depth for the zone, the depth of the front yard for the intervening lot need not exceed the average depth of the front yards of the adjoining lots.

B. Architectural features such as cornices, eaves, sunshades, gutters, chimneys and flues may project into a required yard. Also, steps, terraces, platforms, porches having no roof covering and fences not interfering with the vision clearance requirements may project into a required yard. Signs conforming to the requirements of this title and all other applicable ordinances shall be permitted in required yards.

C. Canopies: The yard between a canopy and any lot line shall be a minimum of 10 feet, except that a smaller setback may be permitted if specifically allowed in a given zone.

D. An addition to an existing residential dwelling which is within 100 feet from the ordinary high water mark along a stream or lake may be constructed provided that the addition is for residential dwelling purposes, no part of the addition is closer to the stream or lake than the existing residential structure, the addition is 900 sq. ft. in area or smaller and does not exceed the area of floor space of the existing structure and the addition conforms with all other setbacks and building limitations. (Ord. 91-020 § 1, 1991; Ord. 81-003 § 1, 1981)

E. Dwellings on parcels created prior to November 1, 1979, may be granted an exception to the 100-foot setback from the ordinary high water mark along a stream or lake subject to Deschutes County Code Title 22, the Uniform Development Procedures Ordinance, and the following conditions: (Ord. 91-020 § 1, 1991)

a. An application shall be filed which includes:

1. A detailed explanation of the planned development.

2. An explanation of why an exception is necessary.

3. A site plan, drawn to scale, and accompanied by such drawings, sketches and descriptions necessary to describe and illustrate the proposed development. The site plan shall, at a minimum, include:

i. An inventory of existing vegetation, including trees on the lot located within 200 feet of the ordinary high water mark along the stream or lake. The inventory shall be in sufficient detail to allow the review and evaluation of the impacts of the proposed development. (Ord. 91-020 § 1, 1991)

ii. Proposed modifications of the vegetation on the lot within 200 feet of the ordinary high water mark along the stream or lake, including the size, species and approximate locations of existing vegetation to be retained and new vegetation proposed to be placed upon the site. (Ord. 91-020 § 1, 1991)

iii. Existing and proposed site contours.

iv. The locations and dimensions of all structures, property lines, easements, high water lines or marks, utilities and uses.

v. Other site elements and information that will assist in the evaluation of the proposed development.

4. An explanation of how the proposed development will satisfy each of the exception criteria set forth in Section 18.120.030(E)(b), below.

b. An exception may be granted only upon findings that:

1. The structure to be sited is a dwelling that is no greater than 40 feet in depth (including garages, carports and decks);

2. Adherence to the 100-foot setback would create a hardship, as defined in paragraph (c) below, preventing such a dwelling from being sited on the lot;

3. The site plan protects and enhances the vegetative fringe between the dwelling and the stream or lake to the degree necessary to

meet the requirements set forth in the applicable goals and policies of the Comprehensive Plan; and

4. A conservation easement providing that the elements of the site plan will be carried out and maintained as approved, in perpetuity, for the area between the ordinary high water mark and the dwelling has been conveyed to the county. (Ord. 91-020 § 1, 1991)

c. For the purposes of this section, a hardship exists only in one of the following situations:

1. Adherence to setbacks required by the zoning ordinance in effect at the time of the application made under this section would prevent the dwelling from being sited on the lot, if the 100-foot setback were observed;

2. The siting of a legal on-site disposal system, placed on the lot prior to November 1, 1979 makes it impossible for the dwelling to meet the 100-foot setback;

3. Any approved initial on-site sewage disposal system and replacement system other than a sand filter system cannot be sited on the lot in a manner that will allow the dwelling to meet the 100-foot setback requirement;

4. If the only initial on-site sewage disposal system for which approval can be obtained is a sand filter system and such a system and its replacement system cannot be sited on the lot in a manner that will allow the dwelling to meet the 100-foot setback requirement; or

5. Dwellings exist on both adjoining lots that are closer to the stream or lake than the proposed dwelling and such existing dwellings are located within 40 feet of the proposed dwelling.

i. If utilization of a sand filter system as a replacement system will allow such a dwelling to meet the 100-foot setback, no exception shall be granted for reasons of on-site sewage disposal constraints.

d. Dwellings qualifying for a setback exception under the criteria set forth above shall be located as follows:

1. Except as set forth in paragraph (2),

below, the dwelling must be located as far as possible from the ordinary high water line of the stream or lake, allowing for the hardship constraints identified for the property.

i. In instances where use of a sand filter system for a replacement system would allow the dwelling to be located further from the stream or lake than if another type of replacement system were utilized, the dwelling shall be sited in a manner to allow only enough room for the approved initial on-site sewage disposal system and a sand filter system as a replacement system.

2. Where a dwelling qualifies for a setback by virtue of paragraph (c)(5), above, the dwelling may be set back at a distance from the ordinary high water mark consistent with the adjoining houses, but in no case shall any part of such dwelling be located closer to the ordinary high water line than a line extending between the points of the adjoining houses that are closest to the river. (Ord. 93-043 § 20A, 20B, 1993; 90-020 § 2, 1990; Ord. 86-032 § 1, 1986; Ord. 84-002 § 1, 1984; Ord. 81-005 § 1, 1981; Ord. 81-003 § 1, 1981)

18.120.040 Building Height Exceptions.

A. The following structures or structural parts are not subject to the building height limitations of this title: public schools, chimneys, tanks, church spires,, belfries, domes, monuments, fire and hose towers, observation towers, transmission towers, smokestacks" flagpoles, radio and other similar projections, and agricultural structures as defined in this Ordinance. This exception does not apply to an Airport Development Zone, Airport Height Combining Zone or Landscape Management Combining Zone. (Ord. 93-043 § 20C, 1993; 92-055 § 18, 1992)

B. An exception (up to 36 feet) to the building height limitations for structures not otherwise exempted by Subsection A of this Section located in the EFU, MUA-10, F-1, F-2, RR-10, OS&C, RSC, RSR-M, RSR-5 and FP zones may be approved upon findings that:

1. The structure is not located in a

Landscape Management Zone;

2. The structure is not located within 100 feet of any rimrock, as defined in Section 18.04.030;

3. After consultation with the applicable fire department, the proposed height does not exceed the height limitation of the department's fire fighting equipment, considering the evacuation of the building's occupants and the fire fighting requirements of the department;

4. The proposed additional height will not adversely impact scenic views from existing nearby residences.

18.120.050 Fill and Removal Exceptions.

A. Fill and removal activities involving the removal of vegetation are permitted outright if the material to be filled or removed will not exceed 50 cubic yards in volume and such fill or removal activities are undertaken for the purpose of (1) removal of diseased or insect-infested trees or shrubs or of rotten or damaged trees that present safety hazards, or (2) normal maintenance and pruning of trees and shrubs.

B. The following fill and removal activities may be authorized by the Planning Director or Hearings Body upon a finding that no adverse impacts will occur to the water resources of Deschutes County:

a. Minor fill or removal required for vegetative enhancement, including excavation and preparation of the ground for planting additional vegetation.

b. Fill or removal for maintenance and repair of existing bridges, dams, irrigation facilities and similar public and semi-public facilities, provided such fill or removal does not alter the existing characteristics of the stream, river or wetland.

c. Fill or removal for maintenance and repair of nonconforming structures or boat docks.

d. Emergency actions taken to mitigate fill and removal violations when such emergency actions are intended to have a beneficial

impact on fish and wildlife habitat and are determined to be the actions with the least overall impacts on the surrounding area, considering hydrologic factors; impact on water quality, on aquatic life and habitat and wildlife and habitat; the recreational, aesthetic and economic values of the affected water resources; and existing streambank stabilization problems.

e. Fish and wildlife habitat enhancement projects approved or sponsored by the Oregon Department of Fish and Wildlife. (Ord. 91-038 § 1, 1991; Ord. 91-020 § 1, 1991; Ord. 86-056 § 3, 1986)

Chapter 18.128

CONDITIONAL USE

Sections:

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- (X) Surface Mining of Resources Exclusively for On-Site Personal, Farm or Forest Use or Maintenance of Irrigation Canals**
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- 18.128.090 Building Permit for an Approved Conditional Use**

18.128.010 Operation.

A. A conditional use listed in this title shall be permitted, altered or denied subject

to the standards and procedures of this title; Deschutes County Code Title 22, the Uniform Development Procedures Ordinance; and the Comprehensive Plan. (Ord. 86-032 § 1, 1986)

B. In the case of a use existing prior to the effective date of this title and classified in this title as a conditional use, any change in use or lot area or an alteration of structure shall conform with the requirements for a conditional use.

18.128.015 General Standards Governing Conditional Uses.

Except for those conditional uses permitting individual single-family dwellings, conditional uses shall comply with the following standards in addition to the standards of the zone in which the conditional use is located and any other applicable standards of this Chapter:

A. The site under consideration shall be determined to be suitable for the proposed use based on the following factors:

1. Site, design and operating characteristics of the use;
2. Adequacy of transportation access to the site; and
3. The natural and physical features of the site, including, but not limited to, general topography, natural hazards and natural resource values.

B. The proposed use shall be compatible with existing and projected uses on surrounding properties based on the factors listed in (A) above.

C. These standards and any other standards of this Chapter may be met by the imposition of conditions calculated to insure that the standard will be met. (Ord. 92-047 § 1, 1992)

18.128.020 Conditions.

In addition to the standards and conditions set forth in a specific zone or in Chapter 18.124, the Planning Director or the Hearings Body may impose the following conditions upon a finding that additional restrictions are warranted.

A. Require a limitation on manner in which the use is conducted, including restriction of hours of operation and restraints to minimize environmental effects such as noise, vibrations, air pollution, glare or odor.

B. Require a special yard or other open space or a change in lot area or lot dimension.

C. Require a limitation on the height, size or location of a structure.

D. Specify the size, number, location and nature of vehicle access points.

E. Increase the required street dedication, roadway width or require additional improvements within the street right-of-way.

F. Designate the size, location, screening, drainage, surfacing or other improvement of a parking or loading area.

G. Limit or specify the number, size location, height and lighting of signs.

H. Limit the location and intensity of outdoor lighting and require shielding.

I. Specify requirements for diking, screening, landscaping or other methods to protect adjacent or nearby property and specify standards for installation and maintenance.

J. Specify the size, height and location of any materials to be used for fencing.

K. Require protection and preservation of existing trees, vegetation, water resources, wildlife habitat or other significant natural resources. (Ord. 91-020 § 1, 1991; Ord. 83-037 § 24, 1983)

L. Require that a site plan be prepared in conformance with Chapter 18.124 of this title. (Ord. 91-038 § 1, 1991)

18.128.030 Performance Bond.

The Planning Director or Hearings Body may require the applicant to furnish the county with a performance bond or other adequate form of assurance to guarantee development subject to the standards and conditions attached in granting a conditional use permit. (Ord. 91-020 § 1, 1991)

18.128.040 Specific Use Standards.

A conditional use shall comply with the

standards of the zone in which it is located and with the standards and conditions set forth in this section.

A. Airports, Aircraft Landing Fields, Aircraft Charter, Rental and Service Maintenance Facilities Not Located in the A-D Zone. The Planning Director or Hearings Body shall find that the location and site design of the proposed facility will not be hazardous to the safety and general welfare of surrounding properties and that the location will not unnecessarily restrict existing and future development of surrounding lands as indicated in the Comprehensive Plan. (Ord. 93-043 § 23, 1993; 91-020 § 1, 1991)

B. Automobile Wrecking Yard or Junkyard: Before being issued a conditional use permit, an automobile wrecking yard or junkyard shall meet the following requirements:

1. The yard shall be enclosed and screened from public view by a sight-obscuring fence not less than six feet in height.

2. All automobiles, wrecked or otherwise, shall be kept inside the fenced area at all times, except that vehicles belonging to customers may be parked outside of the enclosed area while at the establishment or business.

3. All sales, display, storage, repair or other handling of products, merchandise, equipment and other articles shall occur from an enclosed building or within the fenced area.

4. If applicable, the proposal shall conform to state regulations. (Ord. 94-053 § 1, 1994; Ord. 91-020 § 1, 1991)

C. Cemetery.

1. The Planning Director or Hearings Body shall find that the terrain and soil types of a proposed location are suitable for interment, and that the nature of the subsoil and drainage will not have a detrimental effect on groundwater sources or domestic water supplies in the area of the proposed use. (Ord. 94-053 § 1, 1994; Ord. 91-020 § 1, 1991)

D. Church, Hospital, Nursing Home, Convalescent Home, Retirement Home.

1. Such a use shall be authorized as a conditional use only upon finding that sufficient area is provided for the building, required yards and off-street parking. Related structures and uses such as a manse, parochial school or parish house are considered separate uses and additional lot areas shall be required therefore.

2. The applicant shall address the following issues in the application:

- a. Location of the site relative to the service area.

- b. Probable growth and needs thereof.

- c. Site location relative to land uses in the vicinity.

- d. Conformity with Deschutes County Public Works Department standards of proposed access to and from principal streets and the probable effect of the proposal on the traffic volume of adjoining and nearby streets.

3. Such uses or related buildings shall be at least 30 feet from a side or rear lot line.

4. Except in an A-H zone, such uses may be built to exceed the height limitations of the zone in which it is located to a maximum height of 50 feet if the total floor area of the building does not exceed the area of the site and if the yard dimensions in each case are equal to at least two-thirds of the height of the principal structure. (Ord. 94-053 § 1, 1994; Ord. 93-043 § 23A, 1993; 91-020 § 1, 1991)

E. Medical Clinic, Veterinary Clinic, Club, Lodge, Fraternal Organization, Community Center, Grange Hall, Golf Course, Horse Stable and Horse Events requiring conditional uses, Grounds and Buildings for Games or Sports, Country Club, Swimming, Boating, Tennis Clubs and Similar Activities, Government Structures and Land Uses, Parks, Playgrounds. In considering the above, the Planning Director or Hearings Body may authorize the conditional use after it has been determined that the following will be provided:

1. Access from principal streets subject to Deschutes County Public Works Department standards.

2. Off-street parking subject to Section 18.116.030.

3. Building and site design provisions, including landscaping, that will effectively screen neighboring uses from noise, glare, odor and other adverse impacts. (Ord. 94-053 § 1, 1994; Ord. 94-008 § 15, 1994; Ord. 91-020 § 1, 1991)

F. Dog Pounds and Kennels.

1. The Planning Director or Hearings Body may authorize a dog pound or kennel as a conditional use provided that building and site design provisions are adequate to minimize noise and odor. When necessary to protect surrounding properties, the Hearings Officer may require a sight-obscuring fence or hedge and may restrict vehicular access and loading facilities, especially those required by trucks transporting large animals. (Ord. 94-053 § 1, 1994; Ord. 91-020 § 1, 1991)

G. Home Occupations. When permitted as a conditional use and conducted as an accessory use, a home occupation shall be subject to the following limitations:

1. The home occupation is to be secondary to the residential or other use for which a dwelling has been permitted. It shall be conducted only by members of the family residing on the property. The home occupation shall be conducted in such a way that it has no adverse impact on the residential, or in resource zones, resource-oriented character of its location. (Ord 94-053 § 1, 1994; Ord. 92-025 § 6, 1992)

2. Any structure on the property where the home occupation is conducted shall be of a type normally associated with the zone where it is located. No structural alterations affecting the residential appearance of a building shall be allowed to accommodate the home occupation except when otherwise required by law, and then only after the plans for such alterations have been reviewed and approved by the Planning Division. (Ord. 94-053 § 1, 1994; Ord. 91-020 § 1, 1991)

3. The subject property shall have adequate access and parking for the home occupation. Traffic created by the business or

customers of the business shall not be of a volume or frequency that will cause disturbance or inconvenience to nearby land uses. (Ord. 94-053 § 1, 1994)

4. All uses conducted on the subject property shall comply with all requirements of the Deschutes County Building and Safety Division and the Environmental Health Division and any other applicable state or federal laws. (Ord. 94-053 § 1, 1994)

5. The home occupation approval shall be reviewed every twelve months by the Planning Division to ensure compliance with the requirements of this section and the conditions required for approval of the use. (Ord. 94-053 § 1, 1994)

6. No materials or mechanical equipment shall be used which will be detrimental to the residential use of the property or adjoining residences because of vibration, noise, dust, smoke, odor, interference with radio or television reception or other factors. (Ord. 94-053 § 1, 1994; Ord. 91-038 § 1, 1991)

H. Landfill, Solid Waste Disposal Site: The Planning Director or Hearings Body may authorize a landfill or other solid waste disposal site as a conditional use, subject to the following standards: (Ord. 91-020 § 1, 1991)

1. The proposed site shall not create a fire hazard, litter, insect or rodent nuisance, or air or water pollution in the area.

2. The proposed site shall be located in or as near as possible to the area being served.

3. The proposed site shall be located at least one-quarter mile from any existing dwelling, home or public road (except the access road).

4. The proposed site shall be provided with a maintained all-weather access road. (Ord. 94-053 § 1, 1994)

I. Commercial Use or Accessory Use Not Wholly Enclosed Within a Building, or a Retail Establishment, Office, Service Commercial Establishment, Financial Institution, or Personal or Business Service Establishment on a Lot Adjoining or Across a Street From a

Lot in a Residential Zone. In any zone, these uses may be permitted conditionally subject to the following standards:

1. A sight-obscuring fence or evergreen hedge may be required by the Planning Director or Hearings Body when he finds such a fence or hedge or combination thereof is necessary to preserve the values of nearby properties or to protect the aesthetic character of the neighborhood or vicinity.

2. In addition to the requirements of the applicable zone, the Planning Director or Hearings Body may further regulate the placement and design of signs and lights in order to preserve the values of nearby properties, to protect them from glare, noise, or other distractions or to protect the aesthetic character of the neighborhood or vicinity.

3. In order to avoid unnecessary traffic congestion and hazards, the Planning Director or Hearings Body may limit access to the property. (Ord. 94-053 § 1, 1994; Ord. 91-020 § 1, 1991)

J. Commercial Amusement Establishment. A commercial amusement establishment may be authorized after consideration of the following factors:

1. Adequacy of access from principal streets together with the probable effect of traffic volumes on adjoining and nearby streets. (Ord. 91-020 § 1, 1991)

2. Adequacy of off-street parking.

3. Adequacy of building and site design provisions to maintain a reasonable minimum of noise and glare from the building and site. (Section 10.1, Standards and Criteria Related to Approval of Single-Wide. . . repealed by Ord. 91-005 § 46, 1991; Ord. 80-206 § 4, 1980) (Ord. 94-053 § 1, 1994)

K. Manufactured Home Park. A manufactured home park shall be built to state standards in effect at the time of construction and the following provisions:

1. Evidence that the park will be eligible for a certificate of sanitation as required by state law.

2. The space provided for each manufactured home shall be provided with piped

potable water, electrical and sewerage connections.

3. The number of spaces for manufactured homes shall not exceed 12 for each acre of the total acres in the manufactured home park. The Planning Director or Hearings Body may vary this density as follows: (Ord. 94-053 § 1, 1994; Ord. 91-020 § 1, 1991)

- a. If dedicated open space equals 50% or more of the total area of the park, a maximum 10% increase in units per acre may be granted.

- b. If in addition to the requirements in subsection (K)(c)(1) of this section a maintained playground area with approved equipment such as goalposts, swings, slides, etc., is provided, the maximum increase in units per acre may be increased an additional 5%.

- c. If in addition to the requirements in subsections (K)(3)(a) and (b) of this section, approved recreation/community building is provided an additional 10% increase of units/acre may be allowed. (Maximum total increase possible through application of subsection (K)(3) of this section = 25%.)

4. A manufactured home pad shall occupy not more than 40% of the contiguous space provided for the exclusive use of the occupants of the home, exclusive of space provided for the common use of tenants, such as roadways, general use structure, parking spaces, walkways and areas for recreation and landscaping.

5. No manufactured home pad in the park shall be located closer than 15 feet from another manufactured home pad or from a general use building in the park. No manufactured home accessory building or other building or structure on a manufactured home space shall be closer than 10 feet from a manufactured home accessory building or other building or structure on another manufactured home space. No manufactured home pad or other building or structure shall be within 25 feet of a public street property boundary or 10 feet of another property boundary.

6. Facilities shall be provided to assure

that there will be no outdoor storage of furniture, tools, equipment, building materials or supplies belonging to the management of the park.

7. The land which is used for park purposes shall be surrounded, except at entry and exit places, by a sight-obscuring fence or hedge not less than six feet in height.

8. If the park provides spaces for 50 or more manufactured home units, each vehicular way in the park shall be named and marked with signs which are similar in appearance to those used to identify public streets. A map of the named vehicular ways shall be provided to the fire department.

9. The park shall have water supply mains designed to serve fire hydrants and hydrants shall be provided within 500 feet of such space or structure. Each hydrant within the park shall be located on a vehicular way.

10. A minimum of at least 2,500 square feet plus 100 square feet per manufactured home space shall be provided for recreational play area, group or community activities. The Planning Director or Hearings Body may require this area to be protected from streets, parking areas or the like by a fence or the equivalent that conforms to fence regulations, but is at least 30 inches in height where allowed by fence ordinances. Unless otherwise approved, no required open space area shall contain less than 2,500 square feet. Recreation areas shall be improved with grass, plantings, surfacings or buildings suitable for recreational use. No recreation facility created within a manufactured home park only to satisfy the requirements of this section shall be open to the general public. (Ord. 91-020 § 1, 1991)

11. A parking space shall be provided for each manufactured home space on the site. Additional guest parking spaces shall be provided in every manufactured home park within 200 feet of the manufactured home spaces served, at a ratio of one parking space for each two manufactured home spaces. Parking spaces shall have durable and dustless surfaces adequately maintained for all-weather

use and shall be properly drained.

12. All manufactured home parks over 10 acres in area shall be located with access on a street designated as a collector street.

13. All manufactured home parks containing a total site area of five acres or more shall provide a secondary access to the park. Such secondary access shall enter the public street system at least 150 feet from the primary access.

14. Lighting shall be installed along the access ways of the manufactured home park and the recreation area with lights of 100 watts or better not over 100 feet apart. Wires for service to light poles and manufactured home spaces shall be underground.

15. Roadways within the park shall be improved with an all-weather dustless surface and shall be not less than 30 feet in width if parking is permitted on the margin of the roadway, or less than 20 feet in width if parking is not permitted on the edge of the roadway and an adequate designated area is provided and improved for guest parking and tenant recreational vehicles.

16. All manufactured home parks shall have a minimum lot size of one acre. (Ord. 94-053 § 1, 1994; Ord. 91-005 § 47, 1991)

L. Multi-Family Dwelling Complex. A multi-family dwelling complex shall comply with the following provisions prior to occupancy:

1. The number of units permitted by the applicable zone per gross square footage of a site may be increased as follows:

a. If dedicated open space which is developed and landscaped equals 50% or more of the total area of the site, a maximum of 10% increase in the number of units may be granted.

b. If in addition to open space as provided in (1) above, a maintained playground area with approved equipment such as goal-posts, swings, slides, etc., is provided, the number of units permitted may be increased an additional 5%.

c. If in addition to open space and playgrounds as provided in (a) and (b) above,

an approved recreational community building is provided, an additional 10% increase of units may be granted.

d. The maximum total increase in dwelling units made possible by development of open space, playgrounds and recreational facilities shall be 25% of the number of units otherwise allowed.

2. There shall be no outdoor storage of furniture, tools, equipment, building materials or supplies belonging to the occupants or management of the complex. Bicycle storage shall be allowed in the provided sheltered bicycle parking facilities (one parking space per unit for complexes of four (4) units or more). (Ord. 93-005 § 9, 1993)

3. If the complex or any unit thereof is more than 500 feet from a public fire hydrant, such shall be provided at appropriate locations on a vehicular way and shall conform in design and capacity to the public hydrants in the nearest city.

4. A minimum of 2,500 square feet plus 100 square feet per dwelling unit shall be provided for recreation, including but not limited to, playgrounds, playing fields and facilities for group and community activities. The area shall be improved with grassy areas, landscaping, surfacing, equipment or buildings suitable for recreational use. The Hearings Body may require recreational areas to be screened from streets, parking areas or other uses by a sight-obscuring fence. No play area is required if more than 70% of the area is preserved as open space and is improved and landscaped for recreational enjoyment.

5. All such complexes with more than 20 dwelling units shall be located to have access on a street designated as a collector unless otherwise approved by the Planning Director or Hearings Body.

6. All such complexes shall provide both an ingress and egress.

7. All roadways and parking areas shall be paved, and roadways shall not be less than 20 feet in width, except as approved by the Planning Director or Hearings Body.

8. A sight-obscuring fence or evergreen

hedge may be required by the Hearings Officer when such screening is necessary to preserve the values of nearby properties, protect the aesthetic character of the neighborhood or vicinity and provide security for occupants of the subject complex.

9. All accessory structures associated with such a complex shall be set back 50 feet from the property line of an adjoining single-family residential lot or use.

10. Sewer and water facilities shall be provided according to Oregon Department of Environmental Quality standards. (Ord. 94-053 § 1, 1994; Ord. 91-020 § 1, 1991)

M. Recreational Vehicle Park. A recreational vehicle park shall conform to state standards in effect at the time of construction and the following conditions:

1. The space provided for each recreational vehicle shall be not less than 700 square feet exclusive of any space used for common areas such as roadways, general use structures, walkways, parking spaces for vehicles other than recreational vehicles and landscaped areas.

2. Roadways shall be not less than 30 feet in width if parking is permitted on the margin of the roadway, or not less than 20 feet in width if parking is not permitted on the edge of the roadway and shall be paved with asphalt, concrete or similar impervious surface and designed to permit easy access to each recreational vehicle space. (Ord. 91-020 § 1, 1991)

3. A space provided for a recreational vehicle shall be covered with crushed gravel or paved with asphalt, concrete, or similar material and be designed to provide for the control of runoff of surface water. The part of the space which is not occupied by the recreational vehicle, not intended as an access way to the recreational vehicle or part of an outdoor patio, need not be paved or covered with gravel provided the area is landscaped or otherwise treated to prevent dust or mud. (Ord. 91-020 § 1, 1991)

4. A recreational vehicle space shall be provided with piped potable water and sewage

disposal service. A recreational vehicle staying in the park shall be connected to the water and sewage service provided by the park if the vehicle has equipment needing such service.

5. A recreational vehicle space shall be provided with electrical service.

6. Trash receptacles for the disposal of solid waste materials shall be provided in convenient locations for the use of guests of the park and located in such number and of such capacity that there is no uncovered accumulation of trash at any time.

7. No recreational vehicle shall remain in the park for more than 30 days in any 60-day period.

8. The total number of parking spaces in the park, except for the parking provided for the exclusive use of the manager or employees of the park, shall be one space per recreational vehicle space. Parking spaces shall be covered with crushed gravel or paved with asphalt, concrete or similar material.

9. The park shall provide toilets, lavatories and showers for each sex in the following ratios: For each 15 recreational vehicle spaces or any fraction thereof, one toilet, one urinal, one lavatory and one shower for men; two toilets, one lavatory and one shower for women. The toilets and showers shall afford privacy and the showers shall be provided with private dressing rooms. Facilities for each sex shall be located in separate buildings, or, if in the same building, shall be separated by a soundproof wall.

10. The park shall provide one utility building or room containing one clothes washing machine, one clothes drying machine and 15 square feet of space for clothes drying lines for each 10 recreational vehicle spaces or any fraction thereof, unless such facilities are available within a distance of 3 miles and are adequate to meet these standards.

11. Building spaces required by subsections (M)(9) and (10) of this section shall be lighted at all times of night and day, shall be ventilated, shall be provided with heating facilities which shall maintain a room temper-

ature of 68 degrees (F), shall have floors of waterproof material, shall have sanitary ceiling, floor and wall surfaces and shall be provided with floor drains adequate to permit easy cleaning.

12. Except for the access roadway into the park, the park shall be screened on all sides by a sight-obscuring fence not less than six feet in height, unless otherwise approved by the Planning Director or Hearings Body. (Ord. 91-020 § 1, 1991)

13. A neat appearance shall be maintained at all times. Except for vehicles, there shall be no outside storage of materials or equipment belonging to the park or to any guest of the park. (Ord. 91-020 § 1, 1991)

14. Evidence shall be provided that the park will be eligible for a certificate of sanitation as required by state law.

15. Access to the recreational vehicle park shall be from an arterial or collector street. (Ord. 94-053 § 1, 1994; Ord. 91-038 § 1, 1991)

N. Radio, Television Tower, Utility Station or Substation.

1. In a residential zone, all equipment storage on the site may be required to be within an enclosed building.

2. The use may be required to be fenced and landscaped.

3. The minimum lot size for a public utility facility may be waived on finding that the waiver will not result in noise or other detrimental effect to adjacent property.

4. Transmission towers, posts, overhead wires, pumping stations and similar installations shall be located, designed and installed to minimize conflicts with scenic values. (Ord. 94-053 § 1, 1994; Ord. 93-043 § 23B, 1993; 91-020 § 1, 1991)

O. Schools.

1. Nursery schools shall provide and maintain at least 100 square feet of outdoor play area per child. A sight-obscuring fence at least four feet but not more than six feet high shall separate the play area from adjoining lots.

2. Elementary and secondary schools

shall provide a basic site area consistent with state standards for the predicted ultimate enrollment.

3. Secondary schools shall provide a basic site area of 10 acres plus one additional acre for each 100 pupils of predicted ultimate enrollment. (Ord. 94-053 § 1, 1994)

P. Cluster Development (Single-Family Residential Uses Only).

1. Such uses may be authorized as a conditional use only after consideration of the following factors:

a. Need for residential uses in the immediate area of the proposed development.

b. Environmental, social and economic impacts likely to result from the development, including impacts on public facilities such as schools and roads.

c. Effect of the development on the rural character of the area.

d. Effect of the development on agricultural, forestry, wildlife or other natural resource uses in the area.

2. The conditional use shall not be granted unless the following findings are made:

a. Human activities, including all development and alterations of the natural landscape, will be limited to 35 percent of the land and 65 percent shall be kept in open space uses. The area of development shall be measured by drawing a continuous line around the affected area 150 feet on either side of any lot, building, road or other such facility. (Ord. 92-025 § 7, Exhibit D, 1992; Ord. 91-020 § 1, 1991)

b. Uses permitted in the open space area may include the management of natural resources, trail systems or other outdoor uses that are consistent with the character of the natural landscape.

c. All lots within the development shall be contiguous to one another except for occasional corridors which shall not be wider than the average lot width, unless the Planning Director or Hearings Body finds that special circumstances warrant a wider corridor. (Ord. 91-020 § 1, 1991)

d. In the rural zones, the cluster development shall be located on the least productive land. (Ord. 92-025 § 7, Exhibit D, 1992)

e. All subdivision requirements contained in Deschutes County Code Title 17, the Subdivision/Partition Ordinance, shall be met.

f. The total number of units may exceed the overall density established by the minimum lot size of the zone in which the development is proposed by not more than 33 percent.

g. The open space of the proposed development may be platted as a separate parcel or in common ownership of some or all of the clustered units. However, the open area shall not be subject to development unless the whole development is brought inside an urban growth boundary.

h. Roads within the development shall meet the requirements of the County Road Department and shall be considered private roads. An agreement acceptable to the Road Department shall be required for the maintenance of those roads.

i. The rural character of the area shall not be adversely affected.

j. All service connections shall be the minimum length necessary and underground where feasible. (Ord. 91-020 § 1, 1991)

k. Private developments with private roads shall provide bicycle and pedestrian facilities. If the bikeways are constructed as a part of the private roadway, they shall be at least four (4) feet wide on each side of the uncurbed roadway, resulting in a minimum total roadway width of 28 feet. If the private roads are constructed to the minimum standard width of 20 feet, separated bike paths built to County standards shall be provided. If separated paths are meant to be shared by pedestrians or other users, the minimum width shall be 12 feet. Bicycle and pedestrian facilities shall connect with the County bicycle and pedestrian transportation system. (Ord. 93-005 § 10, 1993)

l. Bicycle and pedestrian connections shall be provided at the ends of cul-de-sacs, at mid-block, between subdivision plats, etc., in

the following situations. Connections shall have a 20-foot right-of-way, with at least a 10-foot-wide useable surface, shall be as straight as possible, and shall not be more than 400 feet long. (Ord. 93-005 § 10, 1993)

i. In residential areas and industrial parks where the addition of a connection would reduce the walking or cycling distance to an existing or planned transit stop, school, shopping center, or neighborhood park by 400 feet and by at least 50% over other available routes.

ii. For schools or commercial uses where the addition of a connection would reduce walking or cycling distance to an existing or planned transit stop, school, shopping center, or neighborhood park by 200 feet or by at least 50% over other available routes.

iii. For cul-de-sacs or dead end streets where a street connection is determined by the Hearings Officer or Planning Director to be infeasible or inappropriate. (Ord. 93-005 § 10, 1993)

3. All applications shall be accompanied by a plan with the following information:

a. A plat map meeting all the subdivision requirements of Deschutes County Code Title 17, the Subdivision/Partition Ordinance.

b. An open space management plan which includes designation of proposed open space on the plat, a written management plan and deed restrictions that retain the open space in perpetuity. (Ord. 91-020 § 1, 1991)

c. A written agreement establishing an acceptable homeowners association assuring the maintenance of common property in the development.

4. Dimensional Standards:

a. Setbacks and height limitations shall be as prescribed in the zone in which the development is proposed unless adequate justification for variation is provided the Planning Director or Hearings Body, but in no case shall the setbacks be less than 25 feet or the height greater than 40 feet. (Ord. 91-020 § 1, 1991)

b. Minimum area for a cluster development shall be 5 acres unless otherwise limited

by the zone in which it is proposed.

5. Conditions for phased development shall be specified and performance bonds shall be required by the Planning Director or Hearings Body to assure completion of the project as stipulated. (Ord. 94-053 § 1, 1994; Ord. 91-020 § 1, 1991; Ord. 84-015 § 3, 1984)

Q. Planned Development.

1. Such uses may be authorized as a conditional use only after consideration of the following factors:

a. Proposed land uses and densities.

b. Building types and densities.

c. Circulation pattern, including bicycle and pedestrian circulation, and a demonstration of how those facilities connect to the County transportation facilities. Private developments with private roads shall provide bicycle and pedestrian facilities. (Ord. 93-005 § 11, 1993)

d. Bicycle and pedestrian connections shall be provided at the ends of cul-de-sacs, at mid-block, between subdivision plats, etc., wherever the addition of such a connection would reduce the walking or cycling distance to a connecting street by 400 feet and by at least 50% over other available routes. These connections shall have a 20-foot right-of-way, with at least a 10-foot-wide useable surface, and should not be more than 100 feet long if possible. (Ord. 93-005 § 11, 1993)

e. Parks, playgrounds, open spaces.

f. Existing natural features.

g. Environmental, social, energy and economic impacts likely to result from the development, including impacts on public facilities such as schools, roads, water and sewage systems, fire protection, etc. (Ord. 91-020 § 1, 1991)

h. Effect of the development on the rural character of the area.

i. Proposed ownership pattern.

j. Operation and maintenance proposal (i.e., homeowners association, condominium, etc.).

k. Waste disposal facilities.

l. Water supply system.

m. Lighting.

- n. General timetable of development.
- 2. The conditional use may be granted upon the following findings:
 - a. All subdivision restrictions contained in Deschutes County Code Title 17, the Subdivision/Partition Ordinance, shall be met.
 - b. The proposed development conforms to the Comprehensive Plan.
 - c. Any exceptions from the standards of the underlying district are warranted by the design and amenities incorporated in the development plan and program.
 - d. The proposal is in harmony with the surrounding area or its potential future use.
 - e. The system of ownership and the means of developing, preserving and maintaining open space is adequate.
 - f. That sufficient financing exists to assure the proposed development will be substantially completed within four years of approval.
 - g. Sixty-five percent of the land is to be maintained in open space.
 - h. Adequate provision is made for the preservation of natural resources such as bodies of water, natural vegetation and special terrain features.
- 3. a. All applications for planned developments shall include the materials and information required for approval of a subdivision as specified in Deschutes County Code Title 17, the Subdivision/Partition Ordinance and the materials and information required for approval of a conditional use as specified in this title. (Ord. 91-020 § 1, 1991)
- b. Approval for the conditional use application and the planned development application may be given simultaneously.
- 4. Dimensional Standards:
 - a. Setbacks and height limitations shall be as determined by the Planning Director or Hearings Body upon review of the evidence submitted. (Ord. 91-020 § 1, 1991)
 - b. Densities shall not exceed that established by the underlying zone.
 - c. The minimum lot area, width, frontage and yard requirements otherwise applying to individual buildings in the zone in which a

planned development is proposed do not apply within a planned development. An equivalent overall density factor may be utilized in lieu of the appropriate minimum lot area.

d. Minimum size for a planned development shall be 40 acres.

5. Any commercial use permitted outright in the RSC Zone will be allowed in a planned development, subject to the following conditions:

a. Each use shall be wholly enclosed in a building.

b. The total area of such uses shall not exceed 3% of the total area of the planned development. (Ord. 94-053 § 1, 1994)

R. Planned Communities.

1. Such uses may be authorized as a conditional use only after consideration of the factors listed in subsection (Q)(1) of this section.

2. The conditional use may be granted upon the findings specified in subsection (Q)(2) of this section, except that there must be an additional finding that the planned community will actually function as an independent community.

3. All applications shall be submitted in the form and with the materials required of subdivisions as required by Deschutes County Code Title 17, the Subdivision/Partition Ordinance, and shall also meet the requirements of this title for the approval of conditional uses.

4. Dimensional standards shall be determined as specified in subsection (Q)(4) of this section, except that the minimum size for a planned community shall be 640 acres.

5. Phased development of the project may be permitted if agreed to by the Planning Director or Hearings Body at the time of the initial application. Conditions of approval for phased development shall be specified and performance bonds required by the Planning Director or Hearings Body to assure completion of the project as stipulated. (Ord. 94-053 § 1, 1994; Ord. 91-020 § 1, 1991)

S. Dude Ranches.

1. Such uses may be authorized as a

conditional use only after consideration of the factors listed in subsection (Q)(1) of this section.

2. The conditional use may be granted upon the findings specified in subsection (R)(2) of this section.

3. All applications shall be submitted in the form and with the materials required of subdivisions by Deschutes County Code Title 17, the Subdivision/Partition Ordinance, and shall also meet the requirements in this title for the approval of conditional uses.

4. Dimensional standards are the same as those in subsection (Q)(4) of this section, except that the density of a dude ranch may be greater or less than the density of the underlying zone upon findings by the Planning Director or Hearings Body that the change is warranted and that the proposed density does not violate the purpose of the underlying zone or other terms of this title.

5. Phased development of the project may be permitted if agreed to by the Planning Director or Hearings Body at the time of the initial application. Conditions of approval for phased development shall be specified and performance bonds required by the Planning Director or Hearings Body to assure completion of the project as stipulated. (Ord. 94-053 § 1, 1994; Ord. 92-004 § 12, 1992; Ord. 91-020 § 1, 1991)

T. Shopping Complex.

1. Such uses may be authorized as a conditional use only after a determination is made by the Planning Director or Hearings Body.

a. That the public interest will be served by approval of the proposal based on analysis of environmental, social and economic and energy impacts likely to result from the development. Analysis may include, but not be limited to, consideration of impacts on public facilities such as roads, water supplies, sewer systems and police and fire protection.

b. That the entire complex shall be completed within one year or a master plan shall be submitted that explains the phased development of the project. The master plan

shall specify a timetable of completion for all phases of the project. The master plan shall be fully implemented within five years or extended subject to the terms of Deschutes County Code Title 22, the Uniform Development Procedures Ordinance.

c. That there is adequate area for the buildings, landscaping, parking, septic systems and access to serve the proposed development.

d. That the use is consistent with the character of the area and is not detrimental to the land use pattern of the area.

e. That the proposed shopping complex is to be developed and managed as a total entity, with a plan for maintenance of all elements of the site plan.

f. The proposed shopping complex is appropriate for serving the needs of rural residents in the area.

g. The proposed shopping complex will not attract residents outside the rural area to be serviced. (Ord. 94-053 § 1, 1994; Ord. 91-020 § 1, 1991; Ord. 84-023 § 4, 1984)

U. High-Temperature Geothermal Wells and Small-Scale Geothermal Energy Facilities.

1. Applicants shall provide the following information:

a. Project Description. A detailed narrative which describes the applicant's plan of operations for exploration, production, utilization, and/or injection. This description shall include estimated starting and completion dates for each activity or phase of the project. It shall also include a concise but comprehensive discussion of the project's expected environmental impacts. This narrative shall also include as an exhibit a statement describing the applicability of all local, state or federal inventories of Statewide Planning Goal 5 resources in the project vicinity.

b. Maps. As may be required by the Planning Director or Hearings Body, maps shall be submitted on readily reproducible transparencies as follows: (Ord. 91-020 § 1, 1991)

i. A topographic map, of a scale not less than one inch to one-half mile, on which the

following are shown: all pertinent property ownership and geothermal lease boundaries; the location of all proposed, existing and abandoned geothermal wells and/or energy facilities; all existing and planned access roads; major drainage patterns of the project's operational area; and significant environmental features and natural resource locations, including but not limited to: mineral or aggregate deposits, fish and wildlife habitats, ecologically or scientifically notable natural area, outstanding scenic views, wetlands, surface water bodies, wilderness areas, historic and cultural sites and recreation trails and facilities.

ii. A map of the project site, of a scale not less than one inch to fifty feet, on which is shown a detailed layout of all drilling pads, sumps, equipment, buildings, pipelines, power lines and related facilities.

iii. Other specialized maps, plans or drawings as may be required by the Planning Director or Hearings Body, including but not limited to: a larger-scale map to show any of the foregoing information if details cannot be satisfactorily indicated on the smaller scale map; detailed engineering drawings for any construction at a location on steep terrain, potentially unstable ground or other geologically or environmentally sensitive areas; and engineering drawings of new road construction or existing road modification when such roads are in rugged terrain, or pass through or near environmentally sensitive areas. (Ord. 91-020 § 1, 1991)

c. Emergency Contingency Plan. A detailed emergency contingency plan which addresses prevention or control of fires, blow-outs, pollution incidents, accidents, injuries and adverse weather conditions. This plan shall describe the following:

i. How the emergency will or might affect the applicant's operations; or endanger personnel, public health, safety or the environment.

ii. Measures proposed to prevent, control, mitigate or minimize the possible negative effects of emergency incidents.

iii. Procedures for training and instructing personnel as to proper procedures for preventing, controlling or minimizing the impacts of emergency incidents.

iv. Where and how stand-by emergency control equipment and services are to be obtained in the event of an emergency incident.

v. Notification list with order of notification, including names, telephone numbers and addresses of the applicant's responsible officials and those of applicable emergency service agencies.

vi. Where and how first aid, and minor and major medical aid will be obtained if needed during work on the project.

d. For drilling applications, a narrative and diagrammatic description of the following:

i. The type and capacity of drilling equipment to be used.

ii. The expected drilling schedule.

iii. The drilling method to be used; type of circulating media to be used, e.g., water, mud, foam, air or combination thereof; chemical additives to be used; circulating media cooling measures to be employed; and amounts of reserve circulating media and water to be kept on the drill site. If toxic materials are to be used, protective measures must be explained in detail.

iv. The number and type of workers to be employed during drilling.

v. The safety provisions and emergency shutdown procedures to be used for protection of the public health and the environment.

vi. The planned use, source, quality and consumption rate for any outside water supply.

vii. The method and locations for disposal of wastes.

viii. A description of the intended site restoration procedures to be used after completion of drilling.

ix. When approved by the Planning Director or Hearings Body, applications for prospect wells, as defined by ORS 522.005(15), may satisfy the information requirements of paragraphs (U)(1)(a) through

(U)(1)(d), above by submission of a copy of the applicant's prospect well permit application to the Oregon Department of Geology & Mineral Industries. (Ord. 91-020 § 1, 1991)

e. For energy facility applications, a narrative and diagrammatic description of the following:

i. The structures, equipment and support facilities to be used in the project and their manner of operation.

ii. A description of the purpose and operational characteristics of the major components in the energy facility, including schematic flow diagrams.

iii. An artist's rendering which illustrates the visual appearance of the facility and its immediate environs after completion.

iv. A time schedule for the installation and start-up of the facility.

v. The number and type of construction and permanent workers to be employed at the facility.

vi. The safety provisions and emergency shutdown procedures to be used in the facility for protection of the public health and environment, including a schedule for testing and maintaining safety devices.

vii. The planned use, source, quality and consumption rate for any outside water supply.

viii. The method and locations for disposal of wastes.

ix. A description of facility monitoring to assure continuing compliance with applicable noise, air and water quality standards and regulations and for other potentially significant environmental impacts.

x. A description of the intended abandonment and site restoration procedures to be used if and when the facility is permanently taken out of operation.

2. The siting, drilling, operation and abandonment of wells and energy facilities shall comply with the following standards:

a. **Excluded Areas.** No activity shall be permitted in inventoried natural resource areas, as defined by Oregon Statewide Planning Goal 5, which the county has determined

to be unsuitable for any use other than the inventoried natural resource pursuant to Geothermal Policy 4(f) of the Comprehensive Plan.

b. **Scenic Protection.** Activities shall be designed and conducted to be as compatible as practical with surrounding scenic and visual characteristics. Energy facilities shall be designed to minimize their visual profile and they shall be painted or prepared to be non-reflective and of colors which blend with and reduce contrast with surrounding landscape colors. (Ord. 91-020 § 1, 1991)

c. **Fish and Wildlife Protection.** Activities shall be designed, conducted and monitored, so as to assure protection of surrounding fish and wildlife resources. Activities shall not encroach upon or jeopardize habitat areas which are necessary to sustain local or migratory populations of fish and wildlife determined by the county to be significant.

d. **Protection of Historic and Cultural Resources.** Activities shall be designed and conducted to avoid disturbance of historic and cultural resources. If such resources are discovered, the applicant shall cease construction or operations and inform the county of the discovery within 48 hours. Thereafter, the applicant shall submit a plan for preservation and interpretation of such resources and implement the plan before resumption of construction or operations. (Ord. 91-038 § 1, 1991)

e. **Access Roads.** Activities shall be designed and constructed to utilize existing roads as much as practical. (Ord. 91-020 § 1, 1991)

f. **Signs.** All well and facility sites shall have a sign of not less than three, nor more than six, square feet in surface area prominently erected, which displays the site's name or identification number; the operator's name, address and phone number; the name and phone number of the operator's representative to be contacted in the event of an emergency.

g. **Earth Work.** Drill pads, pipeline routes, facility sites and roads shall be designed and constructed as follows:

i. Plans for drill pads, pipelines, facility sites and roads shall be prepared by a registered civil engineer.

ii. Upon commencement of site work, topsoil shall be removed and stockpiled for later respreading over disturbed areas prior to revegetation subject to subsection (U)(3) of Section 18.128.040. Except for large stumps, vegetation removed during initial site work shall be chipped, stockpiled and respread with topsoil. Stumps shall be buried outside of fills. Vegetation beyond the site perimeter shall not be disturbed; the clearing limits for the site shall be specified in plans submitted to the county. Buffer zones of undisturbed soil and vegetation shall be maintained for 500 feet on either side of stream courses. Roads and pipelines crossing riparian areas shall be designed and constructed at minimum widths and in consideration of maximum erosion control.

iii. Fills shall be compacted to a minimum of 90% relative density (ASTM D-1557) to minimize erosion. If significant erosion occurs, the applicant shall take prompt remedial action. (Ord. 91-020 § 1, 1991)

iv. Fill slopes shall not exceed a gradient of 2:1. The toes of all fills shall be stabilized with rock or keyed into stable soil and placed to reduce erosion potential to an absolute minimum. Revegetation of fill slopes shall be carried out subject to subsection (U)(3). Cut slopes shall not exceed a gradient of 1 1/2:1. Modification of these slope gradients may be made upon written approval of the Deschutes County Public Works Director.

v. Subdrains shall be provided under all fills where natural drainage courses and seepage are evident.

vi. No drill pads, pipelines, facility sites or access roads shall be allowed on potentially active landslides.

vii. Grading and filling shall be designed to channel storm runoff to existing natural drainages. Energy dissipaters and collection devices to reduce the erosion force of unnatural runoff shall be provided.

viii. Sumps shall be designed to withstand both static loads and dynamic loads imposed by potential seismic events. Sumps shall be constructed of material compacted to a minimum of 90% relative density (ASTM D1557), and shall be lined with either clay or an equivalent impermeable membrane. Safety fencing may be required.

ix. Sumps shall be operated in a way that will preclude overtopping. Three feet of free board shall be maintained at all times when sumps are in use. Upon completion of drilling and testing, sumps shall be purged of environmentally harmful chemicals and precipitates and backfilled immediately. (Ord. 91-020 § 1, 1991)

h. Pipelines. All pipelines shall be designed and constructed subject to applicable state standards. Pipelines shall be subsurface at road crossings, unless it is demonstrated that no significantly adverse visual impacts will result from above-ground crossings. In no case shall pipelines impede vehicular traffic. Catch basins and drainages to acceptable receptacles shall be installed and continuously maintained in order to contain condensate.

i. Noise. Activities shall be conducted in compliance with Oregon Department of Environmental Quality noise standards. Noise from drilling and facility operation shall be muffled and times of operation limited to prevent a public nuisance as defined by DEQ. The county may require noise monitoring and reporting over and above that required by the Department of Environmental Quality. (Ord. 91-020 § 1, 1991)

j. Fire Protection. Activities shall be designed and conducted to provide fire protection measures acceptable to the county, any adjacent land management agency and any fire district in which the project is located.

k. Waste Disposal. All wastes generated by a project, including but not limited to refuse, drilling fluids, drill cuttings, sand, precipitates and other solids shall be disposed of in a manner and at a location in conformance with Oregon Department of Environmental Quality standards.

l. Public Safety. Activities shall be designed and conducted to prevent access by unauthorized persons to unattended equipment and operational areas. (Ord. 91-020 § 1, 1991)

m. Air Quality. Activities shall be designed and conducted to comply with the air quality standards of the Oregon Department of Environmental Quality. Operational areas and access roads shall be regularly sprinkled with clean water to control dust. Except for prospect drilling, as defined by ORS 522.005(15), the county may require establishment of a meteorological station and meteorological monitoring at the site.

n. Water Quality. Activities shall be designed and conducted to comply with the water quality standards of the Oregon Department of Environmental Quality. The equipment service and fuel transfer areas, and the area occupied by drilling rigs shall drain into sumps. No fluids of any type shall be allowed to enter stream courses.

o. Subsidence and Induced Seismicity. Activities shall be designed and conducted to minimize the potential for land subsidence or induced seismicity which could result from the withdrawal and/or injection of geothermal fluids. Except for prospect drilling, as defined by ORS 522.005(15), the county may also require establishment of a monitoring program to gauge such impacts during operations. If either subsidence or induced seismicity is determined by the county to present a significant hazard, the county may require remedial action including, but not limited to, reduced production rates, increased injection of waste water or other non-toxic fluids or suspension of production. (Ord. 91-020 § 1, 1991)

p. Clean-up. Upon completion of each phase of a project, the site shall be promptly cleared of all trash, refuse and other waste material. All drilling equipment shall be removed from well pads within 60 days of the completion of a well.

q. Well Drilling Completion Notice. Applicants shall notify the county in writing of

completed well drilling and testing within 7 days of said completion. Applicants shall notify the county in writing of suspended drilling within 7 days of said suspension, when such suspension is expected to last longer than 180 days.

r. Standby Wells. Wells which have encountered geothermal resources and which are awaiting connection to a pipeline or energy facility shall be maintained at a minimum steam bleeding rate in compliance with Oregon Department of Geology and Mineral Industry standards. The area surrounding the wellhead pads of standby wells and producing wells shall be subject to the revegetation requirements of subsection (U)(3).

s. Re-Entry of Wells. Applicants may redrill or otherwise re-enter the same wellbore of any well for which a conditional use permit has already been issued as long as all conditions for the use permit continue to be met.

t. Site Abandonment and Restoration. When a well or facility is permanently abandoned, the applicant shall remove all equipment, structures and other related material within 180 days from the date operations cease. Thereafter, the applicant shall regrade the area of operations to match original land contours as closely as practical and shall revegetate the area subject to subsection (U)(3) of 18.128.040, below.

3. Revegetation. Following the completion of well drilling, or the permanent abandonment of a well or facility, the applicant shall revegetate the area of operations as follows:

a. Previously stockpiled topsoil and chipped vegetation shall be respread over disturbed areas prior to reseeding.

b. Disturbed areas shall be reseeded with native plants and grasses in the first fall following completion of drilling or site abandonment. Temporary fencing of reseeded areas may be required to facilitate revegetation. The revegetation shall be evaluated by the county during the first spring following

initial reseedling, and if determined to have resulted in less than a 75% survival rate, additional revegetation shall be required in the immediately succeeding fall season. (Ord. 94-053 § 1, 1994; Ord. 93-043 § 23C, 23D, 23E, 23F, 23G, 1993; 85-002 § 9, 1985)

V. Hydroelectric Facilities.

1. The criteria set forth below shall apply to any construction or expansion of, or other modification to, hydroelectric facilities in zones where such facilities are permitted as a conditional use. A conditional use permit may be granted for the construction or expansion of, or other modification to, a hydroelectric facility only upon findings by the Planning Director or Hearings Body that the proposal meets each of the following criteria, where applicable: (Ord. 91-020 § 1, 1991)

a. The facility is located at and physically connected to an existing man-made diversion or impoundment.

b. The facility will not increase the maximum surface area or capacity of the impoundment created by the existing dam or diversion to which the facility will be connected.

c. The facility will maintain or enhance to the greatest extent possible the existing scenic, visual, environmental and aesthetic qualities of the affected stretch of the river.

d. The facility will maintain or enhance the existing recreational opportunities on or adjacent to the affected stretch of the river.

e. The facility will maintain or enhance existing fish and wildlife habitat and will have no adverse impact upon any threatened or endangered fish, wildlife or plant species or their habitat.

f. The facility and its operation will maintain or enhance existing water quality in the affected stretch of the river except during construction of the facility when adverse impacts on water quality will be minimized. Specifically, the facility and its operation will not:

i. deposit or create a zone for the deposit of sediments in the river at or adjacent to the site;

ii. increase the temperature of the river in the affected stretch by any means, including but not limited to removal of vegetation or reduction in streamflow; or

iii. create the potential for or result in spillage, leakage or discharge of oil, waste products, chemicals or other substances which could reach the river. (Ord. 91-020 § 1, 1991)

g. The facility and its operation will not increase soil or bank erosion or destroy bank habitat at or on land adjacent to the site except during construction of the facility, during which time soil or bank erosion and destruction of bank habitat will be minimized.

h. The facility and its operation will maintain existing public access to the affected stretch of the river.

i. The facility will not be located at or immediately adjacent to any identified archaeological or historical site, national or state park, wildlife refuge, Bureau of Land Management Outstanding Natural Area or Area of Critical Environmental Concern, Federal Research Natural Area or U. S. Forest Service Special Interest Area.

j. The facility will not be located on any stretch of the river that is being studied or recommended for inclusion in either the Federal Wild and Scenic Rivers Program or the State Scenic Waterways Program, unless location of the facility at that site would not preclude inclusion of the stretch in the state or federal program.

k. The facility and its operation will comply with all applicable noise, water quality and pollution regulations of the Oregon Department of Environmental Quality.

1. The facility and its operation will comply with all applicable state and local fill-and-removal statutes and regulations.

2. The applicant for a conditional use permit for a hydroelectric facility, in addition to all other requirements, shall submit the following for approval:

a. Detailed construction plans and profiles of all facility features including building elevations of the powerhouse and other structures, excavation plans, a narrative

describing where blasting will occur and where excess material will be deposited, and landscaping and reclamation plans. (Ord. 91-020 § 1, 1991)

b. Detailed plans for meeting the criteria set forth in subsection (a) above.

c. Detailed plans for river enhancement documenting both on-site and off-site enhancement plans consistent with adopted river-related goals and policies, such as plans and methods for conserving water and enhancing streamflows. The plan shall identify costs, time schedules and coordination activities with affected persons and agencies for such enhancement plans.

d. A cash deposit, performance bond or other security acceptable to Deschutes County in an amount equal to 100 percent of the estimated cost of river enhancement.

e. Detailed plans for a water conservation and stream enhancement program to be funded by a portion of revenues generated by the operation of the proposed facility. The program plans shall contain the following:

- i. A program timetable;
- ii. Projected gross revenues from the proposed facility;
- iii. Projected program expenditures and the percentage of gross revenues they represent;
- iv. Projected water savings and the percentage of known current water losses they represent;

v. A declaration by the applicant that at least fifty percent of the conserved water will remain undiverted by the applicant;

vi. A declaration by the applicant that water diversion for power generation will not cause water flow in the affected stretch of the river (from the diversion to the tailrace exit) to fall below the minimum streamflow for that stretch as recommended by the Oregon Department of Fish and Wildlife; and

vii. A declaration that the applicant will enter into an agreement with the county to fulfill all of the requirements in paragraphs (a) through (e) of this subsection before beginning construction. (Ord. 94-053 § 1,

1994; Ord. 91-020 § 1, 1991; Ord. 86-018 § 1, 1986)

W. Fill and Removal.

Except as otherwise provided in this title, no person shall fill or remove any material or remove any vegetation, regardless of the amount, within the bed and banks of any stream or river or in any wetland, unless such fill or removal is approved as a conditional use subject to the following standards:

1. An application shall be filed containing a plan with the following information:

a. A detailed explanation of the planned fill or removal including the amount of material to be filled or removed.

b. An explanation of why the fill or removal is necessary.

c. A site plan, drawn to scale and accompanied by such drawings, sketches and descriptions as are necessary to describe and illustrate the proposed fill or removal. The site plan shall, at a minimum, include:

- i. An inventory of existing vegetation.
- ii. The proposed modifications, if any, to the vegetation.
- iii. Existing and proposed site contours.
- iv. Location of property lines, easements and high water marks.
- v. Other site elements or information that will assist in the evaluation of the proposed fill or removal.

2. Public facility and service uses such as construction or maintenance of roads, bridges, electric, gas, telephone, water, sewer transmission and distribution lines, and related facilities controlled by public utilities or cooperative associations, shall not be granted conditional use permits to fill or remove unless the following findings are made:

a. That all necessary state and federal permits will be obtained as a condition of approval of the conditional use.

b. That the public facility and service uses and related facilities cannot, as a practical matter, be located outside of the wetland or bed and banks of the stream or river.

c. That the construction or maintenance requiring the fill or removal will be done in a

manner designed to minimize the adverse impact upon the wetland, stream or river.

d. That erosion will be adequately controlled during and after construction.

e. That the impacts on fish and wildlife habitat from the fill or removal will be minimized to the greatest extent practical. The Oregon Department of Fish and Wildlife will be requested to review and comment on the application.

f. That only the minimum removal of vegetation or material and dredging or excavation necessary for construction and maintenance will be done. (Ord. 91-038 § 1, 1991)

3. Fill or removal required for public park and recreation areas, natural and outdoor education areas, historic and scientific areas, wildlife refuges, public boat launching ramps, public docks and public walkways shall not be allowed as a conditional use unless the following findings are made:

a. That all necessary state and federal permits will be obtained as a condition of approval of the conditional use permit.

b. That only the minimum removal of vegetation or material and dredging or excavation necessary for construction and maintenance will be done.

c. That the specific location of the site will require the minimum amount of disturbance to the natural environment, considering alternative locations in the area and methods of construction.

d. That such construction and maintenance is designed to minimize the adverse impact on the site.

e. That erosion will be adequately controlled during and after construction.

f. That the impacts on fish and wildlife habitat by the fill or removal will be minimized to the greatest extent practical. The Oregon Department of Fish and Wildlife will be requested to review and comment on the application.

g. That the specific location of a site for a public park, recreation area, natural and outdoor education area, historic and scientific area, wildlife refuges, public boat launching

ramps, public docks and walkways will require the minimum amount of disturbance to the natural environment, considering alternative locations in the area and methods of construction. (Ord. 91-038 § 1, 1991)

4. Except for uses identified in paragraphs (2) and (3), above, an application for a conditional use permit for activity involving fill or removal of material or vegetation within the bed and banks of a stream, river or wetland:

a. Shall be granted only after consideration of the following factors:

i. The effects on public or private water supplies and water quality.

ii. The effects on aquatic life and habitat, and wildlife and habitat. The Oregon Department of Fish and Wildlife will be requested to review and comment on the application.

iii. Recreational, aesthetic and economic values of the affected water resources.

iv. Effects on the hydrologic characteristics of the water body such as direction and velocity of flow, elevation of water surface, sediment transportation capacity, stabilization of the bank and flood hazards.

v. The character of the area, considering existing streambank stabilization problems and fill or removal projects which have previously occurred.

b. Shall not be granted unless all of the following conditions are met:

i. That all necessary state and federal permits will be obtained as a condition of approval of the conditional use.

ii. That there is no practical alternative to the proposed project which will have less impact on the surrounding area, considering the factors established in subsection (4)(a) above.

iii. That there will be no significant impacts on the surrounding area, considering the factors established in subsection (4)(a) above.

iv. That erosion will be adequately controlled during and after the project.

v. That the essential character, quality,

and density of existing vegetation will be maintained. Additional vegetation shall be required if necessary to protect aquatic life habitats, functions of the ecosystem, wildlife values, aesthetic resources and to prevent erosion. (Ord. 91-020 § 1, 1991)

vi. That the proposed fill or removal activity will be consistent with all relevant goals and policies of the Deschutes County Comprehensive Plan.

vii. That a conservation easement, as defined in Section 18.04.030, "Conservation Easement," shall be conveyed to the county, which provides, at a minimum, that all elements of the project will be carried out and maintained as approved, in perpetuity, for the regulated fill or removal area and all real property on the same lot, within 10 feet of any wetland, river or stream. (Ord. 94-053 §1, 1994; Ord. 93-043 § 23H, 23I, 23J, 1993; 91-020 § 1, 1991; Ord. 89-008 § 1, 1989; Ord. 87-032 § 1, 1987; Ord. 86-056 § 3 & 4, 1986)

X. Surface Mining of Resources Exclusively for On-Site Personal, Farm or Forest Use or Maintenance of Irrigation Canals. These uses are subject to the following standards:

1. An application shall be filed containing the following information:

a. A detailed explanation of the project and why the surface mining activity is necessary.

b. A site plan drawn to scale and accompanied by any drawings, sketches and descriptions necessary to describe and illustrate the proposed surface mining.

2. A conditional use permit shall not be issued unless the applicant demonstrates at the time of site plan review that the following conditions are or can be met:

a. The surface mining is necessary to conduct or maintain a use allowed in the zone in which the property is located.

b. Erosion will be controlled during and after the surface mining.

c. The surface mining activity can meet all applicable DEQ noise control standards and ambient air quality and emission stan-

dards.

d. Sufficient water is available to support approved methods of dust control and vegetation enhancement.

e. The surface mining does not adversely impact other resources or uses on the site or adjacent properties, including, but not limited to, farm use, forest use, recreational use, historic use and fish and wildlife habitat as designed or through mitigation measures required to minimize these impacts.

3. If the surface mining actively involves the maintenance or creation of man-made lakes, water impoundments or ponds, the applicant shall also demonstrate, at the time of site plan review, that the following conditions are or can be met:

a. There is adequate water legally available to the site to maintain the water impoundment and to prevent stagnation.

b. The soil characteristics or proposed lining of the impoundment are adequate to contain the proposed water and will not result in the waste of water.

c. Where the impoundment bank slope is steeper than 3 feet horizontal to 1 foot vertical, or where the depth is 6 feet or deeper, the perimeter of the impoundment is adequately protected by methods such as fences or access barriers and controls.

d. The surface mining does not adversely affect any drainages, all surface water drainage is contained on site, and existing watercourses or drainages are maintained so as not to adversely affect any surrounding properties. (Ord. 94-053 § 1, 194; Ord. 90-014 § 39, 1990)

Y. Storage, Crushing and Processing of Minerals in Conjunction With the Maintenance or Construction of Public Roads or Highways. A conditional use permit for these uses shall be subject to the following standards:

1. An application shall be filed containing the following information:

a. A detailed explanation of the project, including the duration and operation characteristics of the site.

b. A site plan drawn to scale and

accompanied by such drawings, sketches and descriptions as are necessary to describe and illustrate the proposed project.

2. A conditional use permit for storage, crushing and processing of minerals to be used in conjunction with maintenance and construction of public roads and highways shall be subject to all applicable general operation standards established by Section 18.52.110, except Section 18.52.110, paragraphs (J), (K) and (L). (Ord. 94-053 § 1, 1994; Ord. 90-014 § 40, 1990)

Z. Mini-Storage Facility.

1. Each individual space for rent or sale shall be less than 500 square feet.

2. Mini-storage shall be limited to dead storage. Outside storage shall be limited to boats, recreational vehicles and similar vehicles placed within designated spaces on an all-weather surfaced area which is surrounded by a sight-obscuring fence at least six feet in height.

3. Yards shall be permanently landscaped.

4. Yard dimensions adjacent to residential zones shall be the same as required yards within the residential zone.

5. One parking space for each twenty five storage spaces shall be located at the project office for use by customers.

6. All structures shall be fenced and visually screened.

7. Traffic lanes shall be twelve feet wide with an additional ten-foot parking lane, except where the traffic lane does not serve the storage units. All areas provided for vehicle access, parking and movement shall be improved to minimum public road standards.

8. A residence for a caretaker or 24-hour on-site manager is permitted.

9. There shall be only one access from each adjacent street.

10. Outside lighting, including shading to prevent glare on adjacent properties, may be required for safety and security purposes. (Ord. 94-053 § 1, 1994; Ord. 91-038 § 3, 1991)

AA. Bed and Breakfast Inn.

1. Bed and breakfast inns shall be

restricted to owner-occupied single-family residences.

2. Bed and breakfast inns located in farm or forest zones shall utilize existing dwellings or dwellings conforming to the requirements of those zones relating to single-family dwellings.

3. No more than three sleeping rooms shall be available for the accommodation of inn visitors.

4. No more than eight guests shall be accommodated at any one time.

5. Occupancies shall be limited to not more than thirty consecutive days.

6. Breakfast shall be the only meal provided to inn guests.

7. The exterior of the building shall maintain a residential appearance.

8. The bed and breakfast inn shall be operated in a way that will prevent unreasonable disturbance to area residents.

9. One off-street parking space shall be provided for each guest room in addition to parking required for the residence.

10. Approval shall be conditional upon compliance with all applicable state building code requirements and state sanitation requirements. (Ord. 94-053 § 1, 1994; Ord. 91-038 § 3, 1991)

BB. Campgrounds. A conditional use permit for a campground may be issued only when the following criteria are met:

1. Campgrounds shall provide patrons with opportunities for outdoor recreation that are compatible with the natural setting of the area. Outdoor recreation activities include fishing, swimming, boating, hiking, bicycling, horseback riding and other similar activities. Outdoor recreation does not include commercial uses such as miniature golf courses, go-cart tracks or rental of equipment or animals.

2. Street access shall be provided as follows:

a. The campground shall obtain direct access from a street or road designated as an arterial or collector by the Deschutes County Comprehensive Plan.

b. Access to the campground shall be

adequate to handle the anticipated traffic generated by the use.

c. The Deschutes County Public Works Department or the State Highway Division may require refuge lanes for left-hand turns and deceleration lanes for right-hand turns where necessary for public safety.

3. Water supply and sewage disposal shall be provided as follows:

a. Applicant shall demonstrate that there is adequate potable water available at the site to serve the campground. When the water is to be supplied from a well, a well log is required to show that an ample supply of water will be available for the campground it will serve.

b. Plans for water supply and sewage disposal improvements must be approved by the State Health Division and the Department of Environmental Quality.

c. Evidence shall be provided to demonstrate that the campground will be eligible for a certificate of sanitation as required by the Oregon Department of Environmental Quality.

4. A campground shall conform to state standards specified in ORS 918.650 and the following:

a. Sixty-five percent of a parcel developed as a campground shall be retained as open space. Natural vegetation shall be maintained in open space areas to the fullest extent possible. Walkways, roadways, parking spaces, structures, service areas and campsites shall not be considered open space.

b. The space provided for each campsite shall be not less than 1600 square feet exclusive of any space used for common areas such as roadways, general use structures, walkways, landscaped areas and parking spaces other than those assigned to particular campsites.

c. Campgrounds shall provide potable water, toilet and shower facilities, lighting, picnic tables and garbage collection sites for the convenient use of campers as specified in ORS 918.650. Water and electric lines shall be placed underground.

d. Campgrounds shall not provide camp-

site hookups for sewage disposal or electricity. A centralized sewage dump station that meets state standards may be provided.

e. Roadways permitting one-way traffic shall be not less than 10 feet wide and those permitting two-way traffic shall not be less than 20 feet wide. Where parking is allowed on the margin of the road, an additional 10 feet shall be added for each parking lane.

Roadways shall be improved with an all-weather, dustless surface.

f. Except for the access roadway serving the campground, no vehicular or pedestrian access shall be allowed out of the campground. Fences shall be provided which prevent trespass to property not under the control of the campground owner.

g. Each campsite shall be provided with at least one parking space which shall be paved or covered with crushed gravel and designed to promote drainage of surface runoff.

h. Campgrounds shall be surrounded by buffer strips of existing vegetation or landscaping.

i. To promote privacy and preserve the integrity of the natural setting, campgrounds shall retain existing vegetation to the fullest extent practical.

j. Yards and Setbacks.

i. Campsites or parking spaces shall not be located within the yard and setback areas required by the county for permanent buildings in the zone in which the campground is located.

ii. No developed portion of the campground shall be located within 100 feet of the right-of-way of any road or property line of a lot not part of the campground.

iii. No developed portion of the campground shall be located closer than 300 feet from a road in a Landscape Management overlay zone.

iv. Setback requirements in (ii) and (iii) above may be waived upon a finding by the Planning Director or Hearings Body that the developed portion of the campground will be sufficiently screened and buffered from neigh-

boring properties or the protected landscape area.

k. Tent campers and recreational vehicles shall not remain in the campground for more than 30 days in any 60-day period.

l. The campground shall be licensed as a tourist facility by the State Department of Health as specified in ORS Chapter 446, unless operated by a public entity, timber company or private utility.

m. One dwelling may be allowed for a resident caretaker or proprietor. (Ord. 94-053 § 1, 1994; Ord. 93-005 § 9, 10 & 11, 1993; 91-038 § 3, 1991)

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18.128.050 Procedure for Taking Action on Conditional Use Application.

The procedure for taking action on a conditional use application shall be as follows:

A. A property owner may initiate a request for a conditional use by filing an application on forms provided by the Planning Department.

B. Review of the application shall be conducted according to the terms of Deschutes County Code Title 22, the Uniform Development Procedures Ordinance. (Ord. 86-032 § 1, 1986)

18.128.060 Time Limit on a Permit for a Conditional Use.

A. Authorization of a conditional use shall be void after one year or such lesser time as the authorization may specify unless substantial construction has taken place or the proposed use has occurred. However, the Planning Director or Hearings Body may extend authorization for an additional period not to exceed one year.

B. If it can be demonstrated to the Planning Director or Hearings Body that a delay in establishing a use is due to a delay by a state or federal agency in issuing a required permit and not the fault of the applicant, the Planning Director or Hearings Body may extend the time limit imposed by paragraph (A), above, for a period not to exceed one

year following issuance of the state or federal permit. (Ord. 91-020 § 1, 1991)

18.128.070 Occupancy Permit.

The Planning Director or Hearings Body may require an occupancy permit for any conditional use permitted and approved pursuant to the provisions of this title. The Planning Director or Hearings Body shall consider such a requirement for any use authorized by a conditional use permit for which the ordinance requires on-site or off-site improvements or where such conditions have been established by the Planning Director or Hearings Body upon approval of such use. The requirement of an occupancy permit shall be for the intent of insuring permit compliance and said permit shall not be issued except as set forth by the Planning Director or Hearings Body. The authority to issue an occupancy permit upon compliance with the requirements and conditions of a conditional use permit may be delegated to the Planning Director or the Building Inspector by the Hearings Body at the time of approval of a specific conditional use permit. (Ord. 91-020 § 1, 1991)

18.128.080 Time Share Unit.

A. Any time-share unit project shall have its primary access on an arterial or collector street.

B. New time-share units may be developed in vacant areas in the applicable zoning districts provided that such developments comply with (A), above, and the following:

1. That such development has a minimum site size of ten acres, except within the Planned Community (PC) Zone.

2. That such development is appropriately buffered by the use of yards, landscaping, etc, from adjoining properties as determined during site plan review considering the need for privacy and the effects of noise.

C. The Planning Director or Hearings Body may require bonds to assure installation and maintenance of landscaping, parking and facilities that are part of the buffering scheme.

It may also require that an adequate mechanism will exist, such as an owners' association, that will assure maintenance of such facilities. (Ord. 91-020 § 1, 1991)

D. No structure shall be utilized as a time-share unit unless all the units in the structure or particular phase of the development are used as time-share units for this purpose. (Ord. 83-033 § 11, 1983)

**18.128.090 Building Permit for
an Approved Conditional
Use.**

Building permits for all or any portion of a conditional use shall be issued only on the basis of the plan as approved by the Planning Director or Hearings Body. Any substantial change in the approved plan shall be submitted to the Planning Director or the Hearings Officer as a new application for a conditional use. (Ord. 91-038 § 3, 1991)

(Temporary Use Permit repealed by Ord. 91-020 § 1, 1991)

(Section 8.090 repealed by Ord. 89-004 § 3, 1989)

Appendix F

Appendix F

Oregon Administrative Rules Chapter 250, Division 20-- Marine Board

250-20-091

....(5) Deschutes River;

(a) No person shall operate a motorboat for the purpose of towing a person on water skis, surfboard or similar device and no person shall engage in waterskiing or similar activities on the Deschutes River;

(b) No person shall operate jet ski type boats on the Deschutes River. For the purposes of this rule, jet ski type boat means any motorized vessel or other description of watercraft which is generally less than ten feet in length and capable of exceeding a speed of 15 MPH, including but not limited to jetskis, wet bikes and surf jets;

(c) No person shall operate a motorboat in excess of a "Slow --No Wake", 5 MPH speed limit between Wickiup Dam and the Deschutes National Forest Boundary in Sec. 14, T.18.S., R.11.E., W.M.;

(d) No person shall operate a motorboat for any purpose between the Deschutes National Forest Boundary in Sec. 14, T.18.S., R.11.E., W.M. and Mirror Pond Dam;

(e) No person shall operate a motorboat for any purpose between the Mirror Pond Dam and the Jefferson County Line.

Appendix G

Appendix G

This appendix provides a brief description of the Standards and Guidelines from the Deschutes National Forest Land and Resource Management Plan which apply to the significant issues discussed in Chapter 1.

WILD AND SCENIC-1 Rivers designated by Congress as wild and scenic rivers will be managed in accordance with the standards/guidelines found in Management Area 17.... until river management plans are complete and this Plan is amended.

WT-1 State requirements will be followed in accordance with the Clean Water Act for protection of waters of the State of Oregon (Oregon Administrative Rules, Chapter 340-41) through planning, application, and monitoring of Best Management Practices (BMPs) in conformance with the Clean Water Act, regulations, and federal guidance issued thereto.

WT-2 In cooperation with the State of Oregon, the Forest will use the following process:

1. Select and design BMPs based on site-specific conditions, technical, economic, and institutional feasibility, and the water quality standards for those waters potentially impacted.
2. Implement and enforce BMPs.
3. Monitor to ensure that practices are correctly applied as designed.
4. Monitor to determine the effectiveness of practices in meeting design expectations and in attaining water quality standards.
5. Evaluate monitoring results and mitigate where necessary to minimize impacts from activities where BMPs do not perform as expected.
6. Adjust BMP design standards and application when it is found that beneficial uses are not being protected and water quality standards are not being achieved to the desired level. Evaluate the appropriateness of water quality criteria for reasonably assuring protection of beneficial uses. Consider recommending adjustment of water quality standards.

WT-3 Use the existing agreed to process to implement the State Water Quality Management Plan on lands administered by the USFS as described in Memoranda of Understanding between the Oregon Department of Environmental Quality and U.S. Department of Agriculture, Forest Service (2/12/79 and 12/7/82), and "Attachments A and B" referred to in this MOU (Implementation Plan for Water Quality Planning on National Forest Lands in the Pacific Northwest 12/78 and Best Management Practices for Range and Grazing Activities on Federal Lands, respectively).

WT-4 For a more complete explanation of the above, refer to Appendix H in the Appendix to the FEIS, "Best Management Practices".

WT-5 Individual, general Best Management Practices are described in General Water Quality Best Management Practices, Pacific Northwest Region, 11/88. This provides guidance but is not a direction document. Also included in this document is a description of the process, and limitations and use of these BMPs. Each BMP listed includes the Title, Objectives, Explanation, Implementation and Responsibility, and Monitoring. Evaluations of ability to implement and estimated effectiveness are made at the project level.

WT-6 Not all of the general BMPs listed will normally apply to a given project, and there may be specific BMPs which are not represented by a general BMP in this document.

WT-7 The sensitivity of the project determines whether the site-specific BMP prescriptions are included in the EA/EIS or in the sale/project plan, or in the analysis files.

Fisheries-Wildlife

M17-7 Management will emphasize maintenance or enhancement of habitat for watchable wildlife especially in the riparian zone. Retention of snags will be emphasized for dependent species habitat and as a source of large organic debris for the river. Snags which may be a hazard in recreation sites will receive careful scrutiny and will be removed only if they pose a hazard.

FI-1 Streams, rivers, and lakes will be classified based upon public use and their potential contribution to achieving cooperative fishing targets, (angler success and quality of fishery) with the Oregon Department of Fish and Wildlife. Stream classification will be based upon the fishery objective that will be managed for. Fishery objectives will include the value for the fishery and the type of recreational fishing use.

Appendix 11 identifies the streams, rivers, and lakes providing habitat supporting fishery resources on the Forest. Habitat capacity targets will be identified for each of these waters as a result of habitat surveys. These targets will be reevaluated during project development.

FI-2 Quantified habitat surveys will be completed prior to the pursuit of projects which could affect fish habitat quality on important (listed) streams, rivers and lakes. The data will be analyzed to:

- Assess present conditions and the ability to contribute to fishery resource objectives.
- Determine habitat capacity targets for the rivers, streams, and lakes.
- Quantify changes in fishery outputs from past and proposed project activities which could significantly affect fish resource targets or objectives positively or negatively. (Effects such as improved cover, increased sediment, reduced log recruitment, altered water temperatures will be considered.)
- Identify work that would enhance the potential productivity of the fishery or provide protection from potential negative effects.
- Monitor changes in habitat conditions over time.

FI-3 Stream and lake survey information will be updated every ten years. Stream, river, and lake implementation plans which consider watered and riparian areas will be prepared or updated based on those surveys.

FI-4 Habitat improvement work will be pursued based on the contribution of the work to fishery objectives and targets. Improvement work will adopt measures to protect other resources as needed.

FI-5 Site-specific riparian prescriptions will be developed to enhance the contribution of riparian vegetation to fish habitat quality. Prescriptions will be developed to enhance the recruitment of large organic material and to optimize water temperatures for fish production.

FI-6 Stream crossing structures on fishery streams will provide for fish passage. Existing crossings will be evaluated for their suitability and corrected if needed.

FI-7 Management practices which will significantly reduce the potential production of the Forest's Fishery resources will be corrected to eliminate the impact.

FI-8 Range plans for allotments which include fishing streams will identify quantified stream channel standards that will preserve fish habitat quality. The standards will be based upon the results of a stream survey. Where standards are exceeded corrective actions will be taken.

FI-9 A recreation/fishing management implementation plan will be developed to preserve the diversity and quality of fishing opportunities on the Forest. The plan will be used to evaluate the suitability of fishery resources for alternative recreational use, to identify cooperative targets, and to guide future management.

FI-10 Information will be collected to identify minimum flows necessary to preserve fish habitat on fishery streams. The Forest will cooperate with the State Department of Fish and Wildlife and the Department of Water Resources in legally establishing these flows.

FI-11 The Forest will cooperate with the Oregon Department of Fish and Wildlife to insure that the quality of the recreational crayfish fishery is maintained at a high level.

FI-12 Fishing Guides Special Use Permits will be issued in accordance with standards/guidelines listed under Recreation Special Use Permits.

FI-13 Work with the Oregon Department of Fish and Wildlife, the Oregon Department of Water Resources and local irrigation districts to establish acceptable flows for fish survival in Tumalo and Squaw Creeks, and the Deschutes River below Wickiup. All legal avenues should be pursued.

Vegetation

Scenic River segments: **M17-4** Vegetation will be managed to appear natural and emphasize protection of riparian plant communities. A wide range of silvicultural practices could be allowed provided that such practices are carried on in such a way that there is no adverse effect on the river and its immediate environment.

Recreation River Segments: **M17-5** Vegetation management activities would be allowed under standard restrictions to protect the immediate river environment, water quality, scenic quality, fish and wildlife, riparian plant communities, and other values. Harvest of trees in recreational segments will be oriented towards enhancement of scenic, hydrologic, fisheries, recreational and/or wildlife values.

Also see Standards and Guidelines: RP-1 through RP-47, Riparian Areas

Cultural Resources

CR-1 In compliance with applicable Federal historic preservation legislation (National Historic Preservation Act, Executive Order 11593), a professionally supervised cultural resource inventory program will be conducted on both a Forest-wide and project specific level. The surveys will be conducted according to an inventory plan and research design agreed to by the Forest Service and the State Historic Preservation Office (SHPO). Based on this data base, the Forest will develop and maintain a Forest-wide cultural resource overview that summarizes and compiles known cultural resource information.

CR-2 Cultural resource properties located during inventory will be evaluated by a professional archaeologist/historian to determine their eligibility for listing in the National Register of Historic Places, according to the criteria of eligibility established in the National Historic Preservation Act.

CR-3 In concert with the inventories and site evaluations, the Forest will develop the thematic National Register nominations and management plans for the various classes of prehistoric and historic resource properties found on the forest.

CR-4 Results of project level cultural resource inventories, or the intent to carry out such inventories, will be documented through environmental analysis for the project.

- Cultural resource properties in conflict with ground disturbing projects will be professionally evaluated to determine site significance and to aid in determining the full range of management alternatives.
- Depending upon the nature of the project, the activity may be redesigned to avoid damage or disturbance to significant sites, or mitigation procedures will be developed. In some instances where avoidance is not possible, the value of the property may be conserved through a professionally acceptable data recovery program.

CR-5 Management of cultural resources will be coordinated with other agencies including the State Historic Preservation Office and the Advisory Council on Historic Preservation, as required by Federal and State historic preservation laws and regulations. Management of the Native American cultural resources will also be appropriately coordinated with the Warm Springs and Klamath tribal groups. The Deschutes Historic Landmarks Commission will also be consulted as appropriate.

CR-6 Management of the Native American cultural resources will be coordinated with the appropriate Native American Tribe. This coordination will include (but not necessarily be limited to) notification of the appropriate Tribal Group when projects are proposed in areas of known concern, and opportunity for Tribal involvement in research of sites with known Tribal affiliations.

CR-7 Cultural resources may be developed for educational, scientific, or recreational purposes to the extent the integrity of the resource is maintained.

- Cultural resource management will ensure that properties and their records are protected to prevent unauthorized uses and to prevent degradation.
- The maintenance level for eligible historic structures and prehistoric sites will be based on an analysis of utility, scientific and historical value, public interest, area allocation, and available funding.
- Public use of cultural properties will be monitored to prevent degradation or as specified in a management plan for the property.
- Artifacts recovered from sites on National Forest lands must be curated in a repository with adequate long-term curatorial capabilities.

CR-8 Human Burials: The appropriate treatment of historic and prehistoric human burials shall follow federal policies and Oregon state law. Upon their discovery, burials will be treated as follows:

- They will be immediately evaluated by a Forest Service archaeologist and a qualified forensic anthropologist to determine if the skeletal material is human and to what time period and ethnic group it may be ascribed.
- Appropriate local officials (county coroner) and American Indian tribes will be notified of the discovery if the skeletal material is human. Based on the circumstances of the discovery and the origin and ethnic affiliation of human remains, the burial site will be treated as follows:
 - The burial will be reinterred in place. The project (e.g., a timber sale cutting unit) will be redesigned to avoid causing further impact to the site. The burial site will be monitored and protected in place for all future projects and to prevent vandalism and natural degradation.
 - Where re-interment in-place is neither feasible or prudent, and where affiliation with a recognized American Indian tribal group can be reasonably established, the pertinent tribe or confederation of tribes will be contacted. The nearest tribe or confederation will be contacted in situations where a direct link cannot be made to an existing tribal entity. In either case, based on consultation with the appropriate tribal officials, the burial may be reinterred on an adjacent Indian reservation.

CR-9 Contemporary American Indian Sacred Sites and Religious Places:

The Forest will meet all requirements of the American Indian Religious Freedom Act (AIRFA) prior to the implementation of projects. Based on the AIRFA consultation process with American Indian groups, federal protection of contemporary American Indian sacred sites may include but is not limited to, access to sacred and traditional sites, use and possession of sacred objects, the enactment of sacred objects, and the enactment of ceremonies and traditional rites. Related activities may include gathering of plants for food, medicinal, or craft uses, and the construction of sweat lodges and structures for curing and vision questing.

CR-10 AIRFA addresses the religious rights or freedoms of all American Indians without regard for federal tribal recognition, but does not convey exclusive use of areas or free use of Forest products. Therefore, in considering access to traditional areas or sacred sites, for example, the Forest must also take into account other existing or potential uses. Publicly owned property (cultural sites, artifacts) remain the property of the United States Government. Activities which may affect such properties, sites, or artifacts are subject to existing laws and regulations.

CR-11 The nonrenewable, generally fragile, nature of cultural resources will be recognized and will be accordingly managed to the greatest scientific and public good.

Scenic

M17-11 A Visual Quality Objective of Retention would apply in Scenic River segments, Partial Retention in Recreation River segments.

Recreation

An important objective of management for the Deschutes River is to provide recreation settings close to Bend that feature a relatively natural environment emphasizing day use and minimal development.

Facilities:

Scenic River: M17-4 "Larger scale public use facilities, such as moderate size campgrounds, public information centers, and administrative headquarters are allowed if such structures are screened from the river."

Recreation River: M17-4 "Campgrounds and picnic areas may be established in close proximity to the river. However, recreational classification does not require extensive recreation development."

Access

Motorized travel on land or water may be permitted, prohibited, or restricted as necessary to protect the river values.

Road density is 2.5 miles per section; 1.5 in key elk habitat

The Upper Deschutes River is mentioned in the following locations in the Deschutes National Forest Land and Resource Management Plan:

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Appendix H

Appendix H

Summary of Instream Flow Studies

Many studies have been undertaken over the last half century in order to identify the instream flows necessary to sustain the resource values associated with the Deschutes River. Most of the studies have focused on the needs of the aquatic resources. A few have attempted to balance the needs of other resources associated with the river. The following is a synopsis of the studies, the recommendations from the results of the studies, and the reason for eliminating the flow recommendations of these studies as options for further consideration.

1947 Study

In 1947 the Oregon State Game Commission, in cooperation with the Bureau of Reclamation and the US Fish and Wildlife Service, studied the Deschutes River below the Benham Falls Reservoir Site. Surveys showed 300 cfs was required to cover the entire river bottom and provide negligible losses in trout and fish food, but a compromise minimum flow of 200 cfs was recommended to the State. The Oregon State Game Commission filed an official protest to the 1950 North Unit ID application to transfer storage allotment from the Benham Falls to the Wickiup site. After a hearing, the State Engineer issued an order in 1955 approving the transfer and requiring a 20 cfs release from Wickiup. This order was protested by the Oregon State Game Commission. This 20 cfs minimum flow is still in effect and was determined by irrigation needs rather than by river values.

1954 Study

In 1954 the US Bureau of Reclamation conducted a study to determine the effect of bypassing 20, 50, or 200 cfs at Wickiup Dam throughout the storage season. The study was based on existing irrigation storage practices and rights, and maintenance of a conservation flow of 50 cfs in the Deschutes River below Bend. The study quantified the average annual losses to each irrigation district under the different flow scenarios, but did not recommend changes in the conservation release of 20 cfs.

1961 Study

The State Water Resources Board published a study on the Deschutes River Basin in January 1961. This report displays the results of the Oregon State Game Commission survey conducted in 1959 to 1960 to identify a desirable minimum flow for the Deschutes Basin. The minimum flow to maintain fish production below Wickiup Dam was identified at 200 cfs. The desirable flow for fish production below Wickiup Dam was identified at 500 cfs. Because this study concentrated on aquatic resources it did not attempt to identify flow needs for other resources.

1965-67 Study

In 1965 and 1967 the Oregon Department of Fish and Wildlife (formally the Oregon State

Game Commission) conducted a study of brown trout in the Upper Deschutes River. The study found that over 75% of the brown trout spawning above Benham Falls occurred within ½ mile of Wickiup Dam. It also found that many of the eggs were being smothered with sediment and that lack of oxygen flowing in the gravels resulted in an approximate 20% emergence of brown trout alevin. At 37 cfs useable spawning gravel equaled 25% of that available at 232 cfs. At 232 cfs, dissolved oxygen needed for survival from egg to fry for brown trout was found adequate. Because this study focused on brown trout spawning success and the quality and availability of spawning gravels it did not address other river resources.

1969-70 Study

The Oregon Department of Fish and Wildlife updated their stream flow requirement study in 1969-1970. The flow requirements for all fish life stages of each game fish species were examined. A recommendation of 300 cfs minimum flow below Wickiup Dam resulted. The 300 cfs minimum flow was adopted as an instream flow water right by the State Water Resources Board effective Nov 29, 1984. Due to prior water rights this instream flow is seldom in effect. The justification for this flow was to support aquatic life and minimize pollution.

Diack Flows

In accordance with the Diack decision, before issuing new water rights, the Water Resources Commission must find that recreation, fish and wildlife uses in the scenic waterway will not be impaired. The Deschutes Scenic Waterway Flow Assessment of 1992 identified 400 cfs as the minimum flow needed from Wickiup Dam for fish and wildlife; 500 cfs from April through October for recreation purposes; and 400 cfs from November to March and 500 cfs the remainder of the year for scenic purposes. This study identified the minimum flow necessary for these resources but did not attempt to quantify the optimum. Water quality was not analyzed in this study.

The Diack flows identified for the Deschutes River made the most thorough attempt at quantifying flow needs for all the river resources. The study was incomplete in that water quality was not identified as a value needing to identify a protection flow. The study did discuss minimum and optimum flow needs for the resources but recommended minimum flows only for adaption to the Water Resource Commission.

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A Copy of the FEIS or Summary was sent to the following:

Government Agencies

Advisory Council on Historic Preservation
Bend Chamber of Commerce
Bend Metro Park and Recreation District
Bureau of Indian Affairs
Bureau of Reclamation
Bureau of Land Management
Chief of Navy Operations Environmental Protection
Division
City of Bend
City of Bend Public Works Department
Deschutes County Community Development
Deschutes County Search and Rescue
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Environmental Protection Agency
EPA Office of Environmental Review
FAA Northwest Region
Federal Energy Regulatory Commission
Federal Highway Administration
General Services Administration
Governor's Forest Planning Team
Governor's Watershed Enhancement Board
Governor's Forest Policy Team
Historic Landmarks Commission
HUD Office of Environment and Energy
Interstate Commerce Commission
Lava Lands Visitors Center
Manistee Ranger District

National Marine Fisheries Service
National Resource Conservation Service
Oregon Department of Agriculture
Oregon Department of Energy
Oregon Department of Environmental Quality
Oregon Department of Fish & Wildlife
Oregon Department of Forestry
Oregon Department of Geology and Mineral Industries
Oregon Department of Human Resources
Oregon Department of Land Conservation and
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Oregon Division of State Lands
Oregon Economic Development Department
Oregon Parks and Recreation Department
Oregon State Economist
Oregon State Marine Board
Oregon Water Resources Department
Rural Electrification Administration
Silviculture Laboratory
U.S. Army Engineers Division North Pacific CENPD
U.S. Department of the Interior
U.S. Department of Transportation
U.S. Department of HUD
U.S. Department of Energy
U.S. Naval Observatory OP-963
USCG Environment Impact Branch
USDA Forest Service
USDA National Agricultural Library
USDA Office of Equal Opportunity

Tribes

Confederated Tribes of the Warm Springs Reservation
Klamath Tribes

Schools and Libraries

Central Oregon Community College Library
COCC Forestry Department
Colorado State University Library
Deschutes County Library
Lapine High School
Oregon State University - Forest Management
Redmond High School

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Bigfoot Guide Service
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Crown Pacific
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Fly Fisher's Place Guide Service
Frontier Advertising
Garrison's Guide Service
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Oregon Hunters
Oregon Natural Desert Assoc.
Oregon Natural Resources Council
Oregon Water Wonderland HOA
Pacific Rivers Council
Sierra Club Oregon Chapter
Sunrise Village HOA
Sunriver Anglers
Sunriver Nature Center
Sunriver Owners Association
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Wild River Homeowners Association
Wood Products Task Force

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Midstate Electric Cooperative
Mt. Bachelor, Inc.
Ouzel Outfitters
Owens/Cogan
Patient Angler
Rapid River Outfitters
RE/MAX of Sunriver
Search North America, Inc.
Sunriver Guides and Outfitters
Sunriver Properties Oregon Ltd.
Sunriver Resort
The High Desert Museum
The Prineville Bank- Lapine
The Steward
Thousand Trails Resort
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Wickiup Junction Store

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Media

Central Oregonian
Democrat-Herald
Eugene Register-Guard
Gazette-Times
KBND AM 1110
KICE Radio Sequoia Comm.
KJJK/KRCO
KLRR RM 107.5
KNLR New Life 97

KQAK 105.7 FM
KTWINS Classic Rock
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KWSO
Madras Pioneer
Madras Pioneer
Nuggett Newspaper
Oregon ATV NEWS
Radio City

Redmond Spokesman
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Glossary

Acre-foot - The volume of water that would cover one acre to the depth of one foot.

Allotment - An area designated for use by a prescribed number of livestock for a prescribed period of time.

Animal Unit - One mature (1000 lb.) cow or the equivalent based on the average daily forage consumption of 26 lbs. dry matter per day.

Animal Unit Month - The amount of feed or forage required by animal unit for one month.

Animal Month - A month's tenure upon range by one animal. Not synonymous with animal unit.

Aquatic zone - An area covered by water.

Aquatic habitat - Habitat that occurs in free water.

Associated species - A species found to be numerically more abundant in a particular forest successional stage or type compared to other areas.

Baseline - The starting point for analysis of environmental consequences. This may be the conditions at a point in time (e.g., when inventory data are collected) or may be the average of a set of data collected over a specified period of years.

Biological corridor - A habitat band linking areas of similar management and/or habitat type.

Boulder - For fish habitat, a rock over 10 inches in diameter.

Canopy - The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth. Layers of canopy may be called stories.

Category 2 Species - Species under review by the US Fish and Wildlife Service for protection under the Endangered Species Act. Listing of the species as threatened or endangered may be appropriate, but further information is needed to determine their status.

Cavity nesters - Wildlife species, most frequently birds, that require cavities (holes) in trees for nesting and reproduction.

cfs - Cubic feet per second, a measure of the volume of water that flows past a given location.

Cobble - For fish habitat, a rock 2.5 to 10 inches in diameter.

Contiguous habitat - Habitat suitable to support life needs of species that is distributed continuously or nearly continuously across the landscape.

Core area - That area of habitat essential in the breeding, nesting and rearing of young, up to the point of dispersal of the young.

Corridor - A defined tract of land, usually linear, through which a species must travel to reach habitat suitable for reproduction and other life-sustaining needs.

Cover - Vegetation used by wildlife for protection from predators, or to ameliorate conditions of weather, or in which to reproduce. May also refer to the protection of the soil and the shading provided to herbs and forbs by vegetation.

Cultural Resources - The remains of sites, structures, or objects used by people in the past; this can be historic or

prehistoric.

Cumulative effects - Those effects on the environment that result from the incremental effect of the action when added to the past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

dbh - diameter at breast height; the diameter of a tree measured 4.5 feet above the ground on the uphill side.

Dead and down woody material - All woody material, from whatever source, that is dead and lying on the forest floor.

Developed site - An area with facilities specifically constructed for public recreation purposes.

Developed recreation - Recreation that requires facilities (buildings, parking, picnic tables, etc.) which, in turn, results in concentrated use of the area.

Development Level - A measure of site modification and facility development within a recreation site.

Development level 3 indicates moderate site modification. Roads may be hard surfaced and trails formalized. Traffic controls are usually inconspicuous. Development density is about three family units per acre.

Development level 4 indicates a heavily modified site. Some facilities are designed strictly for the comfort of the user. Roads and trails have artificial surfacing. Traffic controls are present and obvious. Development density is three to five family units per acre. Primary access to the site is usually over paved roads.

Dispersal - The movement, usually one way and on any time scale, of plants or animals from their point of origin to another location where they subsequently produce offspring.

Dispersed recreation - Recreation that does not occur in a developed site.

Dispersed site - A user-created recreation site with no facilities.

Diversity - The variety, distribution, and abundance of different plant and animal communities and species within an area.

Ecosystem diversity - The variety of species and ecological processes that occur in different physical settings.

Ecosystem - A unit comprising interacting organisms considered together with their environment (e.g., marsh, watershed, and lake ecosystems).

Endangered species - A plant or animal that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

Endemic - A species that is unique to a specific locality.

Fine fuels - Fuels such as grass, leaves, draped pine needles, and some kinds of slash which, when dry, ignite readily and are consumed rapidly.

Forb - Any herbaceous plant species other than those in the Gramineae, Cyperaceae, and Juncaceae families; fleshy leaved plants.

Fragmentation - The process of reducing size and connectivity of stands that compose a forest.

Fuels - Plants and woody vegetation, both living and dead, that are capable of burning.

Gravel - For fish habitat, rock 0.08 to 2.5 inches in diameter.

Ground water - Water beneath the earth's surface that accumulates as a result of seepage from the surface and serves as the source of springs and wells.

Guided/outfitted recreation - Recreation opportunities, typically requiring special skills, knowledge, or equipment, provided to the public for a fee and operated under a special use permit from the Forest Service. Examples: guided whitewater rafting, canoe rentals, etc.

Habitat - The place where a plant or animal naturally or normally lives and grows.

Hazard tree - A tree which poses a threat to life or property due to its condition or attitude.

Heavy fuels - Fuels of large diameter such as snags, logs, and large limbs which ignite and are consumed much more slowly than fine fuels.

Hiding cover - Cover used by animals to hide from predators.

Historic Range of Variability (HRV) - The typical fluctuation of processes or functions, and the typical proportions of ecosystem elements in a watershed over a period of time when the ecosystem was not significantly affected by European settlement and management. HRV is the amplitude or minimum-maximum range of "natural conditions."

Ladder fuels - Fuels which allow fire to carry by convection from surface fuels into the crowns with relative ease.

Large Woody Material - Whole or portions of trees, usually with branches and the root wad attached to the bole, which are at least partially submerged and which provide fish habitat.

Long-term - Here, 50-100 years and sometimes beyond.

Migration route - A travel route used routinely by wildlife in their seasonal movement from one habitat to another.

Mitigating measures - Modifications of actions that: 1) avoid impacts by not taking a certain action or parts of an action; 2) minimize impacts by limiting the degree or magnitude of the action and its implementation; 3) rectify impacts by repairing, rehabilitating, or restoring the affected environment; 4) reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action; or 5) compensate for impacts by replacing or providing substitute resources or environments.

Model - An idealized representation of reality developed to describe, analyze, or understand the behavior of some aspect of it; a mathematical representation of the relationships under study. The term model is applicable to a broad class of representations, ranging from a relatively simple qualitative description of a system or organization to a highly abstract set of mathematical equations.

Mosaic - The intermingling of plant communities and their successional stages in such a manner as to give the impression of an interwoven design. or a landscape pattern composed of variably sized and shaped patches of different plant species, ages or stand structures. Mosaics are created and changed by natural disturbances (fire, wind, insects, etc.) or vegetation management.

Multistoried stands - Forest stands that contain trees of various heights and diameter classes and therefore support foliage at various heights in the vertical profile of the stand.

Natural processes - The major actions or events that regulate or influence the function, structure, composition and pattern of ecosystems and that link organisms and their environment. Examples are wildfire, windstorms, flooding, disease, etc.

"No Wake" Speed - A boat speed of less than five miles per hour relative to the current.

Non-commercial recreation - Recreational activities on Forest Service land which do not involve guides or outfitters.

Noxious weed - A plant specified by law as being especially undesirable, troublesome, and difficult to control.

OHV - Off-highway vehicle; Any Class I (three wheelers, four wheelers), Class II (4X4s, jeeps), Class III (motorcycles) All-Terrain Vehicle as defined by the State of Oregon.

Opening - A break in the forest canopy; the existence of an area of essentially bare soil, grasses, forbs, or shrubs in an area dominated by trees.

Outstandingly Remarkable Values (ORV) - Attributes of the river and its immediate environment, considered unique and rare on a regional and national level, which qualify the river for protection under the Wild and Scenic Rivers Act. These attributes include scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values.

Planning record - A file containing maps, studies, and other materials used in the preparation of this Environmental Impact Statement. All documents incorporated by reference are also part of the planning record. This planning record is available for public inspection and review.

Prescribed fire - The burning of forest or range fuels on a specific area under predetermined conditions so that the fire is confined to that area and fulfills management objectives.

Primary range - That part of suitable range that livestock naturally graze first under a current management practice; it usually includes the readily accessible areas that have available water and which will be overused before livestock significantly graze other parts of the allotment.

Range of variability (historic range of variability or natural range of variation) - The components of healthy ecosystems fluctuate over time. The range of sustainable conditions in an ecosystem is determined by time, processes (such as fire), native species, and the land itself.

Recreation Opportunity Spectrum (ROS) - The land classification system that categorizes land by its setting and the probable recreation experiences and activities it affords, based on access, remoteness, naturalness, facilities, social encounters, visitor impacts, and visitor management.

Recreational carrying capacity - The type and level of visitor use that can be accommodated without substantially diminishing the quality of the recreation experience or the physical environment.

Rimrock - (from Deschutes County Zoning Ordinances) Any ledge, outcropping or top or overlying stratum of rock, which forms a face in excess of 45 degrees, and which creates or is within the canyon of the following rivers and streams: 1) Deschutes River; 2) Crooked River; 3) Fall River; 4) Little Deschutes River; 5) Spring River; 6) Paulina Creek; 7) Squaw Creek; and 8) Tumalo Creek. For the purpose of this title, the edge of the rimrock is the uppermost rock ledge or outcrop of rimrock.

Riparian area - A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it. This includes floodplain, woodlands, and all areas within a horizontal distance of approximately 100 feet from the normal line of high water of a stream channel or from the shoreline of a standing body of water.

Secondary Range - That part of the suitable range that, under the existing management and improvement level, is grazed significantly only after the primary range has been overused. Secondary range is not used to base initial carrying capacity estimates.

Sensitive habitats - Include meadows, wetlands, big game winter range areas, big game calving and fawning areas, important ruffed grouse areas, important songbird and waterfowl nesting and foraging areas, and TES wildlife and plant habitats.

Seral stage - One of a series of ecological communities that succeed one another in the biotic development of an area.

Short-term - For this report, usually 10 years.

Single-storied stand - A stand of trees in which the canopy is contained in one layer.

Snag - Any standing dead, partially dead, or defective (cull) tree at least 10 inches in diameter at breast height and at least 15 feet tall.

Snag dependent species - Birds and animals dependent on snags for nesting, roosting, or foraging habitat.

Snowmobile - A self-propelled vehicle capable of traveling over ice or snow which uses an endless belt, tread or cleats, or a combination of tread and cleats as its means of propulsion; is steered wholly or in part by skis or sled type runners; and is not registered as any other type of vehicle.

Spawning gravel - Pea-size to baseball-size rocks usually located in riffle or tail-outs of pools. Water must flow over and through the gravel to allow for the exchange of oxygen for in incubation of the young fish to be successful.

Special habitat - Large trees, snags, down logs, lava, talus, cliffs, duff litter, etc.

Species - (1)A group of individuals that have their major characteristics in common and are potentially interfertile. (2)The Endangered Species Act defines species as including any species or subspecies of plant or animal. Distinct populations of vertebrates also are considered to be species under the act.

Species diversity - The number, different kinds, and relative abundance of species.

Stand - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition so that it is distinguishable from the forest in adjoining areas.

Suppression - All actions undertaken to extinguish or limit fire growth beginning with its discovery.

Travel corridor - A route followed by animals along a belt or band of suitable cover or habitat.

Understory - The trees and other woody species growing under the canopies of larger adjacent trees and other woody growth.

Utilization - Determined by key forage species which are based on preference by cattle, one to two key forage species are selected to represent the area and each species at the site is compared to the Standards and Guidelines. For grasses and grasslike species utilization is based on percent removed by weight. For shrubs utilization is based on incidence of use (if 50 leaders out of 100 are browsed, utilization is 50%)

Visual Quality Standards - Categories of acceptable landscape alteration measured on degrees of deviation from the natural-appearing landscape.

Wet meadows - Areas where grasses predominate. Normally waterlogged within a few inches of the ground surface.

Wetlands - Areas that are inundated by surface water or ground water with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetative or aquatic life that require saturated or seasonally saturated soil conditions for growth and reproduction (Executive Order 11990). Wetlands generally include, but are not limited to, swamps, marshes, bogs, and similar areas.

Wildlife tree - A live tree retained to become future snag habitat.

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Acronyms

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| ACHP | Advisory Council on Historic Preservation |
| ARPA | Archaeological Resources Protection Act |
| ATV | All-terrain vehicle |
| BEMA | Bald Eagle Management Area |
| BLM | Bureau of Land Management |
| BMP | Best management practice |
| BP | Before present |
| CEQ | Council on Environmental Quality |
| CFS | Cubic feet per second |
| COID | Central Oregon Irrigation District |
| CTWS | Confederated Tribes of the Warm Springs Reservation of Oregon |
| DBH | Diameter at breast height |
| DEIS | Draft environmental impact statement |
| DEQ | Department of Environmental Quality |
| DFC | Desired future condition |
| DNF | Deschutes National Forest |
| DSL | Division of State Lands |
| EIS | Environmental impact statement |
| FEIS | Final environmental impact statement |
| FSM | Forest service manual |
| HRV | Historic range of variability |
| IDT | Interdisciplinary team |
| LWM | Large woody material |
| MOA | Memorandum of agreement |
| NEPA | National Environmental Policy Act of 1969 |
| NFMA | National Forest Management Act |
| NHPA | National Historic Preservation Act |
| NTU | Nephelometric Turbidity Unit |
| ODFW | Oregon Department of Fish and Wildlife |
| OHV | Off-highway Vehicle |
| OPRD | Oregon Parks and Recreation Department |
| ORV | Outstandingly Remarkable Value |
| PETS | Proposed, endangered, threatened and sensitive species |
| PMOA | Programmatic memorandum of agreement |
| R | Rural (ROS category) |
| RN | Roaded Natural (ROS category) |
| RNA | Research Natural Area |
| RNNM | Roaded Natural Nonmotorized (ROS category) |
| ROS | Recreation opportunity spectrum |
| S&G | Standards and guidelines |
| SHPO | State Historic Preservation Officer |
| T&E | Threatened and endangered |
| TES | Threatened, endangered, or sensitive species |
| TPA | Trees per acre |
| USFWS | United States Fish and Wildlife Service |
| USFS | United States Dept. of Agriculture - Forest Service |
| VQS | Visual quality standard |
| W&S | Wild and scenic |

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