

# **Fisheries**

## **Step 1: Characterization**

In 1993, the Oregon Department of Fish and Wildlife (ODFW) listed all of the state's bull trout populations as "sensitive". Buchanan et al. (1997) listed bull trout populations in the Middle Fork Willamette as "probably extinct" and on June 10, 1998, the US Fish and Wildlife Service (USFWS) listed the Columbia River bull trout population segment (including the Willamette Basin populations) as *Threatened* under the Endangered Species Act. Critical Habitat was later designated for bull trout by the US Fish and Wildlife Service (70 FR 56212; effective October 26, 2005). The USFWS designated critical habitat for bull trout in the Willamette River basin in the following streams: Blue River, Horse Creek, Lost Creek, McKenzie River, Middle Fork Willamette River, South Fork McKenzie River, Swift Creek, West Fork Horse Creek, and Willamette River. However, they excluded (pursuant to section 4 (a)(3) of the ESA) all stream reaches flowing through Federal land in the basin stating that it is adequately protected by the Northwest Forest Plan Aquatic Conservation Strategy.

Detailed descriptions on the Upper Middle fork Bull Trout Rehabilitation Program, life history and habitat requirements of bull trout can be referenced in the 2002, Upper Middle Fork Watershed Analysis Update. Since the bull trout rehabilitation program began in 1997, we have collected a great deal of data on local bull trout population dynamics, growth, and life history. Based on this data we have also completed numerous habitat enhancement projects that focus on creating better spawning and rearing conditions for bull trout, salmon, and other native aquatic species in the watershed.

Spring Chinook salmon are also endemic to the upper Middle Fork Willamette River and surrounding drainages. Salmon and bull trout habitat largely overlap in the watershed and juvenile salmon are known to be a valuable food source for bull trout. However, artificial propagation and transportation are required to maintain existing populations because upstream migration of spawning adults in the Middle Fork Willamette is blocked by three dams; Dexter at river-mile (RM) 192, Lookout Point (RM 195), and Hills Creek (RM 221). Spring Chinook salmon were federally listed as *threatened* in 1999, due in part to a decline in populations within the Upper Willamette River ESU. NOAA Fisheries has designated critical habitat for 12 Evolutionarily Significant Units of West Coast Salmon and Steelhead in Washington, Oregon, and Idaho (70 FR 52630; effective January 2, 2006).

## **Step 2: Issues and Key Questions**

## **Step 3 and 4: Reference, Current, Trend Conditions**

A great deal of effort by multiple agencies and partnerships has been put into the bull trout rehabilitation program from its inception. Through these relationships we have been able to acquire large amounts of funding to apply towards habitat restoration, public education, and overall watershed health programs.

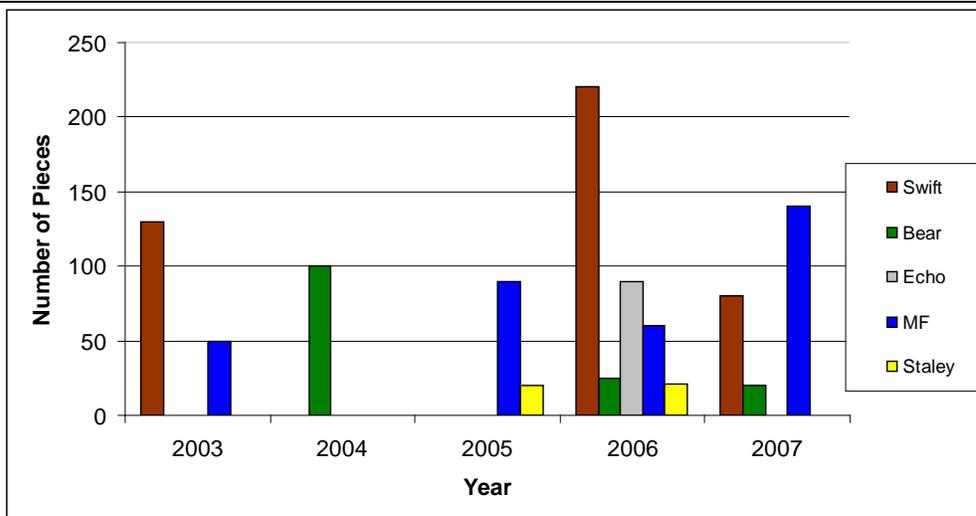
## Public Education

In the last five years we have developed public education in the watershed into a top level program. In cooperation with ODFW we now have large signs posted in the watershed to heighten the awareness of visitors that they are in an area that harbors a rare bull trout population. These signs also help anglers identify bull trout and remind them that they are to release any bull trout caught while angling. We now have colored pocket cards that show the differences between bull trout and brook trout that are available to anglers where licenses and regulation books are available. In 2006, we designed and constructed a kiosk at Indigo Springs Campground that contains an interpretive sign that was designed by local artists that tells the story of the bull trout life cycle. Indigo Springs will also be developed into an area where we intend to conduct future outdoor education programs and provide a place where the public can see bull trout spawning in the wild.

## Habitat Enhancement Program

Bull trout and spring Chinook salmon have high habitat quality standards, and prior to the bull trout rehabilitation project, rearing and spawning habitat were at a minimum throughout the Middle Fork Willamette and its tributaries. Over the past few years multiple large scale restoration projects have occurred. To date; 1,400 logs, 85 rot wads, 26 boulders, 20 whole trees with root-wads, and 50 yards of suitable spawning gravel have been placed throughout the Middle Fork and tributaries. Additionally, three culverts have been replaced or removed, approximately 14 miles of roads have been decommissioned, and currently the development of a bypass spawning channel is nearing completion at Indigo Springs. Habitat enhancement projects have thus far focused on known bull trout and salmon spawning and rearing areas. However, future projects will also consider areas such as migration corridors in the lower watershed. Large wood and habitat structures are an important component to aquatic species in these areas as well. Table xx shows the amount and location of LWD from enhancements project that have been completed in the last five years.

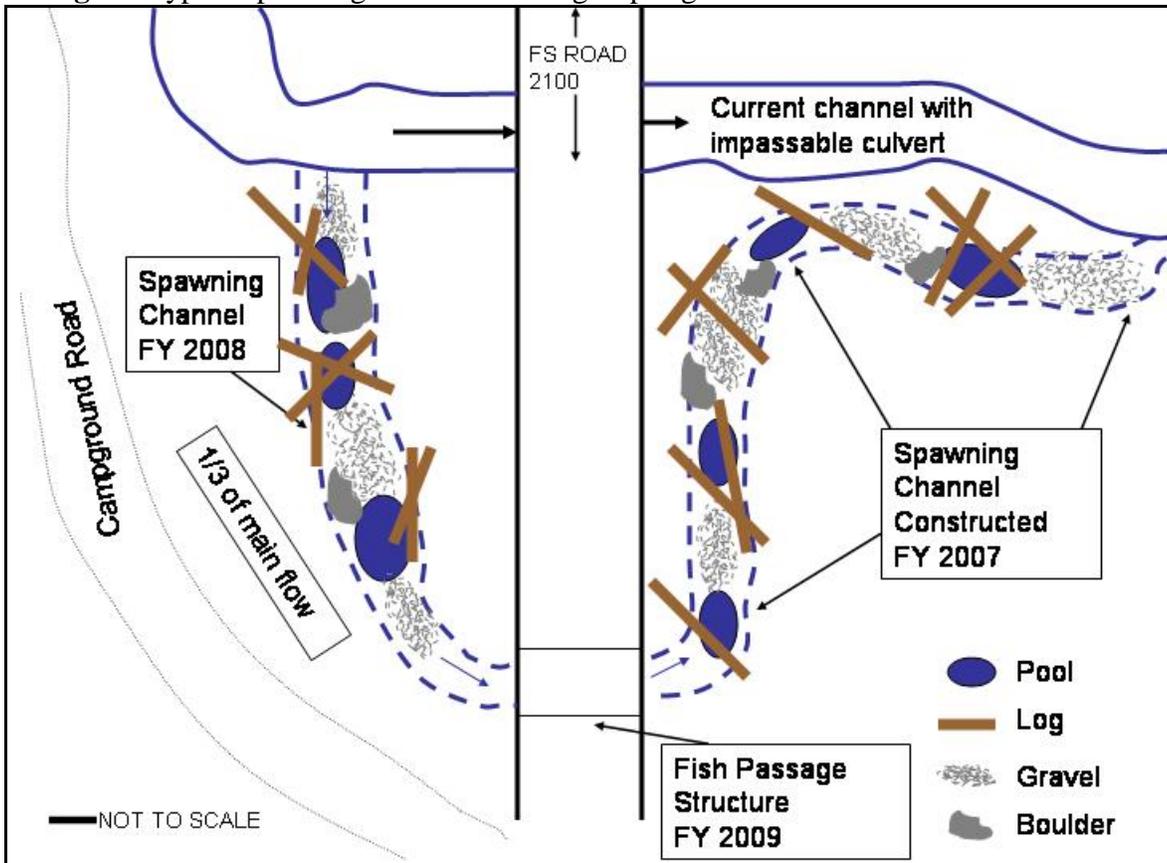
**Table xx.** Large woody material placed in the watershed above Hills Ck Reservoir.



## Indigo Springs Bypass Spawning Channel

Indigo Springs is a designated release site that offers outstanding rearing and spawning habitat. Previous population estimates have determined that Indigo Springs has the highest density of juvenile bull trout for its habitat than any other release site. Approximately 500 feet of the best spawning and rearing habitat in Indigo Springs is blocked by an impassable culvert. In 2006, we reevaluated alternatives to get fish passage into Indigo Springs. We designed a plan to construct a bypass spawning channel that would not only allow upstream fish passage but would also increase suitable habitat.

**Image 1.** Bypass spawning channel on Indigo Springs.



## Culvert Replacement

Several large culverts have been replaced or removed within the Middle Fork watershed. In 2003, two large culverts on Swift Creek that prevented juvenile bull trout from migrating into prime upstream habitat were replaced with structures that allowed passage at all life stages. Also, in 2003 a culvert on Echo Creek that created an impassable barrier was completely removed and the stream banks returned to a more natural state. By removing the migration blockages on these streams we increased the available bull trout habitat by over three miles.

## Accomplished Objectives and Current Project Status

### Bull trout Fry Transfer:

Beginning in 1997 through 2005, bull trout fry were collected and transported from the Anderson Creek population located on McKenzie River and released into designated sites in the Upper Middle Fork Willamette River upstream of Hills Creek Dam (map 1). Release sites were designated by habitat requirements such as adequate forage opportunities, suitable rearing habitat and water temperature. A total of 10,408 bull trout fry were released into the Upper Middle Fork Willamette River. In 2006, the Bull Trout Working Group decided to discontinue fry transfers to evaluate both the donor and recipient populations.

Swift Creek is the only known historic juvenile rearing habitat in the Upper Middle Fork Willamette and Bear Creek is a cold water tributary to Swift Creek. Due to the timing of fry release, access to these release sites is typically blocked by snow during normal winter months. In 2007, a total of 300 bull trout fry were collected from the Anderson Creek population throughout the migration period of February to June and were reared at the Leaburg McKenzie Hatchery. Fry were reared to allow later access into Swift Creek and Bear Creek and to increase survival rates. Of the 300 fry collected, 238 survived in the hatchery until released on October 30, 2007 into Swift Creek and Bear Creek. See [Table xx](#) for 1997-2007 fry transfers.

Table xx. Fry transfers from 1997-2007

Year	Iko	Shadow	Chuckle	Indigo	Swift	Skunk	Found	Bear	Echo	Total
1997			96	26		56				178
1998	938	150	411							1499
1999	1,000	148	302		526					1976
2000	1,075	53	349	204	822		285			2788
2001	418		269		96			673		1456
2002	75		177					38		290
2003	439		365	242				388	28	1462
2004	129		149	109	155			75		617
2005	81		61							142
2006										0
2007					158			80		238
	4155	351	2179	581	1757	56	285	1254	28	10646

### Monitoring:

Multiple monitoring methods are annually used to track and determine bull trout movements and population dynamics including minnow traps, spawning and snorkel surveys and screw traps. The primary tracking method used is half-duplex passive integrated tags (PIT). Beginning in 2003, 242 bull trout have been captured and tagged ([Table 1](#)). Tagged fish are monitored by constructing in-stream antennas made of copper wire that span the width of the river and allow for individual fish that pass through to be uniquely identified. Sites are powered by 12-18 volt batteries that are either exchanged weekly or charged by solar-panel arrangement. Today, we operate up to 11 detecting sites along the bull trout migration path. Another primary sampling method to determine annual adult population estimates is completed by operating a 5 foot rotary screw trap to capture post-spawned adults as they return to Hills Creek Reservoir

Table 1: Number of bull trout captured and tagged to date.

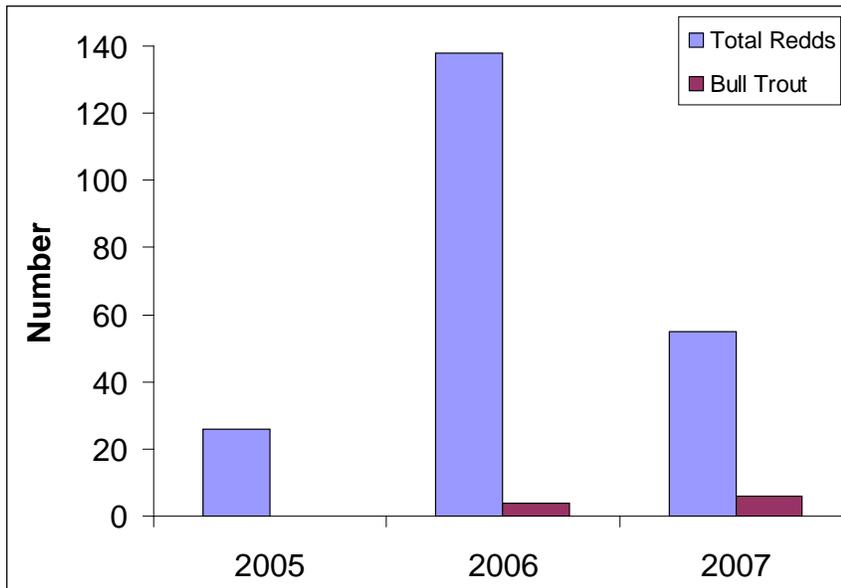
	Year					
	2003	2004	2005	2006	2007	Total
>400	1	3	11	2	0	17
>200		0	3	3	4	10
>100		59	111	33	11	214
Total	1	62	125	38	15	241

Our sampling methods allow us to determine how successful our rehabilitation efforts have been. In 2005 we documented the first sexually mature adult bull trout. In the spring of 2006, we documented the first naturally reproduced bull trout fry in the Upper Middle Fork Willamette River in over 15 years. The following spawning seasons of 2006 and 2007 we continued to document sexually mature bull trout and in the spring of 2007 we observed more naturally reproduced bull trout fry in Iko and Chuckle Springs. Figures xx and xx show redd count and total bull trout caught in the screw trap.

Minnow trapping population estimates: **I need to finish this section**

	2001		2002		2005		2006		2007	
	# Traps	# Fish								
Echo									118	0
Swift			60	0	200				375	0
Swift SC	169	1							20	0
Bear			10	0	33	0			60	0
Found	12	0	40	1	26	0			35	0
Iko	494	70			400	57	127	13		
Indigo			20	1	199	43	33	12		
Chuckle					202	24	60	3		
Shadow			15	2					60	0
BT Springs					19	0				
MF					158	6				

Figure xx: Spawning survey (redd count) data<sup>1</sup>.



<sup>1</sup>Although no known bull trout redds were detected in 2005, bull trout spawning did occur as naturally reproduced bull trout fry were documented in the late winter of 2006.

## Step 5: Synthesis

## Step 6: Recommendations

### **Middle Fork Willamette River Downstream Tributaries Watershed Recommendations.**

Have they been completed? How were they achieved.

#### Wood Recruitment and Shading

1). Priority: Conduct site evaluations of streams having past harvest activities on both sides for placement of LWM and regeneration success. Youngs Creek, Coal Creek, MFW River, and Buck Creek are high priority areas.

Many of these areas have been analyzed and are in much better condition then when the WA was completed. Natural wood has entered the system in the last few years and we have completed numerous large wood placement projects in the area. Buck Creek will see further restoration in 2009 with a new passable culvert at RD 2100 and large wood placed in the lower stream channel to augment existent habitat.

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## Aquatic Habitat Complexity

2). Priority: Add LWM to the MFW River and low gradient tributaries to aid in short term recovery and reconnect side channels where appropriate.

Evaluate and implement placement of LWM in the MFW River.

Evaluate effectiveness of past restoration efforts.

Several LWM addition projects have occurred since the WA was completed and several more are planned for the near future. The majority of projects will add several hundred pieces of LWM to the MF and its tributaries. All past restoration projects have been monitored in the MFW River over the years. Some areas remain intact while others have broken up and migrated downstream. All in all the vast majority of restoration wood remains in the system.

## Culverts and Carrying Capacity

3). Priority: Hydraulic analysis of culverts with potential to affect streams with high aquatic value. If fish passage is not an immediate need, but a desired future condition, less expensive improvements to accommodate a 100 year flood (such as the addition of mid-fill culverts and retrofitting the existing culvert) should be considered until such time as a funding opportunity occurs for replacement.

Plan and implement a program of culvert cleanout.

Culvert design is site specific and many variables are considered before a final product is approved. In the last few years the cost to replace culverts has increased to a point where it is difficult to acquire funding to cover the costs. A typical culvert replaced by an arch today can exceed \$600K. Therefore, design modifications that cut costs are essential to complete these jobs. In areas where high quality fish habitat occurs, fish passage is the primary concern and in general is achieved.

## Species Distribution & Migration

Priority: Modify or replace existing culverts in the high priority areas of Coal, Indian, Snake, Pine, Bohemia, and Estep creeks.

These areas have recently taken on a secondary priority as we now know bull trout and spring Chinook salmon do not use these areas like they do others in the Upper Middle Fork watershed. The majority of available funding is directed to that watershed.

Design new culverts for fish passage.

All culverts are designed for fish passage unless it is determined there is not suitable habitat above the culvert.

Establish baseline information to identify migration timing and flow characteristics for design of high priority culverts.

This has been accomplished for the high priority culverts.

Design and implement a monitoring protocol for existing culvert enhancements.

Culvert replacement projects are continuously monitored using open fish passage for all life stages and passage of a 100 year flood as the criteria.

Continue to monitor species abundance and distribution.

This is part of our annual program of work for listed species as well as resident species, such as cutthroat, rainbow trout, etc.

## Species Composition

Priority: Continue to monitor bull trout and spring Chinook populations.

This is completed on an annual basis with a wealth of partnerships and funds. We monitor adult and juvenile bull trout populations in the Middle Fork Watershed each year by PIT recorders and stationary recording devices, trapping, and snorkel surveys. We work in conjunction with USFWS, ODFW and a wealth of other partners for funding to support this work on an annual basis.

## **Upper Middle Fork Watershed Analysis Updated Fisheries Recommendations.** Have they been completed? How were they achieved.

The Upper Middle Fork Watershed Analysis was last updated in January 2002. The update was largely related to bull trout issues within the watershed. Numerous recommendations from habitat restoration, population size estimating and monitoring, and incorporating the US Fish and Wildlife Service, Bull Trout Recovery Plan into Forest Service management plans were an integral part of the update. The Middle Fork Fisheries Department has completed the majority of tasks outlined in the recommendations section of the WA update. The following is a list of the recommendations related to bull trout in the 2002 update and a brief description on how we have satisfied the requirements of the recommendation.

1). Complete NEPA and repair the Echo Creek culvert (2143-325).

The impassable culvert was removed in 2002. The removal of the culvert now allows fish of all age classes to move through the area.

2). Conduct annual surveys to identify and map primary bull trout spawning and rearing habitat in the Middle Fork from below the gorge to Swift Creek. Monitor spawning populations.

We monitor adult and juvenile bull trout populations in the Middle Fork Watershed each year by PIT recorders and stationary recording devices, trapping, and snorkel surveys. We work in conjunction

with USFWS, ODFW and a wealth of other partners for funding to support this work on an annual basis.

3) Conduct groundwater surveys to identify and map upwelling areas that could be used by bull trout in the Upper Middle Fork watershed.

We have complete surveys of the entire distribution of bull trout in the watershed and feel we have a good understanding on where they currently spawn and areas where they may spawn in the future.

4). Implement the USFWS Bull Trout Recovery Plan.

We model all of our activities around the Watershed Analysis and the USFWS Recovery Plan.

5). Key elements to be implemented on the District include protection of high quality habitat, reduction in road densities, barrier removal, adaptive management, and monitoring.

We identified high quality bull trout habitat in the 2002 WA update and have structured the ATM road closures to focus in those areas. We have completed closure on approx. 40 miles of road and continue to work on more each year. With one exception (Indigo Springs) we have completed all work to correct impassable culverts within known or suspected bull trout habitat in the watershed. Monitoring is an ongoing and continuous process and involves trapping, tagging, and snorkel surveys with numerous partnerships for funding.

6). Increase efforts in public education through information/interpretation of the bull trout fishery with emphasis in the high quality habitat areas.

The FS and out partnerships have created wallet size ID cards (bull trout vs brook trout), color brochures, road signs, and interpretive signs to educate the public on bull trout issues in the watershed and other surrounding areas. **Approx. cost: 30K**

7). Explore opportunities to evaluate special emphasis areas around high quality bull trout habitat.

The FS is working with ODFW to enact new regulations to protect adult bull trout and the head of Hills Creek Reservoir. We are concerned that numerous adult bull trout are lost to angling each year as they reenter the Middle Fork Willamette River in this area.

8). Complete an ATM analysis using the map generated in Figure 3-1 as a guide prioritizing road systems that are directly tributary to bull trout habitat. These are areas delineated in the High Quality Habitat, polygons designed in black figure 3-1.

This task was completed when the ATM plan was finalized for the Upper Middle Fork Watershed.

9). Apply for watershed restoration grants to obtain funding for bull trout habitat restoration.

The FS has collected a large amount of funding from various sources to complete bull trout habitat restoration work in the last five years alone. Approx \$400K in FS, Challenge Cost Share grants, \$40K in OWEB Joint venture funds, \$20K in USFWS grants, \$200K in Title II Payco grants, \$600K CIP fish passage funds, \$10K Trout Unlimited grant. In addition, nearly all of our FS appropriated NFWF (80K per year) funding goes towards bull trout monitoring.

10). Encourage partnerships and collaborative efforts that facilitate fish passage around dams located below the watershed.

This is an ongoing process with USFWS and USACE.

11). Repair two sites on Swift Creek and one on Echo Creek for fish passage. The remaining nine will be treated to support fish passage in the future.

These culverts have been replaced (2003) with stream simulation structures and are currently operating to allow fish passage at all life stages.

12). Prioritize funding in the sixth field watersheds 23-6 Echo Creek and 23-5 Swift Creek, which have higher road aquatic risk ratings.

The majority of all bull trout related funding is utilized in these watersheds. Largely due to the fact that these are the areas bull trout spawn and rear.

13). Conduct annual surveys to identify and map primary spawning and rearing habitat. Continue to monitor to determine if temperature is an issue in these areas.

We monitor the entire watershed each year through various methods and are strongly encouraged that temperature is not a limiting issue for bull trout in at least some areas of the watershed. We do feel that temperature is absolutely an issue in others.

14) Continue to work cooperatively with state and federal agencies.

All bull trout related work is coordinated with the Bull Trout Working Group (Forest Service, USFWS, ODFW, EWEB, USACE, private consultants, etc.). In addition, we maintain numerous other partnerships throughout the year with a multitude of groups and agencies (Trout Unlimited, OWEB, Challenger Cost Share, Lane County, City of Oakridge, Outdoor School, Classrooms to Stream, Native American Tribes, etc).

15). Monitor use of the six dispersed recreation sites listed in high quality bull trout habitat.

We believe these sites are stable at this time and have little to no influence on the persistence of bull trout in the watershed.

16). Work collaboratively with other agencies to improve public awareness of bull trout value and habitat restoration by placing interpretive signs at dispersed campsites.

This has been completed. See question # 6

17). Focus large wood restoration in/around high quality habitat refugia.

All restoration work to date has occurred in high use bull trout areas in the watershed. In the future we will turn our attention to migratory corridors that adult bull trout pass through to reach spawning areas. We expect to turn some areas that are currently uninhabited by juveniles into suitable habitat for rearing in the lower watershed.

18). Implement large wood in-stream projects that focus on full tree lengths where root wads are attached. Projects to introduce big wood (>24") are in need in reaches 5,8,11, and 14; corresponding to the reaches Staley Creek to Swift Creek, Tumblebug to the Middle Fork gorge, and lower Paddy's Valley.

Our restoration projects currently utilize entire trees pulled over that act as structural anchor points for large log jams. We feel these structures have more utility for bull trout than any other structure type in large stream channels. We back stack the pulled tree with several root wads and smaller trees to complete the jam. Our past experience with this method has resulted in numerous improvements to bull trout habitat.

19). Using adaptive management, experiment with different methods to hold wood jams in the Upper Middle Fork River Channel.

See reply to #18

### **New Recommendations for the Upper and Lower Middle Fork Watershed**

1). Continue Phase II and III work at Indigo Springs to provide bull trout passage at Rd. 2100 and complete the new spawning channel.

- a) Phase II will complete the upstream portion of the spawning channel.
- b) Phase III connect the upper spawning channel with lower channel by competing a passage structure under Rd 2100.
- c) Continue to develop Indigo Springs into an outdoor education arena where the public can witness bull trout in the wild.

2). Continue LWM placement in the MFW and tributaries occupied by bull trout and spring Chinook salmon.

- a) Swift Creek, from confluence of Bear Creek to confluence with Middle Fork Willamette (three miles of habitat).
- b) Bear Creek, from confluence with Swift Creek upstream to Rd 2149 crossing (two miles), if it is determined that bull trout continue to use these sections.
- c) Echo Creek from the confluence with Middle Fork Willamette upstream two miles.
- d) Middle Fork Willamette River from confluence of tumblebug Creek to Sand Prairie Campground.

- e) Staley Creek, from confluence with Middle Fork Willamette upstream two miles.
- 3). Continue to close high risk roads that were identified in ATM and focus on areas around high quality bull trout and salmon habitat.
- a) list in spreadsheet the red roads in the three polygons from the 2002 WA update.
  - b) Field truth roads deemed high risk and focus on roads with greatest potential to contribute sediments to the stream network.
- 4). Analyze historic data and information to better understand what the river system looked like historically. Understand when we have reached a “completed” level in adding wood to the MF.
- 5). Monitor bull trout populations annually. Continue PIT tag tracking program to monitor adult spawning populations and trapping operations for juveniles.
- 6). Complete repair, removal or replacement of top ten impassable culverts. (Map 1)
- |                           |                               |
|---------------------------|-------------------------------|
| a) Indigo Spring Rd. 2100 | f) South Fork Staley Creek    |
| b) Buck Creek Rd. 2100    | g) Noisy Creek Rd. 2100       |
| c) Upper Coal             | h) Simpson Creek Rd. 2135-283 |
| d) Lower Coal Rd. 2134    | i) Bear Creek Rd. 2149        |
| e) Windfall Rd. 2117      | j) Gold Creek Rd. 2117.138    |
- 7). Continue to transfer genetic material from the McKenzie watershed to ensure a prolonged and viable bull trout population.
- 8). Assess bull trout usage of Hills Creek Reservoir and other areas such as Hills Creek Watershed.
- 9) Conduct habitat modeling exercise to show all habitat favorable to bull trout life cycle in the watershed.
- 10) Maintain Human use statement and Wild and Scenic options as listed in WA pg 103