Species and Habitats

Aquatic

Oregon Chub *(Oregonichthys crameri)*

Reference Condition

Oregon chub are indigenous to the Willamette Valley, originally found throughout the valley from Portland to the Coast Fork and Middle Fork Willamette Rivers and tributaries. The species lived in off-channel habitat such as beaver ponds, oxbows, stable backwater sloughs, and flooded marshes. These pond-like habitats have minimal or no water flow with depositional substrate and abundant aquatic vegetation.

Prior to construction of dams, the Willamette Valley was often flooded, creating new sidechannels and backwater areas. This species was one of the first native fish to inhabit these areas. Sedell and Froggatt (1984) demonstrated the huge reduction of off-channel habitat along the Willamette River, already seen in 1967. With the loss of habitat, this species began to diminish.

Other influences leading to the decline of the Oregon chub were the channelization of rivers, draining and filling of wetlands, and introduction of non-native fish such as bass and mosquitofish, which prey or compete with Oregon chub. In November, 1993 the fish was federally listed as an endangered species. Prior to this listing an Oregon Chub Working Group was formed. This working group consisted of biologists from several agencies who have been trying to restore habitat, create new habitat, reintroduce the Oregon chub into areas, monitor populations, and educate the public on the importance of this native species to the Willamette Valley.

Current Condition

Populations of Oregon chub are currently found along the Middle Fork Willamette River where pond-like habitat is isolated from Lookout Point and Dexter Reservoirs. Roads or beaver ponds have isolated most of these areas creating barriers for non-native predator species. Other small populations have been found scattered along the Willamette Valley.

The Oregon Department of Fish and Wildlife's research branch has been intensely monitoring known populations and looking for new populations and habitat. The US Forest Service, Oregon Department of Fish and Wildlife and Army Corps of Engineers have been actively involved in developing and enhancing suitable habitat. The US Fish and Wildlife Service has been pursuing the introduction of Oregon chub onto private land where suitable habitat is available. Federal agencies involved with the working group have developed a Programmatic Environmental Assessment for its reintroduction into suitable habitat throughout the Willamette Valley. Education has primarily focused on the development of a brochure to inform people about this endangered species.

Several Oregon chub enhancement projects have been and will be implemented in the project area. Not all projects have been highly successful with regards to increasing Oregon chub habitat, but they have tended to improve aquatic habitat with a resulting benefit to western pond turtles. In the process it was learned that the ponds need to be isolated from non-native fish species.

Within the WAA, the main populations of Oregon chub are found in the Buckhead area, Shady Dell pond and at an old beaver dam pond just west of Hospital Creek. Other populations located just outside the WAA are in Minnow Creek Pond, an alcove to Dexter Reservoir known as The Pit, Elijah Bristow State Park, and East Ferrin Pond.

Anadromous Fish

Reference Condition

Spring chinook *(Onchorhynchus tshawytscha)* are native to the Middle Fork Willamette River. Run size was estimated to be about 2,550 adults returning, representing about 21% of the run above Willamette Falls (COE, 1997). This may have been the largest spring chinook run in any of the subbasins above Willamette Falls. Adults entered in early May to late August, peaking during the end of June. Spawning occurred early September to mid-October. Fish moved up above Dexter to spawn; most spawning occurred east of the WAA in the North Fork of the Middle Fork River, Salt Creek and Salmon Creek. The mainstem Middle Fork of the Willamette River would have been important for large (>3 feet) adult holding pools prior to spawning. Surveys conducted in 1938, prior to dam construction, indicated 13.4 pools per mile.

Very few if any winter steelhead *(Onchorhynchus mykyss)* were native to the Middle Fork Willamette River. ODFW records indicate that winter steelhead runs did not occur until 1956 (Connolly, *et. al.*, 1992). The first hatchery introductions were made after Dexter and Lookout Point dams were completed in 1953. A Skamania stock of summer steelhead was first released into the Middle Fork Willamette subbasin in 1981.

Current Condition

Spring chinook and both summer and winter steelhead adults are now collected at the Dexter facility and spawned at the Oakridge fish hatchery. A small amount of returning fish may be spawning below Dexter Dam. However, due to the change in water temperature of water released from the reservoir (colder during the summer and warmer in the winter compared to pre-dam temperatures), the chinook tend to spawn later in the year (early October to mid-November).

The Oregon Department of Fish and Wildlife's Wild Fish Policy states that it is a priority to reestablish or maintain wild spring chinook in the upper Middle Fork Willamette Subbasin. A reconnaissance report was written by the US Army Corps of Engineers in 1997 analyzing alternatives which allow spring chinook salmon to migrate from their natural spawning habitat in the upper Middle Fork Willamette Subbasin to the ocean and back. More studies are needed and presently awaiting funding. Chinook are currently stocked into Lookout Point Reservoir to help increase the sport fishery.

A stream survey of the Middle Fork Willamette River between Lookout Point and Hills Creek Reservoirs was conducted by ODFW in 1996. Overall pool habitat declined from 13.4 pools/mile in 1938, prior to dam construction, to 6.87 pools/mile. The one exception to this decrease in pool habitat was in Black Canyon, a more confined valley where the majority of habitat consisted of scour pools. Above Black Canyon riffles predominated as the habitat became an alluvial valley. Pool habitat is important in these areas. The data suggests that Black Canyon has adequate adult holding pools for anadromous fish as they move upstream to spawn but the alluvial sections have limited pool habitat.

Resident Trout and Other Native Fish Species

Reference Condition

Rainbow and coastal cutthroat trout *(Oncorhychus clarki clarki)* were found throughout much of the WAA. The majority of trout in the lower reaches and larger streams or rivers were rainbows, while the upper higher-gradient streams had primarily cutthroat. Both residential and fluvial (adults live in river mainstem and migrate into its tributaries to spawn) populations were found in the project area.

Other native fish found in the Middle Fork Willamette River mainstem include Mountain whitefish *(Prosopium williamsoni)*, large scale suckers *(Catostomus macrocheilus)*, northern squawfish *(Ptychoceilus oregonensis)*, longnose dace *(Rhinichthys cataracta)*, speckeled dace *(Rhinichthys osculus)*, redside shiner *(Richardsonius balteatus)*, chiselmouth *(Acrochelius alutaceus)*, peamouth *(Mylocheilus caurinus)*, pauite sculpin *(Cottus beldingi)*, shorthead sculpin *(Cottus confusus)*, reticulate sculpin *(Cottus perplexus)*, torrent sculpin *(Cottus bairdi)*, and lamprey species *(Lampetra* spp.*)*.

Fish found in the higher gradient tributaries were primarily cutthroat trout, rainbow trout, sculpin, and dace. No known records indicate that bull trout *(Salvelinus confluentus)* were found within the WAA. They were found in the upper Middle Fork above Hills Creek Reservoir and possibly in the North Fork Middle Fork Willamette River, which is just above the WAA. Since there are no natural migration barriers, the Middle Fork Willamette may have contained bull trout at one time as a dispersal or migratory species if not a resident. However, temperatures may have been warmer than bull trout require.

Lookout Point Reservoir now covers the area where the Middle Fork Willamette River once flowed. The river provided off-channel habitat for many of these cooler water fish species and large, deep pools for cold water trout. High winter flows flooded lower gradient areas. The main river and its higher gradient tributaries were thought to have a high amount of large woody debris creating log jams, pools, cover habitat, and contributing to the formation of stairstep habitat in higher gradient tributaries. This large woody debris was essential not only providing quality habitat but also contributing towards channel stability. Riparian vegetation consisted primarily of large conifers with hardwood patches in areas with frequent floodplain interaction. These large conifers were the source for the large woody debris.

Current Condition

Map 28 shows the fish-bearing portion of the project area. Resident, fluvial and adfluvial (adults living in the reservoir and migrating up tributaries to spawn) trout populations are found within the WAA.

Several non-native species of fish have been introduced into Lookout Point Reservoir. These include channel catfish *(Ictalurus punctatus),* brown bullhead *(Ictalurus nebulosus),* yellow bullhead *(Ictalurus natalis),* bluegill *(Lepomis macrochirus),* pumpkin seed *(Lepomis gibbosus),* largemouth bass *(Macropterus salmoides),* smallmouth bass *(Macropterus dolomieui),* white crappie *(Promoxis annularis),* and black crappie *(Promoxis nigromaculatus).* Kokanee *(Oncorhychus nerka),* a landlocked sockeye salmon, was also introduced into Lookout point Reservoir; however these fish do not appear to have naturalized. Current game species within Lookout Point Reservoir are rainbow trout, largemouth bass, smallmouth bass, brown bullhead, and crappie. Rainbow trout are commonly caught from the Middle Fork Willamette River above Lookout Point Reservoir.

Erosion resulting from drawdown and wave action along the shoreline of Lookout Point Reservoir affects aquatic species and habitat. The lack of vegetation increases turbidity and decreases food production and available nutrients. Both native fish and non-native fish, such as squawfish and catfish, have adapted well to this cool lake environment and outcompete or prey on native salmonids.

Many of the tributaries flowing into Lookout Point Reservoir or the mainstem Middle Fork Willamette River are now isolated for part of the year by migration barriers created by humans such as road and railroad culverts. These barriers tend to be passable at full pool. However, the pools are low during the winter and spring months when adfluvial trout migrate upstream to spawn.

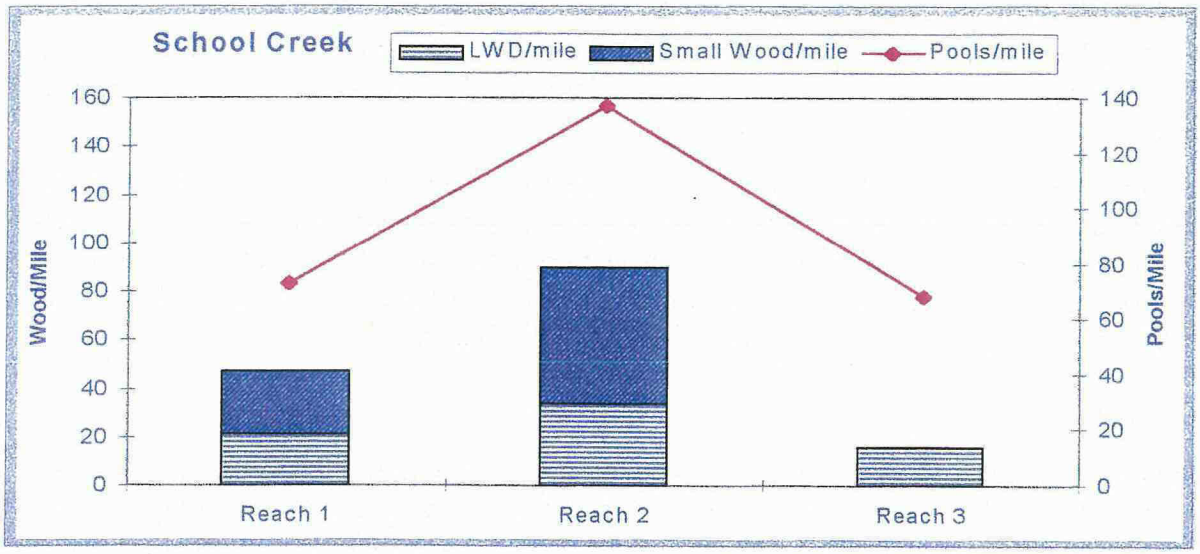
Recent (1996) stream surveys were conducted on Tire, School, Goodman, Deception, and part of Buckhead Creeks *(see Map 31).* Below is a brief discussion of current habitat conditions.

School Creek

School Creek is fish bearing for approximately 1.2 miles. Cutthroat trout were the only species of fish observed. The stream runs through an earthflow terrain where fine sedimentation and channel stability are a concern. Since soils are very deep, large woody debris and a mature riparian seral condition play a major role in providing the channel stability needed in this type of terrain.

Reach 1 begins upstream from the full pool area of Lookout Point Reservoir (above Road 5821) and continues for 0.7 miles to a tributary entering on the right bank (bank directions are always given looking downstream). Fish were observed throughout the reach. Large woody debris was minimal and pool habitat was fair *(see Figure 8).* The high cobble embeddedness level and bank cutting may have resulted from the lack of large wood necessary for stability in this earthflow terrain.

Figure 8. Pools and Wood - School Creek



Riparian condition was poor with an average inner hardwood riparian zone of 37.5 feet (alders). This is a relatively wide inner riparian perhaps suggesting signs of past channel disturbance. Other signs of instability were shown by many small areas of braided channels (16-52 feet long). This is not characteristic of a 'B' Rosgen channel type (this reach was calculated as such) and suggests that the sediment load is not in equilibrium with the channel. The outer riparian varies, primarily consisting of large conifer trees on the left bank and small conifer trees from a past harvest unit along the right bank. Riparian seral condition is below the desired mature seral condition. There are no migration barriers found within this reach.

Reach 2 is also approximately 0.7 miles long and ends at the first crossing of Road 5823. Woody debris and pool habitat increases in this reach. Smaller wood (12-24" DBH and >25' long) appears to be functioning as large woody debris for this small stream *(see Figure 8)*. Sand substrate and cobble embeddedness is still commonly found within the stream channel but to a lesser extent than in Reach 1. Perhaps this woody material is helping to stabilize the stream a little more than in the downstream reach.

The inner hardwood riparian is still quite wide in this reach (about 47 feet), consisting primarily of big leaf maple trees. Again the wide inner riparian suggests possible past channel disturbance. The outer riparian consists of mature trees on the left bank and saplings/poles from a clearcut unit along most of the right bank. This does not meet the desired condition of a predominantly mature seral condition. The highest temperature recorded during the survey was 61°F, but since the survey was conducted in mid-July, temperature may be a concern in August and early September.

This reach was calculated to be an 'A' Rosgen channel type, but areas more characteristic of a 'B' channel may be present. Channel braiding was still evident, although to a lesser extent (ranging from 12-30 feet). This is a sign of channel

instability for an 'A' channel type, suggesting the channel is still out of equilibrium with its sediment load.

An 8 foot falls was found towards the end of the reach. It serves as a migration barrier and is thought to end fish use of the stream. *Rana* species of frogs and tailed frogs were observed in this reach.

Reach 3 is a short reach of only 0.2 miles between the two crossings of Road 5823. Since it is not fish-bearing a Willamette National Forest Modified Level II survey was conducted. Large woody debris was low in numbers and pools were fair. Riparian condition seemed to be the greatest concern since all the trees were recently harvested. Sand was still a significant component of the stream substrate.

Tire Creek

Lower Tire Creek is deeply entrenched, while upper Tire Creek flows through earthflow terrain. The earthflow terrain provides a fine-sediment source since the deep soils are prone to erosion and channel instability. Large woody debris plays an important role in providing stability to the channel in these earthflow areas.

Reach 1 is 1.7 miles long, extending from the confluence of Tire Creek with the Middle Fork Willamette River to just above the second stream crossing of Road 5826, where the stream flow splits into two forks. Fish were only observed for the first 0.25 miles, at which point a 20 foot waterfall provides a year-round migration barrier. Road 5821 crosses Tire Creek at its mouth with a concrete culvert presenting a 13 foot jump during low flow. It may also be a high flow barrier. Many red-legged frogs, Pacific giant salamanders, rough skinned newts, and crayfish are found in the non-fishbearing portion of the stream.

The majority of the reach is steep and deeply entrenched with a stairstep morphology. Stream gradient decreases towards the upper part of the reach where earthflow terrain is found. Plunge pools tend to be very deep for this size stream with 16.7 pools per mile greater than 3 feet deep and an average residual depth of 2.7 feet. Large woody debris is somewhat limited, although this is expected in the steep bedrock canyon portion of this reach.

Riparian vegetation consists predominantly of large conifers. However, a few recent harvest units in the upper part of the reach have left buffer strips adjacent to the stream channel.

Reach 2 begins just above the second stream crossing of Road 5826 and follows the west fork for 0.6 miles to a tributary entering the left bank. No fish were present in this reach, but red-legged frogs and Pacific giant salamanders were abundant. No rough-skinned newts were sighted. The stairstep environment continued, with pools as the primary habitat type.

This reach is within earthflow terrain as indicated by the lack of bedrock, a high cobble embeddedness and copious areas of mass wasting and bank cutting. Large woody debris increases in this reach and is probably aiding the channel stability, although

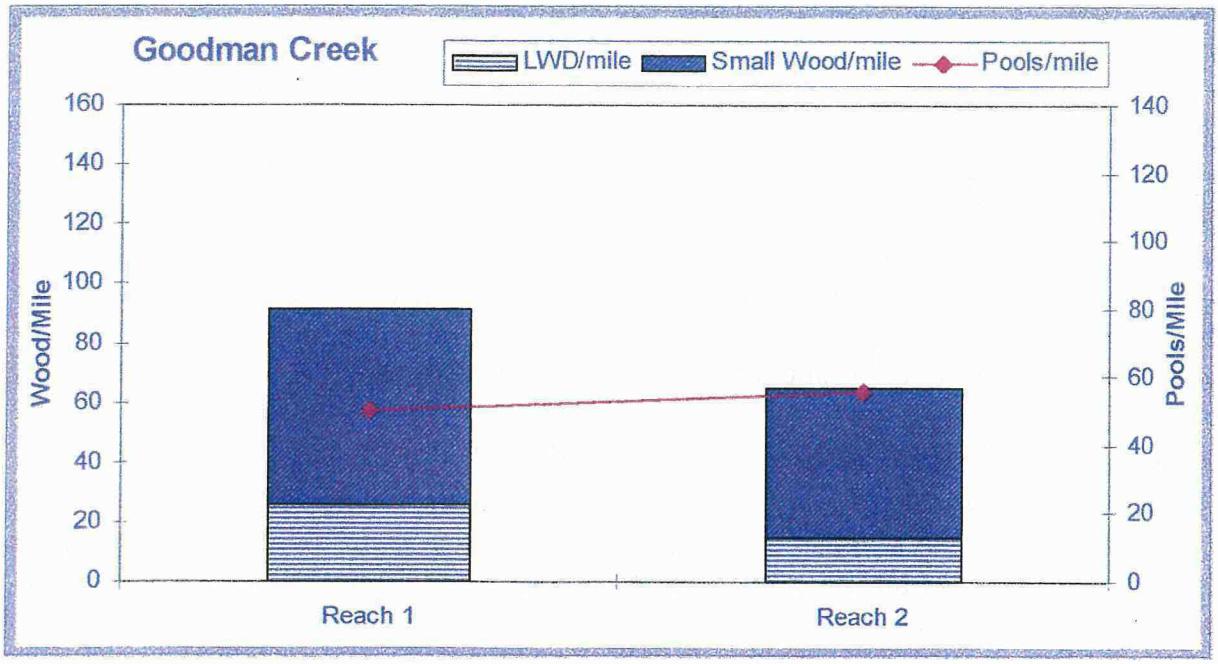
stability is generally poor. Riparian vegetation is primarily large conifer trees but more harvest units are visible from the stream channel than in Reach 1.

Goodman Creek

Goodman Creek is a large drainage (7,226 acres) consisting of three main tributaries. The tributary labeled "Goodman Creek" on the forest/district map is the middle tributary. However, the western tributary had the highest flow and was therefore surveyed. The west fork is moderately steep with deep soils. The middle and east fork tributaries are very steep and highly entrenched.

Reach 1 is two miles long. It begins at full pool for Lookout Point Reservoir and ends at Tributary 4, which had significant stream flow. Pool habitat is fair with shallow pools (residual depth of 0.8 feet) and 50 pools/mile. Large woody debris levels are moderate with 26 pieces/mile *(see Figure 9)*. Small woody debris within this reach brings the total wood/mile up to exceed the desired condition of 80 pieces/mile. However, 11% of the reach was affected by bank cutting, possibly indicating that this smaller wood is not providing channel stability or scouring out channel-width pools as larger pieces would.

Figure 9. Pools and Wood - Goodman Creek



Riparian habitat is of poor quality due to its early seral condition and abundance of hardwoods. This may also affect channel stability and limit the future source of large woody debris. Hardwoods, rather than conifers, dominate the riparian area providing adequate shading to the stream.

In some places only a narrow buffer strip remains adjacent to the stream. There is evidence of salvage logging near the stream and clearcuts have reduced the amount of

large woody debris available. Furthermore, Road 5583 runs parallel to the reach also affecting its riparian area.

Reach 1 was estimated to be a 'B' Rosgen channel type with gravel/cobble substrate. Bedrock is also common in places. The width-to-depth ratio is very high at 30.5, indicating poor channel stability. Cutthroat trout and sculpins were found throughout the reach. Large scale suckers were present in the lower part of the reach. Other aquatic species observed include crayfish and rough skinned newts. Signs of beaver were also seen within the reach.

Reach 2 is 1.7 miles long and ends at Tributary 5. Pool habitat is slightly better in this reach than in Reach 1, having an average residual pool depth of 1.4 feet and 55.4 pools/mile. The amount of large woody debris is lower with 15 pieces/mile in the large category and 50 pieces/mile in the small category. However, the smaller pieces appear to be functioning better in this smaller channel.

The riparian is in good condition with a narrow inner zone of hardwoods and an outer zone consisting primarily of large conifers. This, in conjunction with no road presence adjacent to the channel, has improved channel stability in Reach 2. This reach is also steeper confirming its categorization as an 'A' Rosgen channel. Gravel, along with cobble and boulders, was the primary substrate. Cutthroat trout were the only species found within this reach. Fish use ended at the end of the reach where a large waterfall (greater than 30 feet) was found just above the reach break.

Deception Creek

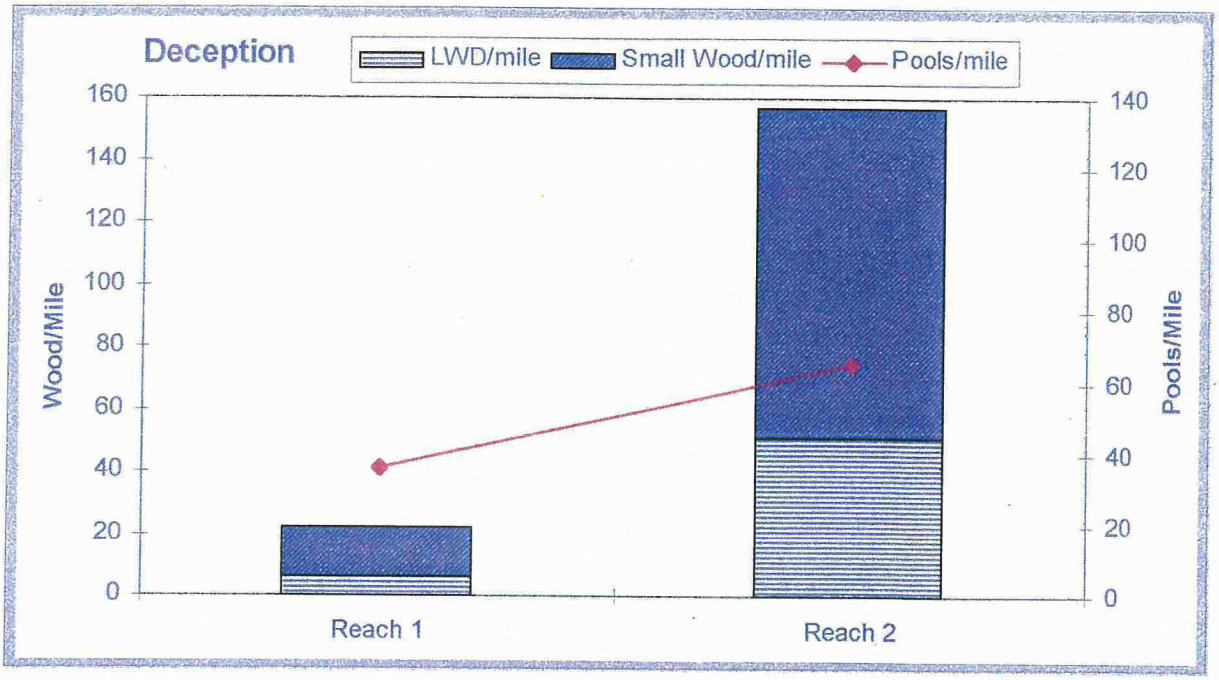
Deception is a large drainage (7,443 acres), with three large tributaries entering its mainstem. The stream channel labeled "Deception Creek" on maps was considered the mainstem. This steep, highly dissected drainage is bedrock constrained and tends to be prone to debris flows, providing a source of coarse substrate such as boulders and cobbles. Much of the drainage is fairly inaccessible as roads are located near the ridgetops or midslope in the upper part of the drainage. Very few roads cross perennial streams and no roads cross fish bearing sections. A total of 8.2 miles within the drainage are fish bearing *(see Map 28).* Two reaches were surveyed.

Reach 1 is 1.6 miles long. A privately owned trailer park is located near the mouth of Deception Creek and borders the stream channel for approximately 800 feet. This trailer park is built on an apparent alluvial fan from a past debris flow. The stream is heavily used by people in this area resulting in an abundance of litter. This reach has poor pool habitat and low amounts of large woody debris. Figure 10 shows that the wood present is largely in the small category (12-24" and >25'). Available pool habitat tends to have good depth, with an average residual pool depth of 1.9 feet and 5 pools per mile deeper than 3 feet. Large cobbles and boulder substrate are common and provide some cover.

Red alder trees dominating the inner riparian provide good shading. However, the riparian area is in poor condition with an average inner zone width of 67 feet. The outer zone is primarily Douglas fir and small red alder trees. The lack of large conifers

near the stream indicates that future recruitment of large woody debris is severely lacking. The riparian zone was often harvested right up to the stream channel. Cable and bucked logs were commonly observed. Bank erosion was seen throughout the reach, possibly resulting from limited large woody debris and past removal of riparian vegetation.

Figure 10. Pools and Wood - Deception Creek



The reach was calculated to be a Rosgen 'B' channel type. Width-to-depth ratio was high at 24.7. This may be an indicator of channel instability and may also result from the high amount of bedload entering the system.

Cutthroat trout were found throughout the reach, with small numbers of dace and sculpin found near the mouth. Red-legged frogs were abundant and often seen sitting on large cobbles and boulders. Rough skinned newts were seen in isolated pools within the bankfull channel. Crayfish were occasionally observed and old beaver signs were found. On the 8th of August at 1410 hours, temperatures were measured at 64°F. These warm temperatures were found in an area considered to have good shade from hardwoods and may be the result of an over widened channel and ground water from adjacent clearcuts.

Reach 2 begins at the second tributary confluence, is 1.1 miles long and ends at the confluence of the fourth tributary. The second and fourth tributaries both contribute about 40% flow to the mainstem. Pool habitat and large woody debris are much more common in this reach *(see Figure 10)*. Most of the wood falls within the small category but a moderate to high amount is also found within larger categories. The increase in number of pools may result from a higher amount of large woody debris.

Riparian condition is fair in this reach, although much better than in the previous reach. The average inner hardwood riparian is 19 feet wide, typical for this type of channel. The outer riparian is dominated by Douglas fir trees and consists of 47% small trees and 53% large, mature trees. Occasional past harvest of riparian trees reached the stream channel.

Gravel and cobble are the most common substrate with a large boulder component. The high amount of bedload is often captured behind large woody debris. Little bank cutting was observed. Large wood and a more intact riparian zone may be aiding in channel stability. This reach was also classified as a Rosgen 'B' channel. The high width-to-depth ratio of 24.8 is uncharacteristic and suggests some possible channel instability. This may be caused by a high bedload resulting from slides and widening the channel. Much higher flows were experienced in this drainage the winter after completion of the survey.

Temperatures were much cooler in this reach, with a high of 59°F at 1445 hours. The intact riparian and smaller stream channel probably influenced these cooler temperatures. Cutthroat trout were the only fish species present in this reach and they extended beyond its end. No red-legged frogs were observed. This is somewhat surprising since so many were present in Reach 1. Perhaps the higher gradient, elevation and increase in cover, such as large woody debris, has discouraged this species.

Buckhead Creek

Buckhead Creek is fish bearing for 5.5 miles. The lower section of Buckhead is unique to the watershed, as a depositional low-gradient stream with a wide floodplain. The area surveyed in 1996 was limited to the first 1.3 miles. An older survey conducted in 1992 inventoried the area further upstream. The low-gradient portion of the Buckhead Creek drainage is a designated Wildlife Area and within a Late Successional Reserve (LSR).

Oregon chub, a federally listed, endangered minnow, is found in low numbers within the low-gradient section of Buckhead Creek. Due to the presence of this species, the NWFP has designated Buckhead Creek as a Key Watershed *(see Map 6).*

Other fish species observed during the survey include speckled and/or longnose dace, redside shiners, and rainbow and/or cutthroat trout. Sampling by Oregon Department of Fish and Wildlife has also documented a few sculpin, northern squawfish and large scale suckers. These species are all found within the low-gradient portion of the stream. Trout are the only fish expected to reside in the steeper upstream reaches. Dace were extremely abundant during the survey. Redside shiners were common and trout were seen throughout the reach. No Oregon chub were observed during the biological portion of the stream inventory. Other aquatic species include Western pond turtle, many beaver, many red-legged frogs, rough skinned newts, and crayfish. These native aquatic species indicate the biological richness and diversity of the low-gradient reach of Buckhead Creek.

District archaeology records indicate that ponds used for steam engines were created at Buckhead when the railroad was built in 1911. It is quite possible that Buckhead Creek may have been channelized and redirected at that time to flow onto the flat area northwest of its original confluence with the Middle Fork Willamette River.

Stream surveys taken in 1937 and 1938 indicate that Buckhead Creek was a small and steep tributary, suggesting that it flowed directly into the Middle Fork Willamette without turning. However, aerial photos from 1944 show that lower Buckhead Creek turned sharply to the north immediately below the railroad culvert forming a very straight channel. Fifty years later, Buckhead Creek is still in this same channel. Natural processes would create sinuosity in low gradient streams. The lack of such meander patterns in Buckhead Creek suggests that it was channelized.

The lack of sinuosity results primarily from human-built berms confining Buckhead Creek. These berms limit floodplain use and create a stationary channel, where normally the stream would meander and have high floodplain interactions in this low-gradient section.

Hardwoods are the dominant tree species found within riparian areas. However, the 1944 aerial photos show a dense stand of conifers in this area. Aerial photos from 1959 clearly indicate harvest of these trees during the BPA powerline right-of-way construction, resulting in its current hardwood riparian condition.

The reach surveyed was classified as a Rosgen 'C' channel type. As indicated, however, sinuosity is low for this type of channel and is thought to result from human-built berms confining the channel. Bermed channels often result in downcut channels that become a Rosgen 'G' type. However, this reach is aggrading rather than degrading.

Riparian vegetation is poor with grass/forbs and hardwood shrub/sapling as the dominant seral types. Himalayan blackberries covering the berms, scotch broom and other non-native vegetation are common within the riparian reserve, primarily due to vegetation maintenance under the powerline right-of-way. Solar exposure is high resulting in elevated temperatures which favor warmer water species such as dace, redside shiners and Oregon chub. However, some areas are almost stagnant pools where temperatures may be too high and eutrophication appears evident; oxygen may be a limiting factor.

Pools are not very deep for this stream (residual pool depth averaged 1.6 feet), especially considering the abundant beaver activity. Since this is a depositional area, the streambed has filled in with sediment, but does not appear to be scouring. Instream large woody debris is minimal or absent in the medium and large size (>24" and >50') and fair for the small category (12-24" and >25'). The small category is expected to be more common for this hardwood dominant riparian zone but quantity should be higher. Future recruitment of large woody debris is extremely limited throughout most of the reach.

Other Aquatic Species

Harlequin Duck (Histrionicus histrionicus)

Current Status

Rivers, streams, and creeks are primary feeding and breeding habitat for Harlequin ducks during the breeding season. Birds winter on the coast where they feed on a wide variety of sea life and then move into fresh water river and stream systems in the spring to breed and rear young. They are known to prefer stream reaches typically ten meters wide, with rocks, logs and an adequate food supply of benthic invertebrates.

Surveys for Harlequin ducks were conducted in 1992 and 1993 on the district with an emphasis on the Fall Creek and Winberry Creek watersheds. The only suitable habitat existing in the project area is the Middle Fork Willamette River above Lookout Point Reservoir and possibly the lower reach of Deception Creek. No known sightings of the duck exist within the WAA.

Future Trends

Approximately five miles of potential nesting and rearing habitat exists for the Harlequin duck within the analysis area. The potential for the duck to actually use this area for nesting is low due to human disturbance and high use within the river corridor. Highway 58, Southern Pacific railroad and motorized (as well as non-motorized) use on the river itself lends to this low potential as the duck is extremely sensitive to human disturbance. There is concern that increased human demand and activity in riparian areas could affect Harlequin duck behavior and breeding success. Continued monitoring is needed to determine trends of use and breeding success.

Northwestern Pond Turtle (Clemmys marmorata marmorata)

Current Status

The Northwestern pond turtle inhabits marshes, sloughs, moderately deep ponds, and slow-moving portions of creeks and rivers, and prefers rocky or muddy bottoms with aquatic vegetation (watercress, cattails, etc.). Fairly extensive surveys and monitoring of the turtle in Lookout Point Reservoir has been conducted by the US Army Corps of Engineers (Beale, 1996). Turtles have been seen in almost every cove or inlet along the north shore of the reservoir. They are not nearly as common along the south side of the reservoir. This is probably attributed to better exposure and basking sites along the north shore in conjunction with more of these protected inlets

A two year Challenge Cost Share telemetry study in cooperation with the COE is currently being conducted along the upper reaches of the reservoir and within the Buckhead Special Wildlife Habitat Area. The work consists of radio attachment to gravid female turtles and tracking these females to determine nesting chronology and nest locations. Initial trapping results indicate a significant population in the Buckhead ponds although it is unclear whether successful nesting and juvenile recruitment is occurring. A significant bullfrog population in the wildlife area has been observed.

Future Trends

Although habitat for the turtle does exist within the WAA, human impacts on nest sites and juvenile recruitment could be impacting its abundance. This is due to loss of habitat from regulated river flows from Hills Creek Reservoir and introduction of non-native species (warm water fish species in the reservoir and the bullfrog) that prey on juvenile turtles and compete for forage. The telemetry work being conducted could provide clues to nest locations and the timing of nesting.

Tailed Frog (Ascaphus truei)

Current Status

The Tailed Frog is a riparian associated late seral species normally found in permanent, fast-flowing, rocky, cold-water streams and headwaters in coniferous forests. Although tailed frogs are normally found in or near streams during rainy weather, they have been known to forage 25 or more meters away from water (Nussbaum, *et. al.,* 1983). Average clutch size is 50 to 60 eggs and in some Cascade populations females breed only in alternating years (Leonard, *et. al.,* 1993). In the Oregon Western Cascades, tailed frogs have a one-to-three year larval period, possibly longer depending on climatic conditions, thus contributing to their relatively low reproductive ability.

Spot amphibian surveys were conducted in the watershed on USFS lands in 1995. Stream surveys were conducted by the fisheries crew in 1996 on a few drainages. These survey efforts resulted in documentation of tailed frogs existing in numerous locations within the WAA, including the Duval Creek, Deception Creek and School Creek drainages.

Future Trends

Tailed frogs, a riparian associated species, should show stable trends within the watershed as impacted riparian areas develop into late successional forests. This will provide increased protection from siltation and higher stream temperatures and also provide corridors for immigration to streams with more favorable conditions. The major concern for the tailed frog is a degrading road system and the increasing potential for road failures with accompanying degradation of associated aquatic habitat.

Cascade torrent salamander (Rhyacotriton cascade)

See Southern torrent salamander

Southern torrent salamander (Rhyacotriton variegatus)

Current Status

Good and Wake's recent revision of the family and genus of Torrent Salamanders in 1992, divided the "Olympic Salamander" into four distinct species not fully accepted by all authorities (Leonard, *et. al.,* 1993). Two of the species which may occur in this watershed are the Southern and Cascade torrent (seep) salamanders. These species

can be separated by range, subtle morphological characteristics, and slight differences in life history. *Rhyacotriton* spp. normally occur in or near permanent, cold streams and seeps in association with talus, small rocks, and gravel, often in late-seral forest streams with moss capped rock rubble. Torrent salamanders are mostly aquatic and their habitat appears to be restricted to riparian zones. These species are sensitive to activities impacting headwater areas and seeps, such as logging and road building, which increase sedimentation and/or water temperatures in their coarse substrate habitat areas.

Amphibian surveys conducted in 1995 have verified presence of *Rhyacotriton* salamanders in the WAA. Documented sightings are in the Duval Creek and Goodman Creek drainages, specifically the upper reaches. It has yet to be determined whether these salamanders are cascade or southern torrent. Voucher specimens have been submitted for genetic testing and identification. This population is located between the current range of both the Southern and Cascade torrent salamander and identification may provide support or oppose the current taxonomy of this genus.

Future Trends

Most cold water undisturbed perennial streams are likely to contain this variety of torrent salamander. As riparian-associated salamanders, the Southern and/or Cascade torrent salamanders will likely have extensive habitat in the future with the provisions of riparian reserves. As with the tailed frogs, there is considerable concern regarding road construction and older road failures due to reduced road maintenance and decreased accessibility (ex. a plugged culvert with associated road failure could deplete a large reach of prime aquatic and associated riparian habitat).

Riparian and Aquatic Habitats

Reference Condition

The riparian seral condition was thought to be similar to the reference seral condition mentioned in the vegetation section. Table 21 represents a "snapshot in time" of the vegetation in 1900.

Table 21. Reference Riparian Seral Condition (1900)

Seral Stage	Age	Riparian
Stand Initiation	0-30 years old	16%
Stem Exclusion	30-80 years old	27%
Understory Reinitiation & Late-Successional Old Growth	80+ years old	57%

As discussed elsewhere (see Vegetation, Fire Regimes, page 45, and Human Uses, Reference Condition, page 90), fire played an important role in this WAA. Native American burning practices kept a portion of the project area in an earlier seral condition compared to adjacent watersheds on the forest.

Wildlife species associated with riparian and aquatic habitats were probably much more abundant and widespread historically than they are today. Intact riparian areas with cooler water temperatures, low sediment and embeddedness levels, and higher levels of snags and coarse woody debris provided optimal conditions for aquatic and riparian-associated wildlife species.

Amphibians, such as the tailed frog and torrent salamander, requiring cool, moist habitat conditions benefited from extensive areas of riparian late successional forest in the northwest and specifically in this watershed. Harlequin ducks and wood ducks, strong aquatic and riparian obligates, were probably more abundant before the influence of European settlers began. Their abundance is directly related to healthy aquatic and riparian systems which provide foraging and nesting habitat. Beaver, river otter, mink and muskrat most likely occurred in greater numbers during the early 1900s, due to healthy riparian and aquatic systems.

The Middle Fork Willamette River corridor served as a major riparian connection between the upper Willamette Valley lowlands and the higher cascade drainages such as the North Fork of the Middle Fork, Salt Creek, Salmon Creek, and the upper Middle Fork. This connection was important in providing species movement and genetic interchange throughout the area and between watersheds east and west of the cascade crest.

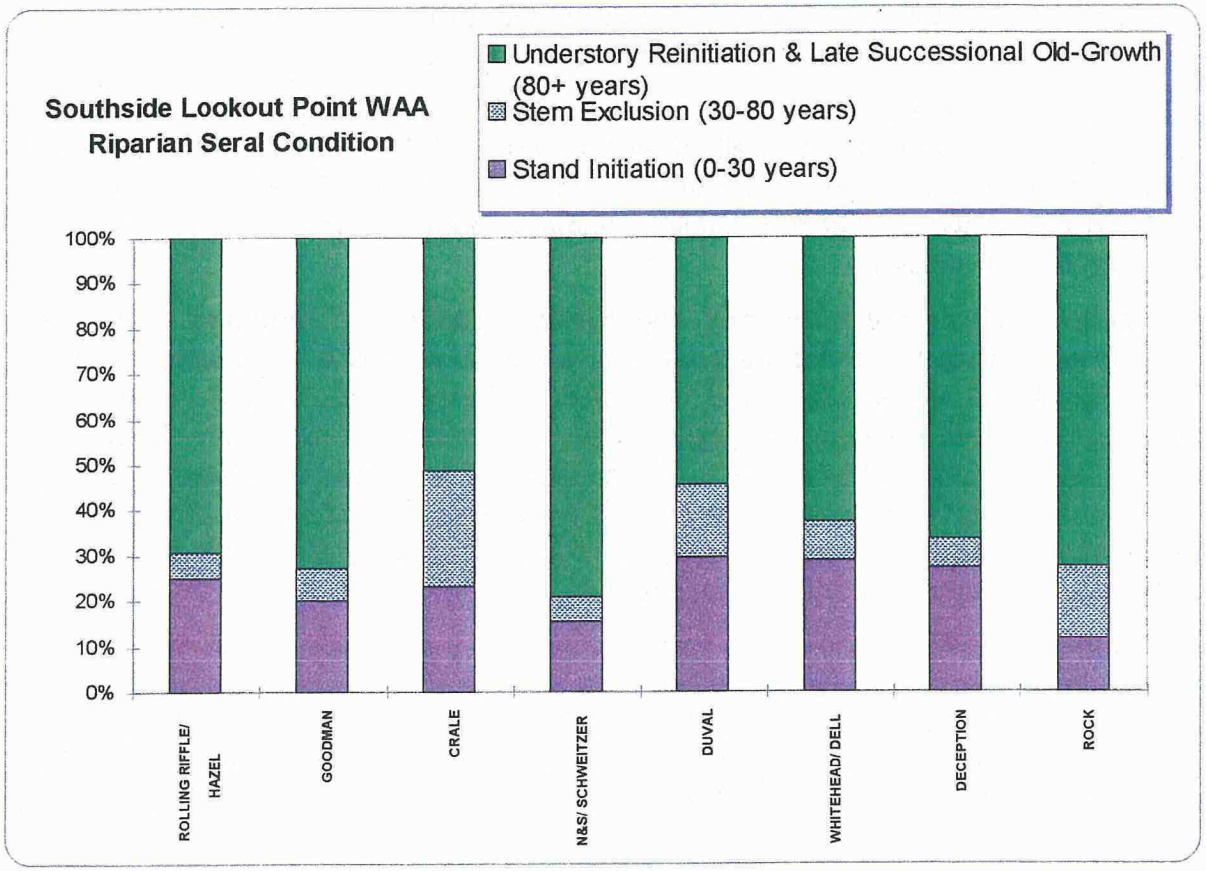
Current Condition

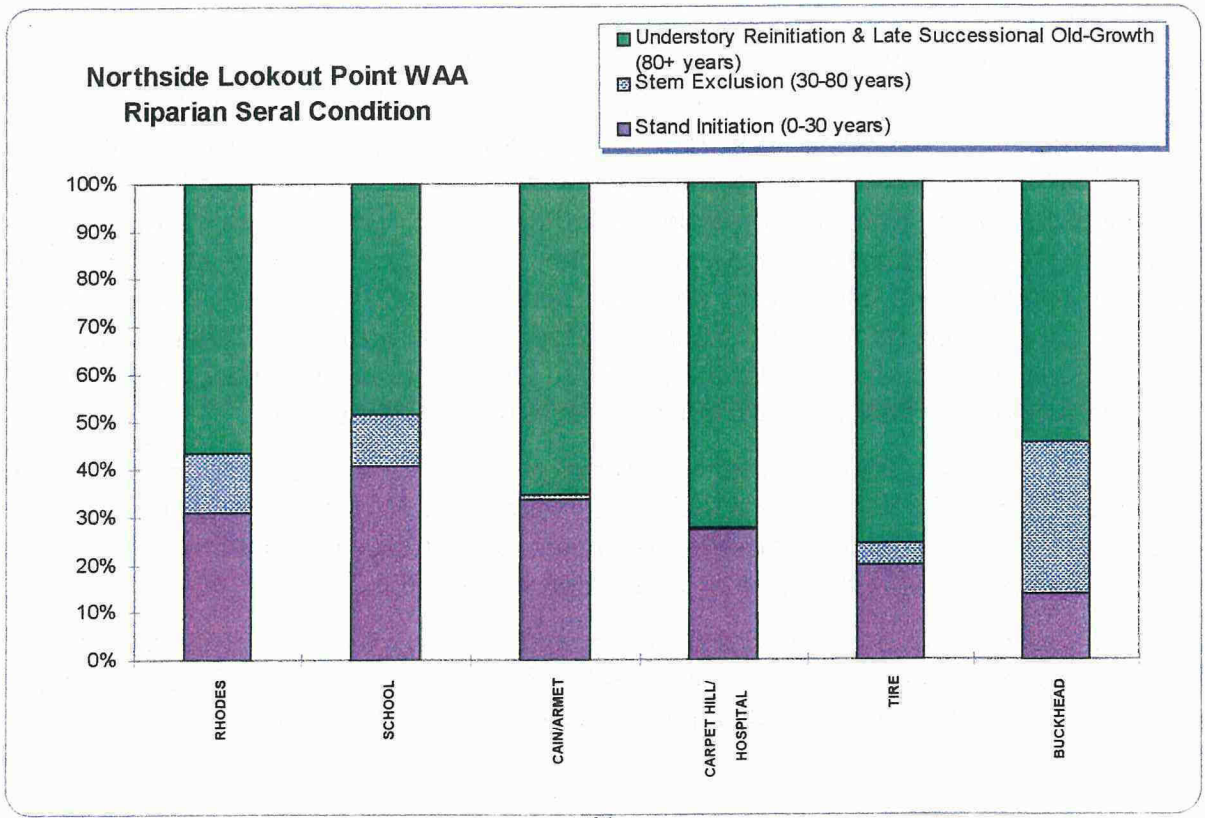
The current seral condition of riparian reserves was determined from GIS data (using acres). Riparian reserves of fish-bearing streams are defined by the height of two site-potential trees (340 feet along both sides of the stream). Riparian reserves along non-fish-bearing streams are one site-potential tree wide (170 feet). Percentages in different seral stages for each drainage are displayed in Figure 11. The data indicates a higher percentage of stand initiation than stem exclusion seral stage. This is reversed from the reference condition of these early and mid seral stages. However, the late seral condition (understory reinitiation and late-successional old-growth) is often equivalent to or exceeds the reference condition of 57%. Crale, Duval, Buckhead, and School Creek drainages have less than the desired older seral condition.

The riparian reserve strategy within the range of the northern spotted owl was developed to provide late successional forest conditions over time to protect aquatic habitat and provide habitat for dispersal of several terrestrial vertebrate species. These include the spotted owl, red tree vole and American marten.

Figure 11 depicts current conditions of the riparian reserve network in the watershed, showing how much of the reserve network has been impacted by past management activities. This analysis was completed using acres as the unit of measurement.

Figure 11. Riparian Seral Condition by Drainage Groups





Map 19 spatially displays impacts to the reserve network by past management activities. The reserve network displayed on this map includes other withdrawn allocations also providing current and potential late successional forest conditions for dispersal.

Lookout Point Reservoir

Lookout Point Reservoir, constructed in 1953, inundated 4,360 acres of agricultural, forest and riparian habitats along with a number of vacated small communities along the river. The annual fluctuations in reservoir water level to support flood control and recreational use have created a fairly "sterile" condition for aquatic dependent wildlife. This reservoir does not have the high recreational use seen in Fall Creek and Hills Creek Reservoirs although a low-water boat ramp has been installed at Signal Point to provide boating access during drawdown periods.

A number of wildlife species are known or suspected to use the reservoir and US Army Corps of Engineer (COE) lands immediately adjacent to the reservoir. These include the Northern bald eagle, Northwestern pond turtle, osprey, Northern spotted owl, red-legged frog, wood duck, red tree vole, pallid bat, Yuma bat, fringed *Myotis*, clouded salamander, sharptail snake, and various waterfowl species using the reservoir as a stopover during seasonal migration.

Terrestrial

Habitat Components and Structure

Reference Condition

Historic vegetation conditions indicate substantial fire history within the WAA *(see Map 15).* A portion of this fire history is suspected to be a result of natural occurrences although a significant portion of the watershed's fire history was attributed to Native American burning. This burning was used to develop and maintain a more open forested condition, beneficial to increased game hunting success and maintenance of fruit and root-bearing plants. Based on age of stands within the WAA, there is evidence that a significant amount of stand replacement acreage was burned in the late 1800s and early 1900s. This fire history could be attributed to Native American burning where burning conditions led to stand replacement events. The historic occurrence of maintenance fires contributed to somewhat lower levels of coarse woody debris (CWD) and snags than currently exist in the same stands. These cool underburns probably aided in keeping fuel buildups to a minimum within these younger forested stands.

Many of the natural stands in existence today are suspected to be low in snags and CWD compared to levels recommended in current plans. This could be due to a combination of fire history and salvage operations in these stands during the last 50 years. Generally speaking, snag and CWD levels in the watershed contributed to healthy terrestrial and riparian systems. Natural recruitment from late successional forest stands provided coarse woody debris for foraging, hiding and denning cover,

benefiting a number of wildlife species such as the American marten, pileated woodpecker and clouded salamanders as well as many invertebrate species. Woody debris recruitment from terrestrial into aquatic systems was a healthy ongoing process, providing an important habitat component to the riparian and aquatic system. As logging and stand management increased in the watershed, activities such as fuels treatment by slash burning or removal of snags and other non-merchantable material, road construction with minimal or no restrictions through riparian areas, and stream cleanout substantially reduced those components which provided optimal microhabitat for many organisms.

Current Condition

Snag and coarse woody debris levels vary substantially within the watershed. Current seral conditions indicate that some areas are potentially low in snag and CWD levels. These include portions of Goodman, Whitehead, Tire, Hardesty, Hospital, Carpet Hill, and Armet Creeks. Refined snag modeling will be needed during planning to determine snag levels with more accuracy.

Connectivity, Dispersal and Interior Habitat Conditions

Reference Condition

Reference vegetative conditions, reconstructed in GIS using stand year of origin information *(see Map 15),* depicts a watershed comprised substantially of early and mid-seral habitat conditions. As previously mentioned, the vegetation conditions at this point in time could be attributed to natural occurring fire and Native American burning to maintain optimal foraging conditions.

The condition of these stands 500 years ago is unknown, but it can be theorized that more late successional habitat existed on the south side of the Middle Fork prior to the 1900 reference year. These stands were contiguous, supplying large amounts of interior habitat for species such as the spotted owl, red tree vole, American marten, goshawk, Cooper's hawk, pileated woodpecker, fisher, vaux's swift, olive-sided flycatcher, Hammond's flycatcher, Townsend's warbler, band-tailed pigeon, and numerous amphibian species. Not only were these and many other species able to breed and reproduce, but they were also able to move, disperse and migrate without major landscape barriers. This provided for well-distributed populations of early and late successional forest dependent species in the watershed.

With the onset of European-American influence and settlement, suitable habitats for late-successional forest related species started to decline. This was largely due to increased forest fragmentation resulting from logging and road construction, degradation of aquatic and riparian conditions, and increased forest fire suppression. Although a relatively high level of early seral conditions existed in 1900, the habitat was more contiguous, thereby providing more interior habitat conditions (early as well as late successional seral stages).

Since 15% of the watershed was estimated to be in an early seral stage condition (stand initiation), early seral stage dependent or contrast species could be as abundant today as they were in 1900. Species abundance in the WAA in 1900 might have been complimented by higher or lower numbers in adjacent watersheds, based on size and location of natural disturbances across the landscape.

Current Condition

The Northwest Forest Plan provides for late successional forest dependent wildlife species movement and dispersal by designation of no-harvest riparian reserves adjacent to Class I-IV streams. Its intent is to maintain healthy riparian systems and provide areas of refuge, movement and dispersal for many riparian as well as terrestrial-associated species. In addition to riparian reserves, other lands set aside within the matrix portion of the watershed complement riparian reserves by providing additional dispersal habitat. These include 100-acre spotted owl core areas within the matrix portion, designated no-harvest LRMP allocations, and unsuited lands currently providing dispersal conditions. The Northwest Forest Plan also directs that the previously established American marten/Pileated woodpecker network revert to matrix lands unless analysis shows a need to retain certain areas (short or long term) to provide specific habitat conditions.

With adoption of the Northwest Forest Plan, the 50-11-40 strategy delineated in the FSEIS (1992) was no longer required. This strategy required every quarter township to maintain at least 50% of the area in stands averaging 11 inches DBH and 40% canopy closure. The USFWS remains concerned with dispersal conditions, not only within the LSRs but also between LSRs. Consultation with the USFWS is recommended when habitat removal or degradation is planned in ¼ townships below the 50-11-40 threshold in identified areas of concern. *(Refer to Northern spotted owl, page 82, for a discussion on dispersal conditions.)*

Further areas of concern are the major ridgetops bordering the watershed. They can be main travel and dispersal corridors for many wildlife and plant species. Winberry Divide, the main ridge between Winberry drainage and the Middle Fork Willamette River, is a main big game travel route and use area. It is also a connector with the Alpine ridge system, eventually extending into the Fall Creek LSR RO219. The ridge defining the southwestern boundary of the WAA is the main divide between the Middle Fork Willamette River drainage and the Coast Fork Willamette River drainage to the south. It provides important habitat for movement and dispersal of plant and animal species from the lowland habitats in the Lost Creek watershed to the Calapooya Divide at the upper end of the Middle Fork drainage above Hills Creek Reservoir. As a result of the riparian reserve strategy in the NWFP, ridgetops may be impacted from concentrated harvest activities in the future, thereby reducing effectiveness of these routes as main travel and dispersal corridors.

Map 20 displays current late-successional forest interior habitat conditions. Interior habitat is defined as stands >80 years in age and having a 100 meter buffer from any edge.

Providing for dispersal and movement of late successional forest wildlife and plant species between Late Successional Reserves is important in maintaining genetic diversity and species health across the landscape. The Lookout Point WAA is located between LSRs RO219 (Fall Creek) and RO222 (south of Highway 58). Currently, a significant combination of human-created features could inhibit successful dispersal between adjacent LSRs. The combined effects of Lookout Point Reservoir, Westfir and Oakridge city limits, Hills Creek Reservoir, Highway 58, and Southern Pacific Railroad could prove to be a significant hindrance to successful long term dispersal between these LSRs. The listed areas are either large tracts of land devoid of late successional forests or narrow strips with high human travel that could deter late successional forest species movement.

Sensitive and Rare Plants

Reference Condition

Human use in the analysis area was concentrated in the lowland riparian zones where Lookout Point Reservoir currently sits and along ridgeline trail systems used by seasonally nomadic tribes (Alpine-Tire Mountain, Mt. June-Hardesty Mountain, and Patterson Mountain Trails). All the USFS sensitive plants may have been encountered by Native Americans or early settlers, but there are no accounts of their use as either medicinal/food plants or as grazing forage.

Current Condition

No plant species listed as Threatened or Endangered by the USFWS occur on the Willamette National Forest. The Forest has a list of sensitive plant species designated by the Regional Forester. The Region's Sensitive Species Program is designed to manage rare species and their habitats to prevent a need for federal listing at a future date. Sensitive species are vulnerable due to low population levels or significant threats to habitat. Table 22 lists sensitive and rare plants found in the analysis area.

Table 22. Sensitive and Rare Plants of the Lookout Point Watershed Analysis Area

Species	Populations	Impacts
Romanzoffia thompsonii	10	Adjacent Trails and Timber Sale Units
Montia howellii	1	Adjacent parking lot and trail
Sidalcea cusickii	1	Adjacent Trail
Phacelia verna	2	Adjacent Trail
Montia diffusa	1	Adjacent Trail

Ten populations of *Romanzoffia thompsonii* are located within the Lookout Point WAA. This species is an annual mistmaiden, residing in rock garden and rock outcrop habitats. Sites always have an abundance of water in the springtime. Thompson's mistmaiden is only found associated with seeps, blooming while they still run (April through June, depending on elevation). Soil development is minimal, usually composed of gravel or scree and found in small pockets of rocky crevices. The substrate on which this plant survives is often a moss mat, most commonly *Bryum miniatum*, with monkeyflowers, plectritis and blue-eyed marys in a plant association called a rock garden.

All populations of *Romanzoffia* are within the Matrix Northwest Forest Plan Allocation. Six populations are in General Forest, three in Scenic and one in a Special Wildlife Habitat (9D) Willamette Forest Plan allocation. All populations are found in special habitats, treated in the Willamette NF land management plan under forestwide standard and guideline FW-211. These habitats and their ecotones will be maintained.

This species is greatly dependent on the hydrologic regime; populations would be devastated if these habitats were to undergo a loss of or change in the water flow pattern. Two of the populations are adjacent to Cloverpatch Trail and three are adjacent to Tire Mountain Trail.

Howell's montia *(Montia howellii)* is a very small resident of ephemeral ponds and puddles. This species tolerates some disturbance (ponding is probably due to compaction) but will not withstand physical destruction of its habitat such as grading or ripping of the roadbed.

The population of montia is located in a Late Successional Reserve Northwest Forest Plan Allocation and a Scenic-Retention foreground Willamette NF Plan Allocation. The habitat is a parking lot for a major trailhead.

Rare and Unique Plants

The Willamette NF also tracks rare and unique plant species with the potential of being listed as Sensitive. These species may be associated with disappearing habitats or they may be common elsewhere and at the edges of their range on the Willamette. They make a major contribution to the overall biodiversity on the Forest. The Willamette Forest Plan directs the Botany Program to create a Forest Watch List for such species (USDA, 1990).

A few of these species are found in the Lookout Point WAA. *Phacelia* is found in rocky areas, characteristic of the high boundaries in the project area's southern portion. Diffuse montia grows in forested habitats which have recently experienced some type of disturbance. Seeds need some type of scarification to germinate (ex. the seed coat may be cracked open by fire or scraped by a machine). Cusick's checkermallow prefers mesic meadow habitats (Hitchcock and Cronquist, 1973).

Survey and Manage Species

Reference Condition

Most of the species designated as survey and manage are associated with old-growth and riparian habitat. It may be that habitat for old-growth associated species has increased during the past 100 years due to fire suppression by early European settlers in the Willamette River valley and Oakridge areas. Prior to this time, it is thought that fires started by Native Americans traveled up to the ridgeline of south-facing slopes and remained in the lower areas of north-facing slopes. We infer from studies in the Santiam drainage (Towle, 1974) that south-facing slopes were composed of oak-savannah habitat with conifers confined primarily to riparian areas and ridgetops. Recent fragmentation of riparian habitat by timber management and related activities, such as road construction, has probably decreased habitat for riparian-dependent species.

Current Condition

The *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA, 1994b) contains a list of species, called survey and manage species, that must be considered when planning projects. A large list of old-growth dependent species was created and effects of alternatives on each species were analyzed by experts during the EIS process (results appear in Table C3 in the NWFP). A survey and manage standard and guideline for all management areas created four categories of survey strategy:

1. *Manage known sites*: in most cases this involves protection of small sites.
2. *Survey prior to ground-disturbing activity*: for botanical elements this refers to projects with decisions made in fiscal year 1999.
3. *Extensive surveys*: conduct surveys to find high-priority sites for management.
4. *General regional surveys*: survey for species to find additional information on habitat and ecology and determine necessary levels of protection.

Botanical survey and manage elements include lichens, bryophytes (mosses and liverworts), fungi, and vascular plants. Information on species distribution is incomplete. The biological importance of these species is just being discovered. Fungi provide food for flying squirrels, the prey base of spotted owls, as well as voles, squirrels, mice, and other small mammals (Maser, *et al.,* 1978). Lichens provide a food source for deer and elk in the winter when grass and shrubs are unpalatable or buried by snow (USDA, 1993). They are also used by flying squirrels, red-backed voles and woodrats (Maser, *et al.,* 1985). Lichens, which contain cyanobacteria as their "algal" symbiont, make nitrogen available in forests where it is a limiting nutrient (USDA, *et al.*, 1993). Bryophytes are important reservoirs of water and nutrients (USDA, *et al.*, 1993) and account for approximately 20% of the total biomass and 95% of the photosynthetic biomass in the forest understory (USDA, 1993). Bryophytes are important food sources for invertebrates and are used as nesting materials for mammals (USDA, *et al.*, 1993).

Lichens are organisms composed of both a fungus and an alga or a cyanobacterium. A number of nitrogen-fixing lichens are found throughout the Forest and are old-growth dependent (Pike, *et al.,* 1975; Lesica, *et al.,* 1991). Although many exact locations are not known, they have been recorded in six locations within the analysis area. Examples are: *Lobaria oregana, Lobaria pulmonaria, Fuscopannaria leucostictoides, Nephroma laevigatum, Pseudocyphellaria anomala,* and *Pseudocyphellaria anthraspis.* These species are epiphytes, so they require retention of standing trees aggregates to maintain a suitable microclimate and provide for dispersal (USDA, 1994a). Their dispersal capability is extremely limited (USDA, 1993). Other lichen species of interest are riparian and closely correlated with hardwood tree species.

One rare nitrogen-fixing lichen *(Lobaria hallii)* is found in the watershed. This species is found on bark and wood of both conifers and hardwoods, usually in riparian areas. The species is one for which the Willamette NF is required to manage known sites (Survey Strategy 1 and 3).

No known survey and manage fungi or vascular plants occur in the watershed. *Allotropa virgata*, the candystick, has potential to occur in the watershed (Survey Strategy 1 and 2). This is a mycotrophic species, a plant with no chlorophyll, which requires an association with another plant for food. The plant grows in the Douglas-fir series and may be associated with western hemlock, Pacific silver fir and lodgepole pine elsewhere. This species is not restricted to old-growth, but the largest populations occur there. It does not tolerate competition and is never abundant. The plant prefers dry, well-drained soils and abundant coarse woody debris (UDSA, 1994a).

Current conditions for riparian species in this WAA are poor compared to historic patterns. The average amount of early seral riparian habitat in the watershed is 33%. Some areas, however, exhibit much higher numbers: School (52%), Crale (49%), Buckhead (45%), Duval (45%), Rhodes (43%), and Whitehead Bride/Dell (38%). This loss of habitat results in very few, if any, remaining trees adjacent to streams and epiphytic species do not have an interior microclimate or habitat. Riparian habitat is highly fragmented so potential dispersal and movement corridors are dissected.

Habitat for late-successional survey and manage species has also changed, with late-successional old-growth (200+ years) increasing from a reference condition of seven percent to its current 30%. However, most of the WAA north of Lookout Point Reservoir (16% of the analysis area) is considered matrix land, so a dramatic reduction in this type of habitat will occur over the course of the next 80 years.

Special Habitats

Reference Condition

Although we have no direct documentation for the previous distribution of special habitats, it is fair to assume that the most common habitat, dry meadows, existed in much greater numbers than they do today. The majority of unique habitats seem to ring the northern and southern reaches of the WAA *(see Map 21).* To the north, the Tire Mountain/Cloverpatch Butte complex of meadows dominates (Willamette Forest

Plan Management Area 9D, Special Wildlife Habitat). In the south an abundance of meadows and rock outcrops are found in the Hardesty/Sawtooth/Mt. June area (Management Area 5b). Recurring fires (set by Native Americans) maintained dry open meadows and prevented conifer encroachment.

The hydrologic regime was probably such that ponds, sumps, wet, and mesic meadows developed over time and remained as sources of unique native vegetation and habitats for some special habitat species obligates. The Winberry Divide and Calapooya Divide probably functioned as a north/south ridgeline corridor for movement of both plant and animal species.

Special habitats were used by Native Americans for food resources (ex. Camas bulbs from mesic meadows and wild onion from dry rock gardens). Selective harvest allowed a continual supply. Using fire as a hunting tool, the Native Americans in the western Cascades manipulated special habitats. As these areas burned along with forested areas, drier habitats burned more intensely then wetter ones. Fires were started in meadows to lure deer and elk in to forage.

Current Condition

Special habitats contribute to the overall biodiversity across the landscape and are important for plants and wildlife. For the most part, these areas are non-forested including meadows, rock outcrops, ponds, and talus slopes. Some special habitats, such as swamps and mineral deposits, are forested.

The Willamette National Forest has recognized the significance of these sites (comprising approximately 1.5% of the Lookout Point WAA) in its standard and guideline FW-211 (USDA, 1990). This S&G states that these sites will be maintained or enhanced (repaired) and their ecotones buffered from management activities.

Special habitats were mapped and given general habitat types using aerial photo interpretation. Dry meadow complexes are the predominate special habitat in the Lookout Point WAA, accounting for close to 420 acres. Others such as dry rock gardens, hardwood complexes, mesic meadows, rock outcrops, and shrubby areas appear in lesser amounts.

Table 23 depicts location and acreage of special habitats. Maintaining or "reclaiming" special habitats is crucial to retaining biodiversity across the landscape in the Pacific Northwest. Various wildlife species have evolved to be either partially or totally dependent on these habitat types for a portion or all of their life histories. It is suspected that some land slugs are dependent on rock slides or talus slopes for a major portion of their life histories. Perennial or intermittent ponds are crucial to the reproduction and larval development of many frogs and salamanders. These ponds also provide a source of insect forage for many species of bats and passerine birds. Dry meadow complexes are important foraging areas for kestrels and great gray owls because they support small mammal prey species such as gophers and voles. Snags and coarse woody debris are important for a long list of wildlife species. They serve as homes for many primary and secondary cavity-nesting birds. Insects and fungi are

decomposers of dead wood which eventually contributes to long-term site productivity. Marten use dead and downed wood for foraging, denning and resting.

Table 23. Special Habitats of Lookout Point Watershed Analysis Area

Habitat Type	Acreage	Number in Watershed
Dry Meadow	419	77
Dry Rock Garden	69	20
Rock Outcrop	65	14
Shrub Alder and Maple	66	9
Mesic Meadow	37	10
Hardwoods	36	6
Talus	19	5
Opening in Canopy	48	15

It is evident that past management activities have affected special habitats. Until the early 1900s, fire played an active role in maintaining dry meadow complexes, such as those found around Tire Mountain, Cloverpatch Butte and Hardesty Mountain. Although the geology of the area indicates shallow soils and low potential for establishment of conifers in these areas, it is probable that since the advent of fire suppression these meadows have started to experience encroachment of conifers, thus affecting habitat availability for certain wildlife species.

Functions of each type of special habitat delineated previously, and the wildlife species which use them, are outlined in the Special Habitat Management Guide (Dimling and McCain, 1992).

Figure 12. Cloverpatch Bluffs from Hampton Boat Launch

To determine the effects of management on special habitats, an analysis was completed using GIS to see if habitat features intersect roads and/or managed stands. The results are found in Table 24. Roads and trails bisect rock gardens, hardwoods, mesic and dry meadows, rock outcrops, and shrub talus. Timber harvest units surround hardwoods, dry meadows, mesic meadows, rock outcrops, and shrub alder.

Table 24. Percent of Special Habitats Intersecting with Roads and Managed Stands

	Acreage Affected	
Habitat Type	Roads	Managed Stands
Dry Meadow	53%	5%
Dry Rock Garden	37%	0%
Rock Outcrop	32%	2%
Shrub Alder and Maple	0%	41%
Mesic Meadow	84%	5%
Hardwoods	14%	64%
Talus	53%	0%
Canopy Opening	6%	44%

Non-Native Species

Reference Condition

At the turn of the century, no non-native species were known to have occurred within the WAA. Any non-native species currently existing in the analysis area was introduced as European people started to enter the area commercially.

Current Condition

Non-native animal species are found in the watershed and potentially affect wildlife species populations. Warm-water fish, such as bass introduced into Lookout Point Reservoir, potentially impact successful recruitment of young pond turtles into the reservoir population due to predation or competition for a very limited food supply resulting from annual water fluctuations. On the positive side, non-native warmwater fish in the reservoir provide a foraging source for bald eagles, herons, mergansers, and kingfishers. Bullfrogs, seemingly very abundant in areas of the project area (especially in the Buckhead Special Wildlife Habitat Area), also affect both turtle and amphibian survival and recruitment into adult populations due to predation.

The starling, a non-native avian species from England; is known to out-compete purple martin for nesting locations in cavities. Purple martin are associated with larger rivers and lakes, essential as foraging areas for insects. Nest sites are generally located immediately adjacent to foraging areas. Although suitable purple martin nesting habitat has been reduced in the watershed with snag removal and fire suppression, the opportunity to increase potential nesting sites does exist through snag creation and nest box placement adjacent to the reservoir and the Middle Fork/Buckhead area above the reservoir. Ideally, this would occur synonymous with holding starling levels in check.

Non-native botanical species of concern include two species of blackberry: Himalayan and evergreen. These species have encroached upon some former riparian areas, namely the Buckhead Wildlife area along North Shore road, as well as many places along the reservoir. They have the potential to outcompete native vegetation and may have an adverse impact on wildlife species. Control of these species has been confined to the eradication of outlying plants.

Noxious Weeds

Reference Condition

Noxious weeds have increased in abundance since the turn of the century. Established weed species have been present in the watershed for years. Scotch broom was introduced as an ornamental shrub and an erosion control agent in the 1920s (Miller, 1995). St. John's-wort has been a medicinal herb for many years; it was probably a garden escapee. Thistles traveled west as contaminants in alfalfa and other crop seedbags and came into Portland in the ballast of sea-faring vessels (Forcella and Harvey, 1988). Most of these species would have been considered newly invading species in the 1930s. Knapweed, toadflax and giant knotweed were probably not found anywhere on the forest.

Current Condition

The Willamette National Forest initiated an Integrated Weed Management Program in 1993. The Forest Plan S&G directs that sites be identified and analyzed for the most effective control methods based on site-specific analysis of weed populations (USDA, 1993a).

The highest priority species for treatment are new invaders: those weeds in early stages of invasion which have not naturalized to the point of resource damage. Spotted knapweed *(Centaurea maculosa)* is located in two areas within this WAA (along the Highway 58 corridor and on Road 5847/547) and meadow knapweed *(Centaurea pratensis)* is found on Road 5824/120. A third new invader, giant knotweed, is known upstream within the WAA and will most likely move into the analysis area. This species is located in the town of Westfir, growing in gravel bar islands, and along the shore of Middle Fork Willamette River.

Control methods for new invaders are site dependent. Some spotted knapweed populations occur near known bull trout habitat, adjacent to Lookout Point Reservoir. These populations will be controlled manually. Other populations along the highway corridor may be sprayed with herbicides.

Other species found within this analysis area are termed *"established infestations."* These weeds have spread to the point where eradication is impossible and resource damage is unacceptable. Established weeds include Canada thistle, bull thistle, tansy ragwort, Scotch broom, and common St. John's-wort.

The most common established weed is Scotch broom, which may be found in any disturbed site but is most commonly associated with clearcut logging units, landings and roads. Scotch broom competes with young conifers in plantations. This species is found throughout; no area has escaped. Other weed species associated with plantations include Canada thistle, bull thistle and tansy. All are generally outcompeted due to lack of sunlight in moderately young (40 year) forest plantations. St. John's-wort can be found in these sites, but is also common in meadow habitats which often harbor natural soil disturbers such as groundhogs and mountain beavers. St. John's-wort, once established, has the ability to outcompete native species, causing a severe reduction in the biological diversity of a site, especially in the rock garden habitats found in this analysis area.

Due to the sheer amount of acreage these infestations cover, treatment methods are limited primarily to biological control. This type of control involves the use of insects which naturally feed on the plant or its seeds, eventually causing an equilibrium in population numbers. Records of biological control releases indicate that insects have been released in the Lookout Point WAA since 1988. Seed weevils and flea beetles have been released for control of Scotch broom and tansy respectively.

Alternative methods have been used to locally control established infestations. These include manual cutting of large Scotch broom in the meadows above North Shore Road and hand-pulling of tansy. Experimental prescribed burning of St. Johns-wort and Scotch broom will also be used as a control method to determine whether St. Johns-wort is susceptible to fire and if the Scotch broom seed bank may be flushed out. These methods are more costly and will be used primarily in areas of biological interest or concern such as meadows, riparian areas and sensitive or rare plant and animal habitats.

Big Game

Reference Condition

The Columbia white-tailed deer *(Odocoileus virginianus leucurus)* is currently listed as threatened by the US Fish and Wildlife Service. The two main populations occurring in the Northwest are along the lower Columbia River in Washington and in Douglas County near Roseburg. This species prefers oak woodland/grassland ecotones and riparian habitat in coniferous forests. Historically, it was suspected to occur throughout the lowlands in and adjacent to the Willamette Valley. The low lying areas of this analysis area, historically composed of oak savanna lowlands and brushy river bottomlands, was probably prime habitat for this species. Reservoir construction and fire suppression has reduced potential habitat for this species in the WAA.

A historical perspective of Roosevelt elk population levels in western Oregon presented by the Oregon Department of Fish and Wildlife (ODFW, 1992) indicates that the species was numerous and widely distributed in western Oregon prior to the arrival of European settlers. During the late 1800s, market hunting for elk and human encroachment on their range substantially reduced elk population levels to a few small

herds along the coast and in the Cascades by 1900. In 1909, the Oregon State Legislature banned elk hunting in the state. This closure continued until 1938, when hunting was reopened on a limited basis. During the closure period, elk populations recovered substantially due to some transplanting efforts but mainly by virtue of an increase and expansion of remnant elk populations. Population trends continued to rise into the 1960s with a dip in numbers occurring in the 1980s. Overall trends have been on the rise in western Oregon up to the present.

The Fall Creek Watershed Analysis (USDA, 1995) modeled big game for the watershed. Modeling indicated that habitat conditions in the early 1900s were capable of supporting more abundant big game populations than current habitat. Lookout Point WAA differs somewhat from Fall Creek, having more acres in early seral conditions due to historic fire occurrence. Modeling was not conducted for big game reference conditions in this WAA, but is suspected that it would show higher habitat values than current indices. This would suggest that big game populations were higher in the past, although historical records and information do not support this. The model used has been built and structured around management activities and responses of big game to these actions. The fact that historical vegetation was composed of large contiguous tracts of forage, hiding and thermal habitat coupled with very low open road densities created high habitat values in the modeling process.

Current Condition

Lookout Point WAA is relatively low in elevation, lying mostly within big game winter range. Currently, 22% lies within summer range (10,805 acres) and 78% lies within winter range (38,156 acres). Summer/winter range division was delineated using the 3,000 feet elevation contour as a base and then adjusting this line based on aspect, slope, topography, and general knowledge of big game use *(see Map 22).* Main areas of documented activity for Roosevelt elk are:

1. The entire portion of the watershed north of Lookout Point Reservoir and the Middle Fork Willamette River is high use winter as well as summer range. This is primarily due to high percentage of south slopes based on drainage topography and low elevation of most of the north shore area.
2. The Patterson Mountain area is high use summer range and provides a mix of conifer stands and special meadow habitats in a small unroaded area.
3. Portions of Whitehead and Dell Creeks are also high use areas due to favorable topography and forage/cover ratios.

The Willamette NF Land and Resource Management Plan guides management of big game habitat in its standards and guidelines. It requires habitat analysis using four habitat components: forage quality, cover quality, road densities, and the spatial arrangement of forage and cover areas relative to each other. These parameters are evaluated using the *Model to Evaluate Elk Habitat in Western Oregon* (Wisdom, 1987). Modeling is accomplished for previously designated Big Game Emphasis Areas (BGEAs). There are eight BGEAs in the analysis area, varying from low to high

emphasis, based mainly on elk use and habitat condition of the area. Habitat conditions using the Wisdom model have been analyzed on the two emphasis areas north of the reservoir and river. These are both high BGEAs. Analysis was not completed for the emphasis areas south of the reservoir and Highway 58 with the exception of identifying open road densities. This area is all within LSR RO 222 where habitat objectives are focused on development of late-successional forest habitat and not on management of habitat for big game.

Table 25 displays current conditions of the two high BGEAs located north of the river and also lists current open road densities on those BGEAs south of the reservoir and river *(see Map 36).*

Table 25. Big Game Habitat Effectiveness Values for Current Conditions in the Watershed
(Standards and Guidelines from Willamette NF LRMP)

Habitat Condition	Forage Quality	Cover Quality	Road Density	Size & Spacing	HEI	Forest S&G HEI	Comments
School/Armet/Hospital High Total Ac. 7,240	.39	.60	.34	.87	.51	.6	Road density and forage quality below S & G of .5
Tire/Buckhead High Total Ac: 8,524	.43	.67	.51	.78	.58	.6	Low forage quality
West Goodman Moderate Total Ac: 5,828	LSR	LSR		LSR	LSR	LSR	S & G of .4 = 2.8 miles/mile^2 of open road
East Goodman/Crale Moderate Total Ac. 6,990	LSR	LSR		LSR	LSR	LSR	S & G of .4 = 2.8 miles/mile^2 of open road
Hardesty Low Total Ac. 4,164	LSR	LSR		LSR	LSR	LSR	S & G of .2 = 4.6 miles/mile^2 of open road
Duval Creek Moderate Total Ac 3,565	LSR	LSR		LSR	LSR	LSR	S & G of .4 = 2.8 miles/mile^2 of open road
Rock/Whitehead/West Deception Creeks High Total Ac: 8,092	LSR	LSR		LSR	LSR	LSR	S & G of .5 = 1.9 miles/mile^2 of open road
East Deception Low Total Ac: 4,557	LSR	LSR		LSR	LSR	LSR	S & G of .2 = 4.6 miles/mile^2 of open road

Legend	High	Moderate	Low

Other Terrestrial Species

The following are threatened, endangered and sensitive species known or suspected to occur within the analysis area. Included in the discussions of each is current information on status and survey history and the potential for future occurrence of listed species based on vegetation trends and land allocations in the NWFP. Also included are species of interest or concern, documented or suspected to occur in this WAA. Refer to Table 38, in Appendix D for species currently listed under the Endangered Species Act. Also listed are those recently included as Category 2 species (USFWS, 1995).

American Peregrine Falcon (Falcon peregrinus anatum)

Current Status

No active peregrine nest sites are known to exist within the project area. In the Pacific states, preferred peregrine falcon nesting sites are sheer cliffs 150 feet or greater in height (USDA, 1987). In 1981, the Oregon Department of Fish and Wildlife completed an aerial reconnaissance of cliffs on the Forest and identified those with nest site potential. None were located on the Lowell Ranger District. In 1991, another aerial survey for peregrine nesting sites was conducted by Joel Pagel. Only one site on the district, in the Portland Creek drainage, was identified as having moderate potential for nesting.

The peregrine falcon feeds almost exclusively on birds, many of which are associated with riparian zones and large bodies of water. Presence of the reservoir provides potential foraging sources for the bird.

In 1995, field reconnaissance was conducted on the ground to assess potential sites for peregrines. The district has expanded the list of potential sites to eight, and monitoring these sites will continue in subsequent years. Four sites have been identified as having some potential within the WAA. Monitoring is ongoing to determine if these sites exhibit any signs of use by peregrines.

Future Trends

The potential exists for peregrines to forage above and adjacent to the reservoir. With potential nest sites identified in the WAA, the reservoir could prove to be a preferred foraging area for birds nesting in surrounding areas.

Northern Bald Eagle (Haliaeetus leucocephalus)

Current Status

Three active eagle pairs are suspected to use portions of the WAA for nesting and/or foraging. The Eagle Rock pair, nesting adjacent to Dexter Reservoir, uses the lower end of Lookout Point for foraging. This could include areas as far up the reservoir as the Goodman Creek inlet. The Hampton pair has nested in the area of Hampton/Duval Creek since 1990 with successful reproduction documented in the majority of these

years. The Ferrin pair, located on the Oakridge RD, are suspected to forage along the Middle Fork as far downriver as the upper end of the reservoir.

Anthony, *et. al.* (1982), recorded that in the Pacific recovery area, resident bald eagle habitat requirements include a nest site in an uneven-aged (multi-storied) stand with old-growth components. Nest trees are usually larger than those trees in surrounding stands (USDA, 1987) and have thick, stout limbs which can support nests weighing in excess of several hundred pounds and up to ten feet in diameter. These nests are located near bodies of water which support an adequate food supply (USDI, 1986). The majority of nests in Oregon are located within a half mile of a body of water; the mean distance of nests in the Cascade Mountains is 470 yards. All forest lands within 1.1 miles of the shoreline surrounding a major body of water can be considered potential bald eagle nesting habitat (USFS, 1987).

Future trends

The Pacific Bald Eagle Recovery Plan (1986) lists one target recovery territories for Lookout Point Reservoir. With the adjacent foraging territories of the three active eagle sites, it is unlikely that enough habitat exists within the WAA to support an additional pair of nesting eagles. Current foraging patterns and examination of prey remains collected at the Hampton nest site indicate a significant reliance on warmwater fish species (coarsescale suckers and northern squawfish). Trends would suggest that continued occupation and successful breeding of the Hampton site and foraging by the two adjacent eagle pairs hinge on an adequate food supply in the reservoir. The Hampton eagles seem adapted to the constant highway and railroad noise based on their successful reproductive history. Concerns are surfacing over the increased off-highway (OHV) motorcycle and vehicle use occurring immediately adjacent to the nest site within the reservoir draw-down zone. This should be addressed in cooperation with the US Army Corps of Engineers to develop a plan of recreational use within the draw-down zone of the reservoir.

Northern Spotted Owl (Strix occidentalis caurina)

Current Status

There are 22 known spotted owl activity centers within the watershed. All are located on USFS lands. No known activity centers occur on COE lands. The USFWS addresses habitat removal adjacent to activity centers using *"Incidental Take"* thresholds, commonly known as *"Take."* Removal of suitable habitat where remaining habitat is below 40% within a 1.2 mile radius of the activity center constitutes *"take"*. Table 26 displays activity centers by land allocation and amount below *"Take"* thresholds.

Table 26. Number of Spotted Owl Activity Centers Above or Below "Take" Thresholds

Owl Habitat Remaining	Matrix	LSR	Total
30% to 40%		1	1
41% to 50%	3	7	10
> 50%	5	6	11
TOTAL	8	14	22

All USFS matrix activity centers are protected by designated 100-acre cores, with the exception of two: one discovered in 1996 in near Cloverpatch and the other discovered in 1995 in the Buckhead area. These two sites are protected with interim 70-acre cores but do not have 100-acre core status.

By definition, suitable spotted owl habitat ranges from mature stands with a developing second story and some larger overstory trees, snags and coarse wood to old-growth stands with a component of large diameter trees, snags, downed logs and decadent, decaying trees. Such stands would meet nesting, roosting, foraging, and dispersal requirements of the spotted owl. Federal lands currently support 26,333 acres (55.7%) of suitable spotted owl habitat within the watershed. This figure differs from the amount of late successional forest (63.0%) present in the watershed. The difference originates in the GIS layer used to compute acres. Late successional forest was computed from the vegetation layer and suitable owl habitat was calculated from the district spotted owl habitat layer. Designation of spotted owl habitat in GIS should be reevaluated based on field reconnaissance to more accurately represent owl habitat, especially in the Hardesty Mountain area.

Critical Habitat

Map 25 displays current spotted owl habitat conditions within the WAA. Overall, 55.7% of the watershed is considered suitable habitat.

Portions of Critical Habitat Units OR-18 and OR-20 are found within the WAA *(see Map 26)*. Approximately 30,431 acres (61.9%) of the watershed lies within these two critical habitat units.

Protocol survey status in the watershed

Over the years, spotted owl survey history has been somewhat fragmented on USFS lands in the analysis area. Survey efforts have been concentrated within the matrix portion of the WAA since 1990, due to the cessation of timber sale planning south of Highway 58 with the adoption of the ISC strategy and subsequent LSR designation from the NWFP. Protocol work is currently outdated in most portions of the LSR and in selected areas of the matrix such as Buckhead, School and Rhodes Creeks.

Dispersal Habitat (11-40) Condition in the Watershed

Table 27 displays percent of acres meeting the 11-40 condition within WAA boundaries. Map 23 depicts values of 11-40 in those drainages. The basic assumption underlying the analysis was that all stands of at least 40 years old meet 11-40 conditions. Table 28 displays 11-40 conditions on federal lands by ¼ townships overlapping the watershed *(see Map 24).*

Table 27. Current Spotted Owl Dispersal (11-40) Conditions within the Watershed

Drainage	% Dispersal
Rhodes	61.9
School	54.7
Cain/Armet	68.8
Carpet Hill/Hospital	61.4
Tire	74.2
Buckhead	60.5
Rolling Riffle/Hazel	70.2
Goodman	74.0
Crale	61.0
North/South/Schweitzer	84.8
Duval	62.8
Whitehead/Bridge/Dell	61.5
Deception	67.6
Rock	64.8

Table 28. Current Spotted Owl Dispersal (11-40) Conditions on Federal Lands by ¼ Township.

Legal Location	%	Geographic Area
T20S R1E NE	61.6%	Rhodes Creek
T20S R2E NW	62.6%	School/Carpet Hill Creeks
T20S R2E NE	69.1%	Cloverpatch/Tire Mountains
T20S R2E SW	56.3%	Cloverpatch Bluffs
T20S R2E SE	61.0%	Tire/Burnt Bridge Creeks
T20S R3E SW	62.3%	Upper Buckhead Creek
T21S R2E NE	53.0%	Lower Buckhead Cr.

Great gray owl (Strix nebulosa nebulosa)

Current Status

The great gray owl is primarily a northern arboreal forest owl and is relatively uncommon west of the Cascades. It is the largest, but not heaviest, owl of the northern forest. Great grays inhabit densely forested edge habitat where exposure to direct sunlight and predators is minimized. This owl is associated with natural meadows, meadow complexes and recently harvested stands where small ground dwelling mammals, primarily voles and pocket gophers, are abundant. The owl's foraging strategy includes perching on low limbs, usually seven to twelve feet high, on the edge or in the interior of natural openings, and preying upon small mammals as they surface. Dense stands adjacent to these foraging areas may be necessary to facilitate efficient utilization of energy in transporting prey to the young or female during nesting. Few studies have been completed on the west side of the Cascades and habitat requirements are still in question.

The great gray owl has often responded to individuals conducting spotted owl surveys in the watershed. Three areas with documented activity are Tire Creek, Patterson Mountain and lower Duval/Schweitzer Creek. Numerous responses over multiple years have been elicited in the Tire Creek area, although follow-up visits to determine location and nesting status have been unsuccessful. Survey protocol work has been completed in Carpet Hill Creek in conjunction with this planning area. A Jobs-in-the-Woods project was funded in 1996 to place great gray owl nesting platforms in optimal habitat areas on the district. A number of platforms were placed in the Tire Creek and Patterson Mountain areas to enhance nesting habitat.

Future Trends

Great gray owls west of the Cascades are thought to inhabit stands similar to the Northern spotted owl. Potential great gray owl habitat exists in the watershed, associated with natural meadows in the Tire Mountain, Patterson Mountain and Cloverpatch Butte areas. Protection buffers surrounding any known owl locations will be implemented. Special habitat buffers adjacent to natural meadows or meadow complexes should provide some foraging and nesting habitat. As stands are harvested, foraging habitat will become available, but it is uncertain whether the owl will use these areas in conjunction with adjacent available nesting habitat. Nesting conditions may be improved by placing constructed nest platforms in areas where great gray owl potential is highest. Meadow complexes in the watershed should be assessed to determine the degree of meadow encroachment and whether prescribed fire will aid in retarding or halting the encroachment process.

Goshawk (Accipiter gentilis)

Current Status

Goshawks inhabit forested areas throughout the northern hemisphere and in the Pacific Northwest, where they use mountainous coniferous forests. This bird, one of three

Accipiter hawks suspected to occur in the watershed (along with Cooper's and Sharp-shinned hawks), is a very aggressive hunter primarily foraging within the canopy for small mammals and birds. There is a growing concern that timber harvest and related activities are causing the decline of goshawk populations, although research and monitoring information does not adequately address this issue in the Northwest. Mature and old-growth forests with closed canopies are often selected for nesting, although the birds have been documented to nest in younger managed stands with closed canopies.

Goshawk surveys were conducted in a number of potential stands in 1993. This was a "one shot" effort due to budget constraints in subsequent years. The stands surveyed were in Schweitzer Creek, Duval Creek and Patterson Mountain areas. Responses were elicited from adults and young in Duval Creek adjacent to the Lawler Trail, although the nest location was not found.

Future Trends

Goshawks have been documented in the WAA. There is a moderate to high potential for goshawks to exist within the watershed in the future. With approximately two thirds of the watershed exempt from timber harvest, goshawk habitat, in the form of larger contiguous stands of late successional and old-growth forests, will become available.

Pacific Western Big-eared Bat (*Corynorhinus townsendii townsendii*)

(also known as Townsend's Big-Eared Bat)

Current Status

Although Pacific Western Big-eared bats are the most characteristic bat in caves of the western US, the small amount of historical population data available indicates a decline in numbers. Caves and cave-like structures are critical habitat for these bats as hibernacula in winter and as roosts for summer nursery colonies (Perkins, 1987). Pacific Western Big-eared bats are also known to roost in the bark crevices of large snags.

Historical evidence indicates the presence of isolated populations of Pacific Western Big-eared bats in Lane County and on private land adjacent to the Willamette National Forest (Perkins, 1987). A general survey of Lane County and the Willamette NF was conducted by Perkins during the summer and winter of 1983-84. In Lane County, hibernacula of this bat were found on private land adjacent to the Willamette NF and near Bohemia Mines on and adjacent to the Umpqua NF (Perkins, 1987). Four recent Pacific Western Big-eared bat sites have been recorded on the Lowell Ranger District, one of these within the watershed. This site is an old crystal mine shaft where a bat was detected in 1989. This old shaft continued to receive sporadic human use during the 1990s and it was thought that closure of the shaft was needed to enhance shaft habitat for bat use. A gate was designed and installed in 1995 to prevent human entrance yet provide bats with access to the cave. Vandalism has occurred at the site since the gate was installed, so the effectiveness of this closure is uncertain. Monitoring will continue to determine effectiveness of this project.

Future Trends

The previously mentioned mine and other potential areas should be protected in the future. Any subsequent sites discovered in the WAA should be protected from site alteration by timber harvest, recreation, etc. Substantial foraging habitat for this and other species of bats exists in the project area; therefore habitat components to enhance roosting opportunities should be developed. This could take the form of providing large snag and bridge habitat.

California Wolverine (Gulo gulo luteus)

Current Status

At the present time, no wolverine studies have been conducted in the Cascades. The most recent and comprehensive study was in northwestern Montana, conducted by Hornocker and Hash (1981) during 1972-1977. Wolverines appear to be extremely wide-ranging, and unaffected by geographic barriers such as mountain ranges, rivers, reservoirs, highways, or valleys. For these reasons, Hornocker and Hash (1981) conclude that wolverine populations should be treated on a regional rather than local basis.

Wilderness or remote country where human activity is limited appears essential to the maintenance of viable wolverine populations. High elevation wilderness areas appear to be preferred in summer, which tends to effectively separate wolverines and humans. The greatest impacts on the potential of land to support wolverines in the Pacific Northwest are largely forest fragmentation, settlement and access (Banci, 1994). Wolverine populations on the edge of extirpation usually have been reduced to areas of habitat which have not been developed, extensively modified or accessed by humans through roads and trails. The perception of the wolverine as a high elevation species usually coincides with areas of increased human disturbance and loss of habitat, restricting them to wilderness and inaccessible areas. In winter, wolverines move to lower elevation areas which are snowbound with very limited human activity. Wolverines make little use of young, thick timber and clear-cuts (Hornocker and Hash, 1981).

Lowell Ranger District is relatively low in elevation with few areas not impacted by human activities. Most of the area has been fragmented and large blocks of intact mature timber stands are rare. There are no known sightings of wolverine on the district correlating with known habitat requirements described above.

Future Trends

With the largest contiguous LSR network designated by the NWFP located in this watershed (LSR RO-222), potential exists for wolverines to inhabit or use this area in the future. Although the habitat might develop and be conducive to wolverine use, the concern remains that high road and trail density and use could prove to be a disturbance barrier, reducing the potential for this species to inhabit this portion of the watershed.

White-footed Vole (*Phenacomys albipes / Arborimus albipes*)

Current Status

Very little is known about the natural history of the White-footed Vole. *Phenacomys* is thought to be one of the most primitive of living Microtines and unable to withstand much competition. Preferred habitat seems to be moist areas near small streams in mature timber or pole-sized regeneration stands (Maser, 1966). Specific studies of the White-footed Vole have not been accomplished, and all trappings of this vole have been accidental. It is suspected that if such studies were undertaken this vole might be more prevalent than is currently believed (Verts, 1990).

Two specimen of the White-footed vole have been collected on or near the Willamette NF. One was found near Vida; the other on the Blue River District. It is thought that this is the easternmost extent of their range (Maser, 1966). Most of the known specimen of *P. albipes* in Oregon are west and north, primarily near the Pacific Coast.

Surveys for the White-footed vole have not been conducted on the Lowell District or within the analysis area. Voles are known to favor riparian associated habitat, although they have also been found in a variety of other forest conditions including logged areas. It is likely that trends for this species in the WAA will be positive, due to the extensive areas of suitable habitat existing or developing in the future as a result of no-harvest allocations.

Pacific fisher (*Martes pennanti pacifica*)

Current Status

The fisher has the potential to occur within the WAA although surveys have not been undertaken to document its presence at this time. They prefer a closed canopy environment with diverse stand structure including large diameter snags and trees with cavities for use as denning sites. Highly diverse stands with adequate amounts of coarse woody material are important in providing foraging habitat for the fisher. They are associated with low and mid-elevation forests of the western hemlock zone. The fisher has been affected by past logging and forest fragmentation, along with increased human access and disturbance patterns in western forests.

Future Trends

Very little is known about relationships between fishers and their habitat in the Pacific Northwest but it is suspected that fisher populations have declined on federal lands due to loss of habitat from forest fragmentation and removal of CWD and snags from cutting units and adjacent natural stands. On the westside of the Cascades the fisher shows a higher affinity for low to mid-elevation hemlock forests than the American marten. Habitat for this species should increase over time in the no-harvest LSR and riparian reserve allocations, thus providing for an increased potential for the species to inhabit the LSR portion of the watershed.

American marten (Martes americana)

Current Status

The marten is another carnivore potentially occurring within the watershed. This species shows a strong preference for large patches of late successional forest which include adequate amounts of larger coarse woody debris in various decay classes. No surveys for the species have been conducted but suitable habitat does exist.

Future Trends

The marten is more abundant and has a wider distribution in the Northwest than the fisher. More information is available on its ecology and habitat preference. The marten shows a strong affinity for late successional forest habitat with its associated components of snags and CWD in various decay classes. They are also strongly associated with forested riparian habitat. The withdrawn allocations (>83% of USFS lands in the watershed) could provide for adequate marten foraging and dispersal in the future. Current condition of these areas requires some time for riparian habitat on federal lands to recover. Eventually, habitat will become available for foraging and dispersal, especially in the higher elevations where marten are more likely to be found.

Oregon red tree vole (Phenacomys longicaudus)

Current Status

The red tree vole is the smallest and least studied of the arboreal rodents of Douglas-fir forests in the Pacific Northwest. They feed exclusively on conifer needles. They are strictly arboreal and may spend their entire life in tree tops. Logging and loss of late successional habitat has had an effect on vole populations in the northwest due to fragmentation and loss of old-growth habitat. The vole's main predator is the spotted owl. Spotted owl pellet analysis in the H. J. Andrews Experimental Forest indicates that the vole constitutes 13% of the spotted owl diet.

The Regional Ecosystem Office has recently issued a memorandum (10/96) adopting interim guidance for the red tree vole consistent with page C-5 of the Northwest Forest Plan Standards and Guidelines. The intent is to provide short term direction for survey and management of the vole in 1997 and 1998. This guidance identifies two screens that would trigger the need for vole surveys prior to ground disturbing activities. The first screen stipulates that at least 10% of the land in a fifth field watershed must be in federal ownership before habitat analysis is required. In addition, if federal ownership is less than 10% and lands are not connected to federal lands in adjacent watersheds, then management of red tree voles is not required. If these conditions are met, the second screen identifies a potential red tree vole habitat threshold that is required to defer survey requirements. This habitat threshold specifies that a minimum of 40% of federal land within a fifth field watershed is forested and

a) has greater than 60% canopy closure,

b) has an average DBH (diameter at breast height) of 10" or greater, and

c) these stands can be maintained through the end of the year 2000.

If these criteria are met, then site specific surveys are not required.

A Forest-wide red tree vole habitat analysis was conducted in November, 1996 at the fifth field watershed scale. The analysis revealed that 71% of the watershed exists in stands that meet the minimum criteria mentioned above. This is well above the 40% minimum threshold that would trigger red tree vole surveys. *Thus, red tree vole surveys are not required in this watershed prior to ground disturbing activities.*

Future Trends

The red tree vole shows an affinity for late successional old-growth forests, although it can also be found in older managed stands. Human-caused or natural disturbances (ex. fire, wind, disease) would tend to greatly reduce local populations of this species. Since approximately 83% of the watershed is in a no-harvest allocation, this species should maintain or increase its abundance within the WAA

Other Mammals

Current Status

Five species of bats, listed as species of concern and identified in Appendix J2 of the FSEIS, are suspected to occur within the watershed. They are listed in Table 38, page 143, in Appendix C. Habitat requirements vary among species. The hoary and silver-haired bats are migratory species which could be present during summer months. Both are associated with late successional old-growth forests when roosting and foraging. The fringed, long-eared and long-legged *Myotis* species tend to use large trees and snags for roosting habitat. These three species also use caves, old mines and rock crevices as winter hibernacula sites. Two large nursery colony size bat houses were constructed and placed in the Buckhead Special Wildlife Habitat Area in 1995. Monitoring of these houses indicated use in 1996 although the species was not identified.

Future Trends

Adequate amounts of foraging habitat exist in the watershed with the presence of Lookout Point Reservoir, the Middle Fork Willamette River and unique pond habitat in the Buckhead area. The no-harvest allocations along with mitigation measures established as Standards & Guides in the NWFP will help provide suitable roosting and wintering sites for these species. Green tree retention guidelines will help in providing additional roost sites within matrix allocation of federal lands. Protection buffers adjacent to ponds and wetlands will also aid in protecting potential foraging areas.

Clouded Salamander (*Aneides ferreus*)

Current Status

Clouded salamanders are normally found in large woody material (LWM), preferably Douglas-fir, and stumps of varying decay previously inhabited by ants, termites, and

other invertebrates (Leonard, *et. al.,* 1993). They require permanent dampness, rotting logs necessary for specific invertebrates, and rocky or woody debris, such as large Class III and IV Douglas-fir logs with sloughing bark, for cover. Once a large log or woody debris has decayed to the point of moisture loss, the salamander must abandon its habitat. Clouded salamanders are dependent upon a continuous supply of suitable large, rotting logs or snags.

Occurrence of this species is probably related to old-growth stands where adequate levels of large rotting logs are present. The species has been documented in the watershed adjacent to Patterson Mountain Special Wildlife Habitat Area (SWHA) in the upper reaches of the Duval Creek drainage. It is suspected that with more adequate survey efforts for terrestrial amphibians, the clouded salamander would be found in other areas of the WAA, especially those in late-successional old growth conditions.

Future Trends

Existing and developing late-successional forests within riparian reserves and other withdrawn allocations should provide some habitat for this species in the future. Forest matrix green tree retention guidelines should provide some opportunities for terrestrial salamanders, although it is doubtful that the altered temperature and moisture regimes of harvested stands, even with CWD provisions, will be conducive to terrestrial amphibian habitation until such stands develop into a closed canopy situation. As the matrix becomes more fragmented, populations of these terrestrial amphibians could become restricted mainly to undisturbed no-harvest allocations.

Oregon Slender Salamander (Batrachoseps wrighti)

Current Status

Oregon slender salamanders are most commonly found in mature Douglas-fir forests on western slopes of the Oregon Cascades (Nussbaum, *et. al.,* 1983). A species endemic to Oregon, this salamander dwells in moss-covered logs, rotting stumps and under rocks or pieces of bark near spring seeps. In late spring and early summer they retreat vertically to a subterranean existence, thereby maintaining suitable moisture regimes. The analysis area falls in the southern edge of its range but no documented sightings exist. This salamander, living a primarily subterranean existence, is not extremely effective in terrestrial movement and some natural barriers may prevent dispersal. It is suspected that more intense terrestrial surveys would yield evidence of this species in the WAA.

Future Trends

Although this species is not documented in the project area, its habitat exists. Historical harvesting activities have removed habitat components necessary for suitable Oregon slender salamander habitat, primarily large logs in varying decay classes and late successional overstory forest conditions providing sufficient moisture regimes. With the provisions for late-successional and riparian reserves, suitable habitat should increase

for this species over time, although it is unclear whether distribution and abundance of the species will be maintained in the northern third of the project area on matrix lands.

Arthropods

No arthropods, as listed on Table C-3 of the Northwest Forest Plan, are suspected to occur within this watershed.

Mollusks

Current Status

Of the mollusks listed in Table C-3 of the Northwest Forest Plan and Appendix J2, only two species may occur. *Prophysaon coeruleum* is a land slug which could occur in coniferous forests from low to mid-elevations. The southern Willamette valley is at the southern end of its range and all historic locations have been absorbed by urban development. There are no known sightings on the Willamette NF. *Prophysaon dubium* is another land slug associated with riparian areas and rock slides. Rock source development could have an effect on this species. Both are survey and manage species requiring surveys prior to implementation of ground disturbing activities in 1999 or thereafter.

Future Trends

Riparian and Special Habitat protection will be important in protection of potential habitat for these species in the future. Surveys will be labor intensive and should provide information to protect discovered sites. Anticipated impacts to matrix lands between the reserves would suggest that the potential for populations to maintain themselves exists only within designated reserves.

Human Uses

Reference Condition

Native Americans

At the time of European exploration, the Middle Fork Willamette drainage, as far upriver as the present town of Lowell, was occupied by the Winefelly band of the Kalapuya. East of this area, the Molala were thought to have been the primary inhabitants, with winter villages in the Oakridge area. The tribes using the Middle Fork watershed were trading partners and often intermarried. The Middle Fork appears to have served as an important corridor for travel between the Willamette Valley and the east side of the Cascades. Unlike the drainages to the north (McKenzie and Santiam), where most of the obsidian used for toolstone came from Obsidian Cliffs near the Middle Sister, obsidian obtained from archeological sites in the Middle Fork drainage comes equally from local sources (Salt Creek), Obsidian Cliffs, and from a variety of sources on the east side, especially the Klamath Lakes area. In pioneer times, settlers

reported groups of Klamath on horseback using the Middle Fork area for trading expeditions. To date, over 50 archaeological sites, representing base camps and seasonally occupied task specific camps have been recorded in the analysis area. While obsidian was preferred for tool making, local jasper and chalcedony was also commonly used.

Vegetation types and fire history of south-facing slopes north of the Middle Fork suggest that this area was maintained as oak woodland and prairie. Fire use by the Kalapuya to maintain this landscape in the Willamette Valley is well documented in the literature (Johannessen, *et. al.,* 1971; Towle, 1974, 1979). It appears likely that fire was consciously used by the native people throughout the Middle Fork corridor. According to John Minto,

> *"Fire was the agency used by the Calapooia tribes to hold their camas grounds and renew their berry patches and grasslands for game and millions of geese, brants, cranes , and swans which wintered in the Western Oregon...On the west face of the Cascades the Molallas claimed dominion, and fire was their agency in improving the game range and berry crops."* (1908:152-153)

Epidemic diseases reduced native populations by at least 80% between 1790 and 1840. Despite the forced relocation of most survivors to reservations, a few remained behind with the new immigrants. Some returned in the 1890s and 1900s to work in the Lowell area hopyards. According to former West Boundary District Ranger C.B. McFarland,

> *"The Indians would come in large numbers to pick hops in the hop yards owned by A.D. Hyland. They would return across the summit with salmon, dried fruits, some green fruits and clothing, and pick huckleberries and hunt...and cross the Willamette Pass just prior to the snowstorms in the early fall."* (McFarland, 1956:4)

Many descendants of local tribes are currently part of the Grand Ronde, Klamath, Siletz, and Warm Springs reservations.

The Homestead Era

The first EuroAmericans to enter the area were probably fur traders working for the Northwest Company of Montreal, Canada. However, no records survive to document their activities. Elijah Bristow was the first settler to stake a claim in Lane County at Pleasant Hill in 1846, arriving via the Oregon Trail. During the next decade, several families moved into open meadows along the Middle Fork, enticed by the Oregon Donation Land Act. The first attempt to pioneer a route across the Cascades down the Middle Fork was that of Stephen H. L. Meek in 1845. Attempting to lead pioneers on a more direct route to the Willamette Valley by heading west from the Snake River, Meek's group became lost and several died before the survivors headed north to join the Oregon Trail at The Dalles.

In 1852, Lane County residents began explorations for a wagon road up the Middle Fork drainage. By 1853, about 1,500 people, mainly members of the Elijah Elliot wagon train, used the Free Emigrant Route. In response to the influx of settlers seeking

title to their lands, Cadastral Surveys were conducted in the vicinity of the Middle Fork as far east as Oakridge between 1854 and 1857. In 1864, Congress began a program of land grant subsidies for road development. During the same year, the Oregon Central Military Wagon Road Company formed in Eugene, beginning survey and construction. Benjamin Simpson, Indian Agent at the Siletz Reservation, was granted the contract for construction of the Oregon Central Military Wagon Road from Butte Disappointment (Lowell) to the Big Pine Openings (near Rigdon Meadows). In 1865, he brought 75 Indian laborers from the reservation to pioneer the road through what is now Dexter and Lookout Point reservoir. By 1867, construction was completed to Emigrant Pass and facilitated the migration of settlers from Western Oregon into the Klamath, Summer and other lake basins of Eastern Oregon. From 1871-1896, Stephen Rigdon and his family operated a seasonal way-station at Rigdon Meadows and kept extensive records of travelers on the road (Beckham, 1981).

Among the homesteaders in the Middle Fork area was Amos Hyland who named the townsite Lowell in honor of his former residence in Lowell, Maine. After the Homestead Act of 1862, pioneers began to occupy the more marginal lands of the Middle Fork within eight miles east of Lowell. By 1900, about a dozen families lived in the area now under Lookout Point Reservoir. Locals called the area "Rush Island", a brushy strip of land between the wagon road and the Middle Fork about 800 yards wide, subject to annual flooding (Williams, 1992). The settlers lived a subsistence lifestyle, depending on wild game for their meat. Briefly, hops were cultivated as a cash crop, but the market soon crashed due to crop disease and market failure.

By the time the Cascade National Forest emerged, it was apparent that attempts at human settlement of the foothill valleys were marginal, and not conducive to farming. Rather, the area was better suited for timber production, grazing or hunting. During and after the Great Depression, locals worked in the woods *"...to give themselves an additional income, because farming wasn't too profitable in those days"* (Hucka, 1996).

During the latter part of the 19th century, a large part of the leadership for creating forest reserves came from urban areas in the Willamette Valley: Portland, Salem, Eugene, and Roseburg.

> *"In 1889...urban dwellers who relied on the mountains for their recreation (outings, mountaineering, hunting and fishing), read scientific reports dealing with the forests and became caught up in the demand for reform of the land laws."* (Rakestraw, 1989)

With people's concern and rage about petty and corrupt management decisions in forests it was no surprise there was little public protest in 1892, when the entire Cascade Range was proposed for a Forest Reserve (Rakestraw, 1989).

Life changed with the beginning of commercial logging and the arrival of the Southern Pacific Railroad. In 1905, inspired by the rise of the Booth-Kelly Lumber Company mills in Springfield, logging camps were established east of Lowell to meet the demand. Many residents became contract loggers and river drivers or "river rats" and drove logs down to the mills on high water. In 1906, J.B. Hills began a harrowing 100-day drive

from Holland Ranch (just below Oakridge) to the Springfield mill pond, enduring drowning and typhoid fever (Huntington, 1984).

In 1909, work began on the Natron Cutoff, a rail link between the Willamette Valley and California. Following the Oregon Central Military Wagon Road route, the rail line was completed to Oakridge in 1912, and began regularly carrying freight and passengers in 1927. Some of the earlier farms broke up and others became sidings, including Carter, Landax, Signal, and Eula (formerly known as Blakelyville), later known as Armet (Lane County Historian, 1988).

Administrative History

In 1907, President Theodore Roosevelt created the Cascade Forest Reserve, ending possibilities of greater settlement along the Middle Fork and opening the era of federal land management. West Boundary Ranger Station was built two and a half miles west of Eula on the north bank of the Middle Fork in T20S, R1E, Section 2.

Early Forest Service rangers on horseback embarked on a ground patrol for fire detection covering a system of trails and vantage points connected to ranger stations by telephone lines. Lookout sites or buildings were established on Eagle's Rest, Hardesty Mountain and Tire Mountain, connected by a system of trails and shelters developed mainly by the Civilian Conservation Corps (CCC) based at Fall Creek between 1933 and 1937. Campgrounds were developed along the Middle Fork at Mossy Maple, River's Edge (both now inundated) and Shady Dell. West Boundary Station was abandoned in 1951 when the facility was moved to its present location in Lowell (Kintzley, 1997).

During and after the CCC era, Forest Service employees were an integral part of the local community. Local people provided books for CCC enrollees and held community events such as dances that were well attended by the young men.

Figure 13. Poling a log through Hellgate, Black Canyon (1905)
Photo courtesy of Lane County Historical Museum.

> *"...the Forest Service as an agency has been, especially until later years, close to the people involved in their areas. For example, they were close to ranchers, they were close to the townspeople in the small communities. Rangers walked pretty tall in these small communities."* (Sorseth, 1982)

Few Forest Service "Rangers" enforcing regulations on the new National Forests left locals free to do as they pleased in the woods. When Federal employees were considered overbearing with people, they were referred to as "bug hatch" (someone "buzzing around" in your face, always telling you what to do) (Reid, 1996).

Chain saws revolutionized the timber industry after World War II.

> *"One man with a chain saw could cut as much as 6-10 men."* (Coltrane, 1996)

> *"It was a good example of technology really changing a whole lot of things. We* (Forest Service) *had a hard time* accepting *the power saw, because surely you couldn't fell a tree with a power saw and save it as well as you could with the hand briar..."* (Sorseth, 1982)

This would not be the last time the Forest Service culture supported a slow-paced acceptance of "new ideas" dealing with forest management.

As soldiers returned from World War II, the housing market boomed, increasing timber demand. Roads were constructed into forested lands to access previously unavailable timber, such as up Patterson Mountain (Worstell, 1996). The size of some sales was directly attributable to this emphasis on accessibility (Sorseth, 1982).

Soon after, during the mid-fifties, local Sierra Club members began vocalizing their interests in keeping forest stands intact, as recreation use increased (Worstell, 1996). However, they were not yet organized to the degree that would make a difference in Forest Service planning (Sorseth, 1982).

By the 1960s, the Forest Service underwent a major expansion in its timber program (Worstell, 1996). By this time community relations with the Forest Service had changed. *"It was not good,"* states Kelly Lunceford. *"If you went into a bar after work, you were ignored (by loggers and mill workers), that's all. They seemed to think the person in the Forest Service wasn't doing anything."* (Lunceford, 1996) Staff, on the other hand, had a different view. They saw their relationship as *"pretty formal. We didn't do too much social activity, but our relation as far as the timber sale contract was good."* (Worstell, 1996).

> *"Oregonians who had lived in rural surroundings were familiar with nature's rapid self-renewal...urbanites, seasonal residents and visitors did not recognize this fact and tended to equate clear cuts with strip mining....Their general way of life and outlook toward the forest was often at odds with those of the established residents. They looked upon the forest as something to be managed primarily for social considerations rather than economic ones—that is, for recreation and aesthetic values rather than for timber production."* (Rakestraw, 1989)

Relations with environmental groups such as the Oregon Natural Resources Council (ONRC), Cathedral Forest Action Group and Oregon Wilderness Coalition hit a low when the area around Hardesty Mountain was not given Wilderness status in the RARE II (Roadless Area Review and Evaluation) process (Rakestraw, 1989). Earth First! members disrupted harvest of Douglas-fir trees blown down during the 1982/83 winter storms **outside** the RARE II area. The flanks of Hardesty Mountain saw the first tree spiking in Oregon (Humphreys, 1997). The struggle for management of National Forests began here in earnest, and its momentum expanded it to a level of national significance by the end of the decade.

In November, 1984, then district ranger Ron Humphrey formed the Hardesty Mountain Consensus Group, bringing the timber industry, environmental groups and public officials together. They produced a compromise management plan over the course of 18 months for incorporation into the 1990 Willamette National Forest Plan. This renewed a meaningful dialogue between the Forest Service and the public on National Forest management.

Current Condition

Recreation

Natural resources and travel corridors within the WAA shaped and continue to affect the availability and type of outdoor recreation opportunities. Many factors influence the way humans use the area, including weather, land management practices, changing recreation trends, water levels, and proximity/accessibility to local populations. Visitation recording has been sporadic and limited in scope, particularly in recent years. It is essential to consider the visitor use market area (Eugene/Springfield) when determining recreation use patterns.

The desire for outdoor recreation resources, facilities, opportunities, and ability as well as intention to use, are known as *recreation demand.*

> *"There is a tendency for recreationists to prefer more natural or primitive settings...with the growing demand for such settings...close to urban areas."* (SCORP, 1994)

Trends indicate that the desire for dispersed recreation opportunities will continue to grow at a steady rate. The 1994 Oregon SCORP (State Comprehensive Outdoor Recreation Plan) identifies activities people participate in, and wish to participate in *(see Table 29).* By 1994, 35% or more households actually participated in bank/dock fishing, nature study, tent camping, boat fishing, swimming (not in a pool), and sightseeing (from a vehicle). In contrast, these same households *desired* to participate in trail hiking, horseback riding on trails and non-motor boating. The difference between current activities and what they desire to be doing can be seen as a future demand for the desired activities. For example, nine percent say they engage in off-road (mountain) biking, but 24% say they desire to take up off-road biking.

Table 29. Statewide Setting Preferences for Dispersed Activities

Activity	Primitive		Semi-Primitive		Roaded Natural		Roaded Modified		Rural/Urban	
	Used	Preferred	Used	Preferred	Used	Preferred	Used	Preferred	Used	Preferred
Swimming, wading at ocean, lake or river	6.3	8.3	10.7	21.5	47.3	44.0	17.4	11.0	18.3	8.9
Motorized boating (including water skiing)	4.6	6.7	4.9	14.6	34.0	41.6	37.2	20.2	29.1	16.9
Non-motorized boating (canoeing, rafting)	9.2	21.7	21.8	31.3	37.9	36.1	23.0	6.0	8.0	4.8
Recreational vehicle camping	4.4	5.2	16.2	19.0	44.1	56.9	22.1	12.1	13.2	6.9
Hiking, backpacking trails	23.3	37.1	34.2	36.2	30.0	22.9	10.0	3.8	2.5	-
Off-road vehicle driving (4-wheel, ATV, etc.)	15.4	20.6	17.9	17.6	35.9	35.3	28.2	23.5	2.6	2.9
Off-road bicycling	-	-	21.2	38.7	15.2	29.0	39.4	19.4	24.2	12.9
Horseback riding on trails	20.0	33.3	22.9	33.3	25.7	15.2	28.6	18.2	2.9	-

The population of the Willamette Basin more than doubled since 1941, increasing pressure on recreational resources. Long-term growth in population, tourism and recreation is expected to increase the demand on forested recreation opportunities.

During the four years since the Oregon SCORP was completed, the WAA has experienced a moderate increase in non-motorized boating, OHV driving, and hiking. Off-road bicycle use has increased greatly.

Lookout Point Dam directly influences recreation patterns. Most non-National Forest lands are located adjacent to the reservoir. Private parcels tend to be harvested timber lands or small private residences, typical of the rural character of the Cascade foothills. Three developed campgrounds, two shelters and one identified dispersed site are found in the WAA, all located within riparian reserves *(see Map 37)*. Two of the three campgrounds are sandwiched between Highway 58 and the Middle Fork of the Willamette. All have been maintained by concessionaires since the spring of 1994. High points along Highway 58 support cellular phone, radio and microwave repeaters.

Recreation Sites

Hampton is small, containing only five sites, and is primarily used as a boat launch during high pool, with some picnicking and swimming. A gate was erected in 1993 and closed during the off-season, to reduce dumping of household trash.

Black Canyon Campground was constructed to replace Mossy Maple and River's Edge campgrounds when Lookout Point Reservoir was built. It has a capacity of 425 PAOTs (people at one time), and receives use in the form of camping, picnicking, bank fishing, swimming/wading, and boating. Year-round access to the boat ramp began in the winter of 1992 in response to the opening of winter fishing season on the Middle Fork

Willamette River. In 1993, outfitter guides officially began using Black Canyon as a take-out point .

Shady Dell's nine sites nestle between slack water from the Middle Fork, Highway 58 and steeply rising forest land. It is now managed as a group site on a reservation basis only due to its past history of low use and attractiveness to "live-in" campers during the past year.

In August 1997, Signal Point boat ramp was completed, providing low water access on the north side of the reservoir.

A 55 acre campground, Lakeview, is proposed at the Forest boundary, off Road 5824. A second proposal is for a campground just east of Goodman Creek, by Highway 58. It is the only site capable of development along the entire 17 mile shoreline on the south side of Lookout Point Reservoir. Both are part of a joint COE and USFS planning project for the entire Lookout Point Reservoir.

Dispersed Use

It was the intent of the Hardesty Concensus Group to offer a primitive recreation experience in the area around Hardesty Mountain. As the steep terrain offers few level areas to camp and few water sources, there is little dispersed camping activity. Most day-use consists of trail use or driving roads for hunting or gathering forest products.

There are 19 trails in this watershed; 85% of trail miles are accessed from Highway 58. Only Goodman Creek Trail lies within a riparian reserve. All other trails have short segments within riparian reserves, as they cross creeks. One third of current recreation trails are "way" trails - steep trails used as travel routes by former Forest Service employees to access work areas. Several trails accessed from Highway 58 continue to increase in popularity with different user groups. During wet weather, use accelerates deterioration of trail tread, decreasing most hikers' enjoyment.

Reconstruction of approximately three miles of the old Boundary trail (Eugene to Pacific Crest Trail) should be completed by the end of September, 1997. Also planned for completion in the next two years is reconstruction of the Lawler trail. Equestrians and mountain bikers prefer longer trails like these, and use is expected to occur soon after reconstruction. Using horseback trails scored second in the SCORP's desired activities, representing a 25% increase over current use; desire for off-road biking ranks eleven.

When the reservoir is down, motorcyclists, four-wheel drivers and off-highway vehicle owners (OHV) enjoy testing their driving skills on the mud flats.

> *"Although the lake is presently closed to ORV's (off road vehicle), the prohibition is difficult to enforce and low to moderate levels of unauthorized ORV use does occur, nearly entirely in the drawdown zone."* (COE, 1992)

The Army Corps of Engineers, however, is working on an OHV plan for the flats, designating use in Section 18, by Armet Creek.

Social

When cutting restrictions on National Forest lands began in 1994, private timberland owners were concerned that these management regulations might affect their lands as well. Several of the private timber lands were harvested soon after the Northwest Forest Plan was set in motion. The gas station/store at Hampton stopped selling gas when new restrictions on gas storage tanks went into effect. The latest owners replaced the tanks and are selling gas again, but the place is once again up for sale.

Because the entire Hardesty area is now managed as a LSR (Late Successional Reserve), few concerned citizens now contact the Lowell District about management of that area. Actions born during the protests of harvest in the Hardesty area, however, are now practiced nation wide. Forest harvest in the Pacific Northwest has dramatically declined as a result of disgruntled groups outside the Forest Service exerting influence over forest management practices.

Today, locals are more concerned with paying to park at trailheads. Many people regard this as unwanted government regulation of their "right" to use the forests and may link it with their anger against the Forest Service for the increasing regulation of timber harvest (not enough harvesting or too much harvesting, depending on their point of view). Time and society will determine the future management of our national forests.

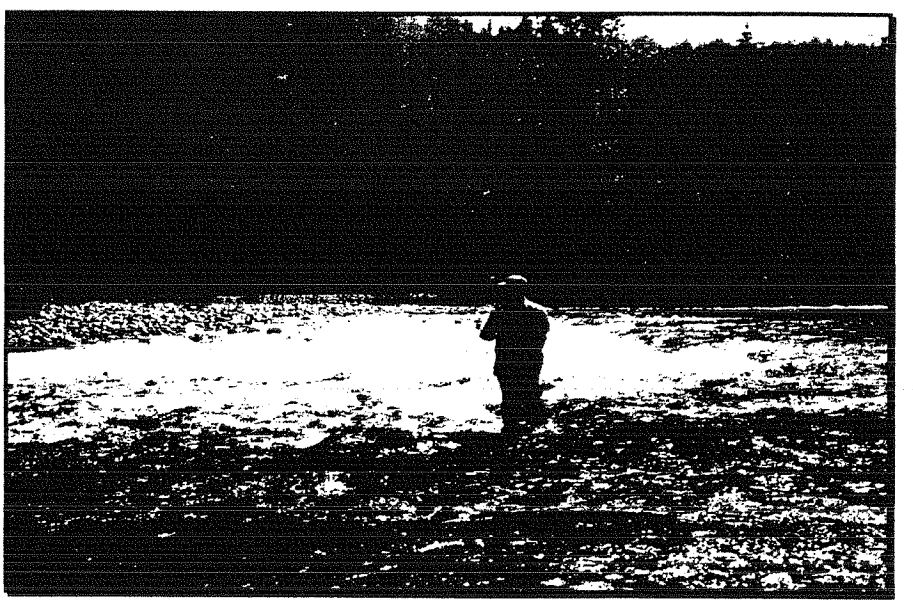


Figure 14. Fly Fishing in Middle Fork of Willamette River near Black Canyon Campground (July 25, 1957)