# DRAFT GRAYBACK/SUCKER PILOT WATERSHED ANALYSIS RESULTS

*Illinois Valley Ranger District*
*Siskiyou National Forest*

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## THE ANALYSIS:

The Grayback/Sucker Watershed Analysis Results summarizes key information developed from the Pilot Watershed Analysis. The analysis considered physical, biological, and social conditions and trends relevant to the Grayback/Sucker watershed. The analysis followed the eight steps of the Federal Guide for Pilot Watershed Analysis (1994).

Information and ideas from several federal, state and local agencies and the public was included in the analysis. The analysis considered the entire watershed, but most of the data collected is from lands under federal management (Forest Service, Bureau of Land Management, National Park Service). Additional analysis documentation includes data files, maps, computer model runs, specialist reports, lists of data gaps, monitoring recommendations and process records. New information will be appended to the analysis as it is collected. Thus, the analysis is considered an ongoing process.

The Grayback/Sucker watershed is one of 15 Pilot Watershed Analysis Areas within the Pacific Northwest and Northern California. It was selected for study because:

1. It is a key federal watershed, designated in the President's Forest Plan.
2. A mix of land ownerships and management allocations occurs (see Figures 1 and 2).
3. Its importance to Oregon Southcoast fisheries is recognized by state managers.
4. Potential restoration and other projects exist in the watershed.

## THE WATERSHED:

The Grayback/Sucker watershed is part of the Rogue River basin in southwestern Oregon. At about 62,000 acres, it makes up 10 percent of the 628,000 acre Illinois River basin. The Illinois River basin, in turn, makes up 20 percent of the 3.3 million-acre Rogue River basin.

The watershed provides for many beneficial uses. Water from the watershed is appropriated for irrigation, livestock, industrial and domestic use. The forests in the watershed are among the most productive in the Illinois basin. Sucker Creek is the principal producer of salmonid fish in the Upper Illinois (above Cave Junction). Developed recreation and tourism are higher in this watershed than any other in the basin. The watershed provides habitat for many plant and animal species valued for their commercial, aesthetic, or intrinsic worth.

**KEY FINDINGS**:

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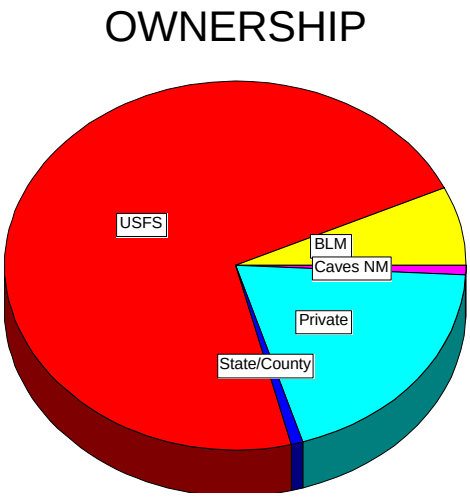
| **Summer low flows** in Sucker Creek are not adequate to accommodate all beneficial uses. |
| **Summer water temperatures in the lower reaches of Sucker and Grayback creeks** are outside of the historic range and can be lethal to salmonids. Warm temperatures favor non-native redside shiners that compete with salmonids for habitat. |
| **Fish habitat in the lower reaches of Sucker and Grayback Creeks** has less large wood, and fewer high quality pools and side channels, than required for optimum habitat. The lower reaches should be areas of high productivity. |
| **Riparian areas along the lower reaches of Grayback and Sucker Creeks** have been disturbed from the 1964 flood, salvage of large wood, mining, logging, and agricultural activities. Hardwoods and conifers growing along these reaches are not large enough to provide for habitat complexity, nor will be large enough for decades. |
| **Port-Orford-cedar root disease** infection sites occur in the watershed, but the area adversely affected by the disease is small. |
| **Timber harvesting** has resulted in a decrease in older forests in the watershed, and decreased the size of individual older forest stands. The predominance of Late-Successional Reserve allocation on federal lands in the watershed (see Figure 2) will likely lead to an increase in stand size and overall acreage of older forest (within 50-150 years, given no stand-replacement disturbances). |
| **Fire suppression has led to increased vegetation density** in unmanaged stands. More stands have a developed understory (ladder fuels). Stands have a greater proportion of shade-tolerant trees (tanoak, white fir), which can lead to forest health stress and increased fire hazard. |
| **In the past, the oldest forests were on north aspects, in moist, lower elevation sites**. Timber harvest patterns and fire suppression activities have shifted the predominance of older forest to higher elevations. |
| **Hardwood stands and meadows** are less prevalent than in the past. |
| **Landscape views** from watershed peaks have been altered by land use activities, and in some cases are below Siskiyou National Forest standards. These areas are considered spiritual sites by some people. **Increased regional population will bring increased demands** for recreation development and potential conflicts between users in the watershed. |

**FIGURE 1.**
**LAND OWNERSHIP**

**Approximate Area**

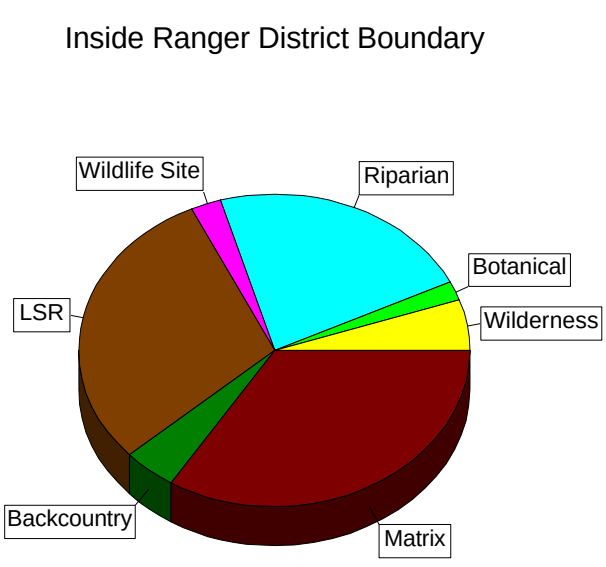
USFS.....42,000 acres
BLM.....6,000 acres
Private.....12,000 acres
State/County..... 300 acres
Caves NM.....500 acres




**Note:** Approximately 80% of the watershed is managed by public agencies. About 19 % is privately owned. Less than one percent is managed by state and county agencies.

**FIGURE 2. LAND ALLOCATIONS**
**Approximate Area**

Wilderness.....3,000 acres
Botanical.....1,000 acres
Backcountry Rec.....2,200 acres
Special Wildlife.....1,200 acres
Riparian Reserves.....10,400 acres
Late-Succ. Reserve...14,000 acres
Matrix.....13,000 acres




**Note:** Acreage is within Ranger District Boundary. Definitions of these and other land management allocations are available by contacting the Ranger District Office.

**MANAGEMENT RECOMMENDATIONS**:

Based on key findings, the following table summarizes management recommendations for the watershed. The recommendations apply primarily to lands under federal management. The Illinois Valley Watershed Action Plan, developed by the Illinois Valley Watershed Council, includes complementary recommendations for private lands (for more information, consult the Oregon State Watershed Health Group in Grants Pass, or the Illinois Valley Soil and Water Conservation District in Cave Junction) .

| EXISTING CONDITION & TRENDS | OBJECTIVE | PRIORITY LOCATIONS | TREATMENT OPTIONS |
|---|---|---|---|
| Riparian areas vary as to how well they provide for objectives of aquatic conservation strategy. | Meet Aquatic Conservation Strategy Obectives for riparian areas. | Riparian Reserves. | Maintain interim reserve widths, including unstable earthflows yet to be mapped; prescribe restoration treatments on a site-specific basis. |
| Recreation and commercial mushroom harvesting adjacent to water may conflict with Aquatic Conservation Strategy. | Meet President's Plan while providing quality recreation. | Riparian Areas, particularly within Grayback Campground. | Educate public about need for riparian protection. Determine how best to meet public need while preserving habitat. |
| Lack of large conifers in riparian areas (lower reaches). Low shade contributes to high water temperatures. | Restore large conifers to riparian areas in the long term. | Tiger Springs. Mined areas in Sucker Creek. Along Grayback Creek. Valley floor. | Plant conifers. Reduce competition from hardwoods. Thin overstocked young conifers. Encourage private landowners to plant/protect riparian vegetation. All efforts will lead to long term shade and wood recruitment. |
| Port-Orford-Cedar (POC) is important for stream shade and the best source of long term riparian wood. POC root disease is killing trees in some areas. | Maintain and restore Port-Orford-cedar. | Port-Orford-cedar habitats. | Preserve Port-Orford-cedar habitats (shady riparian areas). Reduce risk of spread of POC root disease by closing roads in wet season, removing POC along open roads, and isolating infection centers. Public education |
| Channels have become less complex in terms of large wood and side channel habitat for fish. | Maintain and restore floodplain inundation large wood delivery. | Confluence of Grayback and Sucker Creeks. | Manage for large wood recruitment and side channel development in all activities (including Grayback Campground and adjacent facilities). |
| Debris flows may not deliver large wood to channels where they are intercepted by roads. | Maintain and restore large wood delivery processes and sediment regime. | Sites with a high probability of debris flows, such as along Roads 4612080, 4612540, and 4612098. | Redesign road crossings to allow debris flow passage. Decommission roads and remove crossings. |
| Pool habitat is below healthy levels in streams in terms of amount, depth, and cover within pools. | Increase pool habitat complexity. | Fish bearing streams. | Place brush bundles and other cover in pools. Place boulders and large wood in streams to increase pool depth and frequency. |
| Mining and fish habitat improvements can trigger erosion in ancient slide deposits adjacent to stream channels. | Avoid destabilizing ancient slide deposits. | These areas are mapped (see analysis files). | Ensure that mining activities and fish structure placement do not trigger erosion of these landslides. |

| EXISTING CONDITION & TRENDS | OBJECTIVE | PRIORITY LOCATIONS | TREATMENT OPTIONS |
|---|---|---|---|
| Simplified channel form (including riparian disturbance) has led to increased stream velocity. | Maintain and restore integrity of aquatic system and instream flows. | Sucker Creek (Reach 2B; see map in files). | Mitigate effects of past mining and discourage future mining activities that reduce structure and channel roughness. Place large wood or boulders in stream. Restore riparian forests. |
| Some roads are contributing higher than natural rates of sediment to stream channels. | Maintain and restore water quality (i.e. low turbidity and the sediment regime) by reducing rill and gully erosion from road drainage interception. | Shotgun culverts; road segments with inadequate culvert or drainage spacing; sites where quarries, landings, tractor yarding, or fire lines intercept drainages. | (1) Outslope roads. (2) Rip and hydrologically decommission roads. (3) Decrease spacing of road drainage outlets. (4) Revegetate fillslopes. (5) Winter Closures. |
| Some roads have stream crossings where plugged culverts may divert water down the road during storms, eroding new channels. | Maintain and restore water quality (i.e. low turbidity and the sediment regime). | (1) Road crossings that failed during the 1964 storm (see map and list). (2) Road crossings with diversion potential within sensitive soil types. | (1) Field inventory to prioritize specific sites. Provide armored diversion paths and adjust grade. Decommision roads and remove crossings. Increase culvert capacity to reduce plugging. |
| Some road fill are not stable and may fail during storms. | Maintain and restore water quality (i.e. low turbidity and the sediment regime). | See analysis file maps for specific sites. | Geotechnical stabilization. Sidecast fill pullback. Revegetation. Road decommissioning. |
| Some roads cross streams, expanding the length of the stream drainage network by road ditches. Peak flows may be increased, and low flows may be decreased. | Maintain and restore instream flows, protect timing, magnitude, duration, and distribution of peak, high, and low flows. | Where roads expand length of drainage network (sites unknown at this time). | Identify specific treatment sites. Decrease drainage distance between outlets where soils can promote reinfiltration. Decommission roads |
| Dense stands reduce penetration and storage of snowpack. | Increase penetration and storage of snow. | North and east facing slopes above 4500 feet and other high elevation sites. | Thinnings and small patch cuts to reduce snow intercept. |
| Overstocked stands are susceptible to large scale losses from disease, insects drought, and stand-replacement fire. They also reduce spring/summer stream flow because they have high water demand. | Reduce stand densities to improve forest health, reduce fire hazard, and increase streamflow. | Watershed wide; In and around patches of interior forest and urban interface. | (1) Thinning with removal or treatment of fuels.<br>(2) Prescribed fire |
| Fire suppression and other management activities have increased risk of stand-replacement fire. Stand-replacement fires can lead to increased surface erosion and water quality problems. | Reduce susceptibility of stand-replacement fire and subsequent erosion. | Urban interface, Oregon Caves Monument area, high density LSR stands, conifer stands with developed hardwood understories. Areas where risk factors are high on sensitive soils. | Create and maintain fuel break. Thinning, understory removal, or burning to reduce fuel ladder and increase fire tolerance. Long term maintenance through precribed fire. |

| EXISTING CONDITION & TRENDS | OBJECTIVE | PRIORITY LOCATIONS | TREATMENT OPTIONS |
|---|---|---|---|
| Decline in shade-intolerant species such as ponderosa and sugar pine from management activates (harvest and fire suppression). | Maintain and restore ponderosa and sugar Pines where they existed historically. | High elevation undisturbed sites and lower elevation harvested areas. | Favor these species in precommercial thinnings and commercial harvest. Encourage replanting of pine on all ownerships. Maintain openings around pines through thinning or fire |
| Older forest habitat is fragmented. | Restore long-term interior forest habitat. | Older forests, along perennial streams, low on slope, and north aspects. | Preference for harvest in already fragmented areas. Reduce risk of wildfire by reducing fuels at edges of older forest and underburning. |
| Competition from hardwoods and conifers is slowing development of young stands. | Accelerate growth and development of young stands. | Plantations and young natural stands in LSR's adjacent to old growth patches. | (1) Thin and release young stands. (2) Fertilization (in matrix land only). |
| Large hardwoods and conifers are at reduced levels in managed stands. | Long term restoration of large trees. | Entire watershed, especially managed stands, and Riparian and Late-Successional Reserves. | Thinning and manual release to hasten development of large conifers and tree-form hardwoods. |
| Snags and down wood are at reduced levels in managed stands. | Restore sufficient dead wood where it is lacking. | Entire watershed emphasizing managed stands within Riparian and Late Successional Reserves. | Create snags and down wood adjacent to managed stands in the short-term and managed stands in the long-term. |
| During foreseeable future, high proportion of stands will be in mid age class (50-150 years). | A historic balance of stands in all size classes to promote biological diversity. | Throughout watershed; with opportunities tailored to management allocation.. | Use thinnings and prescribed fire to promote development of healthy older stands and regeneration harvest to create young stands. Preference for treating 50 - 100 year old stands. |
| Decline of deciduous oak woodlands, brushfields and meadows. | Restore oak woodlands, brushfields and meadows. | Younger forest habitats, deciduous oak woodlands, and meadows that are filling in. | Thin younger forest to encourage hardwoods and oaks. Cut encroaching conifers in meadows. Burn both habitat types. |

| EXISTING CONDITION & TRENDS | OBJECTIVE | PRIORITY LOCATIONS | TREATMENT OPTIONS |
|---|---|---|---|
| Wildlife increasingly disturbed by people and development.. | Minimize disturbance to wildlife during critical time periods (e.g. breeding). | Wildlife emphasis areas (PETS, game species habitats ). | Seasonal or permanent road closures. Conduct management activities outside of critical periods. |
| Oregon Caves viewshed is in a Heavily Altered condition, and does not meet Siskiyou LRMP Standards & Guidelines. | Meet Siskiyou LRMP visual guidelines. | Within the Oregon Caves Viewshed, and along Caves Highway and Grayback Road. | Consider mitigating past scenic degradatiion in future project design. |

## ANALYSIS CONSIDERATIONS:

Following are 12 physical, biological, or social elements considered in the analysis. They are primary factors affecting the past and current condition of the watershed, and its future.

1. Community Assessment
2. Land Use and Conflict
3. Roads and Trails
4. Recreation
5. Physical Setting
6. Erosion and Sediment Delivery
7. Water Quantity and Temperature
8. Water Use
9. Fish Habitat
10. Fish Species, Population and Distribution
11. Other Aquatic Dependent Species
12 Terrestrial Ecosystem

### 1. Community Assessment

Population surrounding the Grayback/Sucker watershed has increased, and changed in economic focus over the past decade. The nearest communities are small and are located in the Illinois, Rogue and Applegate River basins, all within Josephine County.

A community assessment of the Applegate Valley (Preister, 1994) noted that the population in the county grew by 6.4% between 1980 and 1990. The retirement community also grew, bringing money and stimulating trade and service employment (especially medical). At the same time, employment related to wood products and manufacturing declined steadily.

The shift has affected the culture of the area. Four key cultural findings were discovered in the assessment:

> "...1) Valley residents have a strong land ethic . . . 2) Community discussions centered on oldtimer/newcomer themes . . . 3) The rural culture still works, which means, despite frequent comparisons between oldtimers and newcomers, relations of cooperation and support still predominate . . . 4) Caretaking systems are stretched to their limit. The community has been fragmented by the influx of new people and the decline of the agricultural and forest base."

## 2. Land Use and Conflict

Mining, agriculture, timber harvesting and recreation have had a dramatic impact on the watershed since its settlement (by non-Indian people) in the mid-1800's. Conflicts between different uses and values continue, despite many efforts at resolution.

### Mining

The discovery of gold was the catalyst for development of the watershed. There were two rushes to Sucker Creek -- one in 1853, and one in 1856 -- attracting about 2,000 people during the height of activity. Mining has been sporadic since that time. One larger-scale operation exists on Sucker Creek today; most of the other operations that occur over the estimated 500 claims are small. The effects of historic, large scale mining on riparian and aquatic habitat remain.

### Agriculture

Soon after gold was discovered, small farms began to provide produce to the miners. Water rights for the farms were

established between 1853 and 1934. Limited summer streamflow remains an issue within the watershed. Range use is limited to small private ranches and part of one grazing allotment (40 head of cattle, administered by the Rogue River National Forest). Periodically, some of the cattle wander into the Bigelow Lakes Botanical Area; visitors object to the presence of the cows, and "cow patties."

Timber Harvesting

Timber harvest occurred on a small scale in the watershed between 1851 and 1945. After 1945, it increased dramatically because of demand and mechanized equipment. Forest Service lands in the watershed produced an average annual volume of 36 million board feet between 1960 and 1979, and 22 million board feet between 1980 and 1989 (U.S. Forest Service, 1990). Many conflicts resulted from the timber cutting. For instance, the scenery from viewpoints in the watershed was degraded when the trees were removed. The acceptable thresholds for impacts to the scenery (as set in the Siskiyou LRMP) were exceeded in the Grayback, Oregon Caves, and Horse Mountain Viewsheds.

The harvest of federal lands was reduced sharply in 1990, when the northern spotted owl became protected under the Endangered Species Act. Since 1990, about 26 million board feet has been produced in the watershed on Forest Service lands. An additional 22 million board feet have been produced on Bureau of Land Management (BLM) lands produced about 22 million board feet (Dunham, 1994) in that same time.

The reduction in federal timber harvest has encouraged harvest on private land; currently at its highest level ever (Young, 1994). Reduction in federal harvest has also contributed to layoffs at local mills and logging companies. The unemployment rate for Josephine County (7.8%) was the highest in Oregon for September 1994.

Efforts have been made at conflict resolution. The Siskiyou National Forest Land and Resource Management Plan (LRMP) was completed (signed) in 1987. Full implementation of the LRMP was suspended by the listing of the northern spotted owl and marbled murrelet as threatened species under the Endangered Species Act. The Siskiyou LRMP was amended in 1994, when President Clinton signed the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (commonly referred to as the President's Forest Plan). The President's Forest Plan established land allocations and guidelines for all activities on federal lands. Figure 2 shows land allocations for the Grayback Sucker watershed.

Mushroom Harvesting

Some issues cannot be resolved by regional plans. Mushroom harvesting is an example of a more local conflict. Most of the harvest within the Illinois River basin occurs in the Grayback/Sucker watershed. Social and ecological conflicts have arisen from the mushroom harvest. Land managers have difficulty providing adequate lodging, camping and sanitation for the large and sudden influx of migrant harvesters. Local pickers often distrust the migrants, feeling that their harvest practices can disrupt duff and remove developing spores. Resource managers and other citizens are working to resolve the questions and conflicts related to the mushroom harvest at the local level. The effects of different mushroom harvest practices have not been quantified.

## 3. Roads and Trails

Road closures are, and will continue to be, a controversial issue in the Grayback/Sucker watershed. About 290 miles of road have been built within the watershed. Of these, about 75 miles are maintained for passenger cars, 45 miles are currently closed, and 170 miles require the use of high clearance vehicles. All roads, except Caves Highway and the first segments of FS 4611 and 4612 (asphalt paved), have a rock or native soil surface.

Two recent Bureau of Land Management closures have drawn fire: one road accessed a popular hunting area (Sellards, 1994) and the other accessed a firewood cutting area (Dunham, 1994). More conflicts are expected as roads may be closed for ecological restoration (sediment reduction, Port-Orford-cedar root rot, etc.) or because funding is not available to keep roads maintained to safety standards. This watershed analysis has recommended some road decommissioning (see Management Recommendations). The major access routes through the watershed will likely be maintained to allow for recreational access, as well as forest and fire management.

The trail system in the watershed is currently used primarily for recreation. It evolved from American Indian trails, and trails built for fire suppression when the Siskiyou National Forest was established in 1906. Miles of trail have been replaced by timber access and other roads. Maps of roads and trails, and corresponding descriptions are in the analysis file.

## 4. Recreation in the Watershed

Two types of recreation sites are available in the watershed: developed (established facilities) and dispersed (scattered, undeveloped areas). The developed sites are used more than dispersed sites. Grayback/Sucker is the only watershed on the Siskiyou National Forest where developed recreation predominates. Five developed campgrounds are found within the watershed: Bolan Lake, Cave Creek, Grayback, Caves Trail, and the Goldleaf Resort. The first three campgrounds are managed by the Forest Service, and are the only developed campgrounds on the Illinois Valley Ranger District. The other two campgrounds are privately-owned. Several small, undeveloped campsites are dispersed through the watershed. Some of these have been used since the late 1800's.

Oregon Caves National Monument

The Oregon Caves was discovered in 1873 by Elijah Davidson. In 1909, 480 acres were set aside as the Oregon Caves National Monument. The monument is managed by the National Park Service (United States Department of the Interior). Visitor use to the monument has been gradually decreasing over the last 20 years, from approximately 181,000 people in 1977 to about 100,000 in 1993. In the 1970's most of the visitors were from non-western states; in latter years, almost all are from Oregon, Washington, and California (Oregon, Economic Development Department, 1994).

Wilderness, Backcountry and Botanical Areas

Several areas in the Grayback/Sucker watershed provide for dispersed recreation, but usage by large numbers of people and motorized vehicles are of concern. The Red Buttes Wilderness (about 3500 acres of which is in Sucker Creek) receives about 1200 visitor use days per year (Rogue River LRMP, Appendix E, E-9). Tannen Lakes and the Boundary Trail are popular destinations within the Wilderness. The concentration of people using the Tannen Lakes may be above capacity in terms of the limits to acceptable change (ibid.). Occasional, prohibited motorcycle use on wilderness trails is another concern (Keown, 1994).

The Boundary Trail crosses two National Forests (Siskiyou and Rogue River) and the Red Buttes Wilderness. Some conflicts result, since motorized use is allowed on some parts of the trail, and not on others. The High Divide

Backcountry Recreation Area is adjacent to the wilderness. Approximately 2,300 acres are designated "Motorized Backcountry" (Siskiyou National Forest LRMP IV-97). Most of the use is concentrated on primitive roads, jeep and hiking trails, and dispersed campsites.

Three botanical areas are found in the watershed: Bolan Lake, Bigelow Lakes, and Grayback Mountain (see Siskiyou National Forest LRMP Appendix F, Volume I, F-55, 60, 88 for descriptions of the areas). Mount Elijah is a popular destination for hikers in the Bigelow Lakes Botanical Area. Views from the peak are expansive; it and other peaks are considered sacred sites for many people.

**5. Physical Setting**

Grayback/Sucker Watershed is located near the geographic center of the Klamath Mountains geologic province. The watershed is unusual for its limited amount of serpentine geology (compared to other Illinois River watersheds), and the presence of marble caves.

Elevations range between 1,400 feet at the mouth of Sucker Creek to 7,000 feet on the Applegate Divide. The high ridges are snow-covered for several months each winter, but no permanent snow fields or glaciers are present. Past glaciation is evidenced by a dozen glacial cirques (rock basins carved by mountain glaciers). Three of these cirques are occupied by Bolan Lake and the Tannen Lakes. Maps of these and other landforms in the watershed are available in the analysis files.

A variety of soil types occur in the watershed. Parent materials are granitics and metamorphics (with some serpentine). The granitics tend to be the finest grained, deepest soils and are most sensitive to management activities. A map of soil classes and corresponding acreage is available in the analysis file.

**6. Erosion and Sediment Delivery**

Landslides have affected the current condition of the watershed, and must be considered in future management. Human activities have accelerated erosion with the area. Figure 3 displays the relationship between land use, riparian disturbance, and erosion (sediment delivery). Various sizes, ages, and types of landslides are found in the watershed,

from large ancient earthflows (deep, slow-moving features), to small recently-active debris flows (shallow, rapid, scouring events).

Fifty-one recent landslides have been noted in the watershed between 1940 and 1986. Most of these were connected with the famous 1964 flood[1]. Forty-three percent of the slides are in granitics (granitics cover 25 percent of the watershed). Some of the recent debris flows are related to diversions or plugged culverts at road crossings (see Management Recommendations for restoration potential in these areas).

**FIGURE 3. RIPARIAN CONDITION THROUGH TIME**

| Time Period | Condition |
|---|---|
| **1850-1941** | Gold mining on Sucker Creek (to Fehley Gulch) was extensive. Miners set fires to improve access and visibility. Agriculture was developed in the lower reaches. These activities removed riparian vegetation and delivered sediment. Small scale logging occurred in the lowest elevations. |
| **1941-1964** | Mining activity decreased. Some riparian areas in the mid to upper reaches of Sucker Creek became revegetated. Fire suppression became more effective when mechanized equipment became available, following World War II. At the same time, demand for lumber and tractor logging increased. Sidecast and poorly designed, temporary roads; clear cuts; and riparian logging delivered sediment to Sucker Creek. Agricultural development continued to remove riparian vegetation and contribute sediment. |
| **1964** | December rains melted heavy snowpack. Road failures, culvert washouts, streambank erosion, and debris flows in Cave, Tannen and Grayback Creeks resulted. Riparian vegetation was scoured. The effects of the storm were intensified by human activities, especially the presence of roads. |

[1]More information on the 1964 flood, and a chronology of other flood events is available in the analysis files. The flood was a natural event, but its effects were exacerbated by human activities.

| | |
|---|---|
| **1964-1970** | Timber harvest continued. Large wood created during 1964 storm was salvaged from accessible areas. Agricultural lands continued to be developed, along with land clearing for homes, vineyards, and other uses. |
| **1970 - present** | Timber harvest continued, but practices became more conservative and effects of harvest lessened. Little riparian harvest occurred on public lands. Large scale mining resumed on Sucker Creek, but settling ponds and channel diversions reduced sediment delivery. Dredging in the stream loosened bedload and delivered some sediment. Road cuts and fill slopes, older harvest units, and riparian areas began to be revegetated with conifers, alder, and other hardwoods. |
| **future trend** | Higher standards for road and culvert design reduce risk of failure. Some riparian areas near cleared land become revegetated as other lands continue to be cleared. Mining continues at present levels. Areas disturbed by past mining in lower Sucker Creek are susceptible to severe bed and bank erosion during peak flows. Refined land use practices and restoration emphasis result in less riparian disturbance. |

## 7. Water Quantity and Temperature

Water quantity and temperature are significant issues in the Grayback/Sucker watershed, especially because summer low flows are associated with temperatures that are lethal for salmonids (see Figure 5, Water Temperature and Its Effects on Salmonids).

According to the Rogue River Basin Report of 1985, beneficial uses (existing and potential) are: domestic, livestock, municipal, industrial, irrigation, agriculture, mining, recreation, wildlife and fish.

Water quantity is measured by three parameters: total annual flow, low flow, and peak flow. Total annual flow is mostly correlated to precipitation. Form of precipitation affects timing of flow: when precipitation falls mostly as snow, peak flows are diminished, and flows remain higher into the late spring and summer. Rain on snow or other intense melting events result in high peak flows, with lower flows sooner in the year. Riparian disturbance (see Figure 3), roads, and timber harvest have intensified peak flows (and reduced low flows) in the Grayback/Sucker watershed.

Water temperatures are affected by amount of streamflow, channel form and solar exposure during high summer. The Regional Ecosystem Assessment Project (REAP, 1993) found that streams in western Oregon are warmer than historic times.

Streams in the Grayback/Sucker watershed follow this trend. Water withdrawal has tended to increase water temperature in Sucker Creek, because it reduces water quantity during times of high solar radiation (June and July).

A broad, shallow channel has warmer temperatures that one with similar flow that has deeper pools. Sediment deposited from the 1964 flood, channel widening from early placer mining, salvage of large wood, straightening of channels with bulldozers, construction of berms for water diversion, and removal of gravel bars near bridges contribute to a broader, shallower channel in the lower reaches of Sucker Creek.

Removal of riparian vegetation, streambed disturbance from mining, and removal of stream structure (wood) have also contributed to increased stream temperature. Hardwoods have replaced conifers in some disturbed riparian areas in the lower reaches of Sucker and Grayback Creek; hardwoods do not provide as much shade as taller, denser crowned conifers.

**8. Water Use**

Summer low flows in Sucker Creek are not adequate to provide for all needs. That has been apparent since 1934, when a State Engineer withdrew the stream from further water rights because of insufficient flow. As of 1994, there are consumptive water rights for 47 cubic feet per second (cfs) on Sucker Creek, and 3 cfs on its tributaries.

As the flows decrease through the summer, water use is cut back to the earliest dated rights. In 1924, water use on Sucker Creek was cut back to the single oldest right (which is 1853) in July and eliminated by the end of August (per monthly reports for the Assistant Water Master). In 1994, water use was cut back to 1865 rights (about 15 cfs).

Some water withdrawn for irrigation returns to the stream channel, either overland or subsurface. The quantity of this return flow has not been measured. The water table rises when irrigation season begins (as measured in wells), indicating that excess irrigation water seeps into the subsurface aquifer.

Ground water is presently a source for domestic use, and could be developed further, with proper study of the complex interactions between it and stream flow. Storage of winter streamflow in a reservoir, for release during summer low flows, could also ease competition between some beneficial uses and create possibilities for growth.

A dam site on Sucker Creek was periodically investigated by the Bureau of Reclamation from 1940 to 1971, but the potential project was put on hold, primarily for economic reasons (Bureau of Reclamation, 1964, 1971).

Several issues are related to the Sucker Creek, or other dam proposals. The effects of regulating streamflow on fish habitat and migration; the need for relocation and reconstruction of the Caves Highway on steeper, less stable ground; and a reevaluation of sediment delivery rates and the inundation of gold deposits are all serious considerations.

## 9. Fish Habitat

The watershed analysis considered five fish habitat attributes in the lower reaches of Sucker and Grayback Creeks: pools per mile, depth of pools, pieces of large wood per mile, number of side channels and water temperature. All fish attribute values are below expected in the lower reaches of both creeks (see Figure 4). The low rankings indicate reduced carrying capacity for salmonids in the most important fish production areas in the watershed[2]. Each fish habitat attribute is examined in the following pages.

Fish habitat improvement structures were placed in Grayback Creek and Cave Creek in the late 1980's to improve habitat for coho salmon and rainbow trout respectively. Additional fish improvement opportunities are discussed under Management Recommendations.

[2]The lower reaches of Grayback and Sucker Creeks are critical fish production areas. Maps and descriptions of the conditions and fish habitat attributes associated with stream reaches in the watershed are available in the analysis files.

**FIGURE 4. FISH HABITAT ATTRIBUTES IN THE LOWER REACHES OF GRAYBACK AND SUCKER CREEKS.**

| | NUMBER OF DEEP POOLS PER MILE | | PIECES OF LARGE WOOD PER MILE | | MAXIMUM WATER TEMPERATURE | |
|---|---|---|---|---|---|---|
| | **Expected** | **Actual** | **Expected** | **Actual** | **Expected** | **Actual** |
| **Sucker Creek (Boundary to Nelson Ck. )** | 12 to 31 | 4 | 40 to 80 | 1.7 | Less than 65 degrees | 70 (1993)<br>72 (1994) |
| **Sucker Creek (Nelson Ck. to Grayback Ck.)** | 15 to 37 | 2.5 | 40 to 80 | 4.4 | Less than 65 degrees | 64 (1993)<br>70 (1994) |
| **Grayback Creek (mouth to White Rock Ck.)** | 29 to 73 | 8 | 40 to 80 | 2.8 | Less than 65 degrees | 60 (1993)<br>63 (1994) |
| **Sucker Creek (Grayback Ck. to Yeager Ck.).** | 15 to 38 | 5.8 | 40 to 80 | 1 | Less than 65 degrees | 59 (1993)<br>60 (1994) |

Pool Depth and Pools Per Mile

Pools are important to salmonids during all life stages, but are most important for juvenile salmon during the summer months. Pools with depths greater than three feet are of the highest value because they provide cooler water and cover. The number of pools of any depth, and the number of deeper pools, are below expected values in the lower reaches of Grayback and Sucker Creeks.

## Large Wood

Large wood (small-end diameter greater than 24 inches over 50 feet long) is lacking in streams in the Grayback/Sucker watershed, particularly in the lower reaches. Large wood is important for stream complexity, aquatic and riparian ecosystem processes, and fish habitat. Large wood is delivered by direct input and channel shifting in riparian forests, by landslides, and by streams during high flows.

The lack of large wood is attributed to:

(1) Direct removal by mining, and salvage following the 1964 flood; (2) logging and riparian clearing for agriculture; (3) bank stabilization that inhibits channel shifting; and (4) interception of wood by bridge abutments and midslope roads.

## Side Channels

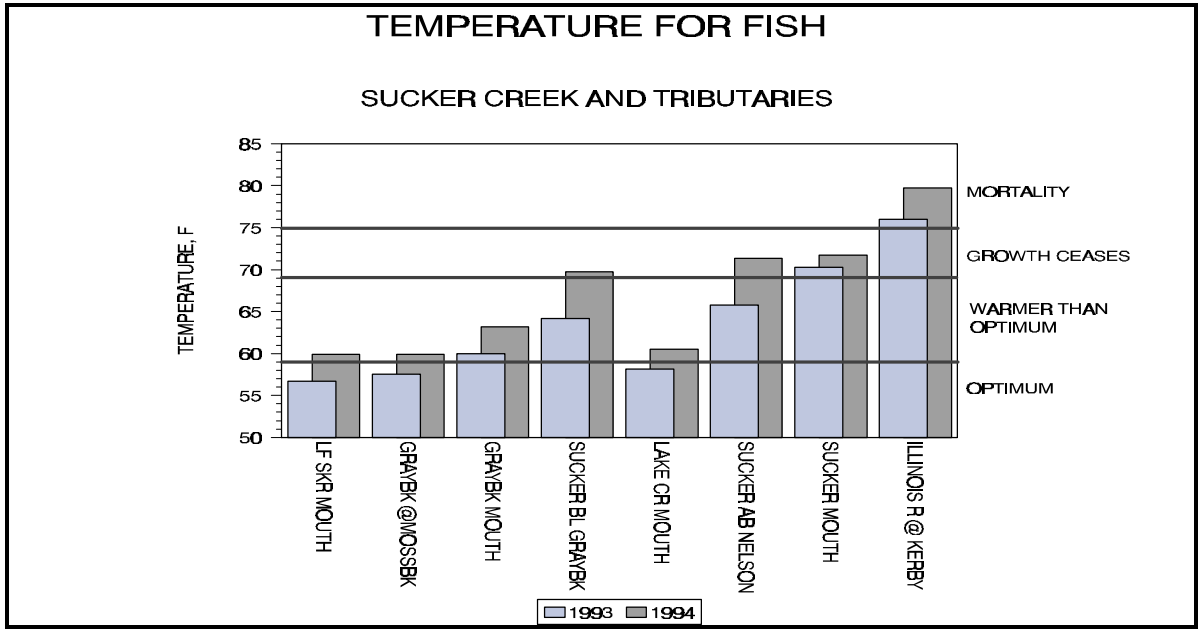
Side channels are critical to overwintering juvenile salmonids, especially coho. Side channels have been reduced from historic levels in Grayback and Sucker Creeks. The conditions and activities that have raised water temperature, reduced large wood, and reduced the number of pools have limited the development of side channels.

## Water Temperature

Summer water temperatures are sub-lethal[3] to salmonids in the lower reaches of Grayback and Sucker Creeks. Optimum fish habitat upstream is fragmented by the warm water. The warm water favors non-native reside shiners that compete with salmonids. The annual phenology (timing of spawning, smoltation, etc.) for coho salmon is not adaptable to the elevated water temperatures. Figure 5 displays the water temperatures measured in the watershed and their relationship to fish habitat.

[3]Sub-lethal means that the water is too warm for salmonid fish to grow.

**FIGURE 5. WATER TEMPERATURE AND ITS EFFECTS ON SALMONIDS.**



## 10. Fish Species, Distribution, and Population Trends

Anadromous and resident salmonid fish are native to the watershed. Anadromous species include: fall chinook (king) salmon, coho (silver) salmon, and steelhead trout. Resident salmonid species are: rainbow and cutthroat trout. Other native fish species found within the watershed include: Pacific lamprey and sculpin. Redside shiner and eastern brook trout are present but are not native to the watershed.

Figure 6 shows current anadromous fish distribution as observed during Forest Service and ODFW surveys. Rainbow trout are present in many tributary streams above and below the anadromous barriers. The trout have been planted in the high lakes in the watershed and the lower reaches of Grayback Creek. The extent to which planted stock has mixed with native stock is not known.

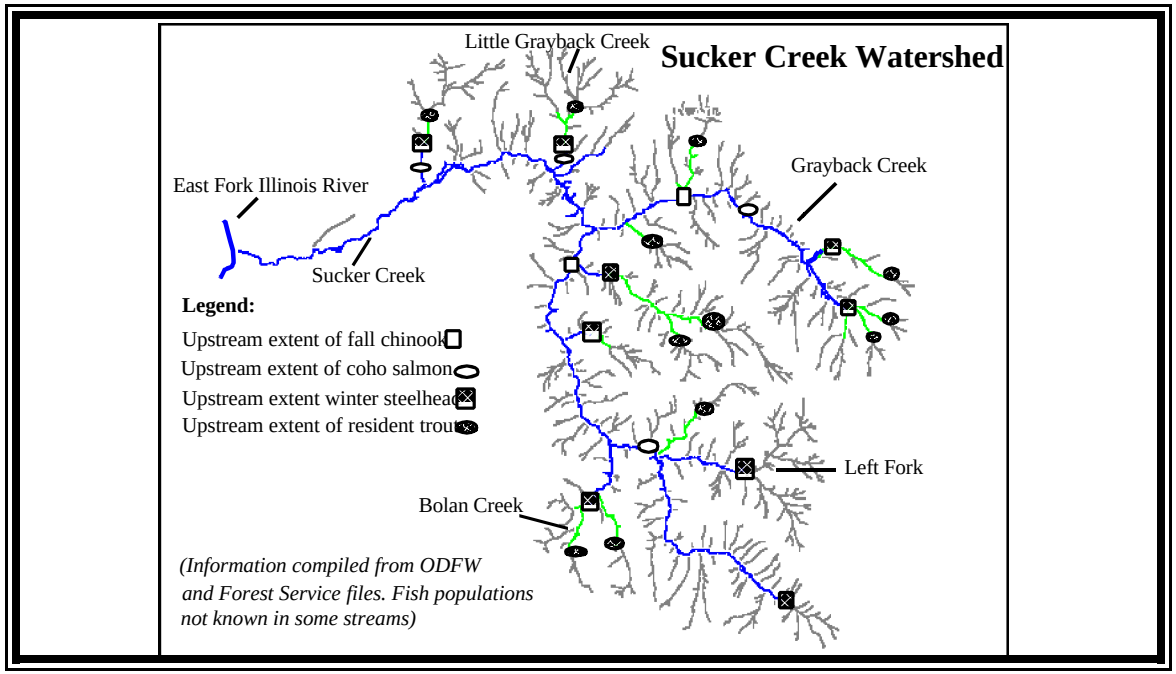



**FIGURE 6. FISH DISTRIBUTION MAP.**

The Oregon Department of Fish and Wildlife (ODFW) currently stocks Bolan Lake with rainbow trout. Rainbow used to be planted in East and West Tannen Lakes (Red Butte Wilderness), but not within the last few years. Historically, Bolan Lake was also stocked with Eastern brook trout. Eastern brook trout have been observed in the lower reach of Cave Creek in years past (USDA,

1972), but they have not been seen recently. Cutthroat trout are present in the upper reaches of the watershed. Historically, cutthroat were well distributed in the lower reaches of Grayback Creek (Craig, 1994).

Sculpin have been observed in Sucker Creek to the confluence with the Left Fork, and in the lower reaches of Grayback Creek. Pacific lamprey are thought to be restricted to the alluvial reaches of both Sucker Creek and Grayback Creek. Redside shiner are well distributed in the lower reaches of Sucker Creek.

Population Trends

Salmonid populations have been declining for decades within the Illinois River Basin; the Grayback/Sucker watershed is no exception. Anadromous fish produced in the watershed are affected by downstream and ocean conditions, particularly fishing and predation. Lack of irrigation system screening affect downstream migrating steelhead trout. Habitat loss or modification throughout river systems affects spawning and rearing salmonids.

Coho salmon (1993), throughout the range of the species, and winter run steelhead (1992), throughout the Illinois River Basin, have recently been petitioned to the National Marine Fisheries Service for listing under the Endangered Species Act. Klamath Mountain Province steelhead trout have been proposed for listing as of March 1995.

Historically, the watershed was one of the most popular fishing areas in Oregon and a destination point for fly fishers. Tannen Lakes and Bolan Lake were also used for winter ice fishing. Today, due to declining populations, salmonid fishing is prohibited in the watershed, other than in Bolan and Tannen Lakes.

**11. Other Aquatic-dependant Species**

Several species of amphibians, reptiles, birds and mammals depend on the cool-water fish habitats described above. Riparian areas provide the link between aquatic and upland habitats. The human activities and natural processes that disturbed riparian areas, and degraded fish habitat, likely had detrimental effects on the other aquatic-dependent species. Species lists are available in the analysis files.

Macro-invertebrates in Sucker, Left Fork Sucker and Grayback Creeks were sampled in 1993 and 1994. No sensitive or

rare species were present. Species collected in Sucker and Grayback Creeks are typical of cool (not cold) water streams that lack complexity. Several warm-water species are also present. Species collected in Left Fork Sucker Creek are typical of year-round cold-water habitats.

**12. Terrestrial Ecosystem**

The Grayback/Sucker watershed is located near the center of the diverse Klamath Province ecosystem. The habitat in the watershed is part of a link between the Cascade Range and the Siskiyou Mountains. This ecosystem provides habitat for a variety of species, including several sensitive and threatened species. For example, the largest concentration of northern spotted owls within the upper Illinois River is found in the watershed. The terrestrial ecosystem analysis focused on critical habitat components identified in the Siskiyou LRMP, as amended by the President's Forest Plan. Lists of known wildlife species in the watershed are available in the analysis files.
Habitat is created, modified, or eliminated by landscape disturbances. Fire, timber harvest, road building, agricultural clearing, and floods are the primary disturbance agents in the watershed. Timber harvest has reduced the size of individual forest stands, and their complexity (canopy layers, dead and down wood, etc.). Fire suppression has had an extensive effect than timber harvest by increasing vegetation densities (live and dead, standing and down) throughout the watershed. Road building allows light into dense forest stands and increases edge habitat. Agricultural clearing and floods have removed riparian forests (see Figure 3).

Many species are closely associated with older forest conditions. Much of the watershed has been allocated to Late-Successional Reserve (see Figure 2), with the primary purpose of providing current and future habitat for these species. The amount of older forest, and the spatial distribution (size and connectivity) of older forest stands affect how well the watershed can support these species. Figure 7 shows 1948 distribution of older forest, compared to current distribution.

Younger forest conditions also support a variety of species. Meadows, deciduous oak savannas, evergreen oak woodlands, younger forests and brushfields were maintained by wildfire and Native American burning (Atzet, 1979). These habitats are declining in the watershed. Disturbance is necessary to maintain these conditions.

Individual large trees, snags and down wood are important to wildlife, whether they exist in older or younger stands. Clear-cuts do not provide as many large trees as burned-over stands of similar age, since wildfires tend to maintain some

of the large trees in a stand. More trees are being retained in harvesting than in the past. President's Plan guidelines require that at least 15 percent of the acreage in harvest units be left uncut, as well as retention of forests in Riparian Reserves.

Figure 8 displays various forest characteristics and how they have changed since fire suppression and extensive timber harvest began in the watershed. It also predicts how they will continue to change given the President's Plan and continued fire suppression. The characteristics described here are considered vital to providing adequate habitat for the plants and animals in the watershed.

**Figure 7. Current and Historic Distribution of Older Stands**.

## FIGURE 8. HABITAT COMPONENTS PAST, PRESENT AND TREND.

| | Pre-1940 | Present-Day | Trend[4] |
|---|---|---|---|
| **Vegetation Density** | Stands of all ages tend to be more open due to frequent, low-intensity burns. | Dense vegetation in unmanaged stands of all ages. | Stand densities increase in unmanaged stands. Higher risk of stand-replacement fire. |
| **Overall Percent Older Forest** | 53% across the watershed. | 35% across the watershed | Increasing percentage of older forest in Late-successional Reserves. |
| **Size and Connectivity of Older Interior Forest Stands** | Stands of older forest are large (up to 16,500 acres) and well-connected. | Older forest stands are smaller and more fragmented. Edge effects more acreage. | President's Plan allocations should increase the size of older forest stands and decrease edge effects. |
| **Location of Older Forest** | Lower elevation, north slopes, where less prone to stand-replacement fire. | Higher elevation sites that are less accessible. | Recovery of older forest in lower elevations. |
| **Younger (Early Successional) Conditions** | Meadows, brushfields and oak groves maintained by fire. | These habitats have been reduced by brush cutting and fire suppression | Future management will maintain these habitats through site specific prescriptions. |

[4]Trend predictions assume harvest levels consistent with the President's Forest Plan, vegetation density treatments, and continued fire suppression.

| | Pre-1940 | Present-Day | Trend[5] |
|---|---|---|---|
| **Riparian Areas** | Riparian areas composed of older forest, even where adjacent upland stand is younger. | Riparian harvest and clearing in low elevation lands result in younger, alder-dominated stands. | Conifer stocking in riparian areas increases. Riparian areas provide dispersal. and migration corridors. |
| **Plant Species Composition** | More shade-intolerant species associated with open forest conditions (pine, Douglas-fir). | Encroachment of shade-tolerant species (white fir, tanoak) as density increases. | Trend to shade-tolerant species with increasing vegetation density. Increased stress on forest health. |
| **Trees, Snags and Down Individual Large Wood** | Scattered throughout young and older forest habitats. | Denser in unharvested stands and reduced in harvested stands. Overall reduction in watershed. | Large snags, trees and down wood continue at reduced levels in harvested stands. Density increases (along with fuel load and fire hazard) in unmanaged stands. |

[5]Trend predictions assume harvest levels consistent with the President's Forest Plan, vegetation density treatments, and continued fire suppression.

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