Observations of Mining Activities in Siskiyou National Forest Riparian Reserves and Probable Impacts to Aquatic Organisms

March 7, 2002

Richard K. Nawa
Siskiyou Project
213 SE "H" Street
Grants Pass, Or 97526
541-476-6648
rich@siskiyou.org

Abstract

Despite adoption of mining standards and guidelines in the Northwest Forest Plan, annual mining in Riparian Reserves has continued to be a chronic cause of stream degradation. The Siskiyou National Forest has over 1,000 active claims, but there is no systematic monitoring of annual physical impacts caused by mining in riparian reserves. Portions of three streams on the Siskiyou National Forest were surveyed by walking the channel in areas where mining activities have been reported in stream surveys. Besides the commonly reported excavations within the active channel, harmful streambank excavations were found outside the active channel. During summer 2000 and 2001 approximately 125 cubic yards were excavated from streambanks at 10 mining sites scattered along 2 miles of Briggs Creek, a major tributary to the Illinois River. Approximately 340 feet of streambank had protective vegetation and armoring removed. I also quantified active channel excavations and documented riparian tree removal, cutting and removal of instream wood, non system roads adjacent to and across streams, trail construction, accumulations of solid waste, improper storage of petroleum products, denuded campsites, and open pit toilets. Annual monitoring of impacts at specific mine sites would provide objective measures of compliance, increase accountability by individual miners, and create a base line for assessing cumulative effects to specific streams. Mineral withdrawal appears to be the best option for long-term protection of streams consistent with the Aquatic Conservation Strategy.

Contents

Maps

Tables

Figures

INTRODUCTION

Despite adoption of mining Standards and Guidelines in the Northwest Forest Plan (ROD C-34), annual mining in riparian reserves continues to be an annual cause of stream degradation. The Siskiyou National Forest (SNF) reports 577 placer claims within streams (USDA 2001:37), but the SNF has not systematically measured annual physical impacts caused by mining in riparian reserves (for example, volume and area of surface disturbance in stream reaches used by spawning coho salmon). Biological impacts of mining related stream disturbances are difficult to measure and often require intensive field research (Harvey and Lisle 1999). In contrast, local physical impacts to stream habitat from mining are relatively easy to measure and can be tabulated for cumulative impact assessment. The purpose of this study was to identify the kinds of mining related physical impacts, quantify those impacts, and assess the significance of impacts to aquatic organisms.

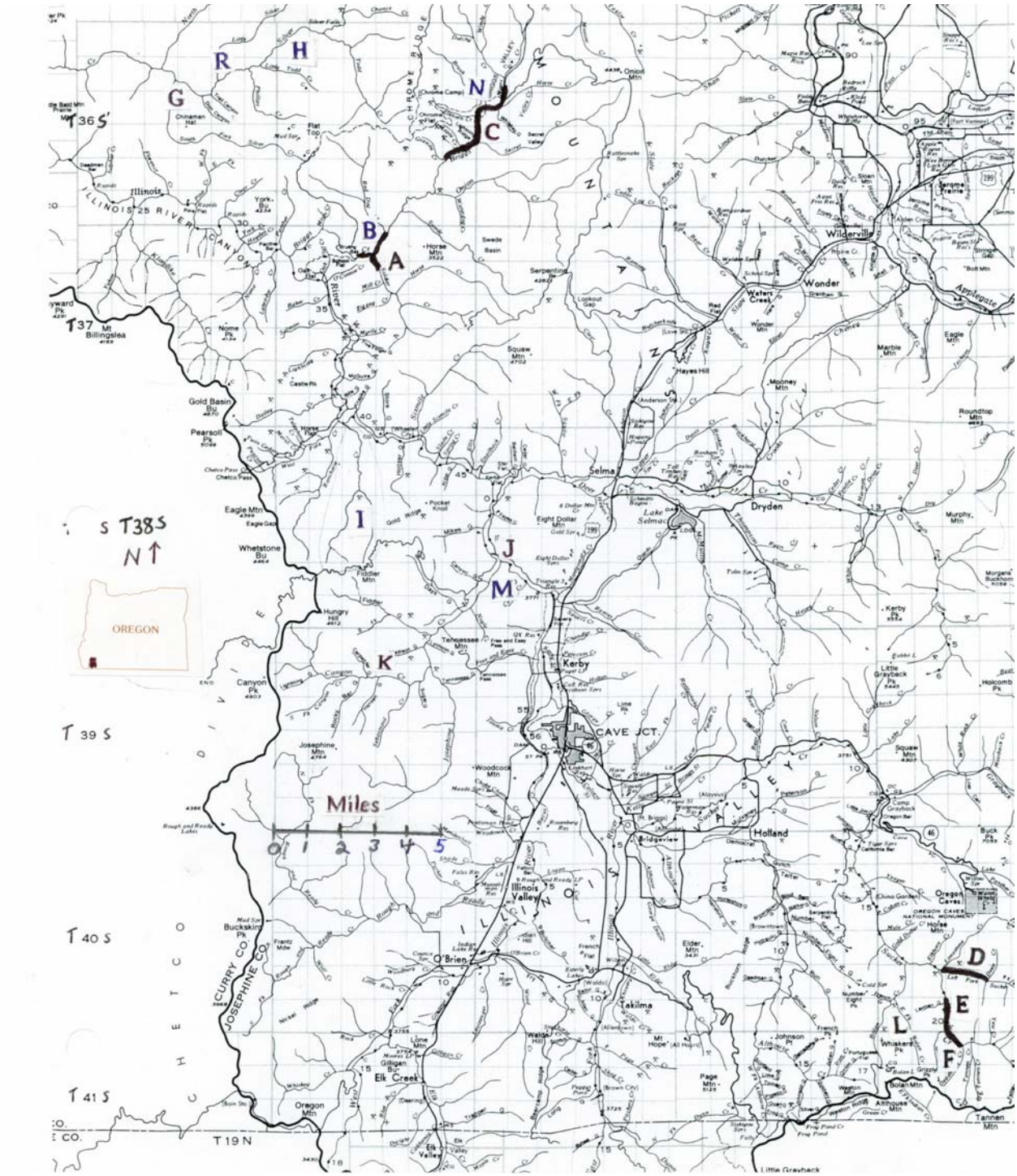
STUDY AREA/STUDY SITES

The study area was the Illinois River Basin in Southwest Oregon (Map 1). This basin has the highest concentration of suction dredge mining operations in the SNF and in Oregon (USDA 2001:37). Study sites were five stream reaches on four streams in the Siskiyou National Forestlands (Map 1, Sites A, B, C, D, and E). Streams and stream reaches were selected based on my knowledge of mining activities and reports of suction dredging found in stream surveys. Each stream surveyed has high densities of mining claims. For example, Briggs Creek has 89 claims and Sucker Creek has 87 claims.

METHODS

I surveyed streams by wading the channel and watching for mining activity. Mining excavations were classified as streambed, streambank or terrace excavations (Figure 1). Lengths, widths, and depths of excavations were measured with a tape or estimated in feet. Minimum depth of shallow excavations was recorded as 1 ft. Year of excavation was usually recorded as 2000 or 2001. Size and volume of older (pre-1950) mine tailings were also recorded. Road and trail lengths were paced or measured from maps. Diameters of severed trees adjacent to mining activities were measured. Areas of denuded vegetation at mining camps were estimated. Nozzle diameters of suction dredges and diameters of plastic pipe used to divert stream flow were measured. Locations of out houses, stream diversions, structures, accumulations of solid waste, petroleum containers, suction dredges, water diversions, steelhead redds and aquatic animals were located on 1:24,000 scale maps and described as discrete observations. Observations were supplemented with photographs.

Map 1. Study streams and locations of selected mining impacts described in text.



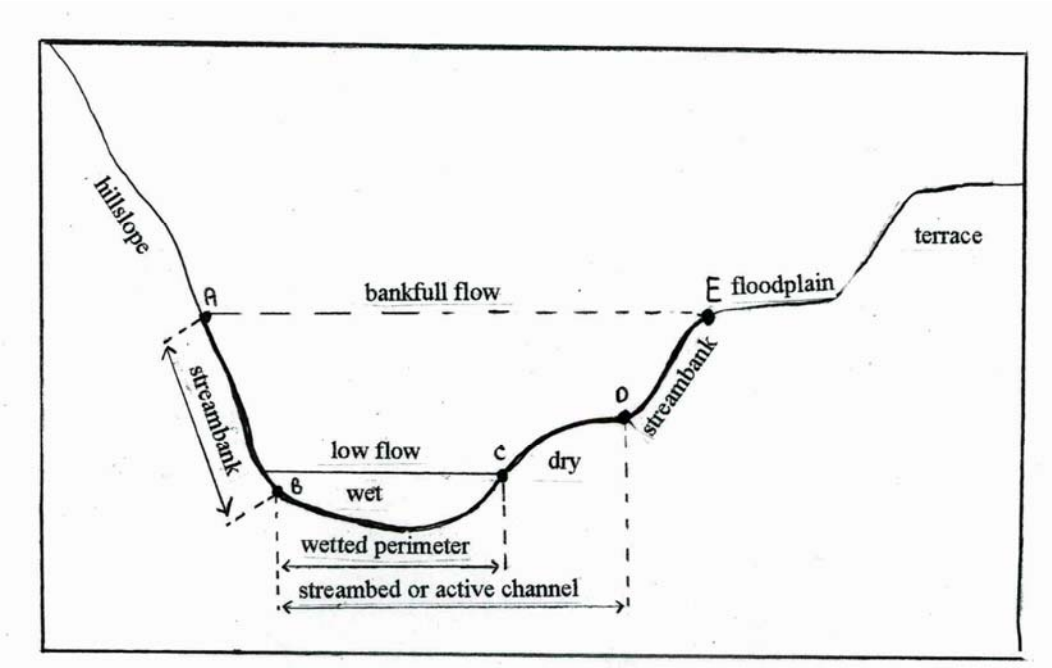


Figure 1. Generalized cross-section of a small mountain stream during summer low flows. The lower extent of the streambank is identified by a change in slope from near vertical to horizontal. Streambanks are steeply sloping or near vertical. The streambed is gently sloping to nearly horizontal. At least one streambank usually extends into the wetted perimeter (the lowermost portion of streambank A-B).

RESULTS

I recorded about 190 observations at the study sites during May-November 2001 (Appendix A) and compiled mining related observations in Tables 1 and 2.

Table 1. Mining excavations found in riparian reserves of four streams in the Siskiyou National Forest, Oregon. N=number of occurrences. Years of excavation in ( ).

Sucker Creek (1.6 mi)	N	Bank ft	yds^3	yds^2
Terrace (2000-01)	3		10	
Streambank (2000-01)	7	113	30	
Streambed (2000-01)	7		156	206
Left Fork Sucker Cr.(1.6 mi)				
Streambank (2001)	1	15	2	
Streambed (2001)	1		3	1
Briggs Cr. (5.1 mi)				
Terrace (1998-00)	3		50	
Streambank (2000-01)	19	355	121	
Streambed (2000-01)	6		225	866
Soldier Cr. (1.2 mi)				
Terrace (1998-00)	3		12	
Streambank (2000)	3	55	29	
All Streams (9.5 mi)				
Terrace (2000-01)	9		72	
Streambank (2000-01)	30	538	182	
Streambed (2000-01)	14		384	1073
Totals	53	538	638	1073

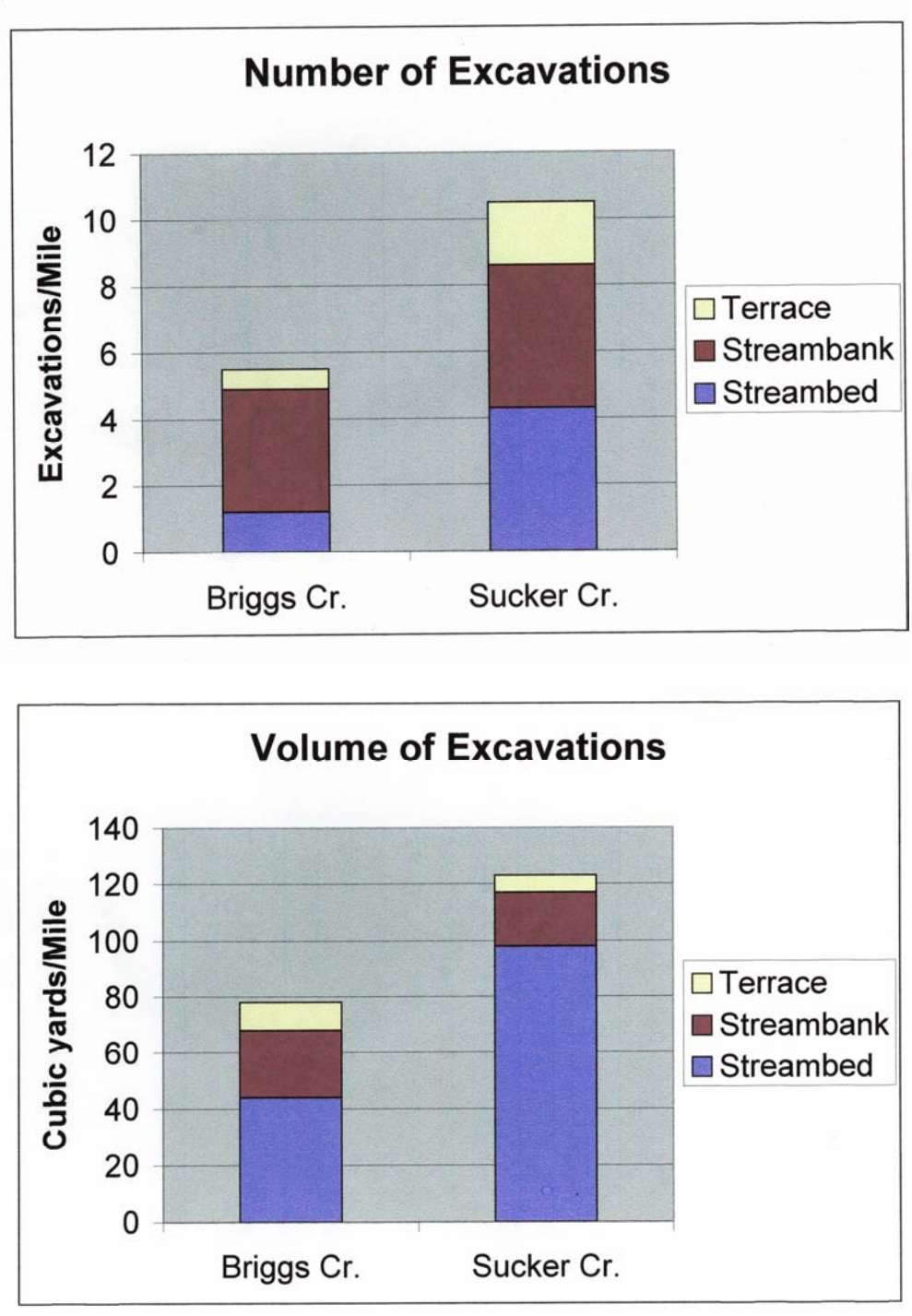


Figure 2. Number (top) and volume (bottom) of excavations from suction dredging along Sucker Creek and Briggs Creek during 2000-2001.

Table 2. Mining impacts and related activities found in riparian reserves along four streams in the Siskiyou National Forest, Oregon.

Creek	Sucker	L.F. Sucker	Briggs	Soldier	Total
Miles Surveyed	1.6	1.6	5.1	1.2	9.5
Roads (mi)	0.6	0.0	5.2	0.2	6.0
Stream Crossings	0	0	5	1	6
Road Density (mi/mi^2)	2.8	0.0	7.5	1.3	4.8
ATV Trail (mi)	0.0	1.6	0.6	0.0	2.2
Existing Trail (mi)	0.3	1.6	0.5	0.01	2.6
New Trail Const. Ft	0.0	220	400	0	620
Reconstruct Trail ft	0.0	162	0	0	162
Hydrology Altered	2	1	2	0	5
Stream Diversion	2	0	0	0	2
Trees Felled	8	0	16	0	24
Fallen Trees Bucked	5	0	3	0	8
Mining Camps	3	1	5	3	12
Outhouses	6	0	0	1	7
Solid Waste	5	2	7	3	17
Petroleum Containers	1	3	2	0	6
Volume oil/gasoline (gallons)	0.2	3.5	0.5	0.0	4.2

Excavations

Streambank excavations were the most common kind of physical impact found, but streambed excavations had higher total volumes (Table 1, Figures 2-5). Most streambank excavations followed the streambank contour but in at least four locations trenches up to 12 ft long were excavated perpendicular to the streambank. Streambank excavation length ranged from 3-88 ft and averaged 18 ft. Estimated volumes of streambank excavations ranged from 0.3-27 yds^3 and averaged 6.1 yds^3.

Area of streambed excavations ranged from 3-277 yds^2 (Avg=77yds^2). Estimated volumes of sediment moved in the streambed ranged from 2-93 yds^2 (Avg=27yds^3). Depth of excavation had to be estimated at most locations making it the biggest source of error. Volume estimates are probably within 50% of actual.

Due to low water conditions during winter 2000-2001 streambed and streambank excavations from summer 2000 were visible during May/June 2001. Terrace excavations persist for many years because they are not affected by winter floods. Historic mining and logging has caused portions of streams to scour to bedrock (e.g. Soldier Creek, upper Sucker Creek) making it impossible to conduct streambed excavations with suction dredges. Streambank excavations dominated in areas where the streambed was scoured to bedrock.

Tailing piles from alluvial excavations prior to 1950 were found along Briggs Creek and Sucker Creek. Two of these moss-covered tailing piles immediately adjacent to Briggs Creek covered 0.5 and 0.2 acres. Five extensive tailing piles along Sucker Creek totaled an estimated 12,000 cubic yards of boulders and cobble (Figure 6). Besides these older (pre 1950) tailings, five smaller piles of boulders and cobble were found on upper Sucker Creek that appeared to be from streambed excavations between 1990 and 1997. These newer tailing piles totaled 134 cubic yards (Map 1 Location F, Figure 7).

Figure 3. During summer 2001, an estimated 7 cubic yards of soil was excavated from 20 ft of streambank (bottom photo) and 5 cubic yards placed directly into Briggs Creek (top photo).

Figure 4. During June/July 2001 about two cubic yards of streambank was excavated into Left Fork Sucker Creek (bottom photo) and about 15 ft of streambank destabilized (top photo).

Figure 5. Approximately 370 square yards of streambed was disturbed making it unsuitable or unsafe for salmon spawning.

Figure 6. Streambed sediment excavated from right bank (A) of Briggs Creek was deposited as a mid-channel bar (B) which now directs flows towards unprotected and undercut streambank (A).

Figure 7. Estimated 4,400 cubic yards of cobble/boulder tailings excavated about 40-60 years ago. Sucker Creek at left remains scoured to bedrock.

Figure 8. An estimated 23 cubic yards of boulders were removed from the streambed to the floodplain of Sucker Creek sometime between 1990-1997.

Road Density

At least 30 percent of the road miles I found in riparian reserves were not on Galice or Illinois Valley Ranger District administrative maps or USGS 7.5' quadrangle maps. Missing roads on recent maps suggests that roads have been constructed or reconstructed since these maps were made and field investigations are needed to avoid underestimating road densities within riparian reserves (Figure 8). For analysis purposes, the riparian reserve was assumed to be a 700-ft wide band containing the stream's active channel. Road densities for each stream's riparian reserve ranged from 0.0 for Left Fork Sucker to 7.5 mi/mi^2 for Briggs Creek (Avg=4.8mi/mi^2).

Motorized Trails

Approximately 1.6 miles of trail along Left Fork Sucker was widened or reconstructed to accommodate ATV's (Figure 9). Similarly about 0.6 miles of the Briggs Creek Trail was used by motorbikes to access mining operations.

Stream Diversions

Two stream diversions were found on Sucker Creek. I estimated that the flow diverted through a 1 inch pvc pipe at less than 1 percent of the streamflow in upper Sucker Creek. A second stream diversion diverted a minor portion of the creek into a wooden trough adjacent to the stream.

Trees Felled/Bucked

Most trees felled were alders less than 12 inches diameter, although one 14-inch diameter Douglas-fir was felled into Briggs Creek and bucked during summer 2001 (Figure 10). At the same location on Briggs Creek a fallen 24-inch diameter maple was bucked and removed from the active channel during 2000-2001 (Figure 11). A 36-inch diameter 20-ft high snag on Briggs Creek had its roots sawn through and its base excavated (Figure 12). Most of the trees felled and bucked along Sucker Creek occurred prior to 2000.

Mining Camps

Denuded and compacted soils at 12 mining camps ranged from .05 to .25 acres (Figure 13). The total compacted area in mining camps was 1.4 acres. Seven outhouses were found at mining camps (Figure 14). Sheds, tables and tents were often found at mining camps but were not enumerated.

Solid Waste

Examples of solid waste were collapsed structures, car batteries, tires, tarps, petroleum containers, plastic buckets, empty food containers, plastic pipe, and abandoned mining equipment (Figure 15). Volumes of solid waste were not recorded.

Figure 9. Sometime during 1975-1990 about 0.4 miles of mining road was bulldozed into very steep slopes above Sucker Creek. Road is not on Illinois Valley District administrative maps or USGS maps.

Figure 10. During summer 2000, a hiking trail along Left Fork Sucker Creek was widened by excavating soil from hillslope to accommodate all-terrain-vehicles (ATVs) used by miners.

Figure 11. During summer 2001, a live 14-inch diameter Douglas-fir tree was felled into Briggs Creek and bucked. Streambank below fallen tree was excavated.

Figure 12. During summer 2000 a fallen 24-inch diameter bigleaf maple in the active channel of Briggs Creek was cut into 2-ft pieces. At the same location a streambank was excavated.

Figure 13. During summer 2001, the roots of a 4 ft. diameter snag were severed and soil dug out from its base.

Figure 14. Year-long mining camp on mining claim along Soldier Creek.

Figure 15. Two adjacent out houses located within 80 ft of Sucker Creek. One on left appears to have been constructed summer 2000.

Figure 16. Discarded plastic barrels, motors, tarps, plastic pipe.

Petroleum Containers

Petroleum containers ranged in size from 1 qt to 2-gallon plastic jugs. All were at least half-filled with oil or gasoline. Five of six containers were located 4-25 ft from the wetted stream (Figure 16).

Figure 17. Two gallons of gasoline left 4 ft from Left Fork Sucker Creek, July 2001.

DISCUSSION

This study provides quantitative data demonstrating that miners construct roads and trails, destroy riparian vegetation, severe instream wood, and excavate streambeds and streambanks in their quest for gold within riparian reserves. Mining impacts must be evaluated within the context that they occur (e.g., stream size, stream habitat conditions and species present). The magnitude and intensity of observed mining impacts was significant because of the sensitivity of small 15-40 ft wide streams to disturbances that affect egg incubation and early development of fishes and amphibians. In addition, the streams surveyed are much below potential for producing salmonids due to cumulative effects from 100-150 years of mining and 50 years of logging.

Mining impacts were similar within and among the streams studied. Similarity of impacts may allow for cautious extrapolation to other streams in the Siskiyou National Forest where riparian reserve mining occurs. Exceptions are large-scale placer mining in Josephine Creek and the use of helicopters to supply mine sites in roadless areas and wilderness (Silver Creek and Chetco River).

Excavations

Streambank excavations were the most frequent impact observed (Table 1). Streambank excavations are particularly harmful because nearly all material excavated from streambanks is directly deposited into the stream channel and increases sediment load. Miners also removed protective boulders and cobble that once armored streambanks (Figure 17). An unknown amount of additional sediment beyond what was excavated from streambanks will be added to the stream each year as denuded streambanks continue to erode during winter floods (Figure 18). Tailings are often left as mid-channel bars (Figure 5) that further direct flow towards erodible streambanks (Harvey and Lisle 1998:11). Trenches dug perpendicular to the streambank will persist for many years and may have beneficial impacts because they function as alcoves or backwater habitat during high flows (my speculation about benefits to fish does not mean that trenches are fish friendly because overall impacts from streambank excavations are overwhelmingly adverse).

Undisturbed streambeds are armored with coarse rock that requires relatively high (bankfull) flows to activate bedload movement of underlying fine sediment (Jackson and Bestcha 1982). Streambed excavations removes the coarse protective armoring and allows the underlying finer sediments to be mobilized by modest (less than bankfull) flows (Figure 19). In other words mining makes the streambed more susceptible to streambed erosion, turbidity, and increased surficial deposition of fines. Increased sediment, unstable eroding streambanks, loss of coarse textured armoring, and mid-channel bars all combine to destabilize streambeds.

Spawning salmon and steelhead are attracted to freshly disturbed or freshly deposited gravels at mined sites. Eleven steelhead redds were found at five sites on Briggs Creek that were either recently dredged or adjacent to mining camps (Map 1 Locations B,C). Steelhead eggs and developing alevins are killed when they are prematurely aborted from the redd by suction dredging as early as June 15 (Harvey and Lisle 1998). Chinook and coho salmon eggs buried in or near mine tailings during October-January are scoured out and killed when winter floods reshape the stream back to pre-mining contours (Harvey and Lisle 1999). Increased channel erosion caused by mining disturbance may also reduce egg-to-fry survival of fall/winter spawning salmon through burial and increased sedimentation.

The surface area of mining impacts to salmon, steelhead and resident trout is not proportional to the total stream area present because spawning gravel is concentrated in the areas being mined. Much of the streambed of upper Sucker Creek and lower Soldier Creek is bedrock. The few depositional areas on upper Sucker Creek suitable for spawning were intensively dredged during 2000 and 2001. Similar concentrations of instream mining and steelhead spawning occurs in Silver Creek where 67% of the steelhead redds during 1997 and 1998 were found in the mainstem above North Fork Silver Creek (Map 1 Location G); the same area where active mining operations are concentrated. Stream areas above the North Fork contain the best deposits of spawning gravel and presumably the best deposits of gold that make these areas attractive to both miners and spawning steelhead. (USDA 1997, USDA 1998)

Excavations in riparian reserves kill other organisms besides salmonids (Harvey and Lisle 1998). Incubating eggs of amphibians such as the tailed frog (*Ascaphus truei*) would suffer direct mortalities because they breed during the summer when dredging occurs (Corkran and Thoms 1996:81). The Klamath smallscale sucker (*Catastomus rumiculus*), sculpins, and mollusks may be

similarly affected. Mining camps, streambank excavations, terrace excavations, road construction, road reconstruction, trail construction, and trail reconstruction may affect survey and manage species (USDA/USDI 2000). Pre-1950 tailing piles adjacent to Briggs Creek and Sucker Creek are suitable habitat for survey and manage snails and amphibians.

Post 1994 mining impacts must be considered cumulative in the context of historic mining. Historic (pre 1950) mining on Briggs Creek and upper Sucker Creek removed large amounts of boulders and cobble from the streambed and left them as tailing piles adjacent to the creek. Besides these older (pre 1950) tailings, 5 smaller piles of boulders and cobble were found on upper Sucker Creek that appeared to be from streambed excavations between 1990 and 1997. These newer tailing piles totaled 134 cubic yards (Map 1 Location F, Figure 7). The discovery of five new tailing piles adjacent to the stream indicates that significant removal (not merely redistribution) of cobble and boulders from Sucker Creek has continued to recent decades. Removal of boulders and cobble from streambeds and creation of excavated pits is important because it increases channel erosion (Kondolf 1994) and contributes to increased exposed bedrock. Exposed bedrock increases stream warming, eliminates interstitial spaces needed for aquatic insects, and eliminates the potential for salmon spawning. Exposed bedrock in heavily mined streams is not likely to recover to a pre-mining alluviated state because of chronic disturbance that increases local channel erosion. In other words, suitable spawning gravel is likely decreasing in some mined areas because of chronic streambed disturbance. Measuring streambed substrate over time on heavily mined reaches would determine the significance of trends.

Figure 18. During June/July 2001 several 2-3 ft diameter boulders were winched from a streambank to expose fine textured soil, Left Fork Sucker Creek.

Figure 19. Nearly all protective armoring has been removed from this streambank making it vulnerable to increased erosion from winter floods. Briggs Creek, 5 Sept 2001.

Figure 20. Streambed excavations removes coarse textured rocks and exposes underlying fine sediment to bedload transport during winter flows. Left Fork Sucker Creek, 17 July 2001.

Figure 21. During heavy rainfall, soil from this 1 ft deep gully on a mining access road goes directly into Briggs Creek. Gully is actively headcutting uphill on 20 percent grade.

Figure 22. Mining access road across Briggs Creek has destroyed riparian vegetation. Exposed soil erodes directly into the stream. Wet stream crossings increases risk of contaminating the stream with Port Orford Cedar root disease.

Figure 23. The cumulative effect of allowing miners to discard unwanted items onto public lands for decades. Josephine Creek, Siskiyou National Forest.

Roads and ATV trails

All mining camps were accessed with roads or ATV trails. High road density within Briggs Creek riparian reserve (7.5 mi/mi^2) is a significant sediment source. Roads leading to mining camps often lacked water bars and culverts. Poorly designed roads diverted hillslope runoff down the road surface creating gullies (Figure 20). Five stream crossings along Briggs Creek delivered roadbed sediment directly into the stream (Figure 21) and increased the risk of petroleum contamination of pristine streams.

Mining roads increases the risk of spreading Port-Orford root disease. Port-Orford cedar is an important component of riparian reserves because it provides shade, streambank stability, and stable instream wood that creates complex habitats used by salmonids and other aquatic creatures (Nawa 1997). The cedar's roots are susceptible to the fatal Port-Orford-Cedar root disease (*Phytophthora lateralis*) (Hansen et al. 2000). Roads and ATV trails are potential pathways for infestation by the root disease. Infectious spores from dead and dying trees are found in muddy areas along infected streams. Mud infested with spores attaches to vehicle tires and frames. Vehicles transport the infected mud to uninfected areas. Port-Orford cedars along Briggs Creek and Left Fork Sucker Creek are currently uninfected by the fatal disease. Briggs Creek is at high risk for infection because of high road densities and numerous stream crossings. Wet season closure of mining roads in upper Briggs Creek were ineffective during winter 2001-2002 because of a vandalized gate at Forest Road 2512-017. Even when the gate is locked, recreational four wheelers have accessed the unnumbered mining roads along Briggs Creek by driving down a steep embankment from Road 2512-017 and into a mining camp. ATV use along Left Fork Sucker Creek could easily infect that drainage.

Mining roads are increasing at an unknown rate. New roads are being constructed or reconstructed by miners with no notification of the Forest. For example, at least 2 miles of roads were found in riparian reserves that are not on Forest Service maps or USGS quads (Figure 8). Unmapped roads suggest that these roads may have been constructed or reconstructed within the past 1-20 years. Without Forest Service notification, during summer 1993, a miner bulldozed a road through a Port Orford cedar wetland along Silver Creek (Map 1 Location H). Similarly, during summer 2000 a miner constructed or reconstructed road accessing a claim on Fall Creek (Map 1 Location I). Without Forest Service notification, a miner accessing a placer claim during July-August 1999 created road ruts and damaged a spring by repeatedly driving an ATV from Eight Dollar Mountain Road to the Illinois River in a botanical area (Map 1 Location J).

In this study I measured and reported road miles within riparian reserves but access to mining claims also includes an extensive road network outside of riparian reserves that contributes sediment to streams. The Canyon Creek Watershed Analysis Area (Map 1 Location K) has 97 miles of road, including surfaced, non-surfaced roads and mining tracks (USDA 1992:3-10). Road density is 2.9 mi/mi^2. Elimination of mining roads in the Canyon Area would drop road density to below 1 mile/mi^2. Mining roads and tracks parallel many of the streams in the Canyon Creek watershed.

Mining access roads attract recreational users who cause additional damage outside of the mining season through off road use in meadows that destroys rare plants, including species that are state or

federally listed. Road widths and surfaces were extremely variable but all were passable during the summer with a Toyota 4-wheel drive truck, including portions of the Briggs Creek Trail (1132). The 3 month mining season (June15-September 15) in the Illinois Basin does not affect recreational use of mining roads. Recreational use of mining roads in riparian reserves increases the risk of spreading Port-Orford cedar root disease because use occurs during the wet season. Recreational users go around locked gates or destroy them to gain access to mining roads within riparian reserves (Map 1 Location N).

Stream Diversions/Hydraulic Mining

I found one small stream diversion where less than 1% of the flow from Sucker Creek was diverted into a 1 inch plastic pipe for 500 ft to service a small 8ft diameter settling pond about 40 ft above the stream (Map1 Location E). Sediment laden water from the settling pond appears to have overflowed into Sucker Creek. Diverting clean water from a stream and returning the water contaminated with sediment is harmful to aquatic animals.

Forest Service stream surveyors have found much larger stream diversions that operated during winter months on Bolan Creek and Canyon Creek. During the late 1980s water was diverted through a series of ditches and into a pipe to hydraulically mine terraces adjacent to Canyon Creek east of Carpenter Gulch (Map 1 Location K). All vegetation and soil covering about 20 acres was destroyed. Sediment laden water from hydraulic mining flowed directly into Canyon Creek for several winters because there were no holding ponds (USDA 1992:3-10). Similarly, during 1987 a 900 ft long ditch diverted most of the flow from Bolan Creek to service hydraulic mining of hillslopes adjacent to Bolan Creek (Map 1 Location L). As recent as April 2000, harmful hydraulic mining of hillslopes and terraces was discovered by the Forest Service in Josephine Creek (Map1 Location M). Holding ponds on Josephine Creek have been known to allegedly accidentally breach and release up to 1,000 cubic yards of sediment into the stream (USDA 1992:3-10). Due to the remoteness of the Siskiyou National Forest streams and lack of effective monitoring and reporting, harmful mining activities in riparian reserves can go undetected for years.

Trees Felled/Fallen Trees Bucked

Most tree felling and bucking of fallen trees during 2000- 2001 was done in conjunction with streambank excavations (Figs 10,11). Miners apparently remove streamside trees and cut roots while excavating streambanks. Removal of streamside trees and shrubs, and subsequent streambank excavation makes streambanks vulnerable to accelerated erosion and channel widening. Channel widening and resulting shifting thalweg destabilizes the streambed. Some maples and alders appear to have been cut for fire wood. Cumulative effects of tree removal would eventually reduce shade and cause stream temperature increases or retard progress towards cooler, pre-mining conditions. Similar destruction of riparian vegetation has been reported from Alaska (Prussian et al. 1999). During summer 2001, the roots of a 4ft-diameter snag were severed and soil dug out from its base (Figure 12). This snag is certain to fall prematurely, thus reducing available habitat for cavity nesting birds and bats. Anyone who ventures near this snag is in danger of being crushed because most of its support has been cut or undermined.

Mining Camps

Mining camps were located immediately adjacent to streams on high floodplains or terraces. Soil compaction and vehicle use prevent recovery of vegetation. Wood structures, sinks, stoves, plastic pipe and tarps at mining camps are often abandoned and become solid waste. Multiple open pit toilets (outhouses) on Sucker Creek could cause fecal contamination of the stream (Figure 14). Human habitation at multiple camps along a stream reduces suitability for wildlife. Remote areas along streams that would otherwise be refugia for fish and wildlife are likely to be hunted and fished due to the presence of miners. For example, I observed fishing lures and tackle at remote mining cabins along the upper reaches of the Little Chetco River where winter steelhead spawn in the Kalmiopsis Wilderness.

Solid Waste Sites

Cans, plastic containers, tires, tarps, car batteries, and mining equipment are abandoned to become unsightly solid waste. Wooden structures eventually collapse and expose unsuspecting hikers to harm from rusting nails. Some streamside areas resemble junkyards because of concentrations of rusting metal machinery and abandoned equipment (for example, Josephine Creek and Canyon Creek, Figure 22). Plastic sheeting and pvc pipe is often left in the stream to deteriorate.

Petroleum Containers

Gasoline or oil containers left unattended increases the risk of a spill or wild fire. Containers left on gravel bars could be swept into the stream during a summer freshet (Figure 23). During summer 1998, miners abandoned several partially filled and leaking 55 gallon barrels adjacent to Silver Creek (Figure 24, Map 1 Location R).

Wild Fire Danger

Unattended or abandoned petroleum containers increases fire danger. The Forest Service allows miners to operate suction dredges in small streams and operate ATV's on narrow hiking trails during extreme fire danger when logging activities are prohibited. Around noon on 3 September 2001, two miners were observed operating a suction dredge in Briggs Creek during extreme fire danger. The dredge was at the edge of the stream immediately adjacent to a Port-Oxford cedar sapling and recently cut vine maples. The miners had operated a motorbike on 0.5 mile of a narrow hiking trail. Gasoline fumes were noticeable on the hiking trail 200 ft above the creek. An open campfire had been recently used at the Elkhorn Mine campsite.

Figure 23. Miners used helicopters to place 55 gallon barrels of gasoline in the streambed of Silver Creek. Siskiyou National Forest. August 1998.

Figure 24. Miners using helicopters abandoned these leaking barrels of gasoline on a terrace above Silver Creek. August 1998.

Conclusion

Observations compiled in this study demonstrate that the Siskiyou National Forest has many remote stream reaches where mining is harming riparian reserves. Cumulative mining impacts over space and time retards recovery of the study streams to pre-mining conditions. Aquatic Conservation Strategy Objectives 3, 5, 8 and 9 cannot be met due to annual, mining- related impacts in riparian reserves (ROD: B-11). Effective monitoring and effective enforcement of mining prohibitions in riparian reserves is not likely to occur with current staffing levels of responsible state and federal agencies and the Forest Service policy to promote mining. In the short-term, the findings of this study can be used to develop more effective prevention or mitigation of annual mining activities that harm streams (for example, reduced streambank excavations, road reconstruction, and felling of riparian trees).

My observations and findings reported by others lead me to conclude that the only long-term solution for protection and recovery of riparian reserves is mineral withdrawal. Mineral withdrawal of the Smith River National Recreation Area on the Six Rivers National Forest and mineral withdrawal of the Steamboat Creek watershed on the Umpqua National Forest provides certainty that mining related impacts in riparian reserves will decrease over time and allow for effective restoration efforts. Much of the upper Chetco River watershed and lower Illinois River in the SNF was withdrawn from mineral entry with designation of the Kalmiopsis Wilderness (one miner on the Chetco River continues to use helicopters for access). Mineral withdrawal is long overdue for remaining Siskiyou National Forest streams threatened by mining.

REFERENCES

Corkran, C.C. and C.Thoms. 1996. Amphibians of Oregon, Washington and British Columbia. Lone Pine Publishing, Renton, WA.

Hansen, E.M. , D.J. Goheen, E.S.Jules, B. Ullian. 2000. Managing Port-Orford cedar and introduced pathogen (*Phytophthora lateralis*). Plant Disease 84 (1):4-14.

Harvey, B.C. and T.E. Lisle. 1998. Effect of Suction Dredging on Streams: a Review and an Evaluation Strategy. Fisheries 23(8):8-17.

Harvey, B.C. and T.E. Lisle. 1999. Scour of Chinook Salmon Redds on Suction Dredge Tailings. North American Journal of Fisheries Management 19:613-617.

Jackson, W.L. and R.L. Beschta. 1982. A model of two-phase bedload transport in an Oregon coast range stream. Earth Surface Processes and Landforms 7:517-527.

Kondolf, G.M. 1995. Managing bedload sediments in regulated rivers: examples from California, USA. Geophysical Monograph 89:165-176.

Nawa, R.K. 1997. The Importance of Port Orford Cedar in Maintaining the Stability, Beauty, and

Ecologic Integrity of Wetlands. In: Proceedings of the First Conference on Siskiyou Ecology, J.K. Beigel, E.S. Jules, B. Snitkin Eds. pp. 90-97. Siskiyou Regional Education Project, Cave Junction, Or.

Oregon Water Resources Research Institute. 1995. Gravel Disturbance Impacts on Salmon Habitat and Stream Health. Volumes I and II. A report prepared for the Oregon Division of State Lands.

Prussian, A.M., T.V. Royer, and G.W. Minshall. 1999. impact of suction dredging on water quality, benthic habitat, and biota in the Fortymile River, Resurrection Creek and Chatanika River, Alaska. Final Report prepared for US Environmental Protection Agency, Seattle, WA by Dept. Biological Sciences, Idaho State University, Pocatello.

ROD. 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl including Standards and Guidelines for Management of Habitat for Late Successional and Old-Growth Forest related Species. USDA Forest Service and USDI Bureau of Land Management.

USDA (Siskiyou National Forest). 1992. Final Environmental Impact Statement. Canyon Integrated Resource Project. Siskiyou National Forest.

USDA (Siskiyou National Forest). 1997. Distribution and Abundance of Winter Steelhead Redds and Spawning Habitat in Silver Creek. Siskiyou National Forest, Grants Pass, OR.

USDA (Siskiyou National Forest). 1998. Winter Steelhead Redd Abundance and Distribution in Silver Creek 1998. Siskiyou National Forest, Grants Pass, OR.

USDA/USDI (U.S. Forest Service and Bureau of Land Management). 2000. Final Supplemental Environmental Impact Statement for Amendment to the Survey & Manage Protection Buffer, and other Mitigation Measures Standards and Guidelines.

USDA (Siskiyou National Forest). 2001. Draft Environmental Impact Statement. Suction Dredging Activities. Siskiyou National Forest, Grants Pass, Or.

APPENDIX A

Table of 198 0bservations
3 Maps
120 Color Photos

Table 1. Observations of fish, wildlife, habitat, and human activities associated with mining in Riparian Reserves, Siskiyou National Forest, Oregon (Updated 5/14/03).

#	Creek	Date Observed	T. R. 1/4Sec	Map Locat	Roll Photo	Activity Animal use	Description
1	Soldier	16May01	37S09W 10SW	1-A	--	road	Wishing Well Claim. Road bulldozed down to creek. Stream scoured to bedrock. POC on banks and floodplain.
2	Soldier	16May01	37S09W 10NW	1-B	--	trail	Trail constructed down to creek on steep terrace. About 40ft x 3ft prone to erosion. Steps dug into soil. POC present.
3	Soldier	16May01	37S09W 10NW	1-B	1-14	terrace excavation	Edge of terrace dug out.
4	Soldier	16May01	37S09W 10NW	1-B	1-15	solid waste	4 ft^2 of particle board, wood with nails sticking out
5	Soldier	16May01	37S09W 10NW	1-C	1-16	solid waste	abandoned coleman propane tanks, plastic jugs, plywood table
6	Soldier	16May01	37S09W 10NW	1-C	1-17	streambank excavation	Edge of floodplain excavated (30x9x2ft)
7	Soldier	16May01	37S09W 10NW	1-D	--	terrace excavation	Redneck mine. terrace dug out but now vegetated
8	Soldier	16May01	37S09W 04SE	1-E	1-18 1-19	streambank excavation	McNuget I. West streambank excavated (20x10ft).
9	Soldier	16May01	37S09W 04SE	1-E	1-20	solid waste	abandoned sluice box near excavated bank
10	Soldier	16May01	37S09W 04SE	1-E	1-21	campsite	0.1 acre denuded, at least 4 sites ? along creek
11	Soldier	16May01	37S09W 04SE	1-E	1-22 1-23	fecal waste	open pit toilet on terrace 50 ft above creek
12	Soldier	16May01	37S09W 04SE	1-E	--	road	300 ft of dirt road on terrace
13	Briggs	16May01	37S09W 04SE	1-F	--	road	Maize of at least 1 mile of dirt roads (#152) on steep slopes and meadows in the vicinity of Soldier Cr. and Briggs Cr.
14	Briggs	16May01	37S09W 04SE	1-F	--	solid waste	aluminum box, carpeting
15	Soldier	16May01	37S09W 04SE	1-G	--	trail	4wd crossing of Soldier Creek trail #1132
16	Soldier	16May01	37S09W 04SE	1-G	--	terrace excavated	10x3x8ft pit about 15 ft below trail #1132
17	Soldier	16May01	37S09W 04SE	1-I	--	streambank excavated	5x4x3ft dug out about 100 ft below trail #1132
18	Briggs	24May01	37S09W 04SE	1-J	2-1	steelhead redd	2001 steelhead redd in side channel adjacent to mining camp"McNugget South" Steve Neuman located 6-14-2000
19	Briggs	24May01	37S09W 04SE	1-J	2-3	steelhead redd(s)	2001 steelhead redd in tailout of pool adjacent to mining camp"McNugget South"
20	Briggs	24May01	37S09W	1-J	2-5	mining camp	About 1/8 acre denuded of vegetation adjacent to Briggs Creek

#	Creek	Date Observed	T. R. 1/4Sec	Map Locat	Roll Photo	Activity Animal use	Description
			04SE				
21	Briggs	24May01	37S09W 04SE	1-J	2-6	Road	road excavated down to wetted perimeter of Briggs Cr. Vegetation destroyed, bare soil subject to erosion.
22	Briggs	24May01	37S09W 04SE	1-K	2-7	Road	About 0.5 miles of spur road 152 loops down onto meadows adjacent to Briggs Creek to access mining claims. 1 ft deep ruts in some areas (not shown in photo)
23	Briggs	24May01	37S09W 04SW	1-L	2-8	road 0.2 mi	Road 675 accesses mining claim (DTS #1 ORMC 154282) on Brushy Bar and crosses Briggs Creek. Gully erosion from this road surface goes directly into Briggs Creek. Sign reads: "Limited Maintenance Not Suitable for Low Clearance Vehicles"
24	Briggs	24May01	37S09W 04SW	1-L	2-10	Road 1.0 mi	Erosion from this 1 ft deep gully on Road 675 goes directly into Briggs Creek. Gully is actively headcutting uphill on 20 percent grade.
25	Briggs	24May01	37S09W 04SW	1-L	2-11	Road	Road crosses Briggs Creek. Riparian vegetation destroyed. Exposed soil subject to erosion directly into Briggs Creek.
26	Briggs	24May01	37S09W 04SW	1-M	2-14	Road 1.2 mi	Culverts under motorized trail 1132 have been altered to accommodate mining equipment which may increase risk of road failure.
27	Briggs	24May01	37S09W 03NW	1-Q	2-15	Road	Road crosses Briggs Creek to access mining claims
28	Briggs	16May01	37S09W 04SE	1-O	--	Road	300 ft of dirt road down to Mc Nugget 1 on low floodplain of Briggs Creek.
29	Briggs	16May01	37S09W 04SE	1-O	--	mining camp	20x20 ft tarp shelter on floodplain and about 1/4 acre denuded for parking.
30	Briggs	16May01	37S09W 04SE	1-O	--	Woody debris	About 1/4 cord of alder bucked up for firewood
31	Briggs	16May01	37S09W 04SE	1-O	--	yellow legged frog	
32	Briggs	16May01	37S09W 04SE	1-O 1-P	--	talus	1/2 acre of talus both sides of Briggs Creek, suitable for DelNorte Salamanders, survey & manage snails
33	Briggs	16May01	37S09W 04SE	1-P	--	western toad	hiding in talus
34	Briggs	16May01	37S09W 04SE	1-P	--	steelhead trout	five juvenile steelhead (3-5") in tailout
35	Red Dog	24May01	37S09W 03NW	1-Q	--	Port-Orford-Cedar	uninfected POC on banks of Red Dog Cr.
36	Red Dog	24May01	37S09W 03NW	1-R	--	excavation	Debris slide (est 444 yds^3) into Red Dog Creek from old mine on east slope
37	Red Dog	24May01	37S09W 03NW	1-R	--	Road	Road related debris slide into Red Dog Creek (est 44 yds^3).
38	Briggs	24May01	37S09W 03NW	1-Q	--	spawning gravel	2 small patches of spawning gravel below Red Dog Creek (est. 166yds^2 and 111yds^2)
39	Briggs	24May01	37S09W 03NW	1-S	2-16	solid waste	plastic barrels,motors, tarps,pipe

#	Creek	Date Observed	T. R. 1/4Sec	Map Locat	Roll Photo	Activity Animal use	Description
40	Briggs	24May01	37S09W 03NW	1-S	2-17	solid waste	abandoned mining equipment next to mining pit
41	Briggs	24May01	37S09W 03NW	1-S	2-18	solid waste	abandoned pipe leading to Briggs Creek
42	Briggs	24May01	37S09W 03NW	1-S	2-19	steelhead redds	steelhead redds located among mine tailings
43	Briggs	24May01	37S09W 03NW	1-S	2-20	trees cut	top of alder tree severed
44	Briggs	24May01	37S09W 03NW	1-V	2-21	steelhead redds	2 mid channel steelhead redds below mine tailings of cobble and boulders
45	Briggs	24May01	37S09W 03NW	1-V	2-23	talus 0.2 A steelhead redd	talus suitable for DelNorte Salamanders and survey/manage mollusks
46	Briggs	24May01	37S09W 03NW	1-U	2-24	Road	debris avalanche into Briggs Creek from motorized trail 1132
47	Briggs	14Jun01	36S08W 18NE	2-A	3-24	terrace excavation	About 0.5 yds^3 dug out from west streambank above high water mark
48	Briggs	14Jun01	36S08W 07SE	2-A	3-25	terrace excavation	About 40yds^3 excavated from east bank at edge of terrace.
49	Briggs	14Jun01	36S08W 07SE	2-B	4-3	petroleum hazard	Unoccupied mining camp with half filled milk jugs of oil left 100 ft from Briggs Cr. Oil jugs appear to have been left since summer 2000.
50	Briggs	14Jun01	36S08W 18NW	2-C	4-7	Road	Road 637 crosses Briggs Creek. Gravel suitable for spawning salmon
51	Briggs	14Jun01	36S08W 07SE	2-B	4-4 4-5	mining camp	Semi-permanent structures at unoccupied mining camp. Structures left in place since at least summer 2000.
52	Briggs	14Jun01	36S08W 18SW	2-D	4-8	streambank excavation	Estimated 20 yds^3 of streambank excavated during summer 2000. Mine tailings have created a 6 cubic yard midchannel bar which directs streamflow towards unvegetated bank excavated by miners.
53	Briggs	14Jun01	36S08W 18SW	2-D	4-14	streambank excavation	Estimated 27 yds^3 of streambank excavated as a trench perpendicular to stream. Probably done during summer 2000.
54	Briggs	14Jun01	36S08W 18SW	2-D	4-13	trees cut	Alder saplings cut from streambank
55	Briggs	14Jun01	36S08W 18SW	2-D	4-15	steelhead redd	Recent (spring 2001) steelhead redd located adjacent to mine tailings
56	Briggs	14Jun01	36S08W 18SW	2-D	--	Port-Orford-Cedar	Uninfected POC up to 30 inched DBH on streambanks
57	Briggs	14Jun01	36S08W 18SW	2-D	4-16	solid waste	abandoned plastic entangled in large wood on floodplain
58	Briggs	14Jun01	36S08W 18SW	2-E	4-17	streambank excavation	About 7 ft of streambank excavated
59	Briggs	14Jun01	36S08W 18SW	2-E	4-18	streambank excavation	Estimated 2.5 cubic yds excavated from streambank
60	Briggs	14Jun01	36S08W	2-F	4-19	streambank	Estimated 4 cubic yds excavated during summer 2000

#	Creek	Date Observed	T. R. 1/4Sec	Map Locat	Roll Photo	Activity Animal use	Description
			18SW			excavation	
61	Briggs	14Jun01	36S08W 18SW	2-F	4-23 5-1	large wood	fallen 24 inch diameter bigleaf maple bucked up on floodplain
62	Briggs	14Jun01	36S08W 18SW	2-G	4-25	streambank excavation	Estimated 3 cubic yds excavated prior to summer 2000
63	Briggs	14Jun01	36S08W 18SW	2-H	5-2	streambank excavation	Estimated 4 yds^3 excavated into streambank and active channel summer 2000
64	Briggs	14Jun01	36S08W 18SW	2-H	5-3	streambank excavation	Estimated 28 ft of streambank excavated back about 2 ft during summer 2000
65	Briggs	14Jun01	36S08W 18SW	2-H	5-4	streambank excavation	Estimated 9ft of streambank excavated back about 1 ft during summer 2000
66	Briggs	14Jun01	36S08W 18SW	2-I	5-5	terrace excavation	Estimated 9 cubic yards excavated from tributary channel/spring
67	Briggs	14Jun01	36S08W 18SW	2-J	--	Road	Unnumbered dirt road parallels Briggs Cr. for 0.3 miles below Brushy Creek. road is used to access claims where banks were excavated
68	Briggs	14Jun01	36S08W 18SW	2-K	--	Road	Estimated 0.6 miles of dirt road accesses in riparian reserve. Elkhorn mine and continues uphill in sec. 24. Crosses Secret Creek and Briggs Creek. Eroding road surface would enter both Secret Creek and Briggs Creek. POC present.
69	Briggs	14Jun01	36S08W 18SW	2-L	5-7	steelhead redd steelhead fry	1" steelhead fry observed next to redd below secret Creek. "golden dragon" mining claim 00-18124
70	Briggs	14Jun01	36S09W 24SE	2-M	5-8	Port-Orford-Cedar	Standing and fallen Port-Orford-Cedar adjacent to "Old Timer" mining claim
71	Briggs	14Jun01	36S09W 24SE	2-M	5-9	steelhead redds	Several steelhead redds below mining claims
72	Briggs	14Jun01	36S09W 24SE	2-N	5-10	streambank excavation	Estimated 9 yds^3 excavated about 70ft upstream of Elkhorn Creek.
73	Briggs	14Jun01	36S09W 24SE	2-N	--	Monadinium fidelis	common snail found among tailings excavated from streambank
74	Briggs	14Jun01	36S09W 24SE	2-P	5-11 5-13	active channel excavation	About 110 yds^2 of suitable spawning habitat excavated, alder tree felled, flow patterns altered by mid channel bar. heavy equipment use suspected
75	Briggs	14Jun01	36S09W 24SE	2-P	5-12	streambank excavation	About 25 ft of streambank excavated
76	Briggs	14Jun01	36S09W 24SE	2-P	5-14	trees cut	alder cut from streambank
77	Briggs	14Jun01	36S09W 24SE	2-P	5-17	steelhead redds	five steelhead redds adjacent to mid channel piles of mining tailings
78	Briggs	14Jun01	36S09W 24SW	2-R	5-18	streambed excavation	Excavation of about 2 cubic yards still visible from summer 2000 mining
79	Briggs	14Jun01	36S09W	2-R	5-21	streambed	during summer 2000 about 277 yds^2 of potentially suitable

#	Creek	Date Observed	T. R. 1/4Sec	Map Locat	Roll Photo	Activity Animal use	Description
			24SW			excavation	spawning gravel was excavated into a mid-channel bar now unsuitable for spawning.
80	Briggs	14Jun01	36S09W 24SW	2-R	5-20	streambank excavation	during summer 2000 about 5.7 yds^3 was excavated from streambank and tree roots severed
81	Briggs	14Jun01	36S09W 24SW	2-R	5-23	streambank excavation	during summer 2000 about 3.8 yds^3 was excavated from streambank
82	Briggs	14Jun01	36S09W 24SW	2-R	5-24	Streambed excavation	mid channel mine tailings from summer 2000 still visible
83	Briggs	14Jun01	36S09W 24SW	2-R	5-25	solid waste	6 inch flexible pipe
84	Left Fork Sucker	12Jun01	40S06W 27NW	3-A	3-3	solid waste	metal cart with cable winch, 6 inch flexible hose.
85	Left Fork Sucker	12Jun01	40S06W 27NW	3-A	3-4	Trail	ATV parked 1.2 miles up Left Fork Sucker Creek, uninfected POC along trail.
86	Left Fork Sucker	12Jun01	40S06W 27NW	3-A	3-5	trail	About 70 ft of new trail construction was excavated into steep slope during summer 2000
87	Left Fork Sucker	12Jun01	40S06W 27NW	3-B	3-9	mining camp	occupied camp established on high floodplain adjacent to creek
88	Left Fork Sucker	12Jun01	40S06W 27NW	3-B	3-12	petroleum hazard	1 quart plastic jug of 30 wt oil lying on ground within 25 ft of stream
89	Left Fork Sucker	12Jun01	40S06W 27NW	3-D	3-10	spawning gravel	gravel suitable for coho salmon or steelhead trout spawning
90	Left Fork Sucker	12Jun01	40S06W 27NW	3-B	3-11	Port Orford Cedar	live 36 inch DBH POC with ax embedded
91	Left Fork Sucker	12Jun01	40S06W 28NE	3-C	3-21	Trail reconstr.	during summer 2000 cement was poured on trail for a distance of about 22 ft
92	Briggs	16May01	37S09E 04SE	1-W	--	large wood	Fallen alder bucked into 6 ft pieces at mining camp on north bank of creek. 30" diameter tree has fallen into creek from south bank.
93	Briggs	16May01	37S09W 04SE	1-X	--	solid waste mining camp	plastic tarps,metal tanks, cooler,table, 100x40 ft area dug out. Lotsa Color II RMC 37400
94	Briggs	16May01	37S09W 04SE	1-Y	--	Road	0.3 mile dirt road accesses lotsa color claim. Gullies in 25% grade road.
95	Left Fork Sucker	12Jun01	40S06W 27NW	3-D	--	Juvenile steelhead	snorkeled nice pool and found 8 rainbow trout(offspring of steelhead) 4-8 inches but no recently emerged fry.
96	Left Fork Sucker	12Jun01	40S06W 27NW	3-E	--	Trail Reconstruc	During summer 2000, hiking trail was widened and cleared for 1.0 mile to accommodate ATVs.
97	Briggs	14Jun01	36S06W 24SW	2-S	--	Streambank excavation	About 40 ft of streambank recently excavated. Tailings adjacent to 6 inch dredge are from this spring, probably excavated during past week (7-14 June 01)
98	Left Fork Sucker	17Jul01	40S06W 28NW	3-E	6-1	Trail reconstr.	During summer 2000, hiking trail along Left Fork Sucker Creek was widened by excavating soil from hillslope to accommodate ATV's (same as obs.96).
99	Left Fork	17Jul01	40S06W	3-G	6-2	large wood	8ft of bole was cut from a fallen tree in a side channel of Left

#	Creek	Date Observed	T. R. 1/4Sec	Map Locat	Roll Photo	Activity Animal use	Description
	Sucker		28NW			tree cut	Fork Sucker Creek
100	Left Fork Sucker	17Jul01	40S06W 28NW	3-G	6-3	trail construct.	During summer 2000, about 100 ft of new trail was constructed to accommodate ATV's
101	Left Fork Sucker	17JUL01	40S06W 28NE	3-H	6-4	trail	During summer 2000, hiking trail 40 ft from Left Fork Sucker Cr. was widened here to accommodate ATVs.
102	Left Fork Sucker	17JUL01	40S06W 28NE	3-C	6-5	Trail Reconstruc	During summer 2000, about 100 ft of trail was widened to accommodate ATVs. Two bags of cement were used to harden about 22 ft of trail. (same as obs 91)
103	Left Fork Sucker	17JUL01	40S06W 27NW	3-B	6-6 6-7	Streambed Excavation	During June/July 2001 about 0.5 cubic yards excavated from stream channel, mostly fine sediment.
104	Left Fork Sucker	17JUL01	40S06W 27NW	3-F	--	Steelhead Fry	Observed four recently emerged 1 inch long steelhead fry. No fry were observed on 12Jun01.
105	Left Fork Sucker	17JUL01	40S06W 27NW	3-F	6-8 6-11	Streambank Excavation	During June/July 2001 about 2.0 cubic yards of streambank was excavated into stream. About 15 ft of streambank destabilized.
106	Left Fork Sucker	17JUL01	40S06W 27NW	3-F	6-12 6-13	Streambank Excavation	During June/July 2001 several 3 ft diameter boulders were winched from streambank to expose fine textured soil
107	Left Fork Sucker	17JUL01	40S06W 27NW	3-F	6-15	petroleum hazard	Two gallons of gasoline left 4 ft from water's edge
108	Left Fork Sucker	17JUL01	40S06W 27NW	3-F	6-9	petroleum hazard	Two gallons of gasoline left 8 ft from water's edge
109	Left Fork Sucker	17JUl01	40S06W 27NW	3-B	6-22	petroleum hazard	Two 2-gallon containers of gasoline left 30 ft from stream.
110	Left Fork Sucker	17JUl01	40S06W 27NW	3-F	6-16	Trail Construct	About 50 ft of new trail constructed on streambank adjacent to Port Orford Cedar.
111	Left Fork Sucker	17JUL01	40S06W 27NW	3-F	6-19	POC	Uninfected Port Orford Cedar growing from streambank at mining site.
112	Left Fork Sucker	17JUL01	40S06W 27NW	3-F	6-20	Sediment	About 60 percent of pool substrate is covered with fine sediment.
113	Left Fork Sucker	17JUL01	40S06W 27NW	3-F	6-18	hydrology altered	Boulders placed across tail out of pool may impede upstream fish movement.
114	Sucker	19JUL01	40S06W 4NW	3-I	6-23	fallen trees cut	Four fallen trees within the active channel cut. About 13 ft cut from one fallen tree.
115	Sucker	19JUL01	40S06W 4NW	3-I	6-24	fallen tree cut	One fallen tree spanning active channel cut.
116	Sucker	19JUL01	40S06W 4NW	3-I	6-25	tree felled	Alder tree cut from streambank
117	Sucker	19JUL01	40S06W 4NW	3-I	6-26	tree cut	two alder trees cut from streambank
118	Sucker	19JUL01	40S06W 4NW	3-J	6-27	Streambed Excavation	An estimated 23 cubic yds of boulders were removed from the streambed to floodplain. Removal occurred about 3-10 years ago.
119	Sucker	19JUl01	40S06W 4NW	3-J	--	Streambed Excavation	An estimated 33 cubic yds of boulders removed from streambed to floodplain. Removal occurred about 3-10 years ago.

#	Creek	Date Observed	T. R. 1/4Sec	Map Locat	Roll Photo	Activity Animal use	Description
120	Sucker	19JUL01	40S06W 4NW	3-J	--	Streambed Excavation	An estimated 22 cubic yds of boulders removed from streambed to floodplain. Removal occurred about 3-10 years ago.
121	Sucker	19JUL01	40S06W 4NW	3-J	6-28	Streambed Excavation	An estimated 23 cubic yds of boulders removed from streambed to floodplain. Removal occurred about 3-10 years ago.
122	Sucker	19JUL01	40S06W 4NW	3-J	--	Solid Waste	55 gallon barrel, 20 ft wooden ladder
123	Sucker	19JUL01	40S06W 4NW	3-J	--	Streambed Excavation	An estimated 33 cubic yds of boulders removed from streambed to floodplain. Removal occurred about 3-10 years ago.
124	Sucker	19JUL01	40S06W 4NW	3-K	6-29	Solid Waste	Collapsed building with nails exposed. 17 ft of stove pipe
125	Sucker	19JUL01	40S06W 4NW	3-K	--	Streambed Excavation	Estimated 3,333 yds^3 of cobble/boulder removed from streambed >50 years ago.
126	Sucker	19JUL01	40S06W 4NW	3-K	--	Streambed Excavation	Estimated 1,481 yds^3 of cobble/boulder removed from streambed >50 years ago.
127	Sucker	19JUL01	40S06W 4NW	3-K	--	Streambed Excavation	Estimated 888 yds^3 of cobble/boulder removed from streambed >50 years ago.
128	Sucker	19JUL01	40S06W 4NW	3-L	--	Existing Trail	A trail follows Sucker Creek upstream from Forest Road 098 for about 0.3 miles.
129	Sucker	19JUL01	40S06W 4NW	3-L	--	Solid Waste	6 pieces of discarded sheet metal estimated 200 square ft.
130	Sucker	19JUL01	40S06W 4NW	3-L	6-32	Dredge	3 inch suction dredge
131	Sucker	19JUL01	40S06W 4NW	3-L	6-33	Road	Possible old mining road obliterated by side channel of Sucker Creek
132	Sucker	19JUL01	40S06W 5NE 32SE	3-M	6-34	stream diversion	Stream diverted into 4 inch pvc which feeds wooden trough
133	Sucker	19JUL01	40S06W 5NE 32SE	3-M	6-35	hydrology altered	Side channel dammed with 2 ft high 15 ft wide berm. overflow flow diverted into 8 inch PVC pipe.
134	Sucker	19JUL01	40S06W 5NE 32SE	3-M	6-36	petroleum hazard	One quart of 30 wt motor oil left 20 ft from stream.
135	Sucker	19JUL01	40S06W 5NE 32SE	3-M	7-6	hydrology altered	Streamflow directed through sluice box.
136	Sucker	19JUL01	40S06W 5NE 32SE	3-M	6-E 7-7	Streambed Excavation	Suction dredge adjacent to estimated 50 yds^2 of excavated streambed.
137	Sucker	19JUL01	40S06W 5NE 32SE	3-M	7-2 7-4	Streambank Excavation	An estimated 3 cubic yards of streambank was excavated from 30 ft of streambank.
138	Sucker	19JUL01	40S06W 5NE 32SE	3-M	7-3 7-5	Trees Cut	At least 5 alder trees removed from streambanks and at least 2 others damaged

#	Creek	Date Observed	T. R. 1/4Sec	Map Locat	Roll Photo	Activity Animal use	Description
139	Sucker	19JUL01	40S06W 5NE 32SE	3-M	7-8	Streambank Excavation	An estimated 2 cubic yards of streambank was excavated from 25 ft of streambank.
140	Sucker	19JUL01	40S06W 5NE 32SE	3-N	7-9	Suction Dredge	Suction dredge in Sucker Creek
141	Sucker	19JUL01	40S09W 4NW	3-L	7-10 7-11	Open Pit Toilets	Two outhouses located within 80 ft of Sucker Creek
142	Briggs	27AUG01	36S08W 18SW	2-E	8-3A 8-7A	Tree Felled	During summer 2001, a live 14 inch diameter Douglas-fir was felled into Briggs Creek.
143	Briggs	27AUG01	36S08W 18SW	2-E	8-24A	Streambank Excavation	During summer 2001, about 4 cubic yards of soil were removed from 15 ft of streambank adjacent to felled tree.
144	Briggs	27AUG01	36S08W 18SW	2-E	8-10A 8-17A	Tree Cut	During summer 2001, the roots of a 4 ft diameter, 20 ft high snag were severed and soil dug out from its base.
145	Briggs	27AUG01	36S08W 18SW	2-E	8-18A 8-15A	Streambank Excavation	During summer 2001, an estimated 2 cubic yards were excavated from 10 ft of streambank and from under snag. (see obs. 60 and 143)
146	Briggs	27AUG01	36S08W 18SW	2-E	8-19A 8-20A	Streambank Excavation	During summer 2001, an estimated 7 cubic yards of soil were excavated from 20 ft of streambank and 5 yds^3 placed directly into Briggs Creek.
147	Briggs	27AUG01	36S08W 18SW	2-E	8-12A	Large Wood Cut	During summer 2001, a fallen maple tree was further cut with a chain saw and removed from active channel. (see obs. 61)
148	Briggs	27AUG01	36S08W 18SW	2-E	8-4A	Streambank Excavation	During summer 2001, an estimated 0.3 yds^3 of soil was excavated from 3 ft of streambank.
149	Briggs	27AUG01	36S08W 18SW	2-E	8-5A	Tree Cut	During summer 2001, a 6 inch diameter tree was cut, uprooted from the streambank and discarded in the stream channel.
150	Briggs	27AUG01	36S08W 18SW	2-J	8-1A	Road	Unnumbered dirt road spur to road 017 parallels Briggs Cr. for 0.3 miles below Brushy Creek. No on Amin map but is on USGS quad. Road is used to access claims where banks were excavated and trees cut (same as obs. 67 but now supplemented with photograph).
151	Briggs	5SEP01	36S09W 24SW	2-N	9-24A	Mining Claim	Metal sign reads: Federal Mining Claim Elkhorn #1-#8 Robert & Lisa Barton ORMC 108238-108245
152	Briggs	3SEP01	36S09W 24SW	2-T	--	Motorbike Fire Hazard	An unlicensed motorbike was observed parked on the Briggs Creek Trail during extreme fire danger.
153	Briggs	3SEP01	36S09W 24SW	2-S	--	Suction Dredge	At 1206PDT two individuals were observed operating a suction dredge in Briggs Creek during extreme fire danger. Gasoline fumes were noticeable on the trail 200 ft above the creek.
154	Briggs	5SEP01	36S09W 24SW	2-T 2-S	9-23A	Trail Construct.	During summer 2000 or spring 2001 about 200 ft of trail was dug down to mineral soil.
155	Briggs	5SEP01	36S09W 24SW	2-S	9-12A 9-13A 9-16A	Streambank Excavation	During summer 2001 an estimated 21 yds^3 were excavated from 88 ft of streambank. Boulders and cobbles which once armored the bank were removed. See obs 97 and letters dated 15 June and 7 Sept to J. Williams.

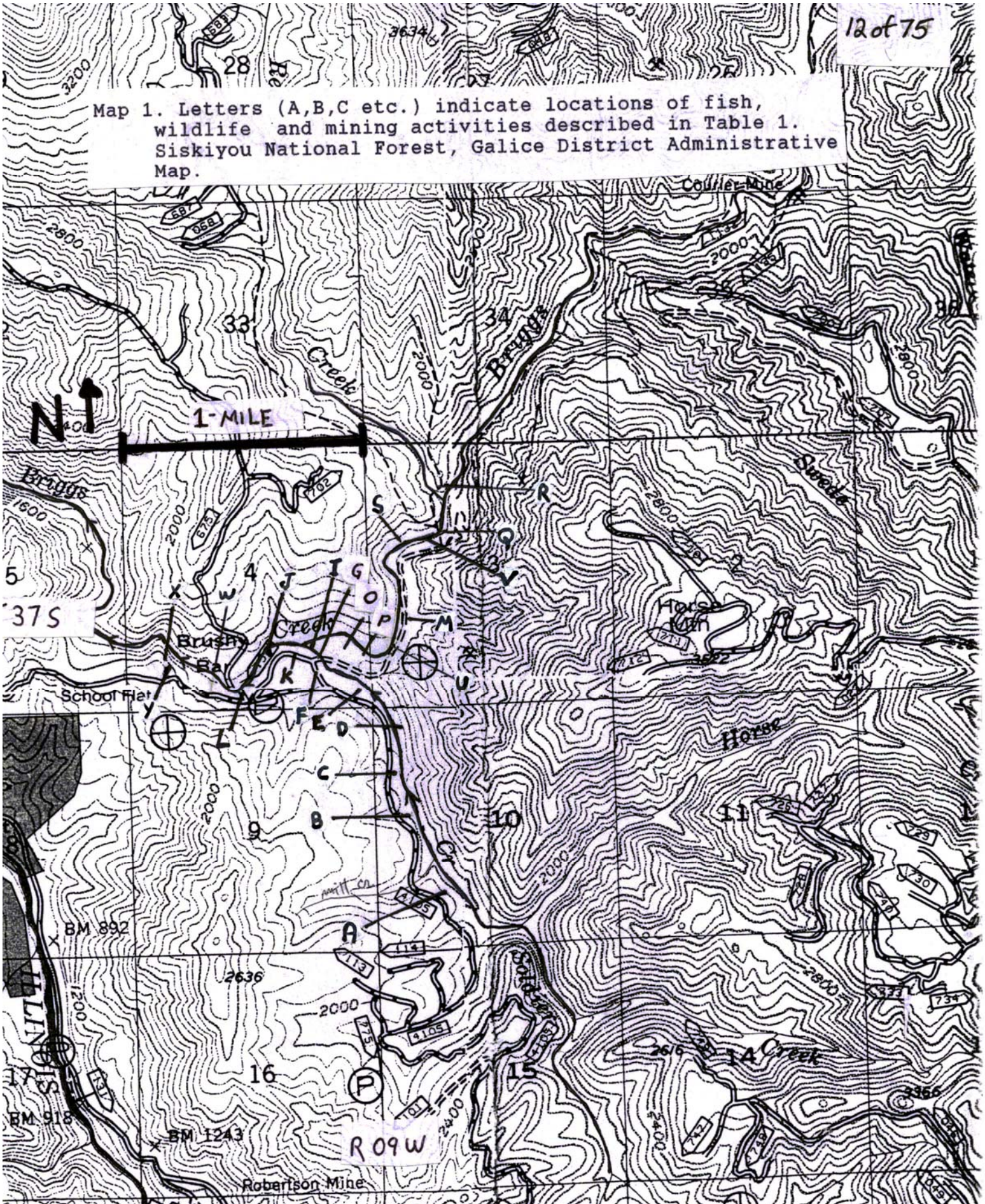
#	Creek	Date Observed	T. R. 1/4Sec	Map Locat	Roll Photo	Activity Animal use	Description
156	Briggs	5SEP01	36S09W 24SW	2-S	9-14A	Hydrology Altered	Streambed sediment excavated from right bank (A) was deposited as a mid-channel bar (B) which now directs flows towards unprotected and undercut streambank.
157	Briggs	5SEP01	36S09W 24SW	2-S	9-7A	Port Orford Cedar	Suction dredge lashed to uninfected Port-Orford-Cedar sapling.
158	Briggs	5SEP01	36S09W 24SW	2-S	9-17A	Streambed Excavation	Approximately 370 yds^2 of streambed were disturbed making them unsuitable or unsafe for salmon spawning. An estimated 60 yds^3 were displaced into tailing piles.
159	Briggs	5SEP01	36S09W 24SW	2-S	9-3A	Trees Cut	At least five 1-2 inch diameter vine maples were cut from streambanks and piled within 30 ft of the dredge.
160	Sucker	9NOV01	40S06W 33NW	3-O	--	Road 0.3mi	Unnumbered road in Sec 32 beyond locked gate goes 0.3 miles down to Sucker Creek. 01mi in riparian reserve
161	Sucker	9NOV01	40S06W 33NW	3-P	11-4	Mining Camp	storage shed, picnic table, 0.1 acre denuded of vegetation. W.D. Bowen #149657 Coldwater 1-4
162	Sucker	9NOV01	40S06W 33NW	3-P	11-6	Outhouse	open pit toilet on terrace about 75ft from creek
163	Sucker	9NOV01	40S06W 33NW	3-P	11-7	Outhouse	open pit toilet on terrace about 200 ft from creek
164	Sucker	9NOV01	40S06W 33NW	3-P	11-10	Road 0.1mi	0.1 mile exclusive spur road from camp down to creek (see obs 160,161). 6 ft high eroding cut slopes.
165	Sucker	9NOV01	40S06W 33NW	3-P	11-10	Terrace Excavation	Estimated 1 cubic yard excavated from terrace.
166	Sucker	9NOV01	40S06W 33NW	3-P	11-11	Terrace Excavation	3x4x12ft pit (est. 5 yds^3) excavated from terrace about 50 ft from Sucker Creek.
167	Sucker	9NOV01	40S06W 33NW	3-P	11-13	Terrace Excavation	8x7x2ft pit (est. 4 yds) excavated from terrace and used as settling pond. Sediment laden water appears to have flowed over artificial embankment and into stream below.
168	Sucker	9NOV01	40S06W 33NW	3-P	11-14	Stream Diversion	About 500 ft of 1" PVC pipe used to divert Sucker Creek into settling pond.
169	Sucker	9NOV01	40S06W 33NW	3-Q	11-15	Tailings	Estimated 4,400 yds3 of cobble/boulder tailings 25 ft above creek. about 40-60 years old. channel is bedrock.
170	Sucker	9NOV01	40S06W 33NW	3-R	11-17	Mining Camp	Estimated 0.1 acre on high floodplain denuded of vegetation. picnic table, car battery, firewood cut from floodplain, sink, tables, tarps, 5 gal. bucket,stove
171	Sucker	9NOV01	40S06W 33NW	3-R	--	Outhouse	Open pit toilet on high floodplain about 200 ft from Sucker Creek.
172	Sucker	9NOV01	40S06W 33NW	3-R	11-18	Streambed Excavation	Unstable tailings (30x10x2) would be attractive to spawning salmon. There are very few suitable spawning locations for 1/2 mile.
173	Sucker	9NOV01	40S06W 33NW	3-R	--	Streambed Excavation	1 cubic yard excavated and about 8 ft of streambank disturbed and rendered unstable
174	Sucker	9NOV01	40S06W	3-S	11-20	Road	Exclusive mining road about 0.4 mile not on Forest Service

#	Creek	Date Observed	T. R. 1/4Sec	Map Locat	Roll Photo	Activity Animal use	Description
			33NW				maps. road bulldozed into very steep slopes about 130 ft above Sucker Creek. estimated 10-30 yrs old.
175	Sucker	9NOV01	40S06W 33NW	3-R	--	Tailings	100x70x8ft tailings pile adjacent to camp (obs 170). Tailings suitable for survey and manage species (DelNorte salamander and rare snails)
176	Sucker	9NOV01	40S06W 33NW	3-T	--	Mining Camp	About 0.05 acre denuded, 12x8 ft cabin G&M Discovery Group. Daniel Monson Et al. ORMC 148143
177	Sucker	9NOV01	40S06W 33NW	3-T	--	Out House	Open pit toilet on terrace 250 ft from Sucker Creek.
178	Sucker	9NOV01	40S06W 33NW	3-T	11-20	Road	350 ft of exclusive mining road accessing mining camp (obs 176). road not on FS maps
179	Sucker	9NOV01	40S06W 33NW	3-T	11-21 11-22	Streambed Excavation	partially eroded summer 2000 tailings pile (20X20x2) has altered configuration of tailout creating 30x40ft patch of unstable spawning gravel attractive to salmon.
180	Sucker	9NOV01	40S06W 33NW	3-T	11-24 11-23	Streambed Excavation	Summer 2001 excavation of pit in streambed (8x6x4ft). 8 cubic yds. 15x10 pile of unstable sand and gravel deposited in tailout of pool. north boundary of claim
181	Sucker	9NOV01	40S06W 33NW	3-T	11-E	Streambank Excavation	13x4x3 (6yds^3) excavated from bank and placed in active channel as unstable gravel
182	Sucker	9NOV01	40S06W 33NW	3-T	--	Streambank Excavation	10x3x1ft (1 yd^3) excavated from bank and placed in active channel
183	Sucker	9NOV01	40S06W 33NW	3-T	--	Streambank Excavation	5x3x1ft (0.5 yd^3) excavated from bank and placed in active channel
184	Sucker	9NOV01	40S06W 33NW	3-T	--	Streambed Excavation	30x3x8ft (26 yd^3) summer 2000. 26 yds of spawning gravel disturbed
185	Sucker	9NOV01	40S06W 33NW	3-T	--	Streambank Excavation	30x3x5ft (17 yd^3) excavated from bank and placed in stream, creating attractive, but unstable spawning gravel between boulders
186	Sucker	9NOV01	40S06W 33NW	3-T	--	Streambed Excavation	30x8x5ft (44 yd^3) of spawning gravel disturbed. summer 2000
187	Sucker	9NOV01	40S06W 33NW	3-T	--	Streambed Excavation	20x5x3ft (11 yd^3) of spawning gravel disturbed. summer 2000
188	Briggs	29NOV01	36S08W 18SW	3-T	--	Mining Camp	0.3 acres denuded and compacted soil
189	Briggs	29NOV01	36S08W 18SW	3-T	--	Road	60 ft steep pitched 4 wheel drive tracks from RD 2512 into mining camp (obs 188).
190	Briggs	31MAY02	36S09W 24SW	2-S	12-17,18	Streambed Excavation	Est. 10 yds excavated before mining season
191	Briggs	31MAY02	36S09W 24SW	2-S	12-18	Dredge	Dredge with 5'nozzle
192	Briggs	31MAY02	36S09W 24SW	2-S	12-19,2022, 23	Dam	2.5'x50' dam constructed before mining season. 12-19 best photo
193	Briggs	31MAY02	36S09W	2-S	12-21	gasoline	5 gallon and 1 gallon containers left about 13 ft above stream

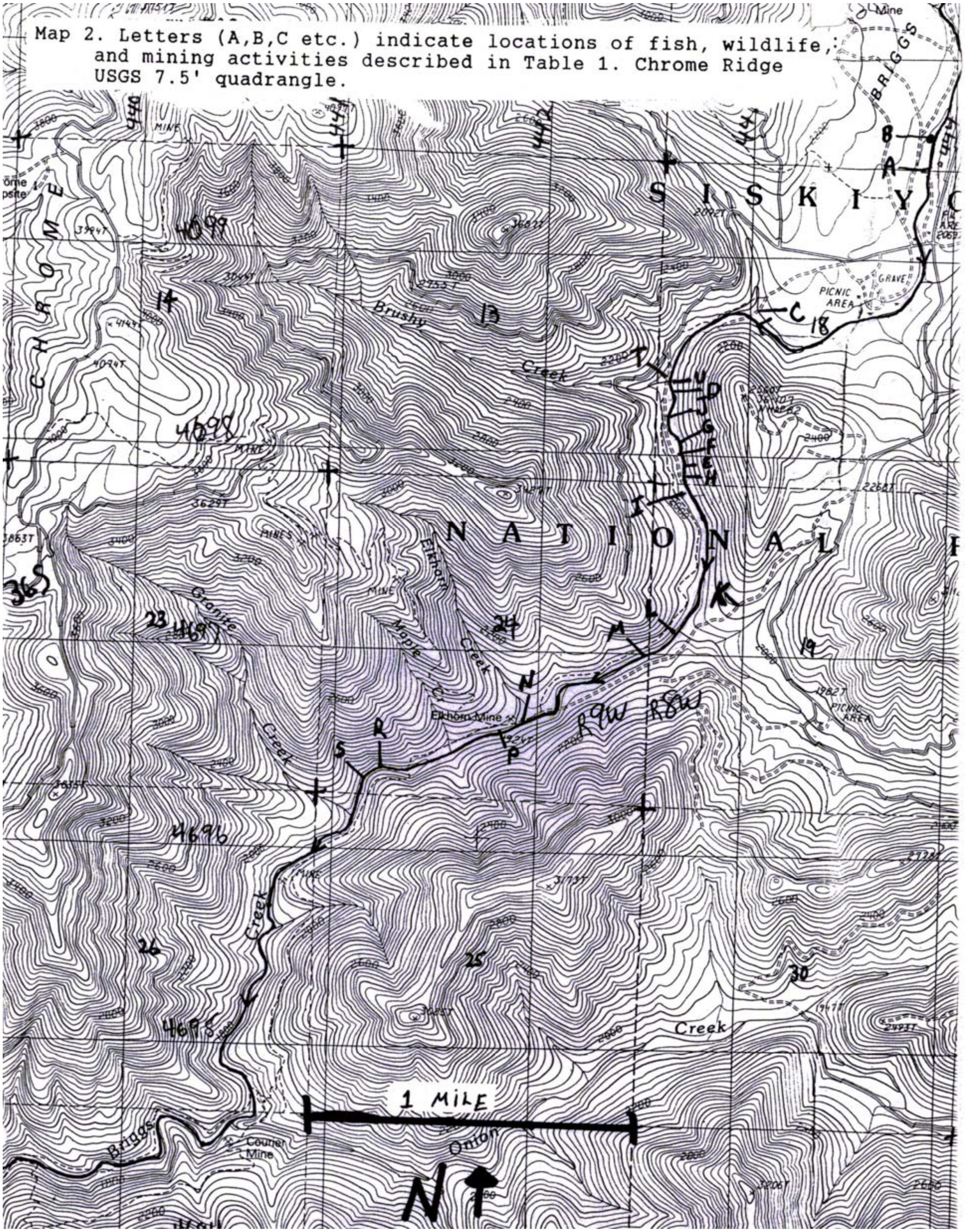
#	Creek	Date Observed	T. R. 1/4Sec	Map Locat	Roll Photo	Activity Animal use	Description
			24SW			containers	
194	Briggs	25SEP02	36S08W 18SW	2-U	13-1A	streambank excavation	Estimated 4 cubic yds excavated. verified by forest service personnel
195	Briggs	25SEP02	36S08W 18SW	2-U	13-2A	streambank excavation	Estimated 1 cubic yd excavated verified by forest service personnel
196	Briggs	25SEP02	36S08W 18SW	2-U	13-3A	dam	small berm of cobble about 8 inches high
197	Brushy	25SEP02	36S08W 18SW	2-U	13-4A,5A	streambank excavation	Estimated 4 cubic yds excavated verified by forest service personnel
198	Briggs	25SEP02	36S08W 18SW	2-U	13-6A	streambed excavation	Estimated 1-3 yds excavated.

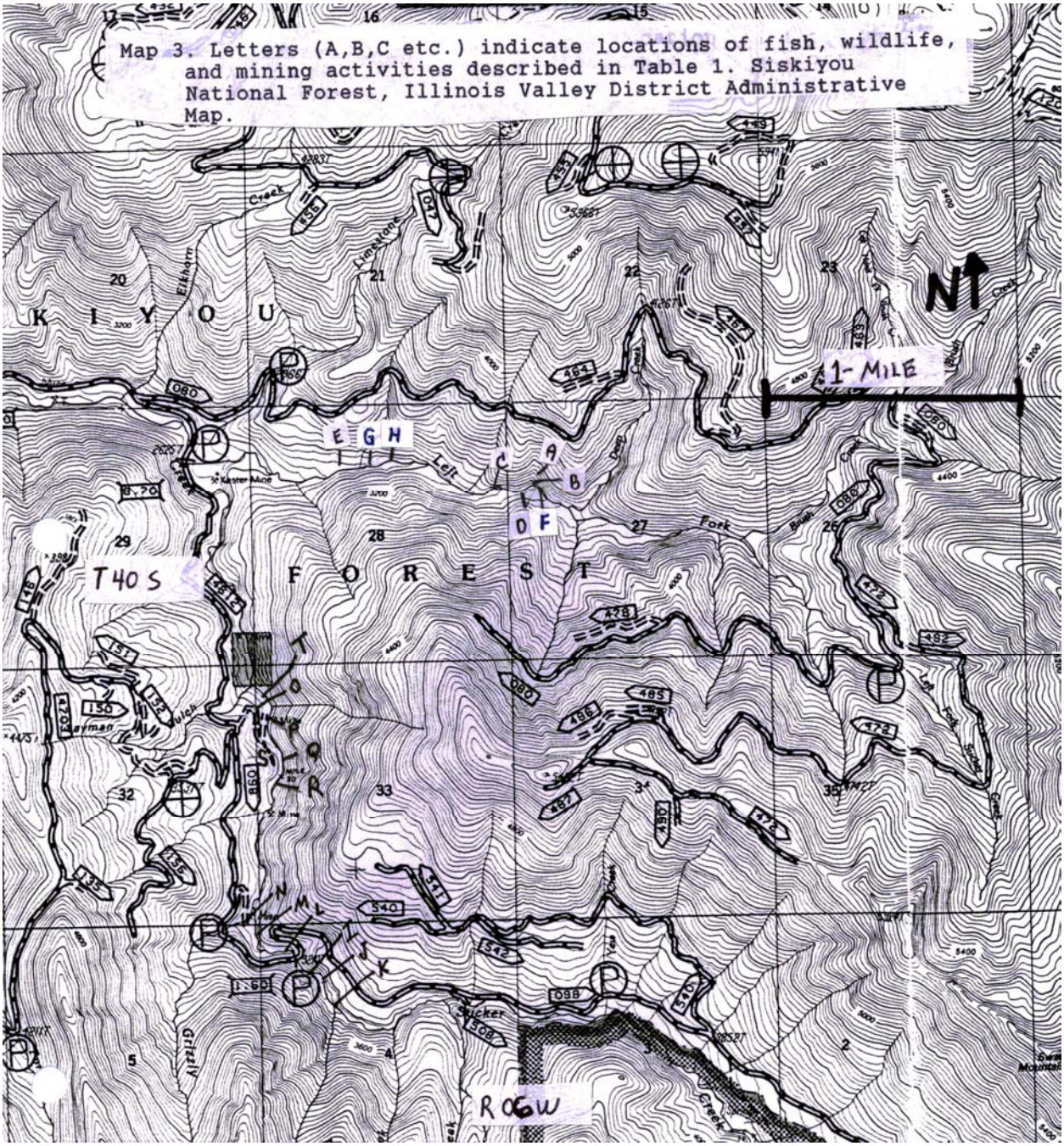
12 of 75

Map 1. Letters (A,B,C etc.) indicate locations of fish, wildlife and mining activities described in Table 1. Siskiyou National Forest, Galice District Administrative Map.



Map 2. Letters (A,B,C etc.) indicate locations of fish, wildlife, and mining activities described in Table 1. Chrome Ridge USGS 7.5' quadrangle.





Map 3. Letters (A,B,C etc.) indicate locations of fish, wildlife, and mining activities described in Table 1. Siskiyou National Forest, Illinois Valley District Administrative Map.