

Scott River Watershed Trip Report
A Field Review of Selected Sites of the Eastside Watershed
April 12-15, 2004
Etna, CA

Requested by:

Siskiyou Resource Conservation District

Prepared by:

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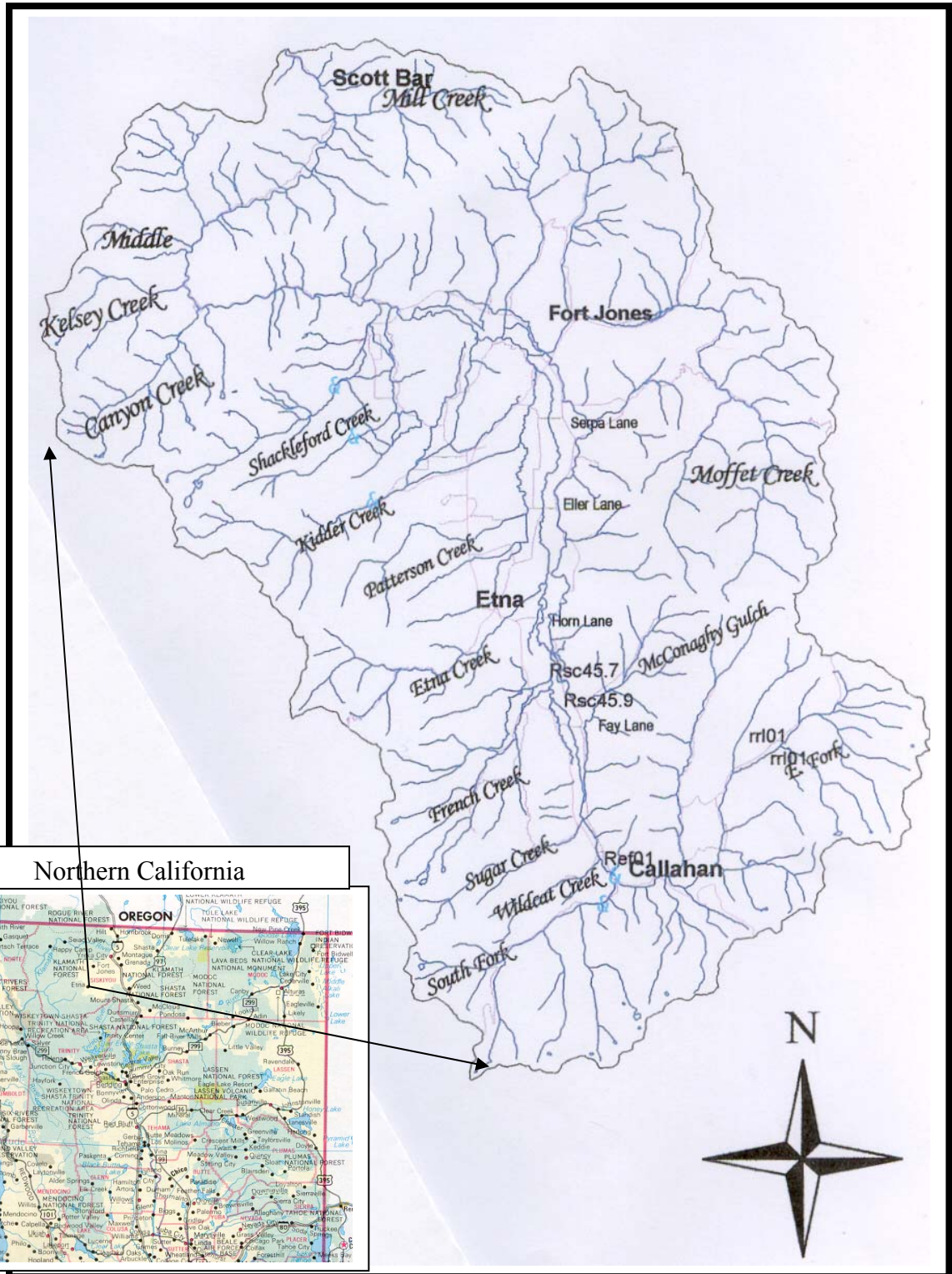
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Watershed Vicinity Map Scott River Assessment

I. Introduction

The Siskiyou Resource Conservation District (SRCD) requested the National Riparian Service Team (NRST) review selected reaches on the Scott River and several tributaries. Sites were selected because they either had restoration work in the past, were thought to be candidates for future efforts, or to give the NRST a general overview of the watershed. Others involved in the review included individuals with the Scott River Watershed Council (SRWC), including private landowners, and the Natural Resources Conservation Service (NRCS). Since 1994 the SRCD and SRWC have implemented riparian restoration projects on 12 different properties along the Scott River, including exclusion fencing and shrub and tree plantings. They expressed to the NRST that project results have been mixed and are now considering how they should proceed in order to obtain the best outcomes for future restoration, with available funds.

The NRST was provided with some background material prior to the service trip, and once there, given a review of the Scott River watershed, the activities associated with the watershed, and the database for water and riparian resources within the watershed. Water quality of the Scott River was listed as “impaired” for sediment (1992) and temperature (1996) by the North Coast Regional Water Quality Control Board and State Water Resources Control Board, a major concern in the valley. It is believed that the water quality has affected the habitat of anadromous fish populations in the Scott River watershed. Coho salmon in the region are listed at both the Federal and State level.¹ Low, late-summer/early-fall water levels in the river are a major concern because they can delay salmon migration. Irrigation of crops in the valley using water diversions from the river and tributaries, affects late season flows. Actions have been taken in the past to provide more water for salmon to the detriment of agriculture activities.

Over a two day period the group examined selected sites, primarily on the east side of Scott Valley, on South Fork, McConaughy Gulch, Moffett Creek, and Scott River, representing a range of land management activities, stream types, and vegetation communities. Observations and discussions were guided by using the indicators in the Proper Functioning Condition assessment method, and key concepts such as site potential and capability. The group focused on identifying potential improvements in riparian vegetation, and discussed some of the reasons plantings either failed or succeeded. Even with historic and recent background information provided, this was a fairly cursory examination of the area from a broad perspective due to the limited time allocation. Because of the less intensive reconnaissance type approach, the findings are more general in nature, and will require more evaluation and prioritization based on SRCD objectives. The outcomes reflect both an affirmation of some of what the local participants have

¹ Coho salmon in the region were listed as Threatened under the Federal Endangered Species Act in 1997 by the National Marine Fisheries Service. Coho salmon were listed by the State of California Fish and Game Commission as Warranted for Listing as Threatened in 2002. Rather than proceeding immediately with regulatory action to add the species to the threatened and endangered species lists, the Commission deferred the regulatory action and directed the Department of Fish & Game to prepare a recovery strategy for coho salmon. On February 4, 2004, the Commission adopted the Recovery Strategy.

learned from their efforts as well as some suggestions for consideration in working through and prioritizing their next steps.

Through implementation of the interagency Creeks and Communities strategy, the NRST works to build understanding of riparian resources among diverse interests as a foundation in support of collaborative problem solving and decision making. In keeping with this philosophy, the NRST spent the morning of the third and final day presenting their findings to the SRWC Quarterly Forum which represents a broad range of interests, many of whom were not able to participate in the field review. The team explained what the streams and river needs are for physical function and covered key riparian-wetland vegetation, how large woody material (LWM) functions in streams and rivers, and recommendations addressing the upland, tributaries, and main stem river, for turning the water”shed” back into a “catchment.”

II. Background

History of Scott River Valley

The SRCDD has documented the Historical Watershed Conditions and a Chronology of Natural Resource Events as part of their Strategic Action Plan. The Historical Watershed Conditions includes chapters on watershed conditions at the time of pioneer settlement, settlement history and land use changes. Conditions and changes are described regarding vegetation, fishery resources, wildlife resources, stream condition, fire disturbance, and floods and droughts. Post-settlement impacts, from minor to major, have occurred from various activities over time: beaver removal, mining, urbanization, tillage, irrigation, channel alteration, livestock grazing, vegetation alteration, timber harvesting, road-building, and fire suppression. The Historical Watershed Conditions conclusions state: “Multiple historic activities have contributed to both temporary and permanent changes in the Scott River watershed over the past 170 years. Many of the negative impacts were unintended consequences of good intentions, during a period of new and expanded use when resource availability often appeared to be inexhaustible. Changes to the natural landscape and streams were needed to sustain the area’s residents, develop communities, and support the local economy. However they have occurred, undesirable changes have led to increased concern regarding the management of the watershed’s natural resources” (SRWC 2004).

Field Review

McConaughy Gulch - April 12, 2004

The team reviewed three reaches of McConaughy Gulch. The lower intermittent reach was dry and goes through an alfalfa field. The stream has been straightened and converted to a drainway. Few characteristics and little definition of the original stream or riparian zone remain. The landowner remembers when the stream was lined with willows and was perennial. Head-cuts from erosion, formation of gullies, and movement of irrigation wheel lines are a problem for the landowner. Several short and long-term solutions were discussed including head-cut repair to prevent further rapid channel

adjustment, and modification of grazing to encourage recovery of riparian plants needed to stabilize the channel.

In the middle reach of McConaughy Gulch, the team observed a flowing stream with a riparian community composed primarily of willows, bluegrass, and annuals. The stream was heavily loaded with sediment that appeared to be coming from multiple sources. The banks were unstable along much of the stream reach. Field observation indicated that the sediment sources include eroding streambanks, roads, surface erosion, and gully erosion. The upland vegetation surrounding the reach was composed of juniper, shrubs, and non-native, shallow-rooted annual grasses.

The upper reach of McConaughy Gulch is located at the confluence of several tributaries in a forested setting. The main stream was flowing but few riparian plants are present. The stream has down-cut but is not overloaded with sediment. Ponderosa pine, scrub-oak, juniper, and Douglas-fir are the primary species along the banks. The roads are contributing sediment, and there is evidence of some overland flow causing erosion. An ephemeral tributary confluencing with McConaughy Creek was dry and heavily loaded with sediment. The ephemeral channel is loaded with sediment above the road also, showing bedload is also coming from the upper watershed. It is not known how much of this comes from natural or accelerated erosion and deposition. The upland grasses present are non-native, shallow-rooted annuals. Season long continuous grazing appears to be the current use. This is not allowing for establishment of deep rooted riparian perennials, both woody and herbaceous, needed to stabilize banks and restore stream function.

Scott River Callahan to Lower Valley Terminus April 13, 2004

The upper watershed of the Scott River in the vicinity of the South Fork is well vegetated with conifers. The South Fork and its tributaries have been impacted by gold mining, and a number of streambanks the team viewed in passing, are composed of unvegetated cobble and fines that have minimal stability. The stream's channels are heavily loaded with coarse and fine sediment. Mid-channel bars are signatures of sediment overloading. The scars of hydraulic mining are still visible (Photo 1). It is probable that some of the waste material from these operations may still be in the channel where it is mobilized during high flow events. Numerous roads contribute to the sediment supply, and efforts are being made by natural resource agencies and land managers to stabilize or decommission them.

In the mainstem Scott River below the confluence of South Fork and East Fork, a massive gold dredge tailings area occupies the former floodplain of the river (Photo 2). The Scott River is mostly confined to the eastern side of the valley by these tailings. It is probable that the loss of the original floodplain that once dissipated flood energy results in an energy transference to the open floodplain immediately downstream. The stream in this reach is braided and very little riparian vegetation was observed along the banks. This condition is an indication of instability. Braiding is also influenced by Young's Dam which traps sediment above it.

Two riparian planting projects were visited. On-site discussions included topics such as native vs exotic stocks, bare root vs cuttings, lethal water table levels in August, irrigation systems, drilling and large (>4" dbh) pole plantings, site potential, rodents, large mammals, and insects. At the site near the fish screen, the floods of 1997 washed away some streambank and floodplain above the screen. After the flood, the erosion area was filled back in and planted with young shrubs and trees (Photo 3). Just below the fish screen, other young shrubs and trees were planted on a riprapped streambank which acts much like a dryer terrace since it is several feet above the low water level (Photo 4). The second planting site had a sandy streambank that is eroding with each high flow event (Photo 5). Plantings across the frequent floodplain died when drip irrigation was turned off. Core drilling to the depth of late summer water tables for deep pole plantings of willow or cottonwood was suggested. Established plantings of rhizomatous willow species such as coyote (*Salix exigua*) and streambank (*Salix melanopsis*) could spread by rhizomes into dryer sites. This would require maintenance along ditch banks, but would have the effect of widening the riparian area faster than waiting for natural regeneration from seed. Revegetation project monitoring is documented in CalForest Nursery 1998 (Feb) and 1998 (Mar). Across the river on the west bank, cottonwood were planted in baffles and from our far away vantage point, appeared to be doing well.

The next site visit was Young's Dam irrigation diversion. River straightening in portions of Scott River below Young's Dam may have caused downcutting and lowering of the channel bed. There is about an eight feet difference in the bed level above and below Young's Dam (Photo 6). The lowering of the river bed level below Young's Dam is believed to be responsible for a drop in the valley's ground water storage capacity. Once the high spring river flows drop, the water in the valley rapidly drains into the lower channel and is lost. Historically the higher bed level prevented the rapid drainage of the soils in the valley.

Portions of Scott River from Young's Dam to the confluence with Moffett Creek have been channelized and/or levied. In those areas, the channel was constructed such that there is no longer access to a frequent floodplain. The high terrace is flooded during higher flow events.

The vegetation along the Scott River from Young's Dam to the end of the valley is sparse. Willow and other riparian hardwoods line the banks of the river in a very narrow band. It was noted that some trees along the entrenched channel were decadent or dying. This may be related to lack of reproduction or the lower water table. The riparian plant community lacks enough width and size to establish roots that can fully stabilize the river. Sections of the bank have been rip-rapped to prevent the river from eroding into agricultural lands. Over 90% of the streamside along this reach of Scott River has been excluded from livestock grazing.

Another stop and discussion took place at Scott River at the confluence with Moffett Creek where the river had been dammed. The dam was removed due to concerns with dam maintenance and fish passage. Removal has resulted in a lowering of the water table, and landowners interested in irrigation and sub-irrigation expressed support for

rebuilding the dam. This resulted in a discussion of what it would take to raise the channel bottom naturally over a long period of time, versus further engineering. Any functional changes will require more sinuosity which will affect agricultural fields.

For a few miles above the entrance to the outflow canyon from Scott River valley, the Scott River is not entrenched, and can access its floodplain. The riparian zone is very narrow and has numerous planted golden willows lining the banks (Photo 7).

Moffett Creek April 14, 2004

Moffett Creek carries a high bedload and the channel has been extensively modified by land management practices. Some reaches of the stream have been channelized, and on others the riparian plant community has been nearly eliminated. Much of the stream along agricultural lands above Highway 3 has been channelized and rip-rapped. Some reaches of the stream in the upstream agricultural areas are bordered by willows and alders. Some of the tree willows were planted when the rip-rap was placed, and are now mature (Photo 8). The tributaries of Moffett Creek are used for grazing and timber production. Over time, grazing impacts have reduced the riparian plant community or caused it to be replaced by annual non-native grasses.

Past timber harvest and road construction has modified the mainstem and tributaries of Moffett Creek. Trees grow large enough to act as hydrologic modifiers based on the size of Moffett Creek and its tributaries. LWM was once an important component of the stream system by dissipating energy and providing sediment storage. Most of the wood has been lost over the last 150 years of human activities, and has contributed to the channel head-cutting and downcutting. A small number of logs and small wood jams were observed in portions of the channel where they were trapping significant quantities of sediment (Photo 9).

Local land managers have been working to improve road locations by establishing them away from streams. They are also planning to change some of the grazing practices on some streams to improve riparian vegetation. The team visited a road relocation and decommissioning site in upper Moffett Creek. The decommissioned road was ripped and cells created to capture and infiltrate water (Photo 10). The new road was located and constructed to prevent erosion and to benefit stream/riparian recovery (Photo 11). Improved grazing management will be needed to realize riparian recovery in the reach with the decommissioned road (Photo 12).

III. Discussion

The NRST visited selected sites within the Scott Valley watershed over a two day period, then gave a presentation to the SRWC Quarterly Forum on the third day. The team initially spent the first half-day reviewing information provided by local SRCD/SRWC personnel and local residents. An impressive amount of data and knowledge has been developed. Their information indicated that they had identified the critical issues and developed plans to begin solving problems. Additionally, they were able to lead the

NRST to several sites indicative of conditions in the Scott River valley and watershed. The time limitation of the team's evaluation required them to deal with Scott River issues from a broad perspective. However, it is the feeling of the team that the wide range of sites and discussions with persons knowledgeable about Scott River watershed provided a valid basis for the overall findings and conclusions.

The participation of local citizens and agency personnel in discussions concerning the condition of the river, tributaries, riparian areas, upland vegetation, and landscape provided invaluable insight into watershed history, major changes, current conditions, and desired conditions for Scott River watershed. A number of changes have been observed by local residents who have lived in the valley for many years. These local people provided the NRST with an array of concerns. The team believes that each of these concerns is important, and result from a legacy of long-term cumulative impacts in the watershed. These concerns are:

- Upland vegetation has changed
- Riparian vegetation has changed
- McConaughy Gulch was perennial and is now intermittent
- There is an accumulation of sediment in streams
- Pools have filled up with sediments
- Portions of Scott River and Moffett Creek were channelized or levied
- River is inadequate to meet fish needs
- Not enough late-season flow for fish and agriculture
- Water table may have dropped
- Restoration of tributary stream function is important to salmon recovery

Each of these legacy items is addressed in this report and recommendations are provided in Section V.

Categorization of the Watershed

The team categorized the watershed (catchment) into three parts: (1) landscape (uplands), (2) tributaries, and (3) main Scott River and valley. Each of these categories will be discussed separately even though they are fully interconnected and interdependent.

Landscape (Uplands)

Roads

Roads act as additional drainways during storm events, accelerating runoff and erosion. Many unmaintained and abandoned roads do not meet best management practices for drainage and erosion prevention. Land managers are aware of this problem and have been addressing it as funds become available.

Loss of Native Grasses

The early European settlers recorded that many upland areas were well vegetated with "fine bunch-grass", "affording excellent and most abundant pasturage" (SRWC 2004).

The native grass species were deeply rooted bunchgrasses that anchored the soil and efficiently infiltrated water. Most of these species have been drastically reduced by changes in land management practices. Two practices that diminished the bunchgrass communities include unregulated year long grazing by livestock, and fire prevention. These practices allowed encroachment by brush and trees on some sites, and on others, replacement by non-native shallow rooted annual grasses. The loss of the soil-holding ability and water infiltration capacities of native grasses is contributing to soil erosion.

Tributary Processes

Riparian Vegetation

In the Scott River tributaries observed, lack of riparian vegetation results in diminished water retention. Riparian vegetation is essential for holding water in the floodplain. The dense root mass and above ground material of riparian plants forms a strong web of resistant fibers that retards water runoff and aids infiltration. Saturated floodplains along the toe of hillslopes slows groundwater drainage towards the stream.

Much of the original Scott River tributary riparian plant community has been reduced or eliminated by a combination of mining, farming practices, grazing, road construction, channelization, logging, and fire suppression. The loss of this riparian vegetation has resulted in stream channel instability and loss of water storage capacity in the floodplains and surrounding landscape.

Large Woody Material (LWM)

The Scott River tributaries have lost much of the LWM that was once imbedded in the stream channels. The LWM provided energy dissipation for stream flow as well as sediment storage hard points throughout the system. Activities that caused this loss include: 1) increased numbers of headwater sluice-outs caused by loss of upslope water infiltration related to vegetation changes, 2) road building and logging adjacent to the low gradient stream beds, 3) harvesting of streamside trees and destruction of the unmerchantable riparian vegetation that provided vertical stability for logs and logjams, 4) intentional removal of logjams to provide fish passage or remove risk to downstream bridges and roads. There is no documentation of systematic LWM removal, yet very little LWM is present even though the close adjacent slopes are forested.

The harvesting of conifer trees within riparian corridors has resulted in a shortage of future LWM. Consequently, many Scott River tributaries face long term LWM deficits. Without LWM, channels will not store the amount of sediment needed to rebuild many of the historic floodplains in tributary streams. This in turn will reduce the capability of the systems to store water that will produce late-season flows.

Scott River Mainstem and Valley

Dredge Tailings

The dredge tailings in upper Scott Valley crowd the river against the eastern flank of the valley. These tailings also obstruct the river from spreading onto the original floodplain. The restrictions of the historic floodplain, coupled with high levels of bedload material

from historic mining and other erosion sources, creates a braided and extremely unstable channel form.

Scott River from Bottom of Dredge Tailings to Young's Dam

The Scott River can access its floodplain from the downstream end of the dredge tailings to Young's Dam. This provides some energy dissipation, however, the young age and small size of the vegetation, coupled with a high bedload contributed by upstream sources and sediment trapping at Young's Dam, creates an unstable braided channel. The channel would be relatively stable if the willow and cottonwood riparian communities were wider and fully mature. In the wide valley bottom areas, the Scott River floodplain developed by incorporating a matrix of sediment, roots, and LWM from the riparian forest. Over millennium, the riparian forest provided massive amounts of LWM to the stream and forested floodplain. Much of the LWM on the floodplain was buried by sediment and stabilized by vast root systems. The interwoven wood/root matrix of the floodplain was stable and resistant to erosive forces of the river. The activities associated with settling of the Scott River Valley cut away the riparian forest controlling the stream. The loss of the riparian forest weakened the floodplain matrix of roots, buried wood, and stable sediment. The loss of this long-term stability caused the upper reach of Scott River to erode, meander and braid. Much of the buried wood was probably lost during this erosion process. For further reading about LWM processing see Maser and Sedell 1994.

The relatively broad floodplain above Young's Dam is currently braided and unstable. However, significant vegetation is developing that may one day stabilize the channel and lower the number of unstable mid-channel bars. Dense cottonwood galleries and willow thickets that once occupied much of the riparian corridor could withstand high flow events. Human activities have broken these galleries into patches of younger age vegetation that do not have the strength to withstand high flood events. Consequently, the Scott River channel continues to braid and shift in this reach.

Scott River from Young's Dam to near the Lower End of Scott Valley

Portions of this reach of the river were channelized or levied by the U.S. Army Corps of Engineers starting in 1938. The channelization straightened and thus shortened the length of Scott River. The shorter length causes an increase in velocity and subsequently leads to channel bed down-cutting. The down-cutting causes an overall lowering of Scott River bed elevation. The river can no longer access its historic frequent floodplain, which prevents it from dissipating energies during frequent events like 2- and 5- year events. The increased river energy has resulted in the need to rip-rap many sections of the river to prevent loss of adjacent agricultural areas.

The vegetation along the channel is relatively sparse for the size of the Scott River. Agricultural areas have encroached on the banks of the river and leave little space for riparian vegetation. The root masses of existing riparian plants are insufficient to withstand the erosive forces of peak flow events. It is probable that cottonwood and willow composed a substantial portion of a much wider historic riparian zone. Few of these stabilizing trees and shrubs are present. Historically, a wide area of live trees and

roots were intertwined with down, buried and partially buried LWM that combined to dissipate stream energy.

Guidance in FEMAT (1993), PACFISH (1995) and INFISH (1995) uses the height of dominant late-successional tree species as the basis for reconnecting streamside buffers needed to safeguard ecological functions. A riparian width adequate for root strength and LWM delivery to the riparian area and river would be the distance of the height of a mature cottonwood along the mainstem.

A consequence of the channelization and levees is that the broad and relatively level floodplain no longer stores water for late-season release. As soon as the spring flow drops, the deeply incised channel cutting through the valley floor allows the accumulated groundwater to run into the relatively empty Scott River. The channel now acts as a drainage ditch similar to those used to drain wet areas. Historically, when the river bed was higher, the hydrostatic pressure of the river and its saturated bed held back the groundwater in the valley until late in the summer and early fall. Additionally, portions of the Scott Valley were historically home to large beaver colonies that created a maze of small dam complexes that stored large quantities of water. This water was gradually released during the late summer as adjacent river flows decreased.

A greater amount of water was in the river longer when all the tributaries were at full potential for water storage. The fact that more water was infiltrated throughout the landscape, tributary floodplains, and valley floodplain, created a regime within which a longer period of time was required for groundwater molecules to wait their turn to exit the Scott River watershed.

VI. Conclusions

The NRST role, when engaged in technical assistance trips, is to provide opinions and advice which the requesting entity can then use in conjunction with other information they have to make appropriate decisions. Therefore, the information contained within this report should be considered as options used by the SRCD and their stakeholders in developing strategies. Given the brief time spent in the Scott River watershed, the NRST was unable to examine all corners of Scott River. Actual on-the-ground observations were largely limited to selected, short stream sections. Therefore, many of the recommendations are by necessity more general than specific in nature. They are intended as “food for thought” when addressing management within the watershed. As always, it will take the collaboration of local people with local knowledge and experience to design the site specific plan necessary to successfully allow the watershed to restore itself. The team hopes to have provided a base from which the SRCD and their stakeholders can work to develop a watershed scale strategy that builds on ongoing management successes, coupled with new management strategies, designed to further solidify and advance recovery efforts.

The NRST observed many modifications to the Scott River Valley by activities that have occurred over the course of the last century and a half of European settlement. These activities have changed the ecological status from that of full potential to one that has a lower capability to function and produce valued products such as abundant and clean water. However, it was also observed that nearly all of the necessary elements are still present to increase the ecological capability to a much higher level. It is unlikely that the original ecological potential can ever be reached due to present day human resource allocations and needs. The residents of the valley are dependent on water for domestic and agricultural use. While people have no control over the amount of precipitation that falls over the landscape, land management does have an effect on the ability of the watershed to capture, store and safely release water. The NRST is confident that there are numerous measures that can increase water storage in the soil within Scott River watershed. Each of these measures can only be effective if they are part of an overall plan that will aggregate them to improve the total water storage capability.

Landscape (Uplands)

Human activities in the watershed have produced a quantum increase in sediment delivery to the tributaries and mainstem Scott River. Roads, logging, mining, unmanaged livestock grazing, and loss of natural fire have all contributed to current problems. The conversion of bunchgrass communities to brush and trees has reduced water infiltration into the soil. Lack of infiltration causes higher rates of run-off and increased soil erosion.

Tributaries

The tributaries of the Scott River watershed have been extensively modified. Many tributaries have lost the ability to dissipate stream energy, filter sediment, aid in floodplain development, and aid ground-water recharge. Roads, logging, mining, channelization and unmanaged livestock grazing have contributed to the loss of riparian communities and LWM. The way the tributaries process water and sediment effects the functional condition of the mainstem.

Scott River

The mainstem Scott River has been extensively modified. The riparian gallery forests that bordered the river and maintained its dimension, pattern, and profile have been lost. The riparian communities are now narrow and inadequate to hold the river in place, and the floodplain has been extensively modified. Portions of the river have been channelized. Channelization may have caused the river to downcut and become less stable. Because it can no longer access its frequent floodplain, it cannot dissipate energy. The increased energy in the incised channel necessitated the installation of extensive amounts of rip-rap to prevent bank erosion and loss of agricultural lands. The floodplain can no longer retain water due to the loss of the hydrostatic pressure originally available when the river bed level was higher.

V. Recommendations

A. *Landscape (Uplands)*

The restoration of the Scott River watershed needs to continue to address the landscape at the broad scale. Existing programs need to be expanded, and new ones initiated to improve grazing management, reintroduce fire cycles, restore native bunchgrass communities, control invasive brush and tree species, and accelerate road management programs.

1. Grazing management

A program of grazing management that is designed to recover native species needs to be implemented in those parts of the landscape where livestock grazing is practiced. Proper grazing strategies considering timing, intensity, and movement of livestock can improve range condition and livestock productivity.

- *Encourage restoration of native bunchgrass species.*

Programs need to be evaluated as to the possibility of recovering deep-rooted native grasses in the uplands. This would eventually provide additional forage while aiding in the restoration of watershed condition. This will require a long-term program that is compatible with the reintroduction of natural fire ecological processes.

Establishment of deep-rooted grasses such as bunchgrass species will stabilize soils and improve water infiltration. Native grass seeds are currently more available and cost effective than just a few years ago. Some sites could be selected to test effectiveness and practicality.

2. Erosion control

Erosion control measures that are currently being used as best practices need to be continued and expanded wherever activities do not meet standards. Forest practices are regulated by the State of California and meeting or exceeding these standards should be a goal for all Scott catchment forest activities.

- *Road management*

Prescriptions for forest road activities should be designed to eliminate erosion from legacy areas and minimize soil disturbances when implementing new activities. Road maintenance of active roads is necessary to reduce non-point source soil erosion.

Private and public road management should concentrate on decommissioning of all unneeded roads. Closure and storm proofing of roads that are only needed periodically can minimize sediment contribution significantly.

3. Increase the role of fire

The agencies charged with fire management need to work closely with watershed interests to develop a program to control trees and brush that are detrimental to watershed function. The NRST understands the difficulty of this as a management tool under the current conditions and because of public opinions. However, the team strongly recommends a program be implemented.

- *Use fire to control juniper and brush species on grass sites*

Efforts to reintroduce fire in the watershed are being examined. The use of fire can help move towards a more natural distribution of juniper, oak, and brush species while encouraging native grasses in those areas that historically were grass dominated. Fire occurrence at regular intervals is needed to kill tree and shrub seedlings. The original fire cycle, depending on aspect, is believed to be between eight and sixteen years (SRWC 2004).

- *Encourage native bunchgrass community expansion*

Techniques, including planting, need to be researched and developed to reestablish the native grass species. Test areas need to be set aside to develop successful techniques for reestablishing these grasses. Information needs to be shared among land managers and the public. The involvement of universities, grants, and graduate programs may provide an effective means of moving such a program forward.

B. Tributaries

Restoration activities in tributaries of the Scott River watershed needs to address regrowth of riparian vegetation and replacement of the LWM that has been lost. The streams will begin to function properly when riparian vegetation and LWM can again dissipate energy, trap sediment, aid in floodplain development and groundwater recharge. Restoration of tributary streams is important to salmon recovery in the mainstem because of their influence on water and sediment delivery.

1. Improve riparian zones

A program needs to be implemented to assess riparian zones and then develop management and monitoring strategies designed specifically for each reach. Each reach of stream has differences in elevation, soils, landform, runoff patterns, and many other attributes that must be assessed separately. Recovery efforts must be tailored to the potential of that stream reach based on its unique attributes.

- *Grazing management to encourage riparian recovery*

Grazing management in riparian areas needs to focus on recovery of riparian vegetation. Grazing impacts include use of the plants as well as mechanical disturbance (hoof damage). Techniques are currently available that will allow livestock grazing to continue while putting riparian vegetation in a recovery mode. Use creativity and explore all options to determine appropriate grazing management systems tailored to the conditions, problems, potential, objectives and livestock management considerations on a site-specific basis.

- *Road management*

A comprehensive inventory of road condition, use, ownership, drainage improvement opportunities, and affects on tributaries should be continued in order to prioritize future areas of work. Decommissioning, relocation, and road maintenance can improve overall tributary and floodplain function.

2. Increase LWM component in forested reaches

Forest harvest and land management should focus on replenishment of LWM that has been lost from many tributaries. A top priority should be given to protection and enhancement of trees that can naturally contribute LWM over the long-term. This is necessary for improving tributary function. Addition of wood through rehabilitation projects can be effective if carefully planned and adapted to appropriate reaches. Mechanical wood supplementation can only be effective when combined with a strategy of continually growing replacement trees.

C. Scott River

The restoration of the mainstem Scott River needs to address expanding the riparian corridor, determining the effects of the dredge tailings on the river's function, and recovery of the channel bottom elevation.

1. Riparian zones

The team strongly supports continuing the planting efforts on the river. Another recommendation is a synthesis of all the planting monitoring data, so what has worked and has not worked is in one place and easily understood. This information is also important for a wider audience so others working on similar issues and similar watersheds can learn from this experience. It should be made available in symposiums, printed literature, and workshops.

The restoration of riparian habitat along the length of the river should continue. Evaluation of riparian restoration techniques should continue. Adaptive management should be employed to eliminate those techniques that are marginal or unsuccessful and improve on those that have promise. Monitoring of techniques and success/failure rates should be incorporated into any watershed restoration efforts. Core drilling to late summer water tables for pole plantings should be explored. If banks are damaged during future flood events, burial of LWM and plantings should be part of any rehabilitation projects.

Wherever possible, the riparian zone along the river should be managed to provide greater root strength for holding banks and retaining water in the floodplains. Landowners should be encouraged to grow more riparian vegetation along the banks of the river to add to the overall stability of the system. A greater mass of vertical and horizontal structure will serve to stabilize the river during peak flow events. A riparian width adequate for root strength and LWM delivery to the riparian area and river would be the distance of the height of a mature cottonwood along the mainstem. One idea that came from the discussions was to initiate research on the ecological and economic feasibility of growing commercial cottonwood plantations along the river. These plantations were envisioned to be **inland from and adjacent to a wide, fully protected natural buffer**. This could provide a wider zone of root strength needed to stabilize the floodplain.

2. Tailings

A study to determine the effects of dredge tailings on the Scott River floodplain function should be initiated. The goal of the study will be to determine what treatments may be needed and might be effective in improving upper valley stream function.

3. Scott Channel Improvement

Efforts should be initiated to model reconfiguration of the Scott River channel from Young's Dam to the outlet of Scott Valley. The objective of this effort would be to determine the feasibility of raising the bed level of the river to improve floodplain water retention, which could occur through allowing the channel to naturally meander through erosion and deposition processes, or further engineering of the channel. It is understood that any changes in the river would mean changes in agricultural practices and require much work in both the technical and social aspects. Understanding the connection between river function and fisheries habitat will help weigh the costs and benefits of project proposals that would come out of such a study.

4. Floodplain Water Storage Capacity

A study to determine the extent of the potential underground water storage capacity should be initiated.

D. Monitoring

Riparian vegetation monitoring techniques that have been found to be effective are documented in Winward 2000. Three sampling methods are described. The vegetation cross-section method evaluates the health of vegetation across the valley floor. The greenline method provides a measurement of the streamside vegetation. The woody species regeneration method measures the density and age class structure of any shrub or tree species that may be present in the sampling area. Together these three sampling procedures can provide an evaluation of the health of riparian vegetation in a given riparian area.

In planting project areas, develop monitoring plans that measure survival of plantings and whether any natural regeneration occurs.

E. Education and Training

Efforts to train and educate interested individuals through the auspices of the SRCD and SRWC to understand stream/riparian function should be continued. Proper Functioning Condition Assessment training courses should be initiated for all interested individuals. This would allow interested parties to develop the common vocabulary that will promote understanding of the Scott River watershed and its functions.

Cooperative education and training of interested groups and citizens is a first step in moving the watershed's current capability closer to a desired future condition at a high level of functionality. To request riparian function training from the California Riparian Team contact Randy Gould (USDA Forest Service, Vallejo, 707-562-8956) or Bill Cunningham (NRCS, Davis, 530-792-5664).

F. Seek Private, State, and Federal Assistance

To help facilitate accomplishment of projects deemed appropriate by local stakeholders, seek outside help from private organizations, and state and federal agencies that have funds and expertise. Build an understanding of the importance of tributary function to mainstem function to help foster support for funding projects in the tributaries.

Scott River watershed project goals should be accomplished without relinquishing local ownership and control.

VI. References

CalForest Nursery. 1998. (Feb) Scott River Riparian Woodland Revegetation Projects Annual Report FY 1996 Scott River Riparian Woodland Revegetation (French Reach Project 96-JITW-05). For SRCD.

CalForest Nursery. 1998. (Mar) Scott River Riparian Woodland Revegetation Projects Annual Report FY 1997 Scott River Riparian Restoration - Fay Lane Restoration Project. For SRCD.

Maser C., and J.R. Sedell. 1994. From the forest to the sea: the ecology of wood in streams, rivers, estuaries, and oceans. St. Lucie Press. Delray Beach, FL. 200 p.

SRWC. 2004. Initial Phase of the Scott River Watershed Council Strategic Action Plan, Section 5, Historical Watershed Conditions.

Winward, A. 2000. Monitoring the vegetation resources in riparian areas. Gen. Tech. Rep. RMRS-GTR-47. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. 49

VII. Photos

See next two pages.



Photo 1. SF Scott River, scars of hydraulic mining are still visible.



Photo 2. Gold dredge tailings area.



Photo 3. Area that eroded, was filled back in, and planted.



Photo 4. Plantings on high streambank.



Photo 5. Eroding sandy streambank in need of riparian-wetland vegetation's stabilizing influence.



Photo 6. Young's Dam.



Photo 7. Scott River above the entrance to the outflow canyon from Scott Valley. The riparian zone is very narrow and has numerous planted golden willow lining the banks.



Photo 8. Portions of Moffett Creek has been channelized, riprapped. Willows planted during construction are now mature.



Photo 9. An example of one of the few logs and small wood jams observed which are trapping sediment.



Photo 10. Group viewing road closure work near Moffett Creek.



Photo 11. New road located and constructed to prevent erosion and to benefit stream/riparian recovery.



Photo 12. Improved grazing management needed for improvement of riparian-wetland vegetation and physical function on Moffett Creek.