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GOOD DIRT

The Newsletter of The Anderson Valley Land Trust
Fall 1997

WHAT TO EXPECT IN THE NAVARRO WATERSHED RESTORATION PLAN

The Navarro Watershed Restoration Plan will contain the most detailed local analysis yet of the causes of the loss of the coho salmon, as well as the significant loss of water quality that threatens not only the salmon, but all the other water uses we rely upon. Building on the scientific description of the problem, the Plan is expected to present feasible, effective solutions to the three main causes of salmon habitat loss identified in the Field Study of the watershed: excessive deposition of fine sediments in streambeds; high summertime stream temperatures; and lack of high-quality pools for fish habitat.

Navarro Watershed Restoration Plan **PUBLIC MEETING**

On Wednesday evening, October 15, there will be a special Public Meeting from 7 - 10 PM at the Grange Hall in Philo focusing on the Navarro Watershed Restoration Plan.

Facilitated by Tom Schott of the Natural Resources Conservation Service, the meeting will include a presentation by Dan Sicular, the Restoration Plan's Project Coordinator, on the results of the scientific Field Study and an overview of the Plan's restoration strategy.

Draft "Recommended Land Management Practices" designed to restore or conserve water quality and salmon habitat will be presented for public comment and discussion.

These first draft "RLMPs" are at the center of the proposed Restoration Plan: these recommended practices will include activities that every landowner in the watershed can do to improve water quality, benefit the fishery and contribute to the valley's overall health and productivity.

The Navarro Watershed Restoration Plan is a project of the Anderson Valley Land Trust, Mendocino County Water Agency and California State Coastal Conservancy.

The Plan's overall Restoration Goals are to:

1. Restore the historic abundance and range of Coho Salmon.
2. Restore the historic abundance and range of Steelhead.
3. Reduce summer water temperatures to enable the survival of Coho.
4. Reduce sediment loads to be in balance with the transport capacity of the watershed and to stop instream habitat degradation.
5. Increase summer stream flows to protect habitat and other uses.

The status of each major sub-basin in the overall 315 square mile watershed will be described in the Plan, with restoration priorities identified specific to that sub-basin. For each restoration Goal and Objective, specific recommendations will be made for improvements to land management practices that landowners across the watershed can make to restore degraded land and streams, and to minimize future disturbances. Therefore, any landowner in any part of the watershed can refer to his or her sub-basin and learn what are the most important things he or she can be doing to contribute to watershed health in a meaningful way.

These "Recommended Land Management Practices" are currently being researched and drafted by restoration professionals from Entrix (formerly Trihey and Associates), Circuit Riders and Pacific Watershed Associates, in consultation with the Natural Resources Conservation Service, the California Dept. of Fish and Game, U.C. Cooperative Extension and others. These recommendations will include ones relating to erosion control, protection and enhancement of riparian areas, streambank stabilization, gully remediation, and improvement of instream fish habitat. The recommendations will be tailored to the specific soils, geology, vegetation and land use history of the Navarro.

Your ideas and personal experience in resource management in Anderson Valley are important to share as part of this process. Copies of the first draft of the Recommended Land Management Practices will be available in early October. You are encouraged to get a copy and review them (available at the Pacific Forest Trust, 14125 Highway 128, Boonville, or call Dan Sicular at 895-3173). Come to the public meeting at the Philo Grange on October 15 to share your comments, or send them in writing to the Anderson Valley Land Trust at P.O. Box One, Yorkville CA 95494 by October 24. Copies of the draft will also be sent to government agencies for their review. The draft recommendations will be revised based on the public and agency comments received.

In addition to general illustrations that will accompany the Recommended Land Management Practices, designs for several local demonstration projects will also be included in the final Plan. Working with interested landowners, several sites will be selected to serve as on-the-ground examples of restoration of typical watershed problems. In particular, we hope to include projects involving remediation of gullies, road-related erosion, riparian revegetation and streambank restoration.

Funding sources, permit requirements, sources of further technical information, and other implementation resources will be identified in the Plan as well. Agencies that can give technical assistance will be listed, as well as local contractors who do restoration work. This will enable landowners to move ahead more easily with the full range of restoration activities recommended in the Plan. Potential sources of funding include the Coastal Conservancy, California Dept. of Fish and Game, Natural Resources Conservation Service, and EPA-State Water Resources Control Board. By having completed this Restoration Plan, projects in the Navarro watershed will receive higher priority for funding than they would have otherwise!

In short, the finished Navarro Watershed Restoration Plan will be the best available source of information – all in one place! – for landowners who want to take the initiative to contribute to the recovery of this watershed's health and natural abundance.

**Join the Anderson Valley Land Trust today
and make a Special Contribution to the
Navarro Project Coordinator Fund**

**We need to raise extra funds to keep Dan Sicular on the job,
completing this important watershed planning process.
*We can't do it without you!***

Questions & Answers

About the Navarro Watershed Restoration Project

Can a restoration plan based on voluntary participation really address the critical problems affecting the Navarro Watershed?

Voluntary activities have the greatest likelihood of success if enough people are motivated to restore the watershed. The voluntary *long term* commitment of valley landowners to watershed restoration may be the only way we're ever going to address the impacts of a long history of land use here. Regulations *may* still be needed to prevent the worst practices that contribute to erosion or loss of riparian vegetation from happening – but regulations won't get people fixing their gullies, replanting their streambanks or improving their road culverts. We believe that education and information combined with technical and financial assistance are the only lasting avenues to restoring watershed health.

Will there be any funding for actual restoration projects?

Since the coho has been listed under the federal Endangered Species Act, and since the EPA has gotten serious about reducing non-point source pollution (otherwise known as high water temperatures and sedimentation), state and federal agencies are making watershed restoration a top priority for funding. Yet even with more funds being made available, there is fierce competition for their distribution. With the completion of the Navarro Watershed Restoration Plan, the Navarro watershed will leap to the top level for funding consideration, making money available that never was before for local restoration projects.

Will the restoration activities only take place on industrial forestland?

No, useful restoration work can take place everywhere. However, the greatest extent – and its not much -- of remaining coho salmon habitat exists in the cooler, forested sub-basins of the Navarro. This is mostly commercial forestland – mostly owned by Louisiana-Pacific. It is essential to the survival of the coho that this last, best habitat be conserved and improved, so that is one of the goals of the Plan. But the Restoration Plan's goals also include improving steelhead habitat and water quality across the whole basin. There will be appropriate and important restoration work to do anywhere you live or work in the watershed.

What is the impact of the Endangered Species Act listing of coho salmon?

This remains to be seen, as the National Marine Fisheries Service and the California Resources Agency wrestle with just how to protect the coho. We have been keeping government agencies involved in the Plan as it is developing. Their review and approval of the Recommended Land Management Practices section of the Plan is important to assure landowners that by following those recommendations they will be doing the right thing. It is our hope that this local community can rally together to restore coho habitat voluntarily, with a minimum of bureaucratic inefficiency.

Have local Anderson Valley folks been involved in this study?

Many many local people -- across the spectrum of land ownership and political allegiance -- have been involved in all different levels of creating the Navarro Watershed Restoration Plan. But this is just the beginning if we are to really accomplish watershed restoration. A stalwart dedicated dozen are serving on the Advisory Group, while more than 70 landowners provided access for the Field Study. Another 15 people have participated in streamflow and turbidity monitoring, along with students from AV High School. All Advisory Group meetings are open to the public and more public meetings are being held as the Plan recommendations are being drafted. More local involvement is not only welcome -- it's essential.



The Navarro River Headlands and Estuary.

Navarro Watershed Problems, Solutions: *What We're Learning*

The Field Study for the Navarro Watershed Restoration Plan is now completed and the results are in. The study explored the present condition of the salmon and steelhead fisheries in the Navarro River. The study results give scientific credence to the belief held by many in the Anderson Valley that the overall health of our watershed has declined, and that this decline is most evident in the condition of our River and streams. The study also shows that restoration of much of the watershed is within our technical abilities. With a concerted effort on the part of interested landowners, we can achieve significant improvements in water quality and aquatic habitat. In so doing, we will also improve the health and productivity of the soil and the land.

A major component of the field study was to collect data on current distribution and relative abundance of fish, and to assess the quality of fish habitat. Our study was funded with grants from the USEPA, the State Coastal Conservancy, and the Federal Emergency Management Agency. Last summer our fisheries team surveyed a representative streams that flow through the different types of geology and vegetation found in the Navarro basin. As part of this process, we contacted scores of landowners and received their permission to access streams on their property. Our own efforts were augmented by those of the California Department of Fish and Game, which for the past several years has been surveying stream conditions in the Navarro Watershed.

The results of the fishery study indicate that steelhead are widespread and relatively abundant in streams throughout the watershed. Steelhead juveniles were found in nearly every stream surveyed by our fisheries team and by the Department of Fish and Game. Our study of the Navarro Estuary shows that the last four miles of the Navarro before it reaches the sea are a particularly important nursery for juvenile steelhead. Large numbers of steelhead juveniles spend their second year of life in the estuary, growing from an average of 3-4 inches to a robust 7-10 inches before moving out to sea. These larger fish have a greater chance of surviving the perils of the ocean, growing to maturity, and returning to spawn in their natal streams.

Coho salmon, meanwhile, have not fared so well. Whereas steelhead are habitat generalists, and have the ability to adapt and survive in a variety of stream conditions, coho are habitat specialists. Adult coho need clean, well-sorted gravel of a particular size to spawn in. Juveniles need cold water throughout their summer of residence in fresh water, and they need deep, shaded, protected pools. In short, coho are superbly adapted to heavily forested, undisturbed coastal streams. Coho were once found throughout the Navarro basin. An example of their former abundance is seen in records of California Department of Fish and Game fish rescue operations in Rancheria Creek in the late 1940's and early 1950's. As decreasing summer stream flows threatened to strand juvenile fish, Fish and Game crews rescued between 1,684 and 51,466 coho each year in the years from 1948 to 1952, and re-released them downstream. There have been no confirmed sightings of coho in Rancheria Creek since the 1970's. Nor have coho been seen in the Anderson Creek basin or in Mill Creek.

Our surveys, as well as those of the Department of Fish and Game and the National Marine Fisheries Service, indicate that coho are currently confined to a few tributary streams in the North Fork basin and in the lower reaches of the mainstem Navarro, areas with cooler temperatures and less erodible soils (National Marine Fisheries Service did find 3 juvenile coho, in poor condition, in North Fork Indian Creek this summer). Our study of habitat conditions shows the reason for the decline of coho populations: few streams have habitat suitable for spawning and rearing coho. Furthermore, even with improving habitat conditions, the recovery of the coho will be slow, given that there are so few returning adults each year.

Our study shows that there are three main factors limiting the coho fishery. These same factors were probably responsible for the decline of the steelhead population:

1. Fine sediment deposition. Nearly all of the streams surveyed had excessive deposits of clay, silt and sand particles on the stream bed. Fine sediment degrades the quality of spawning gravels and inhibits the development of eggs and hatchlings. Fine sediment also limits the production of insects, which are a major food source for salmonid juveniles. Sediments derived from eroded soil and rock are called "clean sediments", but are nonetheless considered a pollutant. High sediment loads have been documented in the Navarro for some time, and have led to state and federal listing of the Navarro as an "impaired water body."

2. Lack of pools. Most of the tributaries to the Navarro have far fewer pools than would be expected in forested coastal streams, and many of the pools that do exist are of poor quality for fish. Our scientific team points to the absence of logs and other large woody debris in streams as the primary reason for a lack of pools. Large woody debris creates areas of slow flow and concentrated flow that create pools, sort gravel, and provide areas of refuge during floods. Large woody debris also provides shade and protection from predators, and encourages the production of insects and other food sources. Fallen old growth redwoods, now nearly completely absent from streams, are particularly important stream habitat elements, as they last for decades or even centuries, and create stable pools, sediment traps, and protective cover.

3. High summer stream temperatures. The Mendocino County Water Agency, the Land Trust's partner in the Navarro Watershed Restoration Plan, has been monitoring stream temperatures in the Navarro and its tributaries since 1995. The results of this monitoring indicate that by July or August few tributaries have temperatures suitable for coho juveniles. Steelhead are more tolerant of warmer temperatures. Even so, several streams monitored experience temperatures marginal or unsuitable for steelhead. Documentation of high water temperatures has led to a second listing of the Navarro as an "impaired water body."

The next step in the field study was to identify the causes of these problems. As the following discussion shows, the problems are all interrelated.

Fine sediment in streams originates from stream banks, hillslopes, and roads subject to accelerated rates of erosion. In order to determine the major sources of sediment, the paths by which it enters stream channels, and the fate of the sediment once it enters stream channels, we constructed a "sediment budget" for the entire Navarro basin. This was a massive undertaking that consumed a considerable portion of the project's resources. The results, however, can be boiled down. The table below identifies the erosional processes that contribute sediment within each of the watershed's five major sub-basins.

Sub-basin	Bank Erosion & Slides 1st-2nd Order Channels		Bank Erosion & Slides 3rd & Larger Order Channels		Gullies		Deep Seated Slides		Roads		Total Sediment Production	
	Tons/yr	%	Tons/yr	%	Tons/yr	%	Tons/yr	%	Tons/yr	%	Tons/yr	%
Anderson Cr	12,100	11%	53,500	49%	25,300	23%	0	0%	18,100	17%	109,001	22%
Indian Cr	10,500	25%	15,600	38%	10,700	26%	0	0%	4,700	11%	41,501	8%
Mainstem	12,100	13%	31,500	34%	3,900	4%	15,700	17%	30,200	32%	93,401	19%
North Fork	15,000	17%	20,700	23%	1,900	2%	0	0%	53,300	59%	90,900	18%
Rancheria Cr	24,900	16%	62,100	40%	36,000	23%	12,000	8%	20,700	13%	155,701	32%
Watershed Total	74,600	15%	183,400	37%	77,800	16%	27,700	6%	127,000	26%	490,504	100%

The table shows that the most significant sources of sediment are gullies, roads, bank erosion, and shallow slides. All of these are treatable with established erosion control techniques. The table also shows the contribution of each major tributary stream to the total sediment budget. The last column shows the average annual tonnage of sediment per square mile of watershed in each of the major tributaries. As can be seen, Anderson Creek has the highest overall rate of erosion. This can be attributed to the unstable geology of the upland area of the Anderson Creek basin, and to extremely high rates of erosion from streambanks in the lower reaches of the Creek and its main tributaries. On the other hand, the North Fork Navarro basin, which has more stable geology and soils, has a significantly lower rate of erosion. Most of the erosion in the North Fork Basin is attributable to the dense network of logging roads associated with industrial timber operations.

As part of the sediment budget, the study team examined air photos of the Navarro basin from 1952, 1965, 1981, and 1992. This examination revealed that there was significant widening of many stream channels and aggradation of stream beds throughout the 1950's and 60's. This was related primarily to the extensive damage caused by tractor logging in the years before the Forest Practices Act, and the unfortunate timing of two major storms in 1955 and 1964. These storms caused extensive landsliding, washouts, and debris flows, which led to widespread deposition of coarse sediments (cobbles and boulders) in stream channels that filled pools, raised the level of streambeds, and destabilized stream banks. The later photo series indicate that many streams are now recovering somewhat from the gross disturbances of the past: many have narrowed to their 1952 width, and field checks show that many streams have scoured much of the coarse sediment deposits from their beds. Given the sheer volume of coarse sediment deposition, and the rapid rate at which coarse sediment breaks down into fine sediment in the Navarro, we can assume that coarse sediment inputs to streams must have had a profound effect on fish habitat. Today, even though erosion rates appear to be lower than in the past, erosion is still much higher than it was in prehistoric times. Erosion can, however, be controlled, and erosion control is central to the restoration plan.

The second major limiting factor, lack of pools, is related primarily to an historic and continuing loss of logs and other large woody debris from streams. Historically, loggers cut

trees right down to the water's edge, and salvaged fallen old growth redwoods from stream channels. These historic practices, combined with the weakness of the current Forest Practice Rules in protecting riparian corridors, has led not only to direct removal of wood from streams, but also to a loss of old growth trees growing on stream banks that would eventually fall into the stream. In the 1960's, overzealous Department of Fish and Game crews exacerbated the situation by systematically clearing out log jams they thought were preventing fish from migrating upstream to their spawning areas.

The historic widening of stream channels also caused destruction of the riparian forest in many stream reaches, leaving broad gravel bars and bare banks where short-lived, quick-rotting hardwoods are only now beginning to colonize. A few stream reaches, such as the lower part of Anderson Creek, continue to experience excessive inputs of coarse sediment, which fills pools and broadens stream channels. Most streams, however, are not currently aggrading. In these more stable streams, careful placement of logs can nearly instantly improve stream habitat conditions. The long-term solutions to the lack of pools, however, are erosion control and re-establishment and protection of old growth forests along stream banks. The restoration plan will include both short-term and long-term recommendations for increasing the incidence and quality of pools.

High summertime stream temperatures are associated primarily with loss of riparian vegetation. An intact forest stream is a deep, shady, cool place, where massive trees form a canopy that blocks out almost all direct sunlight. In the Navarro, however, many miles of streams have lost much or all of their riparian forest, due to logging, stream widening, intentional removal for agriculture, and damage from livestock and deer. Loss of the riparian forest also leads to destabilized stream banks, and the absence of a supply of large woody debris. A major part of the restoration plan must therefore deal with protection of remaining riparian vegetation and enhancement of riparian corridors and stabilization of streambanks through revegetation.

One of the most important conclusions of the study is that the causes of habitat and water quality degradation are treatable, and that these conditions can be reversed. The Navarro Watershed Restoration Plan will be aimed at encouraging voluntary efforts by willing landowners interested in improving conditions on their own land. Through well-planned, coordinated, and concerted efforts to control erosion, protect and enhance riparian corridors, and place habitat structures in streams, land owners in Anderson Valley can improve water quality and set the conditions for a return of the fish.

by Dan Sicular

Project Coordinator for the Navarro Watershed Restoration Plan



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