Executive Summary

California Coastal Watershed Planning and Assessment Program

The Salt River Basin Assessment Report is a special project of the Coastal Watershed Planning and Assessment Program (CWPAP). CWPAP is a CDFG program conducting fishery based watershed assessments along the length of the California coast. The Salt River Basin was chosen as an assessment area due to the pressing nature of the socio-economic and natural resource problems caused by the river's dysfunction. The production of the Salt River Assessment Report adhered to the CWPAP methods manual and protocols; where applicable. The program's work is intended to provide answers to the following assessment questions at the basin and tributary scales in California's coastal watersheds:

- What are the history and trends of the size, distribution, and relative health and diversity of salmonid populations?
- What are the current salmonid habitat conditions; how do these conditions compare to desired conditions?
- What are the impacts of geologic, vegetative, fluvial, and other natural processes on watershed and stream conditions?
- How has land use affected these natural processes and conditions?
- Based upon these conditions, trends, and relationships, are there elements that could be considered to be limiting factors for salmon and steelhead production?
- What watershed management and habitat improvement activities would most likely lead toward more desirable conditions in a timely, cost effective manner?

The assessment program's products are designed to meet these strategic goals:

- Organize and provide existing information and develop limited baseline data to help evaluate the effectiveness of various resource protection programs over time;
- Provide assessment information to help focus watershed improvement programs, and to assist landowners, local watershed groups, and individuals in developing successful projects. This will help guide support programs, such as the CDFG Fishery Restoration Grants Program, toward those watersheds and project types that can efficiently and effectively improve freshwater habitat and lead to improved salmonid populations;
- Provide assessment information to help focus cooperative interagency, nonprofit, and private sector approaches to protect watersheds and streams through watershed stewardship, conservation easements, and other incentive programs;
- Provide assessment information to help landowners and agencies better implement laws that require specific assessments such as the State Forest Practice Act, Clean Water Act, and State Lake and Streambed Alteration Agreements.

General Assessment Approach

The general steps in our large-scale assessments include:

- Determine logical assessment scales;
- Discover and organize existing data and information according to discipline;
- Identify data gaps needed to develop the assessment;
- Collect needed field data;
- Amass and analyze information;

- Develop conclusions and recommendations;
- Facilitate implementation of improvements and monitoring of conditions.

Scale of Assessment and Results

The assessment team used the California Watershed Map (CalWater version 2.2.1) to delineate the Salt River Assessment Basin for assessment and analyses purposes. The study area was further delineated into ecological units: Wildcat Tributaries and the Salt River Delta. Demarcation in this logical manner provides a common scale for conducting assessments. It also allows for reporting of findings and making recommendations for watershed improvement activities that are generally applicable across relatively homogeneous areas.

Assessment Products

This report and its appendices are intended to be useful to landowners, watershed groups, agencies, and individuals to help guide restoration, land use, and management decisions.

Assessment products include:

- A basin level Synthesis Report that includes:
  - Collection of Salt River assessment basin historical and sociological information;
  - Description of historic and current vegetation cover and change, land use, geology and fluvial geomorphology, water quality, and instream habitat conditions;
  - Evaluation of watershed conditions affecting salmonids;
  - An analysis of the suitability of stream reaches and the watershed for salmonid production and refugia areas;
  - Tributary and watershed recommendations for management, refugia protection, and restoration activities to address limiting factors and improve conditions for salmonid productivity;
  - Monitoring recommendations to improve adaptive management efforts.
- Databases of information used and collected;
- A data catalogue and bibliography;
- Web based access to the Program's products: http://ncwatershed.ca.gov/, and http://imaps.dfg.ca.gov/, and ArcIMS site.

Salmonids, Habitat, & Land Use Relationships

There are several factors necessary for the successful completion of an anadromous salmonid's life history. In their freshwater phases, adequate flow, good water quality, free passage, good stream habitat conditions, and proper riparian function are essential for survival. Stream condition includes several factors: adequate stream flow, suitable water quality, appropriate stream temperature, and complex, diverse habitat. Adequate instream flow during low flow periods is essential to provide juvenile salmonids free forage range, cover from predation, and utilization of localized temperature refugia from seeps, springs, and cool tributaries. Important aspects of water quality for anadromous salmonids include water temperature, water chemistry, turbidity, and sediment load. Habitat diversity for salmonids is provided by a combination of deep pools, riffles, and flatwater habitat types.

A functional riparian zone helps to control the amount of sunlight reaching the stream, and provides vegetative litter and invertebrate fall. These contribute to the production of food for the aquatic community, including salmonids. Tree roots and other vegetative cover provide stream bank cohesion and buffer impacts from adjacent uplands. Near stream vegetation eventually provides large woody debris and complexity to the stream (Flosi et al. 1998).

Geology, climate, watershed hydrologic responses, and erosion events interact to shape freshwater salmonid habitats. "In the absence of major disturbance, these processes produce small but virtually continuous changes in variability and diversity against which the manager must judge the modifications produced by nature and human activity. Major disruption of these interactions can drastically alter habitat conditions" (Swanston 1991). Major watershed disruptions can be caused by catastrophic events, such as the 1955 and 1964 floods or major earthquakes. They can also be created over time by multiple small natural and/or human disturbances.

Natural disturbance and recovery processes, at scales from small to very large, have been at work on North Coast watersheds since their formation millions of years ago. Recent major natural disturbance events include large flood events such as occurred in 1955 and 1964 (Lisle 1981a). Major human disturbances associated with post-European expansion like dam construction, agricultural and residential land development, and timber harvesting practices used particularly before the implementation of the 1973 Z'Berg-Nejedly Forest Practice Act have occurred over the past 150 years (Ice 2000).

Salmonid habitat was also degraded during parts of the last century by well-intentioned but misguided restoration actions such as the removal of large woody debris from streams (Ice 1990). More recently, efforts at watershed restoration have been initiated at the local and state levels by such major programs as CDFGs Fishery Restoration Grants Program (FGRP). For example, several California counties, with FGRP funding, have addressed fish passage problems associated with their roads' stream crossings, opening many miles of historic habitat to salmonids. For additional information on stream and watershed recovery opportunities and project types, see the publication by the Federal Interagency Stream Restoration Working Group (FISRWG 1998).

Salt River Basin

The Salt River Basin is located in Humboldt County, 15 miles south of Eureka, CA and encompasses approximately 47 square miles (30,425 acres). The Salt River Basin is comprised of the Wildcat tributaries (12,775 acres) and the alluvial delta (17,650 acres). The headwaters of the Salt River Basin reach an average elevation of 800 feet with maximum elevations of 1,750 feet. The Salt River Basin has a moderate climate with an average annual temperature of 52°F. Average annual precipitation in the region is 44 inches, 90% of which falls during the winter season.

The Salt River Basin is part of the Eel River Delta and Estuary, although its role as an estuarine slough has lessened over the years. At one time the Salt River was a significant part of the Eel River Estuary and was a tidal stream at all times. It is thought that the Salt River occupies a former channel of the Eel River that was left behind as the dominant channel of the Eel River migrated north across the delta over centuries of change. The Salt River, under 1850 conditions, had four anadromous freshwater tributaries, seven smaller drainages and several significant estuarine tributaries.

The Salt River is located in an area where natural processes create a dynamic and ever-changing aquatic system. These natural processes include: loosely consolidated sedimentary rock formation in the Wildcat Hills that are susceptible to large scale landslides; steep slopes, and a high occurrence of earthquakes. The project area is also influenced by tectonic subsidence and uplift and by changes in sea level. Other natural processes that influence the Salt River include intense winter rainfall. A complex interaction of a century and a half of land use actions combined with natural conditions and events have destroyed the Salt River. The Salt River has currently reached a point where it is hydrologically incompetent and serves very few ecosystem benefits and has created numerous socio-economic problems.

Prior to Euro-American exploration and settlement, the Wiyot people inhabited the area. The Wiyot dwelling place, Wotwetwok, was located along the Salt River (Oka't). The Wiyot used the Salt River and its surroundings for fishing and transport.

In 1852, the Ferndale area was settled by the Seth Louis Shaw. The character of the Salt River Delta in the 1850's was much different than it is today. Where it was not a watercourse or a freshwater wetland the Salt

River Delta was densely vegetated with riparian thickets and spruce forests. A large portion of the western Salt River Delta was comprised of tidal lands.

A shipping industry was established along the banks of the Salt River in the town of Port Kenyon in the 1870's, which facilitated the growth of agriculture in the Ferndale area and supported several sawmills and canneries. At that time near Port Kenyon, the Salt River was 200 feet wide and 15 feet deep.

In the 1880's there was a substantial effort to reclaim tidelands in the western delta. A reclamation district was formed and an estimated 2,900 acres of tideland were targeted for reclamation. Levees and tidegates were installed along and across waterways in order to convert tidelands into agricultural land. The actions of widespread tideland reclamation across the Eel River Delta reduced the tidal prism of the Eel River Estuary, which contributed to the reduced the size of the Salt River. Also, several of the creeks tributary to the Salt River were channelized in attempt to reduce the risks of flooding and to accommodate property boundaries.

The vast majority of the Salt River Delta is now in agricultural production. The Wildcat Hills are managed for pastoral land use and small scale timber production by many landowners. Residential development upon the Salt River Delta and the Wildcat Hills will likely increase which is a problem due to an associated increase in road construction and a change in drainage patterns.

Documented fishery resources of the Salt River are at a historic low; however young of the year coho salmon were documented for the first time in Francis Creek in October 2005. Current coastal cutthroat trout observations in the Salt River tributaries are limited to Francis and Russ creeks. Sacramento pikeminnow have been observed in the upper and lower mainstem Salt River and in Francis, Williams and Reas creeks.

Residents that live and work along the banks of the Salt River are plagued by annual flooding and ponding, which has significant economic impact for those directly affected. Also, the Ferndale wastewater treatment plant, located at the confluence of Francis Creek and the Salt River, is currently operating under a Cease and Desist order issued by the North Coast Water Quality Control Board. The Water Quality Control Board has also imposed a moratorium of new sewer hookups for the City of Ferndale. The failure of the City to comply with water quality regulations is directly related to the ever-worsening channel conditions in the Salt River.

Sedimentation in the mainstem Salt River (river mile 7.5) has become so bad that the channel has completely filled with sediment and has caused a diversion of water. The eastern portion of the Salt River Basin has now been diverted to flow into the Old River which represents a 42% reduction in Salt River Basin size. At this time, Williams Creek no longer flows into the Salt River and is no longer accessible to salmonids.

Restoration of the Salt River is led by the Humboldt County Resource Conservation District and supported by the Salt River Advisory Group which is comprised of landowners, the California Department of Fish & Game, Natural Resource Conservation District, Coastal Conservancy, United States Army Corps of Engineers, Humboldt County and the City of Ferndale. Efforts to restore the Salt River aim to solve the cause of ecosystem problems rather than focusing on alleviating current conditions.

Salt River Management Issues

General Management Issues:

- Hydrologic energy in the Salt River has been reduced through the:
    - Loss of tidal prism through historic agricultural conversion of wetlands, sloughs and salt marshes;
    - Exclusion of periodic Eel River flood waters by the Leonardo Levee;
    - Diversion of the eastern 42% of the watershed into Perry Slough and Old River,

    - Prolific growth of nuisance instream vegetation, lessening water velocity and resulting in further sediment deposition;
- Highly erodible soils dominate the upper watershed;
- Seismically very active area and close proximity to the Mendocino Triple Junction;
- Potential of subsidence and uplift within in the Eel River Delta;

Socio-economic

- The Salt River is no longer a navigable waterway;
- Flooding has increased because a reduction of channel capacity of all watercourses in the Salt River Basin due to sediment deposition;
- Degradation of Francis Creek and the Salt River channel has resulted in the Ferndale Wastewater Treatment Plant to be in violation of water quality regulations leading to a cease and desist order issued by the North Coast Water Quality Control Board;
- Health hazards are posed through water quality degradation;
- Agricultural production and land values are decreased by flooding;
- Most domestic and irrigation wells are less than 30 feet deep. Nitrates, fecal contaminants could easily contaminate the shallow ground water;

Land use

- Majority of Salt River Delta is in agricultural production;
- Livestock has access to streams in many locations within the Basin resulting in: stream bank erosion, no recruitment of riparian plant growth, direct input of fecal and urine contaminants, and trampling of stream banks;
- There have been negative impacts to streams and fish habitat from historic timber harvest practices;
- Channel realignment in the trans-delta reaches of some of the Wildcat tributaries from a distributory flow regime to a channelized flow regime has resulted in greater input of sediment in the mainstem Salt River;
- Urbanization and channelization has altered discharge and sediment deposition patterns of Francis Creek;
- Dairy farm waste management infrastructure is, in places, inadequate;
- Unknown, but suspected high quantities of nutrients from agricultural land may present water quality problems in the mainstem of the river as well as in the estuary;
- Erosion from roads and stream banks in the Salt River tributaries is a significant by indeterminate source of suspended sediment;
- Extensive system of levees and berms throughout the basin disrupt channel connectivity with adjacent floodplain;
- Sand quarries may have had a negative impact on the amount of sediment in the Salt River.

Fish and Wildlife

- Canopy cover and riparian vegetation is lacking in some portions of the Wildcat tributaries;
- 2,900 acres of tide land in the Salt River Basin were reclaimed in the late 1800's;
- Salmonid access into the Salt River system is severely impaired, and access to Williams Creek and Coffee Creek has been eliminated;
- Salmonid habitat throughout the entire basin is poor;

- Aquatic macroinvertebrate populations in basin indicate instream sediment impairments;
- Potential large woody debris (LWD) recruitment is generally poor;
- Spawning habitat is inadequate due to excess fine sediments;
- Mercury contamination has been found in the flesh of fish in the Eel River system (Stokes, 1981).

Assessment Sample Base
This assessment was based on the following information:

- CDFG included over 30 field assessments of the Salt River and its tributaries: Williams, Francis, Reas, Coffee and Russ.
- CDFG and Humboldt State University have conducted three fishery surveys on the Eel River Estuary in 1951, 1977, and 1995.
- Natural Resource Conservation Service (formerly known as the Soil Conservation Service) has published five documents focused on Salt River issues as well as numerous memorandums and draft documents concerning: landslides, earthquake assistance, sediment deposition information, macroinvertebrates and soil information.
- Humboldt County Resource Conservation District has contracted numerous studies on the Eel River Delta including: Biological Conditions of the Eel River Delta, Vegetation Survey of the Eel River Delta; Habitat Types of the Eel River Estuary and their Associated Fishes and Invertebrates; Animal Waste Assessment Project, Eel River Delta Animal Waste Demonstration Project, and channel elevation surveys.
- HSU has contributed several papers on the geologic history and current geologic events in the Eel River Delta.
- Technical review and initial project design of the Salt River Restoration process is derived from work compiled by the Salt River Advisory Group which is comprised of the NRCS PL566 Small Watershed Planning Program, Humboldt County Resource Conservation District, County of Humboldt, City of Ferndale, Coastal Conservancy, and Department of Fish and Game, as well as numerous land owners in the Salt River Basin.

Response to Assessment Questions

This assessment uses six guiding assessment questions to organize its issues, findings, conclusions and recommendations.

What are the history and trends of the sizes, distribution, and relative health and diversity of salmonid populations in the Salt River Basin?

Findings and Conclusions:

- Limited fish surveys combined with anecdotal evidence suggests that coastal cutthroat trout populations within the Wildcat tributaries were abundant and have recently reached a historic low;
- Electrofishing in July and October 2005 revealed multiple young of the year coho salmon in Francis Creek through the City of Ferndale;
- Fish surveys of the mainstem Salt River in 1977 indicate the presence of coho, Chinook, and steelhead; however, their numbers were few compared with other sites in the Eel River Estuary at that time;
- Fish surveys of the mainstem Salt River in 1995 indicate the presence of Chinook and steelhead; however, their numbers were very few compared with other sites in the Eel River Estuary at that time;

- Fish surveys of the Wildcat Tributaries in 2003 and 2004 indicate that Francis Creek supports cutthroat and steelhead trout and Russ Creek supports cutthroat trout. There have been no salmonid observations in Williams Creek despite extensive sampling. No salmonids have been detected on Reas Creek although sampling efforts have been limited by access to private land;
- The Salt River cutthroat population represents the southern extent of the range of the coastal cutthroat trout species;
- It is unknown whether the cutthroat trout in the Salt River Basin are anadromous;
- Most recently, pikeminnow have been observed in all portions within the Salt River Basin with the exception of Russ Creek.

What are the current salmonid habitat conditions in the Salt River Basin? How do these compare to desired conditions?

Findings and Conclusions:

(**Instream Habitat)**

The Wildcat tributaries that historically supported salmonids (Williams, Francis, Reas, and Russ creeks) have been assessed for the quality of salmon habitat with the exception of Reas Creek:

- Based on CDFG target values, the amount of pool habitat, the average depths of pools, and the amount of pool shelter elements are unsuitable in Williams, Francis and Russ Creeks;
- The dominant pool cover type in Williams, Francis and Russ creeks is provided by small woody debris followed by undercut banks in Williams and Francis creeks and large woody debris in Russ Creek;
- There is a complete barrier to salmonids on Russ Creek, 500 ft upstream of Centerville Road, but there are resident cutthroat trout upstream of the barrier;
- There is a partial barrier to juvenile salmonids on Russ Creek at the Centerville Road culvert;
- Two culverts on Reas Creek present temporary or partial barriers for juvenile salmonids, and one culvert on Reas Creek presents a nearly complete barrier to juvenile salmonids and adult cutthroat trout;
- There are six tide gates in the Salt River Basin;

(Riparian Condition / Water Temperature)

- Water temperatures throughout the Salt River Basin are generally suitable for salmonids.
- Canopy density measurements from the Salt River Basin tributaries are generally suitable; however, the upper reaches of Williams Creek have less than suitable mean canopy density measurements and the conifer component of the shade canopy is low along all steams;

(Erosion / Sediment)

- Sediment deposition in the mainstem Salt River and its tributaries has reduced the availability and value of estuarine and freshwater habitats by the infilling of the channel and spawning gravels with sediment;

(Gravel / Substrate)

- Available data from the sampled Salt River tributaries indicate that Williams, Francis and Russ creeks do not have suitable spawning gravel;
- The potential of recruiting and retaining appropriately sized gravel from natural processes appears to be poor;

(Other)

- Farm wastes and effluent from the Ferndale waste water treatment facility present water quality problems related to nutrient enrichment;
- The Ferndale wastewater treatment facility has accumulated 241 known water quality violations since 1996.

What are the impacts of geologic, vegetative, fluvial, and other natural processes on watershed and stream conditions?

Finding and conclusions?

- Originally, the majority of the Salt River channel was maintained by tidal action;
- The Salt River Basin is located in a complex tectonic setting near the Mendocino Triple Junction, which has a high occurrence of earthquakes;
- The Wildcat tributaries are particularly prone to landslides due to the loosely consolidated nature of the Wildcat Sedimentary Rock Formation, steep slopes, close proximity to the Mendocino Triple Junction, and heavy winter rainfall;
- There is indication that the Eel River Delta is experiencing non-uniform subsidence; the average net subsidence rate was calculated to be 1 mm/ year in the north and 3.6 mm/ year in the south area;
- Rise in sea level in this region is assumed to be on the order of 1-2 mm/ year;
- The Salt River Delta is a depositional area and is affected not only by those forces within the Salt River Basin but also by the greater Eel River;
- The Salt River was adversely affected by the 1955 and 1964 floods. Much sediment was deposited upon the Salt River Delta and in the Salt River channel.

How has land use affected these natural processes?

Findings and conclusions?

- One of the first land use changes to occur on the Salt River Delta was agricultural conversion. In conjunction with reclamation activities, several dams were built across major sloughs. It is estimated that 2,900 acres of tidelands were converted into farmland by the end of the 19th century, and as a result of the levees and tide gates major slough channels have silted-in completely;
- Basin wide clearance of vegetation (timber harvest, agricultural conversion) from the Wildcat Hills and from the delta has changed the ecological character of the delta and destabilized hillsides in the Wildcat Hills;
- Human activities have interacted with natural geological instability to increase sediment production above natural background levels, although background levels remain indeterminate.
- Many of the impacts on instream habitat conditions are spatially and temporally separated from their upland disturbance sources, which makes the determination of cause and effect indeterminate;
- Eel River has the highest recorded average annual suspended sediment yield per square mile of any river of its size in the U.S;
- Great volumes of sediment, originating from the Wildcat tributaries, deposit in the depositional reaches of the tributaries and in the mainstem Salt River;
- Reas Creek channel has been modified and contained in levees from Centerville Road to its confluence with the Salt River. Additionally, the path of Reas Creek across the delta has been redirected and increased in length by 30%. These changes to Reas Creek affect the flow regime and sediment deposition patterns.
- The modified reach of Reas Creek transports flows that are laden with sediment, which have deposited in lower Reas Creek in the mainstem channel creating a sill, or a high point in the channel elevation;
- Sediment sills in the mainstem Salt River occur downstream of all the Salt River tributaries creating a channel that does not always slope downstream because of sediment accumulations. This process closed the river channel with sediment and redirected the flow of Coffee Creek in 1978 and then again at Williams Creek in 1998; which has essentially split the Salt River Basin into two separate watersheds due to the infilling of the mainstem channel;

- An earthen levee, built in the Grizzly Bluff region of the Salt River Delta in 1967 has eliminated the Eel River floodwaters up to the 10 year flood event. This action has likely contributed to a loss in periodic channel flushing in the eastern most reaches of the mainstem Salt River;
- There are at least six operational tidegates in the Salt River Basin. The specific effects of tide gates on fish passage, water quality, sediment deposition, and instream vegetation growth in the Salt River Basin are have not been quantified;
- The 1964 flood in the Eel River occurred following a post war logging boom in which timber harvests were conducted without regulation;
- The small diameter of near-stream trees limits the recruitment potential of large woody debris to most areas within the Wildcat tributaries and contributes to the lack of instream habitat complexity.

Based upon these conditions, trends, and relationships, are there elements that could be considered to be limiting factors for salmon and steelhead production?

Findings and conclusions?

Based off available information for the Salt River Basin, salmonid populations are being limited by:

- Instream sediment conditions in all portions of the Basin;
- Lack of available, appropriately-sized spawning gravel;
- Lack of habitat complexity throughout the basin;
- Lack of instream large woody debris in the Wildcat tributaries;
- Nuisance instream vegetation conditions in the mainstem Salt River;
- Decreased channel capacity in estuarine and freshwater channels;
- Competition with and predation by exotic pikeminnow;
- Current sediment conditions prevent fish passage to Williams Creek;
- Complete fish passage barriers in Russ Creek and Reas Creek;
- Several partial fish passage barriers in Reas Creek;
- Lack of estuarine channel complexity.

What watershed and habitat improvement activities would most likely lead toward more desirable conditions in a timely, cost effective manner?

Recommendation

Flow, Drainage and Water Quality Improvement Activities

- Re-establish mainstem Salt River from river mile 5.1 to 8.3 (Francis Creek to Coffee Creek), and improve channel conditions from river mile 3.4 to 5.1 (Reas Creek to Francis Creek) to improve drainage and allow access for salmonids;
- Restore estuarine habitat and estuarine wetlands from river mile 0 to 3.4 (confluence of the Salt River with the Eel River to Reas Creek).
- Removal or modification of tide gates and levees in the Salt River Basin for the purpose of improving fish passage, water quality, habitat diversity and channel flushing;
- Assess whether the re-introduction of the Eel River through the Leonardo levee is feasible;
- Improve coordinated planning efforts concerning drainage, wastewater treatment and development with the City of Ferndale;
- Re-introduce east side drainage into Francis Creek downstream of Port Kenyon Road;

- Implement Ferndale Drainage Master Plan;
- Establish a Market Street Drainage Plan;
- Obtain compliance at the Ferndale Wastewater Treatment Facility;
- Continue to implement dairy waste reduction plans and encourage the use of Best Management Practices for dairy waste management;
- Enhance and protect wetland areas and floodplain forests for the purpose of nutrient assimilation, flood storage capacity, sediment deposition and fish and wildlife enhancement;

Erosion and Sediment Delivery Reduction Activities

- Conduct an upslope erosion inventory in the Wildcat tributaries. Potential stream bank and road related sediment sources should be mapped and prioritized. Identified sites should then be treated to reduce the amount of fine sediments entering the stream;
- Design, install and maintain sediment basins on tributaries where sediment loads, stream alterations and infrastructure limit opportunities for restoring natural processes, such as lower Francis Creek;
- Encourage the use of Best Management Practices for all land use development activities to minimize erosion and fine sediment delivery to streams;
- Provide technical assistance and incentives to landowners/ managers in developing and implementing fine sediment reduction plans;
- Limit additional road building in the Wildcat Range.

Riparian and Habitat Improvement Activities

- Increase tidal influence (tidal prism) for the improvement of salmonid rearing habitat and for developing and maintaining channel structure;
- Replace or modify culverts or barriers that create fish passage problems;
- Where necessary, increase the canopy in the Wildcat tributaries by planting appropriate native vegetation like willow, alder, Sitka spruce and Douglas fir along the stream where shade canopy is not at acceptable levels. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects;
- Encourage the use of temporary riparian exclusion fencing where there is evidence of stream bank erosion caused by grazing of livestock;
- Where feasible, design and engineer pool enhancement structures to increase the number and quality of pools. This must be done where the banks are stable or in conjunction with streambank armor to prevent erosion;
- Suitable size spawning substrate in the Wildcat Tributaries is limited to a few limited areas. Projects should be designed at suitable sites to trap and sort spawning gravel;
- Improve fish habitat conditions in the trans-delta reaches of Reas Creek and Williams Creek.
    - Utilize set back levees for the improvement of flood control, riparian function and to establish channel meander and habitat diversity in the trans delta reach of Reas Creek;
- Enhance riparian protections for the improvement of ecosystem benefits;
    - Utilize USDA/ NRCS Wetland Reserve Program or Farm and Ranch Land Protection Program;

Education, Research, and Monitoring Activities

- Encourage and promote Salt River Advisory Group as the lead entity to help facilitate restoration funding efforts and monitoring activities;
- Improve educational and community outreach;
- Continue and expand water quality monitoring efforts of surface waters in the Salt River Basin to include a robust assemblage of water quality parameters;
- Conduct systematic assessment of biological resources in the Salt River Basin;
- Continue to monitor fish populations in the Eel River Delta and the Salt River system;
- Continue to monitor Salt River Basin salmonid habitat;
- Determine ownership boundaries along the Salt River within areas identified in alternative development;
- Analyze Salt River hydrology and hydrodynamics to include the estuary portion and portions of the Wildcat tributaries;
- Analyze Salt River geomorphology in the Salt River Basin;
- Conduct topographic mapping of the Salt River Delta;
- Analyze geomorphic change in the Salt River Basin to include analysis of changes in channel dimensions, sedimentation, channel location and shore lines over the past 130 years;

General

- Acquire conservation easements as an incentive for landowners to conserve and enhance habitat.

The Salt River Advisory Group (SRAG) has approved a framework approach for dealing with the multitude of problems in the Salt River Basin (**SEE APPENDIX A)**. The SRAG restoration framework has organized issues into six major goals which include:

- Improve watershed education, outreach and monitoring;
- Improve water quality conditions;
- Restore channel function and condition;
- Improve drainage and flood control functions;
- Improve and prevent point and non-point source water pollution;
- Enhance and protect fishery and wetland habitats.