



# County of Santa Cruz

## HEALTH SERVICES AGENCY

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### HEALTH SERVICES AGENCY ADMINISTRATION

January 10, 2013

Board of Supervisors  
County of Santa Cruz  
701 Ocean Street  
Santa Cruz, CA 95060

APPROVED AND FILED  
BOARD OF SUPERVISORS AGENDA: January 29, 2013  
DATE: 1/29/13  
COUNTY OF SANTA CRUZ  
SUSAN M. MARCELLO  
EXECUTIVE CLERK OF THE BOARD  
DEPUTY

**SUBJECT: County Water Resources Program Status Report**

Members of the Board:

This letter presents the annual status report on County water resource management activities for integrated regional water management, water supply, water conservation, stormwater management, water quality protection, and habitat restoration. Much of this work is coordinated with other departments and agencies through the Integrated Regional Water Management Program and other efforts.

### Water Resource Challenges in Santa Cruz County

Santa Cruz County continues to address major water resource challenges. Most of the groundwater basins are being pumped in excess of sustainable yield and the major water supply agencies do not have sufficient sustainable supplies to meet current and future demand. Historic salmon and steelhead populations have been greatly diminished by reductions in streamflow, increased erosion and sedimentation, barriers to migration, and removal of large woody material from streams. Coastal water quality has been degraded by urban runoff and leaky sewer systems. The natural benefits of wetlands, floodplains, riparian corridors, and groundwater recharge areas have been significantly diminished by development and agricultural use. The County and its partner agencies are conducting a range of successful efforts to address these and other water resource challenges.

### Integrated Regional Water Management

Most of the diverse water resource management issues in the county are interrelated and are being addressed through comprehensive, collaborative programs. Since 2005, the State has identified "integrated regional water management" as a key approach to addressing state and regional water supply and water management needs. This program has helped to further bolster the County's long-standing watershed management approach, bringing together water agencies, resource protection

agencies, and environmental groups to address water supply, habitat protection, water quality protection, flooding, groundwater recharge, stormwater management, and wastewater management in an integrated and comprehensive manner. County staff has been actively engaged in integrated regional water management in northern Santa Cruz County, the Pajaro Watershed, the Central Coast Region, and at the state level.

Santa Cruz Integrated Regional Water Management Program: County staff worked with the partner agencies in the County to develop and implement the Northern Santa Cruz Preliminary Integrated Regional Water Management Plan, which was adopted by your Board on December 13, 2005. In June 2006, your Board authorized entering into a memorandum of agreement with the other partner agencies. The region received a \$12.5 million Proposition 50 grant to allow partner agencies to implement a variety of projects (Attachment 1). The grant is administered by the Regional Water Management Foundation (RWMF), a subsidiary of the Community Foundation of Santa Cruz County. The County Water Resources Division Director serves on the three-person steering committee for the program and is also on the RWMF Board of Directors. During 2012, County staff worked with the other partner agencies to continue implementation of projects funded by the Proposition 50 grant, many of which are described in subsequent sections of this report. These projects are nearing completion with the overall grant wrapping up in June 2013.

The Regional Water Management Foundation recently received a \$999,750 Proposition 84 IRWM Planning Grant to prepare an updated IRWM Plan and to conduct several technical studies. The grant's components are listed in Attachment 1. This grant will build on the Proposition 50 efforts and result in an updated draft IRWM Plan in 2013. The technical studies will also be completed in 2013 and incorporated into the Plan. This effort will include outreach to current and new partners, stakeholders, and members of the public. A public meeting was held in August 2012 and at least two more are anticipated. After public review the updated Plan will be brought to your Board for adoption.

Pajaro Integrated Regional Water Management Program: County staff is also active in the Pajaro Watershed Integrated Regional Water Management Program. That effort covers the entire Pajaro Watershed and is being lead by Santa Clara Valley Water District, San Benito County Water District and the Pajaro Valley Water Management Agency. The Pajaro Region received \$25 million in Proposition 50 funding, which has funded flood hazard reduction (bench excavation), recycled water, improved irrigation and nutrient management, and other efforts. The Pajaro program also received a Proposition 84 planning grant to update the Pajaro IRWM plan and conduct additional technical studies. This includes a multi-purpose plan for College Lake to provide water supply, flood hazard reduction, and habitat restoration. The Resource Conservation District is leading the College Lake project with assistance from Environmental Health and Public Works staff.

Coordination with Central Coast and Statewide Efforts: The Santa Cruz Region and the Pajaro Region are both located in the Central Coast Hydrologic Region. Proposition 84

provides an allocation of grant funds by hydrologic region, with a total of \$48 million allocated to the Central Coast funding area. A total of nearly \$20 million has been awarded so far for planning and implementation grants in the Central Coast funding area, leaving approximately \$28 million remaining for subsequent rounds of funding. A second implementation grant solicitation is currently underway, but only \$7.5 million is available for the entire Central Coast area with this round. The Santa Cruz region anticipates applying for additional implementation funds during the third round in 2014 when the Plan is completed and more funds are available. The application process is extensive, and relatively expensive to complete.

Staff coordinates and shares information with the other 42 integrated water management regions throughout the state, and are actively engaged in statewide planning efforts. The Water Resources Division Director is engaged in the 2013 Update of the California Water Plan, serving on the Public Advisory Committee, the Finance Caucus, Water Quality Caucus and Central Coast Regional Forum. This is a good opportunity to ensure that local concerns are addressed in statewide planning efforts, policy development, and financing.

### **Water Supply**

Although the County is not a water supply agency, County staff work closely with the water and resource agencies to support their efforts through promotion of collaborative programs for conjunctive water management, water conservation, groundwater recharge, water quality protection, and providing adequate streamflow for water supply and fish habitat. The County also oversees 130 small water systems with 5-199 connections and all of the private well users. Small systems and individual users account for about 10% of the total county population and an estimated 20% of the total non-agricultural water use. Attachment 2 shows a breakdown of water use in the County for 2008, which is considered a more typical year than recent years. Water use in 2009, 2010 and 2011 was significantly lower due to a combination of factors including: 15% water use restrictions in 2009, cool wet summer and spring in 2010 and 2011, and the economic downturn with reduced business and visitor demand. Water use for 2012 has not been compiled yet.

**Pajaro Groundwater Management:** Groundwater overdraft and seawater intrusion in the Pajaro Valley is the largest single water issue in the county. The Pajaro Valley Water Management Agency (PVWMA) is addressing this issue through delivery of recycled water for irrigation in the coastal areas and development of an updated Basin Management Plan. County staff continue to support these efforts and participated in the Ad Hoc Basin Management Plan Advisory Committee, which developed recommendations for projects to include in the updated Basin Management Plan. The draft Plan was presented to the PVWMA Board in August 2012 for preliminary approval prior to initiating the environmental review process. It is expected that environmental review will take place during 2013, followed by Plan adoption and development of a proposed rate structure for approval by the land owners to fund implementation of the Plan. Staff are also actively participating in the Community Dialog on Water in the

Pajaro Valley, which is a community group seeking to organize and support local solutions to the groundwater overdraft. This group is actively looking at the potential for on-farm recharge projects, water conservation, land fallowing, and larger projects to increase water supply. The group estimates that they should be able to reduce agricultural water use by 10-20%. This reduction, in conjunction with the projects included in the Basin Management Plan update, should bring water use in the basin into balance with long term sustainable yield.

Santa Cruz City Water Supply: Santa Cruz City is the largest single water supplier in the County, supplying a population of 95,000. Thirty-five percent of the City's water customers reside outside the City limits. The City is unique among the county water agencies in that 96% of its water supply comes from streams and reservoirs. Although the City has ample water in normal years, during a drought streamflow is much diminished and the available supply is 12% less than current normal demand, requiring short term curtailment of use. This shortfall is expected to worsen to 37-48% during dry years as a result of pending requirements from the resource agencies for the City to reduce the amount of water it takes from streams in order to support the recovery of threatened and endangered fish species through a Habitat Conservation Plan.

The City has implemented a very successful water conservation program and has seen long term water use drop significantly since 2000 despite the growth in new connections in that same time period. However, past successes limit the potential for future additional conservation and the City is not presently counting on further demand reductions until they can complete an assessment of the remaining opportunities for additional conservation. The City's adopted 2011 Urban Water Management Plan projects an increase in demand, although significantly reduced from previous projections. The City is completing their baseline water conservation study which will help identify opportunities for further demand reduction through their updated water conservation plan, which will be prepared in 2013.

The City is striving to complete negotiations with the resource agencies to confirm the expected future reduction in stream water supply and changes in operation of the City system. Recent correspondence from the agencies has requested even further reduction of stream use than the City had previously anticipated. The City is working with Soquel Creek Water District to develop a desalination plant as a supplemental supply to reduce the severity of drought year curtailment, as described below.

As your Board is aware, an application is being considered by the Local Agency Formation Commission (LAFCO) to allow the City of Santa Cruz to expand its sphere of influence and provide extraterritorial water and sewer service to the north campus area proposed for future development in the University of California Santa Cruz's long range development plan. In 2011, LAFCO adopted new water policies requiring new application to demonstrate that it would not cause an increase in water demand. To achieve policy compliance, the University and City have agreed that the University will pay into a water conservation fund to implement water conservation measures among existing users to offset any additional new demand from the University expansion. The

University has also implemented a number of on campus water conservation programs, reducing demand by over 30%. Further action has been delayed by a recent court decision regarding the environmental impact report's adequacy.

Mid-County Groundwater Management: In 2012, Soquel Creek Water District completed updated groundwater recharge and basin yield studies and estimates that current pumping amounts will need to be reduced by over 1500 acre-feet per year in order to address the current groundwater overdraft in the basin. Total pumping will be reduced in the long term as the District implements more demand reduction measures and develops a supplemental supply. County staff continue to be active participants in the Soquel Groundwater Basin Advisory Group and the Soquel Aptos Groundwater Management Authority. The District has begun implementation of their Well Master Plan, which provides for up to five new municipal wells that will reduce the threat of seawater intrusion by shifting pumping further inland from the coast. The District has completed the first new well project which involves the conversion of the irrigation well at Polo Grounds County Park into a municipal well, and has drilled the new O'Neil well at the end of 41<sup>st</sup> Avenue.

SCWD<sup>2</sup> Desalination Project: The Santa Cruz Water Department and Soquel Creek Water District (combined as SCWD<sup>2</sup>) are pursuing a joint effort to develop a desalination facility in order to address the significant shortfall in sustainable supply that both are experiencing. The facility would serve Santa Cruz during the summer during drought years and serve Soquel the remainder of the time. Many years of planning efforts by both agencies identified desalination as the most feasible supplemental supply and they are pursuing development of 2.5 million gallon/day facility by 2017. They have completed preliminary designs, pilot testing, evaluation of intake alternatives, and a water quality assessment. They are now conducting the environmental review process and are completing an evaluation of energy supply alternatives in order to minimize any new generation of greenhouse gases. The environmental impact report should be made available in spring of 2013.

This effort has created considerable discussion in the community regarding the need for the facility and whether or not additional water conservation, water exchanges and other measures could be implemented instead. While some of the current water needs can be met through increased conservation and water exchange, it does not appear that they would provide enough water to reliably meet immediate drought needs or to ensure a rapid enough recovery of the Soquel-Aptos groundwater basin to adequately address the threat of seawater intrusion. The water agencies are assessing the amount of further curtailment that would be required if a desalination plant is not built. Actions by the City Council and the voters will require approval by City voters prior to initiating construction of the plant. The Soquel Water District Board is also considering putting a ballot measure before their voters.

Conjunctive Water Management (Water Exchange): Conjunctive water use involves multiple water sources, usually both surface and groundwater sources, in a way that maximizes water storage and availability under different climatic conditions. This can

involve exchanges among water agencies of winter streamflow, summer groundwater, recycled water, and water from desalination. Conjunctive use can provide for increased water supply reliability, increased groundwater storage, reduced summer stream diversions, and increased summer stream flows. In Santa Cruz County conjunctive use would require connections between separate districts because each is dependent upon a single source of water (i.e. either surface or groundwater).

County staff coordinated a Proposition 50 funded effort to identify the best approaches for conjunctive use and increased groundwater storage in the Lower San Lorenzo Watershed. County staff also evaluated the potential feasibility and benefits of interties and water exchanges among all the water agencies in northern Santa Cruz County. The study found that in most years there is excess water available in the San Lorenzo River that could meet most of the winter needs of the Scotts Valley area, and an average of 30% of the winter needs for Soquel Water District, allowing the groundwater basin to rest and recover to some extent in both areas.

County staff is working with the agencies to further develop this approach with the use of funds from the Proposition 84 IRWM grant. Operation studies that confirm the availability of excess water from the City system during the winter are complete. Further operation studies are underway to evaluate additional scenarios that could involve various infrastructure improvements. Work is also being done to verify that there will be no significant fishery impacts from this effort. This work is being done through an agreement with the City of Santa Cruz, approved by your Board on November 20, 2012. Your Board also approved an agreement for legal services to evaluate the various water rights options to proceed with water exchanges. Additional work remains to evaluate the potential costs of treatment plant upgrades and other infrastructure improvements needed to implement the various options. This work is expected to be completed by June 2013, with recommendations to be presented for proceeding with the various efforts need to implement water exchanges.

Recycled Water Use: The Scotts Valley Water District has used Proposition 50 funds to further extend their recycled water distribution system. Recycled water now accounts for 10% of the water use in the district, leading to further reductions in groundwater pumping. A project is also being pursued for Scotts Valley to provide recycled water to the Pasatiempo golf course. This would reduce the summer demand for potable water supply from the City of Santa Cruz. The City of Watsonville and Pajaro Valley Water Management Agency brought their recycled water project online in March 2009, and delivered 2340 acre-feet of recycled water to coastal farmers in 2012. The draft Basin Management Plan includes recommendations to increase the use of recycled water to at least 4000 af/yr. Soquel Creek Water District and the City of Santa Cruz have investigated various alternatives for use of recycled water, but they generally are not economically or technically feasible at this time. There is also resistance to the use of recycled water on agriculture lands in the north coast state parks. It is expected that recycled water use will become more feasible in the future.

Groundwater Recharge: A key County work plan element is to promote groundwater recharge protection and restoration in critical areas of the county. County staff led a Proposition 50 funded effort to design and install demonstration projects to restore groundwater infiltration from parking areas at the Polo Grounds Park, Brommer Street Park and the new Scotts Valley Library. A modified project was installed at the Scotts Valley Library site using City funds, and two separate recharge facilities were installed at Polo Ground park. Experience gained from this project have helped promote additional projects and programs that are a part of the County and Scotts Valley stormwater programs to reduce the effects of increased runoff from existing and new development. Restoring groundwater recharge capabilities has been identified as one of the most cost-effective methods to increase water supply in the Scotts Valley area where at least 500 acre-feet per year of groundwater yield has been lost as a result of covering recharge areas with impervious surface. County staff worked with partner agencies to secure a Proposition 84 Stormwater Management grant that will fund the installation of additional recharge projects at Brommer Street Park, Heart of Soquel and Scotts Valley. The County's new runoff and pollution control ordinance and stormwater design criteria will also result in more use of projects for stormwater infiltration.

Well Monitoring Program: In 2010, the State enacted legislation requiring groundwater level data submission for all groundwater basins in the State (California Statewide Groundwater Elevation Monitoring). Local water agencies agreed that the County should be the reporting entity for all the groundwater basins in the county. This has involved compiling monitoring data from the individual agencies for submittal to the state, with some additional monitoring efforts to fill in gaps in the reporting network. This has been done relatively easily as an expansion of the County's current voluntary groundwater monitoring program with private well owners in the Soquel-Aptos groundwater basin. County staff prepared and submitted the coordinated monitoring plan to the state and submitted groundwater level data in spring and fall of 2012.

Abandoned Wells: Improperly abandoned wells can serve as conduits for contaminants to move into critical water supply aquifers. As a part of the Prop 50 IRWM grant, County staff implemented a program to identify and provide cost-sharing for proper destruction of 18 wells in the Scotts Valley, Lompico, and Soquel-Aptos areas.

Other Technical Assistance to Water Agencies: County staff also provide other technical assistance to water agencies in the form of report review and analysis of geologic information regarding the underlying structure of groundwater basins. Technical work by the County water resources geologist has lead to a much better understanding of the geologic structure and the storage and movement of water in the basins underlying Scotts Valley and Soquel.

Climate Change: County staff utilized the Prop 50 IRWM grant to fund a study by the U.S. Geological Survey to evaluate the projected impacts of climate change on water resources in Santa Cruz County. This work was completed in 2012. It is projected that groundwater recharge amounts will be reduced by 30% by 2100. This will reduce water available for water supply as well as reduce natural streamflows available for fish.

Climatic water deficit will increase which will increase the demand for irrigation water. Dry seasons are expected to last longer and droughts will become more frequent and severe. Rainfall will become more variable with the potential for more extreme storms and flooding. Staff is also evaluating the potential impacts of sea level rise and more intense winter storms on coastal infrastructure and resources. All of this information will be addressed in Plan development and will be incorporated into the IRWM Plan update and the County's Climate Action Strategy.

### **Water Conservation**

Santa Cruz County water agencies have some of the most effective water conservation programs in the state, with many of the agencies already meeting the adopted state conservation requirements for 2020. The County has contributed staff time and funding to collaborative water conservation efforts, including media advertisement, distribution of educational materials and workshops.

County Water Conservation Measures: The County Code already includes some water conservation requirements for retrofit with water conservation devices at time of property sale and prohibition of water waste in the Soquel and Santa Cruz water service areas. Staff have developed a draft code revision to update and expand the County's water conservation measures, including the creation of a water conservation impact fee that would be applied to new development to mitigate the additional water demand and fund programs to reduce existing water use in areas where agencies are not currently funding toilet rebates and other water conservation programs. This package has been reviewed by the water agencies and County Counsel, but addressing all of their concerns and bringing it forward for adoption was delayed by other work efforts. A final version was reviewed by the Water Advisory Commission in December 2012 and staff expects to bring it to your Board in the spring of 2013.

Water Efficient Landscape Ordinance: In 2009, the State updated its model water efficient landscape ordinance, requiring that local jurisdictions either implement that ordinance or adopt an equivalently effective local ordinance as the model ordinance by January 1, 2010. The State did not release the model ordinance until October, 2009, which did not provide enough time to develop a local approach by that deadline. New ordinances have been adopted for the City of Santa Cruz service area and the Soquel Creek Water District. County Planning Department staff has completed a County ordinance which has been reviewed by the water agencies, stakeholder groups and the Water Advisory Commission. This will be brought to the planning Commission and your board during 2013. In the meantime, water efficient landscaping has been required in much of unincorporated areas pursuant to State requirements and the local regulations within the water service areas of the City of Santa Cruz, City of Watsonville, and Soquel Creek Water District.

Greywater Reuse: In August 2009, the State amended the plumbing code to allow the use of residential greywater irrigation systems to reduce the use of potable water. County Planning and Environmental Health staff worked with the local Greywater



Alliance to establish procedures and educational materials and conduct trainings for use of greywater irrigation systems in a way that is protective of public health and safety and the environment. Environmental Health staff are now reviewing proposals and conducting inspections to assist the City of Santa Cruz and Capitola Building Departments to implement the program within the Cities. At this point, only a limited number of greywater systems have been installed, even though some of the water agencies offer rebates for greywater system installation.

### **Stormwater Management and Water Quality Protection**

**Stormwater Management:** Stormwater management plans for the County and other jurisdictions within the county were approved by the State Regional Water Quality Control Board in 2009. The third annual report of County implementation activities was submitted to your Board on September 11, 2012. Public Works, Planning, and Environmental Health worked together to complete the draft Runoff and Pollution Control Ordinance, Stormwater Construction Best Management Practices Manual and updates to the County Design Criteria for stormwater management, which were adopted by your Board on March 6, 2012. County staff are continuing to work with the Regional Water Quality Control Board on the implementation of requirements for Low Impact Development to address the impacts of hydromodification and Health Services Agency (HSA) Environmental Health Services (EHS) staff are serving on a subcommittee organized by the California Stormwater Quality Association (CASQA) to work with the State Water Resources Control Board in development of new monitoring requirements under the State's new Phase 2 General Stormwater Permit, Ocean Plan and other requirements. It is an ongoing effort to influence the state to adopt requirements that are effective and relevant and not unduly onerous and wasteful of local resources.

**Stormwater Grants:** The State Water Resources Control Board is making Proposition 84 funds available for stormwater management. County staff worked with Ecology Action of Santa Cruz to receive a \$697,170 grant for a Monterey Bay Regional Low Impact Development Planning and Incentives Program. Ecology Action will work with the local agencies, businesses, and property owners to promote low impact development measures to reduce stormwater runoff and pollution. County staff also coordinated efforts and will be the lead for a stormwater implementation grant of \$2,483,157 to implement various recharge and low impact development projects in Scotts Valley, Soquel, Live Oak and Santa Cruz. Your board authorized submittal of this grant application on June 26, 2012. It is expected that the grant documents will be brought to your Board for approval in early spring 2013.

**Beach Water Quality:** County staff continue to work with the State, City of Santa Cruz, City of Capitola, and the Sanitation District to implement projects and conduct monitoring to reduce bacterial contamination and improve beach water quality. Environmental Health completed effectiveness monitoring, analysis and reporting for these projects. EHS staff continue to make good use of new laboratory quantitative polymerase chain reaction (QPCR) equipment which determines the extent to which high bacteria levels are actually caused by human contamination. Staff continue to work

with the cities and other researchers to evaluate the effects of kelp, birds, sea lions and other potential sources. Staff is also actively involved in state-wide beach water quality groups looking at new methods for assessment of beach water quality and source assessment. The Water Resources Division Director is on the State Clean Beach Task Force, which recently approved grant funds for sewer and other infrastructure improvements to improve beach water quality in Capitola and Cowell Beach.

Sediment Monitoring: Staff completed a Prop 50 grant funded program of sediment monitoring in the San Lorenzo, Soquel, Aptos, and Corralitos watersheds. This program provided information on the sources and effects of excessive erosion and sedimentation, the most significant water quality impact in the county. 2010 and 2011 were relatively normal winters and some elevated fine sediment movement was observed in the streams draining the Summit Fire area. In other areas the amount of sediment transport appears to be significantly reduced from historical levels.

Septic System Management: Environmental Health staff maintain ongoing efforts for water quality protection through septic system management, monitoring and investigation, funded by CSA 12. Staff is currently preparing the triennial status report to the State on the San Lorenzo Wastewater Management Program and overall county wastewater management efforts. In 2012, staff continued to be actively involved with the State Water Board, Regional Water Board and other county environmental health directors in the development of a new version of statewide septic regulations, pursuant to AB 885. A number of modifications were made in response to staff comments and the policy was adopted by the State Board on June 19, 2012. The county has up to five years to bring its program into compliance with the new regulations, but staff anticipates that this will occur in the next two years. It is not expected that major changes will be required, but staff will be preparing a set of amendments to the sewage disposal ordinance. Staff will work with the Onsite Sewage Disposal Technical Advisory Committee on the changes prior to bringing them to your Board for consideration.

Other Water Quality Protection Efforts: Staff continue to review land use proposals and proposed timber harvests to ensure that adequate water quality protection measures are included. Staff also review and evaluate manure management plans for existing and proposed horse operations and work closely with the Resource Conservation District and Ecology Action on the Livestock and Land program, which promotes improved water quality protection with livestock owners. Staff is working with City of Watsonville to evaluate problems at Pinto Lake related to accumulated pesticides in the sediment and growth of blue-green algae which releases toxins to the lake.

### **Habitat Improvement and Integrated Watershed Restoration**

FishNet 4C: FishNet 4C (FishNet) is a county-based salmonid protection and restoration program that brings together the six California Coastal Counties of Mendocino, Sonoma, Marin, San Mateo, Santa Cruz, and Monterey. FishNet has been a successful forum for supporting salmonid conservation in these counties. Supervisor Mark Stone represented the County on the steering committee from 2003 to 2012. In

2001, FishNet completed a study of all county programs and policies and made recommendations to improve salmonid habitat protection (Harris et al., 2001). The County of Santa Cruz approved a FishNet Implementation Plan in 2001 that detailed local actions that grew out of these general recommendations. The Implementation Plan ran from 2001 to 2009 and resulted in positive program changes and projects in Planning, Public Works, Parks and EHS. Three significant projects were the adoption of the County Road Maintenance Manual (2004), the Integrated Vegetation Management Program for County roads (2009), and an effort to address fish passage at County road crossings (2002). In 2013, FishNet will no longer have a staff position, which will reduce their presence and connection to state and federal recovery processes, but the steering committee plans to meet biannually to share current projects and address challenges.

Fish Passage Program: A program to address fish passage at high priority county road stream crossings and structures grew out of the FishNet 4C recommendations and the interest of state and federal resource agencies. The County has now completed this program and has no immediate plans to address fish passage at other locations. Between 2002 and 2012, ten high and moderate priority projects were completed to address fish passage at county facilities. The last project involved the removal of a sewer line across the bed of Aptos Creek at Spreckels Drive. This project was funded by the Resource Conservation District with IRWM Proposition 50 funds.

Large Woody Material Management Program: Your Board approved a new policy on March 3, 2009, to retain more large woody material in county streams to improve habitat for fish and other aquatic species. EHS works in cooperation with Public Works to implement the new policy with good success. Requests from property owners for county action to remove large wood were lower in 2011 and 2012 than in 2010. In 2012, 12 requests for assessment were received from property owners, with four log jams ultimately being modified. Educating property owners on the benefits of large woody material is an important aspect of the program (Attachment 3).

Fish Monitoring: County staff continued to coordinate the Santa Cruz County Juvenile Salmonid and Stream Habitat Monitoring Program in partnership with local water agencies. The primary goals of this monitoring program are to track salmonid population levels and habitat conditions, prioritize restoration and conservation efforts, provide permitting and project monitoring data, and inform land and water use decisions. The health of salmonid populations is one of the key indicators of the success of watershed and water resource management efforts.

Densities of juvenile steelhead fluctuate year to year based on adult migration, storm patterns which affect egg and juvenile survival, and dry season rearing conditions including flow and cover habitat. Since 2009, steelhead densities in San Lorenzo and Soquel show a decreasing trend that may signal increase risk for these populations. Aptos and Corralitos steelhead densities show variation but no decreasing trend. Coho salmon are rarely observed and are at high risk of extinction in Santa Cruz County. A summary of the monitoring effort is presented in Attachment 4.

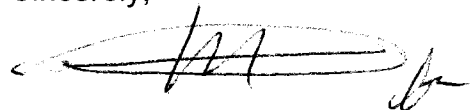
Coho and Steelhead Recovery Plans: The National Marine Fisheries Service released the final Coho Salmon Recovery Plan in September 2012. The plan included extensive detailed recommendations to support the recovery of this critically endangered species in Waddell Creek, Scott Creek, San Vicente Creek, San Lorenzo River, Soquel Creek, Aptos Creek, and streams to the north of Santa Cruz County. County staff is participating in the Priority Action Coho Team (PACT) that is identifying key actions for immediate implementation to prevent the extinction of Central California Coast Coho Salmon. A draft South-Central California Steelhead Recovery Plan is out for public review which covers steelhead in the Pajaro River Watershed. County staff also reviewed and commented on drafts of the Recovery Plan for Central California Coast Steelhead, with the public review draft expected for release in 2013.

### Conclusion and Recommendation

County staff is working closely with other partner agencies to provide an effective, comprehensive and integrated approach to water resources management in the County resulting in an unprecedented number of collaborative projects to address significant water resources issues. Further successful efforts are anticipated in the coming year.

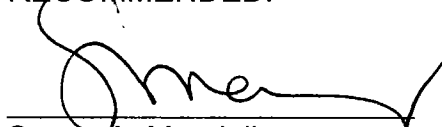
It is, therefore, RECOMMENDED that your Board accept and file this report on County water management activities and direct the Water Resources Division Director to provide an updated annual report in January 2014.

Sincerely,



Giang T. Nguyen  
Health Services Agency Director

RECOMMENDED:



Susan A. Mauriello  
County Administrative Officer

Attachments:

1. Integrated Regional Water Management Grant Projects, Santa Cruz Region
2. Water Use in Santa Cruz County
3. Large Woody Material Management Program Summary Report
4. Juvenile Salmonid and Stream Habitat Monitoring Program Report

cc: Public Works Department  
Planning Department  
Environmental Health  
Water Advisory Commission  
Water Agencies  
LAFCO

**Attachment 1:****Integrated Regional Water Management Grant Projects, Santa Cruz Region**

Following is a listing of the components funded by the Proposition 50 IRWM Implementation grant from 2008-2013, the responsible partner agency, and the current grant amount:

1. Overall Project Administration: Regional Water Management Foundation, \$758,000
2. Abandoned Well Destruction, County Environmental Health Services, \$355,000
3. San Lorenzo/Scotts Valley Conjunctive Use, County Environmental Health Services, \$227,500
4. Aptos Watershed Drainage Master Plan, County Public Works Department, \$227,500
5. Stormwater Pollution Prevention, County Public Works Department, \$207,500
6. Groundwater Recharge Projects and Policies, County Environmental Health, \$332,500
7. New Brighton Sewer Line Relocation, County Sanitation District, \$1,365,000
8. Desal Project Intake Study, Soquel Creek Water District/City of Santa Cruz, \$611,000
9. Polo Grounds Well, Treatment Plant, and Water Conservation Element; Soquel Creek Water Dist. and County Parks; \$2,065,295
10. Polo Grounds Monitoring Well, Soquel Creek Water District, \$150,000
11. Davenport Drinking Water Treatment, Davenport County Sanitation District, \$334,393
12. Watsonville Sloughs Restoration, Resource Conservation District, \$690,000
13. Integrated Watershed Restoration Program, Resource Conservation District, \$3,825,000
14. Recycled Water Pipeline Extensions, Scotts Valley Water District, \$705,705
15. Coordinated Monitoring, County Environmental Health Services, \$350,000
16. Improve Integration of Water Management, County Environmental Health Services, \$295,607

Following are the components of the \$999,750 Proposition 84 IRWM Planning Grant. (the lead agency for each task is shown in parentheses):

1. Update the IRWM plan framework, including governance, financing, relation to land use planning, and stakeholder involvement, County Environmental Health, \$14,000
2. Provide improvements to the IRWM Plan, including updated objectives, management strategies, projects, project prioritization and effectiveness assessment, data management, and performance evaluation, County Environmental Health, \$120,000
3. Develop a climate change strategy relative to water resources and water facilities, County Environmental Health, \$31,500.
4. Evaluate the potential to increase pumping in the eastern Purisima Formation in order to reduce pumping from the overdrafted Aromas formation, Central Water District, \$200,000
5. Update the Santa Margarita Groundwater Model, Scotts Valley Water District, \$221,519
6. Develop detailed recommendations for conjunctive use and water transfers, County Environmental Health, \$164,500
7. Develop a hydrologic and hydraulic model of the middle and lower Watsonville Slough system to support future management and enhancement efforts, Resource Conservation District, \$199,056
8. Administer and manage the Grant, Regional Water Management Foundation, \$49,175

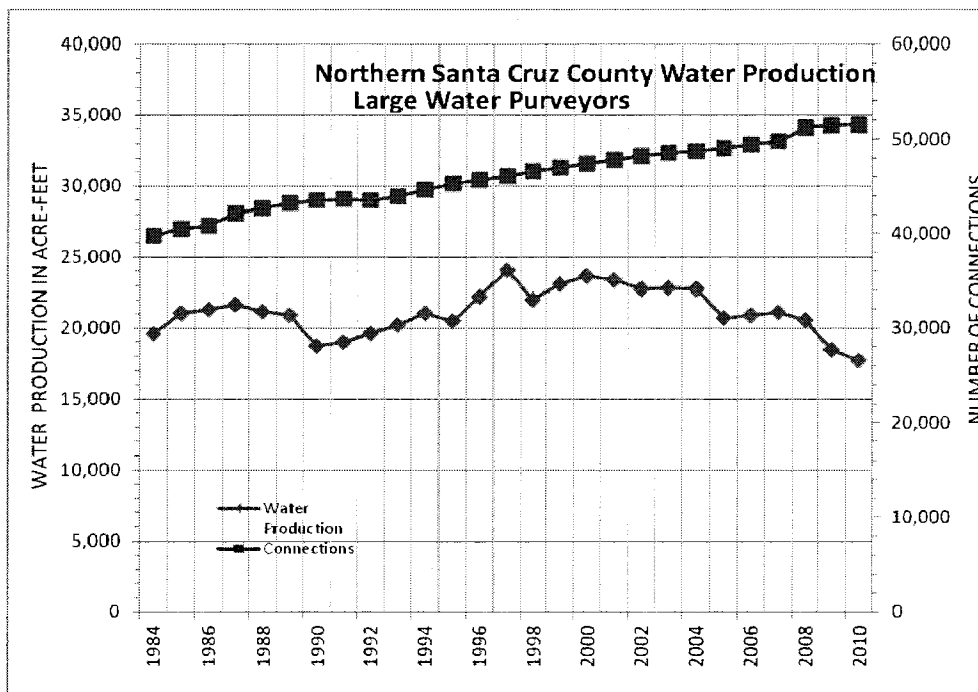
## Attachment 2: Water Use in Santa Cruz County

Water Supplier	Connections	Population	Water Use acre-feet/yr	Ground water	Surface Water	Recycled Water
Santa Cruz City Water Dept.	24,300	95,000	11,054	4%	96%	
Watsonville City Water Dept	15,000	63,700	7,960	89%	11%	
Soquel Creek Water District	15,000	49,000	4,795	100%		
San Lorenzo Valley (SLVWD)	6,085	19,000	2,026	66%	34%	
SLVWD-Felton	1,300	4,000	450		100%	
Scotts Valley Water District	3,600	11,300	1,640	90%		10%
Central Water District	800	2,700	583	100%		
Lompico Creek Water District	500	1,300	83	30%	70%	
Big Basin Water Company	580	1,500	240	15%	85%	
Mount Hermon Association	530	1,400	250	100%		
Forest Lakes Mutual Water Company	330	900	140	100%		
Smaller Water Systems (5-199 conn.)*	3,000	8,000	1,800	95%	5%	
Individual Users*	8,000	20,000	5,000	95%	5%	
Pajaro Agriculture (SC Co only)**			27,200	94%	1%	5%
Mid- & North-County Agriculture*			2,400	75%	25%	
<b>Totals</b>	<b>79,025</b>	<b>277,800</b>	<b>65,621</b>	<b>78%</b>	<b>20%</b>	<b>2%</b>

Estimate made in May 2010, water usage data from 2008, some updates to reflect current conditions

\*Values are Estimates

\*\*Ag water use on the Monterey County side of the Pajaro Basin, was 22,500 AF in 2008



## Large Woody Material Management Program Summary Report 2011-12

December 14, 2012

Prepared by Kristen Kittleson, Fishery Resource Planner  
Environmental Health Services

This report provides a summary of activities from October 1, 2011 to September 30, 2012 relative to implementation of the policy for removal of large woody material in streams. This policy was adopted by the Board of Supervisors on March 3, 2009 and is intended to maintain large woody material in streams to enhance habitat value to the greatest extent possible unless there are immediate threats to public safety, public infrastructure or aquatic habitat. Efforts included immediate response to reports of potential hazards, work to obtain necessary programmatic permits for modification of large woody material when that is justified under county policy, and outreach to the public regarding the importance of maintaining large woody material.

### Response to Reports

The following table provides a summary of the Large Woody Material Management Program from October 1, 2011 (start of the water year) through September 30, 2012. Public Works and Environmental Health Services received 12 service requests during this time period, which was the same number as the previous year.

### **2012 Summary**

<b>Large Woody Material Management Program Summary</b>	
<b>Total number of service requests Oct. 15, 2011 – October 14, 2012</b>	<b>12</b>
County responded by cutting large woody material	4
Staff determined that no immediate modification was needed	7
Large woody material sites that are being monitored	2
Monitored sites being considered for modification	0
Large woody material cut by property owners without authorization	1
Large woody material cut by property owners after county cut part of log jam	1

Of the 12 service requests, the County cut up large woody material at 4 locations:

- In one, a log was jammed into a county-maintained fish ladder. The wood needed to be cut and removed so that the fish ladder would function properly.
- In one case, a large alder tree spanning Soquel Creek was trimmed to remove the upward branches and minimize additional wood from being caught. Unfortunately, the property owner across the creek was not contacted and he cut up more of the tree following the county's work.
- In two cases, a fallen tree and a small debris jam were modified on Corralitos Creek. This stream reach does not provide summer rearing habitat and it has been determined that it's better to eliminate large woody material that could scour pools and encourage large steelhead juveniles to stay into the dry season before the creek dries out.
- In one case, a logjam on the same area of Corralitos Creek was cut up by the property owners before the site could be assessed by the Fishery Resource Planner. However, the logjam is in an area where the County would have at least modified the logjam.

During the 2011-12 winter season, no private or public property was damaged by leaving large woody material in the stream. The large woody material provided habitat benefits in at least 4 of the 12 cases: Habitat benefits included:

- High flow refuge for juveniles and adults.
- Scour for improved pool habitat
- Cover habitat (predator protection) for juvenile rearing habitat
- Habitat complexity



## 2012 Summary Report on the Juvenile Salmonid and Stream Habitat Monitoring Program

*Prepared by: Kristen Kittleson, Fishery Resource Planner  
County of Santa Cruz Water Resources Program  
January 10, 2012*

### Summary

The Juvenile Salmonid and Stream Monitoring Program provides valuable data on local steelhead and coho salmon juvenile densities and stream habitat conditions in four watersheds – San Lorenzo, Soquel, Aptos and Corralitos. Seven local agencies collaborate to fund and direct the program, which is administered by the County of Santa Cruz.

Steelhead are listed as threatened under the federal Endangered Species Act (ESA). Coho salmon are listed as endangered under state and federal ESAs and are at high risk of extinction in both San Mateo and Santa Cruz counties. The data collected in this monitoring effort has already played an important role in shaping recovery recommendations; future data will help track and evaluate these essential conservation efforts. These data can be used to track steelhead and coho salmon spawning and rearing habitat conditions, prioritize restoration and conservation efforts, and inform land and water use decisions. This information can provide habitat and juvenile salmonid (steelhead and coho salmon) density information for permitting and monitoring restoration and public works projects. In addition, these data support an understanding of local population dynamics, which help focus and track conservation efforts.

Based on the significant findings described in this report, conservation efforts should focus on increasing dry season streamflow, providing winter refuge habitat for juveniles through protection of instream large woody material and increase efforts for riparian and watershed protection through existing and improved ordinances, policies and programs.

### Introduction

This summary report describes current understanding of local steelhead and coho salmon juvenile density patterns in four Santa Cruz County watersheds: San Lorenzo, Soquel, Aptos and Corralitos. This report describes significant findings based on the past 6-15 years of data (depending on the watershed), consultant reports, and current scientific research. Current conservation priorities are discussed in the recommendations.

Steelhead trout (*Oncorhynchus mykiss*) occur in most Santa Cruz County streams. The steelhead population is very low compared to historical numbers

and is listed as threatened under the Federal Endangered Species Act (ESA). The San Lorenzo, Soquel and Aptos watersheds support steelhead that are part of the Central California Coast Distinct Population Segment (DPS). A federal recovery plan for this population is in development. In a 2011 status review, NOAA Fisheries determined that CCC steelhead are at moderate risk of extinction both because of a low population size which is more vulnerable to random events and because habitat conditions have not substantially improved since 2005. The Corralitos watershed is part of the South-Central California DPS; a draft Recovery Plan identifies the Pajaro River and tributaries as a Core 1 Priority Watershed.

Coho Salmon (*Oncorhynchus kisutch*) occur in just a few of their historical streams and are listed as endangered under both the state and federal ESAs. Coho salmon are critically endangered in Santa Cruz County. Six Santa Cruz County watersheds are considered priority watersheds to prevent the extinction of coho salmon south of San Francisco Bay. National Marine Fisheries Service (NOAA Fisheries) aims to recover coho salmon in the San Lorenzo, Soquel and Aptos watersheds, with the San Lorenzo playing a potentially key role in recovery due to its size. Waddell, Scott and San Vicente watersheds are also priority watersheds. The coho salmon captive broodstock program supports the population in Scott Creek and may be used in the future to support coho in other watersheds. The captive broodstock program raises coho salmon in captivity until maturity.

Understanding local patterns of steelhead and coho salmon juvenile densities can help identify conservation efforts that will be the most effective for increasing salmonid populations. While there is a considerable body of knowledge about salmonids in general, fish respond to local conditions to create unique patterns of distribution with specific limiting factors. Local conditions include geology, watershed flow dynamics and land use. In addition, the year-to-year variability in both ocean and stream conditions creates year-to-year variability in juvenile densities. Annual monitoring is able to capture this variability while tracking long-term trends. More sporadic sampling would be unable to distinguish between this variability and long-term trends.

This monitoring program is funded as a collaborative effort between the County of Santa Cruz and six local agencies that include San Lorenzo Valley Water District, City of Santa Cruz Water District, Scotts Valley Water District, Soquel Creek Water District, City of Capitola, and the City of Watsonville (see Table 1). This partnership creates a cost-effective program for collecting juvenile salmonid and habitat data in multiple watersheds.

Both NOAA Fisheries and California Department of Fish and Game (CDFG) are very supportive of this monitoring program and have recently begun to serve on the report review team. Data from this monitoring program assist CDFG and NOAA Fisheries in permitting and recovery planning efforts. In return, this

program benefits from new research conducted by the NOAA's Southwest Fisheries Science Center in Santa Cruz that conducts research on Scott and San Vicente creeks on the north coast. In the future, CDFG may collect additional data on adults or outmigrating juveniles, which will contribute to our understanding of local populations.

The fishery consultant team, D.W. ALLEY & Associates, has been conducting the monitoring program under partner funding since 2006. The principal, Don Alley, has over 30 years of experience sampling salmonids and interpreting data in Central Coast streams and has conducted work in local watersheds since 1981. H.T. Harvey & Associates sampled the San Lorenzo Watershed in 2002 for the City of Santa Cruz. D.W. ALLEY & Associates produces an annual report that is available at the Water Resources website

### **Life History**

Steelhead and coho salmon exhibit a complex life history influenced by dynamic factors in both freshwater and marine environments. The following description summarizes their life history and highlights some of the factors that are discussed later in the report.

Steelhead. Adult steelhead migrate upstream from the ocean during the rainy season, anytime from November to March. Steelhead and coho salmon enter local streams only when sufficient streamflow has opened coastal lagoons through which the stream drains to the ocean. Steelhead spawn (mate and lay eggs) in gravel riffles throughout the watershed. Both eggs and newly hatched fish – called alevins – must survive subsequent winter storms that can scour or transport fine sediment that can smother redds (egg nests). When fry emerge, they seek slow-water areas, often at the stream margins. As they grow bigger, the young fish – called juveniles – move into faster water to feed on aquatic and terrestrial insects that are carried in streamflow (drift feeding). For this reason, streamflow is positively correlated to food resources – more flow brings more food. In addition, more flow creates more actual habitat area.

Juvenile steelhead rear in freshwater and lagoon habitats from 1 to 3 years, depending on their rate of growth. Recent research shows that steelhead must grow to at least 150 mm in order to survive the ocean habitat and return as adults (Bond, 2006). Larger steelhead use primarily pool habitat in upper mainstem and tributary reaches and use fast-water habitat in the lower and middle mainstem San Lorenzo River. Lagoons can provide productive rearing habitat due to abundant food resources if water quality is good. Some steelhead rear all summer in the lagoon while other use the lagoon as a transition to the ocean environment. In preparation for living in the ocean, young fish become smolts, a change that prepares them physiologically for the new environment. Juveniles migrate out to the ocean in winter or spring.

Steelhead usually spend 2-4 years in the ocean maturing. Steelhead can migrate into freshwater habitats multiple times to spawn and can even survive living in freshwater before or after spawning for periods of time. Steelhead that never enter the ocean and remain in freshwater streams are called resident trout.

Coho Salmon. Coho salmon have a similar, but more rigid lifecycle than steelhead. With little exception, coho salmon spend their first year in freshwater streams, migrate out to sea where they mature for two years, and return to their native creeks to spawn and die. Because all wild females are three years old, coho salmon develop three consecutive "year classes" in each stream. Coho juveniles prefer pool habitat and are more associated with large woody material than steelhead.

Coho salmon in Santa Cruz County are at the southern edge of their distribution range. They are vulnerable to extreme environmental conditions such as droughts and the timing of winter storms and floods, which open the sandbar for upstream migration and affects the survival of redds and juveniles. Most recently, juvenile coho salmon were impacted by poor ocean conditions (low food supply due to weak upwelling) that dramatically reduced adult returns throughout California.

### Monitoring Methods

The monitoring program collects four categories of data; (1) habitat data within ½ mile stream segments; (2) fish and habitat data at specific sampling sites within the ½ mile stream segment; (3) quantity and type of large woody material within ½ mile stream segments and (4) steelhead occurrence in lagoons. Each year, the study scope is adjusted to reflect current data priorities and funding. The large woody material assessment and lagoon sampling are newer additions that increase the value of the monitoring program.

For habitat monitoring, ½ mile stream segments are habitat typed to CDFG Level III protocols and surveyed for additional habitat metrics, such as cover habitat. Habitat monitoring data include habitat types (pools, riffles, runs), width, depth, canopy cover and sediment conditions. Sediment conditions that are visually evaluated include the percent composition of substrate types, percent fines (sand and silt), and embeddedness, the percent that a cobble or boulder is surrounded by fine sediment. From the habitat monitoring data, a fish sampling site is chosen that reflects average habitat conditions for pool habitats in terms of length, depth and cover. The same fish sampling site is used in multiple years unless habitat data indicate that the site no longer reflects average habitat conditions for that reach.

Fish sampling sites include multiple habitat units of pools, riffles and runs. Fish are sampled using an electroshocker, which stuns fish temporarily so they can be

captured with hand nets. All juvenile salmonids are identified, measured and released. Other fish species are identified, counted and released. Additional habitat data is collected for fish sampling sites. The number of juvenile salmonids captured in a habitat is reported as a density – the number of fish per 100 feet of stream. Juvenile densities are calculated for 2 age and 3 size classes. These categories determine proportions of young-of-the-year and older fish, and growth rates. Divers conduct snorkel surveys in San Lorenzo River pools that are too deep to electrofish.

Large woody material assessments occur in randomly selected stream segments within the 1/2 mile stream reach. Standing and down wood is categorized within the riparian, bankfull and low-flow channel areas. The assessment classifies the type of wood (conifer or hardwood) and whether it is contributing to instream habitat. Conifer wood that is actively contributing to in-stream habitat provides the most benefit to salmonids.

Lagoon fish are sampled using a beach seine. A population estimate for Aptos Lagoon is calculated by conducting a mark and recapture over two consecutive weeks. In separate monitoring programs, the City of Santa Cruz samples San Lorenzo lagoon and the City of Capitola samples Soquel lagoon.

The methods used in this monitoring program rely on selecting sampling sites with average habitat quality and assuming that the data reflect an average density for that stream. An alternative would be to sample about 10% of the habitat and select sites randomly. While random sampling would provide more statistically robust data, it would be many times the cost and be more complex logistically. When the same habitat units are sampled in multiple years, the statistical T-test is used to compare densities between years. This analysis shows that many density changes are significant and not just a component of normal variation.

## Significant Findings

### **Coho salmon are critically endangered in Santa Cruz County.**

Juvenile coho salmon were collected just twice in the past twelve years; 2005 in Bean Creek and 2008 in East Branch Soquel Creek. Juveniles were not collected for the same year class in either 2008 (Bean Creek) or 2011 (Bean Creek or East Branch Soquel Creek).

### **Juvenile steelhead show three life history patterns depending on habitat productivity and migration access.**

Young smolts. The first pattern are young-of-the-year (yoy) steelhead that grow large enough by the sampling period that they are expected to migrate out to the ocean the subsequent winter or spring. Young smolts live in highly productive habitats that include **Aptos lagoon** and the **lower mainstem San Lorenzo**

***River, mainstem Soquel or lagoon?*** A portion of young-of-the-year in larger tributaries such as ***Zayante, Bean and Corralitos*** will grow large enough to smolt in one year. The portion of juveniles that become young smolts depends on spring and summer streamflow, overall juvenile density and habitat quality that year.

***Older smolts.*** Steelhead that take 2 (and sometimes 3) years to reach the size needed to outmigrate represent the second life history pattern. These steelhead live primarily in the tributaries and upper mainstem reaches which are the majority of the sampling sites and represent the greatest geographic area. For these fish, overwinter survival and dry season rearing conditions, especially flow and cover habitat, are critical. Older smolts grow better with lower young-of-the-year densities. These older smolts provide life history and genetic diversity that support steelhead populations in the long term. Older smolts live in portions of the ***San Lorenzo River, Soquel Creek*** and tributary creeks including ***Zayante, Bean, Lompico, Fall, Boulder, Bear, East and West Branch Soquel, Corralitos, Browns Valley, and Shingle Mill Gulch.***

***Resident trout.*** The third pattern consists of resident trout that live in freshwater habitats all year around. Steelhead and resident rainbow trout are the same species with different life histories. While resident trout stay and grow to a larger size than steelhead juveniles in freshwater habitats, they have the capacity to migrate downstream to the ocean, reproduce with steelhead or have offspring that become ocean-going steelhead. Steelhead and resident trout can co-exist throughout the watershed, but resident trout are more common in stream reaches that are less accessible and less productive.

**Total juvenile steelhead densities vary from year-to-year and show a decreasing trend in San Lorenzo and Soquel watersheds since 2009.**

In 2011, young-of-the-year densities were the lowest of all years in San Lorenzo and Soquel watersheds and show a decreasing trend for total densities since 2009 (see Figures B-23 and B-25). While this could be a temporary decrease due to lower streamflows in 2007-2009, it could signal a decrease in the adult population. Aptos and Corralitos show no clear trend for total densities. Data for 2012 is not yet available.

**Young-of-the-year densities correlate to winter and spring storm patterns.**

Young-of-the-year densities reflect early survival, which includes survival as an egg, alevin (newly hatched fry with yolk sac) and young fry. Redds (egg nests) can be destroyed by high flow events that scour spawning gravels or deposit fine sediments that smother eggs or alevins. High flow events can affect fry survival if flow refuge (areas of low velocity) is limited.

Monitoring data show that young-of-the-year densities decrease in years with intense winter or spring storms. In contrast, young-of-the-year densities increase

when moderate winter or spring storms provide passage conditions for adults without subsequent intense storms.

Both these patterns indicate that early survival is sensitive to intense storm events. Conservation efforts to decrease fine sediments, increase flow refuge and attenuate rapid storm peaks will all contribute to improved early survival. Sediment control efforts will decrease fine sediments and improve survival for eggs and alevins. Retention of large wood and flood plain protection and restoration will increase flow refuge and improve survival for young fry, along with efforts to provide runoff retention and detention to attenuate rapid storm peaks.

**Yearling densities correlate to intense winter storms and moderate spring storms.** Yearling densities reflect multiple factors that are not monitored directly through this sampling program. Juvenile mortality can result from predation, starvation, disease or physical trauma associated with intense winter storms.

Since the data show decreased yearling densities following intense winter or spring storms, a lack of winter high flow refuge is considered a primary factor in yearling survival. This finding aligns with assessment and recommendations in recovery plans for both steelhead and coho salmon.

Yearling densities also decrease following springs with moderate flows. These moderate flows provide excellent rearing habitat conditions (lots of flow and food) and it may be that some yearlings are able to grow large enough in the spring season to outmigrate instead of staying in the freshwater environment.

**Juvenile steelhead show a trade-off between density and growth.**

When early survival is good and there are more young-of-the-year steelhead, growth for all juvenile steelhead tends to be lower. When early survival is decreased, the fewer remaining juveniles tend to grow better. With less competition, the fewer fish are able to grow more.

**Stream habitat conditions shows no overall trend.** In general, stream habitat conditions fluctuate year to year depending on flow patterns which influence sediment, scour (depth and cover), dry season flow and habitat form. Recent sediment monitoring data support earlier conclusions that the County's existing ordinances, policies and programs have protected stream habitats from significant further degradation but have not resulted in significant improvement (Balance Hydrologics, 1996).

**Stream habitat variables show weak correlation with juvenile densities.**

Stream habitat monitoring serves two functions: it provides measures of stream condition for the ½ mile stream segments and it provides the data to select the fish sampling sites. Stream habitat conditions vary considerably between years and among sites but most conditions vary within a typical range.

The relationship between juvenile steelhead densities from specific sampling sites and stream habitat conditions from the ½ mile stream reaches is unclear. Habitat conditions reflect summer rearing habitat which may be secondary to overwintering survival under current watershed conditions. In addition, habitat is a combination of multiple factors so that direct linear relationships are weaker. In response to these results, the program has reduced habitat monitoring. A core set of sites are habitat monitored each year, while other sites are monitored about every 3 years.

**Large Woody Material assessments create baseline for new policy.**

In 2009, the Board of Supervisors approved a new policy to retain more large wood in local streams. In 2010, this monitoring program began assessing large woody material in selected reaches to create a baseline dataset for evaluating the effect of the County's new policy. So far, the program has assessed large wood in 11 stream segments that correspond to sampled reaches. Large woody material has been surveyed on Bean, Zayante, Bear, Soquel, East Branch Soquel and Corralitos creeks. The goal is to track how the amount of large woody material changes with the new policy and see if there is a positive response in fish densities.

Densities of wood in Soquel, Bean and Corralitos compared favorably to NOAA Fisheries restoration goals and wood surveys conducted in other regional, but less developed watersheds, that include Gazos, Waddell and Scott. However, much of this wood was in a few logjams and did not contribute to multiple pool habitats.

**Lagoons provide steelhead rearing habitat.** Aptos lagoon was sampled in 2011 and 2012. Results varied between years, with a population estimate of 420 for 2011 and 140 for 2012. Captured steelhead were mostly larger than 150 mm and most were young-of-the-year. These results underscore the value of the lagoon for rearing habitat and the potential benefit of improving habitat in Aptos Lagoon. The City of Capitola funds lagoon sampling in Soquel Creek with annual population estimates; in 2012 steelhead estimates for Soquel Lagoon were only 220 and the lowest of all sampling years. The City of Santa Cruz funds San Lorenzo River lagoon sampling; steelhead population estimates for 2011 were 501 in early summer and 138 in fall.

**Steelhead use at Pajaro Lagoon remains unknown.** Pajaro Lagoon was sampled for the first time under this program in 2012. Steelhead were not captured during sampling at 8 sites in the main lagoon or at 2 sites upstream in the Pajaro River. Since Pajaro watershed supports a steelhead population, we know that steelhead adults and smolts use the lagoon for migration to and from the ocean, but we still do not know if steelhead attempt to rear in the lagoon during the spring or summer months.



**Passage projects show results for steelhead access.** The County of Santa Cruz has a long history of improving fish passage at natural and human barriers. Between 1985 and 1990, the County completed a number of fish passage projects at natural barriers and culvert crossings. Between 2003 and 2012, the County completed an additional 9 projects to improve fish passage at county road stream crossings. Two projects - a culvert retrofit at the Corralitos box culvert (Eureka Canyon Road at PM 2.95) and a fish ladder at a natural barrier on Zayante Creek, Quail Hollow Fish Ladder - show excellent steelhead access upstream. Passage projects on Valencia, Shingle Mill and Lompico creeks show that steelhead access is better in years with high, sustained flows.

**Local streams continue to support native fish populations.** This monitoring program documents the occurrence and general abundance of native fish including lamprey, Sacramento sucker, California roach and several sculpin species. Endangered tidewater goby were collected in both Aptos and Pajaro lagoons in 2012. The fact that Santa Cruz County continues to support a robust native fish fauna reflects well on general watershed health and indicates high potential for successful steelhead and coho salmon restoration.

### Monitoring Recommendations

The following recommendations will be implemented by County Water Resources staff in Environmental Health, in collaboration with other agencies.

**Continue to participate as a partner in the Juvenile Salmonid and Stream Habitat Monitoring Program.**

This collaboratively funded program provides a cost-effective way to collect data that benefits multiple partners while also incorporating broader input and review. Encourage Zone 7 to continue participation to sample Pajaro Lagoon in multiple years.

**Continue to adapt the monitoring program to best fit current data needs.**

The monitoring program has become more flexible in recent years in order to collect the most valuable data in response to new priorities. Continue to review and adapt fieldwork, data analysis and report production to suit program partners and recovery needs.

**Continue to develop database and alternative data analysis.**

Environmental Health Services has been working to collect and organize data from this monitoring program into a more formal database. The core of the database is almost complete and can be used to analyze the data in new ways and to develop public outreach.

## Policy and Program Recommendations

The following section describes several high priority, interconnected recommendations for watershed health as well as steelhead conservation and coho salmon recovery, which will be pursued by Water resources staff, in collaboration with other departments.

### **Participate in efforts to implement the 2012 Federal Coho Salmon Recovery Plan.**

In order to prevent the extinction of coho salmon south of San Francisco Bay, agencies and county residents will need to make a strong commitment to protecting and improving stream habitats. Improving streamflow, sediment control and protection of large woody material for winter flow refuge stand out as the most urgent actions that will benefit both coho salmon recovery and steelhead conservation.

### **Support efforts to increase dry season streamflows.**

The County should continue to support and pursue efforts to increase dry season streamflows through water supply projects, groundwater recharge, water conservation and reduction of impervious surfaces.

### **Increase flow refuge for juveniles to support winter survival.**

Young-of-the-year and older juvenile steelhead and young-of-the-year coho salmon need habitats to escape high stream velocities during storm events. These flow refuge habitats include cover habitat such as undercut streambanks, large woody material and boulders. Channel complexity such as backwater pools, side channels and floodplains also provide refuge from high stream velocities. In the short term, the quickest way to increase flow refuge will be to preserve and protect large woody material in streams. In the longer term, efforts to restore channel complexity including the restoration of floodplain habitats will be important. In addition, efforts to reduce impervious surfaces and thereby reduce stream flashiness should benefit overwintering survival.

### **Balance steelhead conservation efforts between highly productive and intermediate habitats.**

Maintaining life history diversity in steelhead will be critical for long term population sustainability. Accordingly, conservation efforts should be distributed throughout the watershed to support habitat for both young and older smolts. The County should support restoration efforts for lagoons to promote these highly productive habitats. Physical restoration and sand bar management, streamflow and water quality are essential components of lagoon restoration. The County should also protect and restore habitats that support both young and older smolts. Streamflow, flow refuge and riparian protection are essential components of intermediate habitats.

**Improve riparian corridor protection.**

Riparian corridors provide multiple benefits to stream habitats including shade to maintain cold water temperatures, a source of organic material to fuel the stream food web and large woody material when riparian trees fall. Riparian corridors protect water quality by trapping pollutants and providing properties with flood and bank protection.

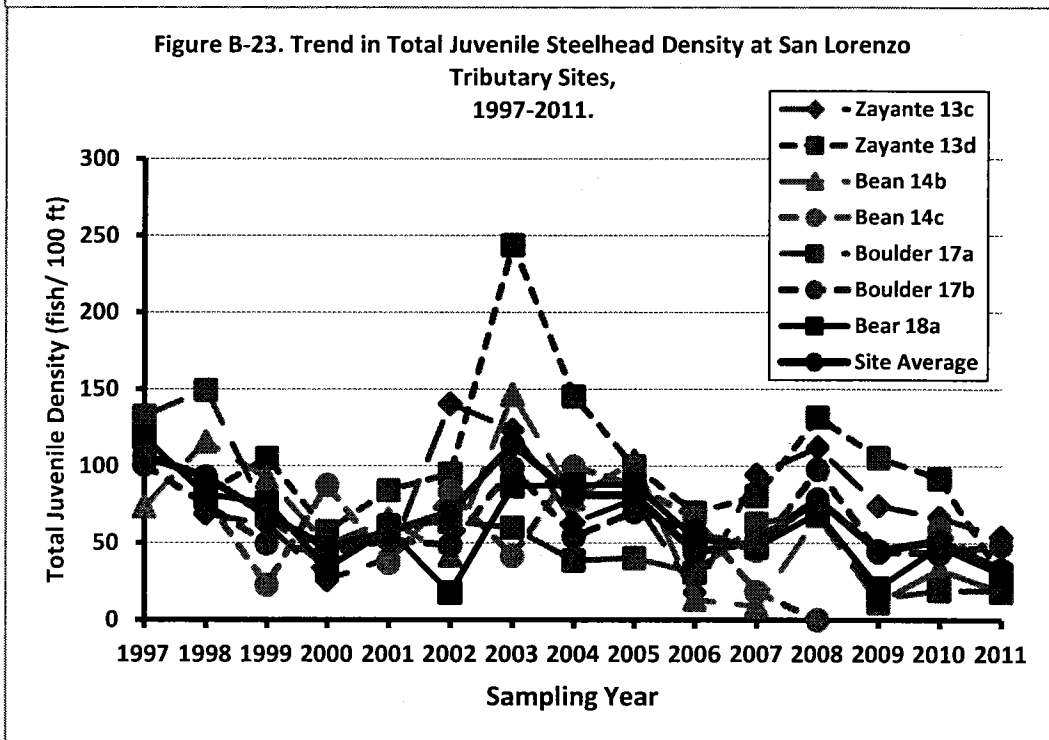
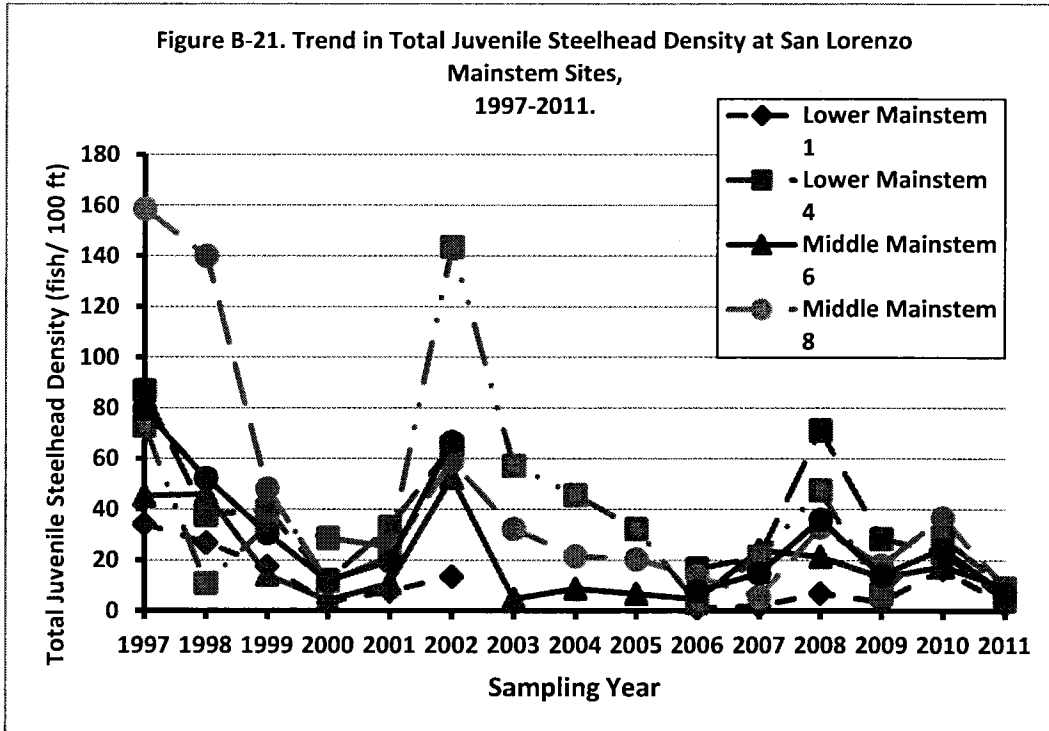
The County's Riparian policies, including enforcement, property owner education and incentives, and planning policies should be reviewed and updated as needed to ensure that they not only protect but provide for significantly improved condition of riparian habitat along Santa Cruz County streams. Impacts from County roads should be considered also. Review the effectiveness of the Riparian Corridor Protection Ordinance and investigate ways to improve implementation and/or enforcement. Support outreach to private landowners about riparian corridors, large woody material and watershed stewardship.

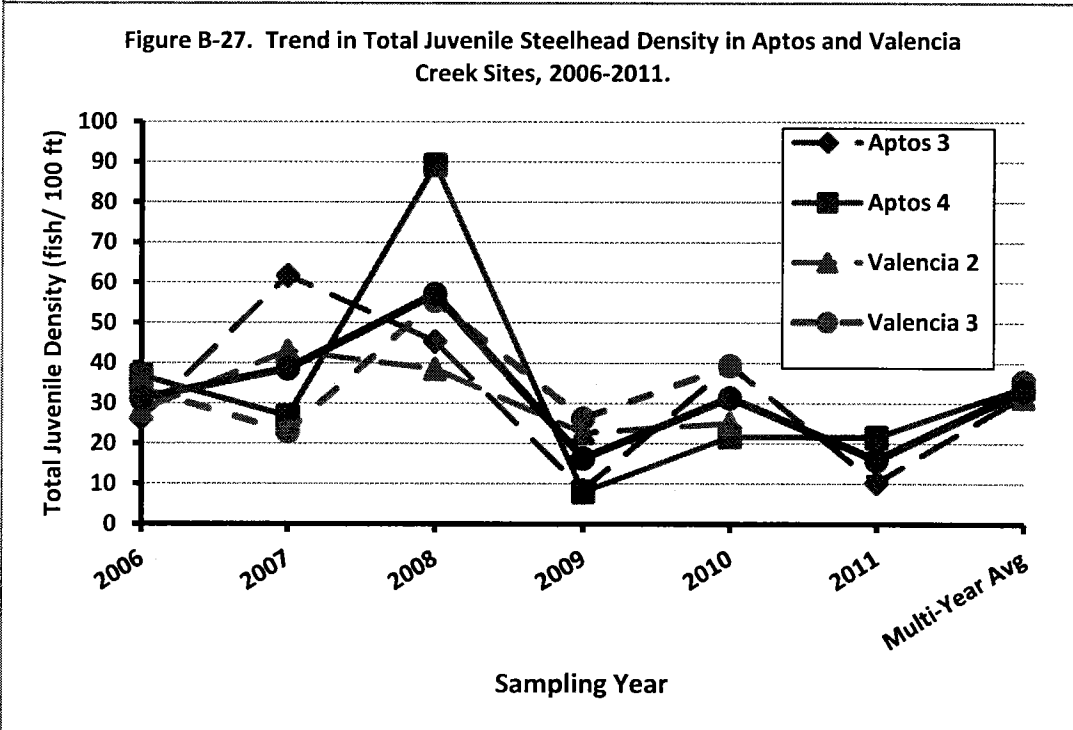
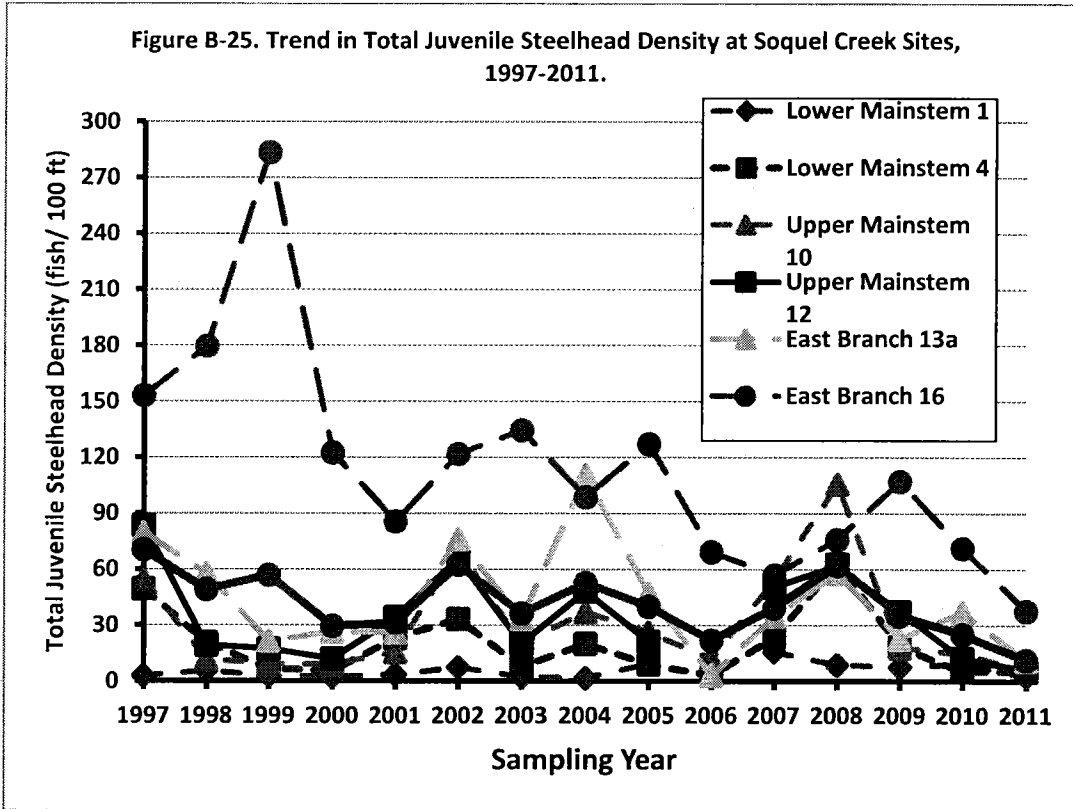
**Conclusion**

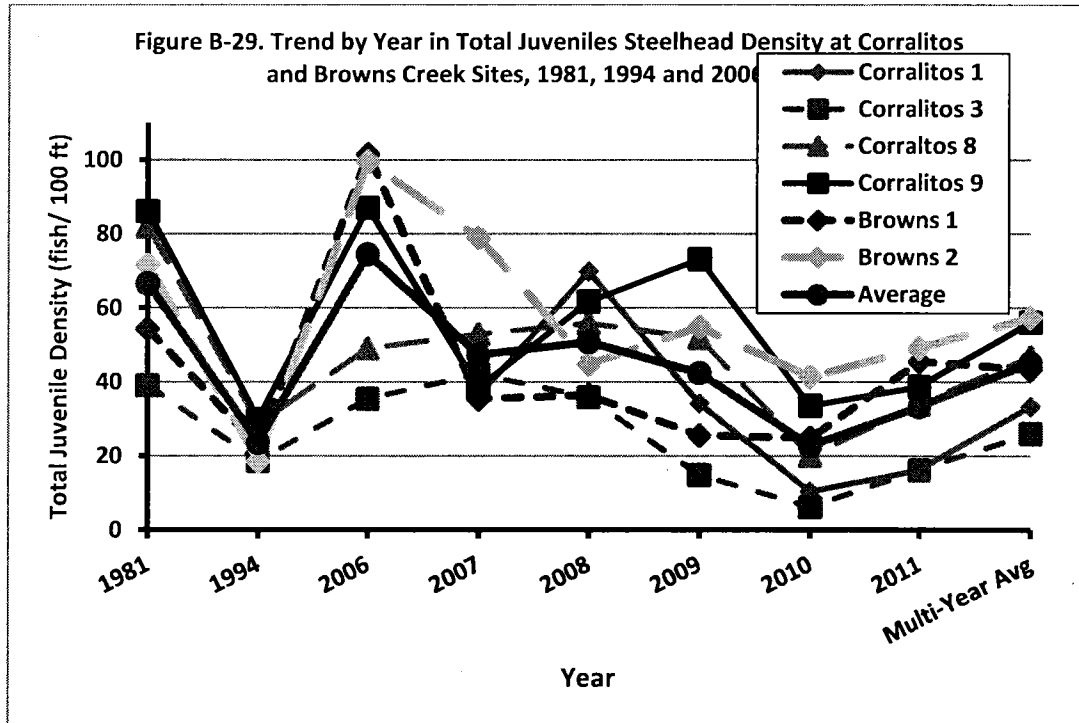
The Juvenile Salmonid and Stream Habitat Monitoring Program continues to provide essential data on steelhead and coho salmon juvenile densities and habitat conditions to seven local agencies. The San Lorenzo, Soquel, Aptos and Corralitos watersheds provide water supply, wildlife habitat, flood capacity, recreation and beauty for local residents. Conservation efforts to protect and restore steelhead and coho salmon will also protect these important watershed values. By tracking stream habitats and salmonid juveniles, this monitoring program shows our success and helps identify future needs for protecting our local watershed resources.

### Figures

The following figures show the trend in total juvenile steelhead density for each sampling site. Sites in the San Lorenzo are divided between mainstem and tributary sites (D.W. ALLEY & Associates, 2012).







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