NORTH COAST RESOURCE PARTNERSHIP

2014 IRWM Drought Project Grant Application

ATTACHMENT 3:

Project Justification

Integrated Regional Water Management Program
Applicant: Humboldt County

This Attachment includes summaries of the proposed projects including purpose and how the Proposal meets drought-related needs. It also contains estimated physical benefits for each project, justifies technical feasibility, and describes how the project will achieve the benefits claimed. Finally, explanations are provided regarding how/whether the benefits will be attained through the least cost alternative.

Project Summary Table

Table 4 – 2014 IRWM Drought Solicitation Project Summary Table

Drought Project Element		1. City of Rio Dell	2. City of Ukiah	4. Sonoma County Water Agency	5. Lewiston Park Mutual Water Company	7. City of Fort Bragg	8. Gualala River Watershed Council	9. Sanctuary Forest	12. Yurok Tribe	13. Westhaven Community Services District	20. California Land Stewardship Institute	21. City of Crescent City
D.1	Provide immediate regional drought preparedness	•	•	•	•	•	•	•			•	
D.2	Increase local water supply reliability and the delivery of safe drinking water	•	•	•	•	•	•	•	•	•	•	•
D.3	Assist water suppliers and regions to implement conservation programs and measures that are not locally cost-effective											
D.4	Reduce water quality conflicts or ecosystem conflicts created by the drought		•	•	•	•	•	•	•		•	
IRWM Project Element												
IR.1	Water supply reliability, water conservation, and water use efficiency	•	•	•	•	•	•	•	•	•	•	•
IR.2	Stormwater capture, storage, clean-up, treatment, and management			•								
IR.3	Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands											
IR.4	Non-point source pollution reduction, management, and monitoring											
IR.5	Groundwater recharge and management projects				•		•					
IR.6	Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users										•	
IR.7	Water banking, exchange, reclamation, and improvement of water quality	•				•	•				•	
IR.8	Planning and implementation of multipurpose flood management programs											
IR.9	Watershed protection and management						•	•	•		•	
IR.10	Drinking water treatment and distribution	•	•		•		•	•	•	•		•
IR.11	Ecosystem and fisheries restoration and protection		•	•	•		•	•	•		•	

#	Proposed Project Sponsor, Project Name	County / Tribe
1	City of Rio Dell, Rio Dell and Scotia CSD Emergency Water Intertie	Humboldt
2	City of Ukiah, Ukiah Valley-Redwood Valley Water Supply Reliability Intertie and Well Development Project	Mendocino
4	Sonoma County Water Agency, Sonoma-Mendocino Immediate Drought Relief Project	Mendocino, Sonoma
5	Lewiston Park Mututal Water Company, Meter Installation	Trinity
7	City of Fort Bragg, Summers Lane Reservoir Project	Mendocino
8	Gualala River Watershed Council, The Flow Bank - Protecting Stream Flow in the Gualala River	Mendocino, Sonoma
9	Sanctuary Forest Inc., Mattole Flow Program: Storage and Forbearance	Humboldt, Mendocino
12	Yurok Tribe, Weitchpec Water Station	Yurok Tribe
13	Westhaven Community Services District, Water Loss Reduction Project	Humboldt
20	California Land Stewardship Institute, Agricultural Water Conservation and Water Supply Reliability Program - Russian and Navarro River Watersheds	Mendocino
21	City of Crescent City, Elevated Water Tank Rehabilitation	Del Norte

0 10 20 30 40
Miles

North Coast Resource Partnership

2014 IRWM Drought Projects

- NCRP 2014 Drought Priority Projects
- North Coast IRWM Boundary
- North Coast 303d Listed Waterbodies
- North Coast Tribal Lands
- California Marine Protected Areas (MPA)
- Area of Special Biological Significance (ASBS)
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community

Data sources: California Department of Fish and Wildlife, Marine BIOS; California Department of Water Resources; US Census, American Community Survey; California State Water Resources Control Board

1. City of Rio Dell

Rio Dell and Scotia Community Service District Emergency Water Intertie

Project Description: Construction of an intertie between the City of Rio Dell and Scotia CSDs connecting near the mill in Scotia to provide water supply reliability.

How project alleviates drought impacts: The proposed intertie will provide immediate drought relief to Rio Dell by connecting the city to a more secure source of water. It will also increase water supply reliability for both Rio Dell and Scotia by providing emergency backup supplies for each other. While the City is addressing repair options for its infiltration gallery, a process that is expected to take between 2 and 7 years including legal proceedings, design, permitting, and construction, the Rio Dell community will have access to high quality water and will also have the necessary time to perform repairs using best management practices to ensure good water quality is maintained in the Eel River during construction.

Drought Project Type: This project provides immediate regional drought preparedness by increasing local water supply reliability and the delivery of safe drinking water for two North Coast DACs. The intertie will provide immediate supply to Rio Dell by connecting the City to Scotia's functioning and adequate infiltration gallery system. The intertie will allow the City of Rio Dell to access higher quality raw water when making repairs to its infiltration gallery and it will allow the City of Rio Dell more flexibility in timing repairs to the infiltration gallery, limiting environmental impacts. When repairs to the infiltration gallery are complete, both Rio Dell and Scotia will experience greater water supply reliability and resiliency to expected changes in precipitation, climate, and storm frequency and intensity.

Reason for Expedited Funding: The City of Rio Dell has had to undertake numerous capital projects in the last year to keep aging City infrastructure in working order and in compliance with state laws. The City has had to take out millions in loans for both the water and wastewater systems. The rate payers have seen huge increases in water and wastewater bills in the last several years. The City does not have reserves to pay for the intertie project, which is needed to assure a reliable supply of water for the City, because it has been using reserves for the emergency repairs needed in 2012 and 2013.

City of Rio Dell
Water District Service Boundary

Connect to Rio Dell Water System

Directionally Drill under Eeel River 650 ft

Scotia
Community Service District
Service Boundary

Rio Dell

Rio Dell
Water Treatment
Facility

Connect to Existing
10" Water Main

Scotia

Scotia
Community Service District

0 1,200 2,400 3,600 4,800

Eel River

Fortuna

Groundwater Basin:
Eel River Valley

City of Rio Dell
Water District Service Boundary

Scotia
Community Service District
Service Boundary

Groundwater Basin:
Pepperwood Town Area

North Coast Resource Partnership

2014 IRWM Drought Project: City of Rio Dell, Rio Dell & Scotia Community Service District Emergency Water Intertie

- Intertie: 10" PVC
- Intertie: Directionally Drill Location
- Water District Service Area
- North Coast IRWM Boundary
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community
- Groundwater Basins

Data sources: GHD; California Department of Fish and Wildlife, Marine BIOS; California Department of Water Resources; US Census, American Community Survey; California State Water Resources Control Board; USGS Digital Raster Graphics

1. City of Rio Dell – Project Physical Benefits

Summary

The City of Rio Dell owns and operates the water treatment plant and facility at/near the end of the Eel River on Hilltop Drive in Rio Dell. The City also owns and operates the water infiltration gallery located in the bed of the Eel River. The capacity of the infiltration gallery has declined; in 2011, the pumps drew air for the first time and intake flow rate decreased from 600 to 300 gpm. The City is currently suing the engineering consultant that designed, permitted, and constructed the infiltration gallery for defects that led to system failures that began in the summer of 2012. Due to the alleged design failures in the infiltration gallery and associated systems, the City has had to take emergency measures to render the system functional at its own expense (GHD 2014).

The Scotia CSD has a similar infiltration gallery, however, unlike the City of Rio Dell's infiltration gallery, it was installed across the length of the River and has not suffered supply loss. The intertie will immediately increase local supply reliability for Rio Dell by providing access to a more secure source. During repairs to its infiltration gallery, the City of Rio Dell will have access to higher quality raw water. This interties project will also allow the City to take enough time to repair its infiltration gallery using best management practices instead of rushing repairs and potentially increasing turbidity in the Eel River. Although needed urgently because of the issues with Rio Dell's infiltration gallery, this project was originally identified as part of the 2006 City of Rio Dell-Scotia Annexation Evaluation in the Water Distribution System Technical Memorandum (page 9, Winzler & Kelly 2006).

Long-term, this project will enhance system resiliency for both DACs - the City of Rio Dell and the Town of Scotia Company (which provides water to Scotia residents); it will provide a temporary alternative supply for either community in the event of a catastrophic system failure or system component breakdown affecting one of the inter-tied systems.

Supporting studies or documents

- City of Rio Dell – Scotia Annexation: Water Distribution System Technical Memorandum (2006) identified this project for future implementation (page 9).
- Rio Dell and Scotia CSD Emergency Water Intertie Maps. GHD depicts and aerial map and project locations (GHD 2014).
- This project is integrated in the Humboldt Operational Area Hazard Mitigation Plan Update Volume 2, 2014, (Chapter 9, pages 9-16 of the HCOAHM, including, RD-13 install an emergency intertie with Scotia, RD-28 to determine City water supplies in the event of a long-term disruption).
- Eel River flow data for 2011, 2013, and 2014 at Scotia - California Department of Water Resources, California Data Exchange Center 2014. This flow data provides a visual display of the increasingly earlier low flows experienced by the Eel River. The end of June the flow

rates are near 135 cfs, which is much lower than previous years; base flows were near 250 cfs at the end of June 2013 and 1200 cfs in June 2011. http://cdec.water.ca.gov/jspplot/jspPlotServlet.jsp?sensor_no=6295&end=10%2F01%2F2011+20%3A50&geom=huge&interval=127&cookies=cdec01

Recent and historic conditions

The City of Rio Dell, a DAC, has as its sole source of water an infiltration gallery located in the Eel River. The City's infiltration gallery was installed along the edge of the river in impermeable bedrock beneath a thin layer of gravel. The deep low flow river channel, however, is currently located on the opposite side of the river and the main summer flows are a long distance from the infiltration gallery. Over the last several years, flows in the Eel River have reduced, making it difficult for water to reach the City's infiltration gallery. In addition, during the winter fine sediments are deposited atop the infiltration gallery, which impede the flow of water through the gravels to the intake system.

The capacity of the infiltration gallery has begun to decline significantly. In 2011, the City's water pumps drew air for the first time and based on the City's water records, the intake flow rate had to be decreased from 600 gallons per minute to 300 gallons/minute. In 2012 & 2013 the situation grew worse. The decreased flow rates were seen sooner in the dry season, mid-July instead of the end of August. Emergency measures including trenching in the Eel River to supply flow to the infiltration gallery had to be taken to avoid a water shortage emergency.

Because of problems with the infiltration gallery (Gans and Brisso 2013) during summer low flows and winter the storms the water supply provided by the infiltration gallery is not reliable. In the summer the City of Rio Dell rents heavy equipment and enter the Eel River channel to create a channel to direct water to the infiltration gallery. The City of Rio Dell has to acquire permits from regulatory agencies to work in the stream channel; the permits cost approximately $25,000.00 and they are good for five years. Rio Dell Water System Staff spend approximately three days per year to prepare and execute this work. The stream is physically altered during this process, potentially increasing the amount of sediment entering the river at a low flow condition and permits require that that area be hazed to deter fish and wildlife from being in the area while work is being completed. This puts additional stresses on aquatic species that would not occur with project implementation; until the gallery is repaired, the City will be able to rely on the intertie.

Based on recent experiences with pipeline crossings of the Eel River, the proposed intertie will be horizontally directionally drilled under the river. The City of Rio Dell recently completed a wastewater pipeline as a part of the city's new waste water treatment plant, which included a portion of directionally drilled pipeline under the Eel River. In 2013 a 14-inch HDPE pipeline was successfully drilled and installed under the Eel River at the north end of Rio Dell near where US Highway 101 crosses the Eel River. This pipeline was originally planned to be placed on the existing southbound US 101 bridge, however the complexity and corresponding added construction schedule time forced the project to look at less complex and lengthy construction methods. It was found that horizontally directionally

drilling the pipeline under the river would take approximately 1 month rather than 6 months as originally scheduled, resulting in a shorter construction schedule and reduction in project costs.

The pipeline will be drilled horizontally under the river and not attached to the bridge as depicted in the Scotia Annexation Report (City of Rio Dell 2006), however the connection points and system operation information are still accurate. The California Emergency Management Agency has been contacted about the project and is supportive and the California Department of Health will be involved with final approval of project implementation to protect public health.

Estimates of without-project conditions

The City of Rio Dell will continue to experience critically reduced water supplies and local water supplies will remain separate. Community resiliency to climate change will continue to be limited and drought impacts will continue. Physical alteration of the stream will continue to be necessary, potentially increasing sedimentation and impacts to aquatic habitat.

An alternative project to drill a well(s) to provide potable water was not considered feasible as a drought contingency plan. The City investigated the option of drilling a new groundwater well as part of a 2002 Water Supply Feasibility Study. Groundwater wells within the City are recharged by rainwater and not the Eel River and may run dry in the summer months. Groundwater wells which do tap into the Eel River under flow could be developed in Metropolitan. However, the City's previous wells in Metropolitan failed, and a pipeline to Metropolitan would also have to cross the Eel River and is further than from the Rio Dell Water Plant to Scotia. In addition, there is no guarantee that in a drought condition the City could obtain permits to drill a new well and pump groundwater that likely is connected to the larger Eel River system.

Another alternative the City has is to purchase water to supply the City during an emergency. Purchasing water from the City of Fortuna, for example, would be the closest likely supply point. However, in a drought situation, the City of Fortuna may not be in a position to provide the excess water. The Humboldt Bay Municipal Water District (HBMWD) is a local wholesale water supplier that sells water to several local municipalities to the north, including the City of Eureka. HBMWD has had an excess of water since the pulp mills stopped operating. Wholesale prices have been increasing dramatically over the last couple of decades, as have retail rates. A conservative estimate of the cost of whole sale water during the drought is $3,000 per day (see Table 5.1 b).

Descriptions of methods used to estimate physical benefits

Interties are a proven mechanism for improving water supply reliability of community water systems. Physical benefits were estimated from conversations with city staff who maintain the water system. Additional information was obtained from the City's annual water use records, examination of Eel River flows, and from other local agencies, where appropriate; detailed explanations are provided in the benefits tables. The California Department of Public Health has approved of the proposed project and will be a review agency to ensure public safety.

Description of any potential adverse physical effects

There are potential adverse physical impacts from crossing the river; however, these will be addressed through the CEQA and permitting processes. The City's recent experience with directionally drilling under the river has shown it can be done safely with no impacts. Unexpected impacts will be considered during the CEQA process; however, a Mitigated Negative Declaration is expected. BMPs to protect water quality and natural resources will be implemented during the construction process.

Table 5.1 a – Annual Project Physical Benefits

Project Name: Rio Dell and Scotia CSD Emergency Water Intertie

Type of Benefit Claimed: Increased water supply reliability

Units of the Benefit Claimed :

households

Additional Information About this Benefit reduced frequency of water shortages for three months every ten years

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2024	0	1280	1280
2034	1280	1280	0
2044	1280	1280	0
Every ten years	1280	1280	0
Last Year of Project Life 2074	1280	1280	0

Comments: Using a conservative estimate of $20 per month per household for three months every ten years, this benefit provides an economic benefit of $76,800 every decade (Barakat & Chamberlin, Inc. 1994) that repairs to the infiltration gallery are tied up in legal proceedings. The project proponent estimates that the repairs would be completed within the next ten years.

Table 5.1 b – Annual Project Physical Benefits

Project Name: Rio Dell and Scotia CSD Emergency Water Intertie
Type of Benefit Claimed: Avoided water supply purchases
Units of the Benefit Claimed : thousand gallons per 3 months
Additional Information About this Benefit water shortages for three months every ten years

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	90,000	90,000
2025	0	90,000	90,000
2025	0	90,000	90,000
Every 10 years	0	90,000	90,000
Last Year of Project Life - 2074	0	90,000	90,000

Comments: The cost of imported water is based on a retail rate of $50/11,220 gallons of water estimated from 2011/2012 HBMWD wholesale data. For emergency situation, it is assumed the City would reduce water use by 25%. An estimated daily water use of approximately 90,000 gallons per day was calculated for the low river flow months of August, September, and October from 2013 data. Based on these assumptions alone, the daily imported water cost would equate to approximately $400 per day in just water cost. If the City were to utilize a 10,000 gallon water trailer, it would take three water trailers each making three approximately one hour round trip to supply the reduced water demand (3 trailers x 10,000 gallons x 3 trips = 90,000 gallons/day). At $120/hour for driver, fuel, and equipment, that would cost approximately $2,160 a day ($120/hr x 6 hr x 3 trucks). The total cost to the City would be approximately $2,560 per day ($76,800/month, $230,400/3 months) to supply water to City residents while drought conditions persist.

Table 5.1 c – Annual Project Physical Benefits

Project Name: Rio Dell and Scotia CSD Emergency Water Intertie
Type of Benefit Claimed: Avoided water supply projects
Units of the Benefit Claimed : $
Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	750,000	750,000
2016	0	0	0
2017	0	0	0
2018	0	0	0
Last Year of Project Life - 2074	0	0	0

Comments: Purchase and installation of 1,000,000 gallon water storage tank; cost estimated by

project proponent based on staff technical input and previous experience.

Table 5.1 d – Annual Project Physical Benefits

Project Name: Rio Dell and Scotia CSD Emergency Water Intertie

Type of Benefit Claimed: Avoided O&M costs

Units of the Benefit Claimed : $

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	4,100	4,100
Yearly	0	4,100	4,100
2018	0	25,000	29,100
2024	4,100	4,100	0
Last Year of Project Life - 2074	4,100	4,100	0

Comments: During summer low flows and winter storms, water supply provided by the infiltration gallery is not reliable (repairs are tied up in litigation). Heavy equipment is used to divert water to the infiltration gallery. The cost of permits is $25,000 every five years and heavy equipment and operator costs are $4,100 yearly. The project proponent estimates that the repairs would be completed within the next ten years, at which point the repairs would provide the same benefits as this project.

Table 6 – Cost Effective Analysis Project name: Rio Dell and Scotia CSD Emergency Water Intertie	
Question 1	Types of benefits provided as shown in Table 5: **Increased water supply reliability, avoided water supply purchases, avoided water supply projects**
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? **Yes**
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. **The alternative of repairs to the infiltration gallery is caught up in a law suit. As the design and engineering is also part of the lawsuit, the City cannot contract for these services to initiate the process of repairs until the lawsuit is settled. The City does not have the funds to separately initiate repairs to the infiltration gallery without funds from the lawsuit. Costs for repair are not known at this time, but could exceed $2 million. Other options to truck in water would cost the City over $1 million for every year of drought (see Table 5.1 b).**
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.
Comments: **The project is the least cost alternative to achieve the benefits over the long term. The intertie provides a permanent means for sharing resources between Rio Dell and Scotia. This project provides climate change resiliency for both DACs and ensures that the Human Right to Water is met during drought emergencies.**	

2. City of Ukiah

Ukiah Valley-Redwood Valley Water Supply Reliability Intertie and Well Development Project

Project Description: Upgrade three existing and build two new interties to connect six DAC public water systems and construct three new wells to strengthen supply reliability.

How project alleviates drought impacts: The proposed improvements to water supply infrastructure within Ukiah will provide additional water supply sources through groundwater well development and increase supply reliability and disaster resiliency through constructing new and upgrading existing interties between six water systems. The City of Ukiah and five local water districts are collaborating to ensure that the necessary interties and plans are in place between their respective systems to ensure that drinking water is provided reliably across the Ukiah area, particularly during times of drought. This project implements the Human Right to Water policy.

Drought Project Type: This project provides immediate regional drought preparedness as it increases local water supply reliability and delivery of safe drinking water in the DAC Ukiah and the surrounding DACs through establishment of system interties. It will reduce ecosystem conflicts created by the drought by providing an alternate source of water to surface water during times of low flow, leaving more water instream for environmental purposes.

Reason for Expedited Funding: Most of these entities are economically disadvantaged communities. The customers cannot afford to pay for increases to their rates in order to fund these capital expenses, in addition to all the other needs of the water systems. If this project is not funded, the water suppliers will opt to not construct the interties. Each agency will be responsible for bearing the cost of the well construction projects and will have to rely on their respective rate payers for the capital outlay which would more than likely result in rate increases.

North Coast Resource Partnership

2014 IRWM Drought Project:
City of Ukiah
Ukiah Valley-Redwood Valley
Water Supply Reliability
Intertie and Well Development Project

- Service Area Boundary: Redwood Valley Water
- Service Area Boundary: Calpella Water District
- Service Area Boundary: Millview County Water District
- Service Area Boundary: Rogina Water Company
- Service Area Boundary: Willow County Water District
- Service Area Boundary: City of Ukiah
- Groundwater Basins
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community

Data sources: City of Ukiah; California Department of Water Resources; California State Water Resources Control Board; US Census, American Community Survey; USGS Digital Raster Graphics

Redwood Valley Rancheria of Pomo Indians

Water District Service Area Boundary: Redwood Valley Water

Well Location: Redwood Valley Water District

Coyote Valley Band of Pomo Indians

Water District Service Area Boundary: Calpella Water District

Existing Intertie: Calpella Water District & Redwood Valley Water

Intertie Upgrade: Calpella Water District & Millview County Water District

Water District Service Area Boundary: Millview County Water District

Intertie Upgrade: City of Ukiah & Millview County Water District

Well Location: City of Ukiah

Water District Service Area Boundary: City of Ukiah

Intertie Upgrade: City of Ukiah & Willow County Water District

Groundwater Basin: Potter Valley

Groundwater Basin: Ukiah Valley

Well Location: Millview County Water District

Intertie: Rogina Water Company & Millview County Water District

Pinoleville Pomo Nation

Water District Service Area Boundary: Rogina Water Company

Water District Service Area Boundary: Willow County Water District

Lake Mendocino

Russian River

Ukiah

0 1 2 3 4
Miles

N

2. City of Ukiah

Summary

On January 7, 2014, the Mendocino County Board of Supervisors unanimously declared a drought emergency. The drought has produced extreme low water levels in Lake Mendocino, and subsequently the Russian River, which constitutes 71% of the raw water supply for the region. This phased project will upgrade 3 existing and build 2 new interties which will connect six public water systems that serve 34,500 customers. The project also includes the construction of three new wells. Additional groundwater wells will diversify the region's available raw water sources and provide increased water supply reliability for times of drought. An intertie will enable water to be wheeled from the southern-most to the northern-most water system, supplying 50 gallons per person per day to all 34,500 customers. Constructing three new wells, one in the northern-most and the other two near the mid-point of the intertie, will increase the Ukiah Valley community's drought tolerance and climate change adaptation.

Supporting studies or documents

- Project Area Map
- Ukiah Valley System Data provides demand data for the six water suppliers
- Source Capacity Data shows capacity for the six water suppliers
- Source Capacity with Curtailment and Reductions provides drought response measures for each of the six water suppliers
- Drought Conservation Status provides conservation status through 2015 for each of the six water suppliers
- Intertie model provides specific information for connecting the six systems
- Redwood Valley Cost Estimate
- Preliminary Well Design
- Scope and costs for New Water Supply Well and Pump Station for Millview County WD

Recent and historical conditions and how the project addresses them

The recent drought has led to a diminished water supply throughout the Ukiah area with some communities more limited than others. A lack of potable water supply can lead to death in the worst case and to diminished living conditions such as poor sanitation and hygiene. Two water suppliers – Millview and Redwood Valley – are currently under enforcement actions by CDPH due to longstanding source capacity limitations (J. Thiele, City of Ukiah, pers. Comm. 7/17/14). Inadequate supplies also increase stress on vulnerable populations (Oviedo and Fincke 2009). By connecting all water systems in the community, all communities will experience increased water supply reliability.

In its Russian River Watershed Analysis web page, the SWRCB has projected that by June 15 2014 there may be no water available for diversions under a riparian basis of right from the Russian River upstream of the confluence with Dry Creek. Additionally, the Russian River Flood Control District (RRFCD) has

required a 25% reduction of water to its users. Future reductions may also be necessary by RRFCD if fall rains do not provide additional water. Most municipal drinking water systems in the Ukiah/Redwood Valley, with the exception of the City of Ukiah (COU), do not have wells that have been determined by the Board to be percolated groundwater. Therefore, all the communities except COU may be reduced to using 75% of their RRFC allotment. Also, well sources and surface water sources may not be able to provide normal production rates as water levels in the Russian River drop.

Estimates of without-project conditions

If dry year conditions continue in 2015, Redwood Valley County Water District (RVCWD) may not have drinking water supplies. Several other water systems may also be at critical levels. Without this infrastructure and a regional drought contingency plan there will be no way to transfer water from those adjacent water systems with water to those without. Hauling water from outside the area will be the only solution. It is estimated that it will take 72 3,500 gallon water trucks daily to provide 50 gallons per person/day to just RVCWD. This process will release GHGs, contributing to climate change and impacting air quality.

The US Army Corps of Engineers has made preliminary findings that the cost of the alternative - to raise the Coyote Valley Dam - outweighs the potential benefits and that it is unlike that a further study would create findings any different.

If this project is not undertaken, some communities within the Ukiah/Redwood Valley may fall below 50 gallons per person per day; limiting water suppliers' ability to implement the Human Right to Water Policy. The community will continue to suffer the effects of drought conditions and lack local water supply reliability and climate change adaptation capabilities.

Descriptions of methods used to estimate physical benefits

The project proponent estimated physical benefits based on previous experience, water supply and usage records, and technical expertise of staff and consultants. Where appropriate, methods are described in detail in Tables 5.2 a – e. Economic research was conducted by ECONorthwest, an economics consultancy, to determine reasonable economic value ranges for benefits commonly provided by NCIRWMP implementation projects (ECONorthwest 2012). These economic values were derived from the region when possible, and nearby or similar ecosystems or regions where necessary.

Description of any potential adverse physical effects

The potential for impacts from the project will be explored during the CEQA Initial Study and addressed, if necessary, during implementation through the use of BMPs during construction, operation, and maintenance.

Table 5.2 a – Annual Project Physical Benefits

Project Name: _Ukiah Valley-Redwood Valley Water Supply Reliability Intertie and Well Development Project__

Type of Benefit Claimed: ___Increased instream flow for environmental purposes_____

Units of the Benefit Claimed : __Acre-feet per year_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	834	834
2015	0	834	834
2016	0	834	834
yearly	0	834	834
Last Year of Project Life - 2065	0	834	834

Comments: The project proponent estimated groundwater availability, and thus water left instream, based on DWR Bulletin 118 (DWR 2004). This benefit provides an estimated $83,400 per year economic value given a conservative estimate of $100 per acre-foot per year (Brown 2007).

Table 5.2 b – Annual Project Physical Benefits

Project Name: _Ukiah Valley-Redwood Valley Water Supply Reliability Intertie and Well Development Project__

Type of Benefit Claimed: __Increased water supply reliability _____

Units of the Benefit Claimed : __Number of household customers _____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	13,800	13,800
2020	0	13,800	13,800
2025	0	13,800	13,800
Every Five Years	0	13,800	13,800
Last Year of Project Life - 2065	0	13,800	13,800

Comments: This project will provide an estimated economic value of $262,200 every five years given an estimated value of $19 per household per month experiencing increased supply reliability for one month once every five years (Barakat & Chamberlin, Inc. 1994).

Table 5.2 c – Annual Project Physical Benefits

Project Name: _Ukiah Valley-Redwood Valley Water Supply Reliability Intertie and Well Development Project__

Type of Benefit Claimed: _____Revenue from water sales to new customers _____

Units of the Benefit Claimed : _____Acre-feet per year _____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	52	52
2016	0	52	52
Etc.	0	52	52
Last Year of Project Life - 2065	0	52	52

Comments: Project proponent estimates this benefit provides an economic value of $52,000 per year. If new water sources are available it would provide approximately 52 AF of additional groundwater sources. The economic value was calculated at $100/AF

Table 5.2 d – Annual Project Physical Benefits

Project Name: _Ukiah Valley-Redwood Valley Water Supply Reliability Intertie and Well Development Project__

Type of Benefit Claimed: _____Avoided water treatment costs_____

Units of the Benefit Claimed : _____Acre-feet per year_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	52	52
2015	0	52	52
2016	0	52	52
yearly	0	52	52
Last Year of Project Life - 2065	0	52	52

Comments: Project proponent estimates this benefit provides an economic value of $26,000 per year. The economic value was determined by taking the average cost of water treatment per AF, which is $500. It is expected that when new groundwater sources are developed, the amount of surface water treatment will decline.

Table 5.2 e – Annual Project Physical Benefits

Project Name: _Ukiah Valley-Redwood Valley Water Supply Reliability Intertie and Well Development Project__

Type of Benefit Claimed: _____Decreased Operations & Maintenance Costs_____

Units of the Benefit Claimed : _____$_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014		64,500	64,500
2015		64,500	64,500
2016		64,500	64,500
yearly		64,500	64,500
Last Year of Project Life - 2065		64,500	64,500

Comments: The project proponent provided this estimate for the avoided costs associated with labor and capital for operations and maintenance.

Table 6.2 – Cost Effective Analysis Project name: Ukiah - Redwood Valleys Water Supply Reliability Intertie and Well Development Project	
Question 1	Types of benefits provided as shown in Table 5: **Increased instream flow, increased water supply reliability, revenue from water sales, avoided water treatment costs, decreased O&M costs**
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? **Yes**
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs: **The only alternative is to haul from one water system to another. The cost of hauled water is approximately $200-300 per 3,400 gallon tanker. Thus, this would be significantly more expensive and result in considerably more carbon emissions than installing interties. It is also less safe from a bacteriological water quality standpoint than providing water through pipes. Other water sources have been considered but the cost to build the infrastructure far exceeds the cost of these projects. For example the cost to raise the Coyote Valley Dam at Lake Mendocino to increase storage would cost an estimated $300,000,000.**
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.
Comments: **The proposed project is the least cost alternative. It provides water supply reliability and climate change adaptation for the communities that will be connected through the intertie system and supported by two new wells. It will improve water quality in the Russian River by decreasing the quantity of surface water withdrawn for municipal/ domestic use.**	

4. Sonoma County Water Agency.

Sonoma - Mendocino Immediate Drought Relief

Project Description: Implement BMPs including converting turf to low water use plants and providing free professionally installed high efficiency plumbing fixtures.

How project alleviates drought impacts: Water use efficiency measures will have a net gain immediately which will help to lessen the severity of the effects from the drought and contribute to long-term water reliability of future water supplies. This project will provide immediate regional drought preparedness by implementing a High-Efficiency Fixture Direct Install Program and a Cash for Grass Turf Rebate. The program will also assist water suppliers and regions to implement conservation programs and measures that are currently not in place. The Water Agency will mentor program proponents to establish water efficiency and conservation programs. This project is a regional collaboration which will benefit drought-affected areas that have not historically implemented water conservation programs by providing incentives directly to customers.

Drought project type: This project provides immediate regional drought preparedness by implementing water conservation measures to avoid surface water withdrawals in the Russian River during critical low flow periods. This project also increases local water supply reliability and the delivery of safe drinking water; conserved water is the least costly source of "new" water (Pacific Institute and NRDC 2014). It also reduces ecosystem conflicts created by the drought by leaving water instream during low flow periods when conditions are limiting for salmonid survival.

Reason for expedited funding: The project area is historically underserved and precluded from current rebate programs. The region as a whole does not currently have the resources necessary to implement this program at the present time. The project cannot be completed with the existing financial resources of the project proponents. Nearly half of the project area is located in economically disadvantaged communities. Residential and commercial customers do not have the financial resources to undertake program activities on their own within a short period of time to help alleviate drought-related impacts. The Water Agency is providing the largest portion of matching funds, but cannot reach all potential customers through its current budget.

North Coast Resource Partnership

2014 IRWM Drought Project: Sonoma County Water Agency Sonoma-Mendocino Immediate Drought Relief Project

- Drought Relief Project Area
- North Coast IRWM Boundary
- North Coast Tribal Lands
- Groundwater Basins
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community
- California Marine Protected Areas (MPA)
- Area of Special Biological Significance (ASBS)

Data sources: Sonoma County Water Agency; California Department of Water Resources; California State Water Resources Control Board; US Census, American Community Survey; USGS Digital Raster Graphics

Willits
Groundwater Basin: Potter Valley
Redwood Valley Rancheria of Pomo Indians
Coyote Valley Band of Pomo Indians
Ukiah
Groundwater Basin: Ukiah Valley
Groundwater Basin: Sanel Valley
Lake Mendocino
Russian River
Hopland Band of Pomo Indians
Drought Relief Project Area
Groundwater Basin: McDowell Valley
Drought Relief Project Area
Cloverdale
Lake Sonoma
Russian River
Groundwater Basin: Alexander Valley
Groundwater Basin: Knights Valley
Groundwater Basin: Fort Ross Terrace Deposits
Stewarts Point State Marine Reserve
Salt Point State Marine Conservation Area
Groundwater Basin: Santa Rosa Valley
Healdsburg
Windsor
Santa Rosa
Sebastopol
Groundwater Basin: Wilson Grove Formation Highlands
Bodega Bay
Bodega Head State Marine Reserve & Conservation Area
Groundwater Basin: Santa Rosa Valley
Ten Mile Beach State Marine Reserve & Conservation Area
MacKerricher State Marine Conservation Area
Drought Relief Project Area
Fort Bragg
Groundwater Basin: Fort Bragg Terrace Area
Mendocino
0 4 8 12 16
Miles
N

4. Sonoma County Water Agency

Summary

This project will benefit rural Russian River communities by implementing Best Management Practices (BMPs) in water use efficiency and conservation. The project will implement long-term drought preparedness strategies that will net immediate benefits. Sonoma and Mendocino counties are facing drought conditions after two consecutive dry years and the driest year on record in 2013. The need for water efficiency has never been greater. Conserved water is the least costly source of "new" water; it is an effective way to prepare for drought scenarios over the long-term. An aggressive conservation program is essential to increase water supply and reduce strains on Lake Mendocino.

The project will implement BMPs through a high-efficiency fixture direct-install component and a turf replacement component. Project elements include converting high-water-use landscaping (turf) to climate appropriate plant material (low water use plants) and provide free, professionally installed, high efficiency plumbing fixtures (toilets, urinals, showerheads, kitchen faucet aerators and bath faucet aerators). The indoor component addresses 75% of total indoor water use (showers 20%, faucets 18%, toilets 20%, and leaks 18%). The outdoor component addresses 50% of total water use and directly reduces peak demand. High levels of participation are expected based on past programs.

The project focuses on drought-affected areas that have not implemented water conservation programs by providing incentives directly to customers. Early adapters will serve as role models in their communities. The Water Agency will mentor program proponents to help establish conservation programs in their service areas that partner agencies will eventually manage independently. The Water Agency will mentor Upper Russian River agencies in this model that will spread to other water users and that can be replicated in other communities.

Supporting studies or documents

- High-Efficiency Plumbing Fixture Direct Install Water Savings Analysis (Koeller 2011) provides study results on a multi-faceted water conservation direct installation program delivered throughout Sonoma County developed and managed by the Water Agency. Findings demonstrate overall water savings per toilet for residential (27.6 gallons) and commercial (58.9 gallons) installations (page 6).
- Specifications for High-Efficiency Fixtures for Installation (Niagara Conservation 2014) provide specific values for calculation of water savings.
- Sonoma County Water Agency flyer solicits residential participation in water conservation activities (see supporting documentation for Att2).

Recent and historical conditions and how the project addresses them

The project area is in extreme drought. Lake Mendocino remains critical at 47% of capacity. Predictions estimate that the lake could go dry by fall of 2014. The current drought has led to an increase in water resource volatility and uncertainty. When reservoir water levels and ground water tables drop, water

supplies, human health, and the environment are put at serious risk. Lower water levels can contribute to higher concentrations of natural and human pollutants. This project supports the lowest-cost alternative to increasing water supply for the Russian River water supply system. The project can be implemented immediately for net benefits now and over the long-term while helping to modify consumer behaviors toward water conservation.

The alternative is to increase storage capacity at Lake Mendocino which is a costly, long-term strategy. The High Efficiency Plumbing Fixture Direct Install Water Savings Analysis (Koeller 2011) discusses the findings and conclusions of an 11 month program during which over 5,000 fixtures were replaced (pg. 3). Metered water consumption data was used to assess demand reductions, if any, due to fixture and fitting replacements. The analysis compared before and after water consumption data furnished by retail water service providers for the years 2008-2009 and 2009-2010 (pg. 5). A summary of key water saving shows that all fixtures and fittings combined provide an average daily water savings of 56.2 gallons per household (p. 11).

The Russian River provides wildlife habitat including warm and cold freshwater habitat for fish migration and spawning. Low flows caused by record-dry weather are putting anadromous fish at risk. This project supports efforts to provide critical flows to maintain suitable habitat for salmonids throughout the Russian River watershed to give fish resources a better chance to survive this difficult drought and to reduce conflict between water consumers and advocates for environmental beneficial uses.

Drought conditions are a symptom of a changing climate. The project will increase awareness among residential customers on the need to use water with greater efficiency now and in the future. Water conservation will result in reduced energy use for pumping and reduced carbon emissions. By reducing residential water demand, a greater supply of water is available for agriculture and wildlife and the community is more resilient in the face of climate change.

Estimates of without-project conditions

If this project is not implemented, the avoided project would be construction of a 200 AF water storage reservoir to store water in winter months at a one-time cost of $4 M. Water users will be required to implement severe water conservation measures without the benefit of technical expertise provided by SCWA and partners. There will be less water to support environmental and recreational beneficial uses and water supply reliability for the partially disadvantaged Russian River watershed community will continue to be threatened. The community will be less resilient to a changing, drier climate and can expect to experience greater hardships associated with water shortages if the drought continues. Even during average rainfall years, water disputes are common and claims of water shortages are rampant. Dry years magnify disagreements over allocation, management, and use of water resources. If the drought continues the community will experience a decrease in resiliency and water security meaning that Lake Mendocino could go dry and residents who depend on the reservoir for their water supply would have little or no water available to them. The community would need to depend exclusively upon costly imported water.

Descriptions of methods used to estimate physical benefits

Benefits were estimated by the project proponent based on supply records and staff expertise, an analysis of a previous high efficiency program, and research by ECONorthwest, an economics consulting firm, which researched geographically relevant economic values for benefits provided by North Coast IRWMP implementation projects (ECONorthwest 2012). Methods are discussed in detail where appropriate in Tables 5.4 a - e.

Description of any potential adverse physical effects

This project will not generate any adverse physical effects.

Table 5.4 a – Annual Project Physical Benefits

Project Name: Sonoma-Mendocino Immediate Drought Relief Project

Type of Benefit Claimed: Increased instream flow for environmental, agricultural, and municipal purposes

Units of the Benefit Claimed : Acre-feet

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015			
2016	0	151	151
2025	200	151	49
Yearly	200	151	49
Last Year of Project Life - 2045	200	151	49

Comments: This project will leave 151 acre-feet per year instream. The water will be used for downstream agricultural, environmental, and municipal purposes. This project provides an estimated economic value of $80 per acre-foot ($ 12,080) per year (Brown 2007). If the alternative water storage project is undertaken (see Table 5.4 f), it will provide 49 more acre feet per year upon completion, estimated to occur within the next ten years.

Table 5.4 b – Annual Project Physical Benefits

Project Name: __Sonoma-Mendocino Immediate Drought Relief Project_____

Type of Benefit Claimed: _Increased water supply reliability_____

Units of the Benefit Claimed : __# households_ _____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	4,000	4,000
2021	4,000	4,000	0
Every 6 years	4,000	4,000	0
Last Year of Project Life - 2045	4,000	4,000	0

Comments: This benefit has an economic value of $19 per household per month during periods of drought, or approximately $228,000 per year assuming three months each year for 4,000 households. The project proponent estimates drought occurrence to be once every 4 to 7 years due to a changing, drier climate. In absence of the project, water shortages could become frequent and common in the face of disagreements over allocation, management, and use of water resources. If the alternative water storage project is undertaken (see Table 5.4 f), it will likely provide the same benefits upon completion, estimated to occur in 2016 with benefits accruing beginning in 2017.

Table 5.4 c – Annual Project Physical Benefits

Project Name: __Sonoma-Mendocino Immediate Drought Relief Project_____

Type of Benefit Claimed: _Avoided water shortage costs_____

Units of the Benefit Claimed : __$1,000_____ _____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	3,780	3,780
2016	0	3,780	3,780
Yearly	0	3,780	3,780
Last Year of Project Life - 2045	0	3,780	3,780

Comments: By preserving water instream, water shortage costs in the form of costly imported water are avoided. The project proponent provided this cost estimate based on in-house records.

Table 5.4 d – Annual Project Physical Benefits

Project Name: __Sonoma-Mendocino Immediate Drought Relief Project_____

Type of Benefit Claimed: _Avoided electric costs_____

Units of the Benefit Claimed : __kWh per y____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	7,384	7,384
2016	0	7,384	7,384
Yearly	0	7,384	7,384
Last Year of Project Life - 2045	0	7,384	7,384

Comments: The estimated economic value of avoided electric costs is $1,475 yearly. Project proponent estimated costs based on previous experience

Table 5.4 e – Annual Project Physical Benefits

Project Name: __Sonoma-Mendocino Immediate Drought Relief Project_____

Type of Benefit Claimed: _Increased quantity or quality of recreation or public access_____

Units of the Benefit Claimed : ___# recreation days_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	270	270
2016	0	270	270
2017 and yearly thereafter	270	270	0
Last Year of Project Life - 2045	270	270	0

Comments: The project proponent estimates that this project will increase the quantity or quality of each of nine types of recreation or public access (camping, fishing, hiking, motorboating, mountain biking, picnicking, sightseeing, swimming, wildlife viewing) by 30 days each year, for an estimated economic value of $15,900 (Loomis 2005). The quality and quantity of recreation activities will increase because of increased instream flow. If the alternative water storage project is undertaken (see Table 5.4 f), it will likely provide the same benefits upon completion, estimated to occur in 2016 with project benefits beginning to accrue in 2017.

Table 5.4 f – Annual Project Physical Benefits Project Name: __Sonoma-Mendocino Immediate Drought Relief Project_____ Type of Benefit Claimed: _Carbon emissions reductions_____ Units of the Benefit Claimed : __tons_____ Additional Information About this Benefit_____			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	2	2
2016	0	2	2
Yearly	0	2	2
Last Year of Project Life - 2045	0	2	2
Comments: The project proponent estimated emissions reductions as follows: Savings = 151 acre-ft/yr * 48.9 kWh/acre-ft = 7,384 kWh/yr. CO2= 7,384 kWh/yr * 0.611 lb CO2/kwh * 6.836% line losses= 4,512 lb CO2/yr = 2 tons/yr. http://oaspub.epa.gov/powpro/ept_pack.charts#result. The economic value of this benefit is $15 per ton of CO2 equivalent, or $30 per year.			

Table 5.4 g – Annual Project Physical Benefits Project Name: __Sonoma-Mendocino Immediate Drought Relief Project_____ Type of Benefit Claimed: _Avoided water supply projects_____ Units of the Benefit Claimed : __$_____ Additional Information About this Benefit_____			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2016	0	4,000,000	4,000,000
2017	0	30,000	30,000
2018	0	30,000	30,000
yearly	0	30,000	30,000
Last Year of Project Life - 2045	0	30,000	30,000
Comments: The proposed project provides 151 acre-feet of water; the avoided project would be a one-time cost of $4 M to design and build a 200 AF water storage reservoir to store water in winter months. Annual costs to operate and maintain the reservoir would be about $30,000. This is a conservative estimate based on SCWA experience with other projects of similar size and scope.			

Table 6.4 – Cost Effective Analysis Project name: Sonoma-Mendocino Immediate Drought Relief Project	
Question 1	Types of benefits provided as shown in Table 5: **Increased instream flow for environmental, agricultural, and municipal purposes, increased water supply reliability, avoided water shortage costs, avoided electric costs, increased recreation/ public access, carbon emissions reductions.**
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? **In order to increase capacity at Coyote Valley Dam the alternative is to raise the dam at Lake Mendocino. Raising the dam is a multi-million dollar project that will take years to design, permit, and construct before benefits reach the community, if the proposed project survives legal challenges. This strategy would have no effect on communities suffering from the effects of drought at the present time.**
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. **The proposed project provides 197 acre feet of water. The avoided project cost would be a one- time cost of $4M to design and build a 200 AF water storage reservoir to store water in winter months. Annual costs to operate and maintain the reservoir would be $30,000. This is in addition to the one-time cost. This is a conservative estimate based on Water Agency experience on other projects of similar size and scope. The project helps avoid or delay raising the Coyote Valley Dam at Lake Mendocino. If Lake Mendocino goes dry, the community will have to buy water, if available. Increasing storage capacity at Coyote Dam is a long-term strategy. These alternatives come at a great cost to the community. This project preserves existing riverine ecosystems and groundwater supply by implementing water conservation strategies immediately that will net benefits at implementation and into the future.**
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. **The proposed project is the most cost effective means to achieving the proposed physical benefits. It is imperative to modify consumer behaviors regarding water use, water efficiency, and conservation. In order to positively influence consumer behavior, the project will work directly with consumers. It is crucial to develop communities of efficient water users. Residential and commercial customers need the right tools to get the job done. Good planning and water use management is critical.**
Comments:	

5. Lewiston Park Mutual Water Company

Meter Installation

Project Description: Installation of household water meters and changing to a tiered billing system to encourage water conservation and provide water supply reliability.

How project alleviates drought impacts: By installing meters, Lewiston Park Mutual Water Agency (LPMWC) will be able to analyze usage data for conservation efforts, impose tiered rates to encourage conservation, and detect and repair leaks. This will increase local water supply reliability and sustainability for a DAC, ensuring compliance with the Human Right to Water. The project will also increase instream flow in the Trinity River and allow for recharge of local aquifers.

Drought Project Type: This project provides immediate regional drought preparedness by promoting conservation. Meter installation and tiered rates will incentivize conservation in a community that has so far been unwilling to implement conservation practices.

Reason for Expedited Funding: Meter installation on LPMWC funding alone is estimated to take a minimum of 6 years. The company attempts to install two meters per month if company funds allow. LPMWC currently takes in roughly $13,000/month; payroll is $3000, operating (both variable and fixed) are roughly $8000, leaving only $2000 for repairs, meter installation, or to put in a separate account for future improvement. This does not include quarterly costs such as Corporate or Payroll Taxes. As it stands, LPMWC takes in just enough money to pay bills, but not enough money to install 167 meters in a timely fashion. Currently LPMWC must rent a backhoe for meter installations; the company must rely on other renters to return it on time and for the renter to properly maintain it. Both of these have been issues and have resulted in projects not being completed in a timely or efficient manner. LPMWC is considering purchasing a backhoe for $35,771.70. Funding for purchasing it would allow for faster project completion.

Trinity River Raw Water Intake

Raw Water Control & Valves

Well #7

Treatment Plant & Well 2

Well #6

Storage Tank and Well #4/5

Lewiston Park Mututal Water Company Service Area

Trinity Lake

Weaverville

Hayfork

Groundwater Basin: Hayfork Valley

Lewiston Park Mututal Water Company Service Area

0 750 1,500 2,250 3,000 Feet

North Coast Resource Partnership

2014 IRWM Drought Project: Lewiston Park Mututal Water Company Meter Installation Project

- Lewiston Park Mutual Water Company Service Area
- North Coast IRWM Boundary
- Groundwater Basins
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community

Data sources: Yurok GIS Department; California Department of Water Resources; US Census, American Community Survey; California State Water Resources Control Board; USGS Digital Raster Graphics

5. Lewiston Park Mutual

Summary

There are five wells that LPMWC uses to supply safe drinking water. Well production numbers have been declining since January 2014. This has caused LPMWC to begin using the river pump on the Trinity River much earlier than normal, and LPMWC must issue a Boil Notice due to the deteriorated state of the Treatment Plant. With declining well production, LPMWC is concerned about the health of the ground water supply. With Trinity Lake already at 40%, Trinity River may not have good flow for the duration of summer

The California Rural Water Association is urging LPMWC to install meters on all customers as soon as possible so that a rate study can be conducted. As it stands, LPMWC knows only what the wells and/or river pump are producing each day. LPMWC has no way to know how much water any given household uses. With meters and a rate study, LPMWC will be able to better understand where all the water produced is going by conducting a water audit. This will assist LPMWC in discovering any leaks in the delivery system and/or in customer's homes. All of this will enable LPMWC to apply for future funding to upgrade the system, to be more efficient, and better able to conserve water for the health of the groundwater supply and the Trinity River.

Supporting studies or documents

- California Water Service Co. (2009) estimates that introducing meters generally encourages water conservation in the 10 – 12% range
- Communities without meters use an average 39 percent more water per capita than the state average (Rogers 2014)
- In places where meters have been installed, water use has substantially declined (Rogers 2014)
- LPMWC May – June Well Production well production data and associated graphs (2014) show that groundwater wells are running dry.

Recent and historical conditions and how the project addresses them

Lewiston Park Subdivision was originally built in the late 1950s when Trinity Dam was being built. Historically, Lewiston is a mining, dam building, and lumber town and area; currently it is a town without an industry. The Lewiston Park Mutual Water Company (LPMWC) was formed to provide water to the residents of the subdivision. Customers have always paid a flat rate for "unlimited" water use. Currently, it is estimated that LPMWC's customers use at least 3 times the national average of water per person per day based on current and past well production figures (LPMWC 2014). LPMWC suspects that part of the loss is due to household leaks that customers have no incentive to fix and part may be due to leaks within the distribution system. Since each meter also has a leak detection meter, it will assist LPMWC in discovering where the leaks reside (residential or distribution) and enable both homeowners and LPMWC to fix them. Since June, LPMWC employees have been actively looking for water waste and instituting a penalty structure; they have been speaking to customers who simply reply with, “I pay my

water bill therefore I can use whatever I want." LPMWC is trying to curb this mentality by installing meters so that customers pay for water used and by instituting a penalty fee schedule. The average daily water production for LPMWC is approximately 150,000 gallons/day divided by (an estimated) 500 people equals 300 gal/person/day which is three times the national average.

In current drought conditions, LPMWC has been unable to enforce water conservation despite outreach regarding the drought, conservation measures, and projected changes to the distribution system since November 2013. Metering customers will enable LPMWC to enforce conservation during times of drought and provide data necessary to maintain and improve the system's aging infrastructure. LPMWC will continue outreach as meters are installed to encourage conservation during times of drought. The data supplied through metering will allow LPMWC to more accurately forecast water supply and develop appropriate responses to projected conditions, making the community less vulnerable to changes in precipitation and other weather associated with climate change.

The Trinity River supports salmonid populations in the Klamath River, especially during summer months. The area of the Trinity Watershed Management Area upstream of Weaverville has a temperature elevation problem due to withdrawals by the Trinity River Diversion (NCRWQCB 2005). By using the Trinity River less – LPMWC anticipates about a 30% decrease in withdrawals from the Trinity River – more water is left instream to benefit fisheries and aquatic habitat.

For LPMWC, meters are a sign of moving in the right direction. Meters are the first, and most important, step in determining how much water customers are actually using, ensuring customers pay for actual water used, and enforcing water conservation - especially during times of drought. Outreach efforts will assist in educating customers about conservation and water waste and their effect on their local ecosystems.

Estimates of without-project conditions

Without funding, this project would likely not be completed until 2020. Currently, LPMWC is running three wells 24/7 to meet demand, however, this has not been enough to meet demand. Two of the wells do not produce adequately – one will only pump for two or three hours before it begins to suck air and the other will run for a day or two until it begins to suck air. If the drought continues through 2015 or longer, LPMWC and its customers would continue to experience a severely diminished water supply; the worst case scenario is that the water could actually run out.

If this drought continues, the groundwater supply will continue to diminish and the flow from Trinity River will not be enough to sustain habitat. It is possible that water rights may be limited and in the worst case scenario, revoked until such time that there is enough water. If the drought continues, LPMWC may have to limit households to a specified amount of time daily to use water, such as two or four hours per day.

Without metering and until drastic water rationing measures are imposed, customers will continue to believe that they have "unlimited" water. Current attempts at voluntary water conservation have been met with anger, resentment and frustration. Lack of conservation measures by users and the current

drought have brought LPMWC to the current conditions - low well production numbers and Boil Water Notices due to being forced to use the river pump, which supplies water that is unfit for human consumption.

Lewiston Park is located in a wilderness area and threat of wildfire is very real, especially during the increasing hot and dry summer months. If the water supply has dwindled to the worst case scenario, it is plausible that the community could be without sufficient water to fight a fire. Without funding assistance, meter installation is projected to take a minimum of 5 years and a maximum of 7 years as the LPMWC would only be able to complete them as funds allow, approximately two meters per month for 167 connections.

Descriptions of methods used to estimate physical benefits

Included in the application are well production figures with graphs for January through June 2014, and prior years in the same time frame. Well production in 2011 and 2012 was steady and LPMWC typically only used two wells. For 2014, LPMWC has been running 3 to 5 wells at any given time to meet customer demand due to the groundwater not being recharged as in the past. Wells are also running dry regularly; this requires a reset of the pumping equipment, which is detrimental to both the aquifers and well pump equipment (LPMWC 2014).

Description of any potential adverse physical effects

Adverse physical effects of meter installation are expected to be nonexistent; this project does not require CEQA analysis.

Table 5.5 a – Annual Project Physical Benefits Project Name: Meter Installation Type of Benefit Claimed: Increased instream flow for environmental purposes Units of the Benefit Claimed : % increase Additional Information About this Benefit			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	15	15
2015	0	30	30
2020	30	30	0
Yearly	30	30	0
Last Year of Project Life - 2065	30	30	0
Comments: The addition of meters with a tiered rate structure will ultimately decrease the amount of water used from the Trinity River. Due to lack of historical records, this is LPMWC's current best estimate of how much water would not be pulled out of the Trinity River. This benefit is expected to provide a conservatively estimated economic value of $80 per acre-foot per year. A higher monetary value may be appropriate since Trinity River water is being made available to Central Valley users (Brown 2007). The project alternative LPMWC adding meters as possible will take between 5 – 7 years, providing the same benefits around 2020.			

Table 5.5 b – Annual Project Physical Benefits

Project Name: Meter Installation

Type of Benefit Claimed: Water supply reliability

Units of the Benefit Claimed : # households

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	167	167
2024	167	167	0
2034	167	167	0
every ten years	167	167	0
Last Year of Project Life - 2065	167	167	0

Comments: This benefit is expected by the project proponent to occur every ten years, for an estimated economic value of $3.173 about every ten years (Barakat & Chamberlin, Inc. 1994). The project alternative LPMWC adding meters as possible will take between 5 – 7 years, providing the same benefits around 2020.

Table 5.5 c – Annual Project Physical Benefits

Project Name: Meter Installation

Type of Benefit Claimed: Increased groundwater recharge

Units of the Benefit Claimed : % increase

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	50 - 70	50 - 70
2015	0	50 - 70	50 - 70
2020	50 – 70	50 - 70	50 - 70
Yearly	50 – 70	50 - 70	50 - 70
Last Year of Project Life - 2065	50 - 70	50 – 70	50 - 70

Comments Current water production figures tells LMPWC that its usage is the three times the national average. Metered rate structures will assist in pulling it down to national average. It is shown that when customers pay for water actually used, they monitor themselves and water usage will drop. Due to this drop, LPMWC will be able to allow wells to run and/or recharge. Currently, LPMWC has only two wells that produce, one well that will produce well for either a few hours or a couple days before sucking air, and two wells that are not worth running as they are dry (per the state's request, they are only run when the river pump is turned on). The project alternative, LPMWC adding meters as possible, will take between 5 – 7 years, providing the same benefits around 2020.

Table 5.5 d – Annual Project Physical Benefits

Project Name: Meter Installation

Type of Benefit Claimed: Avoided electric costs

Units of the Benefit Claimed : % reduction

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	0	0
2015	0	50	50
2020	50	50	0
yearly	50	50	0
Last Year of Project Life - 2065	50	50	0

Comments: Project proponent estimates the economic value is approximately 11,929.90 per year in avoided electric costs. On Trinity River, LPMWC has two 15hp river pumps to pump water up to the treatment plant and during peak demand dry months, the Trinity Public Utility District (electric utility) bill doubles. There are also two 15hp pumps at the treatment plant to transport the water through the distribution system. An average PUD bill will range from $1,100 to $1,500, but during peak months, the PUD bill can jump over $3,000. By cutting the electric costs, that money can then be put aside for future improvements and/or upgrades. Project implementation will provide an estimated $1,500 per year every year through 2020, when the alternative project – phased metering would be complete.

Table 5.5 e – Annual Project Physical Benefits Project Name: Meter Installation Type of Benefit Claimed: Education Benefits Units of the Benefit Claimed : # people Additional Information About this Benefit			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	500	500
2015			
2020	500	0	500
2021			
Last Year of Project Life - 2065			
Comments: Project proponent estimates the educational outreach materials accompanying the newly installed meters will reach about 500 people. Outreach materials provide conservation information for people to decrease their water use. The project alternative - LPMWC adding meters as funding allows will take between 5 – 7 years, providing the same benefits around 2020. Thus, this project provides educational benefits and the associated expected changes in behavior six years before the alternative.			

Table 6.5 – Cost Effective Analysis Project name: Meter Installation	
Question 1	Types of benefits provided as shown in Table 5: increased instream flow, **water supply reliability, increased groundwater recharge, avoided electric costs, and community water conservation education.**
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? **No.**
	If no, why? **The only alternative at this stage is to NOT install meters. This will have a detrimental effect on LPMWC's water supply, especially if the drought continues.**
	If yes, list the methods (including the proposed project) and estimated costs: **By not installing meters, LPMWC will continue to not know how much water each household is using and will continue to be unable to properly enforce water conservation. This will be detrimental to not only the customers but to the aquifers and the river from which LPMWC gets its water.**
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods: **Meter installation is the lowest cost incentive to ensure water conservation.**
Comments: **LPMWC estimates that customers use at least 3 times the national average, based on well production figures. LPMWC believes that through water conservation, it can save up to 50% on its annual electric bill. Currently, LPMWC is over-pumping the wells and running the river pump in order to meet customer demand as the Company cannot enforce conservation.**	

7. City of Fort Bragg.

Summers Lane Reservoir Project

Project Description: Construction of a 45 acre-foot reservoir on a 40 acre site plus associated off-site piping and controls to provide water supply reliability for a DAC.

How project alleviates drought impacts: The Summers Lane Reservoir will diversify sources and increase water supply reliability for the City of Fort Bragg during periods of declining water supply (drought.). At this time, the City can nominally meet current demands, though it has implemented mandatory conservation measures in three of the last five years. A lengthening or worsening of drought conditions will inevitably lead to water usage restrictions, creating regional economic hardship, reducing fire safety, and creating potential public health concerns. Without some sort of storage facility the City has no sources to fall back on, and a critical shortage can quickly occur.

Drought Project Type: This project will increase local water supply reliability and the delivery of drinking water through construction of water storage to diversify water sources for the City of Fort Bragg. The project also reduces ecosystem conflicts created by the drought by allowing the City to meet minimum diversion requirements for the Noyo River during droughts or water source emergencies.

Reason for Expedited Funding: The Summers Lane Reservoir Project was conceived to address drought preparedness, along with long-term sustainability of the City's water supply. Studies were performed and Design Plans and Specifications were prepared. Construction funding for the proposed project has not been available in the City's Water Enterprise Fund and the project has been suspended for the last few years. Under the current drought conditions it is imperative that funding be identified to construct the Reservoir. After two consecutive dry years, 2014 is shaping up to be the third-driest on record (Water Education Foundation 2014). In order to avoid Water Emergencies, construction of the reservoir is now critically necessary.

City of Fort Bragg Water Service Boundary

Water Treatment Plant

Noyo Pump Station

Newman Diversion Meter

Summers Lane Reservoir Meter

Waterfall Gulch Meter

Summers Lane Reservoir

Ten Mile Beach State Marine Conservation Area

Goundwater Basin: Fort Bragg Terrace Area

MacKerricher State Marine Conservation Area

City of Fort Bragg Water Service Area Boundary

Fort Bragg

Noyo River

Pygmy Forest Ecological Staircase ASBS

Point Cabrillo State Marine Reserve

Russian Gulch State Marine Conservation Area

Mendocino

Goundwater Basin: Fort Bragg Terrace Area

0 0.25 0.5 0.75 1 Miles

North Coast Resource Partnership

2014 IRWM Drought Project: City of Fort Bragg Summers Lane Reservoir Project

- City of Fort Bragg Water Service Area Boundary
- Project Pipeline
- North Coast IRWM Boundary
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community
- Groundwater Basins
- California Marine Protected Areas (MPA)
- Area of Special Biological Significance (ASBS)

Data sources: Mendocino County, California Department of Fish and Wildlife, Marine BIOS; California Department of Water Resources; US Census, American Community Survey; California State Water Resources Control Board; USGS Digital Raster Graphics

7. City of Fort Bragg

Summary

This project consists of construction of a 45 acre-foot reservoir on a 40-acre site, plus associated off-site piping and controls. Approximately 7.5-acres will be cleared for the footprint of the reservoir and associated piping. The reservoir will be lined with a 60-mil high-density polyethylene (HDPE) liner and the site will be enclosed with a locking gate and 6-foot high chain link fence. The pipe inlet delivering water to the reservoir is located at Waterfall Gulch, approximately 2 miles south. This inlet currently delivers water to the City of Fort Bragg and the existing Newman Reservoir. The new pipeline for the reservoir will connect to an existing 6-inch diameter pipeline approximately 280 feet west of the intersection of Brush Creek Road and Summers Lane and will discharge into the south end of the reservoir. A bypass line will continue around the reservoir and tie to the outlet.

Supporting studies or documents

- The Summers Lane Pond Plans provide (Lawrence & Associates 2010) detailed drawings of project specifications.
- Lawrence & Associates, an engineering firm with expertise in hydrology and water management, prepared a preliminary design report which included design (pages 21-27), preliminary engineer's estimate (Appendix B), and schedule (Appendix C). It also included a Hydraulic Capacity Model (Figures 5, 6, 7 starting on page 28) with Hydraulic Calculations (Appendix A).
- A Timber Harvest Plan contract was awarded in 2008 for site clearing; it will be approved once the Mitigated Negative Declaration for the project is approved, and prior to acquiring the Timber Harvest Permit, which is scheduled for 9/1/14

Recent and historical conditions and how the project addresses them

The City manages water diverted from the 303(d) listed Noyo River, Newman Gulch (a tributary of Noyo River), and Waterfall Gulch by balancing withdrawals seasonally and tidally. The Noyo diversion must meet minimum bypass flows during drought or other emergencies. The City provides municipal water and trucks water to surrounding North Coast residents – all of these end users rely on these three surface water diversions. Construction of the Reservoir will allow for storage of water from Waterfall Gulch and will decrease reliance on water pumped from the Noyo River during the late summer months and periods of drought when demand peaks and flows diminish, thus allowing the City to meet minimum bypass flows for the Noyo.

In the current drought, water supply is likely to become limited by the end of the summer. The City can provide water as long as it is available, day-to-day, hour-to-hour. When surface flows fall below normal daily needs, there is no supply to fall back on. In the early 1990's, the City undertook a major upgrade of its water treatment facilities. Due to capacity constraints, a water conservation plan was implemented, including: leak detection, water supply metering, water consumer plumbing retrofits, and switching

major industries off City water. The next logical step in water supply infrastructure is development of a water storage facility – this proposed project.

The City is currently experiencing conflict associated with its ability to successfully meet minimum diversion requirements for the Noyo River during droughts or source water emergencies. Thus, not only does this project provide ecosystem benefits by enabling the City to meet minimum bypass requirements, it also provides social benefits through conflict reduction.

The City uses electricity to pump water from the river sources; the new reservoir will use gravity flow to the existing water treatment facility. This will decrease energy use, greenhouse gas emissions, and carbon footprint. Evaporative losses will be minimized with a floating cover; this also minimizes heat gain and waterfowl activity.

The City is not well prepared for climate adaptation; this project will diversify water supply sources, strengthening water supply reliability in future in which the weather patterns are expected to become increasingly variable. Additionally, by decreasing the amount of energy used for pumping by substituting gravity driven water storage, this project decreases GHG emissions, contributing towards state and federal goals for climate change mitigation.

Estimates of without-project conditions

If the project is not implemented, additional water conservation, including rationing, will be implemented. The surface water supply will continue to dwindle and if drought conditions persist, a critical shortage may occur. The City will continue to use electricity to pump water from the rivers and will continue to generate GHGs, thus contributing to, rather than ameliorating, climate change. Additionally, the City will not be resilient to changes in precipitation and temperature expected due to climate change. It will continue to experience issues with water supply reliability, social and environmental conflicts and potential inability to meet the Human Right to Water Policy.

Descriptions of methods used to estimate physical benefits

Physical benefits were estimated using engineering plans and specifications, City records, data, and technical expertise, and research by ECONorthwest, an economics consulting firm (ECONorthwest 2012). Greater detail is provided in Tables 5.7 a – f as appropriate.

Description of any potential adverse physical effects

No potential adverse physical effects have been identified; a Mitigated Negative Declaration has been filed. All implementation activities will be performed in accordance with professional standards and using BMPs.

Table 5.7 a – Annual Project Physical Benefits Project Name: _Summers Lane Reservoir Project_____ Type of Benefit Claimed: ____Increased instream flow for municipal purposes_____ Units of the Benefit Claimed : ___Acre-feet_____ Additional Information About this Benefit_____			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	135	135
2016	0	135	135
Yearly	0	135	135
Last Year of Project Life - 2065	0	135	135
Comments: This benefit is expected to provide a conservatively estimated economic value of $10,800 ($80 per acre-foot) per year (Brown 2007).			

Table 5.7 b – Annual Project Physical Benefits Project Name: Summers Lane Reservoir Project Type of Benefit Claimed: Increased water supply reliability Units of the Benefit Claimed : # households Additional Information About this Benefit			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	2,900	2,900
2017	0	2,900	2,900
2019	0	2,900	2,900
every other year	0	2,900	2,900
Last Year of Project Life - 2065	0	2,900	2,900
Comments: This benefit is expected to provide an estimated economic value of $435,000 every other year (Barakat & Chamberlin 1994). Using a value of $25/household/month yields $300/household/year. This amount multiplied by the 2,900 households results in a value of $870,000 assuming a benefit every year. From 2009 through 2014 (a period of six years), the City of Fort Bragg declared three water emergencies. This is a one in two year occurrence of water shortages or a 50% probability. Construction of the Summers Lane Reservoir will eliminate the water shortage occurrences. This yields a 50% reduction in magnitude. Fifty percent of $870,000 results in a net benefit of $435,000. The alternative projects were not evaluated in this Table because they have been deemed infeasible at this time (see Table 6.7). If they were feasible, they would provide the same benefit upon completion.			

Table 5.7 c – Annual Project Physical Benefits Project Name: _Summers Lane Reservoir Project_____ Type of Benefit Claimed: _Avoided water shortage costs_____ Units of the Benefit Claimed : _____gallons per day_____ Additional Information About this Benefit_____			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	800,000	800,000
2017	0	800,000	800,000
2019	0	800,000	800,000
every other year	0	800,000	800,000
Last Year of Project Life - 2065	0	800,000	800,000
Comments: This benefit will generate an estimated $3,360,000 every two years. The project proponent estimates that the purchase of 800,000 gallons per day for 14 days at $0.30 per gallon will be avoided every two years. From 2009 through 2014 (a period of six years), the City of Fort Bragg declared three water emergencies. This is a one in two year occurrence of water shortages or a 50% probability. The alternative projects were not evaluated in this Table because they have been deemed infeasible at this time (see Table 6.7). If they were feasible, they would provide the same benefit upon completion.			

Table 5.7 d – Annual Project Physical Benefits

Project Name: _Summers Lane Reservoir Project_____

Type of Benefit Claimed: ___Avoided electric costs_____

Units of the Benefit Claimed : ____# hours per year_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	196	196
2015	0	196	196
2017	0	196	196
Yearly	0	196	196
Last Year of Project Life - 2065	0	196	196

Comments: By not pumping at peak hours, the City of Fort Bragg could have saved 196 hours of peak demand pumping last year. This would have applied to 50 days in 2013. Typical hourly pumping costs are $27/hour based on PG&E billing. Assuming four hours/day of pumping, the calculation extends to an estimated annual savings of $5,300/year. The alternative projects were not evaluated in this Table because they have been deemed infeasible at this time (see Table 6.7). If they were feasible, they would provide the same benefit upon completion.

Table 5.7 e – Annual Project Physical Benefits

Project Name: _Summers Lane Reservoir Project_____

Type of Benefit Claimed: __Avoided costs associated with emergency repairs_____

Units of the Benefit Claimed : ____$_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015		7,400	7,400
2016		7,400	7,400
2017		7,400	7,400
yearly		7,400	7,400
Last Year of Project Life - 2065		7,400	7,400

Comments: There have been six major pump breakdowns over the last 12 years; four of them happened in the last three years. Based on this, projections assume a breakdown will occur on average every two years. When a pump is down, it takes about three days to get a repair person on site to perform the repair. Occasionally, a shaft breaks or a motor fails and this repair can take from two to four weeks. Assume approximately three days for this calculation. To account for overtime charges for work done during a weekend or a holiday, a 32% chance was calculated. Straight time charges are approximately $1,350/day. Overtime rates are approximately $2,000 /day. Combined, these values yield $14,800. Since the chance is only 50% per year, the net value is $4,400. In addition, a fire truck is used in lieu of the pumps, when they are inoperable, at a cost of $2,000/day. Similarly, accounting this for over three days of use adjusted for a 50% probability of occurrence yields a cost of $3,000/year. Combined with the repair costs, the total is $7,400/year. The alternative projects were not evaluated in this Table because they have been deemed infeasible at this time (see Table 6.7). If they were feasible, they would provide the same benefit upon completion.

Table 5.7 f – Annual Project Physical Benefits

Project Name: Summers Lane Reservoir Project

Type of Benefit Claimed: Avoided water treatment costs

Units of the Benefit Claimed : $

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	500	500
2016	0	500	500
2017	0	500	500
yearly	0	500	500
Last Year of Project Life - 2065	0	500	500

Comments: Project proponent estimated this benefit based on historic records. When water from the current alternate source (Newman Gulch), is relied upon during the winter months, operational problems from using the more turbid raw water arise at the water treatment plant. Last year, one day of Newman Gulch raw water usage resulted in seven days of additional treatment effort, (e.g. operating hours lengthen, additional clarifier flushes, increased flocculant usage, etc,). This represents an annual cost of $500/year. The alternative projects were not evaluated in this Table because they have been deemed infeasible at this time (see Table 6.7). If they were feasible, they would provide the same benefit upon completion.

Table 6 – Cost Effective Analysis Project name: Summers Lane Reservoir Project	
Question 1	Types of benefits provided as shown in Table 5: **increased instream flow for municipal purposes, increased water supply reliability, avoided water shortage costs, avoided electric costs, avoided costs associated with emergency repairs, avoided water treatment costs**
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? **Yes**
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. **Earlier this year, the City entered into a purchase agreement for a property with long-term potential for development of a well field. The property costs were estimated at approximately $900k and the well-field development at $2.5 million. Operating costs would include pumping and water treatment. The property owner terminated the purchase agreement. The City has investigated the potential acquisition of Georgia Pacific's licensed water rights on the Noyo but determined that those rights will not yield additional water during drought conditions a point of diversion was shared with identical pumping restrictions. The City has determined that the Summers Lane Reservoir project is the most feasible and cost-effective means of improving water supply reliability.**
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. **The proposed alternative is the least cost alternative that will provide the greatest benefits.**
Comments: **Fort Bragg's raw water system depends on surface sources and pumping from the Noyo River. As demand, climate change, and drought risks increase, a new storage facility is a critical need. The Reservoir Project creates dedicated storage that will be adaptively managed to respond to drought conditions and other water emergencies. This storage will enhance the long-term sustainability of Fort Bragg's water supply.**	

8. Gualala River Watershed Council.

The Flow Bank - Protecting Stream Flow in the Gualala

Project Description: This project will reduce use of water diversions by installing rainwater catchment systems and increased off-stream storage capacity and implementing conservation measures.

How project alleviates drought impacts: The project will promote and implement rainwater catchment systems as an alternative water source to increase streamflow during the critical summer period while providing the watershed community with water supply reliability. Through strategic partnerships, the GRWC will address the impact of drought conditions in the watershed, increase the local community's awareness about drought issues facing the watershed, assist local water entities in promoting conservation measures, monitor the effectiveness of the systems, and identify best management practices to maximize benefits to people and ecosystems. The GRWC does not foresee any delay in implementing this phase of our program. The project is ready to be implemented; participants have been identified and no permitting is required.

To alleviate drought-related impacts, the GRWC will install fifty-five 5,000 gallon residential and commercial rain water catchments and seven 55,000 gallon systems, providing winter water collection for use during dry periods. This project will save close to twenty million gallons of water over the life of the tanks that would normally be pumped from diversions, surface springs and shallow wells. The project will be implemented through an existing and dynamic program, building upon GRWC partnerships, minimizing costs and maximizing the outcomes associated with attainment of Gualala River TMDL and Basin Plan goals.

Drought Project Type: This project increases local water supply reliability and the delivery of safe drinking water by providing an alternative source of water to instream diversions, thus increasing instream flow during critical low-flow periods. Because the project leaves water instream for environmental beneficial uses during critical stages of salmonid life cycles, it also reduces ecosystem conflicts created by the drought.

Reason for expedited funding: Landowners in our rural watershed have a range of incomes, some below poverty. To assist the landowners with limited incomes, the GRWC will calculate a landowner match considerate of household incomes and financial limitations. The funds provided for this proposal will provide an incentive for landowners otherwise unwilling to implement water conservation measures on the scale outlined in this proposal.

Del Mar Landing
State Marine Reserve

Stewarts Point Rancheria
Kashia Band of Pomo Indians

South Fork Gualala River

Stewarts Point
State Marine Reserve

Salt Point
State Marine
Conservation Area

Gualala River
Watershed Council Boundary

0 1.5 3 4.5 6
Miles

Groundwater Basin:
Annapolis Ohlson Ranch Highlands

Stewarts Point Rancheria
Kashia Band of Pomo Indians

Del Mar Landing
State Marine Reserve

Stewarts Point
State Marine Reserve

Groundwater Banin:
Fort Ross Terrace Deposits

Salt Point
State Marine
Conservation Area

Gualala River
Watershed Council Boundary

North Coast Resource Partnership

2014 IRWM Drought Project: Gualala River Watershed Council The Flow Bank Program Protecting Stream Flow in the Gualala River

- North Coast IRWM Boundary
- Gualala River Watershed Council Boundary
- Participating Parcels
- Commercial Tanks: 55,000 gallon
- Rainwater Catchment Tank: 5,000 gallon
- North Coast Tribal Lands
- North Coast 303d Listed Waterbodies
- North Coast 303d Listed Streams
- California Marine Protected Areas (MPA)
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community
- Groundwater Basins

Data sources: Gualala Redwoods, Gualala River Watershed Council, California Department of Fish and Wildlife, Marine BIOS; California Department of Water Resources; US Census, American Community Survey; California State Water Resources Control Board; USGS Digital Raster Graphics

8. Gualala River Watershed Council

Summary

The GRWC developed The Flow Bank Program to address the growing crisis of severe seasonal water shortage within the watershed. The program is designed to increase surface flow during the critical summer low flow period to protect aquatic wildlife and provide a secure and reliable water supply for the human community.

The focus of this project is to reduce the use of water diversions by providing rainwater catchment systems and increased off-stream storage capacity to the agricultural and residential community in exchange for a commitment to decrease water extraction during low flow periods.

A pattern of low flows in the Gualala has caused areas of both main-stem and tributary reaches to dry up, leaving disconnected channels and poor water quality in the remaining reaches. Since the onset of the drought, creeks are not meeting winter and summer minimum bypass flow requirements, severely impacting local water companies and triggering increased water costs to their customers. As their streams, springs and wells dry up, rural residents outside the water district boundaries have been forced to import purchased water.

Supporting studies or documents

- Gualala River Synthesis Report (Klamt et al. 2002). Surface water diversions can have a major impact on streamflow and fisheries habitat; method of diversion is also important (p 3 – 5, Appendices, p. 22, 25). Low flow constraints will most likely prohibit future appropriative water right allocations (Appendices, p. 25)
- Gualala River Estuary Study (ECORP 2005).
  - Significant changes to the magnitude or timing of a physical condition or process – such as flow – will have a significant effect on estuary ecology (p. 217).
  - This project meets Management Goal and Objective 1: "To protect the current supplies, and enhance, if necessary, freshwater inflow to the coastal estuary (p. 125)" by providing an alternate source for domestic and community water and thus increasing inflow into the coastal estuary.
  - Geologic and land use conditions in the North Fork – this project's location – allow it to contribute a greater runoff per unit area than the other major tributaries feeding the lower river (p. 36).
- Gualala River Watershed Council Strategic Plan 2010 – 2015 (GRWC 2010). This project meets Objective: "Provide landowners, partners and agencies with tools and resources for developing land use, restoration and conservation strategies that ensure consistency throughout the watershed. Use, when possible, existing efforts that support sound resource management," "Task 5: Develop landowner based water use planning program to address water use issues (GRWC Strategic Plan page 7)."

- Final Recovery Plan for CCC Coho Salmon (NOAA 2012). This project meets specific Action Steps: Increase off stream storage, stream gauge monitoring, and Develop water conservation strategies. Central California Coast Coho Salmon Recovery Plan, Focus Populations: Gualala http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/north_central_california_coast/central_california_coast_coho/gualala_ii.pdf
  - Action 4.1.1.9 Evaluate and implement off-channel storage facilities to reduce impacts of water diversion (storage tanks for rural residential users). Focus efforts in NF Gualala and Wheatfield subwatersheds, page 344
- GRWC QAPP for monitoring sediment reduction (2008) – entire - provides basis for project monitoring
- The Flow Bank DRAFT Program Plan (2014) was designed with the assistance of John Green, Goldridge RCD, Brock Doleman of the Occidental Arts and Ecology Center, the Department of Conservation, NCRWQCB, Judy Rosales of the Coast Ridge Community Forest, and the North Coast Watershed Coordinators Group to meet regional priorities and local needs.

Recent and historical conditions and how the project addresses them

Degradation and loss of freshwater habitat is one of the leading causes for the decline of salmonids in California (CDFG 2004) and the importance of protecting and increasing freshwater habitat by decreasing water diversions from streams, springs and wells is a high priority recommendation in all studies conducted on the Gualala River watershed (e.g. Downie et al. 2003, ECORP & Kamman 2005, GRWC 2010, Klamt 2002).

Low instream flows impairments have been well documented through the Gualala River assessments and the GRWC Cooperative Monitoring Program (http://grwc.info/monitoring.html). Water temperature impacts focused on the current drought are evident as the 2013 watershed-wide higher water temperatures demonstrate (http://grwc.info/Trends.html). Decreases in salmonid habitat and migration corridors in main-stem and tributary reaches are apparent and historically notable. In the Gualala, coho are particularly vulnerable due to their three year life cycle. Since low river flows threaten their primary rearing habitat in the headwaters and adults are dependent on sufficient rainfall to allow them to spawn, three consecutive extreme low-flow summers could literally extirpate the entire coho population (NOAA Fisheries 2014).

During summer months, when stream flows and groundwater supplies are lowest, human demand is highest and endangered fish populations are under extreme stress due to lack of flow, warm water temperatures and high oxygen levels. Increased flows will reduce all these impacts to salmonid populations, assisting with the attainment of the temperature TMDL for the watershed.

Like other coastal locations, the Gualala River watershed is facing more extreme than usual environmental variations due to the changing climate. This project supports a resilient coastal community; rainwater harvesting and storage can be a significant drought adaptation strategy at the local level. The project provides an opportunity to cope with the changed environment on a community-wide scale. In addition to the installation of rainwater tanks, the project includes an educational

component that will address the relationship between drought and climate change with specific actions that can be taken to reduce water use, including a water audit to determine how much water is used and how much can be saved in a home or business. A sound mitigation strategy was built into the project to reduce greenhouse gas emissions. The hiring of local contractors, service providers, and vendors will cut down on transportation costs. Many of the participants live off-grid and will rely on solar-powered electricity to pump water from their storage tanks to the irrigation site while others will use gravity-fed systems. These actions will significantly reduce the project's carbon footprint.

Estimates of without-project conditions

The issue of insufficient river surface flows in the Gualala pre-dates the current drought crisis and will continue unless suitable tools are developed to mitigate the conflict of water use.

If the project is not implemented, the local coho population is at risk or extirpation, and the community will continue to experience limited water supply and will not be prepared for hydrologic and precipitation changes associated with climate change.

The Flow Bank Program is the most cost effective and timeliest approach to seasonally offset the demand for instream flows and groundwater with an estimated 660,000 gallons of stored rainwater. Rainwater harvesting can help reduce demand for surface and groundwater supplies, increase water security for humans, improve fire protection, and result in more reliable instream flows for fish and other aquatic life during the dry season. The north and south forks of the Gualala River watershed provide an ideal opportunity to concentrate community planning and project implementation efforts to demonstrate the potential of rainwater harvesting systems to meet water supply needs. Built into the program is an education and outreach strategy designed to increase public awareness about changing weather patterns and benefits that can be achieved by implementing appropriate climate adaptation strategies.

Descriptions of methods used to estimate physical benefits

Physical benefits were estimated based on project plans and specifications, community data and water use records, GRWC monitoring data and analyses, and technical documents. These included North Gualala Water Company records, landowner water source, use and distribution survey resonses, Catchment Area to Run-off Yield Worksheets provided by OAEC, GRWC's cooperative Monitoring Report, Thalweg Report, and Annual Stream Monitoring Report, and information from the USGS Flow Gauges at North Fork and South Fork and the Wheatfield flow gauge report.

Economic values were researched by ECONorthwest, an economics consulting firm, which used accepted professional practices to determine estimated value ranges for benefits provided by North Coast IRWMP projects that reflect current understanding of and conditions in the Pacific Northwest (ECONorthwest 2012).

Description of any potential adverse physical effects

The 55,000 gallon system at Gualala Arts Center is planned in the Coastal Zone and a review of existing documentation is required for permitting. If the permitting process exceeds the project timeline, an alternative location is designated for the project. Construction will occur according to industry standards and using BMPs.

Table 5.8 a – Annual Project Physical Benefits

Project Name: The Flow Bank - Protecting Stream Flow in the Gualala River

Type of Benefit Claimed: Increased instream flow for environmental purposes

Units of the Benefit Claimed : gallons

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	660,000	660,000
2016	0	660,000	660,000
Yearly	0	660,000	660,000
Last Year of Project Life - 2065	0	660,000	660,000

Comments: The estimated economic value of this benefit is $162 per year (2.03 af/year * $80/af = $162.4)(Brown 2007). Alternative projects were not considered in this table because they are not feasible at this time (see Table 6.8).

Table 5.8 b – Annual Project Physical Benefits

Project Name: _The Flow Bank - Protecting Stream Flow in the Gualala River_____

Type of Benefit Claimed: ___Increased water supply reliability_____

Units of the Benefit Claimed : _____# households _____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	45	45
2016	0	45	45
yearly	0	45	45
Last Year of Project Life - 2065	0	45	45

Comments: This benefit is expected to provide an estimated economic value of $2,138 yearly (Barakat & Chamberlin 1994). The frequency of the increased water supply reliability is variable based on the participant's water use and number of tanks allocated for their property. The average number of months per year of increased water supply reliability provided by this project is two and a half (2.5). Alternative projects were not considered in this table because they are not feasible at this time (see Table 6.8).

Table 5.8 c – Annual Project Physical Benefits

Project Name: _The Flow Bank - Protecting Stream Flow in the Gualala River_____

Type of Benefit Claimed: __Avoided water supply purchases_____

Units of the Benefit Claimed : __gallons per year_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	250,000	250,000
2016	0	250,000	250,000
yearly	0	250,000	250,000
Last Year of Project Life - 2065	0	250,000	250,000

Comments: This value was estimated by the project proponent based on project technical specifications. With an estimated cost of $0.24 per gallon, this project would provide an estimated economic value of $60,000 per year. 250,000 gallons is this amount that landowners participating in this project have had to purchase in the past that they will not need to purchase with project implementation. This amount was based on actual number of gallons annually purchased by landowners offset by increased storage based on proposed size of tank storage. Landowners provided the annual gallons purchased and offset that amount by the amount of proposed increased storage. For example, if a landowner purchased 20,000 gallons annually and two 5,000 gallon tanks will be installed, a a purchase saving of 10,000 gallons was calculated for that landowner. Alternative projects were not considered in this table because they are not feasible at this time (see Table 6.8).

Table 5.8 d – Annual Project Physical Benefits			
Project Name: _The Flow Bank - Protecting Stream Flow in the Gualala River_____			
Type of Benefit Claimed: ___Avoided electric costs_____			
Units of the Benefit Claimed : _____kWh saved_____			
Additional Information About this Benefit_____Based on PG&E baseline rates_____			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	791.22	791.22
2016	0	791.22	791.22
yearly	0	791.22	791.22
Last Year of Project Life - 2065	0	791.22	791.22
Comments: Project proponent estimates that the economic value of this benefit is $12,500. The project proponent estimated the kWh saved by not pumping 2 acre feet per year. The project proponent projected 791.22kwh of power used to pump water from springs and wells. At the rates defined by PG&E, this leads to an annual savings in electrical costs of $107.82 for each year of the project. Alternative projects were not considered in this table because they are not feasible at this time (see Table 6.8).			

Table 5.8 e – Annual Project Physical Benefits			
Project Name: _The Flow Bank - Protecting Stream Flow in the Gualala River_____			
Type of Benefit Claimed: ___Habitat restoration_____			
Units of the Benefit Claimed : __acres _____			
Additional Information About this Benefit_____			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	27	27
2016	0	27	27
yearly	0	27	27
Last Year of Project Life - 2065	0	27	27
Comments: With an estimated economic value of $2 - 4,000 per acre per year for riparian habitat, this project provides a conservative value of $54,000 per year (Chaibai et al. 2009). Alternative projects were not considered in this table because they are not feasible at this time (see Table 6.8).			

Table 6 – Cost Effective Analysis Project name: __The Flow Bank - Protecting Stream Flow in the Gualala River_____	
Question 1	Types of benefits provided as shown in Table 5: **Increased instream flow for environmental purposes, increased water supply reliability, avoided water supply purchases, avoided water shortage costs, avoided electric costs, habitat restoration.**
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? **Yes**
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs: **Yes, a number of increased off-site storage proposals have been considered i.e. large centralized storage tanks or reservoirs but found not to be cost effective plus a project of this scale will be lengthy and the instream benefits will not be realized for years. In comparison, the installation of rainwater catchment systems is a simple, timely, and cost effective measure with immediate instream benefits. This proposal plans to store 660,000 gallons of rainwater annually for ~600,000.00 in State funding. The Sea Ranch Water Company just installed a 700,000 gallon tank; the cost of the tank was 1.25 million dollars with an additional 5 million spent for permitting and infrastructure.**
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. **Not only is the proposed project the least cost alternative, it is the most simple and timely method to provide the benefits described.**
Comments:	

9. Sanctuary Forest

Mattole Flow Program: Storage and Forbearance

Project Description: Installation of 380,000 gallons of water storage and associated water conservation and system improvements and installation of pump intake screens to protect fisheries.

How project alleviates drought impacts: The project increases water supply reliability through diversion of water during higher flows and storage for use during low flows. Water conservation and efficiency improvements are also incorporated. Drinking water treatment and distribution is included in the business/residential complex as needed to meet public health standards for water quality for residents, workers and customers.

Drought Project Type: This project provides immediate regional drought preparedness, increases local water supply reliability and delivery of safe drinking water, and reduces ecosystem conflicts created by the drought. It provides 380,000 gallons of water storage to reduce summertime diversions and provides increased water supply reliability for residents of the DAC Whitehorn.

Reason for Expedited Funding: The project has been approved by CDFW with partial funding. Each landowner will contribute $4,400 to the project but they are unable to contribute more. The planned cost share funding to complete the project has not been secured because of reduced grant funding available and higher competition for grants. In order to meet completion and CEQA-MND expiration dates, expedited funding is necessary. Additionally, expedited funding will accelerate implementation and provide drought relief for families and wildlife as early as 2015.

Point of Diversion:
Whitethorn Construction

Place of Use

Point of Diversion:
Baker & Baker/Dervin

Point of Diversion:
Bremer & Bremer/Pyle

Santuary Forest Storage
and Forbearance Program

Groundwater Basin:
Garberville Town Area

Mattole River

Humboldt County

Mendocino County

Kings Range
National Conservation Area
ASBS

Santuary Forest Storage
and Forbearance Program

0 1,800 3,600 5,400 7,200
Feet

North Coast Resource Partnership

2014 IRWM Drought Project:
Sanctuary Forest Inc.
Mattole Flow Program
Storage and Forbearance

- Sanctuary Forest Forbearance Program
- North Coast IRWM Boundary
- Area of Special Biological Significance (ASBS)
- Groundwater Basins
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community

Data sources: California Department of Fish and Wildlife, Marine BIOS; California Department of Water Resources; US Census, American Community Survey; California State Water Resources Control Board; USGS Digital Raster Graphics

9. Sanctuary Forest

Summary

This project provides an adaptive strategy to climate change and drought that improves salmonid habitat protection and ecological functions while addressing human water needs, security, public health and environmental justice issues in the Mattole headwaters community of Whitethorn, a DAC. The Mattole River headwaters provides both water supply for residents and businesses and habitat for endangered salmonids and other wildlife. Local water resources have been impacted by climate change and drought for nine of the last thirteen years. In low flow years, there is not enough water for both; diversions during low flows result in drying of pools and loss of juvenile salmonid populations. There is no municipal water system and each landowner must develop their own water diversion and supply system.

This project improves summertime streamflows in the Mattole River headwaters by seasonally limiting diversions through storage and forbearance, thereby increasing water quantity, improving water quality, enhancing rearing requirements, and facilitating fish passage. Water will be conserved through infrastructure improvements and leak-proofing, together with new tank storage, resulting in cessation of all diversions during summer low flows. The project also provides water supply reliability for institutional and residential use in a disadvantaged rural community that is completely dependent on surface water diversions.

Expected outcomes include 1) installation of 380,000 gallons of storage and associated water conservation and system improvements resulting in water security for 1 business and 4 residential landowners, 2) improved streamflow and salmonid habitat in five miles of the Mattole headwaters mainstem, 3) improved protection of juvenile salmonids through installation of pump intake screens on five pumps, and 4) increased community and regional participation in water conservation resulting from education associated with the project.

Supporting studies or documents

- Hydrologic Assessments of Low Flows in the Mattole River Basin 2004 – 2011 (Klein 2012) This study analyzes low flow conditions and provides a technical basis for off stream storage (entire document, page 23).
- Mattole River Headwaters Streamflow Improvement Plan (TU and CEMAR 2013). This study recommends water storage to increase summer instream flow (entire document, p. 67, 60 – 76, 113).
- Mattole Flow Program: Institutional Water Storage and Forbearance Conceptual Plan is a preliminary project design that will be modified upon completion of site and system planning (entire document)

Recent and historical conditions and how the project addresses them

Water management impacts due to the 2014 drought include insufficient local water supplies for local residents as well as insufficient regional water supplies normally relied on for water deliveries when local supplies are insufficient. Impacts to fish and wildlife increase under drought condtions because there is not enough surface water for both basic human needs and wildlife. Water theft and conflicts over water have also increased with the 2014 drought.

The Mattole River Forbearance Program was initiated in 2004; beginning in 2009, the forbearance program's effectiveness appeared to be providing measurable benefits to instream flow. With 70% of the pumps turned off in accordance with forbearance agreements, the losing reach period observed in most years prior to 2009 has "significantly decreased both in length and magnitude (Klein 2012, page 23)."

Instream flow studies conducted by Trout Unlimited and the analysis performed by Sanctuary Forest were used to determine flow thresholds for the forbearance season with CDFW. Outcomes from the studies include a no pumping flow threshold of 0.7 cfs for the Sanctuary Forest residential and institutional storage and forbearance program. Recommendations for the restricted pumping period to address cumulative impacts has been set at 5 cfs with CDFW. However, that threshold has been revised to 10 cfs for all new projects to improve juvenile salmonid habitat as per the outcomes of Trout Unlimited studies (TU and CEMAR 2013). The analyses of both studies show that the storage and forbearance program is critical for maintaining flows needed for connectivity between pools and minimum flows needed for salmonid survival. See page 67 for basic sreamflow recommendations from "Mattole River Headwaters Streamflow Improvement Plan", Trout Unlimited, April 2013. See pages 17-18 from "Hydrologic Assessments of Low Flows in the Mattole River Basin" Sanctuary Forest, 2004-2011 for discussion and graphs illustrating Forbearance Program effectiveness.

Sanctuary Forest has researched causes and solutions to the low flow problem for 10 years and concluded that climate change accompanied by a longer dry season is the primary cause. As of the end of 2013, nine of the last thirteen years had the lowest flows in 64 years of record at the Petrolia gage. All of these low flow years correspond with a longer dry season - 4 to 5 months without rain as compared to the historic norm of 3 months. Land use impacts to ground and surface water hydrology are also very significant and restoration of natural hydrologic systems is needed to provide resilience to drought.

Human water use is also significant when flows are low and in the Mattole headwaters represents 20% to 100% of the flow. Therefore Sanctuary Forest has developed two strategies to address drought: changing human use and restoration of ground and surface water hydrology. This proposal addresses the need to support voluntary changes in human use for adaptation to the longer dry seasons of the last decade. Implementation of the storage and forbearance program since 2006 has been very successful. The amount of storage and the quality of the water has been sufficient for all landowners in all the years of the program. Because landowners are able to pump and store water when clarity and quality are good, their stored water is of better quality than when they were practicing direct diversion.

Streamflow has improved as compared to pre-program flows and water conservation awareness in the entire community has increased. The instantaneous streamflow benefits of this project are equal to the sum of the 5 pumps or 0.1 cfs; the amount of streamflow needed for pool connectivity is 0.2 cfs. Therefore, this project significantly contributes to maintaining minimum flows and pool connectivity. Additionally, water quality for salmon habitat is improved as a result of the increased flows.

Finally, this project addresses climate change adaptation by diverting water from the wet seasons for use during the dry season and provides adequate water for extended dry seasons and drought caused by climate change. Impacts on water resources and wildlife habitat are reduced through utilization of stored water in times of water scarcity.

Estimates of without-project conditions

Without-project conditions include the following impacts: lack of water security for household and business use; lack of water supply for fire suppression; and cumulative impacts to streamflow of 50 gallons/minute (0.11 cfs) if all 5 landowners are diverting water at the same time. Because streamflows in the Mattole headwaters where the diversions take place drop to 0.2 cfs or 90 gallons/minute in low flow years and zero in extreme drought years, the cumulative impacts can be catastrophic to juvenile salmonids. In the stream reaches where this project takes place, diverting during the low flow season can completely dewater pools and cause fish kills.

Lack of potable water supply is also a critical problem. There is no municipal water supply in the Mattole headwaters; each landowner must develop their own water system. Most landowners are dependent on surface water and springs that dry up or become very low in drought years. Wells are not usually an option because most of the wells that have been drilled in the headwaters either do not yield any water or the water is of poor quality. Therefore, storing water for the dry season or trucking in water are the only available options. Currently, the closest water available for purchase is from the town of Fortuna (40 miles) and it is unknown how long Fortuna will be able to continue supplying water to other watersheds. Without the project, sufficient storage to last the dry season cannot be installed due to the expense of storage. Lack of adequate water supply for fire suppression is already an issue. During the drought in January 2014, lack of water resulted in loss of home in Whitethorn that could have been saved if water was available and stored nearby.

Descriptions of methods used to estimate physical benefits

The methods used to estimate the physical benefits for water supply and conservation include landowner interviews with the landowners included in the project as well as estimates based on community wide water use questionnaires and 7 years of experience implementing the Mattole storage and forbearance program.

In the 7 years Sanctuary Forest has been implementing the storage and forbearance program, 50,000 gallons of storage has been proven to be sufficient for a 3 person family and 1500 sq. ft. of irrigated garden, lawn or orchard for a period of 105 days. For the institution, current water use was measured and the amount of storage needed for 105 days was calculated. The amount of water conserved is

estimated from the pre-project water use, the improvements that will be incorporated with the storage system, and the allocated water use per day provided by the storage system for each landowner. The pre-project combined water use per day for the 1 institution and the 4 landowners is 8235 gallons. The amount allocated per day is equal to the total storage of 380,000 gallons/105 days or 3619. The difference between the pre project water use and the allocation per day is estimated: 8235-3619= 4616 gallons/day. The largest component of the conserved amount is leak proofing along with weekly monitoring of water use by the landowner. The project proponent's seven years of experience has shown 100% landowner success with reducing their water use to the allocated amount through water conservation, leak proofing and vigilant monitoring of water use.

Water quality benefits are based on specific project design and engineering for each system. Watershed rehabilitation benefits are based on evaluation of existing systems and identification of surface water diversion locations and pumping rates for each landowner. Climate change adaptation benefits are based on 10 years of monitoring streamflow in the Mattole headwaters as well as analysis of the Petrolia streamflow gage indicating that 9 out of the last 13 years have the lowest flows in the 64 year record.

Other facilities, projects, policies or actions required to obtain physical benefits claimed.

Continued operation of the forbearance program is needed to obtain the physical benefits. This includes monitoring streamflows at site MS6 in the Mattole headwaters to determine forbearance threshold flows; outreach to participants and the community with no-pumping alerts; letters and phone communication with all participants giving notice at the beginning and end of the forbearance season and landowner compliance monitoring. Sanctuary Forest is currently working on streamlining the monitoring component of this work to reduce the cost of the program in future years. This approach is based on developing flow relationships between the USGS Ettersburg gage and the MS6 headwaters site such that MS6 flows can be estimated from the Ettersburg gage. Continued operation of the Ettersburg gage is needed to achieve this goal.

Description of any potential adverse physical effects

There is minimal grading and vegetation removal for preparation of the water storage sites. However, all work will be conducted under the CEQA Mitigated Negative Declaration and approved by CDFW staff. No work will be conducted that would impact rare or endangered plants; botanical and archaeological surveys are always conducted prior to construction.

Table 5.9 a – Annual Project Physical Benefits Project Name: ___Mattole Flow Program: Storage and Forbearance_____ Type of Benefit Claimed: ___Increased instream flow for environmental purposes _____ Units of the Benefit Claimed : _____gallons per day_____ Additional Information About this Benefit_____			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	4,616	4,616
2016	0	4,616	4,616
2021	4,616	4,616	4,616
Yearly	4,616	4,616	4,616
Last Year of Project Life - 2030	4,616	4,616	4,616
Comments: This benefit provides an estimated $212 per year economic value given a conservative estimate of $80 per acre-foot per year (Brown 2007). This table includes the possibility that the alternative solution of groundwater recharge would be researched, planned, and implemented within ten years (estimated at around 2021) and would provide the same level of benefit and would continue yearly thereafter.			

Table 5.9 b – Annual Project Physical Benefits

Project Name: Mattole Flow Program: Storage and Forbearance

Type of Benefit Claimed: Change in timing and volume of instream flow

Units of the Benefit Claimed : cubic feet per second

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	0.1	0.1
2016	0	0.1	0.1
2021	0.1	0.1	0.1
Yearly	0.1	0.1	0.1
Last Year of Project Life - 2030	0.1	0.1	0.1

Comments: The instantaneous streamflow benefits of this project are equal to the sum of the 5 pumps or 0.1 cfs; the amount of streamflow needed for pool connectivity is 0.2 cfs. Therefore, this project significantly contributes to maintaining minimum flows and pool connectivity. Additionally, water quality for salmonid habitat is improved as a result of the increased flows. This table includes the possibility that the alternative solution of groundwater recharge would be researched, planned, and implemented within ten years (estimated at around 2021) and would provide the same level of benefit and would continue yearly thereafter.

Table 5.9 c – Annual Project Physical Benefits

Project Name: Mattole Flow Program: Storage and Forbearance

Type of Benefit Claimed: Avoided water supply purchases

Units of the Benefit Claimed : gallons

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	553,920	553,920
2016	0	553,920	553,920
2021	553,920	553,920	0
Yearly	553,920	553,920	0
Last Year of Project Life - 2030	553,920	553,920	0

Comments: This benefit was calculated as follows: (4,616gal/day * 30 days * 4 months = 553,920 gallons per year). It is estimated to provide $166,176 per year economic value. This value was provided by researching local cost of water trucked in. As per hauling companies contacted in June, 2014, the cost would be 0.30/gallon. Currently the closest water available for purchase is in Fortuna CA and the price per gallon is based on the hauling time. Three suppliers were contacted and the average price was used. Since the project proponent has applied for this funding, Fortuna, CA has been put under water rationing and it is unlikely that they could still get water delivered from there. Therefore, the haul is likely farther and the price even higher. This table includes the possibility that the alternative solution of groundwater recharge would be researched, planned, and implemented within ten years (estimated at around 2021) and would provide the same level of benefit and would continue yearly thereafter.

Table 5.9 d – Annual Project Physical Benefits			
Project Name: Mattole Flow Program: Storage and Forbearance			
Type of Benefit Claimed: Fishery improvement and improved fish passage			
Units of the Benefit Claimed : miles			
Additional Information About this Benefit			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015		5	5
2016		5	5
2021	5	5	0
Yearly	5	5	0
Last Year of Project Life - 2030	5	5	0
Comments: Ecosystem and fisheries restoration and protection is addressed by seasonally limiting diversions through storage and forbearance, thereby increasing water quantity, improving water quality, enhancing rearing requirements, and facilitating fish passage. Increased flows enhance water quality through oxygenation and help maintain viable pool habitat and pool connectivity for rearing and emigration. The project also protects juvenile salmonids from injury caused by inadequately screened diversions. This table includes the possibility that the alternative solution of groundwater recharge would be researched, planned, and implemented within ten years (estimated at around 2021) and would provide the same level of benefit and would continue yearly thereafter.			

Table 5.9 e – Annual Project Physical Benefits			
Project Name: Mattole Flow Program: Storage and Forbearance			
Type of Benefit Claimed: Education benefits			
Units of the Benefit Claimed : number of people			
Additional Information About this Benefit			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	500	500
2016	0	0	0
2021	500	0	500
Yearly	0	0	0
Last Year of Project Life - 2030	0	0	0
Comments: This benefit will arise from water conservation education associated with project implementation. This table includes the possibility that the alternative solution of groundwater recharge would be researched, planned, and implemented within ten years (estimated at around 2021) and would provide the same level of benefit at that time.			

Table 5.9 f – Annual Project Physical Benefits

Project Name: Mattole Flow Program: Storage and Forbearance

Type of Benefit Claimed: Avoided public water resources conflicts

Units of the Benefit Claimed : number of diversions

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	5	5
2016	0	5	5
2021	5	5	5
Yearly	5	5	5
Last Year of Project Life - 2030	5	5	5

Comments: This benefit will arise from providing diverters with storage as an alternative source of potable water. It is claimed due to Sanctuary Forest's previous experience with local resource conflicts and will occur yearly. This table includes the possibility that the alternative solution of groundwater recharge would be researched, planned, and implemented within ten years (estimated at around 2021) and would provide the same level of benefit at that time.

Table 6 – Cost Effective Analysis Project name: Mattole Flow Program: Storage and Forbearance	
Question 1	Types of benefits provided as shown in Table 5: **increased instream flow for environmental purposes, change in timing and volume of instream flow, avoided water supply purchases, fishery improvement, education, and avoided water resources conflicts.**
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? **Yes.**
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. **Groundwater recharge along with installation of cisterns and pumping of shallow groundwater could be used in conjunction with water storage tanks with less tank storage needed along with groundwater storage benefits for streamflow. However, further development is needed for design and permitting of this type of project. Costs of the alternative discussed above would likely be similar to the costs for the storage and forbearance program. The reduced costs resulting from less storage tanks would be offset by the costs of building the groundwater recharge basin and associated cistern.**
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods: **The proposed project is the least cost alternative to achieve the physical benefits. Another alternative is trucking in water and there are problems with water availability and quality as well as expense. Over the 15 year term of the forbearance agreement the cost of trucking in replacement water is 3.9 million dollars while the total cost of this project is $ 694,000 or 18%.**
Comments:	

12. Yurok Tribe

Weitchpec Water Station

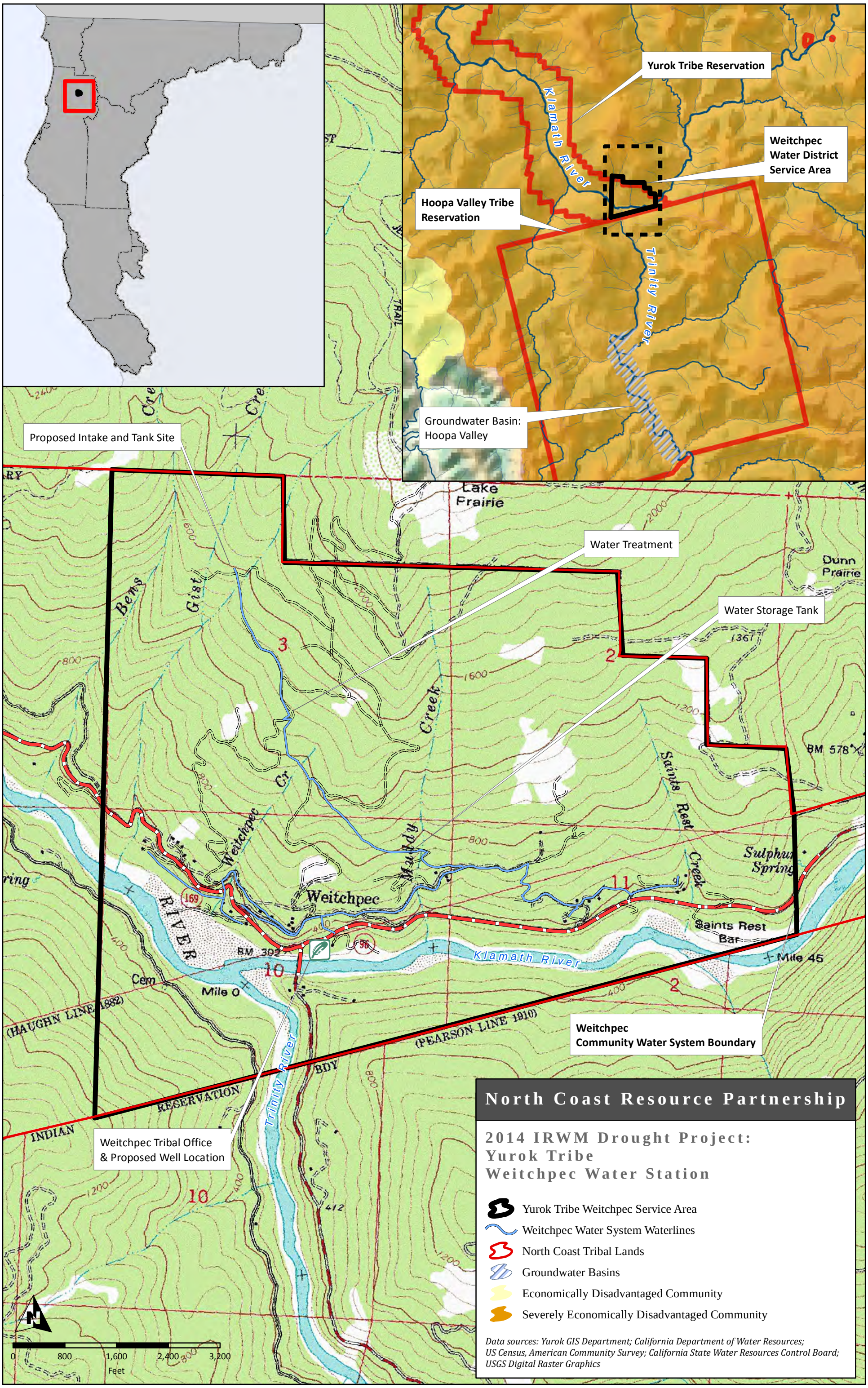
Project Description: A water station including well, water tank and spigot for emergency access, a flush hydrant, and direct line to the community system, increasing supply reliability.

How project alleviates drought impacts: The water station will provide an alternative water system and emergency water supply to allow the Weithchpec Community system to use groundwater instead of declining surface water supplies. The Yurok Surface Water systems are heavily reliant on surface water flows and drought has caused these flows to be reduced to levels that are not likely to continue if drought conditions continue and once surface water flows stop, the community is out of water. It is very difficult to impossible to implement conservation measures drastic enough to change the outcome of drought on these systems. A ground water supply source will alleviate the direct impact of drought and diversify water sources available for community consumption.

Drought Project Type: This project will increase local water supply reliability and the delivery of safe drinking water and it will reduce ecosystem conflicts created by the drought. The proposed Water Station will provide reliable, safe drinking water to the DAC Weitchpec Community Water System (CWS) users. Use of the well instead of surface water supplies eliminates direct conflict with the ecosystem by leaving water instream for listed anadromous fish in the Klamath River, which is 303(d) listed for temperature.

The growing upriver communities require periodic seasonal groundwater extraction given the increasing occurrence of drought, illegal upstream water diversions on CWS supply creeks, and runoff contamination from illegal marijuana grow operations. No nearby water systems can provide water to these rural and mountainous upriver communities. Securing a backup water supply is an important priority for small sole-source dependent water systems such as the Weitchpec CWS.

Reason for Expedited Funding: The Yurok Public Utilities Department is funded by Tribal Council for a Supervisor, Water Operator, and Maintenance Worker. The community is Severely Disadvantaged and the cost to operate the Public Utilities District (PUD) is always over budget. The Tribal Council has struggled with funding the PUD through revenues from low-income residents only. Indian Health Services has not received drought funding and can only provide engineering assistance and construction inspection and oversight. Indian Health Services has worked to ensure deficient systems remain on their list for potential funding in the future, but these funds are limited and often years out for project completion. The Yurok Tribe declared an Emergency from the drought impacts on January 29, 2014. Indian Health Services has ranked the Yurok Tribe's surface water systems as "Tribal Water Systems at Highest Risk Due to Drought Conditions". Humboldt County has also declared a State of Emergency due to the drought impacts. In light of this, the community's need for reliable, safe, drinking water sources as developed in this project is imperative.



North Coast Resource Partnership

2014 IRWM Drought Project: Yurok Tribe Weitchpec Water Station

- Yurok Tribe Weitchpec Service Area
- Weitchpec Water System Waterlines
- North Coast Tribal Lands
- Groundwater Basins
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community

Data sources: Yurok GIS Department; California Department of Water Resources; US Census, American Community Survey; California State Water Resources Control Board; USGS Digital Raster Graphics

12. Yurok Tribe

Summary

The Weitchpec Community Water System uses water from Gist Creek, which is a source of cold water refugia to the Klamath River. Surface water supply is reliant on precipitation, and surface water levels have been decreasing annually, with all-time lows expected in 2014 (Water Education Foundation 2014). In addition to the limited supply, the current water system has poor water quality and lacks emergency access. What were once considered low flow levels on the creek are now standard, with the reduced flows resulting from drought, climate change, and illegal water diversions. This creates a major health and safety concern for the entire community: when creek water flow is low, water quality is impaired; it usually has increased turbidity and organics that require higher levels of carcinogenic disinfection byproducts.

Recent installation of electrical power to the community makes a groundwater well a possibility for the first time. The water station will consist of a well, a small water tank and spigot for emergency water access, a flush hydrant to fill fire trucks, and a direct line to the community water system. Once it is constructed and working, the existing surface water system will be phased out and the well system will be used as a reliable, consistent source of clean drinking water for this DAC. This project will provide a reliable, safe, clean, affordable and accessible water supply adequate for basic human needs in a DAC that is also a Tribal community.

Supporting studies or documents

- Preliminary Engineering Report Weitchpec Emergency Well – this report presents the results and findings of the preliminary planning and design for a 20 gpm emergency groundwater well; this information supports the Indian Health Services (IHS) recommendation to develop an emergency groundwater well (Zimmerman 2014, p. 5).
- Preliminary construction drawings by the Yurok Tribe show site plan and well detail
- Yurok Land Use Plan pg. 33 – The Yurok Land Use Plan is currently approved by the Tribal Council as an internal confidential working document. The Plan designates Weitchpec as a "Community Plan Area", which has a corresponding land use policy for water systems that includes "phased urban development" plans to develop a community water system (2014) .
- The telluric studies are currently in progress and the Yurok Tribe doesn't have a final conclusive report at this time but the site was chosen by Indian Health Services engineers due to its likelihood of having sufficient water volume.
- Water supply is reliant on rain and snow fall and surface water levels have been decreasing annually and are expected to reach all-time lows in 2014 (personal communication, Yurok Public Utilities Program Staff).
- Due to the high amounts of contaminants from agricultural (marijuana) fertilizers that include nitrates, pathogens, pesticides, hydrocarbons, and hazardous materials, it is estimated that the bacteria filtered through the higher elevations down to the ground water could be decreased by

as much as 42%. Water temperature reduction estimates are related to the limited exposure to the sun from the aquifer and/or ground water layer (Job and Simons 1996).

Recent and historical conditions

Indian Health Service proposed the Weitchpec well location and design due to its suitability for the project purpose and satisfaction of all critically constraining factors; the requisite groundwater feasibility will be completed within the next few months by Geoconsultants Inc. – this work is identified as a project match.

The proposed well design is due to the steep terrain of the Yurok Reservation which is primarily constrained by physical and economic factors, not necessarily by groundwater feasibility. The Yurok PUD is a small public utilities district with limited finances. A well in the Weitchpec area needs to be located on land available *to* the Yurok Tribe, be physically accessible by a drilling rig and Yurok Public Utilities staff, located near power and the water distribution system, outside the 100-year floodplain, away from cultural resources, and preferably in a secure area with tribal supervision to prevent vandalism.

No information on groundwater resources in the Upriver region is available or known to exist. Indian Health Service is currently developing a project with Geoconsultants Inc (http://www.geo-consultants.com/) to conduct a regional telluric current groundwater study for the primary Upriver communities, which includes the proposed well location at Weitchpec and a few others locations. Although alternatives are proposed, the well design will remain essentially the same regardless of location due to the physical characteristics of the area. The proposed well location is believed to be geohydrologicially feasible based on its vertical and horizontal proximity to the Klamath River.

The primary alternate well location is still at the Weitchpec Community Center and would result in a similar cost, but is located in the floodplain of the Klamath River for increased geohydrologic feasibility. Locating the well further from the proposed site would move the project away from physical and economic feasibility. If the groundwater study indicates that groundwater accessibility is unlikely at the proposed well locations, the well project will be moved to a feasible upriver location and the additional cost would likely be provided by Indian Health Service. Indian Health Service believes the groundwater study will yield several potential well locations Upriver, as it is unlikely that groundwater is completely infeasible in that area.

Significant potential public health risk and impacts exist related to drought and interrupted access to safe water for upriver communities without a secondary water source. Low creek flows result in reduced water availability and water quality. Lower water quality generally has a higher natural organic matter (NOM) load, which affects health by increasing cancer-causing disinfection byproducts (DBPs) created when NOM reacts with chlorine for disinfection (Zimmerman 2014, p. 5). External health effects related to drought include respiratory illnesses from wildfires and suspended particulate matter in dry conditions, dehydration, illness from blue-green algae exposure, stress from loss of income caused by drought, and insufficient nutritional intake resulting from low crop yields and quality. Health effects

caused by leaked contamination such as pesticides, rodenticides, fertilizers and diesel fuel from upstream illegal marijuana operations range widely.

The Klamath River has extensive and sometimes toxic levels of blue-green algae, a cyanobateria that can harm humans and be fatal to animals. The extensiveness of the water quality impacts has resulted in creation of the Klamath River Blue-Green Algae Electronic Monitoring Program that issues regular testing results and annual reports located at http://www.yuroktribe.org/departments/ytep/water_division.htm. Discontinuing withdrawals from Gist Creek will increase surface water flow to the Klamath River; increased flow to the Klamath will alleviate impacted water quality cause by stagnant, warm and oxygen-depleted water that occurs during low flow conditions such as drought.

Water quality for aquatic species has been a primary concern in the watershed, most especially after the death of 100,000+ endangered salmon during the low flow conditions of 2002 (Belchik et al. 2004a). Protected species that would benefit from the proposed project include: chinook salmon, coho salmon, steelhead trout, tidewater goby and green sturgeon and Gist Creek will provide increased cold water to feed the Klamath River for improved salmonid habitat. This will reduce the levels of stagnant, warm, oxygen-depleted water that contributed to the death of endangered salmon in 2002 and the amount of blue-green algae that can grow (Belchik et al. 2004b).

Currently the poor quality, turbid water from Grist Creek requires significant treatment prior to distribution. The Water Station will be sourced from a well that is not expected to need treatment, but if necessary, IHS has agreed to provide an in-kind baffled chlorinator at the well site. After the water station is in use, the operational costs of water treatment, monitoring a surface water system with the US EPA, improving water quality, and reducing outages will all be reduced.

Educational Outreach has been directed at water consumers with a goal to promote conservation and also to illustrate how the surface water system works during a drought emergency and to convey the importance of a backup water source and alternative system. The PUD has worked to let consumers know that there will be water available until it stops and that there is very little in the way of indicators to prepare for the flows stopping completely. The PUD has met with many consumers to individually explain the importance of repairing leaks, the increased health risks from increased treatment during low flows, the community's general reliance on precipitation, and the overall lack of diverse sources of water.

The community is currently at risk from expected changes to climate in the North Coast. Native communities have been identified as disproportionately at risk from climate change due to often being highly dependent on lands and natural resources for their livelihoods, social, and cultural systems (Oviedo and Fincke 2009). By eliminating dependence on surface water, and thus precipitation patterns, the water station contributes toward Tribal climate change adaptation.

Estimates of without-project conditions

Without the project, the Weitchpec community will continue to experience water shortages and flows to the Klamath River will not be increased. There would continue to be a lack of fire suppression water supply for the upstream community while fire danger increases with increasing drought length. Water could need to be hauled at an estimated cost of $185,000 - $220,000 for a water truck plus the costs of driver, water, insurance, and operations and maintenance. Additionally, potable water supplies are not available within 150 miles of the site and moratoriums have been issued prohibiting water extraction and sale locally.

Descriptions of methods used to estimate physical benefits

Physical benefits were estimated using the most current research on salmonids, aquatic ecosystems, and climate change and using engineering reports developed specifically to assess the proposed project. Methods of estimation are discussed in greater detail in Tables 5.12 a – e where appropriate.

Description of any potential adverse physical effects

Any adverse physical effects of the project will be identified and ameliorated during the CEQA permitting process. Industry standards will be adhered to and BMPs will be used during project implementation.

Table 5.12 a – Annual Project Physical Benefits

Project Name: Weitchpec Water Station
Type of Benefit Claimed: Increased Instream Flow for Environmental Purposes
Units of the Benefit Claimed : Acre-feet per year
Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	100	100
2015	0	100	100
2017	0	100	100
Yearly	0	100	100
Last Year of Project Life - 2065	0	100	100

Comments: The estimated economic value of this benefit is $12,000 per year (Brown 2007). The high end of the economic estimate ($80 - $120 per acre-foot per year) was used because of the history of extreme conflict over water resources in the Klamath River Basin. This increased flow was estimated by the project proponent based on previous usage data.

Table 5.12 b – Annual Project Physical Benefits

Project Name: Weitchpec Water Station

Type of Benefit Claimed: Increased water supply reliability

Units of the Benefit Claimed : Number of household customers

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	32	32
2020	0	32	32
2025	0	32	32
Every Five Years	0	32	32
Last Year of Project Life - 2065	0	32	32

Comments: The estimated economic value of this benefit is $640 per month, $1,920 per year for each year of drought or limited water supply conditions (32 * $20/month * 3 months per year =$1,920 per year) (Barakat and Chamberlin, Inc. 1994). Because of the excessive illegal diversions and trending weather patterns, it is estimated that this benefit will be realized at least every five years.

Table 5.12 c – Annual Project Physical Benefits

Project Name: Weitchpec Water Station
Type of Benefit Claimed: Avoided water supply purchases
Units of the Benefit Claimed : gallons
Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	5760	5760
2020	0	5760	5760
2035	0	5760	5760
Every five years	0	5760	5760
Last Year of Project Life - 2065	0	5760	5760

Comments: This is the volume of water that would otherwise be purchased by consumers in the absence of project implementation. The estimated economic value of this benefit is approximately $1,728 using a conservative estimate of $0.30 per gallon. The frequency of this benefit will depend on the length and frequency of drought conditions. The CA Department of Water Resources has state hydrologic data back to the early 1900s (http://cdec.water.ca.gov/) The hydrologic data shows multi-year droughts from 1912-1913, 1918-1920, 1922-1924. Since then three prolonged periods of drought have impacted this area which include; 1929-1934, 1975-1977, and 1987-1992. On average, drought trends indicate drought occurrences from every other decade to every decade but invariable have lasted multiple years (O'Dea 2013). Given this information and considering the excessive illegal diversions and trending weather patterns, it is estimated that this benefit will be realized at least once every 5 years.

Table 5.12 d – Annual Project Physical Benefits

Project Name: __Weitchpec Water Station_____

Type of Benefit Claimed: _____Avoided costs associated with emergency repairs_____

Units of the Benefit Claimed : _____# hours_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	500	500
2025	0	500	500
2035	0	500	500
2045	0	500	500
Last Year of Project Life - 2065	0	500	500

Comments: The project proponent estimated the economic value of this benefit is $10,875 given an hourly wage of $21.75. They estimate 500 hours of work over about two months to repair leaks, clean sand filters, and monitor tank levels during critical time for illegal surface water diversions. The time estimate is based on two FTEs working at 50% on drought impacts. Two months duration was used as an estimate of the critical drought summer months, and this benefit is expected to be realized at least once every five years considering the excessive number of illegal diversions and trending weather patterns.

Table 5.12 e– Annual Project Physical Benefits

Project Name: Weitchpec Water Station

Type of Benefit Claimed: Education benefits

Units of the Benefit Claimed : Number of people

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	89	89
2015	0	0	0
2016	0	0	0
Yearly	0	0	0
Last Year of Project Life - 2065	0	0	0

Comments: Educational benefits are expected to reach at least one person per household currently on the Yurok community surface water systems and an additional 26 community members out of the 196 community members that live in the area and will attend a meeting or be interested in conservation measures and CWS information. The intended efforts are to education people about wells, water system maintenance, conservation, and surface water systems.

Table 6 – Cost Effective Analysis Project name: Weitchpec Water Station	
Question 1	Types of benefits provided as shown in Table 5 : **Increased instream flow, increased water supply reliability, avoided water supply purchases, avoided costs associated with emergency repairs, and education.**
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? **Yes**
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs: **The engineering report identifies options as 1) no action 2) Emergency well. Hauling water to water storage tanks has also been proposed. A potable water hauling truck is estimated at $185,000-$220,000 and would takes months to order and construct with the additional costs of a driver, water, insurance, and gas.**
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods: **Doing nothing would lead to continued threats to public health, impacts to anadromous fish habitat, and continued lack of fire suppression. The most cost effective alternative that addresses the situation is the proposed Water Station.**
Comments: **This project is the second option from the Engineering Report (Zimmerman 2014) to address the need for the project. Hauling water or leaving the system as is are not considered viable options economically, for the public health, or for the environmental impacts. Hauling water to water tanks is not cost effective and increases VMT and GHG emissions. Considering both predicted and current climate impacts, the proposed Community Water Station is the only socially and economically viable option.**	

13. Westhaven Community Services District.

Water Loss Reduction Project

Project Description: Replace leaking water mains and install needed shutoff valves and fire hydrants to reduce system losses by about 25%,increasing this DAC's water supply reliability.

How project alleviates drought impacts: Replacing the leaking water mains allows the WCSD to reduce water losses in the distribution system by an estimated 25%; this reduction in water loss would help the WCSD make up for supply deficits caused by the drought. Installation of appropriately located shutoff valves would allow for the efficient and timely repair of future leaks that might develop in the replaced water mains. The groundwater table in the WCSD is dropping (see Westhaven CSD Source Capacity and System Consumption – Gallons Per Minute July 2007 – May 2014 and WCSD Well Yield and Water Levels for April 2012/13/14) and residences not connected to the Westhaven CSD's distribution system may need to be supplied temporarily by the WCSD as their wells go dry. Westhaven CSD is still impacted by the 90-91 drought because of a moratorium imposed by CDPH that prohibits new connections until WCSD can prove it has an adequate supply.

Drought Project Type: This project increases local water supply reliability and the delivery of safe drinking water through repair of aging infrastructure, which is currently experiencing average water losses of about 31%. By installing shutoff valves at appropriate locations, WCSD staff will be able to efficiently repair new leaks in the affected areas.

Reason for Expedited Funding: For the past 15 years, the WCSD has been making annual contributions to its Capital Reserves account. The WCSD has existing loan obligations for funds borrowed to finance a major upgrade of water collection and treatment facilities that was made in 1990/92. A rate survey conducted by the CA-Nev AWWA section recently determined that the WCSD already has the highest water rates of all participants who responded to the survey (Raftelis & AWWA 2013 pages 11, 16). WCSD sees no opportunities for significant revenue increases via changes to our rate structure. Finally, there is an additional mile of 2-inch polyethylene pipe that also needs to eventually be replaced. Disadvantaged WCSD residents are incapable of bearing the full cost of these needed repairs and system improvements.

Water Intake Location

Westhaven Community Service District Treatment Facility

Groundwater Basin: Big Lagoon Area

Trinidad Rancheria

Westhaven Community Service District

Groundwater Basin: Mad River Valley

Trinidad

Kelp Beds at Trinidad Head ASBS

McKinleyville

Samoa State Marine Conservation Area

North Coast Resource Partnership

2014 IRWM Drought Project: Westhaven Community Services District Water Loss Reduction Project

- North Coast IRWM Boundary
- Westhaven Community Service District Service Boundary
- Leaking Watermains
- North Coast Tribal Lands
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community
- Groundwater Basins
- California Marine Protected Areas (MPA)
- Area of Special Biological Significance (ASBS)

Data sources: LACO Associates, California Department of Fish and Wildlife, Marine BIOS; California Department of Water Resources; US Census, American Community Survey; California State Water Resources Control Board; USGS Digital Raster Graphics

13. Westhaven Community Services District

Summary

This project will conserve water by replacing Westhaven Community Services District's aging infrastructure. WCSD's water mains are more than 45 years old and have generated repeated and extensive leaks, contributing to an average system loss of about 31% of total water production over the past 2 years. High system water loss poses serious threats to this DAC's water supply reliability during drought periods and limits the WCSD's ability to provide service to new connections. The existing 2-inch mains have outlived their 20 year service life by at least two decades and were improperly bedded when installed, which has generated increased numbers and severity of leaks over the last five years. In addition, these water mains lack an adequate number of shut off valves to allow isolation of pipes for system repairs, the diameter of the mains is not suitable for fire protection, and the leaks pose a potential threat to system water quality because they could potentially allow contaminants to enter beyond the location of water treatment. This project will also install needed shut-off valves and fire hydrants.

This project is expected to reduce system losses by 25% of the current average loss rate, thus reducing average loss rate from the current value of 31% to a 23% loss rate. Projected water savings would reduce vulnerability to drought-induced variation in production of water from springs and the well-based system and would potentially enable WCSD to connect previously identified homeowners to our water system pending the lifting of a moratorium on new connections imposed by the California Department of Public Health in 2006 (CDHS 2006). The moratorium prevents additional service connections until the WCSD can demonstrate that it has a reliable water supply for both wet and dry years. The WCSD expects that the project will result in reduction of system water losses that would allow some or all of 33 targeted homeowners to be added to our water system. These targeted homeowners have insufficient or contaminated well water supplies (see WCSD Private Well Surveys 1989 and 1991).

Supporting studies or documents

- WCSD has maintained detailed records of leak repairs which have allowed for the identification of the most leak prone mains in need of immediate replacement.
- WCSD has maintained detailed records of total water production from the three spring-fed creeks, customer water delivery, and water production and levels for the well acquired in 1994 to augment the water supply. These WCSD records of leak repairs and water production and use clearly show a dwindling water supply for a DAC. Records are provided with technical documentation for this project.
- 2013 Water Rate Survey (Raftelis & AWWA 2013 pages 11, 16). This report shows that WCSD customers pay the highest rates in the state, and those rates are more than twice as much as the next highest rates.
- Humboldt Operational Area Hazard Mitigation Plan Update, Volume 2: Planning Partner Annexes, Part 3 – Annexes for Community Service Districts. Chapter 17. Westhaven

Community Service District Annex. WHCSD-2-Upgrade/Retrofit water distribution system for earthquake and landslides, a high priority initiative with high benefits. Pages 17-5 – 17-6

- WCSD Private Well Surveys from 1989 and 1991 document the contaminated and depleted wells used by the residences prioritized for hookups when the moratorium on connections is lifted.
- WCSD Main Replacement Map shows locations of repairs.
- Additional documentation includes: Priority Water Service Connection Waiting List, WCSD Water Conservation Ordinance, WCSD Monthly Water Loss, WCSD Water Main Failure History, Location Map, Well Yield and Water Levels, Annual Reports to CDPH

Recent and historical conditions and how the project addresses them

The WCSD's water supply originates from three spring creeks and from one well. Current water production from the creeks is 20% less than average production over the past 7 years and will likely decrease further as the impacts of this winter's low rainfall are felt during late summer/ early fall. The well the WCSD uses as a supplemental supply is at an all-time low surface elevation and the WCSD cut back on the well's production to prevent further depletion of this aquifer. The water treatment plant has been able to provide an adequate supply of water through June 2014, as spring creeks constitute most (80%) of the total water production, but if drought conditions continue, supplies are likely to become limited.

Climate change models predict warming temperatures and decreased snow fall (Cayan et al. 2008); these conditions will increase risk of forest fires. Currently, there is inadequate fire protection in the WCSD's service area. This project will add seven hydrants to the water system to protect life and property. By reducing system waste and thus increasing supply, and protecting the community from wildfire, this project also enhances climate change resiliency for this DAC.

Estimates of without-project conditions

If the project is not implemented, a water shortage is likely and mandatory rationing beyond the already low daily use will be implemented. As a last resort, there may be a need to truck in potable or bottled water.

Descriptions of methods used to estimate physical benefits

Physical benefits were estimated based on the number of households with poor quality wells that are waiting for the moratorium to be lifted (see WCSD Private Well Surveys). The project proponent will work with CDPH to monitor the water saved and determine how many, if not all, of the houses with well problems can be connected to the system. Conversations with Tony Wiedemann, CDPH, have indicated that if losses are reduced, houses with well problems will be allowed to connect.

Description of any potential adverse physical effects

The CEQA process will be followed and best management practices will be used during construction activities to identify, minimize and mitigate adverse environmental effects.

Table 5.13 a – Annual Project Physical Benefits

Project Name: Westhaven CSD Water Loss Reduction Project

Type of Benefit Claimed: Increased water supply reliability

Units of the Benefit Claimed : # customers

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	33	33
2016	0	33	33
yearly	0	33	33
Last Year of Project Life - 2035	0	33	33

Comments: This benefit is expected to occur every year, because the new connections will provide a reliable supply for customers whose wells have poor quality and/or insufficient quantity. This benefit is expected to provide estimated economic value of $7,524 yearly (33 households * $19/ household/month * 12 months/year =$ 7,524) (Barakat & Chamberlin, Inc. 1994).

Table 5.13 b – Annual Project Physical Benefits

Project Name: ___Westhaven CSD Water Loss Reduction Project_____

Type of Benefit Claimed: _____Revenue from water sales to new customers__

Units of the Benefit Claimed : _____$_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	30,096	30,096
2016	0	30,096	30,096
yearly	0	30,096	30,096
Last Year of Project Life - 2035	0	30,096	30,096

Comments: This benefit is expected to occur every year, because the new connections will be replacing wells with poor quality and insufficient quantity for a reliable supply. This benefit was estimated by the project proponent based on WCSD usage records; the project proponent took the WCSD's average monthly bill ($76), multiplied by 33 homeowners, and multiplied again by 12 months per year to give a yearly estimated physical benefit of $30,096.

Table 5.13 c – Annual Project Physical Benefits

Project Name: Westhaven CSD Water Loss Reduction Project

Type of Benefit Claimed: Enhanced fire-fighting capabilities

Units of the Benefit Claimed : # homes

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	60	60
2035	0	60	60
Every Five Years	0	60	60
Last Year of Project Life - 2035	0	60	60

Comments: This estimate was provided by the project proponent to account for protection from potential damage to life and property caused by fire. In general, there is a 0.317% chance of a residence in the U.S. catching fire each year and the average monetary damage from a fire is $18,365. Using these very simplified statistics, 0.00317 chance/ home / year * 60 homes = .19 chance of one of the residences catching fire per year or about 1 fire every five years. The damage from fires is estimated at $ 18,365 / occurrence and this is a conservative estimate because these statistics assume nearby fire hydrants and without hydrant there would likely be additional damage. Additionally, the project is located in a highly fire-prone area.

Table 6 – Cost Effective Analysis Project name: _____Westhaven CSD Water Loss Reduction Project_____	
Question 1	Types of benefits provided as shown in Table 5: **water supply reliability, increased revenue from new connections, enhanced fire fighting capabilities**
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? **No.**
	If no, why? **The current rate structure (tiers and costs) have reduced residential water use to extremely low levels and the WCSD Board of Directors has adopted an ordinance to restrict certain uses of water in the event of a declared water shortage. Reduction in water system losses via replacement of leaking water mains is the only practical and immediate solution appropriate for increasing the amount of water available to the WCSD; further reductions in water use cannot be expected and it is irresponsible to develop more water sources when the supply system is leaking significantly.**
	If yes, list the methods (including the proposed project) and estimated costs.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. **The proposed project is the only alternative.**
Comments:	

20. California Land Stewardship Institute.

Agricultural Water Conservation and Water Supply Reliability

Project Description: Implementing water conservation in agricultural irrigation practices and developing municipal recycled water for agricultural use to improve water supply reliability and community climate change resilience.

How project alleviates drought impacts: The regional approach and scope of this project will provide immediate and long term drought preparedness. The Ukiah recycled water project is ready to start construction in summer 2015 and can supply recycled water for agriculture when complete in fall 2015. The soil moisture meter project can be implemented immediately to reduce irrigation water demand. By reducing agricultural water demand and developing an alternative supply, the reliability of Lake Mendocino municipal water supply is increased. Lake Mendocino is integral to the drinking water supply of 600,000 individuals; conflicts over water for salmonids or farms are reduced when agricultural water demand is reduced by this project. The reliability of Lake Mendocino as a water source for both urban populations and agriculture has diminished in the past 10 years due to limitations on the interbasin water transfer from the Potter Valley Project. This hydroelectric generating project moves water from the Eel River to the Russian River and the water is stored in Lake Mendocino. Additionally operation of the Lake is still under Army Corps of Engineers guidance dating from 1959 and often results in large volume flood releases when no additional winter storms are forecast thus reducing the water supply storage to the minimum. Both Mendocino and Sonoma Counties are working with the Corps to update their operations manual.

Drought Project Type: This project provides immediate regional drought preparedness through promotion of water recycling and agricultural irrigation efficiencies. It will increase local water supply reliability by providing agricultural operators with an alternative supply to surface water in the drought-stricken Russian and Navarro watersheds. This project will reduce water quality conflicts created by the drought by providing winegrape growers with an alternative source of water for crop protection during spring frosts. This will save winegrape crops as well as steelhead trout fry, which have been stranded after spring frosts past due to sudden drops in stream stage (SWRCB 2011).

Reason for Expedited Funding: The City of Ukiah has adopted a plan to maximize reuse of its tertiary wastewater through agricultural irrigation and frost control. Building this system from City resources alone will occur slowly and require increasing sewer fees. Much of Ukiah is a DAC, so the cost of building the system would be borne by people unable to afford it. Grant funds will offset the need for increased sewer fees in this DAC. The soil moisture monitoring program is an incentive program to reduce agricultural irrigation demand. It is unlikely that this technology will be applied broadly in the region without an incentive through grant funds. This project addresses reducing agricultural water demand in order to increase the reliability of municipal water supplies and ecosystem functions. This reduction needs to occur as soon as possible to maximize water availability during this drought.

UKIAH

Agricultural Water Conservation
and Water Supply Reliability Program Boundary

New Recyled Water Storage Pond

City of Ukiah
Waste Water Treatment Plan

Agricultural Water Conservation
and Water Supply Reliability Program Boundary

Groundwater Basin: Ukiah Valley

Groundwater Basin: Anderson Valley

North Coast Resource Partnership

2014 IRWM Drought Project: California Land Stewardship Institute Agricultural Water Conservation & Water Supply Reliability Program Russian and Navarro River Watersheds

- Recycled Water Distribution Pipeline
- Agricultural Lands to Receive Recycled Water
- Agricultural Lands: Navarro River Watershed
- Agricultural Lands: Russian River Watershed
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community
- Groundwater Basins

Data sources: California Land Stewardship Institute; California Department of Water Resources; California State Water Resources Control Board; US Census, American Community Survey; USGS Digital Raster Graphics

0 0.25 0.5 0.75 1 Miles

20. California Land Stewardship Institute

Summary

This project provides a long-term solution to drought conditions and climate change and improves water supply reliability by implementing water conservation in agricultural irrigation practices and by developing municipal recycled water as a new source of irrigation water. Agriculture is the largest water user in the Russian and Navarro River watersheds and is a mainstay of the economy. In the Ukiah Valley, the primary agricultural water source is the Russian River and releases from Lake Mendocino. Municipal supplies in the Russian River watershed depend on Lake Mendocino. This project continues the infrastructure improvements needed for complete reuse of Ukiah's recycled water, offsetting 126.2 acre feet of diversions from the Russian River. Federally and state-listed salmonids will benefit from improved instream flow and other beneficial uses in the Russian River will be supported.

This project also proposes a regional program for installing soil moisture meters in vineyards and providing technical assistance in the Russian and Navarro watersheds. The soil moisture meters have sensors placed at 1, 3, & 5 ft. below ground in the root system. Continuous monitoring shows deeper moisture levels and can reduce the need for irrigation. In other areas this type of monitoring has led to water conservation of 20%. A group of agencies and organizations (NRCS, Farm Bureau, and Winegrape Commission) has agreed to collaborate with CLSI to enroll growers, provide technical assistance, and coordinate and advertise workshops in an effort to facilitate installation of up to 100 soil moisture meters and revise irrigation methods to increase efficiency. Reducing irrigation demand in the region will benefit salmonids and other wildlife through greater instream flows and improve water supply reliability for agricultural purposes. Additionally, this project helps this DAC to adapt to increasingly warm and variable conditions caused by climate change.

Supporting studies or documents

- Recycled Water Master Plan. 2012. Carollo Engineers for City of Ukiah (Estimate of recycled water use is derived from Table 7.4 in the Recycled Water Master Plan. Parcels included in this project are depicted in Table 7.5 and shown in Figure 7.2. The table is also used to estimate acres of irrigated land and frost control for the project.
- Irrometer Co. Moisture Sensor Irrigation Design Manual
- SMX Electrical Interface for Watermark or Gypsum Block Sensors
- National Sustainable Agricultural Information Service. 2006. Soil Moisture Monitoring: Low Cost Tools and Methods (Morris, 2006)
- Natural Resource Conservation Service Practice Standard: Irrigation Water Management (449) provides management information for grapegrowers using the moisture sensors
- Mendocino County Crop Report 2012 (p. 3)
- Project maps

Recent and historical conditions and how the project addresses them

Both the Russian and Navarro watersheds have experienced water supply issues due to the ongoing drought. Lake Mendocino has seen elimination of a portion of its supply through reductions in the Potter Valley diversion. During dry years this means that there is not an adequate amount of water to supply growers along the river with water rights, the water rights of the Russian River Mendocino County Flood Control and Water Conservation District (RRFC) which holds rights to 8000 ac ft of water in the lake, the Sonoma County Water Agency which holds a water right to 75,000 ac-ft and needed river flows for fish. In May 2014, the State Water Board curtailed all appropriative rights filed later than 1955 between Coyote Dam and Healdsburg on the mainstem Russian river and its tributaries and is expected to curtail all riparian rights including groundwater uses in July 2014. These curtailments cut off all water supplies to agriculture while maintaining water supply to urban areas.

Agriculture is the largest water user in the Russian River and a major user in the Navarro. Winegrapes are the primary legal crop and typically use low water drip irrigation methods. This project revises the frequency of irrigation by monitoring soil moisture at 3 depths (1, 3, & 5 ft) in the root zone. CLSI will work with the grower to install the sensors and download the data and NRCS will assist by training growers to interpret the data and revise their irrigation scheduling. In some California locations, use of sensors has achieved 20% water conservation. The project also provides an alternative agricultural irrigation supply by constructing the necessary infrastructure of pipes, pumps, and ponds for use of 126.6 acre feet of recycled water. The surface water that is not used will remain in the Russian River for salmonids and municipal supply, increasing the reliability of Lake Mendocino.

In the past, fish strandings have occurred during frost events when agricultural producers have used instream diversions to protect crops. By providing agricultural operators with an alternative source for frost protection, this project leaves more water instream during the sensitive spring spawning period for coho, Chinook, and steelhead. NOAA estimated that frost control can affect 25,872 steelhead trout fry per year in the Upper Russian River (NMFS 2011). This project in conjunction with other completed off-stream ponds make future fish strandings less likely.

This project also provides climate change adaptation capabilities for the City of Ukiah and surrounding agricultural lands by developing an alternative source for irrigation water supply and thus increasing water supply reliability in the area. This project also promotes regional social justice and equity by alleviating the need for increases in sewage fees in the disadvantaged City of Ukiah.

Estimates of without-project conditions

If the Ukiah recycled water project is not built, the water supply reliability of Lake Mendocino will continue to decrease. There are no proposals to create a new source of water for farms except the Ukiah recycled water project. There are also no proposals to implement use of soil moisture meters by growers in regional approach to reduce irrigation demand.

In future low water years curtailments of agricultural water use would continue, resulting in a loss of economic activity and jobs. It is also likely that the focus on reductions of agricultural water supply but

not urban supply will spur adjudication of water supply in the basin, a tortuous process that would likely result in less water for urban uses and more water for agriculture. This change will make the water supply in Lake Mendocino less reliable and increase conflict in the region.

Additionally, if unfunded, the City of Ukiah would be forced to raise water rates to finance this project, which would create a hardship on this DAC. Without additional sources of water, Ukiah would continue to lack climate change resiliency.

Descriptions of methods used to estimate physical benefits

The project proponent used relevant literature and reports to arrive at estimates of agricultural water use, costs of importing water, avoided water supply, and other benefits. Detailed descriptions of methods used to estimate benefits are provided in Tables 5.20 a – 5.20 h where appropriate.

Description of any potential adverse physical effects

There is grading and vegetation removal for implementation of the recycled water project, however, all work is expected to be completed under a Mitigated Negative Declaration. Accepted professional standards and BMPs will be used during project implementation.

Table 5.20 a – Annual Project Physical Benefits

Project Name: __Agricultural Water Conservation and Water Supply Reliability Program_____

Type of Benefit Claimed: _Increased instream flow for environmental and/ or municipal purposes_____

Units of the Benefit Claimed : _____acre-feet per year_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	793	793
2016	0	793	793
Yearly	0	793	793
Last Year of Project Life - 2065	0	793	793

Comments: Use of recycled water offsets 126.6 acre-feet of freshwater and water conservation is estimated at 0.1 acre-feet/acre/year for 6666 acres of farmland. Estimate of recycled water use is derived from Table 7.4 in the Recycled Water Master Plan (Carollo 2012). For soil moisture monitoring, 100 farms averaging 66.66 acres each are expected to receive instruments allowing for 0.1 ac. ft./acre/year conservation for total of 666 ac ft/year. CLSI discussed the use of soil moisture monitoring with a number of growers, NRCS irrigation experts and manufacturers of the instruments to get a general number for the amount of water conservation. This figure was 20%, but it was reduced to 10% for the quantification of benefits to reflect the very low amounts of water used by winegrapes. This water remains in stream for fish and municipal purposes where it is diverted at the Mirabel pumps on the Lower Russian River. This benefit provides an estimated $63,440 per year economic value given a conservative estimate of $80 per acre-foot per year (Brown 2007).

Table 5.20 b – Annual Project Physical Benefits

Project Name: __Agricultural Water Conservation and Water Supply Reliability Program_____

Type of Benefit Claimed: ___Increased water supply reliability_____

Units of the Benefit Claimed : ___# households_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2015	0	1804	1804
2020	0	1804	1804
2025	0	1804	1804
Every Five Years	0	1804	1804
Last Year of Project Life - 2065	0	1804	1804

Comments: This benefit is expected to provide an estimated economic value of $102,828 per year (1804 households * $19 /household/month * 3 months/year) during periods of below average water supply, conservatively estimated at once every five years (Barakat & Chamberlin, Inc. 1994).

Table 5.20 c – Annual Project Physical Benefits

Project Name: __Agricultural Water Conservation and Water Supply Reliability Program_____

Type of Benefit Claimed: __Avoided water supply purchases_____

Units of the Benefit Claimed : ____Acre-feet_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0		
2015	0	126.6	126.6
2022	0	126.6	126.6
Every 7 years	0	126.6	126.6
Last Year of Project Life - 2065	0	126.6	126.6

Comments: The project proponent provided the estimate of the yearly purchase of water by growers that will be offset by use of recycled water during drought conditions, which they estimate will occur every 5 – 10 years. The project proponent estimates a local economic value of $47 per acre foot, yielding an estimated economic benefit of $59,502 about every 7 years.

Table 5.20 d – Annual Project Physical Benefits

Project Name: __Agricultural Water Conservation and Water Supply Reliability Program_____

Type of Benefit Claimed: __Avoided water supply projects_____

Units of the Benefit Claimed : $_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	396,000	396,000
2016	0	396,000	396,000
Yearly	0	396,000	396,000
Last Year of Project Life – 2065	0	396,000	396,000

Comments: Reuse of municipal recycled water avoids the requirement for the City of Ukiah to complete studies related to discharge. These totaled $396,000 in 2011-2012.

Table 5.20 e – Annual Project Physical Benefits

Project Name: Agricultural Water Conservation and Water Supply Reliability Program

Type of Benefit Claimed: Avoided water shortage costs

Units of the Benefit Claimed : $

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	103,213	103,213
2022	0	103,213	103,213
Every Seven Years	0	103,213	103,213
Last Year of Project Life - 2065	0	0	0

Comments: Agricultural sites will avoid water shortage for frost control by using recycled water. Entire crop is lost if no frost control can be done. 20.3 acres of frost control for vineyards provided by the project would save crop worth an average of $1,338/ton and 3.8 tons/acre. The 2012 Mendocino County Crop Report (p .3) was used to determine the average tons/acre for winegrape production and the average value of grapes per ton. Figures for the 2011 and 2012 crops were averaged. It is estimated that frost protection is necessary about once every seven years.

Table 5.20 f – Annual Project Physical Benefits

Project Name: Agricultural Water Conservation and Water Supply Reliability Program

Type of Benefit Claimed: Avoided costs associated with emergency repairs

Units of the Benefit Claimed : $

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	1,000	1,000
2025	0	1,000	1,000
Every 10 years	0	1,000	1,000
Last Year of Project Life - 2065	0	1,000	1,000

Comments: The project proponent provided this estimate for the avoided costs associated with emergency repairs to their percolation ponds if they overflow. The overflow is caused when there are low flows in the river in winter and discharge of the tertiary recycled water is not possible. The project proponent estimates that in the absence of the project, the percolation ponds would overflow once every ten years.

Table 5.20 g – Annual Project Physical Benefits

Project Name: Agricultural Water Conservation and Water Supply Reliability Program

Type of Benefit Claimed: Education

Units of the Benefit Claimed : # landowners

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014	0	500	500
2015			
2016			
Etc.			
Last Year of Project Life			

Comments: CLSI will work with all the agricultural organizations in the Navarro and Russian River watersheds as well as numerous individual growers on the soil moisture meter project. These groups along with the NRCS will form a coordinating committee to implement the project and outreach to all growers, particularly those in DACs about water conservation practices.

Table 6 – Cost Effective Analysis Project name: Agricultural Water Conservation and Water Supply Reliability Program - Russian and Navarro	
Question 1	Types of benefits provided as shown in Table 5: **increased instream flow for environmental purposes, increased water supply reliability, avoided water supply projects, avoided water supply purchases, avoided water shortage costs, avoided costs associated with emergency repairs, education.**
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? **Yes. A suite of alternatives were considered in the Recycled Water Master Plan. The preferred alternative was chosen to maximize reuse of the available water and minimize discharges to the Russian River. A variety of irrigation water conservation measures were evaluated. Soil moisture monitoring was selected due to the current lack of use of this technology by grapegrowers and relatively high potential for water savings based on use in other regions.**
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs: **Alternative 1, Baseline ($635 per AF), Alternative 1B, expanded Baseline ($639 per AF), Alternative 2 Farmers constructing own storage ponds ($560 per AF), Alternative 3 centralized storage ($2,535 per AF), Alternative 3B centralized storage with extended delivery ($2,162 per AF), Alternative 4 supply a combined set of agricultural and urban landscape irrigation demands ($1,199 per AF) (Carollo 2012, Section 6)**
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. **Alternative 2 is the lowest cost alternative and a portion of the proposed project is included. A portion of the project is also included in alternative 1. However the City's goal is complete reuse of the recycled water so they chose alternative 4 as the preferred alternative and the entire proposed project is included in that alternative. The City chose alternative 4 as it is the only one serving municipal users therefore giving more return on investment than ag users will more than likely pay for the water. Also, with the phased approach it stretches the time for full build-out, allowing for time to obtain funding.**

21. City of Crescent City

Elevated Water Tank Rehabilitation

Project Description: Seismically retrofit and perform health and safety upgrades to an existing 50,000 gallon welded steel elevated water tank installed in 1958.

How project alleviates drought impacts: This project increases water supply reliability by stabilizing the Elevated Water Tank to ensure continued water supply reliability and prevent loss of system water.

Drought project type: This project will increase water supply reliability and the delivery of safe drinking water by stabilizing the elevated water tank, thereby improving water infrastructure to ensure a stable supply source.

Reason for expedited funding: The City of Crescent City provides water to DACs and Severely Disadvantaged Communities and has insufficient cash reserves necessary for the project without taking additional debt. In recent years, the City Water Enterprise Fund has received approximately $1.4 million to $1.6 million in annual customer and grant revenues to support the system. However, annual operating and debt costs have been in the $1.8 million to $2.1 million range. As a result, annual deficits ranging from $300,000 to $500,000 in recent years have depleted available cash reserves. Water system rates were recently raised with much public outcry and the City has not accumulated necessary cash reserves to perform this important time- critical project without placing additional debt on the DACs that benefit from this project. Time is of the essence; tank failure from seismic loading is possible and expedited funding is necessary to address the need prior to failure.

Crescent City Water District Boundary:
Pelican Bay State Prison

Water Tank Location
Wonder Stump Road
and Highway 101

Crescent City Water District Boundary:
Meadow Brook

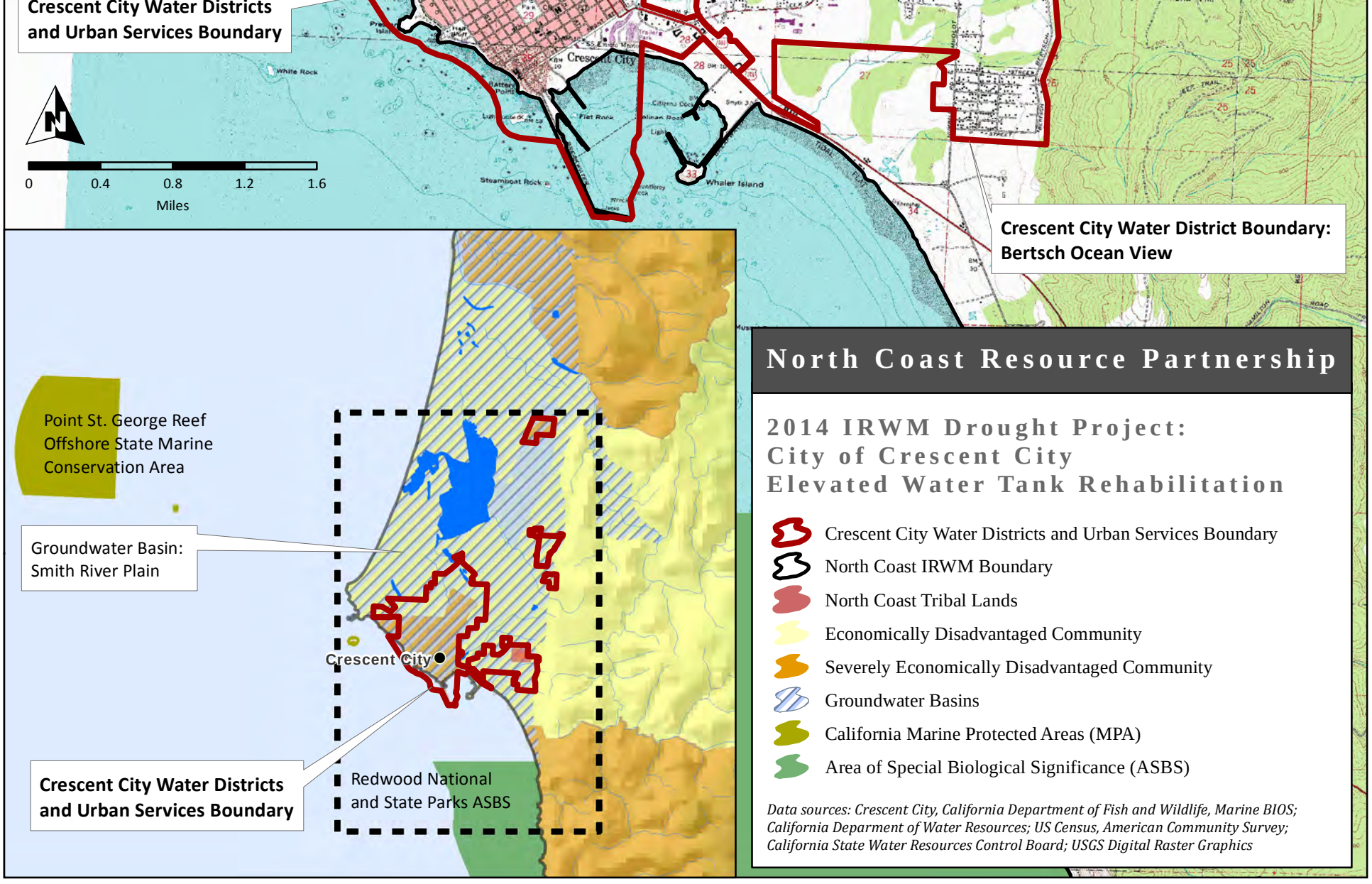
Crescent City Water District Boundary:
Church Tree

Crescent City Water Districts
and Urban Services Boundary

Elk Valley Rancheria

Crescent City Water District Boundary:
Bertsch Ocean View

0 0.4 0.8 1.2 1.6
Miles



North Coast Resource Partnership

2014 IRWM Drought Project:
City of Crescent City
Elevated Water Tank Rehabilitation

- Crescent City Water Districts and Urban Services Boundary
- North Coast IRWM Boundary
- North Coast Tribal Lands
- Economically Disadvantaged Community
- Severely Economically Disadvantaged Community
- Groundwater Basins
- California Marine Protected Areas (MPA)
- Area of Special Biological Significance (ASBS)

Data sources: Crescent City, California Department of Fish and Wildlife, Marine BIOS; California Deparment of Water Resources; US Census, American Community Survey; California State Water Resources Control Board; USGS Digital Raster Graphics

21. City of Crescent City

Supporting studies or documents

- Infra Terra, Inc. 2013. Seismic Assessment 50,000 Gallon Elevated Water Tank City of Crescent City. Report to Pittsburg Tank & Tower Maintenance Co., Inc. 27 pp – entire document.
- Pittsburg Tank & Tower Maintenance Co., Inc. 2013a. Elevated Tank Inspection Report , 36 pages. – entire document.
- Pittsburg Tank & Tower Maintenance Co., Inc. 2013b. Quotation for repair and recoating the 50,000 gallon EST at Wonder Stump Road. 4 pages – entire document.
- Taber Draft Geotechnical Investigation Proposed Elevated Water Tank, Wonder Stump Road– entire document provides the geotechnical criteria for use in design and construction of the elevated water tank. 47 pages.

Recent and historical conditions and how the project addresses them

The Elevated Water Tank met code and design standards in 1958, but does not meet current seismic and engineering codes and standards. The project was developed through detailed assessment of the EWT and local geology (Infra Terra, Inc. 2013, Tabor Consultants 2006). The assessment included a detailed review of the physical condition, safety deficiencies, and foundation shortcomings of the tank (Pittsburg Tank & Tower Maintenance Co., Inc 2013a). The information from the report was used by structural engineers to perform a seismic stability analysis, which concluded that the existing tank is not seismically stable, in addition to the numerous safety deficiencies that limit maintenance access. The scope of work for the EWT retrofit project was developed based upon these studies (Pittsburg Tank & Tower Maintenance Co., Inc. 2013b).

Estimates of without-project conditions

Without this project, the City of Crescent City, which is a Severely Disadvantaged Community, Del Norte County Service Area, Church Tree CSD and Bersch Ocean View CSDs, Elk Valley Rancheria, and Pelican Bay State Prison, which are all DACs, will remain vulnerable to loss of supply if a seismic event occurs. Tank failure and loss of system pressure during an emergency would result in water waste that would potentially be unsupportable if drought conditions continue. The alternative project, construction of a new tank, would provide the same benefits to supply reliability, however, the costs would be about double and it would take longer to obtain funding, increasing the likelihood that a seismic event will occur while the vulnerable tank is still in use and thus increasing the amount of time these DACs are vulnerable.

Descriptions of methods used to estimate physical benefits

Physical benefits were determined by checking City records to determine number of households served. The cost of the alternative was estimated by in-house technical specialists. Economic values estimates were provided by an economics team in 2012 that developed a list of economic values for benefits

common to NCIRWMP projects. The team evaluated the literature with a focus on natural resource valuation in the North Coast of California (ECONorthwest 2012).

Description of any potential adverse physical effects

During the retrofit of the EWT, a temporary pressure control system will be used to maintain pressure in the drinking water distribution system, which should eliminate any impacts to customers. Minor delays to traffic may occur infrequently. During project implementation, minor construction impacts in the area of the foundation of the EWT are expected, however, CEQA procedures will be followed and construction BMPs will be used to minimize impacts.

Table 5.21 a – Annual Project Physical Benefits

Project Name: Elevated Water Tank (EWT) Rehabilitation

Type of Benefit Claimed: Increased Water Supply Reliability

Units of the Benefit Claimed : Number of household customers

Additional Information About this Benefit

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	3,659	3,659
2035	0	3,659	3,659
Every 20 years	0	3,659	3,659
Last Year of Project Life - 2065	0	0	0

Comments: Using a conservative estimate of $19 per month per household, this benefit provides an economic benefit of $834,252 every twenty years (Barakat & Chamberlin 1994 Because this community's funding is limited and the alternative project is approximately twice the cost of this project, the alternative is considered infeasible and this Table does not include its consideration. If it were included, it would provide the same benefits once it's planning, permitting, and construction was completed.

Table 5.21 b – Annual Project Physical Benefits

Project Name: __Elevated Water Tank (EWT) Rehabilitation_____

Type of Benefit Claimed: __Avoided Water Supply Projects _____

Units of the Benefit Claimed : ___$_____

Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	$1,000000	$584,080	$415,920
2016	0	0	0
Etc.	0	0	0
Last Year of Project Life	0	0	0

Comments: The alternative project is construction of a new elevated water tank, which would achieve the same types and amounts of physical benefits, but at a much later date because funding, planning, permitting, and construction would need to occur prior to its implementation . This benefit would provide an estimated economic value of $415,920 once.

Table 5.21 c – Annual Project Physical Benefits Project Name: Elevated Water Tank (EWT) Rehabilitation Type of Benefit Claimed: Enhanced Fire Fighting Capabilities Units of the Benefit Claimed : $ Additional Information About this Benefit			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2014			
2015	0	Unknown	Unknown (Cost of saved property and saved lives)
2016			
Etc.			
Last Year of Project Life			
Comments: If the EWT fails, there would be no water available for firefighting, which could have disastrous consequences, especially during these extreme drought conditions. Water for firefighting would need to be trucked, and if roads are impassable due to a seismic event, the ability to fight fires during the emergency would be severely impaired. The cost of lost property, property damage and loss of life cannot be estimated, but would be significant. It is estimated that such an emergency could happen once in the next 50 years. Because this community's funding is limited and the alternative project is approximately twice the cost of this project, the alternative is considered infeasible and this Table does not include its consideration. If it were included, it would provide the same benefits once its planning, permitting, and construction was completed.			

Table 6.21 – Cost Effective Analysis Project name: Elevated Water Tank (EWT) Rehabilitation	
Question 1	Types of benefits provided as shown in Table 5: **water supply reliability, firefighting capability, avoided water supply projects**
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? **Yes**
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs: **Construction of a new tank at a cost of approximately $1,000,000, double the cost of the proposed project.**
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. **The proposed project is the least cost alternative. It and the alternative would both provide water supply reliability and disaster resiliency for the City of Crescent City.**
Comments:	

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