

**DRAFT WATER RESOURCES
TECHNICAL REPORT**

For:

Humboldt County Community Development Division

DRAFT REPORT

November 2007

Prepared for:

County of Humboldt
Community Development Division

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List of Acronyms

AFY	Acre Feet per Year
BAT	Best Available Technology
BCT	Best Conventional Pollutant Control Technology
BMPs	Best Management Practices
CCAs	Critical Coastal Areas
CEQA	California Environmental Quality Act
cfs	Cubic Feet per Second
CTR	California Toxics Rule
CWA	Clean Water Act
ft ³ /yr	Cubic Meters per Year
HA	Hydrologic Areas
HR	Hydrologic Region
HSA	Hydrologic Sub-Areas
MCLs	Maximum Contaminant Levels
MMM's	Minimum Management Measures
MEP	Maximum Extent Practicable
mg/kg	Milligrams per Kilogram
NPS	Non-point Source
NPDES	National Pollutant Discharge Elimination System
SWQPA	Stormwater Quality Protection Areas
SWPPP	Storm Water Pollution Prevention Plan
SUSMP	Standard Urban Stormwater Mitigation Plan

TMDL	Total Maximum Daily Load
µg/g	Micrograms per Gram
µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
USEPA	United States Environmental Protection Agency
WMA	Watershed Management Areas
WQOs	Water Quality Objectives

Executive Summary

The Water Resources Technical Report presented herein was developed to guide conclusions presented in the draft Water Resources Element of the Humboldt County General Plan. This report builds upon the water resources information developed as part of the Natural Resources and Hazards Report, Volume II. This report presents an analysis of hydrology and water quality for: 1) existing conditions in Humboldt County, including a framework of regulatory requirements; 2) an analysis of future water demands based on the General Plan land use build out; 3) potential mitigation measures and reduced impacts utilizing BMPs; 4) cumulative impacts; and 5) a summary of watershed and water resource issues facing Humboldt County.

Historically, water resources have not been covered as a separate element in the County's General Plan. Currently, only Imperial County has a Water Element. Several other counties, including Sonoma are currently working on water resources elements and it is anticipated that this element will be an important part of general plans in the future. It is hoped that this will serve as a model for integrating water resource issues into the County's planning process.

Humboldt County is blessed with an abundance of water resources, with 5 federally recognized wild and scenic rivers, numerous creeks, rivers and lakes, Humboldt Bay, and 110 miles of ocean frontage.

The water resources of the County, as with other areas of the State, are faced with a myriad of issues both natural and political that could affect future needs:

Pollutants

California ranks TMDL's (Total Maximum Daily Loads) as low, medium, or high priority based on the number and severity of the impairments and the importance of the beneficial uses. In Humboldt County several waterbodies have been identified as impaired by sedimentation, siltation, temperature, low dissolved oxygen, chemical constituents, and by nutrient loads. Of these waterbodies, the Mattole River, Freshwater Creek, and Elk River are listed as the highest priority because of the severity of the impairments and the importance of the beneficial uses.

Sediment impairment affects fifty-nine percent of the area covered by the North Coast Region. The human-caused activities contributing to excessive sediment discharge include but are not limited to:

- Construction;
- Mining;
- Agriculture, including ranching, grazing, and farming;
- Dairies and other types of confined animal operation;
- Timber harvesting;
- Other earth-disturbing activities.

Non Point Pollutants of concern in Humboldt County include:

- Excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
- Oil, grease, and toxic chemicals from urban runoff and energy production;
- Sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks;
- Salt from irrigation practices and acid drainage from abandoned mines;

- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems;
- Atmospheric deposition and hydromodification are also sources of nonpoint source pollution.

Adequacy of Existing Stormwater Management Standards

For the purposes of Humboldt County's General Plan update, site specific stormwater standards for General Plan land use build-out), and development standards should be considered. Standards that prohibit projects from altering the hydrologic regimes of streams by increasing peak flows or decreasing summer low flows by treating all stormwater from at least a two-year rain event through on-site detention and percolation are recommended by Department of Fish and Game. Additionally, for the unincorporated areas of the County that are not covered by existing community plans uniform standards are recommended.

Groundwater Quantity and Quality

As a general rule, most of the wells that truly rely on groundwater as the water source in Humboldt County find that the water is often poor in quality and quantity. While there are exceptions, including some of the wells located in the Humboldt Bay Basin, these wells can have very high levels of iron and manganese and can have insufficient production during the late summer and fall.

Groundwater quality characteristics and specific local impairments vary within the regional setting of Humboldt County. In general, seawater intrusion and nitrates in shallow aquifers are problems in the coastal groundwater basins; high total dissolved solids (TDS) content and iron, boron, and manganese can be problems in the inland basins of the County.

TDS in drinking water originate from natural sources, sewage, urban run-off, industrial wastewater, and chemicals used in the water treatment process. In Humboldt County, elevated TDS has been due to natural environmental features such as carbonate deposits and seawater intrusion, but other sources include stormwater and agricultural runoff, and point/non-point wastewater discharges.

Water Import and Export

Water surpluses and shortages coexist in different parts of California due to growing demands and the limited ability to increase supplies without Herculean new efforts. Hence, while the northern one-third of the state accounts for 75 percent of total water supply, the southern two-thirds accounts for 80 percent of demand.

Water portfolios prepared for the North Coast Hydrological Region by the State Water Resources Control Board shows that for 2001, which was a drier year with precipitation at 60 percent of average, 32,244,000 acre-feet entered the region from, precipitation and inflows from Oregon. Of the inflows, 32,882,000 acre-feet left the region in the form of consumptive use (647 TAF), exports to other regions (703 TAF), outflows to Oregon (66 TAF), statutory required outflows to Salt Sink (8,021 TAF), evaporation and natural runoff (23,323 TAF), and other outflows (122 TAF). The difference between outflows and inflows for 2001 (638 TAF) represented a net decrease in surface water available for storage in 2001.

For years, Humboldt County has had a significant amount of water exported outside of the County borders. As statewide water supplies are falling behind demand, areas with relatively abundant water supplies are likely to be targeted for additional exports. While such proposals

are within the jurisdiction of the SWRCB, Humboldt County needs to be aggressively proactive in protecting its water resource interests.

Hydropower Projects

Relicensing projects have significantly impacted Humboldt County and future relicensing must be thoroughly reviewed to avoid further impacts. The relicensing of the Potter Valley Project and the Klamath River projects are two examples. While such proposals are within the jurisdiction of FERC, Humboldt County needs to be continually proactive in evaluating hydropower projects in excess of 5 Mw in size that utilize the County's water resources.

Availability of Water for Future Growth

Surplus water is available for future growth in certain areas of Humboldt County. The highest level of excess water available for future developments in Humboldt County is from the Humboldt Bay Municipal Water District. There are however critical shortages of domestic water now and therefore projected in the future for several communities all of which are in the Eel River Basin. Those areas include Briceland CSD, Garberville Sanitary District, Phillippsville CSD, Redway CSD, Benbow Water Company, Shelter Cove's Resort Improvement District #1, and Weott CSD. These areas would require infrastructure development to make their individual systems more efficient. Major leaks, inadequate storage facilities, and reliability on un-appropriated water are the leading reasons why domestic water shortage have or will be experienced in the future.

Adequacy of Water-Related Infrastructure to Meet Regulatory Standards

Public infrastructure in Humboldt County is in dire need of upgrades to bring existing systems up to public works and regulatory standards, and need to be expanded to meet current and anticipated population needs. There are numerous sewer, water, and drainage systems in the County that currently pose serious health risks to the public, hamper development, and degrade the community due to their inadequacy. Infrastructure is critical to maintaining the local economy. These projects require state and federal financial assistance due to their high costs. A total of \$180 million is needed just to bring sewer and water systems within Humboldt County into compliance with public works and regulatory standards.

Water Reuse

Increasing the amount of reclaimed water for agriculture and commercial consumers will significantly ease the strain on rivers, lakes, and aquifers that provide us with clean and safe drinking water.

Until the safety and value of reclaimed wastewater is understood, people will balk at the idea of using it. However, the idea is not a novel one. All of our water (including drinking) was at one point used for, or emitted by, something else and is part of a general cycle of rain, ground filtering, and evaporation.

Humboldt County citizens have a responsibility to monitor and control their water use. There are many simple ways for people to reduce excess water use, lower water bills and protect the environment, especially in the spring and summer months. Beyond the standard constraints of watering the lawn only when necessary and washing the car wisely by using soap and a bucket of water such as plumbing retrofits, leak detection and repair, large landscape water conservation programs, rebates for high efficiency washing machines; conservation pricing, heightened citizen involvement and water conservation design practices.

Global Warming

The potential impacts to Humboldt County's water resources as a result of global warming are not clearly known. The Pacific Institute as part of the California Water Update 2005 surveyed existing literature on climate change and its impacts on water resources in California. The study concluded that managing water resources to address climate change impacts could prove different than managing for historical climate variability because:

- Climate changes could produce hydrologic conditions and extremes of a different nature than current systems were designed to manage;
- They may produce similar kinds of variability but outside of the range for which current infrastructure was designed;
- Traditional water resource management assumes that sufficient time and information will be available before the onset of large or irreversible climate impacts to permit managers to respond appropriately;
- Traditional management assumes that no special efforts or plans are required to protect against surprises or uncertainties.

Humboldt County's water managers must determine if existing facilities can handle the impacts that will occur under future climate change, and at what economic cost. Precise information on future climate impacts is unavailable, so water managers must explore the sensitivity of their system to a wider range of conditions, and develop methods or technologies to improve operational water management. They should also determine quantitative impacts from climate change on water supply and flood control, and evaluate alternative water management options. In addition, water managers should closely examine the design practices of hydraulic infrastructure, because of the many uncertainties in predicting peak flows under climate change scenarios.

I. Introduction

A. Purpose and Objectives

The main purpose of this report is to provide an assessment of the hydrologic, stormwater, water quality conditions, and major watershed issues that are present now and could possibly be issues in a twenty-year planning horizon for Humboldt County.

The main objectives of this report include the following:

- Research, collect, and synthesize relevant information regarding water resources of Humboldt County.
- Identify flooding hazard zones and issues within and around the County.
- Characterize and assess the existing storm drainage/stormwater conditions.
- Identify applicable drainage computation methodologies as well as applicable design standards.
- Provide a base map of existing hydrology and proposed hydrology to conceptualize specific stormwater control features.
- Identify applicable stormwater regulations and guidelines.
- Characterize and assess the existing/proposed potential pollutant loads from the various sketch plans.
- Propose mitigation measures such as Best Management Practices (BMPs) to help minimize and/or eliminate potential impacts from pollutant loads.
- Identify Water Supply and Demand availability including water exports.
- Along with the Natural Resources and Hazards Report this report will be used to generate a Water Resources Element for the Humboldt County General Plan Update.

B. Water Resources Element Description

The Governor's Office of Planning and Research (OPR) has suggested that cities and counties include a new water element in their general plan—beyond the currently required seven elements—that focuses on water and the manner in which the city or county will plan for its acquisition, usage, and conservation. This water element is intended to consolidate the Humboldt County's discussion of water issues from other required elements (such as the circulation, conservation, open-space, and safety elements) in one place, making water issues easier for the public to understand. The main thrust of the Water Resource Element is to evaluate the usefulness of a water resource plan along with the regulatory scheme for long-term land use and water planning.

The Water Resources Element will address a range of water related issues in Humboldt County. Some other water-related topics are also addressed in other elements. Water availability as a factor in land use plan map densities is addressed in the Land Use Element and the Community Services and Infrastructure Element. The Conservation and Open Space Elements addresses riparian corridors, wetlands, wildlife protection, tree protection, fishery resources and other biotic resources, water-oriented recreation, soil erosion, forestry, and mineral resources. The Safety Element addresses flood hazards, fire suppression, and hazardous materials. The Water Resources Element has been developed to be consistent with and build upon the information in these other elements. With regard to natural resources, the Natural Resources and Hazards Report prepared by Humboldt County staff provides an assessment of current conditions related to water (surface, ground, and pollution) and watersheds; biological resources (vegetation,

**Humboldt County General Plan
Water Resources Technical Report**

fisheries, and special status species); forest lands (including Timberland Production Zones); agricultural production (including soils and economic structure); parks, recreation, and open space; cultural resources (historical and archaeological sites and landmarks); mineral and energy (sand and gravel, rock, metal, and oil and gas); scenic qualities; and air quality (climate and pollutants). There is a direct link between this Water Resources Technical report and the Natural Resources and Hazards Report as the analysis presented herein builds upon the watershed characterization and regulatory setting of the Natural Resources and Hazards Report

II. Existing Conditions

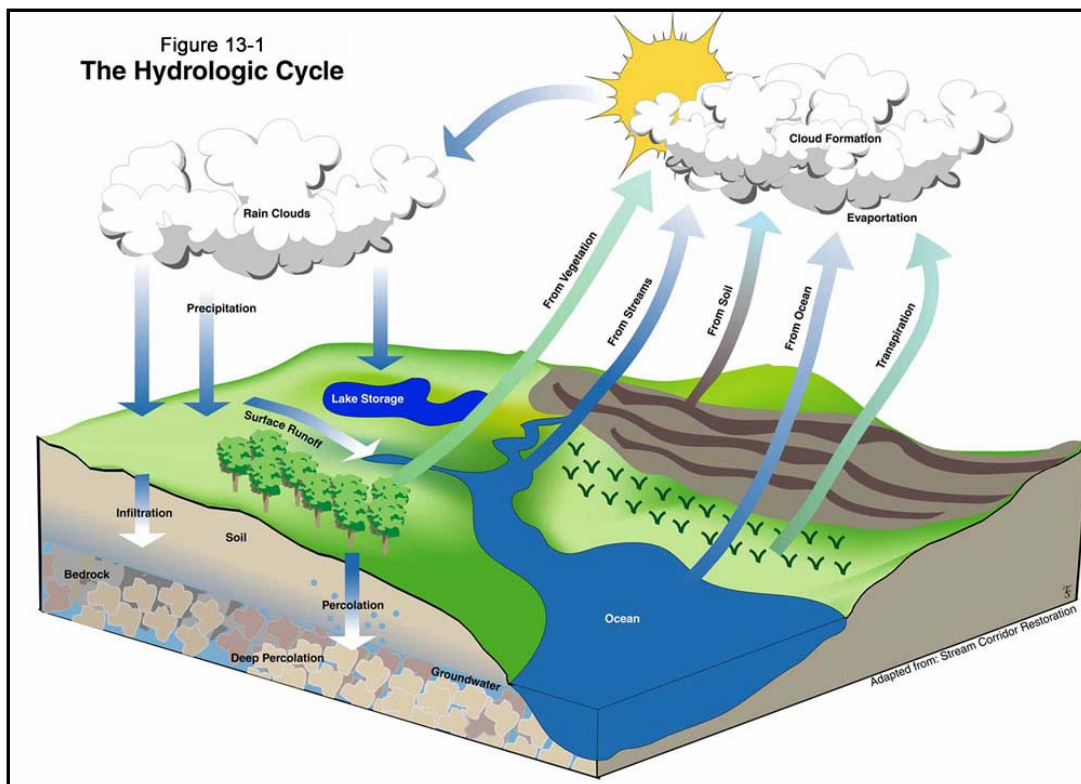
A. Water Resources Background

Linkages between water management and land development occur in different ways. Water pollution is often created on land. Urban development is often restricted, or motivated, by the presence or lack of water. Some types of land uses, such as dense urban development, can cause flooding and water quality issues. Agricultural or industrial land uses may deplete ground water, degrade water quality, or drain naturally wet areas. Clearly, water development and land development are inherently connected.

The approach taken in the General Plan involves: 1) consideration of appropriate land use designations in order to link land use policies, environmental protection, and economic development efforts to water quality and supply objectives; 2) to focus attention on water as a planning concern including the protection of the County's water resources from avoidable export; and 3) to address the shifts in water supply caused by climate change and new development patterns within the County.

Water Cycle

Water moves continuously from Earth's surface into the air and then back to the land, changing only in form. This movement is commonly referred to as the hydrologic cycle and is powered by sunshine and gravity. When the sun heats up water in streams, lakes and oceans, the water evaporates into vapor or steam in the atmosphere. As the moisture-laden air cools, particularly where it is forced higher by steep slopes, the vapor condenses into water which falls as rain or, if the vapor is chilled enough, it forms solid ice crystals and falls as snow. Most of the rain and snowmelt runs off into surface water bodies which drain back to the sea. Some of the precipitation is absorbed into the Earth and becomes "groundwater", some of which moves slowly through subsurface layers to streams, lakes and oceans (Figure 13-1).



There is as much water today in the water cycle as there ever was, but 97 percent of Earth's water is contained in the oceans and is too salty for most land-based uses. Since the salt is left behind during evaporation, the resulting precipitation is fresh water. Of the 3 percent of the water on Earth that is fresh water, most is locked in icecaps and glaciers. Streams and lakes contain only about one-fiftieth of one percent of Earth's water, and ground water constitutes only about half of one percent. Although nearly all water becomes air-borne vapor at one time or another, the atmosphere contains only one-thousandth of one percent of Earth's water.

The North Coast region generally has the most abundant water resources of any region of the State as a result of its location. The high volumes of precipitation and natural river runoff are a key component for most of the beneficial uses of its water bodies, including commercial and recreational fishing, shellfish harvesting, urban and agricultural use, and recreation. Many of the region's forests and watersheds support threatened and endangered species of plants and animals, and the major rivers and streams contain significant anadromous fishery resources. This region also features important coastal resources, including Trinidad Harbor, Humboldt Bay, and many small estuaries and lagoons.

Water Rights

The people of California own all the surface water in the state. Water rights provide the right to reasonable and beneficial use of the water, not ownership of the water. Public interests are thus involved at every level of water management in California.

Rights to use water are subject to the State's obligation under the Public Trust Doctrine as trustee of certain resources for Californians. The Public Trust Doctrine is a legal doctrine that imposes responsibilities on State agencies to protect trust resources associated with California waterways, such as navigation, fisheries, recreation, ecological preservation and related beneficial uses.

The California Constitution requires that water be used in a reasonable and beneficial manner and prohibits misuse and waste of water. Water is used beneficially when, for example, it is used to drink, grow crops or wash cars. What is reasonable water use depends on the circumstances; for example, it could be unreasonable to wash cars during a severe drought. All types of water rights are subject to this constitutional policy, and a state agency, the State Water Resources Control Board (SWRCB) Division of Water Rights, is authorized to take action to prevent unreasonable uses of water. In addition, the SWRCB conducts hearings to determine water rights on un-appropriated waterbodies. A water right hearing is a quasi-judicial proceeding that has, as an objective, the development of an adequate record upon which the SWRCB can rely to make good decisions. In Humboldt County dozens of water rights decisions have been made by the SWRCB over the years. There are two principal types of surface water rights in California, riparian rights and appropriative rights.

Riparian Water Rights

A riparian right is the right to divert, but not store, a portion of the natural flow for use based on the ownership of property adjacent to a natural watercourse. Water claimed through a riparian right must be used on the riparian parcel. Such a right is generally attached to the riparian parcel of land except where a riparian right has been preserved for non-contiguous parcels when land is subdivided. Generally, riparian rights are not lost through non-use. All riparian water users have the same priority; senior and junior riparian water rights do not exist. During times of water shortage, all riparian water users must adjust their water use to allow equal sharing of the available water supply.

Riparian rights are not defined by California statutes but have been established by common law and court decisions. Permits or other government approvals are not required to exercise riparian

rights. However, a permit from the Army Corps of Engineers or some other regulatory agency, or an agreement with the California Department of Fish and Game, may be necessary to construct diversion facilities needed to exercise riparian or appropriative rights.

Appropriative Water Rights

Under the prior appropriation doctrine, a person may acquire a right to divert, store, and use water regardless of whether the land on which it is used is adjacent to a stream or within its watershed. The rule of priority between appropriators is "first in time is first in right." A senior appropriative water rights holder may not change an established use of the water to the detriment of a junior, including a junior's reliance on a senior's return flow. Acquisition of appropriative water rights is subject to the issuance of a permit by the State Water Resources Control Board (SWRCB) with priority based on the date a permit is issued. Permit and license provisions do not apply to pre-1914 appropriative rights (those initiated before the Water Commission Act took effect in 1914), but pre-1914 rights are still subject to reasonable and beneficial use. Appropriative rights may be sold or transferred.

Water flowing in subterranean streams through known and defined channels is subject to diversion, use and regulation under riparian and appropriative rights as described above. Water is considered to be flowing in a subterranean stream through a known and definite channel if it is in contact with surface water and moving in the same direction in a relatively defined channel.

An appropriative water right in California can be maintained only by continuous beneficial use, and can be lost by five or more continuous years of non-use. Riparian rights, on the other hand, cannot be lost through non-use. Appropriative rights can also be lost through abandonment, but to constitute abandonment of an appropriative right, there must be the intent not to resume the beneficial use of the water right. As a result, abandonment is always voluntary.

Groundwater Rights

The vast majority of California's groundwater is unregulated. The State does not have a comprehensive groundwater permit process to regulate ground water withdrawal. There are three legally recognized classifications of groundwater in California: subterranean streams (through known and defined channels), underflow of surface waters, and percolating groundwater. Subterranean streams and underflow of surface waters are subject to the laws of surface waters and are regulated by the State Water Board. Percolating groundwater, on the other hand, has few regulation requirements.

Percolating groundwater has two sub-classifications: overlying land use, and surplus groundwater. Land owners overlying percolating groundwater may use it on an equal and correlative basis. This means that all property owners above a common aquifer possess a shared right to reasonable use of the groundwater aquifer. These rights are similar to riparian rights and since they are correlative, a user cannot take unlimited quantities without regard to the needs of other users. Surplus groundwater may be appropriated for use on non-overlying lands, provided such use will not create overdraft conditions. Landowners overlying groundwater have rights to share the groundwater under their property with other overlying land owners without obtaining a permit from any state agency as long as that groundwater is put to reasonable and beneficial use. Groundwater may also be used on lands which are not overlying, but this right is subordinate to the prior use of any overlying land owners. Surface water can be diverted or pumped into aquifers for later extraction, with SWRCB approval.

The courts have held that cities and counties may regulate groundwater use under their police powers to protect the public's health, safety and welfare. In addition to those powers, the State Water Code provides other regulatory tools including the adoption and implementation of a

groundwater management plan under the Groundwater Management Act (Water Code Section 10750-10755.4; AB 3030). Several California counties have adopted groundwater regulation programs. Litigation has also resulted in court decrees regulating groundwater use in some cases.

Tribal Water Rights

Some of Humboldt County's Indian Reservations as well as other federal lands have reserved water rights implied from acts of the federal government, rather than state law. When tribal lands were reserved, their natural resources were also reserved for tribal use. Since reserved tribal rights were generally not created by state law, states' water allocations did not account for tribal resources.

In the landmark 1908 *Winters v. U.S.* case, the U.S. Supreme Court established that sufficient water was reserved to fulfill the uses of a reservation at the time the reservation was established. The decision, however, did not indicate a method for quantifying tribal water rights. *Winters* rights also retain their validity and seniority over state appropriated water whether or not the tribes have put the water to beneficial use. Only after many years did tribes begin to assert and develop their reserved water rights.

In 1963, the U.S. Supreme Court decision *Arizona v. California* reaffirmed *Winters* and established a quantification standard based on irrigation, presupposing that tribes would pursue agriculture. Despite criticisms of the "practicably irrigable acreage" (PIA) quantification standard from various perspectives, the PIA standard provided certainty to future water development. Quantifying water needs in terms of agricultural potential does not accurately show the many other needs for water. Even urban water quantity and quality assessments that look at the adequacy of the domestic water supply and sanitation do not provide a complete picture of tribal water needs. A large part of the tribal water needs are for instream flows and other waterbodies that support environmental and cultural needs for ceremonial use, fishing, hunting, and trapping.

The *Winters* Doctrine originally applied to Indian reservations but has since been applied to other federal land reservations. A variety of court decisions have extended the reserved right doctrine to encompass not only Indian reservations, but water uses in national forests, national parks and monuments, and military reservations. In the 1963 *Arizona v. California* decision, the U.S. Supreme Court found the *Winters* Doctrine equally applicable to other federal establishments and affirmed an allocation of water for non-Indian federal uses.

B. Public Water Systems

An adequate and sustainable water supply is essential if Humboldt County is to serve projected increases in population, housing, employment, business, and agriculture. The main purpose of this section is to address water supply services provided by public and private entities. The following is a discussion on the various public water systems that serve Humboldt County communities and Figure 13-2 illustrates those portions of Humboldt County that are served by public water suppliers

All water systems are responsible for meeting and maintaining water quality standards established by DHS and the NCRWQCB. The suppliers are required to prepare and adopt wellhead protection plans that will avoid future contamination. To the extent that these plans may need to rely upon the regulation of land uses around supply wells, the County's cooperation may be necessary for wells located in the unincorporated area.

Humboldt Bay Municipal Water District

The Humboldt Bay Municipal Water District (HBMWD) was declared formed in September of 1956 after a successful special election was held.

The District was formed for the purpose of obtaining an adequate supply of water to meet the municipal and projected industrial water demand for the Humboldt Bay area. Formation of the District was prompted by water supply concerns of the cities of Arcata and Eureka. Arcata was dependent upon shallow wells adjacent to the Mad River, and Eureka was furnished water from a badly silted Sweasey Dam.

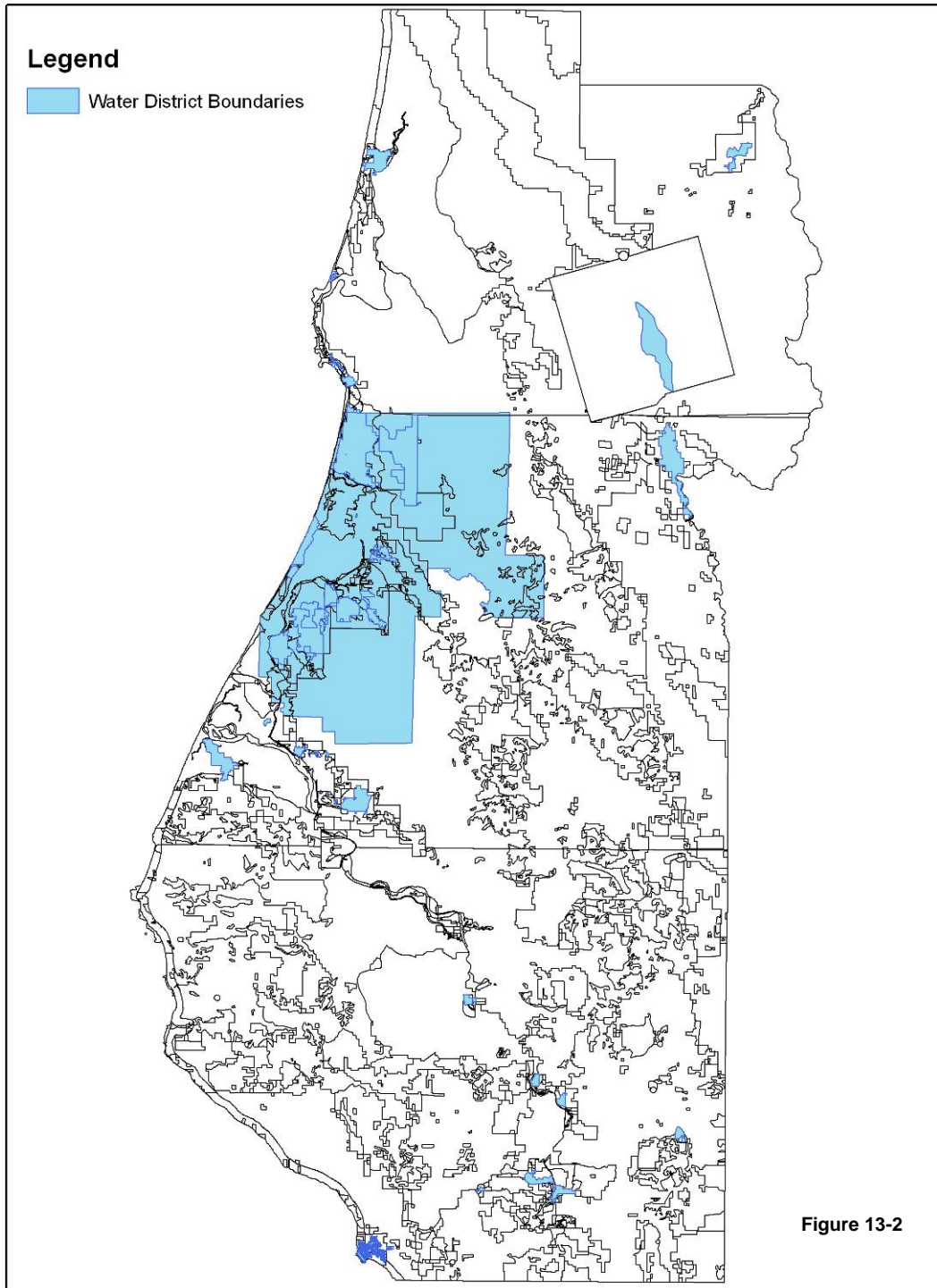
Humboldt Bay Municipal Water District (HBMWD) is a wholesale water agency that serves the greater Humboldt Bay area - including the cities of Eureka, Arcata and Blue Lake, as well as Community Service Districts serving unincorporated areas such as McKinleyville, Cutten, Fairhaven, Fieldbrook and Manila. The population served via these agencies totals about 65,000 people. HBMWD's service area contains a large variety of business and industry; College of the Redwoods, a two year community college; and, Humboldt State University, a campus of the California State University System.

Drinking water delivered by the district is drawn from wells located in the bed of the Mad River northeast of Arcata. These Ranney Wells, draw water from the sands and gravel of the riverbed at depths of 60 to 90 feet, thereby providing a natural filtration process. In the summer this naturally filtered water is disinfected with chlorine and delivered to the District's wholesale municipal and retail customers in the Humboldt Bay Area. In the winter the water is further treated at a regional Turbidity Reduction Facility which reduces the occasional turbidity (cloudiness) in the District's source water. The District's source water has been classified by the DHS as groundwater. A groundwater classification dictates the regulations that a water system must follow to ensure water quality.

Presently, the District has water rights to divert 75 million gallons a day (MGD) from the Mad River. This totals 84,000 acre-feet per year (AFY), which represents 8% of the average annual runoff of the Mad River basin. Under an agreement with the California Department of Fish and Game, the District is responsible for maintaining sufficient flows for the protection, propagation and preservation of fish and wildlife. The flows required for fish and wildlife vary based on the time of year and river conditions; the potential maximum is 46,000 AFY.

The District currently has long-term wholesale contracts in place to provide treated water for domestic use to seven municipalities. The current 20-year contracts were entered into in 1999. Currently the District delivers an average of 11 and a peak of 18 million gallons per day (MGD) of treated domestic water to seven wholesale municipal customers; Eureka, Arcata, Blue Lake, Humboldt CSD, McKinleyville CSD, Fieldbrook CSD and Manila CSD. The domestic water system has a capacity of 21 MGD. By far, the HBMWD has the highest level of excess water available for future developments in Humboldt County

Public Water Sources in Humboldt County



Alderpoint Water District

The Alderpoint Water District was originally organized in 1965. The governing board of the District is the Board of Supervisors; however, the Board of Supervisors appoints a 5 member Board of Directors to supervise the business of the District.

The source of water for the District is an infiltration gallery in the Eel River bed. The infiltration gallery collection pipe is approximately nine feet below the bed of the river. From the infiltration gallery wet well, water is pumped through a six-inch cast iron main to a 5,000-gallon staging tank located 130 feet above the riverbed. The 5,000-gallon tank and its accompanying pump house are located just off River Road. Calcium hypochlorite, a disinfectant, is added to the water in the 5,000-gallon tank. From the 5,000-gallon staging/preliminary distribution tank, water is pumped up another 300-feet, via a six inch main, to a 100,000-gallon redwood storage tank. This main storage tank feeds water into the distribution system serving the community.

Water is distributed directly to several households along River Road north and south of the 5,000-gallon tank from the line to the 100,000-gallon tank. The main distribution system contains approximately 2.5 miles of mainline varying in size from two-inch to six-inch in diameter.

According to statistics derived from the February 2003 Water System Feasibility Study, supply capacity is the range of 216,000 to 320,000 gallons per day, which is well in excess of the current demands and production. Alderpoint is planning to install new pumps, which would provide about 200 gallons per minute (gpm) or 288,000 gallons per day (gpd).

Currently, the District holds a permit from the State Water Resources Control Board for appropriation of 0.25 cubic feet per second that converts to approximately 161,500 gallons per day.

City of Arcata

The primary source of Arcata's drinking water is purchased from HBMWD. HBMWD produces water drawn from wells located in the bed of the Mad River northeast of Arcata.

The secondary source of drinking water is the City of Arcata's Heindon groundwater well. The Heindon well was placed on-line in 1999 to supplement purchased water from HBMWD. All water introduced into the City's distribution system undergoes chlorination and fluoridation treatment. The City is currently contracted with HBMWD to receive a peak water allocation of 3.25 MGD. Water is delivered through 76.5 miles of water distribution mains and storage reservoirs located throughout the community. The City has approximately 4.4 million gallons of storage capacity spread over 17 tanks ranging in size from 25,000 gallons to 1.5 million gallons.

According to 2005/2006 HBMWD records, the City of Arcata's average daily use was 1.825 mgd and peak daily use was 3.405 mgd. The City delivered over 676 million gallons of HBMWD water in fiscal year 2005/2006. The City has approximately 6,000 existing connections and also supplies water to Jacoby Creek Water District (City of Arcata, 2005).

City of Blue Lake

The City of Blue Lake obtains all of its domestic water from the HBMWD.

The City's receives its water supply through contract with HBMWD. Water is delivered through distribution mains and storage reservoirs located throughout the community. The City has approximately 0.9 MG of storage capacity spread over two redwood tanks ranging in size from 400,000 gallons to 500,000 gallons.

The City of Blue Lake's water system is in good condition overall. Peak daily use of HBMWD water for the City (0.378 MGD in 2005/2006) is currently less than their peak rate allocation of 0.50 MGD set in contract with HBMWD on July 1, 2006.

Big Lagoon Community Services District

The Big Lagoon Community Service District was formed on July 1, 1998 under Community Service District law pursuant to sections 61000-61934 of the Government Code. The governing board is elected and consists of a five (5) member Board of Directors to supervise the business of the District.

The District was formed for the purposes of supplying water to houses in the Big Lagoon subdivision and Big Lagoon School. It is important to note that the District was formed conditional upon a Local Coastal Plan amendment to expand the Urban Limit Line to include all properties within the District.

The Big Lagoon CSD manages a water system that was installed for the Big Lagoon subdivision in 1962; the Big Lagoon CSD acquired the water system from a private owner in 1999. The water system now consists of 2 wells, a 20,000 gallon redwood storage tank, booster pumps and 3,000 gallon hydro pneumatic tank with an air compressor.

Forty households and the Big Lagoon School were originally served by the water system. Following an El Nino event in 1998, several homes were lost due to a coastal bluff failure and the system now serves 32 households and the school.

Briceland Community Services District

The Briceland Community Service District (CSD) was formed on September 20, 1989 under Community Service District law pursuant to sections 61000-61934 of the Government Code. The governing board is elected and consists of a five (5) member Board of Directors to supervise the business of the District.

The District was formed for the purposes of improving the water system that was supplying water to houses in the Briceland area. The water system that was in place at the time was an antiquated system put in by the original settlers in the 1880's.

In forming the Briceland CSD, District proponents planned on using State Safe Drinking Water Grant Funds to identify additional water sources and develop two 21,000 -gallon water tanks. New treatment and distribution facilities were also proposed.

The District currently serves 26 lots in the District and 1 outside District boundaries. District representatives have indicated that: "Due to regulatory constraints, the District has no plans of expansion either in terms of size or number of service connections. There are presently four applications for service, the oldest of which has been held on file for more that ten years.

City of Eureka

The City of Eureka purchases water from a wholesaler, Humboldt Bay Municipal Water District. The District's source of water is the Mad River. The District pumps water from the gravel and sand beds beneath the Mad River by four Ranney wells in the riverbed. The Department of Health Services (DHS) has classified the District's water supplied to domestic customers as groundwater. The District is in the process of conducting a Groundwater Study to be used to generate a Groundwater Management Plan (GMP).

According to Humboldt Bay Municipal Water District documents, the District currently has water rights to divert 75 million gallons per day (MGD) from the Mad River, which converts to 84,000 acre feet per year (AFY). The District also owns and operates the R. W. Matthews Dam impounding water in Ruth Lake.

The District manages releases from the dam to ensure sufficient supplies downstream throughout the year. The City of Eureka maintains water rights to Mad River water equivalent to 6,499 AFY (5.8 MGD). Under the agreement between the District and The City of Eureka, the deliveries from the District to the City are considered to be deliveries of the City's water, emanating from its own water rights not those of the District. Deliveries to the City in excess of the City's water rights are considered deliveries of the District's water.

City of Fortuna

The City's water supply comes entirely from five groundwater wells (four active and one emergency stand-by) located at the City's corrosion control facility. The combined rated capacity of all wells is 4,000 gpm, or 5.76 MGD. Water is chlorinated in the wells as a precautionary measure due to the annular seals being less than 50 feet deep and then pumped from the wells into a 120,000 gallon wet well, containing three 100 horsepower booster pumps that pump water into the City's distribution system. The distribution system is divided up into eight pressure zones and contains a series of pumps, water tanks, reservoirs, and hydropneumatic tanks. The combined storage capacity of the system is approximately 7.3 million gallons. Some pressure zones do not have adequate storage, but can be provided water through booster stations with portable generators on site.

According to the January 13, 2005 administrative draft of the Fortuna General Plan, the City produced more than 519 million gallons of drinking water in 2004. Average daily use is therefore estimated at 1.42 mgd, and peak daily use for 2004 was reported as 2.3 mgd in the 2007 DHS annual inspection report. The City has approximately 4,238 existing connections and does not retail water to any other districts.

Fieldbrook- Glendale Community Services District

Both the Glendale and Fieldbrook Valley floor area are served by a community water system operated by the Fieldbrook Glendale Community Services District (FGCSD)..

The "valley floor" portion of the Fieldbrook area and the Glendale portion of the area currently meet its water user's needs with a sufficient and dependable water supply system provided through the FGCSD. FGCSD purchases its treated water from Humboldt Bay Municipal Water District (HBMWD). The FGCSD system begins at a water meter just north of the intersection of Fieldbrook Road and includes over 10 miles of water mains, one booster pump station, and one 400,000 gallon water tank. Water quality is excellent and meets or exceeds State standards. Some localized pressure problems are experienced by some residences and this problem needs to be addressed before any additional growth is to occur. Other water system improvements anticipated to be needed include the installation of a standby (emergency) generator at the booster pump station and the construction of an additional reservoir. In the Glendale area, low water pressure is among the primary concerns voiced by local residents.

Garberville Sanitary District

The Garberville Sanitary District (District) was formed by Order of the Humboldt County Board of Supervisors on April 12, 1932, pursuant to "The Sanitary District Act of 1923" after a majority vote was cast in a general election sometime prior to the April 12, 1932, date. The governing board of the District is the Board of Supervisors; however, the Board of Supervisors appoints a five (5)

member Board of Directors to supervise the business of the District. The District initially was formed for the purpose of providing sewer services.

Presently, the District maintains and operates a water system and a sewer system.

The water system was recently purchased from private owners and consists of two water sources, a treatment plant, four water tanks, three booster stations, approximately 380 active service connections, and a waterline distribution network. One of the water sources is surface water from the South Fork of the Eel River and one is a shallow well in downtown Garberville. The surface water source is regulated by the California Surface Water Treatment Regulations.

The existing system has adequate production, treatment, and storage capacities for the average daily demand. The maximum daily demand is 370,830 gpd based upon the maximum month of July 1999. The total storage capacity for the system is approximately 300,000 gallons. This is not sufficient to meet the maximum daily demand or to provide any fire protection services during the maximum daily demand. The water treatment facility produces water that meets or exceeds the State regulations for drinking water. The turbidity and residual free chlorine levels comply with the maximum allowable levels.

The existing system provides adequate water pressure throughout the District. Reports of inadequate flow for fire suppression purposes have been received for Maple Street. This is likely due to insufficient line sizes. The system in general has very few fire hydrants, and many of those installed are wharf hydrants that will not provide sufficient flow for fire suppression. The fire department reported that there are only a few hydrants that are approved for use during a structure fire, and most are located on Redwood Drive.

The Eel River Infiltration Gallery is the main water source and it is a surface water source. It was originally installed in 1940. The infiltration gallery has one 6-inch 320-gpm 50-HP submersible pump that was installed in February 1999. The pump operates against an approximate 380 feet differential elevation head. The pump discharges to the water treatment plant adjacent to the 200,000-gallon storage tank. The pressure filter in the water treatment plant has a limited capacity of 250 gpm. The existing treatment plant filtration cell does not have sufficient capacity to allow processing of the maximum daily demand. The treatment plant produced a total of 80 million gallons of water in 1999.

The District holds a current water diversion permit from the State Water Resources Control Board for appropriation of water from the South Fork of the Eel River. It limits the diversion of water to 0.595 cubic feet per second, year round. This would equate to a maximum daily diversion of approximately 385,000 gallons if adequate pumps and treatment facilities were available.

The majority of the water mains in downtown Garberville were installed prior to 1940. Some of the lines are lead joint, some are copper, and most are either iron or asbestos cement. Only the line in Redwood Drive is 8 inch. Most of the downtown mains are 4-inch lines. The water mains in the Wallen and Johnson Subdivision were installed in 1978 and are mostly 6-inch lines.

Hoopa Valley Public Utilities District

The Hoopa Valley Public Utilities District was created in 1981 pursuant to a charter granted by the Hoopa Valley Tribe and provides both drinking water and irrigation to all residents of the Hoopa Valley.

The primary drinking water supply for the existing valley wide water system consists of a Ranney-Type collector in the Trinity River, a water treatment plant, and a pump station near the center of the urban zone of the Hoopa Valley community.

One “valley-wide” community water system currently serves the Hoopa Valley east and west of the Trinity River. According to the Hoopa Valley Public Utilities District, there were a total of 539 metered service connections, with about 280 connections on the east, and 259 on the west in 2004. Approximately 2,100 people are served by the water system. The water system has various surface and groundwater sources, with varying manners of treatment.

Overall, about 50 percent of the annual domestic water supply is gravity fed, and the remainder pumped. Storage tanks are located along the valley benches and are connected to the systems throughout the valley. The distribution system generally includes main water trunk lines extending the length of the valley on both sides of the river, with smaller lateral pipes and some main loops. Pressure booster pump stations and water storage tanks higher on the valley benches locally serve the upper portions of the Reservation.

The east side historically had adequate water supply in the winter and spring months, but fell short in the late summer and fall. The former major source, Captain John Gulch, tended to have reduced flow rates or occasionally dried up in the summer and fall months due to its small watershed (less than two square miles). To compensate, untreated water was pumped into the system from the Mill Creek irrigation flume then was treated and distributed to consumers. In 1999, the Captain John system was taken off line and was replaced with the Trinity River collector. The west side generally has year round surface water, but high winter and springtime turbidity levels in Campbell Creek preclude operation of the water treatment plant during this period. Well water normally meets winter and spring demands, but there was insufficient capacity to satisfy summer demand. That deficiency was also ameliorated with the installation of the Trinity River collector.

The existing Valley-wide water system provides water service to the north end of Socktish Field through an eight inch pipeline. The elevation of the pipeline in Socktish Field is approximately 320 feet.

Humboldt Community Services District

The Humboldt Community Services District was declared formed in September of 1952 after a successful special election was held. The District was formed as an independent multi-purpose district organized pursuant to Section 61000 et seq. of the California Government Code. Formation of the District was prompted by an unmet need for urban type services in the rapidly growing “suburban” areas surrounding the City of Eureka. Because the desired services could not be obtained from the City, district formation was the only means available for providing those services necessary for the maintenance of existing and developing residential and commercial areas.

Presently, the District provides water service to approximately 85% of its residents, and sanitary sewer service to approximately 60% of its residents in the more densely developed areas. Streetlights are also provided in various locations throughout the District.

The District purchases approximately 33% of its potable water from the Humboldt Bay Municipal Water District. 34% of the district’s water is provided from District owned wells located at the base of Humboldt Hill and Spruce Point area. These wells primarily serve Humboldt Hill, Fields Landing, King Salmon, College of the Redwoods, and some portions of the Pine Hill area. The District also has a long term contract with the City of Eureka to purchase additional water (34%

of total demand), which also originates from Humboldt Bay Municipal Water District. The district and City's water systems are interconnected at various locations allowing for such transfers to occur.

Hydesville County Water District

The Hydesville County Water District was originally organized March 26, 1963 under Division 12 of the Water Code of the State of California and by Resolution 1861 of the Humboldt County Board of Supervisors. The five member governing board of the District is elected by the residents of the District to supervise the business of the District. The term of office of the board members is four years. The District was formed for the purpose of providing water services.

The District's water supply is obtained from two (2), twelve inch (12") wells located on District owned land near Yager Creek. These wells are equipped with pumps which are rated at a total of approximately 359 gpm. The water is chlorinated at the well site and then pumped to the District's two storage tanks. These storage tanks have a capacity of 200,000 and 400,000 gallons, which is estimated to be the equivalent of seven days of normal usage. The stored water is distributed by gravity, throughout the District's distribution system. The District has installed fire hydrants throughout the service area.

Normal operating procedure for the District is to utilize one well while maintaining their second well in a reserve status, except during peak usage days (estimated to occur five to seven times per year). This is standard procedure which allows for sufficient reserve capacity in case of pump failure or other disruption in the operation of a well.

Jacoby Creek Community Services District

The Jacoby Creek County Water District is an independent, single purpose special district formed pursuant to Section 30000 et seq. of the Water Code of the State of California. The District was declared formed on December 30, 1970 by the Board of Supervisors after a successful special election was held within the area proposed for district formation.

The Jacoby Creek County Water District is located adjacent to the south-eastern boundary of the City of Arcata and extends along Jacoby Creek in a generally south-east direction for approximately four (4) miles. The present boundaries of the District contain approximately five (5) square miles or 3200 acres.

The District's water distribution system was constructed in 1974 with funds obtained from a Davis-Grunsky loan from the State of California. The District obtains its water from the City of Arcata, who in turn, obtain their supply from the Humboldt Bay Municipal Water District. An agreement with the City of Arcata provides for the City to supply water, operate and maintain the distribution system and provide billing and collection services for the District. Water service is currently supplied to 215 connections within the District. Most of these connections are for residential users plus a few small businesses.

Loleta Community Services District

The Loleta Community Services District was originally organized on November 13, 1990 under Government Statute 1923, Statutes 1, and Chapter 171. The governing board of the district is the Board of Directors. The citizens of the District elect the Board of Directors. The District was formed for the purpose of providing water and sewer services.

Presently, the District maintains water and a sewer system. These facilities provide adequate coverage and services to approximately 94% of the households in the District for domestic water supply and to almost 100% of the households in the District for wastewater services.

The District operates two wells located on Peugh Road in Loleta. Water is pumped from the wells through a Green Sand filter where the iron and manganese is removed by injecting chlorine and potassium permanganate. Treated water is provided to the service area through approximately 4.5 miles of pipe and to a 225,000 gallon storage tank located just off the freeway. The treatment system runs an average of twelve to thirteen hours a day.

One of the wells located on Peugh Road pumps on the average of 60,000 gallons of water a day. Development of the other well is currently in progress. The capacity of the new well is designed to produce 309,600 gallons per day (gpd). It should be noted that most of the Loleta area generally have low yields and water quality issues. With the new well producing the designed capacity, the capacity of water production for the Loleta water system will be 369,600 gpd; this is the ideal production rate, the target water production rate is 144,000 gpd. The storage capacity of the Loleta System is 225,000 gallons, which translates to approximately 1.4 days storage (according to the peak daily usage data). A current estimation of peak usage of the system is 157,000 gpd. According to the designed water production, and including the storage capacity of the system's 225,000 gallon tank, the Loleta water system is at 26 percent capacity on the highest use day of the year. However, these numbers do not take fire suppression in to consideration, and they are based on the assumption that the facilities are in perfect running order. The District serves 226 homes, 11 businesses, and 2 industrial sites.

Manila Community Services District

The Manila Community Services District was formed on July 20, 1965 by the Humboldt County Board of Supervisors as an independent multi-purpose district organized pursuant to Resolution No. 2130 adopted under the Community Services District Law, pursuant to Title 6, Division 2, of the California Government Code. The five-member Board of Directors are locally elected by the residents of the District. The District employs a General Manager who is responsible for administering and implementing policies set by the Board.

The District purchases its potable water from the Humboldt Bay Municipal Water District (HBMWD). Water is delivered to Manila by a 15-inch diameter main that continues south through Manila to serve the towns of Samoa and Fairhaven and the pulp mill. A 10-inch diameter main provides water to the District. The District provides water service for approximately 357 service connections (2003) consisting of 354 residential and 3 commercial/industrial. There is ample water from the supplier to meet future demands until maximum build-out of the District occurs.

McKinleyville Community Services District

The McKinleyville Community Services District was declared formed on April 21, 1970 after a successful special election was held within the area proposed for district formation. The District was formed as an independent multi-purpose district organized pursuant to Section 61000 et seq. of the California Government Code. Although the district now provides several services, it was originally formed to provide a community water supply system only. When formed, the district had a land area of 19 square miles or 12,160 acres. The *Azalea Park Annexation* in 1973 (the district's only annexation since formation) added approximately one-half square mile or 320 acres. The district's current boundaries encompass the area from the Pacific Ocean on the west to the foothills bordering the Fieldbrook area on the east. The district extends north from the Mad River approximately 5.5 miles. The McKinleyville CSD is governed by a locally elected five-member Board of Directors

The District purchases its potable water from the Humboldt Bay Municipal Water District. The district's contract with the Humboldt Bay MWD sets average daily water use at 1.45 million gallons per day (MGD) and peak water use at 3.31 MGD. The district provides water service to

approximately 5,417 households. Recent analysis indicated there is ample water from the supplier to meet future demands until maximum build-out of the District occurs. The district currently has 5.25 million gallons of storage, but does have plans to install a six million gallon reservoir on District property located on Murray Road east of Central Avenue. This additional capacity would provide storage in the event of a catastrophic seismic event or prolonged power loss or supply interruption. This additional storage would also result in significant operational power savings since power demand could be shifted to off-peak hours when power is at substantially lower rates.

McKinleyville's water distribution system is designed to provide adequate service to approximately 10,000 homes. As of now, approximately 57% of possible connections have been made to the system. According to the district's manager, the system could be expanded beyond 10,000 connections with the addition of expanded distribution, pumping and storage facilities.

Treated water is then piped from the Essex Hill storage tank under the Mad River to the MCSD's Grant A. Ramey Pump Station at the intersection of Azalea and North Bank Roads. The water is then boosted up to two storage tanks located at Cochran and Norton Roads and in-turn to a third higher elevation tank on McCluski Hill. This system provides a gravity-flow distribution of water to end users and fire hydrants throughout the water service area. A fourth undeveloped tank site on Murray Road has been purchased by the MCSD to serve future community water needs. The total potential system storage capacity is approximately six million gallons. The delivery system, from storage tanks to individual users, consists of about 70 miles of water mains.

Miranda Community Services District

The Miranda USA is provided water service through the Miranda Community Services District (Miranda CSD). The governing board of the district is the Board of Directors, elected by the citizens of the District. The District was formed for the purpose of providing water, sewer, and fire protection services.

The District's water source comes from two wells with rated capacities of 150 gpm and 85 gpm, for a total capacity of 0.338 MGD. The pumps are operated in a lead lag arrangement, with the larger pump leading during summer months and the smaller pump leading during winter months. There are 6-inch asbestos cement (AC) and ductile iron pipes from the wells to the treatment building. Continuous disinfection is provided through a BIF metering pump that injects calcium hypochlorite into the main line. The meter is switched on by the well pumps. Soda ash is used to raise the pH of the water, which is typically around 6.1. The District has 0.2 MG of total storage in the form of two 100,000 gallon tanks, one redwood and one bolted steel. The redwood tank was installed in 1964, and the bolted steel tank was installed in 1978. Both tanks are in good condition.

The distribution system consists of one pressure zone, which is gravity fed by the two tanks. Low pressures are known to occur, especially in the School Road area, due to small diameter (2") mains. This problem is exacerbated when fire hydrants are in use. The District has 20 fire hydrants.

The system has had some action level exceedances for copper and lead in the past, but these issues seem to have been resolved by the addition of soda ash feed.

Orick Community Services District

The Orick Community Services District (CSD) was originally organized in 1955 under Government Statute. The governing board of the District is the Board of Supervisors; however, a 5 member

Board of Directors is elected by the populous to supervise the business of the District. The District was formed for the purpose of providing water and fire protection services.

Presently, the District maintains and operates a water system. The locations of these facilities provide adequate coverage and services to approximately 97% of the households in the District for domestic water supply.

The initial Orick water system was built in 1977-1978 with funds obtained from the State of California under the Davis-Grunsky Program and the Farmers Home Administration at a cost of approximately \$400,000. At the time of planning the existing system, the need for water to service the area south of Orick was recognized but funding availability forced the curtailment of the project. Funding for the extension of the system was granted with aid from Redwood National Park in 1983.

The initial system construction of the water system served most of the residents of the Orick Community. The original system consisted of two 60 foot wells with 10 hp submersible pumps, a 100,000 gallon redwood storage tank, and 8-inch, 6-inch, and 4-inch distribution lines.

In 1978, an 8-inch line was extended southwest along the north side of Route. 101 in anticipation of the 1987 expansion. The 8-inch line was extended west past Hilton Road to the National Park Service Visitors' Center in 1987.

The pumping capacity of the District's water system is approximately 288,000 gallons per day. The system demand is approximately 216,000 gallons per day. The system demand is approximately 75% of the system pumping capacity. Currently 139 of 142 service connections provided by the water facility are being served.

Orleans Community Service District

The Orleans community is provided water service through the Orleans Community Services District (OCSD). The OCSD was originally organized under Government Statute 1923, Statues 1, Chapter 171. The governing board of the district is the Board of Directors. The citizens of the District elect the Board of Directors. The District was formed for the purpose of providing water, sewer, and fire protection services.

OCSD's water supply consists of an infiltration gallery within Peach Creek with unknown but adequate capacity. Water flows by gravity to treatment, where it is prechlorinated and then filtered through three parallel Permutit automatic backwash filters. The District recently began feeding polymer or other coagulant. Water is then stored in a 100,000 gallon redwood tank and fed to distribution. Two pressure zones exist within the system, with one zone served by the redwood storage tank and a second zone served by a booster pump. The distribution system consists of mostly asbestos cement pipe with some ductile iron, PVC, and steel, all ranging in size between 2 inches and 8 inches in diameter. The distribution system was installed in 1977 and 1997.

According to the 2005 DHS annual inspection report, OCSD retailed approximately 26 million gallons of drinking water in 2005. Average daily use for the entire District is estimated at 0.071 mgd, and peak daily use is estimated at approximately 0.513 mgd. The Orleans WSA has approximately 149 active connections and 15 inactive connections. Only one meter used by the Forest Service is unmetered.

Palmer Creek Community Services District

Palmer Creek CSD's water supply consists of two active wells, each capable of pumping 80 gpm. Water pumped from the wells is injected with chlorine and then sent to a contact basin

prior to filtration through a Loprest package treatment plant designed to remove iron and manganese from the groundwater. The plant consists of a reaction vessel and three pressure filters, after which water is boosted to storage and distribution. The District has one 200,000 gallon storage tank that serves two pressure zones; one has reduced pressures through a PRV. The distribution system consists of approximately 38 miles of PVC, cast-iron and asbestos cement pipe ranging in size from 2 inches to 10 inches.

Palmer Creek CSD produced more than 11 million gallons of drinking water in 2003. Average daily use is estimated at approximately 0.031 MGD, and peak daily use is estimated at approximately 0.084 MGD. The District has approximately 150 service connections, of which 127 are active connections. All active connections are metered

Patrick Creek Community Services District

The Patrick Creek Community Service District was originally organized in August 1969 under Community Service District law pursuant to sections 61000-61934 of the Government Code. The governing board of the District is the Board of Supervisors; however, the Board of Supervisors appoints a five (5) member Board of Directors to supervise the business of the District. The term of office of the Board is at the pleasure of the Board of Supervisors.

The District was formed for the purposes of: a) supplying water for domestic use, irrigation, industrial use, fire protection and recreation; b) collection, treatment and disposal of sewage, waste and storm water; c) street lighting; d) streets and road maintenance; and e) construction and improvement of bridges, culverts, curbs, gutters, and drains

The District originally had its own water system. However, in 1973, the Patrick Creek Community Services District (PCCSD) transferred interest in the distribution system to the McKinleyville Community Services District where water obtained from the HBMWD is distributed. The water system currently serves 17 homes, with a total capacity of 18 homes. One household has two lots, and the rest are single lots. With the exception of the possibility of the double lot ownership, the district is at capacity.

Phillipsville Community Services District

The Phillipsville area is provided water service through the Phillipsville Community Services District (PCSD). The PCSD was declared formed in August of 1989 after a successful special election was held. The District was established for the purpose of supplying potable water and fire protection services. The governing board is a five member Board of Directors.

PCSD's water supply consists of a groundwater well of unknown capacity and a surface water spring source with variable capacity. The spring source is unable to meet summertime demands, and therefore only serves the upper portion of the system during low flows while the well supplies water to the rest of the system. The well is primarily used during dry months. The spring is believed to be under the influence of surface water, is not filtered, and is not continuously chlorinated with a reliable method (chlorine tablets). It is therefore not in compliance with SWTR. The well is continuously disinfected with a chlorination feed system located in the well housing. The well has high levels of iron and manganese and suffers from low pH, which causes problems with coloration and corrosion of the distribution system.

The system has a total of eight storage tanks ranging in size from 250 gallons to 60,000 gallons for a total combined capacity of 74,850 gallons. The system has numerous small pressure zones with anywhere between two and four connections. The distribution system consists of a variety of piping, not all of which meet standards. The exact amounts of any particular piping are

unknown. Some electrical conduit is currently being used for water piping. The system has replaced approximately 2,050 feet of piping since 2000 with PVC piping.

According to the 2004 DHS annual inspection report, PCSD retailed an estimated 8.75 million gallons of drinking water in 2003. Average daily use for the entire District is estimated at 0.024 mgd, and peak daily use is estimated at approximately 0.085 mgd. The Phillipsville area has approximately 65 active service connections. The system does not have a master meter to monitor production.

Redway Community Services District

The Redway Community Services District (District) was originally organized in 1965 pursuant to the provisions of Title 6, Division 2 of the Government Code. The governing board of the district is the Board of Supervisors; however, the Board of Supervisors appoints a five member Board of Supervisors to oversee the business of the District. The term of office is four years. The District was formed for the purpose of providing water, sewer, fire protection, collection of garbage, and street lighting service. In 1977 the Redway Sanitary District was dissolved and combined with the Redway Community Services District.

Presently, the District maintains and operates a water system and a sewer system. These facilities provide water service to 100% of the households and businesses in the District, and approximately 93% of the households and businesses with sewer service.

The District's water system consists of two water sources, a conventional filter water treatment plant, three storage facilities, two pressure reduction vaults, and one booster pump station, as well as the transmission and distribution lines, many of which were installed prior to 1950. There are presently 600 service connections.

The sources of water are the South Fork of the Eel River (surface water) and an unnamed spring (ground water). The water treatment plant design capacity is 460,000 gallons per day. The water permit allows for a draw of 1.05 CFS. The spring source is limited to .123 CFS, and 52 AC-FT per year. The maximum production for the spring is 46,000 gallons per day.

The total capacity of the three storage areas is approximately 380,000 gallons. Additional storage capacity is indicated for fire safety during high use periods, which coincide with the highest fire danger seasons. There are areas within the district that are in the planning stages of subdivision; the developer would have to provide the needed additional storage capacity to enable the District to provide services to numerous additional customers.

Resort Improvement District #1 (Shelter Cove)

The Resort Improvement District #1 (RID) was formed in February 1965 pursuant to the provisions of the Public Resources code. The district was created for the purpose of installing and maintaining facilities and providing services within the Shelter Cove Sea Park Subdivision. This is one of only three such districts created prior to the State Legislature's repeal of the enabling legislation in 1975. It is now the only such district remaining in the State because of reorganizations affecting the other two districts.

Presently, the District provides water service to approximately 324 residential customers and 19 commercial customers, and sanitary sewer service to approximately 269 residential customers and 18 commercial customers in the more densely developed areas.

The District's water supply system consists of a diversion facility and treatment plant on Telegraph Creek. The distribution system has been extended throughout the District and contains 18

storage tanks and 10 booster pump stations. Although the distribution system was installed District-wide, the initial water appropriation rights were not sufficient to meet projected demand for full build-out.

City of Rio Dell

The City's water supply comes from a recently completed infiltration gallery in the South Fork of the Eel River. The production capacity of the gallery is tied to water levels within the river, such that in the winter the pumps can deliver around 700 gpm, but in the summer production falls to about 550 gpm (0.792 MGD). Water is pumped to treatment for filtration and disinfection before entering the City's distribution system. The City has two pressure zones served by four tanks ranging in size from 100,000 gallons to 500,000 gallons for a total combined storage capacity of 1.1 million gallons. The distribution system contains approximately 11 miles of pipe, of which 5 miles were replaced with 10" HDPE pipe under the City's infrastructure rehabilitation project. The remaining distribution system ranges in size from 4 inches to 6 inches and consists mainly of AC pipe.

The City has recently invested heavily in upgrading its water system following a declared water emergency in 2001 when the City's water supply began to fail. Since then, they have received \$5.0 million in grant funds to rehabilitate the water distribution system city-wide and \$1.0 million in grant funds and a loan in the amount of \$2.3 million to construct a new infiltration gallery and water treatment plant. The new treatment plant has a design capacity of 700 gpm.

The City has approximately 1,179 connections within the system, of which approximately 96% are residential connections. The City also serves 49 commercial connections, two landscape connections, and two agricultural connections.

Riverside Community Services District

The Riverside Community Service District was formed on June 25, 1991 under Community Service District law pursuant to sections 61000-61934 of the Government Code. The governing board is elected and consists of a five (5) member Board of Directors to supervise the business of the District.

The District was formed for the purposes of securing a state grant to bring an existing water system into compliance with state water quality requirements. The District provides water services for both domestic and agricultural purposes.

The current system provides water service to 71 residential customers and 25 agricultural operations: dairies on the Ferndale bottoms. The District water source consists of artesian springs and wells with a maximum production capacity of approximately 60,000 gallons of water a day. The current system pumps an average of 28,000 gallons of water per day and is at less than half of the District's capacity.

City of Trinidad

The Trinidad water system in its current configuration has been in operation since the early 1970's. Minor improvements have been implemented over the years, but the basic configuration has remained the same. The City's water system serves approximately 315 connections within its sphere of influence.

Potable water for the City system is currently supplied from Luffenholtz Creek, half mile from the coast, and approximately a mile and a half from the City. Originally, homes in the City had individual wells or were served from an untreated water supply from Mill Creek (also referred to as Old Mill Creek). The City obtained the domestic water right for Luffenholtz Creek, and an

infiltration gallery and water treatment plant were constructed to supply the City when it became clear that Mill Creek could not meet long term needs.

The pumps located at the infiltration gallery that supply pressure to move water through treatment to the storage tanks were inundated with sediment a few years back. The pumps were rehabilitated, but have never worked as well as expected since their repair. The pumps should be capable of delivering 120 gallons per minute (gpm), but only deliver about 100 gallons per minute.

The City of Trinidad has an operations and maintenance program that keeps the storage, treatment, and distribution systems in good condition. The storage tanks are regularly inspected and the steel bands tightened to prevent water losses. The City conducted leak detection testing on the distribution system in 2003 and tested all water meters in 2003. Major leaks detected have been repaired, and poorly functioning water meters are being replaced as funds become available.

Weott Community Services District

The Weott USA receives water service from Weott Community Services District (WCSD). The WCSD was originally organized in 1965 pursuant to the provisions of Title 6, Division 2 of the Government Code. The governing board of the district is the Board of Directors, elected by the citizens of the District. The term of office is four years. The District was formed for the purpose of providing water, sewer, and fire protection.

WCSD's water system consists of two surface water sources located across the Eel River and south of Bull Creek. The springs located on Mill Creek are permitted to produce 80 gpm, and the springs located on Corner and Deck Creek are permitted to produce 60 gpm. The springs flow by gravity to two treatment trains – the Mill Creek springs provide water to Line A, while the other springs provide water to Line B. The total rated capacity of these sources is approximately 0.202 MGD.

The springs flow by gravity through two separate treatment and distribution systems – Line A and Line B. Line A has a treatment capacity of 37.7 gpm at the maximum allowable filter loading rate, and Line B has a treatment capacity of 47.7 gpm. Each treatment train has two pressure filters in series. Sodium hypochlorite is injected following filtration. Interties exist between the two systems within the distribution system. Treatment capacity totals approximately 85.4 gpm (0.123 MGD) and is therefore more limiting than source capacity.

The District operates two pressure zones, each served by separate storage and distribution systems. Water storage consists of two tanks: a 79,000 gallon concrete tank and a new 90,000 bolted steel tank. One booster station is in operation to boost Line A following filtration to storage. The distribution system consists of approximately three miles of PVC, steel, and aluminum pipe varying in size from 3 inches to 4 inches.

Westhaven Community Services District

The Westhaven CSD water system was developed by the Westhaven Mutual Water Company: (WMWC), incorporated in 1968 and eventually consisting of 186 shareholders). In 1968, the WMWC assumed ownership of a reservoir fed by surface water sources and a primitive distribution system previously used by a series of private owners to supply domestic water to portions of the community.

The WMWC constructed a second reservoir and installed a new, though substandard, distribution system. The WMWC eventually supplied water to 182 dwellings, one market, two

churches and the volunteer fire department, and promised water to 12 idle services. The WMWC system was operated without filtration, adequate disinfection or treated water storage facilities.

Beginning in 1978, the WMWC came under increasing pressure from the State Department of Health Services to construct water treatment and storage facilities that would provide for the distribution of water that met municipal water quality standards. Hoping to be better able to make needed improvements as a public entity, members of the WMWC Board and other community residents began to pursue formation of a community service district in 1986.

The Westhaven Community Service District (CSD) was formed on May 17, 1988 under Community Service District law pursuant to sections 61000-61934 of the Government Code. The governing board is elected and consists of a five (5) member Board of Directors to supervise the business of the District.

After the District was formed, it assumed ownership and operation of all facilities then owned and operated by WMWC. The District boundary was drawn essentially to include all the service area established by WMWC. As anticipated, the District was able to secure publicly supported funding to improve the water system. A project phased over four years in the early 1990s included construction of a filter for surface water, repair of a failed storage tank, installation of reliable disinfection equipment, purchase of a well and replacement of approximately 25% of the distribution system. Much of the remaining distribution system is substandard and more than 30 years old.

The Westhaven Community Service District currently provides domestic water service to 204 single-family homes and 3 small-scale commercial-type establishments (Westhaven Community Church, Westhaven Center for the Arts, and Westhaven Community Hall). Nineteen (19) idle WMWC services represent a future obligation, making a total of 226 service connections possibility at full capacity.

The system is supplied by three small, spring-fed tributaries of Two Creek at the eastern edge of the community and a 100-foot deep well within the residential area. The creek source represents approximately 75% of the total source capacity, with the well accounting for the remaining 25%. During the system-upgrading project in the early 1990s, the District expended considerable resources in efforts to locate additional local water sources. Except for the well, no additional sources that could be developed in an economically feasible manner were located within the District. During this same time, an attempt by the District to develop a municipal well just outside the northeast boundary failed due to local political impasse.

Willow Creek Community Services District

The Willow Creek Community Services District was originally organized in 1965 under Government Code Section 61600. There are five members of the board who supervise the business of the District.

Presently, the District maintains and operates a water system and park facilities. The locations of these facilities provide adequate coverage and services to 100% of the households in the District for domestic water supply.

The District source of supply is from Willow Creek. It consists of six wells located in the mouth of Willow Creek. Four wells draw water from infiltration galleries in the Willow Creek flood plain acting as a natural filtration system. The water is chlorinated and treated before it placed into the distribution system. The District monitors chlorination and turbidity 24 hours a day. The District

has a pumping capacity of 1.9 million gallons per day. The daily average consumption during peak time is 1.6 million gallons per day. Water storage capacity is 1.1 million gallons.

Currently the District has 960 water service connections. The District anticipates being able to accommodate an additional 1,000 through 1,200 service connections before meeting capacity.

Private Water System and Wastewater Disposal Systems

The balance of the County not served from the public water suppliers outlined above are served by a myriad of private water systems and on-site wastewater disposal systems. Private drinking water systems in the County include springs and other surface water sources and those water sources that are dug, driven, and drilled.

A spring is a place on the earth's surface where groundwater emerges naturally. The water source of most springs is rainfall that seeps into the ground uphill from the spring outlet. While springs may seem like an ideal water supply, they need to be selected with care, developed properly, and tested periodically for contamination.

Spring water moves downhill through soil or cracks in rock until it is forced out of the ground by natural pressure. The amount, or yield, of available water from springs may vary with the time of year and rainfall. Groundwater obtained from springs is similar to water pumped from shallow wells. Like shallow wells, springs may be contaminated by surface water or other sources on or below the ground surface.

Springs are susceptible to contamination because the water feeding them typically flows through the ground for only a short distance, limiting the amount of natural filtering that can occur. Springs may not be a good choice for a water supply if the area uphill where the water collects is used for industry, agriculture, or other potential sources of pollution.

Dug wells are holes in the ground dug by shovel or backhoe. Historically, a dug well was excavated below the groundwater table until incoming water exceeded the digger's bailing rate. The well was then lined (cased) with stones, brick, tile, or other material to prevent collapse. It was covered with a cap of wood, stone, or concrete. Since it is so difficult to dig beneath the ground water table, dug wells are not very deep. Typically, they are only 10 to 30 feet deep. Being so shallow, dug wells have the highest risk of becoming contaminated.

Like dug wells, driven wells pull water from the water-saturated zone above the bedrock. Driven wells can be deeper than dug wells. They are typically 30 to 400 feet deep and are usually located in areas with thick sand and gravel deposits where the ground water table is within 15 feet of the ground's surface. In the proper geologic setting, driven wells can be relatively inexpensive to install. Although deeper than dug wells, driven wells are still relatively shallow and have a moderate-to-high risk of contamination from nearby land activities.

Drilled wells penetrate about 100-400 feet into the bedrock. Bedrock at the surface, it is commonly called ledge. To serve as a water supply, a drilled well must intersect bedrock fractures containing ground water.

Generally, private drinking water sources are not regulated by EPA, the State, or the County. However public water system standards do apply to private water systems that serve over 25 people for more than 60 days per year.

All development within both unincorporated and incorporated areas within the County are subject to meeting minimum development standards for infrastructure. These minimum

standards are detailed in the Humboldt County General Plan and standards set forth and adopted by incorporated cities within the County. Generally for annexations to be considered, infrastructure within the potential annexed area must meet the minimum standards of the City. For example, Fortuna requires all proposed annexations to be up to Fortuna's sewer/water/roads standards and would require a new assessment district where there are deficiencies.

However, regulations governing the on-site disposal of wastewater include the Sewage Disposal Ordinance and the Sewage Disposal Regulations adopted by Humboldt County, and the Policy on the Control of Water Quality with Respect to On- Site Waste Treatment and Disposal Practices adopted by the California Regional Water Quality Control Board.

A septic system is a biological method of household sewage treatment that can be very effective when it has been carefully designed and installed and then is properly used and maintained. Septic systems are designed to provide partial treatment of the sewage, with disposal to the soil in such a manner that the sewage stays under the ground and is further treated by soil organisms so that contaminants do not reach groundwater or streams.

A septic system typically consists of a septic tank and a leaching device. The tank is usually 1,000-2,000 gallons in size and is designed to trap solids and grease and provide initial, primary treatment of sewage. Treatment in the septic tank is anaerobic (without oxygen) and produces a fairly raw effluent that is still very high in bacteria and pathogens, dissolved solids and organics, ammonia and organic nitrogen. The liquid then typically flows by gravity to the leaching device where the sewage soaks into the soil and most of the treatment takes place. The total size of tank and leaching area needed is determined by the expected amount of sewage flow into the system and capabilities of the soil to absorb water. Solids settle to the bottom of the tank and must be periodically pumped out by a qualified pumper before they build up and get into the leach lines. If this happens, the solids will clog the system and cause its failure.

Good treatment is primarily a biological process and it occurs most rapidly in upper soil layers that are rich in soil organisms and with plenty of oxygen to provide aerobic treatment. Besides the basic tank and trench leaching device, an onsite sewage disposal system may include other components such as a pump if the leachfield is higher than the tank. Cesspools and pit privies are old methods of sewage disposal that are now prohibited by the North Coast Regional Water Quality Control Board.

While these systems can work effectively, the presence of high groundwater has significantly reduced their performance. Once in the groundwater, pollutants can travel up to 100 times the distance in unsaturated soils before achieving the same level of treatment. Over the last 20-years there has been significant advances in the development of "alternative" treatment methods that are suitable for residential use. They include mounds, sand filters, recirculation textile and other media filters as well as constructed wetland. While conventional septic tank/leachfield systems represent the easiest and most cost effective system, the alternatives can be used to correct existing deficiencies and to allow development to occur in areas where conventional systems are inadequate. Humboldt County regulations have not been updated since 1984 and should be updated to better incorporate these relatively new technologies.

A current issue that faces the RWQCB and Humboldt County is the protection of "all" groundwater for potential reuse as drinking water. While protecting our drinking water supply is essential, for a number of reasons including geology and water quality (i.e. predominately iron and manganese) many areas of the County are not suitable for productive use of groundwater for drinking water purposes. Currently, this concern is driving the RWQCB to require removal of nitrogen such that advanced technologies are needed at considerable expense. Our

regulations should be set so that they recognize when these advanced technologies do provide any real benefit in terms of environmental protection. Each site in the County is unique and the regulations should be revised to reflect this fact.

The State and County have several regulations to help prevent septic systems from causing pollution or presenting a serious public health hazard. The State Health and Safety Code require an appropriate means of sewage disposal for all homes and businesses. It also prohibits any discharge of sewage on the ground surface. The Health and Safety Code designates the local Health Officer as the person for ensuring proper sewage disposal in each jurisdiction. The Health Officer can delegate these responsibilities to another responsible agency. In Humboldt County, the responsible agency is the Environmental Health Department.

The North Coast Regional Water Quality Control Board is responsible for ensuring that septic systems do not cause pollution of surface or groundwater. The Regional Board has developed many standards for proper septic system installation, including: groundwater separation, stream and well setbacks, slope limitations, minimum system sizing requirements, and allowances for use of alternative technologies. These standards are contained in the Water Quality Control Plan for the North Coast Region (Basin Plan). The Basin Plan delegates permitting and regulating authority to local entities. The County must comply with the minimum standards contained in the Basin Plan in order to keep the authority to permit septic systems.

Another state law has recently passed and been added to the State Water Code that affects the unincorporated coastal areas in relation to septic systems. The Coastal On-site Sewage Treatment System Regulations requires the State Water Quality Control Board to adopt standards and regulations for the permitting and operation of septic systems in coastal areas.

C. Regulatory Setting

This section provides an overview of the regulatory requirements pertinent to Humboldt County jurisdictions.

The overview begins with federal regulations and is followed by a more detailed discussion of state and county regulations relevant to the use of the various water resources. Land development that discharges Stormwater runoff into waters of the United States and/or the State of California is subject to the requirements of Federal, State and local agencies (i.e. California State Water Resources Control Board, North Coast Regional Water Quality Control Board (RWQCB), and the County of Humboldt. Regulations and permits under the United States Army Corps of Engineers and California Department of Fish and Game are also considered.

Water quality protection has long been a priority at all levels of government. In California, programs implementing the Federal Clean Water Act and the State Porter-Cologne Act are administered by the SWRCB, the nine regional water quality control boards (RWQCB) and authorized Indian tribal governments. Humboldt County is governed by the North Coast RWQCB and the Hoopa Valley Tribe for portions of the Trinity River. Waste discharge requirements are set by each RWQCB for point sources, including industrial and commercial uses, community wastewater management systems and individual septic systems. Implementation of point source controls has led to substantial increases in the level of treatment and quality of discharges.

National Pollutant Discharge Elimination System

The focus of regulatory efforts has expanded in recent years to address surface runoff pollutants into drainage channels, streams and groundwater. The National Pollutant Discharge Elimination System (NPDES) program requires individual permits for construction sites and certain industrial

and commercial activities and requires “municipal” area wide permits for urbanized areas. Beginning in 2003, Municipal NPDES permits are required for all local jurisdictions having a population greater than 10,000. Similar approaches to controlling storm water pollution are being developed in the Humboldt County’s Coastal Zone in response to California Coastal Commission policies. The requirements for NPDES permits include the “California Toxics Rule” and State and Federal criteria for metals, pesticides and other pollutants which could affect aquatic life and human health.

Federal Clean Water Act

In 1987, the Federal Water Pollution Control Act (CWA) was amended by adding Section 402(p) that established regulations for both municipal and industrial storm water discharges under the National Pollutant Discharge Elimination System (NPDES) Program. Section 402(p), as amended, requires NPDES permits for stormwater discharges from storm drain systems to waters of the United States. Storm drain systems are described as Municipal Separate Storm Sewer Systems (MS4s) and include streets, gutters, conduits, natural or artificial drains, channels and water courses or other facilities that are owned, operated, maintained or controlled by any permittee (cities and counties) and used for the purpose of collecting, storing, transporting or disposing of storm water.

Section 402(p)(3)(B) of the CWA requires that permits for storm drain systems “ (i) may be issued on a system- or jurisdiction-wide basis; (ii) shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers; and (iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable (MEP), including management practices, control techniques and system, design, and engineering methods, and other such provisions as the Administrator or the State determines appropriate for the control of such pollutants.” The state level discussion of the Clean Water Act included in this report provides further detail.

Federal Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) was originally passed by Congress in 1974 to protect public health by regulating the nation’s public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (SDWA does not regulate private wells which serve fewer than 25 individuals.)

1. California Toxic Rule (CTR) Overview

In accordance with the CWA regulations, States are required to adopt water quality standards for water bodies and have those standards approved by the United States Environmental Protection Agency (USEPA). If States cannot propose acceptable standards to the USEPA, the USEPA is responsible for setting the standards. Because California had not established a complete list of water quality criteria acceptable to the USEPA, EPA Region IX has established numeric water quality criteria for toxic constituents, in particular – metals, as the California Toxics Rule (CTR). CTR limits do not apply to stormwater directly, but in watersheds with adopted Total Maximum Daily Loads (TMDL’s) for metals, are increasingly being used as benchmarks.

2. 303(d) List of Water Quality Limited Segments & TMDL’s Overview

Pursuant to the Clean Water Act (CWA), the State and Regional Boards are required to assess the water quality and beneficial uses of water bodies every two years and list water bodies that have been determined to be impaired on the CWA Water Quality

Limited Segments 303(d) List. Once a water body has been deemed impaired, the State of California and or USEPA are required to develop a Total Maximum Daily Load (TMDL). A TMDL must be developed for each water body and each pollutant or group of pollutants that are causing the impairment to beneficial uses. Essentially, a TMDL is an estimation of the total daily load of pollutants from point sources as a waste load allocation (WLA), non-point sources as a load allocation (LA), and natural sources (background concentration) that a water body may receive without causing an exceedance of applicable water quality criteria. TMDL's account for current and future dischargers into a water body.

3. Municipal Separate Storm Sewer (MS4) Permit Overview

On November 16, 1990, pursuant to Section 402(p) of the CWA, the USEPA promulgated Federal regulations (40 Code of Federal Regulations (CFR) Part 122.26 establishing requirements for stormwater discharges under the NPDES program. However, small municipalities (with less than 100,000 population) are covered under separate permitting requirements. The significance of these federal regulations is discussed in greater detail below.

California State Water Resources Control Board (SWRCB)

Division 7 of the California Water Code, also known as the Porter-Cologne Water Quality Control Act, contains provisions that cover water quality protection and management for California's waters. The Porter-Cologne Act establishes the SWRCB (State Water Resources Control Board) and the nine Regional Water Quality Control Boards (RWQCBs) as the principal state agencies responsible for the protection and, where possible, the enhancement of the quality of California's waters. The SWRCB sets statewide policy, and together with the RWQCBs, implements Federal and State regulations.

4. North Coast Water Quality Control Board Basin Plan

The *Water Quality Control Plan for the North Coast Region* (Basin Plan, January 2007) is comprehensive in scope. It contains a brief description of the North Coast Region, and describes its water quality and quantity problems and the present and potential beneficial uses of the surface and ground waters within the Region. The water quality objectives contained in the Basin Plan are prescribed for the purposes of protecting the beneficial uses and include both narrative and numeric criteria.

The present water quality within the North Coast Region generally meets or exceeds the water quality objectives set forth in Section 3 of the Basin Plan. In most cases the water quality is sufficient to support, and in some cases, enhance the beneficial uses assigned to water bodies in Section 2 of the Basin Plan. However, the Basin Plan identifies a number of present or potential water quality problems which may interfere with beneficial uses or create nuisances or health hazards.

5. Beneficial Uses

Beneficial uses are designated under the CWA Section 303 in accordance with regulations contained in 40 CFR 131. An essential part of a water quality control plan is an assessment of the beneficial uses, which are to be designated and protected. Table 13-1 identifies beneficial uses for each hydrologic area in Humboldt County, as well as for specific waterbodies and broad categories of waters (i.e., bays, estuaries, minor coastal streams, ocean waters, wetlands, and groundwater). Protection will be afforded to the present and potential beneficial uses of waters of the North Coast Region as designated

and presented in Table 13-1. The beneficial uses of any specifically identified water body generally apply to all of its tributaries.

The Basin Plan has identified the following existing and potential beneficial uses for Humboldt County as abbreviated below:

MUN Municipal and Domestic Supply
AGR Agricultural Supply
IND Industrial Service Supply
PRO Industrial Process Supply
GWR Groundwater Recharge
FRSH Freshwater Replenishment
NAV Navigation
POW Hydropower Generation
REC-1 Water Contact Recreation
REC-2 Non-Contact Water Recreation
COMM Commercial and Sport Fishing
WARM Warm Freshwater Habitat
COLD Cold Freshwater Habitat
ASBS Preservation of Areas of Special Biological Significance
SAL Inland Saline Water Habitat
WILD Wildlife Habitat
RARE Rare, Threatened, or Endangered Species
MAR Marine Habitat
MIGR Migration of Aquatic Organisms
SPWN Spawning, Reproduction, and/or Early Development
SHELL Shellfish Harvesting
EST Estuarine Habitat
AQUA Aquaculture
CUL Native American Culture
FLD Flood Peak Attenuation/Flood Water Storage
WET Wetland Habitat
WQE Water Quality Enhancement
FISH Subsistence Fishing

The subheadings are abbreviations of beneficial uses and are taken directly from the Basin Plan. An "E" or a "P" in a column beneath one of these designates an existing or potential beneficial use for a given hydrologic area, sub-area or water body, respectively. The complete list of beneficial uses for Humboldt County follows.

In addition to numerical water quality objectives, the NCRWQCB Basin Plan defines certain narrative objectives which are aimed at prohibiting increases in concentrations of materials that would pose a nuisance or adversely affect beneficial uses of receiving waters such as color, odors, oil and grease, temperature and a whole host of other constituents.

Table 13-3. Beneficial Uses

Hydrologic Unit/Area/Subunit/ Drainage Feature	MUN	AGR	IND	PRO	GWR	FRSH	NAV	POW	REC1	REC2	COMM	WARM	COLD	ASBS	SAL	WILD	RARE	MAR	MIGR	SPWN	SHELL	EST	AQUA	CUL	FLD	WET	WOE
Klamath River Hydrologic Unit																											
Orleans Hydrologic Subarea	E	E	E	P	E	E	E	P	E	E	E	E	E			E	E		E	E	P		P	E			
Trinity River Hydrologic Unit																											
Hoopla Hydrologic Subarea	E	E	E	P	E	E	E	P	E	E	E		E			E	E		E	E	P		P	E			
Willow Creek Hydrologic Subarea	E	E	E	P	E	E	E	E	E	E	E		E			E	E		E	E	P		P				
Redwood Creek Hydrologic Unit																											
Orick Hydrologic Area	E	E	E	P	E		E	P	E	E	E		E			E	E	E	E	E		E	P	E			
Beaver Hydrologic Area	E	E	E	P	E		E	P	E	E	E		E			E	E		E	E		E	P				
Lake Prairie Hydrologic Area	E	E	E	P	E		E	P	E	E	E		E			E	E		E	E		E	P				
Trinidad Hydrologic Unit																											
Big lagoon Hydrologic Unit	E	E	E	P	E	E	E		E	E	E		E	E		E	E	E	E	E		E	P	E			
Little River Hydrologic Unit	P	E	E	P	E	E	E		P	E	E		E			E	E	E	E	E		E	P	E			
Mad River Hydrologic Unit																											
Blue Lake Hydrologic Area	E	E	E	E	E	E	E	P	E	E	E		E			E	E	P	E	E		E	E	E			
N. Fork Mad River Hydrologic Area	E	E	E	E	E	E	E	P	E	E	E		E			E	E		E	E			P				
Butler Valley Hydrologic Area	E	E	E	E	E	E	E	P	E	E	E		E			E	E		E	E			P	E			
Ruth Hydrologic Area	E	E	E	E	E	E	E	E	E	E	E	E	E			E	E		E	E			P				
Eureka Plain Hydrologic Unit																											
Jacoby Creek	E	E	E	P	E	E	E	P	E	E	E		E			E	E		E	E		E	P	E			
Freshwater Creek	E	E	E	P	E	E	E	P	E	E	E		E			E	E		E	E		E	E	E			
Elk River	E	E	E	P	E	E	E	P	E	E	E		E			E	E		E	E		E	P				
Salmon Creek	E	E	E	P	E	E	E	P	E	E	E		E			E	E		E	E		E	P	E			
Humboldt Bay	E	E	E	P		E	E	P	E	E	E		E			E	E	E	E	E	E	E	E	E			
Eel River Hydrologic Unit																											
Lower Eel River Hydrologic Area																											
Ferndale Hydrologic Subarea	E	E	E	P	E	E	E	P	E	E	E		E			E	E	P	E	E	E	E	P	E			
Scotia Hydrologic Subarea	E	E	E	P	E	E	E	P	E	E	E		E			E	E		E	E			P				

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Hydrologic Unit/Area/Subunit/ Drainage Feature	MUN	AGR	IND	PRO	GWR	FRSH	NAV	POW	REC1	REC2	COMM	WARM	COLD	ASBS	SAL	WILD	RARE	MAR	MIGR	SPWN	SHELL	EST	AQUA	CUL	FLD	WET	WOE
Larabee Creek Hydrologic Subarea	E	E	E	P	E	E	F	P	E	F	E		F			F	E		F	E			P				
Van Duzen River Hydrologic Area																											
Hydesville Hydrologic Subarea	E	E	E	P	E	E	E	P	E	E	E	E	E			E	E		E	E			P	E			
Bridgeville Hydrologic Subarea	E	E	E	P	E	E	F	E	E	E	E	E	E			E	E		E	E			P				
Yager Creek Hydrologic Subarea	E	E	E	P	E	E		P	E	E	E	E	E			E	E		E	E			E	E			
S. Fork Eel River Hydrologic Area																											
Weott Hydrologic Subarea	E	E	E	P	E	E	E	P	E	E	E	E	E			E	E		E	E			P				
Benbow Hydrologic Subarea	E	E	E	P	E	E	F	P	E	E	E	E	E			E	E		E	E			P				
Cape Mendocino Hydrologic Unit																											
Mattole River Hydrologic Area	E	E	E	P	E	E	E	P	E	E	E	P	E			E	E		E	E		E	E				

6. California Toxic Rule (CTR)

The California Toxics Rule (CTR) criteria are used as benchmarks to evaluate potential effects of toxic pollutants – in particular metals - on both aquatic and human life. The CTR criteria are applicable to receiving water bodies and not directly applicable to stormwater runoff. Therefore, they are used only for the evaluation of potential acute and chronic toxic effects on aquatic biota. Acute toxicity means a toxic effect, which occurs immediately or shortly after a single exposure; as compared to chronic toxicity, which indicates that a toxic effect that occurs after repeated or prolonged exposure(s).

7. CWA 303(d) List of Water Quality Limited Segments

The other major Clean Water Act regulatory process affecting the future of water quality in Humboldt County is the Total Maximum Daily Load (TMDL) program. TMDL standards differ from previous regulatory methods which focused on waste loads from identifiable point sources. Instead, TMDL's considered the totality of pollutant stressors in a watershed basin and allocate responsibility for action among dischargers. Rather than focusing on a single entity for corrective action, TMDL's often require a number of programs and agencies to work together in achieving the desired level of pollution control. In order for TMDL's to be enforceable, they must be incorporated into a Water Quality Control Plan (Basin Plan). California ranks TMDL's as low, medium, or high priority based on the number and severity of the impairments and the importance of the beneficial uses. The RWQCBs are required to determine which waterbodies are "impaired" by certain pollutants limiting beneficial uses of water and then to initiate a public process to assess pollutant sources, determine acceptable levels, allocate allowable pollutant loads to various sources, and establish an implementation program. The following water bodies in Humboldt County have been identified as impaired:

Table 13-4. TMDL Listed Water Bodies in California

Water Body	Basin	TMDL Stressor	Size Affected	Priority
South Fork Trinity	Klamath-Trinity	Sedimentation/Siltation/Temperature	1161 miles	Medium
Trinity	Klamath-Trinity	Sedimentation/Siltation	1256 miles	Medium
Klamath River	Klamath-Trinity	Nutrients/ Organic Enrichment/Low Dissolved Oxygen Temperature	609 miles	Medium
Mattole River	Mattole	Sedimentation/Siltation/Temperature	503 miles	High
Redwood Creek	Mad-Redwood	Sedimentation/Siltation/Temperature	332 miles	Medium/Low
Mad River	Mad-Redwood	Sedimentation/Siltation/Temperature/Turbidity	654 miles	Low
Freshwater Creek	Eureka Plain	Sedimentation/Siltation	84 miles	High
Elk River	Eureka Plain	Sedimentation/Siltation	88 miles	High
Eel River Delta	Eel River	Sedimentation/Siltation/Temperature	426 miles	Medium
South Fork Eel	Eel River	Sedimentation/Siltation/Temperature	943 miles	Medium
Middle Fork Eel	Eel River	Sedimentation/Siltation/Temperature	1071 miles	Medium
Upper Main Eel River	Eel River	Sedimentation/Siltation/Temperature	1141 miles	Medium
Middle Main Fork Eel	Eel River	Sedimentation/Siltation/Temperature	674 miles	Medium
North Fork Eel	Eel River	Sedimentation/Siltation/Temperature	382 miles	Medium
Van Duzen River	Eel River	Sedimentation/Siltation	585 miles	Medium
Humboldt Bay	Eureka Plain	PCB's	16075 Acres	Low
Jacoby Creek	Eureka Plain	Sediment	19 miles	Low
2002 CWA Section 303(D) List Of Water Quality Limited Segment, North Coast Regional Water Quality Control Board				

Sediment impairment affects fifty-nine percent of the area covered by the North Coast Region. The human-caused activities contributing to excessive sediment discharge include but are not limited to:

- Construction;
- Mining;
- Agriculture, including ranching, grazing, and farming;
- Dairies and other types of confined animal operation;
- Timber harvesting;
- Other earth-disturbing activities.

As of June 2007, the Regional Water Board has developed and adopted 17 sediment TMDL's and TMDL implementation plans for watersheds in the North Coast Region. In November 2004, the NCRWQCB adopted Resolution R1-2004-0087 Total Maximum Daily Load Implementation Policy Statement for Sediment-Impaired Receiving Waters in the North Coast Region. This document directs the development of a work plan to set priorities for addressing sediment waste discharges at a watershed-specific level. It also encourages cooperative relationships and joint efforts in a non-regulatory manner to help land owners meet good stewardship goals.

In June 2007, the NCRWQCB developed draft implementation measures to control excess sediment. It finds that a prohibition offers the most workable solution for those activities not covered by a waste discharge waiver. The adopted language proposed as an amendment to the Basin Plan follows:

"The discharge or threatened discharge of excess sediment from human-caused activities to waters of the state is prohibited. Excess sediment is soil, silt, sand, clay or similar material discharged to waters of the state in an amount that could be deleterious to beneficial uses or cause nuisance. Soil erosion occurs on the landscape as a natural process. This prohibition is intended to encourage application of protective measures that will control the discharge of human-caused excess and help meet the Region's water quality standards".

The Regional Board intends to utilize progressive enforcement measures which may require non-conforming land owners to submit a Report of Waste Discharge.

The Freshwater Creek and Elk River watersheds in the Eureka Plain are unique in the policy instrument used by the Regional Water Quality Control Board to control excess sediment discharge. In 2006, the NCRWQCB issued resolutions and orders for Watershed-Wide Waste Discharge Requirements (WDR's) for timber harvest plan activities conducted by Scotia Pacific Company, Salmon Creek Corporation, and the Pacific Lumber Company which are collectively referred to as "Discharger" in the documents. The resolution and other documents find the discharger owns 78 percent of the total watershed area in Freshwater Creek. In the Elk Creek watershed, the discharger owns 98 percent of the N. Fork, and 51 percent of the S. Fork area.

For both watersheds, the Regional Water Board concluded that timber harvest activities are the dominant factor contributing to the CWA 303(d) sediment impairment. The degradation due to sediment is so severe the watersheds are no longer able to attain their intended beneficial uses. Prior to the issuance of the WDR's, the dominant controlling policy instrument was multi-species Habitat Conservation Plan (HCP) that the

discharger entered into in 1999 with the US Fish and Wildlife Service, NOAA Fisheries, and the California Department of Fish and Game. An Independent Scientific Review Panel found compliance with the HCP prescriptions alone would be insufficient to ensure all beneficial uses of water are protected. The NCRWQCB finds that the WDR's are consistent with both the Basin Plans and the State Water Board's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (May 2004). Taken as a whole, the WDR orders represent the furthest end of the spectrum in progressive enforcement measures the Regional Water Boards can consider.

The Klamath River Nutrient, Temperature, and Dissolved Oxygen TMDL Action Plan under development by the Regional Board were scheduled for completion by the end of 2008 under court-mandated consent decree. A time extension for this TMDL is currently being negotiated between USEPA and the plaintiffs.

8. Municipal Separate Storm Sewer (MS4) permit

The MS4 NPDES permits were developed to target discharges from stormwater conveyance systems which tend to carry toxic pollutants to receiving water bodies. On December 8, 1999, USEPA promulgated Small Municipal Separate Storm Sewer Systems (MS4s) with populations of 100,000 or less and construction sites disturbing between one and five acres of land not covered under the Phase I regulations. NPDES Federal regulations allowed two permitting options: individual permits and general permits. On February 4, 2003, the State Water Resources Control Board adopted a general permit for the Discharge of Storm Water from Small MS4s (WQ Order No. 2003-0005-DWQ, NPDES General Permit No. CA000004) to provide permit coverage for smaller municipalities, including non-traditional Small MS4s. A "regulated Small MS4" is defined as a Small MS4 that discharges to a water of the U.S. or other MS4 regulated by an NPDES permit and is either automatically designated by U.S. EPA pursuant to 40 CFR because it is located within an urbanized area defined by the Bureau of the Census; or individually designated by the SWRCB or RWQCB based on some determining factors.

A regulated Small MS4 will be covered under the Permit once the NOI and SWMP are received by the RWQCB. The Small MS4 can then begin implementing its SWMP with the understanding that the RWQCB may require the municipality to make further revisions to the SWMP. Per this Permit, the MS4s must implement Best Management Practices (BMPs) that reduce pollutants in storm water runoff to the technology-based standard of "Maximum Extent Practicable" (MEP) in lieu of numeric effluent limitations.

Also, the permittee's must implement programs to protect water quality. In the event that discharges may cause or contribute to water quality standard exceedances, BMPs must be proposed and implemented.

The General Permit requirements for regulated Small MS4s are mainly to:

- Develop and implement a SWMP
- Reduce discharge of pollutants to the MEP
- Perform inspection and monitoring

The SWMP must describe how storm water pollutants are to be controlled and address the BMPs for six minimum control measure requirements. These six measures are: 1) Public Education, 2) Public Participation, 3) Illicit Discharge Detection and Elimination, 4)

Construction Site Storm Water Runoff Control, 5) Post Construction Storm Water Management, and 6) Pollution Prevention/Good Housekeeping.

Under the General Phase II Permit, the Small MS4 is responsible for maintaining, implementing, and enforcing the SWMP. The SWMP must describe BMPs and measurable goals, which will satisfy the six minimum control measures identified above. Also, the SWMP shall be designed such that it can be easily updated with subsequent findings. It should include measurable goals, which can be easily modified based on various factors such as design, operation, maintenance, effectiveness, criteria, costs, and public participation. The SWMP must incorporate local applicable strategies for urban runoff control. It must have measurable goals, specific work plans for how to achieve these goals, and specific BMPs and their Standard Operating Procedures on how these measures should operate on a day-to-day basis. This will include providing a detailed schedule (month/year) for when each action should be taken and the frequency/milestones for each specific action undertaken. The SWMP must identify the person(s) in charge of implementing or coordinating the implementation of the SWMP, including the six minimum control measures.

The major stormwater systems within the County include McKinleyville, Arcata, Eureka, and Fortuna. All of these systems qualify as MS4s, but McKinleyville is the only system within the County's jurisdiction. The remaining MS4s are all incorporated cities and as such their responsibility. Aside from McKinleyville's stormwater system, for which the County developed an SWMP in 2005, the County is also responsible for maintaining systems within other unincorporated regions of the County. Major areas with County stormwater infrastructure include the areas surrounding Eureka, such as Cutten, Ridgewood, Pine Hill, and Humboldt Hill, and also Garberville and Shelter Cove. Other areas with minor amounts of drainage infrastructure include Redway, Manila, King Salmon, Fields Landing, Loleta, and Willow Creek.

McKinleyville is the only community within the County's jurisdiction for which a master drainage plan has been completed, and that study was finalized in 1982. A regional storm drainage study was also prepared for the Mid-Humboldt County Urban Planning Program in 1971. No other master drainage studies have been prepared since then.

Shelter Cove's stormwater drains to the King Range ASBS, so this discharge is regulated by the California Ocean Plan. The County has applied for an exemption to the discharge prohibition requirement for this study area, and is in the process of negotiating with the RWQCB on this issue. A likely requirement or condition of the waiver will be development of an MS4 permit and issuance of an NPDES stormwater discharge permit for Shelter Cove.

9. Statewide Construction Permit (SWPPP)

Potential applicants to the County must comply with the SWRCB General Construction Activity Storm Water Permit (NPDES No. CAS000002, Order No. 99-08-DWQ), adopted August 19, 1999 in addition to the Modifications to the State Construction Activity Permit, Resolution Number 2001.046, adopted by the SWRCB on April 26, 2001. Construction activities subject to the NPDES General Permit includes clearing, grading, and disturbances to the ground, such as stockpiling or excavation, that results in soil disturbances of at least one acre of total land area. Construction activities that result in soil disturbances of less than one acre are subject to this General Permit if the construction activity is part of a larger common plan of development that encompasses one or more acres of soil disturbance, or if there is significant water quality impairment

resulting from the activity. The applicant must ensure that a Storm Water Pollution Prevention Plan (SWPPP) is available on site and that a Notice of Intent to comply with the State Permit along with the appropriate fee is filed with the SWRCB prior to grading.

While this permit principally addresses activities during construction, it also includes a section on post-construction stormwater management. The NOI for the General Construction Permit requires a signature by an authorized person.

In addition to compliance with the Standard Urban Storm Water Mitigation Plan (SUSMP), the RWQCB is enforcing compliance with the General Construction Permit which states, "The SWPPP shall include descriptions of the BMPs to reduce pollutants in storm water discharges after all construction phases have been completed at the site (Post-Construction BMPs). Post-construction BMPs include the minimization of land disturbance, the minimization of impervious surfaces, treatment of storm water runoff using infiltration, detention/retention, biofilter BMPs, use of efficient irrigation systems, ensuring that interior drains are not connected to a storm sewer system, and appropriately designed and constructed energy dissipation devices. These must be consistent with all local post-construction storm water management requirements, policies, and guidelines. The discharger must consider site-specific and seasonal conditions when designing the control practices. Operation and maintenance of control practices after construction is completed shall be addressed, including short- and long-term funding sources and responsible parties." As a result, the RWQCB has a great deal of authority to independently enforce compliance as they see fit, consistent with the language of the General Construction Permit.

10. Humboldt County Regulations

As a local government's basic planning document, the Humboldt County General Plan is a key component of a local government's effort to control negative impacts to water resources. Through its policies and standards, the General Plan can be an effective tool in controlling the effects of development and is a particularly valuable tool for addressing nonpoint source pollution issues. Four mandatory elements deal with issues relating to water quality and pollution issues:

- Land Use – density and intensity of use affect nonpoint pollution sources;
- Conservation – may address watershed protection, land or water reclamation, prevention or control of the pollution of stream and other coastal waters, regulation of land uses along stream channels, etc.;
- Open Space – applies to preservation of natural resources, including fish and wildlife habitat, rivers, streams, bays and estuaries, and other open spaces; and
- Circulation – should plan not only for transportation but also for water, sewage, and storm drainage infrastructure.

Local Coastal Plans

Local Coastal Plans (LCP) are required by the State Coastal Act to be prepared for the County's portion of the coastal zone. The LCP consists of a local government's land use plans (LUPs), zoning ordinances, zoning district maps, and within sensitive coastal

resource areas, other implementing actions which meet the requirements of and implements the provisions and policies of the Coastal Act at the local level.

By controlling the type, location, and intensity of land uses in the coastal zone, the LCPs have a direct relation to efforts to control the impact of pollution on water bodies along the coastal zone.

Grading, Erosion Control, Geological Hazards, Streamside Management Areas and related Ordinances.

Completing the regulatory framework provided by local government are the ordinances that implement the General Plan and Local Coastal Plans' policies and standards. Humboldt County's ordinances dealing with grading, erosion control, geological hazards, and streamside management areas were recently strengthened with revisions adopted by the Board of Supervisors in May 2002.

Key revisions include:

1. Update of Building Regulations to incorporate updated uniform codes.
2. Creation of a subsection within the Building Regulations addressing Grading, Excavation, Erosion, and Sedimentation.
3. Modification of other sections relating to geologic hazards and processing of grading and building permits within or affecting Streamside Management or Other Wet Areas.
4. Addition of Geologic Hazards Regulations, including the incorporation of "area of demonstration of stability" provisions.
5. Establishment of a Streamside Management Ordinance, which codifies the Interim Implementation Standards for the Open Space Element of the General Plan (applicable to Non-Coastal areas only).
6. Ordinance revisions addressing vegetation removal or other land disturbing activities, and an ordinance revision needed to assure consistency between County regulations.

These revisions completed efforts to codify and implement comprehensive provisions for dealing with the development and conservation activities with potential impacts to streamside areas, as well as addressing nonpoint source pollution from runoff water. These ordinance revisions have a number of benefits including:

1. Implementation of various General Plan elements including water quality, biological resources, critical and sensitive habitats, geologic hazards, open space, conservation, and erosion and sedimentation control.
2. Additional guidance on the application of erosion and sediment control measures to various developments so that new developments incorporate BMPs.
3. Updating of existing zoning regulations which conform to all local, state, and federal requirements to protect property rights, sensitive habitats, and coastal and other sensitive resources.
4. Management of risk in geologically unstable areas and improvement of erosion control regulations to minimize the risk of building failures due to earthquakes or land movement.

D. Hydrologic Assessment

The North Coast region generally has the most abundant water resources of any region of the State as a result of its unique location and topographic features. The high volumes of precipitation and natural runoff are a key component for most of the beneficial uses of its water bodies, including commercial and recreational fishing, shellfish harvesting, urban and agricultural use, and recreation. Many of the region's forests and watersheds support threatened and endangered species of plants and animals, and the major rivers and streams contain significant anadromous fishery resources. This region also features important coastal resources, including Trinidad Harbor, Humboldt Bay, and many small estuaries and lagoons.

1. Hydrology Methodology

This section provides background information on the methodology used to assess the potential hydrologic impacts of the proposed project.

2. Drainage Areas and Watershed

The term *watershed* describes an area of land that drains down slope to the lowest point. The water moves through a network of drainage pathways, both underground and on the surface. Generally, these pathways converge into streams and rivers, which become progressively larger as the water moves on downstream, eventually reaching an estuary and the ocean. Other terms used interchangeably with watershed include *drainage basin* or *catchment basin*. Watersheds can be large or small. Every stream, tributary, or river has an associated watershed, and small watersheds generally join to become larger ones. The Natural Resources and Hazards report includes additional information on the County's watersheds. This volume and a companion to the Natural Resources and Hazards Report (Volume II) includes more detailed treatments of each planning watershed, as well as detailed discussions of the regulatory framework and the watershed management approaches by various agencies.

Hydrologically, most land in Humboldt County falls within twelve planning watersheds and Humboldt Bay.

The portions of the watersheds that lie within the County are found in Table 13-4. The watersheds within Humboldt County are shown on Figure 13-5.

Table 13-5. Humboldt County Watersheds

Watershed	Basin	Acres Within Humboldt County	Total Acres
South Fork Eel River	Eel Basin	200,395	441,213
Middle Main Eel River	Eel Basin	138,509	333,345
Lower Eel River	Eel Basin	191,052	191,052
Eureka Plain	Mad River-Redwood Creek	124,617	124,617
Lower Klamath River	Klamath-Trinity Basin	332,787	493,453
Mad River	Mad River-Redwood Creek	221,337	322,143
Redwood Creek	Mad River-Redwood Creek	187,788	187,819
Cape Mendocino (Mattole)	Mattole Basin	311,774	319,628
Trinidad	Mad River-Redwood Creek	83,684	83,684
Van Duzen	Eel Basin	234,899	274,083
Lower Trinity River	Klamath-Trinity Basin	192,286	654,967

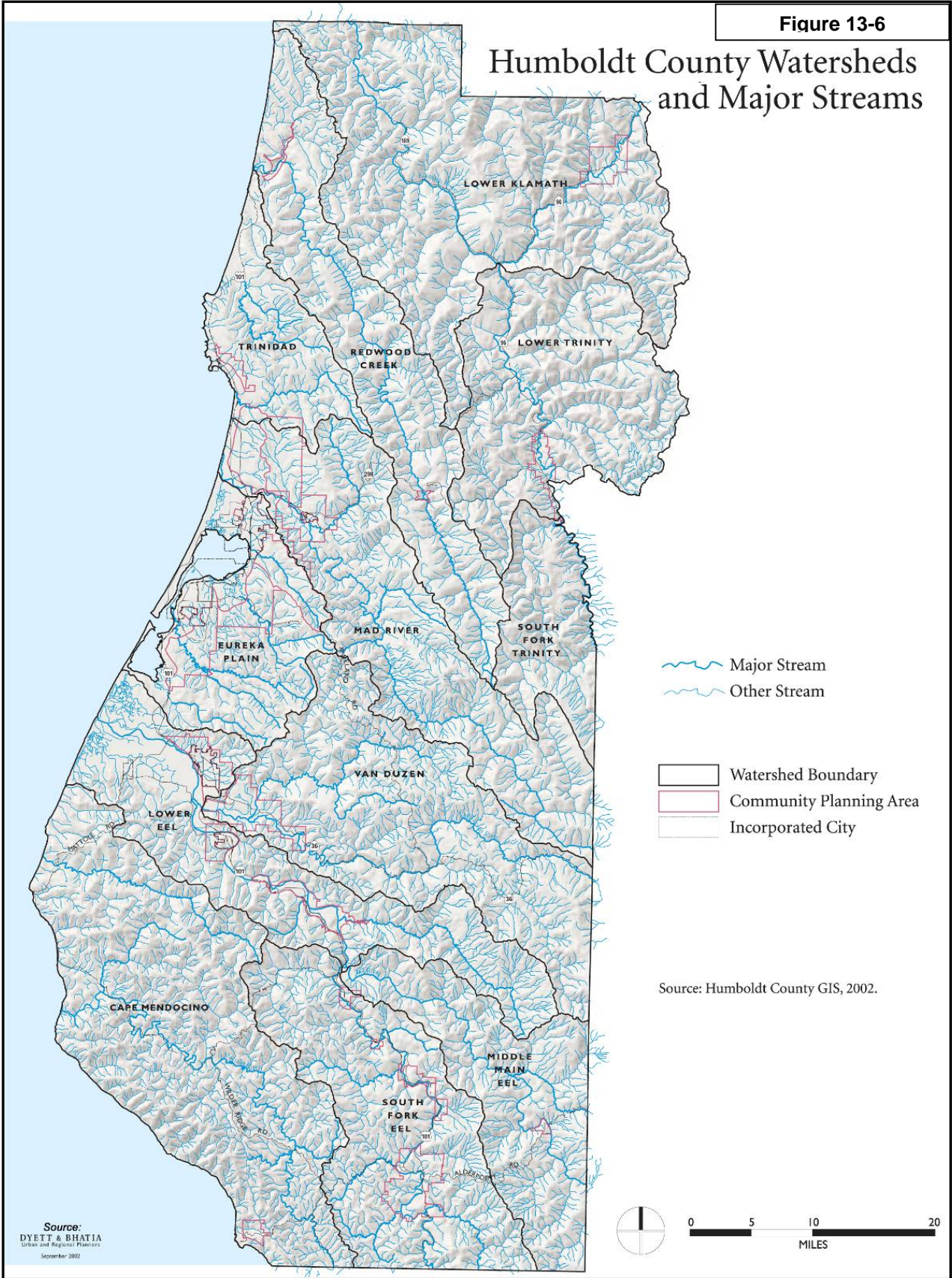
Humboldt County General Plan
 Water Resources Technical Report

Watershed	Basin	Acres Within Humboldt County	Total Acres
South Fork Trinity	Klamath-Trinity Basin	73,205	596,497
Source: Humboldt County GIS, 2002			

Traditionally, planning has been done based upon jurisdictional boundaries, which in most cases are different than watershed boundaries. Watershed planning and management consists of an approach for protecting water quality and quantity that focuses on the whole watershed. Watershed planning and management involve a number of activities, including: targeting priority problems in a watershed; promoting a high level of involvement by interested and affected parties; developing and implementing solutions to problems through the use of the expertise and authority of multiple agencies and organizations; and measuring success through monitoring and other data gathering. Humboldt County community watershed planning efforts can both accommodate growth and protect community and resource values if based on an integration of 'watershed infrastructure' and community desires. As a supplement to traditional land use planning processes, several agencies including the Natural Resource Services, the Redwood Creek Watershed Group, and others have applied the watershed management process in an integrated planning system. *The Lindsay Creek Project: A Watershed and Community Based Land Use Assessment*, is an example of watershed based planning efforts. Another is the *Mattole Watershed Plan, by the Mattole Restoration Council*.

Figure 13-6

Humboldt County Watersheds and Major Streams



The North Coast Integrated Regional Water Management Plan

An important watershed based planning effort in the North Coast region is the North Coast Integrated Regional Water Management Plan (NCIRWMP) - a seven county collaboration that relies upon an adaptive management framework to promote the conservation of north coast ecosystems, while ensuring adequate water quality and supply. The major themes of the NCIRWMP are salmonid recovery, the beneficial uses of water, and intra-regional cooperation.

Humboldt County has been a key leader and participant in the NCIRWMP, and the Water Resources Element of Humboldt County's General Plan reflects the objectives of the NCIRWMP, as well as the preferences and priorities of various state and federal agencies.

The objectives of the NCIRWMP are listed below and are consistent with the California Water Plan, the Watershed Management Initiative, the North Coast Basin Plan, the IRWM Program Preferences and other state and federal priorities and objectives.

1. Conserve and enhance native salmonid populations by protecting and restoring required habitats, water quality and watershed processes
2. Protect and enhance drinking water quality to ensure public health
3. Ensure adequate water supply while minimizing environmental impacts
4. Support implementation of Total Maximum Daily Loads (TMDLs), the North Coast Regional Water Quality Control Board's (NCRWQCB) Watershed Management Initiative, and the Non-Point Source Program Plan.
5. Address environmental justice issues as they relate to disadvantaged communities, drinking water quality and public health
6. Provide an ongoing, inclusive framework for efficient intra-regional cooperation, planning and project implementation

Local planning efforts in the North Coast Region have historically been segregated into jurisdictional planning and watershed planning. Most jurisdictional planning has been focused on county- and city-based based general plans. Although general plans often have a natural resources element, many do not fully integrate the natural resource-based water management issues in a given area.

Watershed planning in the North Coast Region has predominantly focused on natural resources – including specific species, habitats and ecosystem processes, and has largely been directed by the state natural resources agencies. In general, watershed planning does not tend to incorporate municipal considerations to the degree that is necessary for effective integrated water management planning and implementation.

There is an historic lack of a framework for integration of state priorities with local planning efforts. While cumulative impacts are felt at the regional or even statewide scale, many of these impacts tend to be caused at the local level and are most affected by local planning. It is therefore critical that the transfer of data and priorities between state and local planning efforts take place in an organized fashion. Scale issues may also be problematic, as state agencies are addressing broad statewide issues and

priorities, while local planning is high resolution and focused at the county, city or watershed scale.

Statewide Priorities

The State of California has developed several guidance documents that are applicable to integrated water management planning in the North Coast Region. These include the State Water Resources Control Board's Watershed Management Initiative (WMI) and the associated RWQCB Basin Plan, the Department of Water Resource's recently released California Water Plan, and the Department of Fish and Game Recovery Strategy for Coho Salmon. These documents provide technical and jurisdictional direction to the Region in terms of integrated planning to attain water quality objectives and the recovery of endangered salmonids.

Following is a list of Statewide Priorities that the NCIRWMP meets or contributes to:

- TMDL implementation
- Implementation of NCRWQCB WMI Chapter
- Implementation of SWRCB's NPS Pollution Plan
- Implementation of Recommendations of the Floodplain Management Task Force, Recycling Task Force, or State Species Recovery Plan
- Address environmental justice concerns
- Integrated projects with multiple benefits
- Support and improve local and regional water supply reliability
- Contribute expeditiously and measurably to the long-term attainment and maintenance of water quality standards
- Eliminate or significantly reduce pollution in impaired waters and sensitive habitat areas including areas of special biological significance;
- Include safe drinking water and water quality projects that serve disadvantaged communities
- Reduce Conflict Between Water Users or Resolve Water Rights Disputes, Including Interregional Water Rights Issues

Federal Priorities

The NCIRWMP process identifies and incorporates appropriate federal priorities. These may include species recovery plans as outlined by NOAA Fisheries, components of the US Environmental Protection Agency's NPS program and other planning information from agencies such as Natural Resources Conservation Service, U.S. Geological Survey or U.S. Fish and Wildlife Service.

3. Watershed Boundaries

The Natural Resources and Hazards report includes additional information on the County's watersheds including detailed mapping in Volume 2 of the Report.

The NCRWQCB has divided the North Coast region into six designated watershed management areas (WMAs), three of which are fully or partially included in Humboldt

County: Humboldt Bay WMA, Eel River WMA, and the North Coast Rivers WMA. Each of these WMAs is comprised of numerous CalWater Hydrologic Units. CalWater is a spatial dataset of watersheds in California, developed by the Interagency Watershed Mapping Committee, often referred to as the "CalWater Committee". For many years, State and Federal agencies have been working through the committee to map the watersheds and hydrologic units in the State of California. The North Coast is defined by CalWater as Hydrologic Region 1. Each Hydrologic Region is broken up into Hydrologic Units, with each unit indicating an entire major river basin. Large tributaries of major rivers are designated as Hydrologic Areas (HA). In turn, HAs are subdivided into Hydrologic Sub-Areas (HSA). Critical Coastal Areas (CCAs) located in the WMAs in Humboldt County are listed in Table 13-6.

Table 13-7. Critical Coastal Areas, Humboldt County

CCA #	CCA Name	1998 303(d) Listed Waterbodies Flowing into MMAs	SWQPA	1995 CCA list	Notes and additional designations
2	Redwood Creek	X	X	X	
3	Redwood National Park		X		Park includes Klamath and Redwood CCAs within borders
4	Kelp beds at Trinidad Head		X		
5	Mad River			X	
6	Eel River			X	
7	Mattole River	X		X	
8	King Range National Conservation Area		X		

Note: Table includes method of CCA classification: 1) 1998 303(d) listed waterbodies flowing into Marine Managed Areas (MMAs); 2) Stormwater Quality Protection Areas (SWQPAs, formerly Areas of Special Biological Significance, ASBSs); and 3) original 1995 CCA list consisting of 303(d) listed waterbodies (NCRWQCB 2005).

The following is a summary of each Watershed Management Area in Humboldt County as defined by the Watershed Management Initiative (SWRCB), including a range of conditions for each WMA for surface water and groundwater.

4. Humboldt Bay Watershed Management Area

The Humboldt Bay WMA encompasses waterbodies that drain to the Pacific Ocean from Humboldt Bay north to Redwood Creek. The major river systems in the WMA are the Mad River and Redwood Creek; other waterbodies include Humboldt Bay and Mad River Slough, and coastal lagoons (Big, Stone, and Freshwater Lagoons) and streams (Elk and Little Rivers and Freshwater, Jacoby, and Maple Creeks). In the east, the terrain is elevated hill slope with coastal plain occurring in the west. Precipitation ranges from 32 to 98 inches annually. Redwood Creek, the Kelp beds at Trinidad Head, and the Mad River are the Critical Coastal Areas that occur in this WMA (NCRWQCB, 2005) (Table 13-5. CCAs) The streams support production of anadromous salmonids, including steelhead and cutthroat trout, coho and Chinook salmon. Urbanized areas include Trinidad,

McKinleyville, Arcata, and Eureka and rural residential areas are scattered throughout the WMA. The majority of the population lives in the Humboldt Bay area cities of Arcata and Eureka and their surrounding environs.

The Mad River is CWA section 303(d) listed for sediment and temperature impacts. The primary issues for water quality are forestry related, with urbanization and associated industrial and public nonpoint sources. The drinking water for most of the Humboldt Bay area is supplied by Ranney Collectors located within the Mad River with other coastal streams providing drinking water for other communities. Mad River is continuously supplied with water via releases from the Ruth Reservoir (with 48,030 acre-foot storage capacity), although these supplies are dependant on adequate precipitation and flows through the season.

The Eureka waterfront was the site of several industrial operations that left the soil and groundwater contaminated with heavy metals, petroleum products, and pentachlorophenol's (PCPs). The waterfront is now undergoing redevelopment and decontamination efforts.

Redwood Creek flows into the Pacific Ocean near the town of Orick and is located about 35 miles north of Eureka. Redwood Creek drains a 285-mi² area and is about 67 miles long. The watershed is located entirely within Humboldt County. Redwood Creek is a basin of mixed ownership and contains a rich blend of industrial and non-industrial timberlands, coastal and upland agricultural lands, state and federal national parks, other federal properties, and the unincorporated town of Orick. Redwood Creek supports three federally listed as threatened salmonid species as well as the non-listed coastal cutthroat trout (*O. clarki*) and resident fish species (RNSP 1997). The watershed also provides domestic water supplies to rural communities and recreational opportunities. At the coast, Redwood Creek discharges into a designated Water Quality Protection Area (formerly known as Areas of Special Biological Significance) (SWRCB 2001, SWRCB 2003) and a Critical Coastal Area (CCC 2003). Redwood National Park and Prairie Creek Redwoods State Park are located in the lower part of the Redwood Creek basin. This sub basin has been extensively researched and is considered a "reference watershed", and is home to significant old growth stands of coast redwood. In 1982 the park received international recognition when it was designated as both a World Heritage Site and International Biosphere Reserve.

5. Eel River Watershed Management Area

The Eel River and its tributaries comprise the third largest river system in California, and the largest river system draining to Humboldt County's coast. The Eel River WMA encompasses roughly 3,684 square miles (NCRWQCB, 2005). The main tributaries to the Eel River are the Van Duzen River, the Bear River, Yager, Larabee, Bull, and Salmon Creeks. Lake Pillsbury is located near the headwaters of the mainstem of the Eel River. The upper watershed is mountainous and soils are steep and highly erodable. The Eel River is designated as a Critical Coastal Area. In the west, the river meanders on a coastal plain and is joined by the Salt River. Several dairies are located on the coastal plain, as well as several small towns. Other communities in the watershed include Scotia, Garberville, Laytonville, and Willits. In many of the alluvial valleys, surface and ground water are closely connected, thus surface water withdrawals have an effect on local groundwater supplies. A Northwestern railroad line follows along the Eel River from Humboldt Bay to the southern county line and beyond. The last train traversed the portion of the tracks in the Eel River canyon in 1998. A local government agency (Northcoast Railroad Authority) was formed in 1989, with the goal of reviving the railroad.

The rail line has, at times, negatively impacted water quality due to numerous landslides. As of the date of this report rail service in this area has not resumed.

The Eel River WMA is a well-known recreation destination with numerous state and private campgrounds along its length; beneficial uses include both water contact and non-contact uses such as swimming and boating. The river also supports a large recreational fishing industry; it is the third largest producer of salmon and steelhead in the State of California (NCRWQCB 2005). Due to the erodible soils, steep terrain, and land use history, there is significant concern for the viability of this anadromous fishery resource.

6. North Coast River Watershed Management Area

The Mattole River and the King Range National Conservation Area are the only watershed areas in the North Coast Rivers WMA, which are listed as Critical Coastal Areas. The headwaters of the Mattole River begin in Mendocino County, and it flows north 62 river miles, through steep, forested lands in Humboldt County and into the ocean ten miles south of Cape Mendocino. Tributaries to the Mattole River include Mill, Squaw, Bear, Thompson, Honeydew, and Bridge Creeks. The watershed encompasses approximately 304 square miles and is subject to varying rainfall; near the coast, the area receives about 50 inches per year while near the headwaters, about 115 inches of rain fall per year. The largest communities are Petrolia, Honeydew and Whitethorn. There is also a population of about 2000, scattered throughout the watershed. Small landowners – those with less than 450 acres - own about 43 percent of the watershed; the Bureau of Land Management (BLM) owns about 12 percent, and commercial timber companies own most of the remaining land. Silviculture and ranching are the predominant businesses; water quality problems are those associated with timber harvest, road building, forest conversion, and overgrazing. Fish species known to inhabit the Mattole River include coho, Chinook, steelhead, rainbow trout (*Oncorhynchus mykiss*), and brook lamprey (*Ichthyomyzon fossor*); other species include the southern torrent salamander (*Rhyacotriton variegatus*) and tailed frog (*Ascaphus truei*).

There is a significant amount of watershed planning efforts currently underway in Humboldt County. Table 13-6, Multiple Scale & Jurisdiction Watershed Management Planning Efforts lists the major watershed and water resources planning efforts currently underway in Humboldt County.

As Table 13-6 illustrates, the myriad of watershed planning efforts include Federal and State Plans, Regional Plans, Tribal plans, local plans, habitat conservation plans, and plans prepared by advocacy groups. These watershed-based management planning efforts are either regulatory or are functional planning efforts that impact and/or drive Humboldt County's General Plan Update efforts. For example, the Water Quality Control Plan for the North Coast Region and the Water Quality Control Plan of the Hoopa Valley Tribe are regulatory in context as they are a Federal delegated authority under the Clean water Act. Humboldt County has influence on how these plans affect the County's water bodies, but little or no regulatory oversight.

In contrast, the Local Coastal Plans developed within Humboldt County are a sanctioned level of authority granted by the California Coastal Commission pursuant to the Federal Coastal Zone Management Act.

From a functional planning perspective, Table 13-7 is an inventory of watershed planning efforts that either directly impacts the County's General Plan Update process or involves

a strong element of the stakeholders process outlined under Government Code §65351 which provide opportunities for involvement of public agencies, public utility companies, community groups and the general public.

Table 13-8. Multiple Scale & Jurisdiction Watershed Management Planning Efforts

Table 13-11 Multiple Scale & Jurisdiction Watershed Management Planning Efforts																					
	Environmental Restoration and Fisheries Protection			Watershed Protection and Planning							Water Supply Reliability			Clean Water and Water Recycling							
	Wetlands	Fisheries Enhancement	Habitat Restoration	Water Use Efficiency	Water Conservation	Water Management	Stormwater Management	Watershed Planning	NPS Pollution Control	Flood Protection	Watershed Education/Outreach	Urban Stream Restoration	Public Access	Monitoring	Drinking Water - Water Treatment	Groundwater Management	Water Supply	Desalination	Water Quality	Sanitation - Wastewater Treatment	Water Reuse
Federal Plans																					
NOAA Fisheries Salmon Recovery Plans																					
Southern Oregon/Northern California Coast & North-Central California Coast TRTs	x	x																			
Environmental Protection Agency																					
EPA Underground Injection Control Program															x	x			x		
State Plans																					
State Water Resources Control Board																					
Watershed Management Initiative (WMI)						x	x	x	x	x	x	x	x								
Water Quality Control Plan for the Ocean Waters of California																			x		
Nonpoint Source Program Strategy and Implementation Plan						x	x	x	x			x		x	x				x		
Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California	x	x	x																x		
Water Quality Control Policy for the Enclosed Bays and Estuaries of California	x	x	x			x	x	x	x			x		x					x	x	
Rangeland Water Quality Management Plan						x		x	x	x									x		
State Water Resources Control Board																					
California Pesticide Management Plan for Water Quality								x	x	x				x	x				x		
North Coast Regional Water Quality Control Board																					
Water Quality Control Plan for the North Coast Region	x	x	x			x	x	x	x	x	x	x		x	x				x	x	
TMDLs						x	x	x	x	x	x	x		x	x	x			x		
Department of Water Resources																					
California Water Plan	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Fish Passage Improvement Program		x	x																		
California Coastal Commission																					
Local Coastal Programs	x	x	x		x	x	x	x	x	x	x	x		x	x	x			x		x
California's Critical Coastal Areas Program	x					x		x	x	x	x	x							x		
Coastal Access Action Plan										x		x									
California's Ocean and Coastal Resources Coastal Impact Assistance Program	x				x	x		x	x	x									x		

Table 13-8. Multiple Scale & Jurisdiction Watershed Management Planning Efforts (Continued)

Table 13-11 Multiple Scale & Jurisdiction Watershed Management Planning Efforts																					
	Environmental Restoration and Fisheries Protection			Watershed Protection and Planning						Water Supply Reliability		Clean Water and Water Recycling									
	Wetlands	Fisheries Enhancement	Habitat Restoration	Water Use Efficiency	Water Conservation	Water Management	Stormwater Management	Watershed Planning	NPS Pollution Control	Flood Protection	Watershed Education/Outreach	Urban Stream Restoration	Public Access	Monitoring	Drinking Water - Water Treatment	Groundwater Management	Water Supply	Desalination	Water Quality	Sanitation - Wastewater Treatment	Water Reuse
California Department of Fish and Game																					
Recovery Strategy for California Coho Salmon		x	x					x				x	x						x		
Steelhead Restoration and Management Plan for California		x	x					x				x	x						x		
California Resources Agency																					
Protecting Our Ocean California's Action Strategy		x	x			x		x									x		x		
California Coastal Salmon and Watersheds Program	x	x	x				x			x	x	x									
Sediment Master Plan	x						x	x		x	x	x									
Regional Plans																					
Forest Plans																					
Northwest Forest Plan			x				x						x								
Six Rivers National Forest		x	x				x	x													
Pacific Northwest Aquatic Monitoring Partnership														x							
Redwood National and State Park General Management Plan 1999	x		x									x							x		
Resource Conservation District Plans																					
Humboldt County RCD Long Range Plan 1999								x		x											
Other Regional Plans																					
Five Counties Salmonid Conservation Program		x	x				x	x													
Tribal/Reservation Plans																					
Hoop Valley Indian Reservation Water Quality Control Plan 2001								x				x	x	x	x				x	x	
Local Plans																					
City of Arcata Urban Water Management Plan 2000	x					x	x							x		x					
City of Eureka Urban Water Management Plan				x	x									x		x			x	x	
City of Fortuna Urban Water Management Plan					x									x		x					
Humboldt County General Plan 1984		x			x				x							x			x		
Humboldt Bay Watershed Action Plan and Enhancement Plan		x	x							x											
Humboldt Bay Municipal Water District Urban Water Management Plan														x		x					
Humboldt Community Services District 2000 Urban Water Management Plan Update						x								x		x				x	
McKinleyville Community Services District Urban Water Management Plan				x	x									x		x				x	x
Orick Community Plan																				x	

Table 13-8. Multiple Scale & Jurisdiction Watershed Management Planning Efforts (Continued)

Table 13-11 Multiple Scale & Jurisdiction Watershed Management Planning Efforts																					
	Environmental Restoration and Fisheries Protection		Watershed Protection and Planning							Water Supply Reliability		Clean Water and Water Recycling									
	Wetlands	Fisheries Enhancement	Habitat Restoration	Water Use Efficiency	Water Conservation	Water Management	Stormwater Management	Watershed Planning	NPS Pollution Control	Flood Protection	Watershed Education/Outreach	Urban Stream Restoration	Public Access	Monitoring	Drinking Water - Water Treatment	Groundwater Management	Water Supply	Desalination	Water Quality	Sanitation - Wastewater Treatment	Water Reuse
Watershed Plans																					
Humboldt Bay Water Quality Improvement Program		x	x					x		x				x						x	
Lower Klamath River Sub-basin Watershed Restoration Plan (draft) 2003	x	x			x																
Mattole Watershed Plan 2004 (draft)		x	x					x	x					x							
River/Creek Restoration/Management Plans																					
Eel River Restoration (Action) Plan, DFG		x	x					x												x	
Erosion Prevention Planning Project for the Middle Van Duzen River 2003								x												x	
Humboldt Bay Coordinated Research and Monitoring Plan – Draft									x					x						x	
Draft Redwood Creek Water Quality Attainment Strategy for Sediment 1998, NCRWQCB									x					x						x	
Upper Redwood Creek Watershed Updated Summary Report 2004, Redwood National Park			x					x	x					x						x	
South Fork Eel River (Resource Conservation Strategy) Plan Humboldt County RCD			x													x				x	
Salt River Enhancement Plan									x												
Salt River Local Implementation Plan (USDA)									x							x				x	
Stone Lagoon Draft Management Plan 1997																					
Van Duzen River Resource Conservation Strategy 2002, HCRCD		x							x							x				x	
Erosion Prevention Planning Project for the Middle Van Duzen River 2003		x						x												x	

Table 13-8. Multiple Scale & Jurisdiction Watershed Management Planning Efforts (Continued)

Table 13-11 Multiple Scale & Jurisdiction Watershed Management Planning Efforts																					
	Environmental Restoration and Fisheries Protection		Watershed Protection and Planning							Water Supply Reliability			Clean Water and Water Recycling								
	Wetlands	Fisheries Enhancement	Habitat Restoration	Water Use Efficiency	Water Conservation	Water Management	Stormwater Management	Watershed Planning	NPS Pollution Control	Flood Protection	Watershed Education/Outreach	Urban Stream Restoration	Public Access	Monitoring	Drinking Water - Water Treatment	Groundwater Management	Water Supply	Desalination	Water Quality	Sanitation - Wastewater Treatment	Water Reuse
Categorical Plans																					
Habitat Conservation Plans																					
Simpson Timber Aquatic Habitat Conservation Plan		X						X						X						X	
Simpson Timber Company HCP			X					X					X							X	
Pacific Lumber Company HCP			X																		
Multi-species Conservation Plans																					
Southern Pacific Shorebird Conservation Plan			X																		
Salmon and Steelhead Conservation Plan 2004		X	X				X	X					X		X					X	
Humboldt Bay Watershed Salmon and Steelhead Conservation Plan, SSC		X	X				X	X					X		X					X	
PRBO Oak Woodland Bird Conservation Plan			X										X								
PRBO Riparian Bird Conservation Plan			X										X								
Eel River Salmon and Steelhead Restoration Action Plan, CDFG Inland Fisheries Division		X	X				X	X					X		X					X	
Stormwater Management Plans																					
City of Eureka Stormwater Management Plan							X													X	
City of Arcata Stormwater Management/Master Plan							X													X	
Arcata Drainage Master Plan							X													X	
Advocacy, Research, and Outreach Plans																					
Institute for Fisheries Resources Pacific Salmon Restoration Program		X	X				X	X		X											
Institute for Fisheries Resources Sustainable Fisheries Program			X																		
The Water Bond Coalition	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pacific Coast Joint Venture Strategic Plan			X							X											
The Master Plan for the Redwoods			X																		
California North Coast Ecoregional Plan, TNC	X	X	X					X													

7. Aquifers

Groundwater development in Humboldt County occurs along the coast, near the mouths of some of the region's major rivers, on the adjacent narrow marine terraces, or in the inland river valleys and basins. Reliability of these supplies varies significantly from area to area. There are four groundwater basins in Humboldt County: Hoopa Valley, Mad River Valley, Eureka Plain, and Eel River Valley. These basins underlie approximately 245 square miles). Figure 13-9 shows the major groundwater basins within Humboldt County.

Along the coast, most groundwater is developed from shallow wells installed in the sand and gravel beds of several of the region's rivers. Under California law, the water produced in these areas is either considered to be groundwater or groundwater under the influence of surface water. Water from Ranney collectors installed in the Mad River supplies most of the Humboldt Bay area and falls into the later classification, while wells in the Humboldt Hill area are considered groundwater. A recently installed Ranney collector in the Trinity River supplies most of the Hoopa Valley. Except on the Mad River, which has continuous supply via releases from Ruth Reservoir, these supplies are dependent on adequate precipitation and flows throughout the season. In drought years when stream flows are low, seawater intrusion can occur, causing brackish or saline water to enter these systems.

As a general rule, most of the wells in Humboldt County that truly rely on groundwater as the water source find that the water is often poor in quality and quantity. While there are exceptions, including some of the wells located in the Humboldt Bay Basin, these wells can have very high levels of iron and manganese and can have insufficient production during the late summer and fall. Therefore, many groundwater wells rely on the hydrologic connection to the rivers and streams of the valleys. A good example of this variability can be seen in the Cities of Fortuna and Rio Dell. Both had wells located within the Eel River Basin. The City of Rio Dell, with wells located closer to the active river channel experienced water supply problems while City of Fortuna's wells have been good producers. As a result, the City of Rio Dell recently obtained a water right and installed an intake directly in the Eel River.

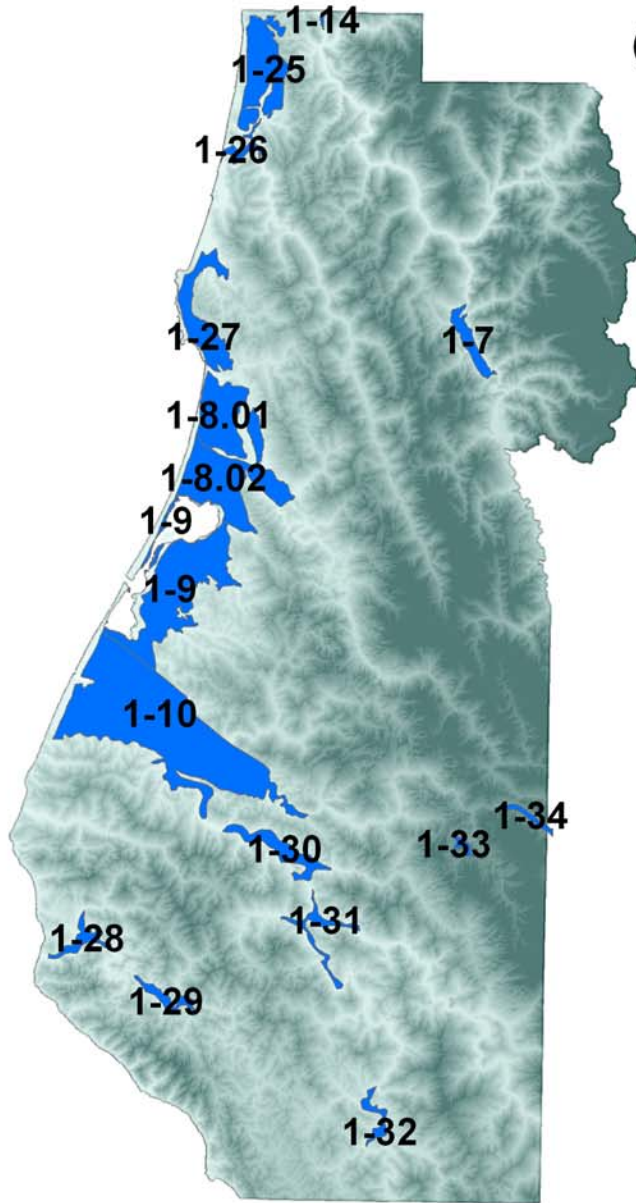
Groundwater quality characteristics and specific local impairments vary within the regional setting of Humboldt County. In general, seawater intrusion and nitrates in shallow aquifers are problems in the coastal groundwater basins; high total dissolved solids (TDS) content and iron, boron, and manganese can be problems in the inland basins of the County.

Total dissolved solids (TDS) comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some small amounts of organic matter that are dissolved in water.

TDS in drinking-water originate from natural sources, sewage, urban run-off, industrial wastewater, and chemicals used in the water treatment process. In Humboldt County, elevated TDS has been due to natural environmental features such as carbonate deposits and sea water intrusion, but other sources include stormwater and agricultural runoff, and point/non-point wastewater discharges.

Figure 13-9

Humboldt County Groundwater Basins



Basin or Sub-basin	Basin Name
1-7	Hoopla Valley
1-8	Mad River Valley
1-8.01	Mad River Lowland
1-8.02	Dows Prairie School Area
1-9	Eureka Plain
1-10	Eel River Valley
1-14	Lower Klamath River Valley
1-25	Prairie Creek Area
1-26	Redwood Creek Area
1-27	Big Lagoon Area
1-28	Mattole River Valley
1-29	Honeydew Town Area
1-30	Pepperwood Town Area
1-31	Weott Town Area
1-32	Garberville Town Area
1-33	Larabee Valley
1-34	Dinsmore Town Area

Source: DWR, 2003

According to the California's Groundwater Update 2003 (Bulletin 118), several of the groundwater basins of the County have been monitored for Total Dissolved Solids (TDS). They include the Hoopa Valley, Mad River Valley Lowland, Eureka Plain, Eel River Valley, Lower Klamath River Valley, and the Redwood Creek Area. Total Dissolved Solids have variable ranges from 43 to 469 mg/L in the six groundwater basins sampled. These higher TDS levels have created some drinking water issues on both private wells and water providers. For example, the Eureka Plain is 37,400 acres in size but has an average of 177 mg/L of TDS and a high of 460 mg/L. The Eel River Valley is 73,700 acres in size and had an average of 237 mg/L of TDS and a high of 340 mg/L. While TDS is not considered a primary pollutant, high TDS levels typically indicate hard water and may lead to scale buildup in pipes, reduced efficiency of water filters, hot water heaters, etc., and aesthetic problems such as a bitter or salty taste.

The United States Environmental Protection Agency (EPA) recommends treatment when TDS concentrations exceed 500 mg/L, or 500 parts per million (ppm). The TDS concentration is considered a Secondary Drinking Water Standard, which means that it is not a health hazard. However, further testing may be warranted, as water with a high TDS concentration may indicate elevated levels of ions that do pose a health concern, such as aluminum, arsenic, copper, lead, nitrate and others.

Humboldt County, covering nearly 3,573 square miles, has a population of approximately 130,000 people living in an area characterized by abundant natural resources. Of these resources, Humboldt County's groundwater plays an important role in our natural environment, communities, industry sectors and agriculture. There are approximately 3,900 wells (PG&E 2002) in Humboldt County. The release of contaminants or pollutants into this resource from natural sources or human activities has the potential for adverse impacts upon human health, the environment and property, depending on the type, location, and quantity of materials released.

Many groundwater wells rely on hydrologic connection to the rivers and streams of the valleys. The City of Rio Dell experienced water supply problems in community wells in recent years and, as a result, developed infiltration galleries in the Eel River. The City's wells are now only used as a backup source.

In the north-central part of the North Coast Hydrologic Region, the major groundwater basins include the Klamath River Valley, Shasta Valley, Scott River Valley, and Butte Valley. The Klamath River Valley is shared with Oregon. The historical annual agricultural surface water supply has been about 20,000 acre-feet. As farming in the valley expanded from the early 1950s to the early 1990s, bringing nearly all the arable land in the valley into production, groundwater was developed to farm the additional acres. It has been estimated that current, fully developed demands are only about 80 percent of the available groundwater supply. By contrast, water supply issues in the other three basins are contingent upon pending management decisions regarding restoration of fish populations in the Klamath River and the Upper Klamath Basin system.

The Endangered Species Act (ESA) fishery issues include lake level requirements for two sucker fish species and in-stream flow requirements for coho salmon and steelhead trout. Since about 1905, the Klamath Project has provided surface water to the agricultural community, which in turn has provided water to the wildlife refuges. Since the early 1990s, it has been recognized that surface water in the Klamath Project is over-allocated, but very little groundwater development had occurred. In 2001, which was a severe drought year, the U.S Bureau of Reclamation (BOR) delivered a total of about 75,000

acre-feet of water to agriculture in California, about 20 percent of normal. In the Klamath River Groundwater Basin this translated to a drought disaster, both for agriculture and the wildlife refuges. In addition, there were significant impacts for both coho salmon and sucker fisheries in the Klamath River watershed. As a result of the reduced surface water deliveries, significant groundwater development occurred, and groundwater extraction increased from an estimated 6,000 acre-feet in 1997 to roughly 60,000 acre-feet in 2001. Because of the complexity of the basin's water issues, a long-term Klamath Project Operation plan has not yet been finalized.

Several USA's and WSA's depend on Humboldt County's groundwater resources. The following is a description of each water provider and the groundwater basin in which water is obtained. Following that is a description of groundwater usage for each of the identified providers.

Arcata (Mad River Lowland)

The primary source of Arcata's drinking water is purchased from HBMWD. HBMWD produces water drawn from wells located in the bed of the Mad River northeast of Arcata. The secondary source of drinking water is the City of Arcata's Heindon groundwater well. The Heindon well was placed on-line in 1999 to supplement purchased water from HBMWD. Based on usage records, less than 10 percent of Arcata's water is obtained from the Heindon well.

Big Lagoon CSD (Big Lagoon Area)

The Big Lagoon CSD manages a water system that was installed for the Big Lagoon subdivision in 1962; the Big Lagoon CSD acquired the water system from a private owner in 1999. The water system now consists of 2 wells, a 20,000 gallon redwood storage tank, booster pumps and 3,000 gallon hydro pneumatic tank with an air compressor.

City of Fortuna (Eel River Valley)

The City's water supply comes entirely from five groundwater wells (four active and one emergency stand-by). The well site includes disinfection and corrosion control facilities. It is believed that this water source is tied to the Eel River.

Garberville (Garberville Town Area)

The water system was recently purchased from private owners and consists of two water sources, a treatment plant, four water tanks, three booster stations, approximately 380 active service connections, and a waterline distribution network. One of the water sources is surface water from the South Fork of the Eel River and one is a shallow well in downtown Garberville. Approximately, 5 percent of Garberville's drinking water is obtained from the downtown well.

Humboldt Community Services District (Eureka Plain)

Approximately 34% of the district's water is provided from District owned wells located at the base of Humboldt Hill and Spruce Point area. These wells primarily serve Humboldt Hill, Fields Landing, King Salmon, College of the Redwoods, and some portions of the Pine Hill area, although this water can be transmitted to the main HCSD system.

Hydesville County Water District (Eel River Valley)

The District's water supply is obtained from two (2), twelve inch (12") wells located on District owned land near Yager Creek.

Loleta Community Services District (Eel River Valley)

The District operates two wells located on Peugh Road in Loleta. Water is pumped from the wells through a Green Sand filter where the iron and manganese is removed by injecting chlorine and potassium permanganate. One of the wells located on Peugh Road pumps on the average of 60,000 gallons of water a day. Development of the other well is currently in progress. The capacity of the new well is designed to produce 309,600 gallons per day (gpd). It should be noted that most of the Loleta area wells generally have low yields and water quality issues.

Miranda Community Services District (No Groundwater Basin – Perched Groundwater)

The District's water source comes from two wells with rated capacities of 150 gpm and 85 gpm, for a total capacity of 0.338 MGD. The pumps are operated in a lead- lag arrangement, with the larger pump leading during summer months and the smaller pump leading during winter months.

Orick Community Services District (Redwood Creek Area)

The initial system construction of the water system served most of the residents of the Orick Community. The original system consisted of two 60 foot wells with 10 hp submersible pumps, a 100,000 gallon redwood storage tank, and 8-inch, 6-inch, and 4-inch distribution lines. In 1978, an 8-inch line was extended southwest along the north side of Route 101 in anticipation of the 1987 expansion. The 8-inch line was extended west past Hilton Road to the National Park Service Visitors' Center in 1987.

Palmer Creek Community Services District (No Groundwater Basin – Perched Groundwater)

Palmer Creek CSD's water supply consists of two active wells, each capable of pumping 80 gpm. Water pumped from the wells is injected with chlorine and then sent to a contact basin prior to filtration through a Loprest package treatment plant designed to remove iron and manganese from the groundwater.

Phillipsville Community Services District (No Groundwater Basin – Perched Groundwater)

PCSD's water supply consists of a groundwater well of unknown capacity and a surface water spring source with variable capacity. The spring source is unable to meet summertime demands, and therefore only serves the upper portion of the system during low flows while the well supplies water to the rest of the system. The well is primarily used during dry months.

Riverside Community Services District (Eel River Valley)

The current system provides water service to 71 residential customers and 25 agricultural operations: dairies on the Ferndale bottoms. The District water source consists of artesian springs and wells with a maximum production capacity of approximately 60,000 gallons of water a day.

Westhaven Community Services District (Big Lagoon Area)

The system is supplied by three small, spring-fed tributaries of Two Creek at the eastern edge of the community and a 100-foot deep well within the residential area. The creek source represents approximately 75% of the total source capacity, with the well accounting for the remaining 25%. Source capacity currently varies between 40 – 60 gpm, compared to a maximum day demand of 0.66 MGD, or approximately 46 gpm. Recent efforts have focused on conservation – installing meters throughout the system and repairing leaks. This CSD suffers from limited source capacity. Additional sources have been sought but none identified. Without an additional source of water, development within the area will be severely limited.

Willow Creek Community Services District (Trinity River)

The District source of supply is from Willow Creek. It consists of six wells located in the mouth of Willow Creek. Four wells draw water from infiltration galleries in the Willow Creek flood plain acting as a natural filtration system. The water is chlorinated and treated before it is placed into the distribution system.

8. Hydrology and Floodplain

Flood hazards in Humboldt County are attributable to rivers, dam failure, and coastal high water hazards (tsunamis and flood tides), with river flooding being by far the most prevalent. Flooding is an important concern for many waterways in Humboldt County, including the Eel River (including the Van Duzen and South Fork), the Mad River, Eureka Plain (especially Freshwater and Jacoby Creeks), and the Trinity River. Flooding is discussed in the Chapter 11 of the Natural Resources and Hazards report, including 100-year flood zone mapping as well as in the Humboldt Operational Area Hazard Mitigation Plan (HMP).

Human activities and settlements tend to concentrate in floodplains, frequently interfering with natural processes. Human activities encroaching upon floodplains affect the distribution and timing of drainage, thereby increasing flood problems. The developed environment can create or exacerbate local flooding problems by altering or confining drainage channels. This increases flooding generally has two causes: 1) the activity reduces the stream's capacity to contain flows; and 2) increases in the impervious area results in flow rates that are higher than the drainage system, either natural or manmade can handle. Historically, many towns, homes and other buildings have been built on floodplains where they are more susceptible to flooding, for several reasons; 1) This is where water is most available, 2) Floodplain land is usually the most fertile for farming, 3) Historically, rivers and other waterways represented an easy and inexpensive sources of transportation, and 4) The flatter land is easier to develop than hilly land.

Approximately seventy percent of the precipitation in Humboldt County occurs from November to March. Major floods have resulted from a succession of intense rainstorms during these months. The two worst flood events in Humboldt County occurred in December 1955 and December 1964. These events caused tens of millions of dollars in damages and also caused numerous fatalities. According to the California State Hazard Mitigation plan, there were nine State proclaimed states of emergency for flood events between 1950 and 1997.

Some land uses are more vulnerable to flooding, such as single-family homes, while others are less vulnerable, such as agricultural land or parks. Table 13-10 shows the

existing land use of all parcels in the 100-year floodplain, including vacant parcels and those in public/open space uses, broken down for the planning area. For parcels in cities; residential, commercial and public/open space are the dominant land use. In the unincorporated County, residential, and Timber/Forest are the dominant land uses. This assessment also found that 24% of the parcels within the 100-year floodplain were vacant, or undeveloped. When you combine the vacant lands with those parcels with open space or low density land uses, 57% of the parcels within the 100-year floodplain have existing uses considered to be more favorable, less risky uses for the floodplain.

Table 13-10. General Land Use of Parcels in 100-Year Floodplain

Land Use	Parcels in 100-Year Floodplain								
	Arcata	Blue Lake	Eureka	Ferndale	Fortuna	Rio Dell	Trinidad	Unincorporated County	Total
Residential	277	1	44	74	162	70	4	2969	3601
Commercial	17	3	24	11	57	3	0	81	196
Light Industrial	14	1	22	0	5	0	0	28	70
Heavy Industrial	1	0	4	0	2	0	0	24	31
Agricultural	1	0	0	0	0	0	0	94	95
Timber/Forest	0	0	0	0	0	0	0	1474	1474
Public Lands	59	10	146	9	23	12	0	1229	1488
Vacant lands	62	2	64	17	50	17	3	1929	2144
Total	431	17	304	111	299	102	7	7828	9099

The number and type of structures exposed to the 100-year and 500-year floods was estimated from the Level 2 HAZUS-MH analysis and is illustrated in Table 13-11. For planning purposes, these estimates represent a fair gauge of vulnerability.

Table 13-11. Structures Within 100-Year/500-Year Floodplain Humboldt County

Jurisdiction	100-Year			500-Year		
	Residential	Other	Total	Residential	Other	Total
Arcata	242	13	255	464	23	487
Blue Lake	17	4	21	100	4	104
Eureka	106	9	115	172	9	181
Ferndale	13	1	14	16	1	17
Fortuna	237	20	257	376	20	396
Rio Dell	170	2	172	192	2	194
Trinidad	4	0	4	4	0	4
Tribes	117	0	117	121	0	121
Unincorporated County	3005	54	3059	3056	53	3109
Total	3911	103	4014	4501	112	4613

Roads or railroads that are blocked or damaged can prevent access throughout the County and can isolate residents and emergency service providers needing to get to vulnerable populations or to make repairs. Bridges washed out or blocked by floods or debris from floods also can cause isolation. Water and sewer systems can be flooded or backed up, causing further health problems. Underground utilities can also be damaged during flood events. Thus it is critical to identify which infrastructure is exposed to flooding to determine what is vulnerable and who may be at risk if that infrastructure is damaged.

Several roads in Humboldt County have been affected by past flood events, both inside and outside the 100-year floodplain. Major roads in Humboldt County that pass through the 100-year floodplain are also exposed to flooding. Many of these roads are built above the flood level, and many others function as levees to prevent flooding. Nonetheless, in certain events these roads may be blocked or damaged by flooding, preventing access to many areas.

Flooding events can significantly impact road bridges. These are important because often they provide the only ingress and egress to some neighborhoods. An analysis showed that there are 73 bridges that are in or cross over the floodplain.

Water and sewer systems can be affected by flooding events. Floodwaters can back up drainage systems, causing localized flooding. Culverts can be blocked by debris from flood events, also causing localized urban flooding. Floodwaters can get into drinking water supplies, causing contamination. Sewer systems can also be backed up, causing wastes to spill into homes, neighborhoods, rivers and streams.

Flooding is a natural event, and floodplains provide many natural and beneficial functions. Nonetheless, with human development factored in, flooding can impact the environment in negative ways. Migrating fish can wash into roads or over dikes into flooded fields, with no possibility of escape. Pollution from roads, such as oil, and hazardous materials can wash into rivers and streams. During floods, these can settle onto normally dry soils, polluting them for agricultural uses. Human development such as bridge abutments and levees, and logjams from timber harvesting can increase stream bank erosion, causing rivers and streams to migrate into non-natural courses.

Recently, Assembly Bill 162 was approved by the Governor (October 10, 2007). This bill would require the land use element to identify and annually review those areas covered by the general plan that are subject to flooding as identified by flood plain mapping prepared by the Federal Emergency Management Agency or the Department of Water Resources. The bill also would require, upon the next revision of the housing element, on or after January 1, 2009, the conservation element of the general plan to identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for purposes of groundwater recharge and stormwater management. For development activities within a flood zone, this new legislation has specific requirements involving the 200-year flood plain as opposed to the previous requirements regarding developments within a 100-year flood zone.

Under the new law Government Code 65300.2 now defines (a) For the purposes of this article, a "200-year flood plain" is an area that has a 1 in 200 chance of flooding in any given year, based on hydrological modeling and other engineering criteria accepted by the Department of Water Resources.

9. Normal, Wet, and Drought Years

Humboldt County is an area of moderate temperatures and considerable precipitation. Temperatures along the coast vary only 10 degrees from summer to winter, although a greater range is found over inland areas. Temperatures of 32 degrees or lower are experienced nearly every winter throughout the area, and colder temperatures are common in the interior. Maximum readings for the year often do not exceed 80 on the coast, while 100 degree plus readings occur frequently in the mountain valleys.

In most years, rainfall is experienced each month of the year, although amounts are negligible from June through August. Seasonal totals average just under than 40 inches in the driest area, and exceed 100 inches in the zones of heavier precipitation. Because of the moisture and moderate temperature the average relative humidity is high. Largely as a result of the proximity of the cool Pacific Ocean, the adjoining coastal area has one of the coolest, most stable temperature regimes to be found anywhere. With increasing distance from the ocean, the marine influence is less pronounced, and inland areas experience wider variations of temperature and lower humidity's.

Humboldt Bay Municipal Water District (HBMWD) provides wholesale water to the majority of the County's population (approximately 70%). During an average normal water year, the area around Ruth Lake receives 70 inches of rainfall. 173,000 acre-feet of water flow into the HBMWD's reservoir via the Mad River, and the runoff from the Mad River watershed above the District's diversion facilities near Arcata is over 1,000,000 acre-feet.

Single Dry Water Year

According to the HBMWD, the water year between October of 1976 and September of 1977 was the driest year recorded by the District, far drier than any other. Rainfall in the Ruth area was 29 inches, or 41% of normal. Flows into the reservoir totaled 26,000 acre-feet or 15% of normal and the run off from the Mad River watershed above the District's diversion facilities 165,000 acre-feet or 16% of normal. The average reservoir volume for the water year was 21,000, which is 44% of capacity and 52% of the normal average volume. The reservoir was drawn to 27% of its capacity at the end of the water year. Fall storms arrived in November of 1977 and quickly refilled the reservoir.

This water year was severely dry throughout the entire State of California, and was a very exceptional year in the District's history. In 32 years of record keeping, it was the only year in which rainfall was less than 50% of normal. It was also the only year in which the reservoir was never filled to capacity. Total flows into the reservoir via the Mad River were half the amounts of the next driest year. Runoff from the watershed and average reservoir volume were each 60% of the next driest year.

Multiple Dry Water Years

According to HBMWD records, the three water years between October 1989 and September 1992 represent the driest multiple years recorded for the District. Rainfall for this period averaged 42 inches per year, 60% of normal. Of these three water years, the driest year for rainfall was water year 1990/1991 with 37 inches (53% of normal).

Flows into Ruth Lake via the Mad River averaged 69,000 acre-feet per year, 40% of normal. The runoff from the Mad River watershed above the District's diversion facilities was 371,000 acre feet, or 37% of normal. Despite the diminished rainfall and runoff, rainfall was more than sufficient to refill the reservoir each year. Reservoir capacity during this period averaged 77% of capacity, or 91% of normal.

Three Year Minimum Water Supply

According to HBMWD records, using the data from the multiple dry years previously discussed, water years 1989 through 1992, the minimum water supply volumes for the next three years would be 252,000 acre-feet, the District's full allocation of 75 MGD. As concluded by the District, even multiple years of reduced rainfall will not necessarily affect water supplies. More crucial than total rainfall is the occurrence of moderate to

heavy storms in the late winter or early spring. One or two of these storms bringing 3 to 5 inches of rain is sufficient to fill the reservoir to capacity. Based on the HBMWD's information discussed above, the District's sole source of water, the Mad River, has been very consistent. Based on this consistency there is no demonstrated need to replace or supplement this source.

Drought Impacts on Other Water Sources

Droughts affecting the more rural areas of Humboldt County historically occurred after two or three consecutive years of below average rainfall for the period between November and March when about 75 percent of the County's average annual precipitation falls. The months of December, January, and February are usually when approximately 50 percent of the rainfall occurs.

The 1977 extreme California drought conditions likely affected water supplies for community and industrial interests countywide in Humboldt and were some of the worst felt in the County's written history. While detailed data on the water supply for systems other than HBMWD is extremely limited or non-existent, it is reasonable to assume that not only were these water supplies compromised to some extent but, the drought forced neighboring counties to petition for additional drawdown of water resources allotted from Humboldt County. Over 70% of the Trinity River is dammed and diverted for the central valley agricultural projects. Significant percentages of the Eel River are diverted to the three moderately drought stricken and rapidly developing counties south (Mendocino, Sonoma, Marin) serving over 350,000 people, not including agricultural interest. If Humboldt County was to experience a drought like that of 1975-77 seasons, the economic, cultural, environmental, and social impact could be significant not only to Humboldt County but to those counties and state projects that depend on water received from Humboldt County.

Insufficient data exists on the water supplies (other than HBMWD) to perform any quantitative analysis of multiple dry year impacts. While there is some stream flow monitoring, the source of supply for each water provider represents a unique hydrologic unit and they generally do not have historic information that would show their ability to provide sufficient water under drought or multiple dry year conditions. Although it would be desirable to have detailed hydrogeologic studies of each system's source of supply, it may not be practical due to the cost of the analysis and the size of these communities. Instead, we recommend that when a community's maximum day of usage approaches 70% of the capacity of its source of supply, it should begin to develop and implement a plan for either increasing its supply or decreasing its peak day usage. Conservation should be the first course of action; however, additional source supply may be required. For a groundwater source, this could entail construction of a new well or increasing the pump size in an existing well. For a surface water source, this would require increasing the output from the existing intake and may require obtaining additional water rights. Having multiple wells or sources of supply is obviously preferable to having a single source. As this is interrelated to the Infrastructure element, we have included policy recommendations regarding conservation and source capacity in the Water Resources Element.

With the exception of the 1940s through the 1960s, California's drought history indicates that there have been multiyear droughts every decade between 1900 and 2000, all of which had mild to serious effects in Humboldt County. Conservatively speaking, Humboldt County can experience the direct effects of drought at least once every decade. This does not include the effects that could result from droughts impacting water dependent counties that rely on Humboldt County water.

The biggest impact in the County during drought conditions will likely be on one or more of the smaller water systems outside of the Humboldt Bay Municipal Water District. Those include the districts located in Willow Creek, Orick, Trinidad, Westhaven, Indianola, Hydesville, Loleta, Riverside, Myers Flats, Phillipsville, Miranda, Weott, Shelter Cove, Redcrest, Benbow, Briceland, and Orleans. Water supply or capacity issues are unique in each of these areas. However, they all share similar characteristics of being small districts with generally limited source capacity.

An extreme multiyear drought more intense than the 1977 drought could impact the County, beyond the impact to community water systems. Within the County, drought conditions could impact agricultural operations, fisheries, and timber production. Intensified by such conditions, extreme wildfires could break out throughout the County. Surrounding Counties, also in drought conditions, would likely increase their demand for Humboldt County water, potentially causing social and political conflicts. If such conditions persisted for several years, the agricultural, fisheries, gravel and sand, and timber industries could experience major setbacks, with increased levels of unemployment and potential property damage.

10. Water Import and Export

For years, Humboldt County has had a significant amount of water exported outside of the County borders. As statewide water supplies are falling behind demand, areas with relatively abundant water supplies are likely to be targeted for additional exports. While such proposals are within the jurisdiction of the SWRCB, Humboldt County needs to be proactive in protecting its water resource interests.

Water portfolios are prepared for the North Coast Hydrological Region by the State Water Resources Control Board. The 2005 Water Plan Update portfolio shows that for 2001, which was a drier year with precipitation at 60 percent of average, 32,244,000 acre-feet entered the region from, precipitation and inflows from Oregon. Of the inflows, 32,882,000 acre-feet left the region in the form of consumptive use (647 TAF), exports to other regions (703 TAF), outflows to Oregon (66 TAF), statutory required outflows to Salt Sink (8,021 TAF), evaporation and natural runoff (23,323 TAF), and other outflows (122 TAF). The difference between outflows and inflows for 2001 (638 TAF) represented a net decrease in surface water available for storage in 2001.

Two of the largest water supply reservoirs in the North Coast region are the U.S. Bureau of Reclamation's 2.437 million acre-foot Trinity Lake on the Trinity River, and the U.S. Corps of Engineer's 380,000 acre-foot Lake Sonoma in the Russian River watershed. These facilities provide water for in stream flows, recreation, hydropower, and water supply purposes.

Water from Trinity Lake is exported from the North Coast region to the Sacramento River region through the U.S. Bureau of Reclamation's Clear Creek Tunnel. Lake Sonoma is operated to provide flood control and in stream flows in the Lower Russian River in Sonoma County. Another intra-basin water transfer system known as the Potter Valley Project has been in existence since 1908 and diverts water from the upper reaches of the Eel River at Cape Horn Dam through a tunnel to the East Fork of the Russian River upstream from Lake Mendocino. The water stored behind Coyote Dam (Lake Mendocino, built in 1958) is used to meet in stream flow requirements, as well as urban and agricultural needs in the lower Russian River watershed and the Santa Rosa area.

As part of the efforts to restore the Trinity River fishery, the Secretary of the Interior in December 2000 under the leadership of the Hoopa Valley Tribe approved a significant change in use of Trinity River Basin water. As part of an effort to restore Trinity River fish habitat, the river's in stream flows were increased from 340,000 acre-feet per year (roughly 25 percent of average annual flow at the Central Valley Project diversion point on the Trinity River) to an average of 595,000 acre-feet per year. This decision, which would reduce the amount of water available for export from the Trinity River to the Central Valley, was challenged by water and power interests in U.S. District Court in 2001. On July 13, 2004, the 9th U.S. Circuit Court of Appeals overturned the injunction imposed by the district court, and ruled that the original year 2000 Record of Decision was adequate. The water allocated to downstream fish flows is now being increased to the new flow schedule, which ranges from a minimum of 368,600 acre-feet in a critically dry year up to 815,000 acre-feet in an extremely wet year.

While such proposals are within the jurisdiction of Federal agencies and the SWRCB, Humboldt County needs to continue to be proactive in protecting its water resource interests.

11. Hydropower Projects Relicensing

Under the Federal Power Act (FPA), the Federal Energy Regulatory Commission (FERC) has exclusive authority to license the construction, operation and maintenance of nonfederal hydropower projects located on navigable waterways or that affect interstate commerce.

A hydropower project license contains terms and conditions that specify how the project may be constructed and operated and requires that the project is properly maintained and operated safely. The FPA mandates that FERC issue licenses for a period of 30 to 50 years. Original licenses are typically issued for a 50-year license term. A "new" license - which is also called a "relicense" - is typically issued for a period of 30-40 years, depending on the extent of proposed new development or environmental mitigation and enhancement measures proposed by the licensee. The length of the license term is typically long enough for the owner to recover their economic investment.

At least 5 years before the license expires, the licensee must declare a notice of intent to relicense to the FERC. The total process of preparing a license application, undergoing the National Environmental Policy Act (NEPA) process and the issuance of a "new" license by FERC is called relicensing.

Water supply impacts of relicensing are difficult to quantify, in part because impacts are site-specific. Some plants subject to relicensing, for example, currently have no bypass flow requirements. It is likely that relicensing would establish bypass flows at these sites. Other plants subject to relicensing already have substantial bypass flows, and it is not clear what changes relicensing would bring.

Relicensing projects have significantly impacted Humboldt County and future relicensing must be thoroughly reviewed to avoid further impacts. The relicensing of the Potter Valley Project and the Klamath River projects are two examples.

The Potter Valley Project is located in the North Coast Range on the Eel River in Mendocino and Lake Counties. Since the dam's construction in 1908, water from the upper Eel River has been diverted to Potter Valley - where it drops 450 feet to generate a small amount (9 megawatts) of hydroelectric power - and then gets "abandoned" near

the headwaters of the Russian River. The Potter Valley Project diverts half of the water produced in the Eel River annually and about 98 percent of the upper Eel's natural summer and autumn flow. This provides significantly increased flows in the Russian River basin while the Eel River is often left with inadequate flows.

The project's diversions have contributed to the depletion of the Eel River's historically abundant salmon and steelhead stocks. All three affected species (coho, Chinook, and steelhead) are listed as "threatened" or "candidate" species under the Federal Endangered Species Act. Restoring this spawning and rearing habitat – primarily through returning flows to the Eel – is crucial to the survival of these anadromous fish runs. FERC, PG&E, Humboldt and Sonoma Counties, environmental groups and others are engaged in negotiations to determine what environmental measures are necessary to help the salmon and steelhead, restore flows to the Eel River, and protect the water supplies of the southern counties. Parties are worried that the sale of the Potter Valley Project to a new owner would upset years of work and progress, and that a new owner may resist accountability for past environmental damages. The Federal Energy Regulatory Commission (FERC), the agency that issues and regulates hydropower licenses, in 2006 ruled against the National Marine Fisheries Service and the US Forest Service regarding the amount of water they deemed necessary to protect salmon and steelhead in the Eel River. FERC ignored repeated pleas from these agencies, Humboldt County, the Round Valley Indian Tribes and environmental groups, and chose to favor water supply deliveries and the project's minimal electricity benefits over fisheries restoration. As a consequence, the project was re-licensed by FERC and the expiration date for the Potter Valley Project is now September 30, 2033.

On the Klamath River, FERC staff prepared a Draft Environmental Impact Statement (DEIS) for relicensing of PacifiCorp's 161-megawatt Klamath Hydroelectric Project, located primarily on the Klamath River in Klamath County, Oregon and Siskiyou County, California. On average, the project generates 757,000 megawatt-hours of electricity annually. The project occupies facilities between river mile 190 and 254 including some lands of the United States, which are administered by the U.S. Bureau of Reclamation and the U.S. Bureau of Land Management.

The existing project consists of eight developments, seven of which are located on the Klamath River. PacifiCorp proposes to decommission the upstream-most East Side and West Side developments and to remove the Keno development, which has no generating facilities, from the project. The remaining project developments on the main stem of the Klamath River are J.C. Boyle, Copco No. 1, Copco No. 2, and Iron Gate. The proposed project also includes the existing Fall Creek development, located on a Klamath River tributary.

The Humboldt County Board of Supervisors unanimously approved a resolution supporting the removal of the four dams on the Klamath River on November 14, 2006. The resolution aims to allow the county to officially weigh in during the public comment period for the Draft Environmental Impact Statement as part of the Federal Energy Regulatory Commission's re-licensing review of the dams. As of the date of this report, this issue is still undecided.

12. Global Warming

The issue of global climate change has begun to play an increasing role in scientific and policy debates over effective water management. In recent years, the evidence that global climate change will have significant effects on water resources in California has

continued to accumulate. More than 150 peer-reviewed scientific articles on climate and water in California have now been published, with many more in preparation, addressing everything from improvements in downscaling of general circulation models to understanding how reservoir operations might be adapted to new conditions.

Some of the most significant impacts of climate change will be on water resources—impacts that are of special concern to regions like the North Coast where water policy is already of great interest and concern.

Evidence of climate change impacts on California’s hydrologic system have already appeared in various forms. Water agencies around the State have begun to consider the implications of climate change for the reliability and safety of water systems, and professional water organizations have begun urging managers and planners to integrate climate change into long-term planning. Although many uncertainties remain, responsible planning requires that the California water community work with climate scientists and others to reduce those uncertainties and to begin to prepare for those impacts that are well understood, already appearing, or likely to appear.

The Pacific Institute as part of the California Water Update 2005 surveyed existing literature on climate change and its impacts on water resources in California. The study reviewed projected effects of climate change on the state’s water supply, delivery, and quality, and explored the economics involved in meeting the challenges that those affects could bring about.

The study concluded that managing water resources to address climate change impacts could prove different than managing for historical climate variability because:

1. Climate changes could produce hydrologic conditions and extremes of a different nature than current systems were designed to manage;
2. They may produce similar kinds of variability but outside of the range for which current infrastructure was designed;
3. Traditional water resource management assumes that sufficient time and information will be available before the onset of large or irreversible climate impacts to permit managers to respond appropriately;
4. Traditional management assumes that no special efforts or plans are required to protect against surprises or uncertainties.

The study identified the following information and recommendations:

Water Planning and Management

Water planners and managers must increase emphasis on trying to understand the consequences of climate change on the state’s water resources.

Modifying Operation of Existing Systems

Managers must determine if existing facilities can handle the impacts that will occur under future climate change, and at what economic cost. Precise information on future climate impacts is unavailable, so water managers must explore the sensitivity of their system to a wider range of conditions, and develop methods or technologies to improve operational water management. They should also determine quantitative impacts from climate change on water supply and flood control, and evaluate alternative water

management options. In addition, water managers should closely examine the design practices of hydraulic infrastructure, because of the many uncertainties in predicting peak flows under climate change scenarios. Rainfall depth-duration-frequency data widely used for designing local storm water control and drainage facilities should be updated at least every 20 years or so, to gradually incorporate climate change data into the record and in the rainfall statistics.

New Supply Options

Supply designs and operations must consider climate change impacts and incorporate wastewater reclamation and reuse, water marketing and transfers, and limited desalinization, where it is cost-effective. Designs for new construction must be robust enough to permit satisfactory operation under a wide range of conditions.

Demand Management, Conservation, and Efficiency

Demand management is critical to mitigate loss of water supply. Efficient management should continue to be developed and implemented, because such improvements have been shown to be more economical than developing new supply.

Economics, Pricing, and Markets

New pricing mechanisms should be used to better recognize the true costs of water supply and to support water markets. In general water has been under priced.

State Water Law

Current water laws were written without considering climate change impacts on water supply. They are predicted to conflict with one another as water resources diminish.

Hydrologic and Environmental Monitoring

Good hydro-meteorological data is the starting point for evaluating the capabilities of water supply and flood protection systems. Important data gaps need to be filled in the following areas: measurements of precipitation and related climate data, stream flow, snow pack, and ocean and Delta water levels; water quality sampling; systematic sea-level measurements; and land use and cover monitoring.

E. Stormwater Quality Assessment

This section provides an overview of existing storm water quality conditions within Humboldt County and is based in part from data obtained from the North Coast Stormwater Coalition. The North Coast Stormwater Coalition was formed in 2004, is a partnership of the City of Eureka, City of Arcata, City of Fortuna, County of Humboldt, Redwood Community Action Agency, California Coastal Commission, Caltrans, and Humboldt Baykeeper. The primary goal of the North Coast Stormwater Coalition is to reduce stormwater pollution in local streams, rivers, Humboldt Bay and the ocean through public education and outreach, coordinating pollution prevention efforts and implementing pollution control measures.

1. Pollutants of Concern

Pollutants of concern include the likely pollutants in stormwater from a particular land use. These are known as nonpoint source pollution. Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural, animal and human-

made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water. These pollutants include:

- Excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
- Oil, grease, and toxic chemicals from urban runoff and energy production;
- Sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks;
- Salt from irrigation practices and acid drainage from abandoned mines;
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems;
- Atmospheric deposition and hydromodification are also sources of nonpoint source pollution.

Water leaving urban roads as stormwater runoff has long been assumed to be a major contributor to the total quantities of diffuse or non point source pollutant load from urban areas. This runoff is typically associated with elevated levels of heavy metals, petroleum hydrocarbons and nutrients. Road surfaces represent a potentially significant source of contamination to streams, particularly during the initial portion of a rainfall event, when contaminants collected during drier periods are washed into adjacent waterways.

The major stormwater systems within the County include McKinleyville, Arcata, Eureka, and Fortuna. All of these systems qualify as MS4s, but McKinleyville is the only system within the County's jurisdiction. The remaining MS4s are all incorporated cities and as such are the City's responsibility. Aside from McKinleyville's stormwater system, for which the County developed an SWMP in 2005, the County is also responsible for maintaining stormwater systems within other unincorporated regions of the County. Major areas with County stormwater infrastructure include the areas surrounding Eureka, such as Cutten, Ridgewood, Pine Hill, and Humboldt Hill, and also Garberville and Shelter Cove. The County also has drainage infrastructure along their entire road system.

McKinleyville and Manila are the only communities within the County's jurisdiction for which a master drainage plan has been completed. McKinleyville's master drainage study was finalized in 1982. A regional storm drainage study was also prepared for the Mid-Humboldt County Urban Planning Program in 1971. No other master drainage studies have been prepared since then.

Shelter Cove's stormwater drains to the King Range ASBS, so this discharge is regulated by the California Ocean Plan. The County has applied for an exemption to the discharge prohibition requirement for this study area, and is in the process of negotiating with the RWQCB on this issue. A likely requirement or condition of the waiver will be development of an MS4 permit and issuance of an NPDES stormwater discharge permit for Shelter Cove.

CAMMPR

California's Management Measures for Polluted Runoff (CAMMPR) is designed to assist California in improving implementation of the California's Nonpoint Source (NPS) Pollution Control Program (Program). Management measures (MMs) form the core of the State's Plan for California's Nonpoint Source Pollution Control Program 1998-2013 (Program Plan)

and provide goals for the management of NPS pollution to which various management practices are applied.

The measures are organized into six categories or sectors, all of which are present in California:

1. Agriculture;
2. Forestry (Silviculture);
3. Urban Areas;
4. Marinas and Recreational Boating;
5. Hydromodification activities; and
6. Wetlands, Riparian Areas, and Vegetated Treatment Systems.

To help states develop sound and effective NPS programs, the U.S. Environmental Protection Agency (USEPA) developed a guidance document pursuant to the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), section 6217(g) titled *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (g-Guidance)* (USEPA[1993]). USEPA and the National Oceanic and Atmospheric Administration (NOAA) expect state programs to implement MMs “in conformity” with the *g-Guidance*. This MM approach is technology-based rather than water-quality based. Because nonpoint sources of pollution are so diverse and since each individual source may contribute only a small quantity of contaminants, identifying the exact sources of nonpoint source pollution can be very expensive and time-consuming. Implementation of technology-based MM's allows states to concentrate their resources initially on implementing measures that are proven to be effective in preventing and controlling NPS pollution.

Pursuant to the Clean Water Act (CWA) and CZARA, the Program Plan addresses two types of MM's:

Minimum Management Measures

These measures are based on the federal guidance and will apply to the land use activities known to be major causes of NPS pollution. For example, keeping grazing animals out of streams is a minimum MM for agricultural sources of NPS pollution. State programs will ensure that people and organizations conducting these specified land use activities implement the appropriate MM's. The goal of implementing these measures is to protect water quality and habitat.

Additional Management Measures

Where nonpoint source pollution continues to prevent critical areas from meeting CWA requirements, even when minimal MM's are used, additional MM's may be necessary. These measures will be targeted directly at reducing the NPS pollution activities that prevent State waters from meeting appropriate water quality standards, such as ensuring the water is safe for drinking, fishing, or swimming.

Implementation of MMs can be achieved through the implementation of management practices (MPs). MPs are structural and nonstructural solutions, used singularly or in combination, that are aimed at reducing the input of particular NPS contaminants into

surface waters. An example of a structural MP is an infiltration basin (a structure that is built to hold runoff and filter contaminants from that runoff before the water is absorbed into the ground). Nonstructural MPs include buffer strips (areas of natural vegetation) that are left as protection between streams or other surface water bodies and farmlands or construction sites.

PROSIP

The *Plan for California's Nonpoint Source Pollution Control Program* is the first significant upgrade of California's Nonpoint Source Pollution Control Program (NPS Program) since its inception in 1988. California is required to have its Program conform to the Clean Water Act (CWA) and section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA). The lead State agencies for upgrading the Program are the State Water Resources Control Board (SWRCB) (designated lead water quality agency), the nine Regional Water Quality Control Boards (RWQCBs), and the California Coastal Commission (CCC) (designated lead coastal zone management agency). Known as the Nonpoint Source Program Strategy and Implementation Plan (PROSIP), the Plan is intended to protect the water resources of the coastal zone by assessing pollutant sources, target efforts, identify five-year goals, coordinate lead and partner agencies, implement financial and technical assistance, and to track and monitor the implementation of MM's and MP's.

The legal framework within which California cities and counties exercise local planning and land use functions that can play a critical role in addressing NPS pollution is provided in the California Planning and Zoning Law (Government Code §§65000 et seq.) and the Subdivision Map Act (SbMA) (Government Code §§66410 et seq.), as well as in the Coastal Act.

2. Adequacy of Existing Standards

While the standards and plans outlined above are designed to mitigate the impacts of stormwater discharges, they are regional in context. For the purposes of Humboldt County's general Plan update, site specific stormwater standards for General Plan land use build-out, and development standards should be considered. Standards that prohibit projects from altering the hydrologic regimes of streams by increasing peak flows or decreasing summer low flows by treating all stormwater from at least a two-year rain event on-site through detention and percolation are recommended by Department of Fish and Game. Additionally, for the unincorporated areas of the County that are not covered by existing community plans uniform standards are recommended.

Municipal members of the North Coast Stormwater Coalition such as the Cities of Eureka and Arcata have promulgated adequate standards and BMPs regarding stormwater management. Highlights of which include:

The City of Arcata's Best Management Practices for Stormwater Management considers runoff performance standards that result in site planning and design techniques to reduce storm flows, capture runoff water, and allow percolation or filtering before being discharged to channels, streams, or lakes. A significant portion of the manual information on Best Management Practices (BMPs) activities has been obtained from the California Stormwater Quality Task Force's Best Management Practice Handbook and modified to suit the needs of the City of Arcata.

The City of Eureka's Storm Water Quality Management and Discharge Control Ordinance, contains detailed BMP requirements that are comprehensive, are consistent with the Federal Clean Water Act and the Porter-Cologne Water Quality Control Act , and are a very effective means of reducing stormwater pollution that are a result of development activities.

Uniform standards should be implemented in the unincorporated areas of Humboldt County. Review of the General Plan Framework Plan and various community plans that have been prepared since the mid-1980 indicates inconsistencies regarding stormwater management.

The California Stormwater Best Management Practice Handbook has provided excellent guidance to the stormwater community since their publication by the Stormwater Quality Task Force (SWQTF) in 1993. Humboldt County should consider following the process that the City of Arcata used by adopting the California Stormwater Quality Task Force's Best Management Practice Handbook, modified to suit the needs of the unincorporated areas of the County. If it is not possible to adopt a modified version of the California Stormwater Best Management Practice Handbook, the following policies and standards should be considered:

Policies

1. Natural drainage courses, including ephemeral, intermittent, and perennial streams, shall be retained and protected from development which would impede the natural drainage pattern, increase erosion or sedimentation, or have a significant adverse effect on water quality or wildlife habitat.
2. Protection shall be given to all Humboldt County rivers and their tributaries.
3. Stormwater discharges from outfalls, culverts, gutters and other drainage control facilities which discharge into natural drainage courses shall be dissipated so that they make no contribution to additional erosion, and include BMPs to reduce impacts.
4. Natural vegetation within and immediately adjacent to the bank full stream channel shall be maintained except for flood control and public safety purposes.
5. Where it is necessary to develop additional drainage facilities, they shall be designed to be as natural in appearance and function as is feasible. All drainage facilities shall be designed to withstand the 100-year storm events and designed and managed to maintain maximum natural habitat of streams and their streamside management areas and buffers.
6. The County shall encourage restoration projects aimed at reducing erosion and improving existing habitat values in Streamside Management Areas. These projects may be pursued utilizing community volunteer programs and urban stream renewal grants. Close cooperation among the County and fish and wildlife agencies will also be sought.
7. Where possible, any new construction will seek to refrain from increasing the rate of runoff.

8. The following erosion and sediment control measures shall be incorporated into development design and improvements:
 - a. Minimize soil exposure during the rainy season by proper timing of grading and construction;
 - b. Retain natural vegetation where feasible;
 - c. Vegetate and mulch denuded areas to protect them from winter rains;
 - d. Divert runoff from steep denuded slopes and critical areas with barriers or ditches, and discharge diverted runoff onto stable, non-erodable areas;
 - e. Minimize length and steepness of slopes by benching, terracing or constructing diversion structures;
 - f. Trap sediment-laden runoff in basins to allow soil particles to settle out before flows are released to receiving waters;
 - g. Inspect sites frequently to ensure control measures are working properly and correct problems as needed;
 - h. Allowance for the construction of public roads, trails, and utilities, when properly mitigated with proper design to withstand the 100-year storm events and designed and managed to maintain maximum natural habitat of streams and their streamside management areas and buffers.
 - i. Roads shall be properly maintained through Road Maintenance Agreements or County Assessment Areas. At a minimum, Road Maintenance Agreements shall be required for all new subdivisions.

3 Standards

1. The County shall develop an ordinance to implement the above policies.
2. All commercial, industrial, multi-family, quasi-public, and public parking facilities shall, whenever possible, provide storm water treatment for parking lot runoff using bio-retention areas, filter strips, and/or other practices that be integrated into required landscaping areas and traffic islands. In all other cases, oil/water separators shall be required. A maintenance plan for oil/water separators shall be required.

III. Growth Impacts

A. Summary of General Plan Development Estimates

The County has defined specific Urban Study Areas (USAs), areas where water and/or sewer systems exist or may be appropriate to consider, for the purpose of evaluating development potential and infrastructure capacity within the County. Study areas are further broken down into two main sub-categories: Urban Service Study Areas and Water Study Areas (WSAs). Urban Service Study Areas are areas where sewer and water service exist or may be feasible to provide, and development densities greater than one unit per acre are appropriate to consider. Water Study Areas are areas where only water service exists or may be feasible to provide, and development densities less than one unit per acre are appropriate to consider.

The County has developed estimates of growth potential for each individual USA and WSA based on recent population and housing growth rates. The county building permit database in conjunction with 1990 and 2000 census data were used to identify the housing and population growth that has occurred over the past ten years within Humboldt County. Analysis of future water demands based on General Plan land use build-out, and projected cumulative demands in the region are described in detail in the Community Infrastructure and Services Technical Report. Summary descriptions are included in this report.

An adequate and sustainable water supply is essential if Humboldt County is to serve projected increases in population, housing, employment, business, and agriculture. The main purpose of this section is to address water supply services provided by public and private entities. The following is a discussion on the various public water systems that serve Humboldt County communities and Figure 13-12 illustrates those portions of Humboldt County that are served by public water suppliers. Table 13-13 is an analysis of production capacity for drinking water, current demand, the current excess or shortfall, and future housing capacity for each service provider based on current system availability. It should be noted that Table 13-13 does not account for infrastructure development to service the projected future housing capacity or the development of additional water treatment systems or the location of future housing. A separate analysis of the future development potential is discussed in the Community Infrastructure and Services Technical Report and the Community Infrastructure and Services Element. Table 13-13 is totally based on gross water capacity availability, includes a deduction for industrial/commercial use at 30% of demand, and is based on the historical (1990 to 2000 average) housing consumptive use of 415 gallons per day per housing unit (average per capita consumption was 129.54 gpd). Actual usage within each community system may differ from this amount.

Existing General Plan densities and a proposed higher density alternative were used to estimate a low and high estimate of the development potential that could occur on residential land within urban study areas, also shown in Table 13-14. It is important to note that the existing development densities DO NOT take into account natural constraints on a parcel, such as steep slopes or wetlands, while the future development numbers do eliminate these acres from the density calculation. Therefore, resulting densities for existing development will appear low compared to proposed densities.

Public Water Sources in Humboldt County

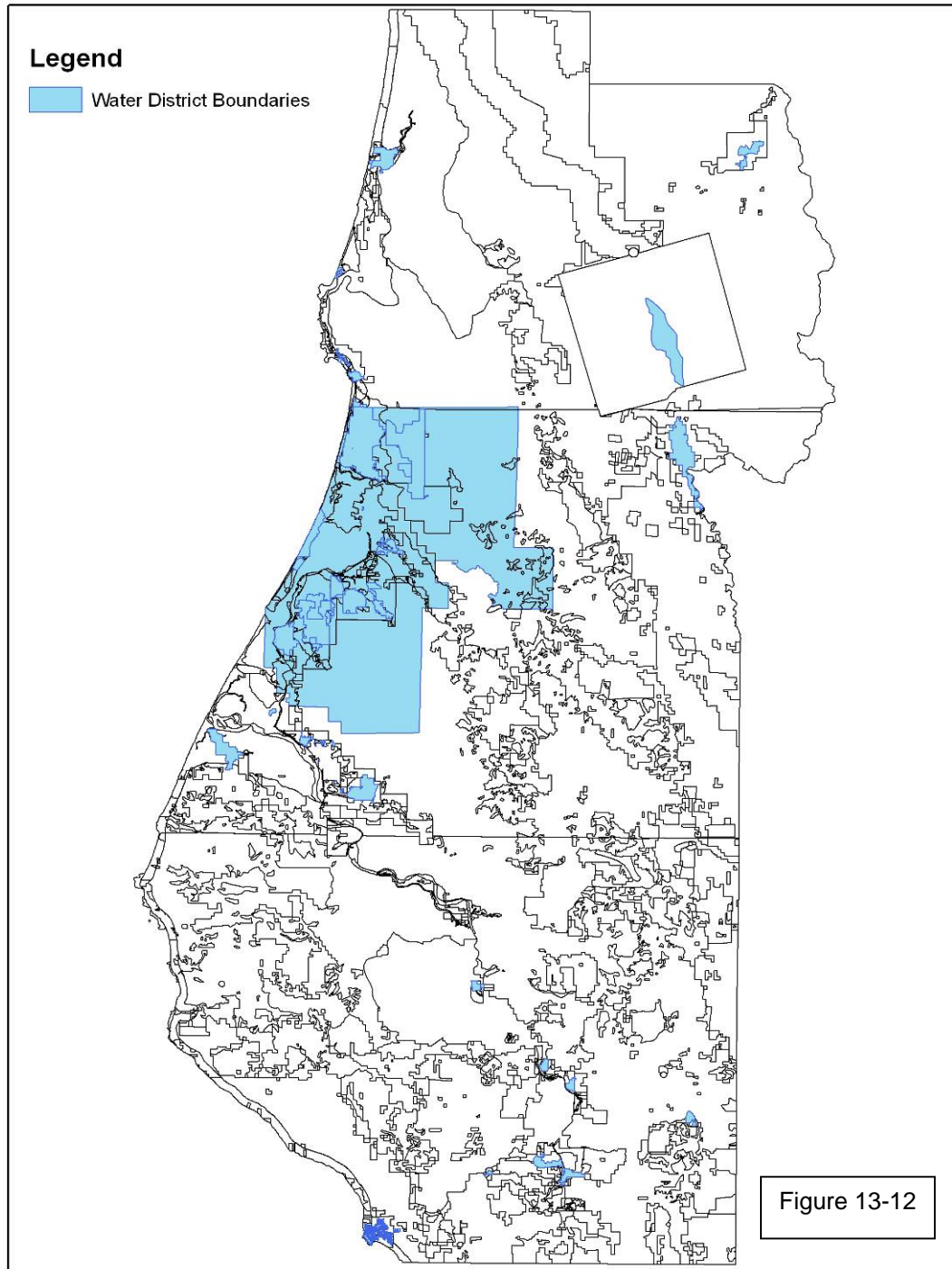


Table 13-13. Gross Estimate of Future Housing Capacity

Provider	Primary Groundwater or (Water Basin)	Current Production Capacity ¹	Current Demand ²	Current Excess (Shortfall)	Future Housing Capacity (Units) ³	Projected Excess/(Shortfall) GPD
HBMWD	Mad River	45 MGD	21 MGD	24 MGD		24,000,000
Alderpoint Water District	(Eel River)	432,000 GPD	80,000 GPD	352,000 GPD	66	324,610
City of Arcata*	Mad River Valley		2,800,000 MGD		205	
City of Blue Lake*	Mad River Valley		280,000 GPD		161	
Big Lagoon CSD	Big Lagoon Area	70,000 GPD	11,650 GPD	58,350 GPD	14	52,540
Briceland CSD	(Eel River)	10,080 GPD	40,000 GPD	(29,920 GPD)	26	(-40,710)
City of Eureka*	Eureka Plain		4,400,000 MGD		8898	
City of Ferndale	Eel River Valley	500,000 GPD	190,000 GPD	310,000 GPD	150	247,750
City of Fortuna	Eel River Valley	5,760,000 GPD	2,300,000 GPD	3,460,000 GPD	450	3,273,250
Fieldbrook/Glendale CSD*	Mad River Valley		325,000 GPD		575	
Garberville Sanitary District	Garberville Town Area	460,800 GPD	310,000 GPD	150,800 GPD	211	63,235
Hoopa Valley PUD	Hoopa Valley	3,200,000 GPD	1,190,000 GPD	2,010,000 GPD	465	1,817,025
Humboldt CSD**	Eureka Plain		2,430,000 MGD		4386	
Hydesville County WD	Eel River Valley	518,400 GPD	280,000 GPD	238,400 GPD	166	169,510
Jacoby Creek CSD*	Mad River Valley		90,000 GPD		101	
Loleta CSD	Eel River Valley	276,000 GPD	210,000 GPD	66,000 GPD	116	17,860
Manila CSD*	Eureka Plain		150,000 GPD		269	
McKinleyville CSD*	Dows Cr		1,190,000 MGD		4249	
Miranda CSD	(Eel River)	338,000 GPD	220,000 GPD	118,000 GPD	74	87,290
Orick CSD	Redwood Creek	274,000 GPD	216,000 GPD	58,000 GPD	66	44,610
Orleans CSD	(Klamath River)	950,000 GPD	513,000 GPD	437,000 GPD	220	345,700
Palmer Creek CSD	Eel River Valley	230,400 GPD	84,000 GPD	146,400 GPD	25	136,025
Patrick Creek CSD*	Dows Prairies Area		7,500 GPD		58	
Phillipsville CSD	(Eel River)	40,000 GPD	40,000 GPD	0	11	(-4,565)
Redway CSD	Garberville Town Area	838,000 GPD	475,000 GPD	363,000 GPD	589	118,565
Shelter Cove	(Cape Mendocino)	360,000 GPD	331,000 GPD	29,000 GPD	1481	(-585,615)
City of Rio Dell	Eel River Valley	792,000 GPD	474,000 GPD	318,000 GPD	223	225,455
Riverside CSD	Eel River Valley	74,000 GPD	46,000 GPD	28,000 GPD	5	25,925
City of Trinidad	Big Lagoon Area	62,000 GPD	40,000 GPD	12,000 GPD	221	(-79,715)
Weott CSD	Weott Town Area	202,000 GPD	258,000 GPD	(56,000 GPD)	61	(-81,315)
Westhaven CSD	Big Lagoon Area	57,600 GPD	66,000 GPD	(8,400 GPD)	424	(-175,960)
Willow Creek CSD	(Trinity River)	3,760,000 GPD	1,800,000 GPD	1,960,000 GPD	580	1,719,300
		Totals			24,546	31,700,770

¹ Current Capacity for HBMWD reduced by 30% for industrial/commercial use.

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² As a measure of consumption, current flows can be seen as equivalent to demand.

³ Based on high estimates from Table 13-12

*Denotes Water Supply obtained totally from HBMWD

** Denotes Water Supply obtained partially from HBMWD (67%)

Table 13-14. Housing Development Potential

USA/WSA	Development Potential			Estimate of Potential Dwelling Units		Estimates of Resulting Densities	
	Vacant /Under-developed Acres	Constrained Acres	Net Developable Acres	Low	High	Low	High
Alderpoint WS	210	79	130	44	66	0.34	0.51
Arcata USA	22	10	12	2	205	0.16	16.73
Benbow WS	103	52	51	55	56	1.08	1.10
Big Lagoon WS	63	11	53	10	14	0.19	0.27
Blue Lake USA	73	23	50	46	143	0.92	2.85
Blue Lake WS	91	6	85	6	18	0.07	0.21
Briceland WS	53	0	53	13	26	0.25	0.49
Fieldbrook WS	5,138	1,383	3,755	138	575	0.04	0.15
Fortuna USA	1,414	527	888	294	450	0.33	0.51
Freshwater WS	1,637	613	1,024	130	335	0.13	0.33
Garberville USA	129	51	79	63	108	0.80	1.37
Garberville WS	1,099	616	483	61	103	0.13	0.21
Glendale USA	284	66	218	20	1,189	0.09	5.46
Glendale WS	59	12	47	1	1	0.02	0.02
Humboldt Hill USA	1,937	713	1,224	963	2,070	0.79	1.69
Hydesville USA	243	65	178	96	554	0.54	3.12
Hydesville WS	1,044	456	588	70	246	0.12	0.42
Indianola WS	1,269	434	835	99	162	0.12	0.19
Jacoby Creek WS	338	53	286	28	101	0.10	0.35
Loleta USA	34	3	31	87	116	2.79	3.72
Manila USA	172	41	131	142	233	1.08	1.78
McKinleyville USA	2,038	356	1,683	2,224	4,112	1.32	2.44
McKinleyville WS	836	166	670	123	137	0.18	0.20
Miranda USA	113	27	86	48	74	0.56	0.86
Myers Flat WS	13	5	8	4	4	0.51	0.51
Myrtle town USA	278	29	249	466	1,021	1.87	4.09
Myrtle town WS	18	2	16	55	81	3.43	5.06
Orick USA	47	28	18	19	30	1.03	1.63
Orick WS	660	482	178	36	36	0.20	0.20
Orleans WS	428	155	273	50	220	0.18	0.81
Phillipsville WS	114	80	34	11	11	0.32	0.32
Redcrest WS	23	3	20	12	16	0.59	0.79
Redway USA	850	381	469	298	589	0.64	1.26
Rio Dell USA	6	2	4	2	8	0.48	1.93
Rio Dell WS	46	6	40	7	7	0.18	0.18
Riverside WS	56	22	34	5	5	0.15	0.15
Samoa USA	69	0	68	0	318	0	4.66
Scotia USA	0	0	0	0	0	0	0
Shelter Cove USA	160	5	155	1,088	1,214	7.03	7.85
Shelter Cove WS	230	143	87	108	267	1.24	3.06
South Eureka USA	3,207	929	2,279	2,687	8,048	1.18	3.53
South Eureka WS	651	477	175	13	47	0.07	0.27
Weott USA	31	5	26	34	61	1.31	2.35
Westhaven WS	668	128	541	79	424	0.15	0.78
Willow Creek USA	24	9	15	12	76	0.79	5.00
Willow Creek WS	1,482	757	726	215	504	0.30	0.69

B. Domestic Water Availability

Small community water systems supply water to a wide variety of uses such as rural businesses, residences and schools, mobile home parks and small unincorporated communities. Most water systems are operated by Community Service Districts or other public entities. Some are owned by private companies or corporations. There are also mutual water companies or associations, which are shareholder owned and operated systems (where shares are based on acreage owned within the service area) that are only authorized to provide water to shareholders. Most of these systems have small revenue bases and relatively high per capita costs and often have difficulty financing major capital investments needed to replace aging facilities or accommodate growth.

Four County water districts serve Humboldt County: Alderpoint County, Hydesville County, Jacoby Creek County, and Humboldt Bay Municipal Water Districts. The largest of the water suppliers is Humboldt Bay Municipal Water District (HBMWD) serving the greater Humboldt Bay Area, including Eureka, Arcata, and Blue Lake as well as community service districts serving the unincorporated areas of McKinleyville, Cutten (HCSD), Fairhaven, Fieldbrook, and Manila. HBMWD serves about 65,000 people a day and can currently deliver up to 20 million gallons daily for domestic purposes. The rest of the county's unincorporated areas are served by community service districts or some form of private system. The water for these systems comes from rivers, springs and wells.

HBMWD has the highest level of excess water available for future developments in Humboldt County, HBMWD water issues are not projected to be problematic for future growth. There are however critical shortages of domestic water now or projected in the future for several USAs/WSAs, many of which are in the Eel River Basin. The following is a discussion of those systems that are projected to have a shortfall, assuming the high estimate of potential development occurs. Additional information regarding each water provider can be found in II B, Public Water Systems.

Briceland CSD

The sole water source for the Briceland CSD is a spring on private property, where the District receives 90% of the spring's flow. The spring's flow is variable and dependent on rainfall. However, in the summertime, the spring outputs 5 – 7 gpm, or between 7,200 and 10,080 gpd. Based on Table 13-11, future high estimates of housing growth would create a domestic water shortfall of about 40,700 gallons per day by the year 2025.

City of Trinidad

Potable water for the City system is currently supplied from Luffenholtz Creek With a project high growth of 221 new housing units by 2025, the City could experience a water deficit of around 79,700 GPD if capacity problems are not solved.

Phillipsville CSD

PCSD's water supply consists of a groundwater well of unknown capacity and a surface water spring source with variable capacity. The spring source is unable to meet summertime demands, and therefore only serves the upper portion of the system during low flows while the well supplies water to the rest of the system. Average daily use for the entire District is estimated at 0.024 mgd, and peak daily use is estimated at approximately 0.085 mgd. The Phillipsville area has approximately 65 active service connections. The system does not have a master meter to monitor production. This system could experience a shortfall in its source of supply of around 4,500 gpd.

Shelter Cove

The District's water supply system consists of a diversion facility and treatment plant on Telegraph Creek. Although the distribution system was installed District-wide, the initial water appropriation rights were not sufficient to meet projected demand for full build-out. Given this situation, the District would face a major water deficit of around 585,000 GPD by 2025 if the projected 223 housing units for the area were to occur.

Weott CSD

WCSD's water system consists of two surface water sources located across the Eel River and south of Bull Creek. The total rated capacity of these sources is approximately 0.202 MGD. By the year 2025, the District is expected to experience a water deficit of around 81,000 GPD.

Westhaven CSD

The system is supplied by three small, spring-fed tributaries of Two Creek at the eastern edge of the community and a 100-foot deep well within the residential area. The Westhaven Community Service District currently provides domestic water service to 207 connections. Nineteen (19) idle WMWC services represent a future obligation, making a total of 226 service connections possibility at full capacity. Projected growth within the District includes up to 424 housing units creating a drinking water shortfall of around 176,000 GPD by 2025. Source capacity currently varies between 40 – 60 gpm, compared to a maximum day demand of 0.66 MGD, or approximately 46 gpm. Recent efforts have focused on conservation – installing meters throughout the system and repairing leaks. This CSD suffers from limited source capacity. Additional sources have been sought but none identified. Without an additional source of water, development within the area will be severely limited.

References

American Society of Civil Engineers. 2001. A Guide For Best Management Practice (BMP) Selection In Urban Developed Areas.

California Environmental Quality Act, CEQA Guidelines, 2007

California Stormwater Quality Association. Stormwater Best Management Practice Handbook for New Development and Redevelopment, January 2003.

California Stormwater Quality Task Force, Construction Storm Water Sampling and Analysis Guidance Document to Assist Dischargers in Complying with California State Water Resources Control Board Resolution No. 2001-046 (October 2001)

California Water Resources Control Board Fact Sheet for Water Quality Order 99-08-DWQ: National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated With Construction Activity (General Permit).

California Water Resources Control Board Resolution No. 2001-046: Modification of Water Quality Order 99-08-DWQ State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (adopted by the SWRCB on 26 April 2001)

Caltrans, 2001. Gross Solids Removal Device Informational Guide. State of California Department of Transportation. June.

Caltrans, 2001. Storm Water Quality Practice Guidelines. State of California, Department of Transportation. November.

Center for Watershed Protection, 2000. The Practice of Watershed Protection.

Currier B., et.al. January 7-11, 2001. California Department of Transportation BMP Retrofit Pilot Program, Transportation Research Board 8th Annual Meeting, Washington, D.C.

Federal Emergency Management Agency (FEMA) Flood Insurance Map -----

Kayhanian M., Johnston J., Yamaguchi H., and Borroum S. 2001. Caltrans Storm Water Management Program. Stormwater Journal.

U.S. Environmental Protection Agency. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California. 40 Code of Federal Regulations Part 131, May 18, 2000.

U.S. Environmental Protection Agency. 1993. Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters.

U.S. Environmental Protection Agency. 1999. *Sand Filters*. EPA 832-F-99-007.

U.S. Environmental Protection Agency. 1999. *Water Quality Inlets*. EPA 832-F-99-012.

Humboldt County General Plan
Water Resources Technical Report

U.S. Green Building Council. 2005. LEED-NC: Green Building Rating System for New Construction & Major Renovations. USGCB.

WEF, 1998. Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87.

2002 CWA Section 303(D) List of Water Quality Limited Segment, North Coast Regional Water Control Board, 2003.

Basin Plan Staff Report for the 2007 Triennial Review, North Coast Regional Water Control Board, 2007.

California Water Plan Update 2005, California Department of Water Resources, 2005.

California's Groundwater Update 2003 – Chapter 7 – North Coast Hydrologic Region, DWR Bulletin 118, 2003.

City of Arcata Storm Water Management Program, City of Arcata, 2003, revised 3/24/04.

City of Eureka Phase III NPDES Storm Water Management Plan, City of Eureka, 2005.

County of Humboldt, Grading, Erosion Control, Geological Hazards, Streamside Management Areas, and Related Ordinance Revisions, Department of Community Development Services and Public Works, 2002.

Draft Measures to Control Excess Sediment, North Coast Regional Water Control Board, 2007

Environmental Assessment for the Issuance of an Incidental Take Permit under Section 10(a)(1)(B) of the Endangered Species Act for the Humboldt Bay Municipal Water District's Operations and Maintenance Activities on the Mad River, HBMWD and Winzler & Kelly Consulting Engineers, 2002.

Humboldt Bay Watershed Salmon and Steelhead Conservation Plan, Humboldt Bay Watershed Advisory Committee and Natural Resources Services, 2005.

Humboldt County General Plan Update Natural Resources and Hazards, Humboldt County, 2006.

Implementing Agreement for the Humboldt Bay Municipal Water Habitat Conservation Plan for its Mad River Operations, HBMWD, 2003.

Linking Land and Sea: A Northern California Coastal Conservation Needs Assessment for Mendocino, Humboldt and Del Norte Counties, Natural Resources Services, 2006.

Management of the California State Water Project, Bulletin 132-05, State of California, December 2006.

North Coast Integrated Regional Water Management Plan – Plan Highlights, Humboldt County, August 2006.

North Coast Integrated Regional Water Management Plan – Attachment 10: Economic Analysis and Water Quality Benefits, Humboldt County, August 2006.

North Coast Watershed Assessment Program, Methods Manual, State of California, 2003.

Proposed 2006 CWA Section 303(D) List of Water Quality Limited Segment, North Coast Regional Water Control Board, 2006.

Power Play: The Sale of PG&E's Hydropower System and the Future of California's Rivers, Environmental Defense, 2005.

Redwood Creek Integrated Watershed Strategy, Redwood Creek Watershed Group, 2006.

Resolution R1-2004-0087, Total Maximum Daily Load Implementation Policy Statement for Sediment Impaired Receiving Waters in the North Coast Region, North Coast Regional Water Control Board, 2004

Socioeconomic Characteristics of the Natural Resources Restoration System, Humboldt County, California, Forest Community Research, 2004. Humboldt Bay Municipal Water District: 2006 Consumer Confidence Report. Humboldt Bay MWD, 2006.

Water Policy and Prosperity in Humboldt County, Rebecca S. Price-Hall, Master of Arts Thesis, 2005.