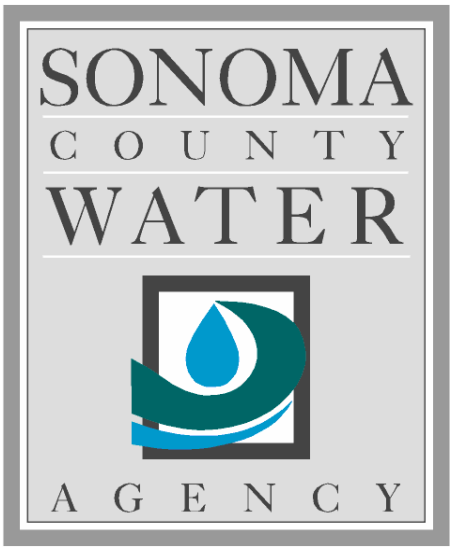
RUSSIAN RIVER ACTIVITIES WORKSHOP



Monday, November 26, 2001
9:00 a.m. – 12:00 p.m.

Sonoma County Board Room
575 Administration Drive
Santa Rosa, CA 95401

STAFF REPORT

SONOMA COUNTY WATER AGENCY

RUSSIAN RIVER ACTIVITIES WORKSHOP

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November 2001

TABLE OF CONTENTS

4.0 ENDANGERED SPECIES ACTIVITIES

5.0 AGENCY WATERSHED PROTECTION ACTIVITIES

6.0 AGRICULTURAL REUSE PROJECTS

7.0 AREAS FOR POLICY DIRECTION

8.0 ACKNOWLEDGEMENTS

LIST OF FIGURES

LIST OF ACRONYMS

ACSH	American Council on Science and Health
AWWARF	American Water Works Research Foundation
BA	Biological Assessment
BML	Bodega Marine Laboratory
BO	Biological Opinion
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CSA	Coalition for Sustainable Agriculture
DBP	Disinfection By-product
DHS	California Department of Health Services
EDC	Endocrine Disruptor Compound
EDSTA	Endocrine Screening and Testing Advisory Committee
EPA	U.S. Environmental Protection Agency
ESA	Federal Endangered Species Act
FEP	Fisheries Enhancement Program
FY	Fiscal Year
GIS	Geographic Information System
ICR	Information Collection Rule
KRIS	Klamath Resource Information System
MCL	Maximum Contaminant Level
MGD	Million Gallons Per Day
MOU	Memorandum of Understanding
NCRWQCB	North Coast Regional Water Quality Control Board
NDMA	Nitrosodimethylamine
NMFS	National Marine Fisheries Service
NTU	Nephalometric Turbidity Unit
PhAC	Pharmaceutically Active Compound
ppb	Parts per billion
PPFC	Public Policy Facilitating Committee

LIST OF ACRONYMS (CONTINUED)

RCD	Resource Conservation District
RRWF	Russian River Well Field
SVCSD	Sonoma Valley County Sanitation District
SWTR	Surface Water Treatment Rule
THM	Trihalomethane
UCMR	Unregulated Contaminant Monitoring Regulation
USFWS	United States Fish and Wildlife Service
VOMWD	Valley of the Moon Water District
WERF	Water Environmental Research Foundation
WSTSP EIR	Water Supply and Transmission System Project Environmental Impact Report

1.0 OVERVIEW

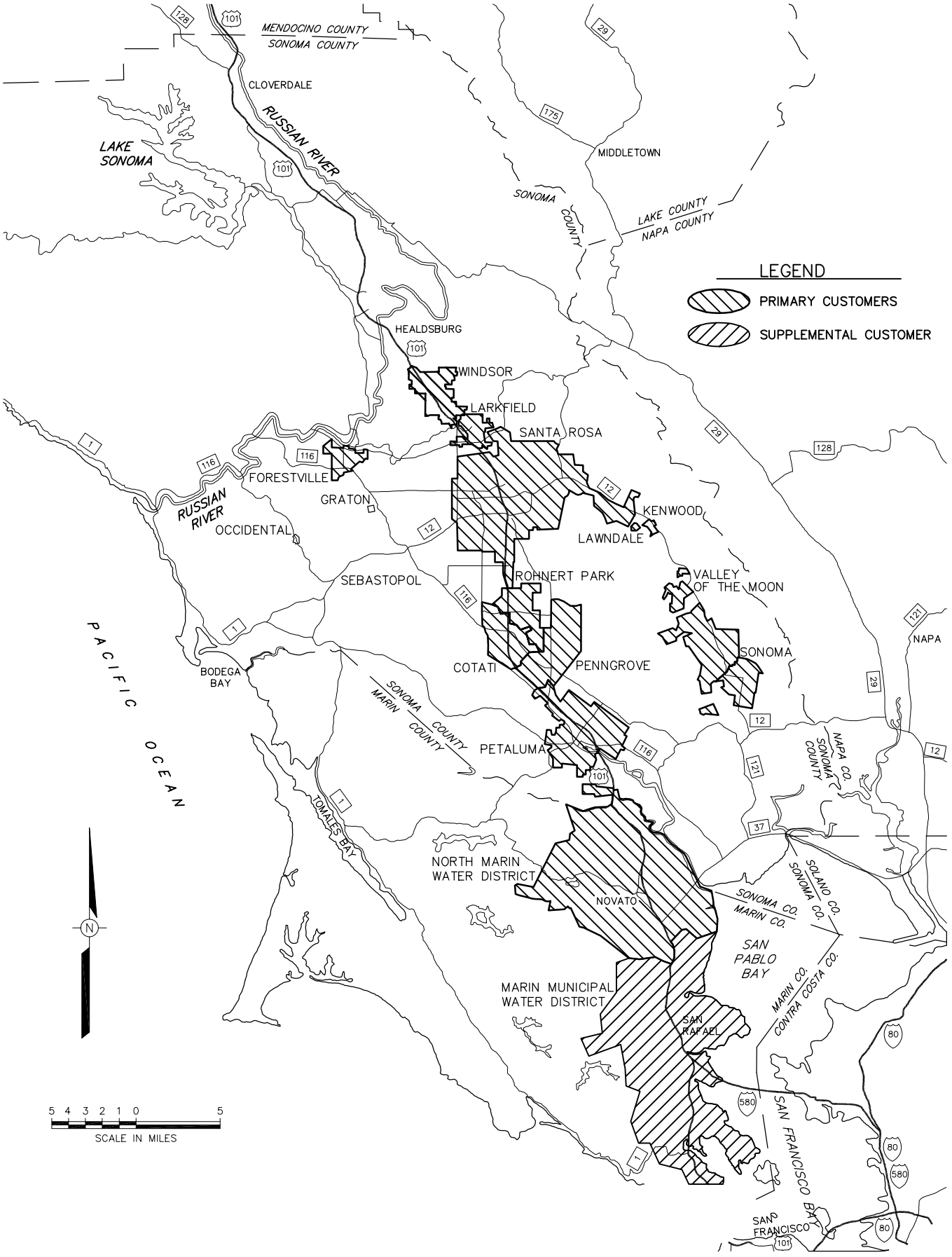
1.1 INTRODUCTION

The Sonoma County Water Agency (Agency) is a special district created in 1949 by the State Legislature. The County Board of Supervisors acts as the Agency's Board of Directors (Board). The act that created the Agency and defines its powers and duties gives it the authority to produce and furnish surface water and groundwater for beneficial uses; to control flood waters; to generate electricity; and to provide recreational facilities in connection with the Agency's facilities. Legislation enacted in 1994 added disposal of wastewater to the Agency's responsibilities. The Agency is the primary provider of potable water for approximately 570,000 people in Sonoma and Marin counties. The Agency's primary water customers, collectively known as the water contractors, consist of the cities of Santa Rosa, Rohnert Park, Petaluma, Cotati, and Sonoma; and the North Marin, Valley of the Moon, and Forestville Water Districts. The Agency also furnishes water to non-primary water customers including the Marin Municipal Water District and Town of Windsor. A map of the Agency's service area is included as Figure 1.

Over the past six years, the Agency has prepared various reports and conducted workshops that address Russian River issues relevant to the Agency's activities. The purpose of these reports and workshops was to document the existing conditions of the Russian River water supply system including environmental concerns, inform the Board about issues facing the Agency, and to request and receive direction from the Board on future Agency Russian River activities.

This report, entitled *Russian River Activities Workshop Staff Report (2001)*, provides information on the Agency's current Russian River activities. The staff report has been prepared to provide written information to interested parties on Russian River Activities which will be presented at a public Board workshop on Monday November 26, beginning at 9:00 a.m. in the Sonoma County Board of Supervisor's Chambers.

The background section of this report provides a brief summary of past Agency reports and workshops regarding the Russian River that preceded this report and are critical to understanding the relationship between topics covered in this report, and that form the basis for the Board policy direction being considered. The remainder of the report provides information on the following topics: 1) the Agency's water supply system including information regarding existing production at the Agency's diversion facilities, existing water quality at the Agency's water supply facilities, and emerging water quality issues that may affect the Agency's water supply; 2) the studies being undertaken in support of the Agency's Diversion Alternatives Project, a component of the Water Supply and Transmission System Project; (3) an update on the recent flow studies conducted to support the Section 7 Consultation with the National Marine Fisheries Service (NMFS), as well as other supporting endangered species activities; (4) an update on Agency watershed protection activities; and, (5) Agency sanitation/agricultural recycled water projects currently under consideration that could offset potable water use while protecting environmental resources in the Agency's service area.



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SONOMA COUNTY WATER AGENCY

FIGURE 1

SONOMA COUNTY WATER AGENCY TRANSMISSION SYSTEM SERVICE AREA

More detailed information regarding each of these topic areas is presented below. The report concludes with requests for policy direction from the Agency's Board. For more information concerning this staff report, you may contact the Public Information Section of the Sonoma County Water Agency at 707/521-6207.

1.2 BACKGROUND

The following background section presents a brief discussion of relevant past Russian River reports and workshops conducted for the Board by Agency staff and describes the focus of the present workshop and supporting staff report.

1.2.1 AGENCY WATER POLICY

In 1991, the Board adopted the Agency's Water Policy. The Water Policy Statement focused on the Agency's role in managing the use of the Russian River water supply, consistent with four guiding principles: promoting water conservation, maintaining adequate streamflows, providing a water supply for Sonoma County, and reasonably allocating the Russian River water supply. This policy provided guidance during the decade that followed and led to expansion of the Agency's water conservation program and development of a water supply project and water supply agreements among the Agency and its public agency water customers. Changing circumstances since 1991, including the transfer of sanitation responsibilities to the Agency following Legislation enacted in 1994 and implemented in 1995, and the listing of three Russian River salmonid species as threatened under the federal Endangered Species Act (ESA) in the late 1990s, require that the Water Policy Statement be updated. The Agency is currently working on an update to the Water Policy Statement.

1.2.2 RUSSIAN RIVER ACTIVITIES WORKSHOP (1995)

On March 27, 1995, at a public workshop entitled Russian River Activities, Agency staff presented information about the Agency's Russian River water supply system and planned Russian River activities to the Agency's Board and received comments from the public. Based on Board direction received subsequent to the workshop, the Agency, among other things, was directed to prepare a document that outlined the current status of conditions of the Russian River, and to provide an update to the Board upon completion of the report.

1.2.3 THE RUSSIAN RIVER, AN ASSESSMENT OF ITS CONDITIONS AND GOVERNMENTAL OVERSIGHT (1996)

The 1996 report, entitled *The Russian River, An Assessment of Its Conditions and Governmental Oversight*, documented conditions in the Russian River system related to water supply, water quality, recreation and public access, gravel mining, fisheries, barriers to fish migration, riparian habitat, flood control, and the overall status of governmental oversight in the Russian River watershed. In addition to assessing current conditions, the report included recommendations regarding the need for a comprehensive management plan for the Russian River that addresses federal, state, and local concerns, as well as the need for greater coordination between the various

agencies with interests in the Russian River. The report also contained recommendations that addressed issues associated with water quality, recreation, gravel mining, fisheries, and flood control.

After release of the report, on October 31, 1996, the NMFS listed coho salmon as threatened under the ESA. Steelhead and chinook salmon were subsequently listed as threatened on August 18, 1997 and September 16, 1999 respectively.

On December 3, 1996, in response to this report and the listing of coho salmon as threatened, the Board authorized, among other things, certain actions to promote coordination, communication, and cooperation among agencies with interests and responsibilities in the Russian River, and certain measures to ensure Agency compliance with the ESA .

1.2.4 RUSSIAN RIVER ACTION PLAN (1997)

In 1997, the Agency prepared the Russian River Action Plan and held a workshop which provided a detailed listing of actions needed to protect listed fish species, as well as identified opportunities to coordinate and cooperate with federal, state, and local agencies to gain federal/state funding to protect listed fish species. On August 12, 1997, in implementing the Russian River Action Plan, the Board directed the Agency, among other things, to fund a Fisheries Enhancement Program (FY 97/98), and to execute a memorandum of understanding among the NMFS, U.S. Army Corps of Engineers (Corps), and the Agency to conduct a Section 7 Consultation under the ESA.

1.2.5 ADDITIONAL REPORTS/WORKSHOPS

Augmenting the aforementioned reports and workshops, Agency staff have updated the Board at regular Board meetings and workshops on various activities in the Russian River. Most recently, staff have updated the Board on various Agency activities including water supply, sanitation and flood control operations, the status of the Section 7 Consultation with the NMFS and Corps regarding the impacts of the Agency's Russian River activities on federal listed species, funding and research programs, and constraints related to the Agency's water transmission system. In keeping with past workshops aimed at updating the Board on new issues that face the Agency, this staff report and workshop focus on emerging issues that demonstrate the increasing complexity of the Agency's activities within the Russian River system.

2.0 REVIEW OF PRODUCTION CAPACITY AND WATER QUALITY – EXISTING RUSSIAN RIVER FACILITIES

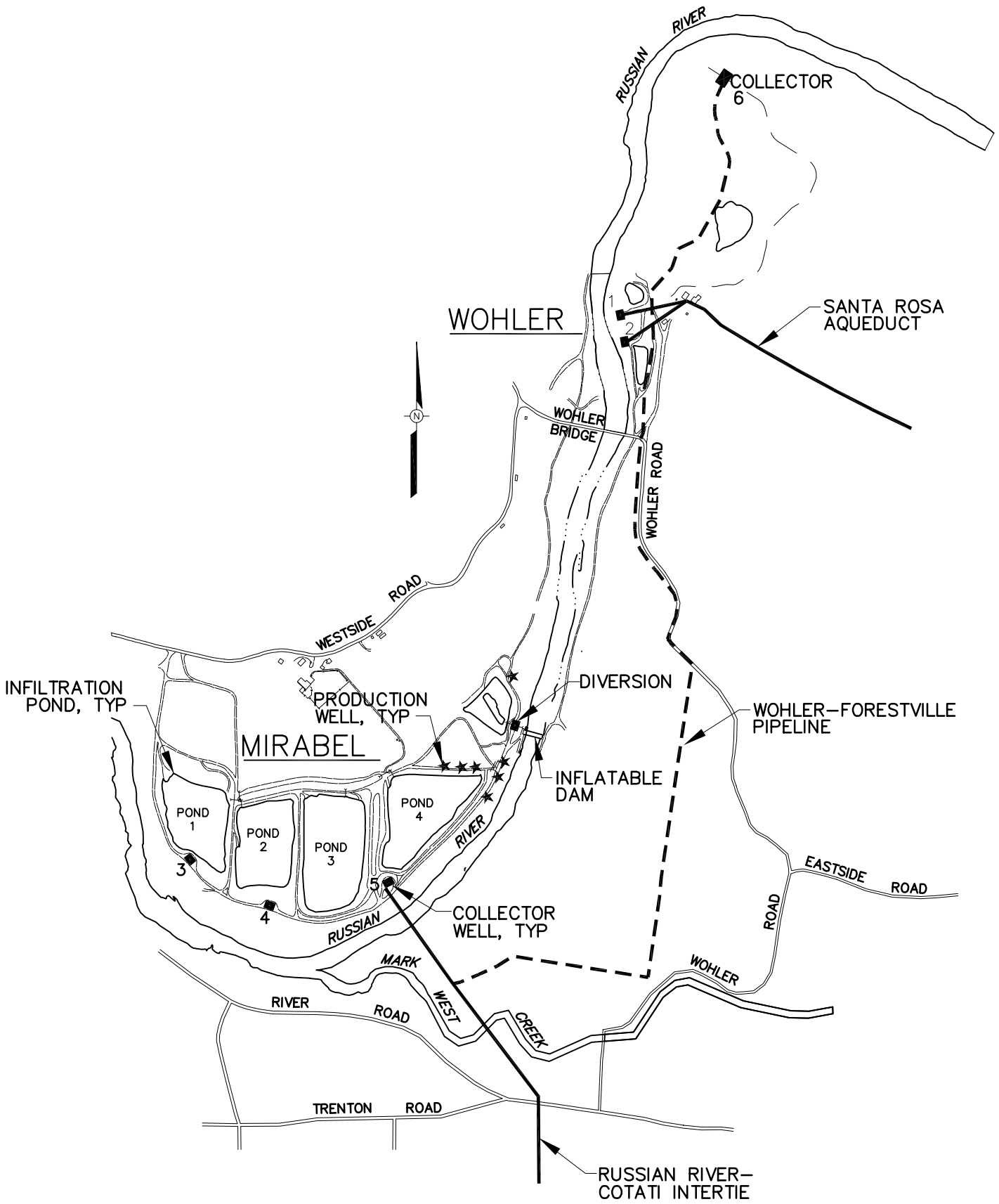
Paramount to the Agency is its ability to continue to supply potable water to its customers that meet both existing demand as well as comply with the complex set of regulatory requirements for potable water supplies. The Agency is committed to ensuring that its water supply and quality are safeguarded for the future, and protective of both human health and the environment. This section presents a discussion of the status of the Agency's water supply facilities, including activities that the Agency is involved in related to water supply and quality.

The Agency conducts ongoing studies of its water supply system, including studies that address both the production capacity of its diversion facilities, and the water quality produced by those facilities. The following describes how the Agency operates its water supply facilities and evaluates the performance of these facilities in terms of production capacity and water quality.

2.1 EXISTING WATER SUPPLY FACILITIES

The Agency operates five collector wells in the Wohler and Mirabel areas adjacent to the Russian River (Figure 2). The first two collector wells (Collectors 1 and 2) were constructed in the late 1950s in the Wohler area. Between 1975 and 1983, Collectors 3, 4, and 5 were s constructed in the Mirabel area. Each collector well consists of a 13 to 16 foot diameter concrete caisson extending approximately 60 to 100 feet into the alluvial aquifer. Horizontal perforated intake laterals extend radially from the bottom of each caisson to a maximum of 175 feet into the aquifer. Each collector well houses two vertical turbine pumps that are driven by electrical motors. Figure 3 provides a schematic of the major components of a typical Russian River collector well. The Agency also operates the Russian River Well Field (RRWF) consisting of seven conventional wells located in the Mirabel area. In order to increase production capacity during peak demand months, the Agency raises an inflatable dam at Mirabel (Figure 2) that allows for operation of five infiltration ponds at Mirabel (the fifth pond is currently not operated) that increase the area of infiltration along the Russian River. Water pools behind the inflatable dam and is diverted into the infiltration ponds to recharge the aquifer below the collector wells.

Currently, Collector No. 6 is being constructed in the Wohler area and is planned for completion in 2003. This new collector will increase the reliable peak production capacity and provide additional standby capacity.



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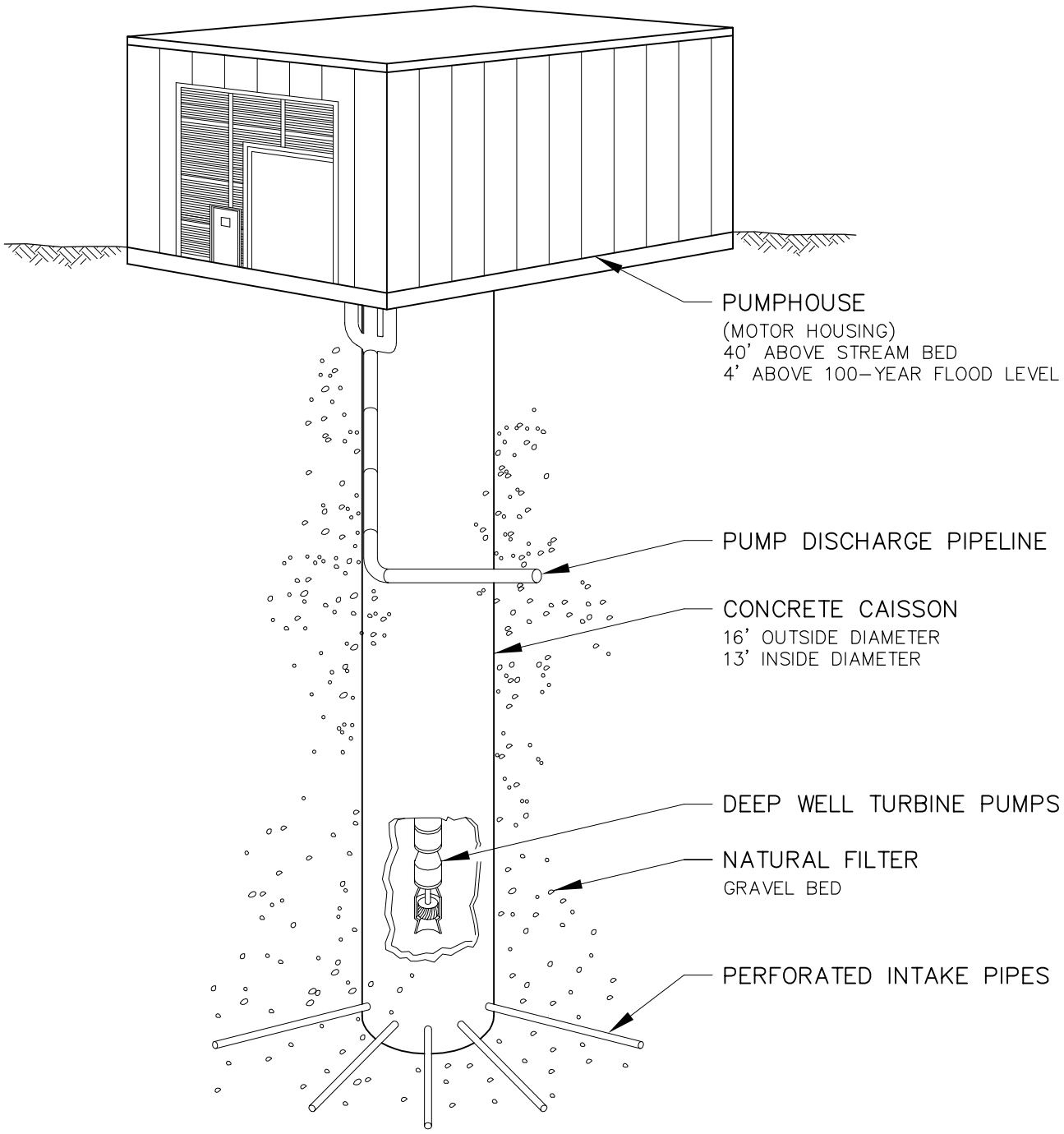
SONOMA COUNTY WATER AGENCY

FIGURE 2
WATER AGENCY SUPPLY FACILITIES



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SONOMA COUNTY WATER AGENCY

FIGURE 3
TYPICAL RUSSIAN RIVER
RANNEY WATER COLLECTOR

2.2 PRODUCTION CAPACITY OF EXISTING FACILITIES

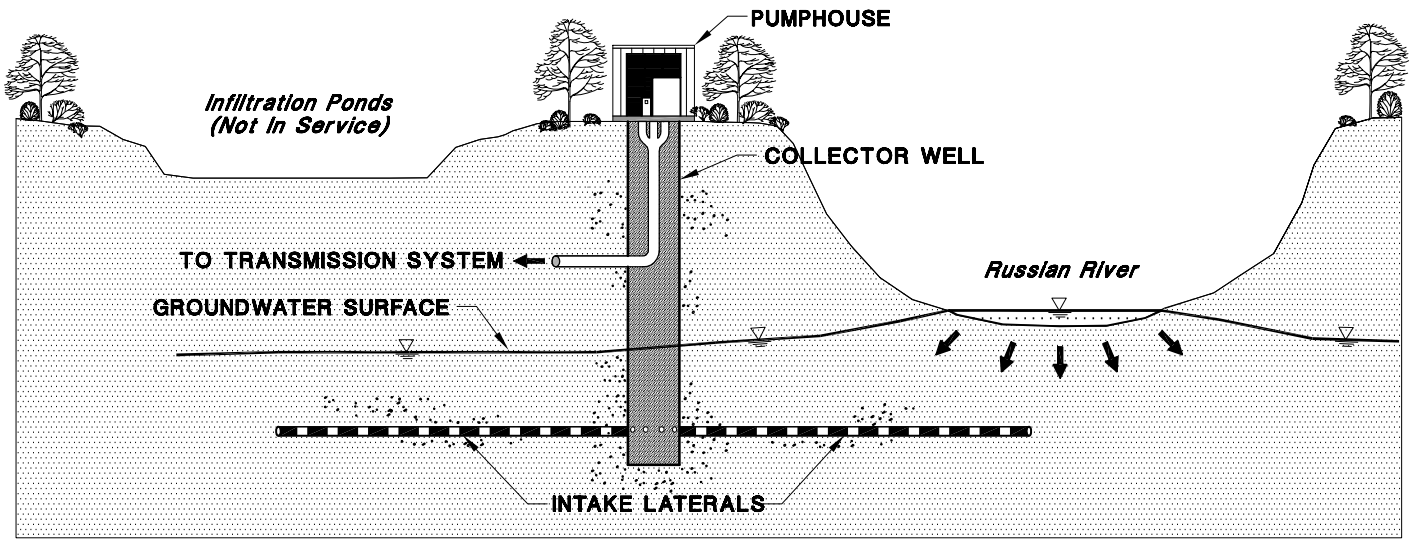
On December 7, 1999, the Agency's Board found that the reliable peak production capacity of the water transmission system is limited to 84 million gallons per day (mgd) as a result of a temporary impairment of the Agency's transmission system. The Board directed the Agency's General Manager/Chief Engineer to perform specific related activities to address issues associated with the temporary impairment. As mentioned above, Collector No. 6 is currently being constructed to increase the reliable peak production capacity to 92 mgd and provide additional standby capacity, also required by the Eleventh Amended Agreement for Water Supply. It is anticipated that the completion of Collector No. 6 will address temporary impairment issues associated with the Agency's diversion facilities.

The Agency recently evaluated the water production capacity of the transmission system during certain periods (fall/early winter and spring) when the inflatable dam is not typically in operation (SCWA, 2000). The evaluation concluded that the Agency's ability to meet its water transmission system demands in the fall/early winter and the spring periods greatly depends on having the flexibility to raise the inflatable dam as necessary.

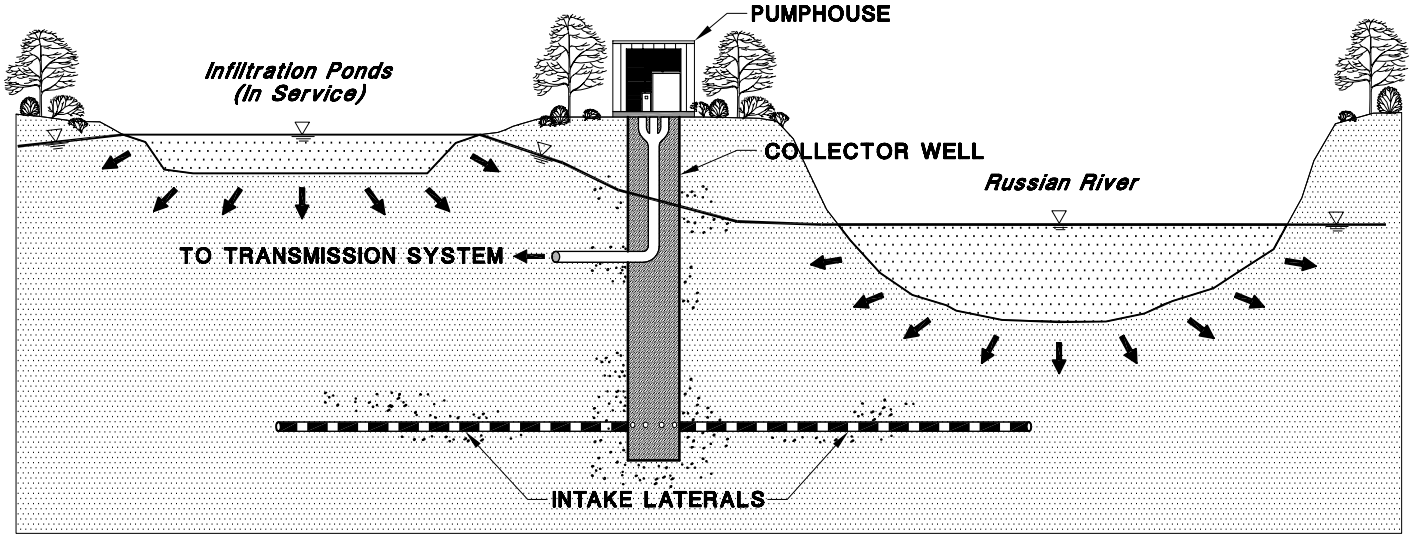
Typically, the inflatable dam is raised in the spring to meet increasing demands. When the inflatable dam is raised, production capacity is increased for two primary reasons. First, surrounding groundwater levels and the area of infiltration along the river are increased, thus enhancing production for all Mirabel and Wohler collectors and wells. Second, the Agency is able to operate the infiltration ponds to enhance the production capacity of the three Mirabel collector wells and the RRWF. Figure 4 illustrates general groundwater conditions when the inflatable dam and infiltration ponds are operating versus when they are not operating.

As demand declines during the fall, the Agency first ceases to use the infiltration ponds and then later lowers the inflatable dam to prevent damage from high river flows. The Agency's evaluation indicates that the production capacity of the Mirabel and Wohler facilities in the fall/early winter ranges from 35 to 40 mgd. This estimate applies to conditions when the inflatable dam is not operational and before significant rainfall and river flow events occur. Because the aquifer conditions are generally the same from year to year due to consistency of the preceding time period (i.e., dry summers), the estimated production capacity for the fall/early winter is relatively consistent from year to year.

Comparison of this production capacity with the demand during the fall/early winter indicates that the production capacity and demand are nearly equal. The aquifer conditions during the fall/early winter represent the period of lowest production capacity. This is because regional groundwater levels are lowest after the dry summer months and the infiltration rates from the river to the underlying aquifer are lowest due to the buildup of fine-grained sediments and organic matter while the inflatable dam was raised.



INFLATABLE DAM NOT IN OPERATION
(ESTIMATED PRODUCTION CAPACITY APPROXIMATELY 40 mgd)



INFLATABLE DAM IN OPERATION
(ESTIMATED PRODUCTION CAPACITY APPROXIMATELY 84 mgd)

SONOMA COUNTY WATER AGENCY

FIGURE 4

SCHEMATIC OF GROUNDWATER CONDITIONS IN THE MIRABEL AREA WITH AND WITHOUT THE INFLATABLE DAM IN OPERATION

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If the Agency's system experiences a relatively dry fall and early winter (as experienced in many recent years) it may be necessary in future years, as demand increases, to raise the inflatable dam during that time of year to increase production. As an example, in the past year the Agency continued to operate the inflatable dam until January 2001.

During the spring, the Agency's production capacity is much more variable than in the fall due to both annual and seasonal factors. Year-to-year, there is great variability in how well the aquifer is recharged during the prior wet-weather season. A sustained period of lesser rainfall/river flow events appears to recharge the aquifer better than sporadic large rainfall/river flow events. In addition to annual variability, there are seasonal differences in the rate of the decline in aquifer conditions as the storage changes from high winter storage to lower summer storage. These annual and seasonal factors produce a wide range of spring aquifer conditions resulting in a more variable production capacity without the dam in operation. This is evidenced by the wide range of dates upon which it has been necessary to raise the inflatable dam to meet demand. Given these variables, the Agency estimates that the spring production capacity of its Mirabel and Wohler facilities ranges from 45 to 60 mgd before the inflatable dam is raised. Spring demand is also highly variable due to the wide range of weather conditions experienced during that time of year. For example, spring demand (i.e., April, May, and June) between 1996 and 1999 has ranged from about 36 to 71 mgd. Fortunately, in the spring, high water demand occurs when flows are low, which historically has permitted the Agency to raise the inflatable dam to meet demand.

Overall, operating the inflatable dam permits the Agency to use several infiltration ponds, helping the aquifer to recharge and increase production capacity to meet not only peak summer demand but spring and fall demand as well. In the future, as demand increases, the Agency will need to increasingly rely on use of the inflatable dam and infiltration ponds to meet not only peak demands but also base demands.

2.3 WATER QUALITY – EXISTING WATER SUPPLY FACILITIES

This section evaluates the quality of water produced by the Agency's existing water supply facilities. This evaluation includes a description of the natural filtration process that is utilized by the Agency's facilities to treat river water for potable use. In addition, a review of the results of long-term water quality monitoring, focused water quality studies, and a Source Water Assessment recently conducted on behalf of the Agency demonstrate that the Agency's facilities produce high quality water and meet or exceed regulatory standards.

2.3.1 NATURAL FILTRATION

The Agency's water diversion facilities utilize the naturally occurring alluvial aquifer adjacent to and underlying the Russian River to filter water to a high quality that meets and exceeds water quality standards for potable use. This process is referred to as natural filtration.

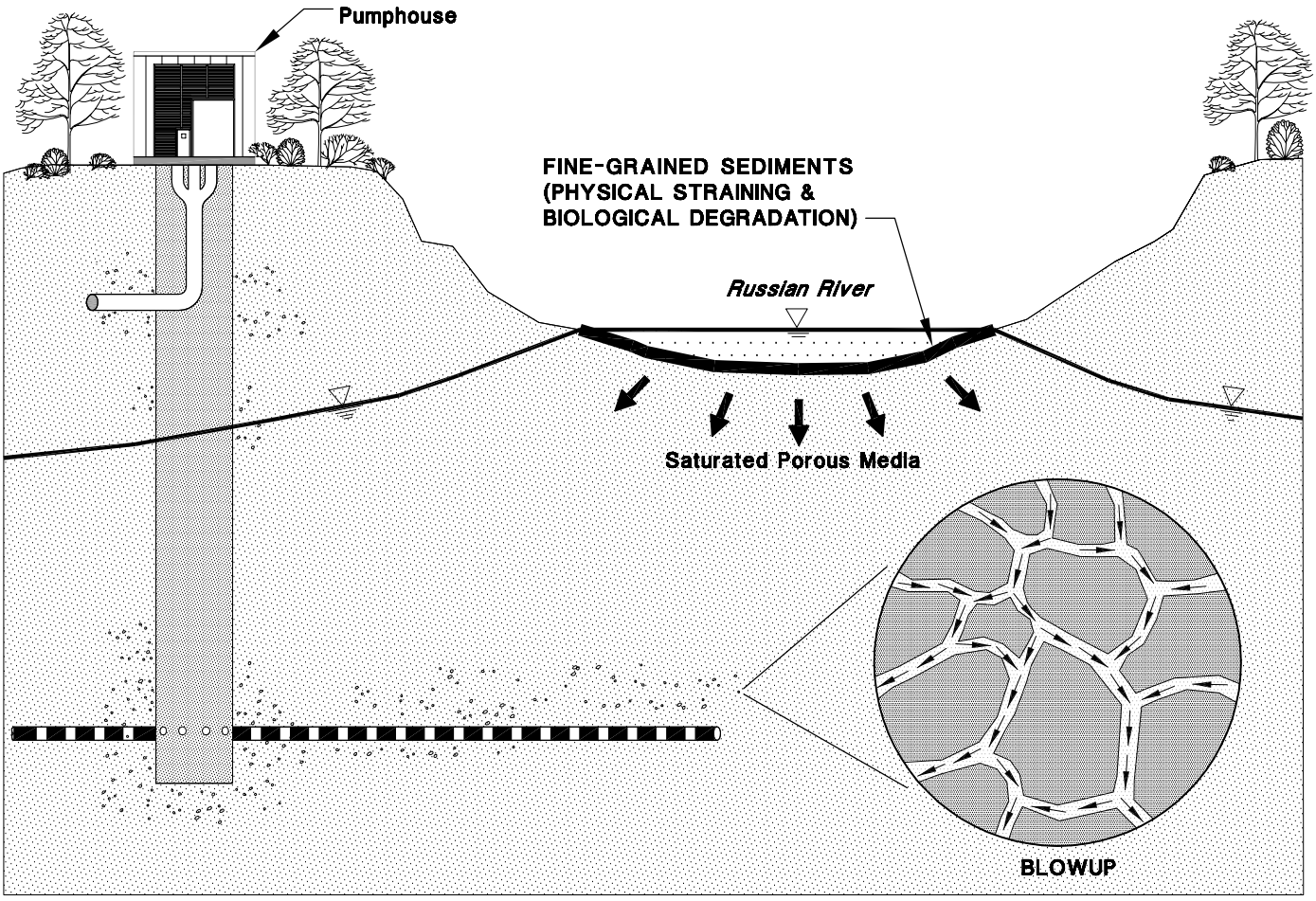
Natural filtration is a complex process consisting of physical, biological, and chemical mechanisms that work in conjunction with each other to improve the quality of water as it travels

through the alluvial aquifer (Wilson, et. al., 1996). Physical mechanisms involved in natural filtration include straining and dispersion. Water containing particulate materials must migrate through very small pore spaces between sand and gravel grains of varying size. These small pore spaces physically strain particulate material from water. In addition, water is forced to migrate through a convoluted path around interlocking sand and gravel grains, causing dispersion of particulate material conveyed with the water phase (Figure 5). Biological degradation of impurities contained within particulate material and soluble material in the water phase occurs through the metabolic activity of naturally occurring microbes within the aquifer material (Wilson et. al., 1996). Biological degradation can occur throughout the aquifer, however, the organic rich fine-grained sediments deposited along the bottom of the river are especially important zones of biological activity (Figure 5). Chemical mechanisms can include ion exchange, adsorption, oxidation and reduction, and hydrolysis. These mechanisms either directly degrade impurities or enhance conditions for greater biological degradation of impurities.

The effectiveness of natural filtration is site-specific. Some of the factors that influence the effectiveness of natural filtration at a given location include:

- Soil composition;
- Thickness of aquifer;
- Travel time or velocity of water through aquifer; and
- Quality of surface water.

The composition of the soil materials that comprise the aquifer is an important factor controlling the effectiveness of natural filtration. Although the soil material must be porous enough to transmit sufficient quantities of water for water supply purposes, it must not be too porous as to transmit water so rapidly that sufficient filtration does not occur. A poorly sorted assemblage of soil materials, consisting mainly of granular materials of different grain sizes from sands to gravels, produces a tightly spaced matrix of materials that is able to transmit sufficient quantities of water. Poorly sorted materials also provide opportunities for natural filtration by creating sufficient contact time between water and aquifer material. In addition, zones of finer-grained materials are beneficial to enhance biological and chemical degradation of impurities. Many areas of the alluvial aquifer adjacent to the Russian River in the area of the Agency's collectors have been found to exhibit the qualities necessary for effective natural filtration.



NATURAL FILTRATION PROCESSES

PHYSICAL - STRAINING AND DISPERSION
CHEMICAL - OXIDATION, REDUCTION, ION EXCHANGE AND ABSORPTION
BIOLOGICAL - DEGRADATION

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FIGURE 5

SCHEMATIC OF TYPICAL NATURAL FILTRATION PROCESSES

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The thickness of the aquifer between the surface water source and the well screen is also an important factor to consider. There must be a sufficient amount of aquifer material for water to travel through to ensure adequate filtration. Figure 6 presents Thaleweg elevations[1] between 1970 to 2000 for the Wohler area. This data indicates that the thickness of the aquifer in the Wohler Area has remained stable during this time period For reference, the following presents the approximate minimum thickness of the alluvial aquifer between the Agency's existing collector well laterals and the nearest source of surface water (i.e., Russian River or infiltration ponds):

- Collector No. 1 – 49 feet
- Collector No. 2 – 49 feet
- Collector No. 3 – 57 feet
- Collector No. 4 – 61 feet
- Collector No. 5 – 46 feet

Another factor is the time that water is in contact with the granular material or the velocity of water as it travels through the porous material. Water that is naturally percolating through the aquifer will travel slower than water that is infiltrating under pumping conditions.

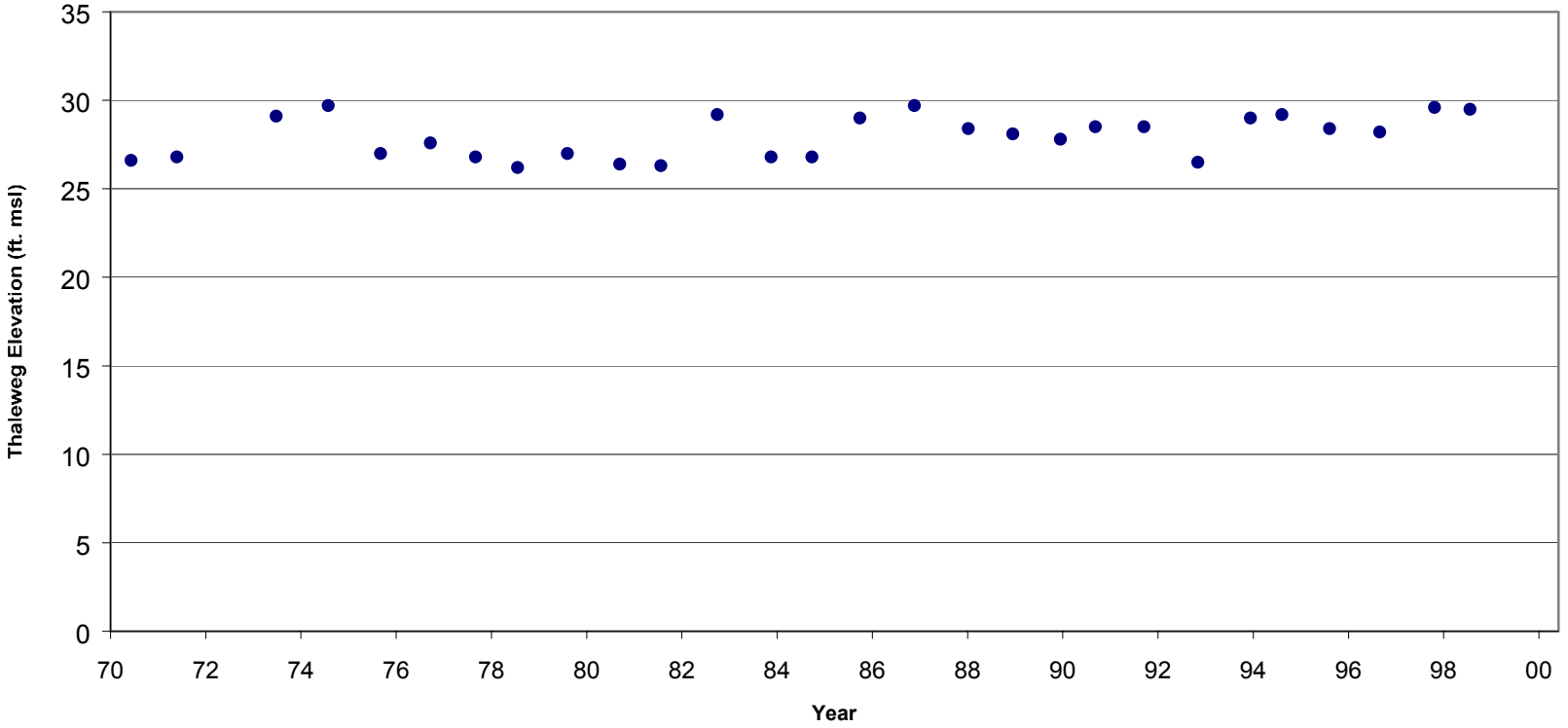
The quality of the source surface water is also an important factor affecting natural filtration. Water of poor quality, such as flood waters, contains a much higher concentration of particulate matter and impurities, thus putting a higher stress on the aquifer to filter these materials.

To evaluate the effectiveness of natural filtration at a specific location, the interrelationship of the preceding factors must be evaluated. For example, during high river flow events, the river bottom is scoured, removing fine grained materials (an important component of the natural filtration process) while loading the aquifer material with relatively poor quality, highly turbid water. Therefore, winter high flow events present the biggest challenge to the natural filtration process. Also water under pumping conditions will migrate through aquifer material more rapidly than under non-pumping conditions thus potentially reducing the degree of natural filtration. However, thicker deposits of aquifer material, relatively high source water quality, and/or good soil conditions can counteract higher water velocities caused by pumping to produce high quality water.

The following sections describe the data collection and analyses that have been performed to assess the ability of Agency's water supply diversion facilities to utilize natural filtration to produce high-quality potable water.

[1] Thaleweg describes the line defining the lowest points along the length of a river bed or valley.

Figure 6.
Summary of Historical Thaleweg Elevations
Wohler Bridge, River Mile 23.0



2.3.2 WATERSHED SANITARY SURVEY AND DRINKING WATER SOURCE ASSESSMENT

In order to comply with the state's Surface Water Treatment Regulations, the Agency recently conducted a Watershed Sanitary Survey and Drinking Water Source Assessment to evaluate the vulnerability of the Agency's water supply facilities to contamination, and if necessary, to identify steps to address potential contamination. This evaluation is required because, as described later in Section 2.3.4, Collector No. 5 is considered to be under the influence of surface water during higher river flow events.

The Drinking Water Source Assessment focused on identifying the types of activities that produce contamination in the watershed, as well as barriers present in the system to limit potential contamination of drinking water supplies. The Drinking Water Source Assessment is presented in an October 2001 report (Coastland Civil Engineering, 2001) which has been submitted to the California Department of Health Services (DHS) for review and approval. The report concluded that based on a study of the watershed and potential contaminating activities, the Agency does not have any issues with contamination, nor is foreseen to have a problem in the future in meeting current water quality regulations. Therefore, the report concludes that the Agency is in compliance with the State's Surface Water Treatment Regulations.

2.3.3 LONG-TERM WATER QUALITY DATA

A review of the annual water quality reports submitted to the DHS between 1965 and 2000 demonstrates the high quality water produced by the Agency's water supply diversion facilities over a sustained period of time. These annual reports summarize information requested by DHS concerning operation of Agency water supply facilities and the quality of the water diverted from the Russian River. Because increased drinking water regulatory requirements are continually being adopted by DHS and other regulatory agencies (i.e., United States Environmental Protection Agency [EPA]), the information submitted in these annual reports has changed between 1965 and 2000 in order to comply with changing regulatory requirements.

The results of water samples collected from Agency water supply facilities for the annual DHS reports in the early and mid 1960's indicate good water quality based on very low turbidity (less than one Nephelometric Turbidity Unit [NTU]) and the absence of bacterial coliform. A review of analytical reports prepared for DHS indicates that water quality from the Agency's Russian River diversions continues to be very good. Analytical results for turbidity have continued to be well below the maximum contaminant level (MCL) of 2 NTU's and bacterial coliform is also an issue at the Agency's water supply facilities.

Beginning in the late 1980's the analytical sampling program was expanded to include a variety of newly regulated organic and inorganic constituents. The number of constituents included for analysis has continued to increase to comply with changing regulatory requirements. The current list of constituents includes both regulated and non-regulated chemicals. Analytical results have indicated that, with the exception of trihalomethanes (THMs), constituents are not present above the laboratory reporting limits (i.e. the concentration at which a laboratory is able to measure a given chemical). THMs form as a result of chlorine oxidizing organic molecules

present in the water. Monitoring of water samples obtained from the collector wells indicates total THMs are consistently present at concentrations below 5 parts per billion (ppb), significantly below the established MCL of 100 ppb and well below the THM concentration present in most public water supply systems. The low concentration of total THMs suggests there is a correspondingly low concentration of organic material present in the raw water collected from the water supply facilities.

2.3.4 FOCUSED WATER QUALITY STUDIES

The Agency has also conducted two focused studies to demonstrate the effectiveness of natural filtration: (1) the Russian River Demonstration Project, completed in 1993 (CH2M Hill, 1993), and (2) the Russian River Caisson 5 Water Quality Evaluation completed in 1998 (Montgomery Watson, 1998). Both of these studies, described below, were conducted with the close coordination and oversight of DHS.

The purpose of the Russian River Demonstration Project was to evaluate whether the Agency's collector wells should be subject to the requirements of the Surface Water Treatment Rule (SWTR). DHS required the Agency to demonstrate that: 1) either each collector provides a treatment equivalent to direct filtration or slow sand filtration, or 2) each collector well is not under the direct influence of surface water and, therefore, not subject to the SWTR requirements. Equivalent treatment is defined as achieving a minimum of 99 percent reduction of Giardia cysts and 90 percent reduction of viruses, before disinfection.

The Russian River Demonstration Project consisted of weekly samples from the Russian River and Collectors 1 through 5 for a period of 15 months between March 1992 and May 1993. Water was tested for turbidity, temperature, pH, particle count, conductivity, bacteria, and microscopic particulate identification. In addition, the turbidity of the river was continuously measured during the study, and individual laterals of Collector 5 were monitored. This extensive sampling program allowed a comparison of water quality between surface water and water diverted from the underlying aquifer. The length of the study also permitted an evaluation of seasonal influences on the effectiveness of natural filtration.

The results of the study showed that water produced from Collectors 1 through 4 was of continuously high quality throughout the sampling program, including periods of high river flow. Specifically, giardia was not detected in the collector water (a total of only two giardia were found directly in the Russian River water during the entire study), the turbidity of water from the collector wells was consistently low despite large fluctuations of turbidity in river water, and coliform bacteria was effectively removed by natural filtration. The study also showed that Collector 5 had excellent water quality throughout the sample program with the exception of short periods of time during high river flows when coliform was detected in the collector water prior to disinfection by chlorination. As previously noted, Collector 5 has the least amount of saturated alluvial material between the bottom of the river and its intake laterals, so it would likely be most prone to decreases in water quality during high river flow events when scouring of the river bottom occurs and river water quality is the lowest.

Based on the results of the Russian River Demonstration Project, DHS determined that Collectors 1 through 4 were not under the direct influence of surface water. Although natural filtration at Collector 5 was determined by DHS to provide the equivalent treatment of slow sand filtration, Collector 5 was also found by DHS to be under the direct influence of surface water. As a consequence, to comply with the SWTR, DHS specified specific disinfection (chlorination) contact time requirements. Although the Agency has always chlorinated the water produced by the collector wells, it is problematic to ensure Collector 5 water (mixed with water from other collector wells) meets the required contact times specified by the SWTR.

To further evaluate the water quality produced by Collector 5, the Agency conducted a second water quality study under the supervision of DHS, referred to as the Russian River Caisson 5 Water Quality Evaluation. The study was designed to evaluate the performance of Collector 5 under various river flows. The study involved monitoring (on a continuous basis, with weekly frequency of sampling) Russian River water quality and flow rates directly, and also monitoring Collector 5 water quality from February 1997 through April 1998. For the study, monitoring was conducted for coliform bacteria, turbidity, particles, river flow and level, and collector water level.

Consistent with the Russian River Demonstration Project, the study concluded that throughout most of the year, the water quality of Collector 5 was excellent and similar to Collectors 1 through 4, but during times of high river flow and turbidity, the bacterial quality of Collector 5 changes prior to chlorination. As a result of this study, DHS determined that Collector 5 operates as a groundwater source unless river flows are greater than 5,000 cubic feet per second (cfs) and until flows drop to below 2,000 cfs. During these high flow periods, water produced from Collector 5 is considered to be groundwater under the direct influence of surface water. Therefore, the Agency avoids operating Collector 5 during high river flow events, due to operational issues as previously noted.

2.4 EMERGING WATER QUALITY ISSUES

The Agency currently participates in federal and state administered programs intended to evaluate emerging water quality issues. To assess emerging water quality issues, it is important to understand that many chemicals that have recently been "discovered" in water sources are due to advances in testing capabilities that allow for their identification. These "new" chemicals have essentially been present in water supply for as long as the contributing sources have been in existence. The following summarizes emerging water quality issues that are confronting public water supply systems throughout the country, including the Agency's Russian River facilities.

2.4.1 INFORMATION COLLECTION RULE CONTAMINANTS

The EPA established the Information Collection Rule (ICR), which specifies monitoring and data reporting requirements for large public water systems. The purpose of the ICR is to provide EPA with information regarding microbial contaminants and disinfection by-products (DBPs). As stated in the Federal Register (40 CFR Part 141), "this information is being collected because a Regulatory Negotiation on disinfectants and DBPs concluded that additional information is needed to assess the potential health problem created by the presence of DBPs and pathogens in drinking water and to assess the extent and severity of risk in order to make sound regulatory and public health decisions."

The Agency has complied with the ICR program by conducting the required sampling and analysis of water representative of chlorinated water from all of the collector wells (i.e., finished water) and pre-chlorinated water (i.e., raw water) from Collector No. 5. Between June 1997 and December 1998, the Agency conducted a total of 19 sample events for microbial contaminants and 6 sampling events for DBPs. The results of these sample events indicate that cryptosporidium and giardia were not detected in either raw or finished water. Also viruses and coliform (total and fecal) were not detected in finished water. In addition, DBPs with established or pending MCLs were detected well below their respective MCLs. For example, total THMs were detected at concentrations of 1 to 2 ppb. The existing MCL for THMs is 100 ppb, and the proposed MCL is 80 ppb. Based on the results of these monitoring activities ICR contaminants (e.g. microbial contaminants and DBPs) do not affect the Agency's water supply system.

2.4.2 UNREGULATED CONTAMINANT MONITORING REGULATION

The Unregulated Contaminant Monitoring Regulation (UCMR) administered by the EPA is intended to generate data that will be used to evaluate and prioritize contaminants on the Drinking Water Contaminant Candidate List. The Drinking Water Contaminant Candidate List is used by EPA when considering new drinking water standards. The UCMR involves three lists of subject compounds for analysis. List 1, containing 12 pesticides and oxygenates, is required of 2,800 large public water systems and 800 small public water systems. The Agency is required to participate in List 1 sampling by conducting two sample events within a one-year period between 2001 and 2003. Future sampling of Lists 2 and 3 will require sampling of additional chemical compounds. Sampling will be required of 300 randomly selected large and small public water systems. At this time, it is unknown whether the Agency will be required to participate in additional sampling.

To comply with the UCMR, the Agency conducted the initial List 1 sample event of raw water from each of its collector wells in June 2001. In addition, the Agency conducted a sample event to analyze for the presence of List 1 chemicals in October 2000 prior to the UCMR required monitoring period. Based on sampling, none of the List 1 compounds was found above the detection levels for reporting. The second UCMR sample event will likely occur during winter 2002.

2.4.3 MONITORING REQUIREMENTS FOR UNREGULATED CHEMICALS IN DRINKING WATER

The DHS is administering a similar program to the UCMR to evaluate and prioritize contaminants either without MCLs or contaminants with action levels, such as secondary standards. Secondary standards are non-enforceable standards that affect drinking water including taste, odor, and appearance. Chemicals requiring monitoring include inorganic compounds (boron, hexavalent chromium, perchlorate, and vanadium) and organic compounds (primarily volatile organic compounds and fuel oxygenates). The Agency also sampled for these chemicals in October 2000 and June 2001. Based on the sampling, none of the chemicals of interest were found at concentrations above the detection levels for reporting. The final sample event will likely occur in winter 2002.

2.4.4 PHARMACEUTICALS AND ENDOCRINE DISRUPTERS

Recently, concerns have been raised about the presence of pharmaceutically active compounds (PhACs) and endocrine disruptor compounds (EDCs) in water supplies. PhACs include hormones, hormone mimickers, antibiotics, blood lipid regulators, analgesics/nonsteroidal anti-inflammatories, beta-blockers, anti-depressents/obsessive-compulsive regulators, antiepileptics, antineoplastics, tranquilizers, retinoids, and diagnostic contrast media (Daughton and Ternes, 1999). EDCs are chemicals that exhibit biological hormonal activity (McLachlan and Korach, 1995). EDCs occur both naturally and are synthesized for medicinal purposes. EDCs can affect the endocrine system by canceling or reducing hormone actions or by changing how natural hormones and their protein receptors are made (American Water Works Research Foundation [AWWARF], 2001).

Recent studies, conducted primarily in Europe and North America, have shown the presence of PhACs and EDCs in surface waters (including rivers), and, in some cases, groundwater as a result of wastewater discharges (e.g., municipal wastewater treatment plants, septic systems, etc.). Some studies have shown health impacts to wildlife (e.g., fish, reptiles, and amphibians) exposed to EDCs resulting in abnormal ratios of sex steroid hormones and changes in reproduction organs (Guillette et al. 1994, Routledge et al. 1998, Colborn et al. 1993, Takahashi et. al., 2000). Concerns have also been raised regarding the potential presence of these chemicals in potable water supplies, including potential adverse effects to human health. For example, chemicals referred to as endocrine disrupters may act or interfere with human hormones (especially estrogens) and cause diseases and birth defects related to the endocrine system (American Council on Science and Health [ACSH], 1999). Health concerns associated with PhACs include antibiotic resistance (AWWARF, 2001).

Two major tasks must be performed to evaluate the effects of PhACs and EDCs on the natural environmental and potable water supplies. The first task consists of evaluating the occurrence of these chemicals in the natural environment. To accomplish this, there are several challenges that must be overcome. For example, sampling programs and analytical methods must first be developed. Due to the low concentrations (e.g., low parts per trillion) of these chemicals in the natural environment, new analytical testing methods must be developed to allow quantification at trace levels. Also, many PhACs degrade to intermediate by-products that may pose equal or higher health concerns than the parent compound. Many governmental and academic research institutions are actively working on evaluating the occurrence of PhACs and EDCs in water

supplies. For example, since 1999, the U.S. Geological Survey has been conducting a reconnaissance sampling program to characterize the presence of 15 biogenic and synthetic hormones and steroids, and 35 household and industrial products, in 30 streams throughout the United States.

The second major task to be performed involves investigating potential significant environmental and human health risks associated with the presence of trace concentrations of the emerging contaminants. The EPA has established a health screening program referred to as the Endocrine Disrupter Screening and Testing Advisory Committee (EDSTAC). This program is a hazard identification process and not a full health risk assessment (ACSH, 1999). A difficulty in assessing the potential health risk of pharmaceuticals in the natural environment is that health studies performed by pharmaceutical companies focus on high doses over a short-term exposure. The situation is the opposite when evaluating these chemicals in a public water supply, where trace concentrations occur over a long-term exposure period.

At this time, it is not clear whether the trace concentrations that have been found in some natural waters pose human health concerns. Based on information that exists regarding EDCs, the ACSH (1999) provides the following observations:

- High doses of some environmental contaminants have produced toxic effects in certain wildlife species. In some instances, the effects appear to involve the endocrine system. Humans, however, have comparatively much lower exposures to these suspected endocrine modulators. This fact is crucial to assessing the potential risks, if any, associated with these substances.

- To date no consistent, convincing association has been made between exposures to synthetic chemicals in the environment and increased cancer in hormonally sensitive human tissues (breast and prostate tissues, for example). While a chemical may cause cancer in certain laboratory animals when given at high doses, it does not necessarily cause cancer in humans who, as indicated above, have much lower exposures to synthetic environmental chemicals.

- Humans are exposed through their diet to estrogenic substances (substances having an effect similar to that of the human hormone estrogen) found in many plants. Dietary exposures to these plant estrogens (phytoestrogens) are presumably greater than are exposures to suspected synthetic endocrine modulators. No adverse health effects have been associated with the overwhelming majority of these dietary exposures.

- There currently is a trend in most environment sectors (i.e., air, water, and soil) toward decreasing concentrations of many environmental contaminants, including several that are suspected of being endocrine disrupters.

- Some of the key research findings that propelled the endocrine disrupter hypothesis have been retracted, are not reproducible, or have not been reproduced.

- The available human epidemiological data do not show any consistent, convincing evidence of increases in detrimental health effects related to industrial chemicals suspected of disrupting the endocrine system.

The Water Environment Research Foundation (WERF), AWWARF, and the WateReuse Foundation sponsored an international workshop in April 2000 to review the current state of PhAC and EDC research and identify issues of concern to water and wastewater entities. Based on the information presented and discussed in the workshop, AWWARF identified the following four areas of research needed to address concerns of drinking water and wastewater communities (AWWARF, 2001):

- Evaluation of conventional and emerging treatment processes to remove or reduce EDCs and PhACs.

- Development of a risk communication strategy to address public concerns regarding emerging contaminants.

- Development of a priority listing of potential EDCs and PhACs.

- Cooperative development of health effects research.

In addition to continuing to fund AWWARF research projects, the Agency participates in other activities in support of areas of research identified by AWWARF, as opportunity and funding allows. For example, the Agency's Board has authorized a pilot study that will, in part, evaluate the ability of new treatment technologies to remove or reduce PhACs and EDCs in wastewater. Agency staff also continues to keep apprised of the latest research information regarding PhACs and EDCs to evaluate potential implications to the Agency's water supply operations.

The Agency has also participated in sampling events to evaluate the presence of some of these chemicals and is also reviewing the results of research as it becomes available. The Agency has cooperated with sampling performed by the Marin Municipal Water District of water collected both from the Agency's collector wells and from the Russian River. River water samples were analyzed for pharmaceutically active compounds using new test methods being developed by researchers at U.C. Berkeley. Preliminary results did not detect 8 target pharmaceutical compounds at a reporting level in the parts per trillion range.

In addition, water samples from the collector wells have been submitted for analysis of EDCs as part of a research program sponsored by AWWARF. This study is utilizing a screening test method that targets certain EDCs. The results of the AWWARF study will not be released until the study is complete. The study is anticipated to be completed in approximately one year.

2.4.5 NITROSODIMETHYLAMINE (NDMA)

NDMA is another example of a chemical that has likely been present in drinking water supplies for several years but has only recently been identified due to improved analytical testing methods. NDMA is a known animal carcinogen and, according to the EPA is a "probable human

carcinogen" (EPA, 1997). As a consequence of these health affects, the action level for NDMA is a very low concentration of 20 parts per trillion. Although there is currently no drinking water MCL for NDMA, the DHS is reviewing health and water quality studies to determine whether a MCL should be established for NDMA.

According to the DHS (DHS, 2001), concerns about the presence of NDMA in water supply systems began in 1998 with the detection of NDMA in water supply wells in Sacramento County. Subsequent monitoring studies have found NDMA present in other water supply wells and treated wastewater systems within California at concentrations in the low parts per trillion to parts per billion range. NDMA appears to be associated with chemicals produced by the aerospace industry. In addition, preliminary evaluations indicated that the presence of NDMA in drinking water may be associated with disinfection processes. This suggestion is based on limited data and is considered to be inconclusive at this time pending the results of ongoing studies. The outcome of these studies will not only have an affect on drinking water systems but also the use of recycled water.

2.5 SUMMARY – PERFORMANCE OF WATER SUPPLY FACILITIES

The Agency's water supply facilities have reliably produced high quality potable water for a sustained period of time. Water quality has been demonstrated to be excellent for 40+ years through long-term monitoring and focused water quality studies. Natural filtration of water as it migrates through the alluvial aquifer produces reliable high quality water when compared to regulatory standards and action levels. Based on available information, land use practices upstream of the Agency's water supply facilities at Wohler and Mirabel (such as agricultural operations, gravel mining, wastewater operations, and recreation), do not appear to have adversely impacted water quality or production from the Agency's water supply facilities.

The Agency faces increasing challenges to the ability of these facilities to continue to reliably produce sufficient production capacity and excellent water quality. Consequently, the Agency must continuously evaluate issues that could impair the performance of its water supply facilities. The following summarizes the key issues described in this report facing the Agency regarding water supply and water quality.

- Water production varies with the natural conditions and operation of the inflatable dam. The inflatable dam is increasingly critical to meet not only peak demands but also increasing base demands throughout the fall and spring. Constraints to the operation of these facilities will significantly affect the production capacity and reliability of the Agency's water supply facilities.

- Emerging water quality issues involve the potential for regulation of chemicals that are currently not regulated. Regulatory action levels for some of these chemicals may be established in the near future while other chemicals may not be regulated for years, if at all, depending on the outcome of comprehensive health studies. The Agency intends to keep apprised of these issues and, as appropriate, participate in applied research studies and sampling programs to better understand the occurrence of such chemicals in the river and groundwater environment near the Agency's water supply facilities. Further, the

Agency will keep the Board and the public informed to the changing circumstances associated with emerging water quality issues and the risks they may pose to the Agency and its customers.

- To further evaluate and plan for potential water quality concerns, the Agency should continue to perform water quality studies to evaluate the presence of PhACs, EDCs, and NDMA in source river water and to investigate the ability of the alluvial aquifer to remove, decrease or attenuate these compounds (if present) while also following research to evaluate potential health concerns. In addition, the Agency should also participate in applied research studies that focus on the ability of innovative wastewater/water treatment technologies to remove or treat these compounds. Removal of these chemicals in wastewater streams can result in benefits to water supply, water quality, and environmental resources.

3.0 PLANNING EFFORTS FOR FUTURE WATER SUPPLY FACILITIES

The Agency is currently conducting planning efforts related to future water supply facilities. These planning efforts, preliminary in nature, are evaluating various scenarios to satisfy the Agency's water supply obligations. In particular, Agency staff must balance engineering concerns with environmental concerns associated with the Russian River watershed. The following presents a discussion of ongoing water supply planning efforts, and the linkage between water supply planning efforts and the Agency's and the Corps' ongoing Section 7 Consultation with the NMFS (Additional information regarding the ongoing Section 7 Consultation and related endangered species activities is included in Section 4.0 (Endangered Species Activities) of this staff report.

3.1 RELATIONSHIP OF WATER SUPPLY PLANNING EFFORTS TO THE AGENCY'S ONGOING SECTION 7 CONSULTATION

A central consideration of water supply planning efforts at the Agency, involves the linkage between the Agency's ongoing Section 7 Consultation and its water supply planning efforts. The Agency has entered into a Section 7 Consultation with the Corps and the NMFS as authorized under the ESA. A major focus of the consultation is to evaluate whether the operation of the Agency's existing water supply facilities negatively affect three threatened fish species in the Russian River watershed (chinook salmon, coho salmon, and steelhead). In addition, the Section 7 consultation will also evaluate the potential affect of future Agency water supply facilities on these species. Of particular significance to the Agency in terms of water supply planning is that the outcome of this process may affect how or if the Agency is able to operate the inflatable dam at Mirabel. As described previously in this report, the inability to operate the inflatable dam and Mirabel infiltration ponds or, implementation of restrictions regarding when the inflatable dam can be operated, could significantly reduce the production capacity of the Agency's existing facilities. As described below, the determination of whether the Agency is able to operate the inflatable dam and infiltration ponds will dictate whether the Agency must plan additional facilities to meet only future demand or whether future facilities must also account for lost production capacity of the existing facilities. Therefore, the Section 7 Consultation remains the driving force behind water supply planning efforts for the Agency, as the outcome of this process will dictate not only how current facilities are operated, but how future facilities will be constructed and operated.

3.2 EVALUATION OF DIVERSION ALTERNATIVES

The Agency is currently conducting studies to identify and evaluate potential water diversion alternatives. The following sections summarize the Agency's evaluation of various diversion alternatives for future water supply facilities.

3.3 WATER SUPPLY PLANNING SCENARIOS

Due to the uncertainties related to the outcome of the Section 7 consultation, the Agency must pursue multiple planning scenarios for future water supply facilities. At a minimum, the Agency must plan to meet the future water supply demands described by the Water Supply and Transmission System Project Environmental Impact Report (WSTSP EIR), certified and approved by the Agency's Board in December 1998. The WSTSP EIR provides for an increase in peak production capacity from 92 mgd to 149 mgd. As a worst case, should the outcome of the Section 7 consultation prohibit the use of the inflatable dam and the Mirabel infiltration ponds, the Agency's peak production capacity would be decreased from its current peak production capacity of approximately 84 mgd to about 40 mgd. Under these conditions, the Agency's planning efforts need to meet not only future WSTSP demands but also account for about half of its existing peak production capacity.

The Diversion Alternatives Program consists of engineering and scientific studies conducted by the Agency to evaluate potential future water supply facilities. There are two practical methods of obtaining or diverting water released under the Agency's water rights from Lake Sonoma and Lake Mendocino, including (1) continued diversion of water from the underlying alluvial aquifer associated with the Russian River, and (2) direct diversion of surface water from Lake Sonoma, Dry Creek, or the Russian River. Although water diverted from the alluvial aquifer is referred to as groundwater to distinguish it from water taken directly from streamflow, it is important to note that this water has been appropriated by the Agency and is either natural streamflow or has been released from Lake Sonoma and Lake Mendocino under the Agency's state authorized water rights. Consequently, from a water rights perspective, this water is not considered groundwater, for which no state permits must be obtained.

As discussed previously, diversion of water from the alluvial aquifer utilizes natural filtration processes so that a constructed treatment facility is not necessary to meet water quality standards other than disinfection and softening (pH adjustment). In contrast, direct diversion of surface water requires subsequent treatment to meet water quality standards. Consequently, surface water diversion requires the construction and operation of a treatment facility. Comparison of these two methods of water diversion shows that groundwater diversion produces the highest quality of water at a lower cost but may be less reliable from a planning perspective given environmental issues related to the Agency's existing facilities. As discussed previously, the Agency's ongoing Section 7 Consultation may result in the Agency's inability to operate the inflatable rubber dam, and, therefore, would reduce the potential for additional collector wells to reliably meet the Agency's water supply obligations. The following discusses the Agency's engineering planning efforts related to both of these diversion methods.

3.4 GROUNDWATER DIVERSION STUDIES

The Agency has diverted groundwater from the alluvial aquifer associated with the Russian River for over forty years. The Agency is conducting studies to evaluate the continuation of such diversions to meet water supply needs in accordance with the previously described planning scenarios.

Specifically, the Agency is conducting hydrogeologic and engineering studies to better understand the nature and extent of the alluvial aquifer, the effectiveness of natural filtration, and how new innovative technologies may be utilized to enhance water production capacity from diversion facilities. The Agency is evaluating the alluvial aquifer from its existing Wohler facilities to the confluence of the Russian River with Dry Creek. Several hydrogeologic studies have been or will be conducted utilizing the following methods: (1) geophysical studies including seismic refraction, self-potential, and electromagnetic surveys; (2) drilling and well installation; (3) aquifer testing; (4) water level and temperature monitoring of surface water and underlying groundwater to evaluate surface water/groundwater interactions; and (5) water quality monitoring, including vertical profiling of water quality through the alluvial aquifer to evaluate the efficiency of natural filtration with depth. A three-dimensional groundwater flow model was developed to assimilate the data gathered and to evaluate how groundwater reacts to different hydrogeologic and pumping conditions. This model is updated and modified as new information becomes available.

As mentioned above, the Agency is also evaluating the feasibility of utilizing new technologies (primarily developed in the oil and gas exploration industry) into the design of future water diversion facilities to increase production capacity of diversion facilities. Given current and future environmental regulations, it is likely that the placement of surface features such as caissons and pump houses will be constrained and, as with Collector No. 6, it will be necessary to locate such facilities farther from the river than is desirable to maximize water production. In addition, if the Agency pursues additional diversion facilities upriver of its existing facilities, such future facilities will be located in areas outside of the backwater of the inflatable dam and, therefore, not benefit from the enhanced groundwater conditions from increased infiltration. The result of decreased production capacity from each future diversion facility (relative to existing facilities) is that more facilities will ultimately need to be constructed and operated to meet water supply needs. For these reasons, the Agency continues to evaluate potential technology advances that will increase production capacity from a given diversion facility.

3.5 SURFACE WATER DIVERSION AND TREATMENT

The Agency is currently conducting a study to evaluate the feasibility of surface water diversion and treatment. Direct diversion of surface water could occur from the Russian River, Dry Creek, or Lake Sonoma. The major components of a surface water diversion and treatment facility include: (1) the diversion facility, (2) treatment plant, and (3) interconnecting pipelines between the diversion facility and the treatment plant and from the treatment plant to the Agency's transmission system. The treatment technologies being evaluated are conventional water treatment, Actiflow treatment, and membrane technologies. The current study is evaluating a total of six diversion/treatment facility configurations, three configurations for future WSTSP demands only and three configurations for future WSTSP demands in addition to lost capacity from existing facilities.

3.6 STATUS OF WATER SUPPLY PLANNING EFFORTS AND THE ENVIRONMENTAL REVIEW PROCESS

The outcome of the Agency's Section 7 Consultation will affect which potential water supply projects may be feasible to meet future needs. Consequently, both the engineering studies and subsequent project-specific review in compliance with the California Environmental Quality Act (CEQA) depend on the result of the Section 7 Consultation.

Once potential engineering options have been developed and the outcome of the Section 7 consultation is known, specific potential diversion alternative projects will be carried forward for full environmental impact review in compliance with CEQA. These alternatives may consist of groundwater diversions, surface water diversion and treatment, or a combination of both methods.

Agency staff anticipate that the Section 7 Consultation process will be completed in 2003. Subsequent to completion of the Section 7 Consultation process, both engineering options and environmental review under CEQA would be completed.

4.0 ENDANGERED SPECIES ACTIVITIES

To support the ongoing Section 7 Consultation, the Agency is assisting the Corps in conducting flow studies in Dry Creek and the main stem of the Russian River between Coyote Valley Dam and Cloverdale. In addition, the Agency is also coordinating several other activities in support of the Section 7 Consultation and the Agency's ongoing efforts to protect listed fish species in the Russian River watershed. The following presents an update of the Agency's Section 7 Consultation and a discussion of recent Agency activities including the flow studies, ongoing Agency efforts to protect listed fish species, and the Agency's participation in recovery planning actions for listed fish species.

4.1 SECTION 7 CONSULTATION UPDATE

In December 1997, the Corps, NMFS, and the Agency entered into a Memorandum of Understanding (MOU) for consultation under Section 7 of the ESA to evaluate the effects of certain Corps, Agency, and Mendocino County Russian River Flood Control and Water Conservation Improvement District (Mendocino County) facilities and operations on fish species listed as threatened under the ESA in the Russian River: steelhead, coho salmon, and chinook salmon. As part of this effort, the Agency and Corps are having a Biological Assessment (BA) prepared to assess impacts of the Corps' and Agency's operations related to flood control and water supply, and to support the Section 7 Consultation. The BA will provide a description of the actions subject to consultation, and ultimately provide the basis for NMFS to prepare a Biological Opinion (BO) that will evaluate the project, including conservation actions. As part of preparing the BA, interim reports are being assembled that document the effects of the Corps and Agency's ongoing activities in the Russian River system on listed fish species. At the completion of the interim reports, the BA will be prepared incorporating information from the various interim reports, and will include an assessment of alternatives to existing operatations. Once the BA is submitted to NMFS, formal consultation under the ESA will be initiated. During the formal consultation process, NMFS will make an assessment of whether the proposed action is likely to jeopardize the continued existence of the species. NMFS will present this conclusion in the BO. The BO will direct how Corps, Agency, and Mendocino County facilities may be operated.

To date, seven of the eight Interim Reports that will be integrated in the BA have been completed. The ESA provides that the analyses included in the BA are to be based on the best available scientific and commercial data. Thus, although no new studies are required under the ESA, the parties involved agreed to collect additional information related to flow-related habitat and salmonid monitoring at the inflatable dam to support development of the BA.

The final report, Interim Report 3, which addresses Flow-Related Habitat, is scheduled for completion in February 2002. A Public Policy Facilitating Committee (PPFC) meeting is scheduled for March 2002 to discuss the findings in Interim Report 3 and receive public input. Although not required for a Section 7 consultation, the BA will also consider alternatives for certain topic areas for activities most likely to impact the listed fish species. These topic areas

are flood control, fish hatchery operations, flow-related habitat, and water supply and diversion facilities. An Alternatives Report will be prepared that includes a project description for each alternative, a description of the objective of the alternative, the expected improvements to operations, and the benefits and/or potential effects of the alternative on listed fish species. This Alternatives Report will be used to evaluate the alternative operations and maintenance options for analysis in the BA. The Alternatives Report is scheduled for completion following Interim Report 3.

The Draft BA is scheduled for completion in Fall 2002. The Final BA is scheduled for completion in early 2003. It is anticipated that the NMFS would issue the BO in 2003. The Agency anticipates that the BO will include guidance in the form of conservation recommendations, reasonable and prudent measures, and terms and conditions that the Agency and Corps will need to follow in order to protect listed fish species.

4.2 FLOW HABITAT STUDIES

To support the ongoing Section 7 Consultation and to provide the best available scientific data for inclusion in the BA, NMFS requested that the Corps, in conjunction with the annual safety inspections and repair work at Warm Springs and Coyote Valley dams, evaluate the effect of flow changes on salmonid habitat. NMFS requested that the Corps conduct the study to develop flow-related habitat information to support the ongoing Section 7 Consultation. The study was conducted in conjunction with reductions in instream flow associated with the annual inspections, and involved evaluating instream habitat characteristics during the low flow period and then re-evaluating the instream habitat at various flow rates as the releases from the dam were increased. The study was conducted on Dry Creek in Sonoma County and on the mainstem Russian River above Cloverdale in Sonoma and Mendocino Counties. Staff from NMFS, the California Department of Fish and Game (CDFG), the California Regional Water Quality Control Board, North Coast Region (NCRWQCB), Entrix, Inc. (Agency consultant), and the Agency assisted the Corps in gathering information during the assessment. The Warm Springs and Coyote Valley dams inspection and repair work and study began on September 10, 2001 and was completed on October 5, 2001.

Information developed by the study will be used to augment the flow-related habitat analysis portion of the BA being prepared for the Section 7 Consultation. Specifically, the study will develop additional information regarding the effects of different stream flows on salmonid habitat along two key spawning and rearing reaches of the Russian River and Dry Creek. The study followed an approach recommended by NMFS to develop and present information for the BA. The flow study was accomplished by using a combination of field measurements, observations by a team of professional fisheries and aquatic biologists, and a qualitative analysis of available habitat at alternative flows. Field measurements included collecting data on the channel profile and substrate, as well as measuring water velocity, depth and wetted channel width. The data collected during the study are being evaluated in conjunction with perceived changes (as evaluated by a team of fisheries and aquatic biologists) in the relative quality and quantity of spawning and rearing habitat for coho salmon, chinook salmon and steelhead.

Flow releases from the two dams were coordinated in terms of volume and timing to meet minimum flow requirements below Healdsburg and to maintain water supply. Specifically, when flows were reduced from Warm Springs Dam, releases were increased from Coyote Valley Dam a few days earlier to coincide with and compensate for the reduced amount of water that was being delivered to the system. Similarly, when releases were reduced from Coyote Valley Dam, flows from Warm Spring Dam were increased to balance flows. To date, the field work portion of the study has been completed. The data and qualitative assessment information gathered during the study is currently being analyzed for inclusion in the BA. The outcome of this analysis, in combination with a synthesis of the analyses contained in the Interim Reports, will lead to a determination regarding the potential effects of various flows on salmonid habitat. Based on the analyses, changes in flow levels may be required. The evaluation prepared for the Draft and Final BAs will contain the overall assessment and conclusions regarding recommended flow levels for salmonid habitat. For further information regarding the flow studies including methodologies, please refer to Appendix A of this report.

4.3 PROTECTION OF LISTED FISH SPECIES

The Agency is involved with a number of restoration and conservation efforts to benefit listed fish species and their critical habitat in the Russian River basin. The Agency either funds or implements these projects with staff time and materials, or through some combination of funding and applied resources. The following presents a summary of activities undertaken by the Agency to protect listed fish species.

4.3.1 RESTORATION ACTIONS

Restoration actions either funded or conducted by the Agency include direct restoration projects such as riparian and aquatic habitat protection, restoration and enhancement, and fish passage, as well as programs to enhance watershed management and water conservation and reuse. The Agency develops restoration project priorities on a basin-wide level in cooperation with CDFG, other public agencies and private interests in the watershed. These projects include restoration of riparian vegetation, improvement to instream habitat, and improvement to fish passage. For more information about the Agency's restoration projects and efforts, please refer to the Fisheries Enhancement Program section of this report.

4.3.2 WATER CONSERVATION AND REUSE

The Agency, on behalf of the water contractors, coordinates and implements a water conservation program. The primary purpose of the program is to protect and enhance regional water supplies. A secondary purpose of the program is to help in reducing diversions on the Russian River. The Water Conservation Program is expected to help in meeting future water demands and may help to reduce the amount of water diverted from the Russian River. Water reuse and conservation is anticipated to reduce peak water demand and diversions on the order of three to five percent.

4.3.3 WATERSHED MANAGEMENT PROJECTS

As part of continuing efforts to protect Russian River listed fish species, the Agency funds and conducts scientific research efforts, disseminates information, and facilitates the regional coordination of management efforts to restore and conserve protected species and their critical habitat. Data collected regarding population trends and habitat use in the Russian River watershed will help focus conservation actions where they will have the greatest effect. Sharing information and coordinating restoration actions with other agencies and resource groups maximizes limited financial resources and beneficial effects. The Agency continues to work with outside entities to further disseminate scientific information collected by the Agency.

4.4 RECOVERY PLANNING ACTIONS

While restoration activities are helpful in enhancing and preserving critical habitat for listed fish species, the Agency, in conjunction with state, federal, and local agencies, is working towards the ultimate recovery of listed fish species in the region, which includes the Russian River watershed. Currently, the Agency is supporting studies needed for the federal recovery planning process, and is participating in the local, state, and federal collaborative approach that is needed for recovery of listed salmonids in the region. The Agency is working with NMFS and CDFG to develop a MOU that provides a framework for coordination and cooperation among applicable entities to advance and further the recovery planning and recovery implementation process for threatened salmonids within NMFS' North-central California Coast Planning Domain (Planning Domain) (Figure 7). Additionally, the Agency is currently coordinating the development and seeking funding assistance for several tools that will assist the recovery planning process and will integrate federal, state, regional and local agencies and other entities in restoration, research and recovery activities. As discussed below, these tools will provide information integral to the recovery planning process by providing information on habitat conditions needed to recover listed fish species and focus restoration actions.

4.4.1 NORTH BAY KLAMATH RESOURCE INFORMATION SYSTEM (KRIS) PROGRAM AND GEOGRAPHIC INFORMATION SYSTEM (GIS)

The Agency is funding development of a KRIS database for the North Bay that will centralize existing watershed information and GIS data pertinent to salmon and steelhead recovery, and develop new data relevant to the Agency's ongoing Section 7 Consultation. This database will assist in the recovery planning process. The KRIS database program is currently being used as an information management tool by state agencies for a number of other north coast watersheds and ultimately will provide a unified platform for data review, analysis, and maintenance.

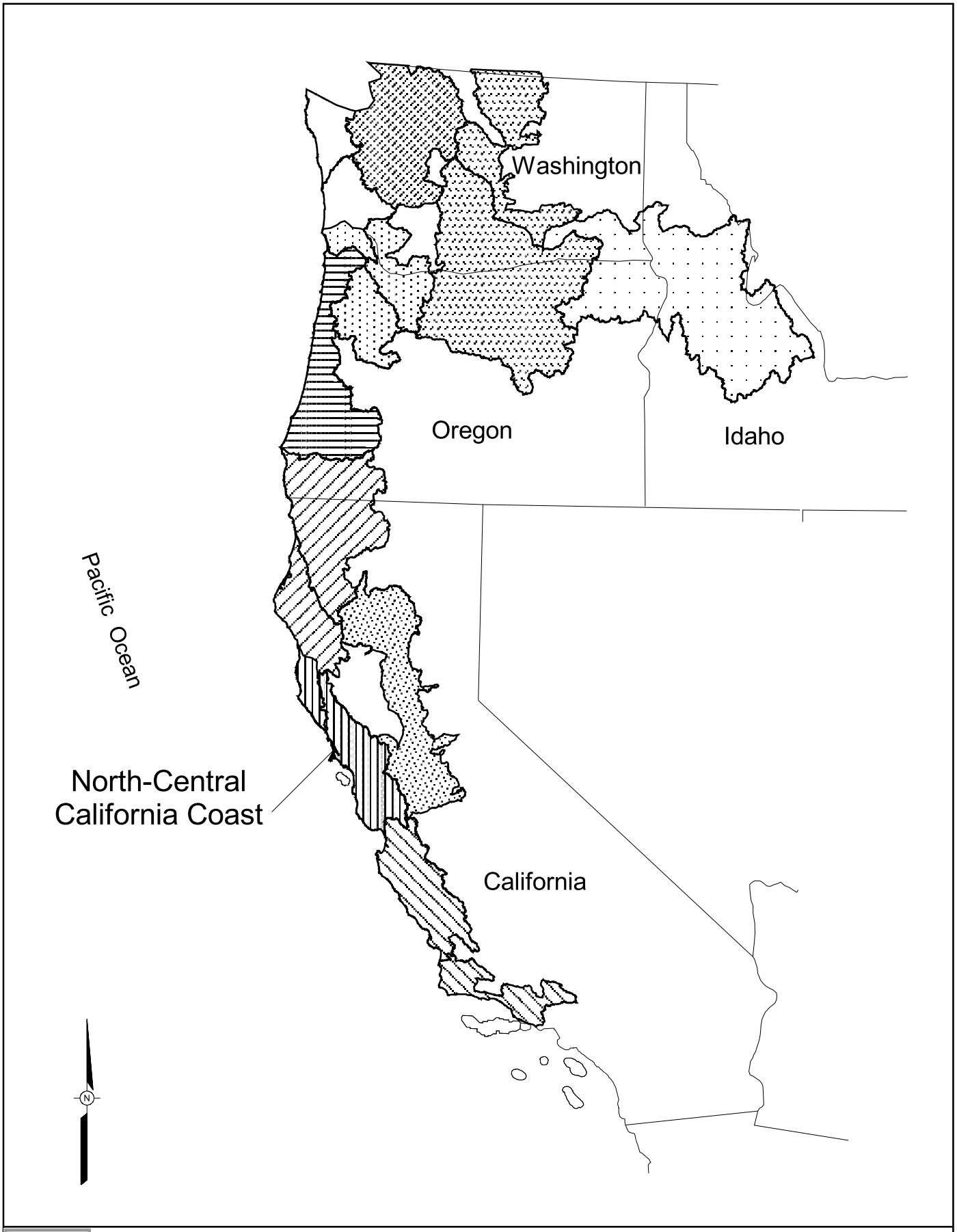


FIGURE 7

NORTH-CENTRAL CALIFORNIA COAST PLANNING DOMAIN

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The North Bay KRIS Program database will include information on separate watersheds in the northern portion of the Planning Domain including: the Navarro and Garcia Rivers and immediately adjacent minor streams; the San Pablo Bay excluding the Napa River; the Russian River; as well as coastal watersheds of Marin and Sonoma counties including Salmon Creek, Bodega Bay, and Tomales and Drakes Bays (Figure 8). The Agency anticipates that a KRIS and supporting GIS would provide a database of existing information relevant to fisheries, water quality, and watershed management throughout the north coast region. Additional GIS layers needed for recovery planning could be developed under a separate program and prioritized in coordination with NMFS, CDFG, and the NCRWQCB, and other state and local entities involved in the recovery planning process in the Planning Domain. Agency staff will investigate this option as the recovery planning process moves forward.

4.4.2 RUSSIAN RIVER BASIN PLAN REVISION

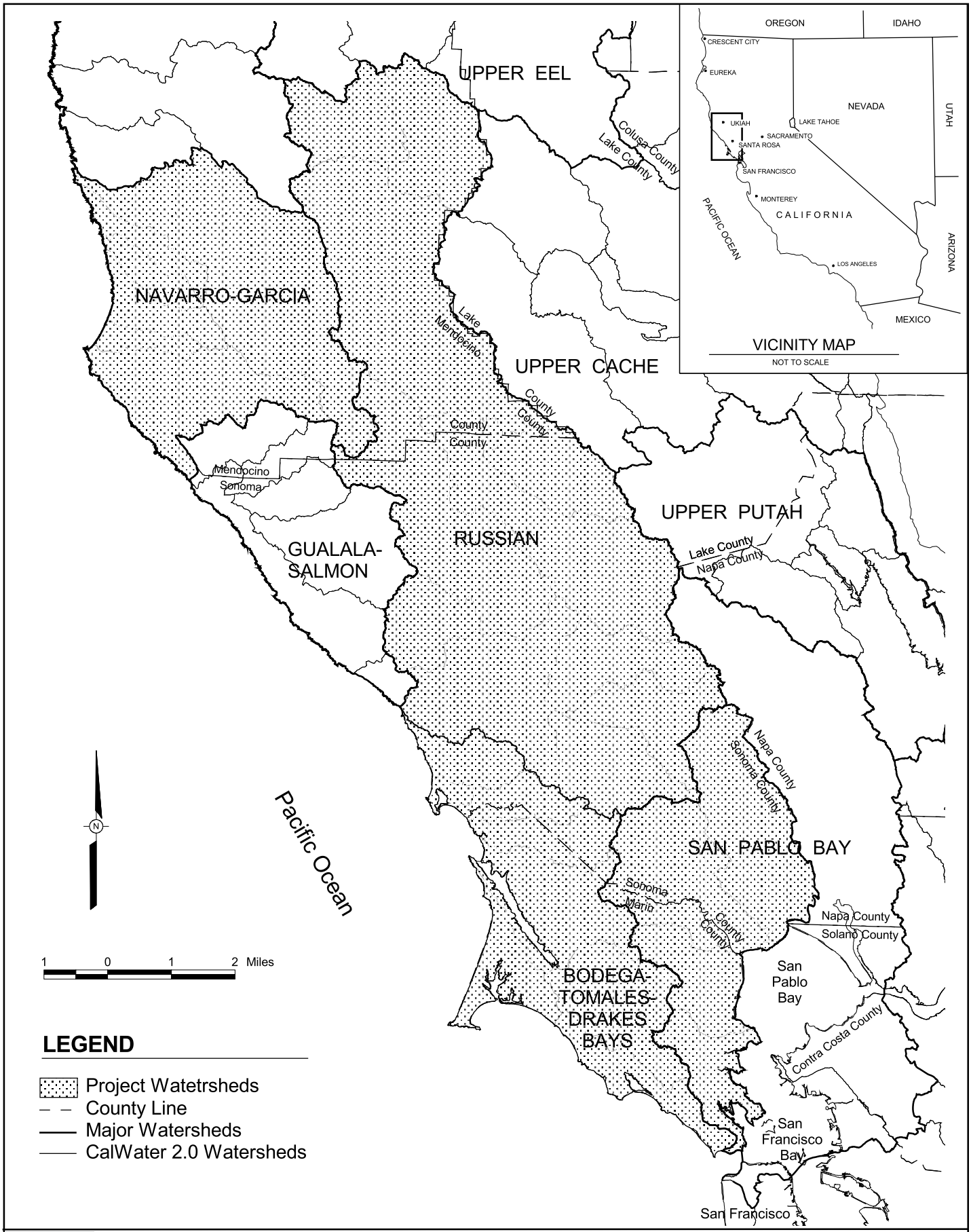
The Agency is currently funding the NCRWQCB's effort to revise the Russian River Basin Plan to incorporate water quality objectives and criteria protective of salmonids. The NCRWQCB is also being funded by the Agency to provide oversight in the development of a Russian River Water Quality Model (discussed below). The NCRWQCB is conducting various water quality monitoring activities and analyses to provide data necessary for the Basin Plan Amendment. These data will also be used to calibrate the Russian River Water Quality Model, and could be used for additional temperature and water quality models for north coast watersheds in the Planning Domain.

4.4.3 WATER QUALITY MODELING

The Agency has funded the development of a Russian River Water Quality Model with oversight by the NCRWQCB. The model will be used by the Agency and Entrix, Inc., for preparation of the Section 7 Consultation BA, and by the NCRWQCB during revision of the Russian River Basin Plan. Additional temperature and/or water quality models may be developed for streams and creeks within the Planning Domain. It is anticipated that the Agency would work cooperatively with the NCRWQCB and the San Francisco Bay Regional Water Quality Control Board to develop additional models.

4.4.4 CONSERVATION HATCHERY PROGRAM

As part of preparation of alternatives for the BA for the Section 7 Consultation, an investigation is being conducted by FishPro, Inc., and Entrix, Inc., into the feasibility of developing a conservation hatchery program for the Russian River. A conservation hatchery would be used to facilitate recovery of native fisheries in the Russian River watershed. A conservation hatchery is a rearing facility that breeds fish genetically equivalent to native stock, with the goal of rearing fish capable of returning to reproduce naturally in their native habitat. Unlike production-oriented hatcheries, a conservation hatchery is intended to contribute to the recovery of a listed fish species by supplementing the native population. The area's existing hatcheries (owned by the Corps and operated by CDFG) are primarily production oriented, but could function as conservation hatcheries by incorporating new conservation management strategies.



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SONOMA COUNTY WATER AGENCY

FIGURE 8

NORTH BAY KRIS PROGRAM PROJECT WATERSHEDS

The Agency is currently investigating existing conservation hatcheries to determine the applicability of developing a conservation hatchery in the Russian River system.

4.4.5 GENETICS RESEARCH

The Agency is currently funding genetic research being conducted by the Bodega Marine Lab (BML) to document biodiversity of coastal salmon in northern California for fisheries enhancement. Genetics research will help to identify native fish stocks and focus recovery efforts. The genetic analyses will identify native fish stocks in the Russian River watershed, the location of these stocks, and whether these stocks are suitable for use in a conservation hatchery. Under the agreement, BML is conducting a study of population genetics for coho and chinook salmon and steelhead in the Russian River watershed. The information developed will contribute to recovery planning efforts for these listed fish species within the Russian River. Recent changes in BML's ability to conduct the work due to permitting constraints may limit BML's ability to perform all of the services in the scope of the original agreement. The Agency is working with BML to revise the scope of work to reflect ongoing research needs and permitting constraints.

4.4.6 CALIFORNIA COASTAL OCEAN MONITORING

The Agency is funding BML to conduct coastal ocean monitoring. Salmon spend approximately seventy-five percent of their life in the ocean but little is known about how ocean conditions influence salmonid survival and abundance. To effectively evaluate future changes in management practices within the Russian River watershed, it is imperative to differentiate between the impact to salmon populations due to changes in ocean conditions and the impact due to changes in watershed management practices. Ocean monitoring will involve the placement of high-frequency coastal radar units and mooring to allow for data collection in marine areas not currently addressed by existing ocean monitoring equipment. BML will use data collected by the instrumentation to develop a description of ocean circulation, from Point Reyes to Stewart's Point, and describe ocean conditions that influence salmonid survival and abundance in the Russian River watershed.

5.0 AGENCY WATERSHED PROTECTION ACTIVITIES

Over the past several years, the Agency has been instrumental in efforts to protect listed fish species in the Russian River and its tributaries, as well as the existing water supply system. As part of its ongoing efforts, the Agency is currently investigating partnership opportunities with other entities to further protect the Russian River and its tributaries, including the protection of native habitat for listed fish species, water supply, and water quality. The following provides a discussion of ongoing Agency activities to protect and preserve native habitats in the Russian River system, and efforts to protect water supply and quality, including: the Agency's Fisheries Enhancement Program (FEP), a program that has funded numerous restoration and habitat enhancement activities in the Russian River and its tributaries; Agency partnerships, including the Cooley Ranch Watershed Protection Project, a joint-effort with the Sonoma County Agricultural Preservation and Open Space District to protect the water quality in lands surrounding Lake Sonoma; and, ongoing efforts to protect water supply and habitat for listed fish species in Dry Creek Valley.

5.1 FISHERIES ENHANCEMENT PROGRAM

Since 1996, the Agency has conducted and coordinated a FEP aimed at improving native fish resources of the Russian River and its tributaries. The primary focus of the FEP is to enhance habitat for three federally protected salmonids: steelhead, chinook salmon, and coho salmon. The specific objectives of the FEP are:

- To work cooperatively and in conjunction with other federal, state, and local agencies to preserve, enhance and restore fishery habitats and resources;
- To develop research programs to study the fisheries within affected watersheds; and
- To assist the Agency in the assessment of impacts, the writing of environmental documents, and permit compliance for Agency projects which may affect fisheries resources.

To accomplish the objectives of the FEP, the Agency conducts and coordinates fishery enhancement projects and provides grants to private and public organizations as an incentive to implement fish enhancement projects. Typical FEP projects include stream restoration, fish surveys, habitat assessments, and other fish enhancement activities. FEP projects are coordinated with various agencies, such as the CDFG, NCRWQCB, NMFS, United States Fish and Wildlife Service (USFWS), and local Resource Conservation Districts (RCDs). The priorities for specific projects are established by the Agency in collaboration with CDFG and other agencies. Data collected during FEP habitat studies are provided to CDFG for entry into the Russian River Basin Plan Geographic Information System database and is accessible to other agencies through CDFG. Also, the Agency maintains all data collected for the FEP in its files.

The FEP has been quite successful since its start in 1996. During the four-year period ended in Fiscal Year 2000-2001, a total of 69 FEP projects were approved and funded. These activities included 37 stream restoration projects, 16 fish and habitat studies, and 16 other projects that

further the FEP objectives. Currently, Agency natural resources staff is conducting several noteworthy projects in the Russian River system. A brief description of each project is presented below.

5.1.1 COPELAND CREEK RESTORATION PROJECT

The Agency is conducting a stream restoration project in an unincorporated area of Sonoma County near Sonoma State University on the Grossi, Sangiacomo, and Anderson properties. The project site is located on approximately 6,000 feet of Copeland Creek between Roberts/Pressley Road and Petaluma Hill Road. The project will involve construction of cattle exclosure and monument fencing, recontouring heavily eroded stream banks, and revegetation with native riparian species. Historically, the project site has been grazed by cattle and horses. Grazing pressures have limited vegetation establishment to non-native grasses and forbs, with tree cover limited to a stand of non-native Eucalyptus, some scattered oaks (*Quercus* sp.), and California buckeye (*Aesculus californicus*). Numerous cattle paths cross the channel and trampling has exacerbated erosion of the banks. Restoration of this section of stream will decrease sediment load and improve fish habitat. Tasks completed in the 1999-00 Work Plan included installation of 7,600 feet of cattle exclusion and monument fencing, recontouring approximately 1,000 feet of streambank, installation of erosion control materials, and the installation of several thousand native trees and plants. Tasks completed in the 2000-2001 Work Plan included the recontouring of an additional 4,000 linear feet of streambank and installation of approximately 4,000 native plants and trees. Tasks proposed for the 2001-02 Work Plan include the recontouring of the final 1,000 linear feet of streambank and installation of approximately 1,000 native plants and trees as well as construction of 2,000 linear feet of cattle exclosure fencing. A monitoring component has also been added to this project for 2001-2002 and will continue for the next five years.

5.1.2 MUMFORD DAM FISH PASSAGE AND RIPARIAN RESTORATION

The Mumford Dam is a medium-size privately-owned diversion dam (approximately 60 wide and 8 feet high) located on the west branch of the Russian River near the town of Redwood Valley in Mendocino County. The dam is used to divert flows for vineyard irrigation and frost protection. Since its construction in the 1970s, the streambed below the dam has down cut between 8-15 feet. This severe down cutting has virtually eliminated fish passage over the structure, restricting access to approximately 50 miles of spawning habitat. In addition, the down cutting has caused massive erosion and bank failure for approximately 600 feet below the dam. The project will involve recontouring the streambanks to a more stabile profile, constructing a series of weirs to facilitate fish passage, and revegetation with native plants. The project will also include upgrading the diversion facilities to be compliant with NMFS fish screening criteria. The Agency has secured a grant commitment through Senate Bill 271 (SB271) for $283,000 in matching funds for construction of this project. Currently, Agency staff are conducting environmental review and preliminary engineering in support of this project.

5.1.3 CROCKER CREEK DAM REMOVAL PROJECT

This project will involve demolition of the remaining dam infrastructure, recontouring the streambanks to a more stable profile, constructing a series of weirs to facilitate fish passage, and

revegetation with native plants. The objective of the project is to restore anadromous fish access to the Crocker Creek watershed and stabilize streambanks in the vicinity of the Crocker Creek dam. The proposed project will benefit primarily steelhead, although both coho and chinook are also present in the Russian River watershed. The Agency has secured a grant through SB271 for $171,000 in matching funds for construction of this project. Implementation of the proposed project will require many tasks including topographical survey of the project site, engineering and design, permitting and environmental compliance, as well as several phases of construction. Currently, Agency staff are conducting environmental review and preliminary engineering in support of this project.

5.2 AGENCY PARTNERSHIPS

The Agency continues to explore partnership opportunities with other agencies. One example where the Agency is partnering to protect watershed lands is occuring adjacent to Lake Sonoma. The Agency received Board approval and authorization to execute a funding agreement between the Agency and the Sonoma County Agricultural Preservation and Open Space District (District) in the amount of $250,000 to contribute toward the District's acquisition of the Cooley Ranch Conservation Easement.

On July 10, 2001 the Board of Directors of the District approved execution of an agreement with the Cooley Ranch Company for acquisition of a conservation easement over 19,064 acres of land in Northern Sonoma County and Southern Mendocino County bordered by Lake Sonoma on the south and known as the Cooley Ranch. The proposed Cooley Ranch Conservation Easement will provide for large-scale watershed protection over an area that includes the sub-watersheds of five tributaries to Dry Creek and covers approximately 1/3 of the privately owned lands within the watershed of Lake Sonoma. Dry Creek is the main tributary to Lake Sonoma and Lake Sonoma is the primary source of the Agency's water supply.

Specific aspects of the proposed Cooley Ranch Conservation Easement that would protect the water quality attributes of the Lake Sonoma watershed include a 100-foot buffer on both sides of certain creeks, restrictions on development and road construction, restrictions on off-road motor vehicle use, restrictions on agrochemical use, restoration and enhancement activities including bank and soil stabilization and practices to reduce erosion, restrictions on timber harvest, and restrictions on dumping of refuse. Many of these provisions also protect the water supply capacity of Lake Sonoma by reducing the rate of sedimentation into the lake.

The funding agreement will also require the District to provide the Agency with information about escorted public access opportunities and natural resource studies on the Cooley Ranch as they arise so that Agency staff may have an opportunity to participate. In addition, the proposed agreement will require that the District provide the Agency with copies of Baseline Documentation describing the current condition of the Cooley Ranch property, and copies of any conservation easement monitoring reports prepared in the future by the District. The Baseline Documentation and easement monitoring reports will provide the Agency with additional information on existing water resources, water quality condition, and biotic features of the Lake Sonoma watershed.

In addition to the example above, the Agency is continuing efforts to identify partnership opportunities with County agencies and other entities to protect and enhance watershed lands.

5.3 DRY CREEK VALLEY

An important area of concern for the Agency with regard to species protection, and water supply and quality is the Dry Creek Valley area. Dry Creek, a tributary of the Russian River, provides potential habitat for federally threatened species including coho and chinook salmon, and steelhead. Dry Creek also serves as the primary conveyance of water from the Agency's water supply pool located in Lake Sonoma to the Russian River. Water, released from Lake Sonoma, flows downstream to the main stem of the Russian River. Once in the Russian River, the water is then available to meet minimum streamflow requirements, and for water supply diversion at the Agency's Mirabel and Wohler facilities. In addition to the Agency's use of Dry Creek for conveyance, a number of agricultural users in the valley also use Dry Creek as a source of water supply for agricultural purposes. Therefore, based on habitat and water supply concerns, the maintenance and the continued efficient operation of Dry Creek as both a conveyance for water supply, and as habitat for listed fish species is essential. To address the use of Dry Creek for water supply purposes while at the same time protecting and preserving habitat for listed fish species, the Agency is currently negotiating an agreement with the Dry Creek Agricultural Water Users, Inc. to better manage existing diversions along Dry Creek for agricultural purposes. The Agency anticipates completion of an agreement with the corporation over the next year. With an agreement in place, protection of the Dry Creek Valley for listed fish species, and as a water supply conveyance system will be better assured.

6.0 AGRICULTURAL REUSE PROJECTS

The Agency is currently working with various entities to investigate the feasibility of projects that use recycled wastewater for beneficial purposes. In particular, the Agency is interested in exploring opportunities to offset existing use of potable water from the Russian River system for agricultural purposes. Recycled water presents a viable and beneficial option to offset potable water used for agricultural irrigation. The Agency has entered into numerous individual agreements with landowners for the use of recycled water produced by Agency operated sanitation facilities. To further promote the use of recycled water, the Agency has also begun to explore two potential large-scale recycled water projects to offset agricultural uses in both northern Sonoma County and in the Sonoma Valley. The following presents a discussion of these two projects.

6.1 NORTH SONOMA COUNTY AGRICULTURAL REUSE PROJECT

6.1.1 PROJECT DESCRIPTION

The former North Sonoma County Water Conservation Corporation, now known as the Coalition for Sustainable Agriculture (CSA) and the Agency are jointly participating in investigating the feasibility of a recycled water project that includes a storage and distribution system for the agricultural use of recycled water. Recycled water would be delivered to the north county through the City of Santa Rosa Subregional Reclamation System Geysers Pipeline.

There are approximately 6,500 acres of agricultural lands owned and/or managed by the CSA members within the entire area that could be irrigated with recycled water. There are at least 14,000 acres of additional agricultural lands within the entire area that are owned by non-CSA entities, and it is possible that some portion of these lands could also be served by the proposed project. See Figure 8 for the location of agricultural lands that could be served with recycled water.

6.1.2 PROJECT PURPOSE

The purpose of the project would be to provide recycled water as an alternative source of water, thus reducing reliance on natural regional water supplies. Presently, agricultural entities divert water directly from the Russian River and its tributaries, or from groundwater wells. Some of the groundwater wells are likely pumping underflow of the Russian River as they are located within the river's alluvial area. Concerns raised by regulatory entities regarding potential impacts to fishery resources within the Russian River watershed may result in limitations on diversion of water within the watershed. The project could provide the CSA and other potential users with a reliable water supply, thereby reducing demands on the region's natural water sources. The project will also provide the City of Santa Rosa, as well as other potential regional wastewater generators, with a beneficial use for recycled water.

Currently, the project is in the feasibility stage. The Agency has received a federal funding commitment of $500,000 from the Bureau of Reclamation for completing project feasibility

studies. After completion of feasibility studies on potential project alternatives, the project would require CEQA environmental review and design, approval of the project, and obtainment of design and construction funding. If the Board approves the project, and adequate funding is secured, the construction of storage reservoirs, conveyance and distribution pipelines, and pump stations would then commence.

6.2 SONOMA VALLEY RECYCLED WATER PROJECT

6.2.1 BACKGROUND

To promote the use of recycled water, the Sonoma Valley County Sanitation District (SVCSD), in conjunction with the Valley of the Moon Water District (VOMWD), and the City of Sonoma, is studying the feasibility of alternatives to store and supply recycled water to potential users within the Sonoma Valley. The VOMWD and City of Sonoma rely on both the Russian River watershed and local groundwater for potable water use. Recycled water presents a potential source of water to supplement and offset existing use of potable water supplies within the Sonoma Valley. The following presents a discussion of the project including the project objectives and benefits.

6.2.2 PROJECT DESCRIPTION

The project includes construction and operation of a recycled water pipeline and associated storage. The project is anticipated to expand reuse of treated effluent for agricultural, institutional, and recreational (city parks, golf course) interests located along the pipeline's route. The project is expected to include connections from the pipeline to storage sites, connection to existing piping facilities, and connections to planned future recycled water users.

The project is also expected to occur in phases. The initial phase would consist of preparing a feasibility study to evaluate potential project alternatives. The second phase would include preparation of environmental documentation in compliance with CEQA, Board approval of the project, and the obtainment of adequate funding. The third phase would consist of design and construction. After completion of the project, the system would provide recycled water to the previously mentioned users.

6.2.3 PROJECT OBJECTIVES AND BENEFITS

The project, as discussed above, would provide significant opportunities for the beneficial reuse of recycled water within both the City of Sonoma and Sonoma Valley. The following presents the objectives and benefits of implementing the project. Specifically, the project would:

- Provide storage capacity for treated effluent to be beneficially reused during the summer months for irrigation of agricultural and institutional land;
- Provide recycled water to users in the VOMWD and City of Sonoma to offset potable water use;
- Reduce use of existing groundwater resources by providing a source of recycled water to offset current groundwater use by the VOMWD and City of Sonoma.

7.0 AREAS FOR POLICY DIRECTION

Based on the issues presented in this staff report, the Agency has identified several areas for policy direction. The Agency should continue to conduct research and studies necessary to further quantify and document impacts to water supply and quality of various activities in the Russian River. Further, the Agency should continue to pursue efforts aimed at enhancing, preserving, and protecting the Russian River watershed. Finally, given changes in Agency responsibilities and watershed conditions since 1991, the Agency should update its Water Policy Statement. Specifically, Agency staff request Board direction as described below.

7.1 RUSSIAN RIVER ACTIVITIES

- Continue studies and research regarding advanced wastewater treatment technologies and the ability of natural filtration to address emerging water quality issues for potable water supply along the Russian River.
- Continue to work with federal, state, and local agencies on cooperative efforts to preserve and protect the water supply, water quality, and environmental resources of the Russian River watershed.
- Work with the City of Sonoma and Valley of the Moon Water District on a cooperative project to provide recycled water to municipal, institutional, commercial, agricultural, and environmental users in the Sonoma Valley, thus promoting protection of Russian River water supplies.

7.2 WATER POLICY

- Update the Agency's Water Policy to reflect new circumstances and Agency responsibilities.
- Schedule a Board workshop on the update of the Agency's Water Policy.

8.0 ACKNOWLEDGEMENTS

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