Environmental Assessment

for the

Issuance of an Incidental Take Permit under Section 10(a)(1)(B) of the Endangered Species Act for the Humboldt Bay Municipal Water District's Operations and Maintenance Activities on the Mad River

December 31, 2002

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ABBREVIATIONS USED IN THIS ENVIRONMENTAL ASSESSMENT

ACOE	Army Corps of Engineers
CCAA	Candidate Conservation Agreement with Assurances
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
District	Humboldt Bay Municipal Water District
DFG	Department of Fish and Game
EA	Environmental Assessment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FONSI	Finding of No Significant Impact
HBMWD	Humboldt Bay Municipal Water District
HCP	Habitat Conservation Plan
IA	Implementing Agreement
ITP	Incidental Take Permit
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
USFWS	United State Fish and Wildlife Service
USGS	United States Geological Survey

1.0 INTRODUCTION

The Humboldt Bay Municipal Water District (District) proposes to continue the on-going operation and maintenance of its existing structures and facilities in the Mad River corridor. The facilities and activities involved are necessary for the continued operation of the District's pumping facilities at Essex, near Arcata, and the hydroelectric power plant at Ruth Lake, all of which are in the Mad River corridor. Moreover, these facilities are necessary for the District's function as the regional water supplier. Without them, the District could not deliver water through its transmission pipelines to its wholesale and retail customers. The activities have been routine for many years as authorized by the U.S. Army Corps of Engineers or the California Department of Fish and Game, or both. In addition, because the District leases land from the U.S. Forest Service for Ruth Lake and Matthews Dam, activities there are subject to the use permit issued by the Forest Service. The locations of the various activities are shown in Figures 1 through 3.

In consultation with the National Marine Fisheries Service (NMFS), the District concluded that some of its activities within the Mad River corridor result in incidental take of coho salmon (*Oncorhyncus kisutch,* Southern Oregon/Northern California Coasts ESU), chinook salmon (*Oncorhyncus tshawytscha*, California Coastal ESU), and steelhead trout (*Oncorhynchus mykiss,* Northern California ESU), all of which are listed as threatened under the federal Endangered Species Act (ESA).

Because take is unauthorized unless permitted by NMFS, the District seeks an incidental take permit from NMFS pursuant to Section 10(a)(1)(B) of the ESA. To support its application for an Incidental Take Permit (ITP), the District has prepared the requisite Habitat Conservation Plan (HCP) covering the coho and chinook salmon and the steelhead trout. The coastal cutthroat trout (*Oncorhyncus clarki clarki)*, whose jurisdiction lies with the U.S. Fish and Wildlife Service (USFWS), is a potential candidate for a future ESA listing and has also been included in the HCP, though not as a covered species.

In addition to its application for an ITP, the District has requested that the NMFS enter into an Implementing Agreement (IA) that addresses anticipated impacts, take, mitigation, habitat conservation, and monitoring. The ITP, HCP, and IA would be in effect for 50 years. If the USFWS determines that listing of the coastal cutthroat trout is warranted, the District may then request a Candidate Conservation Agreement with Assurances (CCAA) from the USFWS to cover that species.

The HCP boundary generally encompasses the Mad River and its adjacent riparian zone from the mouth the Matthews Dam. Although the District's water delivery system includes facilities outside of the HCP boundary, such as pipelines, pump stations, a treatment facility, storage tanks, and its business office, those facilities and associated activities will not be affected by the proposed HCP. Conversely, the activities outside of the HCP boundary do not affect the environment within the HCP boundary. Therefore, in consultation with NMFS, the District concluded that the HCP boundary generally would include only the Mad River and its adjacent riparian zone.

The District prepared this Environmental Assessment (EA) as part of its permit application package. This EA examines the environmental impacts associated with the issuance of an ESA Section 10(a)(1)(B) take permit and implementation of the HCP and IA. The HCP supports the take permit application. The District's HCP provides a complete and detailed description of the proposed project. The EA has been prepared in accordance with NOAA Administrative Order 216-6, which describes NOAA's environmental review procedures for implementing National Environmental Policy Act (NEPA) and related regulations and orders. This EA was prepared by the District for use by NMFS to evaluate whether there will be any significant direct or indirect impacts to the human environment resulting from the issuance of an Incidental Take Permit for the continuance of the municipal water withdrawal and delivery actions of the District.

In addition to the application for a federal Incidental Take Permit, the District's activities on the Mad River also require a permit from Army Corps of Engineers (Section 404 of the Clean Water Act) and the California Department of Fish and Game (Section 1601, Streambed Alteration Agreement). This EA may be used by the District for other purposes in addition to NEPA, such as compliance with the California Environmental Quality Act (CEQA).

The conclusion from the evaluation this EA is that the proposed action will not result in any significant direct or indirect impacts to the human environment.

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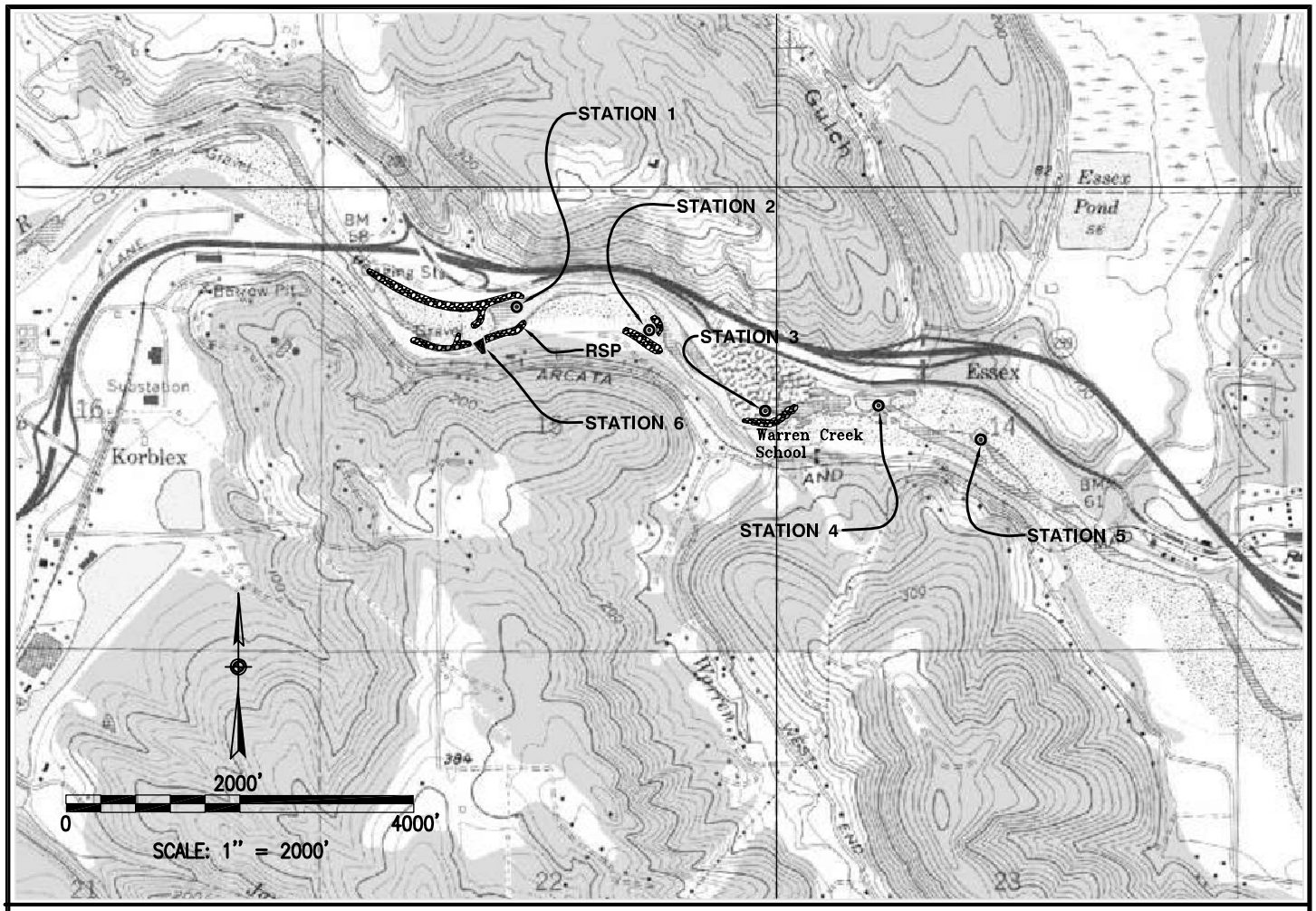

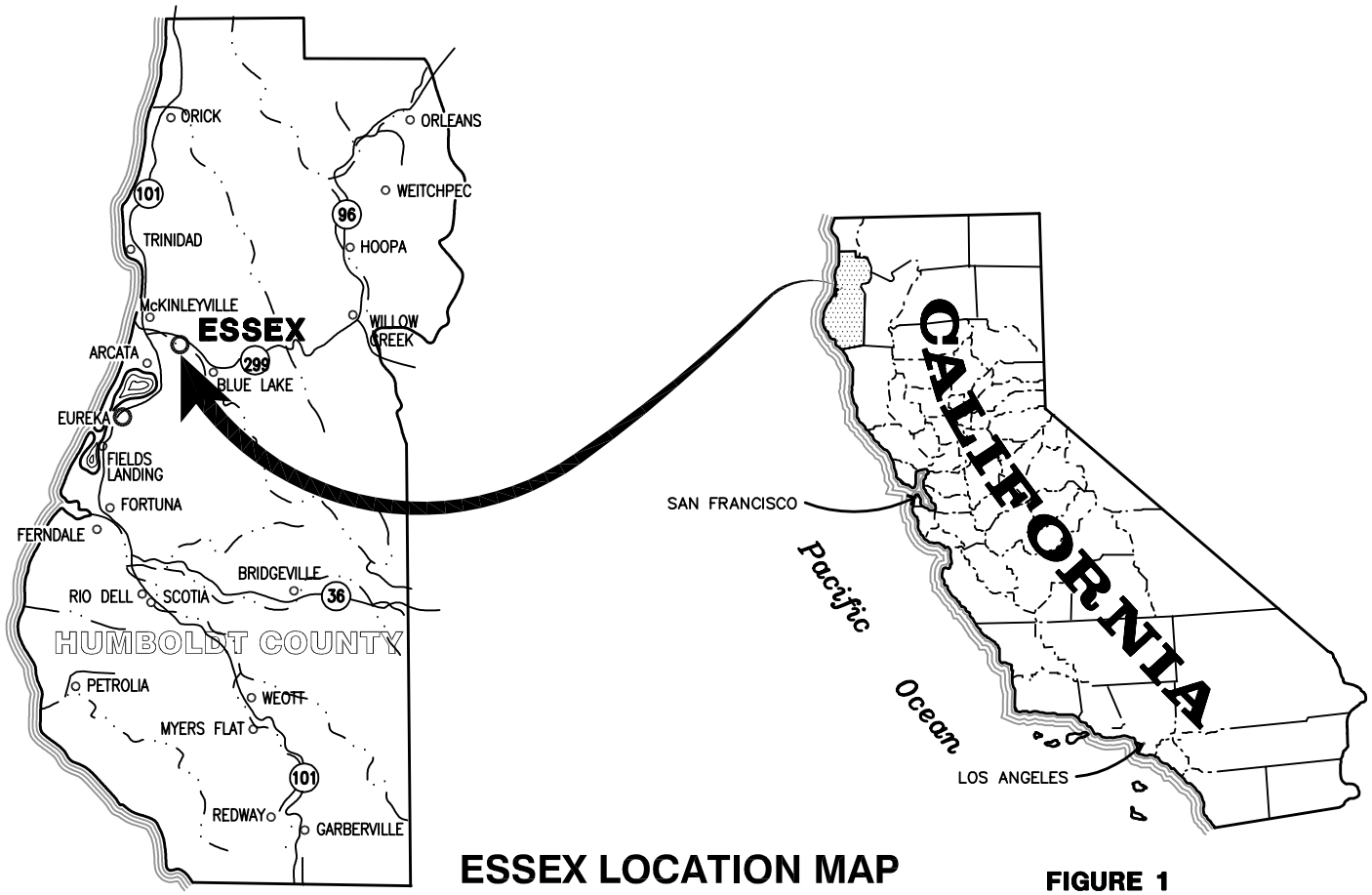

ESSEX LOCATION MAP

FIGURE 1

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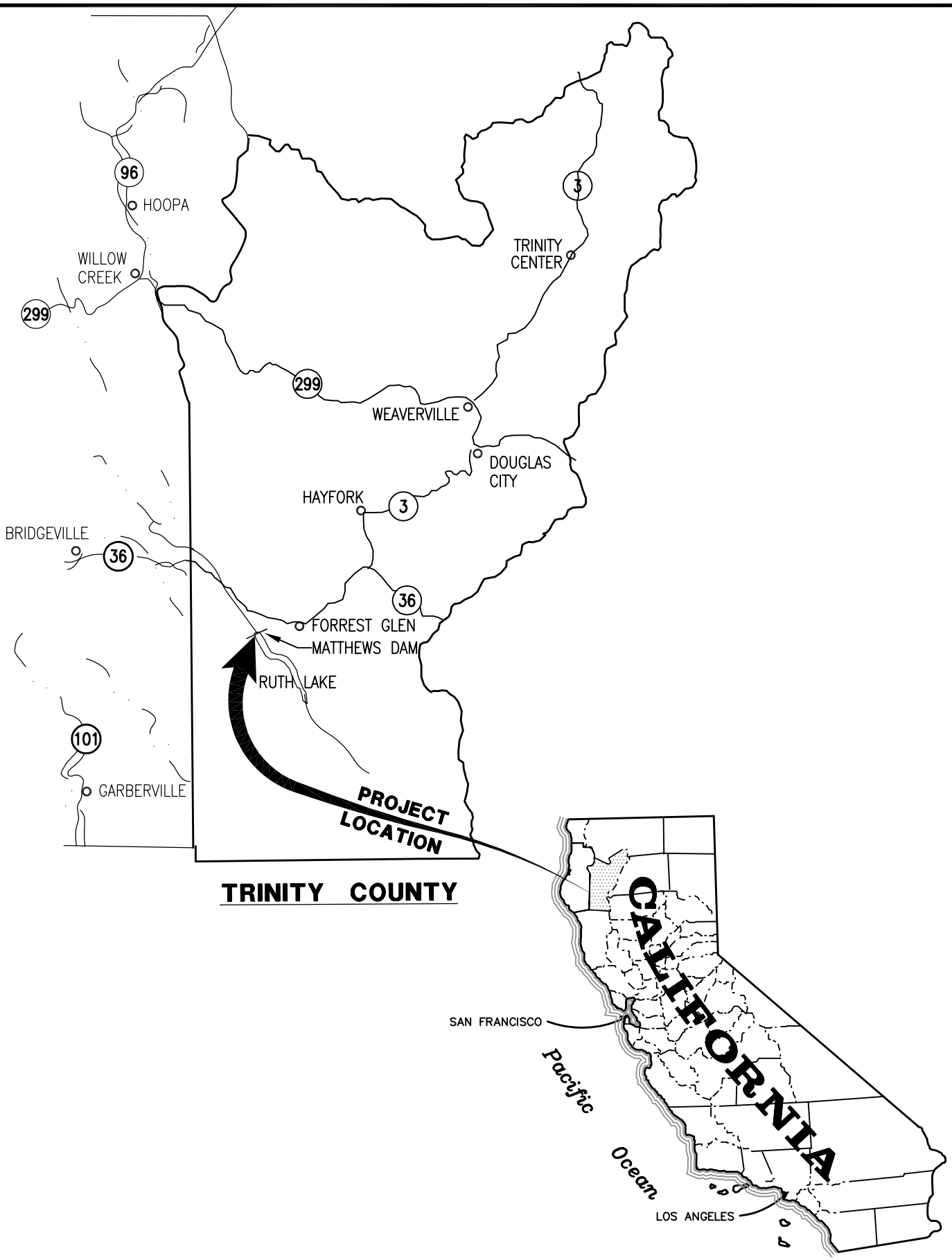

MATTHEWS DAM REGIONAL MAP

FIGURE 2

WINZLER & KELLY

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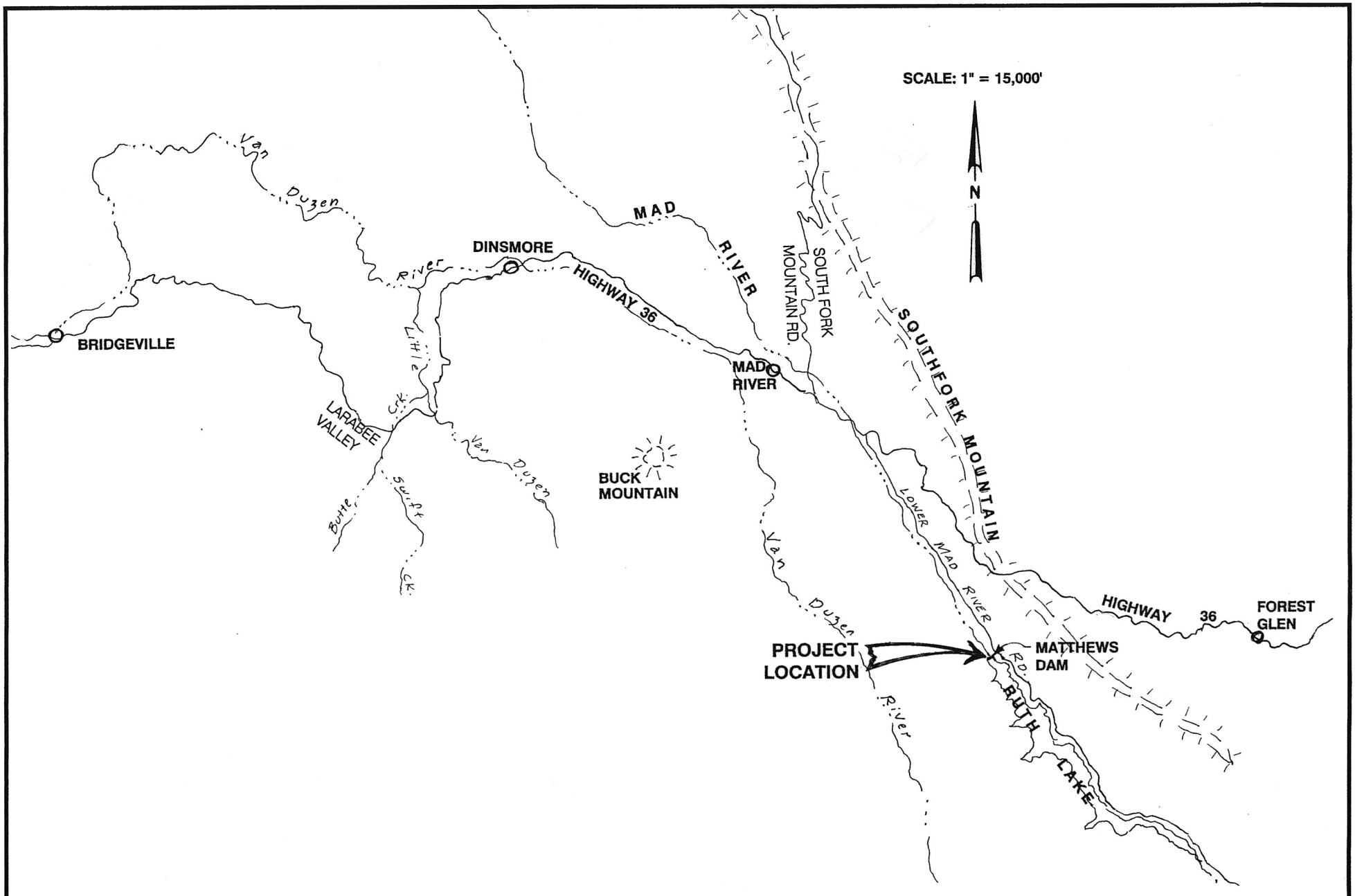

MATTHEWS DAM VICINITY MAP

FIGURE 3

2.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

The proposed federal action is the issuance of a permit (ITP) by NMFS to the District to allow the incidental take of ESA-listed coho salmon, (*Oncorhynchus kisutch*), chinook salmon (*Oncorhynchus tschawytsha*), and steelhead trout (*Oncorhynchus mykiss*) associated with the District's proposed project to continue its activities as the regional supplier of water for domestic and industrial purposes in accordance with the District's proposed HCP.

The purpose for issuing the permit is to authorize the incidental take in accordance with the provisions of the ESA, and this authorization is needed because take cannot be completely avoided despite the comprehensive mitigation and habitat conservation program proposed in the District's HCP for this project. The authorized take would be incidental to the District's activities.

The District's activities include the impoundment, storage, controlled release, and withdrawal of water from the Mad River, and the operation and maintenance of the associated facilities. The project includes the HCP with Implementing Agreement (IA) with respect to the ITP, and possibly a future Candidate Conservation Agreement with Assurances between the District and the USFWS for the coastal cutthroat trout (*Oncorhynchus clarki clarki*).

The project itself is necessary because it constitutes an established, essential service provided by a regional water district. The District is the only water supplier in the greater Humboldt Bay area. There is no alternative to the District-supplied water for domestic and industrial purposes. The District currently supplies wholesale domestic water to approximately 80,000 people in the cities of Eureka, Arcata and Blue Lake and the Humboldt, Manila, McKinleyville, and Fieldbrook Community Services Districts. The District also sells raw water to industrial users on the Samoa Peninsula. This water supply and delivery is essential to the welfare of Humboldt County's population and economy.

Without the proposed Incidental Take Permit from NMFS, the District's activities will be in violation of the ESA, and the conservation measures proposed in the HCP will not be implemented.

3.0 PROPOSED ACTION AND ALTERNATIVES

3.1 Proposed (Preferred) Action

The proposed action is the issuance of a permit under Section 10(a)(1)(B) of the ESA for the incidental take of ESA-listed salmon and steelhead trout associated with the District's proposed project to continue its activities as the regional supplier of water for domestic and industrial purposes in accordance with the District's proposed HCP. This alternative was selected as the preferred action because it will result in the implementation of the conservation measures of the HCP without interfering with the District's public water supply system.

Without the proposed Incidental Take Permit from NMFS, the District's activities will be in violation of the ESA, and the conservation measures proposed in the HCP will not be implemented. The activities included in the proposed action are listed in Table 3-1, along with a comparison with the alternatives. These activities are described in greater detail in Appendix B (which is excerpted from Appendix C of the HCP).

3.2 Alternative 1: No Action

For the purposes of this EA, the no-action alternative has several key features.

1. NMFS would not issue an Incidental Take Permit.
2. The District would not operate under an HCP.
3. The conservation measures developed in the proposed HCP would not be required by an Implementing Agreement between NMFS and the District.
4. The purpose and need of the proposed project—to lessen the impact of the District's Mad River operations while bringing the District into compliance with the ESA—would not be satisfied, and legal uncertainties may persist as to the District's compliance with the ESA. For this reason, the District does not prefer the no-action alternative.
5. All of the activities covered in the proposed HCP would continue to occur as if there had been no HCP development process. Requirements of the District's existing permits, such as Section 404 from the ACOE, 1603 from DFG, and water rights from the SWRCB, would remain in effect.

3.3 Alternative 2: Discontinue the Surface Diversion at Pump Station 6 and Withdraw Water from the Ranney Collectors Only

The Ranney collectors' yields are too low to meet the water demands of the District's customers. During the 1960s and 1970s, the District supplied both municipal and industrial water users through the Ranney collectors. However, in the 1970s, the Ranney collectors alone were incapable of delivering the water needed by the industrial and domestic water customers, so the District constructed its surface diversion station. Therefore, using only the Ranney collectors as a sole source of wholesale water is not a feasible alternative for meeting the current demand.

This alternative would eliminate the operation of P.S. 6 and the associated activities: the low-flow berm, dredging a low-flow channel, dredging the P.S. 6 forebay, repair and modification to the grade-control weir, possible construction of an alternative to the grade-control weir, maintenance or repair of the rock jetty directly north of P.S. 6 across the river on the north bank.

All of the other activities covered in the proposed HCP would continue to occur as if there had been no HCP development process. Requirements of existing permits, such as 404 from the ACOE, 1603 from DFG, and water rights from the SWRCB, would remain in effect. Although there would be no take permit or HCP, the greatest benefits of the HCP—lessening the impact of P.S. 6 on listed species—would be achieved to an even greater degree than under the HCP. However, this does not account for what might be the adverse effects of one or more future projects that would be needed to develop the water supply needed if P.S. 6 were no longer used.

This alternative is not preferred by the District because it fails to meet the core need of the District to meet its obligations as the regional water supplier.

Table 3-1. Comparison of Alternatives

ACTIVITY	PROPOSED ACTION	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2 NO P.S. #6
ITP, HCP, IA	X		
Current activities which occur on an on-going basis:			
1. Releasing flow at Matthews Dam	X	X	X
2. Diverting water in the Essex Reach (sub-surface via Ranney collectors and surface via direct diversion facility).	X	X	X
3. Bypass flows below Essex	X	X	X
4. Operating the direct diversion facility, including the fish screens	X	X	X
5. Dredging the forebay at P.S. 6	X	X	
6. Maintaining adequate water surface elevation to P.S. 6 during low-flow months	X	X	
Current activities which occur only as-needed:			
7. Maintaining adequate capacity in tailrace and spillway pools below Matthews Dam	X	X	X
8. Gaining access to and maintaining Ranney collectors (which may involve building temporary gravel structures in river bed)	X	X	X
9. Maintaining adequate flow to direct diversion facility (P.S. 6)	X	X	
10. Protecting banks and structures (by maintaining or repairing existing rock structures or revetments) in the Essex Reach, and in the tailrace outlet and plunge pool downstream of Matthews Dam	X	X	X Except jetty and weir
Possible future activities:			
11. Restoration of channel capacity below Matthews Dam	X	X	X
12. Repairing, rehabilitating or replacing water lines in the riverbed in Essex Reach	X	X	X
13. Construction of additional grade control structures in the Essex Reach	X	X	

4.0 ENVIRONMENTAL BACKGROUND

This is a brief overview of the Mad River basin. Additional information about the setting is presented in Section 5 (Environmental Consequences) as necessary for discussion of potential environmental impacts.

The Mad River Watershed drains an area of approximately 500 square miles. The basin is 100 miles in length and the Coast Range ridge elevations are 3,000 feet on the west and 5,000 feet on the east. The Mad River headwaters rise in the southern portion of Trinity County, California in the Six Rivers National Forest. The water flows northwesterly to the Pacific Ocean northwest of Arcata in Humboldt County, California. At the time of early settlement, flood events occurring every 2-5 years would spill over into Humboldt Bay. Subsequently, much of the delta region has been diked and converted to agriculture while the channel has been confined within levees. Consequently, spillover into Humboldt Bay occurs much less frequently.

The climate in the region is Mediterranean. Winters are cool and wet with 75 percent of the annual precipitation occurring between November and March, Average annual precipitation caries from around 40 inches near the coast to over 80 inches at the higher elevations. The average precipitation basin-wide is approximately 64 inches. Oceanic influences keep the coastal regions cool during the summer and these influences often move inland along the valley bottom. Hot, dry simmers typify the upper inland reaches of the basin.

The Mad River basin is characterized by mature topography in the northern and southern regions, and younger topography in the middle portion. The basin lies in the Northern Range geomorphic province. The area is characterized by northwest trending faults, with the bedrock dipping towards the northeast. As a result, the ridges and river valleys run northwesterly throughout the region. The Mad River basin lies primarily on top of Franciscan Complex bedrock that ranges in age from the late Jurassic period to the late Cretaceous period (150 million to 65 million years ago). The coastal delta region and the southern interior valleys are essentially flat. The rest of the basin is rugged topography with steep v-shaped canyons. Elevations in the basin range from sea level to slightly more than 6,000 feet (Love, 1996).

The following indented text is excerpted from Appendix A of the District's HCP and summarizes the physical conditions of the Mad River:

> Geomorphically, and for purposes of anadromous salmonid distribution, the Mad River can be stratified into four distinct zones. (Refer to Figure 1 in the HCP main body). Anadromous salmonids fully occupy the estuary and lower river zone and its tributaries up to River Mile (RM) 34; the middle river zone from RM 34 to 61 can be characterized as a geologically unstable and steep (between Wilson Creek RM 45.5 and Bug Creek RM 49, the river drops 600 feet in elevation). In the middle river zone, depending on local conditions and flow, the boulder canyon contains barriers at RM 45, 49, and 53. These barriers prevent anadromous salmonid migration to the upper river zone, which starts above RM 61. Under natural conditions, this zone often had no flow in August or September.

Six tributaries of the Mad River are fish producing streams:
(Refer to Figure 1 in the main body of the HCP)

- RM 10.8 Lindsay Creek, drainage area 17 square miles;
- RM 14.8 North Fork, drainage area 50 square miles;
- RM 20.6 Canon Creek, drainage area 16 square miles;
- RM 32.1 Maple Creek, drainage area 17 square miles;
- RM 33.4 Boulder Creek, drainage area 19 square miles;
- RM 60.7 Pilot Creek, drainage area 40 square miles (This creek is accessible to steelhead only if barriers below on the Mad River are passable).

The watershed's precipitation is affected by its proximity to the Pacific Ocean and its altitude, with annual average precipitation of 40 inches in the lower zone, and an average of 80 inches in the middle zone. Snow is common above 4,000 feet on the eastern ridgeline, with average annual snowfall of one to five feet. The Mad River has two distinct seasons (dry and wet), and from June through October, coastal fog moderates ambient air and water temperatures in the lower zone.

Figure 1, Isohyetal Map, omitted from this excerpt.

Vegetation in the basin varies with disturbance, climate, geology, soils, elevation, slope angle, slope aspect, and proximity to the coast. On a broad scale, some of the more dominant vegetation associations are coastal redwood forest mixed conifer forest, true for forest, oak-woodland, and natural grassland. The Mad River basin is home to an array of wildlife species associated with the variety of habitats.

Queries were made to the to the USFWS and to the California Department of Fish and Game's Natural Diversity Database to identify special-status species found within the project area. The queries were made for the USGS Quadrangles for Arcata North and Ruth Reservoir. The USFWS species lists include twenty special-status species in addition to those included in the HCP. Of those, only the bald eagle (*Haliaeetus leucocephalus*) (Federal Threatened) has relevant association in that the Mad River provides foraging habitat, including perch trees. The USFWS species lists are included in Appendix A of this EA.

The California Natural Diversity Database reported on June 18, 2002, a total of 36 occurrences of nine different special status species for the USGS Arcata North Quadrangle, where the surface diversion facilities are located. A query was also made to the database for the USGS Ruth Lake Quadrangle, in which 68 occurrences of 29 different special-status species were reported. Matthews Dam and Ruth Reservoir are located within that quadrangle. Of those occurrences reported, one special-status plant species showed an occurrence within the vicinity of the project. This species, the maple-leaved checkerbloom (*Sidalcea malachroides*) (CNPS List 1B), was located on a hillside on the north side of the Mad River, approximately one mile west of Lindsay Creek. General habitat associations of the species include upland forest, coastal prairie, coastal scrub, and north coast coniferous forest. No other plant or animal species of special concern in addition to those that are included in the HCP were reported on the Department of Fish and

Game species list. However, other species, such as the osprey (*Pandion haliaetus*) and the great blue heron (*Ardea herodias*), are known to forage in the Mad River.

Table 4-1 shows the ESA list status of the species included in the proposed HCP.

Table 4-1. Designations for Species Included in the Proposed HCP

Common Name	Scientific Name	Status	Habitat
Coho salmon	*Oncorhynchus kisutch*	T, C/R	CH, EFH
Chinook salmon	*Oncorhynchus tschawytsha*	T	EFH
Steelhead trout	*Oncorhynchus mykiss*	T	None
Coastal cutthroat trout	*Oncorhynchus clarki clarki*	CSC	None

KEY:
T: Federal Threatened
C/R: State Candidate/Recovery Species
CSC: California Special Concern Species
CH: Designated Critical Habitat
EFH: Essential Fish Habitat

5.0 ENVIRONMENTAL CONSEQUENCES

This section will describe the probable environmental impacts of the proposed action and alternatives. The assessment will include direct, indirect, and cumulative impacts, as well as mitigation measures to avoid potential impacts.

The following environmental assessment checklist is included to aid in identifying potential adverse effects of the proposed action that must be analyzed in further detail.

Table 5-1. Summary of Environmental Effects of the Proposed (Preferred) Alternative

Environmental Issue	No Adverse Effect	Less Than Significant Adverse Effect	Significant Adverse Effect	Explanation
Aesthetics	X			
Agricultural Resources	X			
Air Quality		X		
Biological Resources (including wetlands & special-status species)		X		Measures have been proposed by the District to mitigate this impact, which will result in a net beneficial impact.
Cultural & Historical Resources	X			
Geology & Soils		X		
Hazardous & Toxic Materials	X			
Hydrology & Water Quality		X		
Land Use Planning	X			
Noise		X		
Population Growth & Housing	X			
Public Health & Hazards	X			
Public Services and Utilities (e.g., water, sewer, waste, etc.)	X			
Recreation	X			
Cumulative Impact	X			Net beneficial impact from proposed mitigation.

5.1 Consequences of the Proposed (Preferred) Action

5.1.1 Aesthetics

Some of the maintenance activities at Essex will be partially visible from State Highway 299 and the nearby river access areas, but they will not be involved in a scenic vista. The Matthews Dam tailrace is visible from Lower Mad River Road (a county road) that passes by the dam, though not within a scenic vista. There are no scenic trees, rock outcroppings, historic buildings, or other scenic resources that will be affected by the activities. The visibility of the activities may be considered a degradation of the local viewshed, but the effects will be mild and temporary and are not considered to be significant. No lighting is proposed. Mitigation is not warranted for any affect on aesthetics.

5.1.2 Agricultural Resources

No covered activities occur within agricultural land. This project will have no bearing on agricultural resources.

5.1.3 Air Quality

Berm maintenance activities involve the use of heavy equipment within the vicinity of the intake station, which can result in minor emissions of diesel and gasoline engine combustion products and earthen dust from construction. The North Coast Air Basin is currently in attainment of all state ambient air quality standards, with the exception of the state standard for particulate matter less than ten micrometers in diameter (PM10). (The national designation is unclassified.) Nearly all areas of the state are classified as non-attainment for PM10. In the context of the small disturbance areas, moist soils, and brief nature of the work, the emissions from the maintenance activities will be negligible.

5.1.4 Biological Resources

The impacts of the proposed action are summarized in Table 5-2, which is Table 6 of the HCP.

The principal concern of NMFS over the District's operations has been the potential impact to the ESA-listed salmon and steelhead from the surface diversion at Pump Station 6. As a result of discussions between NMFS and the District, the District conducted a study in 1998 to evaluate the impacts of that facility. Fish can be impacted at P.S. 6 by the fish bypass system and by the screening system. The 1998 fish study is included in the proposed HCP as an appendix.

With respect to the fish bypass system, the 1998 study estimated the annual rate of salmonid capture as follows: 4 coho fry, 18 chinook fry, 15 steelhead, and 0 cutthroat juveniles. During the course of the study, the mortality rate among the captured fish was 38% for coho, 36% for chinook, and 25% for steelhead. Half of the steelhead captured were hatchery fish, which are not ESA-listed. Although the capture and injury to these listed species is "take" under the ESA, the magnitude of the impact is extremely small compared to the size of current populations.

The proposed HCP reports the findings of an experiment conducted in 1977 by the USFWS California Cooperative Fishery Research Unit, at Humboldt State University. Initially, 2000 hatchery-reared chinook fingerlings were introduced into the P.S. 6 forebay while 44% of the stream flow was being pumped. After 30 minutes, no fish had entered the fish bypass system. The test was then repeated by introducing 2000 more chinook fingerlings approximately two feet in front of the fish screens rather than farther away in the forebay as in the first test. It is unknown how many of the initial batch of introduced fingerlings were still in the forebay. As a result, 218 fish passed through the fish bypass system, 30 of which died. Assuming only the second batch of 2000 fingerlings were exposed to the bypass system, 11% were captured in the system, 14% of those captured were killed, and 1.5% of the 2000 exposed were killed. The author of that report believed that most of the mortality was due to handling rather than the bypass system. Considering the exaggerated test conditions used, these results suggest that the impact of the fish bypass system is very small.

Table 5-2. Impacts of the Proposed (Preferred) Action (Table 6 of the HCP)

DISTRICT ACTIVITY (AND LOCATION)	IMPACT	EXPLANATION
1. Releasing flow at Matthews Dam	Beneficial	Historically, the Mad River's upper reaches frequently went completely dry. Now, the District's releases provide a reliable and continuous flow year-round. Increased flows create approximately 450 acres of additional habitat in the summer and fall, and improve other water quality parameters such as temperature, thereby benefiting aquatic species. Ruth Lake impounds water during the first fall or winter storms; however, this likely has minimal, if any, adverse effect on downstream flows or habitat. The historical flow data indicate that operation of Matthews Dam has not reduced average flows below that which occurred naturally during September, October and November (the period during which the first storms of the season occur). As presented in Tables 4 and 5, the District's operation has significantly increased average daily flows compared to what naturally occurred. ***[Tables 4 and 5 have been omitted from this excerpt. Table 4 is the same as Table 2 in Appendix B of the EA]*** (From Table 4: Sept 77 vs. 0 cfs, October 77 vs. 5 cfs, November 70 vs. 55 cfs; and From Table 5: Sept. 93 vs. 5 cfs, October 112 vs. 27 cfs, November 112 cfs vs. 27 cfs). Matthews Dam is sited such that approximately 25 percent of runoff of Mad River lies above the dam and reservoir. Mad River's total annual discharge into the Pacific Ocean has been computed on average to slightly exceed 1,000,000 acre-feet. Consequently, approximately 250,000 acre-feet of water on average passes through the reservoir, a portion of which is impounded. The reservoir has a retention capacity of 48,000 acre-feet, which in an average year is drawn down to approximately 30,000 acre-feet. Thus, under current operational conditions during an average water year, the natural runoff above the dam is diminished by 20,000 acre-feet, which represents only 2 percent of the river's total natural runoff. On a daily basis, the runoff above the dam varies greatly, from zero surface flows (July through September) to short-term daily flows in excess of 3,000 cfs during intense late fall and winter storms. At the beginning of the fall rainfall period (normally mid to late October) the reservoir level may be twenty to twenty-five feet below the spillway. As a consequence, the majority of inflow above the dam resulting from early rain storms is impounded. During this period, however, the District's operational policy and history has been to release from 50 cfs to in excess of 100 cfs during these early storm periods. The resulting short-term impact to daily runoff resulting from impoundment from early September storms is minimal, increasing to a maximum reduction in daily flows of approximately 85% in October and 97% in November (assuming the 3,000 cfs storm event). It is important to understand these "storm" flows, under natural conditions, would not reach the Essex reach nor the estuary for 60 to 70 hours, at which time the contributing flows of the remaining drainage would significantly mitigate the flow reduction impacts. In terms of impacts upon water depth and wetted perimeter, a natural

DISTRICT ACTIVITY (AND LOCATION)	IMPACT	EXPLANATION
		daily flow of 3,000 cfs would create significant short term increases in the depth and width of surface flows in the upper river reach. However, under natural conditions after heavy rainfall and the resulting storm flows ceased, the surface flow would quickly drop to levels significantly below the sustained flows now provided by the District. It is not possible to assess whether the extreme natural short-term flow variations in the upper reaches were more beneficial or detrimental to fisheries compared to the continuous, but more moderate flow conditions which now exist given the District's operation.
2. Diverting water in the Essex Reach (sub-surface via Ranney collectors and surface via direct diversion facility)	Negligible, if any	The District manages its releases from Matthews to meet its diversion requirements at Essex as well as its bypass requirements below Essex for the protection of fish (see activity 3, below). Appropriative water rights in existence at the time the District acquired its water rights permits from the State were factored in to the release requirements.
3. Bypass flows below Essex	Beneficial	The District maintains minimum bypass flows below Essex in accordance with conditions in its State Water Rights Permits for the protection of fish. Providing bypass flows that are generally greater than "naturally occurring" flows create more river and riparian habitat and aids in keeping the river mouth open.
4. Operating the direct diversion facility (Station 6) including the fish screens	Adverse	The Station 6 forebay is contiguous with the main migratory route of salmonids, and functions similarly to a natural backwater pool habitat. Salmonids (both adults and juveniles) are free to swim in or out Of the forebay and intake structure. The presence of the forebay, like a natural holding pool, does not cause salmonids to delay their migration. Avian and aquatic predators can access the forebay as they can any backwater pool habitat. The predation frequency in the forebay is not known; however there is no reason to believe it is any greater than in naturally occurring backwater pools. In 1998, the District conducted a comprehensive fish study to determine the rate of capture of salmonids at the Station 6 screens. The annual capture rates at the screens were quantified as 4 coho fry, 18 chinook fry, 15 steelhead, and 0 cutthroat juveniles. These rates are less than 0.2% of estimated population in the Mad River. (See Section 7 and Appendix E-1.) ***[Omitted from EA]***.
5. Dredging of forebay at Station 6	Potentially Adverse	Dredging is necessary to remove accumulated silt or debris deposited in the forebay. This activity occurs each year, but only in the winter when background turbidity in the river is very high, so there is no additional adverse turbidity effect. The frequency of dredging varies based on the frequency and severity of winter storms, but typically ranges from 2 to 5 times per month during the winter season. Fish theoretically could be injured or killed if hit with the bucket. A potential benefit of removing debris from the forebay is that a relatively simple habitat is maintained, so juvenile fish may be less likely to utilize it during low-flow periods.
6. Maintaining adequate water surface elevation to Station 6 during low-flow months	Adverse	Water surface elevation must be maintained at 21 feet so the pumps operate properly. A gravel berm is constructed each year when the water surface elevation at Station 6 approaches 21 feet (generally late May or June). The berm connects the existing rock jetty, which projects from the north bank of the river, with the existing grade-control rock weir (downstream of Station 6), thereby ensuring the low-flow channel goes over the grade-control weir as opposed to around it. The berm is

DISTRICT ACTIVITY (AND LOCATION)	IMPACT	EXPLANATION
		constructed from native gravel on the outside edge of the wetted channel, and typically occupies a footprint of approximately 0.15 acres. Turbidity may be temporarily increased above background levels, and juveniles may be injured or killed during construction of the berm. The last three years (2000–2002), a federally-licensed biologist was present during construction to protect fish. The first two years, no injuries or mortality were observed. The third year, 48 juvenile steelhead were killed when they were stranded and the pool rapidly dewatered.
7. Maintaining adequate capacity in tailrace and spillway pools below Matthews Dam	Negligible, if any	Excavation will be necessary if silt, gravel or debris accumulates in the spillway or tailrace pools. The necessity for this work generally occurs only after major storm events, and thus does not occur with great frequency – using the past as a guide, excavation of the spillway or tailrace outlets has only occurred twice in the last ten-to-fifteen years. Juvenile steelheads could be injured or killed, if they were able to navigate downstream barriers and are present at time work is done.
8. Gaining access to and maintaining Ranney collectors (which may involve building temporary gravel structures in river bed)	Negligible, if any	District personnel routinely visit the collectors to perform inspections and ongoing maintenance. To gain access to the collectors located in the river bed, District personnel use a cable car, which transports them from the bank to the collector. Periodically, the District must perform major maintenance (e.g. repair or replace pumps/motors or other heavy equipment), and to do so, a temporary gravel structure must be built for a vehicle or crane to gain access to the collector. Major maintenance does not typically occur with great frequency (in the past, between five and fifteen year intervals per collector). The District also periodically flushes the collectors and discharges water onto the dry river bed. A temporary gravel berm is constructed around the collector to contain the water. This berm creates a settling basin such that any turbidity generated by the flushing activity settles out and does not enter the wetted channel. Flushing has not occurred, and is not expected to occur, with great frequency. In the past, flushing operations have only occurred two or three times in the last 20 years. These access structures and containment berms are constructed with native river run material, outside of the wetted channel, during low-flow periods. The river bed is returned to its pre-construction condition immediately following completion of the work . Currently, the District does not need to cross the river to access any of the collectors; however should the river channel change course, stream crossings may become necessary in the future.
9. Maintaining adequate flow to Station 6	Negative	Modest excavation of the low-flow channel in front of the Station 6 inlet is necessary to remove accumulated gravel/debris. Accumulated gravel must be removed before a permanent bar forms which blocks the entrance to the forebay. When the District excavates, it is through the aggraded bed (e.g. the accumulated gravel) in order to relocate the thalweg in closer proximity to the forebay entrance. The overall bed elevation and slope of the channel are not altered. There is no headwall created, as would occur from in-channel pit mining. The up and down-river riffles are still the hydraulic controls that maintain the overall slope through this reach.

DISTRICT ACTIVITY (AND LOCATION)	IMPACT	EXPLANATION
		This work is necessary to ensure flow from the low-flow channel can freely enter Station 6. The excavated area depends on the extent of accumulation and the location of the low-flow channel in relation to the Station 6 entrance; however a typical area is only 0.1 to 0.2 acres. Turbidity may be temporarily increased above background levels, and juveniles could be injured or killed during excavation work.
10. Protecting banks and structures (by maintaining or repairing existing rock structures or revetments) in the Essex Reach, and in the tailrace outlet and plunge pool downstream of Matthews Dam	Negligible	Several rock structures exist in the Essex reach. Examples of such structures include: revetment which protects the collectors and underground pipelines out to the collectors; a rock jetty (which projects from the north bank just upstream of Station 6), a grade-control weir just downstream of Station 6; and rock slope protection along the banks. Rock slope protection also exists just downstream of Matthews Dam around the plunge pool and tailrace outlets. The District must maintain these structures and make repairs if they are degraded or damaged. Minor, short-term impacts to riparian vegetation could occur, and juveniles could theoretically be killed during the placement of rock. Since this activity is generally in response to storms or other significant events which cause degradation or damage, this work is not expected to occur very frequently.

Even though the studies to date have indicated only a very small impact to fish by the fish bypass system, the District proposes in the HCP to eliminate this impact by eliminating the bypass system as described in Table 5-2 and in the HCP. No adverse impact is expected to result from the proposed modification.

Regarding the fish screen, it does not meet the current NMFS criteria with respect to sweeping velocity and opening size. Although no impact has been observed to occur as a result of this condition, the District proposes to retrofit the screen to meet the NMFS criterion of 3/32 inch opening. The opening is currently 5/32 inch. This will eliminate or greatly reduce any passage through the screen that may occur now. However, the approach velocity will increase, and it is unknown whether fish will impinge on the screen as a result. Therefore, the District also proposes to conduct a 3-year monitoring study to evaluate the effect of the proposed new screen, and whether salmonid fry are actually exposed to the screen. The results of this monitoring study will be evaluated by the District and NMFS under the adaptive management program proposed in the HCP. Regardless of whether there will be take of ESA-listed species, given the existing evidence to date, it appears highly unlikely that a significant adverse impact to fish populations could possibly result. It is not feasible to establish sweeping velocity at the screen.

In addition to impacts from the diversion system at P.S. 6, there also impacts on fish from other in-stream activities, such as the low-flow berm, as described in the HCP and Table 5-2. These impacts will be lessened by mitigations proposed in the HCP, and no significant impact is expected to occur from implementing the HCP.

The designated **Essential Fish Habitat** for coho and chinook is encompassed within the HCP boundary and will be protected by the same measures that will protect Critical Habitat and fish

habitat in general within the HCP area. No significant impact to fish habitat is expected to result from implementing the HCP.

Special-status species in addition to those included in the HCP were reported by the USFWS and California Department of Fish and Game as occurring in the project vicinity. No impact is anticipated to occur to these species, including the maple-leaved checkerbloom, because the project does not include elements that will adversely affect the species or their habitat. The foraging habitat, including perch trees, for bald eagles and other species known in the area will not be affected.

Mitigation measures have been proposed in the District's HCP to reduce the potential for impacts to fish, as outlined in Table 9 from the HCP (inserted below as Table 5-3). Consequently, no significant impacts are expected from the project.

5.1.5 Cultural and Historical Resources

Prior research into historic resources in the Essex area has identified archaeological materials from the Wiyot Indians. The sites are on the elevated terraces near the river, not in the active stream channel. Such research has been performed for gravel extractions and for the District (for a potential water treatment plant location that was not selected).

All ground disturbing activities will occur in the active streambed in the Essex area and in the fill material of the Matthews dam tailrace, not in the native soil. No new bank protection is included in this project, only repair and maintenance of existing riprap, which does not require excavation into previously undisturbed soil. No known historical or archaeological resource is known in the work zone, nor is it plausible that there are any there due to the nature of the earth material that will be disturbed (i.e., river-run material at Essex and quarried sub-soil fill at Matthews Dam.) Therefore, no impact is expected. No unique paleontological resource or unique geological feature is known to exist in the project impact area.

In the event of the accidental discovery of human remains or archaeological materials, all ground-disturbing work will be halted in that area until the situation has been evaluated by a qualified archaeologist or, in the case of human remains, by the coroner of the county where the remains are discovered.

5.1.6 Geology and Soils

The proposed project is known to be in the vicinity of the Mad River Fault. The portion of the Mad River Fault north of the Mad River has been included on current Alquist-Priolo Special Studies Zone mapping for fault rupture hazard. The area south of the river has not been included in this mapping.

The District's activities will continue to take place at the existing facilities and no unique geologic features have been identified in the area.

Table 5-3. Proposed Mitigation Measures (Table 9 of the HCP)

DISTRICT ACTIVITY	POTENTIAL IMPACTS, MITIGATION AND MONITORING
1. Releasing flow at Matthews Dam	Potential Impacts: Take resulting from no flow releases to river, or from rapidly changing flows in a very short time period (e.g. "ramping") Mitigation: Provide flows sufficient to maintain a 5 cfs minimum at all times below the dam. During low-flow times of the year (defined for this purpose as 100 cfs or less), if the District plans to reduce its releases at one time by more than 25%, it shall do so in gradual increments over a 24-hour period to ensure no stranding will result. Monitoring: Daily flow records for releases from Matthews Dam shall be maintained by District.
2. Diverting water in the Essex Reach (sub-surface via Ranney collectors and surface via direct diversion facility)	Potential Impacts: Decreasing flow in river below Essex, potentially causing habitat loss Mitigation: The District will provide sufficient flows to maintain habitat, in accordance with requirements in District's State Water Rights Permits. Monitoring: On a daily basis, the District plans and executes its flow releases to satisfy all downstream requirements (e.g. diversion and bypass below Essex). On a daily basis, the District also monitors the actual flow below Essex to ensure its bypass flow requirements are met (based on daily flow data from the USGS gage station on the Mad River downstream of Essex near the Highway 299 bridge).
3. Bypass flows below Essex	Potential Impact: Decreasing flow below Essex, potentially causing habitat loss. Mitigation: The District will release sufficient water from Matthews Dam to accommodate its downstream diversion requirements, and to maintain the in-stream flow requirements below Essex in accordance with conditions in the District's State Water Rights Permits. It is important to note that the District could be out of compliance with respect to the downstream flow requirements for up to 72 hours following issuance of a USGS "correction factor" which affects the resulting flow measurement at a USGS gage station on the Mad River (See Section 8.2.a and Appendix C for more details). ***[Omitted from EA. Appendix B of the EA is excerpted from Appendix C of the HCP.]*** USGS provides the District with a copy of the gage station correction factor right after they establish one. The District shall immediately increase its release from Matthews if a shortfall in the required bypass flow below Essex occurs following receipt of such correction factor. Monitoring: On a daily basis, the District plans and executes its flow releases to satisfy all downstream requirements (e.g diversion and bypass below Essex). On a daily basis, the District also monitors the actual flow below Essex to ensure its bypass flow requirements are met (based on daily flow data from the USGS gage station on the Mad River downstream of Essex near the Highway 299 bridge).
4. Operating the direct diversion facility (Station 6) including the fish screens	Potential Impacts: Take resulting from operation of the fish screens (impingement or removal via the buckets attached to the screen face) Mitigation: The District will be retrofitting the Station 6 screens to minimize take. The retrofit project is described in detail in Section 8.1. ***[Omitted from EA].*** Monitoring: The District will conduct comprehensive monitoring after the Station 6 screens are retrofitted. The monitoring is described in detail in Section 8.2.c. ***[Omitted from EA].***

DISTRICT ACTIVITY	POTENTIAL IMPACTS, MITIGATION AND MONITORING
5. Dredging of forebay at Station 6	Potential Impact: Take could occur if the clamshell bucket or excavator happens to strike or capture fish which happen to be in the forebay at the time of this work. This activity only occurs in the winter when background turbidity in the river is very high, so additional adverse turbidity effects will not occur. Mitigation: District personnel will strike the top of the water with the bucket prior to starting the dredging in an attempt to "scare away" any fish which may be present. Monitoring: District personnel will visually monitor as work proceeds.
6. Maintaining adequate water surface elevation to Station 6 during low-flow months	Potential Impacts: Take could occur if fish are killed or injured during construction of the low-flow berm. Turbidity may increase for a short period of time just downstream of Station 6. Mitigation: a) Measures to minimize adverse impacts to habitat: The berm will be constructed such that it occupies the minimum possible area of the low-flow channel. Work will occur in a timely manner to minimize turbidity disturbances (e.g. berm will generally be constructed in less than 6-to-8 hours). The Station 6 pumps will be run to draw as much turbid water into the forebay as possible. Any additional techniques known to the District, and suitable for this work, shall be employed to further minimize turbidity effects. The District shall exercise every reasonable precaution to protect the stream from fuel or oil spills. Equipment fueling shall not occur within the bankfull channel. All equipment shall be pressure washed and inspected for leaks prior to entering the river bed. Spill containment kits shall be readily available at the work site. b) Measures to minimize take: Prior to commencing construction of the berm, a fisheries biologist will inspect the area and determine to what extent juvenile salmonids are present. The biologist, in consultation with the District, will determine if any mitigation measures, over and above the following, are warranted based on the conditions present at the time. During construction, the fisheries biologist shall disperse fish by wading the river ahead of the heavy equipment. Additional personnel shall be available to rescue fish if they become stranded in a pool. c) Longer-term Mitigation: Construction of the gravel berm has been required since 1992 to maintain adequate water surface elevation to Station 6 during the low-flow months (given the long-term bed degradation which has occurred in the Mad River). At this time, there is no reason to believe the bed elevation will aggrade and return to its prior elevation. Therefore, the District will likely have to address low water surface elevations during the low-flow months over the foreseeable future. The District shall initiate a study to determine if a more permanent solution is feasible to provide the necessary water-surface elevation during the low-flow months. This study shall include an assessment of the geomorphic conditions at the site, engineering considerations, including navigability, and biological considerations, which shall be developed in consultation with NMFS and CDFG. The study shall identify feasible alternatives and shall recommend the preferred alternative. The District shall complete this study within 3 years after obtaining an Incidental Take Permit from NMFS. Via the adaptive management process of this HCP, the District, in consultation with NMFS, shall pursue a more permanent solution if a feasible

DISTRICT ACTIVITY	POTENTIAL IMPACTS, MITIGATION AND MONITORING
	alternative exists (feasible from engineering, operational and biological perspectives). Monitoring: The fisheries biologist shall provide a report to the District documenting the presence or absence of fish, and whether any injury or mortality occurred. The biologist will recommend additional mitigation, if warranted. The District shall provide pre- and post-construction photographs.
7. Maintaining adequate capacity in tailrace and spillway pools below Matthews Dam	Potential Impact: Take could occur during excavation (if juvenile steelhead are able to navigate the downstream natural barriers and are present in the plunge pool or tailrace outlet at the time when work is being done). Turbidity may increase for a short period of time in the vicinity of the plunge pool or tailrace outlets. Mitigation: a) Measures to minimize adverse impacts to habitat: Work will occur in a timely manner such that turbidity disturbance are minimized. The District shall exercise every reasonable precaution to protect the stream from fuel or oil spills. Equipment fueling shall not occur within the bankfull channel. All equipment shall be pressure washed and inspected for leaks prior to entering the wetted channel bed. Spill containment kits shall be readily available at the work site. b) Measures to minimize take: Prior to commencing work, District personnel shall inspect the area. If fish are present, District personnel will wade the water ahead of heavy equipment to disperse the fish. Monitoring: The District shall monitor work and provide pre- and post-construction photographs.
9. Maintaining adequate flow to Station 6 (by excavating aggraded material in low-flow channel)	Potential Impacts: Take could occur if fish are killed or injured during excavation of the low-flow channel. Turbidity may increase for a short period of time in the vicinity of Station 6. Mitigation: a) Measures to minimize adverse impacts to habitat: The excavation shall be done in such a manner that it occupies the minimum possible area of the low-flow channel. Work shall occur in a timely manner to minimize turbidity disturbances (e.g. generally less than 4-to-6 hours). The Station 6 pumps will be run to draw as much turbid water into the forebay as possible. Any additional techniques known to the District, and suitable for this work, shall be employed to further minimize turbidity effects. The District shall exercise every reasonable precaution to protect the stream from fuel or oil spills. Equipment fueling shall not occur within the bankfull channel. All equipment shall be pressure washed and inspected for leaks prior to entering the river bed. Spill containment kits shall be readily available at the work site. b) Measures to minimize take: During excavation, a fisheries biologist shall disperse fish by wading the river ahead of the heavy equipment. Monitoring: The fisheries biologist shall monitor work and record whether any injury or mortality occurred. The District shall provide pre- and post-construction photographs.
10. Protecting banks and structures (by maintaining or repairing existing rock structures or revetments)	Potential Impacts: Short-term impacts to riparian vegetation could occur, and juveniles could theoretically be killed during the placement of rock. Since this activity is in response to storms or other significant events which cause damage, this work is not expected to occur at all frequently.

DISTRICT ACTIVITY	POTENTIAL IMPACTS, MITIGATION AND MONITORING
	Mitigation: a) Measures to minimize adverse impacts to habitat: Placement of rock structures shall be done in such a manner that it occupies the minimum possible area of the low-flow channel, and minimizes adverse impacts to riparian vegetation. The District shall exercise every reasonable precaution to protect the stream from fuel or oil spills. Equipment fueling shall not occur within the bankfull channel. All equipment shall be pressure washed and inspected for leaks prior to entering the river bed. Spill containment kits shall be readily available at the work site. b) Measures to minimize take: If any rock placement occurs in the wetted channel, District personnel or a fisheries biologist shall be present to disperse fish by wading the river ahead of the heavy equipment which is placing rock. Monitoring: District personnel or the fisheries biologist shall monitor work and provide pre- and post- construction photographs.

5.1.7 Hydrology and Water Quality

Some activities could create turbidity as gravel is moved to create the various berms and platforms. Turbidity may also occur when the river rises and washes away material from these structures. These turbidity events are minor because they are relatively brief and the material involved is largely gravel rather than fines. In most cases, an increase in turbidity will not be noticeable from ambient conditions.

The berms are intended to change the direction of water movement for desired purpose. Adverse consequences have not occurred from these activities in the past, and none are expected in the future. The maintenance activities will be in compliance with all water quality requirements. The activities have no bearing on groundwater, drainage, flooding, or runoff. The amount of surface water is increased during low-flow seasons as a result of the District's activities, and the controlled water releases from Matthews Dam have an overall beneficial affect on the Mad River basin.

5.1.8 Land Use Planning

The proposed project would not result in an alteration of the present or planned land use of the area.

5.1.9 Noise

There will be a temporary, minor increase in sound levels at the sites during maintenance activities. The increase in sound level in the vicinity will be minor and largely masked by highway sounds.

5.1.10 Population Growth and Housing

The project is proposed in order to satisfy regulatory requirements relating to the continuance of the District's existing activities. The quantity of the District's current water diversion and water right pertaining to that diversion will remain unchanged. The proposed project neither limits or induces population growth.

5.1.11 Public Health and Hazards
The proposed project will pose no threat or hazard to the public.

5.1.12 Public Services and Utilities
By its nature, the project will not place significant demands on any utilities or public services.

5.1.13 Recreation
The proposed project will have no bearing on recreational facilities or resources of the project area. The District's on going activities have not conflicted with recreational opportunities on the Mad River in the past and are not expected to do so in the future.

5.1.14 Transportation
The only adverse impact on transportation is the trucking of material from the dredging activities. This is a relatively minor addition to the traffic on West End Road. It has been part of the traffic load for many years, and its continuation is not considered a significant effect.

5.1.15 Cumulative Impacts
Adverse cumulative impacts are not anticipated to occur as a result of the proposed project. The District's Mad River operations have limited adverse individual impacts including a relatively small impact on ESA-listed species. The cumulative impact is considered to be beneficial to the Mad River environment as a whole.

5.2 Consequences of Alternative 1: No Action
The District's current activities are ongoing and the no-action alternative would mean that the District would continue to function as it currently does. Fish screens at Pump Station 6 would not be replaced and the fish bypass system would not be replaced under this no-action alternative. Other than foregoing the benefits of the proposed modifications to P.S. 6 and other mitigations, the no-action alternative has essentially the same impacts as the proposed alternative.

5.3 Consequences of Alternative 2: Discontinue the Surface Diversion at Pump Station 6 and Withdraw Water from the Ranney Collectors Only
Under Alternative 2, there would be no surface diversion and the use of Pump Station 6 would be discontinued. Impacts from all the activities associated with P.S. 6—water diversion, dredging, diversion weir, berm creation, etc.—would be eliminated. Impacts from the remaining activities would be the same as in the proposed alternative. Less water would be released from Matthews Dam during the low flow season, which could adversely affect fish rearing and other wildlife and recreational uses of the river. Another adverse consequence would be the ensuing water shortage and the need to develop one or more other water sources to make up the shortfall.

5.4 Comparison of Impacts
Table 5-4 below is a comparison of the impacts of the proposed action and alternatives.

Table 5-4. Comparison of Impacts Among Alternatives

ALTERNATIVE	IS NEED AND PURPOSE SATISFIED?	PRINCIPLE ENVIRONMENTAL EFFECTS	FEASIBILITY
Proposed Action	Yes. This is the preferred alternative because it will implement the HCP without interfering with District's water supply system.	Harm to listed species from P.S. 6 minimized by HCP. Benefit to stream habitat from water released at Matthews Dam. Benefits from HCP mitigations.	Yes, no barriers to implementation.
Alternative 1: No Action	No. Would not resolve conflict with ESA.	Same as the proposed action except no mitigation by HCP.	Impracticable because of unresolved conflict with ESA.
Alternative 2: Discontinue the Surface Diversion at Pump Station 6 and Withdraw Water from the Ranney Collectors Only	No. Would not provide sufficient water for District's needs.	Impacts from P.S. 6 and associated activities eliminated. Harm to listed species from activities not associated with P.S. 6 same as proposed action. Creates a water shortfall and the need to develop other sources. Less benefit to stream habitat from water releases because much less water will be released.	Impracticable because it will create a water shortfall.

6.0 AGENCIES AND PERSONS CONSULTED

California Department of Fish and Game California Natural Diversity Database, USGS Arcata North and Ruth Lake Quadrangles, June 18, 2002.

Cartwright, Wilbur, Mad River Hatchery, Pers. Comm., July 9, 2002.

County of Humboldt Program Environmental Impact Report on Gravel Removal from the Lower Mad River, May 31, 1994.

Love, Michael – Trend Analysis of Suspended Sediment and Turbidity in the Mad River, California (1960 to 1995), December 1996.

Sanders, Steven, Mt. Shasta Fish Hatchery – Pers. Comm., July 9, 2002.

Trinity and Associates, Aldaron Laird and Humboldt Bay Municipal Water District Habitat Conservation Plan for Humboldt Bay Municipal Water District's Mad River Operations, July 2002.

United States Fish and Wildlife Service, Arcata Fish and Wildlife Office, Species List for Arcata North and Ruth Reservoir Quadrangles, June 14, 2002.

Appendix A
U.S. Fish & Wildlife Service Federal Species Lists

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, CA 95521
(707) 822-7201
FAX (707) 822-8411

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IN REPLY REFER TO:

1-14-2002-1329

July 2, 2002

Ms. Gina Bauer
Winzler and Kelly Consulting Engineers
633 Third Street
Eureka, CA 95501

Subject: Species List for Ruth Reservoir Quadrangle, Humboldt County, California

Dear Ms. Bauer:

As requested by electronic message from your agency dated June 19, 2002, you will find enclosed list(s) of endangered and threatened species that may be present in *or may be affected by* projects in the subject project area (see Enclosure A). This list fulfills the requirement of the Fish and Wildlife Service (Service) to provide species lists pursuant to section 7(c) of the Endangered Species Act of 1973, as amended (Act).

The Service used your map(s) and/or other information to determine the U.S.G.S. 7.5' quadrangle(s) containing the proposed project. The species listed in Enclosure A are those species we believe may occur within, *or be affected by projects within* the Ruth Reservoir quad, where your project is planned.

Some of the species listed in Enclosure A may not be affected by the proposed action. A trained biologist or botanist, familiar with the habitat requirements of the listed species, should determine whether these species or habitats suitable for these species may be affected by the proposed action.

Some pertinent information concerning the distribution, life history, habitat requirements, and published references for the listed species is available upon request. This information may be helpful in preparing the biological assessment for this project, if one is required. Please see Enclosure B for a discussion of the responsibilities Federal agencies have under section 7(c) of the Act and the conditions under which a biological assessment must be prepared by the lead Federal agency or its designated non-Federal representative.
Formal consultation, pursuant to 50 CFR § 402.14, should be initiated if you determine that a listed species may be affected by the proposed project. If you determine that a proposed species may be adversely affected, you should consider requesting a conference with our office pursuant to 50 CFR § 402.10. Informal consultation may be utilized prior to a written request for formal

consultation to exchange information and resolve conflicts with respect to a listed species. If a biological assessment is required, and it is not initiated within 90 days of your receipt of this letter, you should informally verify the accuracy of these lists with our office.

Candidate species are currently being reviewed by the Service and are under consideration for possible listing as endangered or threatened. The term *candidate* now strictly refers to species for which the Service has on file enough information to propose listing. Candidate species have no protection under the Endangered Species Act, but are included for your consideration as it is possible that one or more of these candidates could be proposed and listed before the subject project is completed. Should the biological assessment reveal that candidate species may be adversely affected, you may wish to contact our office for technical assistance. One of the potential benefits from such technical assistance is that by exploring alternatives early in the planning process, it may be possible to avoid conflicts that could otherwise develop, should a candidate species become listed before the project is completed.

If the proposed project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by the U.S. Army Corps of Engineers (Corps), a Corps permit shall be required, pursuant to section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act. Impacts to wetland habitats require site specific mitigation and monitoring. You may request a copy of the Service's General Mitigation and Monitoring Guidelines or submit a detailed description of the proposed impacts for specific comments and recommendations.

Please contact Mr. Greg Goldsmith at (707) 822-7201 if you have any questions regarding the attached lists or your responsibilities under the Endangered Species Act. For the fastest response to species list requests, address them to the attention of the species list coordinator at this address. For questions regarding wetlands, please contact Mr. Randy Brown of this office at (707) 822-7201.

Sincerely,

(FOR) Bruce G. Halstead
Project Leader

Enclosures

Enclosure A
Listed/Proposed Threatened and Endangered Species for the RUTH RESERVOIR Quad (Candidates Included)

July 02,2002

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Fish				
*	*Oncorhynchus mykiss*	Northern California steelhead	T	N
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
*	*Oncorhynchus tshawytscha*	CA coastal chinook salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N

KEY:		
	(PE) Proposed Endangered	Proposed in the Federal Register as being in danger of extinction
	(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future
	(E) Endangered	Listed in the Federal Register as being in danger of extinction
	(T) Threatened	Listed as likely to become endangered within the foreseeable future
	(C) Candidate	Candidate which may become a proposed species
	Critical Habitat	Y = Designated, P = Proposed, N = None Designated
	*	Denotes a species Listed by the National Marine Fisheries Service

Enclosure B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) and (c) OF THE ENDANGERED SPECIES ACT

SECTION 7(a) Consultation/Conference

Requires: (1) federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species; (2) Consultation with FWS when a federal action may affect a listed endangered or threatened species to insure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the federal agency after determining the action may affect a listed species; and (3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat.

SECTION 7(c) Biological Assessment-Major Construction Activity[1]

Requires federal agencies or their designees to prepare a Biological Assessment (BA) for major construction activities. The BA analyzes the effects of the action[2] on listed and proposed species. The process begins with a Federal agency requesting from FWS a list of proposed and listed threatened and endangered species. The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the list, the accuracy of the species list should be informally verified with our Service. No irreversible commitments of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may proceed; however, no construction may begin.

We recommend the following for inclusion in the BA: an on-site inspection of the area affected by the proposal which may include a detailed survey of the area to determine if the species or suitable habitat are present; a review of literature and scientific data to determine species' distribution, habitat needs, and other biological requirement; interviews with experts, including those within FWS, State conservation departments, universities and others who may have data not yet published in scientific literature; an analysis of the effects of the proposal on the species in terms of individuals and populations, including consideration of indirect effects of the proposal on the species and its habitat; an analysis of alternative actions considered. The BA should document the results, including a discussion of study methods used, and problems encountered, and other relevant information. The BA should conclude whether or not a listed or proposed species will be affected. Upon completion, the BA should be forwarded to our office.

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[1] A construction project (or other undertaking having similar physical impacts) which is a major federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332(2)C).

[2] "Effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, CA 95521
(707) 822-7201
FAX (707) 822-8411

IN REPLY REFER TO:

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June 14, 2002

Ms. Gina Bauer
Winzler and Kelly Consulting Engineers
633 Third Street
Eureka, CA 95501

Subject: Species List for Proposed Humboldt Bay Municipal Water District Habitat Conservation Plan Environmental Assessment, Humboldt County, California

Dear Ms. Bauer:

As requested by electronic message from your agency dated June 12, 2002, you will find enclosed list(s) of endangered and threatened species that may be present in *or may be affected by* projects in the subject project area (see Enclosure A). This list fulfills the requirement of the Fish and Wildlife Service (Service) to provide species lists pursuant to section 7(c) of the Endangered Species Act of 1973, as amended (Act).

The Service used your map(s) and/or other information to determine the U.S.G.S. 7.5' quadrangle(s) containing the proposed project. The species listed in Enclosure A are those species we believe may occur within, *or be affected by projects within* the Arcata North quad, where your project is planned.

Some of the species listed in Enclosure A may not be affected by the proposed action. A trained biologist or botanist, familiar with the habitat requirements of the listed species, should determine whether these species or habitats suitable for these species may be affected by the proposed action.

Some pertinent information concerning the distribution, life history, habitat requirements, and published references for the listed species is available upon request. This information may be helpful in preparing the biological assessment for this project, if one is required. Please see Enclosure B for a discussion of the responsibilities Federal agencies have under section 7(c) of the Act and the conditions under which a biological assessment must be prepared by the lead Federal agency or its designated non-Federal representative.
Formal consultation, pursuant to 50 CFR § 402.14, should be initiated if you determine that a listed species may be affected by the proposed project. If you determine that a proposed species

may be adversely affected, you should consider requesting a conference with our office pursuant to 50 CFR § 402.10. Informal consultation may be utilized prior to a written request for formal consultation to exchange information and resolve conflicts with respect to a listed species. If a biological assessment is required, and it is not initiated within 90 days of your receipt of this letter, you should informally verify the accuracy of these lists with our office.

Candidate species are currently being reviewed by the Service and are under consideration for possible listing as endangered or threatened. The term *candidate* now strictly refers to species for which the Service has on file enough information to propose listing. Candidate species have no protection under the Endangered Species Act, but are included for your consideration as it is possible that one or more of these candidates could be proposed and listed before the subject project is completed. Should the biological assessment reveal that candidate species may be adversely affected, you may wish to contact our office for technical assistance. One of the potential benefits from such technical assistance is that by exploring alternatives early in the planning process, it may be possible to avoid conflicts that could otherwise develop, should a candidate species become listed before the project is completed.

If the proposed project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by the U.S. Army Corps of Engineers (Corps), a Corps permit shall be required, pursuant to section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act. Impacts to wetland habitats require site specific mitigation and monitoring. You may request a copy of the Service's General Mitigation and Monitoring Guidelines or submit a detailed description of the proposed impacts for specific comments and recommendations.

Please contact Mr. Greg Goldsmith at (707) 822-7201 if you have any questions regarding the attached lists or your responsibilities under the Endangered Species Act. For the fastest response to species list requests, address them to the attention of the species list coordinator at this address. For questions regarding wetlands, please contact Mr. Randy Brown of this office at (707) 822-7201.

Sincerely,

Acting for Bruce G. Halstead
Project Leader

Enclosures

Enclosure A
Listed/Proposed Threatened and Endangered Species for the ARCATA NORTH Quad (Candidates Included)

June 14,2002

TYPE	SCIENTIFIC NAME	COMMON NAME	CATEGORY	CRITICAL HABITAT
Plants				
	Layia carnosa	beach layia	E	N
Invertebrates				
*	*Haliotis cracherodii*	black abalone	C	N
Fish				
*	*Sebastes paucispinis*	bocaccio	C	N
	Eucyclogobius newberryi	tidewater goby	E	Y
*	*Oncorhynchus mykiss*	Northern California steelhead	T	N
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
*	*Oncorhynchus tshawytscha*	CA coastal chinook salmon	T	Y
Birds				
	Coccyzus americanus	yellow-billed cuckoo	C	N
	Phoebastris albatrus	short-tailed albatross	E	N
	Pelecanus occidentalis californicus	California brown pelican	E	N
	Charadrius alexandrinus nivosus	western snowy plover	T	Y
	Strix occidentalis caurina	northern spotted owl	T	Y
	Brachyramphus marmoratus	marbled murrelet	T	Y
	Haliaeetus leucocephalus	bald eagle	T	N
Mammals				
*	*Balaenoptera musculus*	blue whale	E	N
*	*Megaptera novaengliae*	humpback whale	E	N
*	*Balaenoptera physalus*	fin whale	E	N
*	*Balaenoptera borealis*	sei whale	E	N
*	*Physeter macrocephalus*	sperm whale	E	N
*	*Eumetopias jubatus*	Steller (=northern) sea-lion	T	Y

KEY:		
	(PE) Proposed Endangered	Proposed in the Federal Register as being in danger of extinction
	(PT) Proposed Threatened	Proposed as likely to become endangered within the foreseeable future
	(E) Endangered	Listed in the Federal Register as being in danger of extinction
	(T) Threatened	Listed as likely to become endangered within the foreseeable future
	(C) Candidate	Candidate which may become a proposed species
	Critical Habitat	Y = Designated, P = Proposed, N = None Designated
	*	Denotes a species Listed by the National Marine Fisheries Service

Enclosure B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) and (c) OF THE ENDANGERED SPECIES ACT

SECTION 7(a) Consultation/Conference

Requires: (1) federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species; (2) Consultation with FWS when a federal action may affect a listed endangered or threatened species to insure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the federal agency after determining the action may affect a listed species; and (3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat.

SECTION 7(c) Biological Assessment-Major Construction Activity[1]

Requires federal agencies or their designees to prepare a Biological Assessment (BA) for major construction activities. The BA analyzes the effects of the action[2] on listed and proposed species. The process begins with a Federal agency requesting from FWS a list of proposed and listed threatened and endangered species. The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the list, the accuracy of the species list should be informally verified with our Service. No irreversible commitments of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may proceed; however, no construction may begin.

We recommend the following for inclusion in the BA: an on-site inspection of the area affected by the proposal which may include a detailed survey of the area to determine if the species or suitable habitat are present; a review of literature and scientific data to determine species' distribution, habitat needs, and other biological requirement; interviews with experts, including those within FWS, State conservation departments, universities and others who may have data not yet published in scientific literature; an analysis of the effects of the proposal on the species in terms of individuals and populations, including consideration of indirect effects of the proposal on the species and its habitat; an analysis of alternative actions considered. The BA should document the results, including a discussion of study methods used, and problems encountered, and other relevant information. The BA should conclude whether or not a listed or proposed species will be affected. Upon completion, the BA should be forwarded to our office.

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[1] A construction project (or other undertaking having similar physical impacts) which is a major federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332(2)C).

[2] "Effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action.

Appendix B
HBMWD's Mad River Operations

The following section was excerpted from Appendix C of the District's proposed HCP. Certain sections of the Appendix were omitted because they did not provide information relevant to the environmental analysis provided in this assessment.

Introduction

The District provides water on a wholesale basis to municipal and industrial customers in the Humboldt Bay area, and also to a number of retail customers. The District's wholesale municipal customers include the Cities of Arcata, Blue Lake and Eureka, and the Humboldt, McKinleyville, Manila and Fieldbrook Community Services District. Via the wholesale relationship, the District serves a population of approximately 80,000 in the greater Humboldt Bay area. The District's industrial customer(s) are located on the Samoa Peninsula.

Two delivery systems convey water from the Essex facilities to the District's wholesale customers - one for domestic use and one for industrial use.

The District's domestic system at Essex is comprised of 24" pipelines from the five Ranney collectors, which lie beneath the riverbed. They connect each collector to a main transmission line that is parallel to the south bank of the Mad River. The mainline increases in diameter as it travels downriver from 24" to 51". Water for the domestic system is chlorinated at Essex and then pumped to the District's treatment plant, located at Korblex. From Korblex, the District supplies water on a gravity basis to its seven wholesale municipal customers.

Just downstream of Station 6, the District's industrial water line crosses the Mad River (about 10 feet below the channel bed) to the north bank, and then proceeds downriver. Just above the Highway 299 bridge, the line crosses beneath the Mad River again back to the south bank. The industrial line then proceeds through Arcata and down the Samoa Peninsula.

The District's operations and maintenance activities that are within the HCP planning area were introduced in the main body of the HCP in Section 5. These activities, which are discussed in greater detail in this appendix, are as follows:

Current Activities Which Occur on an Ongoing Basis: These activities include: releasing flow at Matthews Dam; diverting flow in the Essex Reach (subsurface via Ranney collectors and surface via direct diversion facility); bypassing flow below Essex; operating the direct diversion facility (Station 6) including the fish screens; dredging the forebay in front of Station 6; and maintaining adequate water surface elevation to Station 6 during the low-flow months.

Current Activities Which Occur Only As-needed: These activities include: maintaining adequate capacity in tailrace and spillway pools below Matthews Dam (by excavation if sediment, gravel or debris accumulates); gaining access to and maintaining Ranney collectors; maintaining adequate flow to Station 6 (by dredging/excavation of the low-flow channel in front of Station 6 if gravel or debris accumulates); and protecting banks and structures (by repairing/installing rock structures or revetment).

Possible Future Activities: The District will likely need to pursue a number of new projects or activities over the course of the HCP planning horizon (50 years). Possible future activities include: restoring channel capacity below Matthews Dam (if impeded by material resulting from landslide, or other significant deposition); repairing, rehabilitating, or replacing water lines in the riverbed in the Essex reach; and constructing additional grade control structures in the Essex Reach.

Current Activities Which Occur on an Ongoing Basis

1. Releasing Flow at Matthews Dam

Introduction

Completed in 1961, R.W. Matthews Dam is a 172-foot earth filled dam located at River Mile 84 on the Mad River (see photo below). The dam impounds runoff from approximately 121 square miles, or 25% of the Mad River basin, and thereby forms Ruth Lake. Ruth Lake stores surplus water for release to the Mad River during natural low-flow periods. The capacity of Ruth Lake is approximately 48,000 acre-feet. It is designed to supply a "safe yield" of 75 million gallons per day (MGD) average annual diversion at Essex, and to meet minimum bypass flow requirements which have been established for the protection and preservation of fish.

Water passes uncontrolled over the dam's spillway when water surface in Ruth Lake has reached an elevation of 2,654 feet. A 42-inch diameter penstock discharges water from Ruth Lake to the Mad River, which is then conveyed for 75 miles down river to Essex.

In 1981, the Federal Energy Regulatory Commission (FERC) granted Exemption No. 3430 for a 2 MW hydroelectric plant at Matthews Dam. The District has a contract to sell "as available" energy and capacity to PG&E. The District does not operate the plant as an electric "peaking" facility, nor does the District "ramp" its flow releases (e.g. change dramatically in a short period of time in response to power needs). Power production is incidental to water released for the District's water supply function.

Photo of Ruth Lake and Matthew's Dam omitted.

Flow Requirements for the Protection of Fish

The State Water Rights Board (SWRB) and California Department of Fish and Game (CDFG) stipulated minimum flow requirements below Matthews Dam and below the Essex diversions for the protection and preservation of fish. The stipulated minimum flows are as follows:

a) The District shall release a minimum flow of five cubic feet per second into the natural stream bed of Mad River immediately below Ruth Dam (now known as Matthews Dam).

b) The District shall bypass or release into the natural streambed of the Mad River immediately below the Essex diversion the following minimum flows or the natural flow of the Mad River as regulated by diversions now in existence, whichever is less:

- October 1 through October 15 — 30 cfs
- October 16 through October 31 — 50 cfs
- November 1 through June 30 — 75 cfs
- July 1 through July 31 — 50 cfs
- August 1 through August 31 — 40 cfs
- September 1 through September 30 — 30 cfs

District Management of Flow Releases

The District carefully plans and manages its water releases from Matthews Dam on a daily basis to ensure sufficient water is available year round for the District's downstream diversion

requirements and minimum bypass flow requirements below Essex. Additionally, the District accounts for other factors, such as evaporative losses, in determining the amount of water it must release.

The District has the ability to accurately plan its diversion requirements based on known customer demands. The District is able to monitor wholesale customer usage on a real-time basis given the District's SCADA system (Supervisory Control and Data Acquisition). The District also has the ability to calculate natural flow in the Mad River below Essex on a daily basis. Natural flow is defined as follows:

Essex Diversion + Flow Below Essex + Inflow into Ruth at Zenia – Flow Release at Matthews Dam

Natural flow is calculated on a daily basis using daily flow data from the U.S. Geological Survey (USGS) gage stations. USGS gage stations currently exist at three locations on the Mad River – near Zenia which measures the inflow into Ruth Lake, immediately downstream of Matthews Dam which measures the flow release from Matthews Dam, and just downstream of the Essex diversion near the Highway 299 bridge over-crossing. The District is currently engaged in a project with the USGS to improve the accuracy of flow measurement on the Mad River just below Matthews Dam. The District is installing a USGS-approved flow meter which will measure water flowing through the penstock. The District is also developing rating tables which will be used to calculate the volume of water that flows over the ungated spillway during the winter season, and the volume of water which may occasionally flow through the 10-inch "bypass" pipe (which is used to provide discharge to the river if the penstock is temporarily out of service). The sum of the flow through the penstock, over the spillway, and through the bypass pipe is the total flow released into the Mad River below Matthews Dam. The District will continue its cooperative relationship with the USGS, who will periodically validate the improved flow measurement techniques, and will continue to make the resulting flow data available to the public.

As noted above, the District uses USGS flow data during its daily planning process. It is important to note that the USGS data used by the District in its daily planning process will invariably differ from that which USGS later publishes for two reasons. First, the USGS published data represent daily mean discharge, yet the District uses USGS flow data for a particular time of the day (generally seven or eight in the morning). Furthermore, the USGS published data may incorporate after-the-fact adjustments based on "corrections" they believe should have been applied for a certain period of time. These adjustments are incorporated into their final daily mean flow records as published in their annual Water Resources reports.

USGS staff visit the gage stations on the Mad River on a regular basis to assess whether an adjustment to the staff gage height (e.g. "correction factor") is warranted to provide more accurate flow measurement. If USGS establishes a "correction factor" for a station on the Mad River, they provide it to the District in a timely manner. If the District receives a correction factor from USGS and determines that the flow downstream of Essex no longer meets the minimum bypass requirements, the District will increase its release from Matthews Dam. It is important to note that it takes approximately 72 hours for the increased flows to reach Essex. Therefore, the District could be out of compliance with respect to the minimum bypass flows below Essex for a period of up to three days following receipt of a new USGS correction factor.

Information detailing the correction factors, including Table 1 (USGS Correction Factors at Highway 299 Gage Station) was omitted.

The District's flow releases have augmented flows compared to what otherwise occurred naturally.

The District analyzed average monthly flow releases from Matthews Dam between 1989 and 2001. The average monthly flow release from Matthews Dam has augmented natural "pre-District" flows by at least one order of magnitude during the low-flow months. Table 2 presents this monthly flow data. Flow augmentation has many beneficial effects, including expanding river habitat for the benefit of aquatic species.

Table 2. District's flow releases from Matthews compared to natural flow (in cfs)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
"Natural" flow above Ruth Reservoir, prior to District operations	772	622	500	250	123	59	9	1	0	5	55	320
District's releases from Matthews Dam	941	812	691	342	177	111	58	70	77	77	70	281
Net increase in flows resulting from flow releases	169	190	191	92	54	52	49	69	77	72	15	-39

Additionally, the District analyzed daily flow data for the USGS gage station near Forest Glen (No. 11480500) which was located approximately nine miles downstream of Matthews Dam. This station operated between 1953 and 1994, and thus recorded flows prior to and following construction of Matthews Dam. The daily mean flows recorded at this station significantly increased during the low-flow months after the District's operation commenced in 1961.

Table 3 (Daily Mean Stream Flows (cfs) during Low-flow Months) omitted.

2. Diverting Water in the Essex Reach

Sub-surface Diversion via Ranney Collectors

The District constructed five Ranney collectors in the Essex Reach (RM 9.14 to 10.76) to deliver water on a wholesale basis to its domestic and industrial customers. During the initial development phase, the District completed construction of four Ranney collectors (numbers 1 & 1A, 2, 3, and 4). Upon completion, the District found it was unable to meet the water demands of both its municipal customers and industrial customers (e.g. two pulp mills who had contracted for 60 MGD. In 1965, the District began construction of Collector #5. The District then proceeded to convert Collectors #3, #4 and #5 for industrial water delivery, with the addition of upper laterals. Collector #3 was converted to a direct diversion facility, with a pre-settling pond, trash rack, traveling water fish-debris screen, and low-flow weir. However, Collector #3 did not meet required design criteria, and was inadequate as a permanent direct diversion facility. The District later determined that a new direct river diversion facility was required if it was to reliably meet the industrial water needs of 60 MGD.

Each Ranney collector houses two or three large electric-driven pumps and associated equipment. The collectors draw water from the aquifer via lateral pipes located 60 to 90 feet beneath the bed of the river. This water is then treated in accordance with standards set by the California Department of Health Services, and delivered to the District's municipal customers.

Currently, collectors 1, 1A, 2, 3 and 4 are in operation and provide domestic water for municipal purposes. Station 5 is currently not in service.

Photo of Ranney Collector omitted.

Surface Diversion via Direct Diversion Facility

In 1976, a new direct diversion facility was constructed (Station 6) to deliver 60 MGD to the District's industrial customers. Station 6 is comprised of a forebay, which is directly adjacent to the Mad River and extends transverse to the direction of flow, and a concrete pumping structure. This facility and its operation are described in greater detail under Activity 4 later in this appendix.

Photo of Electric-Driven Pump Motors omitted.

Impacts of Diversion on River Stage Elevation

Detailed information regarding impacts of diversion on river stage elevation and hydraulic analysis omitted.

The District's diversion operations do not adversely affect downstream habitat nor cause stranding. As introduced previously, the existing permanent rock dike, temporary gravel berm and rock weir (which together control the water surface to the surface diversion facilities) also create a reservoir or water impound area above the rock weir amounting to 20-25 acre feet of storage, and extending 800 to 1000 feet upstream of the weir. This impounded water volume has a modulating effect upon flow changes below the rock weir. Therefore, any change in water depth or surface width resulting from changes in diversion rates will occur over many hours, as observed by and attested to by District personnel.

3. Bypassing Flows Below Essex

Figures 1.1 through 1.12 referenced below are omitted.

The District maintains bypass flows below Essex in accordance with conditions in its State Water Rights Permits. Management of flow releases, including the minimum bypass requirements, were discussed in detail above under Activity 1. During technical consultation with NMFS on this HCP, NMFS staff requested that the District provide a summary of its bypass flows below Essex for the recent past. Figures 1.1 through 1.12 (at the end of this appendix) present daily flow records for each water year between 1989 and 2001. These figures present natural discharge, discharge above Essex, and discharge below Essex (e.g. the bypass flow) over a range of water year conditions (wet, normal, dry). As can be seen, but for a very few instances, the bypass flows below Essex are greater than the natural flows which would otherwise exist in the Mad River, especially during the critical low-flow months in the late summer and fall.

4. Operating the Direct Diversion Facility, including the Fish Screens

In 1976, a new direct diversion facility was constructed (Station 6) to deliver 60 MGD to the District's industrial customers. Station 6 is comprised of a forebay, which is directly adjacent to the Mad River and extends transverse to the direction of flow, and a concrete pumping structure. A shear wall of removable concrete panels across the entrance of the forebay reduces the amount of debris entering during high flows. Cellular steel sheet pile structures make up the forebay sidewalls. The forebay shape is trapezoidal, 90 feet wide at the riverbank, and tapering to 36 feet wide, in front of the trash racks at the back of the forebay. The forebay is approximately 90 feet long, from the shear wall in front at the river to the trash racks in the back. Within the forebay and approach chambers to the fish screens, no undesirable hydraulic effects (i.e., eddies or stagnant flow zones) exist which would delay, confine, or injure fish.

The concrete intake structure is divided into two equivalent "pumping cells," each one housing three-large electric-driven motors. Each cell is protected by a composite inclined trash rack at the entrance to the structure. The trash racks remove woody debris that ends up in the forebay. The trash racks are made of vertical steel bars spaced two inches apart; their function is to catch floating debris and prevent fish larger than two inches in body width from entering. A mechanical, motor driven trash rake cleans the racks, which is activated manually. The trash rake brings all trash and debris to the pump deck surface for disposal.

Each cell also has a mechanically operated fish screen located approximately 12 feet in front of the pumps. The fish screens are vertical traveling Rex "four post type" screens. The screen, including the structural framing system, completely fills the opening between the concrete sidewalls and is further "guarded" along both sides by redwood 2" x 4" sealing strips, connected directly to the concrete sidewalls. At the bottom of the screen, a steel boot plate reduces any opening at the screen bottom to less than 3/8". The rotation direction of the screen and fish buckets is toward the face of the screen, creating a water movement away from the screen at this point. Each of the two fish screens is 13 feet-2 inches wide (frame to frame) and articulated at 2-foot vertical intervals. The screen material is Type 304 stainless steel wire cloth with 3/16" square opening.

The frequency of screen runs is determined by the debris present in the water. Normally the screens are set to run for 20 minutes every 96 hours; however, the frequency may increase when the river is over 23.0 feet, or the turbidity is over 30 NTU. The screens also activate automatically if head loss is too high.

The fish bypass system begins with the fish baskets/troughs attached to the vertical traveling screens. When the screens are in operation, small organic debris or juvenile fish within 4.5 inches of the screen face will be lifted out of the water column, by one of the 58 troughs, which are attached to the screens at two-foot intervals. The troughs are made of carbon steel (12' l x 2.5" d x 2.5" to 4.5" wide), and are capable of holding water to support fish. As the troughs pass over the head sprockets, fish slide onto a wire screen where a low-pressure spray directs them to a fiberglass trough. Debris generally remains matted on the basket panels and is removed by a high-pressure spray, which blasts debris into a debris trough located immediately below the fish trough. A low pressure flushing flow runs twenty minutes after the screen has stopped operating, to guide the fish back to the river. The fish bypass system is approximately 390 feet long, and

descends approximately 40 feet. Fish are returned to the Mad River below a boulder grade control structure, into a flatwater habitat reach.

Compliance with NMFS Fish Screen Criteria

Station 6 was designed in accordance with CDFG's fish screen criteria in 1975. Station 6 was a "state of the art" diversion and screening facility for its time. More recently, NMFS (1997) and CDFG (1999) have adopted updated fish screen criteria applicable for new facilities. Station 6 is able to meet the primary goal established for new facilities – that is to not separate anadromous salmonids from their main migratory route. The forebay basin at Station 6 functions like a backwater pool or off-channel slough. Anadromous salmonids of all age classes that enter the forebay basin are never segregated from their migratory route in the main channel, nor are they prevented from freely swimming out of the facility. The forebay basin provides a slack water environment that allows suspended sediment to settle, and provides low velocity, deep-water habitat for migrating salmonids. Furthermore, Station 6 currently meets all but two of NMFS screen criteria for new facilities, including arguably the most important criterion – that is approach velocity. Refer to Appendix D for a comprehensive evaluation of how the District's fish screens meet NMFS' 1997 Fish Screening Criteria for Anadramous Salmonids.

During the technical consultation with NMFS in 2000, the District agreed to make Station 6 "fish tight" by complying with NMFS' 3/32-inch screen size opening criterion. The District also agreed to remove the existing buckets on the fish screens and replace them with rakes, thereby eliminating the possibility of lifting fish out of the water. This in turn eliminates the need for the fish return system, which does not meet current standards. Additionally, the District will be conducting a comprehensive monitoring program after the Station 6 retrofit project is complete. The Station 6 retrofit project, plus the monitoring program, are outlined in greater detail in the main body of the District's HCP.

5. Dredging the Forebay at Station 6

The District performs dredging/excavation each winter to remove accumulated sediment. The Mad River experiences highly varying water surface elevations; stage height can vary by over 20 feet. The Mad River also experiences high sediment and debris load in the winter. Therefore, a principal design criterion of Station 6 was mechanical removal of accumulated silt and gravel in the forebay to protect the pumps. The District must dredge the forebay after high flow events deposit large amounts of silt and gravel. The frequency of dredging depends on the severity of winter storms but generally varies between 2 and 5 times per month. Either a crane with a clamshell bucket, or an excavator, is used to dredge the forebay to a depth of 10 to 12 feet msl. The crane or excavator is also used, as needed, to clear the channel in front of the forebay, maintaining a continuous water flow in the forebay and the low flow channel of the river.

6. Maintaining Adequate Water Surface Elevation to Station 6 During Low-Flow Months

From 1976 to 1991, channel conditions in the Mad River allowed the District to operate Station 6 (the direct diversion facility) without any grade or water stage control. However, the bed of the Mad River has degraded over time. In the late 1980's the riverbed near Station 6 was approaching an elevation at which the pumps would vortex and no longer operate. Therefore, in 1991, the District installed two rock structures as a means of controlling water surface elevation – a jetty and a weir. The rock jetty, which projects from the north bank of the river, directs the

flow toward Station 6. The weir, located 190 feet downriver of Station 6, controls the water surface elevation at Station 6 at approximately 21.5 feet mean sea level (msl). This grade control system ensures sufficient water surface elevation at Station 6 during the low flow months.

When runoff declines in late spring and water stage is close to 21 feet msl, the District constructs a berm connecting the rock jetty to the grade control weir downstream. The berm does not divert water into Station 6, rather it ensures water passes over the weir during the low flow months (as opposed to going around it), thereby ensuring adequate water surface elevation at Station 6. The District currently constructs the berm from river-run gravel, derived either from a point bar downstream near the north bank or from the dredging/excavation of the low-flow channel in front of Station 6. The exact location and length of the berm may vary based on channel conditions, but fill is limited to that necessary to connect the rock jetty with the weir. The berm is approximately 350 feet in length, by 20 feet wide, by 3-4 feet high. Therefore, the footprint covers approximately 0.15 acres.

Photos of Berm During Construction and Completed Berm omitted.

The District has evaluated the use of bladders as an alternative to construction of the gravel berm. Bladders were determined to not be a feasible alternative for a variety of reasons. First, there is no way to install and secure bladders given the existing channel configuration and rock structures at each end (the jetty and weir) absent installation of some permanent concrete structure to which the bladders could be attached. More importantly, there is no way to install and remove bladders safely each season. The Mad River water surface elevation can change very rapidly and dramatically in response to storm events. To ensure worker safety, the District would require the bladder to be removed prior to the first significant storms, and the necessary water surface elevation to Station 6 would then not be maintained. If the District waited until after the first storm events (such that the necessary water surface elevation is maintained), the District could not safely remove the bladders, and they potentially could be washed away causing injury or damage down stream.

As discussed in the main body of the HCP, the District will initiate a study to determine if a more permanent solution is available to provide the necessary water-surface elevation.

Current Activities Which Occur Only As-needed

7. Maintaining Adequate Capacity in Tailrace and Spillway Pools below Matthews

Erosion, resulting from high water events passing over the spillway, periodically results in deposition of material in the plunge pool or tailrace channel outlet (the confluence with the Mad River).

In the tailrace channel, aggraded material collects which, in turn, may increase water surface elevation in the tailrace pool. This elevated water surface could result in accelerated bank erosion that threatens the dam face, the hydroelectric facility, or the County road located on the right bank. Aggradations in the past have partially or completely closed off the tailrace channel. At the spillway plunge pool, riprap encased in concrete has been applied on the left bank. This riprap should stabilize the bank and minimize erosion. However, erosion during high discharge

events may still occur. Additionally, course sediment derived from the steep talus slope on the right (east) bank of the spillway may be deposited in the spillway plunge pool.

On an as-needed basis, the District must remove this aggraded material and sediment from the tailrace channel and spillway plunge pool. The tailrace channel, subject to siltation and gravel deposits, covers an area approximately 30 feet by 80 feet (0.05 acres). The spillway plunge pool, subject to siltation and gravel deposits, covers an area approximately 40 feet by 100 feet (0.09 acres).

8. Gaining Access to and Maintaining Ranney Collectors

District personnel routinely visit the collectors to perform inspections and ongoing maintenance. To gain access to the collectors located in the river bed, District personnel are transported in an above-ground cable car. The District must occasionally perform major maintenance at the collectors, including repair or installation of new pumps, motors, or other heavy equipment. A crane will usually be required for the major maintenance, and if so, temporary access structures must be constructed to allow the crane to access equipment on collectors decks.

The temporary access structures to Collectors 1, 2 or 4 are constructed by pushing native river run materials with a backhoe, front end-loader, or tractor. The structures will normally be constructed on the exposed riverbed outside of the wetted channel, during the low-flow period. Under emergency conditions, the District may need to gain access during the higher flow months, and thereby work in the wetted channel. The river bed will be returned to its pre-construction condition upon completion. Two types of temporary access structures exist - roads and ramps - as follows:

- The temporary roads utilizes a maximum of 2,000 to 3,000 cubic yards of material. The temporary road entrances, from the top of bank to the exposed bed of the river, have been previously established at each of Station.
- The ramps are 3 to 4 feet above the exposed riverbed elevation, covering an area approximately 40' by 40' adjacent to the Ranney collector. The ramps range in length from 75' to 200' and height from 10' to 20', depending on the channel topography. The ramp also includes a flattened 25' by 25' area on the top for the crane to set.

Currently, the District does not need to cross the wetted channel to access any of the collectors to perform its maintenance. However, should the river channel change in relation to the collector structures, channel crossings may become necessary in the future.

Occasionally, the District must flush its collectors of accumulated sediment or conduct performance tests. Construction of a temporary berm is necessary to control the run-off generated from these activities. The berm is constructed by pushing riverbed material 3' to 4' high around a portion of the collector. The length and exact configuration depend on the edge of the low-flow water in relation to the collector and the area of discharge. The berm would be constructed away from the low-flow channel, and would not create any pits or pools. Water discharged from the collector would be contained to allow any sedimentation or turbidity to settle out. The water would then percolate into the riverbed, or be allowed to flow back into the river channel through some form of turbidity control (e.g. silt curtains or screens). The berm would be regraded to the original channel bed topography when the activity is complete.

9. Maintaining Adequate Flow to Direct Diversion Facility (Station 6)

Each year, the District must assess changes to channel morphology in front of Station 6. Depending on the magnitude and duration of winter floods, coarse sediment can accumulate behind the rock weir downriver of Station 6. If aggradation threatens to block the forebay and limit exchange of water with the low-flow channel, excavation of aggraded material may be necessary. This gravel must be removed before it causes a bar to form, which can block the entrance to the forebay, and cause the thalweg to shift to the center of the channel. When the District excavates, it is through the aggraded bed (e.g. the accumulated gravel) in order to relocate the thalwag in closer proximity to the forebay entrance. The overall bed elevation and slope of the channel are not altered. There is no headwall created, as would occur from in-channel pit mining. The up and down-river riffles are still the hydraulic controls that maintain the overall slope through this reach.

The configuration and extent of the excavation required varies depending on the amount of material which has aggraded in front of Station 6, and the location of the aggraded material in relation to the low- flow channel of the river. Excavations have typically been approximately 250 – 500 feet by 20 feet (0.11 – 0.23 acres). The sediment removed during dredging is removed or utilized in the construction of the low flow berm each year to minimize excavation of the adjoining gravel bar.

10. Repair of Rock Structures and Revetment

The District has little control over factors that cause degradation or that damage its infrastructure. Existing rock structures and revetments need to be maintained, and rehabilitated or repaired if damaged.

Stationary rock structures that are part of the District's facilities include: a grade control weir below Station 6; a rock jetty which projects from the north bank just upstream of Station 6, three wing jetties on the north bank near Station 1; and rock structures protecting the in-river collectors or domestic lines. Existing rock revetments are located in the plunge pool and tailrace outlet below Matthews Dam, and at various locations in the Essex Reach on both banks of the river from Collector 3 to above the Highway 299 bridge. The revetments vary in length from 100 to 800 feet and consist of ¼ ton to 4 ton rocks. The toe trenches or keys into gravel substrate for these revetments encumber a footprint of approximately 0.75 acres in total. Figure 2 at the end of this appendix show the approximate location of riprap and rock structures in the Essex reach.

Figure 2 was omitted. Please see Figure 1 in the main body of this EA for riprap and rock structure locations.

Possible Future Activities

The District may need to pursue a number of new projects or activities over the course of the HCP planning horizon which is 50 years. Potential future activities contemplated at this time are as follows:

11. Restoring Channel Capacity below Matthews Dam

The river channel below Matthews Dam could become partially or totally blocked if a landslide occurred downstream of the dam. Such an event could seriously threaten the safety and integrity of the dam and powerhouse. Excavation of material in the channel below Matthews Dam would be necessary if the channel was impeded by material from a landslide or other significant deposition.

12. Repairing, Rehabilitating or Replacing Water Lines in the Riverbed in Essex Reach

The District's domestic system has five 24-inch diameter pipelines which run under the river bed connecting each collector to a common pipeline header on the south bank of the river. The District's industrial system has a 51-inch diameter pipeline which crosses under the river twice between Station 6 and the Highway 299 bridge. Over the term of this HCP (e.g. 50 years), these line may need to be repaired, rehabilitated or replaced. Such work would involve excavation (to a depth of approximately 14 to 19 feet) below the gravel surface, installing steel piling under the pipeline (if deemed necessary), encasing the pipe with reinforced concrete, and replacing the excavated material back to original elevation. Where construction could not be performed in an above-ground gravel environment, the river would have to be diverted into a temporary adjacent channel.

13. Constructing Additional Grade Control Structures in the Essex Reach

From 1976 to 1991, channel conditions in the Mad River allowed the District to operate the direct diversion facility without any grade or water stage control. However, the bed of the Mad River has degraded over time. In the late 1980's the riverbed near Station 6 was approaching an elevation at which the pumps would vortex and no longer operate. Therefore, in 1991, the District installed two rock structures as a means of controlling water surface elevation – a jetty and a weir. The rock jetty, which projects from the north bank of the river, directs the flow toward Station 6. The weir, located 190 feet downriver of Station 6, controls the water surface elevation at Station 6 at approximately 21.5 feet mean sea level (msl). This grade control system ensures sufficient water surface elevation at Station 6 during the low flow months. If the riverbed continues to degrade, additional grade-control structure(s) may be required over the 50-year term of the HCP.