ORDER: WR 95-17

LAGUNITAS CREEK

Order Amending Water Rights and Requiring Changes in Water Diversion Practices to Protect Fishing Resources and to Prevent Unauthorized Diversion and Use of Water

October 26, 1995

STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

In the Matter of	)	
	)	
FISHERY PROTECTION AND WATER RIGHT ISSUES OF LAGUNITAS CREEK	)	ORDER: WR 95-17
	)	
Involving Water Right Permits 5633, 9390, 2800 and 18546 of Marin Municipal Water District (Applications 9892, 14278, 17317, and 26242),	)	SOURCE: Lagunitas Creek
	)	COUNTY: Marin
Water Right Permits 19724 and 19725 (Applications 25062 and 35079) and Diversion of Water Under Claim of Pre-1914 Appropriative Water Rights by North Marin Water District, and	)	
Water Right License 4324 (Application 13965) and Diversion of Water Under Claim of Riparian Right by Waldo Giacomini	)	

ORDER AMENDING WATER RIGHTS AND REQUIRING CHANGES IN WATER DIVERSION PRACTICES TO PROTECT FISHERY RESOURCES AND TO PREVENT UNAUTHORIZED DIVERSION AND USE OF WATER

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CITING THE RECORD

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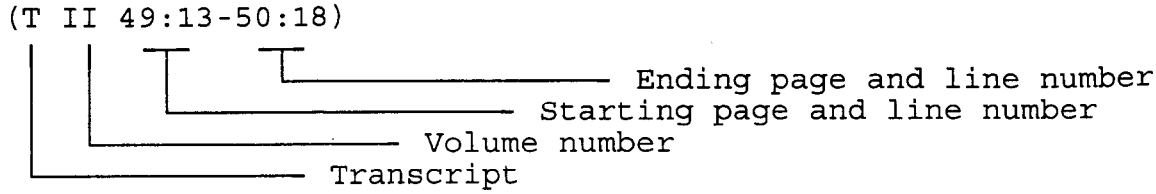

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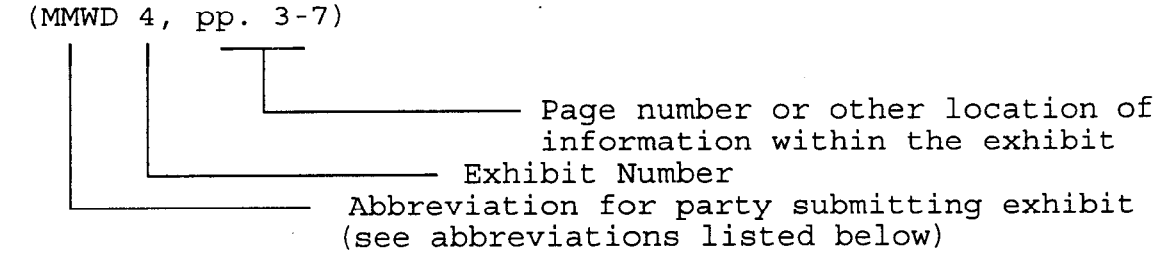

Abbreviations used for the parties:

SWRCB . . . . . State Water Resources Control Board
RWQCB . . . . . Regional Water Quality Control Board, San Francisco Bay Region
MMWD . . . . . Marin Municipal Water District
NMWD . . . . . North Marin Water District
Giacomini . . . . . Waldo Giacomini
DFG . . . . . California Department of Fish and Game
DPR . . . . . California Department of Parks and Recreation
USFWS . . . . . U. S. Fish and Wildlife Service
Evans . . . . . Willis Evans
STB . . . . . Save Tomales Bay Committee

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ORDER AMENDING WATER RIGHTS AND REQUIRING CHANGES IN WATER DIVERSION PRACTICES TO PROTECT FISHERY RESOURCES AND TO PREVENT UNAUTHORIZED DIVERSION AND USE OF WATER

BY THE BOARD:

1.0 INTRODUCTION

This order addresses measures needed to protect fishery resources in Lagunitas Creek in Marin County from the effects of water diversion by Marin Municipal Water District ("District"), North Marin Water District ("North Marin") and Waldo Giacomini ("Giacomini"). The State Water Resources Control Board (SWRCB) previously addressed the subjects of water diversions and fishery resources in Lagunitas Creek in Water Right Decision 1582 adopted in 1982. Decision 1582 approved the District's Kent Lake enlargement project and established interim instream flow standards for Lagunitas Creek. The decision also directed the

District to conduct additional studies on fishery protection measures.

On June 3, 1982, the District petitioned the Marin County Superior Court for a writ of mandate to set aside SWRCB Decision 1582. On March 23, 1983, the court approved a stipulated judgment which remanded the matter to the SWRCB for reconsideration and which required the District to comply with Decision 1582 except for specified modifications to the instream flow requirements established in that decision. On January 21, 1985, the court entered a modified stipulated judgment which has remained in effect pending adoption of this order.

Staff of the District and the Department of Fish and Game (DFG) met numerous times over a two year period following completion of the studies required by Decision 1582. In November of 1990, the District and DFG requested a water right hearing before the SWRCB to resolve remaining issues and to set final water right permit conditions for the project. A hearing was held beginning in March of 1992 to address issues regarding diversion of water from Lagunitas Creek by the District, North Marin, and Waldo Giacomini.

This order reviews the history of water development on Lagunitas Creek; evaluates the use of water by the District, North Marin, and Waldo Giacomini; establishes minimum instream flow requirements and other measures needed to protect fishery resources in Lagunitas Creek. This order also specifies the water right permit and license amendments and other actions needed to protect fishery and other public trust resources and to ensure that water diversion and use are in compliance with the reasonableness requirements of Article X, Section 2 of the California Constitution.

2.0 BACKGROUND

This portion of the order summarizes the geographical, hydrological, historical, and legal background information underlying the amendments to water rights and other requirements established in this order.

2.1 Description of Watershed

Figure 1 shows the location of Lagunitas Creek, the water district boundaries, Samuel P. Taylor State Park, and the Golden Gate National Recreation Area. Figure 2 shows the major dams, reservoirs, tributary streams, gaging stations and other features in the Lagunitas Creek watershed. Lagunitas Creek originates on the north slope of Mount Tamalpiais and flows in a northwesterly direction for about 25 miles before discharging into Tomales Bay. San Geronimo Creek and Nicasio Creek are the two major tributaries to Lagunitas Creek. A third tributary, Olema Creek, flows into Lagunitas Creek near the confluence with Tomales Bay. The Lagunitas Creek watershed is the largest watershed in Marin County, encompassing 103 square miles.

Lagunitas Creek is an important coastal stream for coho salmon and steelhead. The stream also supports the California freshwater shrimp (*Syncaris pacifica*) which has been classified as an endangered species by state and federal agencies. The population of shrimp declined dramatically between 1981 and 1992. (MMWD 2, p. G-1.)[1] Lagunitas Creek once supported coho salmon and steelhead runs of 3,000 to 5,000 fish per year, but construction of dams and other development within the watershed have significantly depleted the fishery resources. Present coho

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[1] *References to exhibits in the record are indicated by the initials or other abbreviation for the party which submitted the exhibit, followed by the exhibit number and page number (or other designated portion of the exhibit). References to the reporter's transcript of the hearing are indicated by "T", followed by the volume number of the transcript, the starting page and line number of the reference and the ending page and line number of the reference.*

FIGURE 1

Location Map

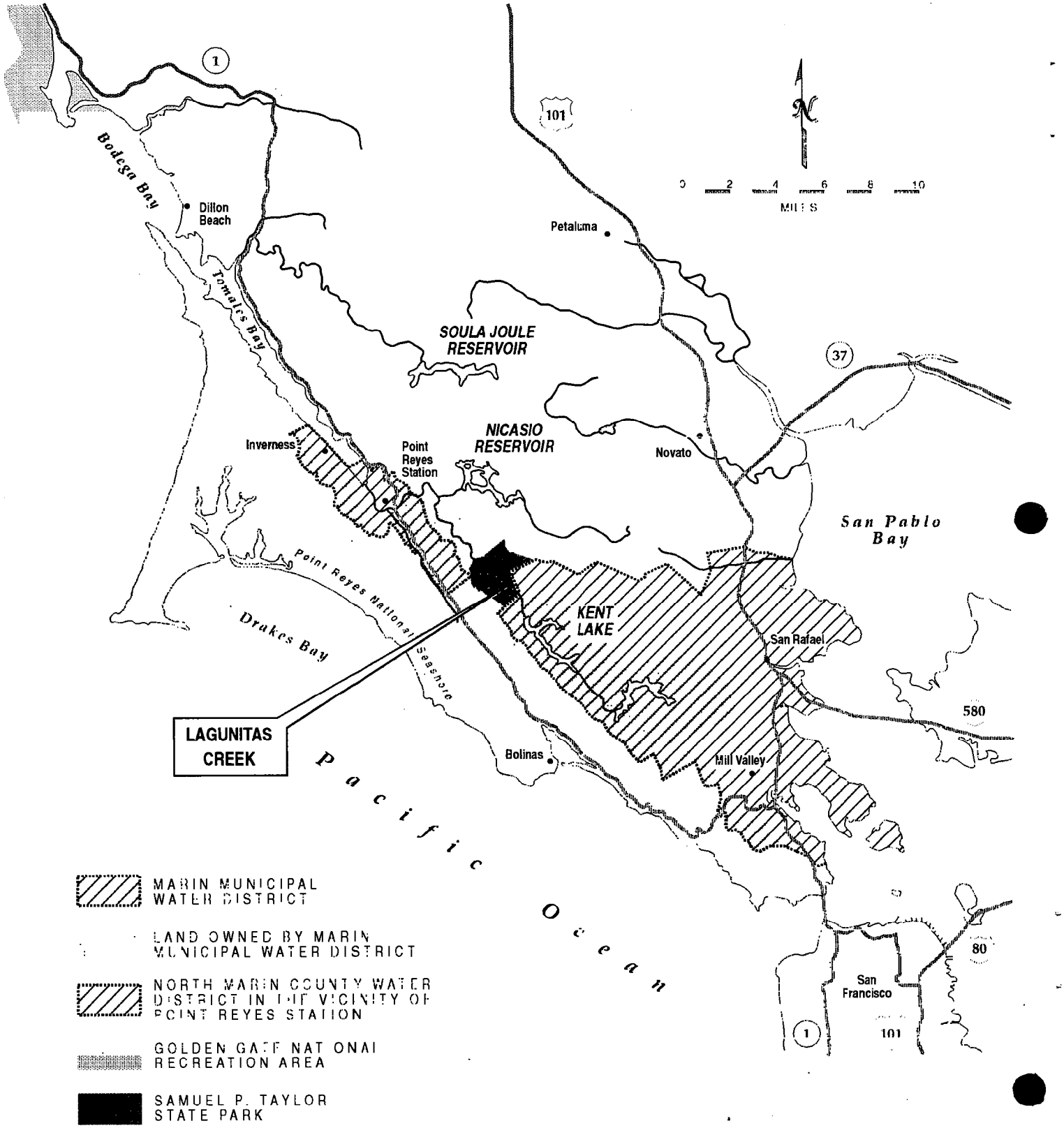
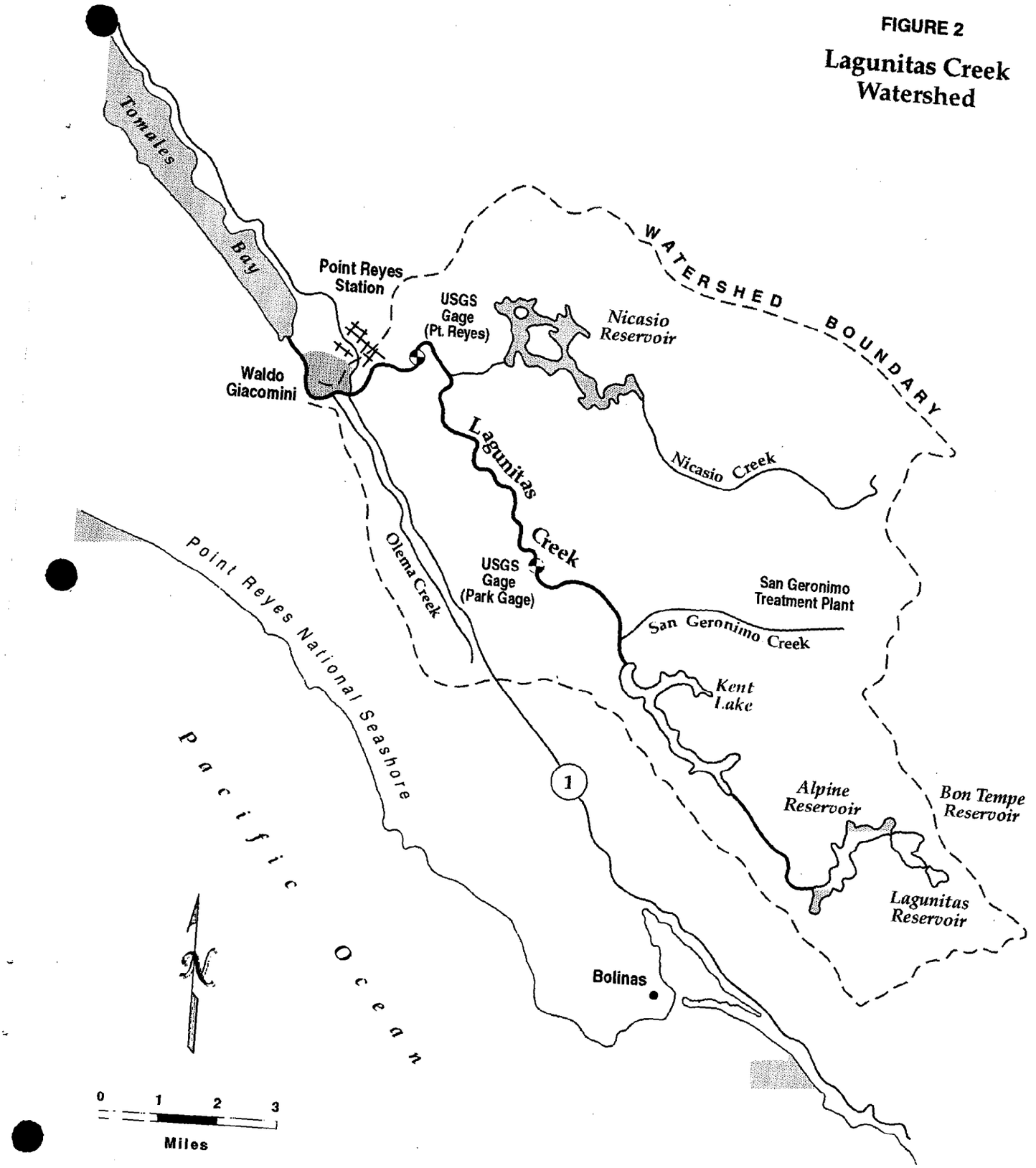


FIGURE 2

Lagunitas Creek Watershed



runs are less than 100 fish per year. (SWRCB 7, pp. vi and 11.) Lagunitas Creek is the primary source of water for several diverters. The largest water user is the Marin Municipal Water District which diverts approximately 25,000 acre-feet per annum (AFA) from a series of reservoirs to serve about 170,000 people in eastern Marin County. North Marin Water District diverts about 270 AFA at a rate of about 0.6 cubic feet per second (cfs) from relatively shallow wells located adjacent to the creek to serve about 1,500 people in the vicinity of Point Reyes Station. Mr. Waldo Giacomini diverts about 565 AFA at a rate of up to 2.7 cfs for irrigation of 350 acres of pasture adjacent to Tomales Bay. Each year, Giacomini constructs a gravel dam in the stream to assist in the diversion of water.

Public land within the watershed includes the Samuel P. Taylor State Park, the Golden Gate National Recreation Area, and land owned by the District. (MMWD 7, Plate 3.) Most of the land within the watershed is publicly owned.

2.2 Hydrology (Precipitation and Streamflow)

Natural run-off patterns in Lagunitas Creek are typical of many coastal California streams. In the natural or unimpaired condition, the creek had high "flashy" winter flows, low summer flows and substantial yearly variation in runoff. (SWRCB 7, p. 8.) From 1955 to 1991, the estimated annual unimpaired runoff averaged 94,000 AF, ranging from a low of 6,000 AF in 1977 to a high of 248,000 AF in 1983. (MMWD 7, Table 29.) Over the 71 years of record from 1925 to 1995, yearly precipitation at the Kent precipitation gage has ranged from a low of 17.2 inches to a high of 116.2 inches for the October 1 through September 30 water year.[2] Virtually all precipitation occurs as rainfall, with an

[2] *Pursuant to Section 761(e) of Title 23 of the California Code of Regulations, the SWRCB takes official notice of the precipitation data for the Kent precipitation gage for 1925 to 1991, as submitted by North Marin Water District in Attachment I to the letter to the SWRCB dated September 21, 1995.*

average of 88 percent occurring from October through March. (MMWD 7, p. 15.) In January 1982, 16 inches of rain fell during a 24-hour period resulting in a recorded flow of 22,000 cfs. The storm caused extensive erosion and sedimentation and raised the bed of the stream by as much as six inches. (MMWD 20, p. 3; MMWD 6, Tab G, pp. 38-43; T II 90:25-94:5.)

The District's reservoirs have altered flows in Lagunitas Creek by reducing winter flows and increasing summer flows, particularly during drought years. The reservoirs have also smoothed out the rapid fluctuations in flow resulting from winter storms. (MMWD 7, p. 15 and Plates 12 and 13.)

Most studies of Lagunitas Creek utilize flow measurements at the USGS gages located in Samuel P. Taylor State Park (Park gage) and near Point Reyes Station (Point Reyes gage, also referred to as the Gallagher gage). (See Figure 2.) Flow data collected since 1955 are considered to be of high quality. (MMWD 7, p. 23.) The tributary inflow from Nicasio Creek is subject to large variations with relatively low inflow in dry years. (T I 115:17-115-20.) Between 1955 and 1991, annual run-off in Nicasio Creek averaged about 30,000 AFA, with a peak annual runoff of 95,000 AF and a low annual runoff of 200 AFA. Most of the runoff is diverted to storage in Nicasio Reservoir. (MMWD 7, Table 18.) During that same period, San Geronimo Creek had an average annual runoff of 12,000 AFA with a peak annual runoff of 31,000 AF and a low annual runoff of 600 AF. There are no major dams or reservoirs on San Geronimo Creek.

Flow at the Point Reyes Station gage is normally greater than flow at the upstream Park gage due to accretions or inflow from Nicasio Creek and other minor tributaries. During summer months of drought years, however, there may be little or no inflow from these sources. (SWRCB 32, p. 6.)

2.3 History of Development in the Watershed

In 1873, the Lagunitas Creek Dam was constructed in the upper reaches of Lagunitas Creek. Over the next 40 years, two dozen water companies served residents of Marin County with water diverted from Lagunitas Creek and from springs located within the watershed. In 1912, the Marin Municipal Water District was formed through consolidations of most of the previous water suppliers and acquisition of the accompanying water rights. During the next 70 years, the District secured water rights and constructed a series of dams in western Marin County. (MMWD 7, p. 17.)

A summary of the District's reservoirs in the Lagunitas Creek watershed and the adjacent Walker Creek and Corte Madera Creek watersheds is provided in Table 1 of the Division of Water Rights staff analysis of the record. The District's reservoirs have a total capacity of 79,561 AF.

Rural communities in the lower portion of the watershed received water from various water companies beginning in 1875. North Marin acquired these water systems in 1970 and now operates a consolidated water supply system diverting water from Lagunitas Creek. (NM 52, pp. 2 and 3.)

2.4 Summary of Water Right Claims

A summary of the water rights claimed by the major diverters from Lagunitas Creek is presented in SWRCB Exhibits 32 and 33. In addition, there are several landowners located adjacent to Lagunitas Creek who divert relatively small quantities of water for domestic use under claim of riparian right. There are also a number of appropriative water rights to divert relatively small quantities of water from Lagunitas Creek or its tributaries under permits issued by the SWRCB. Some of these diversions are upstream of the District's reservoirs. (NM 51, p. 4.) These water users were not parties to this proceeding. Table 1

TABLE 1

SUMMARY OF WATER RIGHT CLAIMS OF THE MARIN MUNICIPAL WATER DISTRICT, NORTH MARIN WATER DISTRICT, AND WALDO GIACOMINI

Entity	Type of Right	Date of Priority	Amount	Season	Point of Diversion
MMWD	Pre-1914 S-4746	1872	350 afa	All Year	Lagunitas Lake
MMWD	Pre-1914 S-10139	1906	49 cfs	All Year	Peters Dam
MMWD	A-9892 P-5633	1940	50 cfs	All Year	Peters, Alpine, Bon Tempe Dams
			6,050 afa	All Year	Peters Dam
			9,450 afa	All Year	Alpine Dam
			4,500 afa	All Year	Bon Tempe Dam
MMWD	A-14278 P-9390	1951	8,550 afa	All Year	Peters Dam
MMWD	A-17317 P-12800	1956	31 cfs 29,000 afa	All Year 10/1-6/30	Nicasio Dam
MMWD	A-26242 P-18546	1980	8,300 afa	9/1-6/30	Peters Dam
North Marin	Pre-1914 S-8763	1844	8,000 gpd to 300 gpm	All Year	Offset wells at Point Reyes Sta.
North Marin	A-25062 P-19724	1976	0.699 cfs	All Year	Offset wells at Point Reyes Sta.
North Marin	A-25079 P-19725	1976	0.961 cfs	All Year	Offset wells at Point Reyes Sta.
Giacomini	Riparian	N/A	Max. Pump Cap. 3.5 cfs	All Year	Giacomini Pump
Giacomini	A-13965 L-4324	1950	2.67 cfs	5/1-11/1	Giacomini Pump

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A - Application
P - Permit
L - License
S - Statement of Water Division and Use

[SWRCB 33, Table 2]

provides a summary of the water rights on Lagunitas Creek and Nicasio Creek claimed by the District, North Marin, and Giacomini. These rights are discussed in Sections 3.0 through 5.4 below.

2.5 Expansion of Kent Lake (Chronology of Events)

The expansion of Kent Lake in 1982 was the last major project constructed on Lagunitas Creek. In September 1979, DFG filed suit challenging the adequacy of the environmental impact report (EIR) which the District prepared for the project. The District and DFG subsequently reached an agreement which provided that: the District would conduct specified studies on how to operate the project to protect aquatic resources; the District would provide specified minimum flows below Peters Dam; and following completion of the studies, DFG could renew the lawsuit if an agreement could not be reached regarding protection of aquatic resources. On October 24, 1979, the Superior Court for Marin County issued a preliminary injunction which incorporated the terms of the parties' agreement. (MMWD 1, pp. 7-10.) Following designation of the freshwater shrimp as an endangered species under the California Endangered Species Act in 1980, the District and DFG entered into a supplemental agreement on additional studies and measures to protect the freshwater shrimp in Lagunitas Creek. (MMWD 19, Tab B.)

The District filed Water Right Application 26242 in 1980 for enlargement of Kent Lake. The District also submitted time extension petitions for permits issued on Application 9892 (Peters Dam, Alpine Lake, and Bon Tempe Lake), Application 14278 (Peters Dam) and Application 17317 (Nicasio Dam). On April 7, 1982, the SWRCB adopted Decision 1582 which approved Application 26242 and the petitions for extensions of time. Decision 1582 established interim flows for fish and wildlife protection and also directed the District to conduct additional studies. The decision concluded that the environmental needs of the Lagunitas

Creek watershed must be evaluated during a period of operation and study before a final determination could be made on the quantity of water held in storage and the quantity released or bypassed for environmental protection. (Decision 1582, p. 27.)

The District sought judicial review of Decision 1582. (Marin County, Superior Court No. 107979.) On March 25, 1983, the court entered a stipulated judgment that modified the flow standards established in Decision 1582 and required the District to comply with those standards pending reconsideration of Decision 1582 by the SWRCB. (MMWD 18, Tab A.)

In April 1983, the District submitted a study plan to the SWRCB which described the scope of studies to be conducted pursuant to Decision 1582. Following discussion by the SWRCB at a public workshop, the proposed study plan was approved by the Chief of the Division of Water Rights. On January 31, 1985, the Superior Court entered a second stipulated judgment which modified the flow requirements established by Decision 1582, directed the District to conduct the studies described in the 1983 study plan, and directed the SWRCB to act diligently to adopt a final decision. (MMWD 18, Tab B.)

By 1988, the District had substantially completed studies relating to fisheries, hydrology and geomorphology, as required by Decision 1582, the agreements with DFG, the 1983 study plan and the court orders. (MMWD 1, pp. 13-17.) DFG conducted other fishery studies on Lagunitas Creek and presented its findings in the April 1986 report titled "Instream Flow Requirements, Anadromous Salmonids Spawning and Rearing, Lagunitas Creek, Marin County." (SWRCB 7.) Following completion of fishery studies by the District and DFG, the two agencies negotiated over a two year period regarding fishery protection measures in Lagunitas Creek. In 1990, the District and DFG advised the SWRCB that negotiations

were unsuccessful and requested that the SWRCB hold a water right hearing. (MMWD 1, pp. 18 and 19.)

2.6 Complaints by Marin Municipal Water District and Trout Unlimited

In 1987, the District and Trout Unlimited filed separate but similar complaints with the SWRCB contending that water diversions near Giacomini's dam resulted in violations of the condition specified in Decision 1582 that requires a flow of one cfs past the Giacomini dam. SWRCB staff investigated the complaints and prepared a Staff Report of Investigation dated November 22, 1988. The SWRCB deferred resolution of the complaints until after review of instream flow requirements in the present proceeding.

2.7 Fish and Game Code Provisions

The Legislature has enacted several statutes relevant to fishery protection measures on Lagunitas Creek. These statutes include Fish and Game Code Section 5937 and the "Salmon, Steelhead Trout and Anadromous Fisheries Program Act" as discussed below.

2.7.1 *Fish and Game Code Section 5937*

The basic statutory requirement for release of water from a dam to protect downstream fish is set forth in Fish and Game Code Section 5937 which provides, in pertinent part:

> "The owner of a dam shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around or through a dam to keep in good condition any fish that may be planted or exist below the dam."

2.7.2 *Salmon, Steelhead Trout and Anadromous Fisheries Program Act*

Legislative policy with respect to protection of anadromous fisheries is set forth in the "Salmon, Steelhead Trout, and Anadromous Fisheries Program Act" enacted in 1988. The act

emphasizes the importance of protecting and increasing the naturally spawning salmon and steelhead trout of the State. (Fish and Game Code Section 6901.) The act establishes state policy to "significantly increase the natural production of salmon and steelhead trout by the end of this century." (Fish and Game Code Section 6902(a).) The act further states that "[t]he protection of, and increase in, naturally spawning salmon and steelhead trout of the state must be accomplished primarily through the improvement of stream habitat." (Fish and Game Code Section 6901(g).) In establishing fishery protection flows for Lagunitas Creek, the SWRCB is obligated to consider the Legislature's determinations regarding the importance of protecting salmon and steelhead trout habitat and increasing natural production of those fish.

2.8 Authority of State Water Resources Control Board

The State Water Resources Control Board has broad authority to establish minimum flows and take other measures needed for protection of fisheries and other public trust resources. That authority is provided by Article X, Section 2 of the California Constitution, Water Code Sections 100 and 275, the public trust doctrine as articulated by the California Supreme Court in National Audubon Society v. Superior Court, (1983) 33 Cal.3d 419, 189 Cal.Rptr. 346, and Water Code Sections 1243 and 1253.

2.8.1 *Reasonableness* Doctrine

Article X, Section 2 of the California Constitution and Water Code Section 100 prohibit the waste, unreasonable use, unreasonable method of use or unreasonable method of diversion of water. Article X, Section 2 applies to all water users of the State and serves as a limitation on every water right and every method of diversion. (Peabody v. Vallejo (1935) 2 Cal.2d 351, 367, 372; 40 P. 2d, 486, 491, 498-499.) The SWRCB has a duty to ensure that all uses and diversions of water comply with the reasonable use and reasonable method of diversion standard of

Article X Section 2 of the California Constitution. (Water Code Section 275; Imperial Irrigation District v. State Water Resources Control Board (1990) 225 Cal. App. 3d 548, 554; 275 Cal.Rptr. 250.)

Article X, Section 2 of the California Constitution also provides that the general welfare requires the State's water resources to be put to beneficial use to the fullest extent to which they are capable. Therefore, in determining the reasonableness of a particular use of water or method of diversion, other competing water demands and beneficial uses of water must be considered. A particular water use or method of diversion may be determined to be unreasonable based on its impact on fish, wildlife, or other instream beneficial uses. (Environmental Defense Fund, Inc. v. East Bay Municipal Utility District (1980) 26 Cal.3d 183, 161 Cal.Rptr. 466.)

2.8.2 ***Public Trust Doctrine***

Under the public trust doctrine, the State retains ongoing supervisory control over navigable waters and the lands beneath those waters. The purpose of the public trust doctrine is to protect navigation, fishing, recreation, fish and wildlife habitat, and aesthetics. (National Audubon Society v. Superior Court (1983) 33 Cal.3d 419, 434-435, 437; 189 Cal.Rptr. 356, 358; cert. denied, 464 U.S. 977.) Fish and Game Code Section 5937 is a legislative expression concerning the public trust doctrine which should be taken into account when the SWRCB acts under its public trust authority. (See California Trout, Inc. v. State Water Resources Control Board (1989) 207 Cal.App.3d 585, 626, 631; 255 Cal.Rptr. 209, 212.)

In applying the public trust doctrine, the State has the power to reconsider past water allocations even if the State considered public trust impacts in its original water allocation decision. The State has the duty of continuing supervision over the taking

and use of appropriated water. (National Audubon Society v. Superior Court, 33 Cal.3d at 445-448; 189 Cal.Rptr. at 363-366.) In this instance, the 1983 Superior Court order requires that the SWRCB reconsider the flow standards established in Decision 1582.

2.8.3 *Water Code Provisions*

Water Code Section 1243 provides:

> "The use of water for recreation and preservation and enhancement of fish and wildlife resources is a beneficial use of water. In determining the amount of water available for appropriation for other beneficial uses, the board shall take into account, whenever it is in the public interest, the amounts of water required for recreation and the preservation and enhancement of fish and wildlife resources."

Water Code Section 1253 states:

> "The board shall allow the appropriation for beneficial purposes of unappropriated water under such terms and conditions as in its judgment will best develop, conserve, and utilize in the public interest the water sought to be appropriated."

As discussed above, the SWRCB has continuing authority to regulate water use under the reasonable use provisions of the California Constitution and under the public trust doctrine. In addition to other applicable statutes, the SWRCB's exercise of its continuing authority over water diversion and use is guided by the legislative directives of Water Code Sections 1243 and 1253.

Water Code Section 1257.5 directs the SWRCB to consider flow requirements proposed by DFG when acting upon applications to appropriate water and authorizes the SWRCB to "establish such streamflow requirements as it deems necessary to protect fish and wildlife as conditions in permits and licenses." Either on its own motion or at the request of the SWRCB, DFG may review streamflow requirements and propose modifications of those requirements. (Public Resources Code Section 10003.)

2.9 Water Right Hearing

The January 9, 1992 hearing notice identified key issues to be addressed at a water right hearing on water diversion and fishery protection in Lagunitas Creek. The hearing officer, SWRCB staff and representatives of several parties participated in a pre-hearing field orientation tour of Lagunitas Creek on January 24, 1992. Ten days of hearing were held between March 23 and November 16, 1992. The following 11 parties participated in the evidentiary portion of the hearing:

Marin Municipal Water District (District or MMWD)
North Marin Municipal Water District (North Marin or NM)
Giacomini Dairy Ranch (Giacomini)
California Department of Fish and Game (DFG)
California Department of Parks and Recreation (DPR)
U.S. Fish and Wildlife Service (USFWS)
U.S. National Park Service
Save Tomales Bay Committee
Mr. Willis Evans
Mr. Richard Plant
Division of Water Rights staff member Charles Rich

The SWRCB also received written and oral policy statements from 16 other parties who did not participate in the evidentiary portion of the hearing.

3.0 MARIN MUNICIPAL WATER DISTRICT'S DIVERSION AND USE OF WATER

In 1990, Marin Municipal Water District supplied approximately 30,000 AF of water via 57,000 service connections to approximately 170,000 people in a 147 square mile service area in eastern Marin County. (MMWD 15, p. 9; MMWD 7, p. 5.) The District's reservoir system in western Marin County is the primary source of water for the District. The District also imports water from the Russian River under contract with Sonoma County Water Agency (SCWA). (MMWD 7, p. 5.)

3.1 Water Supply and Demand

The District's Water Supply Management Plan was adopted in 1989. The plan presents information regarding the District's water supply and water demand, the yield of the existing reservoir system, water deficiencies at the existing level of demand, and alternative sources of supply to meet present and projected water demands. (MMWD 7, pp. 78 and 79; MMWD 13, p. 1-2.) The 1989 Water Supply Management Plan concludes that demand exceeds supply by approximately 5,000 AFA. (MMWD 1, pp. 26-28.) The plan recommends that the District secure an additional 14,000 AFA of water to meet current and future projected demand. The plan assumes that the supplemental water supply would be subject to a 30 percent reduction in dry years, thereby resulting in a yield of about 10,000 AFA in dry years. The plan evaluates several alternative methods of obtaining a supplemental supply and concludes that delivery of water from the Russian River or construction of a desalination plant are the most feasible alternatives. (MMWD 20, pp. 3-5; T I 78:6-79:10.)

Figure 5 of the staff analysis shows actual and projected values for population, total water demand, and per capita water consumption within the District service area from 1930 to 2025. Population within the District has remained at about 170,000 people for the past 20 years. Similarly, total water consumption has remained fairly constant at about 30,000 AFA to 32,000 AFA, with the exception of the 1976/77 drought when water use declined dramatically. Per capita water consumption has shown a gradual but steady increase over the last 20 years except during drought years when per capita consumption declined. The District estimates that total water demand will increase to 37,100 AFA in the year 2005 and to about 40,100 AFA by 2025. (MMWD 7, Table 1; MMWD 13, pp. 2-1 to 2-8 and 3-30.)

The Lagunitas Creek watershed was the District's exclusive source of supply until 1977. At that time, the District completed

construction of the Russian River Intertie which allowed for delivery of water from the Russian River under contract with SCWA. (MMWD 7, p. 4.) In recent years, reclaimed water has supplied about one to two percent of the District's water demand. During the 1976/1977 drought, the District constructed a pipeline across the Richmond-San Rafael Bridge to deliver approximately 4,000 AF of water from the East Bay Municipal Utility District.

Water shortages within the District have resulted in declarations of water shortage emergencies, mandatory water conservation measures and moratoria on new water service connections. (MMWD 20, Tab D; T I 75:21-77:17 and 105:21-106:8.) In 1988, the District declared a water shortage emergency and, in 1989, it imposed a moratorium on new service connections.

The District has conducted several studies to determine the yield, or reliable supply, of its water supply system. Yield includes water diverted from the reservoir system as well as water imported from the Russian River. The District defines yield as the amount of water that can be produced by the system in all years including critically dry years, over the entire period of hydrologic record. (MMWD 7, p. 5.) The District's estimate of the "operational yield" from the various elements of its system includes 25,700 AFA from the Lagunitas reservoir system and 11,600 AFA from the Russian River Intertie under contracts with SCWA, for a total of 37,300 AFA. (MMWD 7, p. 36; T II 125:4-125:12.)

Between 1982 and 1991, the District's actual diversions from its reservoir system averaged 26,700 AFA, including below average diversions during drought years in 1989, 1990 and 1991. (MMWD 7, Table 21.) The relatively small size of the Lagunitas Creek watershed, the large variation in annual precipitation, and the relatively small amount of reservoir storage capacity compared to

annual water demand combine to limit operational flexibility of the District's water supply system. (T I 108:16-109:2.)

Since 1989, the District has estimated the "operational yield" of its reservoir system at 30,000 AFA. (MMWD 7, pp. 5-8.) The District bases its estimate of operational yield upon an estimated demand of 34,000 AFA, mandatory conservation of between 15 and 33 percent in drought years, a minimum pool requirement of 10,000 AF, and release of 3,770 AFA from Kent Lake for instream flow in Lagunitas Creek. (MMWD 7 pp. 7 and 52; MMWD 20, Tab D, pp. 1 and 8; MMWF 7, p. 36.) The District's estimate of its operational yield assumes that it is not required to release any water from Nicasio Reservoir for instream flow in Nicasio Creek. (MMWD 7, p. 52.)

The District considers a 10,000 AF minimum pool to be a prudent reserve or emergency water supply in the event of severe drought. (MMWD 7, p. 7.) The actual minimum pool storage level of MMWD reservoirs is 7,100 AF. (MMWD 7, Table 5.) Reducing reservoir storage below the minimum pool levels would reduce the water level below the existing water intakes and would require installation of temporary pumping facilities. (MMWD 15, p. 8.)

3.2 Russian River Intertie

During the 1976/1977 drought, the District began to rely upon water imported from the Russian River to supplement supplies from the Lagunitas Creek watershed. Water imports from the Russian River increased from 1,845 AF in 1977 to 6,714 AF in 1992. Water from the Russian River is provided to the District pursuant to contract with the SCWA. The water comes primarily from Lake Sonoma and Lake Mendocino. The water is diverted as authorized by permits issued to SCWA and then delivered to the District through the North Marin water supply system.

The original agreement between the District and SCWA was signed in 1975. In 1988, the two parties signed the "Second Amended Offpeak Water Supply Agreement" which provides for delivery of a maximum of 4,300 AF of water to portions of the District during specified months on an "as available" basis.

In 1992, the two parties signed a new agreement which provides for annual delivery of 10,000 AFA on an "as available" basis. The availability of water is determined annually based on end-of-year reservoir storage, projected water needs of other agencies served by SCWA, and other factors. The District presented testimony that the 1991 agreement will provide a net safe yield of 7,300 AFA. (T II 125:4-125:12.)

3.3 Water Conservation

The District presented testimony that it has an extensive water conservation program. (MMWD 7, pp. 10 and 11; MMWD 15, p. 7.) The 1990 Urban Water Management Plan describes various voluntary and mandatory water conservation measures including an educational program, a leak detection program, a "tiered" rate structure, retrofitting of plumbing facilities, and installation of "drought tolerant" landscaping. (MMWD 15, pp. 25-39.) Over half the homes in the District have low-flow facilities and drought tolerant landscaping. (MMWD 15, p. 4.)

During the 1976/1977 drought, customers responded to the District's request to conserve water by reducing use 65 percent. (T I 73:11-73:21.) In 1987, the District determined that existing water conservation measures resulted in saving about 3,000 AF of water, or about 9 percent of the total demand. (MMWD 20, Tab D, p. 7.) Although water conservation measures have served to reduce water demand, they have also served to reduce the "elasticity" of the remaining demand, thereby making it more difficult to further reduce demand during future droughts. (MMWD 15, pp. 7 and 8; T I 84:20-85:5.)

3.4 Reclamation

Use of reclaimed water in the District increased from 60 AFA in 1984 to 485 AFA in 1992. The District anticipates spending $16 million to upgrade the Las Galinas Valley system to provide 1,100 AFA of reclaimed water by the year 2005. The District is also developing plans for construction of reclamation facilities at the Central Marin Sanitation District at a cost of $17 million to provide 900 AFA. Both projects together are expected to provide a total of 2,000 AFA of reclaimed water within 10 years. (MMWD 7, pp. 10 and 11; MMWD 15, pp. 40 and 41; MMWD 20, Tab D, pp. 6-7.)

3.5 Operational Criteria

The District's water supply system includes seven reservoirs, two treatment plants, 108 pumping stations, and 839 miles of water lines. (MMWD 7, PP. 10 and 35; MMWD 15, p. 9.) The operational criteria and constraints on the system are described in the District's exhibits and hearing testimony. (MMWD 7, pp. 35-47; T I 11:13-119:4.) The District has different operational criteria for normal and dry years, and the system is operated on the assumption that the coming year will be dry. (T I 116:11-119:4.) The District attempts to maximize use of water from the Russian River intertie before using water from its local reservoir system in order to preserve its supply of stored water. (MMWD 7, pp. 38 and 43; T I 112:14 -112:16.)

In order to meet instream flow requirements in Lagunitas Creek, the District has used water from Nicasio Reservoir, Kent Lake, or both. (MMWD 2, p. F-1; MMWD 7, p. 41.) Water used for instream flow purposes from Nicasio Reservoir is pumped upstream through a 9.4 mile long, 27 inch pipeline to a location about 0.2 mile below Kent Lake where it is discharged into Lagunitas Creek. (MMWD 7, Plate 22.) The quantities of water released from Kent Lake and Nicasio Reservoir for nonconsumptive purposes for the

years 1982 through 1991 are shown in Table 5 of the staff analysis. (MMWD 7, Table 21.)

3.6 Operations Model Studies

The District developed a computer model to evaluate the overall operation of its water supply system. (MMWD 7, p. 35.) Division of Water Rights staff reviewed the model in 1989 and provided comments regarding use of the model to evaluate potential impacts of revised instream flow requirements. (MMWD 7, Attachment F.)

The District did not offer the model into evidence, but did submit the results of several model studies. The studies evaluated the impacts of the District's instream flow proposals as compared to the "unimpaired" flow condition and the "pre-project" condition (i.e., prior to the expansion of Kent Lake). The District's model studies were based on the important assumption that it would continue water diversions from Lagunitas Creek at historic levels. (T I 125:20-125:22.) Thus, instream flow standards proposed by the District represent the quantity of water that can be provided without increasing water shortages to the District's customers. The District's proposed flow standard is also based on the assumption that the instream flow requirement below Nicasio Reservoir will be eliminated. (MMWD 1, p. 22.) The computer model studies did not evaluate the water supply impacts of the District's most recent contract with SCWA which may provide as much as 10,000 AFA of water from the Russian River. In summary, the District's computer model studies were based on the following assumptions:

(1) Consumptive use demand of 34,000 AFA,

(2) Operational yield of 30,000 AFA, composed of 25,700 AFA from Lagunitas Creek and 4,300 AFA from the Russian River,

(3) Water rationing of 15 percent in dry years and 33 percent in critically dry years,

(4) Release of 3,771 AFA to meet the District's proposed instream flow standards, and

(5) No releases for instream flow purposes below Nicasio Reservoir. (MMWD 1, p. 27; MMWD 7, p. 52.)

The District's model studies were analyzed in a policy statement submitted by the Resources Renewal Institute (RRI) which contends that the District has overstated current water demand and overestimated future growth, leading to inaccurate conclusions regarding its ability to increase releases for instream purposes. RRI argues: (1) that current water demand is closer to 31,000 AFA rather than the higher value used in the District's studies; (2) that the District has overestimated the amount of water needed to meet minimum pool levels; and (3) that the District's projected demand of 40,100 AFA in the year 2035 is high because it assumes full build-out of available sites and assumes average future water use of 186 gallons per capita per day rather than the current level of use of 158 gallons per capita per day.

The evidence shows there is merit in RRI's comments. During the past 20 years, population within the District has remained relatively stable and water use has usually been less than 32,000 AFA. From 1984 through 1991, water use averaged about 30,650 AF. The District's studies utilized a minimum pool level of 10,000 AF although the combined minimum pool reservoir storage is actually 7,100 AF. Implementation of additional water conservation measures would be expected to decrease per capita water use, as opposed to the increase in per capita water use assumed in the District's study.

3.7 Summary of Evidence Regarding Marin Municipal Water District Operations

The evidence in the record indicates that the District is managing its system efficiently and is implementing effective water conservation and reclamation programs. The District has an existing water shortage which results in frequent, and often severe, water supply deficiencies. Projected increases in water demand would lead to larger and more frequent water supply deficiencies. Due to limited storage capacity and other factors, the District reservoir system is drought sensitive. A single dry year can necessitate mandatory water conservation restrictions. The imposition of long-term water conservation measures has reduced the elasticity of demand which reduces the District's ability to achieve further reductions in water use. Although the 1991 agreement with SCWA provides the District a supplemental water supply from the Russian River on an "as available" basis, the contact may not provide an adequate reliable supply during drought conditions.

The evidence indicates that the assumptions utilized in the District's computer model studies overstate current and projected water demand and, consequently, overstate the frequency and extent of potential water supply deficiencies. In the absence of computer model studies based on different assumptions, it is impossible to accurately estimate the extent and frequency of future water supply deficiencies.

District voters have considered a number of proposals to increase available water supplies. In 1971, voters rejected a proposal to provide funding for a permanent Russian River delivery system that would have substantially reduced diversions from the Lagunitas Creek basin. (MMWD 7, p. 4.) In 1991, District voters defeated an $80 million bond issue to fund construction of facilities to import additional Russian River water or construction of a desalination facility. (MMWD 7, p. 8; MMWD 20,

Tab D, p. 5.) At the request of the District, the SWRCB takes official notice, that on November 3, 1992, District voters passed a $37.5 million bond issue to finance water system improvements to promote reclamation and water conservation, provide increased reliability in the existing system, and to allow increased Russian River water deliveries. The water supply impacts of revised instream flow requirements are addressed in Section 7.0 below.

4.0 NORTH MARIN WATER DISTRICT'S DIVERSION AND USE OF WATER

North Marin Water District provides water to about 1,500 people (710 service connections) located in several unincorporated areas of the county near Tomales Bay. North Marin diverts water from two shallow wells located immediately adjacent to Lagunitas Creek near Point Reyes Station. The population of the area served by North Marin is expected to increase to about 1,900 people by the year 2000. North Marin's total annual diversion increased from about 194 AFA in 1981 to 266 AFA in 1991. (NM 29.) In 1988 through 1990, North Marin diverted about 0.5 to 0.6 cfs from the creek during the summer months (June through September). (NM 28.) North Marin has adopted water conservation regulations that apply to its service area. (NM 17.)

4.1 Pre-1914 Appropriative Water Rights

The North Marin Water District, which was established in 1970, claims to have succeeded to several pre-1914 appropriative water rights. The evidence regarding the diversion of water from Lagunitas Creek prior to 1914 and North Marin's possible succession to various pre-1914 appropriative water rights is discussed at length in Chapter 11 of the Division of Water Rights staff analysis of the record. As discussed in the staff analysis, the record establishes that there are questions regarding North Marin's succession to various pre-1914 rights, the possible loss of pre-1914 rights through non-use, and the

extent of any pre-1914 rights which North Marin may have acquired.

Counsel for North Marin argues that Water Code Sections 106.5 and 1203, enacted in 1945, support recognition of an "expanding municipal right under which a municipality's diversions grow as it grows." Assuming that the statutes cited apply to pre-1914 appropriations, their effect would be to relax the diligence requirements that are otherwise applicable to the perfection of appropriative water rights, thus allowing a municipality to secure a long-term claim to water known to be needed for future municipal development while allowing other water users to utilize the water in the meantime. Under the doctrine of gradual or progressive development, the additional use must have been within the scope of the intent of the original appropriator and must be made within a reasonable time.

In this instance, there is no evidence of a pre-1914 notice of appropriation claiming a right to divert a specific amount of water nor is there other evidence of a long-term plan for increased water diversions under claim of a pre-1914 right. (T IV 77:17-78:4.) Therefore, North Marin's diversion and use of water does not qualify under the doctrine of gradual or progressive development, and the SWRCB must base its assessment of the extent of North Marin's pre-1914 water rights on the actual use which occurred within a reasonable time after those rights were initiated.

North Marin did not submit sufficient information to substantiate or define the quantity of water diverted under claim of pre-1914 right by the rural communities of Olema, Inverness Park, or Paradise Ranch Estates. Evidence submitted by North Marin indicates that the 1914 level of water diversion to serve Point Reyes Station was 0.10 cfs. (NM 53) That estimate includes water use for a railroad depot and creamery. Both of those uses

were discontinued about 1940. (NM 53.) Sometime between 1907 and 1924, the water system serving the Point Reyes Station area was expanded to include a series of 16 springs and a pipeline on Black Mountain. No evidence was submitted to show the amount of water that was continuously diverted and placed to beneficial use between 1940 and 1970 when North Marin acquired the water company serving the Point Reyes Station area.

Prior to the hearing, Division of Water Rights staff developed an analysis of water use in Point Reyes Station between 1883 and 1944. That analysis concluded that North Marin's pre-1914 water right would entitle it to divert approximately 0.052 cfs. (SWRCB 33, Appendix C.)

This proceeding does not involve an adjudication of the extent and validity of North Marin's claim of pre-1914 appropriative water rights. However, the evidence in this proceeding indicates that any pre-1914 rights to which North Marin may have succeeded would be limited to a diversion rate substantially less than North Marin's present rate of water diversion from its wells adjacent to Lagunitas Creek.

All diversions of water from Lagunitas Creek, whether done under claim of pre-1914 rights or under the permits from the SWRCB as discussed in Section 4.2 below, are subject to the authority of the SWRCB to take appropriate action to enforce compliance with the reasonable use and diversion requirements of Article 10, Section 2 of the California Constitution. (Water Code Section 275, Imperial Irrigation District v. State Water Resources Control Board (1986) 186 Cal.App.3d 1160, 213 Cal.Rptr. 283.)

4.2 Post-1914 Appropriative Water Rights

In 1985, the SWRCB issued Permit 19724 (Application 25062) and Permit 19725 (Application 25079) which authorize diversion of

0.669 cfs and 0.961 cfs from Lagunitas Creek for use within an identified service area. The permits authorize diversion of water at offset wells near Point Reyes Station. As the most junior water rights on Lagunitas Creek, North Marin's permits were issued subject to the prior downstream rights of Waldo Giacomini and Harold Genazzi. The SWRCB expressly reserved jurisdiction to impose additional conditions upon North Marin's permits in the event of unforeseen impacts on fishery migration. In addition, Condition 15 of the permits provides in part:

> "This permit does not authorize diversion of any water specifically released from storage by Marin Municipal Water District for fish and wildlife protection in Lagunitas Creek in compliance with any permit, license, or order of the State Water Resources Control Board. Permittee shall not divert or impair the flow of such water."

4.3 Character of Water In Wells Adjoining Lagunitas Creek

North Marin contends that its two wells located immediately adjacent to the creek are pumping percolating groundwater rather than the underflow of Lagunitas Creek. Percolating groundwater is not subject to the same permitting and regulatory provisions which apply to surface water and underflow of a watercourse flowing in a known and definite channel. (Water Code Section 1200.)

North Marin's wells are located approximately 50 feet from the edge of the creek with perforations starting five feet below the surface. The wells extend about 60 feet down to bedrock. (NM 49, p. 1; NM 50, p. 1; NM R-1, p. 3.) The wells are located in alluvial deposits at the lower end of a relatively narrow valley. (NM 1, pocket map; NM 15.) In the vicinity of the wells, the material between the stream surface and bedrock is sand and gravel with high permeability. (NM R-1, p. 3; NM 15; NM 50, p. 1.) A Department of Water Resources report describes the narrow strip of land along Lagunitas Creek in the vicinity of

North Marin's wells as "Alluvium. Unconsolidated silt, sand and gravel transported by streams."

Based on data showing the wells are subject to salt water intrusion due to the tidal influence of Lagunitas Creek, North Marin concluded that the wells have direct "hydraulic connections with Lagunitas Creek surface waters." (NM 49, p. 1.) Similarly, the "Summer Dam" report states that the amount of water that can be supplied by wells in the lower portion of Lagunitas Creek "is entirely dependent upon the extent of the sand and gravel materials from which the well draws, together with how well the deposit 'communicates' with the stream channel since most of the water probably derives from the underflow of the creek." (NM 1, p. 24.)

The evidence in the record establishes that the water North Marin pumps from wells in the vicinity of Lagunitas Creek is subsurface stream flow in a known and definite channel. As such, pumping water from North Marin's wells is subject to the regulatory authority of the State Water Resources Control Board pursuant to Part 2 of Division 2 of the Water Code. (Water Code Section 1200 et seq.) Even if the water were to be considered as percolating groundwater, however, North Marin would remain subject to Article 10, Section 2 of the California Constitution prohibiting unreasonable methods of diversion.

4.4 Availability of Water for Diversion Under North Marin's Rights

Flow in the lower portion of Lagunitas Creek during the summer months consists of natural flow and water released from storage by Marin Municipal Water District for protection of fish and wildlife. Division of Water Rights staff developed a hydrology model to quantify the natural flow in the lower portion of Lagunitas Creek as measured at the Point Reyes gage. The Division staff's analysis indicates that there would be limited

natural flow in the lower portion of Lagunitas Creek during summer months of most years, and almost no natural flow during summer months of dry years. (SWRCB 33, Table E-12.) A separate analysis based on a hydrology model developed by Marin Municipal Water District also indicates that there would be almost no natural flow during summer months in dry years. (MMWD 7, Table 26.) The model studies indicate that the flow during July, August, September and October of dry years would be approximately 1 to 3 cfs as measured at the Point Reyes gage.

Although North Marin questioned the accuracy of the models developed by Division staff and Marin Municipal Water District, it did not submit evidence which would refute the model results. (SWRCB 32, NMWD letter dated December 22, 1988; T IV 15:17-16:13.) To the contrary, the model analyses are consistent with evidence provided by North Marin that, in the late summer and early fall of dry years, natural flow is "on the order of 1 to 3 cfs." (NM 5, p. 3.) Flows ranging from 4 to 8 cfs were present at the Point Reyes gage during the summer of 1987, 1988, and 1989. However, those flows were primarily due to storage releases from Kent Lake for protection of fish and wildlife. (MMWD 7, Tables 21 and 29.) As discussed in Section 4.2 above, Term 15 of North Marin's water right permits prohibits diversion of water released from storage by the District for protection of fish and wildlife.

Although North Marin contends that Lagunitas Creek was originally fed on a year-round basis by springs that were inundated by Kent Lake, no evidence was introduced to quantify such spring flow. (SWRCB 32, p. 12.) The inflow from Olema Creek and Bear Creek enters Lagunitas Creek downstream of North Marin's wells. (NM 1, I.A.; T IV 9:15-9:24.)

The limited natural flow present in Lagunitas Creek is available for diversion under senior appropriative rights and rights of

riparian diverters prior to being available for diversion under North Marin's permits. In addition to a riparian claim (See Section 5.2 below), Waldo Giacomini holds appropriative Water Right License 4324 which was initiated by Application 13965 filed in 1950. License 4324 authorizes diversion of up to 2.67 cfs for irrigation from May 1 to November 1 of each year. North Marin's rights under Permits 19724 and 19725 were initiated by Applications 25062 and 25079 filed in 1976. Therefore, North Marin's rights under its permits are junior to Giacomini's appropriative rights.

Based on the evidence in the record, the SWRCB concludes that, in the summer and early fall months of dry years, there is insufficient water available for diversion under North Marin's water rights to satisfy North Marin's existing water demand.

In addition, North Marin's diversion of water is also limited by the presence of salt water intrusion. The tidal influence on Lagunitas Creek extends about one half mile upstream of North Marin's diversion wells, thus making the wells subject to salt water intrusion during high tides. (NM 15.) The extent of salt water intrusion depends upon the size of the high tide, the flow in Lagunitas Creek, and the presence or absence of the Giacomini diversion dam downstream of North Marin's wells. Giacomini normally installs the dam in the creek during the spring about one mile downstream of North Marin's wells. The dam is washed out by high flows in the fall. The dam serves to prevent salt water from moving upstream and creates a pool of fresh water adjacent to the wells. (NM 49, p. 1; NM 1, pp. 6-8.) North Marin has reinstalled the dam on two occasions to prevent salt water intrusion.

Between 1971 and 1991, North Marin experienced salt water intrusions (i.e., chloride concentrations of 250 mg/l) during February 1976, February 1977 and January 1980. (NM 39.)

Elevated salt levels in drinking water represent a public health risk, particularly for people with heart or kidney problems. (NM 49, Attachment A.) In response to the salt water intrusion problem, North Marin has developed special operating procedures which depend upon whether the Giacomini dam is in place, the size of the tide, and the flow in the creek. The data indicate that, by pumping during off-tide cycles when the flow at the Gallagher gage is between 5 and 10 cfs, North Marin can avoid salt water intrusion into its drinking water supply even when the dam has not been installed. (NM 49, p. 2.)[3]

4.5 Conclusions Regarding North Marin's Diversion and Use of Water

Although the extent and validity of the pre-1914 water rights claimed by North Main cannot be conclusively determined in this proceeding, the evidence before the SWRCB indicates that North Marin holds pre-1914 rights for diversion of approximately 0.05 to 0.10 cfs, an amount which is not sufficient to cover its present water diversions from Lagunitas Creek.

In addition to its claim of pre-1914 rights, North Marin also holds Permits 19724 and 19725 which authorize diversion of up to 1.66 cfs from Lagunitas Creek, but which prohibit North Marin from diverting water which Marin Municipal Water District releases from storage for the benefit of fishery resources in Lagunitas Creek. North Marin's permits have a later priority than the licensed right held by Waldo Giacomini and three of the permits held by Marin Municipal Water District. Due to the low natural flow in Lagunitas Creek and the presence of senior rightholders downstream of North Marin's point of diversion, no

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[3] *The flows that are required to be present at the Park gage as a condition of Marin Municipal Water District's permits under the terms of this order exceed the flows that have historically been present during the times at which North Marin experienced salt water intrusion problems.*

water would ordinarily be available for diversion under Permits 19724 and 19725 during July through October of dry years.

There are significant public health and public interest considerations involved with North Marin's delivery of water to approximately 1,500 people. Therefore, it is essential for North Marin to secure an alternative water supply to be used during July through October of dry years. In past years, North Marin has negotiated short-term agreements under which Marin Municipal Water District has provided water to meet North Marin's needs on a temporary basis. (SWRCB 32, attached letter dated December 22, 1988; NM 52, pp. 6 and 7.) Negotiation of a similar arrangement on a long-term basis would allow for meeting North Marin's water requirements while protecting instream uses and prior rights.[4]

5.0 DIVERSION AND USE OF WATER ON WALDO GIACOMINI PROPERTY

Waldo Giacomini owns about 570 acres near the confluence of Lagunitas Creek and Tomales Bay. Giacomini diverts water from Lagunitas Creek under Water Right License 4324 (Application 13965) and under claim of riparian right. In 1991, Giacomini diverted about 1.61 cfs during the irrigation season for irrigation of pasture. He diverts a total of about 565 AFA, most of which is diverted during the irrigation season that extends from May through October. (Giacomini 2.) As discussed in Section 5.3 below, Giacomini constructs an earthen dam in Lagunitas Creek during late spring or summer in order to prevent saltwater intrusion at his point of diversion. The dam is washed out by heavy flows during the wet season and is reconstructed the

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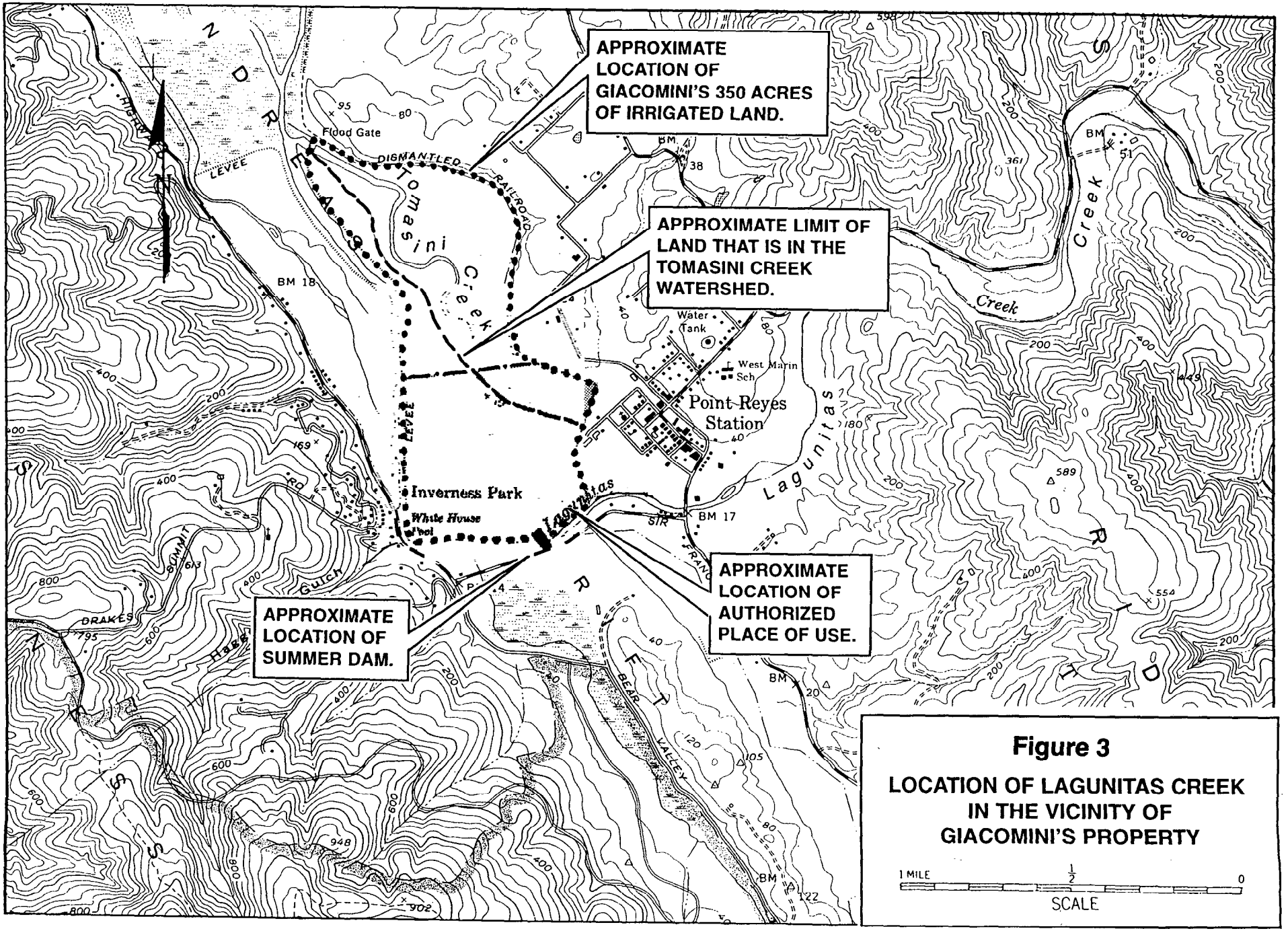
[4] *If North Marin were required to purchase sufficient water to allow diversion of 0.5 cfs during the July through October period of dry years, the result would be that it would buy about 120 acre-feet once every six years. At a cost of $350 per AF, the needed water could be purchased for $42,000 for an average annual cost of approximately $7,000 or about $10 per year per service connection. The actual cost of obtaining a replacement supply could be higher.*

next year. The location of Giacomini's property and the summer dam are shown on Figure 3.

5.1 Diversions Under Claim of Riparian Rights

Of the 570 acres which Giacomini owns in the vicinity of Lagunitas Creek, 370 acres are irrigated pasture. The pasture area was originally tidal marsh which was reclaimed through construction of about 1.5 miles of levees along Lagunitas Creek and other actions. Prior to construction of the levees, salt water would cover the tidal marsh area during high tide. (T IV 43:17-44:8.) Giacomini drilled two wells on the southeast portion of the property to obtain water, but the water from both wells was too salty for irrigation. (T IV 44:16-44:20.) Giacomini later attempted to divert water directly from Lagunitas Creek, but the tidal influence in the creek caused the water to become too salty in May or June depending on the conditions each year. (T IV 44:21-45:16.) Since the mid-1940s, Giacomini has constructed an earthen dam in the creek in May or June of most years in order to limit the effect of tidal water on the creek at the location of his diversion. (T IV 43:16-46:3.)

The availability of water to Giacomini under claim of a riparian right is uncertain for two reasons. First, as described in the 1988 Division of Water Rights staff report, approximately 170 acres of the 370 acres of irrigated land on Giacomini's property was originally within the watershed of Tomasini Creek rather than Lagunitas Creek. The present topography of Giacomini's irrigated pasture was affected by Giacomini's rerouting of Tomasini Creek to a location along the east property line and by subsequent grading and leveling of the land which was formerly bisected by Tomasini Creek. (Giacomini 6, p. 1; SWRCB 33, Appendix D.) Due to changes in the channel location of Tomasini Creek and the drainage of the Giacomini property, it is unclear how much of Giacomini's irrigated acreage should be considered to be riparian to Lagunitas Creek.


APPROXIMATE LOCATION OF GIACOMINI'S 350 ACRES OF IRRIGATED LAND.
APPROXIMATE LIMIT OF LAND THAT IS IN THE TOMASINI CREEK WATERSHED.
APPROXIMATE LOCATION OF AUTHORIZED PLACE OF USE.
APPROXIMATE LOCATION OF SUMMER DAM.
Flood Gate
DISMANTLED RAILROAD
LEVEE
Tomasini Creek
BM 18
Water Tank
West Marin Sch
Point Reyes Station
Inverness Park
White House Pool
Lagunitas
Lagunitas Creek
BM 17
SUMMIT
Gulch
DRAKES
Haggerty
BEAR VALLEY
BM
Figure 3
LOCATION OF LAGUNITAS CREEK IN THE VICINITY OF GIACOMINI'S PROPERTY
1 MILE
1/2
0
SCALE

The second reason for uncertainty regarding the extent of Giacomini's riparian right is due to the fact that most of the irrigated property has been reclaimed from tidal marsh. A riparian water right normally entitles a landowner to divert a portion of the water naturally flowing in a natural watercourse for use on the parcel of property adjoining the watercourse. As a general rule, "riparian rights exist only in natural watercourses and in waters naturally flowing therein." Chowchilla Farms v. Martin (1933) 219 Cal. 1, 19; 25 P.2d 435, 442. A riparian's only rights are those which the riparian landowner would have under the natural conditions existing in the stream. Lindbloom v. Round Valley Water Co. (1918) 178 Cal. 450; 173 P. 994. Under natural conditions, the water quality of Lagunitas Creek as it flows across the Giacomini property would be unsuitable for irrigation.

In some circumstances, an artificial channel which has existed for a long period of time and which has all the attributes of a natural channel can be treated as a natural channel for purposes of determining if riparian rights attach to adjoining land. (Chowchilla Farms v. Martin, Id. 219 Cal. at 19 and 20.) In this instance, the rerouted channel of Lagunitas Creek has existed for many years. For purposes of determining the fishery protection measures to be required under the present order, however, it is unnecessary for the SWRCB to determine how the present alignment of Lagunitas Creek affects the extent of Giacomini's riparian rights.

In recent years, Giacomini has delayed installation of the earthen dam until June 15 and has removed the dam by early November, due to concerns of DFG and the U. S. Fish and Wildlife Service about the effects of the dam on fish passage in the stream. During the portion of the irrigation season when the dam is not in place, Giacomini has diverted water at a location upstream of his property in order to avoid the tidal influence

problems which affect the stream as it passes through his property. A riparian landowner may locate his point of diversion upstream of his property provided that the riparian does not impair rights of others and all necessary easements are obtained. (Miller & Lux v. Enterprise Canal & Land Co., supra, 169 Cal. 415; 147 P. 567.) However, a riparian cannot divert water from an upstream location if the natural flow of the stream is not sufficient to reach the riparian's property under natural conditions. (Drake v. Tucker (1919) 43 Cal.App. 53, 184 P. 502.) In this instance, the natural flow of Lagunitas Creek would ordinarily be sufficient to reach Giacomini's property, but the tidal influence on the creek would make the water reaching the Giacomini property unusable during portions of the year. Only by use of the dam to reduce the tidal influence can Giacomini obtain water of useable quality throughout the irrigation season at the point of diversion on his property.

The SWRCB is not aware of any California court decisions which address the existence or extent of riparian rights on land reclaimed from tidal marsh areas where water of useable quality was not present under natural conditions. The evidence in this instance raises questions regarding the riparian character of Giacomini's pasture area with respect to Lagunitas Creek and additional questions regarding Giacomini's practice of installing an earthen dam in order to obtain water of useable quality at times when no such water would be present under natural conditions. It is unnecessary to resolve issues concerning the existence or extent of Giacomini's riparian rights, however, in order to address the fishery protection and reasonable use issues before the SWRCB in this proceeding.

In addition to Giacomini's claim of riparian rights, Giacomini also holds appropriative water right License 4324 as discussed in Section 5.2 below. Regardless of whether Giacomini's diversions are considered to be under riparian right or License 4324, all

diversion and use of water in California is subject the provisions of Article X, Section 2 of the California Constitution requiring the diverter to employ a reasonable method of diversion and use.

5.2 Water Right License 4324

Giacomini holds Water Right License 4324 issued on Application 13965 which was submitted in 1950. License 4324 authorizes diversion of up to 2.67 cfs from May 1 to November 1 for irrigation of a total of 175 acres described as: 115 acres, within projected section 35, T3N, R9W, MDB&M; and 60 acres within projected Section 36, T3N, R9W, MDB&M. The licensed diversion rate was based on a duty of water factor of 1 cfs for 60 acres. (SWRCB 1d, Report of Inspection dated 4/23/53.) Figure 2 shows the approximate limits of the authorized place of use covered by the license. The license authorizes use of water on only 175 acres of the 350 acres of pasture that is currently irrigated.

In May 1993, the SWRCB approved a petition submitted by Giacomini for a temporary urgency change to authorize two additional points of diversion under License 4324. The change allowed Giacomini to divert water from North Marin's two well sites located approximately 0.9 and 1.5 miles upstream of the existing dam site, and prohibited Giacomini from installing the summer dam until after June 15. Giacomini delivered water to his property through an above-ground pipeline from the North Marin wells. The primary purpose of the temporary change was to lessen potential impacts of the dam on outmigrating salmon smolts. On June 29, 1995, the SWRCB approved a petition to authorize the additional points of diversion under License 4324 on a long-term basis.

5.3 History and Operation of Giacomini Diversion Dam

Each year for the past 50 years, Giacomini has constructed an earthen dam in Lagunitas Creek. The dam is adjacent to Giacomini's property, about 2.5 miles upstream from the mouth of

Lagunitas Creek. The dam is approximately 100 feet long, 10 feet high, and 60 feet wide at the base. It is constructed with a dragline and bulldozer using approximately 1,300 cubic yards of material extracted from the streambed. The dam creates a pond that is about seven feet deep and which extends about 1.75 miles upstream, with a surface area of about 17 acres. Giacomini diverts water from the pond using a 24 inch diameter pipe with a wire mesh fish screen. There is a permanent concrete structure in the northern abutment of the dam with a Denil fish ladder. (NM 1, p. 6.) The earthen dam is installed in the late spring and is usually washed out by the first large storm in the fall. (Giacomini 3.)

The Giacomoni dam is installed to prevent saltwater intrusion in Lagunitas Creek during tidal cycles and to provide freshwater for irrigation and stockwatering. (T VI 18:20-18:23.) The dam also helps prevent saltwater intrusion into North Marin's wells located about one mile upstream of Giacomini's dam and in several wells for domestic water supplies located adjacent to the creek. Evidence provided by North Marin indicates that the porous nature of the dam results in seepage of about 0.05 cfs. (NM 66.)

Since 1975, the U.S. Army Corps of Engineers (Corps) has issued a permit for the Giacomini dam pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. In 1987, the Corps issued an interim permit to Giacomini that allowed construction of the dam for five years and which required Giacomini to submit specified information regarding water quality and fishery resources. The permit also required Giacomini to investigate alternatives to the present dam. (NM 1.)

In accordance with the 1987 Corps permit, North Marin conducted studies on behalf of Giacomini of two alternative dam sites and different types of dam construction. ("The Summer Dam," NM 1, p. 1.) North Marin concluded that an alternative location

identified as the Genazzi site, about 0.6 mile upstream of the existing dam and 0.4 mile downstream of North Marin's wells, would provide protection against saltwater intrusion into North Marin's wells. A second alternative identified as the Marshall site, located about 1.2 miles upstream of the present dam and about 0.2 mile upstream of North Marin's wells, would not prevent saltwater intrusion in North Marin's wells and would require relocation of the wells. (NM 1, p. 2.) Estimated costs associated with relocating the seasonal dam to the Genazzi site are approximately $200,000. Estimated costs for relocating to the Marshall site are approximately $750,000. The costs of relocating North Marin's wells to an upstream location accounts for about half the estimated cost of the Marshall site alternative. Both sites would have higher annual operating costs. (NM 1, p. 4.) The summer dam report also concludes that Giacomini could divert water from the Marshall site without constructing a dam in the streambed. (NM 1, p. 22.)

DFG has entered into streambed alteration agreements with Giacomini covering installation of his diversion dam. The agreement which was issued in conjunction with the temporary urgency change petition before the SWRCB in 1993 provides that Giacomini shall not install the diversion dam prior to June 15, shall not repair the dam after October 15, and shall breach the dam on November 1.

5.4 Conclusions Regarding Diversion of Water for Use on Giacomini Property

The evidence before the SWRCB raises questions regarding the existence and extent of riparian water rights to divert water for irrigation of pasture on the Giacomini property which need not be resolved in this proceeding. In addition to his riparian claim, however, Giacomini holds Water Right License 4324 which authorizes diversion of up to 2.67 cfs for irrigation of the 175 acre place of use specified in the license. Diversion under

License 4324 for irrigation of other areas would require SWRCB approval of a petition to change the place of use. Regardless of the basis of right under which water is diverted for use on the Giacomini property, Article X, Section 2 of the California Constitution requires that the diverter employ a reasonable method of diversion. The effects of Giacomini's water diversions upon fishery resources and operational changes needed in Giacomini's method of diversion in order to provide reasonable protection for fishery resources are discussed in Sections 6.8 through 6.8.3 below.

6.0 PROTECTION OF FISHERY AND OTHER PUBLIC TRUST RESOURCES

The majority of evidence presented at the hearing concerns the effect of water diversions upon coho salmon and steelhead in Lagunitas Creek. Other fish species of concern in Lagunitas Creek include the endangered freshwater shrimp, Neomysid shrimp, sturgeon and, possibly, the tidewater goby. As discussed in Sections 6.8 through 6.8.3 below, the presence of the Giacomini dam affects the amount of habitat available for Neomysid shrimp, sturgeon and the tidewater goby.

Consultants for Marin Municipal Water District conducted extensive studies of various aspects of fishery resources in Lagunitas Creek between 1977 and 1992. The majority of Marin's studies were conducted by D. W. Kelley and Associates (Kelley). Entrix, Inc. (Entrix) was retained to review Kelley's studies and do additional analyses. Kelley and Entrix jointly prepared an extensive report titled Habitat Recommendations for Lagunitas Creek (1992, hereinafter referred to as Kelley/Entrix). In addition, geomorphologist Barry Hecht studied the sediment situation in Lagunitas Creek. Hydrologic analyses of various possible flows were performed by Dana Roxen of the District's staff.

In addition to the studies conducted for the District, the Department of Fish and Game (DFG) conducted an Instream Flow Incremental Methodology (IFIM) study in 1982, primarily to determine flows needed for salmon and steelhead spawning and rearing habitat. (SWRCB 7.) DFG presented testimony by William Cox, Gary Smith, Ken Aasen, Larry Eng, and Cindy Chadwick regarding various fish and wildlife issues in the Lagunitas Creek basin.

Giacomini and North Marin presented testimony of fishery consultant Alice Rich, which focused on the impact of the Giacomini dam on fishery resources. USFWS also presented evidence regarding the impact of the dam. Other parties presented testimony on a variety of fishery and public trust issues.

The evidence regarding the status of fishery resources in Lagunitas Creek, life stages of steelhead and salmonids, and preferred habitats, is reviewed briefly in Section 6.1 below. Following that, Sections 6.2 through 6.8 review the evidence concerning instream flow requirements for fishery protection, effects of sedimentation on the fishery, use of woody debris in creating fishery habitat, water quality considerations relevant to protection of fish, water quality considerations relevant to public recreation and aesthetics, and the effect of the Giacomini dam on fish in Lagunitas Creek.

6.1 Status, Life Stages and Preferred Habitat for Salmonids in Lagunitas Creek

The report on the IFIM study conducted by DFG states that coho salmon and steelhead populations in California have dwindled to 20 percent and 40 percent of their historic population levels. (SWRCB 7; p. vi.) The condition of coho salmon and steelhead in Lagunitas Creek is discussed below.

6.1.1 *Current Status*

Lagunitas Creek once supported substantial runs of coho salmon, with an annual escapement of 3,000 to 5,000 fish. (SWRCB 1, T 12/8/80, 174:22-174:26.) Only a remnant population currently exists, with the number of returning spawners ranging from a few to 400. (SWRCB 7, pp. vi and 11.) In conducting counts of emigrating smolts for the District in 1982 and 1983, Kelley counted about 1,050 and 2,000 smolts respectively. Kelley estimated that these outmigrations would produce about 50 and 100 returning spawners. (MMWD 2, App. B, letter dated 1/26/88, Figure 1.) Surveys conducted by other parties between 1984 and 1991 indicate that total coho spawning runs ranged from 25 to 75 fish per year during that time period. A total of 49 coho spawners were identified in a survey of Lagunitas Creek performed for the District in early 1992. (MMWD 2, App. K, Table K-1.)

The present population of steelhead in Lagunitas Creek is much smaller than the historic population. The District's consultants state that, in recent years, there have been fewer than 50 adult pair of steelhead spawners in Lagunitas Creek and less than 100 adult pair of spawners in the entire watershed.

6.1.2 *Life Stages of Coho Salmon and Steelhead*

Coho salmon and steelhead are both anadromous fish which are born in freshwater, migrate to the ocean, and return to their stream of birth to repeat the life cycle. After spawning, steelhead often return to the ocean, whereas coho always die in the stream. The two species have similar life stages, but different freshwater habitat requirements. Figure 4 shows the life stages for coho and steelhead as described by Kelley/Entrix, and DFG. (MMWD 2, Fig. 3-1; SWRCB 7, Fig. 6.)

Coho Salmon: Adult coho arrive at the mouth of Lagunitas Creek in late fall and migrate upstream when storms increase streamflow. After reaching suitable spawning areas, the fish may

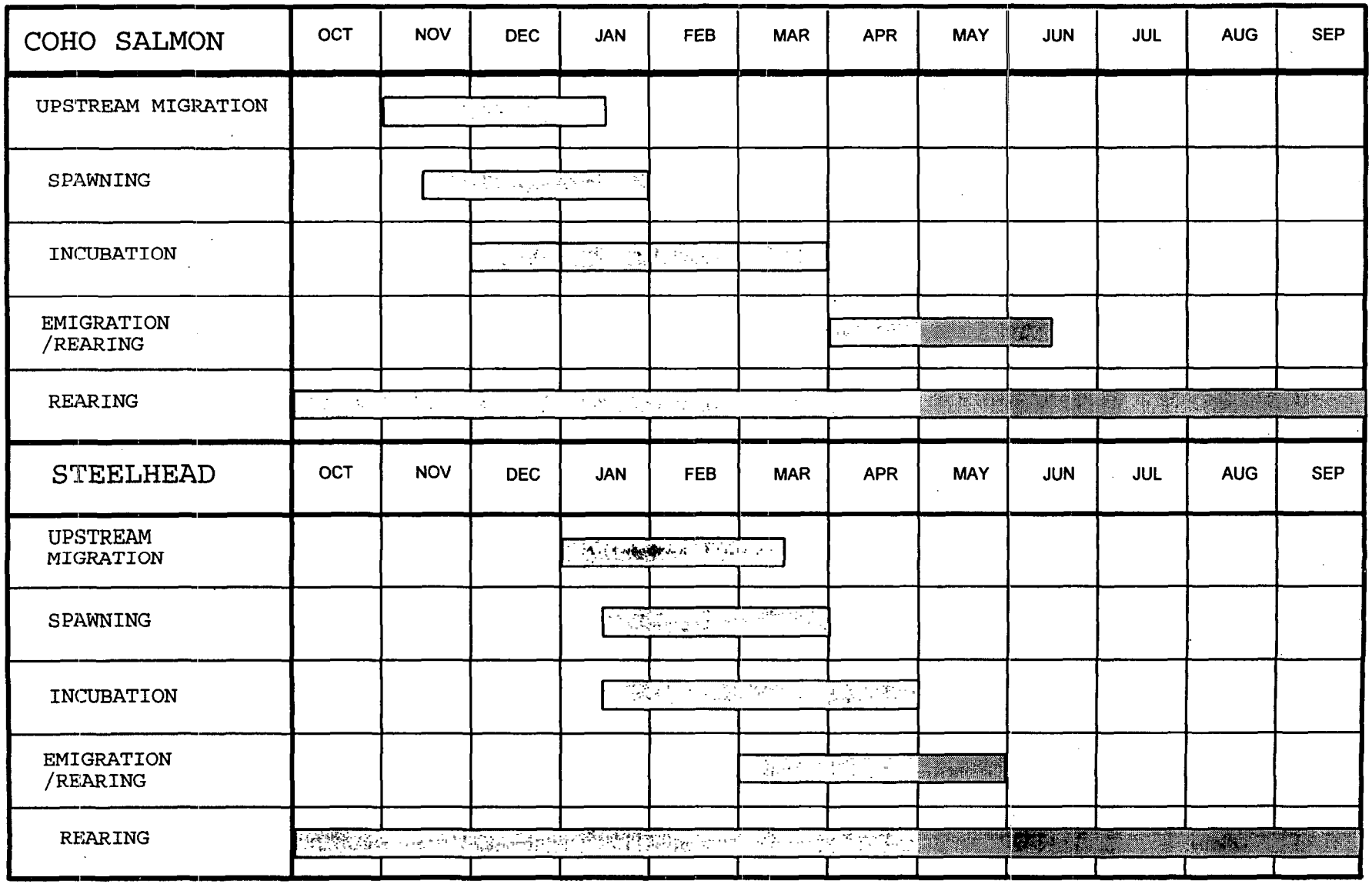


Figure 4. Life Stages of Coho Salmon and Steelhead

hold for some time before building redds and spawning. After spawning, the fish die. The salmon embryos incubate while buried in the gravels of the redds. Embryo survival and development are dependent on dissolved oxygen and water temperature. (MMWD 5, p. 73.) After emerging as fry, the young fish generally remain in freshwater for one year until the next spring when they undergo a physiological process called smoltification and migrate out to the ocean. Some coho migrate to the ocean in their first year. The salmon remain in the ocean for two years before returning to freshwater to spawn. The Kelley/Entrix report states that because of the coho's "relatively rigid life cycle," poor reproductive success in one year generally results in a poor spawning run three years later. Successive years of poor conditions can reduce populations for several generations. (MMWD 2, pp. 3-1 to 3-4.)

Steelhead: Steelhead have similar life stages to coho but with three significant differences: (1) steelhead may spend one to four years in the ocean before returning to spawn; (2) some steelhead may spawn several times, returning to the ocean after each time; and (3) steelhead spawn later in the winter when there is usually higher flow in the stream. Steelhead populations are generally more resilient to adverse conditions than are coho populations. (MMWD 2, pp. 3-1 to 3-4 and 3-11.)

6.1.3 *Coho Salmon and Steelhead Habitat*

Adult coho and steelhead in small coastal streams generally build their redds in low flow channels, in glides or at the head of riffles. (MMWD 2, p. 3-13; T VIII 111:11-111:21.) Ideal rearing habitat for fry and juvenile salmonids is a cold stream with 50 to 57.2 degree Fahrenheit water, alternating pool-riffle habitat, and an abundance of cover. (MMWD 2, p. 3-18.) Coho are usually more abundant in deeper pools, whereas steelhead prefer riffles and glides. (MMWD 2, p. 3-19; T VII 20:8-20:11; T VIII 112:11-122:12.) The proportion of riffle, pool and run habitat in

various reaches of Lagunitas Creek is described in a habitat survey conducted by Entrix. (MMWD R-8.)

6.2 Status, Lifestages and Preferred Habitat for Freshwater Shrimp in Lagunitas Creek

The California freshwater shrimp (*Syncaris pacifica*) is distributed in small stretches of low gradient streams in Marin, Sonoma and Napa counties. The largest surviving population is found in Lagunitas Creek. (USFWS 4, p. 1.) Population surveys were conducted in 1981 and 1991. Taking into account the numbers of shrimp caught and the differences in sampling effort, it was determined that the shrimp were 2.4 times more abundant in 1981 than in 1992. (SWRCB 8, p. 9; MMWD 2, Section G.) The decline in abundance is believed to be due to pronounced lack of fine root development in exposed or submerged vegetation, a decrease in availability of undercut banks, changes in channel structure, silt accumulations and low water depths along pool edges. (MMWD 2, Section G.)

On June 27, 1980, the California Fish and Game Commission designated the California freshwater shrimp as an endangered species under the California Endangered Species Act. The shrimp was added to the federal list of endangered and threatened species, effective November 30, 1988. (USFWS 11.) The final rule published in the Federal Register states the shrimp is endangered due to the introduction of predatory fish and deterioration or loss of habitat resulting from water diversion, impoundments, livestock grazing, agricultural activities and development, urbanization, and water pollution. (T VI, 23:23-24:7; USFWS 11 (50 CFR Part 17); USFWS 4, p. 1.)

Freshwater shrimp have a two or three year life cycle in which they mature in their second year and breed in the fall. Eggs are carried by the females through the winter and they hatch in the spring. Juveniles grow throughout the summer months. (T II

56:17-57:18.) Freshwater shrimp prefer slow moving water and are typically found in pools with little or no current. The shrimp are not common in shallow water but increase in numbers with increasing depth. (SWRCB 8, p. 4.) During the winter, the freshwater shrimp are found beneath undercut banks, among exposed root systems. In late spring and summer, they can also be found on terrestrial vegetation which extends into the water.

6.3 Flows Needed for Fishery Protection Purposes

6.3.1 *Methodologies and Considerations Used in Developing Flow Recommendations*

DFG and the District both presented instream flow recommendations as shown on Figures 5 and 6. (SWRCB 7. p. 32; MMWD 2, p. 6-2.) DFG's recommendations were based primarily on the results of a 1982 IFIM study aimed at determining the spawning and rearing flows for coho salmon and steelhead.[5] DFG did not address the needs of freshwater shrimp during development of its model. (SWRCB 7, p. 26.)

The District's consultants were concerned about the methodology used in the DFG's IFIM study due to the evolution of study methods in the 10 years since the DFG study was conducted. DFG retained fishery consultant Thomas Payne to review the IFIM study, methods and results. In order to evaluate the concerns

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[5] *An IFIM (Instream Flow Incremental Methodology) study is a tool used to predict changes in fish habitat with changes in flow. Input to the model are hydraulic characteristics of the stream and habitat parameters for different life stages of selected fish species. Output are a predicted relative quantity of habitat, represented as weighted useable area (WUA) per 1,000 linear feet of stream versus incremental changes in flow for each target species and life stage. WUA values provide relative indices of habitat availability rather than absolute quantities of habitat.*

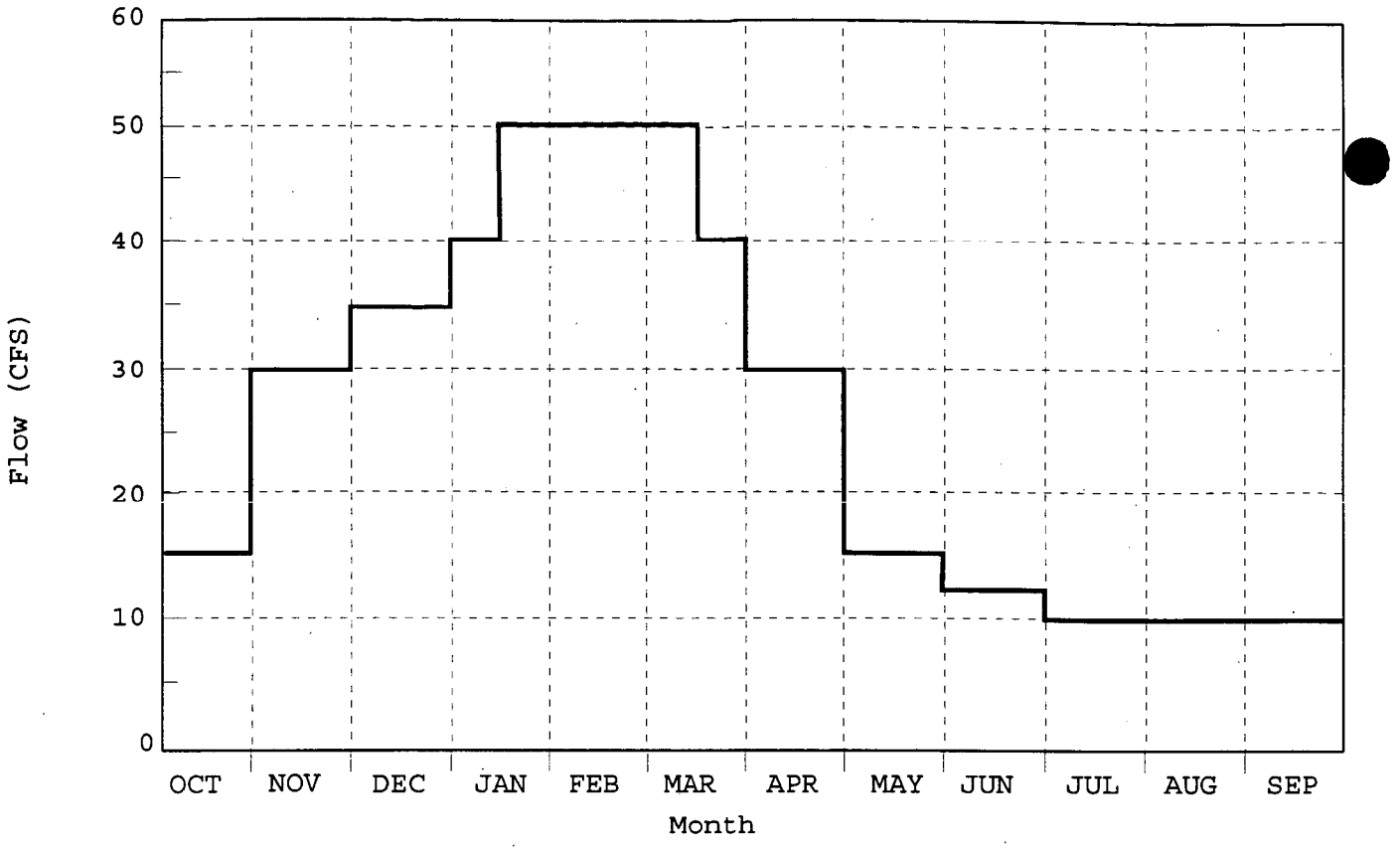

Figure 5. DFG's Proposed Flow Regime

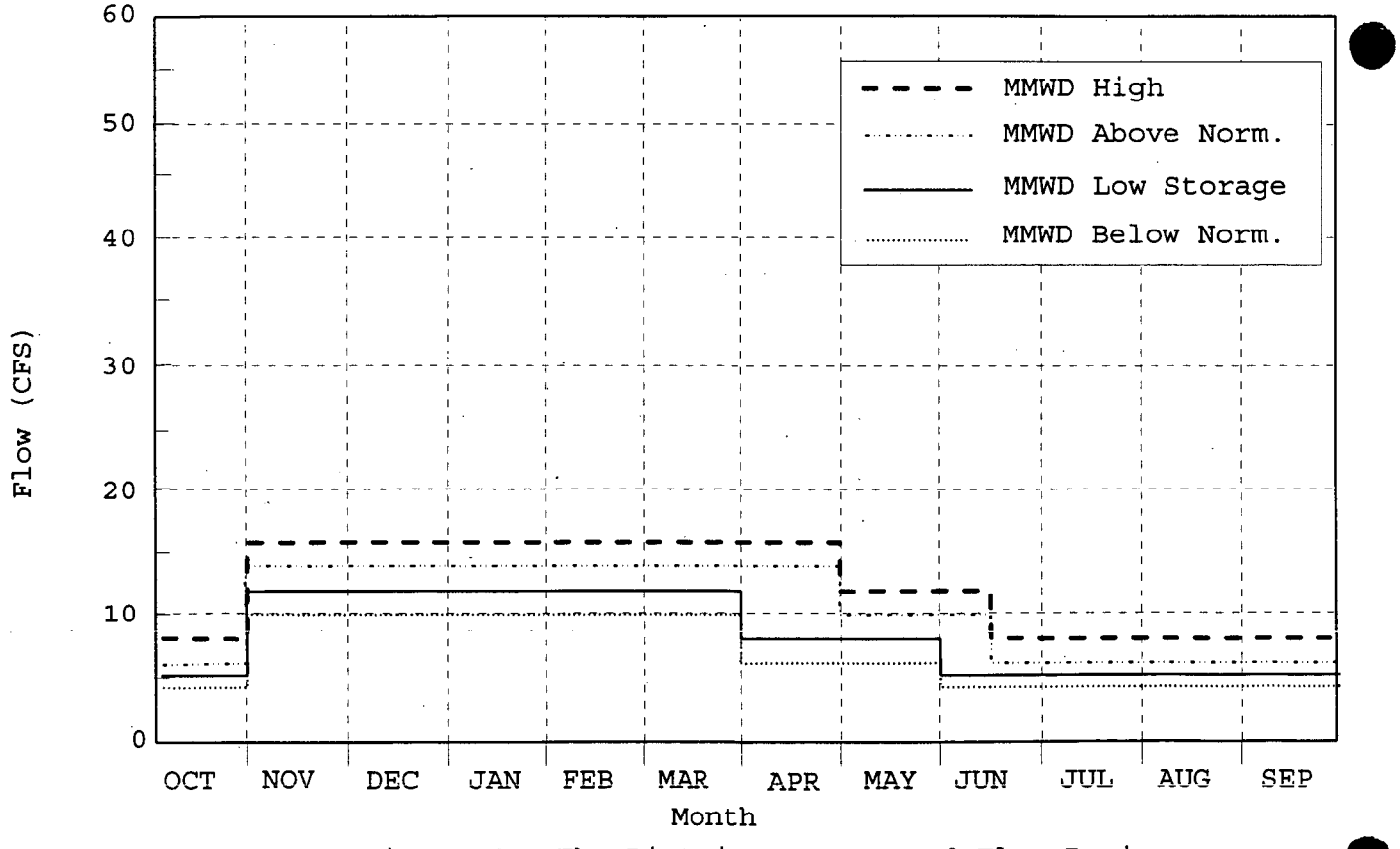

Figure 6. The District's Proposed Flow Regime

raised by the District, Mr. Payne reviewed and analyzed the IFIM data for coho and steelhead for "Reach A" of Lagunitas Creek using three different methods of predicting increases in WUA with increases of flow for all life stages for coho and steelhead in Reach A. The evaluation predicted habitat based on the methodology in the DFG study, current IFIM methodology, and Entrix's habitat data. (T X 43:1-43:18.) All three methods produced similar results with maximum habitat predicted to occur at flows of 30 cfs, 30 cfs and 25 cfs respectively. Mr. Payne concluded that the original DFG method produced reasonable results. (T X 50:12-50:25.) The results of Mr. Payne's analysis establish that increases in flow up to 25 or 30 cfs provide increased habitat for coho salmon spawning.

The District's instream flow recommendations were not based on an IFIM study. Rather, the District's recommendations were based in large part upon other fishery studies conducted by Kelley on Lagunitas Creek, Kelley's direct observations and professional judgment, and the guideline that total instream flow requirements not cause a reduction below historic yields in the amount of water diverted from the Lagunitas Creek watershed for municipal use by the District. (MMWD 2, pp. 1-1, 6-3, and 6-13.) Entrix performed a limiting factor analysis based on evaluation of the physical and biological conditions that may limit or affect individual life stages of salmonids in Lagunitas Creek. In some instances, Entrix determined that the limiting factors were conditions other than flow. (MMWD 2, pp. 2-1 and 3-6; T II 44:15-49:24.) When comparing the District's fishery flow recommendations with DFG's recommendations, it is important to recognize that the District's recommendations were developed based in part upon the District's projected water use and demand. (MMWD 7, p. 53; T VI 213:6-213:8.)

The flow recommendations developed by the parties acknowledge the different flow requirements needed during different life stages.

Flow recommendations for fall and winter months should take the following factors into account: (1) amount of flow needed to attract fish into the stream (attraction flows); (2) amount of water needed for upstream migration (passage flows); (3) amount of water needed to provide suitable depth and velocity in spawning areas (spawning flows); (4) amount of water needed for incubation of the embryos in the redds (incubation flows); and (5) high flows which can destroy redds during the incubation period (scouring flows). The major considerations in developing flow recommendations for the spring are: (1) incubation flows; (2) rearing flows for young salmonids; and (3) flows for the out-migration of juveniles to the ocean (emigration flows). During the summer months, the major flow considerations are: (1) providing rearing flows for young of the year and juvenile coho salmon and steelhead; and (2) providing suitable flows for freshwater shrimp as discussed in Section 6.3.5 below.

The staff analysis provides an extensive summary and discussion of the evidence presented regarding suitable instream flows for the various lifestages of salmonids and freshwater shrimp. The presence of multiple species of fish with different habitat preferences means that the determination of desired flows necessarily requires balancing of competing objectives. Limited water availability in the Lagunitas Creek watershed and the need for water to serve municipal and domestic uses must also be considered in establishing instream flow requirements.

Sections 6.3.2 through 6.3.5 below set forth the SWRCB's conclusions regarding desired flows for fishery protection purposes in Lagunitas Creek. Of the three species of primary concern in Lagunitas Creek, the SWRCB has given priority to flows which are consistent with protection of the endangered freshwater shrimp. Of the two salmonid species, priority is given to all life stages of coho salmon because the life history

characteristics of steelhead provide them greater flexibility than coho salmon.

6.3.2 *Fall/Winter Flows for Salmon and Steelhead*

The primary considerations in establishing instream flows for coho salmon and steelhead during the fall and winter period (November 1 through March 31) are providing sufficient flow to: (1) attract salmonids into the stream; (2) allow for upstream migration of salmonids; and (3) provide adequate spawning habitat. Each of these considerations is discussed below.

Attraction Flows: The timing of salmonid upstream migration is variable and does not appear to be triggered by a specific flow. Rather, upstream migration appears generally to coincide with the decline in flow following a runoff event. DFG records indicate that from 1949 to 1962, the first sightings of upstream Coho migration ranged from November 27 to December 21. Nicasio Reservoir fish trap data between 1963 and 1969 indicate that the first coho were captured from November 7 to December 13. Kelley observed the first coho on November 19 in 1983 and on November 6 in 1984.

Kelley conducted studies in 1982, 1983, and 1984 to determine the attraction flow needed for coho salmon, but the results were inconclusive due to confounding storm events and the low number of returning adults. Based on observations and professional opinion, Kelley concluded that a mean daily flow of 35 cfs would probably be needed to attract salmon into Lagunitas Creek. (MMWD 5, p. 25; T III 49:22-50:1.) Kelley concluded that 35 cfs would also attract steelhead into Lagunitas Creek.

DFG biologist William Cox testified that although 35 cfs would provide adequate passage flows, he was reluctant to say that 35 cfs would provide adequate attraction flows. (T IV 178:1-178:12.) DFG recommended that an attraction flow of up to 100

cfs be provided below Kent Lake, from November through March of each year, in accordance with a schedule to be provided by DFG. (T V 184:7-184:25; T VIII 45:4-46:19)[6] DFG's attraction flow recommendations were based on observations, professional opinion and information from Kelley's studies, rather than on the IFIM methodology. (T VIII 27:13-28:11.) Releases for attraction flows would be coordinated with a natural event, such as a rainstorm or low pressure front. In the absence of such events, DFG recommends waiting until the middle or end of December when the fish would be congregating at the mouth of Lagunitas Creek and then releasing up to 100 cfs for two or three days for attraction or upstream migration. (T IV 251:23-252:7; T V 102:8-106:20.) As indicated on Figure 5, DFG recommends a base flow of 30 cfs throughout November, increasing to 35 cfs for the month of December.

Stream flow records for Lagunitas Creek show that storm events often produce short-term flows in excess of 100 cfs during winter months. (MMWD 2, Figures 3-4 and App. B; MMWD 7, Table 25 and Figures 25-28.) The limited data available on upstream migration indicates that storm events tend to trigger upstream migration of salmonids in Lagunitas Creek. In the absence of specific studies or data to support a requirement to provide attraction flows of 100 cfs, the SWRCB concludes that the record before it does not support establishment of DFG's attraction flow recommendation.

Upstream Migration Flows: In 1982, Kelley identified several riffles and other obstacles to upstream migration to the principal spawning habitats located 6 to 25 miles upstream of Tomales Bay. (MMWD 2, p. 3-11.) Kelley determined that a flow

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[6] *A 1960 agreement between DFG and the District requires that the District release up to 4,000 AF of water from Nicasio Reservoir for instream purposes from November through March. DFG proposes that this 4,000 AF release requirement be transferred from Nicasio Reservoir to Kent Reservoir and that the water for attraction flows be released at Peters Dam.*

of 35 cfs was needed for three days to provide adult salmon with adequate passage over riffles to spawning areas. (MMWD 5, p. 30; MMWD 2, pp. A-4 and A-5.) The district later characterized this flow as an upstream migration flow.

Some salmon historically have migrated upstream successfully when flows were less than 35 cfs and less than three days in duration, (MMWD 2, pp. B-1 to B-8.) It is not clear, however, whether lack of suitable flows delayed or limited upstream passage. (MMWD 2, p. A-4.)

Entrix evaluated instream flows from 1973 to 1991 to determine the likely effect of flow on important life history events for coho salmon. The presence of four or more "freshets" (upstream migration flows of 35 cfs or more for three days) was considered to provide good upstream passage conditions. Two or fewer freshets were considered to provide poor passage conditions. Applying the Entrix criteria, poor upstream passage conditions for returning adult coho salmon were present in 10 of the last 18 years. A similar evaluation for steelhead concluded that passage conditions for steelhead were very limited in three of the 18 years, and good in 11 of 18 years. (MMWD 2, p. 4-4.)

Based on the Kelly/Entrix work, the District recommends that a "freshet," or upstream migration flow, of 35 cfs be provided for three consecutive days, when a triggering flow of 25 cfs or more due to a natural storm event occurs at the Park gage beginning November 1. If no triggering flow occurs by a certain time, then the upstream migration flows for periods of three consecutive days would be provided anyway. The number and timing of upstream migration flow releases would depend on storage conditions, with no increased flows required when a "low reservoir storage condition" exists. When the brief increased flow releases were not being made for upstream migration purposes, the District

recommends that spawning flows ranging from 10 to 16 cfs should be provided.

Kelley/Entrix concluded that flows of less than 35 cfs have probably been one of the major constraints to maintaining higher coho populations in Lagunitas Creek, and that lack of adequate migration flow is often a "major limiting factor" for the coho population. (MMWD 2, pp. 7-2 and 3-29.) Steelhead migration was determined to be less limited by flows under all conditions evaluated than was coho migration.

Based on the evidence presented, the SWRCB concludes that minimum flows of 35 cfs for three days should be provided each fall and winter to provide adequate flow for upstream migration of coho salmon and steelhead. These flows should be provided to coincide with natural storm events whenever possible. The flows should be provided in accordance with the following criteria:

(1) The first flow of 35 cfs should be provided in conjunction with the first storm that occurs after November 1 that produces a "trigger" flow of 25 cfs at the Park gage. The District should be required to bypass or release sufficient water from storage to maintain a minimum flow of 35 cfs at the Park gage for three days. If no storm produces a trigger flow by November 15, the District should be required to provide a flow of 35 cfs for three days beginning on November 15.

(2) A second flow of 35 cfs for three days should be required no later than December 1. If a "trigger" flow of 25 cfs does not occur naturally after November 18 and before December 1, then the District should be required to provide a flow of 35 cfs on December 1.

(3) A third flow of 35 cfs for three days should be provided no later than January 1. If a trigger flow of 25 cfs does not occur naturally after December 4 and before January 1, the District should be required to provide an upstream migration flow beginning on January 1.

(4) A fourth flow of 35 cfs for three days should be required in conjunction with any storm that occurs between January 4 and January 31 which produces a trigger flow of 30 cfs at the Park gage.

The criteria described above would coincide with higher flows that would occur under natural conditions and provide suitable upstream migration flows for coho salmon and steelhead. The District recognized that lack of sufficient upstream migration flows is a limiting factor for coho salmon, but did not propose that upstream migration flows described above be required in years with low reservoir storage conditions. Providing the specified flows would be particularly important during dry years, however, since there would be fewer naturally occurring periods of adequate flows. Consequently, the SWRCB concludes that the above flow criteria should apply in all types of water years.

Spawning Flows: Adult coho salmon typically migrate into Tomales Bay in late summer and early fall. The fish assemble in a 2.5 mile tidewater reach of the stream before migrating upstream when major storms increase flow. After reaching suitable spawning areas, coho may "hold" in those areas before spawning. (SWRCB 7, p. 27; MMWD 2, p. 3-4.) The DFG fishery report states that spawning occurs from November through January. (SWRCB 7, p. 27.) The District presented evidence that spawning begins following the first "freshet" in November and lasts through mid-January. (MMWD 5, p. 33-36; MMWD 2, Figures 3-8.)

Steelhead generally spawn later than coho salmon. DFG states that steelhead may enter the stream as early as mid-December and that most steelhead have spawned by mid-March. Similar to coho, steelhead may not spawn immediately after reaching the spawning area. (SWRCB 7, p. 27.) DFG recommends peak flows for steelhead spawning from January 15 through March 15. (SWRCB 7, p. 27.) Kelley conducted spawning surveys in 1983-1984 which indicated that steelhead redds were constructed between late January and late March. (MMWD 5, p. 59.) Kelley/Entrix state that the spawning period for steelhead is from January 1 through March 31. For the purpose of the District's comparative flow analysis, spawning was assumed to begin after the first freshet within that period. (MMWD 2, p. A-13.)

As shown on Figure 5, DFG recommends a stepped flow regime beginning with 15 cfs on October 1 and reaching a maximum of 50 cfs between January 16 and March 15. DFG's flow recommendations for coho and steelhead are based on IFIM study results. The DFG study concluded that maximum spawning habitat for coho is provided at a flow of 35 cfs as measured at the Park gage. The maximum spawning habitat for steelhead would be provided at a flow of 70 cfs. (SWRCB 7, Figures 7 and 8.) At DFG's recommended flow of 50 cfs, approximately 80 percent of the spawning habitat in Lagunitas Creek exists in the Park and Tocaloma reaches. (SWRCB 7, pp. 22-24.) Due to the fact that accretions result in higher flows below the Park gage, DFG determined that adequate spawning habitat for coho and steelhead would be provided at flows of 30 cfs and 50 cfs respectively. (SWRCB 7, pp. 26-27.) The flow regime recommended by DFG is designed to "optimize" and "balance" the flows for coho and steelhead. (SWRCB 7, pp. 21 and 26.)

The District proposes adoption of the Kelley/Entrix recommendation for spawning flows for both coho salmon and steelhead. The recommended flows range from 10 to 16 cfs from

November through March or April, depending on the amount of water in storage. (MMWD 2, Table 6-1.) The District's comparative flow analysis indicates that the proposed spawning flows would provide sufficient habitat for zero redds in one year and a minimum of 379 redds in all other years evaluated. (MMWD 2, pp. 7-4 and 7-7.) In developing spawning flow recommendations, the District utilized separate analyses conducted by Kelley and Entrix. Both analyses determined that the potential number of redds for coho and steelhead increases with flows up to at least 28 cfs. That conclusion is generally consistent with the DFG data indicating that spawning habitat increases with flows up to 35 cfs for salmon and 70 cfs for steelhead. The spawning flow analyses conducted by Kelley and Entrix are discussed in more detail in the staff analysis of the record in this proceeding.

Spawning habitat was limiting for coho salmon in 14 of the 18 years between from 1973 to 1991. Spawning flows were generally less than 10 cfs in 6 of those years and between 10 and 20 cfs in 8 years. (MMWD 2, p. 4-4.) Steelhead need greater flows for spawning than coho. Because steelhead construct larger redds, there is generally only sufficient habitat for one fourth of the steelhead redds at any given flow as there would be for coho redds. Entrix determined that spawning habitat was limiting for steelhead in most of the 18 years evaluated. (MMWD 2, p. 4-13.) Flows greater than 20 cfs are considered preferable to flows less than 20 cfs for both steelhead and coho salmon spawning. (MMWD, pp. A-15 to A-18.)

Fisheries biologist Willis Evans recommended that spawning flow releases of 25 cfs as measured at Peters Dam be provided from the time that salmonids first enter the stream after October 15 until March 30. (Evans 1, p. 7.)

Based on the evidence presented, the SWRCB concludes that flows for salmonid spawning should be provided commencing immediately

after the first "freshet" for upstream migration in November of each year and extending through March 31 of the next year. From the time that the flow requirement for spawning purposes commences in November through the end of December, a minimum flow of 20 cfs should be provided for spawning purposes. The 20 cfs minimum flow requirement in November and December is designed primarily for the benefit of coho spawning. The flow would provide 73 percent of the maximum weighted useable area, as determined by DFG's IFIM study, and sites for 642 coho redds as determined by the Kelley/Entrix study. (SWRCB 7, Table 9; MMWD 2, Table 3-3.)

During the steelhead upstream migration period of January 1 to March 15, the SWRCB concludes that the minimum flow for protection of spawning habitat should be increased to 25 cfs. A flow of 25 cfs would provide: (1) 29 percent of the maximum weighted useable area for steelhead spawning and sites for 196 steelhead redds; and (2) 89 percent of the maximum weighted useable area for coho spawners that spawn relatively late in the season and sites for 718 coho redds. (SWRCB 7, Tables 8 and 9; MMWD 2, Table 3-3.) From March 15 through March 31, the minimum required flow for protection of spawning habitat would revert back to the 20 cfs requirement that applies in November and December.

In dry years (see Section 6.4 below), the SWRCB concludes that minimum required flow for protection of salmonid spawning habitat from the time of the first upstream migration flow in November through March 31 should be 20 cfs. A flow of 20 cfs would provide 73 percent of the maximum weighted useable area for salmon and sites for 169 steelhead redds. (SWRCB 7, Table 9; MMWD 2, Table 3-3.) The dry year flows would occur an average of one year in six.

The flow requirements for protection of spawning habitat established in this order commence following the first "freshet" for upstream migration purposes that occurs after November 1. Thus, in years when there are no early storms, the minimum summer flow would continue until November 15. In years with early storms, a flow of 20 cfs for protection of spawning habitat would be provided as early as November 1. This approach provides a "real time" flow regime that is modified in accordance with natural conditions.

Overwinter Habitat: The minimum flows for protection of spawning habitat established in this order would also provide adequate over-wintering habitat for coho and steelhead juveniles. Based on the DFG IFIM study, a flow of 20 cfs provides 93 percent, 63 percent, and 90 percent of the maximum weighted useable area for coho fry, steelhead fry, and steelhead juveniles, respectively. A flow of 25 cfs provides 99 percent, 55 percent, and 96 percent of maximum habitat for the same life stages. (SWRCB 7, Tables 8 and 9.)

Incubation flows: Following spawning, coho salmon embryos incubate within the redds from five to seven weeks. Steelhead embryos incubate for shorter periods of time, particularly if water temperature is warmer during the incubation period. (MMWD 2, p. 3-15.) Kelley/Entrix indicated that the majority of salmon incubation occurs from December through early March, with the peak incubation period for steelhead from February through mid-April. (MMWD 2, p. 3-2.) The DFG report states that incubation of steelhead continues through the end of April. (MMWD 32, p. 5.)

Successful incubation of salmonids depends on the proper combination of water temperature, dissolved oxygen, water velocity, stream gradient and gravel composition. (MMWD 2, pp. 3-15 to 3-17; MMWD 5, p. 73.) DFG expressed concern that

flows of less than 10 cfs might not provide sufficient dissolved oxygen levels for the incubation period. (MMWD 32, p. 5.)

The District presented recommendations from the Kelley/Entrix report that minimum spawning flows, which begin in November, should be continued through the incubation period. Thus, in high and above normal reservoir storage years, the Kelley/Entrix report recommends that minimum flows of 16 cfs and 14 cfs, respectively, would be maintained through April 30. For below normal and low water storage years, minimum flows of 12 cfs and 10 cfs, respectively, would be maintained through March 31. (MMWD 2, p. 6-10.) The Kelly/Entrix report also states that scouring of salmonid redds is considered to be a "serious limiting factor" for both coho and steelhead in Lagunitas Creek. Kelley/Entrix state that high flows in the 500 cfs to 1,000 cfs range could result in a significant loss of fish. (MMWD 2, pp. 3-15 to 3-17.)

Based on the evidence presented by DFG and the District, the SWRCB concludes that the minimum flows established to provide protection of spawning habitat would also provide suitable habitat for incubation of coho and steelhead embryos through the month of March. The minimum flow requirements of 16 cfs during April in normal years, and 14 cfs during April of dry years (see Section 6.3.3), would continue to provide suitable incubation habitat for the duration of the incubation period.

Freshwater Shrimp: Little evidence was presented regarding desirable flows for protection of freshwater shrimp during the winter. During the winter, the shrimp seek refuge from high currents in areas with undercut banks, as discussed in Section 6.3.5 below. (MMWD 2, p. G-6.) The minimum flow requirements established for protection of salmonids during the fall and winter period would generally result in lower flows and slower water velocities than what existed under unimpaired conditions.

Consequently, the minimum flow requirements should not adversely affect freshwater shrimp.

6.3.3 *Spring Flows for Salmon and Steelhead*

Establishing appropriate fishery protection flows for the spring period of April 1 through June 15 involves consideration of habitat requirements for: incubation of steelhead embryos, rearing coho fry and juveniles, rearing steelhead fry and juveniles, and outmigration of steelhead and coho smolts. The subject of appropriate flows for incubation was addressed in Section 6.3.2 above. The subjects of appropriate flows for rearing and outmigration are discussed below.

Rearing: DFG describes the period from March 15 through June as the spring rearing period and the period from July 1 through October 31 as the summer rearing period. (DFG 9, p. 5.) DFG's IFIM study examined the relationship between rearing habitat and flow for steelhead fry, steelhead juveniles and coho fry. (SWRCB 7, Tables 8 and 9.) Maximum weighted useable area for steelhead fry is provided at flows of 5 cfs, and maximum habitat for steelhead juveniles is provided at a flow of 35 cfs. For coho fry, maximum weighted useable area is provided at a flow of 25 cfs. DFG's IFIM study states that spring flows are particularly important for coho and steelhead, and that the percentage of salmonids that return to spawn is directly related to the size of the fish at the time of migration. The survival rate of the fish in the ocean is directly related to the size of the smolt at the time of emigration. (SWRCB 7, p. 13.) Kelley testified that he generally agreed with this conclusion based on data relating to the survival and return rates of different sized salmonids from Central Valley hatcheries and data from other studies. (T VII 150:21-151:24.)

DFG recommends that the higher winter flows be reduced gradually to the lower summer base flow. Maintaining relatively high flows

in the spring would be expected to maintain lower water temperatures and to allow fish to rear longer in the stream and attain greater size before emigration to the ocean. From a flow of 50 cfs recommended for February 1 through March 15, DFG recommends reducing flows to 40 cfs for the second half of March, 30 cfs for April, 15 cfs for May and 12 cfs in June.

The District recommends different minimum flow requirements for each of four hydrologic and water storage conditions. Recommended minimum flow requirements during April range between 6 cfs and 16 cfs; minimum flow recommendations for May range between 6 cfs and 12 cfs; and minimum flow recommendations for all or part of June range between 4 cfs and 12 cfs. (MMWD 5, p. 147.)

The SWRCB concludes that flows for rearing habitat during the spring are important to assure maximum growth in emigrating salmonids which, in turn, affects the survival of fish in the ocean, and the rate of returning spawners. The minimum flow requirements set forth below in Table 2 below provide a large percentage of the potential weighted useable area available for rearing, while reflecting a gradual decline from the higher flows during the winter spawning period to the lower flows required in the summer (as discussed in Section 6.3.4 below).

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TABLE 2

LAGUNITAS CREEK
MINIMUM INSTREAM FLOW REQUIREMENTS

Normal Year Requirements			
Time Period			*Flow (cfs)*
November 1/15*	-	December 31	20
January 1	-	March 15	25
March 16	-	March 31	20
April 1	-	April 30	16
May 1	-	June 15	12
June 16	-	November 1/15*	8

Dry Year Requirements			
Time Period			*Flow (cfs)*
November 1/15*	-	March 31	20
April 1	-	April 30	14
May 1	-	June 15	10
June 16	-	November 1/15*	6

** The minimum flow of 20 cfs in November shall begin following the first storm that produces a "trigger" flow of 25 cfs as measured at the USGS gage at Taylor State Park. In the absence of a storm causing a "trigger" flow, the 20 cfs flow requirement shall become effective on November 15 of each year.*

Outmigration: Kelley concluded that streamflows of the magnitude he recommended during April and May appear suitable for salmonid emigration from Lagunitas Creek. (MMWD 5, p. 147.) However, the Kelley/Entrix report identified a number of other non-flow factors that may adversely affect emigration, including the Giacomini summer dam, high water temperatures in the estuary, and predation. (MMWD 2, p. 4-10.) Coho salmon outmigration begins in April, peaks in May, and extends through June. Steelhead outmigration begins in March, peaks in April, and extends through May. (MMWD 5, pp. 128-133.) No party recommended a particular flow needed for outmigration. The average flows observed by Kelley in 1984 and 1985 were 17.2 and 12.6 cfs in April, and 11 and 10 cfs in May. Kelley considered flows in that range to be suitable for emigration. The SWRCB concludes that in addition to

providing habitat for rearing, the flow requirements specified in Table 2 above will provide suitable flow for emigration.

6.3.4 *Summer Flows for Salmon and Steelhead*

In developing summer flow recommendations for the summer period, DFG considered each life stage of coho salmon and steelhead that would be present, as well as desirable flow levels for freshwater shrimp and other species. Primary consideration was given to freshwater shrimp and young-of-the-year coho. Although 15 cfs would provide better flows for coho and steelhead during the summer period, DFG was concerned that 15 cfs would result in water velocities harmful to freshwater shrimp. In an effort to balance competing needs, DFG recommends a minimum flow requirement of 10 cfs for the period of July 1 through September 30. (T V 82:18-82:22 and 193:19-193-25; T VIII 48:15-50:16 and 58:20-58:21.) DFG recognizes that the proposed summer flows are higher than would have occurred under unimpaired conditions, but suggests that the recommended flows will help to mitigate for the loss of upstream habitat due to water development projects. (T VIII 122:25-123:16.)

The District recommends summer flows of from 4 to 8 cfs from July 1 until the first "trigger" flow in November, depending upon the amount of water in storage in District reservoirs. Flows in June would vary from 12 to 4 cfs depending on storage conditions. (MMWD 2, p. 6-2.) Kelley testified that he did not measure juvenile rearing habitat at flows higher than 5 cfs because nobody thought that the District would entertain the idea of releasing more than 5 cfs. (T IX 106:3-106:10.) Similarly during the SWRCB hearing in 1980, Kelley testified that the optimum flow for fish in Lagunitas Creek was probably about 15 to 20 cfs, but that there was not much point in studying things that are "not relevant." (T 11/14/80 139:10-139/25.)

Based on a comparative flow analysis of unimpaired conditions, conditions prior to enlargement of Kent Lake, and the District's recommended minimum flows, the Kelley/Entrix report concludes that its recommended flows would provide better summer rearing conditions than existed prior to Kent Lake enlargement or under unimpaired conditions. (MMWD 2, pp. A-33 to A-38.) The District's comparative flow analysis has limited value, however, because: (1) prior to enlargement of Kent Lake, the District ordinarily did not release water from Kent Lake for fishery protection; and (2) although summer flows in unimpaired conditions were often low, upstream rearing areas were available which have since been blocked by dams. Sedimentation was also less of a problem in unimpaired conditions than at present.

The SWRCB concludes that the endangered species status of freshwater shrimp requires that special consideration be given to maintaining flows suitable to that species. Thus, although the summer flows recommended by DFG would be more desirable if providing habitat for salmonids were the only objective, the competing needs of providing suitable flows for freshwater shrimp and providing water for municipal use justify a lower flow.

As explained in Section 6.5.3 below, studies conducted by Entrix indicate that optimum flow conditions for freshwater shrimp are provided at 7 cfs, but there is no appreciable change in habitat conditions with flows up to 8 cfs. The SWRCB concludes that a flow of 8 cfs will provide sufficient habitat for rearing of steelhead and coho salmon from June 15 through October 31 while not adversely impacting freshwater shrimp. In recognition of limited water availability to meet competing demands in dry years, the required minimum flow should be reduced to 6 cfs from June 1 through October 31 of dry years. A flow of 6 cfs will provide good habitat for freshwater shrimp, and in combination with the water temperature requirements and other provisions of this order, a flow of 6 cfs will also provide good summer habitat

for coho salmon and steelhead. As explained in Section 6.3.2 above, the "summer" period instream flows remain in effect until the first "trigger" storm event in early November or, if no storm occurs, then until November 15.

6.3.5 *Flows for Freshwater Shrimp*

The District presented the results of two studies regarding freshwater shrimp in Lagunitas Creek. The first study was a population survey of freshwater shrimp which identified the stream reaches and types of habitat occupied by the shrimp. (MMWD 2, Attachment G.) During the summer, shrimp were found along the edges of pools, away from the main current, among exposed root systems. (MMWD 2, p. G-4.) During the winter, the shrimp seek refuge from high currents in areas with undercut banks. (MMWD 2, p. G-6.) Streambank vegetation helps to conceal shrimp from predators and serves as a substrate from which shrimp obtain food. (MMWD 2, pp. G-9 and G-21.) Low stream velocity may increase the abundance of predators that feed on the shrimp. (MMWD 2, p. G-18.) Providing additional riparian vegetation and woody debris, and reducing sedimentation, could improve habitat for the freshwater shrimp. (MMWD 2, pp. G-39, G-25, and G-26.)

The second study presented by the District developed a relationship between flow and habitat using a method similar to that used in DFG's IFIM study for steelhead and salmon. (T II 58:15-59:1; 73:24-73:25; and 248:1-248:25.) The study concluded that the amount of habitat for freshwater shrimp increases slowly up to flows of 7 cfs and then begins to decline. (T II 59:10-60:6.) The relationship between flow and shrimp habitat is particularly important during summer when freshwater shrimp are further out in the stream channel. The shrimp are not as susceptible to changes in flow and velocity during the winter when they retreat deep into riparian vegetation or undercut banks. (T II 60:3-60 14.) Biologist Jean Baldrige testified that the most important factors for freshwater shrimp habitat are

adequate roots and woody debris within the creek. Baldrige also testified about the desirability of undercut banks for shrimp habitat, and expressed the opinion that a sediment management plan may result in more undercut banks. (T II 60:15-61:8.)

DFG did not conduct an IFIM study to determine desirable flows for freshwater shrimp. (SWRCB 7, pp. v-vi.) However, DFG submitted a report regarding the distribution, life history and status of the freshwater shrimp. The report recommends adequate summer water levels and protection of riparian vegetation in order to protect the freshwater shrimp. (DFG 10, p. 1.)

6.3.6 *Summary of Flows for Fishery Protection Purposes*

Based on the evidence presented in this proceeding, the SWRCB concludes that Marin Municipal Water District's permits should be amended to require the District to provide minimum instream flows for protection of coho salmon, steelhead, and California freshwater shrimp in Lagunitas Creek as specified previously in Table 2 and as shown in Figure 7 below.

Figure 8 shows the minimum requirements established by this order, the existing flow requirements presently in effect, DFG's flow recommendations and the flow recommendations proposed by the District for dry year and wet year conditions. As can be seen from Figure 8, the minimum flows required under this order are similar, but not identical to the flow requirements now in effect under the 1985 stipulated judgement entered by the Superior Court for Marin County. Section 6.4 below establishes the criteria for determination of "normal" and "dry" water year classifications for purposes of determining the applicable minimum flow requirements.

In addition to adequate flows for protection of fish habitat and migration, the evidence presented supports requiring a number of other measures to protect fishery and other public trust

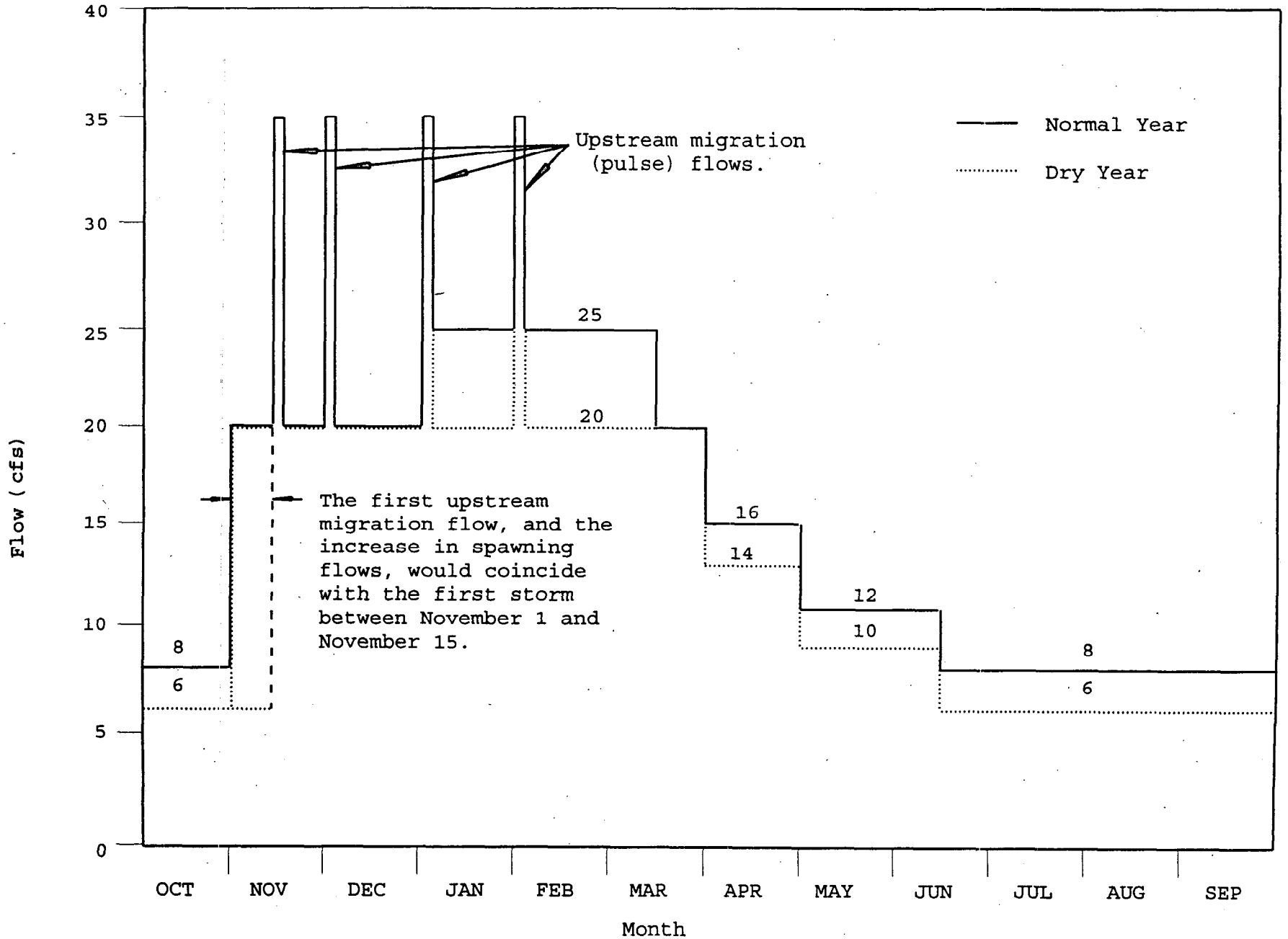

Figure 22. Proposed Instream Flow Regime

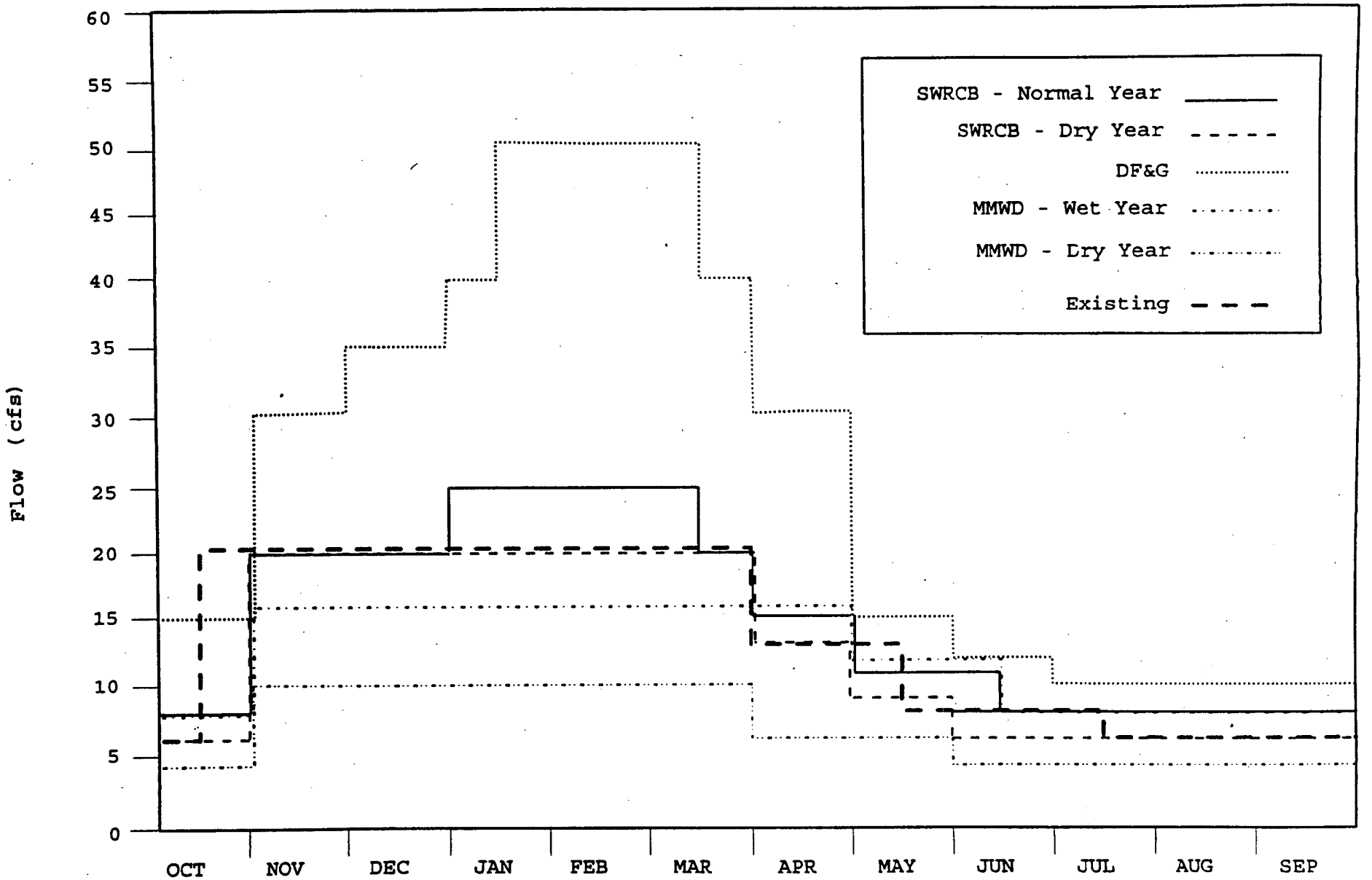

Figure 8. Comparision of Proposed and Existing Flow Standards.

resources in Lagunitas Creek as discussed in Sections 6.5 through 6.9 below. In view of the tremendous changes that have occurred in the Lagunitas Creek basin, it is not realistic to suggest that the requirements established in this order can restore the fishery to what existed in the unimpaired condition. The task before the SWRCB is to regulate the major water diversions in the basin in a manner that maximizes the competing beneficial uses of water, maintains fish in good condition, and protects public trust resources where feasible. The relationship between the minimum flow requirements established in this order and use of water for consumptive purposes is addressed in Section 7.0.

6.4 Water Year Classifications

The instream flow requirements established in this order vary in accordance with the precipitation which occurs in the preceding 6-month and 15-month period. As shown in Figure 7, the instream flow requirements applicable during "dry years" are lower than the requirements for "normal years" except for the periods of November 1 through December 31 and March 1 through March 15. The determination of dry and normal years will depend upon precipitation as measured at the Kent rainfall gage on January 1 and April 1, as described below:

April 1 Determination: The April 1 determination of whether dry or normal year flow requirements apply would be based on the total precipitation that occurred in the six month period from October 1 through March 31. An average of approximately 88 percent of the total annual precipitation falls during this six month period. If the total precipitation during that period is less than 28 inches, then the District would be required to meet dry year flow requirements from April 1 through December 31. If the precipitation is 28 inches or greater, the District would be required to meet normal year flow requirements.

January 1 Determination: The January 1 determination would be based on total precipitation that occurs in the 15 month period preceding January 1. If total precipitation during this period is less than 48 inches, the District would be required to meet dry year flow requirements from January 1 through March 31. If precipitation during that 15 month period is 48 inches or greater, the District would be required to meet the normal year flow requirements.

Based on the precipitation records for the Kent precipitation gage, the dry year flow requirements established in this order correspond to precipitation patterns which occur an average of once every six years. A one in six year frequency of occurrence corresponds with the District's recent history of mandatory water conservation measures which have been imposed in approximately one in six years. (MMWD 1, p. 35.)

The approach to determination of water year type presently specified in the District's permits is based on both reservoir storage and projected runoff. As described above, the new criteria for determination of water year type established in this order are based on precipitation in preceding months. Although the amount of precipitation in preceding months would reasonably be expected to be reflected in reservoir storage levels, the criteria established in this order do not establish reservoir storage levels as independent criteria. From an operational standpoint, the specified approach requires that, on January 1 and April 1 of each year, the District will have to review its available water supplies and determine whether mandatory water conservation measures will be needed during the coming year. This is similar to the District's existing practice which is to assess water availability during March to determine if water conservation measures will be required during the remainder of the year. (MMWD 7, p. 45.)

The District and DFG both proposed methods for determination of water year classification based on a combination of precipitation and reservoir storage. In this instance, tying instream flow requirements directly to reservoir storage levels in either of the ways proposed by DFG and the District poses at least two problems. First, it can result in monthly fluctuations in instream flow which have the potential for dewatering redds and stranding fish. Second, the amount of water in reservoir storage can be affected significantly by the District's diversion of water for municipal use, which is projected to increase from about 30,000 AFA to 40,000 AFA. In the absence of new sources of supply, this increase in municipal demand would be expected to result in a long-term decline in the average amount of water held in reservoir storage. To deal with this problem, the District proposed a complex accounting system that would determine instream flows based on the current level of development. (MMWD 7, pp. 48-51; T I 133:16-135:6.) However, the contract between the District and the SCWA for delivery of water from the Russian River may cause the District's proposed approach to be disadvantageous to the District. (T I 80:18-81:2.) For example, if the District were to use water from the Russian River before using water from reservoir storage, it could be required to maintain higher instream flow standards in Lagunitas Creek due to greater amounts of water retained in reservoir storage.

Basing the determination of dry year versus normal year instream flow requirements on precipitation in accordance with the criteria established in this order avoids complications which would arise from tying flow requirements directly to the amount of water in storage. The method for determining water year types adopted in this order will also provide more uniform flows throughout the entire spawning and incubation period and will minimize the potential for dewatering redds or stranding fish.

6.5 Sediment Control

6.5.1 *Description of Problem*

Erosion and sedimentation have resulted in large quantities of sand and fine gravel filling pools and glide habitat areas, and filling the spaces around cobbles, boulders and undercut banks. The result is to reduce habitat available for juvenile fish, freshwater shrimp and other aquatic organisms. (SWRCB 7, p. 2; MMWD 2, p. 1-3; MMWD 6, pp. 2 and 6; MMWD 20, p. 2.) In 1979, DFG and the District signed an agreement calling for a three phase study to include: (1) investigation of sources of sediment in Lagunitas Creek; (2) development of a sediment transport model and evaluation of sediment management programs; and (3) a recommended sediment management program. SWRCB Decision 1582 directed the District to conduct a study to determine the impacts of the Peters Dam enlargement project on sediment transport in Lagunitas Creek. (SWRCB Decision 1582, p. 34.)

The District submitted a series of reports relating to sediment problems in Lagunitas Creek. (MMWD 1, 2, 6, 7, 20, and 25.) The District's dams have reduced the size and frequency of winter flushing flows which transport sediments downstream, resulting in loss of fishery habitat. (SWRCB 6, p. 62; MMWD 6, Tab C, p. 1; MMWD 7, pp. 62 and 63.) Expansion of Kent Lake may have reduced the sediment transport capacity of Lagunitas Creek by an average of 10 to 20 percent, or approximately 600 tons of sediment per year. (MMWD 7, p. 62.) The District's consultants estimated that removal of 600 tons of sediment annually would offset the effects of the dam. (T III 87:7-89:16.)

There is substantial year-to-year variation in the amount of sediment deposition in the creek. (MMWD 6, p. 18.) A single large storm may account for the majority of total sedimentation that occurs in a decade. (MMWD 7, p. 62.) A torrential storm in early 1982, for example, resulted in considerable erosion and sedimentation, raising the bed of the stream by as much as seven

inches. (MMWD 6, Tab G, pp. 38-43.) The District presented testimony that the deepening of the pools in the upper portion of the creek over the last ten years indicates that the sediment deposited by that large storm gradually is being flushed out of the system. (T III 206:20-207:25.)

The District's consultant testified that the "overwhelming" majority of sediment originates in the San Geronimo Creek watershed, in which there are approximately 1,200 separate landholdings. (T II 101:7-101:4; 115:17-115:20.) Less than one to two percent of the sediment is the result of bank sloughing. (T II 94:24-95:1.) Because the sediment from the San Geronimo Creek Basin is relatively coarse material, it is difficult to transport the sediment downstream. (T II 100:23-101:1.)

6.5.2 *Potential Sediment Control Measures*

The two general approaches to sediment control in Lagunitas Creek are to reduce the amount of sediment entering the creek or to increase the rate at which sediment is removed. The District's consultants concluded that a well designed habitat enhancement program would be likely to include both methods. (MMWD 6, Tab C, p. 36.) The various types of sediment control measures evaluated by the District are described below.

Flushing Flows: Based on sediment model transport studies conducted by the District's consultants, flows of approximately 500 cfs for 20 to 100 days would be needed to move 600 tons per year of sediment. (T II 102:13-102:25.) This represents 20,000 to 100,000 AF of water. Over the 30 year period evaluated in the study, the consultant concluded that approximately 700,000 AF, or an average of 23,000 AF per year would be required to flush out the additional sediment attributed to the expansion of Kent Lake. (MMWD 7, pp. 63 and 64.) In addition to the relatively large amount of water required, flushing flows of approximately 500 cfs could scour existing redds, result in sediment filling pools and

wash woody debris from the stream channel. (T II 103:1-104:20.) High flows could also have the undesirable effect of transporting cobbles out of the stream. (T III 82:14-86:10.) The District concluded that flushing flows would not provide an effective approach to reducing sediment in Lagunitas Creek. (T II 102:10-102:12.)

Sediment Basins: The District also evaluated the feasibility of constructing large sediment basins or sediment traps at various sites on San Geronimo Creek and Lagunitas Creek. This approach would involve annual removal of sediment trapped behind low level dams constructed in the stream channel. The District's consultant predicted that the traps could capture up to 45 percent of the total sediment bedload. Problems associated with construction of sediment basins include: relatively high costs, creation of fish passage problems, destruction of salmon spawning beds, removal of large trees, and DFG opposition. (MMWD 7, pp. 65-7-; T II 104:21-105:19.)

Stream Bank Stabilization: The District's consultants also examined the feasibility of constructing streambank stabilization projects at over 100 sites along San Geronimo Creek. The identified projects were projected to reduce sediment load by about six percent. The District has not pursued this approach because the projects would be relatively costly, would require cooperation of a large number of landowners, could require on-going maintenance, and would not meet the District's objectives for sediment reduction. (MMWD 7, pp. 65 and 66; MMWD 6, Tab H, pp. 1-6; T II 105:20-106:20.)

Other Sediment Control Measures: Other sediment control measures examined by the District's consultants were estimated to have the combined potential of reducing sediment loading by an additional 500 to 1,000 tons per year. (T II 243-17-246:19; T II 208:5-208:10.) The measures evaluated include: implementation of

sediment control measures on public lands by the public agencies having jurisdiction; implementation of more effective watershed management practices on the District's extensive landholdings in the watershed; volunteer programs to improve stream habitat; improved agricultural and timber management practices; reducing sediment loading caused by a large landowner in the Devil's Gulch basin; and regulation of cattle in the riparian zone.

The Tomales Bay Association presented a policy statement concerning measures taken to reduce sediment in Olema Creek in order to improve salmon and steelhead habitat. The Association's volunteer program has included construction of a fence and riparian vegetation planting along Olema Creek, streambank stabilization projects, removing log-jams, and numerous other small-scale projects. (T IV 129:5-131:7.) The Evans Environmental Group also described measures that could be taken to restore the streambed in Olema Creek. (Evans 1, pp. 15 and 16.) The Coastal Conservancy, Trout Unlimited, the Marin Conservation District and other groups have also worked to control sediment in the Lagunitas Creek watershed. (T III 149:16-149:25.)

6.5.3 *District's Present Sediment Control Program*

The District's existing sediment management program consists of a structural component focusing on sediment control in the San Geronimo Basin, and a non-structural component which includes an oversight committee, a monitoring program, management of woody debris, and execution of watershed protection agreements with individual landowners. (T II 108:23-112:3.)

The District's sediment control program for the San Geronimo Basin includes a list of specific projects which will be implemented by the Marin County Resources Conservation District in accordance with an agreement with the water district. (MMWD 25, pp. 7 and 8; MMWD 7, Attachment C.) The long-term goal

of the plan is to reduce annual coarse sediment yield from the San Geronimo Basin by 15 percent, or approximately 600 tons per year, in order to mitigate impacts caused by the expansion of Kent Lake. (MMWD 6, Tab K, p. 1; T III 182:22-182:25.) Implementation of the measures described in the plan is intended to maintain the streambed in its present condition. (T II 99:3-99:8.) The District has committed $300,000 for construction of the projects and $55,000 per year for a period of 10 years for operation and maintenance of completed projects and monitoring streambed conditions. (MMWD 7, Attachment C, p. 2.)

The District began a program of watershed protection agreements with landowners which require landowners to conform to land-use practices that minimize impacts to water quality and fishery habitat in Lagunitas Creek. At the time of the hearing, the District had executed agreements with 40 parties, or approximately 2 percent of the landowners in the basin. (MMWD 7, Attachment B, cover letter, p. 2.)

The District's geomorphological consultant concluded that the District's existing sediment control program for San Geronimo Creek will, at best, produce "marginal" improvement to the habitat in Lagunitas Creek. The consultant testified that "non-structural" sediment control measures will have to be successful in order to realize an overall improvement in the control of sediment and an appreciable gain in habitat. (T III 90:20-90:21; T III 181:8-185:4; RT III 246:10-246:14.)

The District's fishery consultant stated that control of sediment is vitally important to the overall protection and enhancement of fishery resources and that the District's present program is designed "only to keep conditions from worsening as a result of an enlarged dam, not necessarily to improve them." Improvement of sediment conditions beyond those proposed in the District's plan is needed to improve substrate conditions which could lead

to improved habitat and more abundant populations of salmon and steelhead. The full potential of the fishery recommendations will not be realized until additional sediment control measures are implemented beyond those proposed in the District's plan. (MMWD 2, pp. 1-4, 7-15, and 7-16.)

6.5.4 *Conclusions Regarding Sediment Control Measures*

The District has begun development of an excellent sediment control program, but there are three areas where the program should be improved. First, the District's present program is designed to mitigate impacts resulting only from the expansion of Kent Lake. The record shows that water development in the Lagunitas Creek watershed has had substantial adverse effects on the fishery and fishery habitat conditions in Lagunitas Creek. The District's sediment control project should be designed to help provide the habitat needed to maintain fish in good condition, rather than to simply mitigate for the impacts caused by the most recent project. A second deficiency in the present program is that it focuses on the San Geronimo Basin and does not include a management program for the entire Lagunitas Creek watershed. (T III 182:14-182:15.) Evidence submitted by the District indicates that there may be other areas such as county roads, District land, and land in the Devil's Gulch area, where sediment control projects would be cost effective and feasible. Finally, the District's present sediment control program focuses primarily on structural programs although the evidence indicates that greater use of non-structural sediment control measures would also be beneficial.

In view of the impact of District projects upon fishery habitat and the recognized importance of sediment control measures to protect and restore fishery habitat, the SWRCB concludes that the District should be directed to prepare a comprehensive sediment management plan. The goal of the plan should be to provide a significant, long-term improvement in streambed conditions in

Lagunitas Creek for the benefit of coho salmon and steelhead. The plan should incorporate the District's on-going program and should identify other specific sediment control measures and projects. The plan should describe the costs involved, sources of funds, the party or parties responsible for implementation, the time schedule and a monitoring program. As recommended by the District's consultant, the plan should have the flexibility to respond to changing conditions within the watershed and should have approximately a 10-year time frame. (T II 117:1-117:6.) In developing the plan, the District should coordinate and provide an opportunity for input from environmental groups, landowners, the general public and governmental agencies including Marin County, the Marin County Resources Conservation District, the California Department of Parks and Recreation, the National Park Service, DFG, USFWS and the Regional Water Quality Control Board for the San Francisco Bay Region (RWQCB).

An alternative method of reducing excess sediment in Lagunitas Creek would entail the use of "flushing flow" releases. Due to the large quantity of water needed for flushing flows, the very limited amount of water ordinarily available in the basin, and the availability of other means of reducing sediment, the SWRCB concludes that, in this particular instance, reliance upon scheduled flushing flow releases may not be consistent with the constitutional mandate to maximize the beneficial use of water. (California Constitution, Article X, Section 2.)

The RWQCB proposes to work with the District, Marin County, and the SWRCB to establish, implement and oversee a comprehensive watershed management plan to improve the quality of water in the Nicasio Creek watershed. (T IV 121:17-125:6.) As part of that process, it would be appropriate for the RWQCB to review and monitor the sediment management plan required by this order.

6.6 Use of Woody Debris for Habitat Enhancement

The study prepared by the District's fishery consultant states that woody debris is important for juvenile coho salmon, yearling steelhead, and freshwater shrimp. Woody debris performs the multiple functions of creating and maintaining pools, providing cover, and providing foraging sites. Woody debris helps create habitat diversity by varying water velocity and depth. Woody debris also provides habitat for freshwater shrimp. Although past management practices have removed woody debris in the Taylor State Park area, the District's consultant stated that woody debris is particularly important in that reach. (MMWD 2, pp. 1-4, 3-30,6-20 to 6-22, 7-10, and App. D.)

Among the District's plans and recommendations are holding public workshops to encourage parties to develop better riparian management practices, development of a riparian management plan which would define measures to improve woody debris, and monitoring to determine the effectiveness of the riparian management plan. The District recommends that the plan be developed in coordination with the State Department of Parks and Recreation due to the importance of woody debris in the state park reach. (MMWD 2, pp. 6-20 to 6-22.)

The evidence supports the District's conclusion that additional woody debris would improve fishery habitat in Lagunitas Creek. Development of a riparian management plan would help to promote the goal of additional woody debris. Consequently, the SWRCB concludes that the District should be directed to develop and submit a riparian management plan within one year of the date of this order. The plan should describe goals and objectives, specific projects, responsible parties, estimated time schedules, and a maintenance and monitoring program. The District should provide an opportunity for input by environmental organizations, local land owners, the general public and appropriate public agencies. The riparian management plan and the sediment

management plan addressed in Section 6.5 can be submitted as separate components of a single plan.

6.7 Water Quality

The District presented testimony that Nicasio Reservoir and Kent Lake have good water quality and that the same treatment process is used for water from both sources. (T II 165: 23-166:9.) In general, however, water from Nicasio Reservoir has a higher temperature, higher turbidity, and lower dissolved oxygen levels than does water from Kent Lake. Therefore, use of water from Nicasio Reservoir to meet the instream flow requirements in Lagunitas Creek is less desirable than is release of water from Kent Lake. The recent history of instream flow requirements in Nicasio Creek and Lagunitas Creek is summarized below followed by a discussion of the relationship between various water quality parameters and use of water for fishery protection and other purposes.

6.7.1 *Background Information*

Over the years, water from Nicasio Reservoir alternatively has been: (1) released for instream purposes in Nicasio Creek; (2) held in exchange for water released from Kent Lake; and (3) piped to a point below Kent Lake where it has been released into Lagunitas Creek for instream flow purposes.

The District's original obligation to provide a quantified amount of water from Nicasio Reservoir for use for instream purposes stems from a 1960 agreement between the District and DFG entered into at the time of the District's application to appropriate water for the Nicasio Reservoir project. The agreement required that the District provide 800 AF per month for the preservation of fish and wildlife from November 1 through March 31 for a total annual obligation from Nicasio Creek of 4,000 AF. The agreement included provisions for reduced flows during periods of below normal runoff. The agreement called for construction of

facilities to trap salmonids below Nicasio Reservoir and transport them upstream for natural spawning above the dam. Downstream migrants were to be trapped and transported for release below the dam in the spring. (MMWD 19, Section C.)

After concluding that records showed the fish trapping and transport program on Nicasio Creek were not cost effective, the parties entered into a new agreement in October 1971. The 1971 agreement replaced the fish trapping program with a fish stocking program in which the District purchased salmon and steelhead yearlings for release into Nicasio Creek. (MMWD 1, pp. 22 and 23.) A subsequent agreement entered into in 1979 established instream flow requirements in Lagunitas Creek which required the District to maintain specified flows in Lagunitas Creek at the Tocaloma gage below the confluence with Nicasio Creek. The 1979 agreement declared previous agreements between DFG and the District concerning water releases from Nicasio Reservoir to be null and void. (MMWD 19, Section A.)

On April 7, 1981, the SWRCB issued Decision 1582 which set interim flow requirements for Lagunitas Creek that differed from the 1979 agreement and established a number of other terms. In the absence of approval of subsequent agreements between the District and DFG, Decision 1582 concluded that the permit condition requiring the District to release water from Nicasio Reservoir in accordance with the 1960 agreement remained in effect. (Decision 1582, p. 20.) Decision 1582 also established interim flow schedules which could be met through a combination of natural flow, tributary inflow and storage releases. As discussed in Section 2.5, the interim flow requirements currently in effect for Lagunitas Creek were established in a stipulated judgment entered in 1985.

During the 1992 water right hearing, DFG did not request releases into Nicasio Creek, preferring to have higher instream flows in

Lagunitas Creek. The District's present instream flow recommendations for Lagunitas Creek assume that the 1960 agreement provision for flows in Nicasio Creek will not be in effect. (MMWD 1, p. 22.) Due to the limited fishery habitat available between the Nicasio Reservoir dam and the confluence with Lagunitas Creek, neither DFG nor any other party to the present proceeding recommended establishing a specific instream flow requirement for that reach of Nicasio Creek. DFG, however, recommends that the 800 AF per month (4,000 AF total) release requirement from Nicasio Reservoir should be transferred to and replaced by Kent Lake water to be released into Lagunitas Creek at Peters Dam. (DFG 7, p. 2; SWRCB 7, p. 32.)[7]

As originally issued, Permit 12800 allowed the District to divert 31 cfs by direct diversion from Nicasio Creek throughout the year and to divert up to 29,000 AFA to storage in Nicasio Reservoir from October 1 to June 30 of each year. On December 16, 1983, the District submitted a petition requesting that the permit be amended to provide for 22,430 AFA to be stored in Nicasio Reservoir and the remaining 6,570 AFA to be stored in Kent Lake. The petition stated that "less than one year in ten on the average, it may be necessary to pump water diverted at Nicasio Dam to storage in Kent Lake."

In response to the District's petition, on August 7, 1985, the Division of Water Rights entered an order which approved storage in Kent Lake of 6,570 AFA of water diverted from Nicasio Creek

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[7] *The original intent of the Nicasio Reservoir release requirement in the 1960 agreement was to partially mitigate for the loss of access to 11 miles of salmonid habitat upstream of Nicasio Reservoir. The mitigation effort failed for various reasons. Under the 1983 stipulated judgment, DFG has the option of waiving any release requirement from Nicasio Reservoir in favor of obtaining increased flow releases from Kent Lake. The minimal habitat on Nicasio Creek is not considered sufficient to sustain a run of salmon or steelhead. Therefore, DFG has opted to require higher flows in Lagunitas Creek rather than to require the District to make specified releases into Nicasio Creek.*

under Permit 12800. The August 7, 1985 order also specifies the places of use for the various purposes of use authorized in the permit. Nicasio Reservoir is the authorized place of use for water used for fish and wildlife purposes. Lagunitas Creek below Peters Dam was not specified as place of use for water diverted from Nicasio Creek. Long-term authorization to pump water from Nicasio Reservoir upstream for release into Lagunitas Creek for fishery purposes would require SWRCB approval of a petition from the District requesting amendment of the authorized places of use for water diverted from Nicasio Creek under Permit 12800.

On an interim basis, however, SWRCB Decision 1582 and the stipulated judgment presently in effect acknowledge that the District may pump Nicasio water for release at the base of Peters Dam to meet the interim flow requirements in Lagunitas Creek. Thus, under the interim conditions governing operation of District facilities prior to this order, flows in Lagunitas Creek directly below Peters Dam have consisted of water from Kent Lake, Nicasio Reservoir, or a combination of both. The District proposes to continue this practice. (MMWD 7, p. 72.) In determining how best to meet the instream flow requirements for Lagunitas Creek established in this order, the differences in water temperature, dissolved oxygen and turbidity of water from each source should be considered.

6.7.2 *Water Temperature, Dissolved Oxygen and Turbidity*

Water Temperature: The District submitted data regarding average monthly water temperatures in Nicasio Reservoir and Kent Lake from 1986 through 1990. The data show that water of 50 degrees Fahrenheit or colder was available in Kent Lake at all times during the five year period between 1986 and 1991, a period which included several drought years. The temperature in Nicasio Reservoir was considerably warmer during the same period, particularly during the summer months when the average water

temperature was between 65 and 70 degrees Fahrenheit. (MMWD 7, Plates 16-20.)

Water temperatures in Kent Lake are stratified with colder water available at lower depths. The District can release water from eight different outlets, ranging in depth from 20 feet to 185 feet below the surface of the lake. (MMWD 7, Plate 22.) The multiple depth outlet arrangement at Kent Lake allows the District to release water meeting the water temperature requirements of downstream fish throughout the year. In contrast, Nicasio Reservoir is only 100 feet deep. (MMWD 7, Plate 16.) During summer months, the District conducts aeration activities in Nicasio Reservoir to combat algal blooms and low oxygen levels. As a result, water temperatures in the vicinity of the water intake structure at Nicasio Reservoir are relatively uniform without regard to water depth. (MMWD 7, p. 74.)

The data submitted by the District show that the differences in water temperature at Nicasio Reservoir and Kent Lake are reflected in water temperatures in Lagunitas Creek. When water from Nicasio Reservoir is released into Lagunitas Creek, water temperatures have been higher than when water is released from Kent Lake. In May 1990, for example, the water temperature in Lagunitas Creek at Shafter Bridge was 60.8 degrees Fahrenheit when water was released from Nicasio Reservoir and 55.4 degrees Fahrenheit when water was released from Kent Lake. (MMWD 7, Table 12.)

Turbidity: Data submitted by the District show that turbidity levels in Kent Lake are considerably lower than in Nicasio Reservoir. Turbidity values range from one to four Nephelometric Turbidity Units (NTU) in Kent Lake and from 10 to 100 NTU in

Nicasio Reservoir.[8] During March of 1986, turbidity in Kent Lake increased to 4 NTU while turbidity at Nicasio Reservoir ranged from 100 to 200 NTU. (MMWD 7, Plates 16-20.)

Dissolved Oxygen: The water in Nicasio Reservoir generally has lower dissolved oxygen than the water in Kent Lake. Due to the method used to release water from Nicasio Reservoir into Lagunitas Creek at the base of Peters Dam, the water released into the creek has relatively high dissolved oxygen levels. (MMWD 7, p. 94.) No evidence was presented that low dissolved oxygen levels are a problem for fish in Lagunitas Creek.

6.7.3 *Effects of Water Quality Upon Fish*

Effects of Temperature on Fish: Water temperatures outside the tolerance range of different species of fish can have a variety of adverse impacts which vary with the lifestages of different species. (MMWD 2, pp. 6-13 to 6-14.) Based on a review of scientific literature, the Kelley/Entrix report states that the preferred temperatures for coho salmon rearing range from 53 to 58 degrees Fahrenheit. (MMWD 2, p. 3-19.) In coastal streams, growth slows and then stops as water temperatures reach and then exceed about 68.5 degrees Fahrenheit. Coho juveniles cannot survive water temperatures exceeding 71.6 degrees Fahrenheit for extended periods. Steelhead can tolerate a wider range of temperatures than coho, with their preferred temperature range being between 45 and 58 degrees Fahrenheit. (MMWD 2, pp. 3-7 and 3-19; MMWD 5, p. 78.)

Preferred temperatures for salmonid incubation range from 46 to 56 degrees Fahrenheit. (MMWD 5, p. 78.) The District recommends a maximum mean daily water temperature requirement of 56 degrees

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[8] *Nephelometric Turbidity Units (NTU) are a measure of refracted light (i.e., light reflected at a right angle) in a sample. NTUs are the present standard for measurement of turbidity.*

Fahrenheit for the benefit of migration, spawning and incubation during the period November 1 through April 15. (MMWD 2, p. 6-14.) As shown on Figure 4, the incubation period for steelhead extends through the end of April.

California freshwater shrimp are more tolerant of variations in temperature. In one study of several streams, shrimp were collected in pools with temperatures that ranged from 42 to 63 degrees Fahrenheit. From May 1989 to December 1991, water temperatures in Lagunitas Creek fluctuated between 40 and 61 degrees Fahrenheit. (MMWD 7, Table 12.) DFG presented testimony regarding shrimp in an aquarium that appeared to tolerate temperatures up to approximately 78 degrees Fahrenheit. (T IV 188:25-189:7.)

Effects of Turbidity on Fish: Increases in turbidity can affect stream ecosystems in several ways, including reduced primary productivity due to reduced light penetration and interference with sight-feeding by fish due to the reduced visibility. (MMWD 2, pp. F-10 to F-15.) The District presented expert testimony indicating that reductions in primary productivity in Lagunitas Creek would not be expected to interfere with the food sources of salmonids. (T II 34:18-35:18.) The reduction in visibility, however, could be more significant since salmonids must see their prey in order to feed. Turbidities as low as 25 NTU have been reported to reduce fish growth. Salmonids are also more likely to remain at higher densities in clear water than in more turbid areas. (MMWD 2, p. F-15.) Younger fish are particularly sensitive to high turbidity. (DPR 7, p. 142.)

In Lagunitas Creek, the most important areas for juvenile rearing are the Shafter and Park reaches which are within the area of influence of turbid water. (T VIII 114:20-115:24.) If Nicasio Reservoir water were to continue to be used to meet flow requirements in Lagunitas Creek, the timing of releases of

Nicasio Reservoir water could include the spring and early summer rearing period. (MMWD 2, P. F-2.) There was testimony that fish shift their feeding strategies when exposed to turbid streams. (T II 36:18-36:21.) The fact remains, however, that reduced visibility due to turbidity reduces feeding efficiency.

The Kelley/Entrix report states that turbid water from Nicasio Reservoir causes very little loss of freshwater shrimp habitat due to sediment deposition and may assist in hiding shrimp from sight-feeding predators. (MMWD 2, p. F-18.) The District recommends adoption of specified turbidity standards for Lagunitas Creek. (MMWD 2, p. 2-21.)

DFG stated there is no information to indicate whether turbidity will affect the shrimp. (DFG 9, p. 7.) DFG recommended prohibiting release of Nicasio Reservoir water into Lagunitas Creek when the turbidity is greater than 25 NTU, unless the background water is of lower quality than the Nicasio Reservoir water, or unless there is no Kent Reservoir water of higher quality available. (DFG 9, p. 7.) During the hearing, DFG biologist William Cox stated that the District's proposed turbidity standard would be satisfactory. (T IV 188:14-188:16.)

Imprinting: Imprinting is the process that influences salmonids to return to their natal stream at the time of spawning. Young fish which are artificially hatched, and then planted in a stream, return to the stream in which they were planted and not to the stream in which they were hatched or to which their parents returned. The rate of straying among steelhead is less than among coho salmon. (SWRCB 9, pp. 91 and 197.)

Kenneth Fox of the Save Tomales Bay Committee raised the issue of undesirable imprinting that may occur if Nicasio Reservoir water is released to meet instream flow requirements in Lagunitas Creek. Mr. Fox stated that if juvenile salmonids imprint on

water that is "entirely Nicasio in origin during the late spring, albeit released at Kent, then it is likely that at least some returning salmon will try to migrate up Nicasio Creek during years when Nicasio Reservoir is spilling or when water is being released from Nicasio Dam." (STBC 1, p. 4.) Although Mr. Fox did not testify as an expert witness in fisheries biology, the subject of imprinting is a legitimate concern.

There was differing testimony regarding the specific stage or time period that imprinting occurs. Biologist Alice Rich testified that it happens "some time between the fry emergence out of the gravel and ... their migration out of the stream ... some time between the end of February and the beginning of June." (T IX 37:17-37:24.) Biologist Wayne Lifton was more specific, testifying that imprinting occurs during the smolt emigration period. (T IX 120:12-120:21.)

Data submitted by the District indicate that releases into Lagunitas Creek under its proposed method of operations could include water from Kent Lake, Nicasio Reservoir, or a combination of both. The sources of water for instream flows could vary on a monthly, seasonal, and yearly basis. Under the District's projected operations, Nicasio Reservoir water could be released into Lagunitas Creek throughout the year, except during October, and the frequency and duration of the release would be highly variable between years. Consequently, the composition of the water at the time when imprinting occurs could be significantly different than at the time when the fish return to spawn.

If water from Nicasio Reservoir were released into Lagunitas Creek below Peters Dam in the spring and juvenile salmonids were to imprint upon that water, then adult salmonids could be attracted up Nicasio Creek at the time they return to spawn. There is only about one mile of spawning habitat remaining in Nicasio Creek below Nicasio Dam. (SWRCB 7, p. 7.) Under current

conditions, it is unlikely that salmonids attracted into Nicasio Creek would successfully spawn and reproduce. In the case of coho salmon, the adverse effects of one unsuccessful year could carry over for many years.

6.7.4 ***Effects of Water Quality Upon Recreation and Aesthetics***

Approximately three and one half miles of Lagunitas Creek flows through Samuel P. Taylor State Park. The park has an average of 150,000 visitors per year who engage in various recreational activities. The State Department of Parks and Recreation (DPR) reports that Lagunitas Creek provides the focal point for public use and enjoyment of the state park. (DPR Q, pp. 1-3.)

Recreation and aesthetics in the State Park can be adversely affected by higher turbidity in Lagunitas Creek resulting from release of water from Nicasio Reservoir at the base of Peters Dam. (DPR 13.) Park rangers receive frequent negative comments regarding the discoloration of Lagunitas Creek caused by turbidity of water from Nicasio Reservoir. (DPR 8.) DPR contends that the higher turbidity and discoloration of Lagunitas Creek caused by water from Nicasio Reservoir is in violation of provisions in the Regional Water Quality Control Board's Basin Plan for color, suspended material, and turbidity, and also in violation of the SWRCB's Non-degradation Policy. (DPR A, pp. 4 and 5; DPR Closing Brief.) (See Section 6.7.5 below.)

Lagunitas Creek is within the administrative boundaries of the Golden Gate National Recreation Area. The recreation area was established to preserve for public use certain areas having outstanding natural, historic, scenic and recreational values. (Sec. 1, 86 Stat. 1299.) The National Park Service recommends adoption of the flow regime proposed by DFG in order to protect the ecological health of the Lagunitas Creek system and associated wildlife. (NPS 1, p. 1 and 2.)

6.7.5 *Compliance With Water Quality Objectives*

The beneficial uses of Lagunitas Creek identified in the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) include fish spawning, fish migration, cold freshwater habitat, and recreation. The water quality objectives for turbidity and temperature of surface waters as specified in Chapter 3 of the Basin Plan state, in part, as follows:

> **Turbidity**: Water shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.
>
> **Temperature**: The natural receiving water of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the RWQCB that such alteration in temperature does not adversely affect beneficial uses.

The RWQCB's policy statement states that the basin plan objectives for Lagunitas Creek are not met when water from Nicasio Reservoir is released into Lagunitas Creek. RWQCB staff appeared at the hearing to explain their concerns. The RWQCB proposes to work with the District, Marin County, and the SWRCB to establish, implement and oversee a comprehensive watershed management plan to improve the quality of water in the Nicasio Creek watershed. (T IV 121:17-125:6.)

In addition to provisions of the Basin Plan, releases of water from Nicasio Reservoir into Lagunitas Creek below Peters Dam are subject to the SWRCB's Policy with Respect to Maintaining High Quality Waters in California under which existing instream water uses and the level of water quality necessary to protect those uses must be maintained and protected. (See SWRCB Order No. 86-17 at pp. 17-18, citing SWRCB Resolution No. 68-16 and 40 C.F.R. Section 131.12.)

6.7.6 *Impact of Water Quality Upon District Operations*

Differences in water quality from the different reservoirs have had no adverse impacts on operation of the District's water treatment plants. (MMWD 7, p. 73.) The combination of naturally high water quality in the Lagunitas Creek basin and the District's facilities "have enabled the District to deliver a reliable supply of easily treatable water from the District's lakes to the treatment plants virtually all the time." (MMWD 7, p. 72.) Information from the District's Water Operations Report indicates that, under the present configuration of the District's piping system, prohibiting the release of water from Nicasio Reservoir into Lagunitas Creek below Peters Dam would limit the District's ability to transfer water from Nicasio Reservoir to its treatment plants and to other lakes in the summer. (MMWD 7, p. 75.)

Although the District has evaluated the possibility of constructing additional pipelines to assure the availability of Nicasio Reservoir water to District treatment plants at all times, it had not identified a "satisfactory" solution at the time of the hearing. (MMWD 7, p. 76.) There was insufficient evidence presented to determine why a different piping configuration was not considered feasible, nor was any evidence submitted regarding the construction costs of the alternatives that were investigated.

6.7.7 *Conclusions Regarding Water Quality Considerations*

Kent Lake and Nicasio Reservoir both provide high quality water which can be easily treated for municipal use. In the past, the District has pumped water from Nicasio Reservoir to Kent Lake or to a point below Peters Dam where it is released to meet instream flow requirements in Lagunitas Creek. The temperature and turbidity of water from Nicasio Reservoir generally exceed the temperature and turbidity of water from Kent Lake. As discussed

in Section 6.7.3, the higher water temperatures and turbidity can have adverse impacts upon salmonids in Lagunitas Creek.

In addition to problems caused by higher turbidity and higher water temperatures, importing Nicasio Reservoir water for release at the base of Peters Dam creates potential problems due to imprinting of the water on young salmonids in Lagunitas Creek. This imprinting can adversely affect the later upstream migration of adult salmonids which may be attracted to unsatisfactory spawning habitat in Nicasio Creek.

The release of higher turbidity water from Nicasio Reservoir into Lagunitas Creek also adversely affects the visual appearance and aesthetics of Lagunitas Creek, particularly within the state and federal park areas.

Discharge of lower quality water into a receiving water of higher quality is subject to regulation under the waste discharge requirement process. (Water Code Sections 13260 and 13263.) The discharge would also be subject to applicable non-degradation policies. (SWRCB Resolution No. 68-16; 40 CFR 130.12.) Under the circumstances existing in this case, the pumping of water from Nicasio Reservoir for release into Lagunitas Creek at the base of Peters Dam is in violation of the Basin Plan and of the SWRCB's Non-degradation Policy.

In addition to complying with water quality permitting requirements, however, the District's diversion and use of water are subject to the overriding provisions of Article X, Section 2 of the California Constitution prohibiting any unreasonable use, method of use, or method of diversion. In view of the combination of problems described above, the SWRCB concludes that pumping water from Nicasio Creek upstream for release into Lagunitas Creek constitutes an unreasonable use and diversion of water in violation of Article X, Section 2. Consequently, this

order directs the District to cease release of water from Nicasio Reservoir into Lagunitas Creek or its tributaries between the base of Peters Dam and the confluence of Lagunitas Creek and Nicasio Creek.[9]

In order to maintain suitable habitat for salmonids, the mean daily water temperature in Lagunitas Creek, as measured at the Park gage, should be kept at or below 58 degrees Fahrenheit between May 1 and October 31. A temperature of 58 degrees is at the upper limit of the preferred temperature range for rearing of coho and steelhead. In order to maintain suitable habitat for salmonid incubation, the mean daily water temperature between November 1 and April 30 should be kept at or below 56 degrees Fahrenheit as measured at the Park gage. Evidence presented by the District indicates that an adequate supply of cool water should be available at all times in Kent Lake. The multiple level outlet structure present at Peters Dam will allow the District to release water from different levels at different times of the year in order to meet the specified temperature standards. If, for any reason, the District is unable to meet the applicable temperature requirements, the permit conditions at the end of this order establish a procedure for advising relevant agencies and requesting temporary relief from the temperature requirements specified in this order.

6.8 Effects of Giacomini Dam upon Fishery Resources

Sections 5.0 through 5.4 above address the diversion and use of water from the Giacomini dam and the operation of the dam in

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[9] *Pumping water from Nicasio Reservoir into Kent Lake is not prohibited by this order even though a portion of the Nicasio Reservoir water would eventually be released into Lagunitas Creek below Kent Lake. The effects of higher temperature and turbidity of Nicasio Reservoir water would be diluted by the greater volume of water in Kent Lake. Problems related to young salmonids imprinting on water from a different source would be expected to decrease due to less variability in the composition of water released into Lagunitas Creek below Kent Dam.*

recent years. The effects of the Giacomini dam upon fishery resources are addressed in Sections 6.8.1 through 6.8.3 below.

6.8.1 *Effects of Giacomini Dam Upon Salmonids*

Several parties at the hearing addressed the potential impact of the Giacomini dam on delaying outmigration of juvenile coho salmon and steelhead in late spring. Concerns were also expressed that the dam creates a barrier in an estuarine environment, affects water quality in the estuary, and results in significant differentials in temperature, salinity and food availability for salmonids upstream and downstream of the dam.

The USFWS has objected to the installation of the Giacomini dam since 1975. (USFWS 5, pp. 1-3.) Based on studies conducted by Kelley and DFG, the USFWS concluded that the Giacomini dam creates an impediment to migrating salmon and steelhead. USFWS concluded that smolts were still present in the creek when the dam was installed on May 15, and sometimes as late as June 24 to July 1. (T VI 20:19-20:23; T VI 53:6-53:10; T VI 58:1-60:3; USFWS 6, p. 2; USFWS 3, p. 2.)

USFWS presented testimony that "[a]nadromous fish migrate most successfully when they can freely move along a salinity gradient while physiologically acclimating to the gradual change. The abrupt salinity change between water up and downstream of the dam may stress outmigrants. In addition, the impoundment tends to delay fish movement. When outmigration is delayed, increased predation by other fish can occur resulting in substantial losses." (T VI 21:2-21:14.) The USFWS also presented testimony that where there have been summer dams in other river systems, construction has not been allowed until later in the year, ranging from between June 1 to July 1. (T VI 54:22-55:5.) In view of the cumulative losses of anadromous salmonid resources in California, the USFWS believes that the adverse impact of the

Giacomini dam takes on added significance. (T VI 21:2-22:6 and USFWS 6, p. 2.)

In summary, the USFWS opposes summer dams when there are practical alternatives available, but considers installation of the Giacomini dam during July to be less objectionable than in earlier months. (T VI 104:24-105:10.) Following one day of sampling behind the Giacomini dam in 1987, a DFG biologist wrote a memorandum concluding that the dam was not obstructing the downstream migration of young steelhead. (T VI 12:6-14:3.) The biologist also testified, however, that his first preference would be that no dam be installed, and his second preference was that installation of the dam be delayed as long as possible to allow for completion of downstream fish migration before the dam went in. (T VIII 103:10-103:16.)

Kelley testified that although there were no scientific data to support a specific flow for emigration of smolts passing the Giacomini dam, it was desirable to get the smolts out as soon as possible in order to reduce the risk to their survival posed by warming water temperatures in the estuary. Kelley also testified that he "would like to see whatever flow is released for fish in the upper stream ... pass over the dam and into the estuary until such time as there are insignificant numbers of smolts moving downstream and that in most years is about the end of June." (T VII 174:6-175:2.) Data collected by Kelley indicated that, during sampling in 1983 and 1984, peak numbers of coho salmon smolts were captured during the first half of June in both years. Steelhead trout smolts were most abundant in early June of 1983 and the latter part of June in 1984. Increasing numbers of steelhead trout fry were collected from May through July 1, 1984. (T VI 20:11-20:18; USFWS 10, pp. 175-176; T VI 54:22-55:16.)

Water temperature data collected by Kelley in June and July 1984 indicate that there could be a 10 degree Fahrenheit difference

between the water temperatures upstream and downstream of the Giacomini dam. By mid-June of 1983 and late June of 1984, water temperatures in the estuary reached 75 degrees Fahrenheit, a temperature harmful to juvenile salmonids. (MMWD 5, pp. 165-169.)

Although it is not uncommon for coastal streams to be blocked by a naturally occurring sand or gravel bar at some times of the year, there are significant differences between the blockage created by the Giacomini dam on Lagunitas Creek and the type of blockages which occur on other California streams under natural conditions. Under natural conditions, the location of the natural blockage would be near the mouth of the estuary. (T VI 43:2-43:12 and 98:18-98:24.) Natural blockages of coastal streams would also be expected to be largely dependent upon the flow present in the stream at a particular time.

6.8.2 *Effects of Giacomini Dam Upon Other Species of Fish*

Neomysid Shrimp: Neomysid shrimp provide an important food source for salmonids in Lagunitas Creek. (T VII 196:16-196:17; 193:12-193:19.) Neomysid population densities were sampled in lower Lagunitas Creek in 1983 and 1984. Analysis of stomach content samples of coho salmon and steelhead smolts taken between May 19 and June 24, 1983, both above and below the Giacomini dam, showed that Neomysid shrimp were the predominant organism consumed by the fish. The Giacomini dam reduces the size of the estuarine environment which decreases available habitat for the shrimp. (T VI 21:11-21.) The USFWS presented testimony that the dam reduced potential estuarine habitat for Neomysids for a distance of about one-half to one mile upstream of the dam. (T VI 61:10-61-22.)

Freshwater Shrimp: As discussed in Section 6.2, Lagunitas Creek also provides important habitat for the freshwater shrimp *Syncaris pacifica*. The Giacomini dam is not likely to affect the

freshwater shrimp, however, because the shrimp are found only in reaches upstream of tidal influence. The most downstream location in which the freshwater shrimp have been found is approximately one mile upstream of Point Reyes Station. (USFWS 15, p. 1.)

Sturgeon: Anadromous white sturgeon have been observed in lower Lagunitas Creek below the Giacomini dam during the summer months. (T VII 26:5; T VIII 98:20-98:23.) The USFWS presented evidence that sturgeon in Lagunitas Creek are unable to ascend the fish ladder in the Giacomini dam. (USFWS 3, p. 2; T VI 20:21-20:23.) However, the extent of available sturgeon habitat upstream of the dam is not known. (T VI 81:8-81:25; T VIII 89:1-90:1.)

Tidewater Goby: The tidewater goby is native to coastal streams and lagoons on the Pacific Coast of California from San Diego County to Del Norte County. Although once widespread, tidewater goby populations have declined significantly in recent years. The USFWS attributes the decline of the tidewater goby to heavy human impact on the narrow zone of coastal stream habitat used by the species. The absence of a marine larval stage in the tidewater goby life cycle means that, once it is eliminated from a particular stream or lagoon, it probably will not be able to recolonize that stream or lagoon from another location. (USFWS 15, p. 2.)

USFWS presented testimony that tidewater gobies have been collected in the Lagunitas Creek estuary in the past. (T VI 27:23-27:24.) Sampling by a DFG biologist and a consultant for North Marin in 1987, however, found no tidewater gobies in lower Lagunitas Creek. (T VI 15:8-15:14.) The burrowing habits of the tidewater goby make it difficult to sample the species, and the sampling technique used in the 1987 attempt may have missed some fish if any were present. (T VI 33:20-34:15.)

It is likely that the extensive development in the Lagunitas Creek area has hurt the tidewater goby population. The Giacomini dam near the mouth of Lagunitas Creek would block movement of fish between upper Tomales Bay and the freshwater habitat in Lagunitas Creek and would eliminate the gradual transition zone between salt water and freshwater that characterizes estuaries and lagoons. Under natural conditions, the salinity transition zone would migrate seasonally as the hydraulic head of the stream changes. If a dam is installed early in the year, any tidewater gobies that are downstream of the dam at that time would be trapped in a zone of rising salinity. The USFWS is not certain whether tidewater gobies would be able to survive or reproduce in the area of rising salinity below the dam, but the impact of the dam on tidewater gobies would be "disastrous" if the salinity concentration approaches that of seawater. (USFWS 15.)

In October 1990, the USFWS received a petition to list the tidewater goby as endangered under the federal Endangered Species Act. (T VI, 27:10-17:19.) The SWRCB takes official notice of the fact that the tidewater goby was listed as a federal endangered species on February 4, 1994. (59 Fed. Reg. 24, 5494-5498.) If Lagunitas Creek is included within the designated critical habitat for the tidewater goby, additional restrictions upon the installation and operation of the Giacomini dam may be necessary. The evidence before the SWRCB in the present proceeding, however, is insufficient to establish the presence of tidewater gobies in Lagunitas Creek currently.

6.8.3 *Summary of Conclusions Regarding Giacomini Dam and Protection of Fishery Resources*

The evidence establishes that installation of the Giacomini dam before July 1 each year can delay the outmigration of active juvenile salmonids and may result in increased predation. In addition, the Giacomini dam creates water quality conditions which are detrimental to juvenile salmonids due to the

temperature differential between the water above the dam and the water downstream of the dam. This temperature differential increases the stress upon juvenile salmonids at the time they are moving from a freshwater to a brackish or salt water environment. Installation of the Giacomini dam at the present location also interrupts the natural freshwater and salt water exchange in the Lagunitas Creek estuary with resultant adverse effects on a variety of species that inhabit lower Lagunitas Creek. Among the adverse effects is the reduction of habitat for Neomysid shrimp, an important source of food for migrating salmonids.

Continued installation of the Giacomini dam at the present location will have adverse effects on salmonids and estuarine fish. The evidence in the record shows that those adverse effects can be significantly reduced by decreasing the time which the dam is in place. Adverse effects on the estuary can be further reduced by relocating the dam upstream, away from the mouth of the estuary.

Despite the adverse effects of the Giacomini dam on the estuary, the SWRCB recognizes that, at present, effective irrigation of the Giacomini property is dependent on the presence of the dam from approximately June 15 through October 31. If Giacomini or North Marin conclude that a seasonal diversion dam will be necessary to meet their future water diversion needs, any such dam should be installed as late as possible and in no event should the dam be installed prior to June 15. Any seasonal diversion dam should be removed by November 1 if high flows have not washed it out earlier. In addition, any dam which is installed should be located upstream of the Highway 1 Bridge. Alternative points of diversion and water diversion facilities were identified and evaluated in a 1987 study. (NMWD 1, "The Summer Dam".)

If Giacomini and North Marin decide that installation of a seasonal diversion dam upstream of the Highway 1 Bridge is appropriate, they can determine the specific location of the dam based on economic and environmental factors and the water diversion needs of the affected parties. In view of the long history of diversion at the site of the present Giacomini dam and the time needed to evaluate alternative locations and establish alternative water diversion procedures, the SWRCB concludes that Giacomini should be allowed to continue diverting water at the existing dam location for the period of June 15 through October 31 during 1996 and 1997. The SWRCB further concludes, however, that continued installation of the dam at the present location after the 1997 irrigation season would be an unreasonable method of diversion in violation of Article X, Section 2 of the California Constitution.

6.9 Summary of Measures to Protect Fishery and Other Public Trust Resources

The evidence discussed in the preceding sections establishes the need for a comprehensive package of measures to protect fishery and other public trust resources in the Lagunitas Creek basin. The minimum instream flow requirements specified in Section 6.3.6 will help provide suitable habitat for all life stages of coho salmon, steelhead, and the California freshwater shrimp. Establishing the maximum water temperature requirements specified in this order will provide water of suitable temperatures to promote growth in young coho salmon and steelhead.

Prohibiting the pumping and discharge of water from Nicasio Reservoir directly into Lagunitas Creek will help in meeting the water temperature requirement, reduce water turbidity, and avoid problems resulting from young salmonids in Lagunitas Creek imprinting upon water from Nicasio Reservoir. In addition, preserving the water quality of Lagunitas Creek through prohibiting the discharge of more turbid water from Nicasio

Reservoir will serve to protect the visual appeal and recreational uses of Lagunitas Creek as it flows through the Samuel P. Taylor State Park.

In accordance with evidence presented by the Marin Municipal Water District and others, this order requires the District to undertake an expanded sediment control program to help mitigate the adverse effects which extensive development has had on sediment accumulation in Lagunitas Creek. Similarly, this order directs the District to develop a riparian management plan which would help improve fishery habitat through increasing the amount of woody debris in key areas of Lagunitas Creek.

Finally, this order concludes that installation of the summer dam at its present location is unreasonable and should be discontinued following the 1997 irrigation season. During the 1996 and 1997 irrigation seasons, the dam should be installed as late in the year as possible and no sooner than June 15. The regulation of the Giacomini diversion dam in accordance with the provisions of this order should protect outmigration of coho salmon and steelhead, and should help to restore the estuarine environment of Lagunitas Creek to a more natural condition providing additional habitat for Neomysid shrimp and anadromous white sturgeon.

7.0 EFFECT OF REVISED INSTREAM FLOW STANDARDS AND WATER TEMPERATURE REQUIREMENT ON WATER DIVERSIONS BY MARIN MUNICIPAL WATER DISTRICT

Water Supply Impacts: Table 3 below shows the quantity of water needed to comply with the minimum flow requirements established in this order, the quantity needed to comply with the existing interim flow requirements, and the quantities needed to comply with the recommendations of the District and DFG.

TABLE 3

COMPARISON OF QUANTITIES OF WATER NEEDED TO COMPLY WITH DIFFERENT MINIMUM FLOW REQUIREMENTS

Source of Requirement	*Quantity of Water (AFA)*	
	Wet/Normal Year	*Dry Year*
SWRCB(Present Order)	11,050	9,000
Existing Requirement	9,400	7,000
District Recommendation	8,300	4,700
DFG Recommendation	18,300	*

* *Variable depending upon reservoir storage, runoff and other factors.*

The minimum flow requirements and recommendations above would be measured at the Park gage approximately two miles downstream of Kent Lake. The effect of the different minimum flow alternatives upon water available for consumptive use by the District would vary depending upon the hydrology of each year and District operations. A portion of the water needed to meet any of the above flow requirements or recommendations would be contributed by inflow from San Geronimo Creek.

Although the District developed a hydrology model to evaluate the effects of the District's flow recommendations, that model was not submitted into evidence in the current proceeding. Comprehensive analysis of the differing impacts of the alternative minimum flow alternatives upon the District's water supplies over a period of years would require use of an operations model capable of modeling all assumed conditions. From the numbers in Table 3 above, however, one can see that the flows established in this order would require 1,650 AF more water than the existing requirements in normal years, and 2,000 AF more water than the existing requirements in dry years. On the other hand, the flows established in this order would require substantially less water than would be needed to meet DFG's flow recommendations. It should be recognized that a portion of the

water needed to meet instream flow requirements comes from unregulated flows over which the District has no control.

Based on the evidence discussed previously, the SWRCB believes that the flows established in this order, in combination with the other required measures, will be sufficient to keep fish in good condition and to protect public trust resources in Lagunitas Creek. In view of the competing demands for the limited quantity of water available in the Lagunitas Creek basin, the SWRCB does not believe that the greater quantities of water needed to meet the DFG recommendations can be justified.

In addition to minimum flow requirements, this order also establishes maximum water temperature requirements to be met at the Park gage. The evidence indicates that the water in Kent Lake should be sufficiently cool to meet the temperature requirements without making excess releases. If the District encounters problems in meeting the temperature requirements established in this order, however, the requirements can be reevaluated by the SWRCB in the exercise of its continuing authority.

As discussed in Sections 3.2 through 3.4, the District has already instituted significant water conservation and reclamation projects, as well as taken steps to obtain water from other sources. Previous unsuccessful bond issues to develop alternative sources of water supply confirm the District's awareness of the need to obtain additional water supplies to augment its Lagunitas Creek system. Although the District's water demand may be somewhat less than assumed for purposes of its operational modeling studies, the quantity of water needed for instream flows under this order is greater than was assumed in the District's study. The District will need to pursue options to augment its water supply.

Economic Costs: Testimony presented by the District indicates that alternative sources of water can be obtained at a cost ranging from $350 per AF for surface water supplies up to $1,800 per AF for reclaimed water or water obtained through desalination. (T II 221:9-223:7.) Depending upon hydrologic and reservoir storage conditions, a 2,000 AF increase in the dry year instream flow requirements could reduce the amount of water available for consumptive use in dry years by up to 2,000 AF. At estimated costs for replacement water ranging from $350 to $1,800 per AF, 2,000 AF of water could be acquired for approximately $700,000 to $3,600,000 depending upon the source and actual cost of the replacement supply. That cost could be distributed among the approximately 57,000 parties with service connections to District facilities. This order increases the quantity of water needed to comply with the instream flow requirement for normal years by about 1,650 AF above the existing requirement. The cost of complying with the increase in minimum instream flows in normal years is expected to be less than in dry years.

8.0 EFFECT OF WATER DIVERSIONS ON TOMALES BAY

Water development in the Lagunitas Creek watershed has reduced annual inflow into Tomales Bay by over 30,000 AFA out of a total average unimpaired run-off of approximately 94,000 AFA. Richard Plant of Save Tomales Bay Association expressed concern about the need to provide adequate quantities of fresh water inflow to support the Tomales Bay ecosystem. Mr. Plant also identified several areas in which he thought that evidence submitted by other parties was erroneous or insufficient. (T VII 20:2-42:7.)

The District presented a limited study of the effects of Kent Lake enlargement on inflow and estuarine circulation in Tomales Bay. (MMWD 2, Appendix I.) There is very little evidence in the record, however, regarding the overall effects of water development in the basin upon Tomales Bay. In the absence of evidence justifying amendment of water rights or other

restrictions to protect resources in Tomales Bay, this order does not direct any specific action to protect the bay. The SWRCB's standard continuing authority term is included in all permits and licenses which are subject to this order. Standard permit and license Term 12 advises all parties that the water rights involved are subject to the SWRCB's continuing authority to impose specific requirements as needed to protect or restore public trust uses and to prevent waste or unreasonable use of water. If there is evidence at some future time to justify amendment of water right permits or licenses to protect Tomales Bay, then the SWRCB can take appropriate action at that time.

9.0 SUMMARY

The issue of flows for fishery protection in Lagunitas Creek was previously addressed in SWRCB Decision 1582 adopted in 1982. Marin Municipal Water District filed suit challenging the flow requirements specified in that order. In accordance with a stipulated judgment from the Superior Court for Marin County dated January 31, 1985, the SWRCB undertook a review of the conditions governing water diversions from Lagunitas Creek by Marin Municipal Water District. After allowing time for fishery studies and negotiations between the District and DFG, the SWRCB held a water right hearing in 1992. The hearing addressed issues related to fishery protection and the diversion and use of water by Marin Municipal Water District, North Marin Water District and Waldo Giacomini. The findings and provisions of this order are based on the evidence in the record and the SWRCB's authority and responsibility under Article X, Section 2 of the California Constitution, relevant statutes, and the public trust doctrine.[10]

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[10] *The provisions of the present order are exempt from the California Environmental Quality Act (Public Resources Code Section 21000 et seq.) in accordance with Sections 15307, 15308, and 15321 of Title 23, California Code of Regulations. Marin Municipal Water District's enlargement of Kent Dam was previously the subject of a certified environmental impact report. (MMWD 8.)*

Lagunitas Creek provides habitat for coho salmon, steelhead, the California freshwater shrimp, Neomysid shrimp and a variety of other aquatic life. Much fishery habitat in the Lagunitas Creek watershed has been lost due to construction of dams and other development. In order to protect and improve the remaining habitat, this order requires a package of measures including minimum instream flow requirements, maximum water temperature requirements, measures to protect water quality, a sedimentation control plan, a riparian vegetation management plan and removal of a seasonal water diversion dam.

The new instream flow requirements and water temperature requirements established in this order are added as conditions to water right permits held by Marin Municipal Water District. The required minimum flows can be met from release of water from Kent Lake or from natural inflow to Lagunitas Creek and its tributaries above the USGS gage located in the Samuel P. Taylor State Park. The minimum flow requirements established in this order represent an equitable allocation of water which will maintain fish in good condition while allowing continued diversion of substantial quantities of water for municipal use and irrigation.

Due to the relatively high temperature and turbidity of water from Nicasio Reservoir, and problems caused by young salmon "imprinting" on water from a foreign source, this order prohibits the District from pumping and releasing water from Nicasio Reservoir directly into Lagunitas Creek below Peters Dam. In order to improve and protect remaining fishery habitat in Lagunitas Creek, this order also requires the District to prepare a sediment control plan and a riparian management plan.

North Marin Water District diverts water from Lagunitas Creek under a combination of pre-1914 appropriative rights and Permits 19724 and 19725. North Marin's pre-1914 appropriative rights

have not been adjudicated. Evidence in the record indicates that North Marin holds a pre-1914 right to divert between 0.05 cfs and 0.10 cfs, an amount which is substantially less than its more recent rate of diversion. Due to the low natural flow of Lagunitas Creek and the existence of senior water rights, there ordinarily is no water available for diversion by North Marin under Permits 19724 and 19725 during July through October of dry years. Due to public health and public interest considerations in ensuring a reliable water supply to meet municipal water needs, this order requires North Marin to submit evidence within one year that it has obtained an alternative supply of water for the months of July through October of dry years.

Fish and aquatic organisms in the lower reach of Lagunitas Creek can be adversely affected by the presence of a seasonal water diversion dam on Lagunitas Creek as it flows through the property of Waldo Giacomini. The SWRCB concludes that the continued installation and presence of the seasonal diversion dam after the 1997 irrigation season would constitute an unreasonable method of diversion in violation of Article X, Section 2 of the California Constitution and Water Code Section 100. In order to reduce adverse impacts on migrating salmonids, this order restricts the season during which the dam may be in place during the 1996 and 1997 irrigation seasons. Any diversion of water from Lagunitas Creek under License 4324 after that time must be at an alternative upstream location. Approval of a change petition will also be required in order for Giacomini to use water diverted under License 4324 on 175 acres of pasture not presently included in the authorized place of use.

Based on the preceding findings, the SWRCB concludes that the water rights and water diversion practices of Marin Municipal Water District, North Marin Water District, and Waldo Giacomini should be revised in accordance with the provisions of the order

below. The order deletes specified permit and license terms which are inconsistent with the newly established requirements.

ORDER

Based on the evidence in the record and the findings set forth in this order, the diversion of water from Lagunitas Creek by Marin Municipal Water District, North Marin Water District, and Waldo Giacomini shall be subject to the provisions below:

MARIN MUNICIPAL WATER DISTRICT

IT IS HEREBY ORDERED that Water Right Permits 5633, 9390, and 18546 (Applications 9892, 14278, 26242) are amended to include the following conditions:

1. **Instream Flow Requirement:** Permittee shall make a metered release of at least one cubic foot per second (cfs) directly below Peters Dam at all times and shall bypass or release sufficient water from Kent Lake to maintain the following minimum instream flow requirements, as measured in cfs at the U.S. Geologic Service gage at Taylor State Park.

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LAGUNITAS CREEK
MINIMUM INSTREAM FLOW REQUIREMENTS

Normal Year Requirements			
Time Period			*Flow (cfs)*
November 1/15*	-	December 31	20
January 1	-	March 15	25
March 16	-	March 31	20
April 1	-	April 30	16
May 1	-	June 15	12
June 16	-	November 1/15*	8

Dry Year Requirements			
Time Period			*Flow (cfs)*
November 1/15*	-	March 31	20
April 1	-	April 30	14
May 1	-	June 15	10
June 16	-	November 1/15*	6

** The minimum flow of 20 cfs in November shall begin following the first storm that produces a "trigger" flow of 25 cfs as measured at the USGS gage at Taylor State Park. In the absence of a storm causing a "trigger" flow, the 20 cfs flow requirement shall become effective on November 15 of each year.*

2. **Upstream Migration Flows**: To provide for the upstream migration of anadromous fish, Permittee shall ensure that four upstream migration flows are provided between November 1 and February 3, as described below. An "upstream migration flow" is defined as a continuous flow of at least 35 cfs that exists for 3 days as measured at the USGS gage at Taylor State Park. A "trigger" flow is defined as a flow of 25 cfs between November 1 and December 31, or a flow of 30 cfs between January 1 and January 31, as measured at the USGS gage at Taylor State Park. Permittee shall attempt to provide upstream migration flows that coincide with natural runoff from storm events.

   a. The first upstream migration flow shall be provided in conjunction with the first storm that occurs after

November 1 that produces a trigger flow of 25 cfs at the park gage. The minimum spawning flow of 20 cfs shall then be maintained for the rest of the month. If no storm produces a trigger flow before November 15, Permittee shall release sufficient water from Kent Lake to provide an upstream migration flow beginning on November 15.

b. A second upstream migration flow shall be provided in conjunction with a storm that occurs after November 4 that produces a trigger flow of 25 cfs at the park gage. If a second trigger flow of 25 cfs does not occur before December 1, Permittee shall release sufficient water from Kent Lake to provide an upstream migration flow beginning on December 1.

c. A third upstream migration flow shall be provided in conjunction with a storm that occurs after December 4 that produces a trigger flow of 25 cfs at the park gage. If a trigger flow of 25 cfs does not occur before January 1, Permittee shall release sufficient water from Kent Lake to provide an upstream migration flow beginning on January 1.

d. A fourth upstream migration flow shall be provided in conjunction with a storm that occurs after January 4 that produces a trigger flow of 30 cfs at the park gage. If a trigger flow of 30 cfs does not occur before February 1, Permittee shall release sufficient water from Kent Lake to provide an upstream migration flow beginning on February 1.

3. **Water Year Classification:** The water year classification shall be determined on January 1 and April 1 of each year, based on precipitation as measured at the Kent rain gage.

The January 1 water year classification shall be based on the total precipitation measured during the preceding 15 month period. If the total precipitation during this 15 month period is less than 48 inches, Permittee shall maintain the dry-year flow requirements from January 1 through March 31. If the total precipitation during this 15 month period is 48 inches or greater, Permittee shall maintain the normal year flow requirements from January 1 through March 31. The April 1 water year classification shall be based on the total precipitation during the preceding 6 month period. If the total precipitation during this 6 month period is less than 28 inches, Permittee shall maintain the dry year flow requirements from April 1 to the first upstream migration flow in November. If the total precipitation during this six-month period is 28 inches or greater, Permittee shall maintain the normal year flow standard from April 1 to the first upstream migration flow in November.

4. **Water Temperature**: Permittee shall bypass or release sufficient water from Kent Lake to maintain a mean daily water temperature of 58 degrees Fahrenheit, or less, between May 1 and October 31, as measured at the USGS gage at Taylor State Park. From November 1 through April 30, permittee shall bypass or release sufficient water from Kent Lake to maintain a mean daily water temperature of 56 degrees Fahrenheit, or less, as measured at the USGS gage at Taylor State Park.

5. **Special Circumstances**: In the event Permittee determines that it cannot meet the flow and/or water temperature conditions described above, Permittee shall immediately notify the Department of Fish and Game (DFG), the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS) and the Chief of the Division of Water Rights. The notification shall include specific information

explaining the condition that cannot be met, the reason the condition cannot be met, and the length of time that the condition cannot be met. Permittee shall consult with DFG, USFWS and NMFS in an attempt to develop a plan of operation that is acceptable to DFG, USFWS, NMFS and the Permittee. If a plan acceptable to Permittee, DFG, USFWS, and NMFS is developed, the plan should be submitted for review by the Chief of the Division of Water Rights. If DFG, USFWS, NMFS and Permittee cannot reach agreement within a reasonable period of time, Permittee shall submit a proposed plan of operation for review by the Chief of the Division of Water Rights, to include:

a. The reasons or justification for the modification of the flow or temperature requirements;

b. A specific plan of operation, including the proposed release schedule from Kent Lake;

c. A description of other measures to be taken by the Permittee to deal with any deficiencies in water supply, including whether the Permittee will declare a water supply emergency and impose mandatory water conservation measures; and

d. Measures to be taken by Permittee to mitigate any potential adverse impacts to the fishery resources in Lagunitas Creek due to the Permittee's inability to meet the flow or temperature requirements specified in this permit.

Permittee shall be responsible for complying with requirements of the California Environmental Quality Act.

The Chief of the Division of Water Rights shall review the District's proposed plan of operation, and if acceptable, shall approve the proposed plan.

6. **Ramping**: Permittee shall make every reasonable effort to control releases from Kent Lake in order to minimize rapid changes in flow in Lagunitas Creek, except as necessary to provide the upstream migration flows required under this permit.

7. **Control of Sediment**: Permittee shall prepare a Sediment Management Plan that describes measures that should be taken to reduce sedimentation and to provide an appreciable improvement in the fishery habitat within the Lagunitas Creek watershed. During the development of the plan, Permittee shall coordinate with appropriate public agencies, and provide an opportunity for input by local environmental groups, property owners in the area, and the general public. Within one year from the date of this order, Permittee shall submit a draft Sedimentation Management Plan to the State Water Resources Control Board for review by the Chief of the Division of Water Rights that describes:

   a. Specific sediment management programs and projects.

   b. Agency responsible for each program or project.

   c. Estimated costs for each program or project.

   d. Time schedule for implementation of each program or project.

   e. Public participation process.

   f. Monitoring program.

g. Reporting procedures.

Permittee shall also submit a copy of the draft Sedimentation Management Plan to the Regional Water Quality Control Board (Regional Board), DFG, USFWS and NMFS at the time the draft plan is submitted to the State Water Resources Control Board. The Regional Board, DFG, USFWS, and NMFS shall have the opportunity to review and comment on the draft plan.

Following consideration of any comments provided by the Regional Board, DFG, USFWS, NMFS and the Chief of the Division of Water Rights, Permittee shall prepare and submit a final Sedimentation Management Plan to the State Water Resources Control Board for approval by the Chief of the Division of Water Rights. Permittee shall provide copies of the final Sedimentation Management Plan to the Regional Board, DFG, USFWS, and NMFS at the time it submits the plan to the State Water Resources Control Board. The Regional Board, DFG, USFWS, and NMFS shall have the opportunity to review and comment upon the final plan prior to approval by the Chief of the Division of Water Rights. The Chief of the Division of Water Rights shall notify the SWRCB Board Members if the final Sedimentation Management Plan submitted by Permittee is not acceptable. Following approval of an acceptable Sedimentation Management Plan, Permittee shall provide the appropriate level of funding and resources to ensure effective implementation of the measures described in the plan.

8. **Riparian Management Plan:** Permittee shall prepare a Riparian Management Plan that describes measures to be taken to improve the riparian vegetation and woody debris within the Lagunitas Creek watershed in order to improve habitat for fishery resources. During the development of the plan, Permittee shall coordinate with appropriate public agencies,

and provide an opportunity for input by local environmental groups, property owners in the area, and the general public. Within one year of the date of this order, Permittee shall submit a draft Riparian Management Plan to the State Water Resources Control Board for review by the Chief of the Division of Water Rights that describes:

a. Specific riparian management programs and projects

b. Party responsible for each program or project.

c. Estimated costs for each program or project.

d. Time schedule for implementation of each program or project.

e. Public participation process.

f. Monitoring program.

g. Reporting procedures.

Permittee shall also submit a copy of the draft Riparian Management Plan to DFG, USFWS and NMFS at the time the draft plan is submitted to the State Water Resources Control Board. The DFG, USFWS, and NMFS shall have the opportunity to review and comment on the draft plan.

Following consideration of any comments provided by the DFG, USFWS, NMFS and the Chief of the Division of Water Rights, Permittee shall prepare and submit a final Riparian Management Plan to the State Water Resources Control Board for approval by the Chief of the Division of Water Rights. Permittee shall provide copies of the final Riparian Management Plan to DFG, USFWS, and NMFS at the time it

submits the plan to the State Water Resources Control Board. The DFG, USFWS, and NMFS shall have the opportunity to review and comment upon the final plan prior to approval by the Chief of the Division of Water Rights. The Chief of the Division of Water Rights shall notify the SWRCB Board Members if the final Riparian Management Plan submitted by Permittee is not acceptable. Following approval of an acceptable Riparian Management Plan, Permittee shall provide the appropriate level of funding and resources to ensure effective implementation of the measures described in the plan.

9. **Monitoring of Fishery Resources:** Permittee shall be responsible for monitoring the coho salmon, steelhead and freshwater shrimp populations in Lagunitas Creek. Within six months, Permittee shall submit to the State Water Resources Control Board, for the approval of the Chief of Division of Water Rights, a workplan that describes the scope of the monitoring studies to be conducted. During the development of the workplan, Permittee shall consult with the DFG, USFWS and NMFS regarding the scope and duration of the monitoring studies. Following the approval of a plan that is acceptable to the Chief of the Division of Water Rights, the monitoring studies shall be conducted in accordance with the scope of work and time schedule described in the work plan. Permittee shall provide sufficient funding and resources to assure satisfactory completion of the monitoring studies. Annual reports shall be submitted to the Chief of the Division of Water Rights, by December 31 of each year, until the monitoring studies are completed.

10. **Gages:** In order to document compliance with the terms of this permit, Permittee shall ensure that a continuous record is maintained of the daily flow and temperature at the USGS gage at Taylor State Park. That data shall be made available

to the State Water Resources Control Board upon request, in a format acceptable to the Chief of the Division of Water Rights.

11. **Reporting**: Permittee shall submit a report to the State Water Resources Control Board by December 31 of each year that verifies Permittee's compliance with permit conditions for the previous water year ending September 30. The report shall be submitted to the Division of Water Rights in a format designated by the Chief of the Division of Water Rights.

IT IS FURTHER ORDERED that:

1. Conditions 19, 20, 21, 22, 23, 24, 25, 26, and 27 are deleted from amended Permit 5633 issued on May 20, 1982. (Application 9892).

2. Conditions 19, 21, 22, 23, 24, 25, 26, 27, 28 and 29 are deleted from amended Permit 9390 issued on May 20, 1982 (Application 14278).

3. Conditions 21, 23, 24, 25, 26, 27, 28, 29, 30 and 31 are deleted from Permit 18546 (Application 26242).

4. Amended Permit 12800 issued on May 20, 1982 (Application 17317) is amended to include the following condition:

   > Permittee shall not release water from Nicasio Reservoir directly into Lagunitas Creek, or its tributaries, between the base of Peters Dam and the confluence of Nicasio Creek and Lagunitas Creek.

5. Conditions 12, 18, 19, 20, 21, 22, 23, 24, 25, and 26 are deleted from amended Permit 12800 issued on May 20, 1982 (Application 17317).

NORTH MARIN WATER DISTRICT

IT IS FURTHER ORDERED that Water Right Permits 19724 and 19725 (Applications 25062 and 25079) are amended as follows:

1. The following condition is added to Permits 19724 and 19725:

   Within one year of the date of this order, Permittee shall notify the State Water Resources Control Board of an alternative source of water to be used by Permittee during the low-flow months of July through October of dry years. After that date, Permittee shall not divert water from Lagunitas Creek during the low-flow months of dry years. A dry year is defined as a year in which the total precipitation that occurs from October 1 through April 1 is less than 28 inches, as measured at the Marin Municipal Water District's Kent precipitation gage.

2. Condition 16 is deleted from Permits 19724 and 19725.

WALDO GIACOMINI

IT IS FURTHER ORDERED that Water Right License 4324 (Application 13965) is amended to include the following conditions:

1. If Licensee intends to continue to use of water diverted from Lagunitas Creek under this license on the 175 acre portion of his property located outside of the authorized place of use, within six months of the date of this order, Licensee shall submit a petition to amend the authorized place of use to include the additional area.

2. The summer diversion dam at the location authorized in this license shall be installed as late as possible, but in no event shall the dam be installed prior to June 15. Any seasonal diversion dam shall be removed by November 1 of each year if high flows have not washed it out earlier. Licensee

shall remove the summer diversion dam at the presently specified location on or before November 1, 1997, and shall not reinstall the dam at that location thereafter. No diversion dam shall be installed for diversion of water under this license at an alternative location prior to approval by the State Water Resources Control Board.

IT IS FURTHER ORDERED that Waldo Giacomini or his successor in interest shall not install a dam on Lagunitas Creek downstream of the Highway 1 Bridge any time after November 1, 1997, to divert water under any basis or claim of water right.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 26, 1995.

AYE: John Caffrey
Mary Jane Forster
Marc Del Piero
James M. Stubchaer
John W. Brown

NO: None.

ABSENT: None.

ABSTAIN: None.

Maureen Marché
Administrative Assistant to the Board