# TOTAL MAXIMUM DAILY LOADS FOR SANTA CLARA RIVER ESTUARY BEACH/SURFERS' KNOLL, MCGRATH STATE BEACH, AND MANDALAY BEACH COLIFORM AND BEACH CLOSURES

## STAFF REPORT

**California Regional Water Quality Control Board**
**Los Angeles Region**

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## 1.0 INTRODUCTION

The 1998 303(d) list of impaired waterbodies in California identifies Surfers' Knoll/Santa Clara River Estuary Beach (Surfers' Knoll) and McGrath Beach State Park (McGrath Beach) as impaired by coliform bacteria and McGrath and Mandalay Beaches as impaired by beach closures. The impairment listings are based on data showing the presence of high coliform counts from Ventura County Environmental Health Division (VC/EHD) sampling and State Water Resources Control Board (State Board) records of beach closures.

More recent data and records from these sources and the original listing data were reviewed by California Regional Water Quality Control Board, Los Angeles Region (Regional Board) staff for the 2002 water quality assessment (WQA) and this TMDL study. Review of the recent data show that Surfers' Knoll is no longer impaired by coliform bacteria and McGrath and Mandalay Beaches are no longer impaired by beach closures. Closures are required if there are spills on the beach. There have been no spills in the last three years. As part of the 2002 WQA, the Regional Board staff have recommended removal of these impairments from the forthcoming 303(d) list. State Board has approved the 303(d) list, and the United States Environmental Protection Agency (US EPA) is reviewing these recommendations. As described in this report, the remaining impairment is the total coliform impairment of McGrath Beach and the major source causing this impairment is a discharge from McGrath Lake. In light of the sole remaining impairment in this coastal area, the Regional Board staff have prepared this document to establish a Total Maximum Daily Load (TMDL) and Implementation Plan that will result in a decrease in bacterial contamination and the attainment of bacterial water quality standards for McGrath Beach.

### 1.1 REGULATORY BACKGROUND

The Water Quality Control Plan, Los Angeles Region (*Basin Plan*) contains water quality objectives for waters in the Los Angeles Region. The Basin Plan: (1) designates beneficial uses for surface and ground waters; (2) sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's antidegradation policy; and (3) describes implementation programs to protect all waters in the Los Angeles Region.

The water quality objectives established in the Basin Plan are mandated under Division 7 of the California Water Code, known as the "Porter-Cologne Water Quality Control Act" (Porter-Cologne). The Basin Plan implements Porter-Cologne and, along with applicable State Board policies (e.g., the California Ocean Plan), serves as the State Water Quality Control Plan applicable to the coastal watershed draining to McGrath Beach, as required pursuant to the federal Clean Water Act (CWA).

Section 303(d) of the CWA requires that each state identify those waters within its boundaries for which existing controls and effluent limitations alone do not ensure attainment of water quality objectives. The resulting list is referred to as the "303(d)

list." The CWA further requires that states establish a priority ranking for waters on the 303(d) list, then, in accordance with the priority ranking, establish TMDLs.

A TMDL is the sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background (40 CFR 130.2) such that the capacity of the waterbody to assimilate pollutant loads (loading capacity) is not exceeded. The TMDL shall be established at levels necessary to attain and maintain the applicable narrative and numerical water quality objectives with seasonal variations and a margin of safety (MOS) to address uncertainty in the analysis. Determinations of TMDLs shall take into account critical conditions for stream flow, loading, and water quality parameters (40 CFR 130.7(c)(1)).

The United States Environmental Protection Agency (USEPA) has oversight authority for the 303(d) program and is required to review and either approve or disapprove a state's 303(d) list and each TMDL developed by a state. If a state fails to develop a TMDL in a timely manner or if the USEPA disapproves a TMDL submittal by a state, USEPA is required to establish a TMDL for that waterbody (40 CFR 130.7(d)(2)).

The elements of a TMDL are described in 40 CFR Sections 130.2 and 130.7, and Section 303(d) of the CWA, as well as in USEPA guidance (USEPA, 1991).

### 1.2 CONSENT DECREE

On March 22, 1999, a 13-year schedule for the development of TMDLs in the Los Angeles Region was established in a consent decree (*Heal the Bay, Inc. et al. v. Browner, et al. C 98-4825 SBA*). Prior to the approval of this decree, Regional Board staff had identified over 700 waterbody-pollutant combinations in the Los Angeles Region where TMDLs would be required (LARWQCB, 1996, 1998).

For the purpose of scheduling TMDL development, the consent decree combined the waterbody-pollutant combinations into 92 TMDL analytical units. Analytical Unit No. 23 consists of Santa Clara River Estuary Beach/Surfers' Knoll, McGrath Beach, and Mandalay Beach. McGrath Beach, Surfers' Knoll and Mandalay Beach are listed with impairments related to pathogens. However, Surfers' Knoll and Mandalay Beach have been recommended for removal from the 2002 303(d) list by Regional Board staff, as described below.

## 2.0 PROBLEM IDENTIFICATION

This section describes the WQA methodology that led to the listing of Surfers' Knoll, McGrath Beach and Mandalay Beach as impaired for coliform bacteria and beach closures. This section reviews data that led to the listing of the sites and further data, reviews the water quality objectives applying to this TMDL, describes the geography and history of the region, describes the affected beneficial uses, and states the water quality objectives of the waterbody.

The data used by Regional Board staff that led to the impairment of McGrath Beach exceedance of the total coliform objective are discussed below. Where available, more recent data were reviewed to confirm the 1998 303(d) listings. As Regional Board staff's listing recommendations are based on impairments to water quality, it is appropriate to begin this section with a review of the applicable water quality objectives.

State water quality standards consist of the following elements: 1) beneficial uses, 2) narrative and numeric objectives to protect beneficial uses and 3) an antidegradation policy. In California, the each of the regional boards define beneficial uses in their respective basin plans.

Table 2.1 in the Basin Plan for the Los Angeles Region (1994) lists 20 beneficial uses for Surfers' Knoll, McGrath Beach and Mandalay Beach. Excerpts from this table are reproduced in Table 2, in section 2.3, below. These uses are specified as existing (E) uses. All existing beneficial uses must be protected.

## 2.1 Review of Data

As stated above, Surfers' Knoll and McGrath State Beach were listed as impaired for total coliform in the 1998 303(d) list. Additionally, McGrath Beach and Mandalay Beach were listed for beach closures. In each listing, water contact recreation (REC-1) was identified as the beneficial use not supported due to total coliform and beach closures. More recent pathogen and beach closure data were reviewed for the 2002 WQA. The data review shows that the data indicate that Surfers' Knoll is not impaired for coliform bacteria. As such, Surfers' Knoll was recommended for removal from the 303(d) list and will not require load or waste load allocations. This TMDL includes continued monitoring by VC/EHD, which is already required by existing laws and is not a new regulatory requirement of this TMDL.

The recent beach closure data show that both McGrath and Mandalay Beaches have had no beach closures in the past three years. They were also recommended for removal from the 2002 303(d) list. Therefore, McGrath and Mandalay Beaches will not require load or waste load allocations for beach closures. Again, the VC/EHD will continue monitoring and posting beaches as required by other applicable laws.

McGrath Beach remains impaired for total coliform. Therefore, this TMDL staff report will focus on the McGrath Beach impairment for total coliform. All waste load allocations established by this TMDL will be for the purpose of eliminating the total coliform impairment at McGrath Beach.

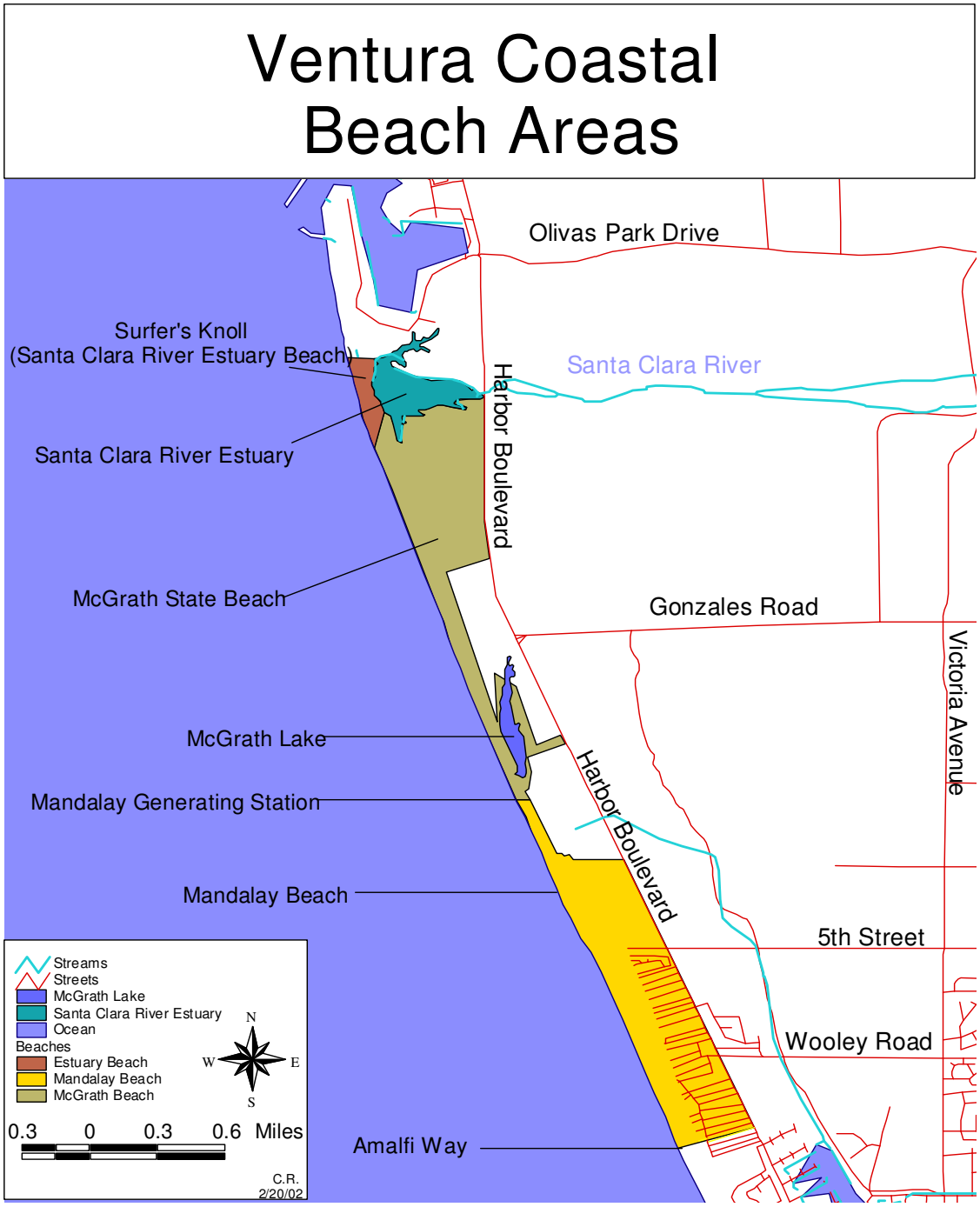
TABLE 1. Santa Clara River Estuary Beach, McGrath State Beach, and Mandalay Beach Total Coliform and Beach Closures TMDL Problem Statement

| Beach | 1998 303(d) List for Total Coliform | 1998 303(d)List for Beach Closures | 2002 Water Quality Assessment |
|---|---|---|---|
| Surfers' Knoll | **X** | | New data, recommended for delisting for coliform bacteria |
| McGrath Beach | **X** | **X** | **Continued impairment for total coliform** New data, recommended for delisting for beach closures |
| Mandalay Beach | | **X** | New data, recommended for delisting for beach closures |

## 2.2 GEOGRAPHY

On the Ventura County coastline, just south of the City of Ventura, there is a series of beaches, shown in Figure 1. Starting from the north is Surfers' Knoll, which is adjacent to the Santa Clara River Estuary, and is also known as Santa Clara River Estuary Beach. Adjacent to this beach, heading southeast down the coast is McGrath Beach. McGrath Beach runs along a northwest to southeast direction, and is 1.7 miles long. For the purposes of the Regional Board and as used by VC/EHD as the major data source, this includes Mandalay State Beach. In the middle of McGrath Beach, between the dunes and Harbor Boulevard to the east is a small back dunes lake, McGrath Lake. McGrath Lake is approximately 10 acres, with a wetlands area on its east side. Continuing south on the beach is the Reliant Energy Mandalay Generating Station (Mandalay Generating Station). This point is the end of McGrath State Beach. The next beach south is Mandalay City Beach (Mandalay Beach). This beach is also 1.7 miles long, and it extends in a northwest to southeast direction from the Mandalay Generating Station to Amalfi Way in the City of Oxnard.

FIGURE 1. MAP OF SURFERS' KNOLL, MCGRATH BEACH, MCGRATH LAKE, AND MANDALAY BEACH



Directly east of the beaches and the lake, Harbor Boulevard runs nominally north and south through much of Ventura County, including along the length of these three beaches. East of Harbor Boulevard through much of this region is agricultural land. There is agricultural land directly east of McGrath Beach and McGrath Lake to the north and south of Gonzales Road. West of Harbor Boulevard at Gonzales Road are petroleum extraction facilities. Additional oil and gas wells are scattered throughout the agricultural lands. Beyond the agricultural land is the Bailard Landfill, and several nurseries. To the south of Gonzales Road is a dog kennel.

## 2.3 BENEFICIAL USES

Beneficial uses are defined in the Basin Plan for individual water bodies and general statements of beneficial uses for water bodies not covered by individual beneficial uses. While the Basin Plan assigns beneficial uses for Mandalay Beach individually, beneficial uses for Surfers' Knoll and McGrath Beach fall under the general Ventura County Coastal Nearshore beneficial uses. These beneficial uses are shown in Table 1.

TABLE 2. Surfers' Knoll, McGrath Beach and Mandalay Beach Beneficial Uses, and Description. Excerpt from the Basin Plan, Table 2-1.

| **Reach** | **Hydro. Unit No.** | **MUN** | **IND** | **PROC** | **AGR** | **GWR** | **FRSH** | **NAV** | **REC 1** | **REC 2** | **COMM** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Surfers' Knoll | 403.11 | | E | | | | | E | E | E | E |
| McGrath Beach | 403.11 | | E | | | | | E | E | E | E |
| Mandalay Beach | 403.11 | | | | | | | E | E | E | E |

| **Reach** | **WARM** | **COLD** | **EST** | **MAR** | **WILD** | **BIOL** | **RARE** | **MIGR** | **SPWN** | **SHELL** | **WET** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Surfers' Knoll | | | | E | E | Ean | Ee | Ef | Ef | E | |
| McGrath Beach | | | | E | E | Ean | Ee | Ef | Ef | E | |
| Mandalay Beach | | | | E | E | | Ee | | | E | |

E: Existing beneficial use. P: Potential beneficial use. I: Intermittent beneficial use. e: One or more rare species utilize all ocean, bays, estuaries, and coastal wetlands for foraging and/or nesting. f: Aquatic organisms utilize all bays, estuaries, and coastal wetlands, to a certain extent, for spawning and early development. This may include migration into areas that are heavily influenced by freshwater inputs. an: Areas of Special Biological Significance. Some designations may be considered for exemptions at a later date.

Beneficial uses for these coastal areas include industrial service supply (IND); navigation (NAV); water contact and non-contact recreation (REC-1 and REC-2); commercial and sport fishing (COMM); marine habitat (MAR); wildlife habitat (WILD); preservation of biological habitats (BIOL); rare threatened, or endangered species habitat (RARE); migration of aquatic organisms (MIGR); spawning, reproduction, and/or early development (SPWN); and shellfish harvesting (SHELL).

### *2.3.1 Water Contact Recreation*

As stated above, Surfers' Knoll and McGrath Beach are currently listed as impaired for total coliform in the 1998 303(d) list. Additionally, McGrath Beach and Mandalay Beach are listed for beach closures. In each listing, REC-1 was identified as the

beneficial use that was not supported due to total coliform and beach closures. REC-1 is described in the Basin Plan as "Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs." The number of visitors to McGrath Beach varies from approximately 1,400 per month in the winter to 16,000 per month in the summer. McGrath Beach also has a campground that contains 146 campsites. These sites are routinely full during the summer season.

### *2.3.2 Non-contact Water Recreation*

Non-contact water recreation, or REC-2, is defined by the Basin Plan as, "Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beach combing, camping, boating, tidepool, and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities." REC-2 objectives for pathogen indicators are much greater than the objectives for protection of REC-1 activities. Therefore, protecting the REC-1 uses will protect the REC-2 uses.

## 2.4 WATER QUALITY OBJECTIVES

The Regional Board adopted bacteria water quality objectives on October 25, 2001 (Regional Board Resolution 01-018; see Appendix A), which were then approved by the State Water Resources Control Board on July 18, 2002 (State Board Resolution 2002-0142), the Office of Administrative Law approved it on September 19, 2002 (OAL File No. 02-0807-01-S), and the US EPA approved it on September 25, 2002. Resolution 01-018 updated the bacteria objectives for fresh and marine waters designated as REC-1. The revised objectives for marine waters consist of geometric mean objectives and single sample objectives for enterococcus and total and coliform, and are consistent with current USEPA guidance (1986). These revised objectives in the Basin Plan are equivalent to those in the Ocean Plan. Table 3, below, lists the Ocean Plan objectives for marine waters designated for REC-1.

TABLE 3. Ocean Plan Objectives for Ocean Waters Designated for REC-1

| **Parameter** | **Geometric Mean Objective** | **Single Sample Objective** |
|---|---|---|
| Fecal coliform | 200/100 mL | 400/100 mL |
| Total coliform | | 1000/100 mL |
| Total coliform: less than 20% of samples in 30 days exceed | | 1000/100 mL |

## 3.0 NUMERIC TARGET

### 3.1 WATER CONTACT RECREATION

This TMDL is based on a multi-part numeric target based on the bacteria objectives for marine waters designated for water contact recreation, REC-1, specified in the Basin Plan amendment adopted by the Regional Board on October 25, 2001 and approved by the State Water Resources Control Board on July 18, 2002. These objectives are consistent with those specified in the California Code of Regulations, title 17, section 7958 "Bacteriological Standards" and "Ambient Water Quality for Bacteria – 1986" (U.S. EPA, 1986). The objectives include four bacterial indicators: total coliform, fecal coliform, enterococcus, and the fecal-to-total coliform ratio.

#### *3.1.1 Bacteria*

For this TMDL, the numeric targets will be equivalent to the recently adopted Basin Plan objectives, as measured at point zero (also referred to as the "mixing zone" or "wave wash").[1] This approach recognizes that an effective means of protecting the beneficial use is by requiring compliance with the objectives wherever water contact recreation occurs. These samples will be taken at ankle depth. These targets apply during both dry and wet weather, since there is water contact recreation throughout the year, including during wet weather, at the beaches. The geometric mean targets are based on a rolling 30-day period, and may not be exceeded at any time.

The "point zero" and "ankle depth" approach was used in the Regional Board' Santa Monica Bay Beaches Dry and Wet Weather TMDLs. The State Board and USEPA have already approved this methodology through full approval of the Santa Monica Bay Beaches Dry Weather TMDL. Regional Board staff believe that a comparable strategy for numeric targets is appropriate in for the McGrath Beach bacteria TMDL as well.

The TMDL targets are:

**In Marine Waters Designated for Water Contact Recreation (REC-1)**

1. Geometric Mean

*a. Total coliform density shall not exceed 1,000/100mL*
b. *Fecal coliform density shall not exceed 200/100mL*
*c. Enterococcus density shall not exceed 35/100mL*

[1] Point zero is the point at which water from the outfall initially mixes with ocean water. Point zero has been selected as the compliance point for the numeric target because access to these outfall is, on the whole, not restricted. People are often observed swimming near storm drains.

2. Single Sample Objectives

*a. Total coliform density shall not exceed 10,000/100mL*
b. *Fecal coliform density shall not exceed 400/100mL*
*c. Enterococcus density shall not exceed 104/100mL*
*d. Total coliform density shall not exceed 1,000/100mL, if the ratio of fecal-to-coliform exceeds 0.1.*

Current objectives for bacteria in marine waters, as listed in the California Ocean Plan (2001) (Ocean Plan) are shown in Table 3, above. The revised Basin Plan objective for total coliform has a higher single sample objective, but there now are geometric means for the pathogen indicators listed in the revised objectives. The numeric target is based on the geometric mean. This is the lowest value for coliform and the most stringent value. It is noted that for compliance purposes the revised objective also provides a single sample limit of 10,000/100 mL.

The numeric target for this TMDL will require samples to meet criteria from both the Ocean Plan and the Basin Plan as measured at point zero (also referred to as the "mixing zone" or "wave wash"). Point zero is the point at which water from the discharge initially mixes with ocean water, and is consistent with the 'point of initial dilution' as defined in the Ocean Plan. Point zero has been selected as the compliance point for the numeric target for two reasons. First, public access to this source is not restricted. Second, in a study conducted for the Santa Monica Bay Pathogen TMDL, researchers found that the dilution zone is specific and highly dependent on prevailing oceanographic and climatic conditions (e.g., wave height, tide height, longshore velocity, wind speed) (SCCWRP 2001). There are inadequate data to accurately define dilution zones, other than point zero, for the freshwater outlets at McGrath Beach under all possible oceanographic and climatic conditions. Section 6.2 describes the waste load allocations, which includes details of the MOS.

### *3.1.2 Beach Closures*

The US EPA criteria for beach closures are:
- Fully Supporting = Zero beach closures in the previous three years
- Partially Supporting = Averaging 1 beach closure per year, lasting less than one week long per closure.

Recent beach closure data show that McGrath and Mandalay Beaches have met water quality objectives for beach closures. Regional Board staff have recommended that they are removed from the 2002 303(d) list. Therefore, McGrath and Mandalay Beaches will not be addressed through load allocations for beach closures, however, they will continue to be monitored.

## 3.2 ANTIDEGRADATION

The state of California's water quality objective has an Antidegradation Policy. As stated in the Basin Plan, "the Statement of Policy with Respect to Maintaining High Quality Waters in California (State Board Resolution No. 68-16), restricts degradation of

surface or ground waters. In particular, this policy protects waterbodies where existing quality is higher than is necessary for the protection of beneficial uses.

"Under the Antidegradation Policy, any actions that can adversely affect water quality in all surface and ground waters (i) must be consistent with the maximum benefit to the people of the state, (ii) must not result in water quality less than that prescribed in water quality plans and policies. Furthermore, any actions that can adversely affect surface waters are also subject to the federal Antidegradation Policy."

Nothing in this document is meant to, or will allow, a degradation of the current quality of water on any of these waterbodies listed herein.

## 4.0 SOURCE ASSESSMENT

This section on source assessment describes how the sources of coliform were investigated and the final source determined. It starts with a major source to McGrath Beach, the discharge from McGrath Lake. Following that is a report on the data used to determine the impairments of each beach. These data are detailed for each sampling location, and used to discuss the sources to the beach. Later a discussion of the seasonality of the data is presented. Finally, non-point sources of coliform for the area are described.

### 4.1 HISTORY

McGrath Lake is approximately 10 acres.[2] It is elongated along a north-south axis, stretching between Harbor Boulevard and the dunes along McGrath Beach. The lake is situated in Ventura County, just south of the Santa Clara River and the City of San Buenaventura. It is as much as 140 meters (m) across, approximately 900 m long, and its depth varies from approximately 0.6 m deep in the north end to 1.5 m deep in the south end.[3] On the west side McGrath Lake is surrounded by sand dunes in the publicly owned area, and a natural incline leading up to a road in the privately held northern end.

The Santa Clara River Estuary and McGrath Lake are habitat to a number of endangered and threatened species including the bird species southwestern willow flycatcher, least bell's vireo, western snowy plover, brown pelican, and California least tern. In addition to requiring this habitat, these birds are also a source of total coliform to McGrath Beach.

According to the McGrath Lake WAC:

> West of Harbor Boulevard and north of McGrath Lake is an area of arroyo willow riparian habitat which transitions to bulrush (tule) wetlands at the north end of the lake. Additional areas of bulrush habitat are found along the lake's eastern shore.

[2] Communication from California State Parks, September 30, 2002.

[3] Chemical and Biological Measures of Sediment Quality in McGrath Lake, February 1999, RWQCB-LA. et al.

A United States Coast Guard map of the area, produced in 1855, shows a much larger wetlands complex to the north and east of the current lake. Since the mid-1800's, the majority of these wetlands have been converted to agricultural land and public roads. The construction of Harbor Boulevard in 1958 significantly reduced the acreage of the remaining open water, as well as the remaining wetlands, and impacted the surface hydrology of the lake.

The Water level of McGrath Lake has been mechanically manipulated since the early 1900's. At the time, the agricultural landowner controlled wet-season flooding by breaching the sand dunes near the south end of the lake, allowing the lake to drain to the ocean. This practice was continued through the end of the 20th Century, when coastal regulations precluded this activity.

Additional flood control was provided by the installation of a pump/pipeline system in the mid-1900's. Water from the lake is pumped through a pipeline at the north end of the lake, where it is discharged onto the beach behind sand dunes. The water flows behind the dunes and often enters the surf zone at the Pacific Ocean. Some time before 1953, a 10-inch pipe and pump were installed. During the 1990's, a diesel pump and 15-inch pipe were added to the existing pipeline. The electric pump is normally used several times a week throughout the year, and every day during rain events. The diesel pump is used to augment the electric pump during particularly heavy rains. The capacity of the electric pump is 2,700 gallons per minute (gpm), or 1.3 MGD. The capacity of the diesel pump is 4,750 gpm or 2.28 MGD.

In the absence of pumping, high ground water and surface runoff may cause flooding or damage to crops on agricultural lands east of Harbor Boulevard. Flood waters have also been known to flow across Harbor Boulevard at Gonzales Road, and across lands to the south of McGrath Lake. Regular pumping helps to minimize this flooding and prevent crop damage.[4]

A study was completed in 1999 titled, "Chemical and Biological Measures of Sediment Quality in McGrath Lake," by Regional Board staff, Moss Landing Marine Laboratories, CA DFG, University of California, Santa Cruz, and the Institute of Marine Sciences. This report was completed as part of the Bay Protection and Toxic Cleanup Program (BPTCP or Toxic Hot Spots program. This program studied bays, estuaries, and estuary-like water bodies primarily for sediment quality. Additionally, this study looked at some water quality issues in McGrath Lake.

This study showed that the water in the lake exhibited toxicity. For the Subsurface Water Test, subsurface water samples from the pump house and agriculture drain, the survival rate of a mysid shrimp, the *Neomysis mercedis*, was 12% and 24%, respectively.

[4] Kennedy/Jenks Report, 2002.

## 4.2 DATA ANALYSIS

This section will describe the data used for the 1996, 1998, and 2002 WQAs that lead to the 303(d) listings which lead to this TMDL.

### *4.2.1 1996 and 1998 Listings for Beach Closures*

The State Board collects data on beach closures. Local health departments send this data to the Board, which compiles them. These data are not inclusive of all beach postings, only beach closures.

The 1996 and 1998 beach closure listings appear to be based on the State Board data. For the 1996 and 1998 WQAs, the State Board received data showing one beach closure for McGrath Beach. This closure was caused by an 80,000-gallon oil spill, and lasted from 12-27-93 to 1-11-94. Mandalay Beach was listed in the 1996 WQA for beach closures due to a sewage spill. All documentation shows that this sewage spill actually occurred in Mandalay Bay, not on Mandalay Beach. More recent data show that there have been no *beach closures* within the past three years.

### *4.2.2 1996 Coliform Listing Data*

The EPA's 1996 303(d) list included Surfers' Knoll and McGrath Beach as not supporting the REC-1 beneficial use. Assessment guidelines for this listing were described as, "For entire data set, wet and dry weather fecal coliform objectives are exceeded more than 15% or wet and dry weather total coliform data are exceeded more than 20%."[5]

### *4.2.3 Beach Closure Data, 1997 to Present*

There have been several beach closures on these beaches since the 1996 WQA.

- McGrath Beach was closed for a discharge of 20,000 gallons of raw sewage. An unknown amount entered the ocean. This spill closed McGrath Beach for two days, April 6 and 7, 1997.
- McGrath and Mandalay Beaches were closed for 2 weeks, from February 4th to the 18th, 1998 due to flooding.
- McGrath Beach was closed for four days from January 25 to the 29th, 1999, due to a spill from a sewage line.

Neither McGrath Beach nor Mandalay Beach has been closed in the last 3 years. EPA criteria states that for a beach to be fully supporting, it must have no closures in the last 3 years. These data indicate that these beaches meet that criterion. Regional Board staff have recommended these beaches for removal from the 2002 303(d) list.

### *4.2.4 Coliform Data, 1997 to Present*

In 1997 Assembly Bill 411 was passed, requiring local health departments to analyze beaches for bacteria on a regular basis. This monitoring is required from April 1 to

[5] US EPA 305(b) Guidelines.

October 30 of each year. The frequency and location of sampling are determined by local government. In Ventura County, this is overseen by the VC/EHD. VC/EHD routinely collects samples on a weekly basis, all year round. If samples exceed regulatory objectives, they may collect additional samples to show when the objectives are met.

VC/EHD samples are collected at one location on Surfers' Knoll and at three locations on McGrath Beach at the north end, middle, and south end. Samples are collected in the surf zone at ankle depth, approximately 50 yards from any freshwater outlet.

Data were submitted by the Regional Board to State Board for the 2002 WQA by June 15, 2002. That data came from a number of sources, including VC/EHD, Mandalay Generating Station, and Regional Board sampling. Data submitted indicate that Surfers' Knoll is no longer impaired. Regional Board staff have recommended its removal from the 2002 303(d) list.

Due to the AB 411 requirements, indicator bacteria data for beaches in general, and Ventura County Beaches specifically, are now plentiful. For the 2002 WQA, there are nearly 200 data per sampling location on McGrath Beach. Using data submitted by the initial May 2001 deadline, all three sampling locations exceeded water quality objectives for total coliform. Using all the data received by the final June 2002 deadline, only the middle of McGrath Beach exceeds water quality objectives for total coliform. Therefore, McGrath Beach is not recommended for delisting, and this TMDL will focus on that section of the beach and the source of bacterial contamination at McGrath Beach.

## 4.3 SOURCE ANALYSIS

Data used for this TMDL were collected from four sources: (1) Ventura Wastewater Reclamation Facility (VWRF) and (2) Reliant's Mandalay Generating Station (Mandalay Generating Station) provided data required by their NPDES permits and otherwise collected. (3) Ambient beach data were collected by the VC/EHD for their AB 411 requirements. (4) Samples collected by Regional Board staff for development of this TMDL. The samples collected by VC/EHD were collected approximately 50 yards from any source to the beach. These sources are the Santa Clara River Estuary, which is estuary flow, McGrath Lake discharge, a freshwater outlet, and Mandalay Generating Station, mixed fresh and saline flow from the Edison Canal. They were collected at ankle depth. As they were not collected in the source, or where the source meets the tide water, these samples routinely underestimate the influence of the pathogens on the water in some areas. Regional Board staff also collected samples upstream in the watershed.

Regional Board staff determined that additional sampling was needed to augment the data that the Regional Board had received by January 2002. The sampling plan was designed to investigate the sources to McGrath Beach and their impact on the ocean water quality. Samples were collected from each of the areas where VC/EHD routinely collect samples, at the north end, middle, and south end of the beach. However, Regional Board staff collected the samples from wave wash, when possible, or near where wave

wash was expected. The nearest large and therefore most likely sources to those sites are the Santa Clara River Estuary outfall, the McGrath Lake outfall, and the Mandalay Generating Station outfall, respectively. Samples were collected on the same day, and nearly the same time at several sites and potential sources to show any correlation. Samples were collected weekly for five weeks. The results are discussed below.

Regional Board staff collected samples for two purposes. The first was to characterize the watershed relative to its listing on the 303(d) list. The second purpose was to collect data for the waterbody model, linking sources to the contamination in the tide. For that reason, not all of the data collected by Regional Board staff was used to describe the waterbody, even though it may have been used in the linkage analysis.

Additionally, data were analyzed for dry season (April 1 to October 31) versus wet season (November 1 to March 31). For all sites, wet season data were somewhat more likely to exceed objectives than dry season. This is most pronounced at the McGrath Lake discharge site, site 27000. This data is discussed in detail in sections 4.3.2 and 4.4.

The sites discussed below are shown in detail in Figure 1, above.

### *4.3.1 Surfers' Knoll/Santa Clara River Estuary Beach Coliform Bacteria*

Surfers' Knoll is also known as the Santa Clara River Estuary Beach. This location was listed on the 1998 303(d) list for coliform bacteria. For the 2002 (d) listing, recent data were analyzed by Regional Board staff for both total and fecal coliform bacteria. At this time the data indicate that the beach meets REC-1 objectives for both fecal coliform and total coliform bacteria and has been recommended by the Regional and State Boards for delisting. The data are described in Table 4, below. Because the recent data indicate that Surfers' Knoll complies with the water quality objectives, Regional Board staff did not include sampling of the estuary water quality and the beach water quality or analyze the linkage from the sources to water quality at Surfers' Knoll/Santa Clara River Estuary Beach. This TMDL Implementation Plan recommends continued analysis of the VC/EHD monitoring data at this location, as required by applicable laws, to ensure that this beach remains in compliance with the water quality objectives.

If such monitoring indicates impairment, the TMDL will be re-evaluated.

TABLE 4. Surfers' Knoll, McGrath Beach and Mandalay Beach Total Coliform Data

| Sampling Location | Number of Samples | Percent total coliform samples exceeding the 2002 303 (d) listing single sample objective (1,000/100 mL) | Percent fecal coliform samples exceeding the single sample objective (400/100mL) |
|---|---|---|---|
| Surfers' Knoll | 102 | 14.7 % | 2% |
| McGrath Beach North | 189 | 16.4 % | 1% |
| McGrath Beach Center | 185 | 22.7 % | 2% |
| McGrath Beach South | 186 | 17.2 % | 0.5% |

### *4.3.2 McGrath Beach Total Coliform*

VC/EHD collects weekly samples in compliance with AB 411. This law requires local governments collect weekly samples to document pathogen levels along coastal areas. VC/EHD collects samples weekly both during the AB 411 season (April 1 to October 31) as well as the rest of the year. They also collect samples to confirm contamination when it is found, and show when the water is no longer exceeds regulatory levels. Therefore, VC/EHD collects samples more often than weekly. During the study period, 1997 to 2002, VC/EHD collected additional study samples along the coast in this area, as well as inland samples. Samples are collected at three locations along McGrath State Beach. They are North Gonzales Road, Gonzales Road, and Go Kart sites at the north, middle, and south end of the beach.

#### 4.3.2.1 North Gonzales Road Site

The northern location, VC/EHD site number 26000, north of Gonzales Road, is just south of the Santa Clara River Estuary. The major source to this location appears to be the estuary, when it is open to the tide. The information from the original data for the 2002 303(d) list showed this site as exceeding the Ocean Plan total coliform objective of 1000 MPN/100 mL for 20% of the samples.

Recent data show site 26000 exceeds this objective for 16% of the samples from October 1998 to June 2002.[6] Criteria for listing on the 2002 303(d) list required exceedance for 20% of the samples. However, this site also exceeded the geometric mean[7] of 1000/100 mL for 13 of 157 data sets[8] or 8%. These geometric mean

[6] Note that this data set is a subset of the complete data set, which includes data from VC/EHD, Mandalay Generating Station, and the Regional Board. The complete data set included samples collected contemporaneously in near vicinity. The maximum of these duplicates was used for this table and data discussed in this section. All data was used in the modeling for the linkage analysis.

[7] The information on geometric mean is provided for illustrative use only.

exceedances occurred more frequently during wet than dry seasons. Total coliform data are shown in Table 5, below.

TABLE 5. Total Coliform Summary

| Site | Number of Samples | Number of Exceeding Total Coliform Instantaneous | Percent Exceeding 2002 303 (d) Single Sample Limit | Data Sets | Number of Data Sets Exceeding Geometric Mean | Percent Data Sets Exceeding Geometric Mean |
|---|---|---|---|---|---|---|
| North Gonzales Road | 189 | 31 | 16% | 157 | 13 | 8% |
| Gonzales Road | 185 | 42 | 23% | 151 | 24 | 16% |
| Go Kart | 186 | 32 | 17% | 156 | 17 | 11% |

Fecal coliform data for this site include 3 exceedances of 204 samples, or 1%. Enterococcus data for this site include 11 exceedances of 203 samples, or 5%. This site is not recommended for listing as impaired for fecal coliform or enterococcus on the 2002 303(d) list.

#### 4.3.2.2 Gonzales Road Site

VC/EHD named the second sample location on McGrath State Beach as Gonzales Road. This is site number 27000, and it is near the outfall for the McGrath Lake discharge. Samples were collected in approximately the same location every week. However, the outfall from McGrath Lake meanders and reaches the tide at different locations. Previously, the outfall reached the tide north of the sampling location. Starting earlier this year, the outfall had moved enough that it is now south of the sampling location.[9] This could affect the sample results, if the tide continued moving in a southerly direction. Also, current data show lower total coliform concentrations.

Originally on the 2002 303(d) list, this site exceeded the 1000 MPN/100 mL objective for 40% of the samples. With the new data, it exceeds the objective for 23% of the samples. However, this site also exceeded the geometric mean of 1000/100 mL for 24 of 151 or 16% of data sets. These exceedances occurred only slightly more often during wet than dry seasons. This site is still impaired and is expected to remain on the 2002 303(d) list. Data for total coliform are shown in Table 3, above.

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[8] The Basin Plan requires five samples in a 30-day period to assess the total coliform geometric mean. A data set is 5 or more samples that were collected during a rolling 30-day period.

[9] VC/EHD, personal communication, 2002.

Fecal coliform data for this site include 4 exceedances of 223 samples, or 2%. Enterococcus data for this site include 14 exceedances of 218 samples, or 6%. This site is not listed as impaired for fecal coliform or enterococcus on the 2002 303(d) list.

#### 4.3.2.3 Go Kart Site

VC/EHD named the third sample location on McGrath State Beach as Go Kart site, named after the business on Harbor Boulevard adjacent to the site. This is site number 28000, and it is at the southern end of the beach, just north of Reliant Energy's Mandalay Generating Station (Generating Station) outfall. In the original data analysis for the 2002 303(d) list, 30% of the samples exceeded the 1000 MPN/mL total coliform objective. With the new data, 17% of the samples exceed the objective. However, this site also exceeded the geometric mean of 1000/100 mL 17 of 156 or 11% of the data sets. These geometric mean exceedances occurred more often during wet than dry seasons. Data for total coliform are shown in Table 3, below.

Fecal coliform data for this site include 1 exceedance of 201 samples, or 0.5%. Enterococcus data for this site include 10 exceedances of 197 samples, or 5%. This site is not listed as impaired for fecal coliform or enterococcus on the 2002 303(d) list.

## 4.4 SEASONALITY

In this TMDL, summer is defined by the AB 411 sampling requirements, which are April 1 to October 31. Winter is defined as the remaining months, or November 1 to March 31.

While there were significant summer exceedances of the 1000/100mL objective for total coliform, the number of exceedances were fewer than winter exceedences. Overall in winter, there were 61 exceedance of 257 samples, or 24%. The data for the individual sites showed more. The North Gonzales Road site, near the estuary, had 17 exceedances out of 85 winter samples, or 20%. This data is summarized in Table 5, below. This is slightly more than the overall rate of exceedance at that site. The source for that site is the Estuary, and VWRF provides the water in the Estuary at a constant rate all year long.

TABLE 6. Seasonal Total Coliform Data for McGrath Beach

| Site | # Winter Samples | # Samples Exceeding | % Exceeding in Winter | # Samples Exceeding | # Summer Samples | % Exceeding in Summer |
|---|---|---|---|---|---|---|
| North Gonzales Road | 85 | 17 | 20% | 14 | 104 | 13% |
| Gonzales Road | 85 | 26 | 31% | 16 | 100 | 16% |
| Go Kart | 87 | 18 | 21% | 14 | 99 | 14% |

The Gonzales Road site, near the McGrath Lake outfall, exceeds the objective for only 16% of its samples exceeding the objective during the summer, as opposed to 31% during the winter. This is also consistent with its source. The McGrath Lake outfall has

a much greater flow during the winter (10 MGD) than during the summer (0.6 MGD). The outfall water is also less likely to reach to marine water during the summer.

The summer data for the Go Kart site, near the Mandalay Generating Station outfall exceeds more often in the winter.

Appendix B contains the data used for this TMDL assessment.

TABLE 7. 303(d) List Status

| **Site** | 1998 303(d) Listing | 2002 303(d) Listing (Recommendation) |
|---|---|---|
| Surfers' Knoll | Coliform bacteria | Remove from listing |
| North Gonzales Road | Coliform bacteria, beach closures[10] | Watch, remove from listing |
| Gonzales Road | Coliform bacteria, beach closures[10] | Impaired, remove from listing |
| Go Kart | Coliform bacteria, beach closures[10] | Watch, remove from listing |
| Mandalay Beach | Beach closures | Remove from listing |

## 4.5 POINT SOURCES

### *4.5.1 McGrath Lake*

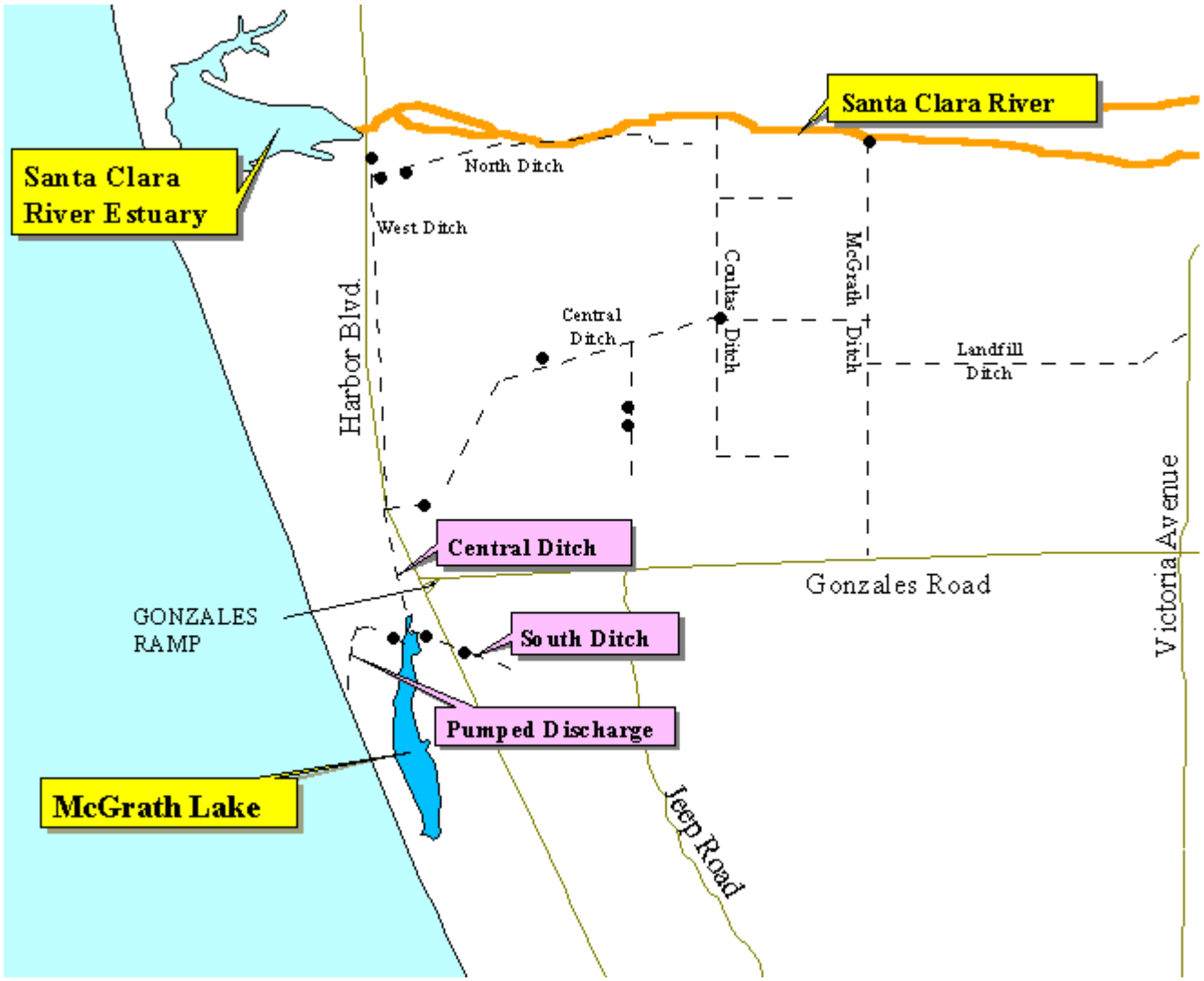
McGrath Beach has two point sources, the McGrath Lake discharge and the Mandalay Generating Station discharge. The location of greatest impairment is at the Gonzales Road sampling site, near the McGrath Lake outfall. As discussed above, this lake constitutes the main source of total coliform bacteria to the beach at this location.

McGrath Lake has several sources of water. Sources of water include irrigation and drainage runoff, groundwater and rainfall.[11] The main source is water from the irrigation ditch, called Central Ditch that comes from agricultural property across Harbor Boulevard from the lake. This ditch starts at the eastern end of the nearest farm property, and goes through the fields westward. When viewed on two occasions, in winter and spring, Central Ditch had water from the start. Central Ditch had the ability to collect runoff from the fields, but was not observed doing so on either occasion. Water was added from tile drains. Water was also added from a pump that removes water from an

[10] This listing is for beach closures for all of McGrath Beach, not individual sites.
[11] This is an estimated figure applicable to one set of conditions in the winter of 1992-1993. The data was from Chemical and Biological Measures of Sediment Quality in McGrath Lake, February 1999, RWQCB-LA. et al.

artesian-like well, water that would be used to water crops when needed.[12] Birds were along the sides of the ditch and in the water in the ditch. On a spring visit, there were over 15 birds in the entire length of the ditch, which staff estimated as less than ½-mile long. This water crosses under Harbor Boulevard, north of Gonzales Road, and travels through an undeveloped, wooded area before it contacts McGrath Lake. The ditches are detailed in Figure 2, below.

FIGURE 2. SOURCES TO AND DISCHARGE FROM MCGRATH LAKE




[12] Personal communication from David Murray of Coastal Berry during a tour of the site on April 9, 2002.

South of Gonzales Road there is a second ditch with a pump, called South Ditch. It leads from another farm and other property and flows under Harbor Boulevard to McGrath Lake. This ditch is rarely filled, flowing only during wet weather.[13] This ditch goes near a dog kennel. According to the McGrath Lake WAC, a diversion of this water is planned.

McGrath lake elevation rises in wet weather approximately 3 inches per day, or 2.8 MGD. This is from groundwater percolating into the lake and increased flows of surface water.[14] Therefore, the lake has a number of sources of water in addition to return flows from irrigated agriculture. Additionally, the water from the lake is pumped through a pipe onto the beach. Therefore, Regional Board staff find that this water does not meet the exemption for return flows from irrigated agriculture as stated in the Clean Water Act Section 502(14); 33 U.S.C. Section 1362(14).

> The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture.

Therefore, Regional Board Staff conclude that this discharge is a point source.

This water pumped onto the beach typically reaches the tide. Stakeholders state that "the lake water that is pumped to the beach flows through the sand dunes until it either reaches the ocean or percolates into the sand. During winter months, sand buildup on the beach often creates a barrier that causes the outfall water to accumulate behind the dunes. Winter high tides often overtop the sand barrier, adding to the volume of accumulated outflow until the sand barrier is naturally breached."[15] The water as pumped out of the lake and the water in the “creek” on the beach contain coliform that exceed the ocean objective of 1,000/100 mL of total coliform bacteria. 17 million gallons were pumped from the lake onto the beach during the month of June 2002. Winter flow has been estimated at an average 10.1 MGD.

### *4.5.2 Mandalay Generating Station*

The second point source to McGrath Beach is Mandalay Generating Station. The water supplied to Mandalay Generating Station comes from the Edison Canal. This canal originates in Channel Islands Harbor, which has a number of pathogen exceedances, but not enough to be put on the 303(d) list. Additional freshwater drains into the canal from

[13] Communication from State Parks on June 24, 2002.
[14] Chemical and Biological Measures of Sediment Quality in McGrath Lake, February 1999, RWQCB-LA. et al.
[15] Response to comments letter from McGrath Lake Watershed Action Committee, January 31, 2003.

various farms and stormdrains. These flows can also be high in coliform bacteria.[16] All of this water constitutes the cooling water for the generating station. After use as cooling water, it is discharged to McGrath Beach. The generating station has occasional high coliform counts, but routinely has very high flows. The Generating Station flows vary from approximately 50 MGD to 280 MGD[17], or approximately 88 to 500 times the flow from McGrath Lake to the beach. This outfall flows directly to the beach as well. The high flows make the occasional high coliform counts a significant impact even compared to the routinely high coliform counts from McGrath Lake.

### 4.6 NONPOINT SOURCES

The northern most sampling site on McGrath Beach is near the opening, or breach, to the Santa Clara River Estuary. The estuary, when it breaches, is a significant source of coliform to the beach. The major water source is VWRF, which has a total coliform objective of 2/100mL. Therefore, VWRF is not a source of total coliform.[18] The estuary is home to a large number of birds and other wildlife. The wildlife is likely to the major source of total coliform from the estuary to the beach. However, the estuary also is the source for the least impaired part of the beach, i.e. the sampling site with the lowest coliform levels. This location is expected to be removed from the 2002 303(d) list.

## 5.0 LINKAGE ANALYSIS

Linkage analysis for this TMDL is done using water quality modeling. The model used was based on the Water Quality Model, first developed by Lee et al. (1985). Water quality modeling is used to: (1) determine the contributions of different sources to bacteria loads (source assessment), (2) relate these loadings to water quality responses in the receiving water, (tide), and (3) estimate the necessary load reductions necessary to meet the numeric targets.

The linkage analysis for this TMDL was performed using a far field diffusion and buildup model. The mixing and dispersion of the wastewater discharge from a discharge point or structure like an outfall or a diffuser can be conceptually divided into two phases: (i) near field mixing, (ii) far field diffusion and buildup. The near field phenomenon occurs in a matter of minutes and within a region measured out to several hundred meters. The buildup in the far field occurs over days and weeks over distances beyond a few kilometers. The far field diffusion is in between these two scales, i.e., a time scale of hours to a few days and a distance scale of a few hundred meters to a few kilometers. For the near field, the mixing is dominated by discharge jet momentum.

Data utilized were obtained from VWRF, VC/EHD, and Mandalay Generating Station, and collected by Regional Board staff. Data for this model include 628 samples

[16] Communication from Mandalay Generating Station on September 30, 2002.
[17] Communication from Mandalay Generating Station on June 7, 2002.
[18] Exceedances of this objective are uncommon. Any exceedance of this objective would constitute an upset and be handled as a spill. Therefore these exceedances will not be considered as part of this TMDL.

in 3 locations off McGrath Beach. For calibration purposes, 15 samples were used for model validation. For this model, coliform die-off is assumed at $0.8d^{-1}$.[19]

The resulting contributions, or loads, from the main sources and their required reductions are discussed in detail in Section 6, Allocations.

The report for this model is shown in Appendix C.

## 6.0 ALLOCATIONS

### 6.1 LOAD ALLOCATIONS (SANTA CLARA RIVER ESTUARY)

The waste load allocations (WLAs) and load allocations (LAs) have been devised from the modeling of the sources and the linkage analysis. The sole non-point source is the Santa Clara River Estuary. Water from the estuary reaches the beach at site 26000, the North Gonzales Road site, which is recommended for removal from the 2002 303(d) list. The total coliform sources in this estuary are mainly birds, which live in or use the estuary as migratory habitat. The total coliform load in summer is 1.02*10 exp.12 MPN/day. The LA to meet the numeric target based on the linkage analysis is 4.87*10 exp.12. Therefore, this source needs no source reduction during the summer. In the winter the total coliform load is 9.24*10 exp.12. Therefore, this load will need further study.

### 6.2 WASTE LOAD ALLOCATIONS

For McGrath Beach there are only two point sources contributing to total coliform exceedances. Those sources, McGrath Lake and the Mandalay Generating Station have waste load allocations required for this TMDL.

The WLA is expressed as a concentration to allow for seasonal or operational flow variations. Mass based WLAs are provided for illustrative purposes and include an explicit MOS for the McGrath Lake discharge. The WLA is 1000/100 mL, and the mass based WLA includes a 20% MOS. The existing Mandalay Generating Station NPDES permit requires that they meet the 1000/100 mL for receiving water, which is consistent with the concentration based WLA in this TMDL.

[19] This rate was used in the Santa Monica Bay Beaches Dry Weather Bacteria TMDL and is in the range of acceptable die-off rates. It is considered a conservative value. Section 6.3 provides additional discussion on this value.

TABLE 8. Concentration Waste Load Allocations for McGrath Lake and Mandalay Generating Station

| Location | Total Coliform WLA, /100 mL |
|---|---|
| McGrath Lake Discharge | 1,000 |
| Mandalay Generating Station | 1,000 |

Both sources were modeled as discussed in Section 5.0, Linkage Analysis. Based on a monthly flow for June 2002 of 17 million gallons, McGrath Lake for dry weather was modeled to have total daily loads on average of 2.37*10 exp. 11 MPN/day. In order to meet the WLA of 800 MPN/100mL, the Total Maximum Daily Load, or TMDL will be 1.92 * 10 exp.11.[20] The reduction in total daily load would be 19%. If the amount of water discharged from McGrath Lake remains the same, the average total coliform count would also require a 19% reduction.

For winter, the average daily flow is as much as 10.1 million gallons per day. The average winter total coliform density is 23083 MPN/100 mL. This results in a coliform load of 8.82*10 exp.12. To meet the TMDL of 1.92 * 10 exp.11, the McGrath Lake discharge will need a 97% reduction.

Using the geometric mean of the data for the Mandalay Generating Station, the current total load is 1.03*10 exp.12. To meet the numeric target, it would be allocated a TMDL of 5.7*10 exp.12. Consequently, Regional Board staff assesses that the existing load is consistent with the TMDL.

TABLE 9. Load Reductions

| **Site** | **Current Summer Daily Load (* 10 exp. 12)** | **Current Winter Daily Load (* 10 exp. 12)** | **Mass TMDL (* 10 exp. 12)** | **Percent Reduction** |
|---|---|---|---|---|
| Santa Clara River Estuary | 1.02 | 9.24 | 4.87 | Load reduction pending studies for the Santa Clara River Coliform TMDL |
| McGrath Lake Discharge | 0.237 | 8.82 | 0.192 | 19% summer 97% winter |
| Mandalay Generating Station | (Geometric mean) 1.03 | | 5.7 | None |

[20] 1.92 * 10 exp.11 is equal to $1.92 \times 10^{11}$, or $1.92 * 10^{11}$.

## 6.3 MARGIN OF SAFETY

A margin of safety (MOS) is applied to the available load to account for uncertainties in the TMDL analysis and can be implicit or explicit. An implicit MOS occurs when the linkage data follow conservative assumptions. An explicit MOS is stated separately from the data. For this TMDL, the MOS is added both implicitly and explicitly. The explicit MOS is the difference between the numeric target and the objective used in the model. The implicit MOSs are dilution between the outflow and wave wash, degradation of coliform bacteria, and selection of bacteria models.

### *6.3.1 Explicit Margin of Safety*

For this TMDL an explicit MOS of 20% is proposed for the WLA on a mass basis. That is, when considering the WLA on a mass basis, the model was chosen with an objective for total coliform of 800/100 mL to account for the limited data set available the model. Also, the model data used were chosen with the geometric mean representing the concentrations in the tide, not a higher percentile range of the data, as the geometric mean seems to most accurately reflect the ongoing situation in the area.

### *6.3.2 Dilution Between Sources and Wave Wash*

This model uses a quasi-steady-state condition for when the source water reaches the tide. Therefore, there is dilution between these sources. This is not a conservative assumption.

### *6.3.3 Bacterial Degradation*

The die-off rate for total coliform in seawater is 0.7 to 3.0 per day according to the *Protocol for Developing Pathogen TMDLs* (2000). This model uses a 0.8 d(-1) degradation rate. This is the same bacterial degradation rate used in the Santa Monica Bay Pathogen TMDL. Based on three experiments, two in fresh water and one in marine water, bacterial degradation was shown to range from hours to days. Transport time from most subwatersheds during wet weather is short. Therefore, the conclusion is that bacteria degradation is not fast enough to greatly affect bacteria densities in the wave wash. Based on the results of the fresh water experiments, the model assumes a bacteria die-off rate of 0.8 d-1. Degradation rates were shown to be as high as 1.0 d-1. (See Appendix D for a discussion of the experimental design and results of the bacteria degradation study.) (See Appendix C for details on the model.)

# 7.0 IMPLEMENTATION

The data show that for Surfers' Knoll, McGrath Beach and Mandalay Beach there are two sources that need to be addressed by WLAs. These are the McGrath Lake Outfall and the Mandalay Generating Station outfall.

California Water Code section 13360 precludes the Regional Board from specifying the method of compliance with orders issued by the Regional Board; however California Water Code section 13242 requires that the Basin Plan include an implementation plan to describe the nature of actions to be taken and a time schedule for action. This implementation plan contains additional studies to be conducted by Coastal Berry

Company, LLC (Coastal Berry) and Mandalay Generating Station to refine estimates of waste load allocations and assimilative capacity and options to attain compliance with the WQO for total coliform on McGrath Beach. The implementation plan includes additional studies and a time schedule to determine the best method to meet WLAs for McGrath Beach.

In accordance with the Clean Water Act, point sources, which include sources of discharged wastewater pumped through a pipe, are also required to have an NPDES permit. The Mandalay Generating Station has an NPDES permit. The McGrath Lake discharge does not currently have an NPDES permit.

### 7.1 SANTA CLARA RIVER ESTUARY

The discharge from the Santa Clara River Estuary does not cause impairment due to exceedance of the single sample total coliform objective, but appears to cause or contribute to exceedences of the total coliform geometric mean objective. The discharge from the estuary is not well defined. Because the primary source of wastewater discharged into the estuary is effluent from the Ventura Wastewater Reclamation Facility which is disinfected, and the estuary supports a large bird population, Regional Board staff concludes that the coliform source into and from the Santa Clara River Estuary is primarily natural, i.e. birds in the estuary. These sources of coliform will be addressed in an upcoming pathogen TMDL for the Santa Clara River Estuary. This site will be monitored as described in the Implementation Plan for this TMDL and further investigated as part of the upcoming Santa Clara River Estuary TMDL. Regional Board staff will study AB 411 data to monitor the estuary discharge. Further information may be used in upcoming TMDLs.

### 7.2 MCGRATH LAKE OUTFALL

In 1961, the coastal area now called McGrath Beach, and most of McGrath Lake was deeded to the State of California by the McGrath family. At that time, the McGrath family retained the right to discharge water from that lake, and, as stated in the grant[21], to "maintain the level of (the) lake ... through whatever means seem desirable to" the McGrath family or anyone they authorize. That currently is Coastal Berry. The grant continues, "...however, that any installations necessary for the control and/or maintenance of the lake between the above specified levels shall be located on grantors' land or that portion of said lake situate on grantors' land, and further provided that any exercise of such rights shall in no way interfere with the use of the land herein conveyed or in any way disturb the improvements placed thereon in pursuit of its use for State purposes."

McGrath Lake receives flow from an agricultural ditch year round. It also receives flow from a second agricultural ditch south of Gonzales Road during wet weather.[22] It receives runoff from agriculture and the surrounding area. Additionally, the lake receives shallow groundwater that discharges into the lake, again in greater quantities during wet weather.

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[21] Grant deed recorded on May 3, 1961, Book 2004, Page 224, Ventura County.
[22] Communication from State Parks, June 24, 2002.

The McGrath Lake WAC was formed as an adjunct to the McGrath Lake Trustee Council, which was formed in connection with a spill in McGrath Lake in 1993. The WAC consists of members of the McGrath family, who own the north end of the lake and some nearby land used for agriculture and other uses, State Parks, California Fish and Game, United States Fish and Wildlife, Coastal Berry, and Bailard landfill, which is near Coastal Berry property. The WAC is currently working to develop a watershed management plan that will address a broad spectrum of water quality issues affecting the watershed, including coliforms. It is also investigating the feasibility of ceasing discharge to and from the lake. The outcome of these studies may influence the implementation strategies for the McGrath Lake Discharge.

As shown in Load Allocations, Section 6.2, the TMDL is 1.92 * 10 exp.11. This location needs to reduce the dry weather coliform by approximately 19% to reach this total coliform bacteria TMDL. This discharge will be addressed through a Clean-up and Abatement Order (CAO) with a time schedule that will require the levels of coliform to be reduced such that they do not impair the beneficial uses of McGrath Beach. Additionally, other objectives must be met. Therefore, the solution to the coliform problems at McGrath Beach cannot impact the other beneficial uses for McGrath Beach of the beneficial uses of McGrath Lake. The impact of any treatment system or other method of removing the impairment must be analyzed to ensure that these uses do not become impaired. The WLA for total coliform will become effective upon order of the CAO by the Regional Board's Executive Officer. The CAO with time schedule will allow the Discharger to implement interim measures to reduce coliform loading and complete technical reports to determine the best option for meeting Ocean Plan and Basin Plan requirements for discharge. At the end of the three-year time schedule, the CAO requires that the discharge from McGrath Lake will meet all applicable requirements or be terminated. The CAO will also require this site to be studied further for a permanent reduction in total coliform load and ensure the McGrath Lake discharge meets Basin Plan and Ocean Plan requirements.

### *7.2.1 Implementation Strategies for McGrath Lake Discharge*

Staff have investigated several possible methods for reducing the pathogen output from McGrath Lake. Those strategies are reduced to diversion of the flow to the lake, treatment, or diversion of the outfall. Each of these systems is discussed below.

#### 7.2.1.1 Treatment

Treatment of wastewater can be broken into two major categories: onsite above-ground treatment facilities and below ground treatment.

Above ground treatment of the water would require having the water from the lake, not just the agricultural fields, treated for pathogens. That is because the lake has sources of pathogens, i.e. birds, which may not be disturbed. Therefore, simply removing pathogens from the source water to the lake may sufficiently reduce the load of pathogens from the lake outfall.

Treatment facilities would need to be sized to address flows from less than 1 MGD of water in the summer, to over 10 MGD of wastewater in the winter. This is quite variable, and may require disinfection on the same scale as VWRF. Therefore, packaged pretreatment plants would not be adequate to address wet weather loads, but may be suitable for dry weather discharges.

However, treatment might be broken into seasonal treatment: summer and winter. In that scenario, onsite treatment during summer months would treat approximately 0.6 MGD. A small, prefabricated treatment plant could be used to treat the discharge in the summer. As a reduction of 19% of the total coliform is required to meet the TMDL, as little as 19% of the water might need to be treated. Therefore, a treatment plant could cost from approximately $0.43 to $1.3 million in initial capital costs, and about $100,000 to $250,000 in operating costs per year. Treatment would require a land footprint approximately 0.15 to 0.45 acres.[23]

Below ground treatment could be a leach field either with or without a septic system. A leach field would require a minimum distance between the leaching and the groundwater table. As there is shallow groundwater that discharges into the lake, exhibiting water contact between surface and lake waters and groundwater, it is unlikely that there would be sufficient distance between the water table and a leach field.

#### 7.2.1.2 Diversion

VWRF has a sewer line pipeline which extends southward next to Harbor Boulevard. VWRF is located approximately one mile from Gonzales Road, and has a capacity of 11 MGD, currently processing 9.5 MGD. It might be possible to divert the flow from the agricultural land to VWRF. In the summer this flow is about 0.6 MGD.

However, this quantity of flow might require a connection to the City of San Buenaventura's main trunk line terminus approximately 1 mile north of the entrance to the campground, or approximately 2 miles north of McGrath Lake. VWRF staff estimate connection fees at $5,800,000, and treatment costs at $300,000 to $400,000 per year.

Additionally, City of San Buenaventura policy "prohibits properties located outside its boundaries to connect to its sewer system....The Ventura City Council must approve such agreements."[24]

During wet weather, however, the flow from the lake averages 10 MGD, which would exceed the capacity of VWRF. Total coliform levels in the winter in this area of the beach are slightly lower than summer levels, but not enough that the dilution would eliminate the need to reduce total coliform levels. This water would also need to be diverted. The cost for treating one million gallons is approximately $1,170 per day. Therefore, the cost to treat this water during the 5 month wet season for 10 MGD would be $1.8 million.

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[23] Communication with Pollution Control Systems, November 13, 2002.
[24] Comment letter from VWRF, January 24, 2003.

There is another potential issue with treating the wet weather discharge at VWRF. The salinity at the lake is not known, but thought to be brackish, due to salt water intrusion during storms. VWRF has maximum salt levels for influent as follows: total dissolved solids (TDS): 4270 mg/L, sulfate: 3660 mg/L, chloride: 880 mg/L. If the McGrath Lake discharge exceeds these levels, it could not be treated at VWRF.[25]

Another form of diversion would be to change the location of the inlet to the McGrath Lake pump. Currently, the lake is pumped from the north end, very near the location where the agricultural ditch flows into the lake. According to recently collected RWQCB data, the south end of the lake has significantly lower levels of pathogens, possibly because it is deeper than the north end of the Lake and has greater assimilative capacity.[26] Therefore, if the flow from the lake to the ocean were to come from the south end of the lake, pathogens would be reduced significantly.

Finally, the outfall currently discharges water onto the beach. The outfall could be moved to discharge into the ocean. The length and diameter of the pipe would need to be determined, but for a simple 15-inch pipe of 500 feet the cost would be approximately $40,000.[27] Studies and possibly treatment may be required for this alternative. Additional costs for permits, and other technical requirements would be necessary.

#### 7.2.1.3 Ceasing Ocean Discharge

Another option for the discharge from McGrath Lake to McGrath Beach is to cease discharge to the ocean. One method of ceasing discharge was covered briefly in section 7.2.1.2, above, where the discharge from Coastal Berry property was recommended to be diverted to VWRF. There are other possible methods of ceasing discharge. They include: 1) letting the water enter the lake, but not discharging to the ocean and 2) not discharging agricultural and other water to the lake by disposing of it using other means. These methods have the flaw that not all of the water in the lake comes from agricultural discharge and miscellaneous flows from Coastal Berry. There is a second drainage ditch flowing into McGrath Lake. It comes from the south side of Gonzales Road, and it passes by a kennel in addition to agricultural lands. According to the McGrath family[28] this ditch has water flowing in it only during wet weather. Additional water seems to enter the lake from ground water.

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[25] Communication with VWRF, November 7, 2002.

[26] This data does not necessarily agree with the data collected on May 19, 1999. However, all of that data exceeded the method's top concentration level, so a difference in concentrations is not shown. This data is shown in Appendix B.

[27] The cost estimate is based on standard factors from RS Means Environmental Remediation Cost Data, 6th annual edition (2000), including engineering and construction.

[28] Commnunication during WAC meeting (January 2002).

The first method would increase the size of the lake. If the lake did not breach, either naturally or anthropomorphically, it would flood eastward, as described in section 4.1.

The next possible method is to discharge this water to the Santa Clara River. This would be just upstream of the estuary, and therefore the flows would need to meet estuary water quality objectives. While the water from agriculture might meet coliform objectives for the river and estuary, the water might not meet other water quality objectives for the receiving waters.

The final method suggested above would require additional methods for disposal of the water. Methods could include use for agriculture if the water is of appropriate quality, or paid disposal.

All of these methods require additional study. The implementation plan requires that Coastal Berry submit a technical report that evaluates and proposes measures to meet requirements for waste discharged to coastal waters. This report will include complete characterization of the waste discharge for conventional, toxic and priority pollutants. The technical report will also include an analysis of measures that meet the requirements in wet and dry weather. The report will be certified by a registered civil engineer and submitted to the Regional Board within 365 days of the date of issuance of the CAO.

### *7.2.2 Implementation Plan*

In addition to studying and reporting on possible implementation strategies, the CAO requires Coastal Berry to complete several other measures. After the Regional Board's Executive Officer approves Coastal Berry must implement the measures to meet the requirements for waste discharge to the coastal waters within three years of CAO issuance.

The CAO also requires Coastal Berry to implement a monthly monitoring program to include coliform characterization of the discharge using AB 411 guidelines. Samples will be collected both at wave wash and at the discharge point, where the pump(s) discharges the water from McGrath Lake to the beach. This is necessary as there may be a change in the quality of the water before it reaches the ocean. As much of this water is absorbed into the sand, it may affect groundwater or other surface water despite not reaching the tide. Coastal Berry will submit monitoring reports on a quarterly basis.

Three years after the CAO is issued, Coastal berry will either cease discharge of water from McGrath Lake or submit a Report of Waste Discharge. At that time Coastal Berry will meet bacteria water quality standards as stated in the Basin Plan and the Ocean Plan. However, if the Discharger encounters delays beyond their control, the Executive Officer may provide an extension of up to six months to complete implementation.

### 7.3 MONITORING STRATEGY FOR MANDALAY GENERATING STATION

Listing data for the 2002 303(d) list show this site as exceeding the total coliform objectives for 28% of the samples. Current data show that this site exceeds the objective for 19% of the samples collected. To be listed on the 303(d) list, it must exceed 20%. Mandalay Generating Station, the major source at this site, currently has an NPDES permit to discharge with objectives for total and fecal coliform. Monitoring results from Mandalay Generating Station will be reviewed to ensure that the discharge meets the objectives for total coliform in ocean water.

TABLE 10. Implementation Schedule

| Implementation Act | Responsible Party | Implementation Date |
|---|---|---|
| WLA for coliform bacteria apply to the McGrath Lake discharge. | Coastal Berry | Effective Date of Clean-up and Abatement Order (CAO) |
| Submit quarterly monitoring reports on the monthly monitoring of coliform in the discharge and at wave wash. | Coastal Berry | Monthly monitoring shall be implemented upon effective date of the CAO. Quarterly reports are due by the 15th of the month following the end of each calendar quarter. |
| Begin monitoring in wave wash at McGrath Lake Outfall, when possible, and Mandalay Generating Station Outfall. | Coastal Berry, Mandalay Generating Station, and VC/EHD to coordinate. | One year after effective date of CAO. |
| Report on interim methods for reducing coliform load from discharge. | Coastal Berry | 120 days after effective date of CAO. |
| Complete study of ceasing discharge and associated methods. | Coastal Berry, McGrath WAC | Three years after effective date of CAO. |
| Obtain Permit for McGrath Lake Discharge, if necessary. | Regional Board/Coastal Berry | Three years after effective date of CAO. |
| Water from McGrath Lake Outfall Meets WLA of 800/100 mL, and all requirements of the Basin Plan. | Coastal Berry | Three years after effective date of CAO. |

## 8.0 MONITORING PROGRAMS

Currently, McGrath Beach is monitored by VC/EHD weekly at three locations. Each of these locations is purposefully located at least 50 feet from the location where the

outflow from the beach reaches the water. This is how most sampling is done throughout Ventura County by VC/EHD and Los Angeles County by a number of entities, as well as by others throughout the state.[29] This method of sampling is used to show the levels of coliform in the surf zone. However, this location of sample sites is inadequate for purposes of this TMDL. This TMDL requires samples reflecting the amount of total coliform that may be contacted during REC-1 use of the sites. For the purposes of meeting this TMDL, monitoring samples will be collected at ankle depth where the discharge meets the tide.

The monitoring sites will otherwise remain virtually unchanged. Three sites along McGrath Beach will be monitored at the northern end, middle, and southern end of the beach. All samples will be collected in wave wash, as discussed in Section 3.1 and at ankle depth (3 inches). The northern end sample will be collected at the Santa Clara River Estuary outflow, when flowing, or near to the expected flow when it is not. The mid-beach sample will likewise be collected in the McGrath Lake outfall flow, when flowing, or as near to the expected flow when it is not. According to their permit, Mandalay Generating Station collects samples at the southern end of the beach in its outflow. Currently, this sample is collected quarterly. Samples will be collected monthly. The Mandalay Generating Station has continuous flow, so it will always be collected in this location.

[29] Santa Monica Bay Dry Weather Pathogen TMDL (2002).

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