

**USE ATTAINABILITY ANALYSIS
SANTA ANA-DELHI CHANNEL TIDAL PRISM**



October 4, 2013

Santa Ana Regional Water Quality Control Board

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UAA ANALYSIS: SANTA ANA-DELHI CHANNEL – TIDAL PRISM

1.0 Executive Summary

This analysis demonstrates that the REC1 use does not exist and is not attainable in the Tidal Prism of the Santa Ana-Delhi Channel. REC2 use of the Tidal Prism exists and the Tidal Prism should be so designated. The uses are described as:

Water Contact Recreation (REC1) waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs.

Non-contact Water Recreation (REC2) waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonable possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.

The Tidal Prism is a heavily eroded, earthen or rip-rap lined flood control channel except for the upper half of the western bank, which is concrete lined. The Tidal Prism extends upstream 1038 feet from the Bicycle Bridge located at the boundary of the Upper Newport Bay Ecological Reserve to the point where the channel makes a sharp turn to the west. Public access is prohibited by law and prevented by chain link fencing and locked gates. During dry weather, flows in the Tidal Prism are predominantly tidal flows and urban nuisance flows.

Extensive field surveys, interviews of knowledgeable local authorities and photographic evidence indicate that water contact recreation is not occurring and has not occurred in the Santa Ana-Delhi Channel Tidal Prism. The REC1 use cannot occur in this area because flood control modifications preclude attainment of this use.

Analysis of historical water quality monitoring data indicates that the bacterial objectives are not being met. However, the REC1 use cannot be attained by imposing more stringent effluent limitations or requiring additional Best Management Practices (BMPs) to control non-point sources because factors other than water quality will continue to preclude this use.

Tidal flows in the Tidal Prism provide the opportunity for viewing wildlife from the Bicycle Bridge. As a result, the REC2 use is attained. However, the REC1 use is not attained and should not be designated for the Tidal Prism.

2.0 Segment Description

2.1 Location

The Santa Ana-Delhi Channel watershed (approximately 20 mi²) is located in Orange County and includes portions of the cities of Santa Ana, Costa Mesa, and Newport Beach. See Figure SAD-1. The channel starts in the midsection of the City of Santa Ana and empties into the Upper Newport Bay Ecological Reserve in the City of Newport Beach. Currently, the Santa Ana-Delhi Channel is not listed in the Basin Plan. Three reaches of the Channel are proposed to be identified and included in the Basin Plan: the Tidal Prism, which is the subject of the UAA contained herein, and Reaches 1 and 2 of the Channel. UAAs for Reaches 1 and 2 have also been conducted and reported in a separate document.

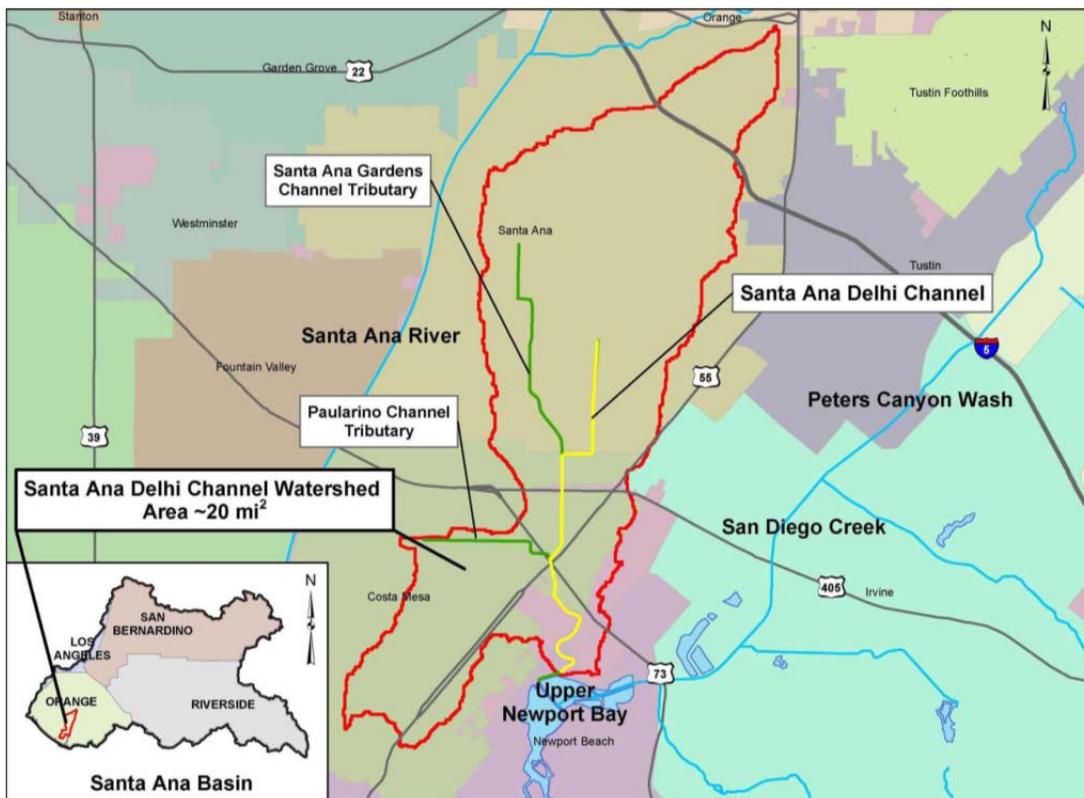


Figure SAD-1. Santa Ana-Delhi Channel Watershed (Source: Use Attainability Analysis Technical Report for the Santa Ana-Delhi Channel, CDM, August 2010 Figure 2-1)

The downstream boundary of the proposed Tidal Prism is the pedestrian/ equestrian/ bicycle bridge (Bicycle Bridge) located at the terminus of University Drive in the City of Newport Beach. The Bicycle Bridge separates the Tidal Prism from the Upper Newport Bay Ecological Reserve. The upstream boundary of the Tidal Prism segment is 1,036 feet upstream of the Bicycle Bridge at the point where the channel turns sharply to the west (left). See Figure SAD-2. Representative photographs of the Tidal Prism are shown in Figures SAD-3 and SAD-4.

2.2 Proximate Land Uses

As noted, the Upper Newport Bay Ecological Reserve lies to the south of the terminus of the Tidal Prism, just downstream of the Bicycle Bridge. The popular Peter and Mary Muth Interpretative Center lies to the west of the Bicycle Bridge in the Upper Newport Bay Nature Preserve, which surrounds the Ecological Reserve. An office complex and residences border the western bank of the Tidal Prism. Along the eastern bank lies a strip of vacant property owned by the Orange County Public Works Department (OCPW) and currently used as an informal equestrian area. To the east of the vacant area lie residential properties consisting of some horse properties and large estates. A public golf course is located to the north of the most upstream section of the Tidal Prism. All areas immediately adjacent to the Tidal Prism are located in the City of Newport Beach. The channel is completely fenced and posted to prohibit access.



Figure SAD-2. Santa Ana-Delhi Channel, Tidal Prism Segment



Figure SAD-3. Tidal Prism, looking upstream from Bicycle Bridge.
Regional Board staff photograph, June 2010.

2.3 Channel Characteristics

The Tidal Prism is the most downstream section of the Santa Ana-Delhi Channel, which was originally constructed by agricultural interests. In 1870, the community of Delhi was founded in what is now the southern section of the city of Santa Ana near the current location of Warner Avenue. The land in this area was used for the production of sugar beets and several sugar mills were established in the area. As farming increased it became necessary to drain this area of natural sumps and swamps. As a result, in the 1890's a drainage ditch was dug from this area to Newport Bay¹. It is likely that in the most downstream section the ditch followed the historic meandering path of a short natural drainage that emptied into Upper Newport Bay². The present day Santa Ana-Delhi Channel now follows the alignment of the original drainage ditch.

2.3.1 Morphology

The Tidal Prism features a 20 ft. wide earthen bottom with an earthen side slope along the eastern channel bank (on the right when facing upstream from the Bicycle Bridge). The eastern side slope has transformed into a steep, eroded cliff several feet in height. The western or left bank adjacent to

¹ Orange County Environmental Management Agency. Draft Environmental Impact Report #527, Santa Ana-Delhi Channel System April 1993.

² Trimble, Stanley W., Historic Hydrographic and Hydrologic Changes in the Newport Bay-San Diego Creek Watershed, June 1, 1998.

the residences along Anniversary Lane is a reinforced concrete side slope. See Figure SAD-4. This side slope transitions downstream to a rip-rap covered area and then, closest to the Bicycle Bridge, an earthen side slope. See photograph on the cover of this report. The channel bottom near the Bicycle Bridge is composed of dark clayey soils. In the upper section of the Tidal Prism, small riprap rock, likely placed for erosion control, is found in the channel bottom with sections of clay and silt soil. See Figure SAD-4.



Figure SAD-4. Tidal Prism, most upstream section. The upstream terminus of the Tidal Prism is the point at which the Channel curves sharply to the west (in this photo to the left). (Regional Board staff photograph (OCPW staff person at upper right), April 2013)

The Tidal Prism is completely fenced off by a six foot high chain fence with locked gates. The area is posted by the OCPW that public access is not permitted by law. The typical fencing surrounding the Tidal Prism is shown in Figure SAD-4, above. (Note: though not apparent in this photograph, the golf course is fenced off from the channel.)

2.4 Regulatory Status

No segment of the Santa Ana-Delhi Channel is currently identified or included in the Basin Plan. As stated above, it is proposed that three segments of the Channel be added to the Basin Plan, including the Tidal Prism. The following beneficial use designations or exceptions are recommended for the Tidal Prism:

MAR (Marine Habitat): The marine waters of the channel support marine habitat that is interconnected with the marine habitat of Upper Newport Bay. Marine fish can be seen at times swimming in this reach. Although the most upstream section of the tidal prism often experiences brackish or freshwater conditions during low tides, marine waters typically dominate this upstream section during high tides.

MUN (Municipal and Domestic Supply): MUN is not an existing use nor can this use be feasibly attained in the future. Total dissolved solids (TDS) levels exceed 3,000 mg/l.³ An exception from the MUN designation is appropriate pursuant to the Sources of Drinking Water Policy.

RARE (Rare, Threatened, or Endangered Species): Wildlife biologists working with California Department of Fish and Wildlife (CDFW) and the United States Fish and Wildlife Service (USFWS) report that the federally-listed Light-footed Clapper Rail (*Rallus longirostris levipes*) has been observed in the Tidal Prism. The federally-listed California Least Tern (*Sterna antillarum browni*) is reported to forage in the Tidal Prism⁴.

REC2 (Non-contact Water Recreation): Field and camera observations, reported in this UAA, demonstrate that the Bicycle Bridge is heavily used by walkers, runners, bicyclists and even equestrians traveling around the Ecological Preserve. From the Bridge, visitors engage in wildlife observation, sightseeing and aesthetic enjoyment of the upstream Tidal Prism (as well as the downstream Ecological Reserve).

WILD (Wildlife Habitat): Birds and other wildlife from Upper Newport Bay regularly use the Tidal Prism as habitat.

2.4.1 303 (d) Listings and Total Maximum Daily Loads (TMDLs)

The Santa Ana-Delhi is listed on the 2010 303 (d) list as impaired for indicator bacteria. As discussed above, the Santa Ana-Delhi Channel flows into Upper Newport Bay, which is also 303(d) listed for indicator bacteria. The Regional Board adopted and is implementing a fecal coliform (bacteria indicator) TMDL for Newport Bay that includes wasteload and load allocations for bacteria indicator inputs from tributaries, including the Santa Ana-Delhi Channel. Bacterial investigations in the Channel have been conducted and BMPs have been and will be implemented in response to TMDL and stormwater permit requirements (Orange County Areawide Urban Storm Water Runoff Management Program NPDES permit (Order No. R8-2009-0033, NDPEs CA 8618030, as amended) to improve bacteria indicator quality conditions in the Channel and to assure that the Channel, the second largest tributary to the Bay, does not cause or contribute to the impairment downstream in the Bay. Re-designation of Tidal Prism (and other reaches of the Channel, as recommended in a separate UAA document) would allow focused implementation of BMPs in downstream areas adjacent or close to

³ The "Glossary of Salt Water" published by the Water Quality Association classifies ocean waters as containing 30,000 to 40,000 ppm TDS (i.e., 3,000 to 4,000 mg/L).

⁴ Orange County Environmental Management Agency. Draft Environmental Impact Report #527, Santa Ana-Delhi Channel System April 1993.

the Bay, which is expected to enhance their effectiveness in protecting downstream recreational uses⁵.

3.0 Use Attainability Analysis – Factors Analysis

3.1 Regulatory Framework – UAAs and Beneficial Use Designations

Section 101 (a) (2) of the CWA states that “it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983”. The CWA and implementing federal regulations provide special protection for these “fishable/swimmable” uses by establishing a rebuttable presumption that all surface waters should support these uses and should be so designated as part of states’ water quality standards.

To overcome this presumption, the states are required to conduct a Use Attainability Analysis (UAA) and demonstrate that attaining the use(s) is not feasible based on one or more of the six factors identified in federal regulations (40 CFR 131.10(g)):

1. Naturally occurring pollutant concentrations prevent the attainment of the use; or
2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modifications in a way that would result in the attainment of the use; or
5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses: or
6. Controls more stringent than those required by sections 301 (b) (Effluent Limitations) and 306 (National Standards of Performance) of the Act would result in substantial and widespread economic and social impact.

A UAA is a structured scientific assessment of the factors affecting the attainment of the use(s), which can include physical, chemical, biological, and economic factors as described in 40 CFR 131.10 (g)(1)-(6), above .

Federal regulation at 40 CFR 131.10 (h) prohibits States from removing designated uses if:

⁵ Experience with a media filtration and UV treatment facility for Aliso Creek (in the San Diego Region) shows that such treatment can be highly effective in reducing bacteria at the end of the pipe, but that the treatment effect is or may be negated by bacteria in the receiving water. Thus, the location of the BMP is critical to assure that bacteria reductions occur where needed.

1. They are existing uses, as defined in 40 CFR 131.3, unless a use requiring more stringent criteria is added; or
2. Such uses will be attained by implementing effluent limits required under sections 301 (b) and 306 of the Act and by implementing cost-effective and reasonable best management practices for nonpoint source control.

“Existing uses” are those uses actually attained in the water body on or after November 28, 1975 (the date of USEPA’s initial water quality standards regulation), whether or not they are included in the water quality standards.⁶ Guidance provided by USEPA in 1985 indicates that an “existing” primary contact recreational use⁷ can be established by demonstrating that swimming has actually occurred since November 28, 1975, or that the water quality is suitable to allow such uses to occur, unless there are physical problems that prevent the use regardless of water quality.⁸ Suitable water quality is demonstrated by consistent, not merely sporadic, attainment of applicable water quality objectives. More recent USEPA guidance states that USEPA considers an “existing” use to mean the use and water quality necessary to support the use that have been achieved in the waterbody on or after November 28, 1975.⁹ USEPA states that: “It is appropriate to describe the existing uses of a waterbody in terms of both actual use and water quality because doing so provides the most comprehensive means of describing the baseline conditions that must be protected.”

USEPA has indicated that where there is very limited actual primary contact use and the physical and/or water quality characteristics of the water body do not and are not likely to support that use, then it would be appropriate to conclude the primary contact recreation is not an “existing” use¹⁰. In making such determinations, federal guidance recommends that states should consider a **suite of factors** such as the actual use (present and historic), existing water quality, potential water quality conditions, access, recreational facilities, location (e.g., proximity to suitable recreational alternatives), safety considerations, as well as the physical conditions of the water body.¹¹ However, states are not required to evaluate all six factors identified in 40 CFR 131.10(g) as part of every UAA.

In designating the uses of a water body, and in considering changes to those designations, states must take into consideration the water quality standards of downstream waters and ensure that water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters. (40 CFR 131.10(b)).

Finally, decisions to remove or not designate REC1 uses for surface waters are subject to reconsideration as part of the Basin Plan Triennial Review process. Where new information and/or changed conditions warrant the REC1 designation, then the Basin Plan must be amended accordingly.

⁶ 40 CFR 131.3

⁷ “Primary contact” recreation is equivalent to California’s REC1 (water contact recreation) beneficial use

⁸ USEPA. Questions & Answers on: Antidegradation, August 1985.

⁹ USEPA, Letter w/attachment from Denise Keehneer (Director, Standards and Health Protection Division) to Derek Smithee, State of Oklahoma, September 5, 2008. (Cited as updated information in USEPA Water Quality Standards Handbook, Second Edition. EPA-823-B-12-002, Chapter 4)

¹⁰ USEPA. 63 FR 36752 (July 7, 1998)

¹¹ USEPA. 63 FR 36756 (July 7, 1998)

3.2 40 CFR 131.10(g) Factor Assessment

The Tidal Prism of the Santa Ana-Delhi Channel is incapable of supporting water contact recreation because:

Dams, diversions or other types of hydrologic modifications preclude the attainment of the use and it is not feasible to restore the water body to its original condition or to operate such modifications in a way that would result in the attainment of the use (see Section 3.2.1).

3.2.1 40 CFR 131.10 (g) Factor 4: Dams, diversions or other types of hydrologic modifications preclude the attainment of the use

3.2.1.1 Methods and Fieldwork

CDM (now CDM-Smith), serving as consultants to the SWQSTF, prepared a UAA Technical Report assessing and summarizing key attributes of the channel morphology, and other characteristics, such as adjacent land use, in August 2010.¹² Regional Board staff made reconnaissance visits to the Channel, including the Tidal Prism, on at least eight occasions from 2009 through 2013. Relevant reports on the history of the channel and its morphology were reviewed. These included the Orange County Environmental Management Agency “Draft Environmental Impact Report #527, Santa Ana-Delhi Channel System April 1993”, which described the physical conditions and the history of the Channel. In addition, RB Staff reviewed the report “Santa Ana-Delhi Channel Improvement Project” April 2012 by RBF Consulting which describes proposed modifications to the Tidal Prism and adjacent sections of Reach 1 (see below).

3.2.1.2 Findings and Conclusions

As described in Section 2, above, the Santa Ana Delhi Channel, including the Tidal Prism, has been modified significantly over time to accommodate flows and prevent flooding. Flood flows can be quite large and erosive, up to 14.62 fps as measured at the Bicycle Bridge¹³. Concrete or rip-rap lining predominates on the western bank of the Tidal Prism; the eastern bank is a heavily eroded, steep earthen bank. These physical modifications of the channel make access both difficult and hazardous. Further, the Tidal Prism is fenced and locked gates preclude access. Signs are posted to prohibit access. There are high quality and easily accessible recreational areas (Newport Bay (outside the Ecological Reserve) and Pacific Ocean beaches) in close proximity. According to OCPW staff, flooding in the Tidal Prism can be severe: at times, flood flows breach the concrete banks on the west and the earthen/rip-rapped bank on the east side of the channel. Erosional damage to the earthen slopes occurs as noted in Figure SAD-3 and the figure on the report cover. As reported in the April 2012 RBF report, to address this problem, OCPW is considering further modifications to widen the channel in the Tidal Prism from 20 to 60-129 feet. All channel slopes other than the existing concrete slope would be reinforced with rip rap. The newly widened channel would be fenced, gated, and posted to prohibit access.

¹² CDM Use Attainability Analysis Technical Report for the Santa Ana - Delhi Channel. August 2010

¹³ RBF Consulting. Santa Ana-Delhi Channel (FO1) Improvement Project. April 16, 2012

It is not feasible to restore the Tidal Prism to its original condition or to operate the modified channel so as to attain REC1 use. As just described, the magnitude and erosive nature of flood flows prompted the design of further channel modifications designed to prevent flooding and bank erosion. The nature of these modifications would continue to preclude REC1 use.

4.0 Existing Use Analysis

4.1 Regulatory Requirements

As described in Section 3.1, federal law and regulation create the rebuttable presumption that all surface waters support “swimmable” uses (REC1). A UAA is required to overcome this presumption and justify the decision not to designate a surface waterbody as REC1 (or to de-designate the REC1 use for that waterbody). However, states must designate REC1 if that use is “existing” or if the recreational use can be attained by implementing effluent limits required under sections 301 (b) and 306 of the Clean Water Act and by implementing cost-effective and reasonable Best management Practices for non-point source control.¹⁴ A formal analysis was conducted to evaluate these factors.

4.2 Evaluation of Actual Recreational Activities

4.2.1 Assessment Methods

This analysis consisted of numerous site visits by Regional Board and CDM staff, on-site weekend REC use surveys during the summers of 2006 and 2011, interviews of OCPW staff, Orange County Environmental Health staff and Nature Preserve Rangers, and a review of evidence of historical recreational use. As part of remote camera surveys conducted by the Task Force, a digital field observation camera was placed at the Bicycle Bridge, facing downstream toward the un-fenced areas of the Upper Newport Bay Ecological Reserve/Nature Preserve. This camera placement was chosen to provide an indication of recreational activity in an area that would be expected to receive more extensive use than the Tidal Prism, given its un-fenced, natural state.

4.2.2 Physical Surveys and Other Information

Task Force members visited the Tidal Prism six times in 2006 and five times in 2011 to conduct in person, on-site recreational use surveys. The Task Force members visited the site on weekends in the summer months and were to stay at least a half hour to record whatever recreational activity they observed. The Task Force members filled out a survey form to describe the number of people observed, if any, in the area, the weather, depth and clarity of the water and any evidence of recreational activity. The Task Force members who conducted the surveys reported seeing no individuals in the Tidal Prism waters or even inside the fences of the channel. The surveyors reported seeing numerous individuals crossing the Bicycle Bridge and walking along the trails in the Nature Preserve adjacent to the Ecological Reserve downstream of the Tidal Prism.

¹⁴ 40 CFR 131.10 (h)

During the one year period that the digital camera was in operation at the Bicycle Bridge, CDM made forty-one visits to the Tidal Prism to maintain the camera. As part of each of these visits, CDM looked both upstream from the Bicycle Bridge, from which the entire length of the Tidal Prism can be observed, and downstream. CDM logged observations including water depth, aesthetic quality of the water, and evidence of recreational activity. CDM did not observe anyone in the water or in the channel in the Tidal Prism during any of the 41 site visits.

The OCPW staff members who regularly conduct channel maintenance activities reported no observations of individuals in the water in the Tidal Prism or even inside the fencing. Likewise, Orange County Harbors, Beaches and Park Department Rangers patrolling the Upper Newport Bay Nature Preserve, which surrounds the Ecological Preserve, reported that they had never observed any individuals in the Tidal Prism channel.

Since the 1980's, Orange County Environmental Health (OCHCA) staff have collected water samples from the Bicycle Bridge to measure indicator bacteria. The OCHCA staff person ¹⁵ who has collected samples at the Bridge from about 1995 to the present on an almost weekly basis has reported that she has never seen anyone in the water in the Tidal Prism or even inside the fencing.

Finally, Regional Board staff has made at least eight visits to the Tidal Prism since the work of the Task Force began. Board staff has never seen anyone in the water or inside the fenced area of the channel during any visit.

4.2.3 Digital Field Observation Camera Recreation Survey

As noted above, a digital field observation camera was placed on the Bicycle Bridge, facing downstream toward the Upper Newport Bay Ecological Reserve/Nature Preserve, to obtain photographic evidence concerning recreational activity in the area. As also noted, the placement of the camera was downstream, rather than upstream into the Tidal Prism itself. The area of the Reserve in the camera field of vision (see Figure SAD-6) is unfenced, accessible, and, of course, close to the Bicycle Bridge/Tidal Prism. If the data collected showed that no water contact recreation occurred in this area, then it is very unlikely that such activity would occur in the Tidal Prism, given the channel characteristics and difficulty of access. (Note that Upper Newport Bay itself is designated REC1 and no changes to this designation are proposed.)

Table SAD-1 shows the duration of the survey and number of images collected at this location. An image was collected every fifteen minutes during daylight hours throughout the study duration unless signal strength fluctuations or equipment failures precluded collection and transmission. Images were not collected at night due to darkness.

¹⁵ Tami Halle, OCHCA. Personal Communication, 2011.

**Table SAD-1
Recreational Use Survey Duration and Number of Images Collected**

| Survey Location | Start Date | End Date | Number of Images |
|---|-------------------|-----------------|-------------------------|
| Upper Newport Bay (Bicycle Bridge) | 6/20/2005 | 6/6/2006 | 20,203 |

Any image containing a person or persons within channel fencing or boundaries was defined as a recreation event. If a person or persons were observed meeting the same conditions as above during the weekly on-site surveys, these were also considered events. An event could include one or more persons. For each event each person's activity and the estimated duration of the event were logged. If an activity was captured on only one image, an activity duration was reported as <30 minutes. Likewise, if the same activity by the same person or persons was observed in two consecutive fifteen-minute interval images, the duration was reported as <45 minutes.

Table SAD-2 presents a summary of the activity recorded at the Upper Newport Bay (Bicycle Bridge) camera site. The seasonal periods defined in southern California NPDES stormwater permits were used to categorize the observations by season: dry season (April 1 to September 30) and wet season (October 1 to March 31). Figure SAD-6 is a photograph of the camera view and Figure SAD-7 is an example of a photograph of observed activity. The full recreational use survey information can be found in the Recreational Use Survey Data Report – Santa Ana-Delhi Channel prepared for the Task Force by CDM in October 2006.

**Table SAD-2
Recreational Activity Recorded for the Santa Ana-Delhi Channel**

| Location | Number of Individuals | | | Estimated Duration (min) | Type of Activity |
|---|------------------------------|-------------------|-------------------|---------------------------------|----------------------------------|
| | Total | Dry Season | Wet Season | | |
| Upper Newport Bay (Bicycle Bridge) | 38 | 34 | 4 | 1,170 | Walking, Sitting, Boating |



Figure SAD-5

Photo of the Camera View at the Recreational Use Survey Location for Santa Ana-Delhi Channel (Upper Newport Bay). Camera is located on Bicycle Bridge facing away from the Tidal Prism. The Muth Interpretive Center is seen in the distance. (Source: Use Attainability Analysis Technical Report for the Santa Ana-Delhi Channel August 2010 by CDM)



Figure SAD-6

Photo of Activity at Recreational Use Survey Location for Santa Ana-Delhi Channel (Upper Newport Bay), 5/19/2006 12:30 (Source: Use Attainability Analysis Technical Report for Santa Ana-Delhi Channel Figure 3-8, August 2010 by CDM)

4.2.4 Evidence re Historical Recreational Use

To collect information regarding historical recreational use, CDM conducted inquiries to local jurisdictional agencies, online searches of California newspaper archives, databases (engineering and environmental trade journals), and search engines such Google News archive and Lexis-Nexis to identify any accounts or reference to recreational activities in the Santa Ana Delhi channel. No historical use information was identified from these searches.

4.2.5 Probable Future Use

Information regarding potential future recreational uses for the Santa Ana-Delhi Channel was obtained through discussions with local agencies and review of relevant county and municipal master plans. The Cities of Costa Mesa, Newport Beach, and Santa Ana were contacted, as was the County of Orange. Based on these inquiries, proposed planned uses were documented, as presented below.

According to the Orange County Flood Control District, facilities that could support water contact recreation use are not planned for the channel. Areas immediately adjacent to the Tidal Prism are included in the proposed Santa Ana Heights Regional Trail System and a trail has been planned to extend from Upper Newport Bay to the Orange County Fairgrounds. A part of this trail, located adjacent to the Santa Ana-Delhi Channel but not adjacent to the Tidal Prism, is already in use. The trail is separated from the Channel by fencing.

In 2011, planning staff for the County provided updated planning information. While there remain plans for riding, hiking and biking trails adjacent to the channel, there are no firm plans for implementation or funding. There are no plans to provide recreational facilities that would support water contact recreation in the channel itself.

4.2.6 Summary – Evidence of Past, Present or Probable Future Recreational Use

In summary, there is no evidence of actual or historic REC1 use in the proposed Tidal Prism. Multiple field surveys, information provided by public agency staff members who routinely visit the Tidal Prism and photographic data provided no evidence of current REC1 use. Nor is there any evidence of historic use of the Tidal Prism for REC1 use.

The lack of REC1 use in the Tidal Prism is a reflection of the various characteristics of the channel described above. In addition to the morphology of the channel, these include fencing and locked gates, signage to prohibit access, and the proximity of easily accessible and preferable recreational areas elsewhere (e.g., Newport Bay (outside the Ecological Reserve), ocean beaches). While it is theoretically possible to enter the Tidal Prism from Upper Newport Bay by paddling a canoe or kayak or perhaps swimming it is both very unlikely and unlawful. In the interest of protecting salt marsh habitat and sensitive species (e.g., light footed clapper rail) in the Ecological Reserve, the California Department of Fish and Wildlife has posted signage to prohibit entry to the Reserve and the Channel. Beyond legal restrictions and other bars to access (fencing, locked gates, steep eroded slopes, etc.), the conditions of the Tidal Prism simply make recreating in the channel very unappealing. The channel is very narrow and, at low tide during dry weather, the water is generally

shallow. There is no beach or shoreline to access and the slopes and bottom consist of clayey soils rich with decomposing organic material. Sting rays are noted in abundance in the Channel, which would likely discourage individuals from swimming or wading in the channel's murky waters. When and if the proposed widening of the Tidal Prism is completed, it is expected that the area will be constructed to support a shallow water salt marsh habitat in most sections. It is very likely that listed wildlife species may use the area, which would result in continued CDFW restrictions on public access. Such changed circumstances can be considered as part of the Basin Plan Triennial Review.

4.3 Evaluation of Ambient Water Quality

4.3.1 Assessment Methods

The Orange County Health Care Agency (OCHCA) has performed water quality monitoring of the Tidal Prism of the Santa Ana-Delhi Channel at the Bicycle Bridge since 1985. This location is noted by the OCHCA as "Santa Ana-Delhi Channel at Back Bay." From 1985 to 2008, samples were collected at this location and analyzed for fecal coliform approximately weekly, providing 3, 4 or 5 samples per month. The fecal coliform data are presented in Appendix 1.

Since 2008, the OCHCA has sampled at the Bicycle Bridge for enterococcus. Weekly monitoring data for enterococcus collected from January 4, 2010 to November 21, 2011 were evaluated to determine antidegradation targets for the proposed Tidal Prism section of the channel. See the January 12, 2012 Staff Report, Section 5.2 for a discussion of REC2 antidegradation targets for the Tidal Prism.

4.3.2 Findings and Conclusions

For the fecal coliform data collected during 1985-2008, when 5 or more samples were collected in a 30 day period (calendar month, not rolling 30 day periods), a geometric mean (geomean) was calculated and compared to the existing REC1 fecal coliform objective (200 organisms/100mL based on five or more samples/30 day period). Where insufficient data were available to calculate geomeans, the fecal coliform data were compared generally to that part of the existing REC1 fecal coliform objective that specifies that not more than 10% of the samples exceed 400 organisms/100mL for any 30-day period.

These fecal coliform data indicate that the existing fecal coliform objectives are consistently exceeded, with minor exception. Fifty-six (56) geomean fecal coliform values were calculated and all but one exceeded the fecal coliform geomean objective of 200 organisms/100mL. (See also CDM SAD Technical Report, Figure 3-16). Approximately two-thirds of the grab sample results for fecal coliform exceeded the 400 fecal coliform per 100 mL objective. (See also CDM SAD Technical Report, Figure 3-15).

Using the enterococcus data collected at the Bicycle Bridge by OCHCA from January 4, 2010 to November 21, 2011, Regional Board calculated a geomean of 439 per 100mL as the recommended antidegradation target. (The calculation methodology is described in Section 5.2 of the January 12, 2012 staff report for the recreation standards amendments.) This geomean exceeds the USEPA's

enterococcus geometric mean criterion of 35 per 100 mL for marine waters. See Appendix 2 for table of enterococcus data.

In summary, the monitoring data demonstrate that applicable water quality objectives for REC1 are consistently exceeded.

4.3.3 Probable Future Water Quality

BMPs, including inspections for illegal discharges/illicit connections and public education, are being implemented pursuant to the Orange County Urban Storm Water Runoff permit (MS4 Permit). The area tributary to the Santa Ana-Delhi Channel is sewerred and septic tanks are not considered a source of bacteria inputs. Sewer system leaks have not been demonstrated to be a contributor to bacteria densities in the Channel. OCPW has conducted an extensive review of Best Management Practices (BMPs) for bacteria control (see Table SAD-3). Very few BMPs provide the level of effectiveness required to achieve consistent compliance with bacteria water quality standards. Those BMPs that are most effective (e.g. percolation ponds and artificial wetlands) require large amounts of land that is not available in the fully-developed watershed draining to the Santa Ana-Delhi Channel. Given the constraints of land availability, significant water quality improvement that results in consistent compliance with bacteria quality objectives as the result of BMP implementation is likely to be highly problematic. As part of the recreation standards amendments for inland waters, antidegradation targets for enterococcus were calculated for the Tidal Prism by Regional Board staff (see discussion in Section 5.2 of the January 12, 2012 staff report). The intent of these targets and accompanying monitoring requirements is to assure that water quality conditions do not degrade in the Tidal Prism should REC1 not be designated and, accordingly, REC1 objectives not apply. A diversion is being planned near the upstream end of the Tidal Prism to address the indicator bacteria and other established TMDLs and improve quality conditions in both the immediate and downstream receiving waters. See further discussion in Section 6.2.

Imposing stringent effluent limitations pursuant to Section 301(b) and 306 of the Clean Water Act would have no effect on water quality in the Tidal Prism because there are no municipal publicly-owned treatment works (POTW) or industrial wastewater discharges to the Santa Ana-Delhi Channel.

Most important, even if water quality was in compliance with the bacterial objectives, REC1 use would continue to be precluded by the same hydrologic modification constraints that exist today. To protect public safety, access to the Channel is prohibited. The entire length of the Channel, including the Tidal Prism, is fenced and gated to deny entry. Warning signs are displayed stating that access is prohibited. Regular site visits by maintenance crews help ensure compliance. For these reasons, the REC1 use cannot be attained by imposing more stringent effluent limitations or requiring additional BMPs to control non-point sources.

Table SAD-3: Evaluation of BMP Alternatives for Effective Control of Bacteria

| Bacteria BMP Type | Parameter | Mean Influent #/100 mL | Mean Effluent #/100 mL | n | Percent Removal | Source |
|---|----------------|------------------------|------------------------|----|-----------------|---------------------------------------|
| Water Treatment BMPs | | | | | | |
| Wet Basins (Retention ponds, wet ponds, wet extended detention ponds, stormwater ponds, retention basins). Retains permanent pool. | FC | 11700 | 100 | NR | 99 | CalTrans (2004) study in SoCal |
| | FC | 4400 | 20 | NR | 99 | CalTrans (2004) study in SoCal |
| | FC | 1929 | 515 | 9 | 73 | BMP dB; Fremont, CA |
| | FC | 58 | 5 | 24 | 91 | BMP dB; Largo, FL |
| | FC | 4231 | 2475 | 16 | 41.5 | BMP dB; Valhalla, NY |
| | FC | NR | 1779 | 10 | 90 | Schueler (2000); ON |
| | FC | NR | 2858 | 10 | 64 | Schueler (2000); ON |
| | <i>E. coli</i> | NR | NR | 10 | 86 | Schueler (2000); ON |
| | <i>E. coli</i> | NR | NR | 10 | 51 | Schueler (2000); ON |
| | FC | 152 | 63 | 84 | 58 | Mallin et al. (2002); NC |
| Dry Basins (Dry ponds, detention or extended detention basins or ponds). Designed to empty within several days. | FC | 900 | 2000 | NR | -122 | CalTrans (2004) study in SoCal; storm |
| | FC | 6700 | 7500 | NR | -12 | CalTrans (2004) study in SoCal; storm |
| | FC | 27 | 27 | 8 | 0 | USGS (2004) study in USVI |
| | FC | 3412 | 724 | 35 | 79 | Harper et al. (1999) study in FL |
| | <i>E. coli</i> | 563 | 515 | 18 | 9 | MSAR (2009) |
| | FC | 957 | 738 | 18 | 23 | MSAR (2009) |
| | <i>E. coli</i> | 149 | 204 | 12 | -37 | MSAR (2009) |
| | FC | 380 | 490 | 12 | -29 | MSAR (2009) |
| Constructed Wetlands (Stormwater wetlands, wetland basins, shallow marshes, extended detention wetlands). "Essentially shallow wet basins." | FC | 33.8 | 7.4 | 5 | 78 | Hinds et al. (2004); Columbus |
| | FC | 760 | 80 | 10 | 89 | LN & COO (2004); Laguna Niguel |
| | FC | 1915 | 116 | 9 | 94 | LN & COO (2004); Laguna Niguel |
| | FC | 5178 | 101 | 12 | 98 | LN & COO (2004); Laguna Niguel |
| | <i>E. coli</i> | 4163 | 27 | 10 | 99 | LN & COO (2004); Laguna Niguel |
| | <i>E. coli</i> | 1897 | 107 | 9 | 94 | LN & COO (2004); Laguna Niguel |

| Table SAD-3 : Evaluation of BMP Alternatives for Effective Control of Bacteria (Continued) | | | | | | |
|--|----------------|----------------------|-----------------------|----|---|------------------------------------|
| Bacteria BMP Type | Parameter | Mean Influent #100mL | Mean Effluent #100 mL | n | Percent Removal | Source |
| Water Treatment BMPs | | | | | | |
| | <i>E. coli</i> | 630 | 73 | 9 | 88 | LN & COO (2004); Laguna Niguel |
| Media Filters | FC | 5800 | 1400 | NR | 76 | CalTrans (2004) study in SoCal |
| | FC | NR | 18528 | | -85 | City of Austin (1997) |
| | FC | NR | NR | | 36 | Glick et al. (1998); Austin, TX |
| Disinfection (UV, ozone, chlorine) | FC | 32800** | 16** | | 99.9% (inversely proportional to turbidity) | **County of Orange (2008) |
| Diversion | | | | | 100% of diverted fraction | RBF (2003) |
| Vegetated Swales or Channels (Grassed channels, dry swales, retention swales). Only includes those features with little to moderate soil infiltration. | FC | 386 | 459 | NR | -19 | BMP dB; Altadena, Caltrans (2004) |
| | FC | 84853 | 47 | NR | 99.9 | BMP dB; Carlsbad, Caltrans (2004) |
| | FC | 490 | 1122 | NR | -129 | BMP dB; Cerritos, Caltrans (2004) |
| | <i>E. coli</i> | 20651 | 717 | 18 | 97 | MSAR (2009); dry |
| | FC | 16293 | 675 | 18 | 96 | MSAR (2009); dry |
| | <i>E. coli</i> | 2448 | 2904 | 12 | -19 | MSAR (2009); wet |
| | FC | 3954 | 4196 | 12 | -6 | MSAR (2009); wet |
| | FC | 65 | 105 | NR | -62 | BMP dB; Downey, Caltrans (2004) |
| | FC | 9460 | 9168 | NR | 3 | BMP dB; Lakewood, Caltrans (2004) |
| | FC | 1366 | 239 | NR | 82 | BMP dB; Vista, CA, Caltrans (2004) |
| Volume Reduction BMPs | | | | | | |
| Infiltration Basins & Trenches | FC | 80-5000 | <23 | 9 | >99 | LASGRWC (2005) |
| | <i>E. coli</i> | 20-1300 | <6.9 | 9 | >99 | |
| | FC | 500 | ND-800 | 8 | | |
| | FC | ND-13000 | 11-110 | 8 | | |
| | <i>E. coli</i> | ND-120 | ND | 8 | >99 | |

5.0 Protection of Downstream Uses

5.1 Regulatory Requirements

In designating the uses of a water body, and in considering changes to those designations, states must take into consideration the water quality standards of downstream waters and ensure that water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters¹⁶. As previously described, the Santa Ana-Delhi Channel is tributary to Upper Newport Bay, which is designated both REC1 and REC2. No changes to these designations are proposed. These designated beneficial uses of Upper Newport Bay must continue to be protected.

5.2 Compliance Strategies

As described above (Section 4.3.3), BMPs are being employed to reduce fecal indicator bacteria in the Santa Ana-Delhi Channel and downstream receiving waters. Antidegradation bacteria indicator targets have been identified to prevent water quality degradation. Additional BMPs will be implemented as necessary in conformance with established TMDLs and the Orange County Areawide Urban Storm Water Runoff NPDES Permit (MS4 Permit).

Currently a diversion facility is being designed to capture and divert low flow from the Santa Ana-Delhi Channel¹⁷. The diversion, sponsored by the cities of Newport Beach, Costa Mesa, and Santa Ana, is planned to address surface water quality in accordance with the MS4 Permit and established TMDLs for Upper Newport Bay, including the fecal coliform and nutrient TMDLs. The diversion would be constructed near the upstream end of the Tidal Prism and just downstream of the concrete apron of the Mesa Drive road crossing and culvert. The diversion would remove low flow to be pumped into the Orange County Sanitation District (OCSD) sanitary sewer system and/or to be used for golf course irrigation. It is anticipated that the diversion will improve the water quality of downstream waters by removing from inflow waters not only pathogens but also nutrients, which have been found to support regrowth of pathogen microscopic organisms.¹⁸ See Figure SAD-9.

¹⁶ 40 CFR 131.10(b)

¹⁷ TMDL Compliance Alternatives Santa Ana Delhi Watershed, URS May 22, 2012

¹⁸ Recent studies have shown that nutrients at excessive levels in urban runoff have been found to encourage regrowth of fecal indicator bacteria in streambed sediments and salt marshes (Grant et al. 2001 and Litton et al. 2010).



Figure SAD-7. Santa Ana Delhi Channel Mesa Drive/Irvine Avenue Proposed Diversion Site Plan. The diversion would divert low flows into the sanitary sewer or to be used as irrigation for the adjacent golf course.
 URS August 2012

6.0 Triennial Review Requirements

6.1 Regulatory Requirements

Section 101(a)(2) of the Clean Water Act states: "it is the national goal that wherever attainable, an interim goal of water quality which provides for ... recreation in and on the water be achieved..." Federal regulations [40 CFR 131.6(a)] requires states to enact water quality standards and "use designations consistent with the provisions of section 101(a)(2)."

A Use Attainability Analysis (UAA) must be conducted when "the State designates or has designated uses that do not include the uses specified in section 101(a)(2) of the Act" [40 CFR 131.10(j)]. In addition, in accordance with 40 CFR 131.20(a)(1): "Any water body segment with water quality standards that do not include the uses specified in section 101(a)(2) of the Act shall be re-examined every three years to determine if any new information has become available. If such new information indicates that the uses specified in section 101(a)(2) of the Act are attainable, the State shall revise its standards accordingly."

6.2 Reassessment Procedures

If the Tidal Prism of the Santa Ana-Delhi Channel is not designated REC1, the Regional Board will re-examine this decision every three years as part of the Triennial Review process. The focus of this review will be to determine whether there has been any substantial change to the factors supporting the original determination. However, it is not necessary to conduct an entirely new UAA as part of this review.

In preparation for the Triennial Review, Regional Board staff will visit the Tidal Prism of the Santa Ana-Delhi Channel to confirm that the existing hydromodifications and access restrictions remain in place and unaltered. In addition, staff will request the Orange County Flood Control District to provide data summarizing the flow diversions from the Tidal Prism to the Orange County Sanitation District and or golf course. Finally, the Regional Board will solicit any new information concerning actual or potential recreational use of the Santa Ana-Delhi Channel when public notice is given for the Triennial Review.

If new evidence indicates that recreation in or on the water may be attainable because the factors previously precluding the use have changed, the Regional Board may elect to: 1) designate Santa Ana-Delhi Channel Tidal Prism for REC1; or 2) require that a new UAA be conducted in order to determine whether the Santa Ana-Delhi Channel should continue not to be de-designated REC1. The review may also consider whether circumstances have changed such that there should be reconsideration of the REC2 designation.

The Regional Board retains the authority and discretion to re-examine the issue of appropriate use designations for the Santa Ana-Delhi Channel more frequently than once every three years when warranted.

7.0 References

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- Water Quality Association. The "Glossary of Salt Water" classifies ocean waters as containing 30,000 to 40,000 ppm TDS (i.e., 3,000 to 4,000 mg/L).

Appendix 1 – Fecal Coliform Data for the Santa Ana Delhi Channel Tidal Prism ¹⁹

| Table 3-3²⁰ | | | | |
|---|------------------------------|---------------------------|----------------------------|----------------------------|
| Summary of Monthly Fecal Coliform: Santa Ana Delhi Channel at Back Bay 1985-2008 | | | | |
| Month and Year | Numbers of Samples Collected | Minimum Value (MPN/100ml) | Maximum Value (MPN /100ml) | Geometric Mean (MPN/100ml) |
| Fecal Coliform | | | | |
| 12/1985 | 1 | 700 | 700 | |
| 1/1986 | 4 | 1,300 | 5,000 | |
| 2/1986 | 4 | 110 | 7,000 | |
| 3/1986 | 5 | 400 | 30,000 | 2,862 |
| 4/1986 | 4 | 200 | 50,000 | |
| 5/1986 | 4 | 200 | 1,300 | |
| 6/1986 | 5 | 200 | 160,000 | 1,542 |
| 7/1986 | 4 | 800 | 22,000 | |
| 8/1986 | 4 | 80 | 200 | |
| 9/1986 | 5 | 20 | 17,000 | 422 |
| 10/1986 | 4 | 4,000 | 160,000 | |
| 11/1986 | 3 | 20 | 1,700 | |
| 12/1986 | 5 | 400 | 160,000 | 7,767 |
| 1/1987 | 4 | 200 | 1,300 | |
| 2/1987 | 4 | 300 | 7,000 | |
| 3/1987 | 5 | 200 | 24,000 | 842 |
| 4/1987 | 4 | 200 | 200 | |
| 5/1987 | 4 | 200 | 700 | |
| 6/1987 | 5 | 20 | 400 | 145 |
| 7/1987 | 3 | 200 | 400 | |
| 8/1987 | 4 | 80 | 2,300 | |
| 9/1987 | 4 | 400 | 3,000 | |
| 10/1987 | 4 | 800 | 160,000 | |
| 11/1987 | 5 | 500 | 2,300 | 933 |
| 12/1987 | 4 | 20 | 7,000 | |
| 1/1988 | 4 | 20 | 2,400 | |
| 2/1988 | 5 | 20 | 8,000 | 264 |

¹⁹ Samples collected by Orange County Environmental Department at the Bicycle Bridge.

²⁰ Source: UAA Technical Report for Santa Ana Delhi by CDM, August 2010

Appendix 1 – Fecal Coliform Data for the Santa Ana Delhi Channel Tidal Prism (continued)

| Table 3-3 | | | | |
|---|------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| Summary of Monthly Fecal Coliform at the Santa Ana Delhi Channel at Back Bay 1985-2008 | | | | |
| Fecal Coliform | | | | |
| Month and Year | Number of Samples Collected | Minimum Value (MPN/100ml) | Maximum Value (MPN /100ml) | Geometric Mean (MPN/100ml) |
| 3/1988 | 3 | 20 | 500 | |
| 4/1988 | 4 | 80 | 8,000 | |
| 5/1988 | 1 | 20 | 20 | |
| 6/1988 | 5 | 40 | 1,100 | 354 |
| 7/1988 | 4 | 400 | 800 | |
| 8/1988 | 5 | 600 | 50,000 | 3201 |
| 9/1988 | 4 | 1,300 | 3,000 | |
| 10/1988 | 5 | 800 | 3,000 | 1739 |
| 11/1988 | 4 | 80 | 160,000 | |
| 12/1988 | 2 | 1,300 | 2,400 | |
| 1/1989 | 4 | 800 | 13,000 | |
| 2/1989 | 3 | 3,000 | 7,000 | |
| 3/1989 | 3 | 800 | 5,000 | |
| 4/1989 | 3 | 2,200 | 8,000 | |
| 5/1989 | 5 | 1,300 | 22,000 | 5,430 |
| 6/1989 | 3 | 300 | 50,000 | |
| 7/1989 | 3 | 2,200 | 17,000 | |
| 8/1989 | 4 | 5,000 | 50,000 | |
| 9/1989 | 2 | 11,000 | 160,000 | |
| 10/1989 | 4 | 110 | 30,000 | |
| 11/1989 | 4 | 2,300 | 160,000 | |
| 12/1989 | 3 | 800 | 13,000 | |
| 1/1990 | 4 | 2,300 | 5,000 | |
| 2/1990 | 3 | 80 | 3,000 | |
| 3/1990 | 3 | 7,000 | 22,000 | |
| 4/1990 | 4 | 130 | 5,000 | |
| 5/1990 | 4 | 300 | 160,000 | |
| 6/1990 | 4 | 1,700 | 160,000 | |

Appendix 1 – Fecal Coliform Data for the Santa Ana Delhi Channel Tidal Prism (continued)

| Table 3-3 | | | | |
|---|------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| Summary of Monthly Fecal Coliform at the Santa Ana Delhi Channel at Back Bay 1985-2008 | | | | |
| Fecal Coliform | | | | |
| Month and Year | Number of Samples Collected | Minimum Value (MPN/100ml) | Maximum Value (MPN /100ml) | Geometric Mean (MPN/100ml) |
| 7/1990 | 4 | 700 | 13,000 | |
| 8/1990 | 3 | 40 | 300 | |
| 9/1990 | 4 | 130 | 800 | |
| 10/1990 | 5 | 300 | 5,000 | 710 |
| 11/1990 | 3 | 70 | 30,000 | |
| 12/1990 | 3 | 300 | 3,000 | |
| 1/1991 | 3 | 270 | 1,100 | |
| 2/1991 | 3 | 500 | 1,300 | |
| 3/1991 | 2 | 3,000 | 5,000 | |
| 4/1991 | 2 | 1,400 | 13,000 | |
| 5/1991 | 1 | 800 | 800 | |
| 6/1991 | 1 | 300 | 300 | |
| 7/1991 | 3 | 800 | 160,000 | |
| 8/1991 | 1 | 5,000 | 5,000 | |
| 10/1991 | 4 | 500 | 160,000 | |
| 11/1991 | 4 | 800 | 90,000 | |
| 12/1991 | 2 | 20 | 16,000 | |
| 4/1992 | 1 | 300 | 300 | |
| 6/1992 | 2 | 110 | 2,300 | |
| 8/1992 | 1 | 30,000 | 30,000 | |
| 9/1992 | 2 | 170 | 220 | |
| 1/1993 | 1 | 230 | 230 | |
| 8/1993 | 1 | 16,000 | 16,000 | |
| 9/1993 | 2 | 800 | 16,000 | |
| 10/1993 | 4 | 230 | 5,000 | |
| 11/1993 | 3 | 3,000 | 5,000 | |
| 12/1993 | 2 | 5,000 | 13,000 | |
| 1/1994 | 5 | 80 | 1,100 | 280 |

Appendix 1 – Fecal Coliform Data for the Santa Ana Delhi Channel Tidal Prism (continued)

| Table 3-3 Summary of Monthly Fecal Coliform at the Santa Ana Delhi Channel at Back Bay 1985-2008 | | | | |
|---|------------------------------|--|---|---|
| Fecal Coliform | | | | |
| Month and Year | Number of Samples | Minimum Value (MPN/100ml) | Maximum Value (MPN /100ml) | Geometric Mean (MPN/100ml) |
| 2/1994 | 3 | 500 | 8,000 | |
| 3/1994 | 5 | 500 | 24,000 | 2,429 |
| 4/1994 | 3 | 1,300 | 160,000 | |
| 5/1994 | 3 | 1,100 | 5,000 | |
| 8/1994 | 5 | 170 | 3,000 | 723 |
| 9/1994 | 3 | 170 | 2,400 | |
| 10/1994 | 4 | 130 | 1,400 | |
| 11/1994 | 5 | 230 | 16,000 | 3,506 |
| 12/1994 | 3 | 800 | 16,000 | |
| 1/1995 | 1 | 3,000 | 3,000 | |
| 6/1997 | 4 | 800 | 16,000 | |
| 7/1997 | 5 | 700 | 5,000 | 1,820 |
| 8/1997 | 4 | 230 | 1,700 | |
| 9/1997 | 5 | 700 | 90,000 | 4,169 |
| 10/1997 | 5 | 300 | 50,000 | 2,966 |
| 11/1997 | 3 | 3,000 | 8,000 | |
| 12/1997 | 5 | 230 | 13,000 | 2,182 |
| 1/1998 | 4 | 170 | 2,300 | |
| 2/1998 | 2 | 9,000 | 13,000 | |
| 3/1998 | 5 | 300 | 13,000 | 1,175 |
| 4/1998 | 4 | 500 | 3,000 | |
| 5/1998 | 4 | 500 | 5,000 | |
| 6/1998 | 4 | 80 | 800 | |
| 7/1998 | 5 | 130 | 17,000 | 1,276 |
| 8/1998 | 5 | 500 | 5,000 | 1,075 |
| 9/1998 | 4 | 700 | 5,000 | |
| 10/1998 | 4 | 230 | 160,000 | |
| 11/1998 | 4 | 529 | 24,192 | |

Appendix 1 – Fecal Coliform Data for the Santa Ana Delhi Channel Tidal Prism (continued)

| Table 3-3 Summary of Monthly Fecal Coliform at the Santa Ana Delhi Channel at Back Bay 1985-2008 | | | | |
|---|---|--|---|---|
| Fecal Coliform | | | | |
| Month and Year | Numbers of Samples Collected | Minimum Value (MPN/100ml) | Maximum Value (MPN /100ml) | Geometric Mean (MPN/100mL) |
| 12/1998 | 5 | 100 | 57,940 | 8,676 |
| 1/1999 | 4 | 10,462 | 24,192 | |
| 2/1999 | 4 | 74 | 241,920 | |
| 3/1999 | 5 | 100 | 111,985 | 1,848 |
| 4/1999 | 4 | 7,490 | 92,080 | |
| 5/1999 | 4 | 110 | 141,360 | |
| 6/1999 | 5 | 52 | 46,110 | 417 |
| 7/1999 | 4 | 100 | 241,920 | |
| 8/1999 | 5 | 410 | 2,098 | 808 |
| 9/1999 | 4 | 637 | 24,192 | |
| 10/1999 | 4 | 187 | 24,192 | |
| 11/1999 | 5 | 108 | 24,192 | 2,295 |
| 12/1999 | 4 | 52 | 5,794 | |
| 1/2000 | 4 | 74 | 24,192 | |
| 2/2000 | 5 | 10 | 12,033 | 928 |
| 3/2000 | 4 | 98 | 24,192 | |
| 4/2000 | 4 | 121 | 9,804 | |
| 5/2000 | 4 | 173 | 327 | |
| 6/2000 | 4 | 181 | 211 | |
| 7/2000 | 4 | 228 | 723 | |
| 8/2000 | 6 | 20 | 24,192 | 312 |
| 9/2000 | 4 | 379 | 8,164 | |
| 10/2000 | 4 | 145 | 359 | |
| 11/2000 | 5 | 109 | 855 | 210 |
| 12/2000 | 4 | 146 | 536 | |
| 1/2001 | 5 | 187 | 24,192 | 751 |
| 2/2001 | 4 | 110 | 5,172 | |
| 3/2001 | 4 | 187 | 19,863 | |

Appendix 1 – Fecal Coliform Data for the Santa Ana Delhi Channel Tidal Prism (continued)

| Table 3-3 Summary of Monthly Fecal Coliform at the Santa Ana Delhi Channel at Back Bay 1985-2008 | | | | |
|---|------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| Fecal Coliform | | | | |
| Month and Year | Number of Samples Collected | Minimum Value (MPN/100ml) | Maximum Value (MPN /100ml) | Geometric Mean (MPN/100ml) |
| 4/2001 | 5 | 340 | 3,200 | 845 |
| 5/2001 | 4 | 140 | 880 | |
| 6/2001 | 4 | 130 | 500 | |
| 7/2001 | 5 | 800 | 6,600 | 1,572 |
| 8/2001 | 4 | 440 | 3,200 | |
| 9/2001 | 4 | 400 | 3,800 | |
| 10/2001 | 5 | 870 | 12,000 | 2,466 |
| 11/2001 | 4 | 12,000 | 12,000 | |
| 12/2001 | 4 | 640 | 12,000 | |
| 1/2002 | 5 | 180 | 15,400 | 629 |
| 2/2002 | 4 | 760 | 2,000 | |
| 3/2002 | 4 | 130 | 18,800 | |
| 4/2002 | 5 | 280 | 2,200 | 725 |
| 5/2002 | 4 | 400 | 930 | |
| 6/2002 | 4 | 340 | 1,000 | |
| 7/2002 | 5 | 320 | 5,000 | 940 |
| 8/2002 | 4 | 400 | 2,000 | |
| 9/2002 | 5 | 220 | 7,600 | 937 |
| 10/2002 | 4 | 570 | 13,000 | |
| 11/2002 | 4 | 880 | 6,000 | |
| 12/2002 | 4 | 330 | 2,800 | |
| 1/2003 | 4 | 200 | 340 | |
| 2/2003 | 4 | 70 | 1,190 | |
| 3/2003 | 4 | 380 | 1,010 | |
| 4/2003 | 4 | 230 | 800 | |
| 5/2003 | 4 | 530 | 3,800 | |
| 6/2003 | 5 | 220 | 4,600 | 1,677 |
| 7/2003 | 4 | 600 | 2,400 | |

Appendix 1 – Fecal Coliform Data for the Santa Ana Delhi Channel Tidal Prism (continued)

| Table 3-3 | | | | |
|---|------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| Summary of Monthly Fecal Coliform at the Santa Ana Delhi Channel at Back Bay 1985-2008 | | | | |
| Fecal Coliform | | | | |
| Month and Year | Number of Samples Collected | Minimum Value (MPN/100ml) | Maximum Value (MPN /100ml) | Geometric Mean (MPN/100ml) |
| 8/2003 | 4 | 130 | 7,800 | |
| 9/2003 | 5 | 10 | 2,000 | 284 |
| 10/2003 | 4 | 240 | 460 | |
| 11/2003 | 3 | 250 | 1,000 | |
| 12/2003 | 4 | 120 | 7,200 | |
| 1/2004 | 4 | 60 | 15,000 | |
| 2/2004 | 4 | 100 | 4,200 | |
| 3/2004 | 5 | 140 | 270 | 203 |
| 4/2004 | 4 | 110 | 5,600 | |
| 5/2004 | 4 | 80 | 270 | |
| 6/2004 | 6 | 250 | 1,000 | 417 |
| 7/2004 | 4 | 140 | 1,000 | |
| 8/2004 | 5 | 170 | 5,000 | 484 |
| 9/2004 | 4 | 310 | 1,000 | |
| 10/2004 | 3 | 250 | 7,000 | |
| 11/2004 | 5 | 430 | 25,000 | 3,502 |
| 12/2004 | 3 | 240 | 290 | |
| 1/2005 | 5 | 260 | 19,000 | 1,679 |
| 2/2005 | 4 | 570 | 12,000 | |
| 3/2005 | 3 | 320 | 520 | |
| 4/2005 | 2 | 470 | 13,000 | |
| 5/2005 | 5 | 100 | 760 | 316 |
| 6/2005 | 4 | 140 | 190 | |
| 7/2005 | 3 | 420 | 4,600 | |
| 8/2005 | 3 | 570 | 18,000 | |
| 9/2005 | 3 | 400 | 1,010 | |
| 10/2005 | 4 | 390 | 2,600 | |
| 11/2005 | 4 | 560 | 1,170 | |

Appendix 1 – Fecal Coliform Data for the Santa Ana Delhi Channel Tidal Prism (continued)

| Table 3-3 Summary of Monthly Fecal Coliform at the Santa Ana Delhi Channel at Back Bay 1985-2008 | | | | |
|---|--|--|---|---|
| Fecal Coliform | | | | |
| Month and Year | Number of Samples Collected | Minimum Value (MPN/100ml) | Maximum Value (MPN /100ml) | Geometric Mean (MPN/100ml) |
| 12/2005 | 4 | 250 | 3,800 | |
| 1/2006 | 5 | 70 | 14,000 | 362 |
| 2/2006 | 4 | 130 | 3,600 | |
| 3/2006 | 4 | 200 | 440 | |
| 4/2006 | 4 | 150 | 4,600 | |
| 5/2006 | 5 | 390 | 15,000 | 2,215 |
| 6/2006 | 4 | 390 | 2,000 | |
| 7/2006 | 4 | 510 | 8,200 | |
| 8/2006 | 4 | 1,000 | 2,800 | |
| 9/2006 | 3 | 900 | 7,600 | |
| 10/2006 | 5 | 700 | 5,000 | 2,249 |
| 11/2006 | 3 | 310 | 1,030 | |
| 12/2006 | 4 | 590 | 21,400 | |
| 1/2007 | 5 | 210 | 490 | 267 |
| 2/2007 | 4 | 180 | 12,000 | |
| 3/2007 | 4 | 80 | 17,000 | |
| 4/2007 | 5 | 50 | 5,400 | 478 |
| 5/2007 | 3 | 280 | 530 | |
| 6/2007 | 4 | 100 | 1,650 | |
| 7/2007 | 5 | 240 | 390 | 316 |
| 8/2007 | 4 | 240 | 2,200 | |
| 9/2007 | 2 | 480 | 4,000 | |
| 10/2007 | 5 | 290 | 3,600 | 1,412 |
| 11/2007 | 4 | 380 | 11,000 | |
| 12/2007 | 4 | 100 | 2,000 | |
| 1/2008 | 5 | 150 | 18,000 | 1,265 |
| 2/2008 | 4 | 40 | 720 | |
| 3/2008 | 4 | 40 | 270 | |

Appendix 1 – Fecal Coliform Data for the Santa Ana Delhi Channel Tidal Prism (continued)

| Table 3-3 | | | | |
|---|------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| Summary of Monthly Fecal Coliform at the Santa Ana Delhi Channel at Back Bay 1985-2008 | | | | |
| Fecal Coliform | | | | |
| Month and Year | Number of Samples Collected | Minimum Value (MPN/100ml) | Maximum Value (MPN /100ml) | Geometric Mean (MPN/100ml) |
| 4/2008 | 4 | 50 | 200 | |
| 5/2008 | 4 | 80 | 2,000 | |
| 6/2008 | 4 | 130 | 2,200 | |
| 7/2008 | 4 | 120 | 560 | |
| 8/2008 | 3 | 190 | 300 | |
| 9/2008 | 4 | 100 | 10,000 | |
| 10/2008 | 4 | 170 | 390 | |
| 11/2008 | 3 | 130 | 290 | |
| 12/2008 | 5 | 390 | 14,000 | 1,840 |

Appendix 2
Monitoring Results for Enterococcus
Santa Ana-Delhi Channel
Newport Beach Back Bay at Bicycle Bridge
Data Provided by: OC Health Care Agency-
Environmental Health Division

| Date | Enterococcus (CFU/100 mL) |
|-----------|---------------------------|
| 1/4/2010 | 70 |
| 1/11/2010 | 160 |
| 1/25/2010 | 400 |
| 2/1/2010 | 400 |
| 2/8/2010 | 800 |
| 2/16/2010 | 56 |
| 2/22/2010 | 8400 |
| 3/1/2010 | 3200 |
| 3/8/2010 | 1000 |
| 3/15/2010 | 120 |
| 3/22/2010 | 150 |
| 3/29/2010 | 70 |
| 4/5/2010 | 208 |
| 4/19/2010 | 289 |
| 4/26/2010 | 261 |
| 5/3/2010 | 98 |
| 5/10/2010 | 170 |
| 5/17/2010 | 240 |
| 5/24/2010 | 150 |
| 6/1/2010 | 400 |
| 6/7/2010 | 800 |
| 6/14/2010 | 240 |
| 6/21/2010 | 200 |
| 6/28/2010 | 230 |
| 7/6/2010 | 1000 |
| 7/12/2010 | 354 |
| 7/19/2010 | 2200 |
| 7/26/2010 | 400 |
| 8/2/2010 | 190 |
| 8/9/2010 | 140 |
| 8/16/2010 | 291 |
| 8/23/2010 | 96 |
| 8/30/2010 | 82 |

| Date | Enterococcus (CFU/100 mL) |
|------------|---------------------------|
| 9/7/2010 | 400 |
| 9/13/2010 | 60 |
| 9/20/2010 | 2000 |
| 9/27/2010 | 110 |
| 10/4/2010 | 1000 |
| 10/12/2010 | 800 |
| 10/18/2010 | 6800 |
| 10/26/2010 | 1000 |
| 11/1/2010 | 1000 |
| 11/8/2010 | 19000 |
| 11/15/2010 | 198 |
| 11/22/2010 | 2000 |
| 11/29/2010 | 2200 |
| 12/6/2010 | 19000 |
| 12/15/2010 | 1000 |
| 12/27/2010 | 2400 |
| 1/4/2011 | 2000 |
| 1/10/2011 | 180 |
| 1/18/2011 | 42 |
| 1/24/2011 | 64 |
| 1/31/2011 | 12000 |
| 2/7/2011 | 234 |
| 2/16/2011 | 11000 |
| 2/23/2011 | 600 |
| 3/1/2011 | 42 |
| 3/8/2011 | 20 |
| 3/14/2011 | 140 |
| 3/23/2011 | 2000 |
| 3/28/2011 | <200 |
| 4/4/2011 | 140 |
| 4/11/2011 | 86 |
| 4/18/2011 | 88 |
| 4/25/2011 | 28 |

| Date | Enterococcus (CFU/100 mL) |
|------------|---------------------------|
| 5/2/2011 | 34 |
| 5/9/2011 | 78 |
| 5/23/2011 | 283 |
| 5/31/2011 | 82 |
| 6/6/2011 | 110 |
| 6/13/2011 | 337 |
| 6/20/2011 | 251 |
| 6/27/2011 | 220 |
| 7/5/2011 | 86 |
| 7/11/2011 | 251 |
| 7/18/2011 | 64 |
| 7/25/2011 | 200 |
| 8/1/2011 | 1000 |
| 8/8/2011 | 1000 |
| 8/15/2011 | 400 |
| 8/22/2011 | 800 |
| 8/29/2011 | 130 |
| 9/6/2011 | 140 |
| 9/12/2011 | 1000 |
| 9/19/2011 | 600 |
| 9/26/2011 | 88 |
| 10/11/2011 | 400 |
| 10/17/2011 | 66 |
| 10/24/2011 | 1000 |
| 10/31/2011 | 800 |
| 11/7/2011 | 6000 |
| 11/16/2011 | 1000 |
| 11/21/2011 | 28600 |