SUMMARY

The Watershed Sanitary Survey (WSS) covers source water system used by the City of San Diego (CSD). The initial WSS was completed in 1996. This report is the fourth five-year update of that survey. The purpose of such a survey is to identify actual or potential sources of local source water contamination which might adversely affect the quality and treatability of water used as the domestic supply for the CSD. The Watershed Sanitary Survey update will serve to evaluate source water quality issues and as a basis for future watershed management and planning efforts. This WSS has been modified to list all potential contaminating activities (PCAs) by watershed not river system (Chapter 4). This was suggested by CDPH after their review of the 2010 WSS. Also, water quality data review (Chapter 5) was broken down by reservoir watershed instead of just river system. Additional comments from the 2010 WSS was to include the recommendations, along with any progress and the effectiveness of these recommendations in the summary, from the previous WSS. The two sections below address these comments followed by the summary for the current WSS.

Recommendations from 2010 WSS

The recommendations fall into three categories:

- Watershed Management and Control Practices
- Public Education
- Inter-jurisdictional Coordination

Watershed Management and Control Practices

- Bi-weekly area surveys including: condition of fencing, gates, locks, and signs, evidence of illegal off-road activity or dumping, signs of excessive erosion or obvious contamination of source water streams.
- Routinely scheduled water quality sampling and electronic profiling of source water streams and reservoirs.
- Permitting and limiting public use of resources.
- Exclusion from critical areas.
- Staff on site during periods of allowed public access.
- Available and maintained waste facilities including: trashcans, toilets, and “pack it in – pack it out” plastic trash bag dispensers.
- Annual maintenance of parking areas, roads, and storm drains including removal of weeds, litter, and debris.
- Use of lower emission four-stroke motors on city owned vessels; including rental fleet.
- Minimized on-site use and storage of hazardous materials.
- Weekly inspection of on-site hazardous material/waste containers and storage sites.
- Quarterly inspection of on-site spill-kits; including 300 feet of containment boom.

In areas under City jurisdiction, the City should:

- Continue to routinely survey, monitor, and limit the use of resources including: water quality, land conditions, and land use, with emphases to meet all regulatory requirements and efficiently obtain the necessary information to make evaluations on the water quality, identify trends in degradation, isolate sources of contamination, and determine effects of management practices. Initiate an acute event source water monitoring program for specific events (such as: rain, fires, and spills) that could directly impact the CSD local source water.
- Formulate a watershed land strategy to acquire parcels, conservation easements, or development rights for lands proximal to the source waters that, if preserved, would protect water quality.
- Continue public involvement and maintain established signage and public education material as to the importance of protecting the source water; ensure that it is readily available, accurate, and appropriate.
- Continued public outreach to promote awareness of quagga and zebra mussels, including personnel prevention activities, by providing signage, pamphlets, posters and other publications supplied CDFG at infested and non-infested reservoirs.
- Install additional signage at source water reservoirs to discourage the public feeding of animals.

In areas not under City jurisdiction, the City should:

- Continue to screen land use and water quality permit activities.
- Maintain public outreach signage installed in several transportation corridors to educate travelers and residents that they are currently within watershed boundaries and to help protect the resource.
- Maintain coordination with other agencies and stakeholders on issues regarding the potential impacts to local source water quality.
- Continue stakeholder participation in the Regional Quagga Mussel Working group.

Review of recommendations from 2010 WSS

During the past five years the CSD has followed through with the above recommendations. The City continues to routinely survey, monitor, and limit the use of resources including: water quality, land conditions, and land use, with emphases to meet all regulatory requirements and efficiently obtain the necessary information to make evaluations on the water quality, identify trends in degradation, isolate sources of contamination, and determine effects of management practices.

Since the 2010 WSS, the City also has acquire parcels, conservation easements, or development rights for lands proximal to the source waters that, if preserved, would protect water quality. These improvements are highlighted in Chapter 3.

With the City only having jurisdiction of about ten percent of the area within its source water systems public outreach and coordination with other agencies and stakeholders is important. The City continues to use signage in and around all recreational areas to increase the public awareness of the importance of watershed protection and protection of water quality.

Effectiveness of these measures are hard to measure, however water quality within our source waters have continued to remain good. The City is actively involved with other local agencies and stakeholders on issues regarding source water quality, examples of this include the following:

- Project Clean Water
- Regional Quagga Mussel Working Group
- Assisting with RWQCB and its work with Harmful Algae Blooms and Cyanotoxins monitoring study in the San Diego Region
- Assessment of the use of Bio-controls for the prevention of settlement of Quagga mussel with-in San Diego Reservoirs (California Sea Grant)
- Biweekly Water Ops meetings where reservoir quality is discussed.
- Watershed monitoring program co-funded by LRP, with results sent to and interpreted by Jeff Pasek, Watershed Manager
- Doug Campbell, Senior Chemist, and others attended a San Diego IRWM Regional Water Data Management Project, where representatives of water, wastewater, and stormwater / watershed monitoring groups met to discuss the possibility of a regional database that facilitates the sharing and increased use of available data for watershed and other environmental protection.
- EMTS conducts outreach through the Sewer Science Program that engages local students in important environmental initiatives related to drinking water, wastewater treatment, water recycling, stormwater pollution prevention (with the support of the San Diego Think Blue Program), including watershed, reservoir, and marine environmental health and protection. Over the past five years the program has contacted over 1000 local students.
- EMTS staff attended the ATEEC Southwest Regional Water Conversation to discuss emerging workforce development needs in the fields of water and wastewater operations, environmental laboratories, watershed runoff control, and regulatory compliance.
- WQL has participated in a number of webinars dedicated to emerging issues in watershed and reservoir quality, including HABs, cyanotoxins, etc.

2015 WSS Summary

The local source water system for the CSD comprises eight watersheds, nine storage reservoirs, a network of raw water conveyances interconnecting the reservoirs and three water treatment plants. The local source water system covers over 900 square miles, while the distribution system covers over 200 square miles. From a management prospective, the local source water system is divided into four independent systems based on the location of the source water treatment, they are: the San Diego River System (comprising the El Capitan, Murray, San Vicente and Sutherland Watersheds) which supplies the Alvarado Water Treatment Plant (Alvarado WTP), the Otay-Cottonwood System (comprising the Barrett, Dulzura and Otay Watersheds) which supplies the Otay Water Treatment Plant (Otay WTP), the Miramar System which supplies the Miramar Water Treatment Plant (Miramar WTP), and the Hodges System. The Hodges System has no City of San Diego owned treatment facility, however, in 2012, construction of the Hodges-Olivenhain Pipeline and pump station connecting Hodges to

Olivenhain was completed as part of the San Diego Water Authority's Emergency Storage Project. This connection provides the ability to transfer water between Hodges Reservoir and the SDCWA Aqueduct System via Olivenhain Reservoir, subsequently, the CSD now has the ability to utilize the storage capacity of Hodges Reservoir to augment overall emergency and impound storage.

All three treatment WTPs were recently reconditioned and two of the plants: Alvarado WTP and Otay WTP expanded their treatment capacity. The reconditioning included a change in primary disinfection from chlorine to ozone in Alvarado WTP and Miramar WTP; and from chlorine to chlorine dioxide in the Otay WTP. In addition, all three WTPs were modified for the addition of Fluoride.

The local source water system is located in southern and central San Diego County on the western slope of the peninsular mountains. The region has a Mediterranean climate with distinct wet and dry seasons. Precipitation generally increases from west to east, with annual precipitation ranging from about 12 inches per year in the lower elevations of the system to over 30 inches per year in the upper elevations. Average annual local runoff collected by the source water system is approximately 100,000 acre-feet per year (AFY). Nearly all precipitation occurs from October through April. Winter snowfalls are common in the highest elevations and summers are dry and hot.

The terrain within local source water system is generally mountainous. The geology of the area is dominated by Mesozoic metavolcanic, metasedimentary, and plutonic rocks in the Peninsular Ranges. Dominant soil types are highly susceptible to erosion especially if the vegetation is disturbed or the hydrography is modified. A diverse assemblage of wildlife species including; reptiles, birds, and mammals are commonly found within the boundaries of the local source water system. Many species are common to both upland and lowland areas occurring form sea level to the mountains where suitable habitat is available. Dominant native vegetation types are well adapted to fire, drought tolerant and are not considered important consumers of water.

Comparison of raw source water quality to drinking water standards is <u>for reference purposes only</u>, as the potable drinking water standards do not apply to raw source water. Raw source water commonly exceeded drinking water limits for pH, turbidity, color, nutrients, coliform bacteria, manganese, and sometimes exceeded drinking water limits for arsenic, iron, total dissolved solids, and conductivity. No radiological constituents were found at levels higher than drinking water standards in the reservoirs or watersheds.

Due to several earthquake fault zones that exist in Southern California, along with the age of much of the source water system infrastructure, the threat of earthquake damage to the source water system remains significant. Geologic hazards such as: asbestos, mercury, and radon are not considered to be an issue in City source water quality, although, elevated levels of arsenic have been detected in two tributaries (RHR, UOR) in the Otay-Cottonwood System. A majority of the land area within source water boundaries has slopes of between 16% and 50% creating the likelihood of transport of soils and contaminants to water bodies (**Table 3.2**). In addition, dominant soil types are highly susceptible to erosion especially if the vegetation is disturbed (**Table 3.3**) or the hydrography is modified.

Dominant native vegetation types are well adapted to fire, drought tolerant and are not considered significant consumers of water. Wildlife species in general are not considered to be a significant source of contamination, although large residential populations of water fowl located at several source water reservoirs continue to be considered a minor source of bacterial contamination. The 2007 discovery of the aquatic invasive species *Dreissena bugensis* in the source water system has the potential to significantly impact the ecosystems in source water reservoirs, and the infrastructure for the conveyance and treatment of source water increasing frequency and cost of maintenance.

Potential Contaminant Sources within the Local Source Water System

Urban Development throughout the entire source water system and agriculture primarily in the San Diego River and Hodges systems continue to pose the greatest potential concerns for chronic water quality degradation (**Tables 3.4, 3.00205, 4.1, 4.2, 4.10**). These potential contamination sources include many nonpoint sources which are more difficult to control than point sources.

The greatest potential concerns for acute water quality degradation primarily include wastewater spills in the San Diego River and Hodges systems, and fires in the San Diego River, Otay-Cottonwood, and Hodges systems (**Tables 4.8, 4.9, 4.13**); particularly if the events are large, severe, or occur in sensitive areas.

- **Point Source:**
  1) Chemical spills at hazardous waste storage sites or along transportation corridors.
  2) Nutrients, pathogens, and organic matter from concentrated animal feeding operations.
  3) Nutrients, pathogens, organic matter, and gross pollutants from wastewater spills from collection systems, pump stations, and wastewater treatment facilities.
- **Non-point Source:**
  1) Sediment, nutrients, chemicals, and pathogens from residential and commercial development.
  2) Nutrients and pathogens from failing, older OWDS.
  3) Sediment and nutrients from agricultural areas.
  4) Sediment and nutrients from burned areas.

Assessment of Source Waters

San Diego River System

San Diego River System source water quality data indicates that constituents are typical of raw waters of Southern California. Mean values of TN and Ortho-phosphate from the streams in the San Diego River System have decreased since the 2010 WSS, while little change was identified at the reservoirs. This same trend was identified in mean values of most metal parameters. These reductions may be attributed to the continued recovery of the El Capitan and San Vicente Watersheds since the massive fires of 2003 which burned 94% of El Captain and 98% of San Vicente Watersheds.

Methyl t-Butyl Ether (MTBE) values remained non-detect (ND); this may be attributed to its elimination as an oxygenator in gasoline in the San Diego area and equipping all rental boats on CSD reservoirs with 4-stroke motors replacing older 2-stroke motors.

Otay-Cottonwood System

Otay-Cottonwood System source water quality data indicates that most constituents are typical of raw waters of Southern California. Mean values of TN (6.73 mg/L) and arsenic (23.6 mg/L) for streams, have increased since the 2010 WSS. Due to the historically dry conditions only two samples were collect for metal analysis from streams within the Otay-Cottonwood system, Rolling Hill Ranch (RHR2) and Upper Otay River (UOR1) (**Appendix 5**).

RHR2 and UOR1are located north-west and terminate into Upper Otay Reservoir; a tributary reservoir to Otay Reservoir. The origin of the arsenic is believed to be the disturbance of the local volcanic rock in the surrounding Jamul Mountains from vigorous development.

Mean values of measured constituents experienced slight changes at the reservoirs within the Otay and Cottonwood system. MTBE values, all ND, have continued to decline

Miramar System

Miramar System source water quality data indicates that constituents are typical of raw waters of Southern California. Mean values of water quality parameters have experience little change since the 2010 WSS. MTBE values, all ND, have continued to decline.

Hodges System

Hodges System source water quality data indicates little change in parameters since the 2010 WSS. Mean TN values at both the streams and reservoir did see a significate decrease since the 2010 WSS. As in the other systems, Hodges continued to see a decline in MTBE values, all ND, since the 2010 WSS.

Assessment of Regulatory Compliance

The review of source (raw) water and treated water quality for the Alvarado, Otay and Miramar WTP's are highlighted in Chapter 5. The City is currently in full compliance with existing and pending regulatory requirements. Currently all three WTP's have undergone upgrades to meet the requirements of the Stage 2 Disinfectants and Disinfectant Byproducts Rule (D/DBP) and the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). Alvarado and Miramar WTP's have added ozone, while Otay WTP has added chlorine dioxide; replacing free chlorine as primary disinfectant.