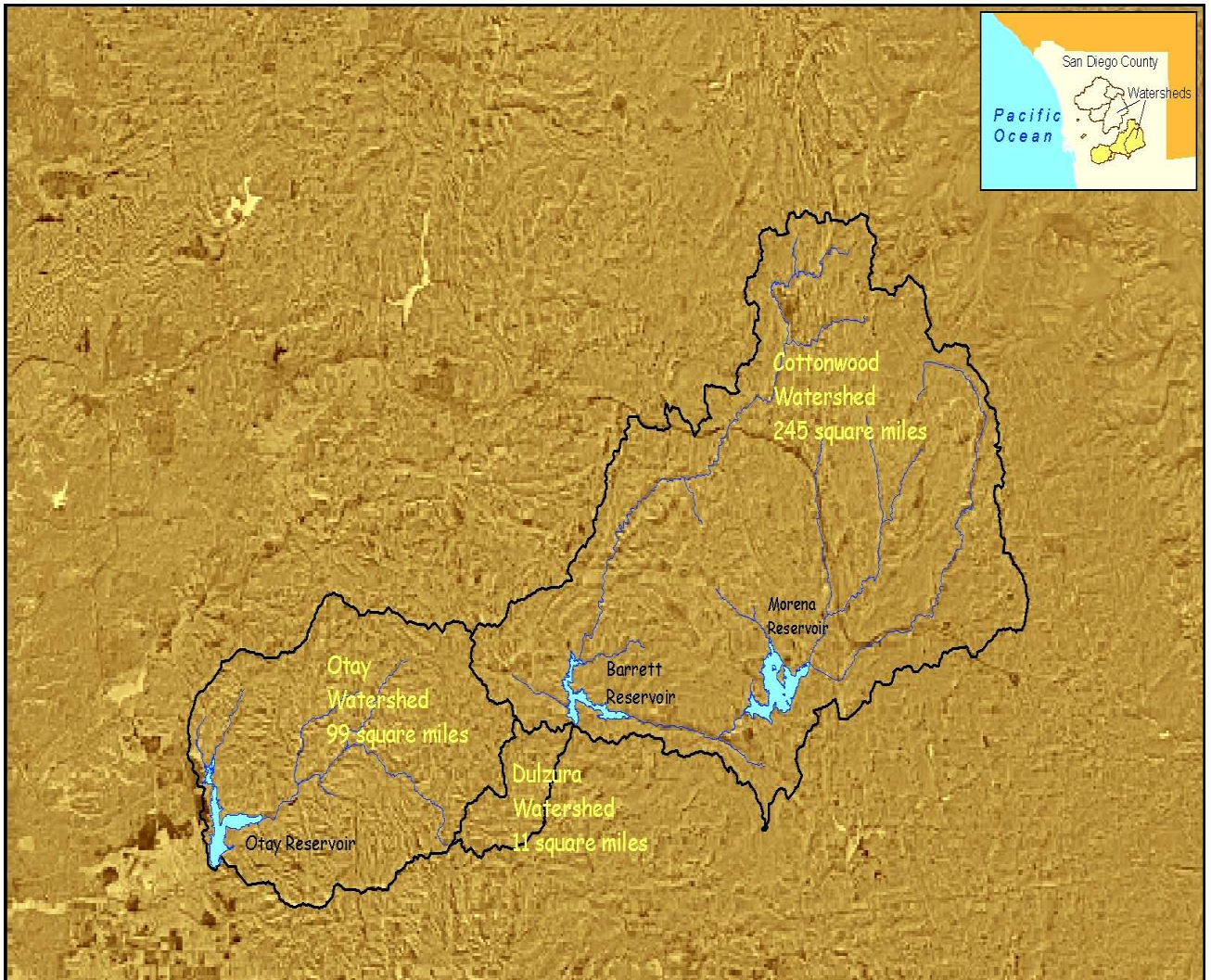




The City of San Diego Water Department 2005 Watershed Sanitary Survey

Otay/Cottonwood Watersheds

Volume 3 of 5

Data Collected Between 01/01/01– 12/31/05

ABBREVIATIONS

ACOE	Army Corps of Engineers
ADT	Average daily traffic
ADWF	Average dry weather flow
AF/Y	Acre-Feet per Year
AWWA	American Water Works Association
BLM	Bureau of Land Management – U.S. Federal
BMPs	Best Management Practices
CDF	California Department of Forestry
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CDMG	California Division of Mines and Geology
CEQA	California Environmental Quality Act
CFR	California Federal Regulation
cfs	Cubic feet per second
City	City of San Diego
CNDDDB	California Natural Diversity Database
CNF	Cleveland National Forest
CNPS	California Native Plant Society
County	County of San Diego
CWA	San Diego County Water Authority
D/DBP	Disinfection/Disinfection By-Product
DHS	Department of Health Services
DMG	Division of Mines and Geology – State of California
dS/M	Decisiemens per meter
DSOD	Division of Safety of Dams
EPA	Environmental Protection Agency
ESWTR	Enhanced Surface Water Treatment Rule
GIS	Geographic Information System
gpd	Gallons per day
Gpm	Gallons per minute
HAAs	Haloacetic Acids

ABBREVIATIONS

Helix	Helix Water District
HPC	Heterotrophic Plate Count
HSU	Hydrographic Subunit
HU	Hydrographic Unit
HUMAN CON	Human Consumption
IOCs	Inorganic Chemicals
LPG	Liquid Propane Gas
LSE LF	Loose Leaf
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MG	Million Gallons
mg/L	Milligrams per liter (parts per million)
mgd	Million gallons per day
mgy	Million gallons per year
MHCP	Multiple Species Conservation Program
MSL	Mean Sea Level
MWD	Metropolitan Water District
N-GRNHS	Nursery Greenhouse
N-OUTDR	Nursery Outdoor
NEPA	National Environmental Protection Act
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTU	Nephelometric Turbidity Unit
OTC	Olympic Training Center
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
RCA	Resource Conservation Area
RMWD	Ramona Municipal Water District
RO	Reverse Osmosis
RUIS	Regional Urban Information System

ABBREVIATIONS

RWQCB	California Regional Water Quality Board
SANDAG	San Diego Association of Governments
SCS	Soil Conservation Service – U.S.
SDWA	Safe Drinking Water Act - Federal
SMCL	Secondary Maximum Contaminant Level
SOCs	Synthetic Organic Chemicals
SP	Soluble Powder
SUB	Subtropical
SWPPPs	Storm Water Pollution Prevention Plans
TCR	Total Coliform Rule – Federal
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
THMs	Trihalomethanes
TTHMs	Total Trihalomethanes
TOC	Total Organic Carbon
TRANSPL	Transplants
ug/L	Micrograms per liter (parts per billion)
UNCUL	Uncultivated
UNSP	Unspecified
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Society
VOCs	Volatile Organic Compounds
WDRs	Waste Discharge Requirements
WPCF	Water Pollution Control Facility
WRF	Water Reclamation Facility
WSS	Watershed Sanitary Survey
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

VOLUME 3

THE COTTONWOOD-OTAY SYSTEM

CHAPTER 1: SYNOPSIS

Introduction

This volume is the second five-year update of the 1996 Watershed Sanitary Survey (WSS) for the Otay and Cottonwood Watersheds. The Otay/Cottonwood System is comprised of four reservoirs, their watersheds, the Dulzura Conduit, and the Otay Water Treatment Plant (Figure 3-1.1). The system covers a combined area of 226,245 acres, or about 354 square miles.

The Otay Watershed is made up of the Upper Otay Reservoir and the Lower Otay Reservoir. The primary function of Lower Otay Reservoir is to store imported water from the San Diego County Water Authority, local runoff water, and water transferred from Barrett and Morena Reservoirs located in the Cottonwood Watershed via the Dulzura Conduit. The Upper Otay Reservoir is no longer used for surface water storage.

The Cottonwood Watershed consists of the Morena and Barrett Reservoirs, which are impoundments along Cottonwood Creek. The primary function of these reservoirs is to store local runoff water. Below Barrett Dam, Cottonwood Creek flows into Mexico and joins the Tijuana River. Water from Barrett Reservoir is diverted by the Dulzura Conduit, which discharges into Dulzura Creek at the headwaters of the Otay River. The water ultimately reaches the Otay Reservoir. Essentially, this system transfers water from the Tijuana River Basin to the Otay River Basin.

Natural runoff from a small area upslope of the Dulzura Conduit can be captured into the conduit via a series of diverting structures. This area is known as the Dulzura Watershed. Since it contributes directly to Otay Reservoir, it is considered part of the Otay/Cottonwood System.

Watershed Sanitary Survey Requirements

The California Surface Water Treatment Rule (SWTR), in Title 22, Article 7, Section 64665 of the State Code of Regulations, requires every public water system using surface water to conduct a comprehensive sanitary survey of its watersheds every five years. The purpose of such a survey is to identify actual or potential sources of contamination, or any other watershed-related factor, which might adversely affect the quality of water used for domestic drinking water. The initial WSS was completed January 1, 1996 and is to be updated every five years thereafter.

The City of San Diego Water Department and its oversight agencies will use the Watershed Sanitary Survey Update (WSS Update) to evaluate water quality problems which might result from contaminants in the watersheds. The WSS Update will also serve as a basis for future watershed management and planning efforts.

Objectives

The main objectives of this WSS Update are to:

- Satisfy the regulatory requirement for a watershed sanitary survey.
- Identify and assess existing and potential future sources of contamination in the watersheds.
- Provide a general description of existing watershed control and management practices.
- Provide general recommendations for improving watershed management practices in order to protect the quality of the surface waters entering the reservoirs.

Conduct of the Study

This update of the WSS for the Otay/Cottonwood Watersheds was produced by the staff of the City of San Diego Water Department, Water Quality Laboratory. The survey covers the water supply system from the most remote points of the San Diego River System Watersheds to the treatment facility. It was conducted by reviewing existing aerial photographs, GIS data, reports, water quality data and other record documents, and was supplemented by field surveys and personal knowledge of Water Department staff.

Report Organization

The organization of this volume has changed since the 2001 WSS Update. The executive summary, formerly Chapter 1, has been removed from the individual volumes. The remaining chapters have been rearranged as follows:

- Chapter 1: Synopsis
- Chapter 2: Description of Watersheds/Source Water System and Review of 2001 Watershed Sanitary Survey Recommendations
- Chapter 3: Existing Conditions in the Watersheds
- Chapter 4: Water Quality Assessment
- Chapter 5: Conclusions and Recommendations

CHAPTER 2: DESCRIPTION OF WATERSHEDS/SOURCE WATER SYSTEM AND REVIEW OF 2001 WSS RECOMMENDATIONS

Introduction

The following is a summary of the findings of the 2001 Cottonwood-Otay System Watershed Sanitary Survey Update. It covers Potential Contaminant sources, Water Quality, Watershed Management and Control Practices, and Conclusions and Recommendations for management of the watershed.

Cottonwood Watershed—Barrett Reservoir

Potential Contaminant Sources -

Recreation

Potential sources of contamination from recreational use of the Barrett Reservoir are soil erosion from off-trail hiking; excretions of hunting dogs; and gasoline spillage from fishing boats.

Runoff

There is not sufficient data from which to infer a relationship between seasonal runoff and microorganism counts.

Significant Events

There have been two small brushfires since 1996, in the far northeastern part of the watershed, which were not considered a significant threat to water quality. There have been no significant earthquakes from 1996 to 2000.

Agriculture

All of the agriculture in the Cottonwood Watershed consists of extensive activity. Some fields along Cottonwood Creek are being developed for intensive cultivation.

Animal Grazing

Animal grazing occurs on much of the watershed, mostly within the Cleveland National Forest. Loss of vegetation from grazing may increase soil erosion and sedimentation of streams and rivers.

Concentrated Animals Facilities

There are no concentrated animals facilities within the Cottonwood Watershed.

Wastewater Facilities & Reclaimed Water

The Pine Valley Water Pollution Control Facility has a permit to discharge up to 40,000 gallons per day, to percolation ponds. There have been no plant spills recorded in the past five years.

Septic Systems and Sewer Overflows

There are very few septic systems in the watershed, mostly located in Morena Village, Mount Empire High School, Barrett Honor Camp, and the Pine Valley community. Occasional problems occur during high rainfalls. A small commercial area in Pine Valley is served by a sewer system.

Mines

There are twenty-one mines located in the Cottonwood Watershed, many of which are inactive. There have been no recorded incidents at the mine sites.

Hazardous Materials

Solid and liquid hazardous wastes are mostly oil based. Liquid waste is typically hauled away by licensed haulers. There is also capacity for storing 267960 gallons of hazardous liquid, most of which is gasoline. There are no hazardous waste disposal facilities in the watershed.

Water Quality –

Monitoring

Samples were taken from the reservoir surface at the outlet tower, and from eighteen sites within the watershed. Data was provided by the City of San

Diego Water Quality Laboratory. The source water was analyzed for organic and inorganic constituents, and general physical characteristics. Results were compared to the MCL and/or SMCL standards for drinking water.

Raw Water Quality

Results of surface water samples at times exceeded limits for turbidity, pH, color, aluminum, and manganese. Microbiological parameters were not monitored at Barrett Reservoir.

Treated Water Quality

The raw water at times exceeded MCL/SMCL for drinking water for turbidity, color, pH, aluminum, and manganese. Barrett Reservoir feeds into Lower Otay Reservoir, and these constituents were adequately treated at the Otay WTP, with occasional exceptions for odor, turbidity, pH, and TTHM. The Otay WTP consistently meets federal and state drinking water regulations.

The Otay WTP is currently in compliance with the IESWTR and Stage 1 D/DBP Rule. The Otay WTP would also meet the requirements of the Phase I standards of the Stage 2 D/DBP. For Phase II, a study must be conducted to determine the monitoring sites with the highest DBP. The Otay WTP apparently will also comply with the LT2ESWTR for Cryptosporidium, as well as upcoming regulations for Arsenic and Sulfate.

Watershed Management and Control Practices -

Most of the land is owned by the Cleveland National Forest and the City of San Diego Water Department. The City of San Diego monitors the watershed at Morena Reservoir by limiting access to the reservoir, patrolling and observation, and water quality monitoring. Other federal, state, and local agencies also exercise control over land use and activities within the watershed.

Conclusions -

Potential Contaminant Sources

Potential contaminant sources include corrals and animal boarding facilities, fires, animal grazing, accidental wastewater discharge, unauthorized waste disposal, and recreational use.

Watershed Management

No formal watershed management program exists. Land ownership patterns affect control measures in the watershed; therefore, the focus is on cooperation between agencies. However, the City of San Diego exercises a number of management practices. On City-owned land, the City directly controls land use activity. On land not owned by the City, controls include monitoring land use, permits and other regulatory actions, and coordinating with other agencies. A Watershed/ Water Quality Protection Committee was established by the City in September, 1994.

Water Quality Conditions

Raw water monitoring at the Barrett Reservoir has detected several water quality constituents at levels that may be of concern, including turbidity, coliforms, MTBE, and TOC. Barrett Reservoir feeds into Lower Otay Reservoir, and all of these constituents are effectively treated at the Otay WTP.

Cottonwood Watershed—Morena Reservoir

Potential Contaminant Sources -

Recreation

Potential sources of contamination from recreational use of the Morena Reservoir soil erosion from off-trail hiking and horseback riding; discarded trash from picnicking and camping; excretions of horses and personal pets; and gasoline spillage from fishing boats and other personal craft. Incidental

personal contact occurs; however, microorganism contamination from such contact is minimal.

Runoff

Microorganisms are not currently monitored at Morena Reservoir, therefore, there is no existing data from which to infer a relationship between seasonal runoff and microorganism counts.

Significant Events

There have been two small brushfires since 1996, in the far northeastern part of the watershed, which were not considered a significant threat to water quality. There have been no significant earthquakes from 1996 to 2000.

Agriculture

All of the agriculture in the watershed consists of extensive activity. Some fields along Cottonwood Creek are being developed for intensive cultivation.

Animal Grazing

Animal grazing occurs on much of the watershed, mostly within the Cleveland National Forest. Loss of vegetation from grazing may increase soil erosion and sedimentation of streams and rivers.

Concentrated Animals Facilities

There are no concentrated animals facilities within the Cottonwood Watershed.

Wastewater Facilities & Reclaimed Water

The Pine Valley Water Pollution Control Facility has a permit to discharge up to 40,000 gallons per day, to percolation ponds. There have been no plant spills recorded in the past five years.

Septic Systems and Sewer Overflows

There are very few septic systems in the watershed, mostly located in Morena Village and the Pine Valley community. Occasional problems occur during high rainfalls. A small commercial area is served by a sewer system.

Mines

There are twenty-one mines located in the Cottonwood Watershed, many of which are inactive. There have been no recorded incidents at the mine sites.

Hazardous Materials

Solid and liquid hazardous wastes are mostly oil based. Liquid waste is typically hauled away by licensed haulers. There is also capacity for storing 267960 gallons of hazardous liquid, most of which is gasoline. There are no hazardous waste disposal facilities in the watershed.

Water Quality -

Monitoring

Samples were taken from the reservoir surface at the outlet tower, and from eighteen sites within the watershed. Data was provided by the City of San Diego Water Quality Laboratory. The source water was analyzed for organic and inorganic constituents, and general physical characteristics. Results were compared to the MCL and/or SMCL standards for drinking water.

Raw Water Quality

Results of surface water samples at times exceeded limits for turbidity, pH, color, manganese, and MTBE. Microbiological parameters were not monitored at Morena Reservoir.

Treated Water Quality

The raw water at times exceeded MCL/SMCL for drinking water for turbidity, color, odor, pH, manganese, and MTBE. Morena Reservoir feeds into Barrett Reservoir and ultimately to Lower Otay Reservoir, and these constituents were adequately treated at the Otay WTP, with occasional exceptions for odor, turbidity, pH, and TTHM. The Otay WTP consistently meets federal and state drinking water regulations.

The Otay WTP is currently in compliance with the IESWTR and Stage 1 D/DBP Rule. The Otay WTP would also meet the requirements of the Phase I standards of the Stage 2 D/DBP. For Phase II, a study must be conducted to determine the monitoring sites with the highest DBP. The Otay WTP apparently will also comply with the LT2ESWTR for *Cryptosporidium*, as well as upcoming regulations for Arsenic and Sulfate.

Watershed Management and Control Practices -

Most of the land is publicly owned or national forest land, with a small percentage of rural community. The City of San Diego monitors the watershed at Morena Reservoir by limiting access to the reservoir, patrolling and observation, and water quality monitoring. Other federal, state, and local agencies also exercise control over land use and activities within the watershed.

Conclusions -

Potential Contaminant Sources

Potential contaminant sources include corrals and animal boarding facilities, fires, animal grazing, accidental wastewater discharge, unauthorized waste disposal, and recreational use.

Watershed management

No formal watershed management program exists. Land ownership patterns affect control measures in the watershed; therefore, the focus is on cooperation between agencies. However, the City of San Diego exercises a number of management practices. On City-owned land, the City directly controls land use activity. On land not owned by the City, controls include monitoring land use, permits and other regulatory actions, and coordinating with other agencies. A Watershed/ Water Quality Protection Committee was established by the City in September, 1994.

Water Quality Conditions

Raw water monitoring at the Morena Reservoir has detected several water quality constituents at levels that may be of concern, including turbidity, pH, color, MTBE, and TOC. Morena Reservoir feeds via Barrett Reservoir into Lower Otay Reservoir, and all of these constituents are effectively treated at the Otay WTP.

Lower Otay-Dulzura Conduit Watershed

Potential Contaminant Sources -

Recreation

Potential sources of contamination from recreational use of the Lower Otay Reservoir include hunting, off-trail hiking and horseback riding; discarded trash from picnicking; excretions of horses and personal pets; and gasoline spillage from fishing boats and other personal craft. Incidental personal contact occurs due to water sport training; however, microorganism contamination from such contact is minimal.

Runoff

Coliform data suggest that microorganism counts correlate to seasonal rainfall runoff in the Lower Otay Reservoir.

Significant Events

There have been three fairly large brushfires since 1996, all of which were considered a significant threat to water quality. Another small fire in the Dulzura Conduit watershed had little impact on water quality. Consequences of burning include soil erosion, stream sediment, ash and debris, and chemical fire retardants. There have been no significant earthquakes from 1996 to 2000.

Agriculture

Most agriculture consists of extensive activity, especially near Dulzura and Jamul Creeks. Less than ten percent of the watershed is given to intensive farming, vineyards, and orchards. Orchards and intensive plots rely more heavily upon fertilizers and pesticides.

Animal Grazing

Animal grazing is permitted on Federal lands. There is also grazing on privately owned lands; however, the grazing lease has expired and will not be renewed. Loss of vegetation from grazing may increase soil erosion and sedimentation of streams and rivers. The City of San Diego plans to fence the area around the reservoir against livestock

Concentrated Animals Facilities

There are no concentrated animal facilities within the Lower Otay-Dulzura Conduit Watershed.

Wastewater Facilities & Reclaimed Water

There are no wastewater facilities in the Otay-Dulzura Conduit Watershed. Reclaimed water from the Otay Water District is delivered to two locations near the Lower Otay Reservoir, but not within the watershed.

Septic Systems and Sewer Overflows

There are very few septic systems in the watershed. There have been no reported septic problems or sewer overflows.

Mines

There are three mines located in the Otay Watershed. There have been no recorded incidents at the mine sites.

Hazardous Materials

Solid and liquid hazardous wastes are mostly oil waste and used oil filters. There is also capacity for storing 42700 gallons of hazardous liquid, all of which is gasoline or diesel fuel. There are no hazardous waste disposal facilities in the watershed.

Water Quality -

Monitoring

Samples were taken from the surface, from four outlet gauges, and the influent and effluent of the Otay Water Treatment Plant. Data was provided by the City of San Diego Water Quality Laboratory. The source water was analyzed for organic and inorganic constituents, microorganisms, and general physical characteristics. Results were compared to the MCL and/or SMCL standards for drinking water.

Raw Water Quality

Results of surface water samples at times exceeded limits for turbidity, pH, color, aluminum, manganese, and MTBE. Microbiological studies indicated the presence of microorganisms, including *Cryptosporidium* and *Giardia*, in all samples. Of the four outlets sampled, gauge 84 had the poorest general physical characteristics. Gauge 95 had the highest TOC levels.

Treated Water Quality

The raw water at times exceeded MCL/SMCL for drinking water for turbidity, color, odor, pH, aluminum, iron, manganese, zinc, and TTHM. These constituents were adequately treated at the Otay WTP, with occasional exceptions for odor, turbidity, pH, and TTHM. While microorganisms were present in all raw water samples, they were removed by the treatment process. The Otay WTP consistently meets federal and state drinking water regulations.

The Otay WTP is currently in compliance with the IESWTR and Stage 1 D/DBP Rule. The Otay WTP would also meet the requirements of the Phase I standards of the Stage 2 D/DBP. For Phase II, a study must be conducted to determine the monitoring sites with the highest DBP. The Otay WTP apparently will also comply with the LT2ESWTR for *Cryptosporidium*, as well as upcoming regulations for Arsenic and Sulfate.

Watershed Management and Control Practices -

Much of the land is rural and privately owned, or is unincorporated County land. The City of San Diego monitors the watershed at Lower Otay Reservoir by limiting access to the reservoir, patrolling and observation, and water quality monitoring. Other federal, state, and local agencies also exercise control over land use and activities within the watershed.

Conclusions -

Potential Contaminant Sources

Potential contaminant sources include corrals and boarding facilities, fires, animal grazing, accidental wastewater discharge, unauthorized waste disposal, filter backwash from Otay WTP, and recreational use.

Watershed Management

No formal watershed management program exists. Land ownership patterns limit control measures in the watershed; therefore, the focus is on cooperation between agencies. However, the City of San Diego exercises a number of management practices. On City-owned land, the City directly controls land use activity. On land not owned by the City, controls include monitoring land use, permits and other regulatory actions, and coordinating with other agencies. A Watershed/ Water Quality Protection Committee was established by the City in September, 1994.

Water Quality Conditions

Raw water monitoring at the Lower Otay Reservoir has detected several water quality constituents at levels that may be of concern, including turbidity, coliforms, MTBE, and TOC. All of these constituents are effectively treated at the Otay WTP.

Recommendations & Review-

The underlying theme of all recommendations is protection of the watershed and source water quality. The recommendations fall into four categories:

- Water Quality Monitoring,
- Interjurisdictional Coordination,
- Watershed Management and Control Practices,
- Public Education.

Following each recommendation will be a review of the actions taken and/or current status of the recommendation.

Water Quality Monitoring –

Recommendations

- 1) Continue to develop and evaluate the long-term monitoring program for the watershed; and, in the final monitoring program, identify how the goals and objectives can be met with the monitoring plan.
- 2) Augment the existing City monitoring program with additional parameters.
- 3) Find and test alternative methods for algal control while continuing to minimize the use of copper sulfate.

Review

- 1) The City has instituted a program to measure flow, solids, pathogens and nutrients on a monthly basis and to measure metals and a suite of organics on a quarterly basis at 13 creeks that flow directly into the three reservoirs of this watershed system. The City has also collected bioassessment samples at four sites in the watershed system.
- 2) As noted above, the City has begun to test for total nitrogen and total phosphorus on a monthly basis at tributaries. Also we sample for these parameters on a monthly basis from the reservoir.
- 3) No change in status.

Interjurisdictional Coordination –

Recommendations

- 1) Establish lines of communication with neighboring agencies and overlapping jurisdictions by developing written City policies, developing workgroups, and setting up a City Control Review Committee.
- 2) Coordinate with Jurisdictional Agencies such as San Diego County and the USFS.

Review

- 1) The City contracted with Brown & Caldwell to produce a document providing guidelines for new development in our watersheds. This document has been completed and is being used by the City Water Department in its review of projects. The City Water Dept has also established a Watershed Manager and a Watershed Project Officer and the City has established contacts with other agencies by participating on watershed plan committees. The City is reviewing more projects than it has in the past; however, no formal clearinghouse has been established. There has been no change in status regarding the development of workgroups.
- 2) A Joint Exercise of Powers Agreement (JEPA) was entered into during 2004 by the County of San Diego, City of Chula Vista, City Of Imperial Beach, and City of San Diego to produce a watershed management plan for the Otay River Watershed.

Watershed Management and Control –

Recommendations

- 1) Develop a land acquisition strategy to gain control of lands proximate to water.
- 2) Work with landowners and regulatory agencies to reduce the potential impact of cattle grazing and other agricultural practices.
- 3) Monitor creeks near wastewater storage ponds and facilities where there is a history of spills.

Review

- 1) The City has not adopted a strategy to acquire parcels, easements, or development rights; however, the City has worked with other agencies to purchase some privately owned lands that are proximate to water bodies for conservation purposes.
- 2) No Change in status.
- 3) No Change in status.

Public Education –

Recommendations

- 1) Develop and distribute educational materials to landowners, businesses, residents, and recreational users of the land about the importance of protecting the watershed. Establish a telephone number for reporting spills and illegal dumping.
- 2) Conduct public information sessions about the impact of various activities on water quality and supply.
- 3) Encourage a 'Friends of the Watershed' type of volunteer organization.
- 4) Launch a public awareness and signage campaign along transportation corridors.

Review

- 1) Everyone who purchases a lake permit receives a brochure that details the importance of keeping the reservoir clean because it is a source of our drinking water. In addition, posters are placed on kiosks at the reservoirs, asking people to recycle and help protect water quality.
- 2) See answer #1.
- 3) The "Friends of the Otay Valley Regional Park" has been encouraged to pursue cleanup efforts in the Otay River Valley. The City has provided free trash pickup for volunteer efforts on different occasions.
- 4) Signs have been developed for placement on major corridors that let travelers know they are entering a watershed. The City is working with CalTrans on locations to place the signs.