OTAY RIVER WATERSHED
SPECIAL AREA MANAGEMENT PLAN

SUMMARY REPORT AND
USER MANUAL FOR GIS DATABASE

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Regulatory Division
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1.0 INTRODUCTION

1.1 BACKGROUND ON SPECIAL AREA MANAGEMENT PLANS

The 1980 Amendments to the Coastal Zone Management Act define the Special Area Management Plan (SAMP) process as "a comprehensive plan providing for natural resource protection and reasonable coastal-dependent economic growth containing a detailed and comprehensive statement of policies, standards and criteria to guide public and private uses of lands and waters; and mechanisms for timely implementation in specific geographic areas within the coastal zone."

The United States Army Corps of Engineers (USACE) indicated this process of collaborative interagency planning within a geographic area of special sensitivity is applicable in non-coastal areas and can be useful to reduce challenges associated with the traditional case-by-case review of projects. The objectives are that developmental interests can plan with predictability and environmental interests are assured that individual and cumulative impacts are analyzed in the context of broad ecosystem needs.

1.2 DEVELOPMENT OF THE OTAY RIVER WATERSHED SAMP

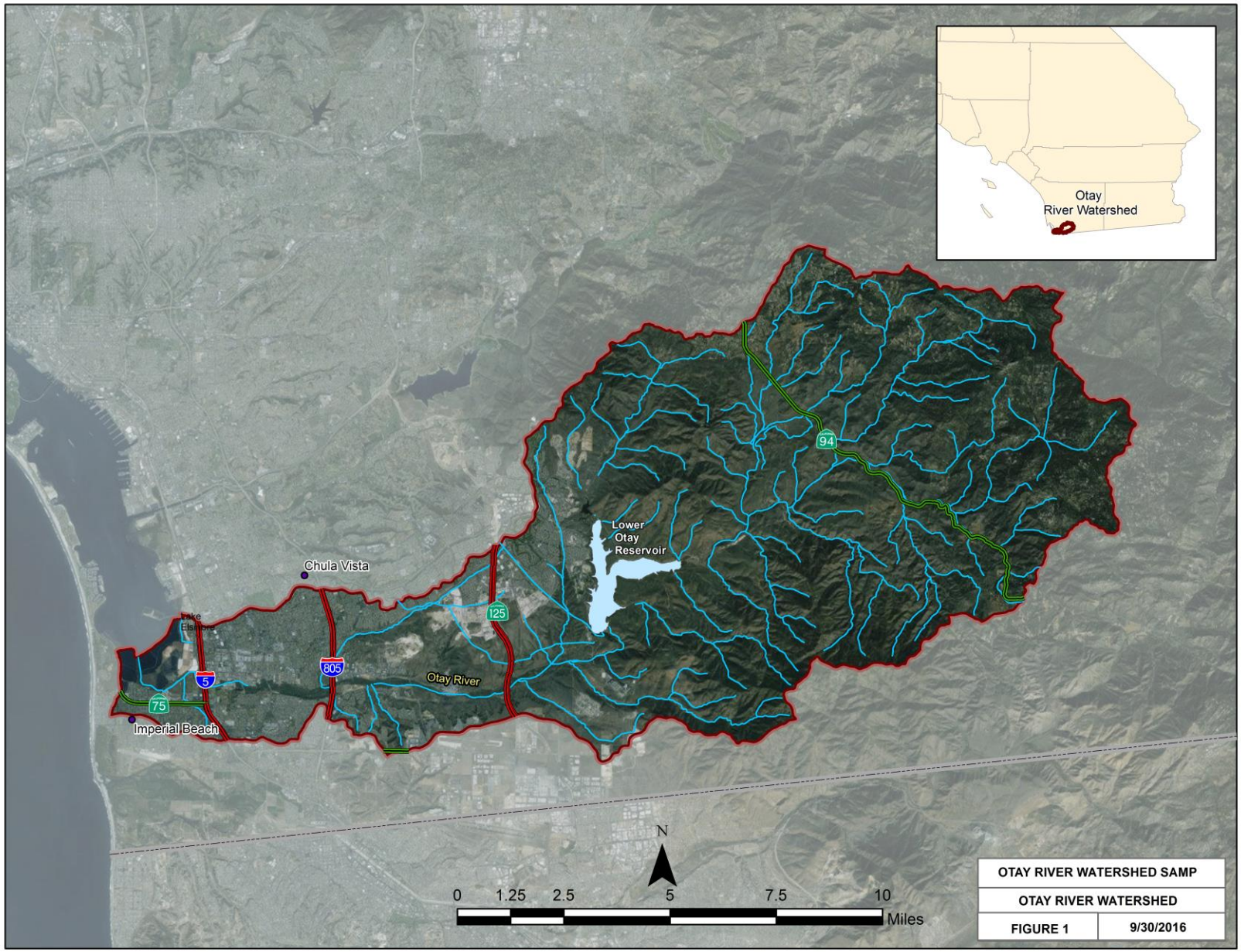
The USACE's Los Angeles District Regulatory Division initiated the Otay River Watershed SAMP in 2003 as a comprehensive plan for protecting and enhancing aquatic resources in the watershed while providing for the permitting of reasonable economic development and public infrastructure/maintenance activities in consideration of local land use plans and the regional Multiple Species Conservation Plan (MSCP) for San Diego County. Conceptual elements of the SAMP included:

- An abbreviated permitting process for projects in the watershed subject to the USACE permit authority under Section 404 of the Clean Water Act (CWA).
- A comprehensive aquatic resource conservation program and restoration plan for the protection, restoration/enhancement, and management of aquatic resources within the watershed**.**

The Otay River Watershed encompasses approximately 145 square miles (92,920 acres) bounded by the crest of the San Ysidro Mountains on the south, Skyline Drive on the north and the Pacific Ocean to the west. Figure 1 shows the boundaries of the watershed.

1.2.1 Goal and Objectives

The SAMP was originally intended to provide aquatic resource assessment tools and a watershed-specific regulatory framework to preserve, enhance, and restore aquatic resources, while allowing reasonable and responsible economic development within the watershed.


Otay
River Watershed
Lower
Otay
Reservoir
Chula Vista
Lake
Otay River
Imperial Beach
94
125
805
5
75
N
0 1.25 2.5 5 7.5 10
Miles
OTAY RIVER WATERSHED SAMP
OTAY RIVER WATERSHED
FIGURE 1
9/30/2016

The goals of the SAMP process included: 1) establishing a watershed-wide aquatic resource reserve program; and 2) minimizing individual and cumulative impacts of future projects in the watershed. At the end of the SAMP process, it was intended that there would be areas to be protected and preserved, as well as areas where future regulated activities would be allowed to occur, provided they meet specific SAMP permit criteria developed for the protection of aquatic resources within the watershed. These regulated activities would include residential, commercial, industrial, recreational development; public infrastructure such as roads and utilities; and maintenance of public facilities.

The objectives of the Otay River Watershed SAMP included: (1) evaluate the extent and condition of existing aquatic resources in the watershed; (2) develop a comprehensive management plan and reserve program to preserve and enhance existing aquatic resources; and (3) identify alternative land development scenarios in the context of the aquatic resource management actions and reserve designs.

1.2.2 Coordination with County Planning Process and Stakeholders

The SAMP was originally initiated in coordination with the County of San Diego's Multiple Species Conservation Plan (MSCP). The SAMP was intended as a separate, stand-alone process to address aquatic resources but considered the conservation strategy and reserve program that was developed for threatened and endangered species as part of the MSCP.

In development of the SAMP, the USACE committed to working cooperatively with local, state and federal stakeholder agencies including:

- San Diego County Department of Planning and Land Use (County);
- California Department of Fish and Wildlife (CDFW) (formerly California Department of Fish and Game), South Coast Region;
- U.S. Fish and Wildlife Service (USFWS) Region I;
- U.S. Environmental Protection Agency (USEPA) Region IX; and
- California Regional Water Quality Control Board (RWQCB) (Region 9 – San Diego).

1.2.3 USACE Assessment and Restoration of Aquatic Resources

The SAMP began with two key USACE studies that defined and characterized aquatic resources within the watershed:

- Planning Level Delineation and Geospatial Characterization of Aquatic Resources for Otay Watershed, San Diego County (PLD) prepared by Robert Lichvar (2003) of the USACE's Engineering Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL); and

- Assessment of Riparian Ecosystem Integrity: Otay River Watershed (also referred to the Landscape Level Functional Assessment (LLFA) prepared by R. Daniel Smith (2004) of the USACE's ERDC Waterways Experiment Station (WES).

A third study was prepared that identified a series of restoration templates that could be applied to various reaches of the riparian ecosystems to help improve ecosystem functional integrity:

- Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection (Restoration Plan) by R. Daniel Smith (2006) of the USACE's ERDC WES.

The GIS mapping data produced from these three studies are key GIS layers in Otay River Watershed SAMP GIS database and are briefly described in the following three subsections.

1.2.3.1 PLD

The PLD was performed to describe the baseline occurrence of aquatic resources observed in the watershed, and is defined as the identification of areas that meet both the jurisdictional requirements under Section 404 of the CWA and the California Fish and Game (CFG) Code Section 1600 at a watershed scale. For the PLD, sampling protocols outlined in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and 33 CFR 328 were modified for use at the watershed scale. The PLD was accomplished by combining onsite mapping efforts for vegetation and hydrogeomorphic surfaces with detailed field sampling to provide locations of aquatic resources and their regulatory status under Section 404. The work required interpretation of orthophoto quadrangles and stereoscopic aerial photography, and verifying the jurisdictional status and location of identified aquatic resources using sampling and global positioning system (GPS) techniques at representative numbers of field locations. A planning level map of aquatic resources including jurisdictional waters of the U.S. was created which provided a tool for the visualization of these resources within an ARC INFO or ArcView based GIS. With this data, a GIS database of riparian ecosystems and watershed characteristics was developed, which was subsequently used in the LLFA process (as described below). Although the PLD is considered highly accurate at the planning level, it does not replace the need for project-specific delineations for permitting purposes.

1.2.3.2 LLFA

The LLFA was conducted to characterize and rank the functional "integrity" of the watershed's riparian ecosystems for the purpose of evaluating SAMP alternatives. Integrity refers to the quality, or state of being complete, and implies correspondence with a natural or original condition of the resource. Riparian ecosystems with high ecosystem "integrity" were considered to: (1) exhibit the full range of physical, chemical, and biological attributes and processes that characterized riparian ecosystems in the southern California region over short and long term cycles prior to cultural alteration; and (2) support a balanced, integrated, and adaptive biological community resulting from natural evolutionary and biogeographic processes.

A first step in the LLFA was to divide the riparian ecosystem along the project site drainages into assessment units or "riparian reaches", taking into account the influence of the adjacent upland areas and drainage basin on the aquatic resources. Riparian reaches were defined as the segment of the main stem bankfull stream channel and adjacent riparian ecosystem that was relatively homogenous in term of geologic, geomorphic, biological, hydrologic and cultural alteration characteristics.

Next, characterization of each riparian reach was accomplished during a site visit to each reach that included observations of species and locations of dominant vegetation based on geomorphic features (i.e., bankfull channel, floodplain, terrace), measurement of channel. A characterization of the riparian reaches based on the endpoint indicators (hydrology, water quality and habitat) was accomplished using data from field visits and use of aerial photographs and topographic maps, and assigning values representing a percentage deviation from the culturally-unaltered (reference) condition for each of the three endpoint indicators. The indicator values were then converted to numerical scores with the highest values representing a riparian reach in close concurrence with the reference condition (high integrity), and the lowest scores having deviation of 50% or more from the reference condition (low integrity). Maps showing functional integrity rankings for hydrology, water quality and habitat indices were then developed for the riparian reaches of the watershed.

1.2.3.3 Restoration Plan

The Restoration Plan developed a classification of potential Restoration Templates for riparian ecosystems in various states of cultural alteration, applicable across all geomorphic zones. The study examined each riparian reach to establish specific restoration criteria in terms of channel cross section and form, the scale of terraces present, and dominant vegetation types appropriate to each of the Restoration Templates. Using aerial photography and field assessment data, restoration templates were assigned to each riparian reach based on the condition of the channel, riparian vegetation, and surrounding land uses. The assigned restoration template was intended to represent the best possible restoration target, given the potential natural patterns expected for the riparian reach's geomorphic conditions. The objective of each template was to re-establish, to the extent possible, all of the vegetation zones present under relatively natural conditions, and in relative proportions approximately corresponding to the extent of the geomorphic surfaces found in relatively intact reference reaches.

It was recognized that the restoration templates were intended to be general templates structured specifically to determine the feasibility of restoring individual reaches, and to prioritize restoration actions based on the functional benefits likely to be realized. While final restoration designs could resemble these templates and associated relative dimensions, site-specific restoration designs would have to be developed and include grading plans and specifications for planting stock, planting densities, irrigation practices, and similar requirements.

1.3 OUTCOME OF THE OTAY RIVER WATERSHED SAMP

Between 2005 and 2010, the USACE Los Angeles District conducted outreach and held coordination meetings with the various stakeholder agencies including the County, CDFW, RWQCB, USEPA, and USFWS to establish SAMP program elements consisting of an aquatic resource conservation area and a watershed-wide SAMP permitting framework. The intent of the SAMP program elements was to conserve existing high integrity aquatic resources; streamline Section 404 permitting in areas with lower integrity aquatic resources; prioritize and restore riparian reaches of the watershed to achieve an overall increase the watershed's ecosystem integrity; and minimize overall cumulative impacts of new development and infrastructure maintenance activities in the watershed.

Establishment of SAMP program elements was not ultimately achieved. The USACE redirected resources into establishing a SAMP GIS database that incorporates ERDC's PLD, LLFA and Restoration Plan elements. The resulting SAMP GIS database is intended to be a practical tool for use by USACE staff in making well-informed decisions on CWA Section 404 permits with regard to the character and functions of existing jurisdictional aquatic resources and prioritization of mitigation/restoration in targeted areas of the watershed. The GIS database will also be a useful tool for local stakeholders to use in watershed management and land use planning evaluations. Section 4.0 addresses intended uses of the SAMP GIS database in further detail.

2.0 OTAY RIVER WATERSHED SAMP GIS DATABASE

The USACE Los Angeles District contracted with AECOM (formerly URS Corporation) to compile and create a SAMP GIS database to help assess the past, existing and future aquatic resource conditions of the watershed. The work was conducted under Contract No. W91238-11-D-0016 Task Order CQ01.

The data compiled includes existing USACE SAMP data for the watershed (PLD, LLFA and Restoration Plan as described previously in Section 1.2.3) as well as data on geology, geomorphology, hydrology, surface and groundwater quality, flood control facilities, land use, resource conservation, and wetland and biological information for the watershed. The data was compiled in GIS format including tables for all available attributes of GIS layers.

2.1 PURPOSE OF THE SAMP GIS DATABASE

The purpose of the project is to create a comprehensive and well-documented GIS database of the riparian ecosystem and related data, made available to USACE staff and other watershed stakeholders, to help assess past, present and future aquatic resource conditions of the watershed in light of land use changes.

The GIS database was formatted and transmitted to the USACE for use as an on-line mapping tool for desktop users of Corps Map, ArcGIS, or equivalent. This user manual was prepared at the conclusion of the GIS work to serve as a guide to the GIS database layers by providing a summary and description of each data layer, source data for each layer, and use limitations of the data if any.

2.2 GIS LAYERS COMPRISING THE DATABASE

The GIS layers for the watershed are derived from a variety of sources, primarily the USACE's SAMP PLD, LLFA and Restoration Plan. Other data sources include but are not limited to County of San Diego, State Water Resources Control Board (SWRCB), United States Geologic Survey (USGS), USFWS, and Southern California Association of Governments (SCAG). A listing of each layer is provided below along with the data source. Appendix A contains a discussion of each layer, its source, and limitations of use.

GIS Layer	Source
Otay River Watershed Boundary	USACE ERDC – WES
SAMP Data and Analysis	
PLD • Mainstem Waterways • Mainstem Tributaries • Washes • Springs • Hydrogeomorphic Floodplain Units • Regulatory Probability Rating Units • Vegetation Species Association Units	USACE ERDC-CRREL
LLFA • Hydrologic Integrity (Normalized Index Scores) • Water Quality Integrity (Normalized Index Scores) • Habitat Integrity (Normalized Index Scores)	USACE ERDC - WES
Restoration Planning for Riparian Ecosystems • Possible Opportunities (Priorities by Restoration Goal) • Geomorphic Zones of the Watershed • Restoration Templates • Baseline Hydrologic Integrity (Normalized Index Scores) • Baseline Water Quality Integrity (Normalized Index Scores) • Baseline Habitat Integrity (Normalized Index Scores) • Level of Restoration Effort • Potential for Functional Gains • Restoration Scenarios to Increase Hydrologic Integrity • Restoration Scenarios to Increase Water Quality Integrity • Restoration Scenarios to Increase Habitat Integrity	USACE ERDC - WES

GIS Layer	Source
Riparian Ecosystems within Public/Conserved Lands • Bureau of Land Management (BLM) • State of California • County of San Diego • Public-Quasi-Public Conserved Lands, San Diego County	San Diego County and other public agencies and conservation groups. California Protected Areas Database
Analysis of Future Land Use • Vacant Land Planned for Development (2015)	Aerial Map 2015 General Plans for San Diego County and local cities
Geology & Soils Data • Faults • Liquefaction Zones • Rock Type • Soils (SSURGO) Soil Survey	California Geologic Survey, USGS California Division of Mines and Geology United States Department of Agriculture - National Resource Conservation Service

Hydrography and Hydrologic Data
• National Wetland Inventory (NWI)
• National Hydrography Dataset (NHD) Flowline
• FEMA Flood Zones (100-year floodplain)
• Flood Infrastructure
  ○ Road Culverts
  ○ Drain Conveyances
  ○ Levees
  ○ Detention/Retention Basins
	USFWS
	USGS
	Federal Emergency Management Agency (FEMA)
	San Diego County

Water Quality Impaired Waterbodies (303(b) and 303(d)-Listed Waters) • Streams • Lakes	SWRCB
Habitat & Wildlife Linkages for Riparian Species Federally Designated Critical Habitats • Least bell's vireo • Mexican Flannelbush • Otay tarplant • Quino Checkerspot Butterfly • Riverside Fairy Shrimp • San Diego Fairy Shrimp • San Diego thommint • Spreading Naverretia • Western Snowy Plover Wildlife Linkages and Corridors	USFWS San Diego County
Land Use & Land Cover Land Use Land Cover	San Diego County

GIS Layer	Source
Aerial Photos as Background Layer 1971 Digital Historical Aerial Photo 1994 Digital Historical Aerial Photo 2014- 2016 Digital Aerial Photos	 NETR (see Section 2.3) NETR (see Section 2.3) ESRI

2.3 AERIAL AND STREET IMAGERY

In addition to the GIS layers developed for use in the Otay River Watershed SAMP GIS database, several different background layers are available for analysis. The ESRI platform that supports the system includes numerous background layers including current aerial photography covering the entire project area, USGS topographic maps, various street layer depictions, and special user layers.

The project also includes two additional layers of historic aerial photographs. Two black and white, ortho-rectified MrSid format files of compiled aerial photography were procured from National Environmental Title Research (NETR) for the entire Otay River Watershed for two historical periods 1971 and 1994 to visually capture the change in landscape over time. Both of the two seamless photographs generally have a resolution of 1 meter per pixel and are almost completely continuous.

3.0 ANALYSIS USING THE SAMP GIS DATABASE

The Otay River Watershed SAMP GIS database can be used to provide watershed information based on a single purpose GIS layer or combined to provide an overlay analysis using two or more GIS layers.

Example data from a single GIS layer:

- Identification of aquatic resources with degraded habitat integrity
- Identification of vacant land that is planned for development
- Analysis of historical land use using historical aerial photography
- Identification of lands designated in the MSCP
- Identification of flood control infrastructure facilities of San Diego County
- Analysis of the extent of stream channelization
- Increase in water quality integrity for restoration of riparian ecosystem immediately adjacent to waters of the U.S. (Restoration Scenario 1 – see discussion below)*
- Increase in habitat integrity for local drainage basins, based on restoration of rangeland in upland areas to native vegetation (Restoration Scenario 2 – see discussion below)*

- Increase in hydrologic integrity for local drainage basins based on restoration of agricultural land in upland areas to native vegetation (Restoration Scenario 3 – see discussion below)*

Example data from overlay analysis of combined GIS layers:

- Identification of areas of potential land development that may be intruding into high integrity riparian habitat
- Identification of areas of potential land development that may encroach into critical habitats or wildlife migration corridors
- Analysis of acreage of impacts to a riparian resource from a potential land development
- Analysis of high integrity riparian areas subject to erosion/sedimentation
- Analysis of historical change to aquatic resources from land development and flood control
- Analysis of the integrity of aquatic resources in areas designated Public-Quasi-Public Conserved lands
- Identification of soil type in riparian areas with low habitat integrity

*Restoration Scenario Layers:

The SAMP GIS database contains a series of individual restoration planning layers that show the increases in habitat, hydrologic and water quality integrity for three different restoration scenarios. These scenarios are:

- Scenario 1: Restoration within the riparian ecosystem immediately adjacent to waters of the U.S. (e.g., stream channel geomorphic features, riparian vegetation, etc). The increase in integrity under Scenario 1 was determined by subtracting the baseline integrity from the integrity calculated under Scenario 1 for each local drainage area. This was done for all three indices of integrity: habitat, hydrologic and water quality.

- Scenario 2: Restoration of active or former rangeland within upland areas to native vegetation. The increase in integrity under Scenario 2 was determined by subtracting the baseline integrity from the integrity calculated under Scenario 2 for each local drainage area. This was done for all three indices: habitat, hydrologic and water quality.

- Scenario 3: Restoration of agricultural lands as well as active or former rangeland within upland areas to native vegetation. The increase in integrity under Scenario 3 was determined by subtracting the baseline habitat integrity from the habitat integrity calculated under Scenario 3 for each local drainage area. This was done for all three indices: habitat, hydrologic and water quality.

4.0 INTENDED USES OF THE SAMP WATERSHED DATABASE

The SAMP GIS database is intended for use by staff of the USACE Regulatory Division in making well-informed decisions on CWA Section 404 permits. The database provides staff with a USACE ERDC-prepared planning level delineation and functional integrity characterization of jurisdictional resources that may be impacted by a regulated activity. Staff can rely on this data for an initial desktop assessment of a project's potential impact to the functions and values of the jurisdictional resource (at the reach level) and facilitate decisions on the type and extent of compensatory mitigation that would be needed for no net loss in functions and values. Using the ERDC restoration planning layers, staff can also make decisions on the best locations for compensatory mitigation, as well as the type and level of restoration effort that would be needed to provide an increase in functional integrity of the aquatic resource. From a regulatory management perspective, use of the SAMP database promotes implementation of the Compensatory Mitigation Rule (33 CFR Parts 325 and 332) (40 CFR Part 230) which calls for a watershed approach to mitigation.

Other users of the database could include land use planners within San Diego County and the various cities who will now have access to detailed aquatic resources data that can help inform their decision making when evaluating land development plans or when updating their General Plan including the Open Space/Conservation Element to understand how aquatic resources could be affected by land use change. The data can also be used to help better inform land use planning decisions on new or expanded open space/conservation areas and riparian buffer zones.

Agencies and other stakeholders involved in watershed planning and management can use the SAMP GIS database to identify watershed stressors and impacted resources, restoration potential of various riparian resources, source analysis for assessing total daily maximum loads (TMDLs) and locations for implementing regional best management practices that help address water quality. The data can also be used to help inform decisions on flood plain restoration or riparian habitat restoration. Additionally, stakeholders can use an historical aerial photo layer, combined with overlays of aquatic resources, vacant land planned for development, and public/conserved lands, to analyze the extent of land use change that has occurred in the watershed, as well as changes to aquatic resources, and what areas of remaining resources could best be restored or conserved.

5.0 DATABASE ACCESSIBILITY, MAINTENANCE, AND LIMITATIONS

5.1 ACCESSIBILITY OF SAMP GIS DATABASE

The Otay River Watershed SAMP GIS database is available to all users who access the USACE SAMP webpage, a public site at:

http://www.spl.usace.army.mil/Missions/Regulatory/Projects-Programs/

The GIS maps are provided in ArcGIS server format for non-technical users.

5.2 LONG-TERM MAINTENANCE OF THE DATABASE

GIS layers prepared by public agencies, other than SAMP data layers prepared by the USACE, are expected to be updated from time to time based on changing conditions. Therefore, once per year, GIS staff should review public agency GIS data layers used in the SAMP GIS database and identify if revised/updated postings of the data layers have been made. If revisions/updates have been made, GIS staff should evaluate the significance of the revisions, and consider updating the GIS layer in the SAMP GIS database. In particular, GIS staff should review layers for land use/land cover, property ownership, city boundaries, parcel maps, conserved lands, national wetland inventory, federally-designated critical habitats, impaired waters, and stream hydromodification. Data in these layers may change over time, while data in others layers may not. For example data for soils, rock type, faults and other geologic information is not likely to change on a regular basis, and therefore would not require regular review for map layer updates.

5.3 DATABASE LIMITATIONS

The data in the Otay River Watershed SAMP GIS database is limited to the quality of the data received by public agencies. As discussed in Section 5.2, many data layers require regular review and update to ensure the data layers in the database are the most current.

USACE's SAMP data provided in the PLD, LLFA and Restoration Plan were prepared over the period 2003 to 2006. These SAMP data reflect conditions at the time these studies were conducted. Use of the SAMP data for evaluation of new development, infrastructure or maintenance projects will require review of current aerial maps and/or field verification to confirm present conditions.

APPENDIX

DESCRIPTIONS, SOURCES, AND LIMITATIONS OF OTAY RIVER WATERSHED SAMP GIS DATABASE

APPENDIX A

DESCRIPTIONS, SOURCES, AND LIMITATIONS OF GIS DATABASE

FOR

OTAY RIVER WATERSHED

SPECIAL AREA MANAGEMENT PLAN

SUMMARY REPORT AND USER MANUAL

United States Army Corps of Engineers
Los Angeles District
Regulatory Division
915 Wilshire Boulevard
Los Angeles, CA 90015

October 2016

SAMP DATA LAYERS

PLANNING LEVEL DELINEATION AND GEOSPATIAL CHARACTERIZATION OF AQUATIC RESOURCES OF OTAY RIVER WATERSHED (PLD)

Otay River Watershed Boundary

Summary
The Otay River Watershed represents the land area that drains into the Otay River. The Otay River Watershed is the extent of the Otay River Watershed Special Area Management Plan (SAMP) boundary.

Description
The layer was developed based on hydrologic analysis of the topography and the storm water flow pattern.

Credits
Lichvar, R. 2003. Planning Level Delineation and Geospatial Characterization of Aquatic Resources for Otay Watershed, San Diego County U.S. Army Engineer Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL).

Use Limitations
There are no access or use limitations for this layer.

Subwatersheds, Otay River Watershed

Summary
The PLD identified nine hydrologic subareas in the Otay Watershed which drain to the Otay River based on a standard nested watershed delineation scheme developed by the State Water Resources Control Board.

Description
The subwatersheds are hydrologic units (or “subareas”) that represent a limited hydrologic system for analysis and assessment of the watershed.

Credits
Lichvar, R. 2003. Planning Level Delineation and Geospatial Characterization of Aquatic Resources for Otay Watershed, San Diego County U.S. Army Engineer Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL).

Use Limitations
There are no access or use limitations for this layer.

Mainstem Waterways, Otay River Watershed

Summary
Mainstem waterways in the Otay River Watershed were identified and mapped. The large differences in length and area of the mainstem channels in these reaches reflects the extreme differences between urban areas and more natural landscapes in terms of the longitudinal homogeneity of vegetation cover, engineering, and other types of disturbance that occur along stream channels and their associated riparian ecosystems.

These mainstem waterways are Waters of the United States (WoUS) and regulated under Section 404 of the Clean Water Act (jurisdictional waters). The areas, delineated as WoUS in the PLD, met the requirements outlined in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and subsequent guidance from the Office of the Chief of Engineers, but are subject to field verification.

Description
A mainstem waterway is the primary downstream segment of a stream or river, classified in Strahler system of hydrologic classification as the highest order stream in a drainage basin, as contrasted to its upstream tributaries (lower classified streams). Water enters the mainstem from the upstream tributaries (riparian reaches). In general, as stream orders increase, the width of the bankfull channel increases, and the size of the area supporting riparian vegetation increases.

Credits
Lichvar, R. 2003. Planning Level Delineation and Geospatial Characterization of Aquatic Resources for Otay Watershed, San Diego County U.S. Army Engineer Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL).

Use Limitations
There are no access limitations for this layer. Waters delineated in the PLD are subject to field verification.

Mainstem Tributaries, Otay River Watershed

Summary
Each of the mainstem tributaries in the Otay River Watershed were identified and mapped. These mainstem waterways are WoUS and regulated under Section 404 of the Clean Water Act (e.g.

jurisdictional waters). The areas, delineated as WoUS in the PLD, met the requirements outlined in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987 and subsequent guidance from the Office of the Chief of Engineers, but are subject to field verification.

Description
Mainstem tributaries are lower order streams that contribute drainage to mainstems (higher order streams). First order streams (i.e., the smallest mapped streams, or stream branches, without tributaries) discharge into second order streams (i.e., branches of streams receiving discharges from only first order streams). Lower order streams may discharge directly into a third order stream (i.e., larger branches of a stream receiving first and second order tributaries).

Credits
Lichvar, R. 2003. Planning Level Delineation and Geospatial Characterization of Aquatic Resources for Otay Watershed, San Diego County U.S. Army Engineer Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL).

Use Limitations
There are no access limitations for this layer. Waters delineated in the PLD are subject to field verification.

Springs, Otay River Watershed

Summary
Jurisdictional springs were identified and mapped throughout the Otay River Watershed.

Description
Springs identified (at the planning level) as jurisdictional under the Clean Water Act and under the regulatory authority of the USACE.

Credits
Lichvar, R. 2003. Planning Level Delineation and Geospatial Characterization of Aquatic Resources for Otay Watershed, San Diego County U.S. Army Engineer Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL).

Use Limitations
There are no access limitations for this layer. Waters delineated in the PLD are subject to field verification.

Washes, Otay River Watershed

Summary
Jurisdictional washes identified throughout the SAMP area.

Description
Jurisdictional washes identified (at the planning level) as jurisdictional under the Clean Water Act and under the regulatory authority of the USACE.

Credits
Lichvar, R. 2003. Planning Level Delineation and Geospatial Characterization of Aquatic Resources for Otay Watershed, San Diego County U.S. Army Engineer Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL).

Use Limitations
There are no access limitations for this layer. Waters delineated in the PLD are subject to field verification.

Hydrogeomorphic Floodplain Units, Otay River Watershed

Summary
Hydrogeomorphic floodplain units were mapped for the purposes of indicating flood frequency for use in delineation purposes. Typically, floodplain terraces develop on second-order, third-order, and greater Strahler stream types. First-order streams typically lack floodplain terraces since they are located on steeper slopes, have smaller drainage areas, and are confined to bedrock channels that limit their ability to create floodplain terraces

Description
The two floodplain map units identified in the field were the active and abandoned floodplain terraces. The active floodplain contains the bankfull and the adjacent active floodplain terrace that contains features associated with frequent flooding. These features include high-flow channels, unvegetated surfaces, bed and bank, and a break in slope. The abandoned floodplain terrace is above the active floodplain and contains features associated with infrequent and seasonally wet areas. Potentially regulated hydrologic features in this terrace are driven by infrequent overbank flooding, local precipitation, and occasional groundwater discharge within paleo channels and other depressional features. Often there is a distinct change of vegetation community from the active to the abandoned floodplain.

Credits

Lichvar, R. 2003. Planning Level Delineation and Geospatial Characterization of Aquatic Resources for Otay Watershed, San Diego County, U.S. Army Engineer Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL).

Use Limitations

There are no access and use limitations for this layer.

Regulatory Probability Rating Units, Otay River Watershed

Summary

The modification of standard delineation sampling protocols and the development of wetland probability ratings for Section 404 regulatory purposes for the riparian vegetation map units allowed for a watershed-scale delineation. The sampling protocols outlined in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory, 1987) and "Waters of the United States" (WoUS) at 33 CFR 328 were modified for use at the watershed scale. To delineate at this scale, riparian corridors were mapped for hydrogeomorphic surfaces representing a combined bankfull and active floodplain and a separate abandoned floodplain terrace, which were later interpreted for return-interval requirements under Section 404. Individual vegetation units at the species-association level were sampled at 169 sites to develop a characterization of the indicators for both wetlands and other WoUS.

Description

By combining field sampling results for wetland occurrences within various mapped vegetation types with the flood frequency information obtained from the geomorphic surface map, probability ratings intended for regulatory purposes were developed to accommodate all variations. Six categories of wetland or WoUS ratings were assigned to each of the riparian vegetation units, with ratings ranging from always regulated to upland or not regulated.

Credits

Environmental Laboratory (1987) Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Use Limitations

There are no access and use limitations for this layer.

Vegetation Species Association Units, Otay River Watershed

Summary

Vegetation map units were developed through a series of modifications to the California natural community classification by Holland (1986). In previous SAMP efforts in other watersheds in southern California, ERDC found that existing vegetation classifications lacked sensitivity for use in watershed-scale wetland delineations.

Description

To meet the needs of identifying wetlands, ERDC developed a classification that followed the hierarchical schemes of both Holland and Sawyer and Keeler-Wolf (1995) but added another level of specificity at the species level. This classification shares the use of growth forms and dominant species, with expanded use of additional species identifiers for both native and non-native units.

Credits

Lichvar, R. 2003. Planning Level Delineation and Geospatial Characterization of Aquatic Resources for Otay Watershed, San Diego County, U.S. Army Engineer Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL).

Holland, R.F. (1986) Preliminary descriptions of the terrestrial natural communities of California. Unpublished report. California Department of Fish and Game, Sacramento, California.

Sawyer, J., and T. Keeler-Wolf (1995) A Manual of California Vegetation. California Native Plant Society, California.

Use Limitations

There are no access and use limitations for this layer.

ASSESSMENT OF RIPARIAN ECOSYSTEM INTEGRITY: OTAY RIVER WATERSHED

Habitat Integrity- Otay River Watershed

Summary

Each riparian reach of the Otay River Watershed was assessed for habitat integrity.

Description

Habitat integrity refers to the quality, or state of being complete, and implies correspondence with a natural or original condition of the resource. Riparian ecosystems that ranked high for high ecosystem "integrity" were considered to: (1) exhibit the full range of physical, chemical, and biological attributes and processes that characterized riparian ecosystems in the southern California region over short and long term cycles prior to cultural alteration; and (2) support a balanced, integrated, and adaptive biological community resulting from natural evolutionary and biogeographic processes. For a more detailed description of the process to assess of habitat integrity, please refer to the USACE report "Assessment of Riparian Ecosystem Integrity: Otay River Watershed, San Diego County, California" by R.D. Smith, dated March 2004.

Credits

Smith, R.D. 2004. Assessment of Riparian Ecosystem Integrity: Otay Watershed, San Diego County, California. U.S. Army Engineer Research and Development Center, Waterways Experiment Station, Vicksburg, MS. Final Report to the U.S. Army Corps of Engineers, Los Angeles District.

Use Limitations

There are no access and use limitations for this layer.

Hydrologic Integrity - Otay River Watershed

Summary

Each riparian reach of the Otay River Watershed was assessed for hydrologic integrity.

Description

Hydrologic integrity refers to the quality, or state of being complete, and implies correspondence with a natural or original condition of the resource. Riparian ecosystems that ranked high for high ecosystem "integrity" were considered to: (1) exhibit the full range of physical, chemical, and biological attributes and processes that characterized riparian ecosystems in the southern California region over short and long term cycles prior to cultural alteration; and (2) support a balanced, integrated, and adaptive biological community resulting from natural evolutionary and biogeographic processes. For a more detailed description of the process to assess of hydrologic integrity, please refer to the USACE report "Assessment of Riparian Ecosystem Integrity: Otay River Watershed, San Diego County, California" by R.D. Smith, dated March 2004.

Credits
Smith, R.D. 2004. Assessment of Riparian Ecosystem Integrity: Otay Watershed, San Diego County, California. U.S. Army Engineer Research and Development Center, Waterways Experiment Station, Vicksburg, MS. Final Report to the U.S. Army Corps of Engineers, Los Angeles District.

Use Limitations
There are no access and use limitations for this layer.

Water Quality Integrity - Otay River Watershed

Summary
Each of the riparian reaches of the Otay River Watershed were identified and assessed for water quality integrity.

Description
Water quality integrity refers to the quality, or state of being complete, and implies correspondence with a natural or original condition of the resource. Riparian ecosystems that ranked high for high ecosystem “integrity” were considered to: (1) exhibit the full range of physical, chemical, and biological attributes and processes that characterized riparian ecosystems in the southern California region over short and long term cycles prior to cultural alteration; and (2) support a balanced, integrated, and adaptive biological community resulting from natural evolutionary and biogeographic processes. For a more detailed description of the process to assess of water quality integrity, please refer to the USACE report "Assessment of Riparian Ecosystem Integrity: Otay River Watershed, San Diego County, California" by R.D. Smith, dated March 2004.

Credits
Smith, R.D. 2004. Assessment of Riparian Ecosystem Integrity: Otay Watershed, San Diego County, California. U.S. Army Engineer Research and Development Center, Waterways Experiment Station, Vicksburg, MS. Final Report to the U.S. Army Corps of Engineers, Los Angeles District.

Use Limitations
There are no access and use limitations for this layer.

RIPARIAN ECOSYSTEM RESTORATION PLAN FOR THE OTAY RIVER WATERSHED: GENERAL DESIGN CRITERIA AND SITE SELECTION

Baseline Habitat Integrity – (Normalized Index Scores), Otay River Watershed

Summary

The change in habitat integrity of each riparian reach was assessed using three different restoration scenarios (normalized index scores) described in the Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection (Restoration Plan) by R. Daniel Smith (2006) of ERDC.

Description

One of the primary applications of the Assessment of Riparian Ecosystem Integrity (Smith 2004) is to identify specific riparian reaches where restoration will maximize the increase in riparian ecosystem integrity in the watershed, given a specific set of criteria or objectives. Three restoration scenarios were simulated and changes in integrity were mapped at the local drainage area scale to facilitate a comparison between riparian reaches.

Credits

Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Baseline Hydrologic Integrity (Normalized Index Scores), Otay River Watershed

Summary

The change in hydrologic integrity of each riparian reach was assessed using three different restoration scenarios (normalized index scores) described in the Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection (Restoration Plan) by R. Daniel Smith (2006) of ERDC

Description

One of the primary applications of the Assessment of Riparian Ecosystem Integrity (Smith 2004) is to identify specific riparian reaches where restoration will maximize the increase in riparian ecosystem integrity in the watershed, given a specific set of criteria or objectives. Three restoration scenarios were simulated and changes in integrity were mapped at the local drainage area scale to facilitate a comparison between riparian reaches.

Credits
Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations
There are no access and use limitations for this layer.

Baseline Water Quality Integrity (Normalized Index Scores), Otay River Watershed

Summary
The change in water quality integrity of each riparian reach was assessed using three different restoration scenarios (normalized index scores) described in the Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection by R. Daniel Smith (2006) of ERDC.

Description
One of the primary applications of the Assessment of Riparian Ecosystem Integrity (Smith 2004) is to identify specific riparian reaches where restoration will maximize the increase in riparian ecosystem integrity in the watershed, given a specific set of criteria or objectives. Three restoration scenarios were simulated and changes in integrity were mapped at the local drainage area scale to facilitate a comparison between riparian reaches.

Credits
Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations
There are no access and use limitations for this layer.

Geomorphic Zones of the Watershed, Otay River Watershed

Summary
The geomorphic zones reflect fundamental geomorphic characteristics under “equilibrium” conditions. Geomorphology rating is an indicator of the likelihood of erosion from storm water flow.

Description

Seven different geomorphology zones were identified in the analysis of the geomorphology zones of the Otay River Watershed. Each assigned riparian reach was classified using aerial photography, baseline assessment data and field evaluations. The Geomorphic zones are as follows:

V-shaped Valley: High-gradient stream channel systems that are located within the mountains or are first-order streams in the foothills.

Colluvial Valley: Streams confined by colluvium, boulder bar deposits, or bedrock, having narrow floodplains and narrow, discontinuous terraces.

Boulder Dominated Floodplain/Terrace: Characterized by deep, extensive accumulations of boulders and cobble that extend from valley wall to valley wall.

Steep Alluvial Fan: Fairly steep, truncated tributaries that occur where streams enter large valleys in mountainous terrain.

Alluvial Valley with Meandering Stream: Sinuous channel systems that meander widely across the valley floor, have well-developed floodplains with alternating bars, and have one or more broad terraces that dominate the remainder of the valley bottom.

Valley Fill: Stream reaches of major stream valleys that have been filled with deep, well-drained sediments and that show only trace channel systems and little or no terrace development.

Sandy Wash: Channel type consisting of a relatively narrow, flow-bottomed channel with low, distinct banks that give way to gentle sloping alluvial and/or colluvial deposits.

Credits

Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Level of Restoration Effort – Otay River

Summary

Using the riparian reaches of the Watershed identified in the Assessment of Riparian Ecosystem Integrity (Smith 2004), each of the reaches were rated for the level of effort required to restore the watershed riparian habitats. The Restoration Plan developed a classification of potential Restoration Templates for riparian ecosystems in various states of cultural alteration, applicable across all geomorphic zones. The study examined each riparian reach to establish specific restoration criteria in terms of channel cross section and form, the scale of terraces present, and dominant vegetation types appropriate to each of the Restoration Templates. Using aerial photography and field assessment data, six restoration templates were assigned to each riparian reach based the condition of the channel, riparian vegetation, and surrounding land uses. The assigned restoration template was intended to represent the best possible restoration target, given the potential natural patterns expected for the riparian reach's geomorphic conditions. The objective of each template was to re-establish, to the extent possible, all of the vegetation zones present under relatively natural conditions, and in relative proportions approximately corresponding to the extent of the geomorphic surfaces found in relatively intact reference reaches.

It was recognized that the restoration templates were intended to be general templates structured specifically to determine the feasibility of restoring individual reaches, and to prioritize restoration actions based on the functional benefits likely to be realized. While final restoration designs could resemble these templates and associated relative dimensions, site-specific restoration designs would have to be developed and include grading plans and specifications for planting stock, planting densities, irrigation practices, and similar requirements.

Description

Each riparian reach identified for the level of restoration effort required corresponds to the individual reach and the corresponding reach ID.

LOE (Level of Effort) Classification:

Heavy Earth / Heavy Plant: Stream reaches for which a large numbers of plants must be introduced and/or substantial mechanical site preparation is needed. These reaches may be deeply incised channel segments that require extensive soil removal to re-establish floodplains and terrace systems tens of feet below the current grade, and grading back of high vertical banks to stable angles of repose.

Light Earth / Heavy Plant: Stream reaches requiring a large numbers of plants to be introduced and/or substantial mechanical site preparation is needed. Planting activities may involve hand-

planting of willows at the base of an unstable bank, or adding species that may have been grazed from a community back into an otherwise intact riparian area or upland buffer.

Light Planting: No reconfiguration of the land surface is needed. Treatment consists of spot-planting of native plants. Typically, this would involve hand-planting of willows at the base of an unstable bank, or adding species that may have been grazed from a community back into an otherwise intact riparian area or upland buffer.

Light Plant / Exotic Control: No reconfiguration of the land surface is needed. Treatment consists of control of exotic species and spot-planting of native plants. Typically, this would involve hand-planting of willows at the base of an unstable bank, or adding species that may have been grazed from a community back into an otherwise intact riparian area or upland buffer.

Moderate Earth / Heavy Plant: Stream segments and associated riparian areas that require reconfiguration in some areas. Moderate Earthwork is intended to indicate widening of floodplains and terraces in systems where channels are not deeply incised, but need more space to re-establish equilibrium and community diversity. Typically, this will involve excavation of less than 6 feet of soil depth, though there is no implication regarding the lateral extent of the excavation.

None: Stream reaches in which no restoration is considered necessary because they are functional in their current condition, requiring only vigilance to prevent invasion of exotic plant species.

Credits

Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Restoration Templates, Otay River Watershed

Summary

One of six restoration templates were assigned to each riparian reach based on the potential to establish natural plant communities with composition, structure, and overall diversity characteristic of the geomorphic zone.

Description

ERDC developed a classification of potential Restoration Templates for riparian ecosystems in various states of cultural alteration, applicable across all Geomorphic Zones and established specific restoration criteria in terms of channel cross section and form, the scale of terraces present, and dominant vegetation types appropriate to each of the restoration Templates. One of six restoration templates was assigned to each riparian reach based on the condition of the channel, riparian vegetation, and surrounding land uses. The assigned restoration template was intended to represent the best possible restoration target, given the potential natural patterns expected for the Geomorphic Zone. The objective of each template is to re-establish, to the extent possible, all of the vegetation zones present under relatively natural conditions, and in relative proportions approximately corresponding to the extent of the geomorphic surfaces found in relatively intact reference reaches.

Credits

Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Increase in Habitat Integrity Index Scenario 1 – Otay River Watershed

Summary

Increase in habitat integrity expected to result from Scenario 1: restoration within the riparian ecosystem immediately adjacent to waters of the U.S., e.g., stream channel geomorphic features, riparian vegetation, etc.

Description

The increase in habitat integrity under Scenario 1 was determined by subtracting the baseline habitat integrity from the habitat integrity calculated under Scenario 1 for each local drainage area.

Credits

Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Increase in Habitat Integrity Index Scenario 2 – Otay River Watershed

Summary
Increase in habitat integrity expected to result from Scenario 2: restoration of active or former rangeland within upland areas to native vegetation.

Description
The increase in habitat integrity under Scenario 2 was determined by subtracting the baseline habitat integrity from the habitat integrity calculated under Scenario 2 for each local drainage area.

Credits
Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Increase in Habitat Integrity Index Scenario 3 – Otay River Watershed

Summary
Increase in habitat integrity expected to result from Scenario 3: restoration of agricultural lands as well as active or former rangeland within upland areas to native vegetation.

Description
The increase in habitat integrity under Scenario 3 was determined by subtracting the baseline habitat integrity from the habitat integrity calculated under Scenario 3 for each local drainage area.

Credits
Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Increase in Hydrologic Integrity Index Scenario 1 – Otay River Watershed

Summary

Increase in hydrologic integrity expected to result from Scenario 1: restoration within the riparian ecosystem immediately adjacent to waters of the U.S., e.g., stream channel geomorphic features, riparian vegetation, etc.

Description

The increase in hydrologic integrity under Scenario 1 was determined by subtracting the baseline hydrologic integrity from the hydrologic integrity calculated under Scenario 1 for each local drainage area.

Credits

Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Increase in Hydrologic Integrity Index Scenario 2 – Otay River Watershed

Summary

Increase in hydrologic integrity expected to result from Scenario 2: restoration of active or former rangeland within upland areas to native vegetation.

Description

The increase in hydrologic integrity under Scenario 2 was determined by subtracting the baseline hydrologic integrity from the hydrologic integrity calculated under Scenario 2 for each local drainage area.

Credits

Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Increase in Hydrologic Integrity Index Scenario 3 – Otay River Watershed

Summary
Increase in hydrologic integrity expected to result from Scenario 3: restoration of agricultural lands as well as active or former rangeland within upland areas to native vegetation.

Description
The increase in hydrologic integrity under Scenario 3 was determined by subtracting the baseline hydrologic integrity from the hydrologic integrity calculated under Scenario 3 for each local drainage area.

Credits
Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Increase in Water Quality Integrity Index Scenario 1 – Otay River Watershed

Summary
Increase in water quality integrity expected to result from Scenario 1: restoration within the riparian ecosystem immediately adjacent to waters of the U.S., e.g., stream channel geomorphic features, riparian vegetation, etc.

Description
The increase in water quality integrity under Scenario 1 was determined by subtracting the baseline hydrologic integrity from the water quality integrity calculated under Scenario 1 for each local drainage area.

Credits
Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Increase in Water Quality Integrity Index Scenario 2 – Otay River Watershed

Summary
Increase in water quality integrity expected to result from Scenario 2: restoration of active or former rangeland within upland areas to native vegetation.

Description
The increase in water quality integrity under Scenario 2 was determined by subtracting the baseline water quality integrity from the water quality integrity calculated under Scenario 2 for each local drainage area.

Credits
Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

Increase in Water Quality Integrity Index Scenario 3 – Otay River Watershed

Summary
Increase in water quality integrity expected to result from restoration of agricultural lands as well as active or former rangeland within upland areas to native vegetation.

Description
The increase in water quality integrity under scenario 3 was determined by subtracting the baseline water quality integrity from the water quality integrity calculated under scenario 3 for each local drainage area.

Credits
Smith, R.D. 2006. Riparian Ecosystem Restoration Plan for the Otay River Watershed: General Design Criteria and Site Selection. U.S. Army Corps Engineer Research Development Center, Waterways Experimentation Station.

Use Limitations

There are no access and use limitations for this layer.

OTHER GIS LAYERS (NON - USACE SAMP)

U.S EPA Assessed Impaired Waterbodies, 303(B) and 303(D) Streams

Summary

This is a line topology layer for the Otay River Watershed. Under Section 303(d) of the federal Clean Water Act, states, territories and authorized tribes are required to develop a list of water quality limited segments. The 303(d)-listed waters do not meet water quality standards, even after minimum required levels of pollution control technology have been installed. The Clean Water Act requires that in California, the State Water Resources Control Board (SWRCB) establish priority rankings for water bodies on the lists and develop action plans, called Total Maximum Daily Loads (TMDLs), to improve water quality. Every two years, the SWRCB submits a report on the State's water quality to the U.S. EPA pursuant to Section 305(b) of the Clean Water Act. The report provides water quality information to the general public and serves as the basis for U.S. EPA 's National Water Quality Inventory Report to Congress.

Description

This dataset is a compilation of the linear water bodies (rivers, streams, coastlines) and lakes in California assessed under Sections 303(d) and 305(b) of the Clean Water Act for the 2010 listing cycle. Each water body is assigned a unique Water Body ID (WBID) number as well as selected associated information (water body name, Regional Water Quality Control Board number, etc.).

This layer provides a spatial representation of the assessed and pollutant-impaired water bodies in the Otay River Watershed for the 2010 listing cycle.

Credits

SWRCB
U.S. EPA, Office of Information Management and Analysis

Use Limitations

There are no access and use limitations for this layer.

EPA Assessed Impaired Waterbodies, 303(B) and 303(D) Lakes

Summary

This is a polygon topology layer for the Otay River Watershed. Under Section 303(d) of the Clean Water Act, states, territories and authorized tribes are required to develop a list of water

quality limited segments. The 303(d)-listed waters do not meet water quality standards, even after minimum required levels of pollution control technology have been installed. The Clean Water Act requires that in California, the SWRCB establish priority rankings for water bodies on the lists and develop action plans, called as Total Maximum Daily Loads (TMDL), to improve water quality. Every two years, the SWRCB submits a report on the State's water quality to the U.S. EPA pursuant to Section 305(b) of the federal Clean Water Act. The Report provides water quality information to the general public and serves as the basis for U.S. EPA 's National Water Quality Inventory Report to Congress.

Description
This dataset is a compilation of the lakes and water bodies in California assessed under Sections 303(d) and 305(b) of the Clean Water Act for the 2010 listing cycle. Each water body is assigned a unique Water Body ID (WBID) number as well as selected associated information (water body name, Regional Water Quality Control Board number, etc.).

This layer provides a spatial representation of the assessed and pollutant-impaired water bodies in the Otay River Watershed for the 2010 listing cycle.

Credits
SWRCB
U.S. EPA, Office of Information Management and Analysis

Use Limitations
There are no access and use limitations for this layer.

Faults

Summary
The purpose of this data layer is to show all known fault lines in the Otay River Watershed. The accuracy of this data allows for general reference analysis and mapping.

Description
This data is based on United States Geological Survey (USGS) or California Division of Mining and Geology (CDMG) reports.

Credits
USGS, CDMG

Use Limitations

None.

Retention Basins

Summary
These retention basins were extracted from the Vegetation Species Associated Units layer.

Description
To meet the needs of identifying wetlands, ERDC developed a classification that followed the hierarchical schemes of both Holland and Sawyer and Keeler-Wolf (1995) but added another level of specificity at the species level. This classification shares the use of growth forms and dominant species, with expanded use of additional species identifiers for both native and non-native units. This scheme also identified retention basins.

Credits
Holland, R.F. (1986) Preliminary descriptions of the terrestrial natural communities of California. Unpublished report. California Department of Fish and Game, Sacramento, California.

Sawyer, J., and T. Keeler-Wolf (1995) A Manual of California Vegetation. California Native Plant Society, California.

Drain Conveyances

Summary

This layer contains Storm Drain Conveyances used for City of San Diego Public Works GIS/SAP Work Management System. The geographic extent is the City of San Diego.

Description
This layer is a line topology layer that shows drain conveyances in the Otay River Watershed .

Credits
SanGIS

Use Limitations
There are no access and use limitations for this layer.

Flood Zones - FEMA 100 Years

Summary

The flood data used in this layer is Q3 flood data derived from the Flood Insurance Rate Maps (FIRM) published by the Federal Emergency Management Agency (FEMA). The file is georeferenced to earth's surface using geographic projection and decimal degree coordinate system. The specifications for the horizontal control of Q3 Flood Data files are consistent with those required for mapping at a scale of 1:24000.

Description

The FIRM is the basis for floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP). Insurance applications include enforcement of the mandatory purchase requirement of the Flood Disaster Protection Act which "... requires the purchase of flood insurance by property owners who are being assisted by Federal programs or by Federally supervised, regulated or insured agencies or institutions in the acquisition or improvement of land facilities located or to be located in identified areas having special flood hazards" (Section 2 (b) (4) of the 1973 Flood Disaster Protection Act). In addition to the identification of Special Flood Hazard Areas, the risk zones shown on the FIRMs are the basis for the establishment of premium rates for flood coverage offered through the NFIP. Q3 Flood Data files are intended to convey certain key features from the existing hard copy FIRM to provide users with automated flood risk data. Edge-matching errors, overlaps and deficiencies in coverage, and similar problems are not corrected during digitizing or post-processing. These data may be used to locate Special Flood Hazard Areas (SFHAs). More detailed information may be obtained from the paper FIRM.

Credits

FEMA Mitigation Directorate Q3 Flood Data Program 500 C Street, SW Washington, D.C. 20472

Use Limitations

There are no access and use limitations for this layer.

Rock Type (Geology)

Summary

Geologic features and rock types as determined by the USGS and California Geological Survey (CGS).

Description
These digital maps are a reformulation of previously published maps, primarily maps of states. The reformulation gives all the maps the same structure and format, allowing them to be combined into regional maps. The associated data tables have information about age and lithology of the map units, also in a standard format.

Credits
USGS, CGS

Habitat, Critical, US Fish and Wildlife Service

Summary
Critical habitat areas are considered essential for the conservation of a listed species. Federal agencies are required to consult with the U.S. Fish and Wildlife Service (USFWS) on actions they carry out, fund, or authorize to ensure that their actions will not destroy or adversely modify critical habitat. These areas provide notice to the public and land managers of the importance of these areas to the conservation of a listed species. Special protections and/or restrictions are possible in areas where Federal funding, permits, licenses, authorizations, or actions occur or are required.

Description
When a species is proposed for listing as endangered or threatened under the Endangered Species Act, the USFWS must consider whether there are areas of habitat believed to be essential to species' conservation. Those areas may be proposed for designation as "critical habitat." Critical habitat is a term defined and used in the Endangered Species Act. It is a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery. An area is designated as "critical habitat" after the USFWS publishes a proposed Federal regulation in the Federal Register and receives and considers public comments on the proposal. The final boundaries of the critical habitat are also published in the Federal Register.

Credits
USFWS

Use Limitations
There are no access and use limitations for this layer.

Land Cover

Summary

To illustrate the vegetation communities and disturbed areas throughout San Diego County to assist in ecological resource management and land use planning efforts as part of the County of San Diego's General Plan.

Description

Vegetation Information in the San Diego Region. The original layer was created by the City of San Diego, the County of San Diego and San Diego Association of Governments (SANDAG) and had become static. This layer, now maintained by the San Diego County Department of Planning and Land Use, is updated as needed, using aerial imagery and georeferenced bio-maps.

Credits

City of San Diego; SANDAG; County of San Diego, Planning & Development Services, Land Use and Environment Group Land Use and Environment Group (LUEG)-GIS Service

Use Limitations

Modifications, corrections or updates can be made on request. The County of San Diego, Planning & Development Services, LUEG-GIS Service would consider external information sources as input to future versions of the vegetation layer.

Land Use, SANDAG

Summary
Developed to support the Otay Watershed Management Plan (WMP) and Otay River Watershed SAMP.

Description
2006 SANDAG existing land use data layer updated in developed areas by Technology Associated in 2007 based on current orthophoto.

Credits
SANDAG, Technology Associated

Liquefaction

Summary
Within the County, there may be a potential for liquefaction in areas with loose sandy soils combined with a shallow groundwater table, which typically are located in alluvial river valleys/basins and floodplains. The geological data maps in this layer were created for the purpose of screening for geologic hazards including liquefaction potential. They map were created at a regional scale and are not to be used to make land use decisions.

Description
This dataset combines the following: existing liquefaction areas from local maps, National Earthquake Hazards Reduction Program (NEHRP) which rates soils from hard to soft, and known hydric soils from the United States Department of Agriculture (USDA) Soil Survey to identify the potential areas where liquefaction may occur.

Credits
USDA, NEHRP

Use Limitations
These data are to be used for screening analysis for liquefaction potential in environmental review documents, and are not to be used for making regulatory decisions.

Multi-Species Conservation Plan (MSCP) Conserved Areas

Summary

Designations of the County of San Diego's Multiple Species Conservation Program South County Subregional Plan. These data were developed in order to establish a preserve design for the South County MSCP (SCMSCP).

Description

This map depicts the SCMSCP plan. The existing boundaries of this County Subarea Plan apply to land that is served by the City of San Diego Metro Wastewater Sewer System and the boundaries extend from the southern portion of Ramona and the San Dieguito River; east to Poway, Lakeside and Alpine; and south to the border with Mexico.

The San Diego County Board of Supervisors established the original MSCP in October 1997 as an integral part of the County's efforts to protect parks and open space. The protection of sensitive plant and animal species by the MSCP eliminates the need to list the species as endangered under Federal and State Endangered Species Acts and reduces the costly permit process for private landowners and public agencies. The goal of the MSCP (a 50-year program) is to maintain and enhance biological diversity in the region and maintain viable populations of endangered, threatened, and key sensitive species and their habitats. Not only are endangered and threatened species protected by the MSCP, but the residents of the community will benefit from this preservation of the natural environment as well. Planning a preserve system for the North County region also promotes regional economic viability through streamlining the land use permit process - a significant benefit to landowners. The MSCP is a cooperative effort among the County and other local jurisdictions and the USFWS and the California Department of Fish and Wildlife (the Wildlife Agencies). These public partners are working with various private landowners, conservation groups, and community planning groups, developers and other stakeholders in assembling the preserve.

More information on the MSCP can be found at: http://www.sdcounty.ca.gov/pds/mscp/

Credits

County of San Diego, Department of Planning and Land Use; County of San Diego, Planning & Development Services, LUEG-GIS Service

Use Limitations

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National Wetland Inventory

Summary

The present goal of the USFWS is to provide the citizens of the United States and its Trust Territories with current geospatially referenced information on the status, extent, characteristics and functions of wetlands, riparian, deepwater and related aquatic habitats in priority areas to promote the understanding and conservation of these resources.

Description

This data set represents the extent, approximate location and type of wetlands and deepwater habitats in the conterminous United States. These data delineate the areal extent of wetlands and surface waters as defined by Cowardin et al. (1979). Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and near shore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery. By policy, the USFWS also excludes certain types of "farmed wetlands" as may be defined by the Food Security Act or that do not coincide with the Cowardin et al. definition. More information is available by contacting the USFWS' Regional Wetland Coordinator (https://www.fws.gov/Wetlands/nwi/RWC.html) for additional information on what types of farmed wetlands are included on wetland maps.

Credits

USFWS

Use Limitations

Acknowledgement of the USFWS and (or) the National Wetlands Inventory would be appreciated in products derived from these data There are no access or use limitation for this layer.

National Hydrography Dataset (NHD)

Summary

The NHD is a national framework for assigning reach addresses to water-related entities, such as industrial discharges, drinking water supplies, fish habitat areas, wild and scenic rivers. Reach addresses establish the locations of these entities relative to one another within the NHD surface water drainage network, much like addresses on streets. Once linked to the NHD by their reach addresses, the upstream/downstream relationships of these water-related entities--and any associated information about them--can be analyzed using software tools ranging from spreadsheets to GIS can also be used to combine NHD-based network analysis with other data layers, such as soils, land use and population, to help understand and display their respective effects upon one another. Furthermore, because the NHD provides a nationally consistent framework for addressing and analysis, water-related information linked to reach addresses by one organization (national, state, local) can be shared with other organizations and easily integrated into many different types of applications to the benefit of all.

Description

The NHD is a feature-based database that interconnects and uniquely identifies the stream segments or reaches that make up the nation's surface water drainage system. NHD data was originally developed at 1:100,000-scale and exists at that scale for the whole country. This high-resolution NHD, generally developed at 1:24,000/1:12,000 scale, adds detail to the original 1:100,000-scale NHD. (Data for Alaska, Puerto Rico and the Virgin Islands was developed at high-resolution, not 1:100,000 scale.) Local resolution NHD is being developed where partners and data exist. The NHD contains reach codes for networked features, flow direction, names, and centerline representations for areal water bodies. Reaches are also defined on waterbodies and the approximate shorelines of the Great Lakes, the Atlantic and Pacific Oceans and the Gulf of Mexico. The NHD also incorporates the National Spatial Data Infrastructure framework criteria established by the Federal Geographic Data Committee.

Credits

USGS

Use Limitations

None.

Road Culverts

Summary
Culverts in the unincorporated San Diego County. Most are maintained either by road fund crews or flood control district crews. Some private culverts are also included in this dataset.

Description
Road culverts in unincorporated areas.

Credits
County of San Diego Department of Public Works, LUEG-GIS.

Use Limitations
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Soil Survey (SSURGO)

Summary
The SSURGO Soils database is produced by the Natural Resource Conservation Service (NRCS) of the USDA). It provides a detailed delineation of soil types.

Description
The SSURGO soils database contains information about soil as collected by the National Cooperative Soil Survey over the course of a century. The information was gathered by walking over the land and observing the soil. Many soil samples were analyzed in laboratories. The map units describe soils and other components that have unique properties, interpretations, and productivity. The information was collected at scales ranging from 1:12,000 to 1:63,360. More details were gathered at a scale of 1:12,000 than at a scale of 1:63,360. The mapping is intended for natural resource planning and management by landowners, townships, and counties. Some knowledge of soils data and map scale is necessary to avoid misunderstandings.

Credits
NRCS, USDA, 2014

Use Limitations
There are no access and use limitations for this layer.

Drain Structures

Summary
This layer provides the ability to identify storm drain structures in the City of San Diego.

Description
Storm Drain Structures used for Public Works GIS/SAP Work Management System. The geographic extent is the City of San Diego.

Credits
SanGIS, City of San Diego

Use Limitations
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Areas of Potential Development Pressure (Vacant Land Planned for Development)

Summary
This layer contains parcels that are currently vacant but potential sites of future development.

Description
Parcels that are currently vacant but have had future potential uses identified.

Credits
County of San Diego, SanGIS

Use Limitations
There are no access and use limitations for this layer.

Habitat & Wildlife Linkages for Riparian Species

Summary
A wildlife corridor can be defined as a linear landscape feature that allows animal movement between two patches of habitat or between habitat and geographically discrete resources (e.g., water). Regional corridors link two or more large areas of natural open space and are necessary to maintain demographic and genetic exchange between wildlife populations residing within these geographically disjunct areas. Local corridors allow resident animals' access to necessary resources (e.g., water, food, cover, or den sites) within a large habitat patch, and they also may function as secondary connections to the regional corridor system.

Description
This layer shows wildlife corridors for focal species in San Diego County such as California gnatcatcher, coastal cactus wren, mammalian predators (mountain lion, coyote, and bobcat), and deer that are likely to occur in relatively low densities and that would be unable to cross large areas of man-modified or otherwise unsuitable habitat without a wildlife corridor linkage.

Credits
County of San Diego, SANGIS,
South Coast Missing Linkages: A Wildland Network for the South Coast Ecoregion

Use Limitations
There are no access and use limitations for this layer.

Public Lands - California Protected Areas Database (CPAD)

Summary
CPAD is suitable for a wide range of planning, assessment, analysis and display purposes. CPAD should not be used as the basis for regulatory, legal or other specific governmental actions. See the CPAD Data Disclaimer for more information.

Description
CPAD contains data on lands owned in fee by governments, non-profits and some private entities that are protected for open space purposes. Data includes all such areas in California, from small urban parks to large national parks and forests, mostly aligned to assessor parcel boundaries. Data is collected by Holdings (parcels) which are aggregated to Units (commonly named areas within counties) and Super Units (commonly named areas generally).

Credits
CPAD - www.calands.org

Use Limitations
All users must review the CPAD Data Disclaimer before using the dataset - CPAD is generally available to any user.