PART III: PROJECTS

Coordinated studies, plans, projects, partnerships, programs and policies are all required to successfully manage water resources over the long term. This phase of the IRCWMP has focused primarily on planning and projects. The outcomes are a planning methodology to identify and integrate projects and a list of prioritized projects.

The planning framework and methodology were presented in Parts I and II of this Plan. Part III focuses on projects and the state strategies they implement. Chapter 10: Local Level Planning and Integration presents local objectives, project integration designs, and the list of projects that support both local and regional objectives.

Chapter 11: Regional Prioritization presents a simple scoring system based on a project's multiple benefits and an integration concept that is based on state priorities. Once the body of Regional Performance Objectives is sufficiently robust and detailed, the scoring system can be adapted in a more sophisticated manner to reward projects that accomplish specific regional objectives. Additionally, the scoring system can be easily modified to accommodate changes in local and state priorities.

Chapter 12: Next Steps for Plan Implementation summarizes the studies, programs, policies, plans and partnerships that will be needed in subsequent phases of this IRCWMP process

10 • LOCAL LEVEL PLANNING & INTEGRATION

A key concept of this Plan is that project-level planning and design should be infused with ideas that promote rebalancing of the hydrologic system, in order to establish a healthy and stable ecosystem. Based on this underlying principle, the purpose of the IRWM planning process is to identify, prioritize and implement those projects that are key toward 1) addressing water resource issues and 2) creating a foundation for implementing other supporting water resource projects and programs.

Chapter 2 presented state guidelines for water resource planning (Section 2.6). This chapter describes local project planning elements, which are then used to outline potential integrated local programs.

As a first step in defining local programs, it is useful to define sub-regions or 'Planning Areas" within the watershed as follows:

1) Northern Foothills
2) Southern Foothills
3) Central Plain
4) Urban Bay
5) Bay/Coastal
6) Coastal Canyons

Each Planning Area is a cluster of subwatersheds that share relatively similar hydrologic circumstances and benefit from project designs tailored to local conditions.

Based on this delineation, meetings were held with stakeholders within each Planning Area. Stakeholders were queried regarding local objectives, project challenges, and ideas for potential projects and programs that would be beneficial to the area. These discussions are the basis for this Plan's project-level planning and integration.

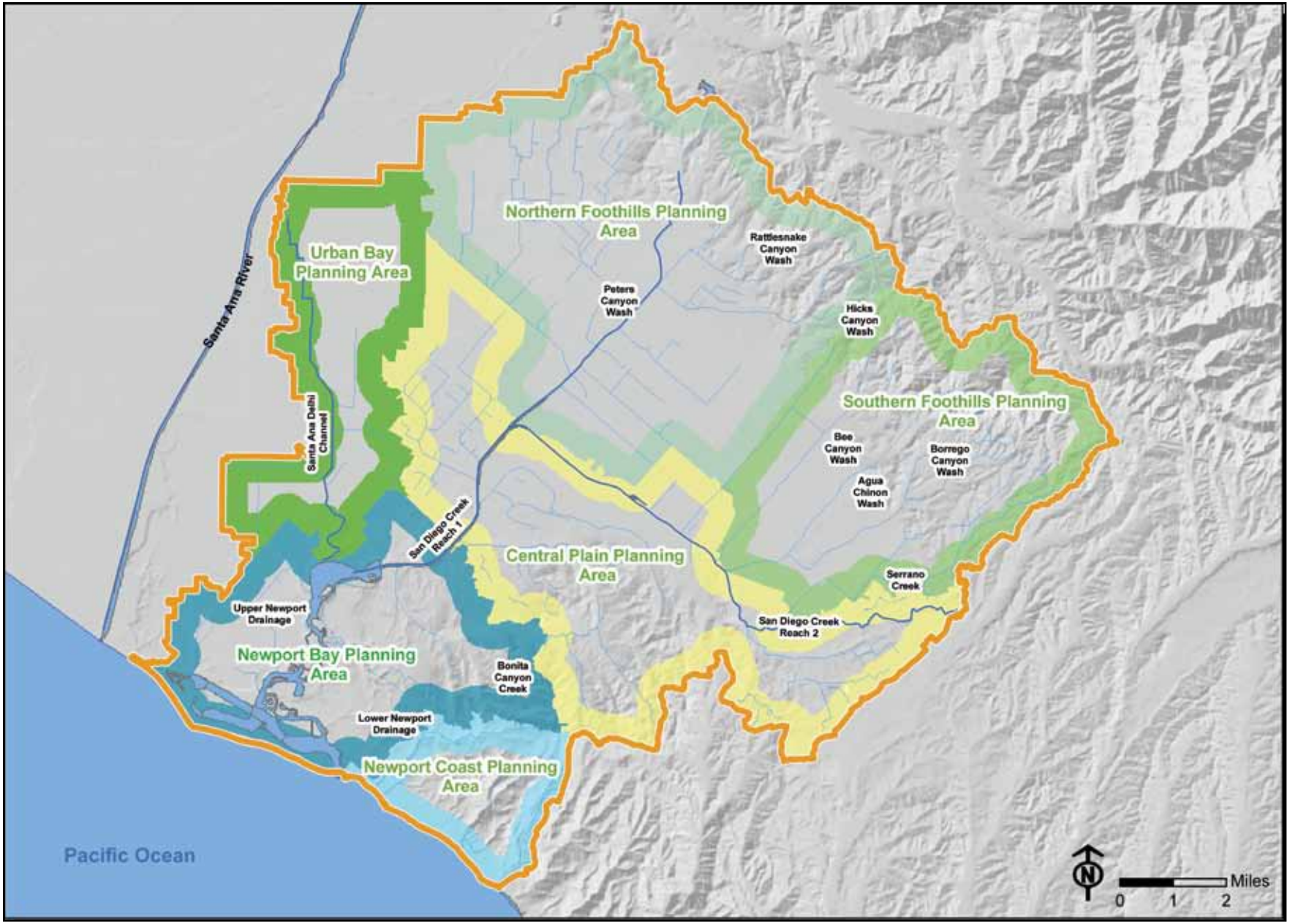


Figure 10.1 IRCWMP Planning Areas.

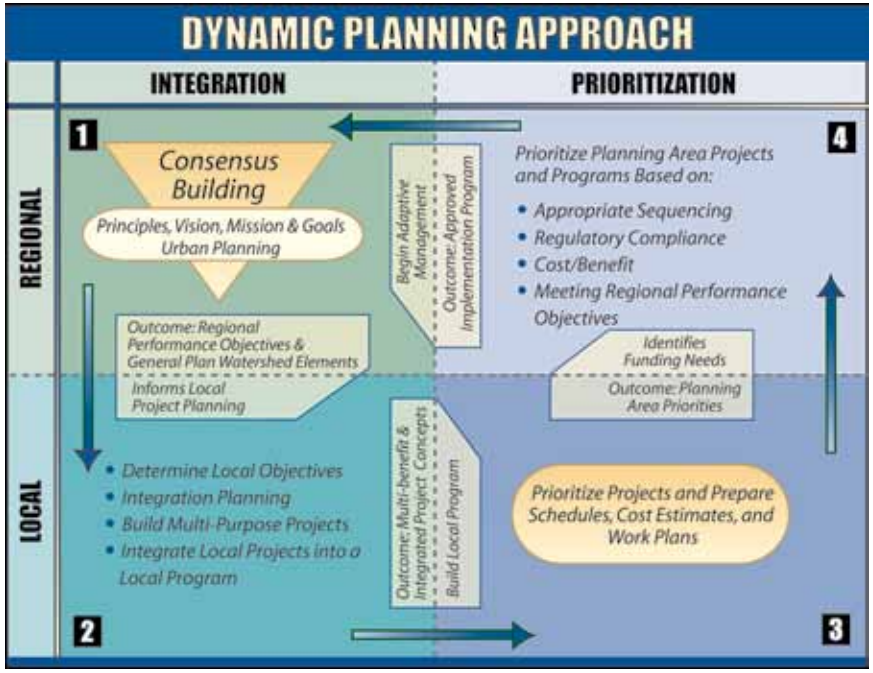


Figure 10.2 Dynamic Planning Approach

Project level planning and integration consists of four parts, as illustrated in Step 2 of the Dynamic Planning Approach (Figure 10.2).

1. Defining local objectives
2. Assessing challenges and opportunities
3. Building multi-purpose projects, and
4. Integrating projects into larger planning and programming efforts through integration planning.

Local objectives are based on immediate and long-term needs and goals. This Plan provides a framework where local objectives can inform and be guided by the Regional (watershed-wide) Performance Objectives, which set watershed targets and milestones toward re-establishing a healthy and stable regional ecosystem. Local and regional objectives guide the planning and formulation of potential water resource projects. Table 10.1 lists potential key and supporting projects for each of the planning areas.

There are already many examples in our watershed of water resource projects that provide multiple benefits. The most important types of projects are those that address the most egregious impacts to a healthy hydrologic system. These projects can be considered as baseline or cornerstone projects. These projects not only work to reestablish a healthy and balanced ecosystem, but also create a foundation that fosters supporting and future projects.

Integration

At the root of the concept of integrated water resource planning are inter-linking and cross-connecting multi-purpose water resource projects that have been designed in accordance with hydrologic principles. Planning and design integration are creative actions involving the four water resource areas (flood control, water supply, water quality and habitat), economics, community interests, political climate and funding opportunities. Chapter 4 outlines four types of regional integration and thirteen types of local-level integration that can be considered by the project proponent in order to create cross-

Table 10.1 Central Orange County IRCWMP: Key Projects for Each Planning Area

	Northern Foothills	Southern Foothills	Central Plain	Urban Bay	Bay/Coastal	Coastal Canyons
HYDROLOGY/ FLOOD CONTROL	• Foothill detention basins	• Borrego/Serrano in-line detention basins • Borrego/Serrano canyon stabilization • Foothill detention basins • Re-establishment of Agua Chinon Canyon. • Upper Bee Canyon restoration	• San Diego Creek flood conveyance improvements below Jeffrey Road • Michelson water reclamation plant flood wall • Peters Canyon Wash Restoration		• University Avenue flood protection project	• Buck Gully erosion control project
WATER QUALITY	• MCAS-Tustin Storm and Groundwater Capture • Cienega filtration plant (Selenium removal) • NTS • Como wetland project • Peters Canyon Wash in-Line Channel Restoration • Smartimer Irrigation controllers	• Great Park groundwater cleanup • Foothill fire risk reduction program • Smartimer Irrigation controllers	• Selenium removal • San Diego Creek In-channel sediment traps, • NTS • Smartimer Irrigation controllers	• Pilot projects to reduce runoff from medians • Delhi Channel diversion & restoration pilot projects • Smartimer Irrigation controllers	• Upper Newport Bay Dredging project • Harbor dredging project • Rhine Channel remediation • Newport Bay copper reduction project • NTS-San Joaquin • Smartimer irrigation controllers	• Buck Gully stabilization project • Canyon fuel modification program • Smartimer Irrigation controllers
WATER SUPPLY	• Groundwater treatment • MCAS-Tustin water supply wells • Rattlesnake reservoir • Rawlings reservoir • Weather indexing • CA Friendly landscaping program • Landscaping auditing program	• Lake storage for irrigation water (Great Park) • Baker pipeline regional water treatment plant • Siphon Canyon Reservoir • Lake Forest recycled water expansion project • Weather indexing • CA Friendly landscaping program • Landscaping auditing program	• San Joaquin Hill Reservoir storage for reclaimed water • Peters Canyon reservoir conversion to recycled water storage • Recycled water expansion project • Weather indexing • CA Friendly landscaping program • Landscaping auditing program	• Recycled water expansion project • Weather indexing • CA Friendly landscaping program • Landscaping auditing program	• Recycled water expansion project • Weather indexing • CA Friendly landscaping program • Landscaping auditing program	• Recycled water expansion project • Weather indexing • CA Friendly landscaping program • Landscaping auditing program

Table 10.1 Central Orange County IRCWMP: Key Projects for Each Planning Area

	Northern Foothills	Southern Foothills	Central Plain	Urban Bay	Bay/Coastal	Coastal Canyons
HABITAT	• Foothill Fire Risk Reduction • Open space acquisition - Headwaters of Hicks and Rattlesnake Canyons.	• Agua Chinon wildlife corridor • Great Park multi-use trails. • Great Park native plant landscaping program • Limestone Canyon & Whiting Ranch Wilderness Park restoration • Toll Road area habitat restoration and fire suppression projects	• Shady and Bommer Canyons habitat linkage areas • Irvine Business Center trail and ecosystem enhancements • Irvine Wildlife Corridor	• Watershed AP environmental science classes	• Newport Bay Restoration projects • Big Canyon creek restoration project • Lower SDC tidal barrier project • Bonita Canyon Creek restoration • San Joaquin Marsh restoration	• Buck Gully Resource Management plan • Landscape and irrigation ordinance • Tidepool projection program • ASBS investigation and protection program

connections with other projects and stakeholders. The best example of planning integration in our Region is the Orange County Great Park (see Section 10.2).

This chapter examines each of the six Planning Areas with regard to regional issues, local objectives and the challenges of reestablishing a hydrologic balance within the Region. It then presents examples of baseline and supporting projects. The integration concepts outlined in Chapter 4 are illustrated by calling out potential interlinkages among the projects within the Bay/Coastal Planning Area (Section 10.5).

10.1 Northern Foothills Planning Area

The Northern Foothills Planning Area includes four major drainages: Hicks Canyon, Rattlesnake Canyon, El Modena-Irvine Channel and Peters Canyon Wash. The first three channels drain into Peters Canyon Wash, which ultimately drains the entire Planning Area. Hills and canyons lie along its outer edges, but it flattens out as the topography transitions into the Tustin Plain. The local land use jurisdictions are the Cities of Irvine, Orange (very small area), Santa Ana, Tustin and unincorporated areas of the County of Orange. It also includes the former Tustin Marine Corps Air Station, within the City of Tustin's jurisdiction. Additional Planning Area partners include: California Department of Fish and Game, East Orange County Water District, IRWD, William Lyon Homes, Vestar Kimco, Lennar Corporation, Tustin Legacy Partners, John Laing Homes, Rancho Santiago Community College District,

South Orange County Community College District, Nature Reserve of Orange County, Shea Homes, and The Irvine Company.

Regional Issues:

- Selenium in groundwater
- Urban runoff pollution
- Water supply
- Limited habitat connectivity

Local Objectives:

- Redevelop the former Tustin Marine Corps Air Station
- Develop water wells to supply development at the former MCAS-Tustin.
- Upgrade water treatment facilities to treat colored water and contaminated groundwater
- Reduce fire hazards in the foothills
- Reduce selenium loads to Newport Bay
- Reduce sediment and other pollutant loads to Newport Bay
- Acquire and improve park facilities
- Improve habitat connectivity
- Remove invasive plants in the canyons and reestablish native plant communities.

Planning Area Challenges and Opportunities:

- Additional potable water supply is needed in order to develop the former Marine Corps Air Station at Redhill Road.
- Potable groundwater supplies are potentially threatened by a plume of pollution.
- Storm flows are significant, which constrains downstream riparian restoration.
- This area has been a problematic source of selenium. Perched groundwater draining from the Tustin Plain picks up selenium from the soils and carries it into stream channels and then the bay, where it poses a potential hazard to the reproductive processes of the estuary species.
- Enabling riparian restoration would require reducing peak storm flows, which would require stormwater capture. As infiltration could contribute to the selenium transport issue, projects that capture, treat and reuse stormwater above ground could enable riparian restoration downstream, reduce the selenium being transported into the bay through groundwater, and create a local source of nonpotable water supply.
- These multipurpose surface water projects will help to create baseline hydrologic conditions that will enable other projects that are required to achieve the Desired State's Regional Performance Objectives and the local stakeholder objectives. Supporting projects and programs include reducing urban runoff and water demand through water conservation.

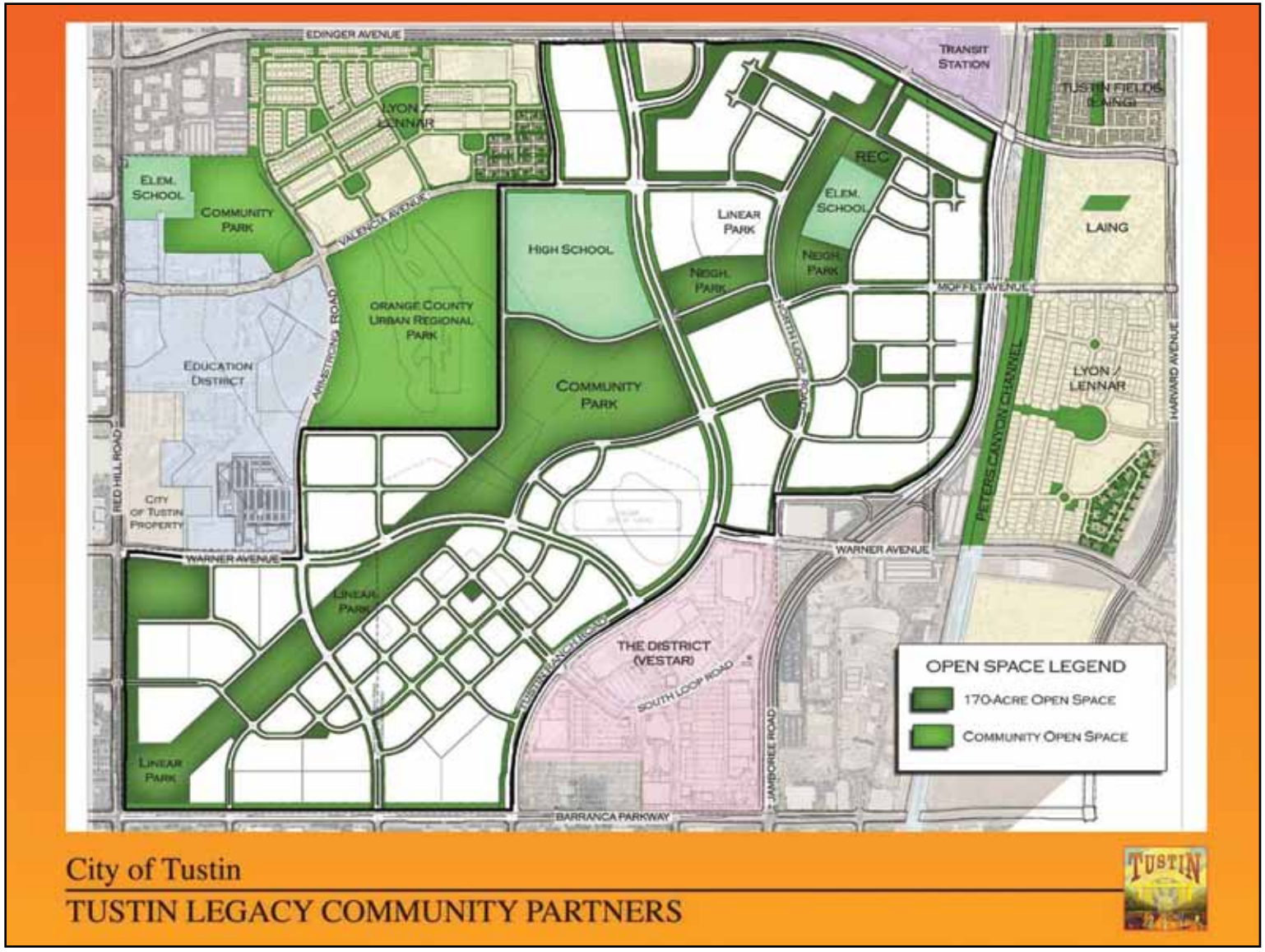


Figure 10.3 Tustin Legacy Open Space (proposed), Tustin Legacy Specific Plan

Baseline Project:

TUSTIN MARINE CORPS AIR STATION STORMWATER AND GROUNDWATER CAPTURE AND REUSE: The former 1,600 acre MCAS-Tustin, located in the City of Tustin, is being redeveloped by Vestar Kimco, John Laing Homes, Tustin Legacy Partners, William Lyon Homes, Lennar Corporation, and Rancho Santiago and South Orange County Community College Districts, as 'Tustin Legacy'. Tustin Legacy is a master-planned community with commercial, residential, and industrial elements and will be the site of a new regional park. IRWD will be installing four wells in support of this project.

The master plan for this project includes a variety of open spaces that could be used as water retention facilities. This water could then be made available as a supply source for the other urban parts of this new development project.

These projects could capture as much water as is technically feasible from the Planning Area, especially groundwater runoff that occurs year round.

Supporting Project Examples:

IMPROVE WATER SUPPLY RELIABILITY: The City of Tustin has pumped and treated contaminated groundwater, both for potable use and to protect the aquifer from further contamination. The City is now engaged in a program to modernize its aging facilities and to bring new facilities online to treat and use water colored by fulvic and humic acids. This area is also a good candidate for expanding landscape water use efficiency measures.

Figure10.4 Natural treatment wetland, Irvine

HABITAT PROTECTION THROUGH FIRE RISK REDUCTION MEASURES: The November, 2007 Santiago Fire in the neighboring foothills burned seventeen percent of the county, including valuable foothill habitat and some canyon homes in the cities of Tustin and Irvine. This Plan proposes fire risk reduction measures, including freeway fire barriers and human activity exclusion zones during the high fire season.

SELENIUM REMOVAL: Selenium discharges from this area have been impacting endangered and other species in Newport Bay through bioaccumulation (Hibbs, 2008). A stakeholder group including state, county and local agencies, water districts and private entities, was formed in 2005 in order to oversee the development of a Nitrogen and Selenium Management Program

Figure 10.5 Least Bell's vireo of California, considered endangered, primarily from loss of riparian habitat and cowbird parasitism. Photo courtesy of Scott Streit, www.bird-friends.com

(NSMP). Under this program, treatment technologies and BMPs are being developed and implemented. See Figure 3.21 for a map of selenium concentrations.

NATURAL TREATMENT: The Plan proposes a series of water quality projects, including IRWD Natural Treatment Systems, the City of Irvine's Como Wetland Project, and the City of Tustin's Peters Canyon Wash In-line Channel Restoration. These projects will be engineered to provide removal of metal, bacteria and nutrients.

OPEN SPACE: Several important sites that will improve foothill habitat connectivity have been identified in the vicinity of the headwaters of Hicks and Rattlesnake Canyons.

10.2 Southern Foothills Planning Area

The Southern Foothills Planning Area includes five major drainages: Serrano Creek, Borrego Canyon Wash, Agua Chinon Wash, Bee Canyon Wash and Marshburn Channel. The former El Toro Marine Corps Air Station, home of the Orange County Great Park, is located across all of these drainages. The local jurisdictions include portions of the cities of Laguna Woods, Lake Forest, and Irvine, as well as unincorporated areas of the County of Orange. Other area partners include the California Department of Fish and Game, U.S. Fish and Wildlife Service, FAA, Department of Defense, Great Park Corporation, Heritage Fields El Toro LLC, Nature Reserve of Orange County, IRWD and The Irvine Company.

Regional Issues:

- Excessive erosion, sedimentation and channel destabilization
- Fragmented riparian corridors
- Pollution in urban runoff

Local Objectives:

- Complete development of the Baker Ranch and redevelopment of the former El Toro Marine Corps Air Station
- Reduce fire hazards in the foothills
- Stabilize canyons

- Reduce sediment and pollutant loads to Newport Bay
- Improve habitat connectivity
- Remove invasive plants in the canyons and re-establish native plant communities.

Planning Area Challenges and Opportunities:

This area contains steep sandstone canyons with sandy streambeds. With development, sediment supplies from the surrounding land have decreased, while stormwater runoff volumes and velocities have increased, subjecting the canyons to erosion by "hungry-water". This is particularly true for Borrego Canyon and Serrano Creek. As a result, this Planning Area is the largest source of sediment deposition to the Newport Bay.

Projects that will establish the necessary baseline conditions to support the attainment of all of the area objectives are: 1) stormwater capture projects that reduce peak flows in the canyon washes and 2) canyon stabilization projects. These projects will create opportunities for concurrent or complementary riparian habitat restoration projects in the canyons and channels.

Baseline Project:

- **BORREGO/SERRANO SUBWATERSHED STORMWATER CAPTURE:** Orange County Flood Control District will have to define exactly how much stormwater should be retained on land in order to stabilize Borrego and Serrano Canyons' soft bottom stream channels. These figures will define the required capacity of water retention facilities. Development of stormwater capture and retention facilities that reduce peak flows in Borrego and Serrano Creeks will help establish the necessary baseline conditions for this area.

  The Great Park Master Plan incorporates stormwater capture capabilities into the park design while its manmade lake, supplied with recycled water and stormwater, will be used for irrigation. In addition, the Nature Reserve of Orange County could develop retention facilities within its territory, where feasible. Various land use jurisdictions or local agencies that want additional sources of irrigation water for future use may also find it in their interest to develop these kinds of facilities in urban open space areas. Currently, no projects have been submitted to serve this function. Either existing projects could be modified to serve this capacity, or new projects could be developed.

Supporting Project Examples:

- **GREAT PARK AND GREAT PARK NEIGHBORHOODS WATER INFRASTRUCTURE:** One of the most important developments in Orange County is the redevelopment of the former El Toro Marine Corps Air Station. This redevelopment includes 2,300 acres of urban development called Great Park Neighborhoods (owned by Heritage Fields El Toro, LLC), and 1,347-acres of park space known as the Orange County Great Park. The Master Plans for these communities and the park focus on opportunities to create and strengthen ecological, social and cultural connections. The Great Park has established sustainability goals

for energy and water conservation, as well as for promoting 'green' technologies.

(Note: On August 11, 2009, the Irvine City Council approved an Amended and Restated Development Agreement, calling for Heritage Fields to commit $58 million over the next five years for Great Park infrastructure and maintenance, and to give the City 131 more acres of park land. In return, the developer is dropping plans for a promised golf course, will increase the number of dwelling units, and will build on a 173-acre swath of agricultural land north of Irvine Boulevard (Orange County Register, 2009).

The Great Park and Great Park Neighborhoods water infrastructure projects are integrated within this Planning Area to the extent that they can help capture and treat runoff, incorporate water use efficiency measures, increase habitat, and do not detract from any of the other regional or local objectives.

- **GREAT PARK WILDLIFE CORRIDOR:** The wildlife corridor is designed with the goal of reconnecting two large patches of Orange County's NCCP/HCP wildlife areas. The first patch includes the Cleveland National Forest, Limestone-Whiting Wilderness Park and the proposed El Toro National Wildlife Refuge to the north of Irvine. The second patch includes the Irvine Open Space Preserve, Laguna Coast Wilderness and Crystal Cove State Park to the south of Interstate 5. Sections 2, 3, and 4 of the habitat corridor, extending from Irvine Boulevard to the Borrego Flood Control Channel, fall within the confines of the park. Development of the corridor will include significant terraforming

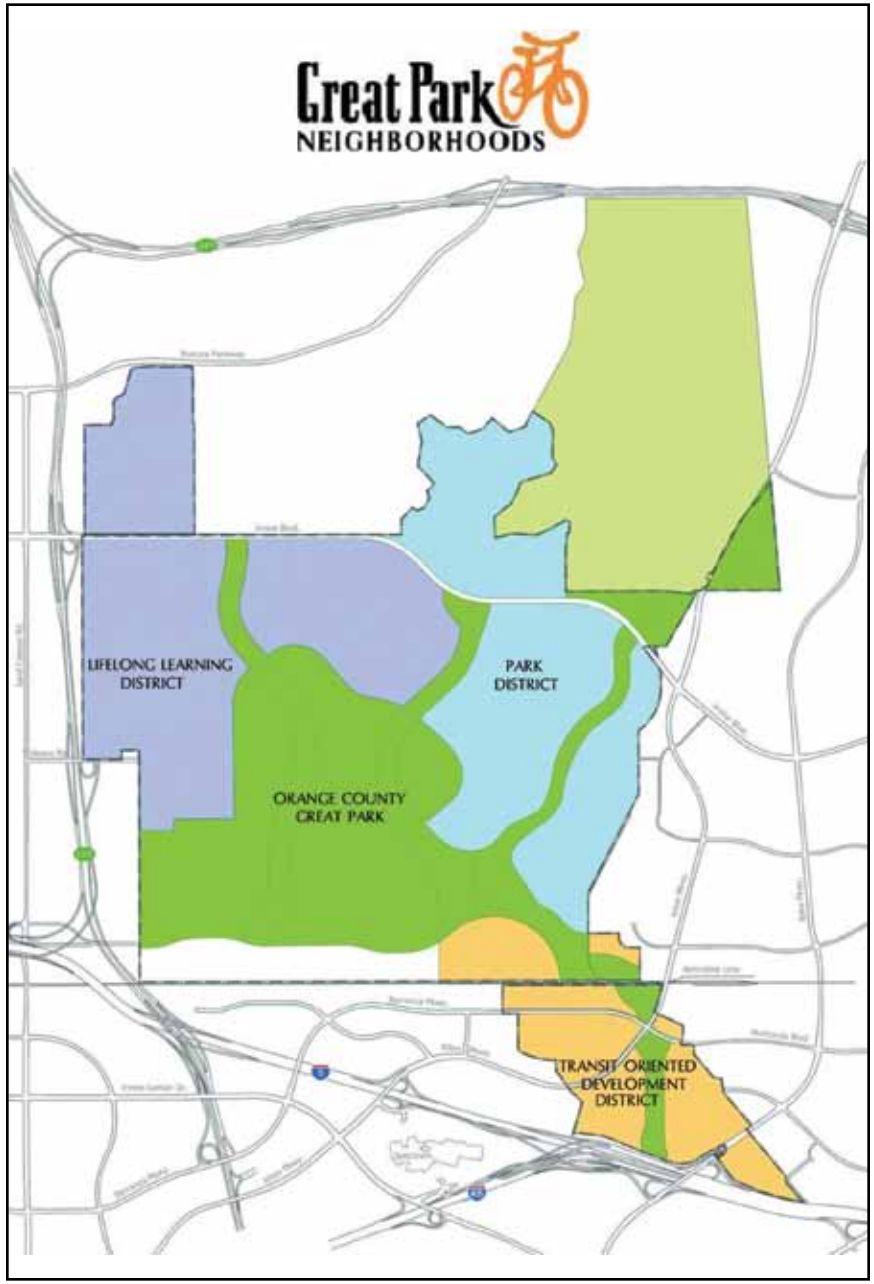


Figure. 10.6 Great Park and Great Park Neighborhoods (Source: www.greatparkneighborhoods.com).

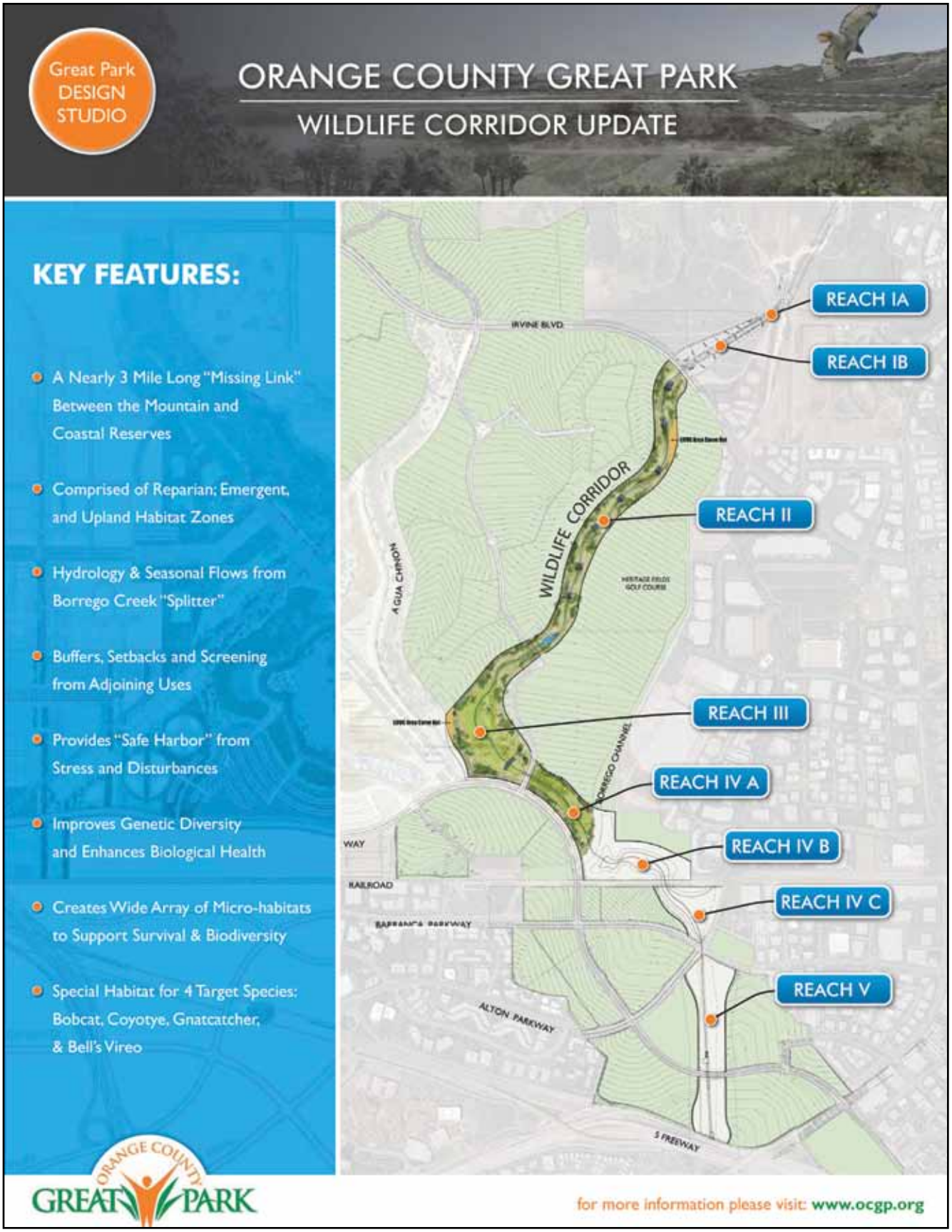


Figure 10.7 Great Park segment of proposed Wildlife Corridor. (Source: Great Park Design Studio)

and habitat restoration along Borrego Canyon Wash and Serrano Creek, including a partial dry-weather flow diversion of Borrego Wash north of Irvine Boulevard, and the creation of intermittent ponds and wetlands. The development of the Great Park will also re-establish a reach of the Agua Chinon Wash by daylighting the park portion of the creek, currently piped underground, and restoring riparian and upland vegetation along its banks.

- **BORREGO/SERRANO STABILIZATION:** Streambed down-cutting and erosion in Serrano Creek threatens to undermine homes and damage sewer and electrical facilities. Furthermore, an estimated 30 to 40 percent of the sediment entering Newport Bay originates from erosion in Serrano Creek and Borrego Canyon Wash. The County and other stakeholders are spearheading efforts to stabilize these canyons using eco-friendly materials (gabions and drop-structures). These future projects also provide opportunities to restore habitat within these canyons. These projects support integrated project design for this Planning Area by stabilizing the physical structure of this system, helping to better support the other ecological functions in this system.
- **FIRE RISK REDUCTION:** The November 2007 Santiago Fire in the neighboring foothills is the latest dramatic instance of the vulnerability of these valuable habitat areas to human activities. This Plan proposes implementing additional fire risk reduction measures, including freeway fire barriers and human activity exclusion zones during the high fire season.

Figure 10.8 Erosion in Serrano Creek

10.3 Central Plain Planning Area

The Central Plain Planning Area includes the area generally bounded by Alton Parkway to the north and the San Joaquin Hills Corridor Toll Road to the south. San Diego Creek and the lower reaches of Peters Canyon Wash are the primary drainage channels. The Laguna Canyon Wash, Sand Canyon Wash and Bonita Canyon Wash subwatersheds are also a part of this planning area. The primary municipal jurisdiction in the area is the City of Irvine, but it also includes Laguna Woods, Santa Ana and Tustin, as well as unincorporated areas of the County of Orange around the John Wayne Airport. Other stakeholders include the California

Department of Fish and Game, IRWD, Nature Reserve of Orange County and The Irvine Company.

Regional Issues:

- Selenium contamination
- Legacy pesticide contamination
- Contaminated dry-weather flows

Local Objectives:

- Ensure flood control.
- Develop adequate and reliable water supply.
- Reduce selenium loads to Newport Bay.
- Reduce sediment and other pollutant loads to Newport Bay.
- Construct transportation improvement projects constrained by contaminated shallow groundwater.
- Improve habitat connectivity.
- Remove invasive plants in the canyons and reestablish native plant communities.

Planning Area Challenges and Opportunities:

The central area of this Region is known as the Tustin Plain. It historically received water flowing down from both the Northern and Southern Foothills Planning Areas. Because the terrain is flat, surface water would slow down, deposit sediment it picked up from the foothills, and then percolate into the ground, where it would

Figure10.9 A weather-based smart controller, a Best Management Practice being tested in Newport Coast for controlling runoff

flow both above and below ground toward the Swamp of the Frogs. The lower portion of the Northern Foothills Planning Area shares these same hydrologic conditions. Over time, the soils in both of these Planning Areas accumulated selenium and agricultural pesticides. These leached into groundwater that now flows into storm channels and is carried into Newport Bay, causing biological contamination. This Planning Area is also positioned over the groundwater basin, leading to drinking water quality concerns from the legacy pollutants.

Historically, the defining hydrologic characteristic of this Planning Area has been the flow of groundwater relatively close to the surface.

Water near the surface increases the primary production capacity of the habitat but also creates a flooding risk; i.e., potential habitat value is highest in the same places that natural potential for flooding is highest. Moreover, this is also where legacy contaminants are most likely to concentrate. Additionally, the contaminated groundwater poses a problem for the water supply.

Projects that will begin to reintegrate baseline hydrologic conditions in this Planning Area are multipurpose floodplain management projects that manage land in the most flood-prone areas, treat the water to remove contaminants, and then restore native habitat where feasible.

Baseline Projects:

- **FLOOD CHANNEL CAPACITY:** The Orange County Flood Control District is planning flood conveyance improvements on the lower reach of San Diego Creek below Jeffrey Road.
- **NITROGEN & SELENIUM MANAGEMENT TASK FORCE GROUNDWATER TREATMENT PROJECTS:** Pilot projects are underway to test treatment trains for selenium removal.

Supporting Project Examples:

- **WATER REUSE:** IRWD is exploring projects to increase its production of reclaimed water and to begin using the San Joaquin Hills Reservoir for storage.
- **RUNOFF SOURCE CONTROLS:** In-channel sediment traps, natural treatment systems, irrigation runoff reduction projects, low impact development and other source controls are being tested and implemented in order to reduce sediment and pollutant loads to Newport Bay.

Figure 10.10 Brown-headed cowbird trap

- **HABITAT:** Important habitat linkage areas in Shady and Bommer Canyons have been proposed for incorporation into the NCCP Reserve. The Nature Reserve of Orange County and the Irvine Company are working together in this area on programs to remove non-native birds, such as the brown-headed cowbird nest parasite. They are also removing invasive plants and replanting with native plants.

- Irvine Business Complex (IBC): This is a Mixed Use Residential Plan and Overlay Zone located within the City of Irvine. Opportunities exist for ecosystem restoration and trail enhancement along the riparian corridors in this area that would complement urban redevelopment activities (http://www.cityofirvine.org/depts/cd/planningactivities/ibc_graphics.asp).

10.4 Urban Bay Planning Area

The Urban Bay Planning Area includes the eastern areas of the cities of Santa Ana and Costa Mesa that drain into the Santa Ana Delhi Channel. This area is the oldest, densest and most highly urbanized area of the watershed. It has a low, flat elevation with a high water table. The low elevations could be at risk for flooding if sea levels rise due to global warming. The Region's disadvantaged communities are also located within this Planning Area (Figure 3.16, Disadvantaged Communities within the Region).

Regional Issues:

- Urban Runoff Pollution

Local Objectives:

- Reduce sediment and other pollutant loads to Newport Bay by source controls, drought tolerant landscapes and low impact development retrofits.
- Increase watershed science educational opportunities at all levels (grade school, high school, Santa Ana Community College)
- Increase public awareness and access to the watershed ecological and recreational opportunities.

Planning Area Challenges and Opportunities:

Because this area is so densely urbanized, pollutant loads associated with over-irrigation and wash-down activities have become a problem. There are few open spaces for implementing runoff capture projects, and few open space, habitat or riparian restoration projects.

The best prospects for achieving the baseline conditions required for balancing the local hydrology lie with urban revitalization and renewal projects that can incorporate runoff capture and treatment projects, open space and habitat amenities, and drought tolerant landscaping.

Green infrastructure can be integrated into renewal or infill projects that will capture and treat runoff at the neighborhood scale. Habitat and riparian restoration projects can also be incorporated into the surrounding land uses. This provides the additional amenities of landscape, vegetation and open space that make the development an attractive, pleasant place to be.

Baseline Project:

Runoff Improvement Pilot Projects: This Plan proposes pilot projects utilizing drought tolerant landscaping, alternative irrigation technologies and runoff capture and treatment, in order to reduce runoff volumes from landscaped medians, streetscapes, residential and commercial areas.

Supporting Project Examples:

- **LOWER SANTA ANA DELHI CHANNEL RESTORATION PILOT PROJECT:** The Santa Ana Delhi Channel is the second largest tributary to Newport Bay. This subwatershed includes some of the oldest and most urbanized area of the basin. A pilot program in the lower reach of this channel will reestablish creek habitat, construct water quality improvement features and launch a model pollutant source reduction program within the adjacent neighborhoods. This project will tie into the larger efforts to restore Upper Newport Bay.
- **HIGH SCHOOL EDUCATION:** An Advanced Placement Environmental Sciences class, supplemented with emerging watershed information and studies, is proposed for each high school in this Planning Area. These classes will include guest speakers with local watershed expertise, field trips to NCCP areas and Newport Bay, and special projects involving watershed monitoring. The goal is to inspire high school students to continue study within the environmental sciences at the local community college or UCI.
- **COMMUNITY OUTREACH:** As new watershed restoration projects come online, there will be opportunities to showcase their success to the community. 'Eco-tours' can be set up for interested community members. Community conferences in association with sponsoring high schools can be an innovative way to energize the community about watershed resources and the benefits of knowledgably using these resources.

10.5 Bay/Coastal Planning Area

The Bay/Coastal Planning area includes many small canyons that drain directly into Upper and Lower Newport Bay, the lower reaches of San Diego Creek and the Santa Ana Delhi Channel, all of which are tidally influenced. Land use jurisdictions include the cities of Costa Mesa, Irvine, Newport Beach, and the County of Orange. Additional stakeholders include the U.S. Army Corps of Engineers, California Department of Fish and Game, IRWD, RWQCB, California Coastal Commission, Newport Bay Naturalists and Friends, Southern California Wetland Recovery Project, Save and Protect Our Newport Bay, and UCI.

Regional Issues:

- Sediment and pollutant loads entering the bay
- Pollutant loads from canyons and storm drains
- Habitat degradation due to public use and invasive plants

Local Objectives:

Hydrology/Flood Control

- Protect low-lying areas from flooding around the harbor, upper bay and San Diego Creek.

Water Quality

- Reduce water quality impacts associated with local urban runoff, boat maintenance activities and legacy pollutants.
- Maintain harbor navigation.
- Reduce irrigation runoff.

Water Supply

- Expand the recycled water program.
- Increase public awareness of, and access to, CIMIS (California Irrigation Management Information System) weather indexing data – used by property owners to manually adjust irrigation controllers (http://wwwcimis.water.ca.gov).
- Expand landscape irrigation reduction programs.

Habitat

- Restore the Upper Newport Bay ecosystem habitat for endangered fish and bird species.
- Provide methods to facilitate maintenance of the bay's bulkheads, marinas and docks while protecting high value eel grass areas.
- Restore the upland areas around Upper Newport Bay.
- Improve NCCP habitat connectivity with Buck Gully and Shady Canyon.

Economy

- Foster a healthy environment for tourism and harbor-related businesses.

Planning Area Challenges and Opportunities:

The defining hydrologic characteristic of Newport Bay and its immediate surroundings is the intertidal interaction of salt and fresh waters. Originally, Newport Bay had very little freshwater flowing into it because its largest tributary, San Diego Creek, flowed into the Swamp of the Frogs. This made the bay more of a large coastal salt water lagoon than an estuarine type of environment.

San Diego Creek was connected to the bay in the early 1960's as a flood control project to drain stormwater off of private property. Instead of draining the water to the ocean directly, it was directed into the upper end of the bay.

The diversion of San Diego Creek into Upper Newport Bay had two important impacts:

1. It dramatically increased the amount of fresh water in the bay, creating an estuarine environment and affecting the survival of organisms that required a more salty environment.
2. It delivered significant sediment loads and pollutants to the bay.

The current practice for handling the excess sediment is to periodically dredge the bay. However, with cost now topping $50 million for the latest Upper Bay dredging program, a new strategy is clearly called for: the strategy of rebalancing upstream watershed hydrology to reduce sediment and pollutant loading to the bay.

Rebalancing a disturbed watershed equilibrium will be a trial-and-error affair. Monitoring the health of the bay over time will serve as a barometer of restoration activity success. The kinds of projects that will best enable the effective management of the Newport Bay Planning Area are projects that provide the quantitative and qualitative data necessary to implement a science based, adaptive

management program. This data will also provide the foundation for focusing and refining watershed Regional Performance Objectives.

BASELINE PROJECT:

- **NEWPORT BAY PROTECTION AND RESTORATION PROGRAM:** Estuary protection and restoration projects center on two primary tributaries, San Diego Creek and Santa Ana Delhi Channel, at the points where they enter Upper Newport Bay. Programs are in place that study selenium, legacy pesticides, sediment, nutrients, toxic materials and fecal indicator bacteria entering the bay. These programs inform pilot projects that curtail point and non-point sources of these pollutants. Habitat restoration projects are underway that have drawn together jurisdictional agencies, water resource experts in academia, professional consultants and community activists. I1(2); I2(2,12); I7

  I2(2,12) means that this project was designed to promote healthy downstream hydrologic function (Integration Type 2) for Project No. 2 – Harbor Dredging and Project No. 12 – Upper Newport Bay Habitat Restoration. See Table 4.1 for a complete listing of integration types.

SUPPORTING PROJECTS:

Navigation/Economics

- **HARBOR DREDGING:** The long-term economic health of the harbor depends on maintaining the depth of the harbor. I1(1,3)

Hydrology/Flood Control

- **SEA LEVEL RISE AND SEAWALL EVALUATION STUDIES:** A more precise understanding on how sea level changes could affect the peninsula and islands will help define more efficient measures for protecting harbor resources.
- **UPLAND AREAS AND UNIVERSITY AVENUE FLOOD THREAT EVALUATION:** Sea level rise studies will help define the threat to areas around Upper Newport Bay.

Water Quality

- **RHINE CHANNEL SECTION OF NEWPORT HARBOR:** Dredging of the harbor will provide an opportunity to more cost effectively address this difficult water quality problem. I1(2,3)
- **SAN JOAQUIN MARSH NATURAL TREATMENT SYSTEM (NTS):** The NTS provides a lower-cost way to reduce pollutants of concern in San Diego Creek. I1(1); I3(upstream NTS projects); I11

Water Supply

- **EAST BLUFF RECLAIMED WATER EXPANSION PROGRAM:** With the cost of water rising at a rapid rate, the option of installing a reclaimed water system is becoming increasingly attractive. I1(8,9,10,11); I5
- **SMARTIMER IRRIGATION CONTROLLER:** These irrigation controllers adjust watering times based on predicted weather. Successful pilot programs will promote a larger future program within the Planning Area as well as for the entire watershed. I1(7,9,10,11); I3 (watershed-wide)

Figure 10.11 Dredging in Upper Newport Bay, Army Corps of Engineers restoration project

- **WEATHER INDEXING:** A weather index, such as the statewide CIMIS website, based on predicted weather conditions, solar irradiance, wind, etc. can be published daily in the local paper and used by property owners to manually adjust irrigation controllers if they are not using the weather-basined Smartimer irrigation controllers. I1(7,9,10,11); I5
- **"CALIFORNIA-FRIENDLY" LANDSCAPING PROGRAM:** A landscaping pilot program promoting native and other non-invasive, water-thrifty plants could result in lower landscape irrigation needs. Combined with an Integrated Pest Management program, it could also reduce the need for fertilizers and pesticides that can be transported into the canyon or bay. Successful pilot programs will promote a larger future program within the planning area. I1(7, 8,9,11); I3 (watershed-wide); I5
- **LANDSCAPING AUDITING PROGRAM:** I1(7,8,9,10); I3 (watershed-wide); I5

- **WATER CONSERVATION AND WATER QUALITY PUBLIC OUTREACH PROGRAM:** www.WaterSmartNewport.org

Habitat

- **UPPER NEWPORT BAY HABITAT RESTORATION PROJECT:** The centerpiece for the restoration of Upper Newport Bay is currently underway under the auspices of the Army Corps of Engineers Ecosystem Restoration Project. It includes components for sediment detention, open water restoration (dredging), island creation, and island rehabilitation. This habitat project has water quality improvement elements as well as long-term, indirect economic benefits. I1(1,13); I7;
- **UPPER NEWPORT BAY UPLAND RESTORATION PROGRAM:** This program includes 25 projects along the periphery of the bay to stabilize slopes, remove invasive plants, remove illegal trails, rehabilitate walking trails, plant coastal sage scrub and cactus scrub, refurbish wetland areas, and create bird-watching lookouts. I1(1,13); I7; I8
- **BIG CANYON CREEK RESTORATION PROJECT:** Currently in design, this project will be the City of Newport Beach's largest canyon restoration project to date, including re-establishment of tidal influence at the canyon mouth and restoration of 50 acres of coastal sage scrub. Simple amenities, such as a small amphitheatre and information signage, will accommodate school field trips and community access. I1(1, 12, 13, 14); I3(upstream NTS projects); I7; I8; I11

Figure 10.12 ROOTS restoration activities — pampas grass removal

10.13 Big Canyon Creek mouth

Figure 10.14 Lower San Diego Creek, looking north toward Jamboree

Figure 10.15 San Joaquin Marsh

10.16 Bonita Canyon Creek

10.17 Newport Harbor

- **LOWER SAN DIEGO CREEK TIDAL BARRIER (BETWEEN THE MICHELSON WATER RECLAMATION PLANT AND JAMBOREE ROAD):** The removal of a plank barrier in San Diego Creek at Jamboree will re-establish the tidal prism in the creek. A future study will indicate estuarine restoration options along the impacted reach of San Diego Creek, which could include rehabilitation of light-footed clapper rail or least Bell's vireo habitats. I1(1, 12);

  Re-establishment of the tidal prism further strengthens the connectivity between the bay and the San Joaquin Marsh area where ten wetland, riparian and upland projects are proposed by the County, IRWD and UCI.

- **BONITA CANYON CREEK:** Refurbishment of relatively intact upland and riparian habitats along the 73 Toll Road will provide a stronger connection between the NCCP Reserve in Newport Bay and the NCCP Reserve areas within the Newport Coast Watershed and would include coastal sage scrub restoration projects at Coyote Canyon Landfill, adjacent to the UCI campus, and along Bonita Canyon Creek. Enhancement efforts will provide protection from flooding at Jamboree Road. I1(1, 12)

- **LOWER NEWPORT BAY (NEWPORT HARBOR):** The Harbor Area Management Plan for Lower Newport Bay is under preparation and a draft summary is included in Appendix J. The study addresses several important issues facing the harbor including potential sea level rise, navigational concerns, eel grass protection, sediment and water quality management practices, and beach replenishment. It will be the platform for follow-up focus studies. I1(1, 2); I3(upstream NTS projects); I6; I7; I11

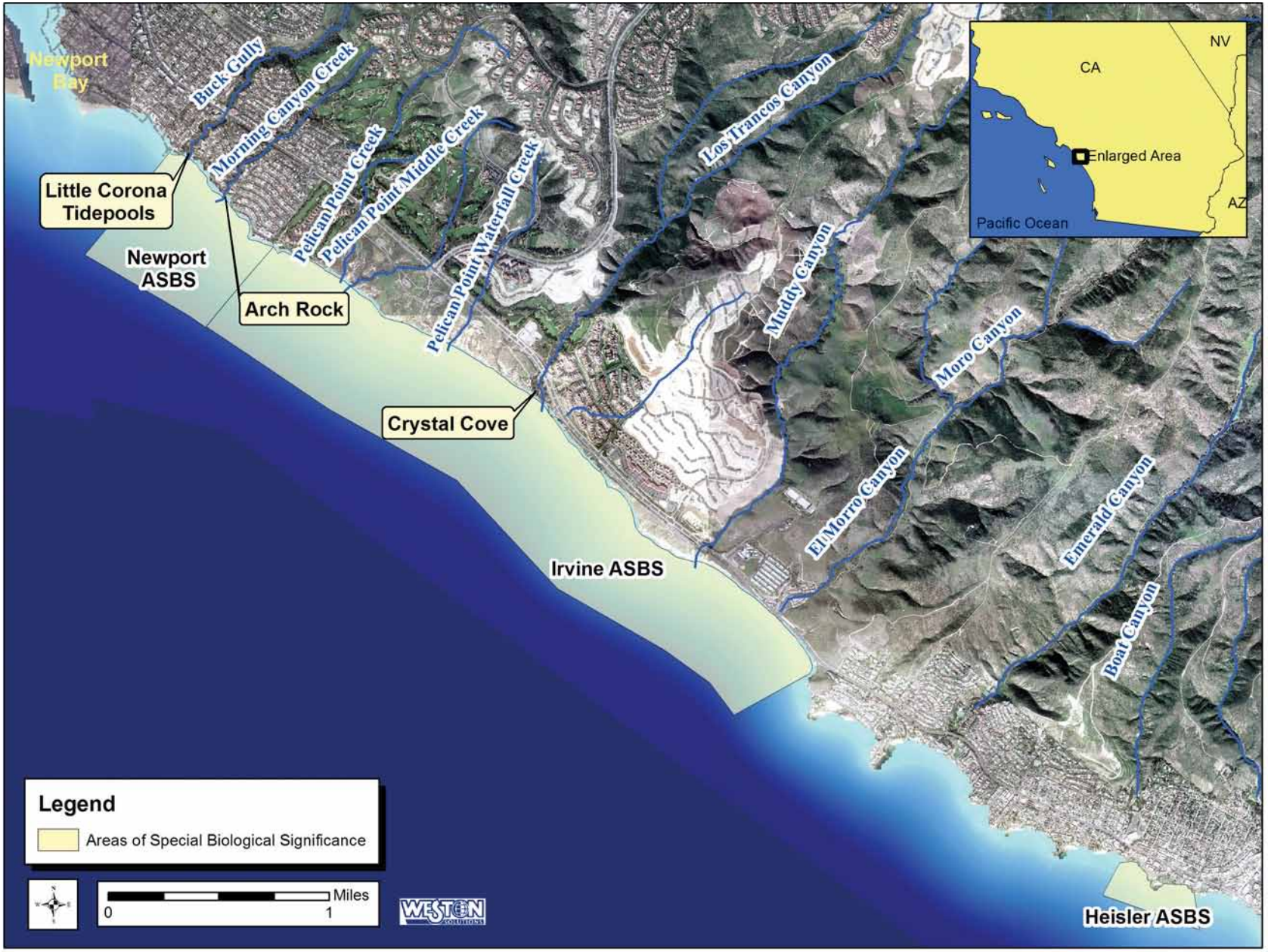
10.6 Coastal Canyons Planning Area

(See also: Chapter 3.5.2.3: Newport Coast Watershed)

This Planning Area includes the two rocky intertidal ASBSs: 1) Robert E. Badham State Marine Conservation Area, from Poppy Avenue (north) to Cameo Shores (south) and 2) Crystal Cove State Marine Conservation Area, from Cameo Shores (north) to the end of El Morro (south).

The Coastal Canyons Planning Area is a ten-square-mile watershed, referred to as the Newport Coast Watershed. It includes eight coastal canyons that drain into the Areas of Special Biological Significance (ASBS) that lie along its three-mile stretch of coastline. The ASBSs are also within the receiving waters for the Newport Bay watershed. Planning Area partners include California Department of Parks and Recreation, City of Newport Beach, County of Orange, California Department of Fish and Game, Friends of Newport Coast, IRWD, Orange County Coastkeeper, Orange County Surfrider Foundation, Southern California Wetland Recovery Project, California Coastal Commission, RWQCB, and The Irvine Company.

The Newport Coast Watershed Management Plan, completed in 2007, provides a roadmap for meeting the challenges of this planning area (Weston Solutions, 2007). The Plan incorporates



10.18 Robert E. Badham State Marine Sanctuary(Newport ASBS) and Crystal Cove State Marine Sanctuary (Irvine ASBS)

findings of the 2006 study of groundwater recharge and exfiltration in the canyon due to over-irrigation practices in this area (Todd Engineering, 2006). A separate study is underway to further investigate the potential stressors to the ASBS rocky intertidal areas. This report was completed in June, 2009 (Weston Solutions and Everest International Consultants).

Regional Issues:

- Fire Prevention
- ASBS protection

Local Objectives:

- Reduce fire hazards in the canyons.
- Stabilize canyons.
- Reduce pollutant loads to the ASBS from the canyon and Newport Bay.
- Reduce pollutant loads to the canyons through water conservation measures.
- Reduce public impacts to the ASBS rocky intertidal areas.
- Remove invasive plants in the canyons and reestablish native plants.
- Provide public access and recreational opportunities.
- Promote watershed education (grade school, high school and university levels).

Planning Area Challenges and Opportunities:

Fire danger is high due to proximity of urban development to natural open space areas. The danger is compounded because of canyon overgrowth of non-native plants.

With mounting pressures on the state-wide water supply, the State in 2009 declared a regulatory drought, mandating a 20 percent cutback in water usage. The potential for water savings in Newport Coast is highlighted by the continual flow of runoff in the naturally seasonally-dry canyons. The amount of water running in Buck Gully is 17 million gallons a month, a significant portion of which originates from the Delta or the Colorado River.

There are some limited pollutant impacts within the coastal canyon streams including CTR (California Toxics Rule) exceedences of fecal indicator bacteria and copper. Perhaps more important is the transport of pesticides and fertilizers into the canyon that, in concert with over-irrigation practices, stimulate plant growth, especially non-natives. The overgrowth compounds the danger of fire. The State Water Resource Control Board and the California Coastal Commission are paying special attention to pollutant discharges from the canyons into the ASBS.

The Newport Beach Fire Department has completed a preliminary study for implementing a fuel modification program in Buck Gully and Morning Canyon for fire protection. Complementary studies for canyon landscaping and irrigation are being prepared by the Public Works and Planning Departments. Once these preliminary

studies are completed, staff will meet with homeowner associations to discuss options for implementing measures in the canyons to reduce fire risk and reduce irrigation runoff into the canyons.

The fire danger necessitates creation of fuel modification zones that act as fire breaks between urban communities and natural open space. As has been seen elsewhere in Southern California, fires can quickly spread down vegetated canyons and into urban communities. Establishing fire breaks between these canyons and local neighborhoods are important for safety considerations.

Baseline Project:

- **BUCK GULLY RESERVE RESOURCE AND RECREATION MANAGEMENT PLAN (RRMP):** Buck Gully has experienced the most urban development of the all the coastal canyons in this compact watershed. As such, it has provided an early warning of negative impacts caused by urban development: streambed erosion, canyon bank destabilization, foliage overgrowth due to over-irrigation on the hillside, invasive species, destruction of habitat for endangered species, and pollutant loads to the beach and sensitive marine-life areas. A comprehensive program is underway to correct immediate problems and to reestablish an ecological balance that will also provide educational and recreational opportunities to the community and tourists.

  "As a signatory to the Central-Coastal Subregion NCCP/HCP, the City (of Newport Beach) has certain obligations under the Implementation Agreement to ensure the appropriate management of the BGR. These obligations are shared with the IRC (Irvine Ranch Conservancy) and include the preparation of a Resource and Recreation Management Plan (RRMP), which focuses on preserving and protecting the unique resources of the BGR while integrating passive recreation uses, as appropriate. The RRMP describes the regulatory setting, existing conditions, potential issues and threats, public access and recreation management, the physical and natural resources management, and the monitoring and adaptive management of resources located within the habitat Reserve System." (Buck Gully Reserve Resource and Recreation Management Plan, Executive Summary, 2009)

Supporting Project Examples:
Runoff Reduction Projects:

- A 2005 study determined that Buck Gully was sending up to 190 million gallons of runoff a year into the Crystal Cove ASBS. The City of Newport Beach introduced a runoff reduction program, conducting irrigation efficiency audits for homeowners and encouraging them to fix leaks. The City also offered free weather-based controllers to homeowners who had efficient irrigation equipment and at least 1,200 square feet of irrigated landscape. With a federal grant and matching city funds, the City purchased 650 controllers and hired contractors to install and program them and later follow up with the homeowners. Monitoring indicates a 20 percent runoff reduction in Buck Gully (Stemming the Runoff Tide, 2007).

  A supporting project is to continue and expand this program, by working with landowners in canyon areas to increase usage

of: weather-based 'smart' controllers, alternative low-runoff irrigation technologies, irrigation audits, citations for excess dry weather runoff, and drought tolerant plantings designed in context with Orange County Fire Authority fuel modification regulations. In tandem, the City could conduct landscape education workshops for homeowners, homeowner associations and landscape maintenance companies.

- **WATER CONSERVATION:** The Irvine Company has recently completed a major two-year project to re-sod the Pelican Hills Golf Course with more water-thrifty fairways, and plant native plants around the fairways.
- **CANYON STABILIZATION:** The Morning Canyon Stabilization Project, constructed in 2005, is one of the first successful coastal canyon stabilization projects in Southern California using eco-friendly slope stabilization methods. This project removed the largest stand of *Arundo donax* (giant reed) in Newport Coast and replanted a one-half- mile reach of canyon with native plants.
- Buck Gully: The Buck Gully Road Maintenance and Wetland Project was completed in 2008. Using four types of gabion structures, this project combines utilitarian components with innovative restoration techniques.
- **TIDE POOL EDUCATION:** The City of Newport Beach tide pool docent program has been a successful educational pilot program for working with beach-goers, teaching them to treat the tide pool areas with respect.

10.19 Pelican Hills Golf Course

- **HIGH SCHOOL EDUCATION:** Surfrider Foundation and the City of Newport Beach have teamed up with Corona del Mar High School to sponsor supplementary reference materials, site visits, guest speakers and field visits for an Advanced Placement Environmental Sciences class.
- **ASBSS:** A variety of studies and projects have created a core experience to serve as a basis for more focused studies of pollutant and public impacts to the ASBSs, as well as for

10.20 Morning Canyon Stabilization Project, before and after

10.21 Buck Gully Road Maintenance and Wetland Project

Figure 10.22 Public impact to tide pools in ASBS Marine Sanctuary

pilot and capital environmental improvement projects for this Planning Area. Proposed studies and projects include:

- Buck Gully canyon slope fire protection program
- Buck Gully Erosion and Canyon Stabilization Project
- Canyon bacterial source identification study
- Toxic load modeling from Newport Bay
- Poppy Lane bioswale
- Boat copper paint alternatives pilot project
- Irrigation runoff reduction program
- Rocky inter-tidal public exclusion pilot project
- Buck Gully canyon habitat protection and public access program

Sponsorship of expanded high school science classes to include watershed topics

10.7 Project Strategy Summary

(Refer to Figure 2.1: IRCWMP Planning Framework)

A strategy, as defined by the California Water Plan Update of 2005, is a project, program or policy that helps local agencies and governments manage their water and related resources. This chapter has focused on projects with an on-the-ground, place-based perspective to help create a stable hydrologic balance. It has also explored opportunities for combining strategies within a single project so as to serve multiple purposes and provide multiple benefits.

All of the state strategies discussed so far are implementation actions. There are two state strategies that are not implementation actions, but rather planning actions: the Watershed Management and Urban Land Use Management strategies. These two planning strategies are implemented by this entire document and planning effort. They will continue to be implemented through further development of the Desired State, IRCWMP objectives and projects, IRCWMP administration and through future land use planning efforts.

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