

## CALIFORNIA COASTAL COMMISSION

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### LCP Update Guide

## Section 4. Environmentally Sensitive Habitats and Other Natural Resources

***Environmentally Sensitive Area*** is defined in Coastal Act §30107.5 as: any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.

***Review the principal Coastal Act policies concerning Marine Resources and ESHA*** in Sections 30107.5, 30121, 30240, 30230, 30231, 30233, at: <http://www.coastal.ca.gov/coastact.pdf>.

The Coastal Act sets high standards for the protection of Environmentally Sensitive Habitat Areas (ESHA), including various types of wetlands, riparian areas, coastal prairies, woodlands and forests, and other natural resources in the coastal zone. The Commission has gained significant experience in applying the Coastal Act and LCPs to the protection of such resources. Also, there have been some important changes regarding the protection of ESHAs that stem from new scientific research, such as the identification of new sensitive species, or from court decisions interpreting the requirements of the Coastal Act.

### ***What should an updated Natural Resources component include?***

- A definition of *ESHA* that is consistent with the Coastal Act §30107.5;
- A definition of *wetland* that is consistent with Coastal Act §30121 and §13577(b) of the Code of Regulations;
- A statement that the condition of the wetland does not affect its regulatory status as a wetland, as defined in your LCP;
- An ESHA map and descriptions of existing, known sensitive habitat areas;
- A statement that the ESHA maps are not an exhaustive compilation of the habitat areas that meet the ESHA definition;
- Requirements for conducting site-specific biological evaluations and field observations to identify ESHA and other sensitive resources and potential impacts, including cumulative impacts, at the time of proposed development or plan amendment applications;
- Requirements for a historical analysis of disturbed areas adjacent to or within ESHA to determine if these areas were cleared or disturbed pursuant to a valid local or Coastal Commission coastal development permit;
- Requirements for determining and protecting adequate buffers to ESHA based on scientific evaluation;
- Designations and zoning, where practical, over ESHAs that limit uses to resource-dependent ones;
- Allowable uses that may result in the diking, filling or dredging of

- wetlands, lakes, and open coastal waters only when consistent with Coastal Act §30233;
- Protective policies carrying out Coastal Act §§30230, 30231, 30233 and 32040;
  - Designations and zoning of areas adjacent to ESHAs to ensure uses are compatible with the protection of the resources;
  - Policies to ensure compatibility between ESHAs and adjacent land uses;
  - Measures to address landscaping and vegetation clearance for fire protection purposes to avoid and minimize impacts to ESHA;
  - Protective policies to avoid or minimize the removal of native tree species of special concern;
  - Measures to avoid invasive species;
  - Mitigation measures for any resource-dependent or other allowed uses in ESHA, including mitigation ratios for unavoidable loss of ESHAs;
  - Requirements for protection of ESHA through the use of open space easements or deed restrictions;
  - Requirements for ensuring complete and detailed restoration and monitoring plans for projects involving habitat mitigation and restoration;
  - Measures to address beach grooming, consistent with protection of sensitive species (e.g., grunion and western snowy plover);
  - Tree trimming and removal policies;
  - Standards for erecting bird safe buildings;
  - Lighting and noise reduction policies;
  - Wind energy policies that account for ESHA protection and wildlife movement;
  - Provisions addressing climate change and sea level rise effects on ESHA.

***Where can I read some examples of updated resource policies?***

- **San Luis Obispo County Periodic LCP Review**, at:  
<http://www.coastal.ca.gov/recap/slo/slo-intro.pdf>.  
<http://www.coastal.ca.gov/recap/slo/slo-asha.pdf>.
- **San Luis Obispo County - Estero Area Plan Update**, at:  
<http://documents.coastal.ca.gov/reports/2008/7/Th16a-7-2008.pdf>
- **UC Santa Barbara Long Range Development Plan (LRDP Amendment 1-09)**, at:

<http://documents.coastal.ca.gov/reports/2006/11/F3a-s-11-2006.pdf>

- **City of Malibu Land Use Plan, Chapter 3—Marine and Land Resources**, at: <http://qcode.us/codes/malibu-coastal/>
- **City of Malibu Local Implementation Plan, Chapters 4—Environmentally Sensitive Habitat Area Overlay and 5—Native Tree Protection Ordinance**, at: <http://qcode.us/codes/malibu-coastal/>
- **City of Newport Beach Coastal Land Use Plan, Chapter 4: Coastal Resource Protection**, at: <http://www.newportbeachca.gov/index.aspx?page=1316>

### *What are some of the issues to address in an updated resources component?*

Updating your LCP's resources section is an opportunity to first ensure that adequate definitions and methods are in place to identify all ESHA and then to revise your maps and inventories accordingly. Next, you can ensure that policies and designations remain protective of ESHA, as directed by Coastal Act policies, based on the latest available scientific information and precedential decisions. Protection can also encompass buffering of ESHA, mitigating for the allowed loss of any ESHA and following up on any mitigation or restoration to ensure success. Advances in ESHA protection regarding invasive species, beach grooming, tree trimming, bird safe buildings, night lighting, noise, wind energy and climate change should also be considered in an LCP update.

#### ◆ **Definitions of ESHA and Wetlands**

Since many LCPs were first certified, there have been problems on appeals and increased litigation stemming from confusing and inconsistent definitions for ESHA and wetlands. To avoid confusion, LCPs should incorporate the basic Coastal Act definition found in §30107.5:

#### **Section 30107.5 Environmentally sensitive area**

*"Environmentally sensitive area" means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.*

Similarly, you can avoid confusion and ensure consistency with the Coastal Act by using the definitions of wetlands found in §30121 of the Coastal Act and §13577(b) of the California Code of Regulations (CCR).

#### **Section 30121 Wetland**

*"Wetland" means lands within the coastal zone which may be covered periodically or permanently with shallow water and*

*include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens.*

**CCR §13577(b) (in part)**

*Wetland shall be defined as land where the water table is at, near, or above the land surface long enough to promote the formation of hydric soils or to support the growth of hydrophytes, and shall also include those types of wetlands where vegetation is lacking and soil is poorly developed or absent as a result of frequent and drastic fluctuations of surface water levels, wave action, water flow, turbidity or high concentrations of salts or other substances in the substrate.*

Based on these definitions, wetlands under the Coastal Act may only display one of the wetland parameters typically used to define wetland areas, unlike the U.S. Army Corps of Engineers, which uses a three parameter definition under its federal authorities. In October 2011, the Coastal Commission conducted a workshop on wetland definition and delineation that may be useful in understanding these distinctions:

To watch a video of the presentation provided to the Commission by staff biologist Dr. John Dixon, see:

- **Wetlands Briefing Definition and Delineation of Wetlands in the Coastal Zone** (begins at approximately 0:33:40 and concludes at approximately 1:40:40), at: [mms://media.calspan.org/calspan/Video\\_Files/CCC/CCC\\_11-10-05/CCC\\_11-10-05.wmv](mms://media.calspan.org/calspan/Video_Files/CCC/CCC_11-10-05/CCC_11-10-05.wmv)

To read a copy of the Background Information Handout to the briefing, see:

- **Definition and Delineation of Wetlands in the Coastal Zone**, at: <http://documents.coastal.ca.gov/reports/2011/10/W4-10-2011.pdf>

The Coastal Act definition of wetland (§ 30121) does not distinguish between wetlands according to their quality. Thus, under the Coastal Act, poorly functioning or degraded areas that meet the definition of wetlands are subject to wetland protection policies. To ensure consistency with the Coastal Act, therefore, you should consider including in your LCP a statement that the condition of the wetland does not affect its regulatory status as a defined wetland. This principal has been established in the following court case:

- **(2000) Kirkorowicz v. California Coastal Commission, 83 Cal. App. 4th 980**, at: <http://caselaw.findlaw.com/ca-court-of-appeal/1402621.html>

Certainty in the application of ESHA policies can also be enhanced by providing more detail and examples of the kinds of habitats that may be defined as ESHA in a particular area. For example:

- **City of Malibu Land Use Plan, Policy 3.1**, at:

<http://qcode.us/codes/malibu-coastal/>,

*3.1 Areas in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments are Environmentally Sensitive Habitat Areas (ESHAs) and are generally shown on the LUP ESHA Map. The ESHAs in the City of Malibu are riparian areas, streams, native woodlands, native grasslands/savannas, chaparral, coastal sage scrub, dunes, bluffs, and wetlands, unless there is site-specific evidence that establishes that a habitat area is not especially valuable because of its special nature or role in the ecosystem. Regardless of whether streams and wetlands are designated as ESHA, the policies and standards in the LCP applicable to streams and wetlands shall apply. Existing, legally established agricultural uses, confined animal facilities, and fuel modification areas required by the Los Angeles County Fire Department for existing, legal structures do not meet the definition of ESHA.*

- **City of Newport Beach Coastal Land Use Plan, Chapter 4: Coastal Resource Protection, at:**

<http://www.newportbeachca.gov/index.aspx?page=1316>

#### ◆ ESHA Identification

ESHA designations are often based on the presence of rare plants, animals and/or habitats, or on areas that support populations of rare, sensitive, or especially valuable species or habitats. Section 30240(a) of the Coastal Act restricts development within ESHA to only those uses that are dependent on the resource, and requires that ESHA be protected against significant disruption of habitat values. It also requires that areas adjacent to ESHA and parks and recreation areas be sited and designed to prevent degradation of those areas and to be compatible with the continuance of those habitat and recreation areas.

Pursuant to Section 30107.5, in order to determine whether an area constitutes an ESHA, and is therefore subject to the protections of Section 30240, the Commission has asked if either of the following conditions have been met:

- 1) There are rare species or habitat in the subject area;
- 2) There are especially valuable species or habitat in the area, which is determined based on:
  - a) whether any species or habitat that is present has a special nature, OR

#### ***Coastal Act Section 30240 states:***

*(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.*

*(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

- b) whether any species or habitat that is present has a special role in the ecosystem

When the Commission has found that either of these two conditions is met, it has assessed whether the habitat or species meeting these conditions is easily disturbed or degraded by human activities and developments. If they are, the Commission has found the area to be ESHA. It should be noted that even disturbed or degraded habitats may constitute ESHA depending on the level of disturbance.

There are a numerous authoritative resources that can be used to help identify sensitive species and habitats. You should consider using the following resources in order to assess whether an area should be considered ESHA:

- ❑ The list of rare, threatened or endangered species prepared under the California or Federal Endangered Species Act,
- ❑ The list of “fully protected species” or “species of special concern” by the California Department of Fish and Wildlife (CDFW)
- ❑ The list of “1b” species prepared by the California Native Plant Society.
- ❑ The CDFW *List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database*.

In addition, Commission staff will also consider identifying a species or habitat as rare when there is other compelling evidence of rarity such as consideration for listing as rare, threatened or endangered under the California or Federal Endangered Species Acts and/or evidence of rarity in published academic studies.

Many online tools have become available recently to assist in site specific analysis, including:

- ❑ **The California Natural Resources Diversity Database**, at: <http://www.dfg.ca.gov/bdb/html/cnddb.html> and <http://www.dfg.ca.gov/bdb/pdfs/natcomlist.pdf>,
- ❑ **List of State and Federally Threatened and Endangered Animal Species**, at: <http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf>
- ❑ **List of State and Federally Threatened and Endangered Plant Species**, at: <http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEPlants.pdf>
- ❑ **Inventory of the California Native Plant Society**, at: <http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi>

For examples of a Resources Component with updated ESHA identification, see:

- ❑ **San Luis Obispo County - Estero Area Plan Update**, at:

<http://documents.coastal.ca.gov/reports/2008/7/Th16a-7-2008.pdf>

For policies regarding identifying riparian corridors, see, for example:

- **Santa Barbara Major LCPA 1-09-A**, at:  
<http://documents.coastal.ca.gov/reports/2010/11/Th6b-s-11-2010.pdf>

For identification of coastal dunes, coastal sage scrub, chaparral, and other ESHAs, see, for example:

- **City of Malibu Land Use Plan**, including Policy 3.1 quoted above, at: <http://qcode.us/codes/malibu-coastal/>,

For identification of wetlands and coastal dunes, see, for example:

- **City of Newport Beach Coastal Land Use Plan, Chapter 4: Coastal Resource Protection**, at:  
<http://www.newportbeachca.gov/index.aspx?page=1316>

#### ◆ Use of Resource Maps

In recent years the Commission has identified at least two major concerns related to the use of LCP Resource Maps in coastal regulation. First, many LCPs adopted a decade or more ago may be relying on maps of environmentally sensitive habitat areas (ESHA) that are no longer accurate given new scientific information and changes in the natural environment. As a result, ESHA may not be protected.

Second, some jurisdictions may be relying solely on outdated maps in determining whether ESHA exists on a site, rather than including specific site analysis that considers the current biological conditions on the site. This could potentially result in an incorrect determination of whether a local action on a proposed project is appealable to the Commission and possibly result in litigation.

You should consider updating your LCP to clarify that while maps can serve as an illustrative tool to help identify potential resources, it is the actual presence of ESHA on the site that should dictate whether ESHA policies apply to a site. Your LCP update should ensure that ESHA and wetland determinations are based on actual site-specific conditions, not just existing maps, such as through biological surveys at the time of proposed development or plan amendments, and that any area that actually meets the definitions of either must be given all the protections provided in your LCP, regardless of its prior presence or absence on a resource map. You can better implement such a policy if your LCP policies and filing requirements ensure that a thorough site-specific assessment of habitat and resources is undertaken, if necessary, as part of the development review process in order to identify any such resources.

For policies regarding use of resource maps, see, for example:

- **Santa Barbara Major LCPA 1-09-A**, at:  
<http://documents.coastal.ca.gov/reports/2010/11/Th6b-s-11-2010.pdf>

◆ **Cumulative Impacts**

Section 30250 of the Coastal Act requires the analysis of cumulative impacts. It states, in part:

*New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources...*

In addition, Coastal Act section 30105.5 defines “Cumulatively; cumulative effect” as:

*"Cumulatively" or "cumulative effect" means the incremental effects of an individual project shall be reviewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.*

In the Commission staff’s experience, biological reports completed for development projects often do not adequately consider cumulative impacts. Depending on the scale of a particular project, its location, and the natural resources involved (level of sensitivity and rarity), a cumulative impact analysis may be important and necessary. You should consider updating your LCP to include an explicit requirement that an applicant conduct a cumulative impact analysis as part of the application process, if circumstances warrant such an analysis. (Note that Section 30250 requires cumulative impact analysis generally, not just for ESHA, and LCPs should address all cumulative impacts through planning.)

◆ **Avoidance of Impacts to ESHA**

The California Coastal Act requires that only development dependent on the resource be allowed in ESHA. The Commission has found that such things as hiking and educational trails, low impact camping, educational signage and kiosks, research, and restoration qualify as resource dependent development. It is important for LCP land use designations to reflect the requirements of Section 30240, and you should consider listing the types of limited uses that may be allowed in ESHA.

The court’s decision in the Bolsa Chica Land Trust case, noted below, confirmed that the Coastal Act requires that ESHA be avoided and buffered from development impacts and that providing mitigation for impacts is not a sufficient justification for allowing development where the impacts to ESHA are avoidable:

- **Bolsa Chica Land Trust v. Superior Court** 71 Cal. Ap.4<sup>th</sup> 493, 507, at:  
[http://scholar.google.com/scholar\\_case?case=17104884799653855840&q=Bolsa+Chica+Land+Trust+v.+Superior+Court&hl=en&as\\_sdt=2,5&as\\_vis=1](http://scholar.google.com/scholar_case?case=17104884799653855840&q=Bolsa+Chica+Land+Trust+v.+Superior+Court&hl=en&as_sdt=2,5&as_vis=1)



You should consider amending your LCP to clearly state that only “resource dependent” development is allowed in ESHA, consistent with Coastal Act §30240.

◆ **Buffers**

You should consider updating your LCP to establish setbacks or buffers between development and wetlands or ESHA in order to protect natural ecosystem functions of the respective habitat and organisms supported by the habitat. Buffers serve as transitional habitat and provide distance and physical barriers from human degradation and disturbance. Coastal Act section 30231 specifically references riparian buffers as a means to protect these areas.

Thus, updating the LCP is an opportunity to establish or revise required buffer dimensions to be more in line with the scientific literature and to be more specifically tailored to individual ESHAs. For example, in 1988, the Habitat Management Division of the Washington State Department of Wildlife recommended minimum buffers of 61m (200 feet) for forested wetlands and 91m (300 feet) for non-forested wetlands, such as salt marshes, based on the essential needs of fish and wildlife. Similarly, a number of studies examining the effectiveness of riparian buffers have determined that 30-60m (97.5-195 feet) wide riparian buffer strips will effectively protect water resources through physical and chemical filtration processes (Lee & Samuel 1976; Phillips 1989; Davies & Nelson 1994; Brososke *et al.* 1997, Wenger & Fowler 2000). Regarding raptors, Richardson and Miller (1997) recommend buffer zones for 11 species (osprey, Cooper's hawk, northern goshawk, sharp-shinned hawk, golden eagle, red-tailed hawk, ferruginous hawk, bald eagle, prairie falcon, peregrine falcon, and American kestrel) ranging from 50 to 1600m (164 to 5250 feet).

Some LCPs already have incorporated such tailored buffer provisions. For example Sonoma County requires a 600-foot buffer for heron rookeries and the City of Carpinteria requires a 300-foot buffer for trees supporting nesting raptors. The City of San Diego requires buffers of: 300 feet from any nesting site of Cooper's hawks, 1,500 feet from known locations of the southern pond turtle, 900 feet from any nesting sites of northern harriers, 4,000 feet from any nesting sites of golden eagles, and 300 feet from any occupied burrow of burrowing owls.

Under circumstances in which it was not feasible to establish buffers as wide as those recommended in the scientific literature or where the literature is lacking in guidance for certain ESHAs, the Commission has required minimum 100-foot buffers. To ensure protection of ESHA, if such a standardized minimum buffer distance is included in your LCP, you should consider complementing it with a provision to require greater buffers on a case by case basis based on specific project reviews.

In more urbanized areas, lesser buffer distances may be warranted, as in this example:

- **Santa Cruz City-Wide Creeks and Wetlands Management Plan**, at: <http://www.cityofsantacruz.com/index.aspx?page=371>

Buffer width reductions may not be appropriate in areas where natural vegetation has previously been removed, but could return or be re-established. For example:

- **Santa Barbara County Coastal Zoning Ordinance**, at: <http://www.sbcountyplanning.org/PDF/A/Article%20II.pdf>

*Sec. 35-97.19 Development Standards for Stream Habitats...Riparian vegetation shall be protected and shall be included in the buffer. Where riparian vegetation has previously been removed, except in association with channelization, the buffer shall allow for the re-establishment of riparian vegetation to its prior extent to the greatest degree possible.*

#### ◆ Mitigation Ratios

You should consider updating your LCP to include mitigation ratio policies to direct mitigation and restoration when ESHA is unavoidably impacted. Established mitigation ratios for habitat restoration or replacement are important because: 1) in most cases there is a time gap with a loss of ecosystem function between the direct, indirect, or cumulative impacts to, or removal of, the respective habitat, 2) the artificial creation or restoration of habitats can never completely compensate for impacts, and 3) there is no guarantee that habitat creation or restoration will be entirely or even partially successful. A recent study on wetland restoration and creation showed that most of the projects it examined have not entirely compensated for loss of ecosystem functions (Ambrose *et al.* 2007). Because of the potential for less than 100% success in restoring a given area, it is important to consider LCP policies that incorporate mitigation ratios into their natural resource policies and standards. The Commission has in the past used the following mitigation ratios:

- 10:1 for native tree replacement (e.g. oaks, walnut, sycamore)
- 4:1 for wetlands
- 3:1 for riparian habitats
- 3:1 for other habitats that support state or federal rare, threatened, or endangered species, species of special concern or CNPS 1b or 2 listed plants
- 2:1 for coastal sage scrub not occupied by listed species.

#### ◆ **Restoration and Monitoring Requirements**

Consider updating your LCP to include specific provisions to require a complete and detailed Restoration and Monitoring Plan for any proposed or required habitat creation or restoration. Because submittal of conceptual plans can cause review delays, you could consider adding a policy that updates your CDP filing requirements to require that applications involving habitat restoration or mitigation be deemed incomplete (or unfiled) until submittal of such a plan. Nearly all significant restoration projects will require preliminary field sampling and the results of this sampling could be included in the habitat creation or restoration and monitoring plan.

An updated LCP could include policies that require the following types of information in a restoration and monitoring plan:

- Stand-alone documents that describe actual methods and practices to be employed, including performance/success criteria and adaptive management and monitoring requirements;
- Complete information regarding restoration and monitoring, rather than just marginal notes on large format engineering or landscaping plans, simple tables and bulleted lists, or mere references to information in other planning documents or to literature on field or statistical methods;
- Plans that are sufficiently detailed that they could be implemented by a technical specialist who has not been involved in the project; and
- Plans that are written in such a way that an educated layperson could understand and evaluate the plan.

#### ◆ **Avoidance of Invasive, Non-Native Species And Requirements for Landscaping Plans**

Invasive, non-native species, also called invasive exotics, are non-native plants and animals that have been somehow (often accidentally) introduced into an area, survive well in their new environment, and are problematic for a variety of reasons. Not all non-native species cause problems – only about 15% of non-native introductions are invasive. However, there is growing concern about non-native invasive species because of the serious economic and ecosystem consequences associated with their introduction. Invasive species can have myriad impacts upon native communities; they may: outcompete and displace native species, thereby changing the character of entire ecosystems; impede waterways; increase water loss in aquatic habitats through increased transpiration; increase fire hazard; change community structure in detrimental ways for native species; and modify habitats favoring other introduced species.

You should consider updating your LCP to include policies addressing invasive species, such as a prohibition on the use of non-native invasive plants in any landscaping plans, particularly in locations in or adjacent to sensitive

areas. The identification of such plants could be tied to authoritative lists, such as the one produced by the California Invasive Plant Council:

- **California Invasive Plant Inventory**, at: <http://www.cal-ipc.org/ip/inventory/index.php>

In addition to requiring that landscaping plans avoid the use of non-native invasive plant species, LCP policies could include, where appropriate, requirements that landscape plans are:

- Professionally prepared,
- Permanently implemented through bonding or deed restrictions,
- Designed to require the use of only non-invasive plants,
- Designed to ensure removal of non-native, invasive plants from the site,
- Designed to prohibit or minimize the use of rodenticides, herbicides and pesticides in areas adjacent to or within ESHA, and
- Designed to include minimum requirements for fire department required vegetation clearance through a brush management or fuel modification plan in areas adjacent to or within ESHA.

You could also consider regionally appropriate policies to promote additional methods of eradicating non-native invasive plants by the most environmentally benign methods available.

While the marine environment is within the Commission’s jurisdiction, LCP policies for land based accessory development or activities can help ensure that boats, barges and other equipment towed or transported to a site for dredging or other in-water work will avoid or minimize introducing non-native invasive species into nearshore and coastal waterways.

#### ◆ **Beach Grooming: Beach Wrack, Snowy Plover, Least Tern and Grunion Adverse Impacts**

Recent research has reinforced the importance of protecting “*beach wrack*” as part of the marine ecosystem. “*Beach wrack*” refers to the mounds of seaweed and other loose organic material that is brought ashore and accumulates by the natural processes of tides and waves. While these mounds may appear to beach visitors as unsightly debris, research has found that wrack is an important nutrient source for the beach ecosystem, in that it provides micro-habitat for a variety of organisms, supports the prey of many marine and terrestrial invertebrates and shorebirds, and contributes to the establishment of coastal strand and incipient dune habitat. Regular grooming of sandy beaches can destroy the wrack and degrade the near shore habitat. Research has shown that groomed beaches have lower invertebrate species richness, abundance and biomass and supports fewer birds in absolute numbers and species diversity

(Dugan *et al.* 2010, Dugan *et al.* 2003). And grooming strips beaches of native plants and incipient dunes, making beaches more vulnerable to erosion.

Beach grooming can negatively impact sensitive shorebird species, such as the western snowy plover and the California least tern, that forage and nest on the open beach. The western snow plover (*Charadrius alexandrinus nivosus*) was listed as a federally threatened species under the Federal Endangered Species Act in 1993, due to habitat loss and disturbance throughout its coastal breeding range which stretches from Washington to Baja California, Mexico. The western snowy plover establishes nests (simple scrapes in the sand) just above the wrack line in the upper beach and coastal strand zone. These nests are very exposed and vulnerable to disturbance and predation. The California least tern (*Sterna antillarum brownii*) was listed as an endangered species in 1972, with a population of less than 600 breeding pairs. The California least tern breeds on exposed tidal flats, beaches and bays of the Pacific Ocean within a very limited range of southern California, in San Francisco Bay, and in the extreme northwest of Mexico. Since listing, aggressive management efforts have helped the least tern population grow to about 4,500 breeding pairs, but it is still listed and remains vulnerable to predators, natural disasters and further human disturbance.

The Commission has identified plovers and terns and their nesting and foraging habitat as ESHA protected them under Section 30240 of the Coastal Act. Many of the beaches along the California coast include critical habitat areas for the western snowy plover; at least 90% of the breeding population on the Pacific coast, which remains under 3,000 in number, is found on California beaches, and the central coast from San Luis Obispo through Ventura County contains nearly 45% of the plover population. Plovers make their nests on sandy beaches using anything they can find, including driftwood, shells, kelp and other vegetative debris found in beach wrack. Least terns usually nest on barren or sparsely vegetated sand or gravel areas, and may even make use of very shallow artificial indentations, such as a footprint. Beach grooming not only removes potential plover and tern nest material, but can also flatten the subtle topographic depressions that these birds use to nest in.

Beach grooming can also negatively impact California grunion (*Leuresthes tenuis*), which are a species of fish with a very unique mating ritual. Grunion come ashore in the spring and summer to reproduce during particularly high night-time tides. Female grunion come up on the beach first, and dig their tails into the sand to lay their eggs. Next, male grunion come ashore and wrap themselves around females to deposit their sperm and fertilize the eggs. For the next ten days or so grunion eggs remain buried in the sand until the next high tide when the eggs hatch and young grunion are washed out to sea. If beach grooming occurs while grunion eggs are buried, all the eggs may be destroyed. In order to protect buried grunion eggs, the Beach Ecology Coalition has developed beach grooming protocols that prevent negative impacts to grunion (see link below).

In order to avoid adverse beach ecosystem impacts detailed above, cities and counties that have historically conducted beach grooming activities may consider reviewing their beach maintenance practices to determine if grooming could be curtailed entirely, or conducted in a more ecologically sound manner. With the growing understanding of the importance of beach wrack to healthy beach ecosystems and the sensitivity of beach habitats and organisms, you could consider LCP policies that would prohibit beach grooming. Alternatively, you could consider policies that encourage alternative beach grooming strategies, such as hand grooming, seasonal grooming, zonal grooming (e.g., leaving wrack on some beaches year-round), rotational grooming (alternating grooming to allow beach ecology to “recover”), and threshold grooming (grooming only when the amount of wrack surpasses a specific volume).

You could consider updating your LCP to include policies and management measures for beach maintenance that strike the appropriate balance between protection of sensitive beach resources and maintaining the recreational values of sandy beaches. An update of your LCP could provide explicit guidance for protecting threatened and endangered wildlife species and their habitats. The US Fish and Wildlife Service website can provide good background information on western snowy plovers and California least terns, and the federal register can provide maps showing critical habitat areas for both species. The 2007 USFWS Recovery Plan for the western snowy plover, and USFWS Revised Recovery Plan for the California least tern, approved in 1985, both include objectives and measures that can be taken for protecting and managing existing populations, in order to aid in the recovery of these threatened and endangered species. (See links provided below.)

Where applicable, LCPs could also include policies and management procedures that protect grunion by restricting sand-disturbing activities when grunion are present. You could consider policies that limit beach grooming and other disruptive activities to areas above the semi lunar high tide mark.

For more information on the effects of beach grooming, see for example:

- ❑ **Ecological Impacts of beach Grooming on Exposed Sandy Beaches**; by Dr. Jenifer Dugan, University of California, Santa Barbara; at: [http://www-csgc.ucsd.edu/RESEARCH/PROJPROF\\_PDF/RCZ174.pdf](http://www-csgc.ucsd.edu/RESEARCH/PROJPROF_PDF/RCZ174.pdf)
- ❑ **Beachpedia article on beach grooming** at: [http://www.beachpedia.org/Beach\\_Grooming](http://www.beachpedia.org/Beach_Grooming)
- ❑ **A Feast Interrupted; Beach Grooming Takes Away Shorebirds Dinner**; by Hal Hughes; in *Coast & Ocean* Vol. 19, no. 4, Winter 2003/2004, (pg. 12) at: <http://www.coastal.ca.gov/la/lcpguide/A%20Feast%20Interrupted-Hughes-Coast%20and%20Ocean-Winter%202003%202004-v19-no4.pdf>

for a complete edition of Coast and Ocean, Vol. 19, go to:  
[http://scc.ca.gov/webmaster/coast\\_ocean\\_archives/1904.pdf](http://scc.ca.gov/webmaster/coast_ocean_archives/1904.pdf)

For more information concerning beach wrack see:

- ❑ **Kelp Wrack: Hopping with Life in Ventura County**; by Jenifer Dugan, Sea Grant Publication, at:  
<http://nsgl.gso.uri.edu/casg/casgg11020.pdf>
- ❑ **Population Dynamics and Ecology of Beach Wrack Macro-invertebrates of the Central California Coast** by D. Lavoie, Southern California Academy of Sciences Bulletin, BCAS-A84(1), April 1985, at:  
<http://cluster.biodiversitylibrary.org/b/bulletin8401sout/bulletin8401sout.pdf#page=3>
- ❑ **The Response of Macrofauna Communities and Shorebirds to Macrophyte Wrack Subsidies on Exposed Sandy Beaches of Southern California**. J.E. Dugan, et al., Estuarine, Coastal and Shelf Science 58S (2003) pgs 25–40. at:  
[https://www.bren.ucsb.edu/academics/courses/254/Readings/Dugan\\_et\\_al\\_2003.pdf](https://www.bren.ucsb.edu/academics/courses/254/Readings/Dugan_et_al_2003.pdf)

You can find more information on western snowy plover, California least tern, and grunion at:

- ❑ **Western Snowy Plover - Audubon online species page**, at:  
[http://ca.audubon.org/birds/snowy\\_plover.php](http://ca.audubon.org/birds/snowy_plover.php)
- ❑ **Western Snowy Plover – USFWS official species profile page**, at:  
<http://www.fws.gov/arcata/es/birds/WSP/plover.html>
- ❑ **Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Pacific Coast Population of the Western Snowy Plover; Final Rule; 50 CFR Part 17**); for maps showing critical habitat areas, at:  
[http://www.fws.gov/arcata/es/birds/WSP/documents/2005Sept29\\_designationCriticalHabitat.pdf](http://www.fws.gov/arcata/es/birds/WSP/documents/2005Sept29_designationCriticalHabitat.pdf)
- ❑ **Western Snowy Plover - Sharing the Beach**, California State Parks brochure, at:  
[http://www.westernsnowyplover.org/pdfs/state\\_parks\\_sharing\\_beach\\_brochure.pdf](http://www.westernsnowyplover.org/pdfs/state_parks_sharing_beach_brochure.pdf)
- ❑ **Rules and Guidelines for protecting western snowy plovers**; California State Parks brochure, at:  
<http://www.parks.ca.gov/pages/735/files/flyerploverhr.pdf>
- ❑ **California least tern – USFWS official species profile page**, at:  
<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B03X>

- ❑ **California least tern – USFWS 5-year Review - Summary & Evaluation**, at:  
<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B03X>
- ❑ **USFWS Revised California least tern Recover Plan**, at:  
<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B03X>
- ❑ **California least tern – California Department of Pesticide Regulations**, at:  
[http://www.cdpr.ca.gov/docs/endspec/espdfs/clt\\_bio.pdf](http://www.cdpr.ca.gov/docs/endspec/espdfs/clt_bio.pdf)
- ❑ **California Grunion Facts and Runs**, by California Department of Fish and Game, at:  
<http://www.dfg.ca.gov/marine/grunionschedule.asp>
- ❑ **Grunion.org website** (where you can also watch a National Geographic video on grunion), at: <http://grunion.pepperdine.edu/>.

To read Coastal Commission discussion of these issues, check out the following adopted staff reports:

- ❑ **City of Solana Beach LCP Land Use Plan**, at:  
<http://documents.coastal.ca.gov/reports/2012/3/W12e-3-2012.pdf>
- ❑ **Beach and Sediment Management Program for the Santa Barbara Harbor and Waterfront Area**, at:  
<http://documents.coastal.ca.gov/reports/2006/4/Th12c-4-2006.pdf>
- ❑ **City of Santa Cruz Beach Management Plan**, at:  
<http://documents.coastal.ca.gov/reports/2011/6/Th10c-6-2011.pdf>
- ❑ **City of Newport Beach Coastal Land Use Plan**, Chapter 4: Coastal Resource Protection, at:  
<http://www.newportbeachca.gov/index.aspx?page=1316>

#### ◆ **Tree Trimming and Removal**

Many cities and counties are obligated to trim trees for regular tree maintenance, safety of the public, and protection of property. There may also be public view issues related to maintaining vegetation, including trees, in a manner that protects public views, especially from Highway One. To address these situations while also considering protection of habitat, you could consider updating your LCP to include tree trimming policies that ensure the protection of bird nesting habitat protected by the Migratory Bird Treaty Act and the long-term protection of breeding, roosting, and nesting habitat of state and federally listed bird species, California bird species of special concern, and bird species that play an especially valuable role in the ecosystem. A number of jurisdictions, including the cities of Long Beach and Dana Point, have adopted policies that address tree trimming and removal, both outside of and



during bird breeding season, for any tree that has been used for breeding and nesting within the past five years.

You could also consider LCP policies that address any tree removal that is not part of a timber harvesting plan submitted pursuant to the provisions of the Z'berg-Nejedly Forest Practice Act of 1973. Generally this would include timber harvests of less than three acres, of non-commercial species, or for non-commercial use, as well as other tree removal (down to the single tree) done for non-harvesting purposes. (For tree removal associated with timber harvests more than three acres, see Section 11. Timberlands). LCPs should already have policies addressing other Coastal Act topics that would apply to tree cutting, such as environmentally sensitive habitat or scenic view protection. But, given existing or proposed development, there may be a need for provisions that specifically address tree removal. Some habitat related issues that have come to the Coastal Commission's attention in recent years include the following:

- Removal of trees that had provided vegetative screening of development in scenic viewsheds;
- Cutting and disposal methods of diseased trees;
- Trimming, thinning, or pruning that while not completely removing a tree renders it unsuitable for habitat or more prone to dying;
- Removal of non-native trees that nevertheless serve as habitat;
- Unauthorized tree removal undertaken due to a perceived hazard.

For tree trimming and tree removal policies approved by the Commission, see for example:

- ❑ **Channel Islands Harbor Public Works Plan 1-07** with addenda with suggested modification regarding bird surveys required for tree trimming activities (see pg 4, no 8, regarding Policy 11), at: <http://documents.coastal.ca.gov/reports/2008/2/F5a-2-2008.pdf>
- ❑ **Channel Islands Harbor Notice of Impending Development (NOID) 1-09**, for 5-yr tree trimming program, at: <http://documents.coastal.ca.gov/reports/2009/6/W17a-6-2009.pdf>
- ❑ **Coastal Development Permit #5-08-187 (City of Long Beach)** to conduct annual and emergency tree trimming activities consistent with the City of Long Beach tree trimming and tree removal policy, at: <http://documents.coastal.ca.gov/reports/2009/2/W23b-2-2009.pdf>
- ❑ **Dana Point Harbor Major LCP Amendment 1-08**, pages 54-56, for tree trimming, at: <http://documents.coastal.ca.gov/reports/2009/10/Th22a-10-2009.pdf>
- ❑ **City of Dana Point Major LCP Amendment DPT-MAJ-1-10 (Dana Point Harbor Revitalization IP)**, at: <http://documents.coastal.ca.gov/reports/2011/4/W11a-4-2011.pdf>

- **Marina del Rey – Major LCP Amendment 01-11** --bird nesting and tree trimming issues, at:  
<http://documents.coastal.ca.gov/reports/2011/11/Th11a-11-2011.pdf>  
and <http://documents.coastal.ca.gov/reports/2011/11/Th11b-11-2011.pdf>

#### ◆ **Bird-Safe Buildings**

Since most development is concentrated along rivers, woodlands, coasts, and wetlands that birds depend on for food and shelter, urban sprawl and intensified urbanization have eliminated and/or degraded bird habitat in many places around the globe. Loss of habitat squeezes birds into urbanized areas where they encounter man-made structures. Modern urban buildings that have clear glass or reflect light during the day and are lit at night, as well as suburban and rural buildings with large windows and reflective surfaces, can present serious hazards for birds. Bird populations, which have declined from loss of habitat, are seriously threatened by the growing presence of man-made structures within their transit and migratory flight space.

Over three decades of research has documented that buildings and windows are the top killer of birds in North America. In the United States, an estimated 100 million to one billion birds perish each year from fatal encounters with buildings. This level of bird mortality is believed to be significant enough to impact the viability of bird populations, leading to local, regional, and national declines.

A number of factors contribute to a building being a hazard for birds. When updating your LCP, you could consider adding policies that would require an assessment of the following factors when determining whether to require bird safe building practices: 1) location of the building in relation to recognized migration corridors or flyways; 2) proximity of the building to open terrestrial and aquatic foraging areas – parks, forests, rivers, streams, wetlands and ocean; 3) proximity of the building to documented stopover or roosting locations; and 4) regions prone to haze, fog, mist, or low-lying clouds. Researchers have found that a combination of building characteristics, coined, “bird-hazards,” present the greatest threat to birds. These characteristics include buildings located within or immediately adjacent to open spaces with lush landscaping and with a façade of more than thirty-five percent (35%) glazing; buildings located adjacent to or near wetlands or open water and with a facade of more than thirty-five percent (35%) glazing; and buildings with ‘bird traps’ such as glass courtyards, transparent building corners, and glass balconies.

It is possible to design buildings so they are less hazardous to birds by implementing bird-safe building practices. Bird-safe building practices include features such as specific treatments and design considerations for windows and glazed surfaces, lighting, and landscaping.

You should consider adding policies to your LCP that would require bird safe building design, such as those listed below:

- All new buildings, and major renovations of existing buildings, shall be required to provide bird-safe building facade treatments in order to reduce potential for bird strikes.
- Landscaped areas next to buildings, including patios and interior courtyards, shall be designed and sited to avoid or minimize bird-strike hazards caused by reflective building surfaces.
- Buildings shall be designed to use minimal external lighting (limited to pedestrian safety needs) and to minimize direct upward light, spill light, glare and artificial night sky glow. Buildings shall also be designed to minimize light pollution from interior lighting to the maximum feasible extent.

For policies regarding bird safe buildings, see, for example:

- **City of Long Beach, Major LCP Amendment LOB-MAJ-1-10**, see suggested modifications on pages 6-7, at:  
<http://documents.coastal.ca.gov/reports/2011/6/Th18a-6-2011.pdf>

#### ◆ Night Lighting

Over a century of scientific studies and observations have established that artificial night lighting attracts night foraging seabirds and night migrating songbirds and disrupts their normal breeding, foraging and/or migratory activities. Both seabirds and migratory songbirds have been observed to continually circle lights, falling prey to “light entrapment,” whereby they remain trapped within the zone of illumination and are unable or unwilling to return to the darkness until overcome with exhaustion or the lights are hidden by the dawn. Birds have also been observed to become disoriented in the presence of bright lighting at night, suffering injury or death after colliding with lights or nearby structures or becoming stranded on lighted platforms where they can become vulnerable to injury, oiling or other feather contamination, exhaustion, and depredation by avian predators that may also be attracted to illuminated areas due to presence of prey species.

Recent studies suggest that the long visible wavelengths (light in the red spectrum) transmitted by red and white colored light as well as many broad spectrum florescent, high pressure sodium and metal halide lights may be particularly problematic because these wavelengths may disrupt the navigational and directional senses of some birds and that these effects may be compounded during periods of fog or low cloud cover.

Artificial lighting of marine waters may also have adverse impacts on marine organisms other than birds. Some forage fishes and plankton species may be attracted to the artificially lit waters, making them more vulnerable to predation. Predators such as marine birds, marine mammals and large predatory fishes have been known to use the illumination of lights to feed on fishes and plankton.

In addition to attracting predators, artificial light may interfere with diurnal vertical migration by zooplankton and some species of fish. Diurnal vertical migration by zooplankton to deep, poorly illuminated habitats during the day is thought to reduce the probability of attack by visual predators. Zooplankton and some pelagic fishes come up into the phytoplankton-rich surface waters to feed when it is dark and they cannot be seen by visual predators. The migration responds to changes in light intensity and water column temperature structure and may be influenced by artificial night lighting.

Where applicable, you should consider updating your LCP to include policies that require that the full range of potential effects associated with night lighting in coastal/marine areas is evaluated as part of development review and provide measures to avoid and/or minimize these effects.

Policies to avoid adverse impacts may include:

- Encouraging the use of directional and/or shielded lighting in place of upward facing lighting or spot lights;
- Avoiding the use of lighting directed over marine waters;
- Encouraging the use of shorter wavelength or “bird-friendly” lighting; and
- Avoiding the use of steady burning red or white lights in visually prominent areas.

Examples of policies and zoning include:

- ❑ **City of Malibu Land Use Plan**, see policies 3.42, 3.56, 6.18, and 6.23, at: <http://qcode.us/codes/malibu-coastal/>
- ❑ **City of Malibu Local Implementation Plan**, see section 4.6.2, at: <http://qcode.us/codes/malibu-coastal/>
- ❑ **City of Long Beach, Major LCP Amendment LOB-MAJ-1-10**, page 7 includes suggested modifications for lighting design and night time lighting that would avoid adverse impacts to migratory birds, at: <http://documents.coastal.ca.gov/reports/2011/6/Th18a-6-2011.pdf>
- ❑ **City of Malibu LCP Amendment MAJ-1-11 Part A**, which limited football field lighting, and conditions require monitoring of possible impacts during migration, at: <http://documents.coastal.ca.gov/reports/2011/10/W13a-10-2011.pdf>
- ❑ **International Dark Skies Associations’ Model Lighting Ordinance**, at: <http://www.darksky.org/outdoorlighting/mlo> is a resource for specific and protective lighting standards.

## Surface Noise

The effect of construction noise on animals is not well understood; however significant noise levels may affect animals in a number of ways. Most research has focused on the effects of highway and construction noise upon birds. This research has found that continuous noise above the ambient environment or single or multiple impulse noise above 100 dB may produce changes in foraging and reproductive behavior; may mask signals birds use to communicate; may mask biological signals impairing detection of sounds of predators and/or prey; may decrease hearing sensitivity temporarily or permanently; and/or may increase stress and alter reproductive and other hormone levels. There may even be more substantial and enduring impacts that potentially include interference with breeding by individuals and populations, thereby threatening the survival of individuals or species.

Much of the information regarding impacts of noise on birds has been extrapolated from studies involving the influence of noise on humans. Studies on humans have demonstrated that 60 decibels (dB) is a volume above which humans display avoidance behavior, aggravation, irritability, and distraction (USEPA Noise Effects Handbook, 1981). This same value (60 dB) is a widely used threshold for projects involving heavy equipment in areas supporting sensitive bird species. This threshold criterion is presented by many agencies and consultants as the noise threshold above which birds may be adversely impacted.

You should consider updating your LCP to include policies addressing noise impacts in an effort to minimize those impacts to sensitive birds and other animal species. Examples of such policies include:

- Requiring that construction projects that involve noisy equipment in close proximity to habitats that support sensitive birds or other sensitive animals follow noise impact precautions.
- Require the preparation of ambient noise reports for particular locations.
- Employ biologists qualified to monitor noise levels during construction.

While the 60 dB decibel range is widely accepted and employed for projects involving potential noise impacts upon birds, its use is without well founded scientific justification. And while this criterion can be valuable as a starting point, you should consider analyzing ambient environment noise levels when assessing the decibel thresholds as they are applied to projects on a case by case basis. Rural areas will have much lower exposure to significant ambient noise compared to urban areas.

For policies regarding surface noise, see, for example:

- **Channel Islands Harbor Public Works Plan (PWP)**, Pgs 14-15, Modifications #21 and 22 which deal with surface noise issues, at: <http://documents.coastal.ca.gov/reports/2008/10/Th30c-10-2008.pdf>

#### ◆ **Wind Energy**

As noted in the September 2011, *U.S. Fish and Wildlife Service (USFWS) Draft Land-Based Wind Energy Guidelines*, “wind energy facilities can have negative effects on fish, wildlife, and their habitats.” Scientific research also suggests that certain types of meteorological research structures erected to gather data on wind speeds and directions may also have adverse impacts on wildlife and habitat resources. However, with proper diligence paid to siting, operations, and management of wind energy projects, it is possible to mitigate for some of the adverse effects to fish, wildlife, and their habitats. The USFWS Guidelines note that “this is best accomplished through early coordination with the Service and other stakeholders. Such coordination should occur prior to any financial obligation or finalization of lease agreements to allow for the greatest range of development and mitigation options.”

In addition to siting, the number, design, and size of wind energy conversion systems (WECS) also can have a substantial influence on their potential to result in adverse impacts. For example, the September 2011 USFWS *Draft Land-Based Wind Energy Guidelines* provides an evaluation of potential impacts associated with WECS and recommends potential mitigation measures, including a four-tiered process to be taken for new projects including screening of potential sites, site characterization, pre-construction biological monitoring and assessment, and post-construction fatality monitoring and impact evaluation. See:

- **U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines**, at: [http://www.fws.gov/windenergy/docs/WEG\\_September\\_13\\_2011.pdf](http://www.fws.gov/windenergy/docs/WEG_September_13_2011.pdf)

When updating your LCP, you should consider policies that require identification of potential impacts of land based wind energy systems and recommendations for conditioning such projects to avoid, minimize, or mitigate for such impacts. One good source for identifying methods for minimizing impacts and for mitigating unavoidable impacts to birds is the USFWS guidelines. This subject is also discussed in the LUP Guide Section 10 on Energy and Industrial Development.

Local governments should also consider adopting wind turbine-specific policies that require: (a) incorporation of well-established “best practices” for minimizing impacts to wildlife; (b) include a basic monitoring condition (i.e., requiring the applicant to monitor and record any carcasses or injured animals; and (c) include a condition requiring the applicant to shut-down and remove the turbine if impacts exceed a particular threshold.

Section 10 of this LUP Update Guide on Energy and Industrial Development provides examples of Commission actions that discuss how to consider impacts of WECS and development. In addition, see:

- **California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Developments**, at:  
<http://www.energy.ca.gov/windguidelines/index.html>

◆ **Climate Change and Sea Level Change**

Coastal habitats face increased vulnerability from many aspects of climate change, such as changing weather patterns, temperature, precipitation, and sea level. Vulnerable coastal ecosystems include beaches, wetlands, riparian areas, coastal sage scrub, chaparral, grasslands, and woodlands.

The *2009 California Climate Adaptation Strategy* found that average temperatures throughout the state could increase 1.8 to 5.4°F by 2050 and 3.6 to 9°F by 2100, with temperature increases expected to be more pronounced during the summer months. The report is:

- **2009 California Climate Adaptation Strategy**, at:  
<http://www.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF>

In addition, 11 of the 12 climate models used to project changing climate conditions in California projected a significant decrease in precipitation from the 1961 – 1990 baseline condition, with more precipitation falling as rain instead of snow. These increases in temperature and possible decreases in precipitation will greatly alter the locations where native coastal species can thrive and grow.

In addition to changes to temperature and rainfall, increases in sea level will alter the physical characteristics of the habitat – inundating beaches, converting dry beach to intertidal or subtidal areas, and relocating the intertidal zone of wetlands to a more inland or upland location. And, the species that depend upon these habitat areas will either be lost or relocate with the habitat. Finally, ocean acidification will change the chemistry of the nearshore and offshore waters, stressing species that use calcium for shells or skeletal growth. Such changes will impact coastal habitats in myriad ways; a primary concern is that many coastal habitat species, permanently attached organisms (plants and some animals), and animals with small home ranges may not be capable of adapting as quickly as the climate is projected to change.

Other climate change concerns with regards to sensitive coastal habitats include: 1) increased erosion of habitats due to sea level rise, 2) loss of wetland habitat due to sea level rise, 3) increased competition from non-native species as native species become more vulnerable, 4) increased fires and 5) loss and fragmentation of migration corridors. Coastal organisms occupying habitats at the edges of their ranges and that are subject to situations such as those listed

above will be particularly vulnerable to extinction if they are not able to adapt to these changes.

The 2009 California Climate Adaptation Strategy identifies several potential impacts of sea level rise on biodiversity and habitat, along with habitat adaptation strategies that can be used to minimize and manage possible future impacts.

Suggested LCP guidance for addressing Sea Level Rise is being developed and when available it will be linked here.

For more information on climate change and sea level rise, check out:

- **2009 California Climate Adaptation Strategy**, at: <http://www.climatechange.ca.gov/adaptation/>

Especially useful for protecting sensitive coastal resources may be the sections:

- Biodiversity / Habitat
- Oceans / Coasts, and
- Water

Other informative websites include:

- **Third California Climate Change Assessment Reports**, at: [http://climatechange.ca.gov/climate\\_action\\_team/reports/third\\_assessment/index.html](http://climatechange.ca.gov/climate_action_team/reports/third_assessment/index.html)
- **CalAdapt Website**, at: <http://cal-adapt.org/>
- **Ecosystem Based Management Tools Network Database**, at: <http://www.ebmtoolsdatabase.org/resource/climate-change-vulnerability-assessment-and-adaptation-tools>
- **Climate Ready Estuaries Coastal Toolkit**, at: <http://www.epa.gov/climateradyestuaries/>