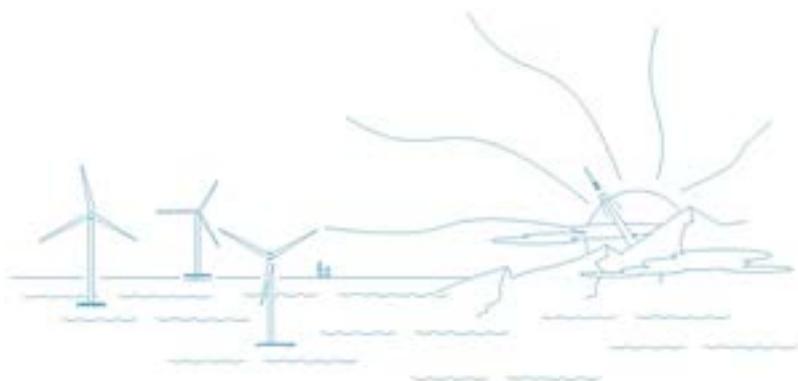




# CADEMO Project Siting Factors Report



Prepared by CADEMO Corporation

**June 2021**

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## 1. INTRODUCTION

The selection of the Point Arguello site for the CADEMO floating offshore wind demonstration project resulted from a detailed analysis of potential locations along the entire California coastline. This analysis was centered on the special requirements of a demonstration-scale project, as described below.

The broader objectives of the project as a demonstration project are addressed in the “210604 CADEMO Research and Demonstration Goals B1” document. This Siting Factors Report lists the project’s siting objectives and major constraints, identifies six California siting regions, addresses each region in terms of key siting criteria, identifies specific site locations with potential to host the project, and evaluates those sites based on the siting criteria. The report concludes that the identification of the CADEMO project site off Point Arguello is most consistent with the siting criteria and project objectives.

## 2. SITING OBJECTIVES

There are five key siting objectives (listed below) that are closely aligned with the overall project objectives of CADEMO as a FLOW demonstration project in California, which are:

**Objective 1: Consistent with the needs of a technology, environmental, and economic demonstration project.** The following are key aspects of siting the project to meet the special needs of a demonstration project.

- A demonstration project must be sited close to shore and supporting infrastructure. A larger, utility-scale project could be more optimally sited further offshore in higher wind speed areas despite the longer subsea cable requirements because the project is supported by a large revenue stream. A key requirement of a demonstration project is that it is easily accessible for modifications as the project gathers data about project operation. This is more feasible at a more accessible site closer to shore and can provide the same benefits in research and demonstration as a project sited further from shore.
- Given the purpose of a demonstration project, it must be permitted and constructed quickly, relative to larger utility-scale projects so that the latter can learn and benefit from experience with the demonstration project. This means that the appropriate location is in state waters (within three nautical miles (nm) from shore) because leasing and permitting through the State Lands Commission (SLC) and cooperating agencies requires much less time than the equivalent process for sites on the outer continental shelf that the Bureau of Ocean Energy Management (BOEM) manages, due to the scale of development involved. The BOEM process includes several discrete steps that occur in sequence (call for lease interest, competitive bidding for leaseholds, Site Assessment Plan and data gathering, formal lease, Construction and Operations Plan) before construction. Moving through these steps can take eight years or more. BOEM announced in May 2021 that it expects to open the Morro Bay and Humboldt offshore wind lease areas for auction in summer 2022, with the first projects operational in the early 2030s. In comparison, SLC’s permitting and leasing process for CADEMO is well under way and operation is expected by 2026.
- In addition, the permitting process for a very large commercial project runs a proportionally greater risk of encountering environmental issues, with subsequent delays to find solutions, which may include further delays due to a need to modify the project and seek permits for those modifications. A larger project will also take longer to fabricate and construct. A smaller project closer to shore has

a good chance to be up and running relatively quickly while observing important environmental protections.

**Objective 2: *A minimum average wind speed at 90 meters of 7.5 m/s and minimum depth of 50 meters.*** A minimum average wind resource speed of 7.5 m/s at 90 meters height is needed to experience a broad range of conditions for turbine and flotation system testing, particularly given the new generation large (12-15 MW) turbines that CADEMO will be testing. The tension leg platform design requires a minimum draft of 50m.

**Objective 3: *Located within feasible distance of a grid connection (major substation).*** The ability to connect with and export power to the state electricity grid is a critical requirement for a project to demonstrate capacity factor and overall contribution to grid reliability. Connection to the grid also provides the required access to market to sell the power generated to offset the costs of construction and operation. Construction of a long subsea transmission cable (>6 nm) or on-land generator tie-line (>10 miles) would be prohibitively expensive and not be economically feasible for a small-scale demonstration project. For example, a BOEM-funded study by PG&E for the Schatz Energy Research Center in 2020 estimated the needed transmission upgrades for a 48 MW floating demonstration project in the Humboldt Call Area would cost approximately \$540 million. Where suitable connection points are identified, there is an additional requirement to ensure that the sufficient spare voltage capacity exists to connect the power generated.

**Objective 4: *Avoids sensitive biological resource areas to the extent practicable.*** The most sensitive biological resources areas are relatively well known in coastal California, given the many years of research that has been done by the California Cooperative Oceanic Fisheries Investigations program (CalCOFI), US Fish and Wildlife Service, BOEM, research universities, and others. The project should avoid marine protected areas, including marine reserves and areas known to be of special biological sensitivity.

**Objective 5: *Avoids conflicts with other land and sea uses to the extent practicable.*** These include scenic viewsheds and major coastal recreational areas, major fishing grounds, shipping lanes, military areas, aquaculture sites and other important land and sea uses.

### 3. REGIONS OF CONSIDERATION

Given the project siting objectives, which regions along the California Coastline can best meet these objectives? The following are six major coastal California regions for offshore wind demonstrator siting purposes (north to south, Figure 1 – CADEMO Site Regions of Consideration):

- 1) Region 1 - Oregon border to Cape Mendocino
- 2) Region 2 - Cape Mendocino to Point Arena
- 3) Region 3 - Point Arena to Cambria (Central California)
- 4) Region 4 - Cambria to Point Conception
- 5) Region 5 - Point Conception to the Mexican Border
- 6) Region 6 – The Channel Islands

Two of these regions are eliminated from consideration because they have no suitable areas for offshore wind:

- a) **Region 5** - From Point Conception to the Mexican border along the California coastline, average wind speed at 90 m height does not exceed 7.5 m/s and so this region does not meet the minimum criteria for wind speed under Objective 2.
- b) **Region 6** – The Channel Islands: San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara Islands constitute the Channel Islands National Park and are surrounded by the Channel Islands National Marine Sanctuary to a distance of six nautical miles. For this reason, the siting of an offshore wind demonstration project would not be consistent with Objective 4 and would be prohibited per the National Oceanic and Atmospheric Administration’s National Marine Sanctuary Program regulations at 15 CFR 922.72(a){4}i.

San Nicolas Island is a United States Navy base whose waters are home to classified weapons tests, war games, and live fire practices. This would be considered a major conflict with other uses and would be inconsistent with Objective 5. In addition, this island lies more than 60 miles offshore and any subsea transmission cable route to land would need to cross steep-sided canyons up to 5,000' deep, thus not complying with Objective 3. San Clemente and Santa Catalina Islands have average wind speeds under 7.5 m/s and thus do not meet Objective 2.

#### 4. REGIONAL SUITABILITY ANALYSIS

The next level of siting factors analysis identifies sites meeting the project objectives within the remaining three regions. The sites were explored using the NOAA’s Marine Cadastre National Viewer (NOAA 2021)ii, the California Offshore Wind Energy Gateway data basin<sup>iii</sup>, the California Energy Commission<sup>iv</sup>, and the U.S. Geological Survey California State Waters Map Series Data Catalog<sup>v</sup> to show the locations of marine protected areas and other important features, and other sources as noted.

##### 4.1. Oregon Border to Cape Mendocino

In this region, average annual wind speed >7.5 m/s is available from the Oregon border south for about 25 miles to the Crescent City harbor area. Due to offshore rocks at the St. George Reef, state waters in this area extend in a bulge for about 7 nautical miles offshore directly off Crescent City. However, water depths of 50 m (and outside of a State Marine Reserve) are only available south of the Point St. George Reef State Marine Conservation Area and Dragon Channel. Waters north of Crescent City are very shallow and unsuitable per Siting Objective 2.

The only feasible site in this region is the following:

- **Dragon Channel** – For about 4 nautical miles south of the Pyramid Point State Marine Conservation Area (SMCA). South of this towards Crescent City the water depth within State waters would be too shallow for either the SATH barge (9.5m draft) or the tension leg platform (TLP) design (30 m draft). This site is marginally useful, however, from an engineering perspective because of the relatively small area that exceeds 50 m in depth.

##### 4.2. Cape Mendocino to Pt. Arena

From just north of Cape Mendocino to Shelter Cove (33 miles), the average wind speed in State waters is greater than 7.5 m/s and in fact is very strong, reaching up to levels over 10 m/s. The seafloor near Cape Mendocino, however, includes large sections of rocky bottom that are classified as Essential Fish Habitat,

excluding moorings and cabling. There are three State Marine Reserves (SMRs) in this section of coastline (South Cape Mendocino, Mattole Canyon, Sea Lion Gulch), a State Marine Conservation Area (SMCA) (Big Flat), and three Essential Fish Habitat Conservation Areas (EFH HCAs: Mendocino Ridge, Blunt's Reef, Delgada Canyon).

In addition, this area is very remote, and from the Mattole River (10 miles south of Cape Mendocino) to Shelter Cove, there are no roads near the shoreline. Adjacent land is part of the King Range National Conservation Area, a semi-wilderness area administered by the U.S. Bureau of Land Management. Nearshore areas along this stretch of coastline are part of the King Range Area of Special Biological Significance State Water Quality Protection Area. These factors would make it very difficult to site and operate a demonstration project in this sub-region. Nevertheless, there are four sites that lie outside of the marine reserves and EFH conservation areas, included for comparison with other prospective sites.

- **Mattole** – between South Cape Mendocino SMR and Mattole Canyon SMR
- **Windy Point** – between Mattole Canyon SMR and the Sea Lion Gulch SMR
- **Spanish Canyon** - between the Sea Lion Gulch SMR and Big Flat SMCA
- **Point Delgada** - between the Big Flat SMCA and the Delgado Canyon EFH HCA

#### 4.3. Point Arena to Cambria (Central California)

The Central California area covers approximately 275 miles, with the vast majority covered by National Marine Sanctuary designations that extend from shore for a long distance into the Pacific Ocean. Offshore wind facilities and their cables are currently prohibited in these areas, and so most of this area does not meet Objective 5.

In this region, average annual wind speed >7.5 m/s is available in State waters from Point Arena to Point Reyes. There are three potential areas identified to the north of the region that technically could host a demonstration project. Although this area is dependent on tourism, has a coastal road and a number of coastal residential properties (which will create viewshed issues and interference with coastal vistas) and is located next to (and in some cases intersects) with the Mendocino Country Pelagic Important Bird Area, these three sites sit outside of marine reserves and are included for comparison with other prospective sites.

- **Point Arena** – between Point Arena and Saunders Reef SMCA
- **Gualala** – between Saunders Reef SMCA and Stewarts Point SMR
- **Russian River** – between Stewarts Point SMR and Bodega Head SMR

#### 4.4. Cambria to Point Conception

In this region, the coastline from Point Arguello to Point Conception (about 15 air miles) provides suitable average annual wind speeds > 7.5 m/s. Possible sites for the demonstration project include the following:

- **Point Arguello** – Offshore of Vandenberg Space Force Base (VSFB) with a shore landing at Vandenberg Dock and an alternative location further south (offshore Jalama beach, north of the Point Conception SMR). The Point Conception SMR extends to the 3 nautical mile limit of state waters along a line due west from the Point Conception area.

These sites have an added benefit of the potential to provide renewable power to VSFB, helping the U.S. Space Force to achieve its goal of energy security and resiliency.

## 5. SITING SUITABILITY ANALYSIS

The regional suitability analysis has identified nine possible sites, as follows:

- a) Dragon Channel (Region 1)
- b) Mattole (Region 2)
- c) Windy Point (Region 2)
- d) Spanish Canyon (Region 2)
- e) Point Delgada (Region 2)
- f) Point Arena (Region 3)
- g) Gualala (Region 3)
- h) Russian River (Region 3)
- i) Point Arguello (Region 4)

An internal scoring heatmap exercise was undertaken to identify any prohibitive factors and understand the relative strength and weakness of each location. The multi-attribute decision analysis (MADA) scoring was moderated through the use of a comparative scoring guide (table 2). The scoring result is provided in the table 1 below:

Objective	Constraint	Region 1		Region 2		Region 2		Region 2		Region 3		Region 3		Region 4	
		Dragon Channel	Mattole	Windy Point	Spanish Canyon	Point Delgada	Point Arena	Gualala	Russian River	Point Arguello					
1	In CA State Lands	Yes	5	Yes	5	Yes	5	Yes	5	Yes	5	Yes	5	Yes	5
	Water Depth (> 50 m)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Wind Energy Resource	7.37 to 8.62	4	8.87 to 9.2	5	9.62 to 9.87	5	7.62 to 9.87	5	7.87	2	7.62 to 8.12	3	7.62 to 8.62	4
	Distance to grid (miles - straight line)	13	30	1	30	1	26	1	20	2	1.5	1.5	2.5	2.5	10
	Grid Capacity and Availability (kV)	66	66	66	66	66	66	66	60	60	3	3	3	3	4
3	Sensitive Biological Resource	DPS and MAMU	1	DPS, King Range ASBS	2	DPS, King Range ASBS	2	DPS, King Range ASBS	2	Farallones National Marine Sanctuary	1	Farallones National Marine Sanctuary	1	Farallones National Marine Sanctuary	1
	Viewshed	Crescent City	1	Petrolia and Mattole Beach	1	Rocks and Islands Wilderness	1	Rocke and Islands Wilderness	1	Point Arena, CA1 shoreline highway	1	Gualala Point Regional Park, CA1 shoreline highway	1	CA1 shoreline highway	1
	Other Users	Critical Fisheries		Wilderness		Wilderness		Wilderness		Tourism		Tourism		Tourism	
	Total		14		14		14		12		13		14		13
															17

Table 1 - CADEMO Site Location Heatmap

Criteria			1	2	3	4	5
	2	Wind Energy Resource (m/s)	< 7.5	7.5 - 8.0	8.0 - 8.5	8.5 - 9.0	>9.0
3	Distance to Grid (miles)		> 20	15 - 20	10 - 15	5 - 10	< 5
	Grid Capacity (kV)		< 60	60 - 66	66 - 110	110 - 200	>200
4	Sensitive biological Resource		Prohibitive	Difficult	Manageable	Mild Constraint	None
	Viewshed		Designated	Scenic Area	Residential Recreational	Industrial	None
5	Other Users		Critical Fisheries Wilderness Tourism Dependent	High Tourist Recreational	DoD Fisheries	Light Fisheries	No critical Uses

Table 2 - MADA Scoring Guidance Table

Further detail of the screening level analysis to determine suitable sites for the CADEMO demonstration project is provided below. For clarity, each site was required to meet objective 1 and 2 before taken forward for consideration:

- Siting Objective 1 - all sites considered need to be at least 50m in depth and within state waters.
- Siting Objective 2 - areas failing to exceed an average annual wind speed 7.5 m/s were eliminated.

### 5.1. Region 1 - Dragon Channel

**Objective 3: *Location within feasible distance of a grid connection.*** A project at Dragon Channel would most likely connect with PacificCorp's transmission infrastructure at either the PacificCorp Belmont or Northcrest 66 kV substation. These are located within Crescent City. Coastal Del Norte County is a small and isolated load pocket with limited connectivity and may require significant system upgrades to handle CADEMO's transmission load. In addition, the PacificCorp transmission system serves power north to Oregon, not south to California, and so would not help meet California's renewable power goals.

**Siting Objective 4: *Secure a site that avoids sensitive biological resource areas to the extent practicable.*** The site is in critical habitat for the Southern DPS of the green sturgeon. Regulatory agencies have expressed concerns about the sensitivity of this species to electric and magnetic fields from subsea cables.

The site would be near the Audubon Society's Pelican Bay MAMU Important Bird Area. This area which encompasses pelagic open water habitat for the marbled murrelet (*Brachyramphus marmoratus*), a state-endangered, federal-threatened species and extends through this species' usual offshore foraging range, about a nautical mile offshore (Audubon Society 2021<sup>vi</sup>).

**Siting Objective 5: *Secure a site that avoids conflicts with other land and sea uses to the extent practicable.*** This site is located roughly five to six nautical miles from the entrance of the Crescent City harbor. Crescent City is home to a substantial fishing fleet and portions of the area are relatively shallow (50 to 100 m) soft bottom that is good habitat and fishing grounds for Dungeness crab (California Department of Fish and Wildlife<sup>vii</sup>, CDFW 2021a). In 2019, commercial fish landings at Crescent City totaled more than \$22M and over 86 percent of this (\$19M) was from Dungeness crab fishing (CDFW 2021b). This represents one third of the \$52M annual value of Dungeness crab landings in the California in 2019 (CDFW 2021c). A project proposed for this location would encounter strong and vocal opposition from commercial fishers. A project this close to the Crescent City harbor entrance may also interfere with general navigation to the port, given that access to the port is constrained by the St. George Reef.

Recreational users of the scenic Crescent City waterfront and Crescent Beach are likely to object to the visual resources impacts of a demonstration project in this location, within 5 nautical miles of the shoreline.

The project in this location would also be within 5 nautical miles of the Del Norte County Airport in Crescent City and would likely conflict with flight operations and radars.

### 5.2. Region 2 - Mattole, Windy Point, Spanish Canyon, and Point Delgada

These prospective sites are treated together because of their geographic proximity.

**Objective 3, *Grid Connection Feasibility***—This area is entirely lacking in grid connectivity. The nearest PG&E transmission lines and substations are inland in the State Route 101 corridor (inland in this area

partly due to mountainous terrain on the coast). From Point Delgada (southern end), the nearest substation is at Garberville, a straight-line distance of 15 miles and a road distance of 25 miles over rough terrain.

**Siting Objective 4: Secure a site that avoids sensitive biological resource areas to the extent practicable.** The site is in critical habitat for the Southern DPS of the green sturgeon. In the past, regulatory agencies have expressed concerns about the sensitivity of this species to electric and magnetic fields from subsea cables.

Submerged areas within a short distance of the shore adjacent to all three sites are part of the King Range Area of Special Biological Significance State Water Quality Protection Area/King Range State Marine Reserve.

**Siting Objective 5: Secure a site that avoids conflicts with other land and sea uses to the extent practicable.** Land adjacent to three of the sites (Windy Point, Spanish Canyon and Point Delgada) is part of the King Range National Conservation Area, and is part of the “Lost Coast,” the state’s only remaining significant roadless coastal area. The visual impact of an offshore wind project to a wilderness area would be a significant issue with any of these sites. The same three sites are also within the Rocks and Islands Wilderness, part of the National Wilderness Preservation System. The remaining site, Mattole, is overlooked by the unincorporated community of Petrolia and the local scenic spot of Mattole Beach.

### 5.3. Region 3 – Point Arena, Gualala and Russian River

These prospective sites are treated together due to their geographic proximity.

**Objective 3: Grid Connection Feasibility**—This region has relatively close access to local grid, with a local substation, operated by PG&E and rated between 33 to 92kV, available at each location of Point Arena, Gualala or Russian River (Fort Ross). Connection should be relatively straightforward with distances being between two to five miles at the nearest points. However, there are limited power offtake options in the region.

**Siting Objective 4: Secure a site that avoids sensitive biological resource areas to the extent practicable.** The site is in critical habitat for the Southern DPS of the green sturgeon. Regulatory agencies have expressed concerns about the sensitivity of this species to electric and magnetic fields from subsea cables.

The Audubon Society’s Mendocino Coast Pelagic Important Bird Area (IBA)<sup>viii</sup> is located a few miles farther out to sea from these three sites. The project would not directly affect either of these areas. The Point Arena IBA is designated for the pink-footed shearwater (*Ardenna creatopus*), a species is on Audubon WatchList and considered vulnerable, per the International Union for the Conservation of Nature (IUCN). Shearwaters are the lowest-flying of all seabirds, typically flying within only 10m of the surface of the water. Encounters with an offshore wind turbine rotor (25 m above water) are thus likely to be rare. While these IBAs are important for the species, they represent only a small proportion of its overall foraging range, which extends from southern Chile to Alaska and the pink shearwaters of the project area represent a small part of the overall population. The Mendocino Coast Pelagic IBA is designated for the black-footed albatross (*Phoebastria nigripes*). This species is considered near-threatened by the IUCN, mainly because of the effects of long-line fishing.

**Siting Objective 5: Secure a site that avoids conflicts with other land and sea uses to the extent practicable.** These sites pose at least two compatible use conflicts. First, the entire area lies within the Greater Farallones National Marine Sanctuary<sup>ix</sup>, within which an offshore wind project would not be permitted.

Second, although the coastal strip is relatively sparsely populated, all three sites can be directly viewed from the California State Route 1 Shoreline Highway, designated as an “All-American” road<sup>x</sup> providing a scenic route to numerous tourist attractions along the route. These include Manchester State Park, Point Arena Lighthouse, Point Arena-Stornetta Public Lands, Pelican Bluffs, Schooner Gulch State Beach, Glennen Beach, Gualala Point Regional Park, Shell Beach, Stillwater Cove Regional Park, Salt Point State Park, Fort Ross State Historic Park, Russian Gulch State Beach, and Sonoma Coast State Park, among others. In addition, residences along the coast would be considered highly sensitive to visual resources impacts, as many are recreational homes that are specifically oriented for views of the coast and ocean.

#### 5.4. Region 4 - Point Arguello

**Objective 3, Grid Connection Feasibility**—A facility at Point Arguello can interconnect with the Vandenberg grid at Vandenberg Space Force Base Substation “N” or can interconnect with the wider PG&E grid at 115 kV at Surf Substation, approximately 10 miles north of a cable landing at Vandenberg Dock.

Routing a cable to shore at Jalama Beach would not be feasible because the land route to the nearest substation would be prohibitively long (Manville Substation south of Lompoc) and would have to be constructed over difficult terrain. A cable route to the Gaviota substation would not be feasible because it would have to cross the Point Conception SMR.

**Siting Objective 4: Secure a site that avoids sensitive biological resource areas to the extent practicable.** The site is in critical habitat for the leatherback turtle, but project operations would not be likely to harm this species’ breeding habitat or food sources.

The Audubon Society’s Point Conception Important Bird Area<sup>xxii</sup> is located approximately five nautical miles further out to sea at its nearest point from the Point Arguello site, and the Point Sal Important Bird Area<sup>xxiixiv</sup> is approximately fourteen nautical miles north. The project would not directly affect either of these areas.

Both Important Bird Areas (IBAs) are designated for the pink-footed shearwater (*Ardenna creatopus*), a species on the Audubon WatchList and is considered vulnerable, per the International Union for the Conservation of Nature. Shearwaters are the lowest-flying of all seabirds, typically flying within only 10m of the surface of the water. Encounters with an offshore wind turbine rotor (25 m above water) are thus likely to be rare. While these IBAs are important for the species, they represent only a small proportion of its overall foraging range, which extends from southern Chile to Alaska and the pink shearwaters of the project area represent a small part of the overall population.

The Point Conception IBA also identifies the ashystorm petrel (*Oceanodroma homochroa*) as a feature. The ashystorm petrel breeds on rocky islands off California and Mexico and is an endangered species (c. 10,000 birds and declining). Its range is relatively limited compared to other seabird species but still covers many thousands of square km. Most foraging is done around the edge of the continental shelf. This group of birds (storm petrels) feed by skipping over the surface of the sea, very rarely flying at height. The risk to this species, and consequently the IBA, is therefore very low.

An additional Point Sal IBA feature is Brandt's cormorant (*Phalacrocorax penicillatus*). This species is numerous (population c. 230,000 individuals) and has a very large range. It feeds mostly in shallow waters but also further out in deeper water. Flights over water tend to be low, beneath the rotor swept zone. It's very unlikely that significant numbers of birds will use the CADEMO area, and birds which might occur in the area are likely to be on the water or flying low over it. The risk to the birds from the scheme is therefore very low, and consequently to the integrity of the IBA.

The waters off Point Sal also provide feeding areas for the brown pelican (*Pelecanus occidentalis*) which roosts on the shore near Point Sal (approximately 20 miles north of Point Arguello). The coastal region around Point Sal supports large numbers of this species, which is identified as a secondary feature within the IBA, but it is an inshore species, rarely venturing out to deeper waters. The risk to this species, and consequently the IBA is extremely low.

Independent researchers (Calambokidis 2015) have identified a biologically important area (BIA) for the endangered blue whale in the project area (extending from Point Conception north to Point Sal), with moderately high blue whale density. The potential for vessel collisions this species would need to be carefully managed at this site.

**Siting Objective 5: *Secure a site that avoids conflicts with other land and sea uses to the extent practicable.*** One unique aspect of the Point Arguello site is that a significant portion of the adjacent onshore land in the northern area of the region is owned and managed by the Vandenberg Space Force Base (VSFB) for about 28 miles from the shoreline to the crest of adjacent mountains. This greatly reduces conflicts based on visual resources impacts to recreational or residential uses, because of the lack of private or other public land in the project viewshed. Public access to the coastline in this area is limited to small areas at Surf and Jalama beaches, each more than 10 air miles from the nearest turbine site.

The site is relatively distant from the nearest fishing ports at Morro Bay (45 nautical miles), Port San Luis (35 nautical miles), and Santa Barbara (60 nautical miles). While commercial fishing boats use the area, based on the historical landings records from the Californian Department of Fish and Wildlife, the catch in fishing blocks around this site is likely to be rated as lower in value than in areas closer to fishing ports.

An offshore wind project in region 4 presents potential conflict issues with flight operations and radars at Vandenberg Space Force Base, however consultation with the U.S. Department of Defense through their Site Clearinghouse process has identified appropriate mitigation to resolve this (see section 7).

The southern section of region 4 is located within one of the Californian Department of Fish and Wildlife designated California halibut trawl areas and would therefore be likely to draw significant opposition from commercial fishing interests (Conservation Biology Institute 2021).

## 6. CONCLUSION OF THE SITING ANALYSIS

Siting analysis concludes that only one of the nine sites assessed would be feasible for CADEMO:

**Region 1 - Dragon Channel** – Infeasible because of the major potential conflict with the crab fishing industry, lack of a connection to the California grid, and proximity to the Crescent City waterfront and Crescent Beach viewsheds.

**Region 2 - Mattole, Windy Point, Spanish Canyon, and Point Delgada** - Infeasible because of visual resources conflicts with a wilderness area, biological resources sensitivity, and lack of grid connectivity.

**Region 3 - Point Arena, Gualala and Russian River** – Infeasible because of conflict with the National Marine Sanctuary, visual resource conflicts with State Parks, recreational viewers at scenic viewpoints along the adjacent shoreline highway and conflict with residential users of coastal properties.

**Region 4 - Point Arguello** – Feasible. The Point Arguello site is excellent for a demonstration project because of the relative lack of conflicts with potentially competing uses or interests and because it meets all the project siting objectives, as follows:

- **Objective 1: Consistent with the needs of a technology, environmental, and economic demonstration project.** The site is near shore, easily accessible, located away from areas of significant use conflict but relatively near support facilities.
- **Objective 2: With a minimum average wind speed at 90 meters of 7.5 m/s and minimum depth of 50 meters.** The site exceeds these minimum criteria.
- **Objective 3: Grid Connection Feasibility** This site can easily connect with VSFB Substation N or Surf Substation using a generator tie-line less than 10 miles long.
- **Objective 4: Avoids sensitive biological resource areas to the extent practicable.** The site avoids marine reserves and important bird areas. Although located in critical habitat for the leatherback turtle and in important cetacean feeding areas, the project would not conflict with or directly affect these species.
- **Objective 5: Avoids conflicts with other land and sea uses to the extent practicable.** There would be few or no conflicts with recreational and residential users over visual resources impact because of the siting on federal government property at VSFB. The site is not near a commercial fishing port or major fishing grounds.

## 7. SITE SELECTION WITHIN THE POINT ARGUELLO REGION

Following the initial process identifying the Arguello region as the preferential location as, number of areas around Platform Irene and VSFB outside of designated protected areas, available offshore seabed profile, proximity to an available grid connection at Surf Substation and significant available environmental information gathered as part of the CalWave project were identified. The preferred location being selected on the following basis:

- The most favorable location for wind resource and yield (i.e. highest wind).
- Few environmental constraints (it avoided activities within the Vandenberg State Marine Reserve).
- Favorable geotechnical and seabed conditions for mooring design.
- Avoidance of areas of high coastal population and minimization of visual intrusion.

These assessments led to the selection of a lease area for the demonstration project which formed the basis of the SLC lease and permit application.

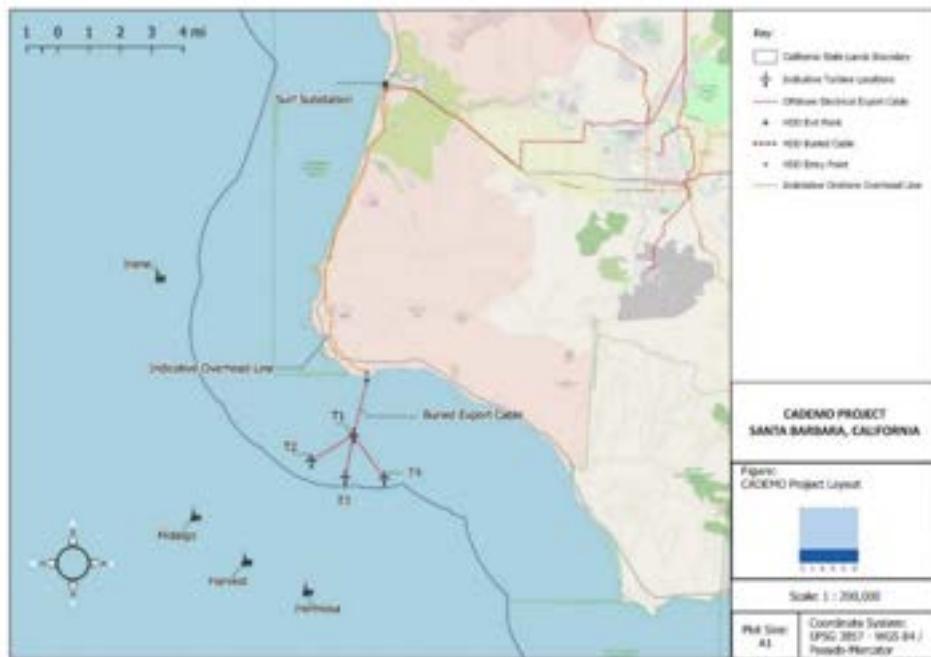


Figure 1 - Original CADEMO turbine locations

During the SLC application, a dialogue was opened with the Department of Defense Military Aviation and Installation Assurance Siting Clearinghouse (The Clearinghouse) on the specific locations for the floating offshore wind turbines. At a meeting on the 22 May 2020, the Clearinghouse provided feedback that their analysis determined that any locality south of Point Arguello would be military incompatible. This led to the identification of a revised configuration that is considered by the Clearinghouse as mission compatible with mitigation. This configuration now forms the basis of the CADEMO seabed lease and permit application to the State Lands Commission and is presented in figure 2:

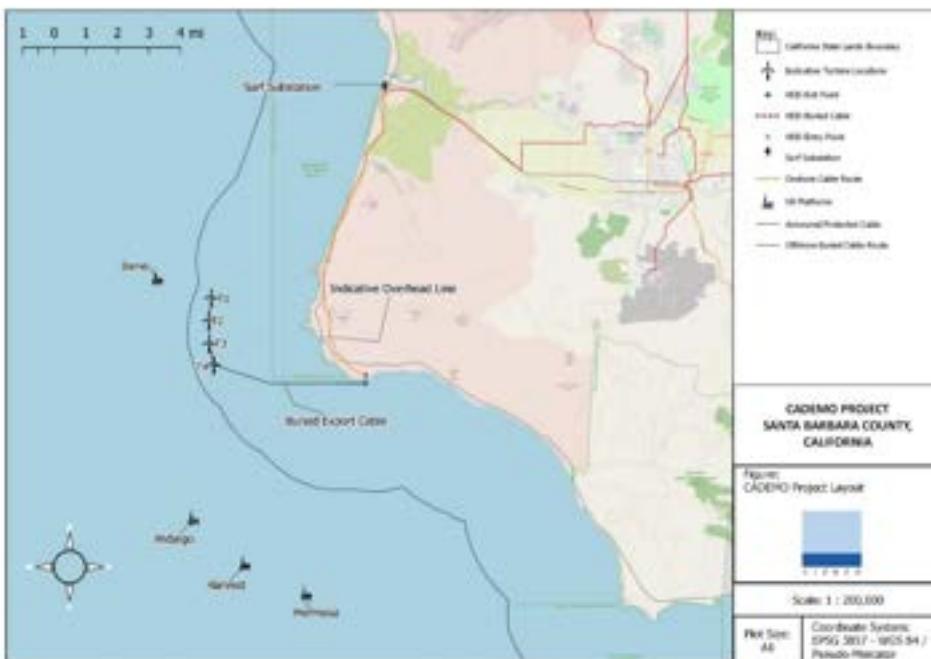


Figure 2 - CADEMO Project Layout

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<sup>i</sup> <https://www.law.cornell.edu/cfr/text/15/922.72>

<sup>ii</sup> <https://marinecadastre.gov/nationalviewer/>

<sup>iii</sup> <https://caoffshorewind.databasin.org/>

<sup>iv</sup> <https://caenergy.maps.arcgis.com/home/index.html>

<sup>v</sup> <https://pubs.usgs.gov/ds/781/>

<sup>vi</sup> <https://www.audubon.org/important-bird-areas/pelican-bay-ca-mamu>

<sup>vii</sup> <https://marinespecies.wildlife.ca.gov/dungeness-crab/the-fishery/>

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viii <https://www.audubon.org/important-bird-areas/mendocino-coast-pelagic-ca>

ix <https://farallones.noaa.gov/>

x <https://www.fhwa.dot.gov/byways/states/CA>

xi <https://www.audubon.org/important-bird-areas/point-conception-121w34n>

xii <https://www.audubon.org/important-bird-areas/point-conception->

<https://www.audubon.org/important-bird-areas/point-conception-121w34n#:~:text=The%20Point%20Conception%20120W34N%20IBA,%2C%20ports%2C%20and%20oil%20extraction>

xiii <https://www.audubon.org/important-bird-areas/point-sal-121w35n>

xiv <https://www.audubon.org/important-bird-areas/point-sal-120w35n>



## APPENDIX 1 – SITE SELECTION HEATMAP DETAIL

Objective	Constraint	Region 1		Region 2		Region 2		Region 3		Region 3	
		Dragon Channel	Mattole	Windy Point	Spanish Canyon	Point Arena	Guadalu	Russian River	Point Arguello		Region 4
1	In CA State Lands	Yes	5	Yes	5	Yes	5	Yes	5	Yes	5
	Wind Depth (> 50 m)	Yes	5	Yes	5	Yes	5	Yes	5	Yes	5
2	Wind Energy	7.37 to 8.62	4	8.87 to 9.2	5	9.62 to 9.87	5	7.62 to 9.87	5	7.87	2
	Resource	7.37 to 8.62	4	8.87 to 9.2	5	9.62 to 9.87	5	7.62 to 8.12	3	7.62 to 8.62	4
3	Distance to grid (miles, straight line)	13	30	1	26	1	20	2	1.5	3	10
	Grid Capacity and Availability (kV)	66	66	66	66	66	66	60	60	60	115
4	Sensitive Biological Resource	DPS and MAMU	1	DPS, King Range ASBS	2	DPS, King Range ASBS	2	DPS, King Range ASBS	2	Farallones National Marine Sanctuary	Farallones National Marine Sanctuary
	Viewshed	Crescent City	1	Petrolia and Mattole Beach	1	Rocks and Islands Wilderness	1	Rocks and Islands Wilderness	1	Point Arena, CA1 shoreline highway	Guadalu Point Regional Park, CA1 shoreline highway
5	Other Users	Critical Fisheries	Wilderness	Wilderness	Wilderness	Wilderness	Wilderness	Wilderness	Wilderness	Jalama Beach	CA1 shoreline highway
	Total	14	14	14	14	14	14	12	13	14	17
Criteria											
2	Wind Energy Resource (m/s)	1	2	3	4	3	4	5	5	5	5
3	Distance to Grid (miles)	< 7.5	7.5 - 8.0	8.0 - 8.5	8.5 - 9.0	8.5 - 9.0	8.5 - 9.0	>9.0	>9.0	>9.0	>9.0
4	Grid Capacity (kV)	> 20	15 - 20	10 - 15	5 - 10	5 - 10	5 - 10	< 5	< 5	< 5	< 5
	Sensitive biological Resource	< 60	60 - 66	66 - 110	110 - 200	110 - 200	110 - 200	>200	>200	>200	>200
5	Viewshed	Prohibitive	Difficult	Manageable	Mild Constraint	Mild Constraint	Mild Constraint	None	None	None	None
	Other Users	Critical Fisheries	Designated	Scenic Area	Residential	Residential	Residential	Industrial	Industrial	Industrial	Industrial
		Wilderness	Recreational	Recreational	Recreational	Recreational	Recreational	Industrial	Industrial	Industrial	Industrial
		Tourism Dependent	Fisheries	Fisheries	Fisheries	Fisheries	Fisheries	No critical Uses	No critical Uses	No critical Uses	No critical Uses

**APPENDIX 2 – CADEMO SITING FACTORS MAPS****Index:**

<b>Figure</b>	<b>Title</b>
1	Site Regions of Consideration
2	Region 1 - Oregon border to Cape Mendocino – Technical Constraints
3	Region 1 - Oregon border to Cape Mendocino – Protected and Sensitive Areas
4	Region 1 - Oregon border to Cape Mendocino – Sensitive Habitats
5	Region 2 - Cape Mendocino to Point Arena – Technical Constraints
6	Region 2 - Cape Mendocino to Point Arena – Protected and Sensitive Areas
7	Region 2 - Cape Mendocino to Point Arena – Sensitive Habitats
8	Region 3 - Point Arena to Cambria (Central California) – Technical Constraints
9	Region 3 - Point Arena to Cambria (Central California) – Protected and Sensitive Areas
10	Region 3 - Point Arena to Cambria (Central California)
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17	Region 6 – The Channel Islands – Technical Constraints
18	Region 6 – The Channel Islands – Protected and Sensitive Areas
19	Region 6 – The Channel Islands – Sensitive Habitats
20	Point Arguello – detailed constraints



**Legend**

- Technically Suitable Area (Depth + SLC)
- Region Area
- Oregon Border to Cape Mendocino
- Cape Mendocino to Point Arena
- Point Arena to Cambria
- Cambria to Point Conception
- Point Conception to the Mexican Border
- The Channel Islands
- State Boundary

Sources: Cierco, 2021

UTM Zone 11 North  
Datum: NAD 1983

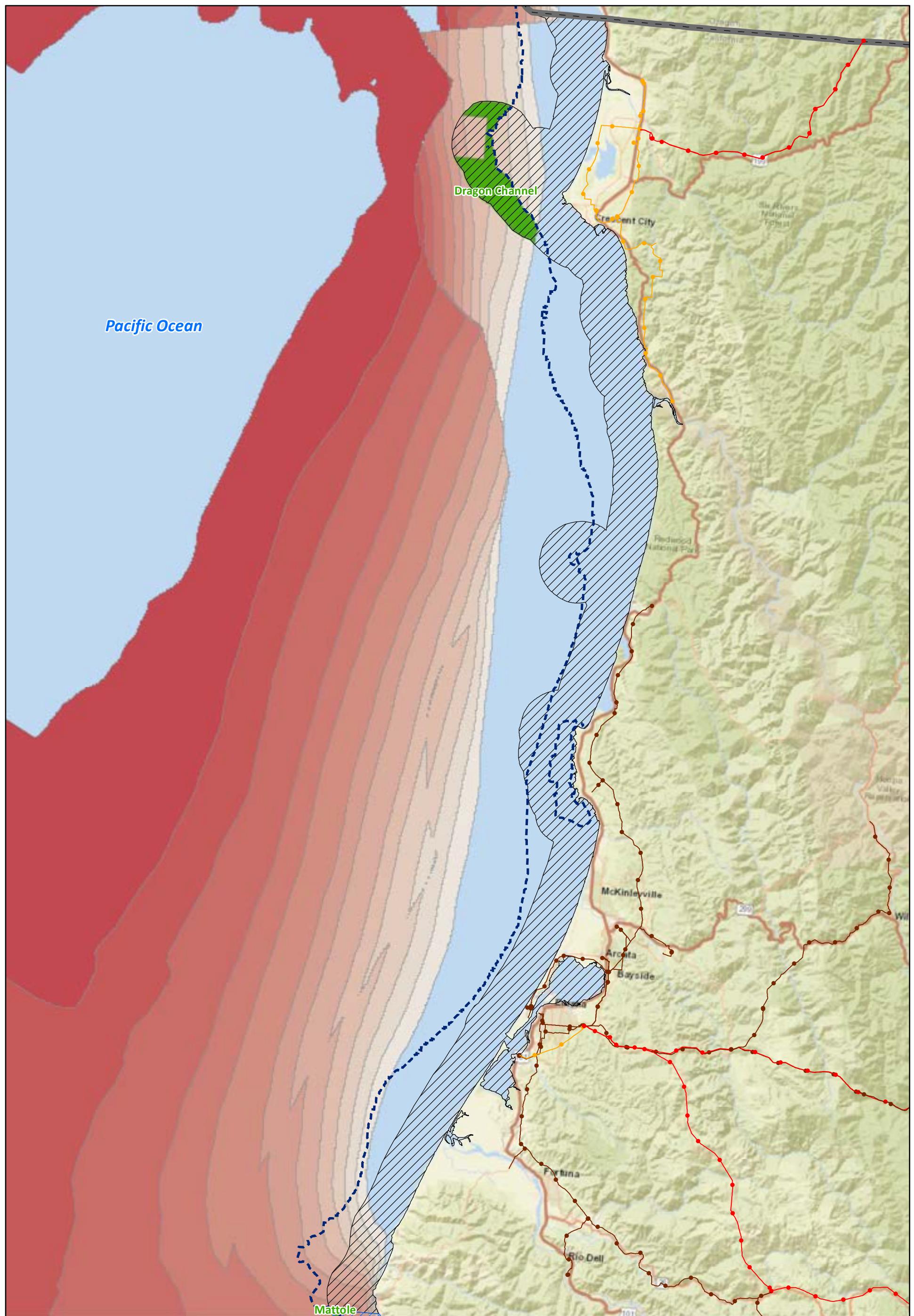
June 07, 2021



**Figure 1**  
**Site Regions of Consideration**

Cierco  
CADEMO Project

0 30 60  
Miles



Legend		Windspeed	Transmission Line (kV)
Region Area	Technically Suitable Area (Depth + SLC)	8.625	60 kV
Oregon Border to Cape Mendocino	7.375	8.875	69 kV
Cape Mendocino to Point Arena	7.625	9.125	115 kV
— Minimum Depth (-50)	7.875	9.375	
	8.125	9.625	
	8.375	9.875	

Sources: Cierco, NOAA, CEC, 2021



UTM Zone 11 North  
Datum: NAD 1983

June 07, 2021

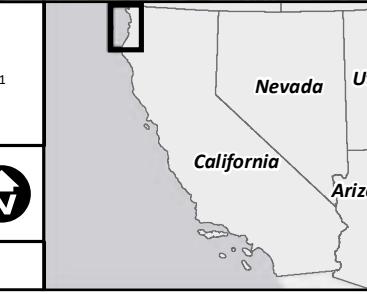
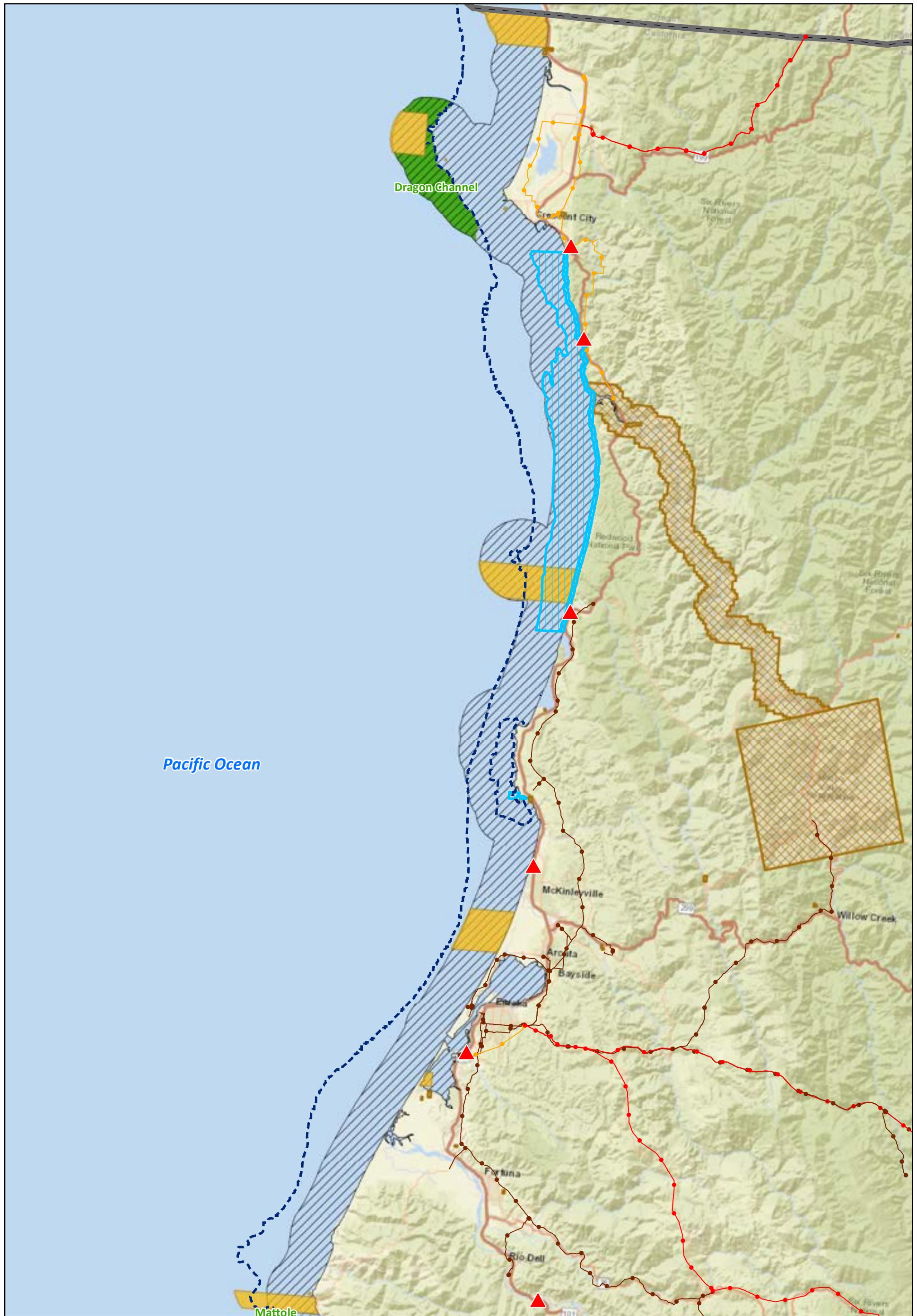


Figure 2  
Region 1 - Oregon Border to Cape Mendocino  
Technical Constraints

Cierco  
CADEMO Project

0 5 10  
Miles



**Legend**

- Vista Point** (red triangle)
- Technically Suitable Area (Depth + SLC)** (green shaded area)
- Region Area**

  - Oregon Border to Cape Mendocino
  - Cape Mendocino to Point Arena
  - Federal Protected Area
  - State Protected Area
  - Coastal Tribal Lands
  - Minimum Depth (-50)

**Transmission Line (kV)**

- 60 kV
- 69 kV
- 115 kV

**State Boundary**

Sources: Cierco, NOAA, CEC, State of California, Offshore Wind Database, 2021

UTM Zone 11 North  
Datum: NAD 1983

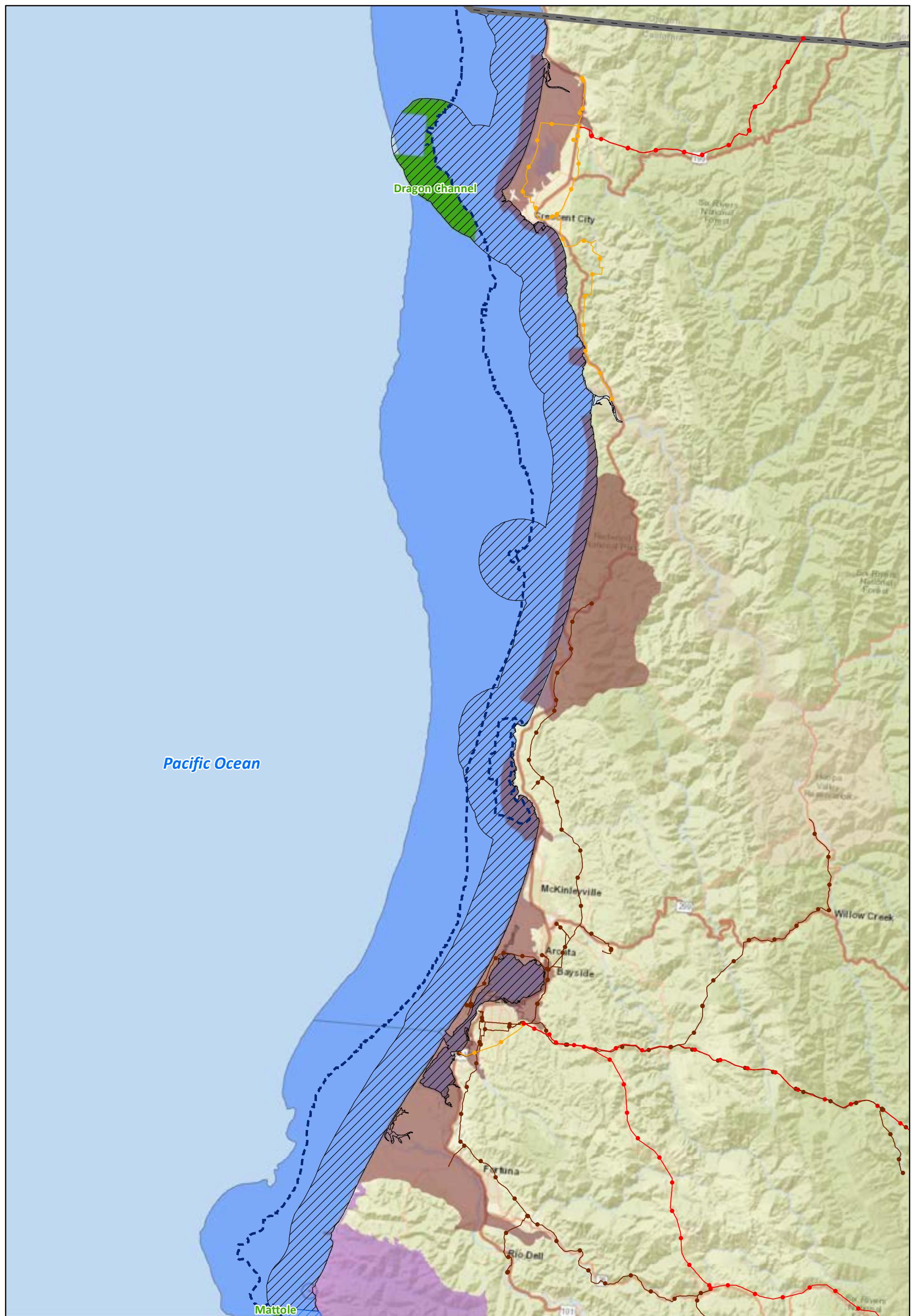
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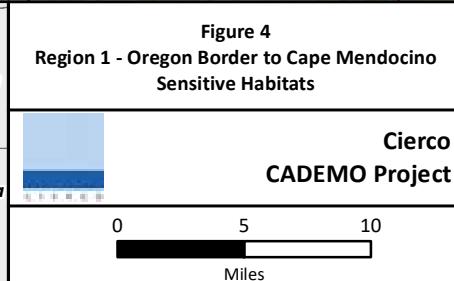
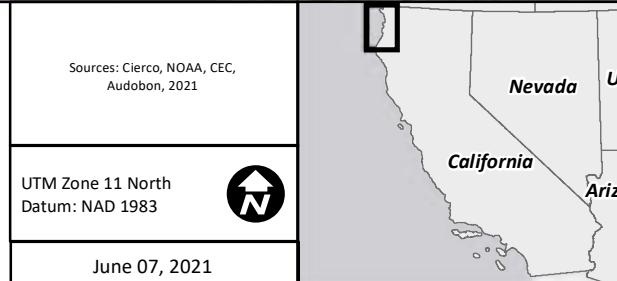
**Region 1 - Oregon Border to Cape Mendocino Protected and Sensitive Areas**

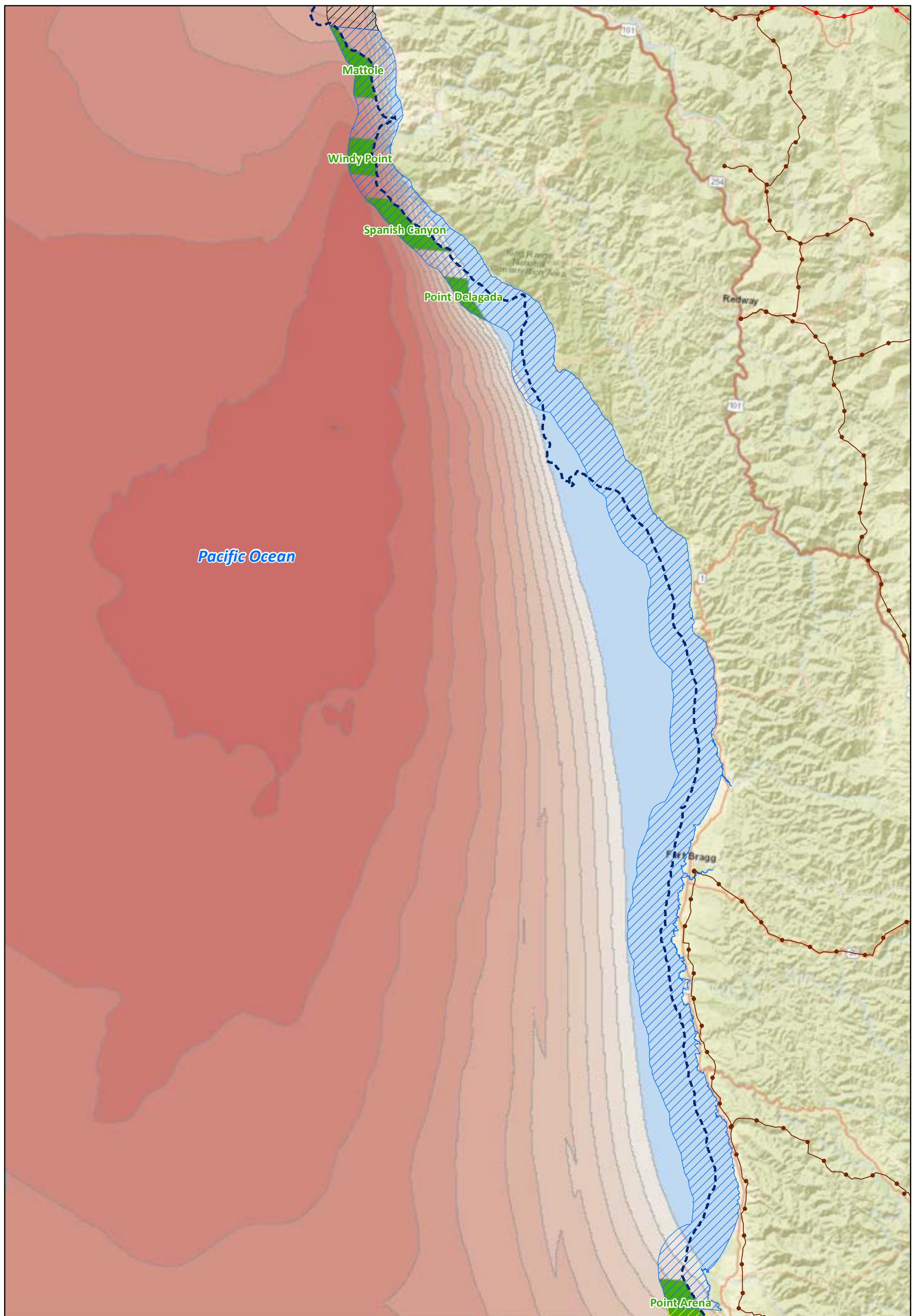
**Cierco CADEMO Project**

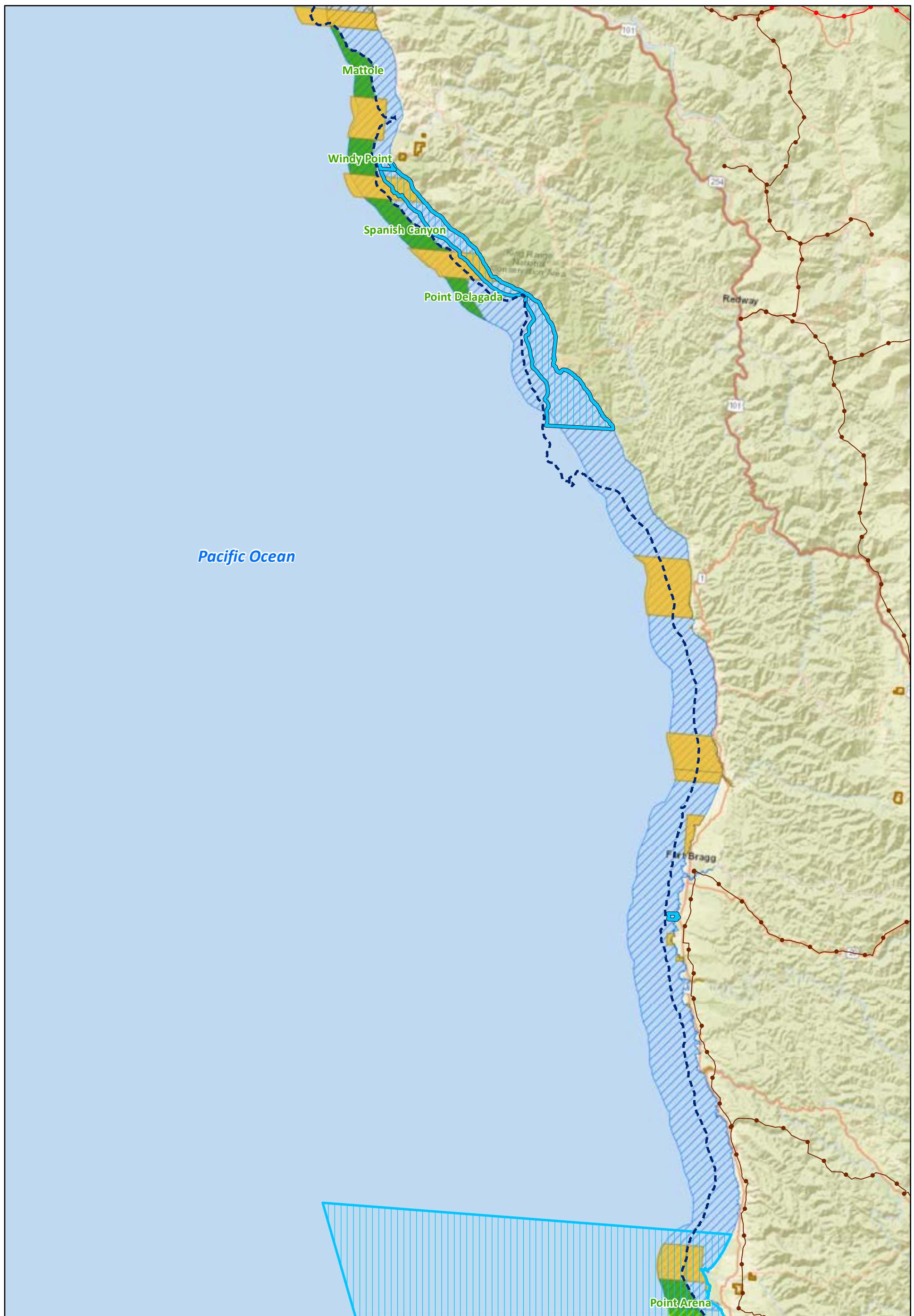
0 5 10  
Miles



Legend	Transmission Line (kV)
<input type="checkbox"/> Technically Suitable Area (Depth + SLC)	60 kV
<input type="checkbox"/> Region Area	69 kV
<input type="checkbox"/> Important Bird Areas (IBA)	115 kV
<input type="checkbox"/> Oregon Border to Cape Mendocino	
<input type="checkbox"/> Cape Mendocino to Point Arena	
<input type="checkbox"/> Global	
<input type="checkbox"/> State	
<input type="checkbox"/> Green Sturgeon Critical Habitat	
<input type="checkbox"/> Steller Sea Lion Critical Habitat	
<input type="checkbox"/> Minimum Depth (-50)	







**Legend**

- Technically Suitable Area (Depth + SLC)
- Oregon Border to Cape Mendocino
- Cape Mendocino to Point Arena
- Point Arena to Cambria
- Federal Protected Area
- State Protected Area
- Coastal Tribal Lands

**Transmission Line (kV)**

- 60 kV
- 115 kV

**Geographic Features:**

- Minimum Depth (-50)

Sources: Cierco, NOAA, CEC, State of California, Offshore Wind Databasin, 2021

UTM Zone 11 North  
Datum: NAD 1983

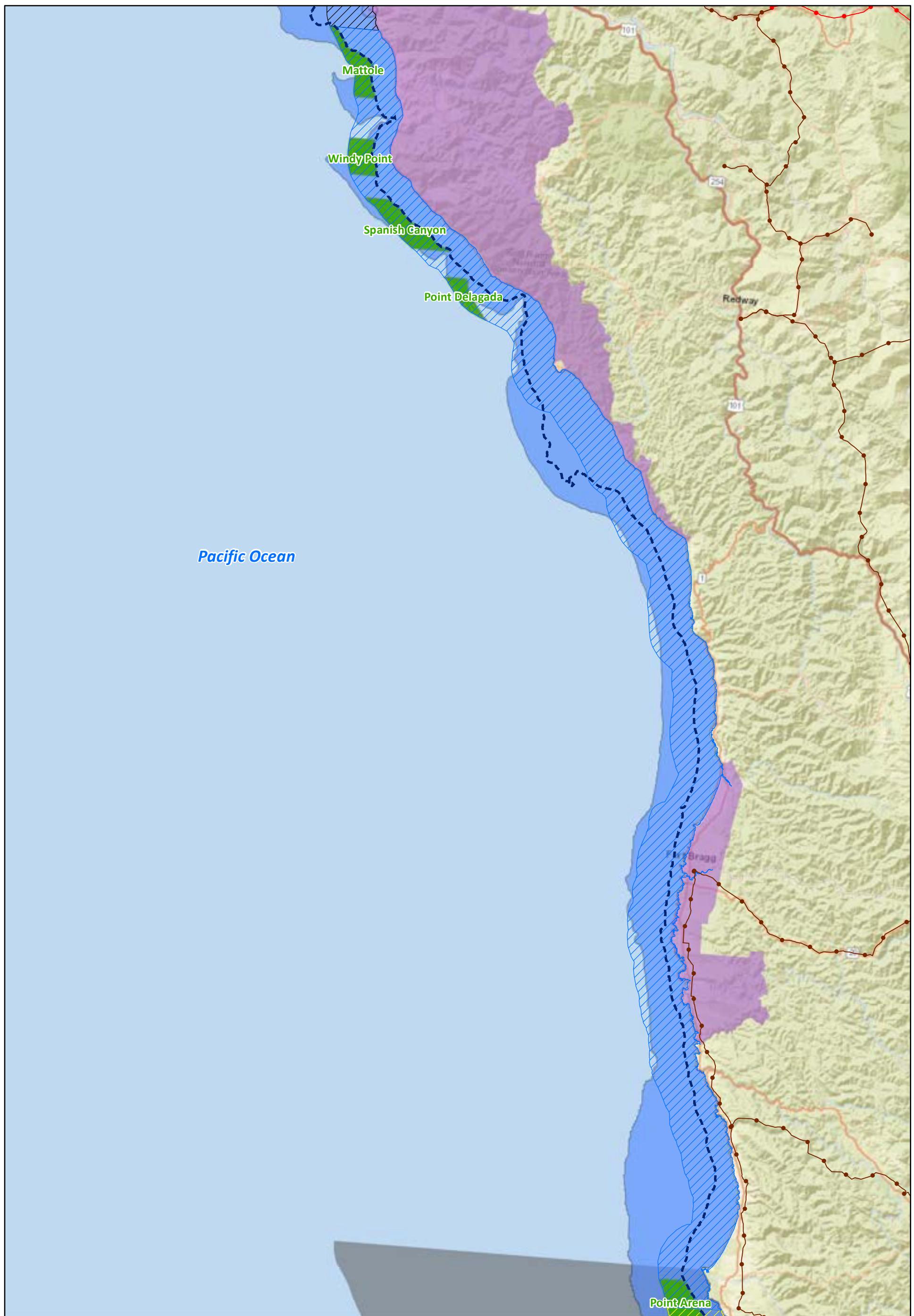
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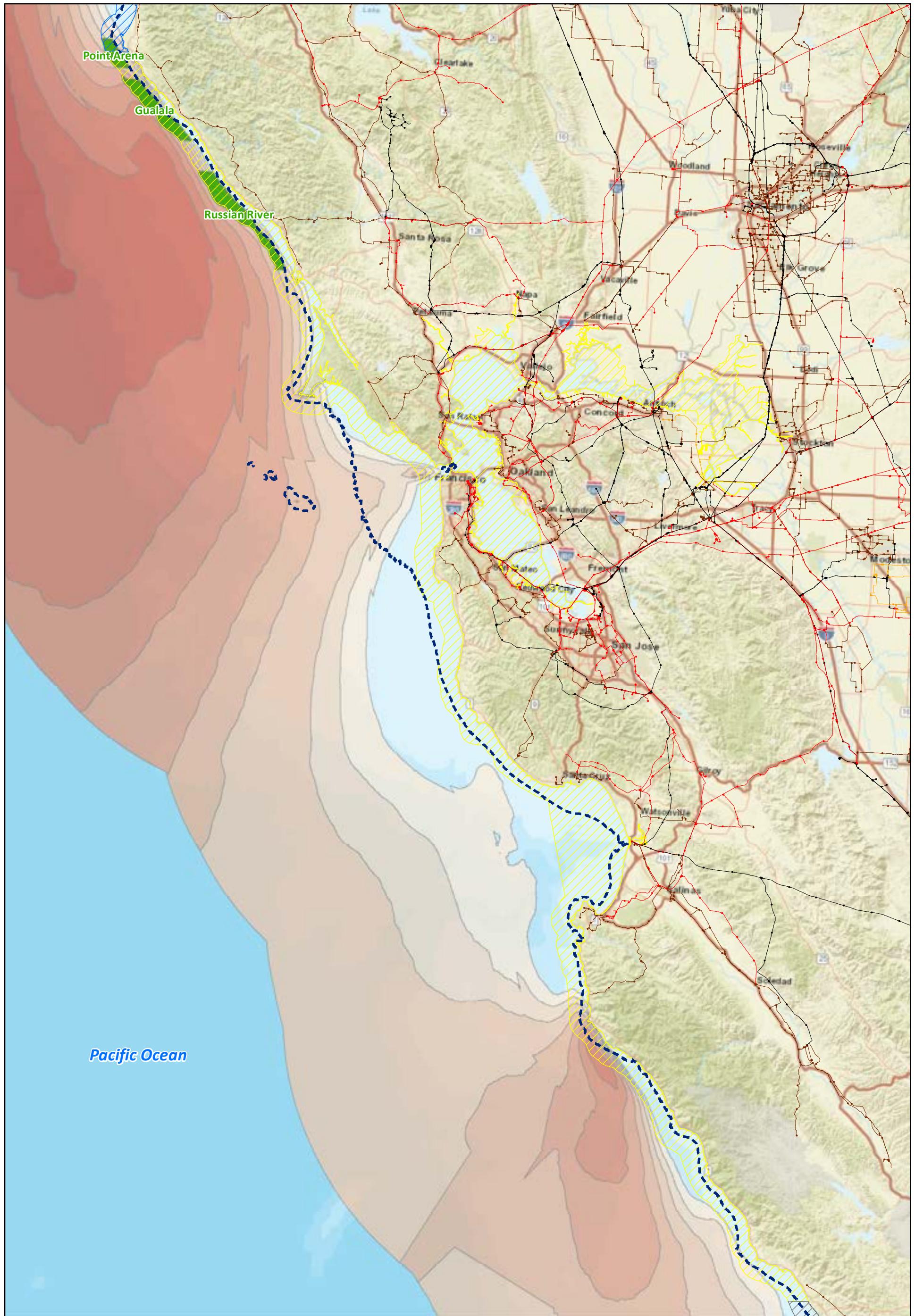


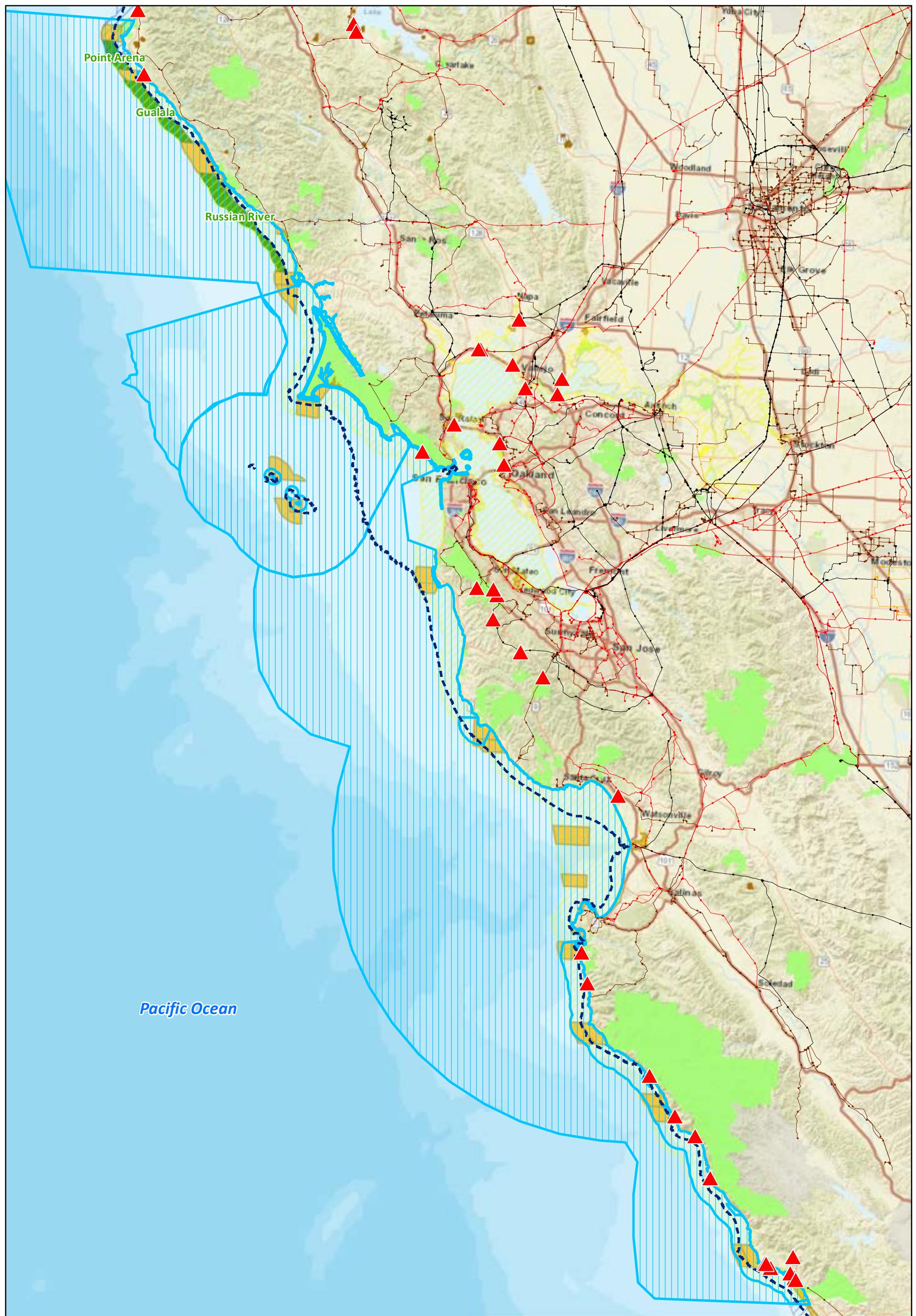
**Figure 6**  
**Region 2 - Cape Mendocino to Point Arena**  
**Protected and Sensitive Areas**

Cierco  
CADEMO Project

0 5 10  
Miles







**Legend**

- ▲ Vista Point
- Technically Suitable Area (Depth + SLC)
- Region Area
  - Cape Mendocino to Point Arena
  - Point Arena to Cambria
  - Cambria to Point Conception
  - Park Boundary

■ Federal Protected Area

■ State Protected Area

■ Coastal Tribal Lands

— Minimum Depth (-50)

Transmission Line (kV)

— 60 kV

— 69 kV

— 115 kV

— 230 kV

Sources: Cierco, NOAA, CEC, State of California, Offshore Wind Databasin, ESRI, 2021

UTM Zone 11 North  
Datum: NAD 1983

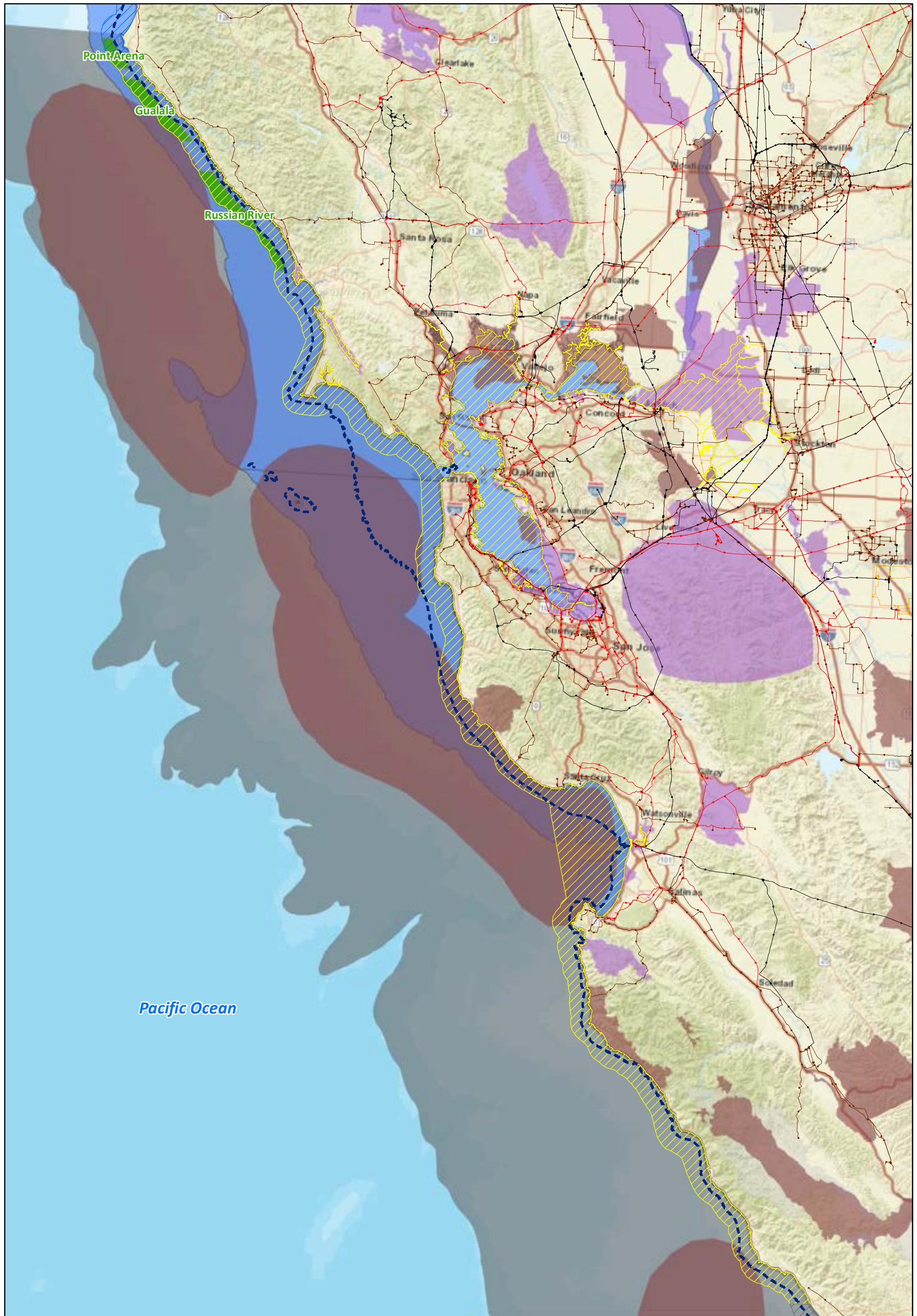
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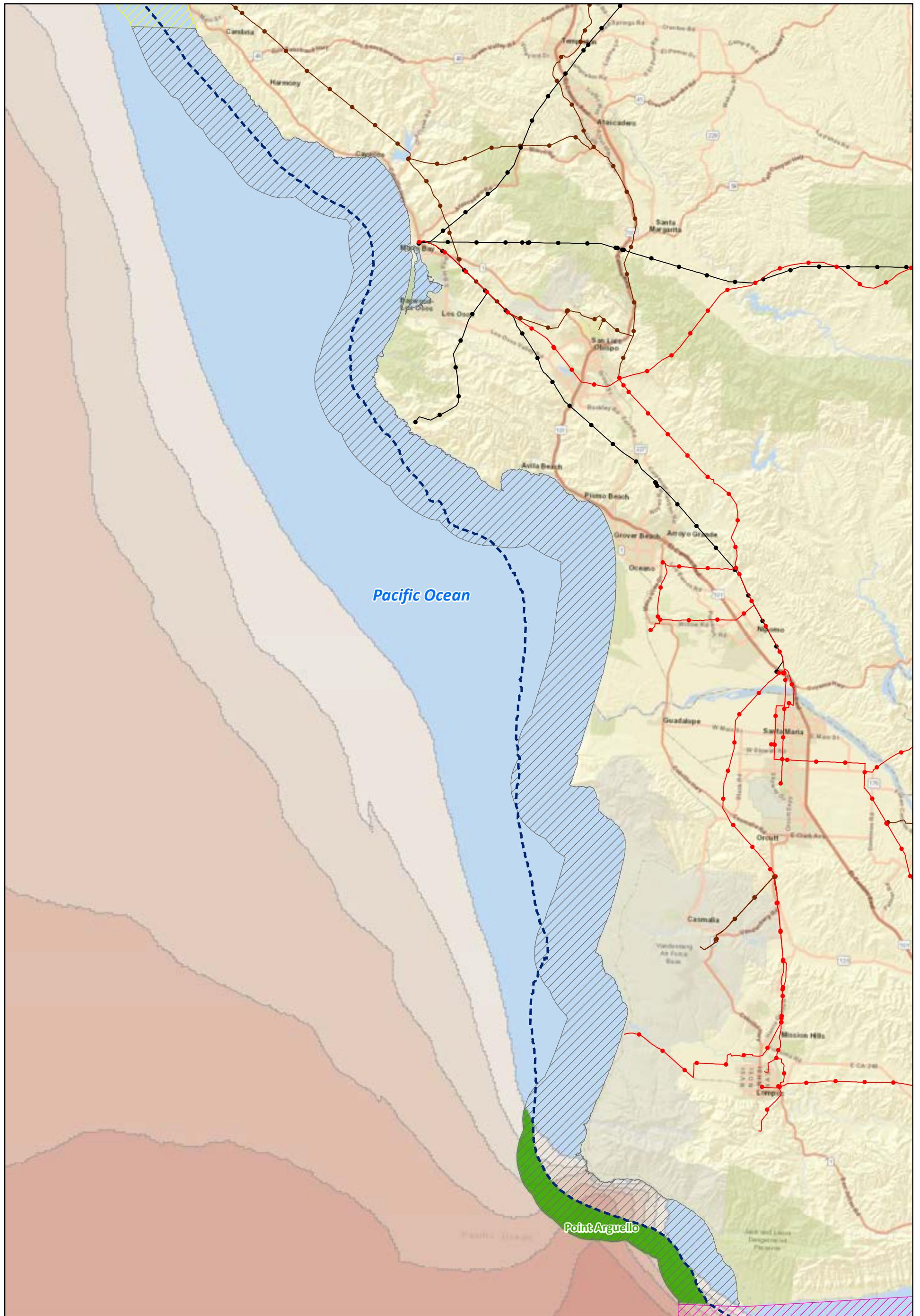


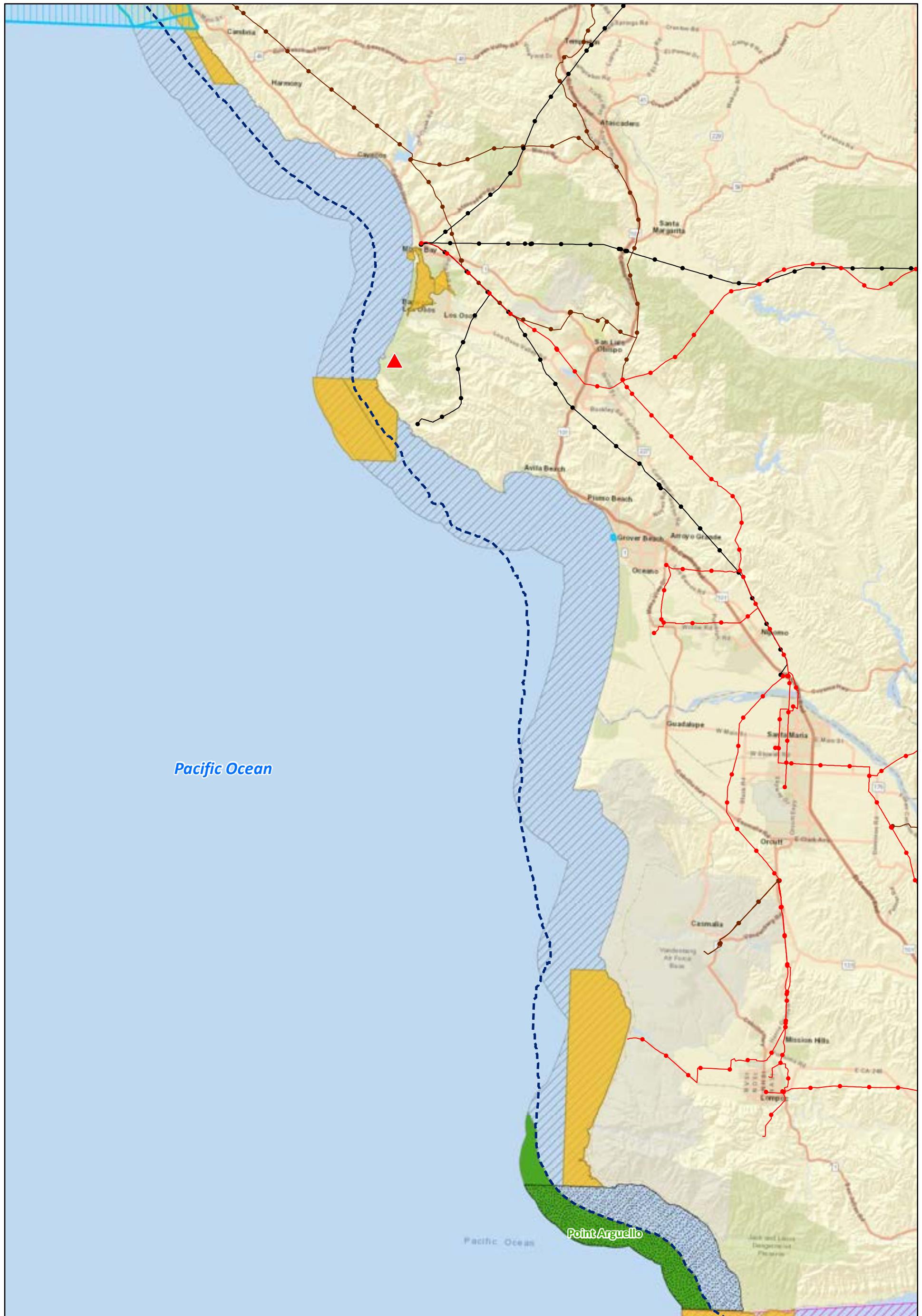
**Figure 9**  
Region 3 - Point Arena to Cambria (Central California)  
Protected and Sensitive Areas

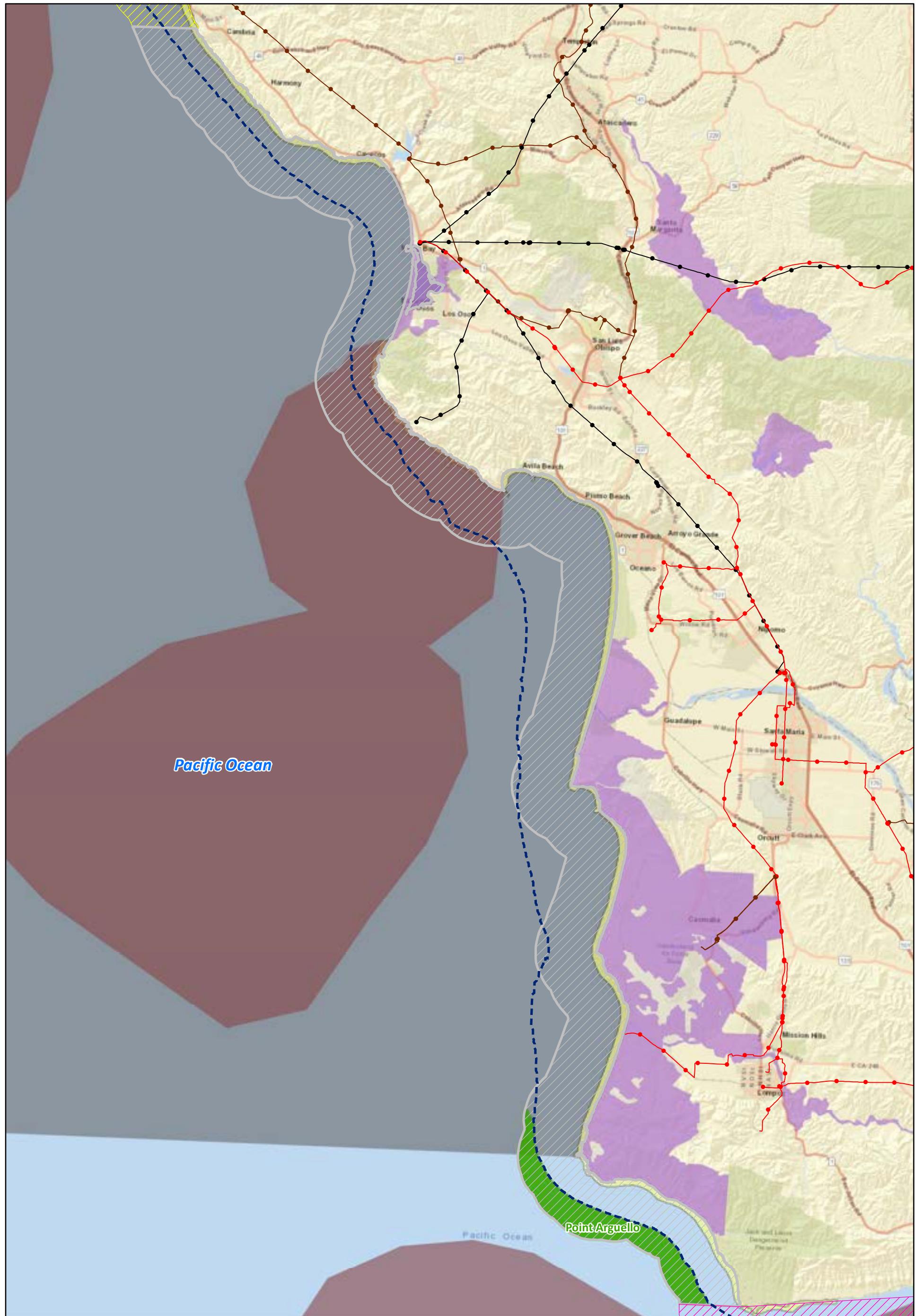
**Cierco**  
CADEMA Project

0 10 20  
Miles





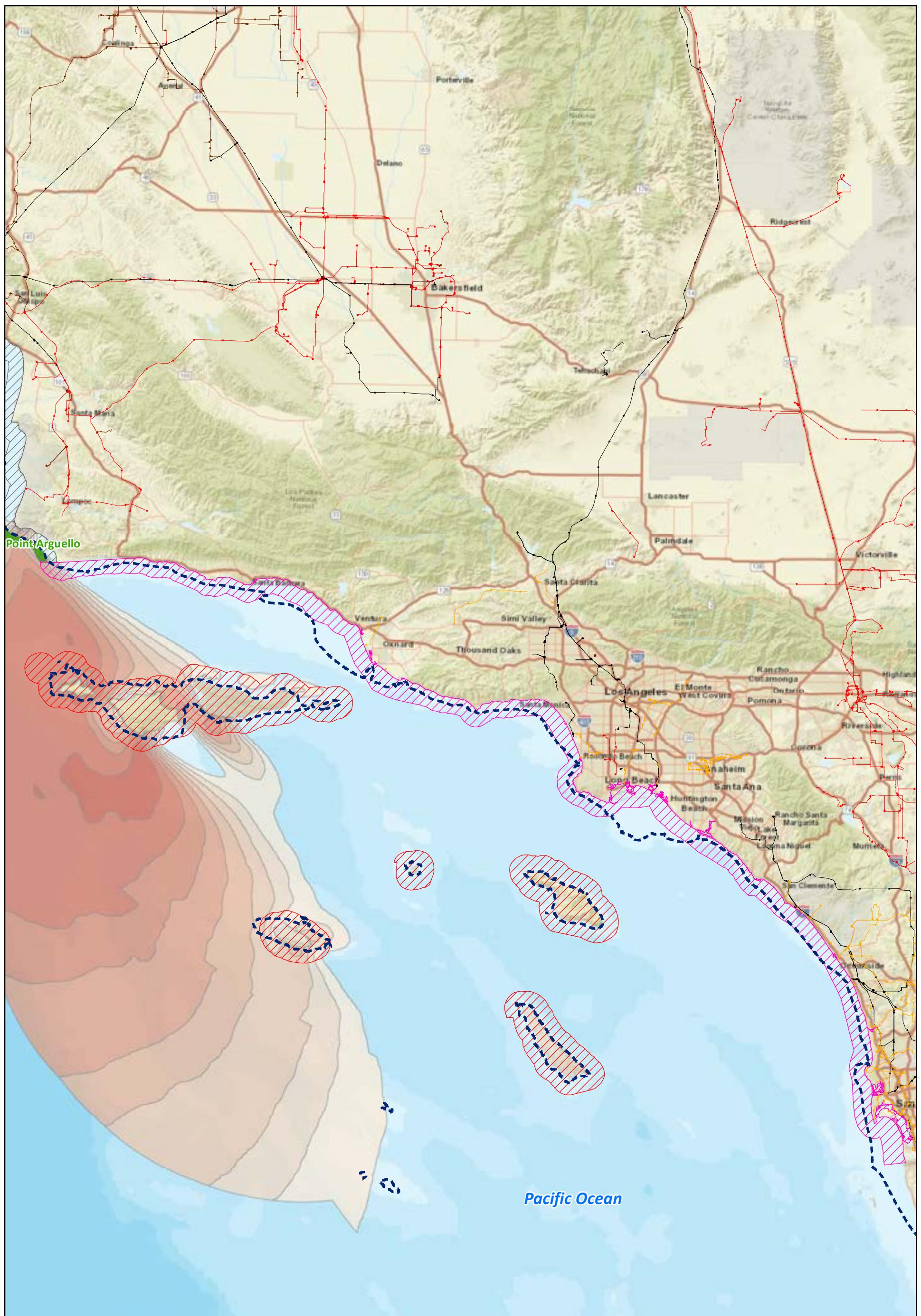




**Figure 13**  
**Region 4 - Cambria to Point Conception Sensitive Habitats**

**Cierco**  
**CADEMO Project**

0 5 10 Miles



<b>Legend</b>	<b>Transmission Line (kV)</b>
<b>Region Area</b>	7.625
■ Cambria to Point Conception	7.875
■ Point Conception to the Mexican Border	8.125
■ The Channel Islands	8.375
■ Minimum Depth (-50)	8.625
<b>Windspeed</b>	8.875
	9.125
	9.375

Sources: Cierco, NOAA, CEC, 2021

UTM Zone 11 North  
Datum: NAD 1983

June 07, 2021



**Figure 14**  
**Region 5 - Point Conception to the Mexican Border**  
**Technical Constraints**

**Cierco**

**CADEMO Project**

0 10 20  
Miles



**Legend**

- Vista Point** (Red triangle)
- Technically Suitable Area (Depth + SLC)** (Green rectangle)
- Region Area** (Grey rectangle)
- Cambria to Point Conception** (Grey rectangle)
- Point Conception to the Mexican Border** (Grey rectangle)
- The Channel Islands** (Red rectangle)
- Federal Protected Area** (Blue rectangle)
- State Protected Area** (Yellow rectangle)
- Coastal Tribal Lands** (Grey rectangle)
- Transmission Line (kV)**
  - Minimum Depth (-50) (Blue line)
  - 60 kV (Brown line)
  - 69 kV (Yellow line)
  - 115 kV (Red line)
  - 230 kV (Black line)

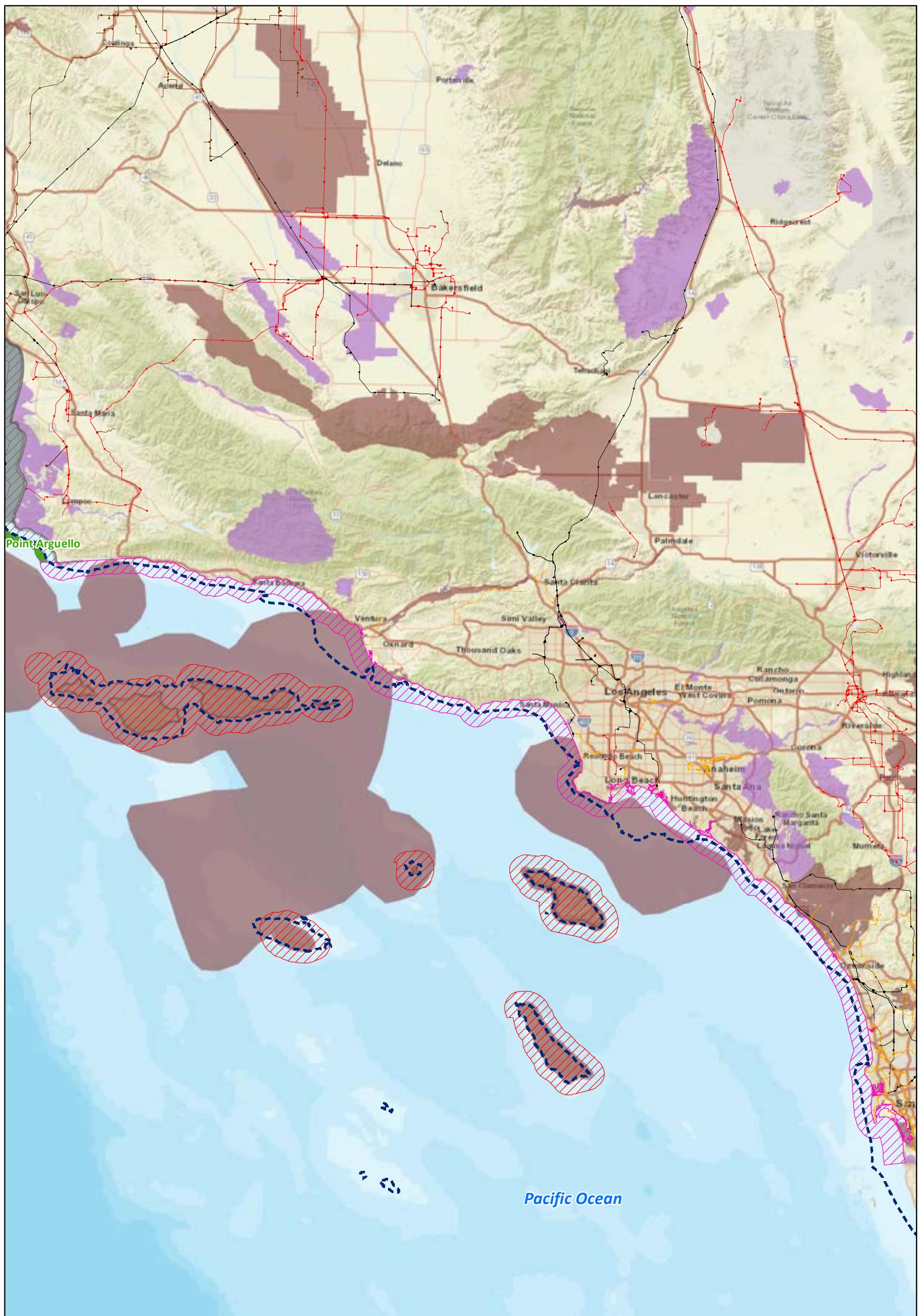
Sources: Cierco, NOAA, CEC, State of California, Offshore Wind Databasin, 2021

## UTM Zone 11 North

**Figure 15**  
**Region 5 - Point Conception to the Mexican Border**  
**Protected and Sensitive Areas**

Cierco  
DEMO Project

A horizontal scale with a black bar indicating a value between 10 and 20. The scale is labeled "Miles" below it.



#### Legend

Technically Suitable Area (Depth + SLC)	— Minimum Depth (-50)
<b>Region Area</b>	
□ Cambria to Point Conception	
□ Point Conception to the Mexican Border	
□ The Channel Islands	
<b>Important Bird Areas (IBA)</b>	
■ Global	— 60 kV
■ State	— 69 kV
■ Black Abalone Critical Habitat	— 115 kV
■ Leatherback Turtle Critical Habitat	— 230 kV

Sources: Cierco, NOAA, CEC, Audobon, 2021

UTM Zone 11 North  
Datum: NAD 1983

June 07, 2021

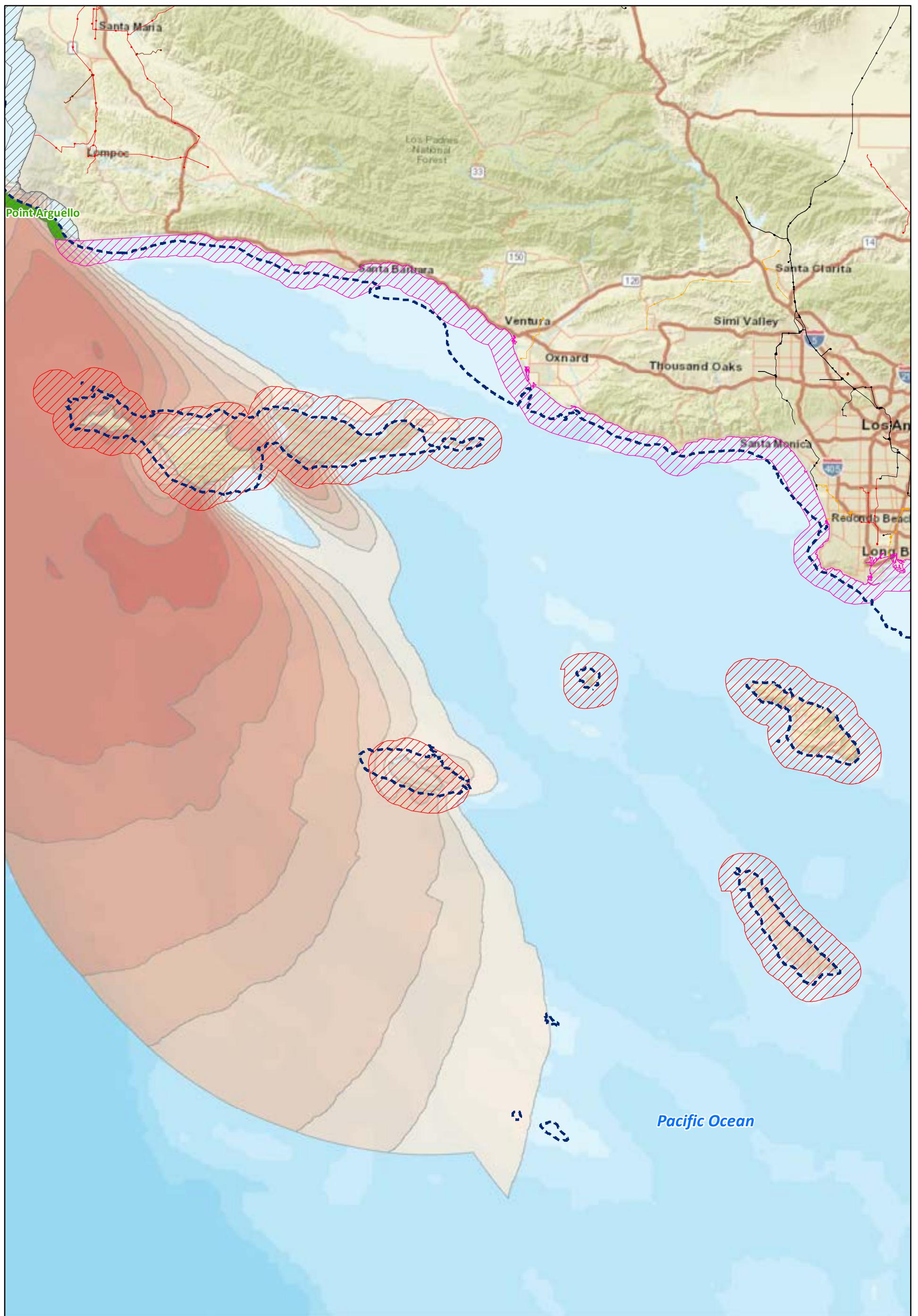


Figure 16  
Region 5 - Point Conception to the Mexican Border  
Sensitive Habitats

Cierco

CADEMO Project

0 10 20  
Miles



Legend		Windspeed	Transmission Line (kV)
Technically Suitable Area (Depth + SLC)		8.625	60 kV
Region Area		7.375	69 kV
Cambria to Point Conception		8.875	115 kV
Point Conception to the Mexican Border		7.625	230 kV
The Channel Islands		7.875	
Minimum Depth (-50)		8.125	
		8.375	
		9.125	
		9.375	
		9.625	
		9.875	

Sources: Cierco, NOAA, CEC, 2021

UTM Zone 11 North  
Datum: NAD 1983

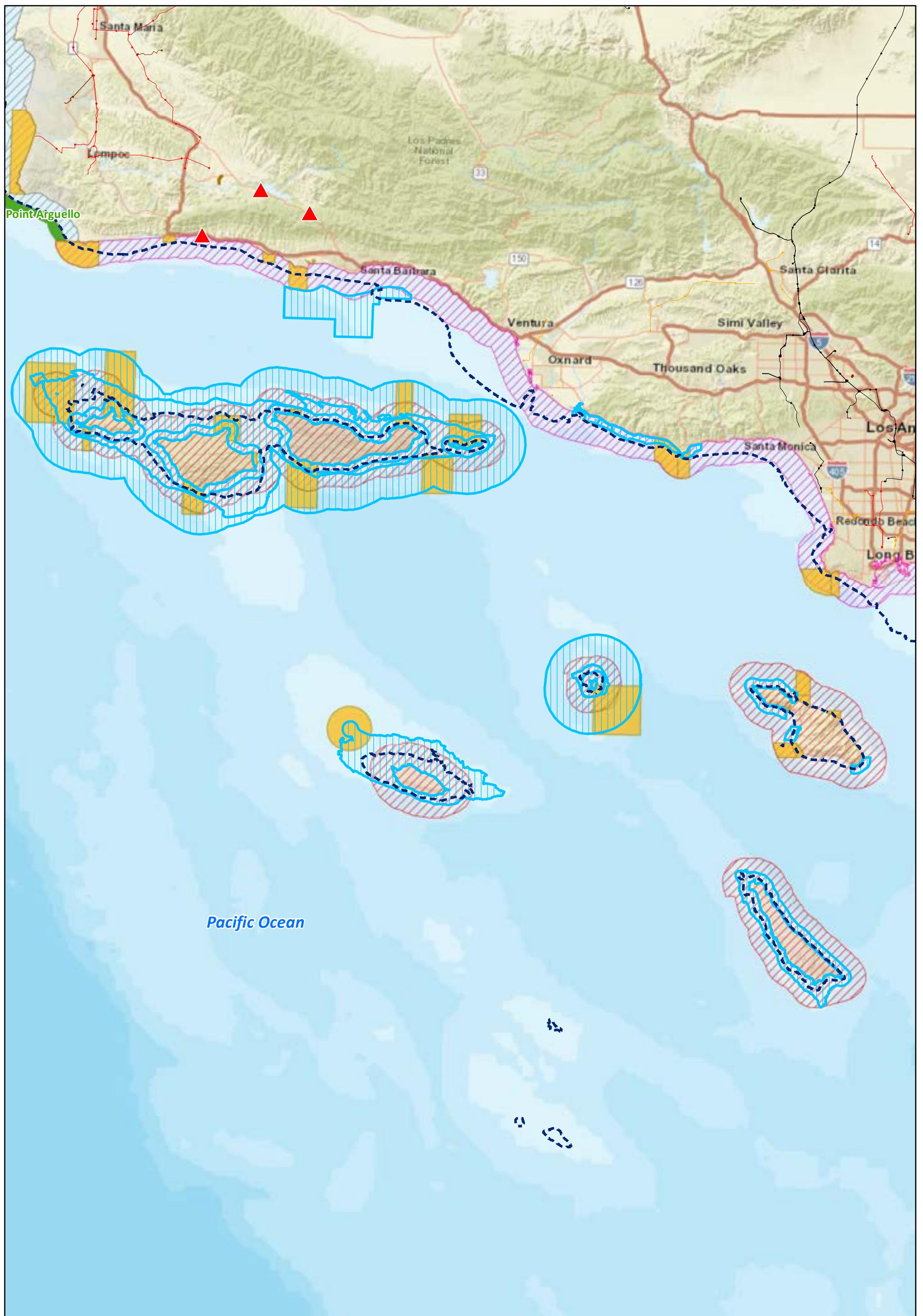
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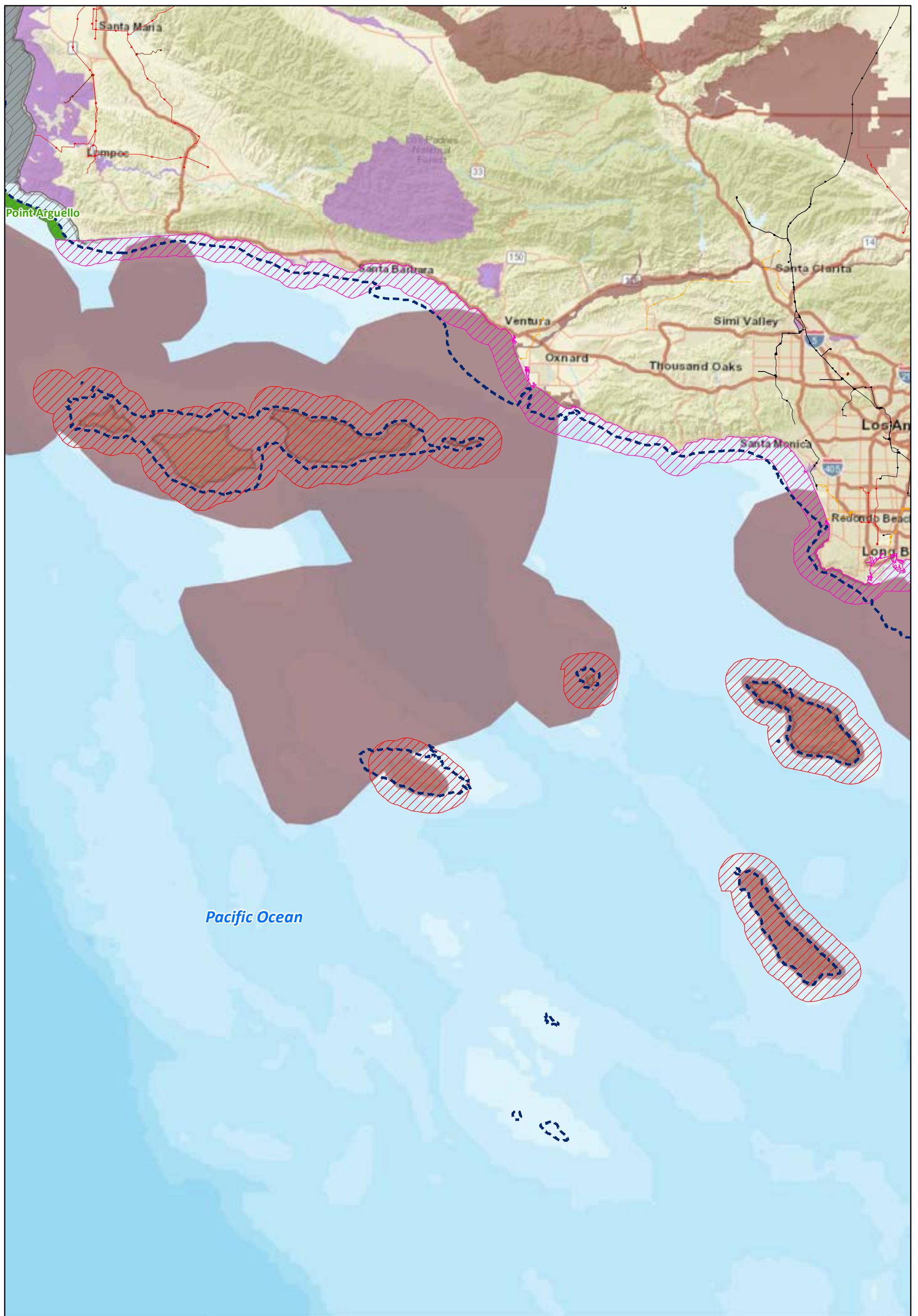


**Figure 17**  
**Region 6 – The Channel Islands**  
**Technical Constraints**

Cierco  
CADEMO Project

0 10 20  
Miles





Legend	
Technically Suitable Area (Depth + SLC)	Black Abalone Critical Habitat
Region Area	Leatherback Turtle Critical Habitat
Cambria to Point Conception	— Minimum Depth (-50)
Point Conception to the Mexican Border	— 60 kV
The Channel Islands	— 69 kV
Important Bird Areas (IBA)	— 115 kV
Global	— 230 kV
State	

Sources: Clerco, NOAA, CEC, Audubon, 2021

UTM Zone 11 North  
Datum: NAD 1983

June 07, 2021



**Figure 19**  
**Region 6 – The Channel Islands**  
**Sensitive Habitats**

Clerco

CADEMO Project

0 10 20

Miles

