

**The Industrialization of Our Ocean:**

**Wave Device Arrays:**

**Blessing or Curse?**

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Presentation to Gulf of the Farallones Sanctuary Advisory Council  
December 13, 2007  
Bodega Marine Lab

The background is a gradient of light blue to white. On the left side, there are several white, curved, glowing lines that sweep across the frame, creating a sense of motion and depth. The overall aesthetic is clean, modern, and professional.

# **Our Coast Now:**



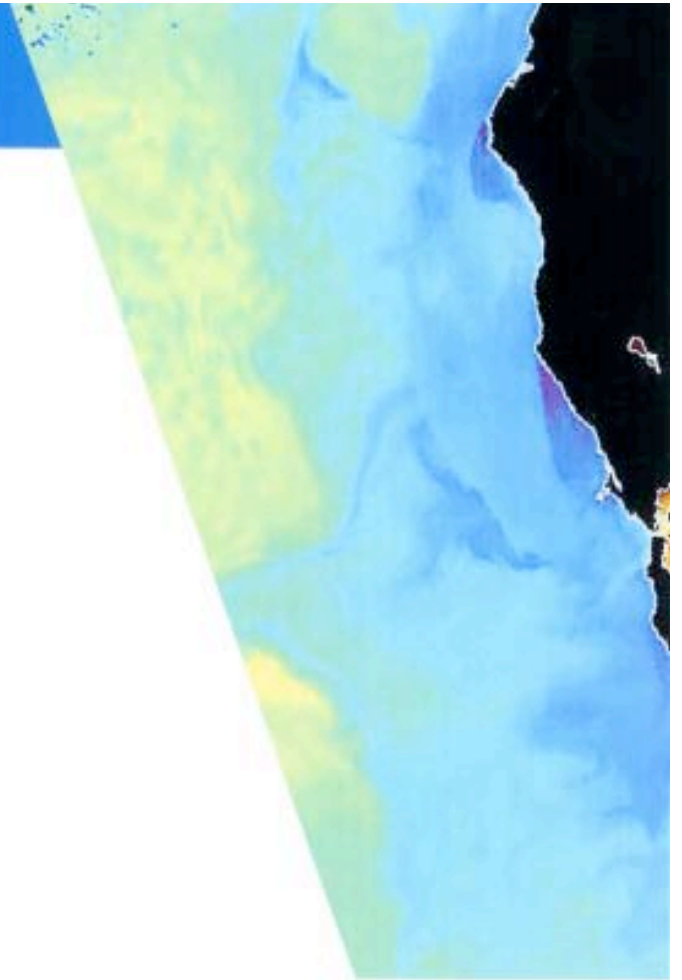
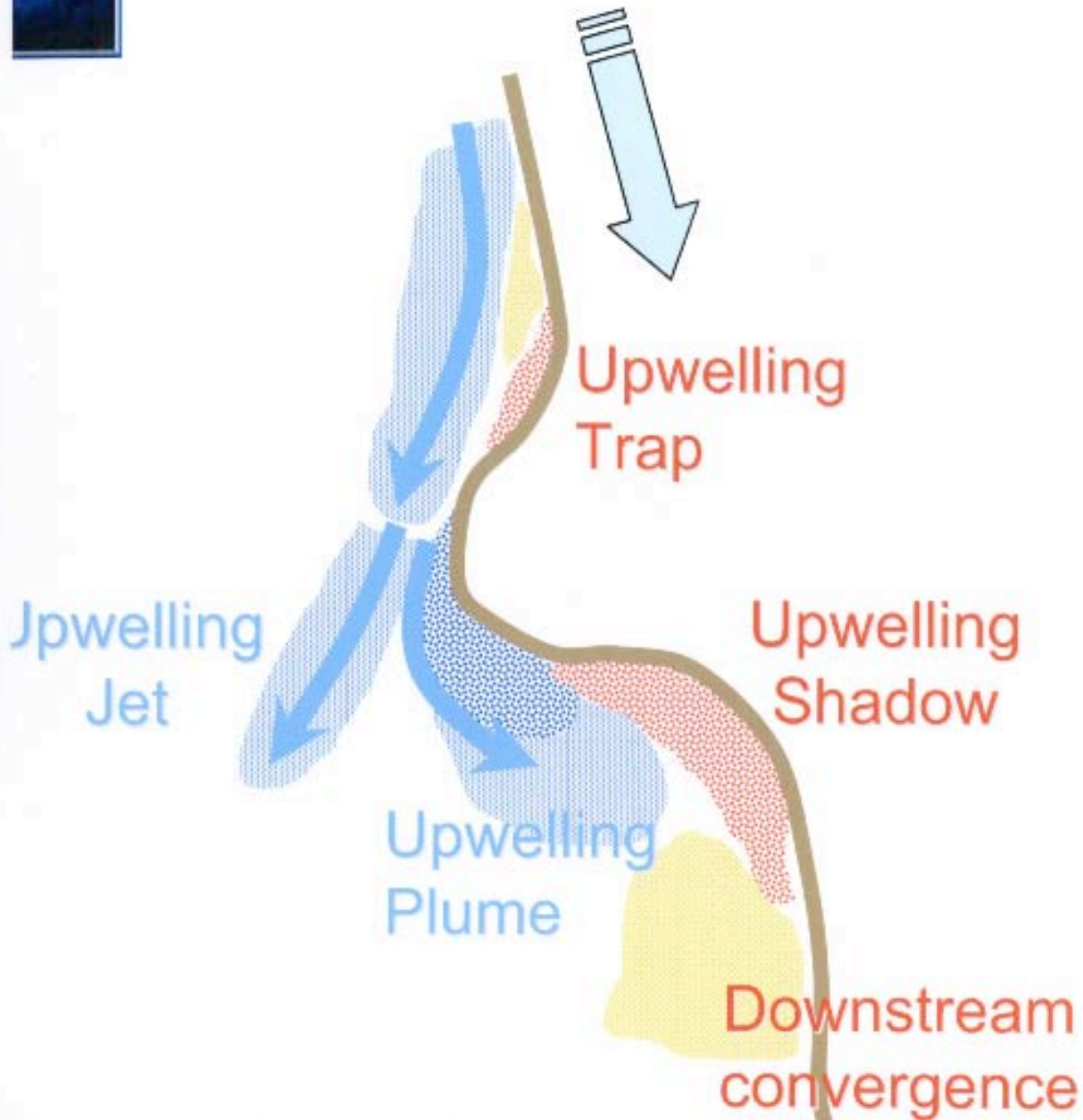
## **World's four major productive oceanic upwelling centers:**

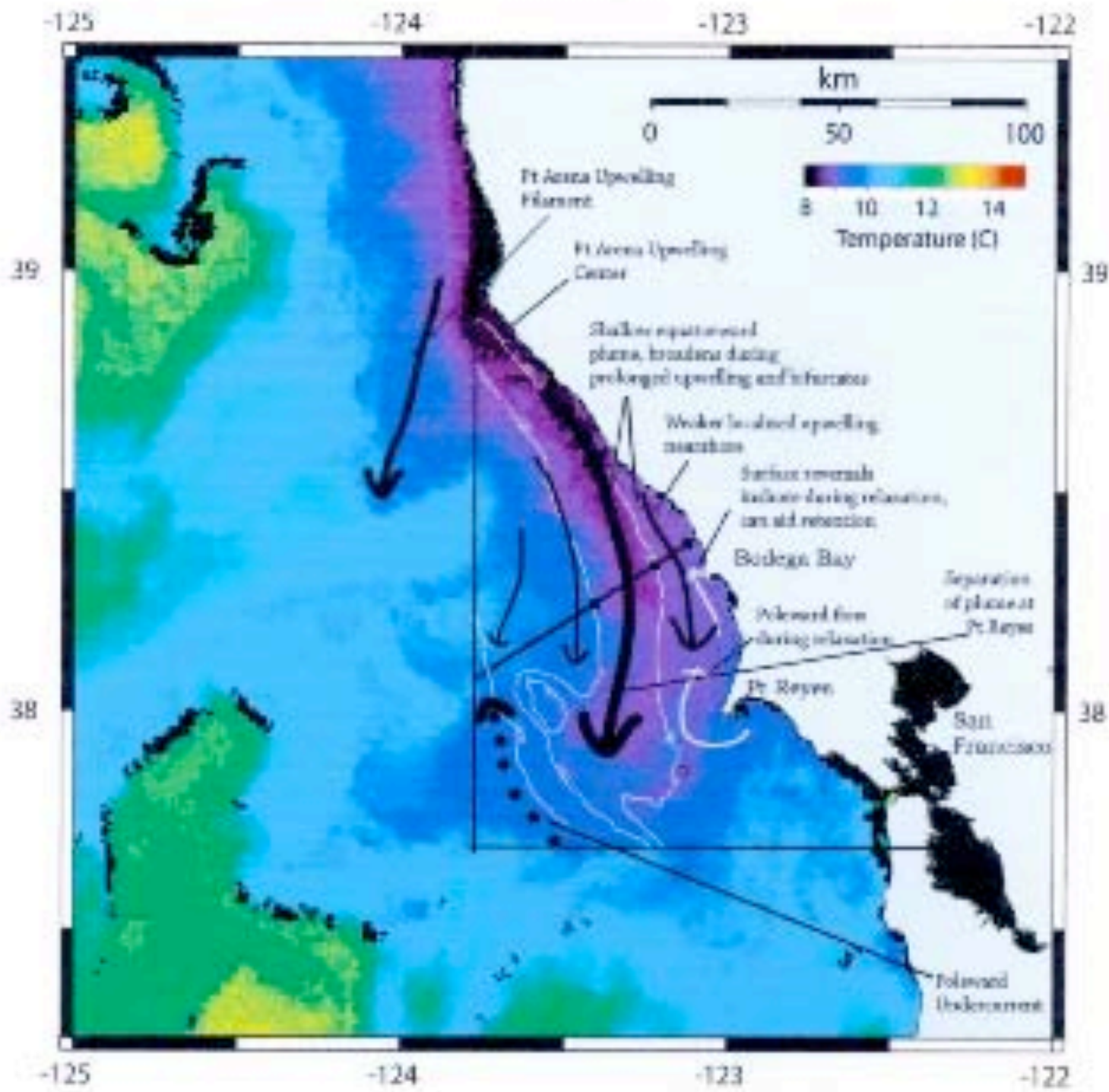
- **Humboldt Current off the coast of Chile and Peru.**
- **Canary Current off northwest Africa and the Iberian Peninsula.**
- **Benguela Current off northwest Africa.**
- **California Current: Just north of Ft. Bragg to Pt. Arena.**
- **Each located on the western edges of their continents at midlatitude, where the winds that drive upwelling persist.**

## **World's four major productive oceanic upwelling centers:**

- **Though upwelling centers make up less than 2 percent of the surface area of the ocean, these regions have historically supplied approximately half of the world's fish catch.**

# Upwelling at Capes



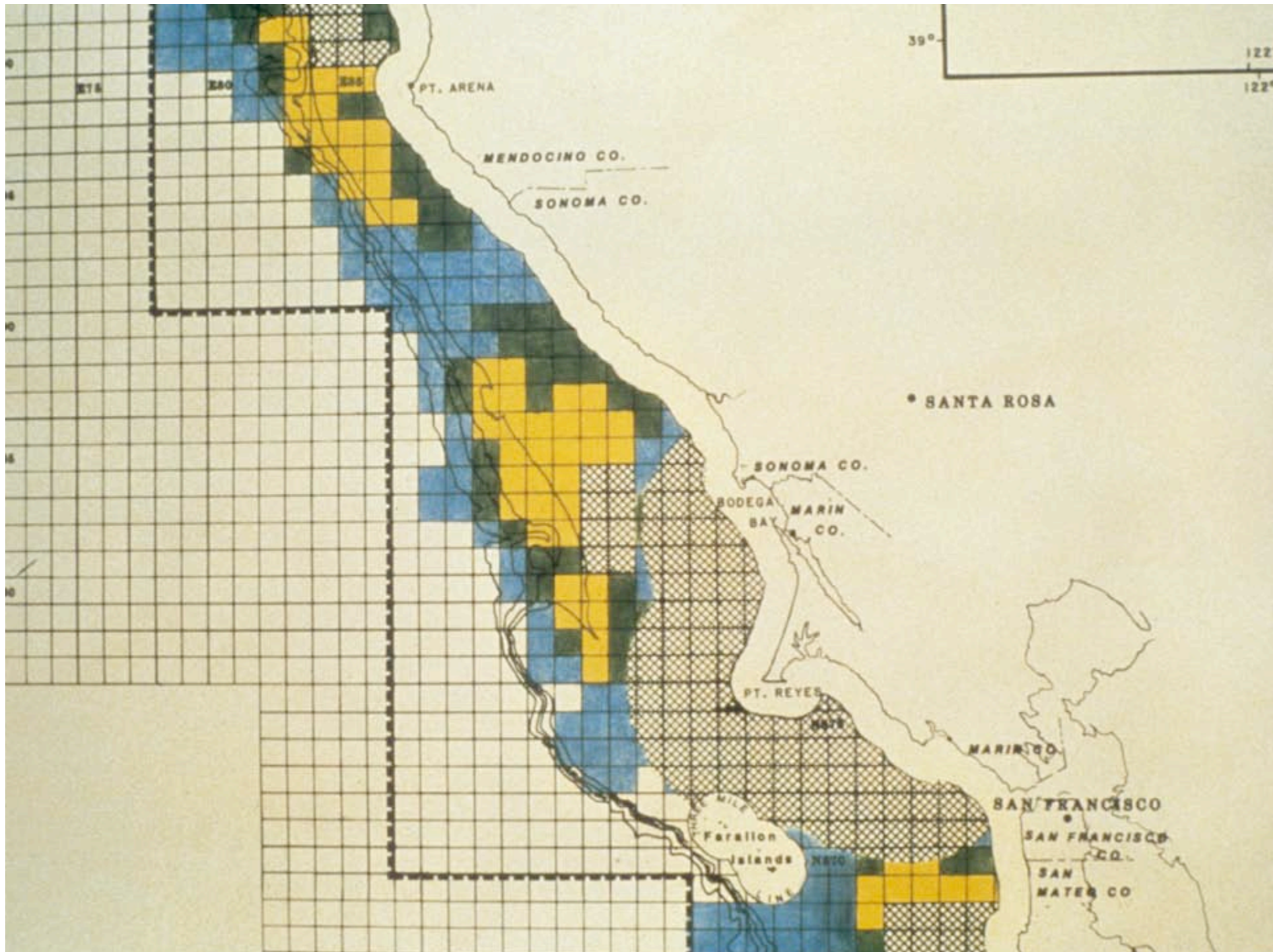


The background is a light blue gradient with several white, curved, glowing lines that sweep across the upper left portion of the frame, creating a sense of motion and depth.

# **Current Status of Ocean Zoning**

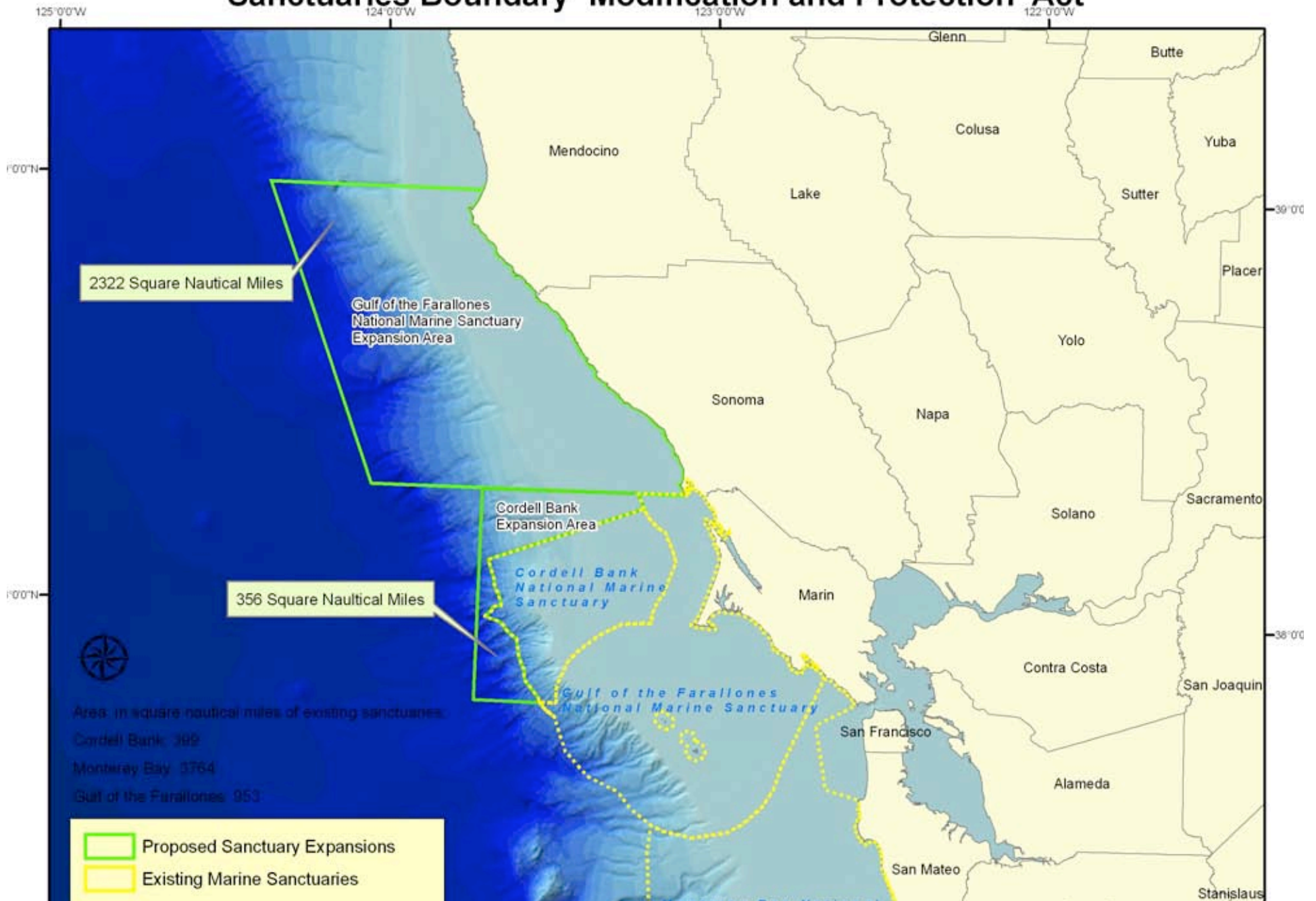








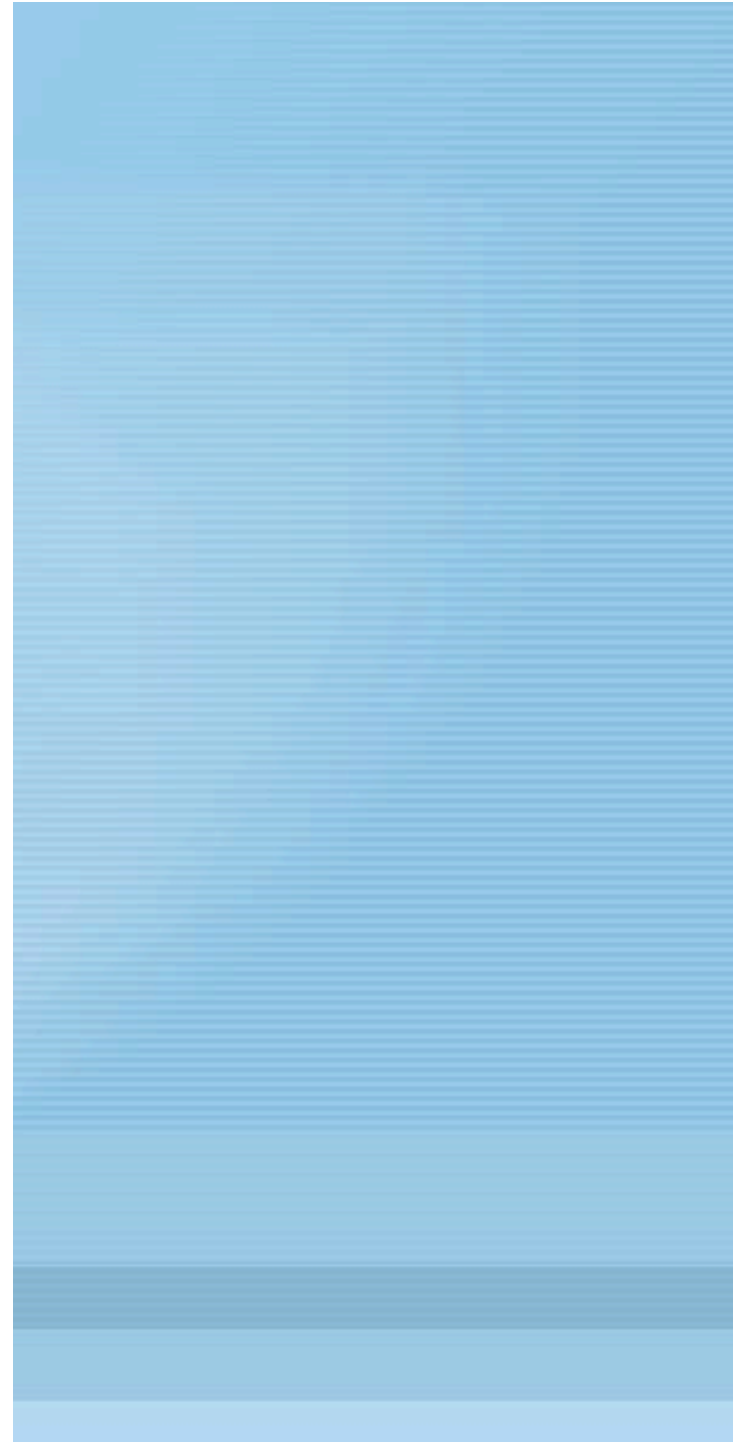
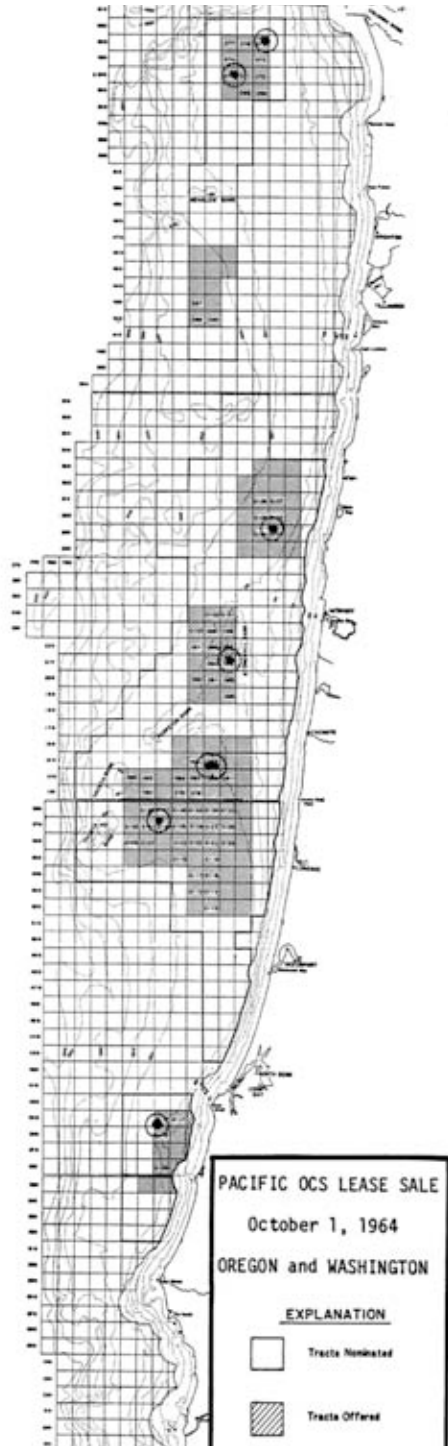
# Gulf of the Farallones and Cordell Bank National Marine Sanctuaries Boundary Modification and Protection Act



**FEDERAL  
WATERS  
(Minerals  
Management  
Service,  
Department  
of Interior)**

**STATE  
WATERS  
(California  
State Lands  
Commission,  
Federal Energy  
Regulatory  
Commission)**

← 3 miles →



# Oregon Coast



Information on this map is based on data provided by the Oregon Department of Geology and Mineral Industries. This information is provided for informational purposes only. The Oregon Department of Geology and Mineral Industries does not warrant the accuracy or completeness of the information. This information is provided for informational purposes only.



Map 10-2011  
Oregon Department of Geology and Mineral Industries  
1000 NE Oregon Street, Suite 200  
Portland, Oregon 97232  
503.945.3800  
www.odgi.org

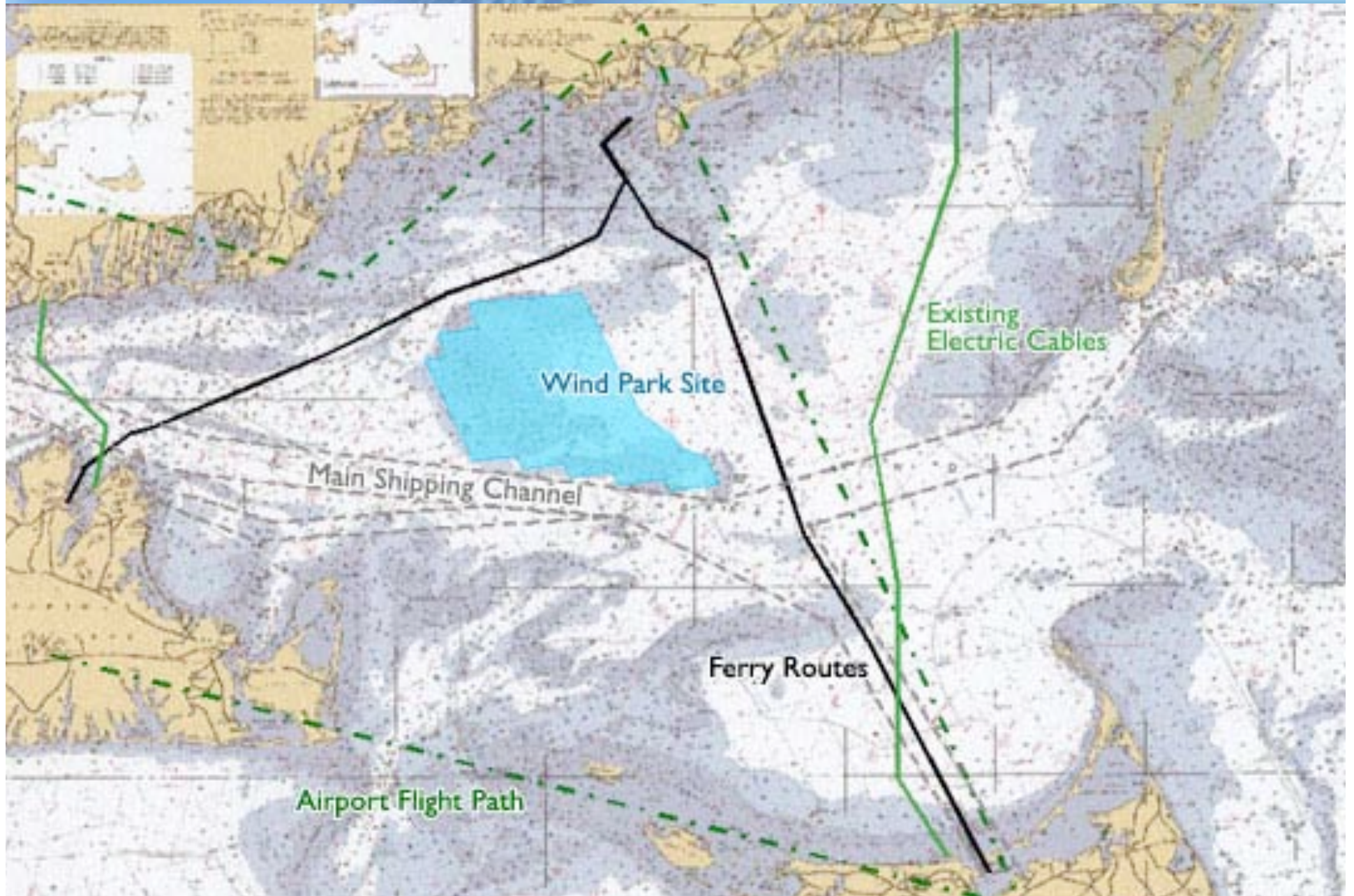


The background is a light blue gradient with abstract white lines that curve and swirl, creating a sense of motion and energy. The text is centered and rendered in a bold, red, sans-serif font with a slight drop shadow.

# **Environmental Impacts of Renewable Energy**







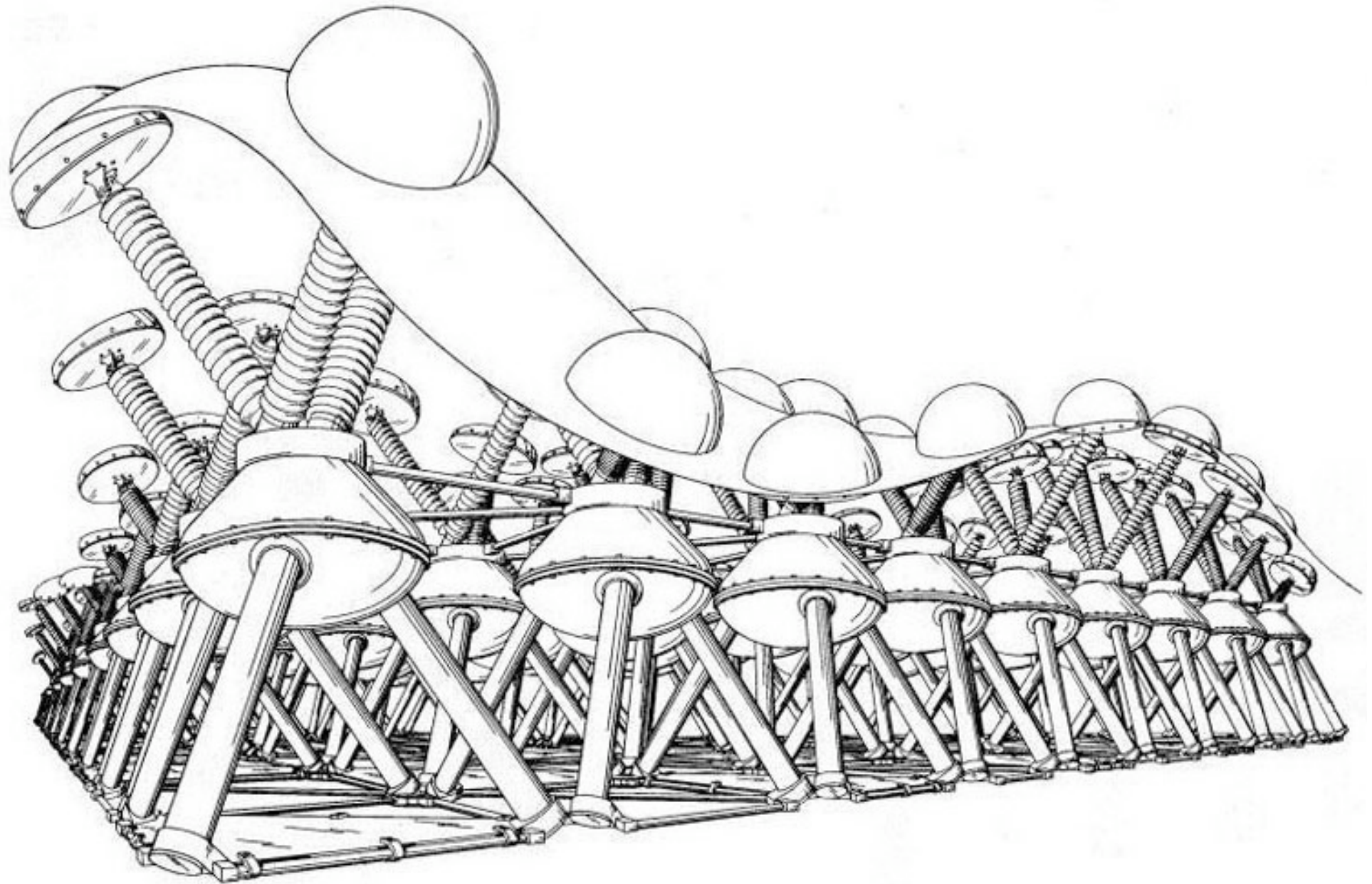


The background is a light blue gradient with several white, curved, glowing lines that sweep across the upper left portion of the frame, creating a sense of motion and depth.

# **Klondike Wave Rush**











# Wave Energy Issues:

- Hazards to Navigation.
- Toxic Biofouling Chemicals.
- Cable Routing, Landfalls.
- Marine Mammal Interactions.
- Seabirds.
- Space Use Conflicts: Fishing Grounds, Safe Anchorages.
- Habitat Conversion.

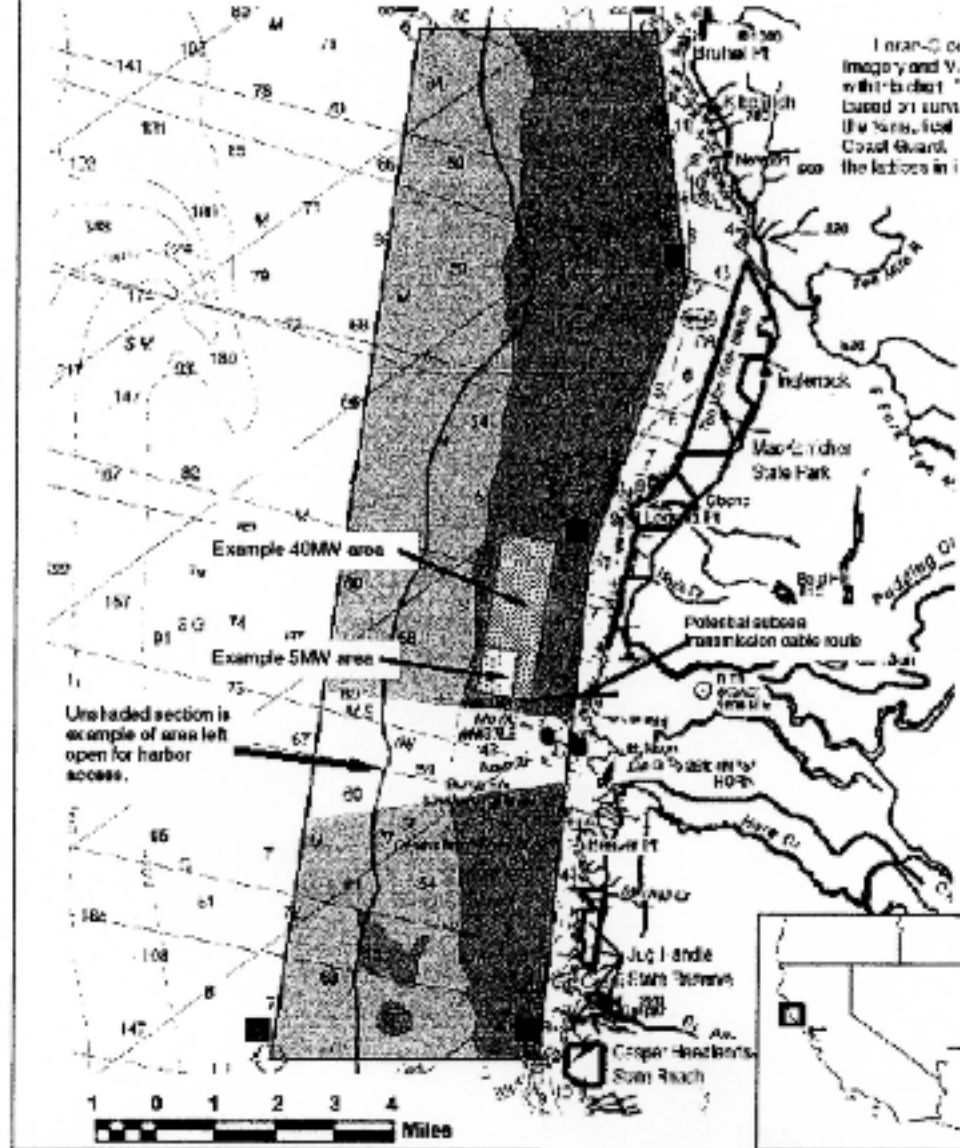
# Responsible Decommissioning

-Thorough  
Site Restoration  
Post-Project.

-Bonding.

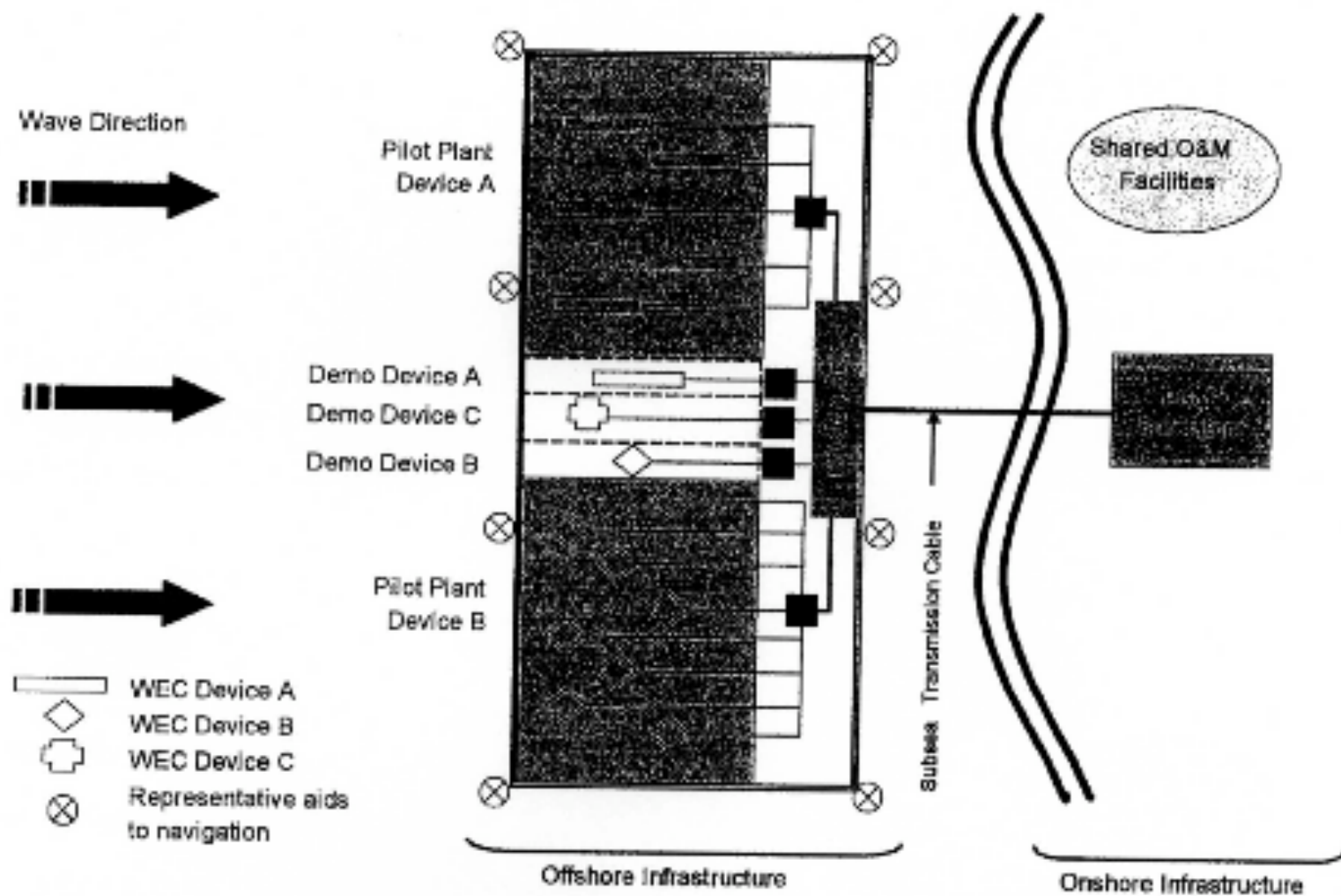
# PG&E Mendocino WaveConnect Project

Permit application boundary shows proposed area of investigation. Actual project would occupy smaller area. Possible footprints of 5MW and 40MW projects are shown below for reference.



Water depth in fathoms: 1 fathom = 6 feet  
Source: NOAA chart # 18620

# PG&E MENDOCINO WAVECONNECT PROJECT DIAGRAM



# **PG&E Proposal off of Mendocino County:**

- **Proposed Capacity 40 MW.**
- **From one-half to six miles off the coast of Mendocino County.**
- **Permit boundary straddles line between state submerged lands and federal Outer Continental Shelf lands.**

# Streamlined Permit Proposal for Wave Installations:

- **FERC Jurisdiction.**
- **“Small” Projects, 5 MW or less.**
- **Connected to Power Grid.**
- **Revocable, if damage to environment can be proven.**
- **Can be Extended to 30-50 years.**

# **Circumventing Federal Environmental Laws:**

- **Marine Mammal Protection Act.**
- **National Environmental Policy Act.**
- **Endangered Species Act.**
- **National Historic Preservation Act.**
- **Coastal Zone Management Act.**

# **Circumventing Federal Environmental Laws:**

- **Proposing Company Becomes Lead Agency.**
- **Generic “Environmental Assessment” Document.**
- **Fiscal Incentives.**



The background is a solid blue color with a subtle gradient. On the left side, there are several thin, white, curved lines that sweep across the frame, creating a sense of motion and energy. The text is centered in the lower half of the image.

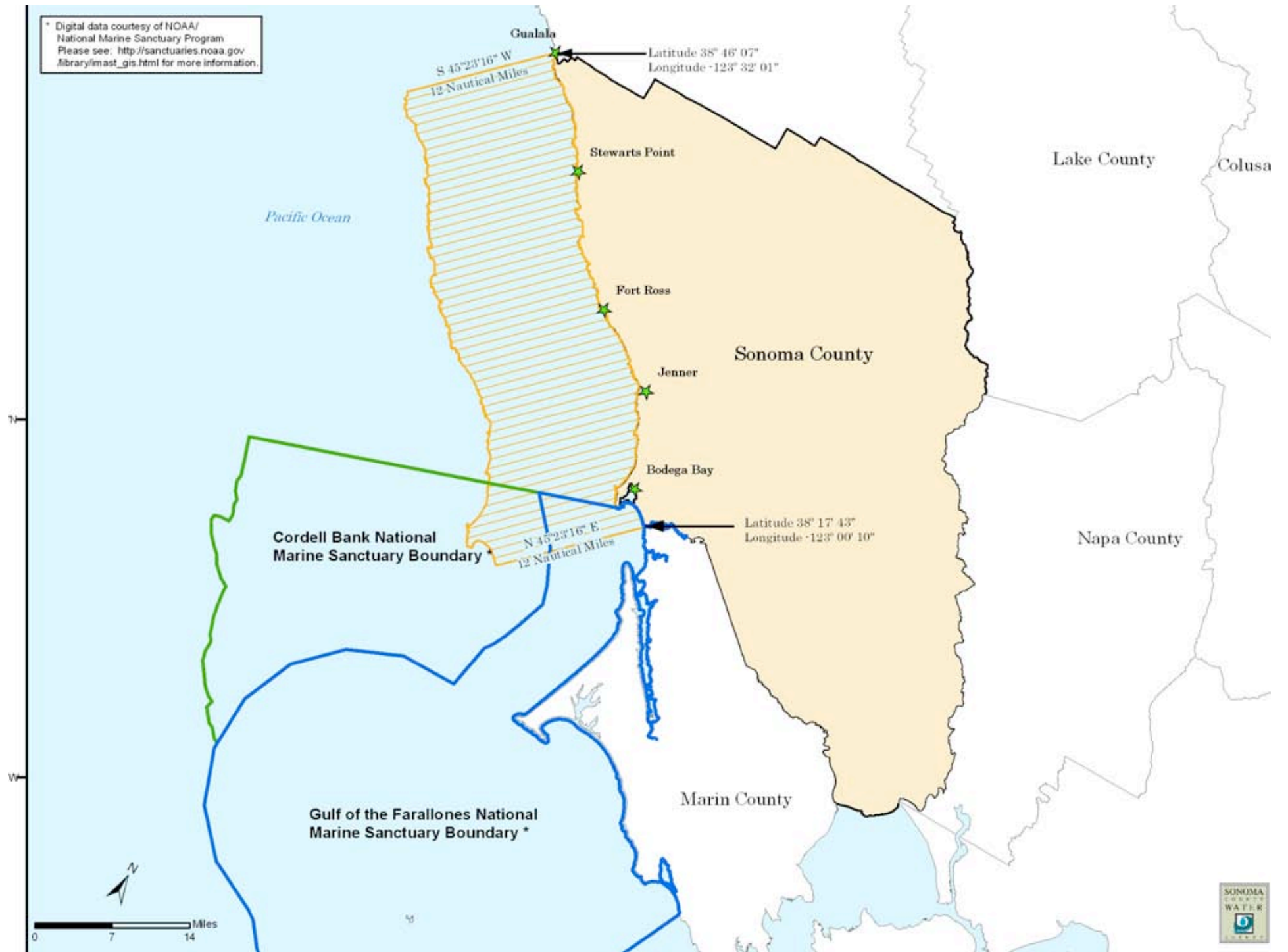
# **SONOMA COAST HYDROKINETIC ENERGY PROJECT**

# Why Apply to FERC ?

- AB-32
- Agency and County GHG Reduction Commitment
- Emphasis on Renewable Energy Resources
- Local Control of Process



\* Digital data courtesy of NOAA/  
National Marine Sanctuary Program  
Please see: [http://sanctuaries.noaa.gov/library/imast\\_gis.html](http://sanctuaries.noaa.gov/library/imast_gis.html) for more information.

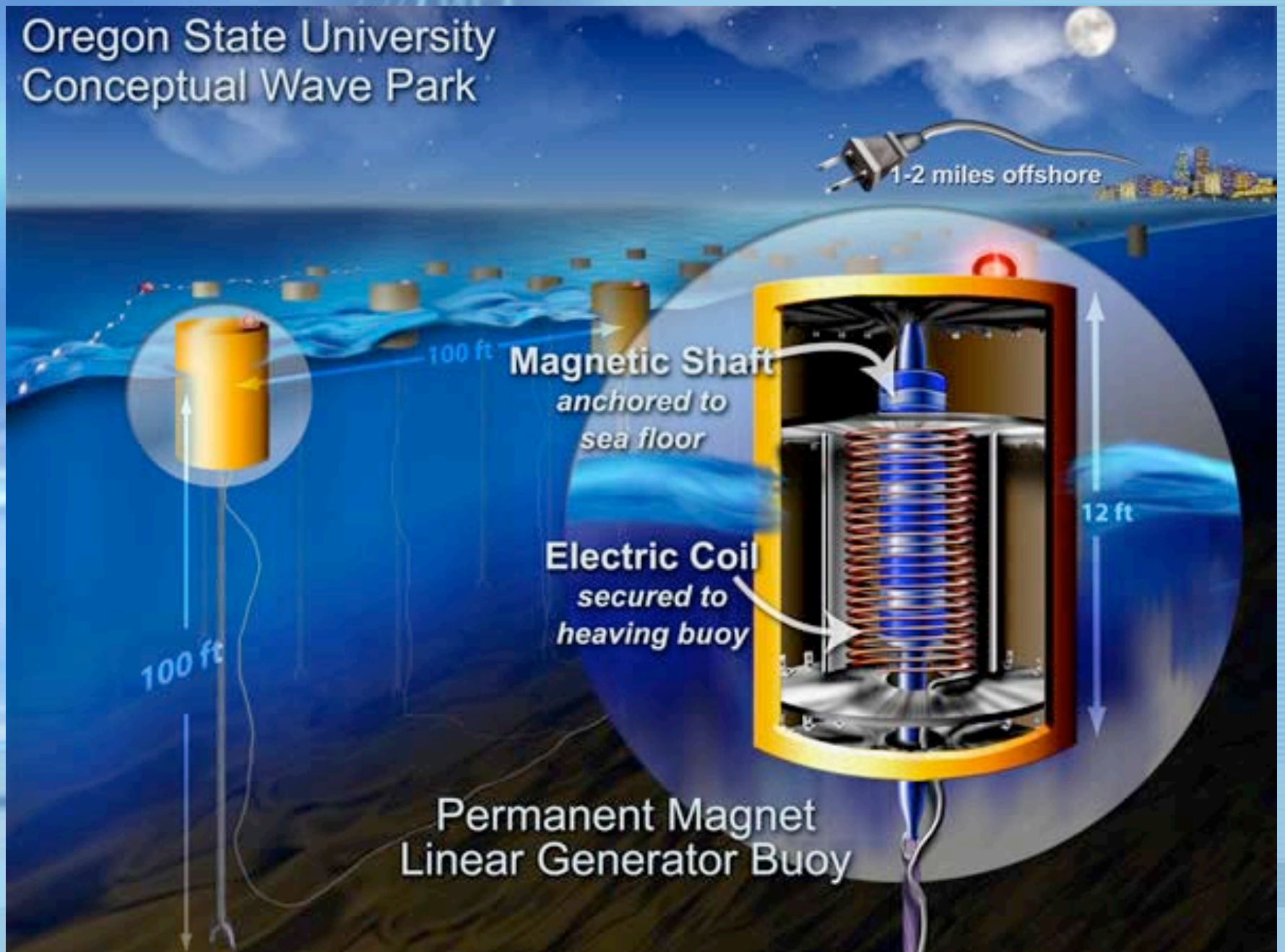


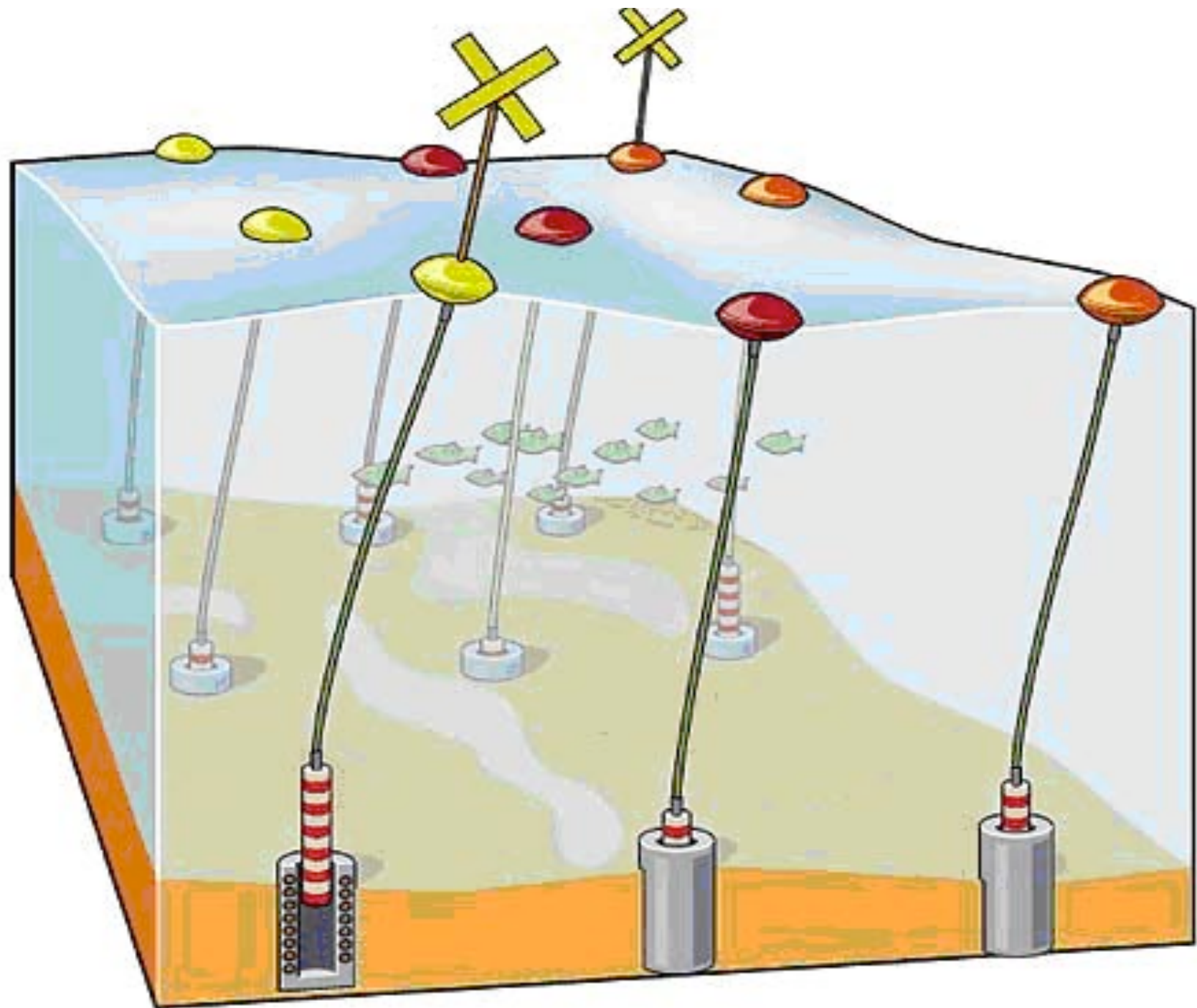
# Emerging Technologies

- Magnetic Generator Buoy
- Point Absorber
- Pelamis Wave Power Converter
- Other Technologies



# Oregon State University Conceptual Wave Park







# Full Scale Pelamis





# Issues to be Considered

- Environmental Impacts
- Aesthetic Impacts
- Economic Impacts
- Power Transmission
- Cost

# Sonoma County Ocean Energy Considerations

- Previous HF Radar Infrastructure Investment
- Local Governance consistent with sustainable objectives & Ocean Commissions recommendations
- Consistent with IRWMP objectives
- Allows for scalable and manageable benefits
- CeNCOOS member

# Estimated Costs

- Review and study of feasibility (\$250,000)
- Field Studies (\$250,000)
- Evaluation of Specific Sites and Technologies (\$250,000)
- Focused Evaluation of Project Alternatives (\$250,000)
- Environmental Report (\$750,000)

# Wave of the Future??





