

Data Portals and Decision Support Tools

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Fisheries Sustainability & Leadership Forum
Stanford University
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Outline

1. Data Portals
2. Decision Support Tools
3. Decision Guide
4. Decision Support Tool simulation



National Information Management System

- Provides a foundation of data for CMSP
- Includes over 150 authoritative data sets
- Links to regional data portals
- Serves as a CMSP community of best practice
- Includes a directory for decision support tools
- Release of prototype in October 2011



Regional Data Portals

- Collaboration of government, non-government, and academic institutions
- Federal and state geospatial data included
- Data types include: jurisdictional, ecological, human use, and ocean observing
- Data (and metadata) can be downloaded by users
- Map viewer for viewing data products
- Northeast and Mid-Atlantic regions most developed



Northeast Regional Data Portal

Biology and Habitat

- Bird Nest Sites (Source: NOAA ESI)
- Bird Habitat (Source: NOAA ESI)
- Cetacean Habitat (Source: NOAA ESI)
- Eelgrass Habitat (Source: UNH, MEDMR, RIDEM, U.S. Fish and Wildlife Service, and MA DEP)
- Right Whale Core Habitat (Source: MA CZM and NOAA)
- Shellfish Habitat (Source: MEDMR and MADMF)

Commercial, Industrial, and Military

- Marine Farms (Source: NOAA)
- Offshore Wind Energy Potential (Source: NREL)
- Permitted Cape Wind (Source: MA CZM)
- AIS Sample (Source: MOP)
- VMS Sample (Source: MOP)

Geology

- Sediment Grain Size (Source: USGS)
- LNG Sites (Source: U.S. Coast Guard)

Physical Oceanography

- Bathymetry (Source: NOAA)
- Depth Contours (Source: USGS)
- Maximum Current Velocity (Source: ASA)
- Maximum Shear (Source: ASA)
- Mean Current Velocity (Source: ASA)
- Mean Shear (Source: ASA)
- Shoreline (Source: NOAA ESI)
- NERACOOS Buoys (Source: NERACOOS)



Standards, Regulations, and References

- Affirmation of Datum for Surveying and Mapping Activities
- Affirmation of Vertical Datum for Surveying and Mapping Activities
- Automatic Identification System; Vessel Carriage Requirement
- Circular No. A-16 Revised, A-119, A-13
- FGDC-endorsed standards
- FGDC-endorsed external standards
- Federal Enterprise Architecture
- Northeast Vessel Monitoring Program Regulations
- Title 50: Wildlife and Fisheries Part 648 – Fisheries of the Northeastern United States

Fisheries Data

- Critical habitat and spawning areas
- Connectivity to prey populations
- Migration routes and movement patterns
- Fishing closures
- Areas of concentrated fishing effort
- Vessel routes



Decision Support Tools

Interactive software designed to facilitate, support, and inform decisionmaking by helping users:

- Compile useful information;
- Visualize information;
- Characterize problems and solutions; and
- Understand tradeoffs and alternatives.

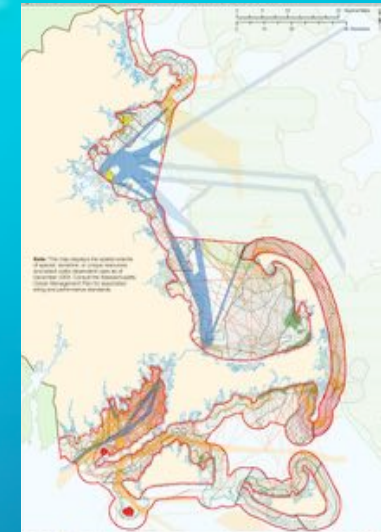


Many processes, many tools

Marxan



Gulf of Mexico
Decision Support



MIDAS

Atlantis

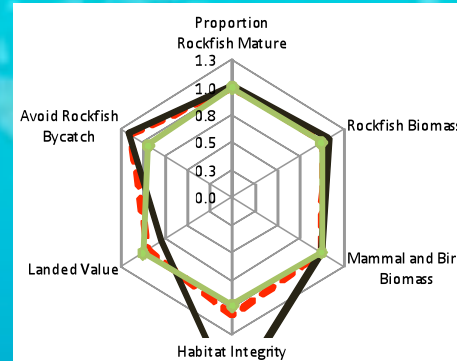


MarineMap

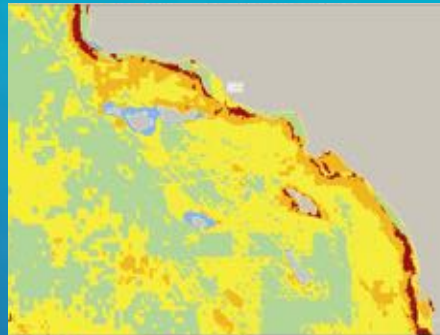


Marine
Planning Toolbar

Decision Guide



Coastal Resilience

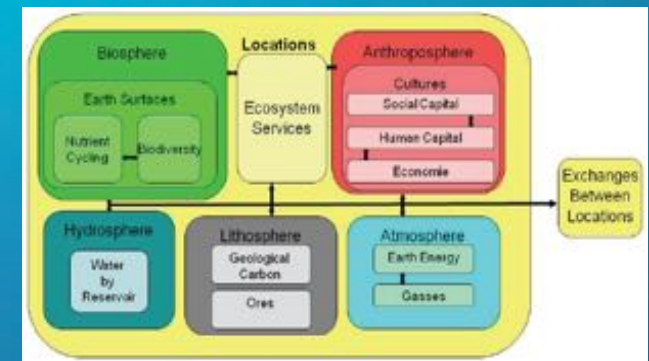


Cumulative Impacts

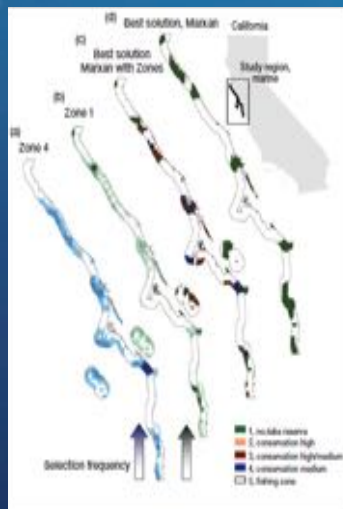
Atlantis



InVEST

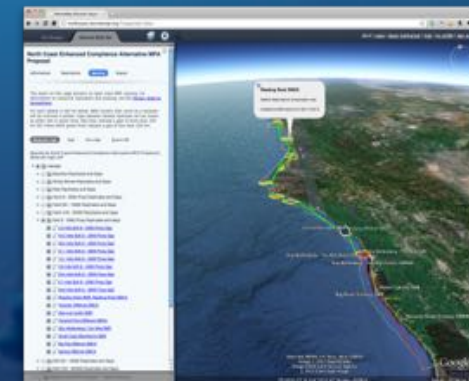


MIMES



Marxan w/
Zones

Multipurpose
Marine Cadastre



MarineMap

Decision Guide – Range of uses

Mapping



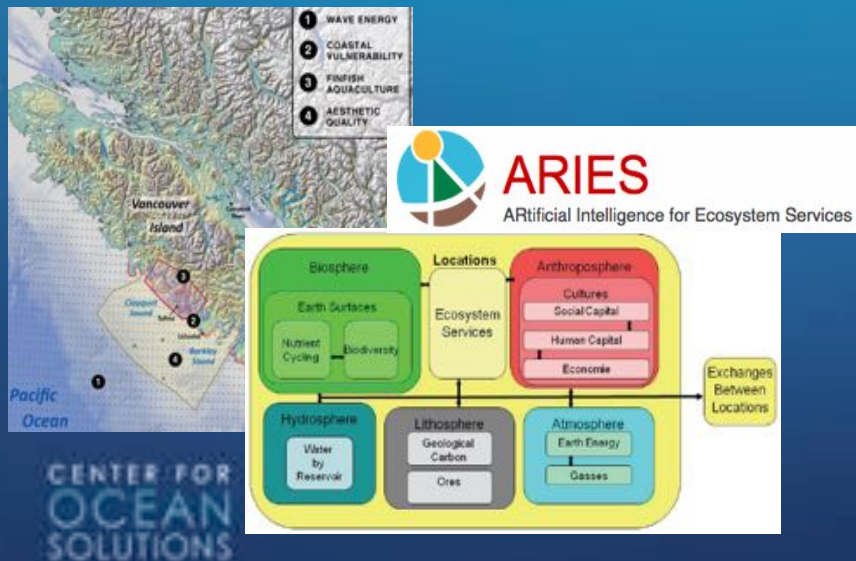
Zoning



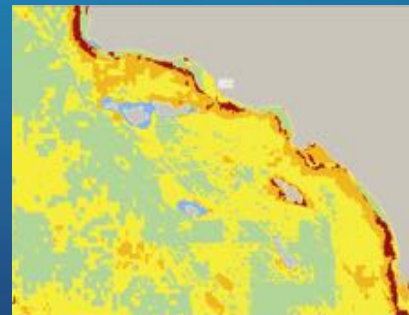
Climate change adaptation



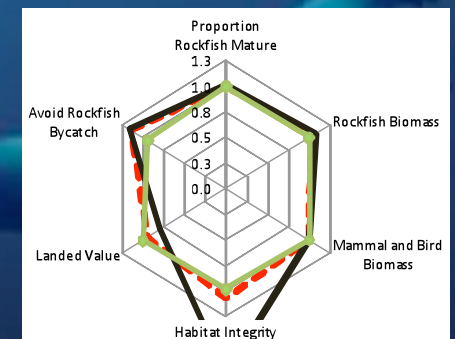
Ecosystem service valuation



Cumulative impacts



Trade-offs



Decision Guide – Range of expertise

Minimal training or technical expertise	Minimal training & expertise but process objectives must be set in advance	Expert users
InVEST	ARIES	ARIES
MarineMap	Coastal Resilience	Atlantis
Multipurpose Marine Cadastre	Cumulative Impacts	InVEST
	Marxan w/ Zones	Marxan w/ Zones
	MIMES	MIMES



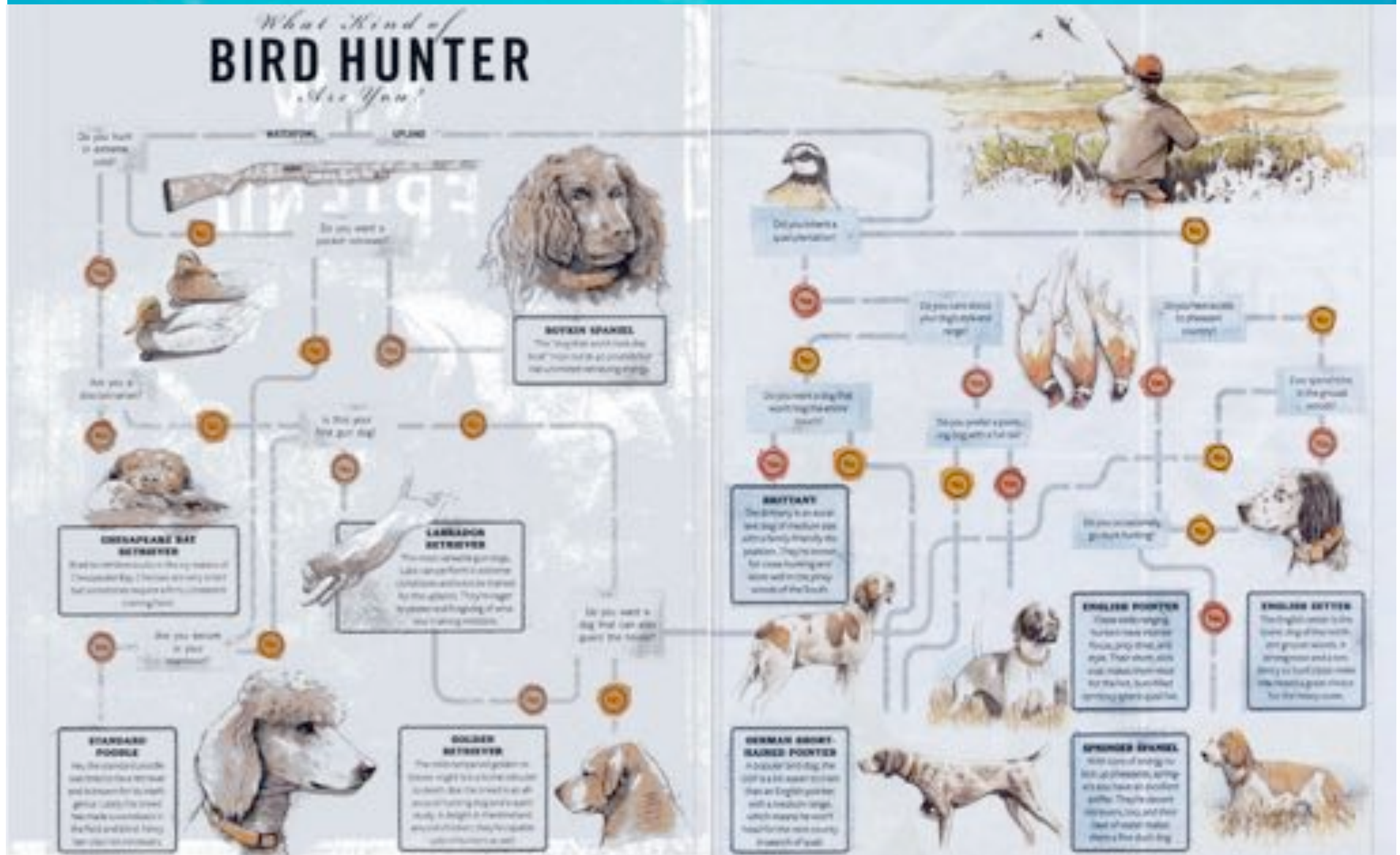
Decision Guide – Function Matrix

		DECISION SUPPORT TOOLS									
		ARIES	Atlantis	Coastal Resilience	Cumulative Impacts	INVEST	MarineMap	Marxan with Zones	MIMES	Multipurpose Marine Cadastre	
TOOL FUNCTION	DATA MANAGEMENT										
	Data provisioning	✓		✓	✓	✓			✓	✓	
	Data quality assessment	✓									
	Data upload & archival	✓		✓	✓			✓	✓		
	Data development			✓				✓	✓		
	MAPPING & VISUALIZATION										
	Spatial										
	Basemaps/Physical	✓		✓	✓	✓	✓	✓	✓	✓	
	Habitats/species	✓		✓	✓	✓	✓		✓	✓	
	Ecosystems services	✓				✓			✓		
	Temporal features	✓		✓		✓	✓		✓		
	Vulnerability	✓		✓	✓	✓			✓		
	Uses	✓		✓	✓	✓	✓	✓	✓	✓	
	Incompatibility & impacts	✓		✓	✓	✓	✓	✓	✓	✓	
	Jurisdictions	✓		✓	✓		✓			✓	
	Non-spatial										
	Graphical display	✓	✓			✓	✓		✓		
	Reports	✓	✓				✓		✓		

Decision Guide – Feature Matrix

		ARES	Atlantis	Coastal Resilience	Cumulative Impacts	InvEST	Marine-Map	Marxan with Zones	MIMES	Multi-purpose Marine Cadastre
FEATURE CATEGORY	SPECIFIC FEATURE									
Priority tool objective	Conservation	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Emerging uses	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Managing trade-offs	✓	✓		✓	✓	✓	✓	✓	
	Education & awareness	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Scenario analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Socio-economic	✓	✓	✓		✓	✓	✓	✓	✓
Data demands & needs	Specific data types needed to use DST	✓	✓	✓	✓	✓		✓	✓	
	Incorporates multiple types of data	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Resolution of required data is flexible	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Minimum amount of data required	✓	✓			✓		✓	✓	
Output type	Maps	✓	✓	✓	✓	✓	✓	✓		✓
	Models	✓	✓	✓	✓	✓			✓	
	Valuation	✓	✓			✓			✓	
	Reports	✓		✓	✓	✓	✓	✓	✓	✓
	Movies		✓	✓					✓	
Validation/peer-review	Data	✓		✓	✓	✓		✓	✓	✓
	Code/model	✓			✓	✓			✓	
	Application		✓	✓	✓	✓	✓	✓	✓	
Transferability	Transferable	✓	✓			✓	✓	✓	✓	✓
	Customized	✓	✓	✓	✓	✓	✓	✓		
Transparency	Working assumptions are stated clearly upfront	✓		✓	✓	✓	✓		✓	
	Working assumptions are expressed in modeling equations or software code	✓	✓	✓					✓	
	Working assumptions are understandable by all users						✓		✓	
	Assumptions can be supplied by users	✓				✓			✓	

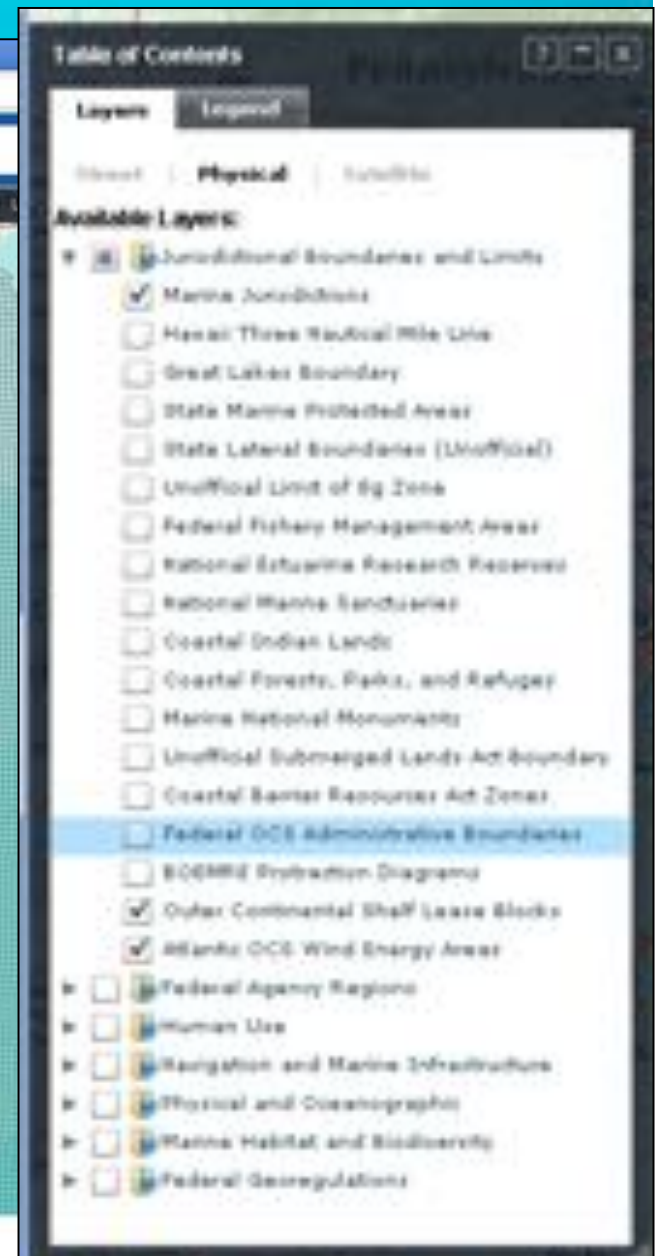
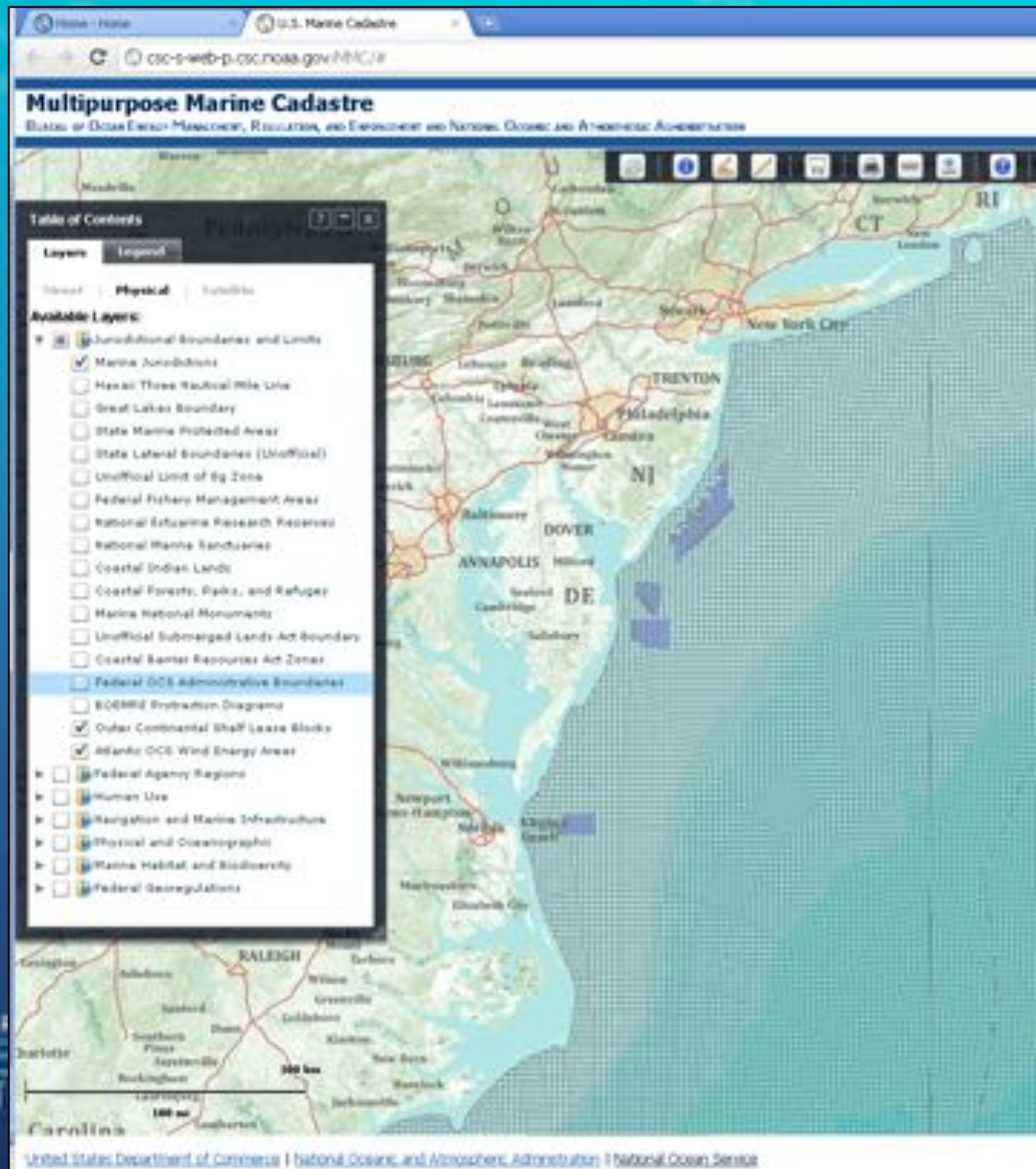
Decision Guide – Rubric



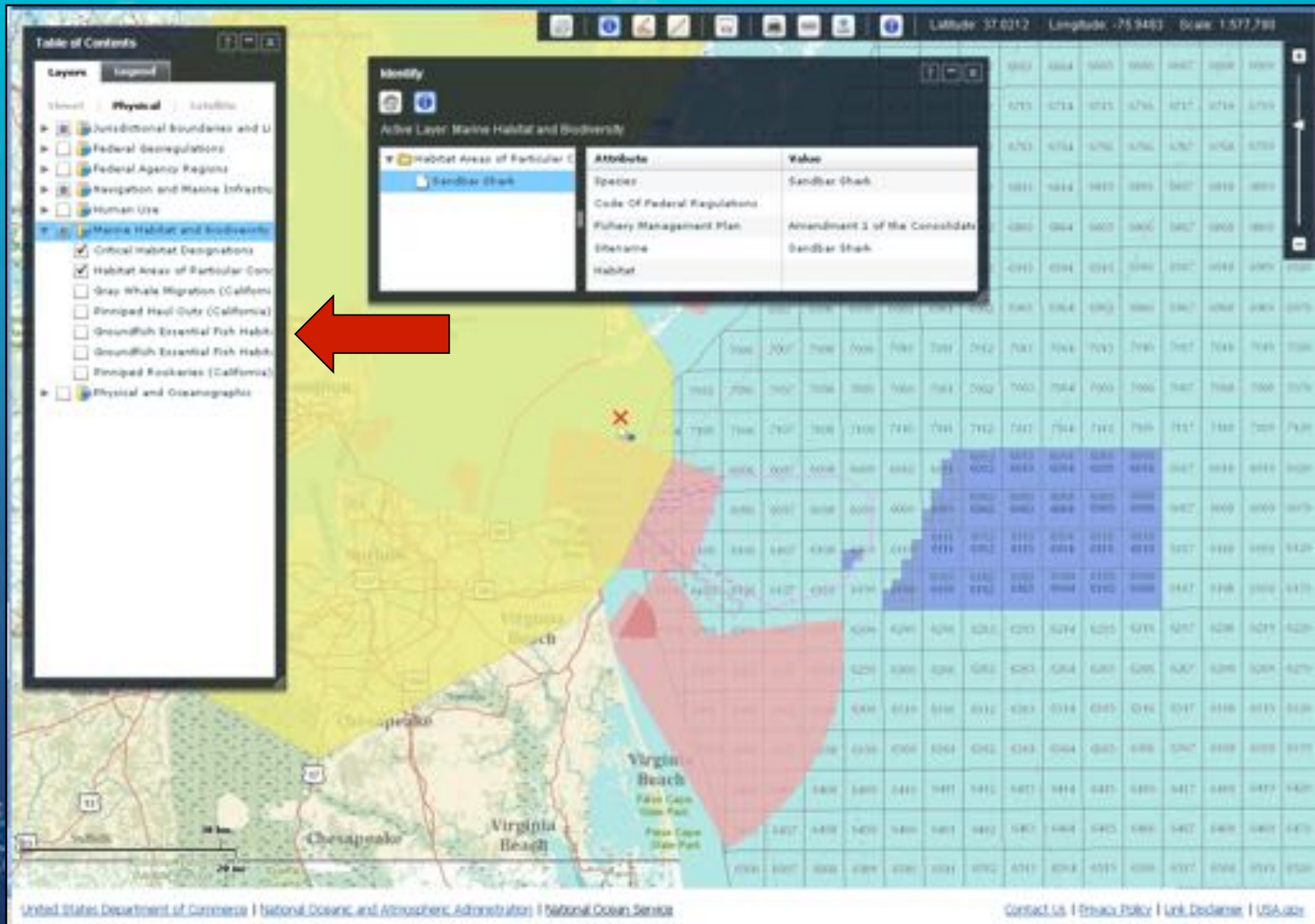
Decision Guide – Rubric

		PROCESS STEP		Gather data & define current conditions			Identify issues, constraints, and future conditions			Develop alternative management measures			Evaluate alternative scenarios			Monitor and evaluate management measures			Refine goals and objectives							
		TOOL FUNCTION			Data Management			Mapping & Visualization			Stakeholder Participation			Mapping & Visualization			Stakeholder Participation			Mapping & Visualization			Stakeholder Participation			Adaptive Management
Integrate Support Tools	ARIS	X	X	X	X	/	X	X	/	/	X	X	/	/	X	/	X	X	/	X	X	/				
	Atlantis					/			/				/			X			X			X				
	Coastal Resilience	X	X	/	X	/	/	X	/		/	X	/		/		X	/		X	/					
	Cumulative Impacts	/	X	/	X	○	/	X	○	X	/	X	○	X	/	○	X	/	○	X	/	○				
	INVEST	○	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
	MarineMap		X	X	X	X	X	X	X	X	X	X	X	X	X	/	X	X	/	X	X	/				
	Maroon with Tides		○	X	○	/	X	○	/	/	X	○	/	/	X	○	○	X	○	○	X	○				
	MMAIS	X	X	/	X	X	/	X	X	X	/	X	X	X	/	/	X	/	/	X	/	/				
	Multipurpose Marine Cadastre	X	/	○	/		/	/		/	○	/		/	○		/	○		/	○					

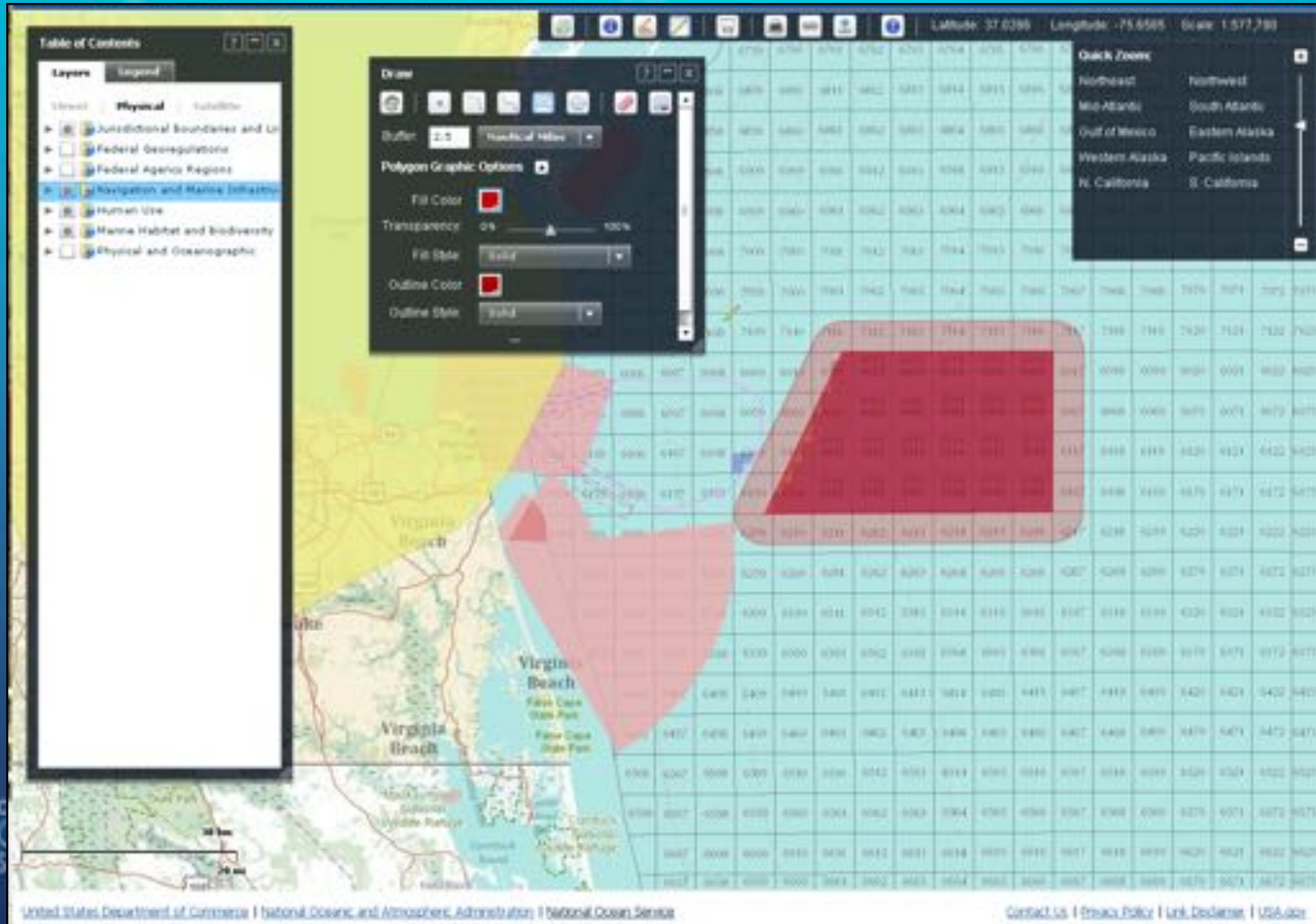
Multipurpose Marine Cadastre



Multipurpose Marine Cadastre



Multipurpose Marine Cadastre



Decision Support Tools in Practice

Ecological principles revisited...



1. Maintain native species diversity



2. Maintain habitat diversity & heterogeneity



3. Maintain populations of key species



4. Maintain connectivity between populations



DSTs in Practice – ecological principles

Ecological Principle	Features/data sets
Native species diversity	• Migratory hotspots • ADDITIONAL DATA NEEDED
Habitat diversity & heterogeneity	• Eelgrass • Persistent kelp forests • Estuaries • Nearshore habitats • Hard substrate • Upwelling centers
Key species	• Seabird density & colonies • Eelgrass • Persistent kelp forests • Leatherback sea turtles
Connectivity	• Upwelling centers • River plumes • Storm water run-off • Agricultural run-off

Proposed hydrokinetic project - Greenwave



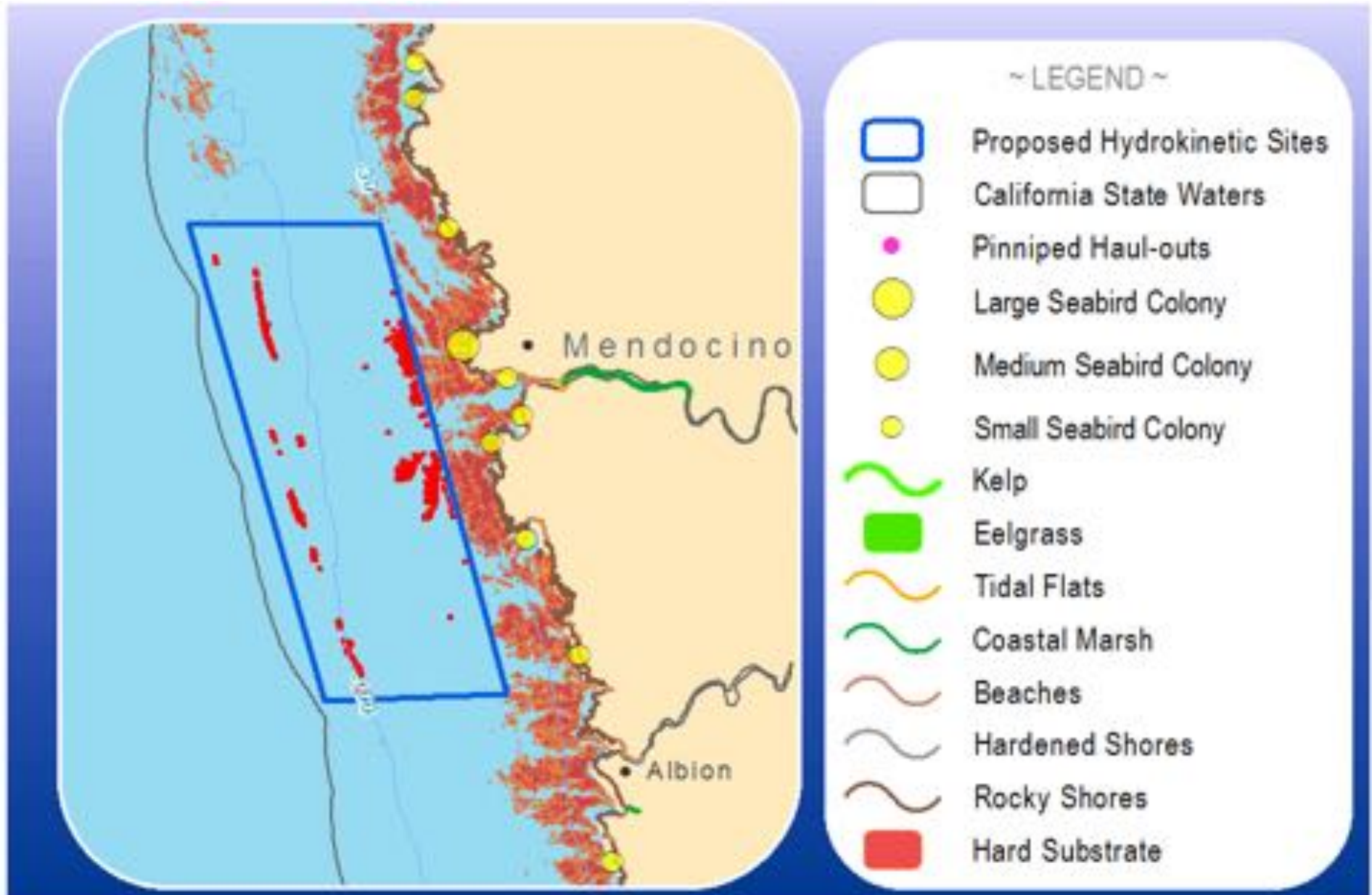
Proposed hydrokinetic project – Greenwave

- Ecosystem attributes



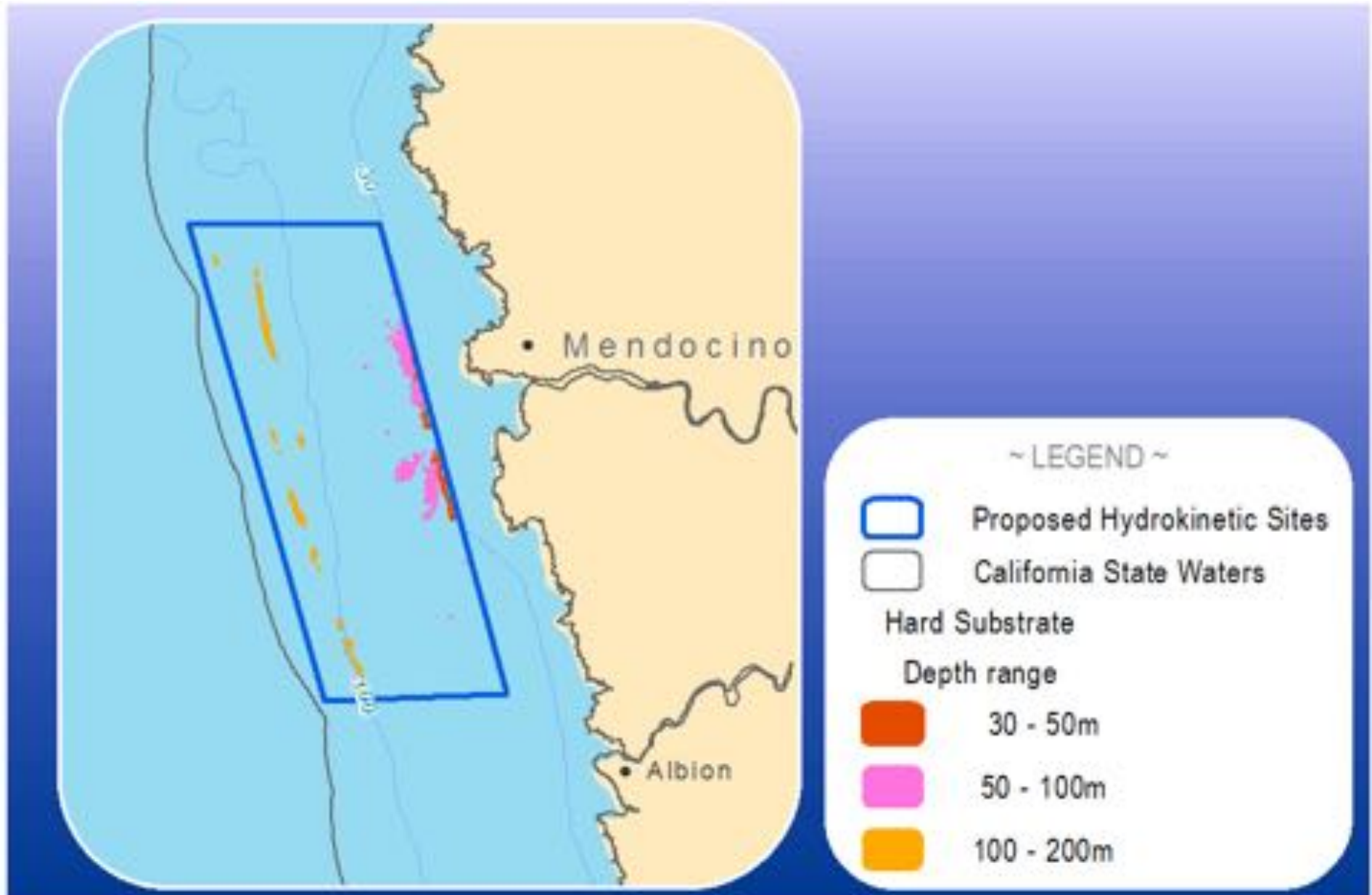
Proposed hydrokinetic project – Greenwave

- Vulnerable habitat incompatible with hydrokinetic siting



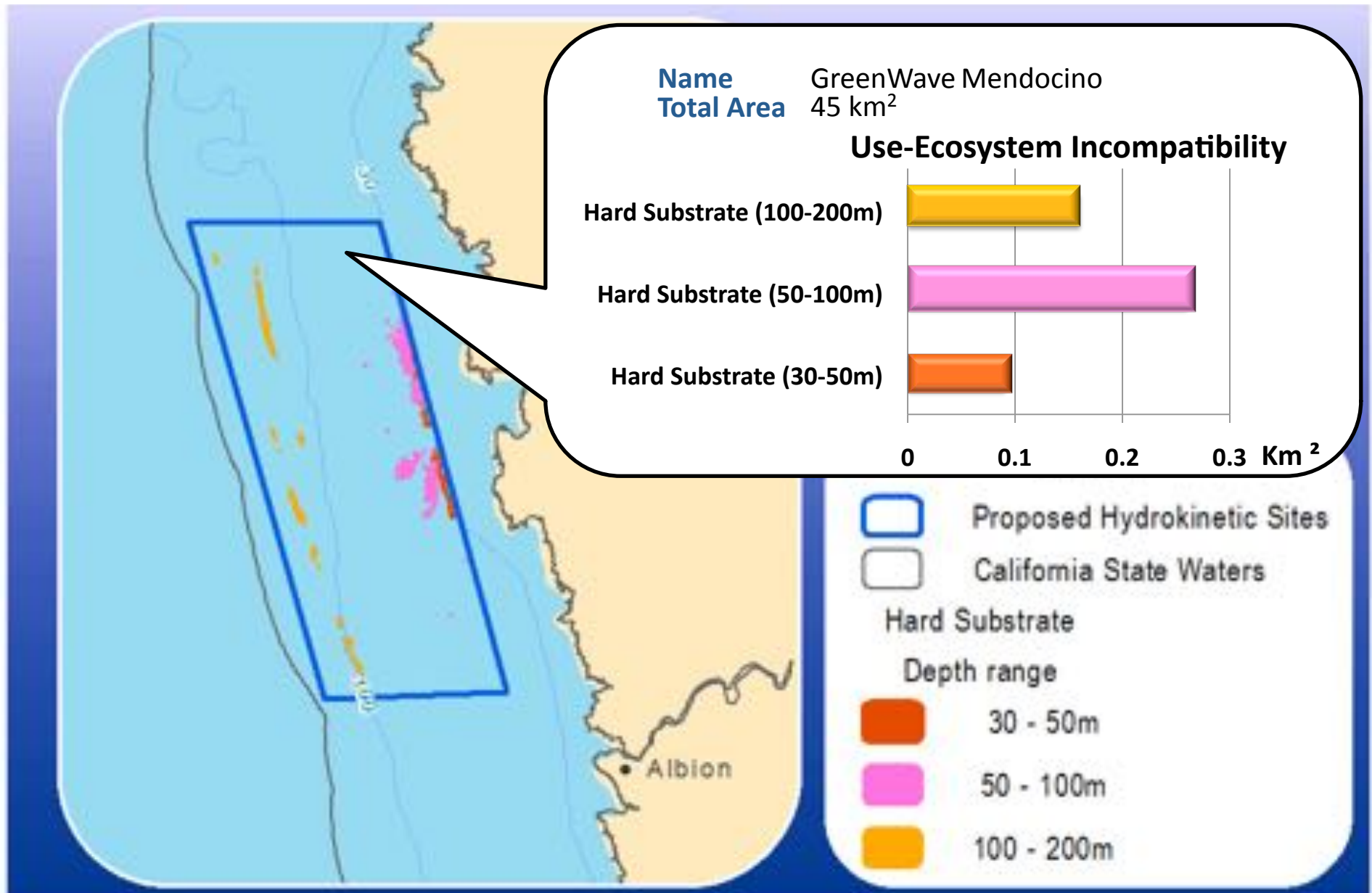
Proposed hydrokinetic project – Greenwave

- Vulnerable habitat within hydrokinetic footprint



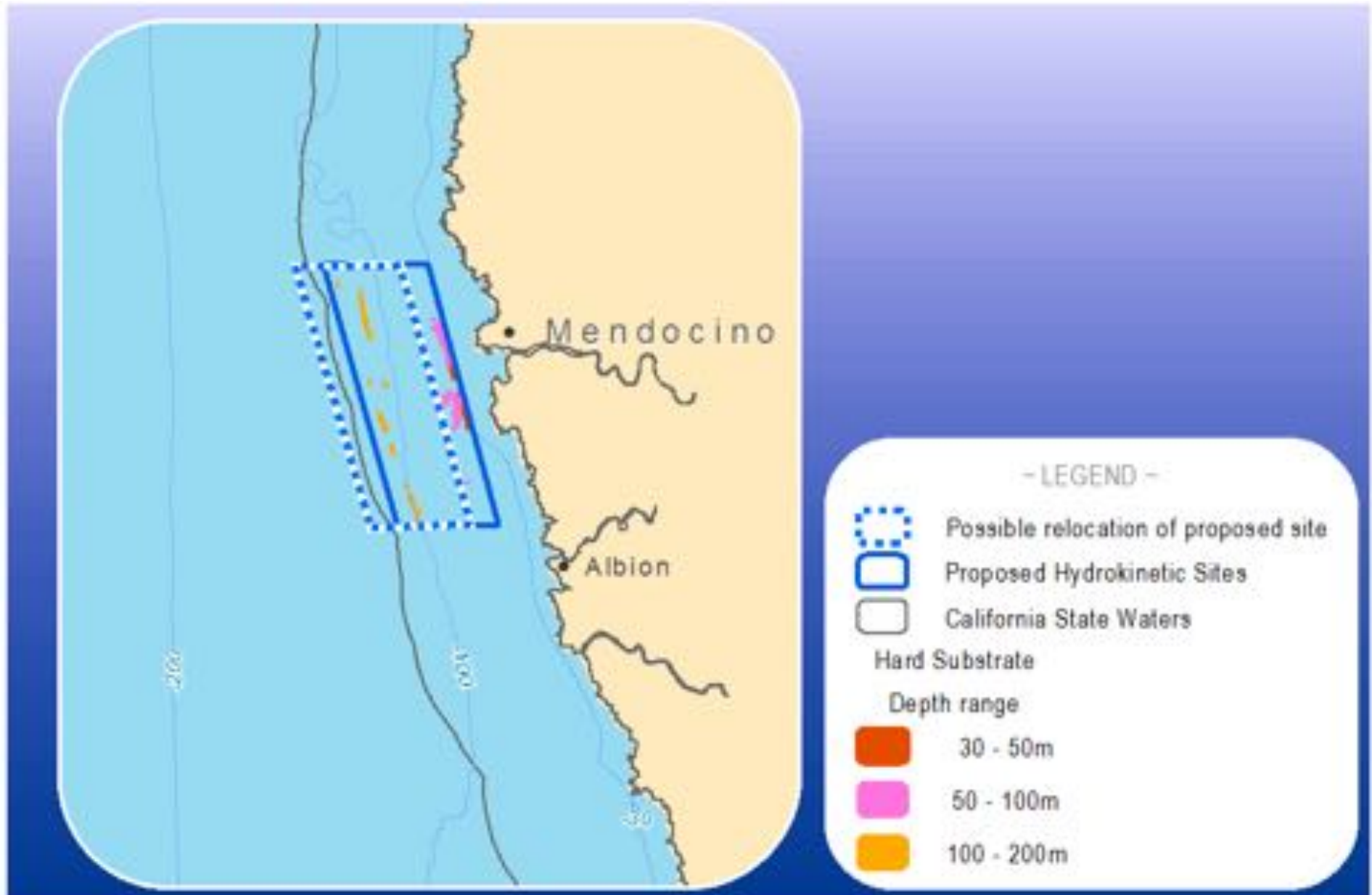
Proposed hydrokinetic project – Greenwave

- Vulnerable habitat incompatible with hydrokinetic siting



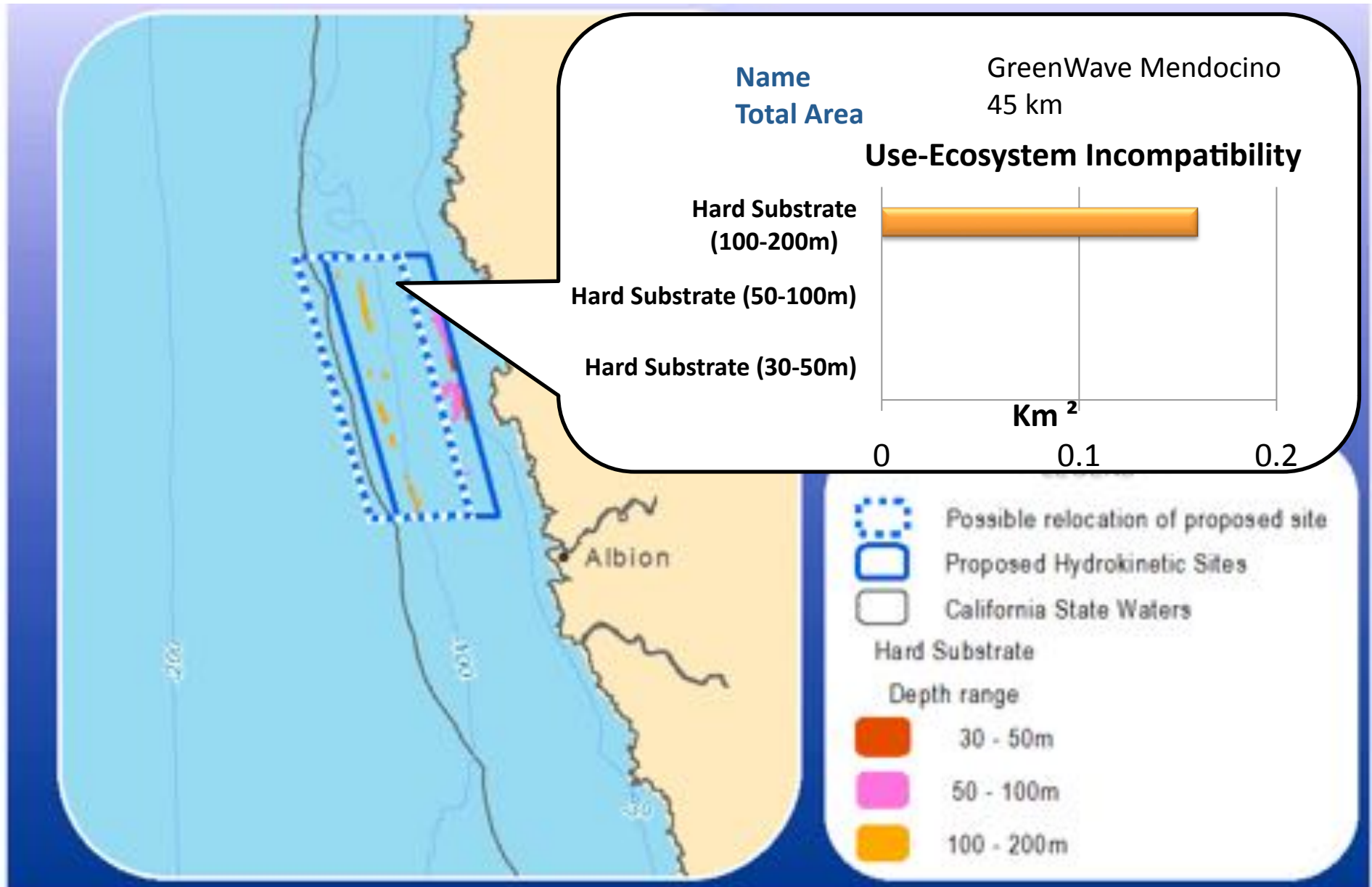
Proposed hydrokinetic project – Greenwave

- Possible relocation of proposed site – offshore alternative



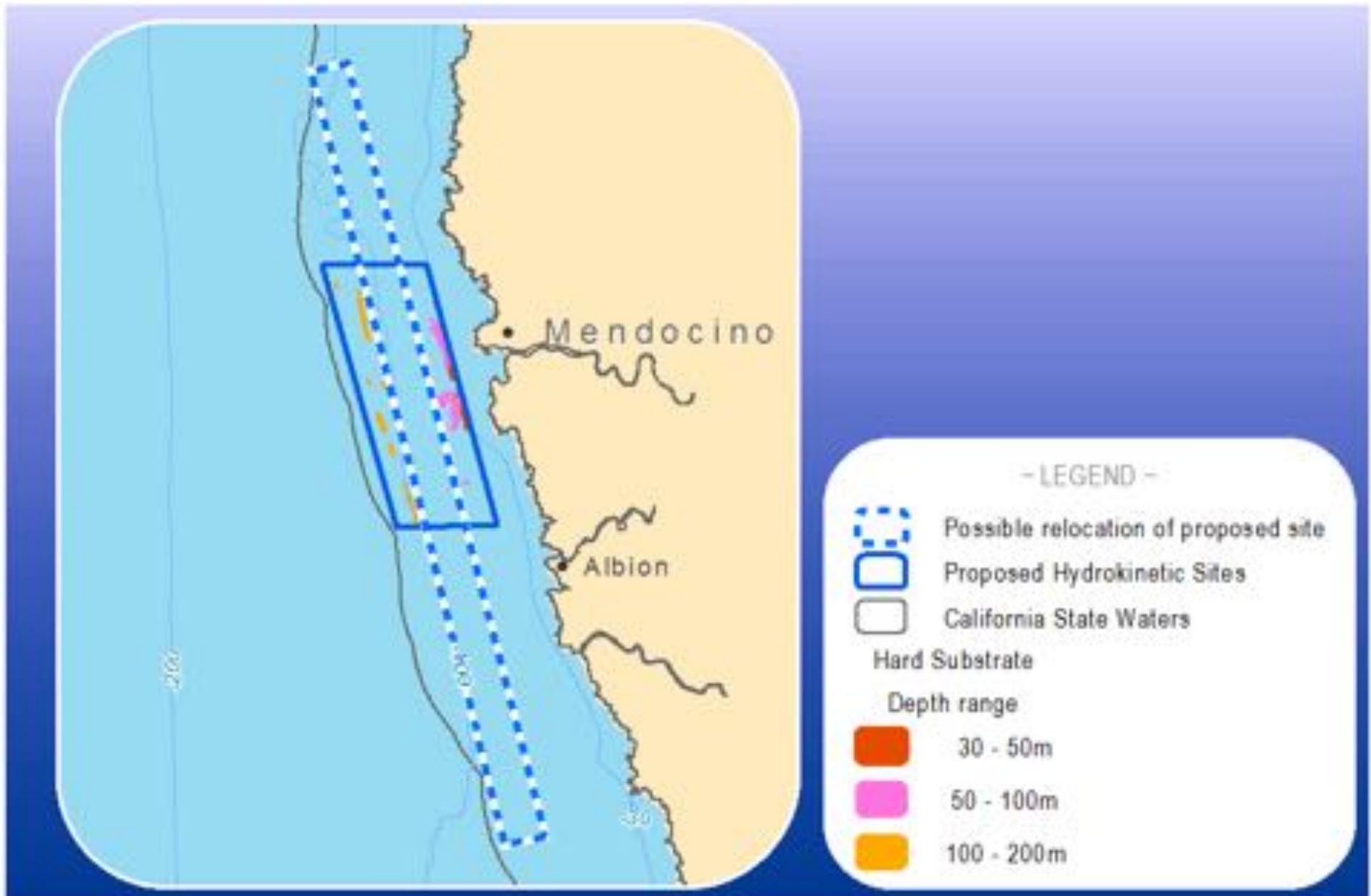
Proposed hydrokinetic project – Greenwave

- Vulnerable habitat incompatibility – offshore alternative



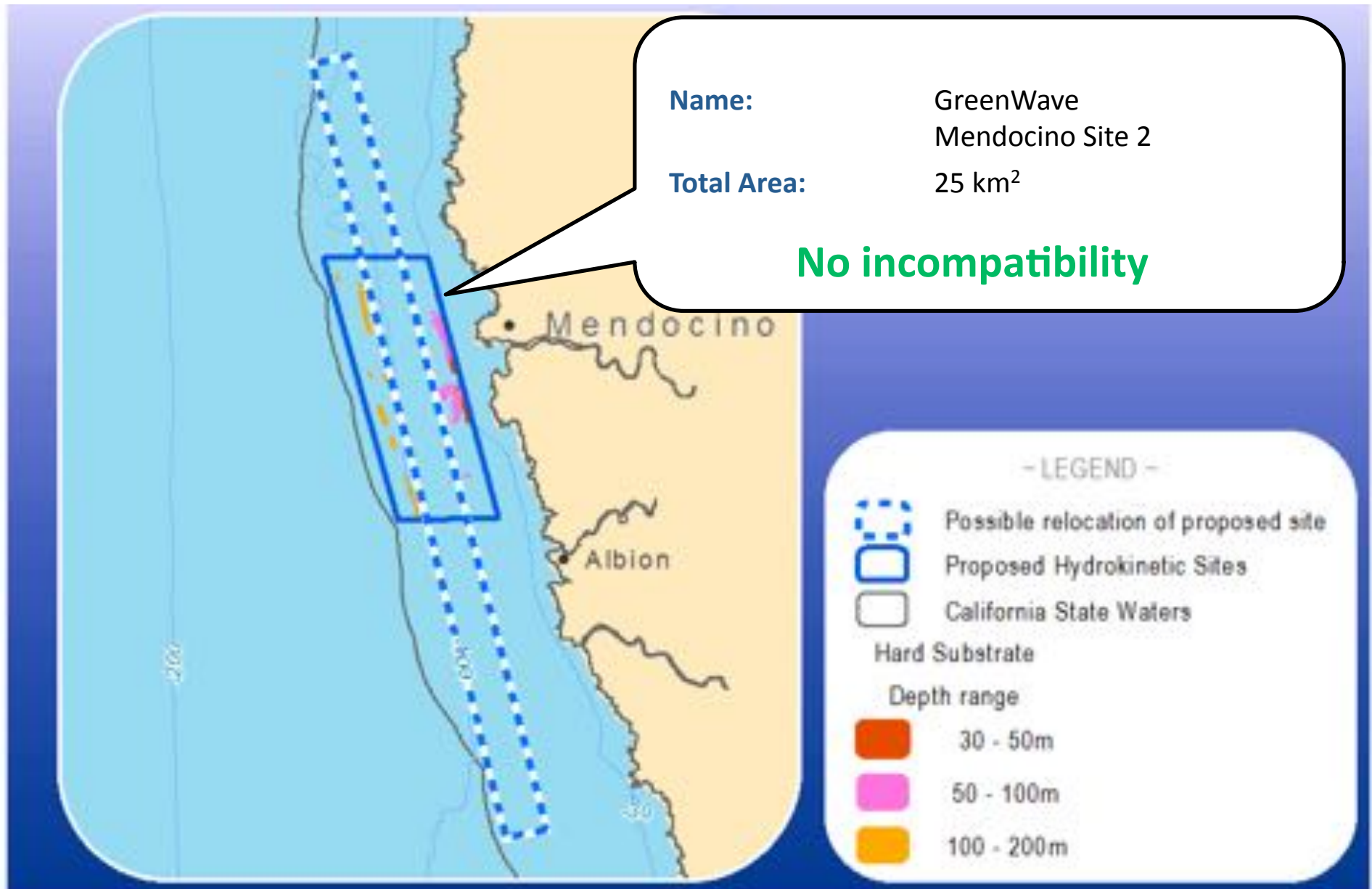
Proposed hydrokinetic project – Greenwave

- Possible relocation of proposed site – nearshore alternative



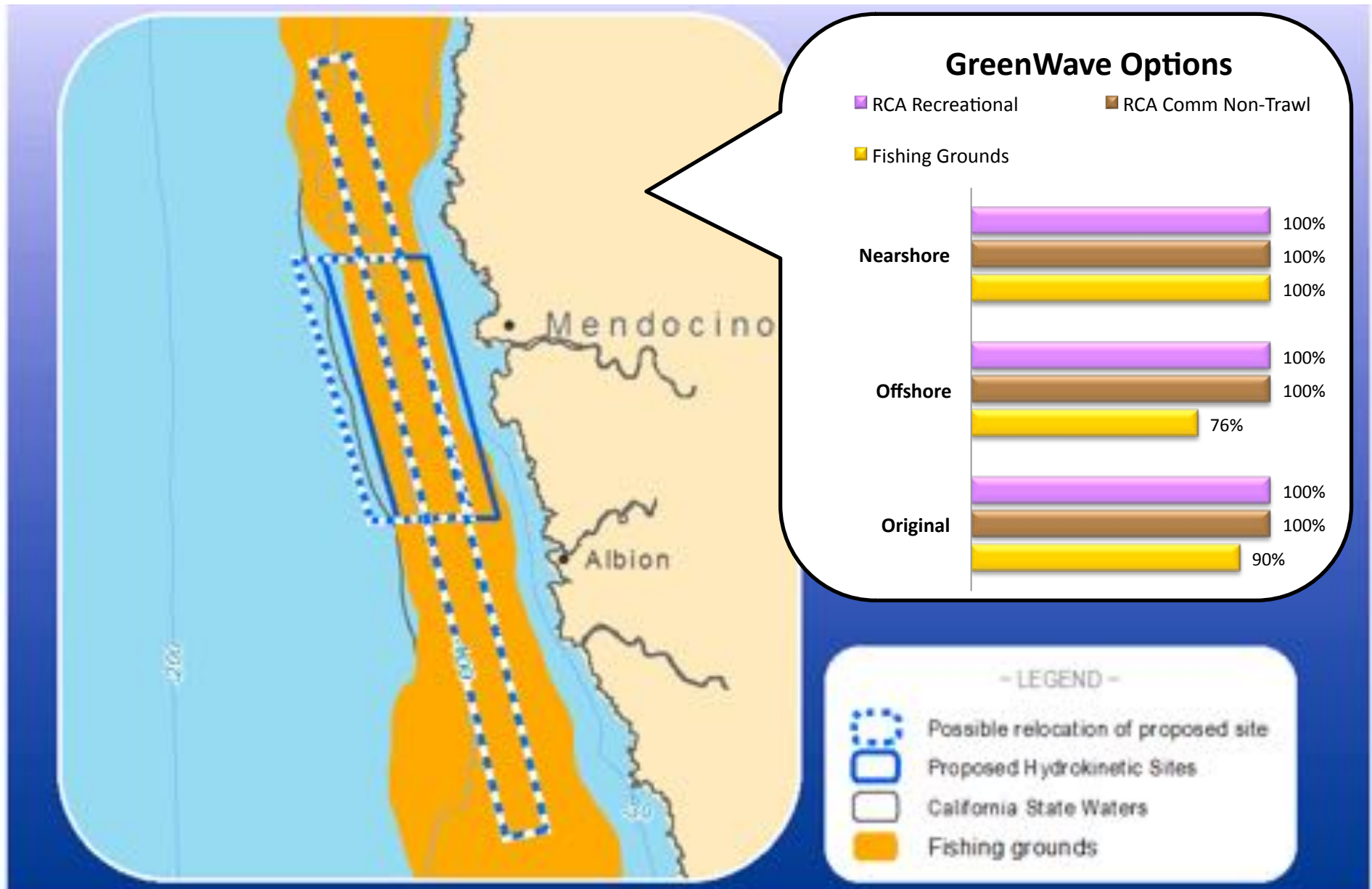
Proposed hydrokinetic project – Greenwave

- No vulnerable habitat incompatibility – nearshore alternative



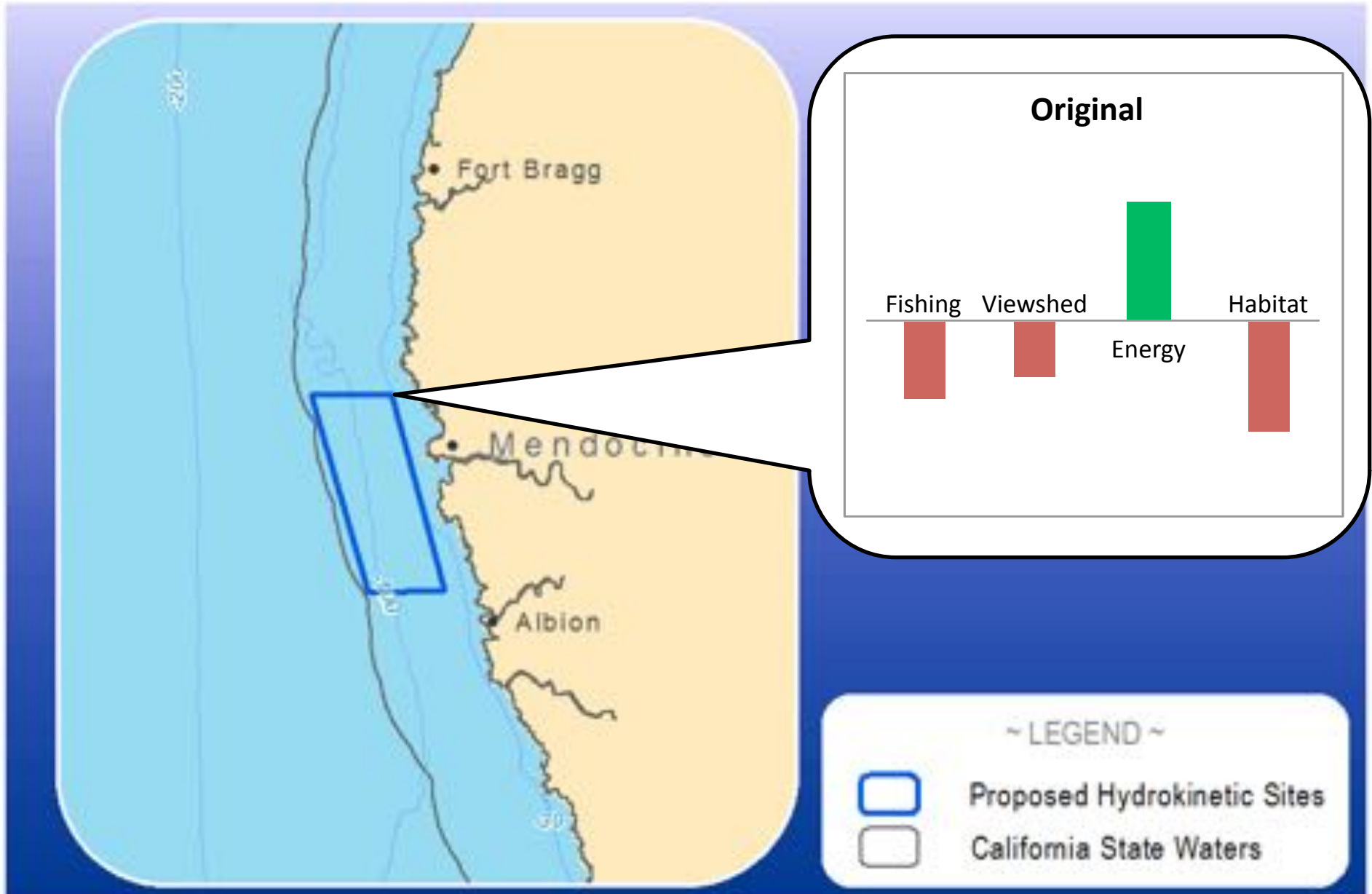
Proposed hydrokinetic project – Greenwave

- Overlap of human uses & management areas



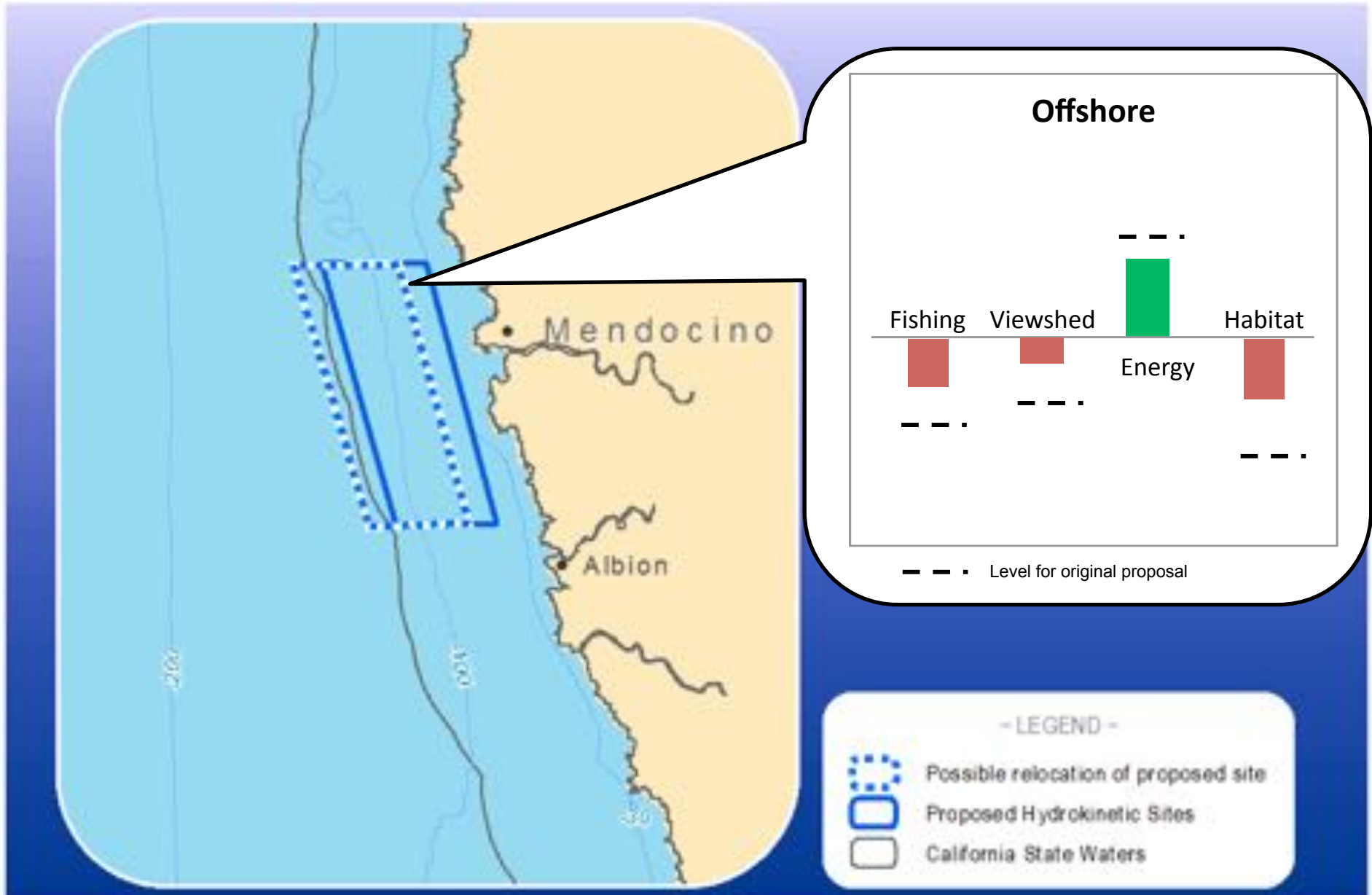
Trade-off analysis

- Social, economic, & ecological considerations



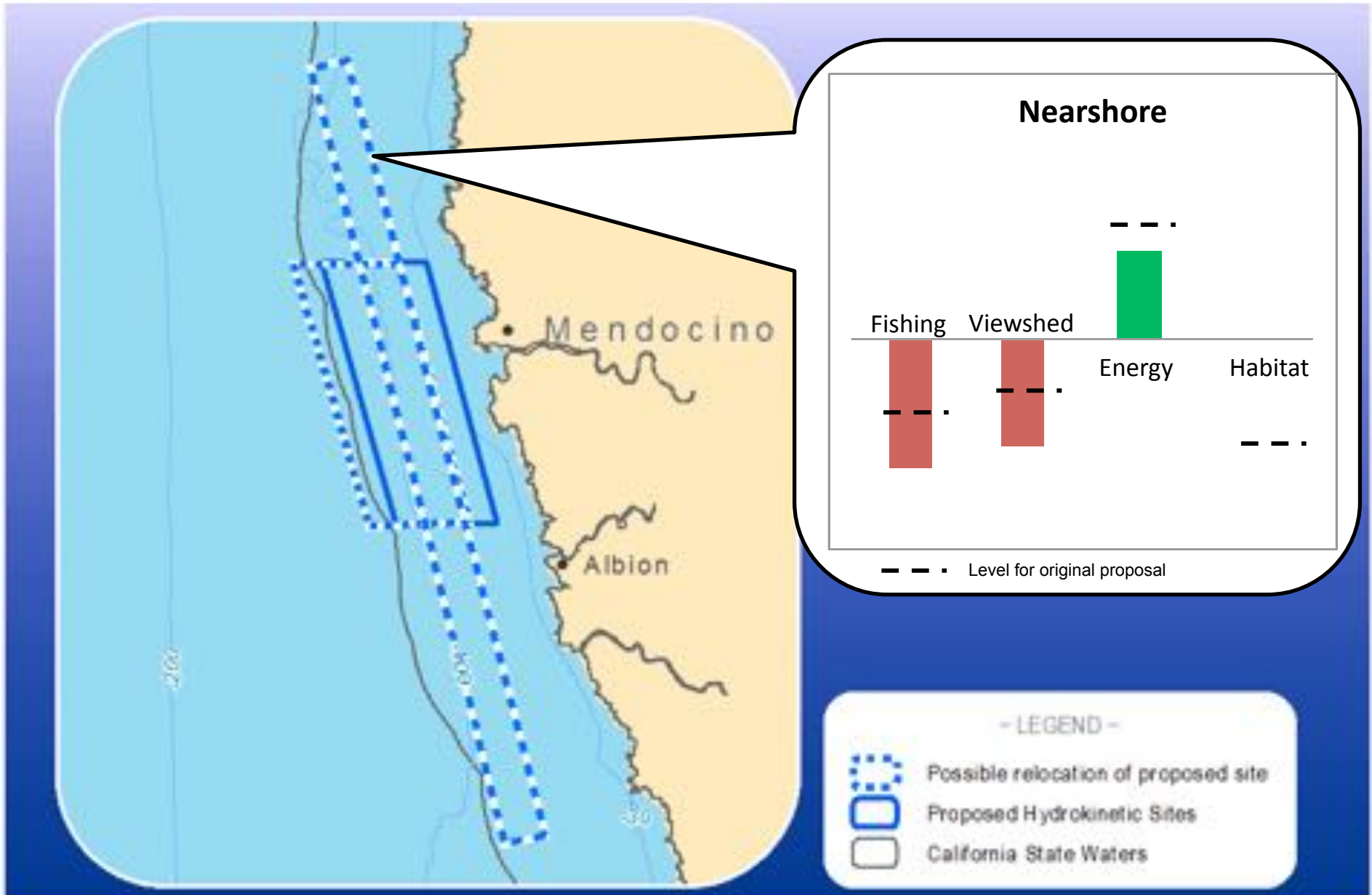
Trade-off analysis

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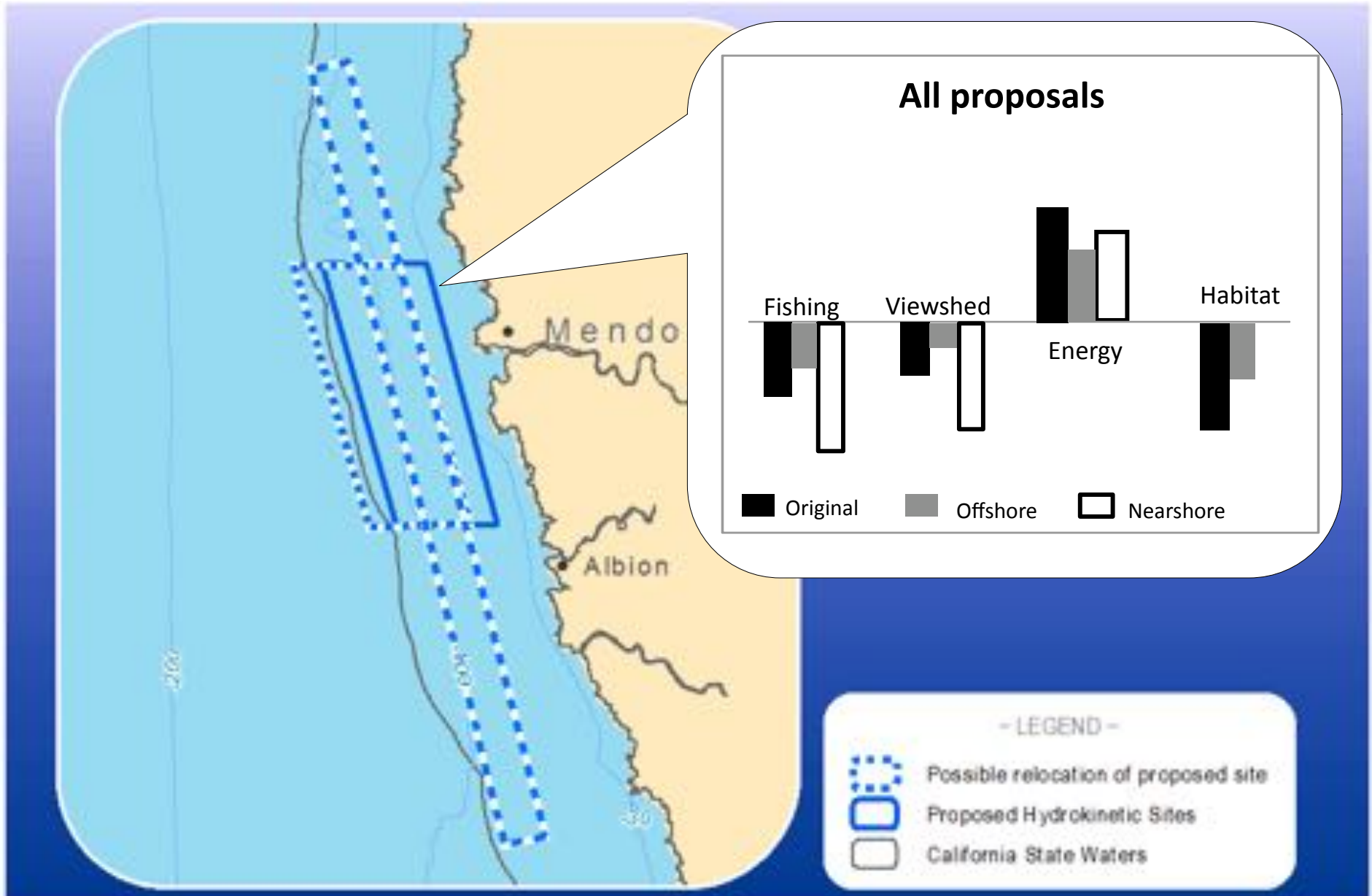
Trade-off analysis

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Trade-off analysis

- Social, economic, & ecological considerations



Information required during project review

Project site and existing conditions	☐
Surrounding areas and the types and frequencies of their use	☐
Types & locations of habitats of rare, threatened, or endangered species	☐
Spatial relationship to wetlands, shellfish resources, aquatic vegetation, and critical habitat areas	☐
Compliance with any general or specific land use plan	☐
Project development plan that shows the project's nature, features, and location with respect to the proposed site	☐
Expected environmental impacts	☐
Site and project alternatives with a description of why the proponent selected them proposed site	☐
Proposed mitigation measures	☐

Summary

- National Information Management System prototype in the fall (late October)
- NROC and MARCO regional portal development in progress
- Fisheries data an important component of portals but often not included
- Many decision support tools available to support marine spatial planning efforts
- Use of decision support tools help to include stakeholders in the process and make trade-offs and management decisions more transparent

Thanks!



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