GIS and Offshore Wind

Frank Pendleton

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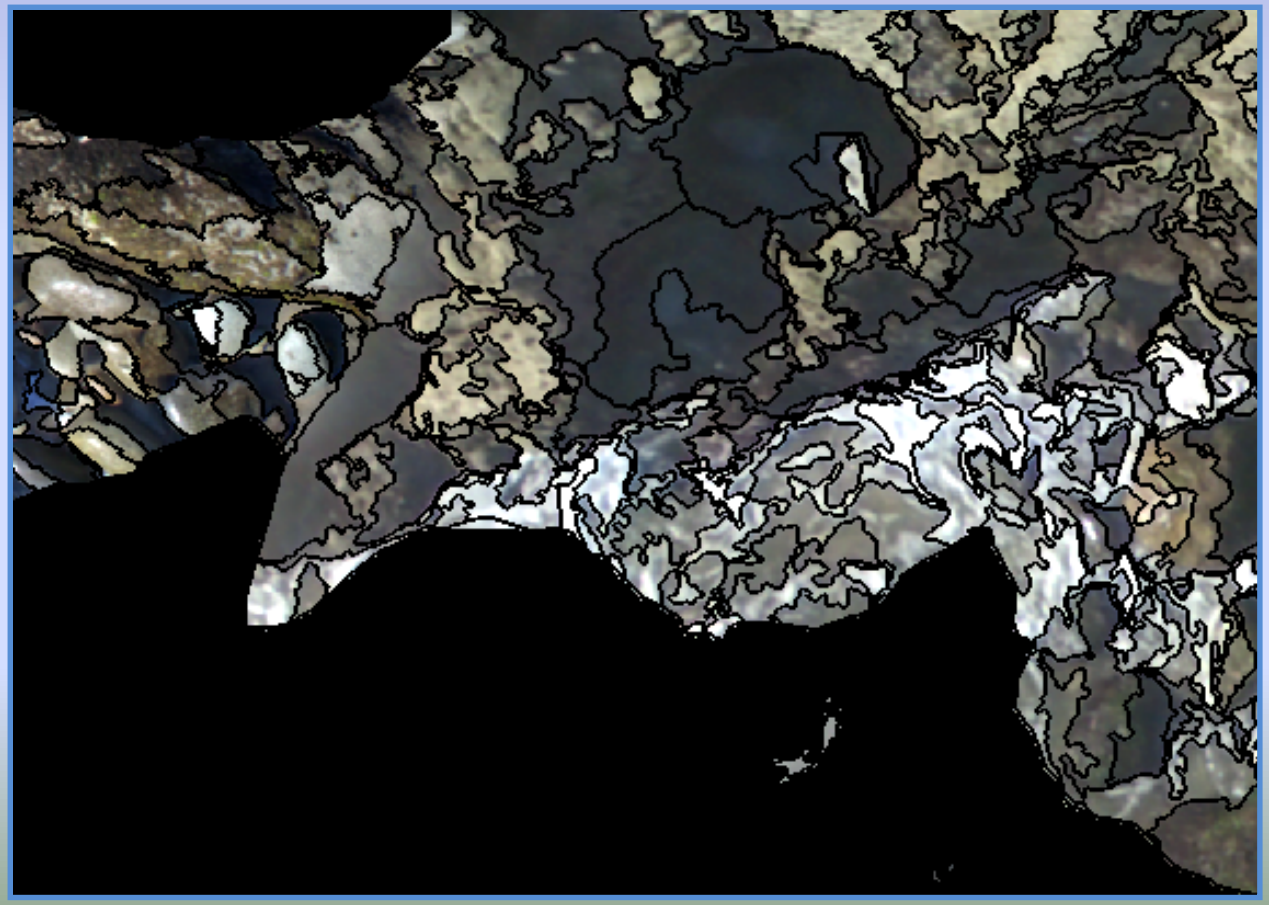
Bureau of Ocean Energy Management

Pacific OCS Region

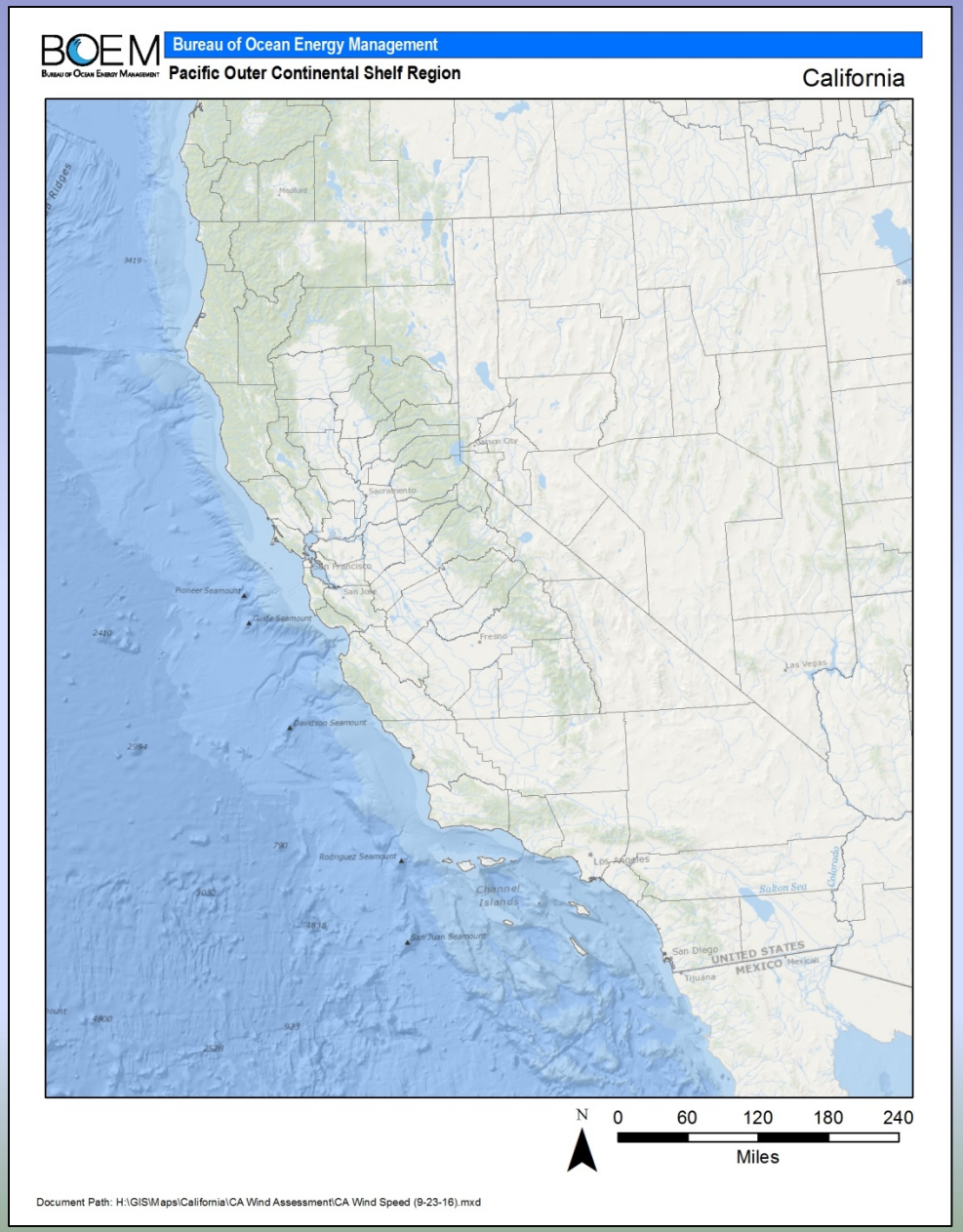


November 2, 2016

GIS and Offshore Wind

Geographic Information Systems

- More than Maps
- Data
- Analysis
- Maps bring data to your soul.

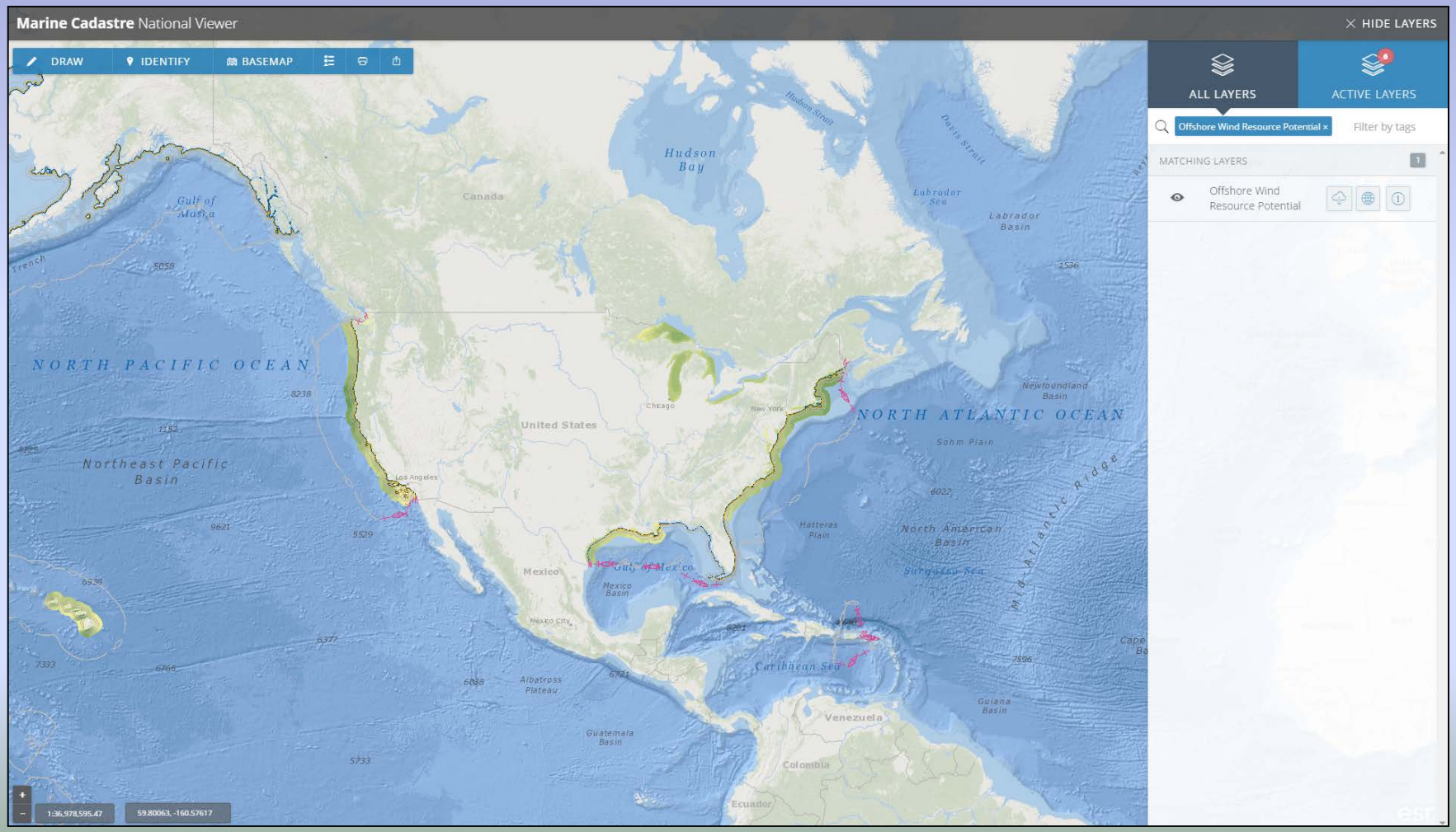


Overview

- All projects happen somewhere…
  - and other things happen there too.
- A few things to consider for Offshore Wind
  - Political Boundaries
  - Bathymetry
  - Wind Speed
  - Ports
  - Vessel Traffic

Data Portals

- Marine Cadastre / Wind Prospector
- View, Download, Services

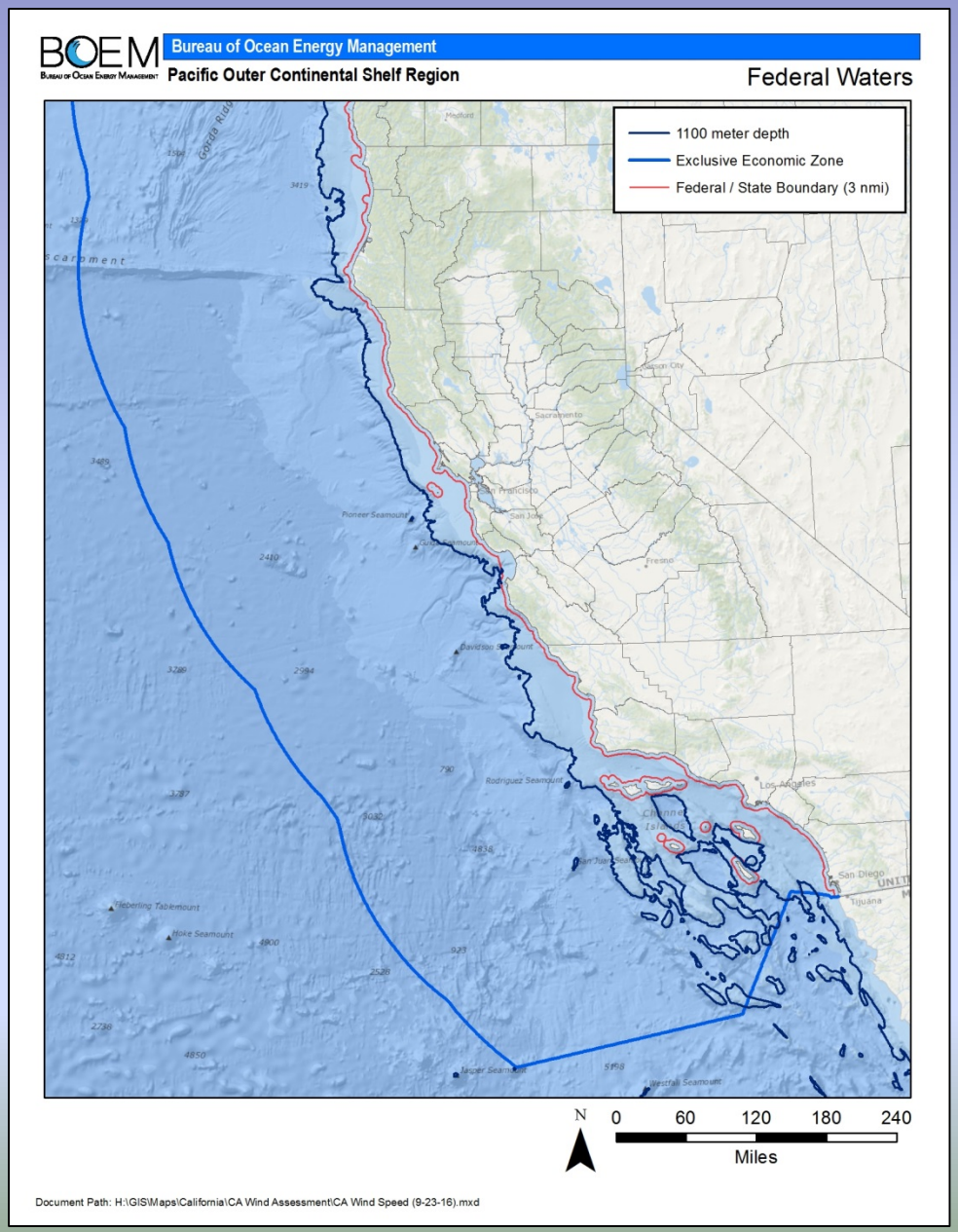


Federal or State Waters

- Federal / State Line (3 nmi)
- Exclusive Economic Zone (200 nmi)

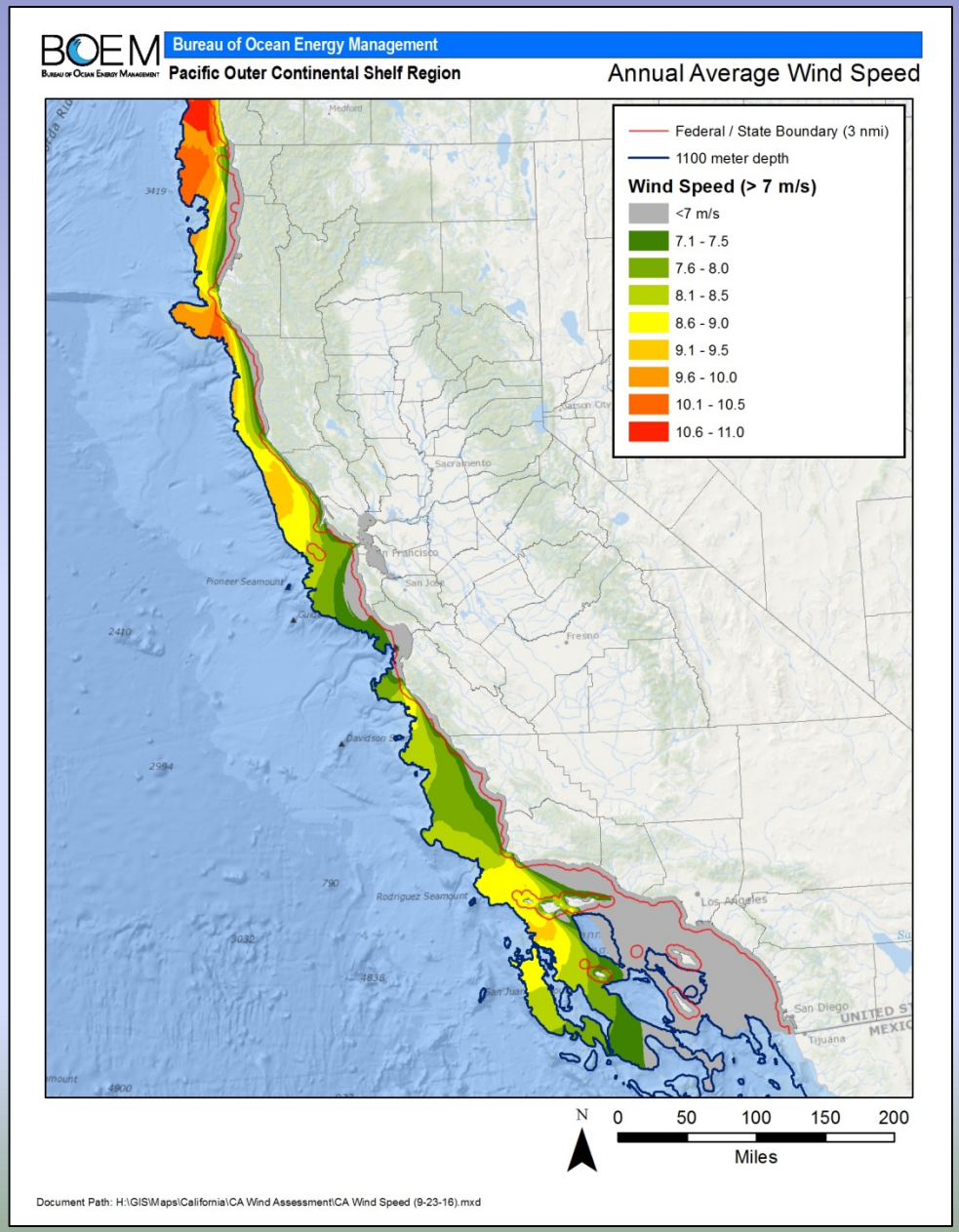
Bathymetry

- 1100 meter contour



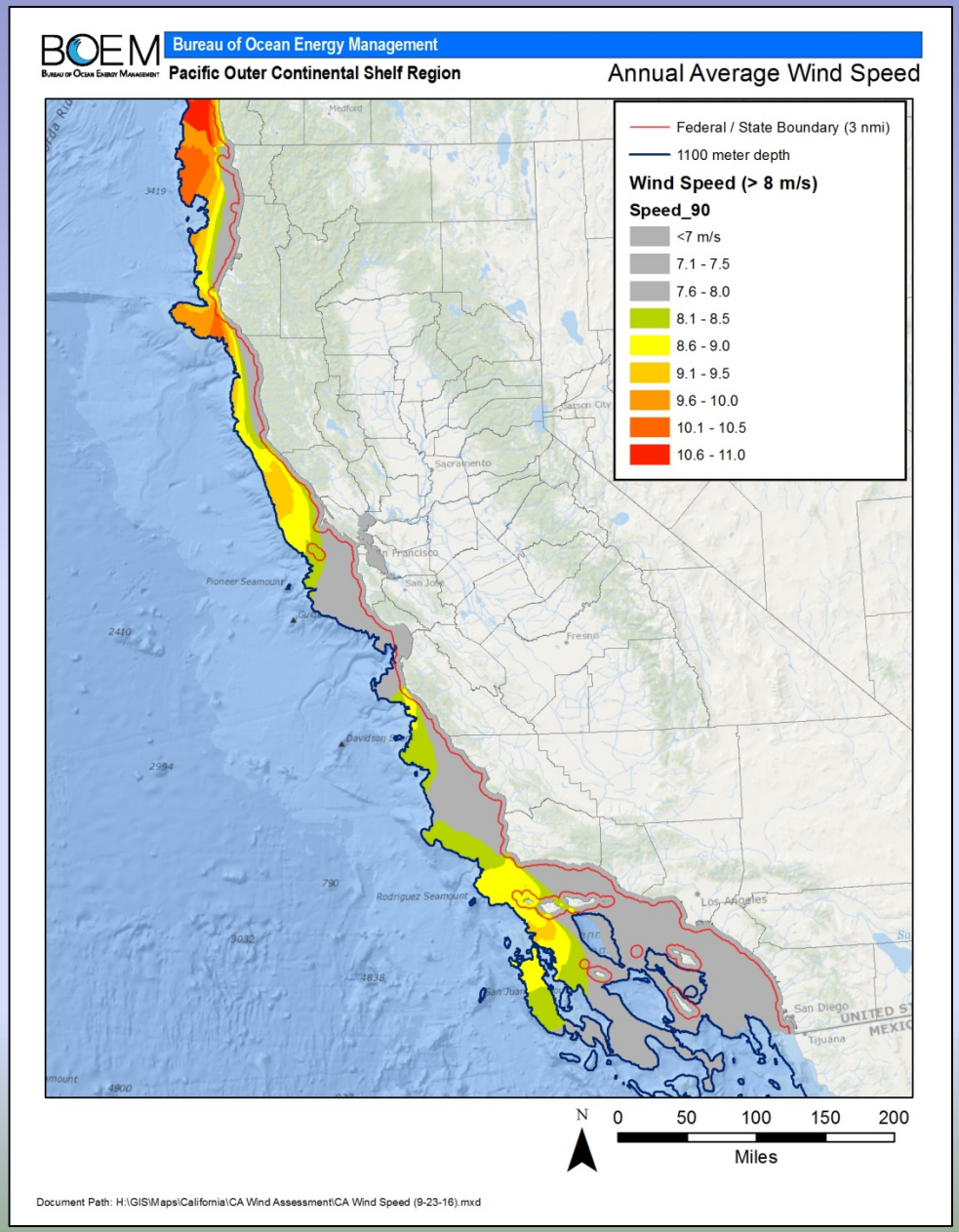
Average Wind Speed

- 7 m/s wind speed
- NREL data



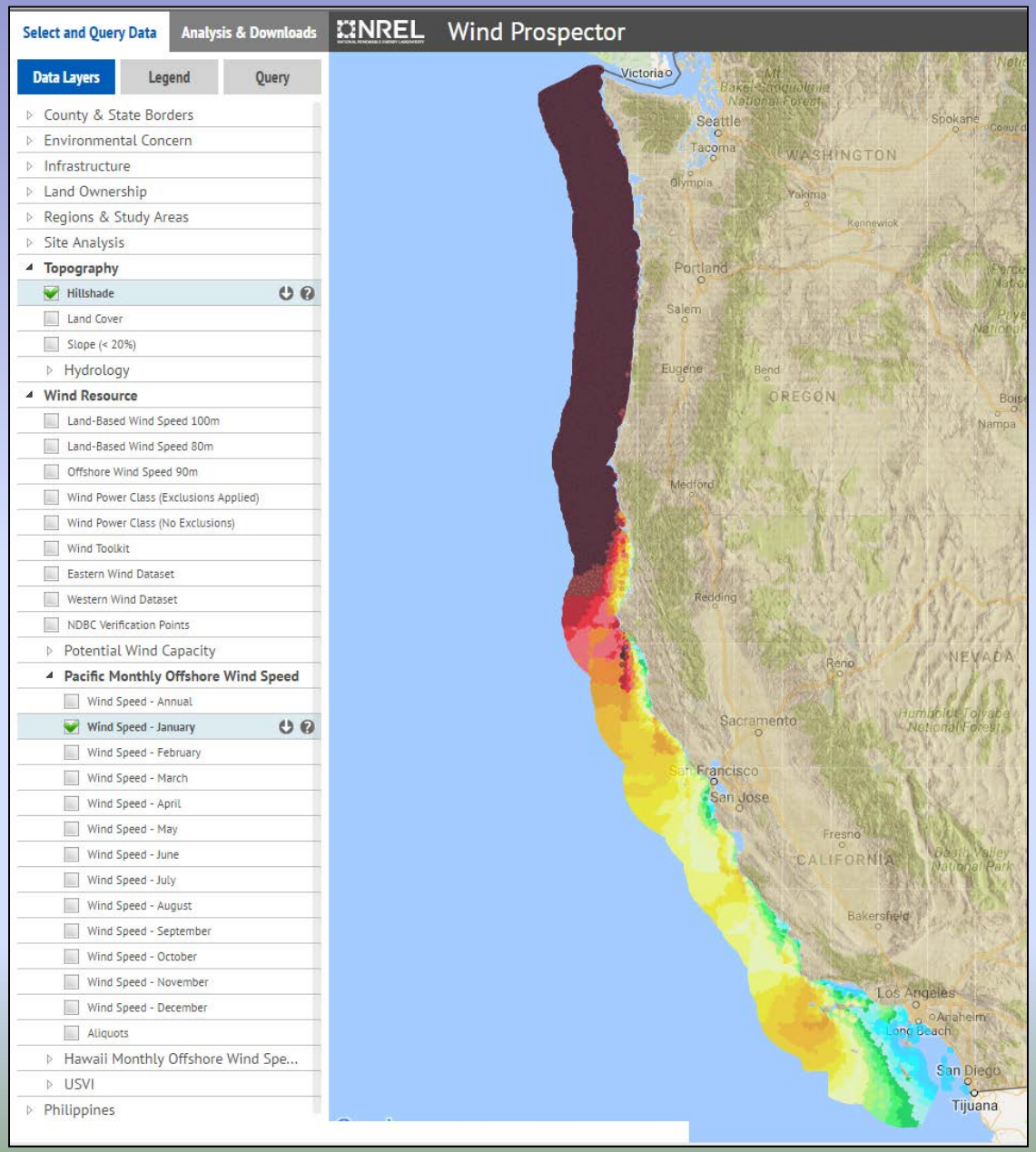
Average Wind Speed

- 8 m/s wind speed
- Annual Average
- But wind isn't always the same.
- Hourly Data by Month
  - Modeled by NREL



Wind Speed Variation

- Hourly by Month
- By BOEM Aliquot
- NREL
  - Wind Prospector



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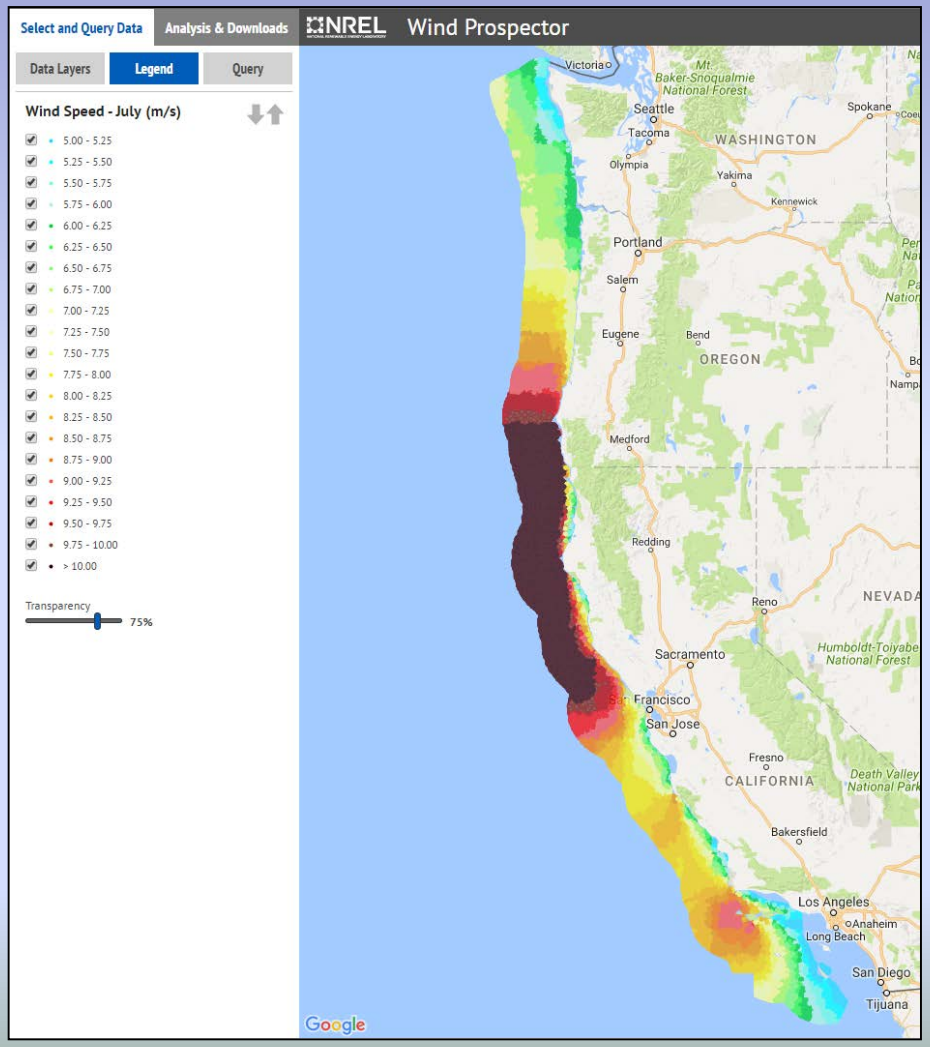
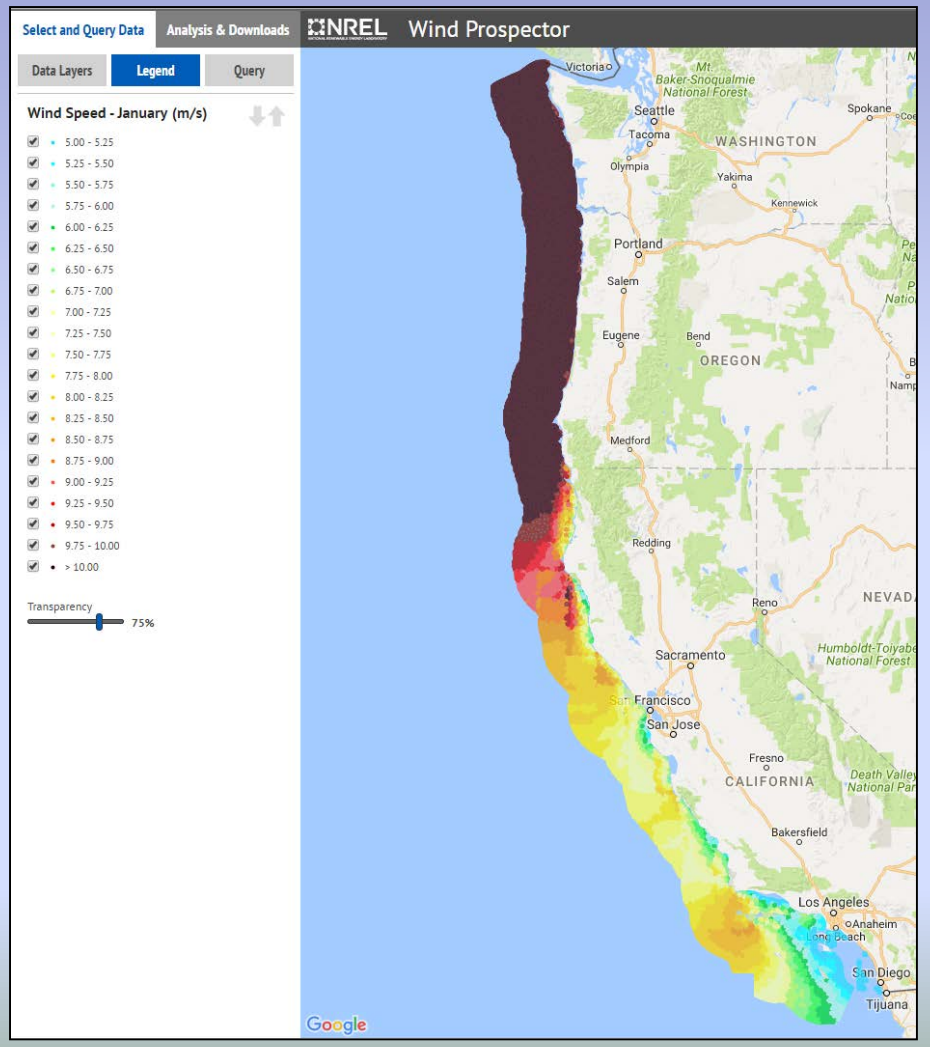
Wind Speed Variation

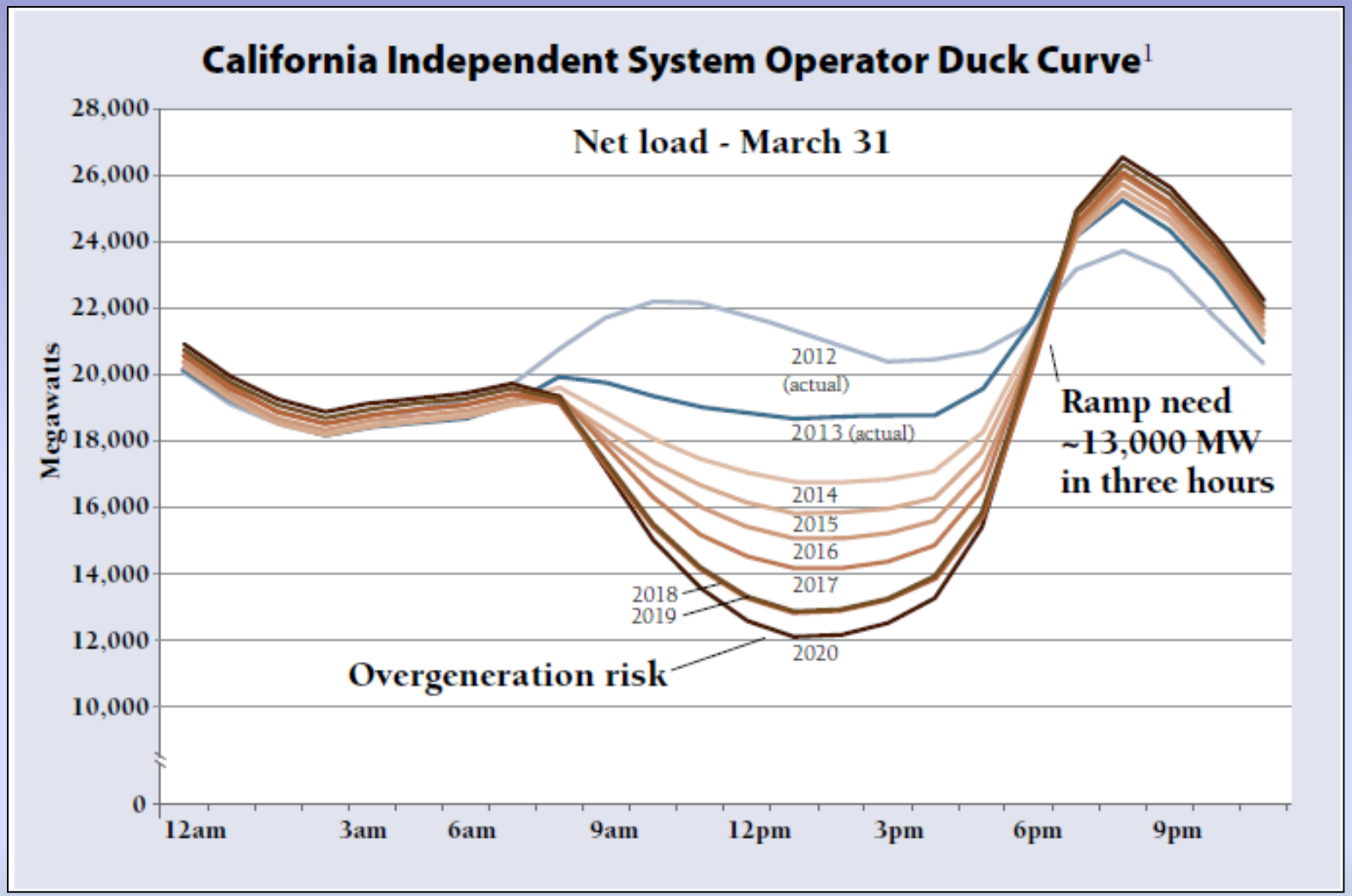
July



January



The Duck Curve



California ISO. (2013). "What the duck curve tells us about managing a green grid."

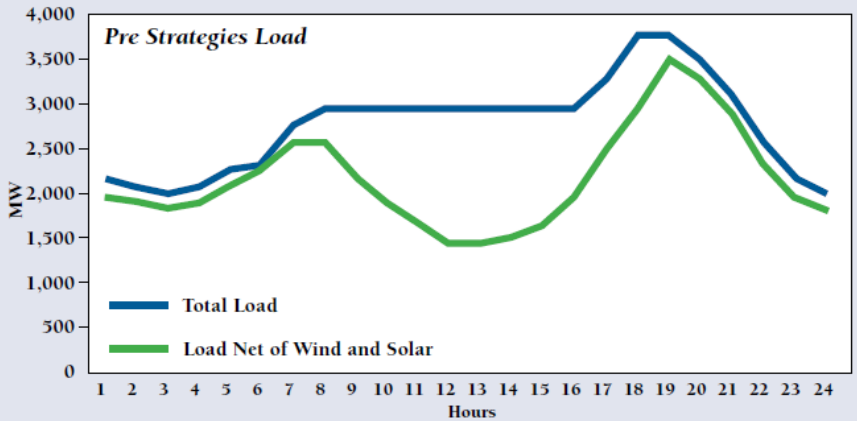
Flattening out the Duck Curve

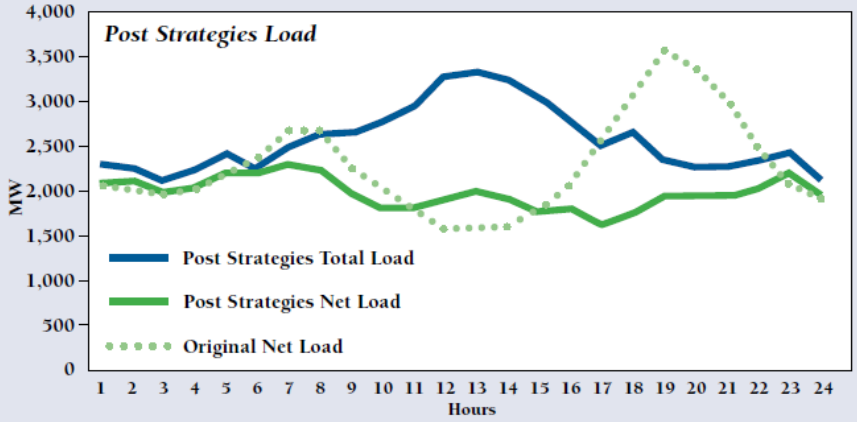
RAP® Energy solutions for a changing world

Teaching the "Duck" to Fly

Second Edition

Author
Jim Lazar

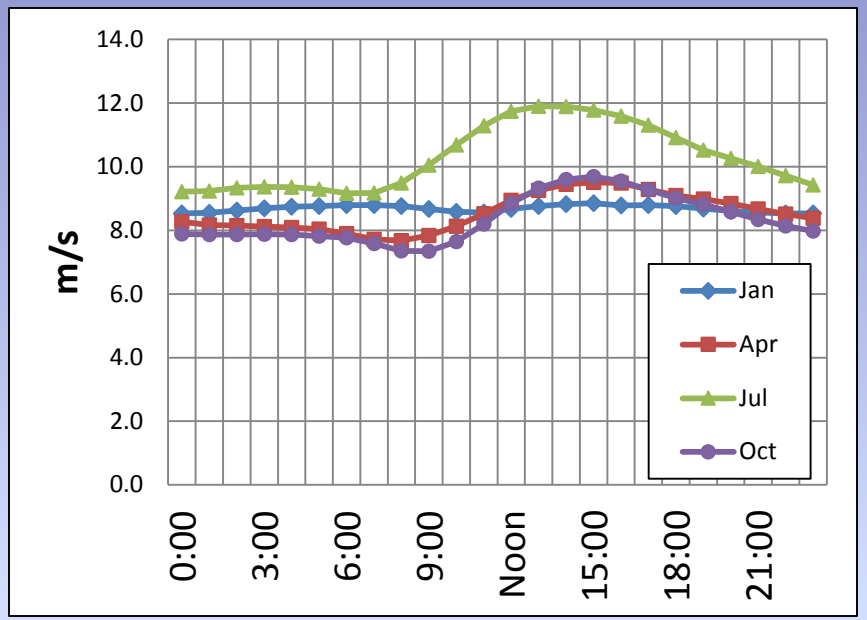


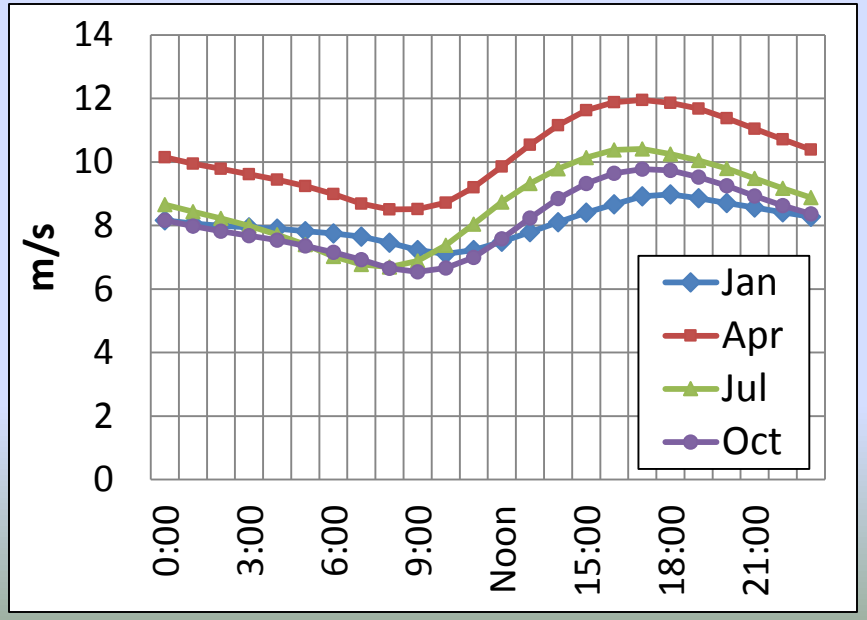


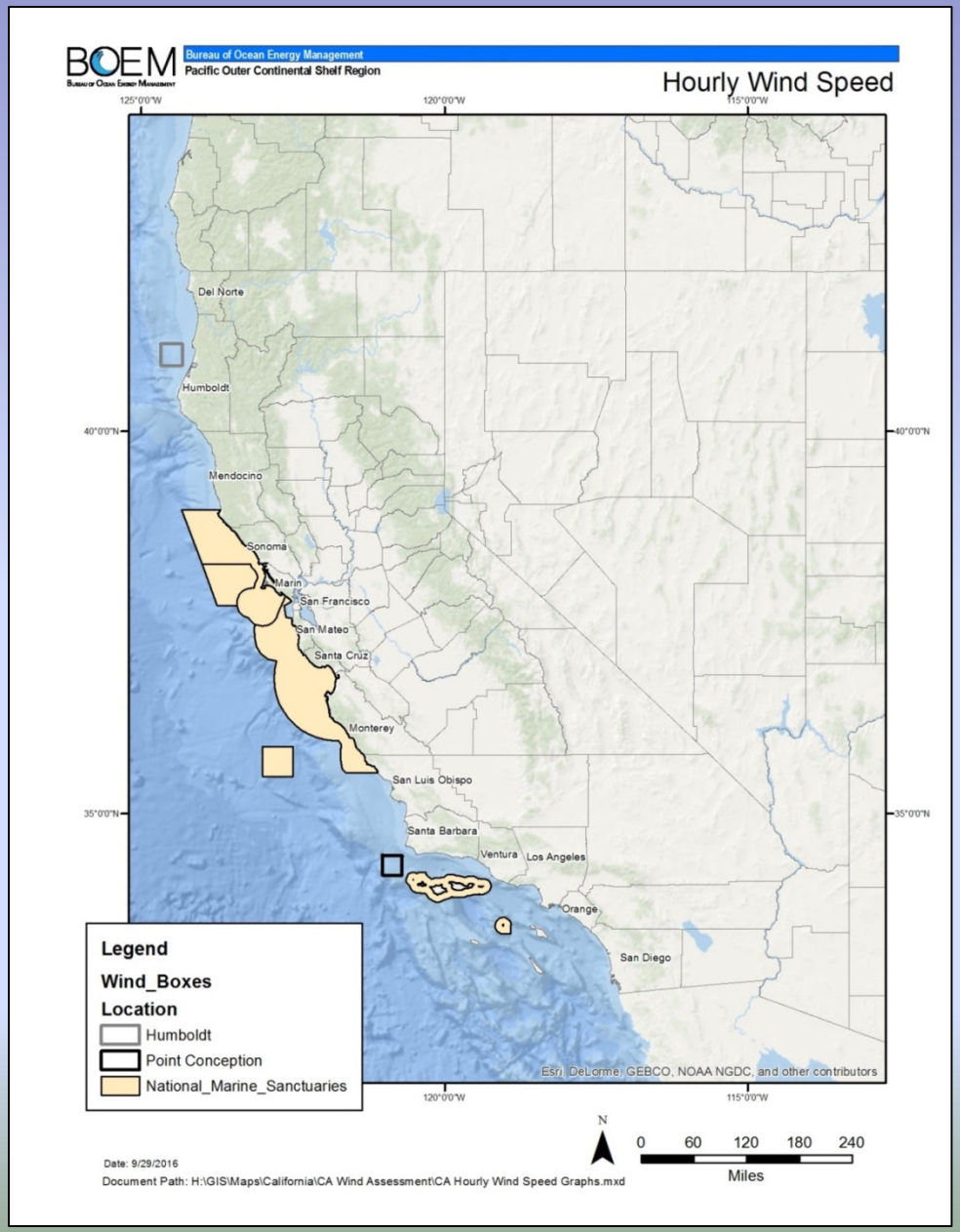
Strategy 2:

Acquire and Deploy Peak-Oriented Renewable Resources

Hourly Wind Speed







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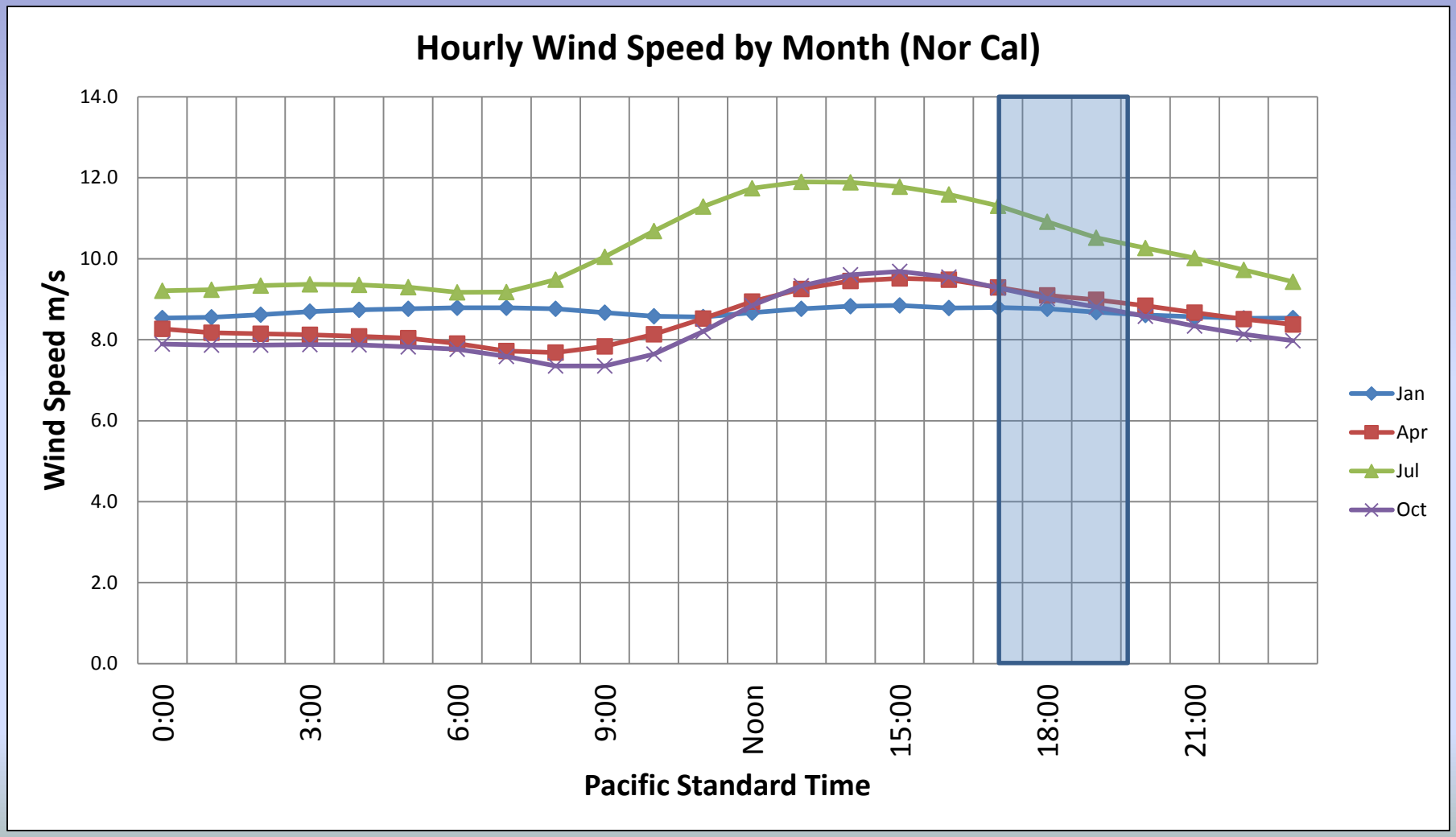
Hourly Wind Speed



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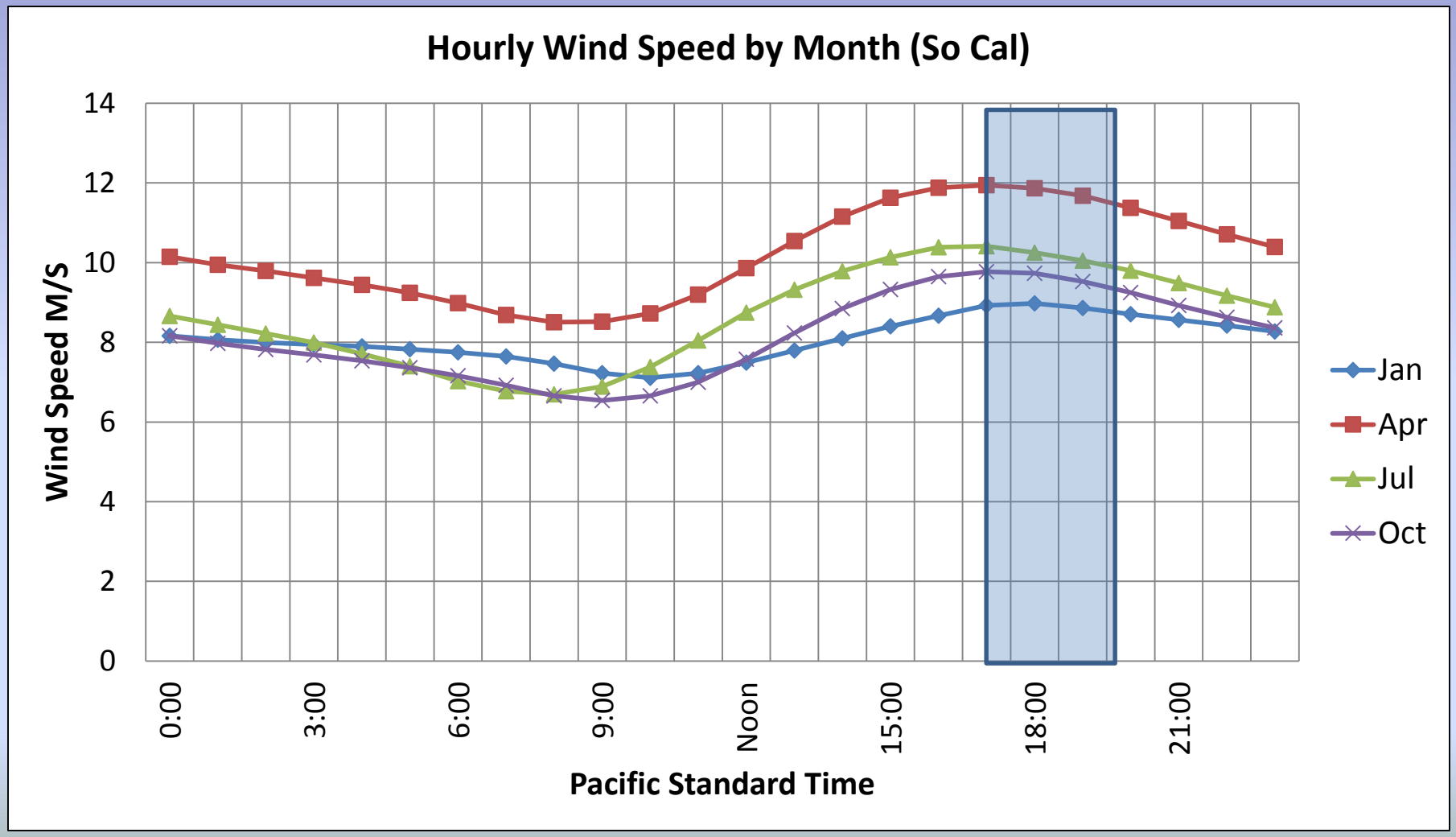
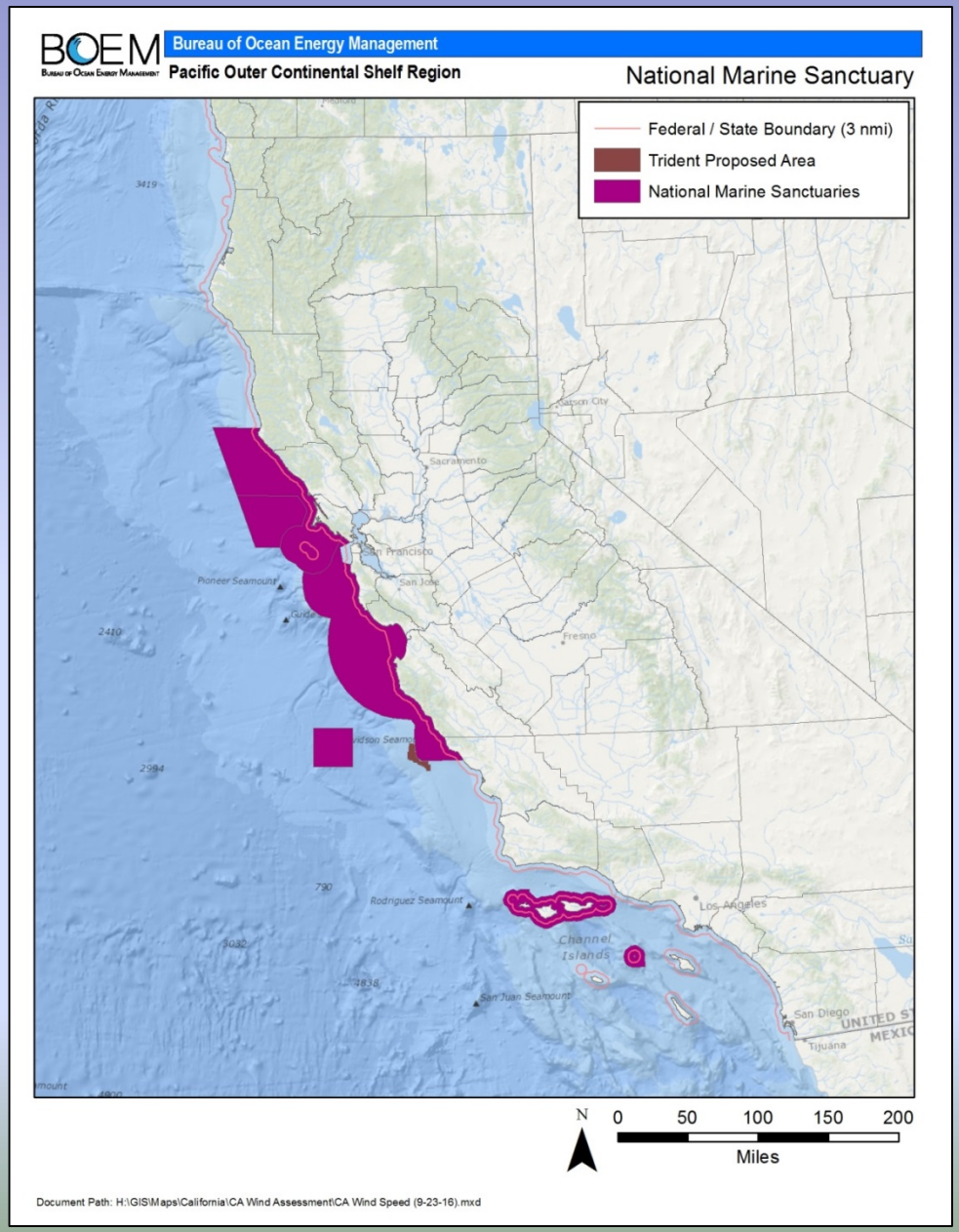
Hourly Wind Speed



National Marine Sanctuaries

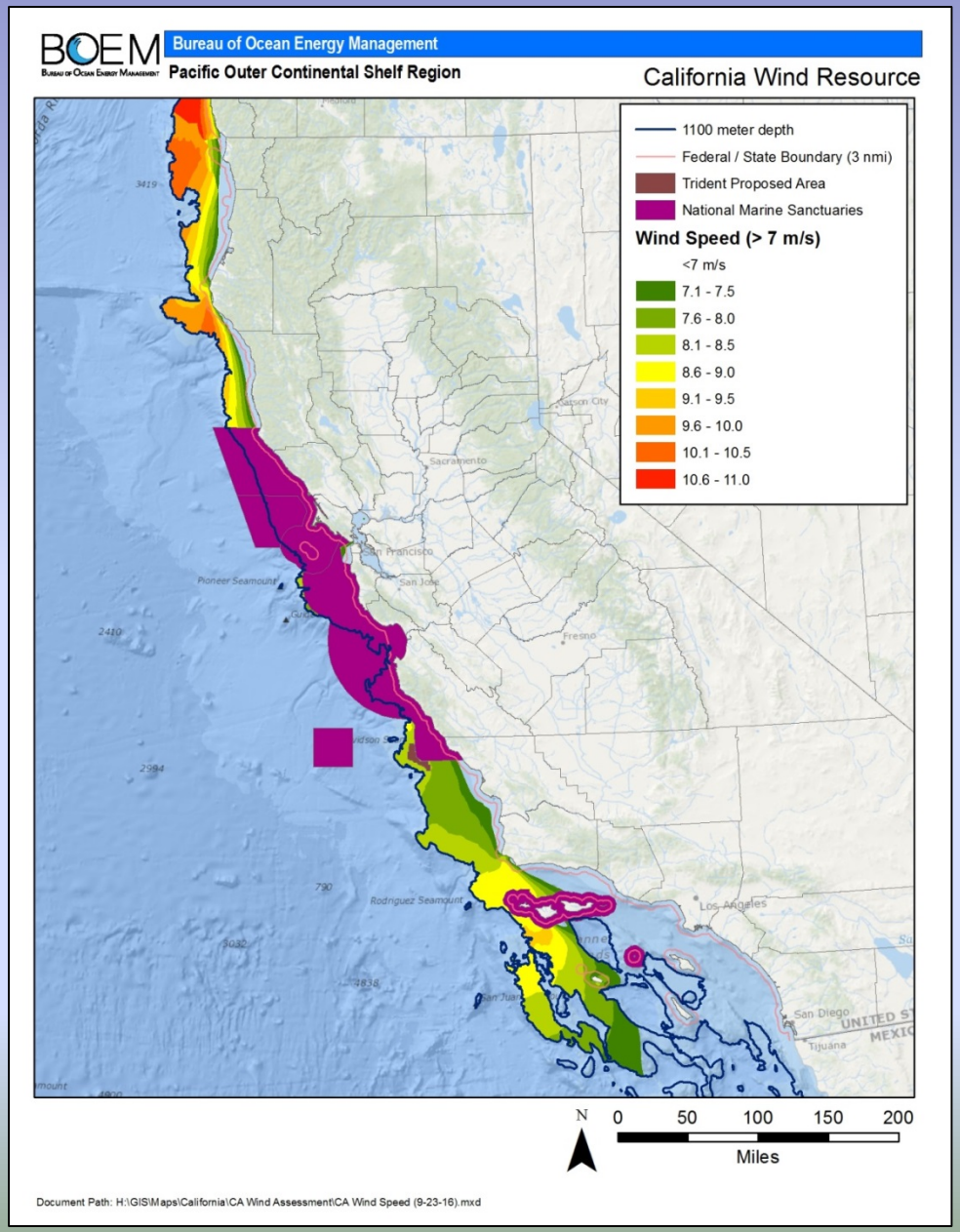
Not BOEM Jurisdiction



National Marine Sanctuaries

7 m/s wind

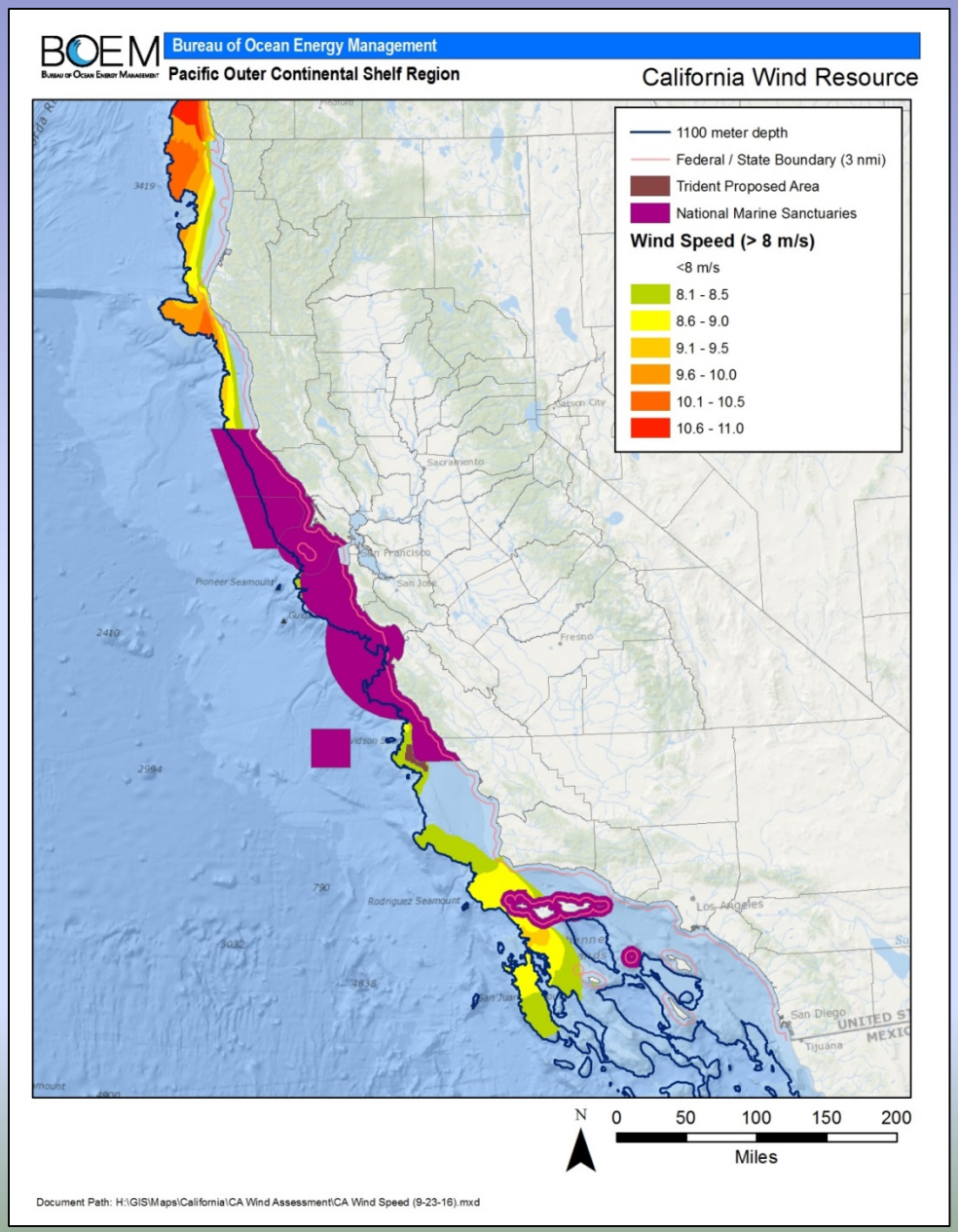
1100 meters



National Marine Sanctuaries

8 m/s wind

1100 meters

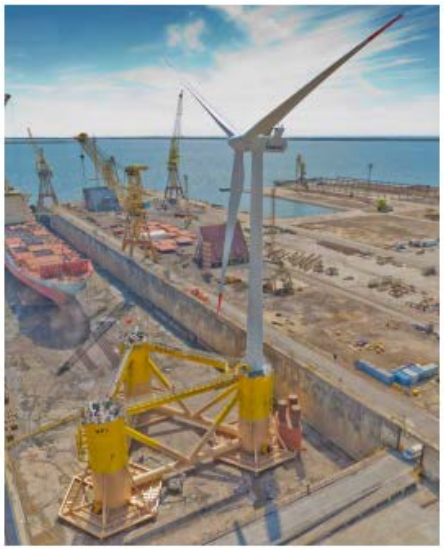


Port Infrastructure

- How close are ports?
- Outfitted for floating wind?

OCS Study
BOEM 2016-011

Determining the Infrastructure Needs to Support Offshore Floating Wind and Marine Hydrokinetic Facilities on the Pacific West Coast and Hawaii



US Department of the Interior
Bureau of Ocean Energy Management
Pacific OCS Region

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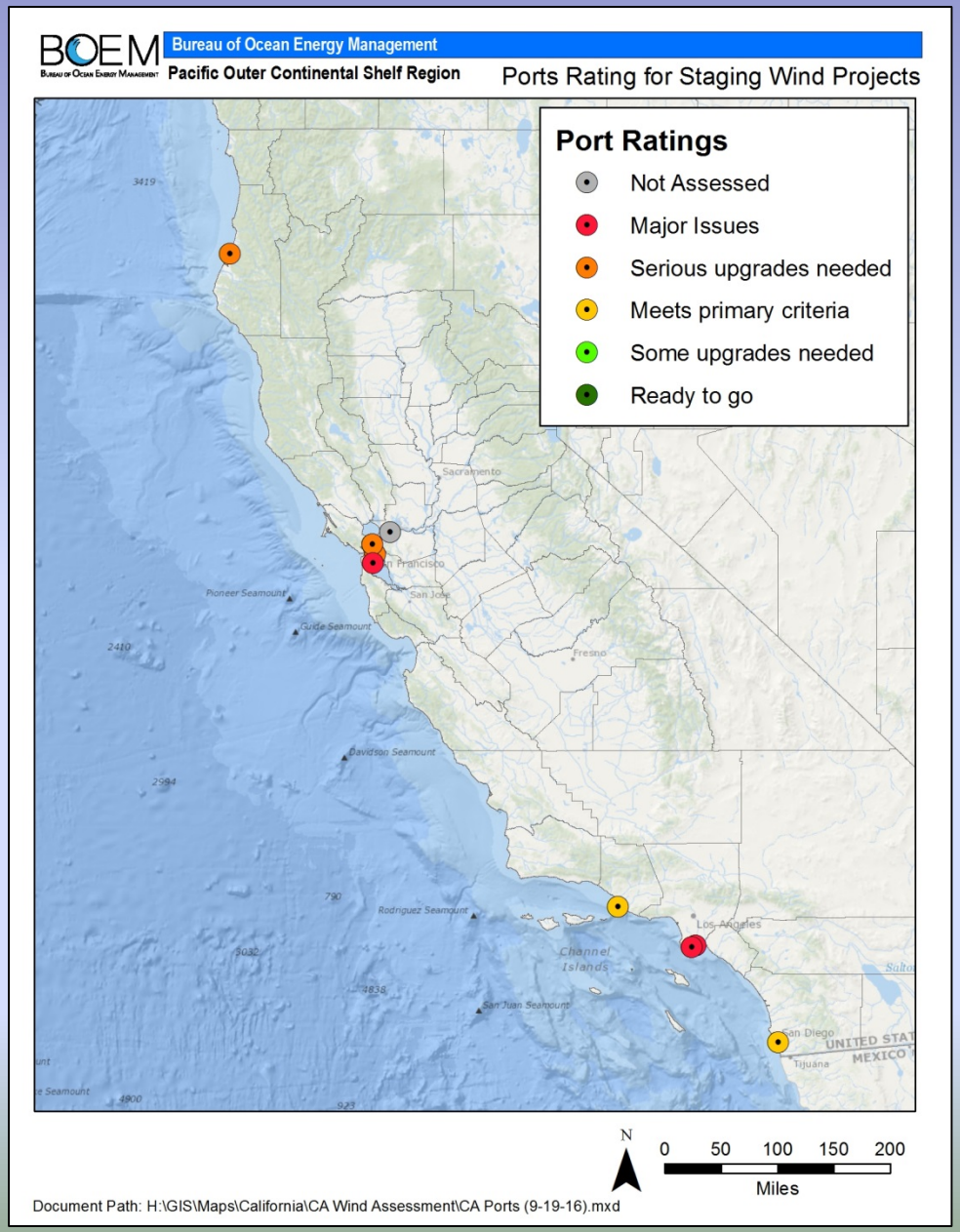
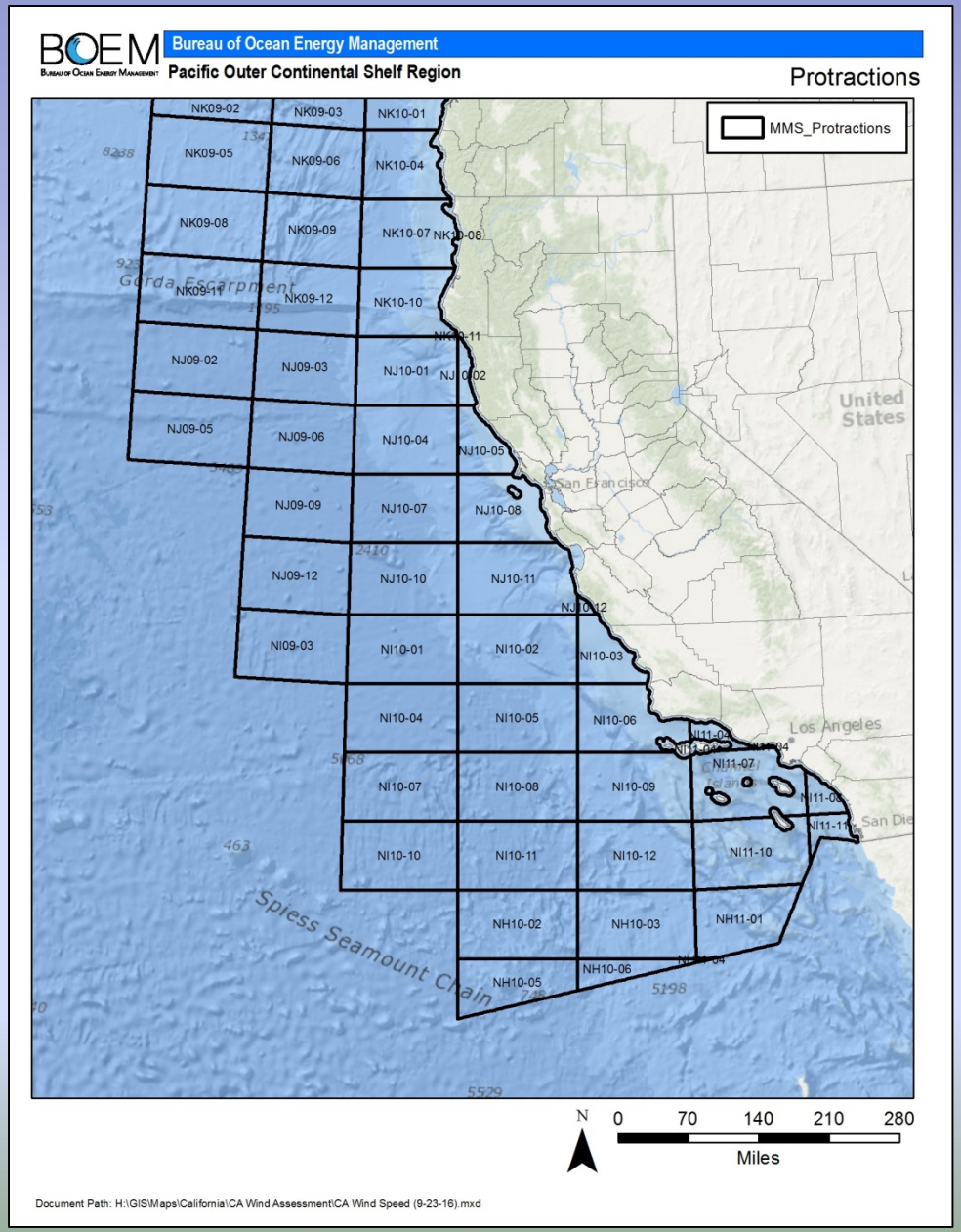
Bureau of Ocean Energy Management



The world according to BOEM

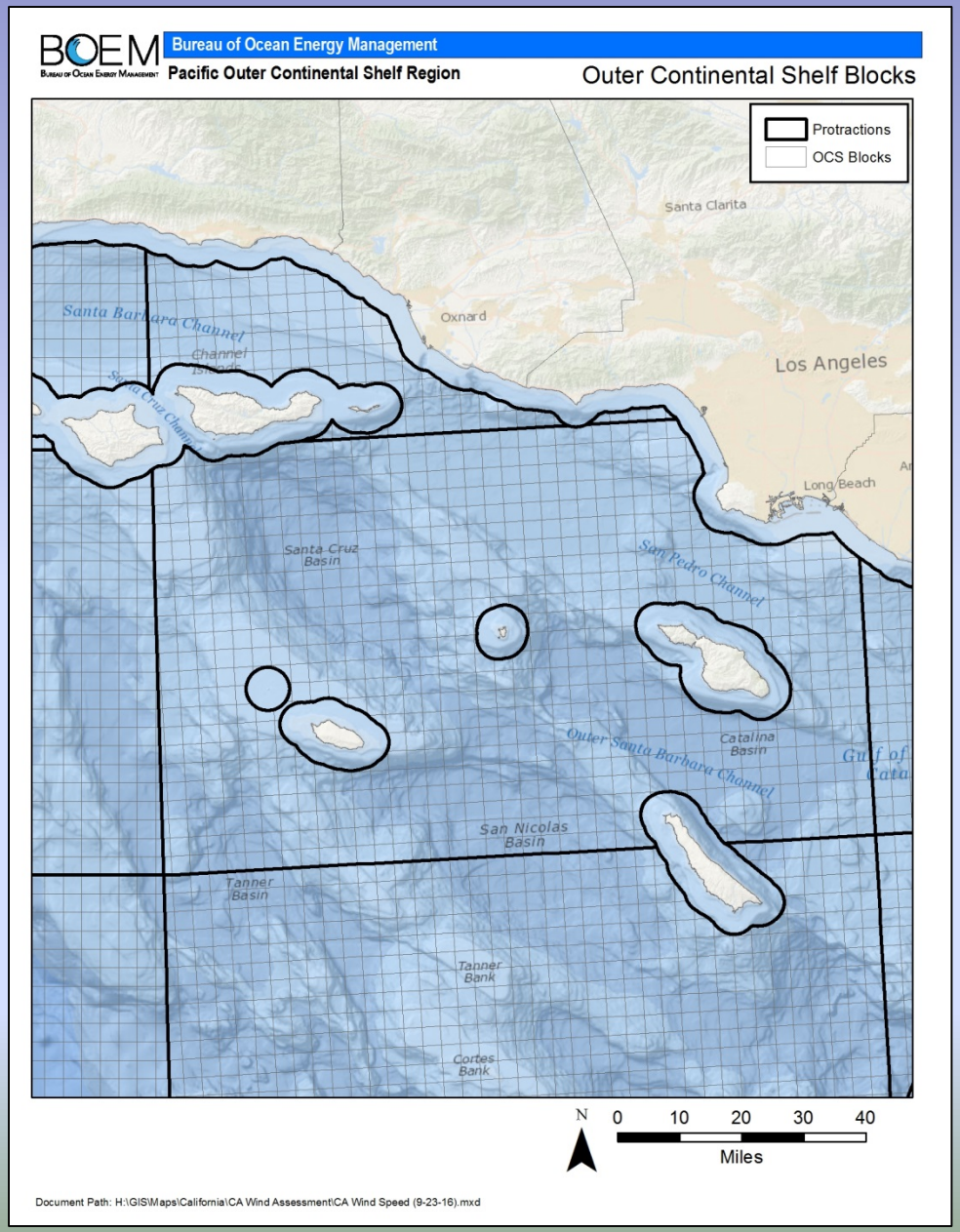
- The ocean is made up of boxes
  - Protractions
    - OCS Blocks
      - Aliquots

- Protractions
  - 1 x 2 degrees
  - Extension of USGS 1:250k maps



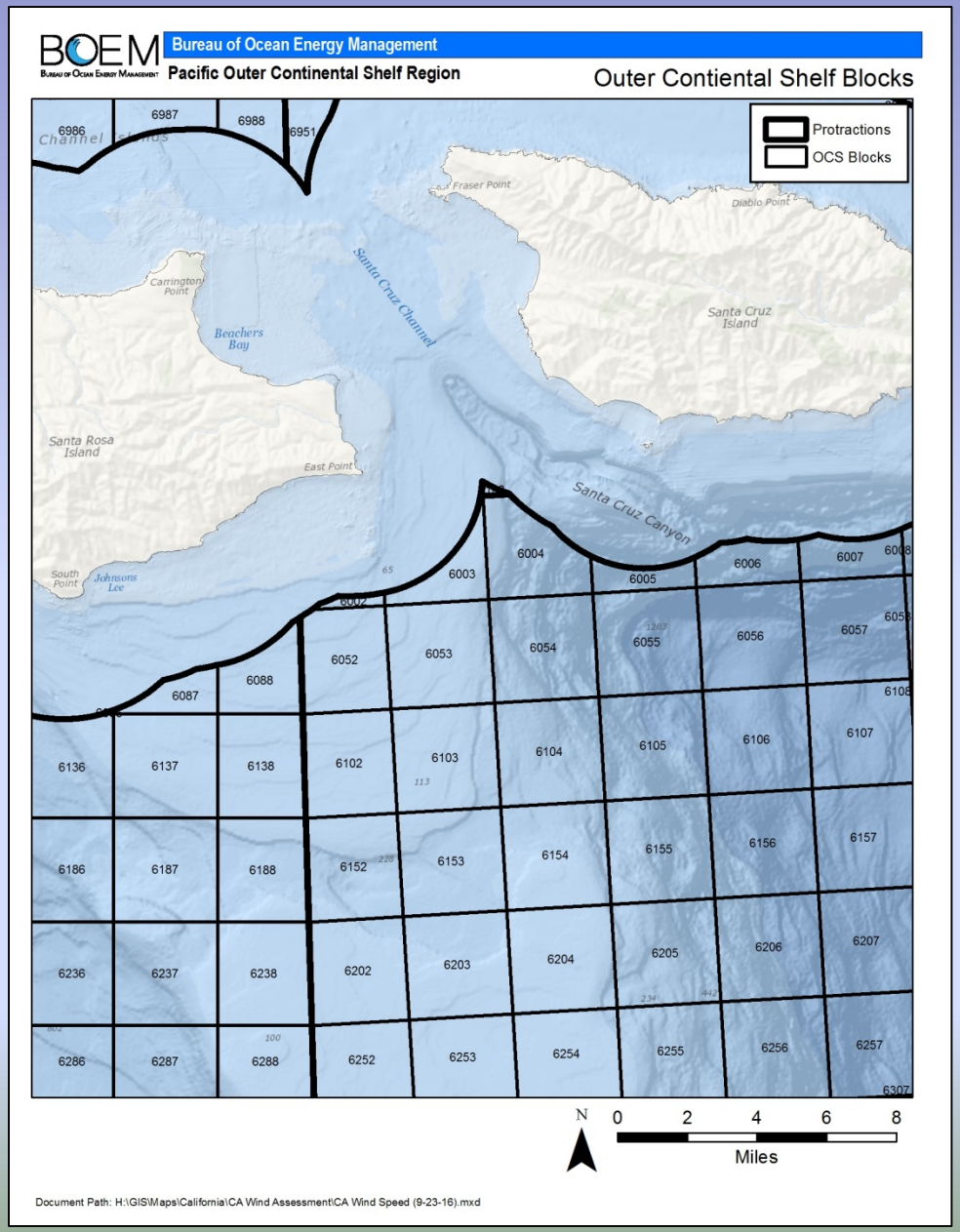
The world according to BOEM

- OCS Blocks
  - 4800 x 4800 meters
  - 3 x 3 miles



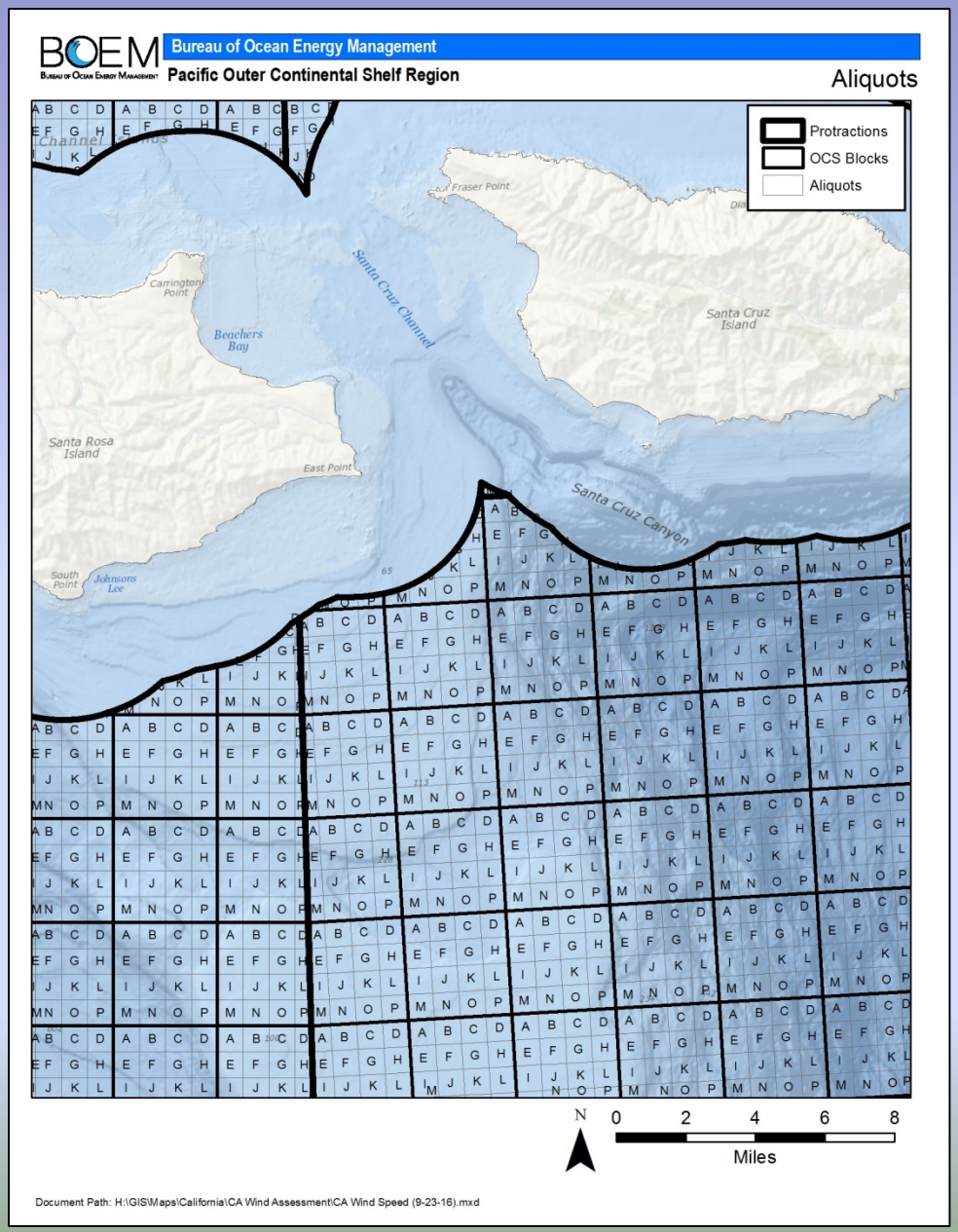
The world according to BOEM

- OCS Blocks
  - Block Numbers



The world according to BOEM

- Aliquots
  - 1200 x 1200 meters
- NI11-07 6054A

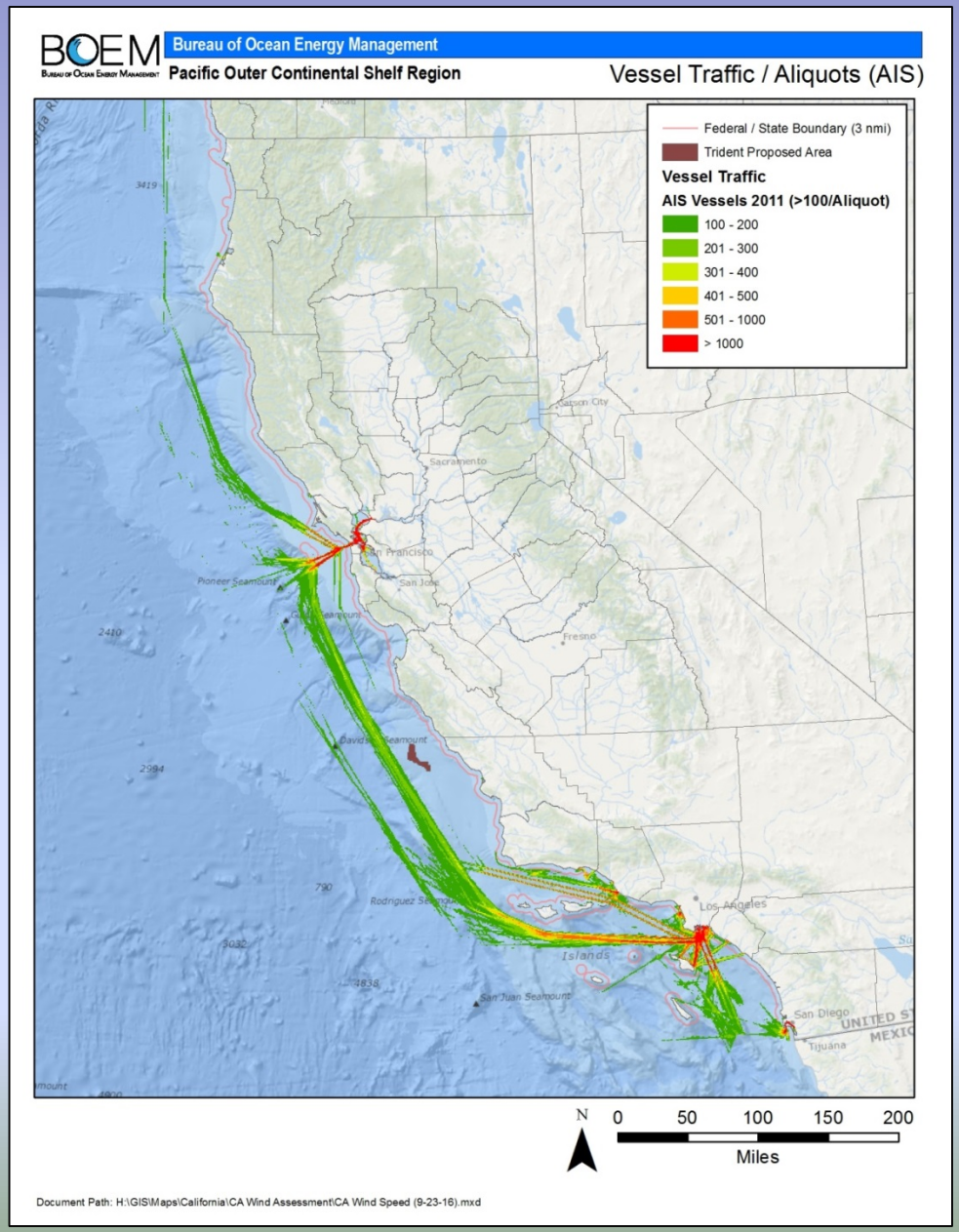


Vessel Traffic

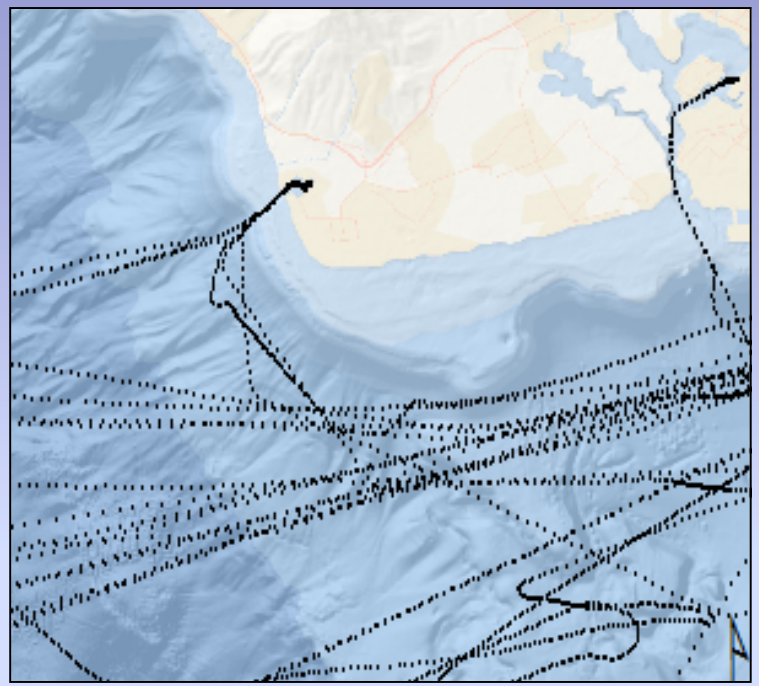
Automatic Identification System

- By Vessel Type
- By Month

MarineCadastre.gov/AIS



Vessel Traffic

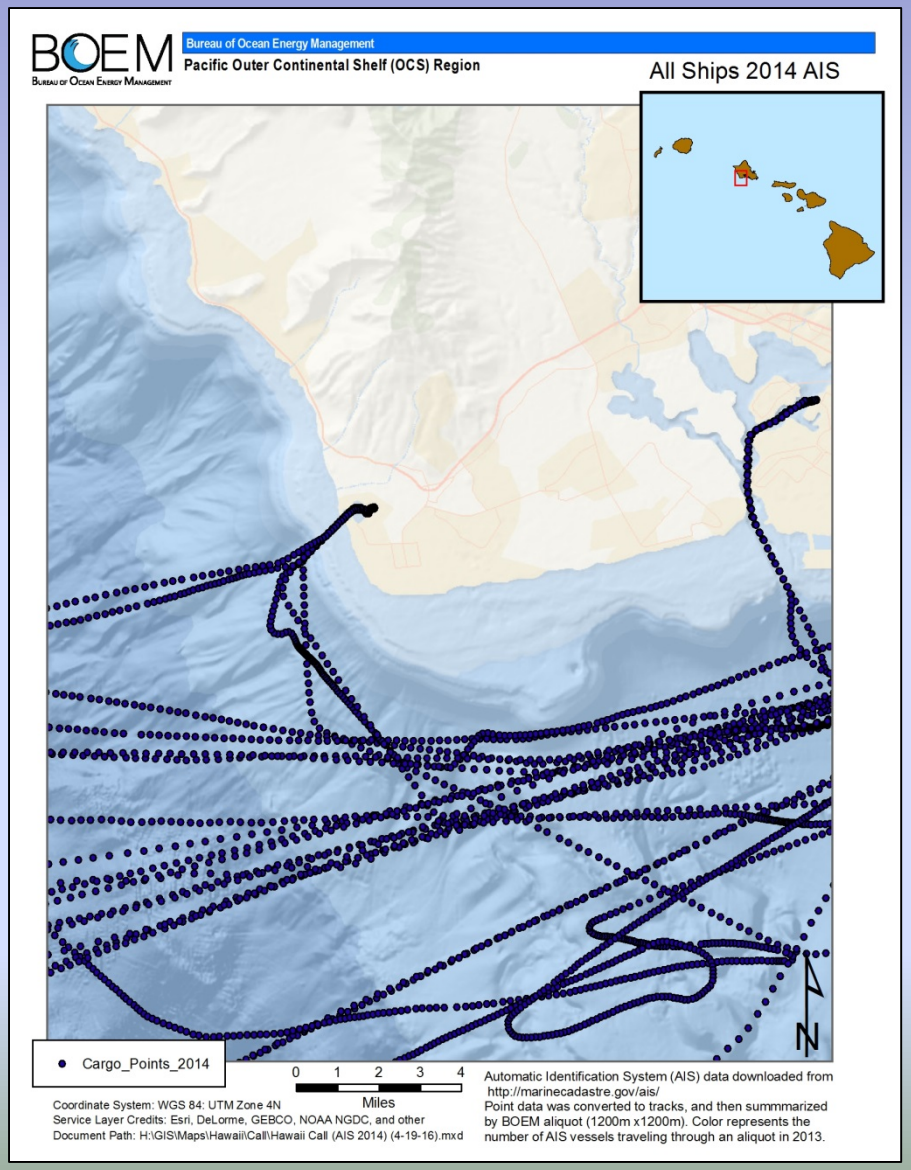


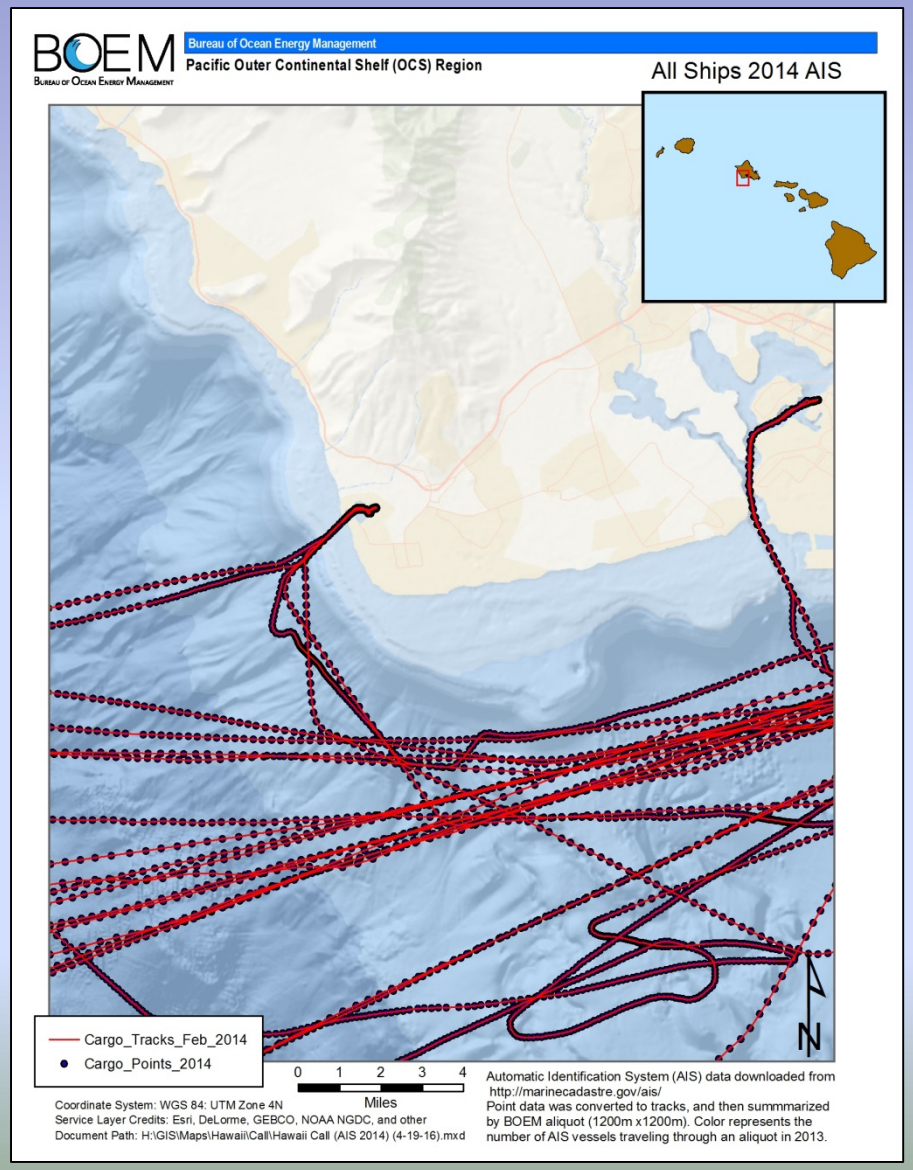
Vessel ID, Date, Type, Size, Status…

20,000,000 points / UTM zone

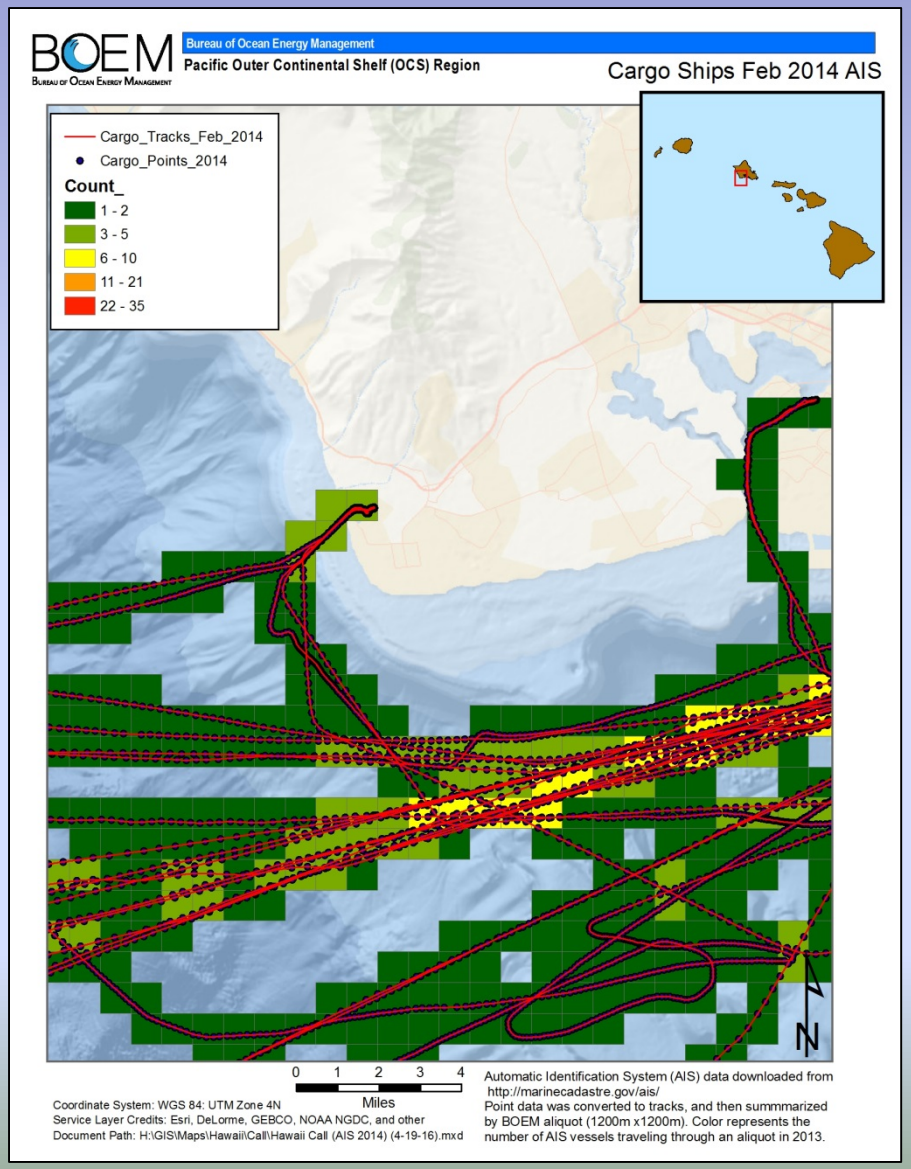
MMSI *	BaseDateTime	VesselType	Length	Width	DimensionComponents	Status
303406020	1/31/2014 11:59:57 PM	Fishing	100	0	50,50,0,0	Under way using
366420467	1/31/2014 11:59:57 PM	Cargo ships	50	9	36,14,6,3	Under way using
319620030	2/1/2014	Pleasure craft	88	14	32,56,5,9	Moored
368000925	2/1/2014	Tanker(s)	182	32	151,31,16,16	Under way using
310000556	2/1/2014 12:00:02 AM	Passenger ship	271	40	26,245,20,20	Moored
366939041	2/1/2014 12:00:02 AM	Engaged in dred	0	0	0,0,0,0	Under way using
368009303	2/1/2014 12:00:03 AM	Fishing	17	7	8,9,3,4	Under way using
367800690	2/1/2014 12:00:03 AM	Towing and len	38	12	11,27,6,6	Under way using
367506509	2/1/2014 12:00:03 AM	Towing	0	0	0,0,0,0	Under way using

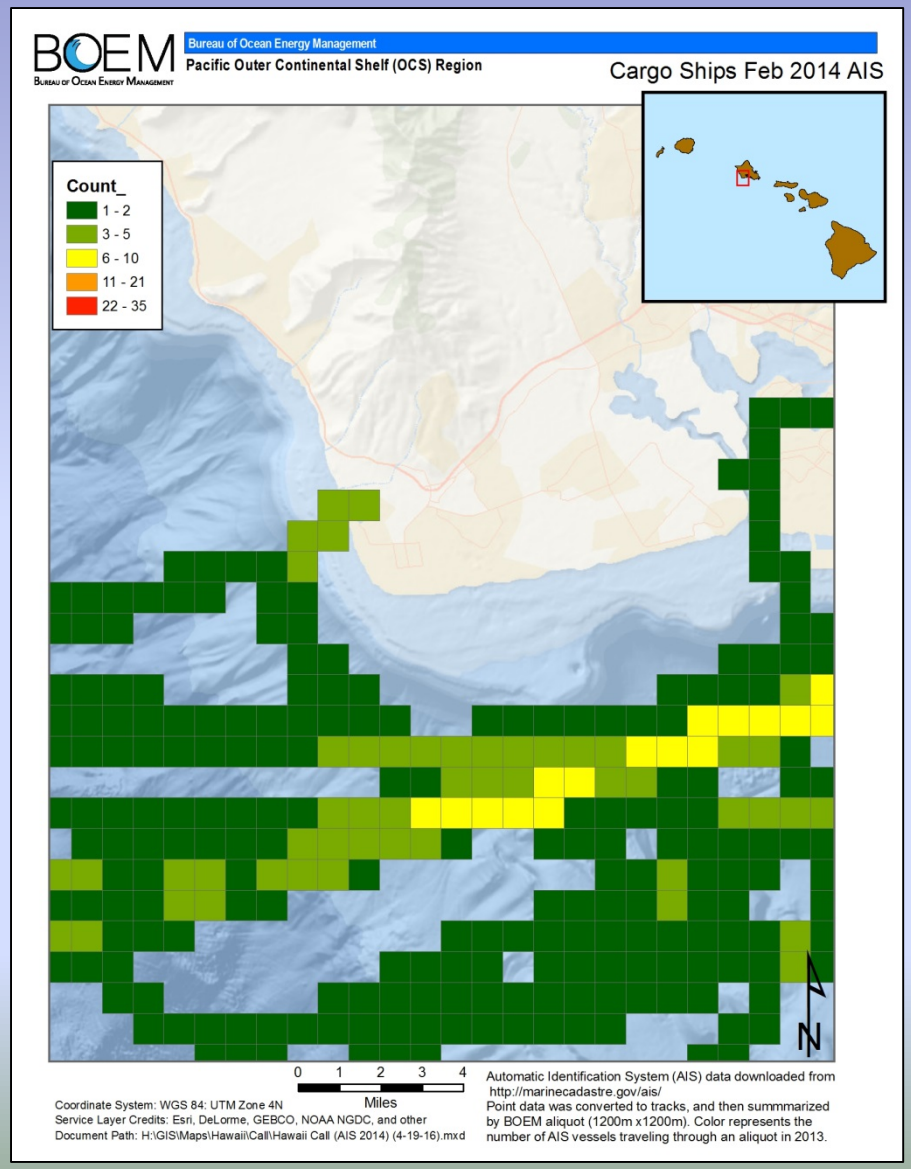
Vessel Traffic





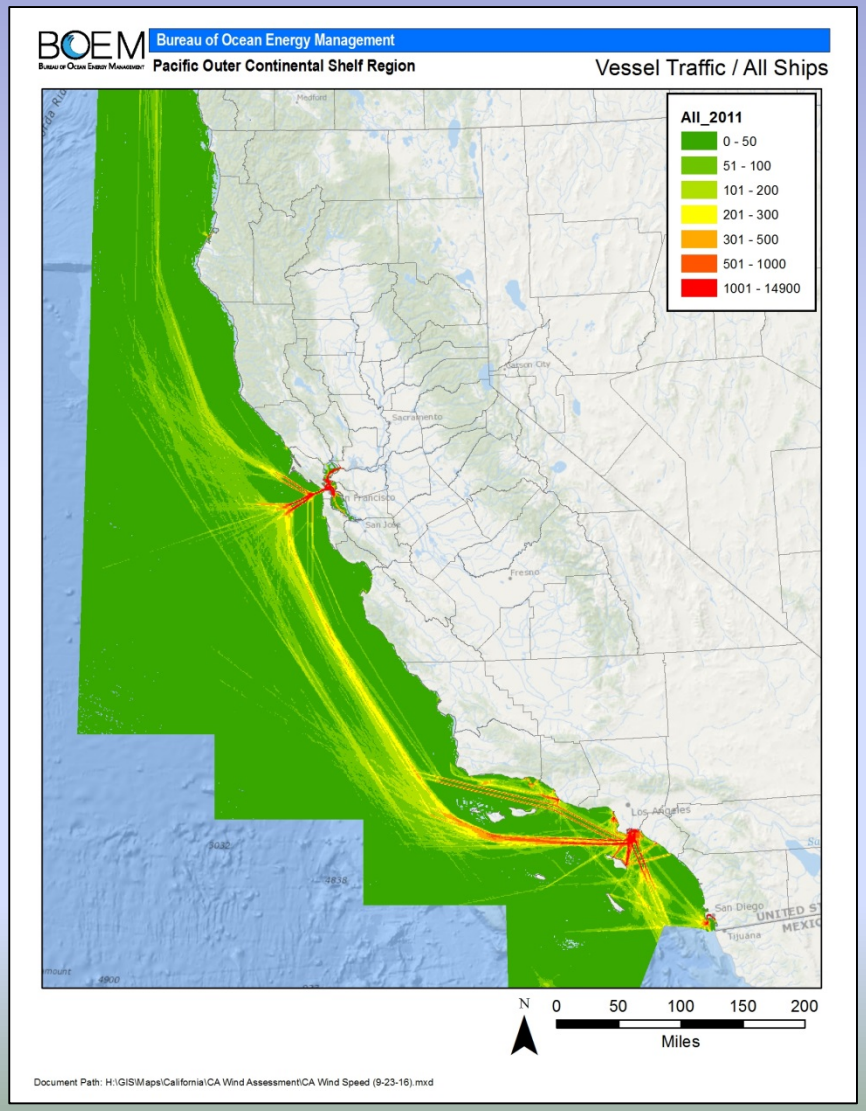
Vessel Traffic



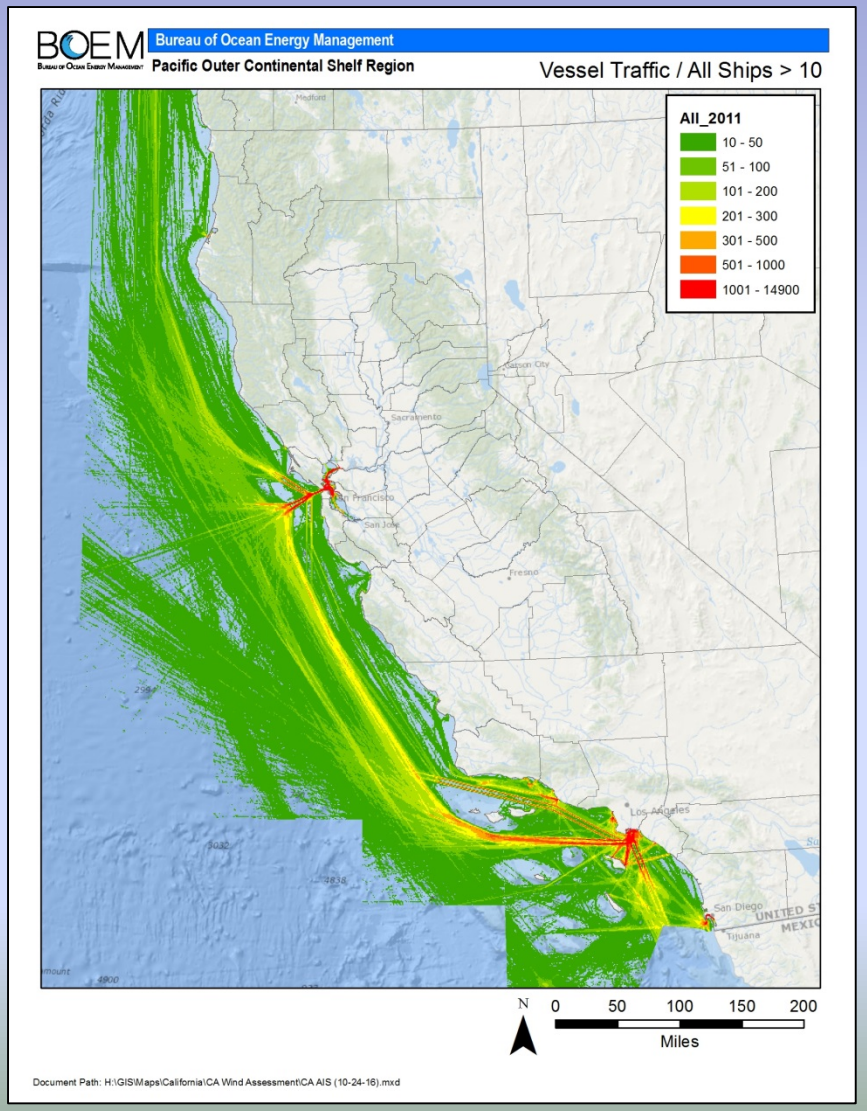


Vessel Traffic

All Ships

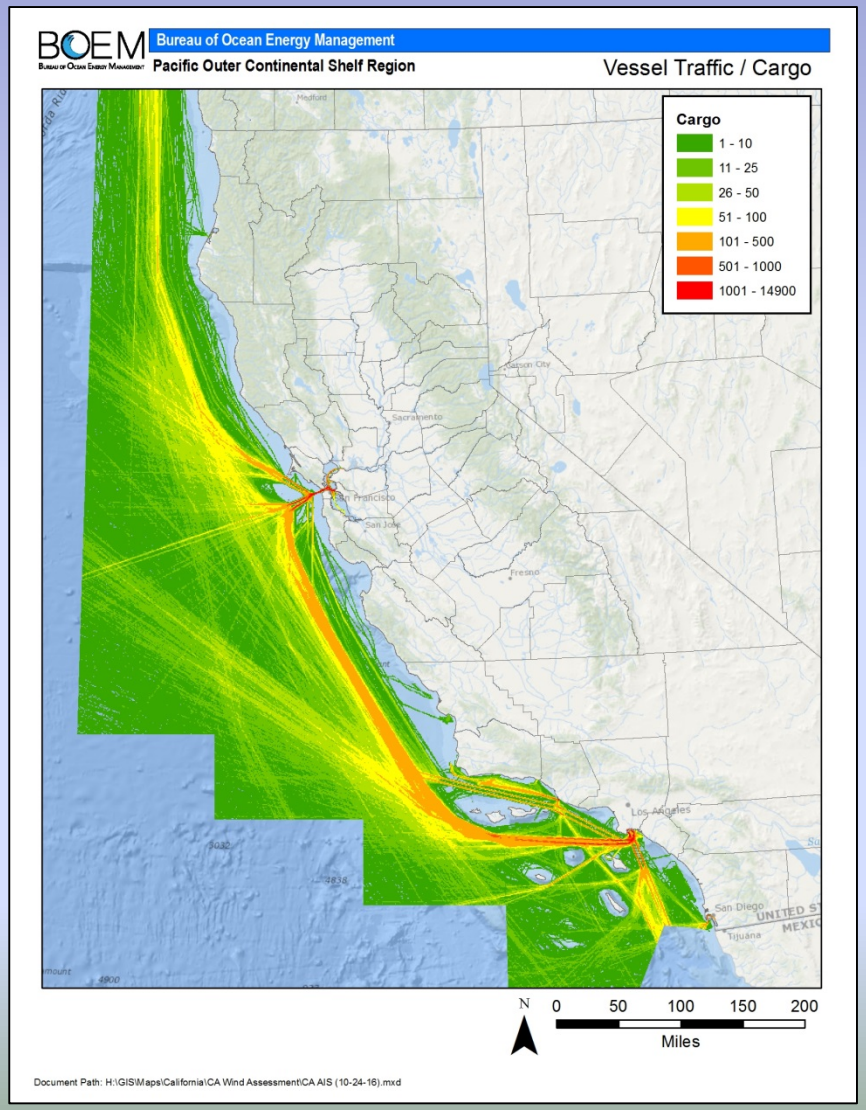


All Ships > 10

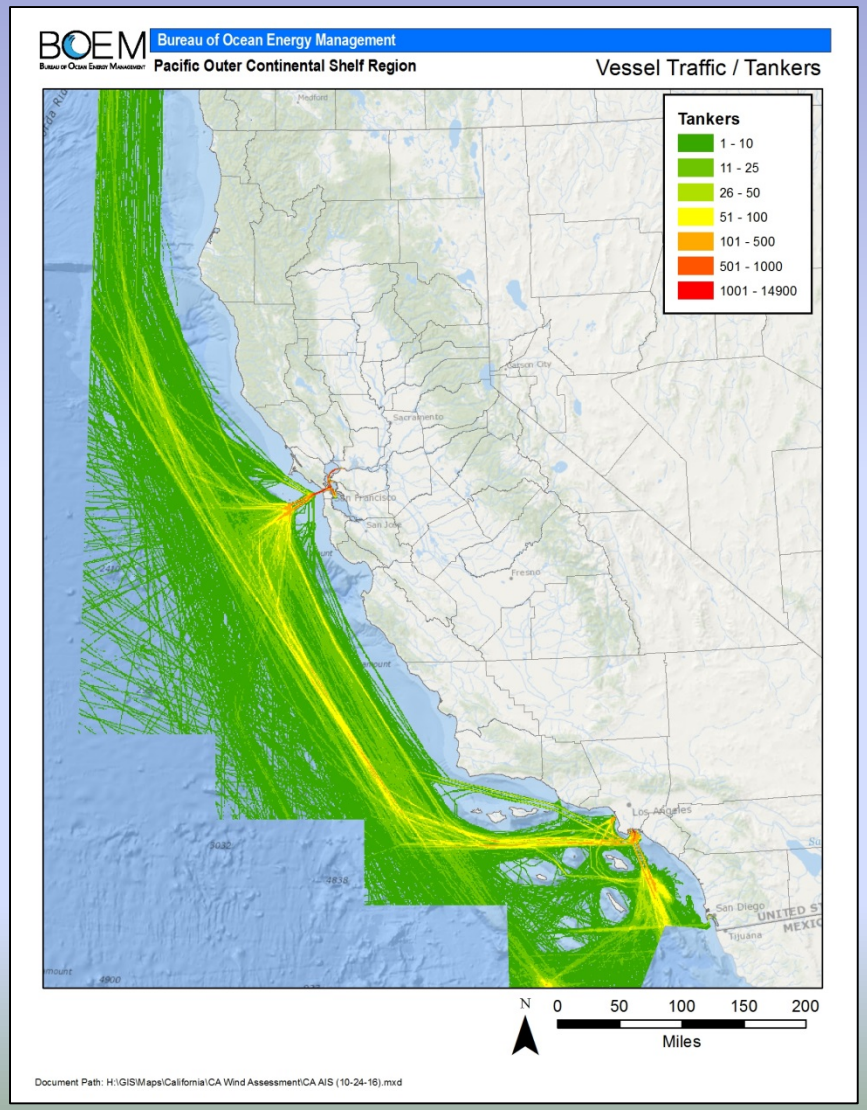


Vessel Traffic

Cargo Ships

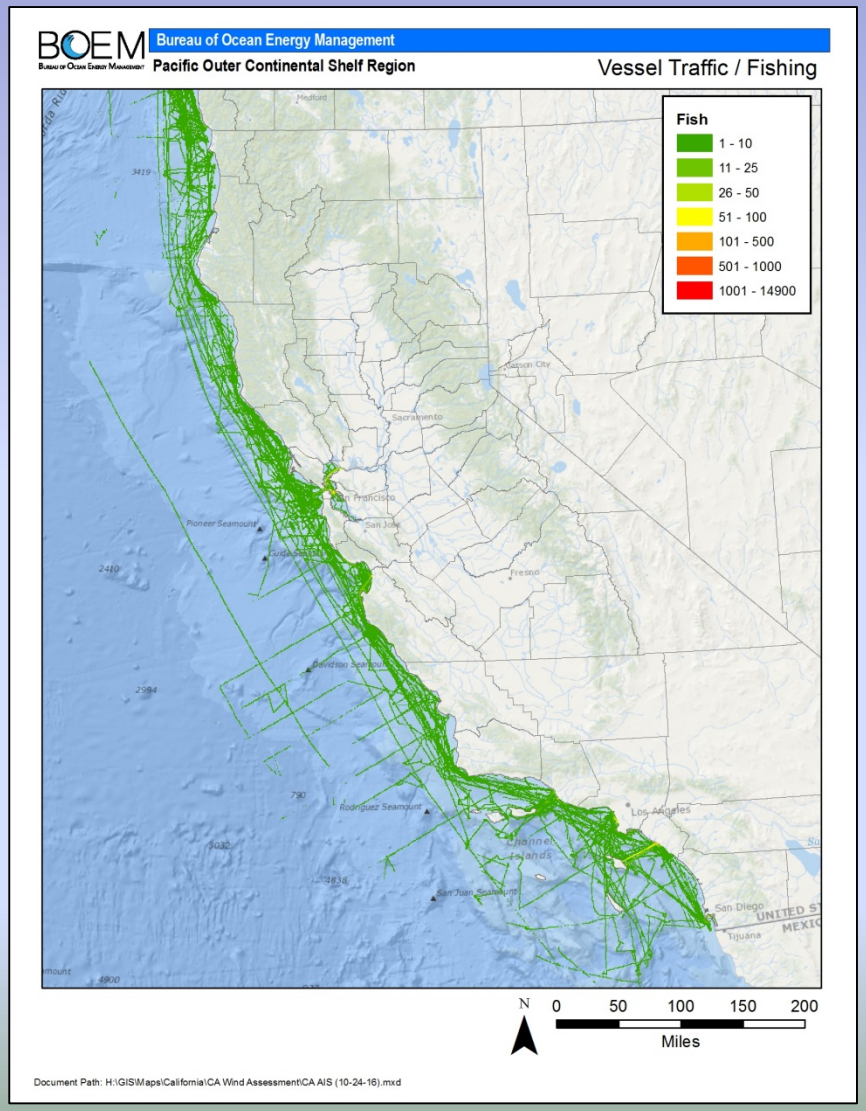


Tankers

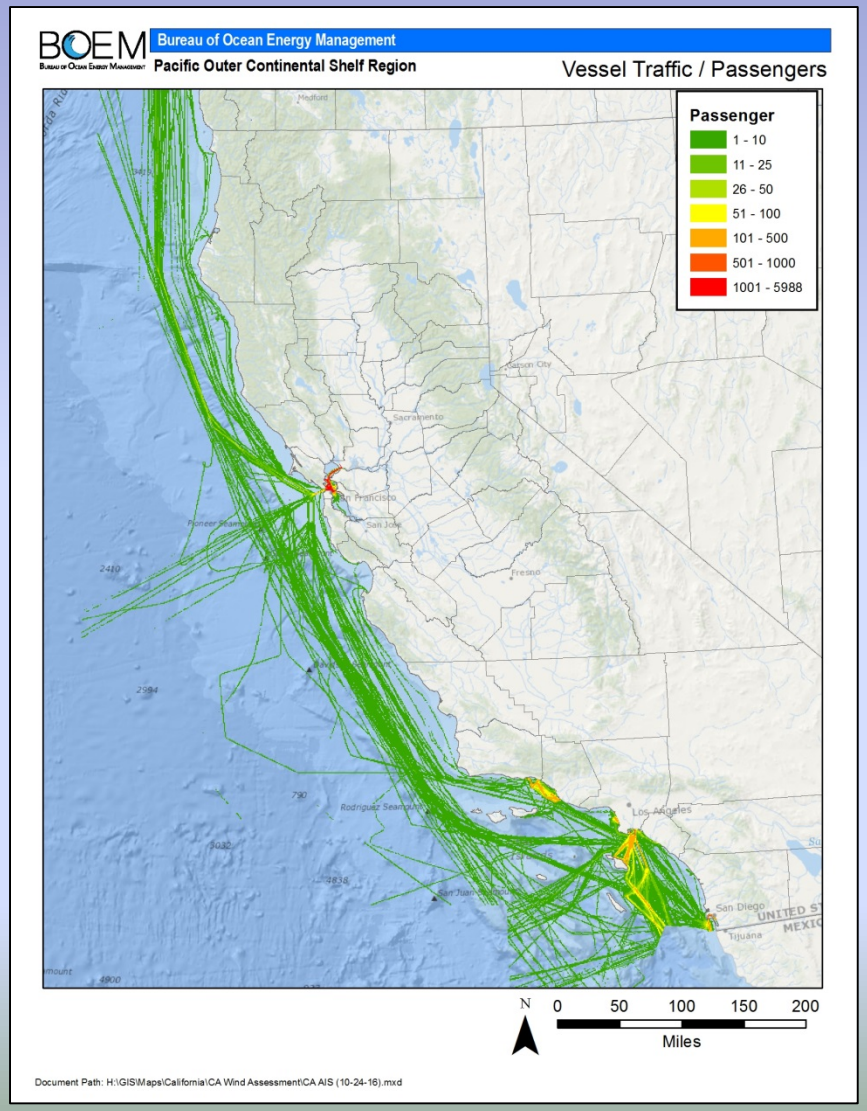


Vessel Traffic

Fishing



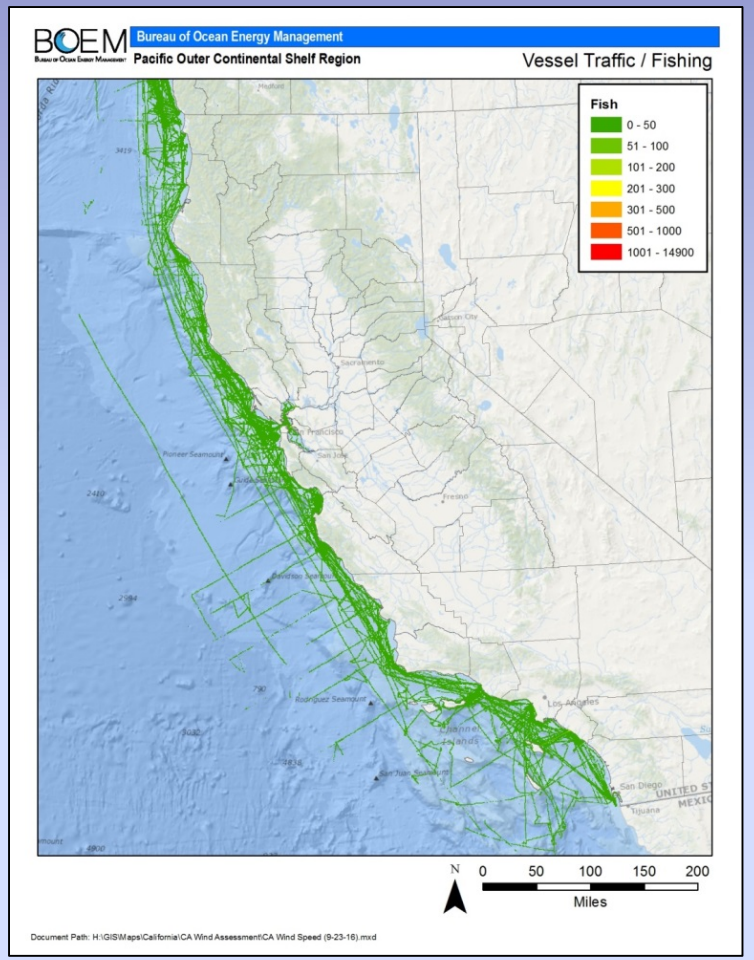
Passenger



GIS and Offshore Wind

http://marinecadastre.gov/

https://maps.nrel.gov/wind-prospector/



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