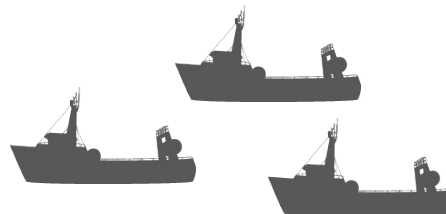
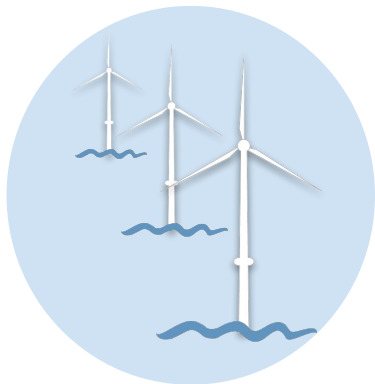




**NOAA**  
**FISHERIES**

# Preparing Fisheries Footprints for CA OSW siting



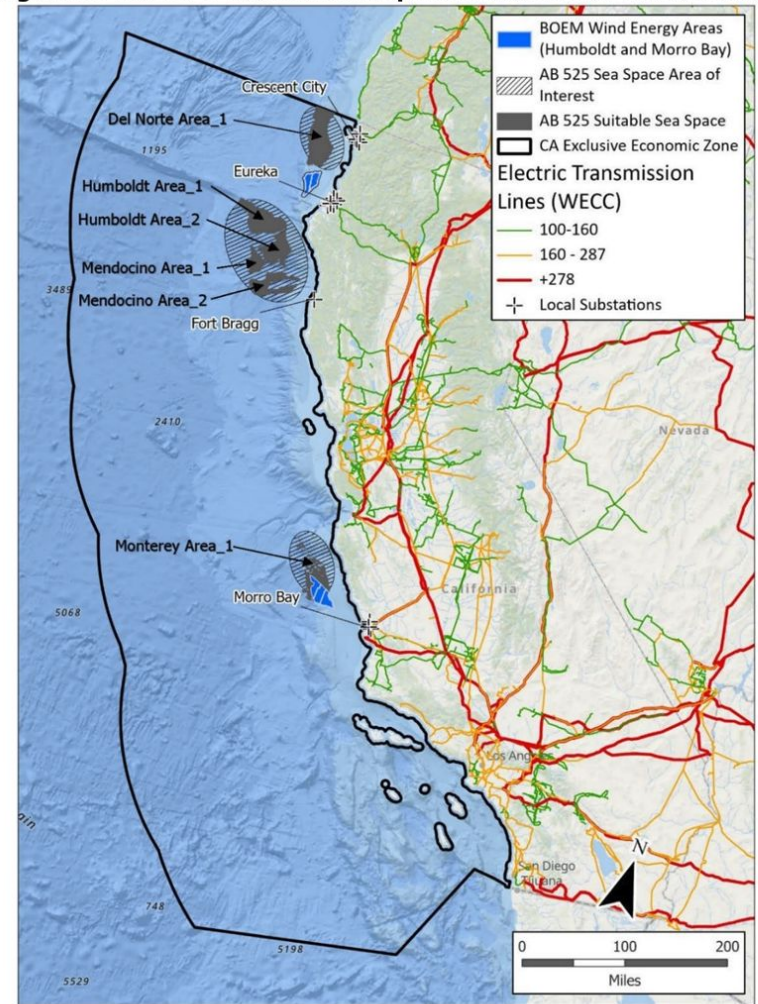
fisheries

**Kelly Andrews, Blake Feist (NWFSC); Lilah Ise (WCR)**

# Preparing for siting off California

- AB525 strategic plan being finalized sometime this year ...
- NMFS is working on footprints in anticipation of the state of CA and BOEM eventually looking at siting options and potentially using the NOAA NCCOS spatial model
- Build off methods used by NMFS & ODFW in joint analysis for fisheries layers for the OR NCCOS model:
  - Kelly Andrews, Blake Feist, J. Lilah Isé (NMFS)
  - Justin Ainsworth, Caren Braby, Delia Kelly, Jessica Watson (ODFW)

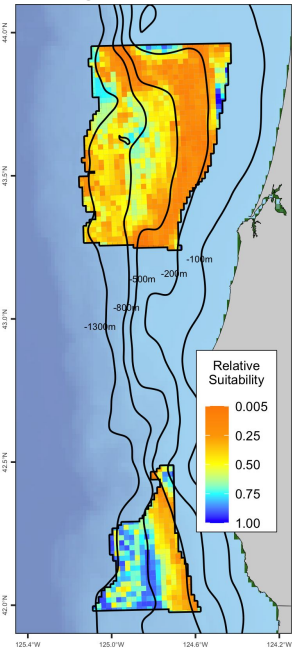
Figure 5-1: AB 525 Suitable Sea Space Identification for Further Analysis



Source: CEC. 2023

# NMFS layers contributed to the OR NCCOS Model

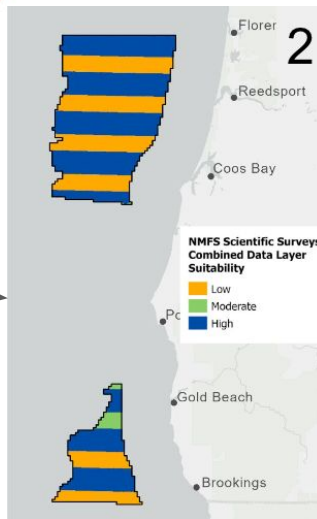
## Fisheries - NMFS & ODFW analysis



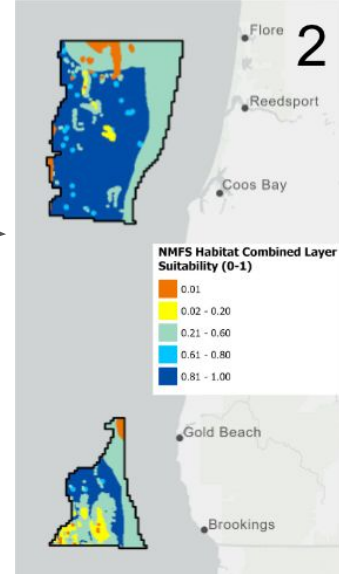
**FINAL SUITABILITY =**  
Geometric mean for each  
grid cell across all submodels



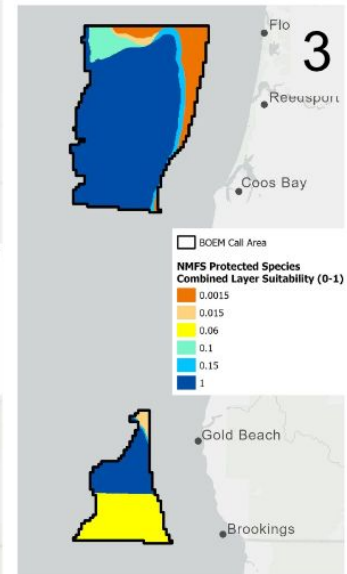
NMFS  
Scientific  
surveys



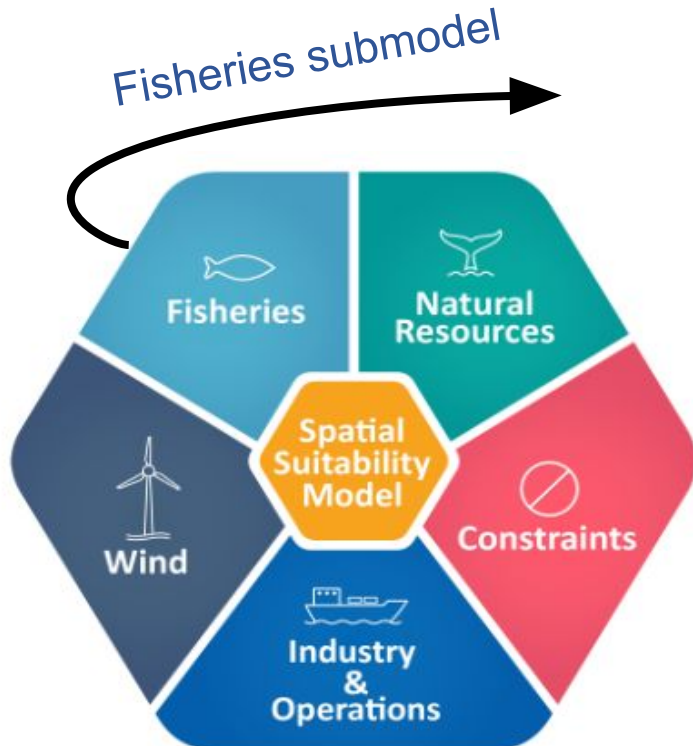
## Habitat



## Protected Resources



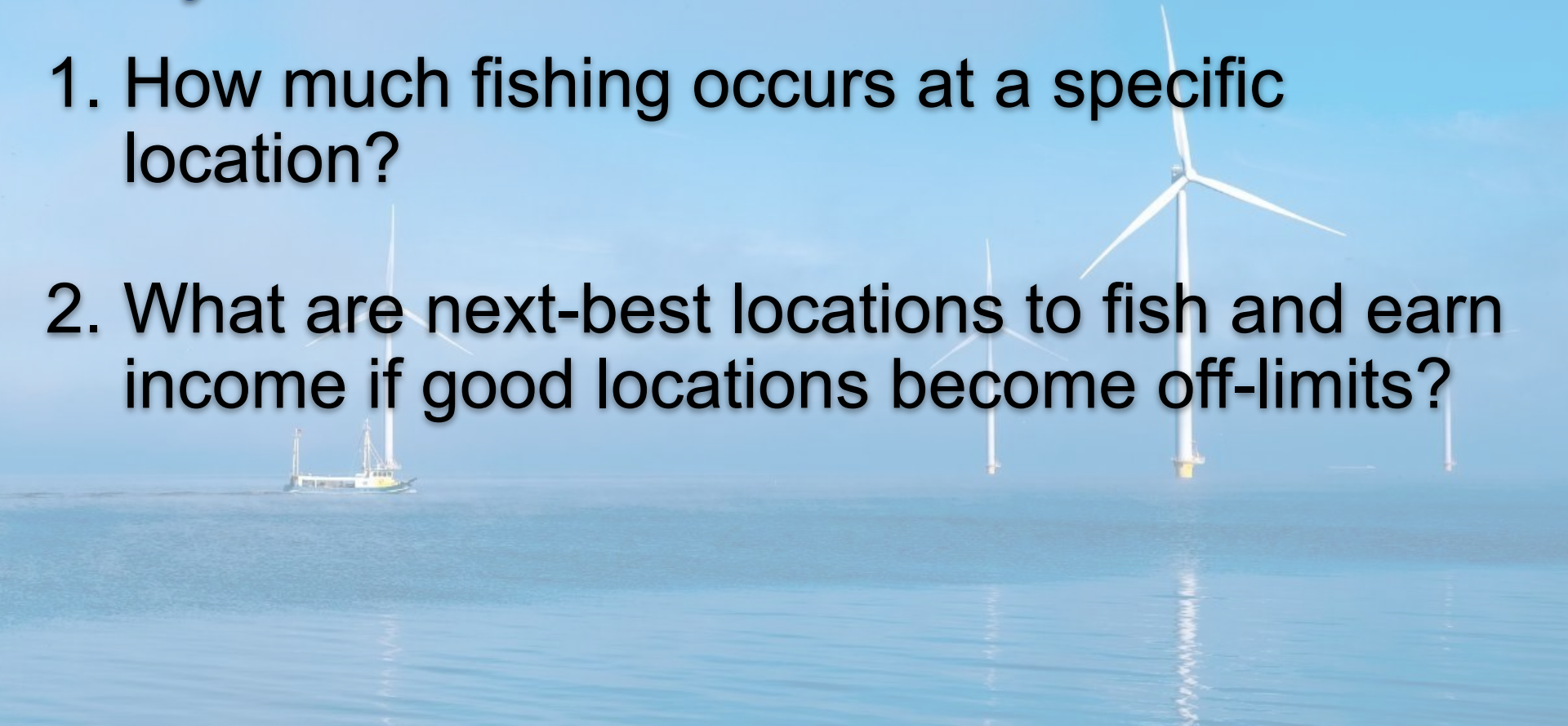
# Identify potential conflicts between OWE areas and West Coast fisheries



- NMFS and ODFW worked together to determine what data could best represent the space used by West Coast fisheries
  - What metrics?
  - What fisheries?
  - What years of data?

# Key Questions

1. How much fishing occurs at a specific location?
2. What are next-best locations to fish and earn income if good locations become off-limits?



# Sectors Analyzed, Years and Data Sources

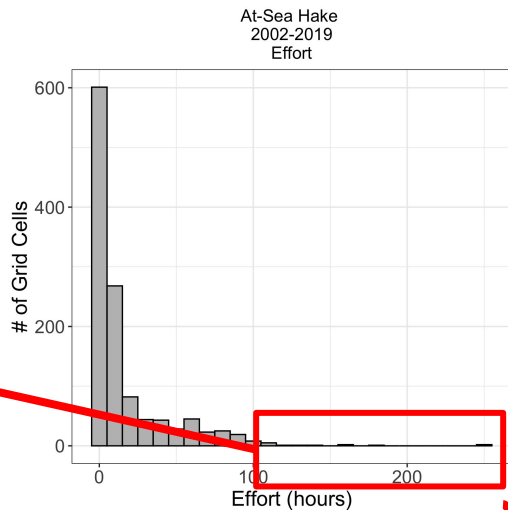
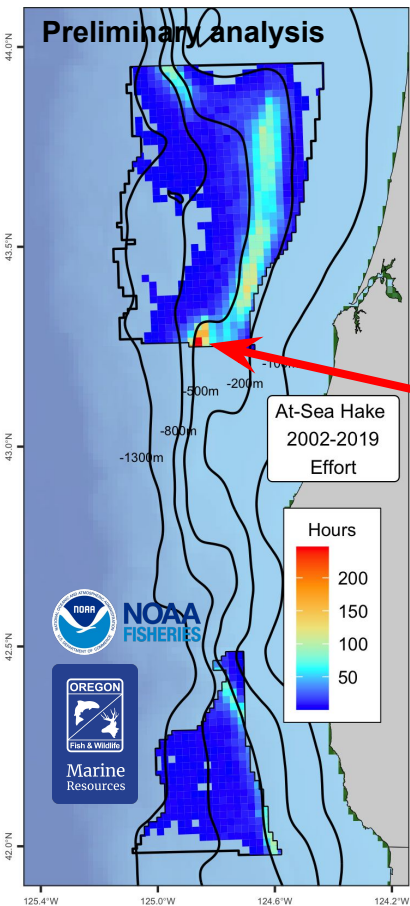
<b>HAKE</b>	At-sea
	Shoreside
<b>GROUND FISH</b>	Bottom trawl
	Fixed gear: - <i>pot</i>
	Fixed gear: - <i>longline</i>
<b>PINK SHRIMP</b>	
<b>DUNGENESS</b>	
<b>ALBACORE</b>	Commercial
	Charter

*Use the best available data sources to accurately map and represent fishing activities*

1. Geolocating fishery towlines and pot strings:
  - NMFS Observer Program and EM
  - State, federal and PacFIN logbook
2. Revenue from PacFIN fish tickets
3. Time span varied across 2002 - 2021

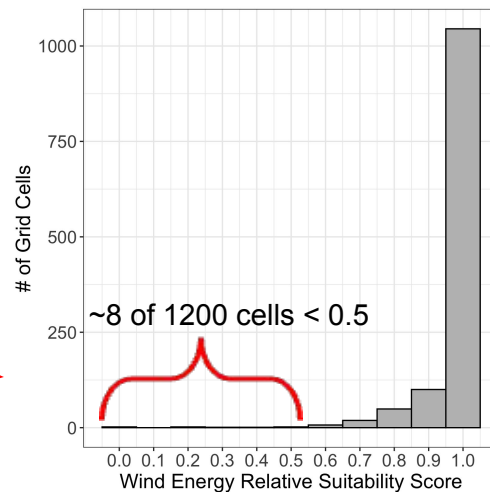


# Problem #1

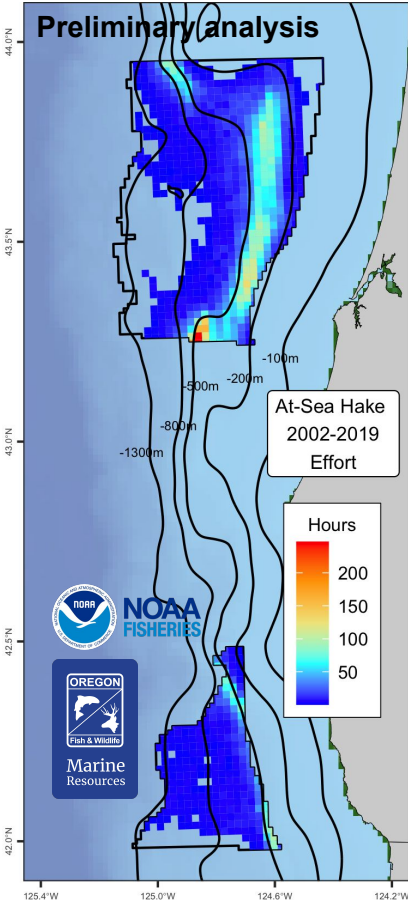


The distributions of spatially explicit fisheries activity data are notoriously skewed with long tails of low activity punctuated by far fewer high intensity locations, which tends to **de-emphasize** the true footprint of a given fishery...

Transformed  
to Suitability  
Scores in the  
suitability  
model



# Becomes particularly problematic for Question #2



- Key Questions
  1. “How much fishing is associated with a specific location?”
  2. “**What are next-best locations to fish and earn income if good locations become off-limits?**”
- Solution: Rank transform the raw data to account for the inherent distributional problems



# Problem #2

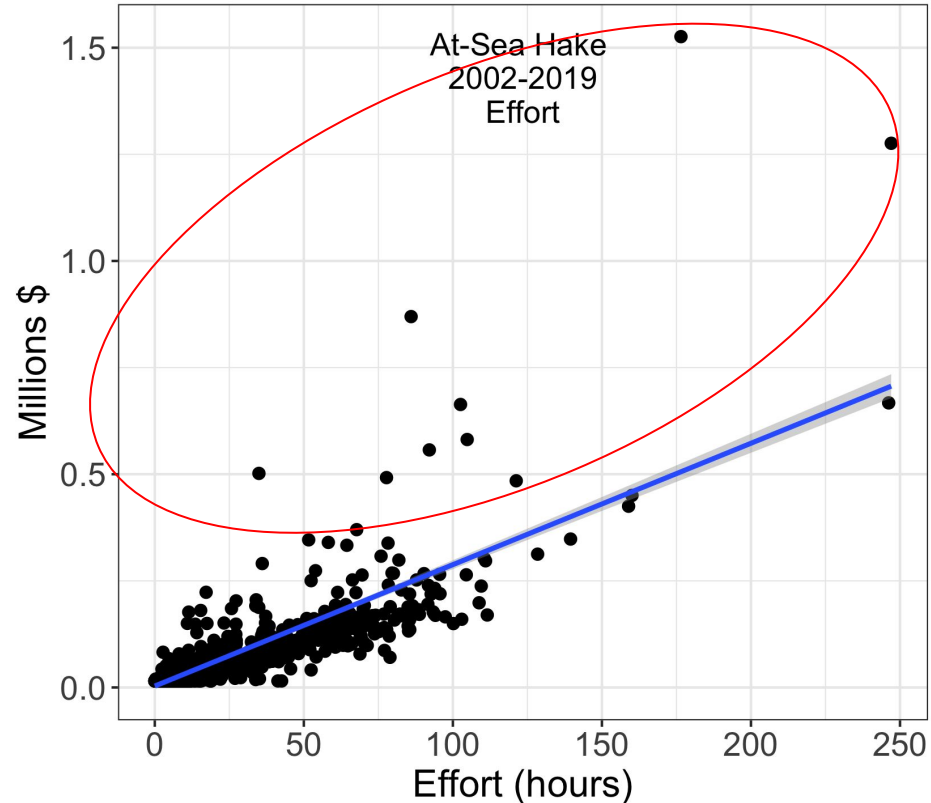
Which measure of fishery activity intensity is the most representative?

- Effort?
- Revenue?

*Effort and revenue are correlated, but not perfectly, so it's important to simultaneously account for both measures using a combined metric*

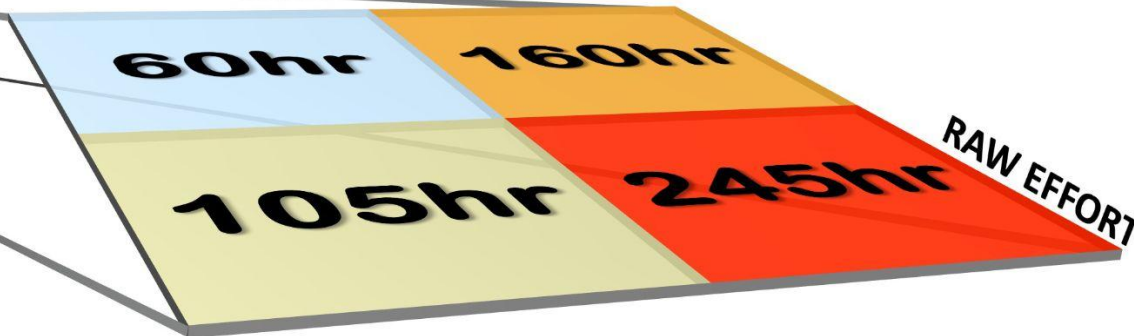
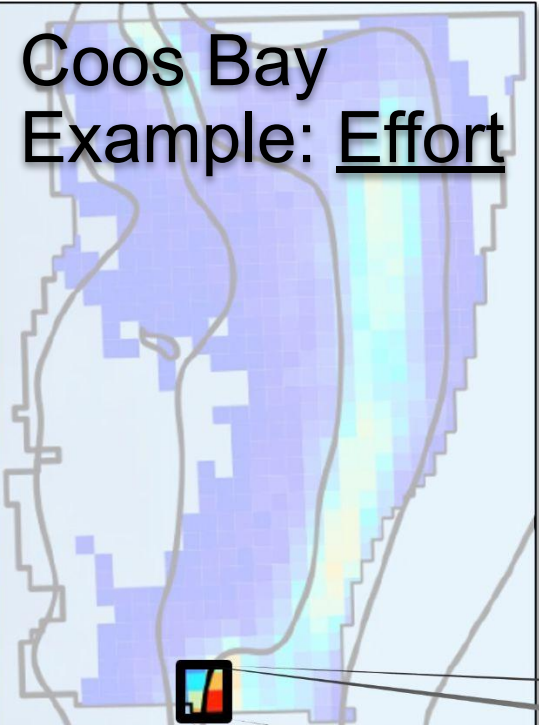
## Solution

- Normalize each ranked metric between 0 and 1
- Select highest normalized value between effort and revenue

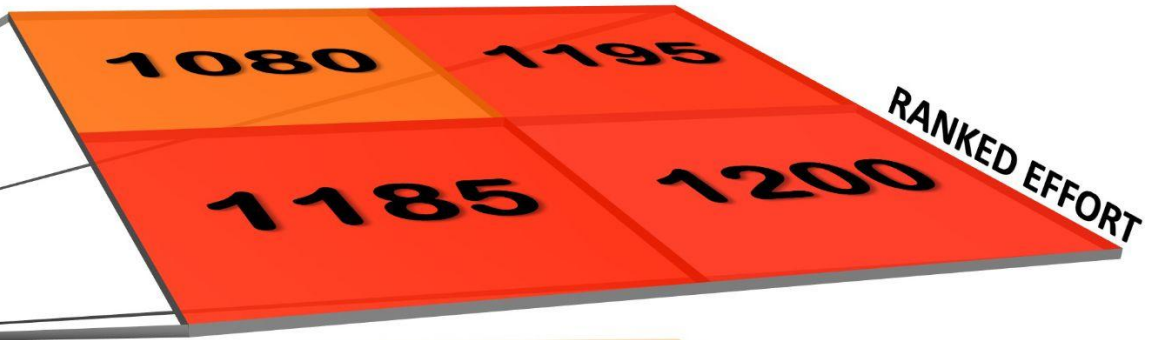


# Coos Bay

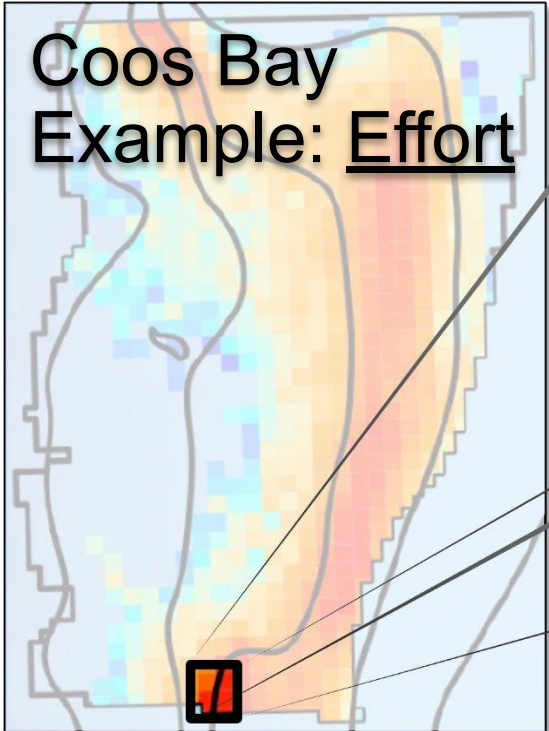
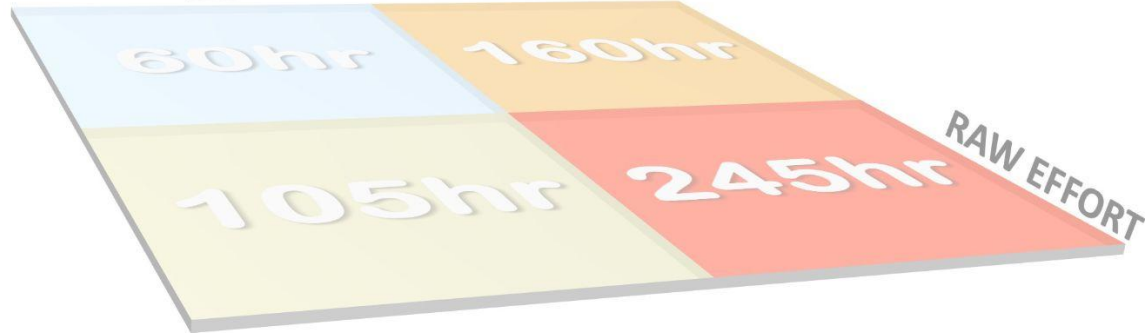
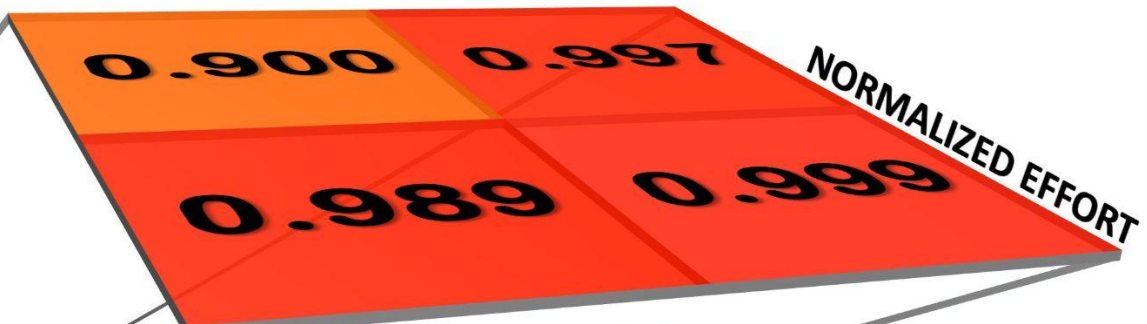
Example: Effort



# Coos Bay Example: Effort

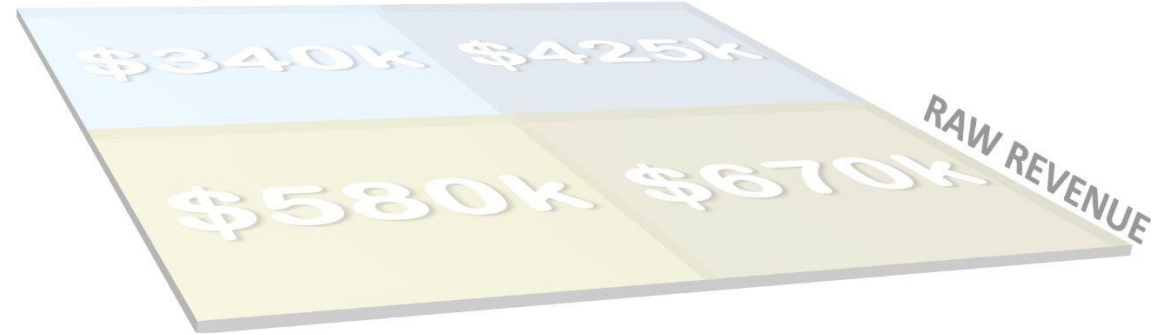
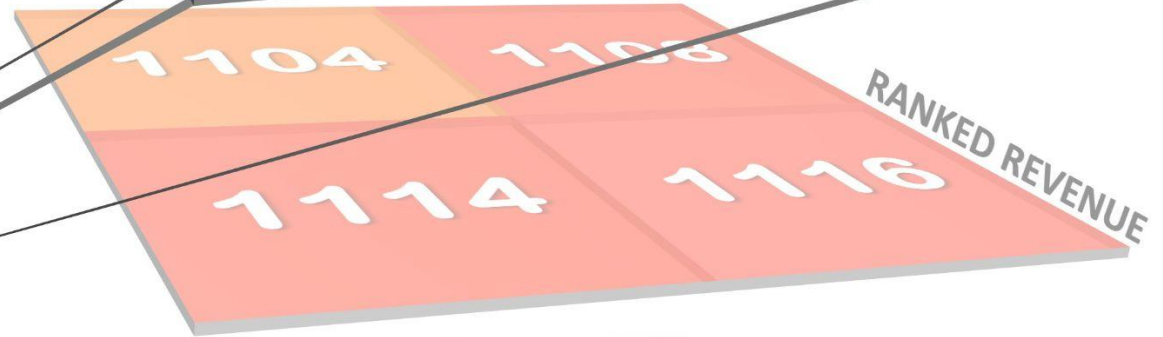
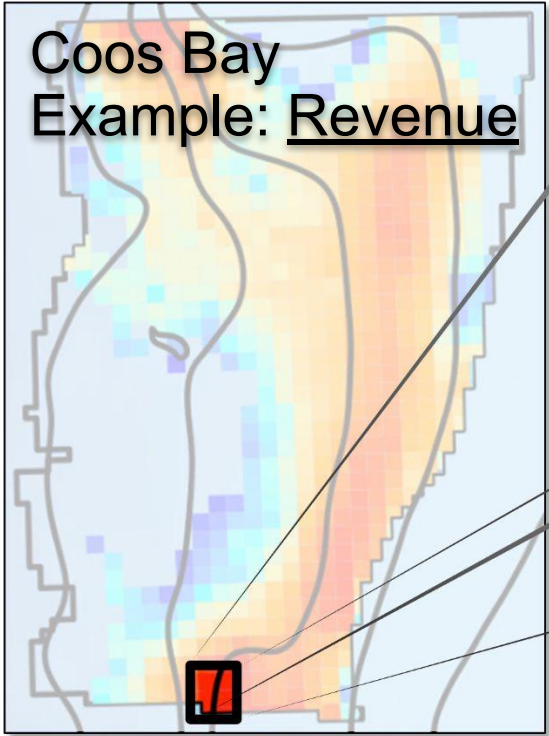


# Coos Bay Example: Effort

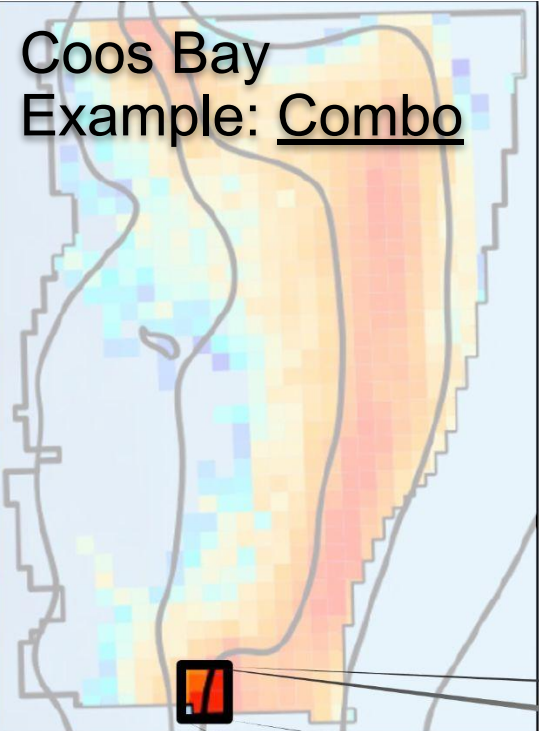


# Coos Bay

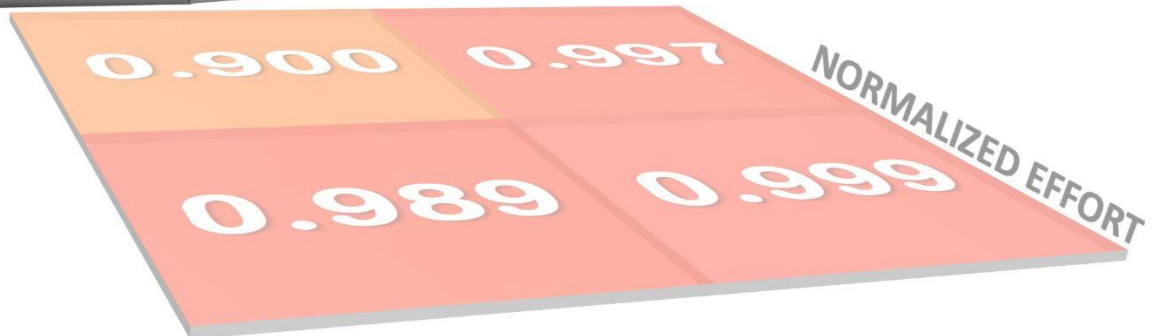
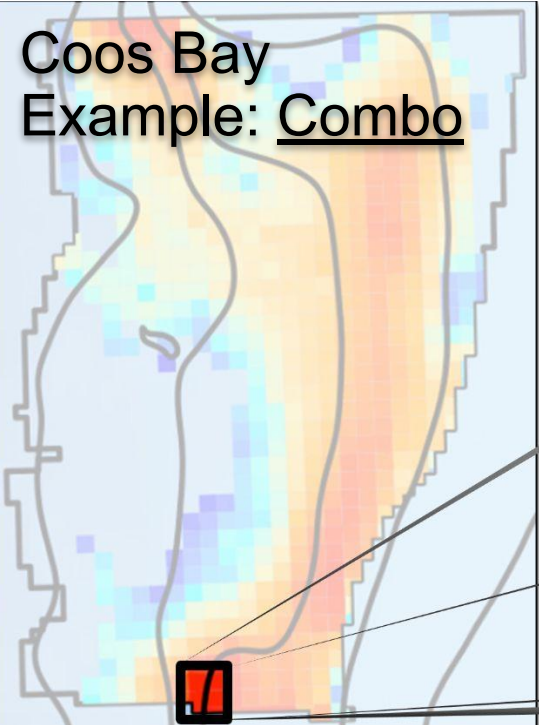
Example: Revenue



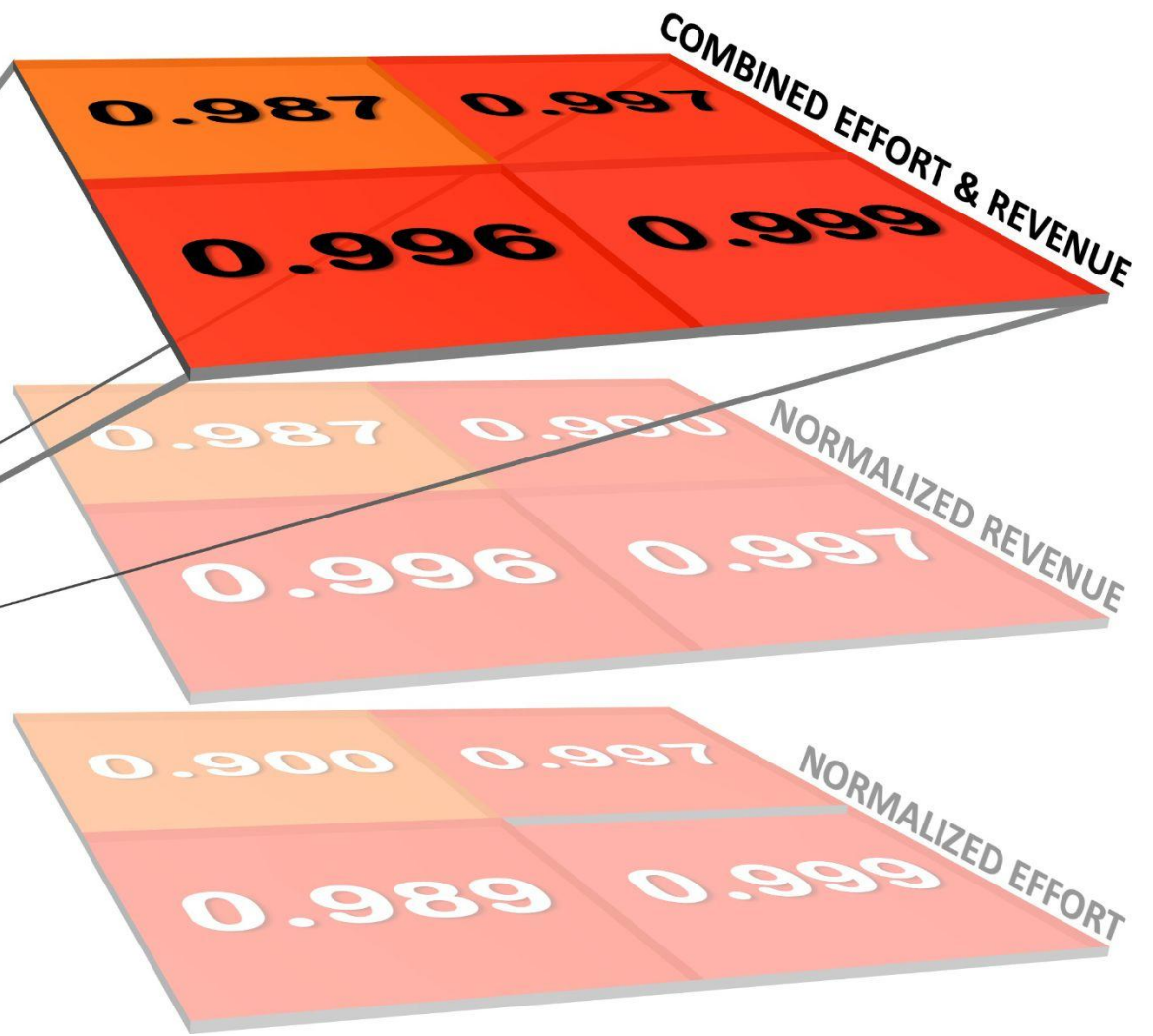
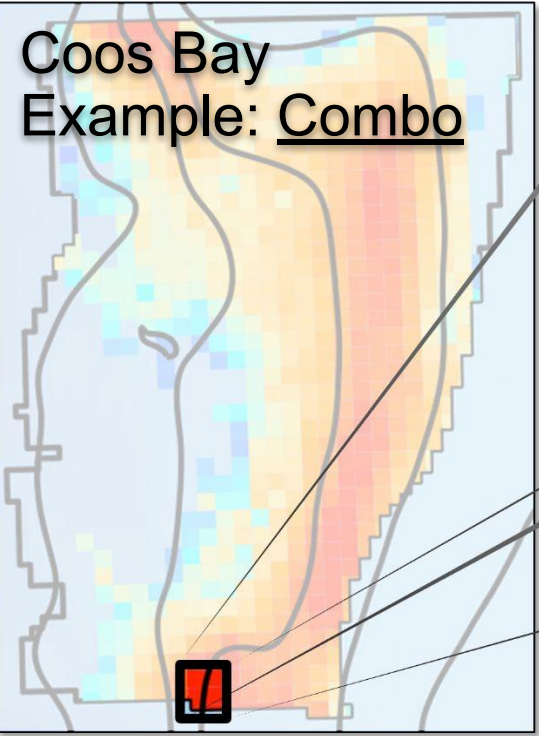
Coos Bay  
Example: Combo



Coos Bay  
Example: Combo

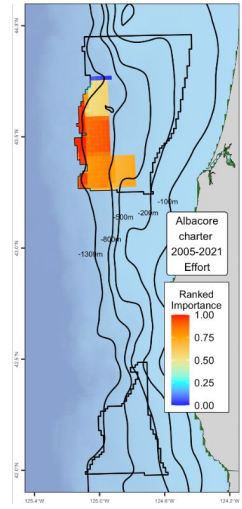
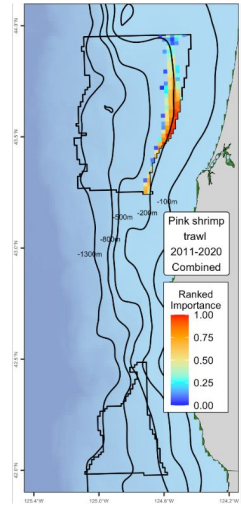
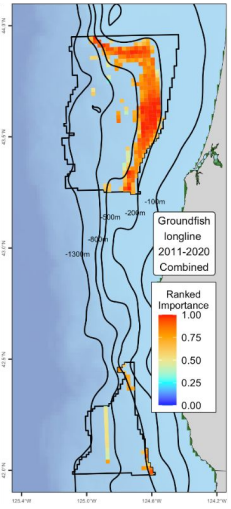
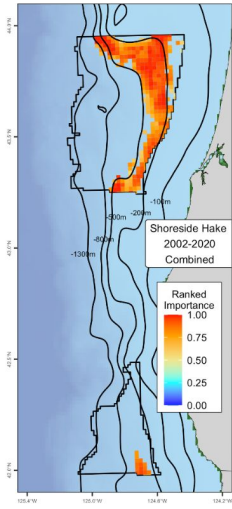
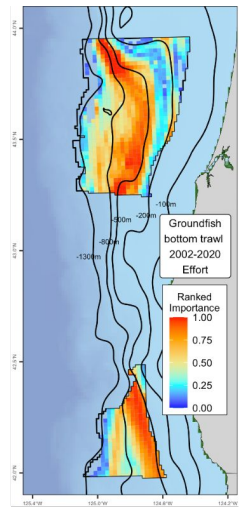
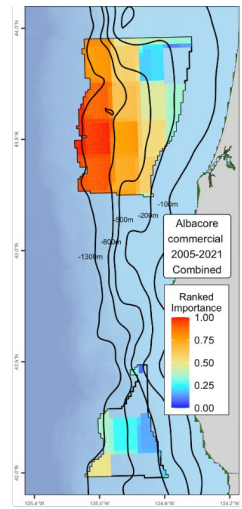
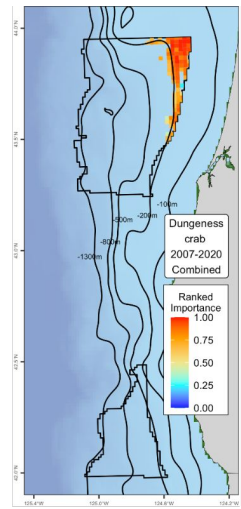
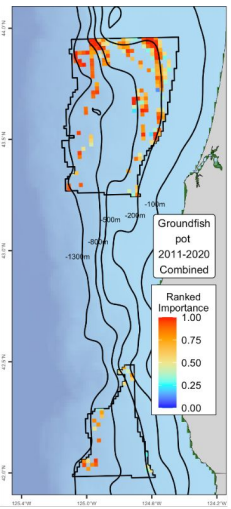
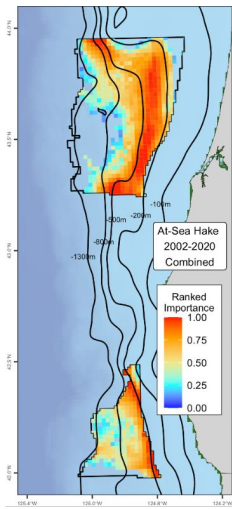


Coos Bay  
Example: Combo





# Combine and calculate suitability score across all nine fisheries

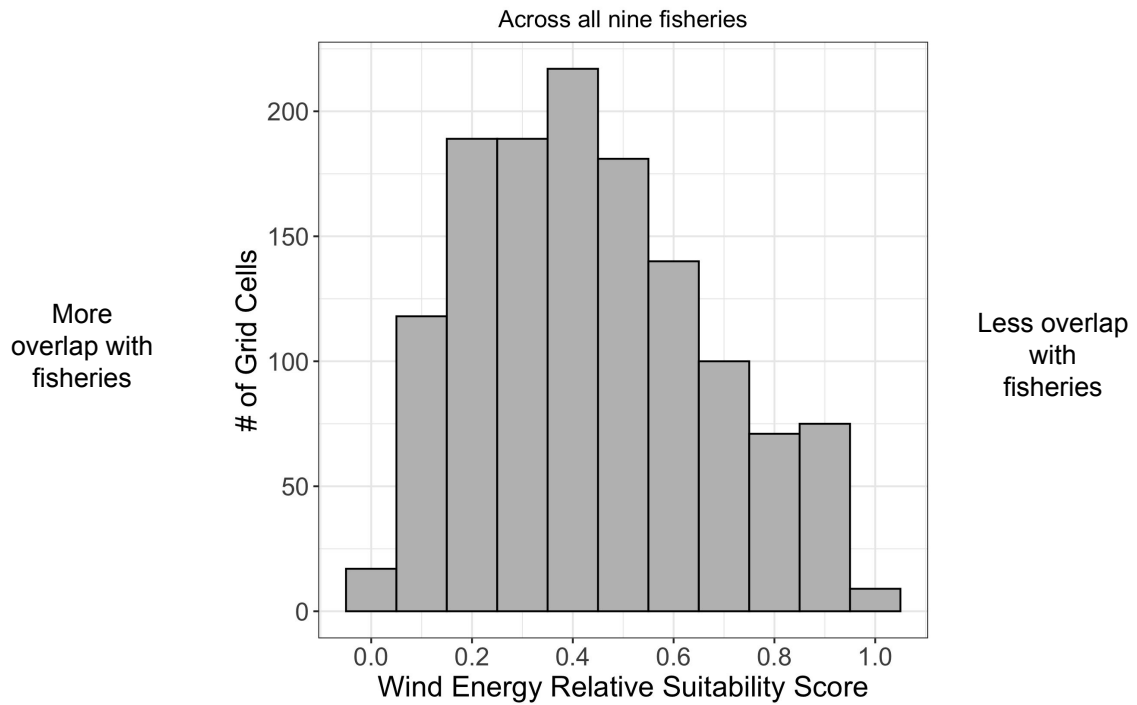


Geometric mean:

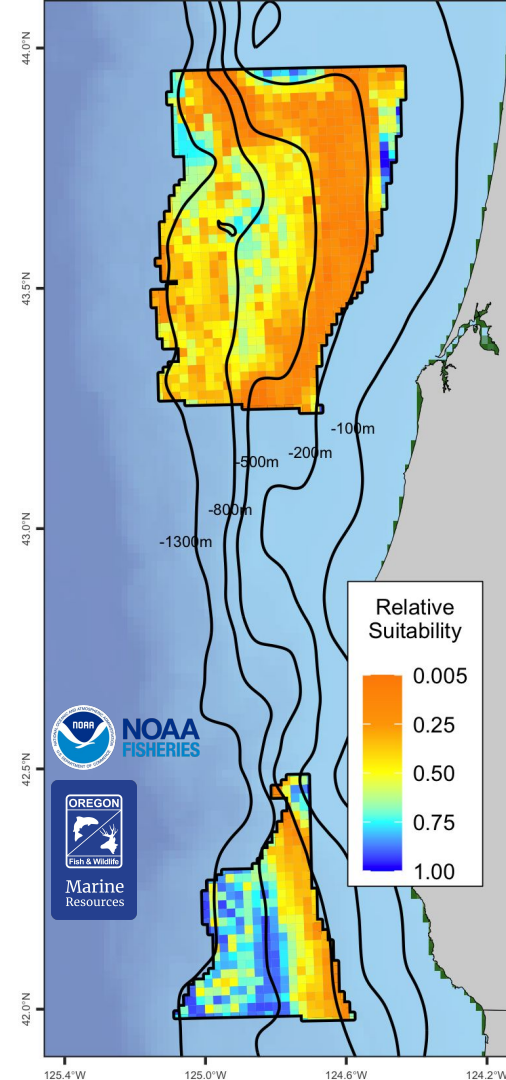
$$\text{Suitability score} = \sqrt[9]{ASH * SSH * GFP * GFL * CRAB * PS * ALCO * ALCH * GFBT}$$

\*many low 'Importance' blue grid cells can not be shown due to confidentiality rules

# Combined fisheries submodel using Ranked Importance

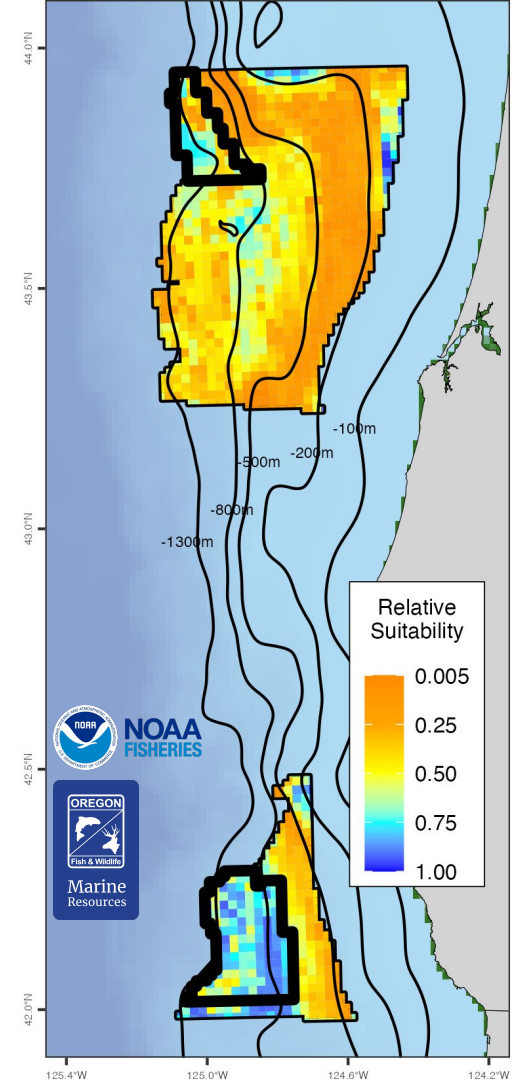


Less suitable to OWE  $\longleftrightarrow$  More suitable to OWE



# Application of fisheries footprints

- BOEM used these fisheries data, in addition to spatial data across all other submodels
- Final Wind Energy Areas off the coast of southern Oregon largely avoided the most broadly-important locations for these nine fisheries.



Building on experiences  
from Oregon modeling

# Key Points

- Will use similar modeling framework
- California has different fisheries and monitoring data
- Have had time to improve and expand on OR models

# Differences between OR and CA Fishery Models

- Measures of fishing intensity
  - Effort (hours fished)
  - Ex-vessel revenue
  - Tonnes landed
- Time period: Revenue generally spanned 2011-2020 in OR, but in CA will match time spans for effort and biomass caught
- Same species/fisheries from OR, plus many more



## **MPC / PFMC Comments on Previous OR Model**

*“analysis is a step forward” “represent a beneficial improvement over similar analyses”*

*“some MPC members would like additional information and explanation about the fishery suitability scores”*

*“Suggest better representation of temporal variability”*

*“Account for fishing vessels that avoid bycatch and restricted species”*

*“use VMS where it can improve the data”*

*“account for boats fishing off OR and landing in WA or CA”*

*“Incorporate pounds of protein in each grid cell”*

*“evaluate the entire coast”*

*“identify sensitive areas such as larval nursery areas”*

*“Spatial data for recreational fisheries data is either not available or is too coarse scale”*

## **Considerations for CA**

Enhancing with feedback where possible

Did today’s presentation help?

Could characterize as variance, CV, etc.

Could implement work by others, e.g., Stock et al. (2020) to model?

Implementing for Chinook & Dungeness

Addressed in OR model, where possible. For CA, will account for fishing in CA waters that is landed in OR.

Tonnes landed now 3<sup>rd</sup> measure

Developing fishing heatmaps coast wide to account for effects locally (port level), cumulatively and outside wind farms

CCIEA report 2024

Have limited rec fishery data, but open to suggestions



# ODFW & NMFS provided 5 scenarios for BOEM's consideration in OR

**CONSTRAINT (score = 0)**

**Score = 0.001**

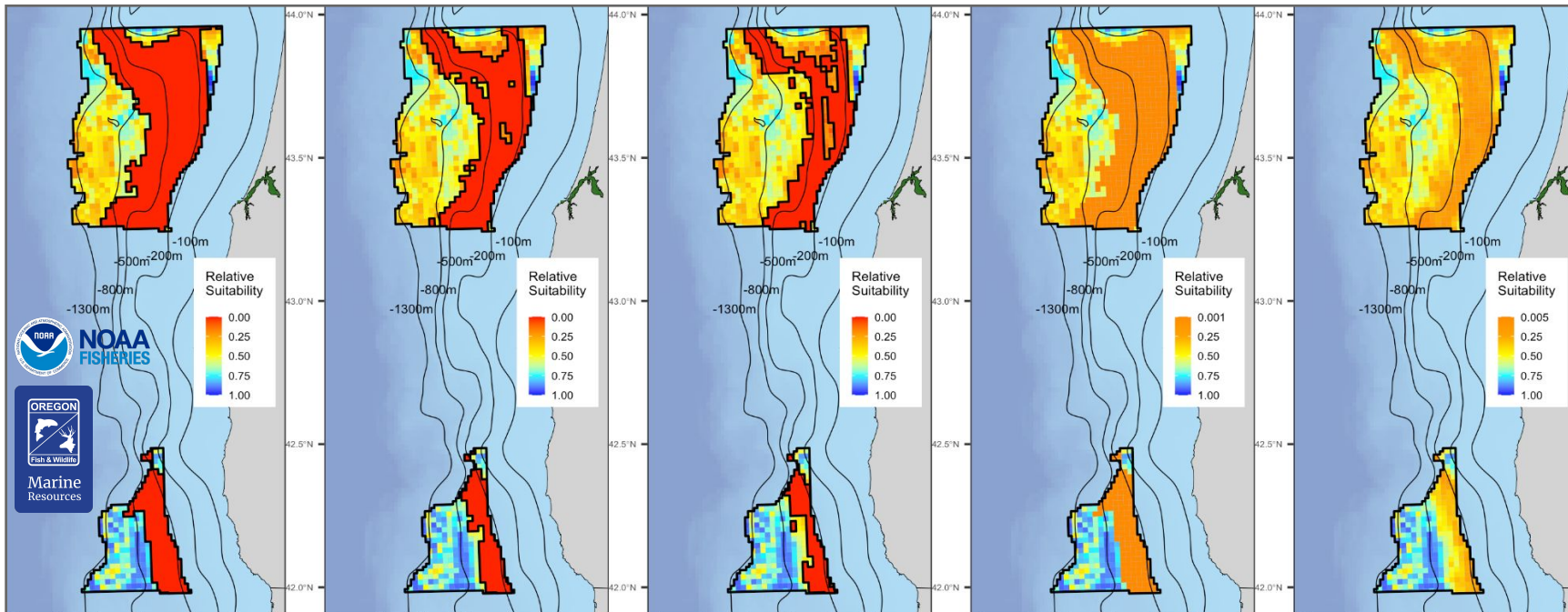
**1) 75% trawl**

**2) 60% trawl**

**3) 50% trawl**

**4) 75% trawl**

**5) Baseline  
All 9 fisheries**



**Percent calculation = ranked importance of the combined revenue & effort for the 4 trawl fisheries**