

Characterizing Fisheries Footprints for Offshore Wind Energy Planning:

NMFS and ODFW Joint Technical Assistance to BOEM and NCCOS for BOEM's Oregon Spatial Model



NOAA
FISHERIES

PFMC Marine Planning Committee, Feb 2, 2023



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Data, Methods & Maps

- What metrics will best characterize the spatial footprints of fisheries?
- Which fisheries do we have access to data?
- Preliminary exploration - What do the data look like?
- Creating a combined metric for each fishery
- Maps of each fishery
- Combined fisheries layer: Relative suitability scores for fisheries submodel

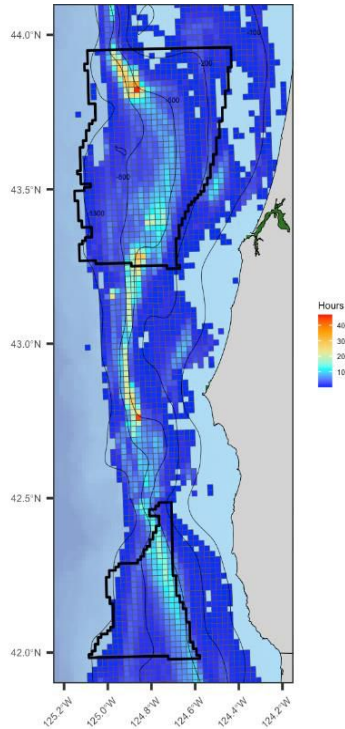
What data can we provide?

How to measure spatial importance for fisheries?

Given short timeline for completing analyses, able to leverage existing geospatial data layers of fishing effort and associated revenue for several fisheries from two ongoing NMFS [CCIEA](#) projects.

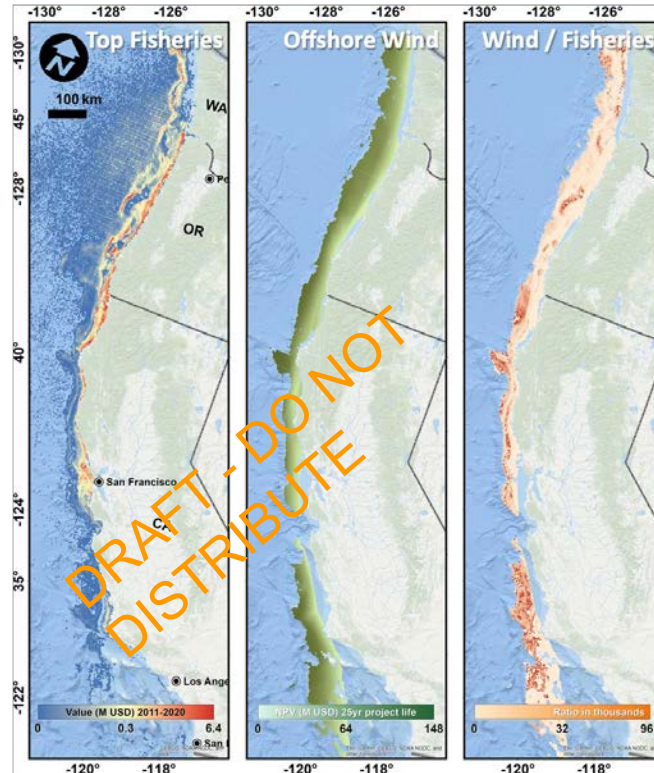
[CCIEA Ecosystem Status Reports](#) (2018 - 2022):

Indicators of human activities



Fishing effort of groundfish bottom trawl fisheries (hours trawled)

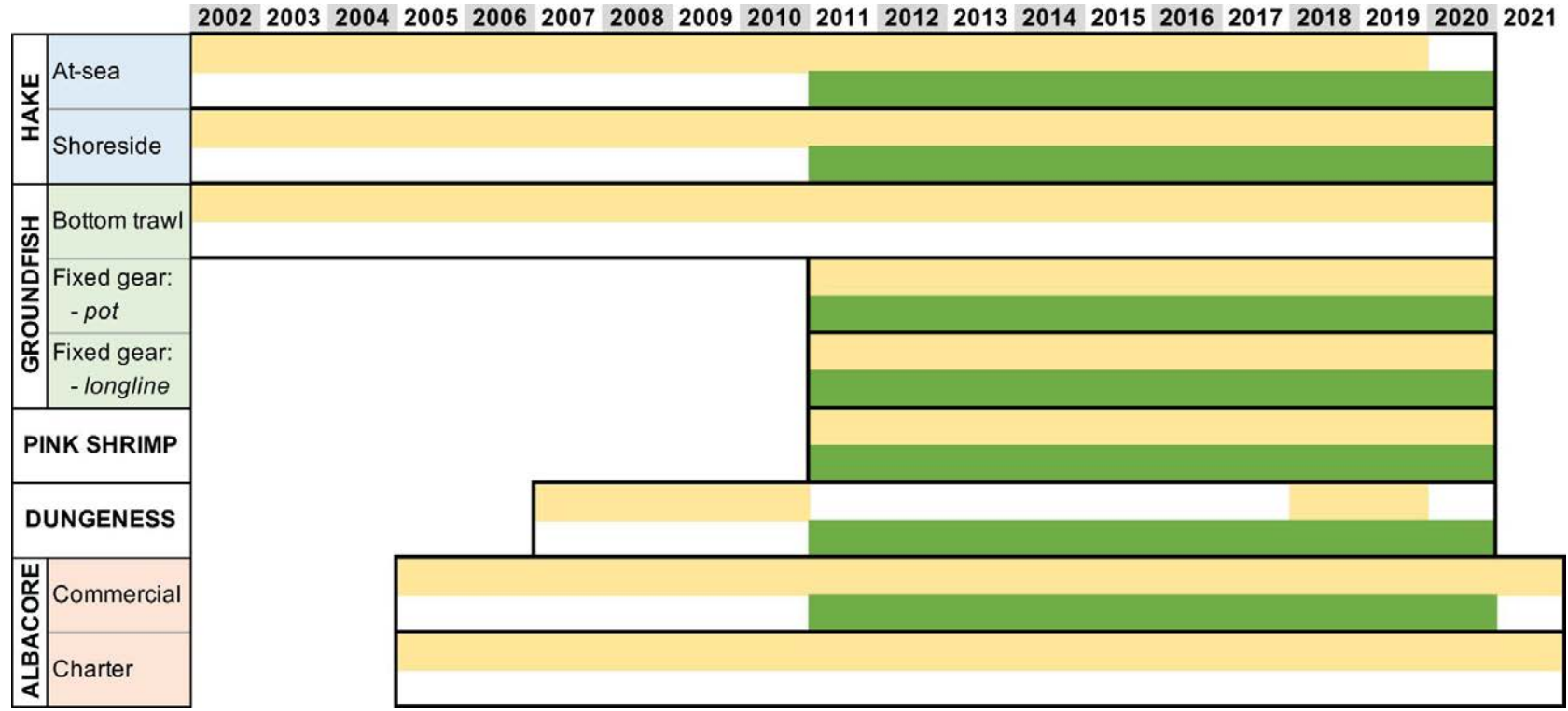
Cumulative Value of Top Fisheries (2011-2020) & Wind Energy
Feist et al. (In Prep) DO NOT DISTRIBUTE



Fisheries Considered

- GOAL -- Accurate representation of West Coast fisheries
 - Effort and revenue data
- Which fisheries had spatial data that could be acquired and analyzed within the short time?
 - Fisheries considered -- 11
 - Included -- 9 (federal and state)
- Not included:
 - salmon and halibut -- spatial data limitations and time constraints
 - CPS -- operates closer to shore
 - recreational fisheries (except albacore charter) -- spatial data not available

Sectors and Years Analyzed



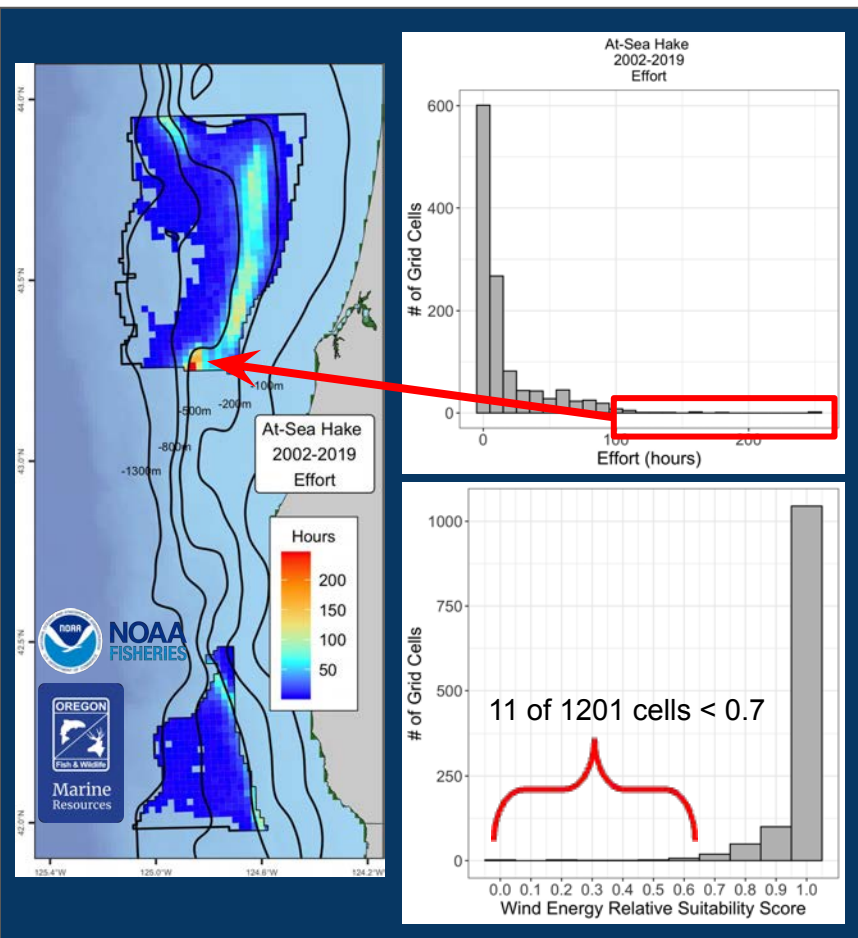
Effort: fishing coordinates, duration fished & amount of fixed gear from state and federal logbooks or ASHOP

Revenue: state and federal logbooks & WCGOP & ASHOP data matched to PacFIN fish ticket database



What do the data look like?

Raw data



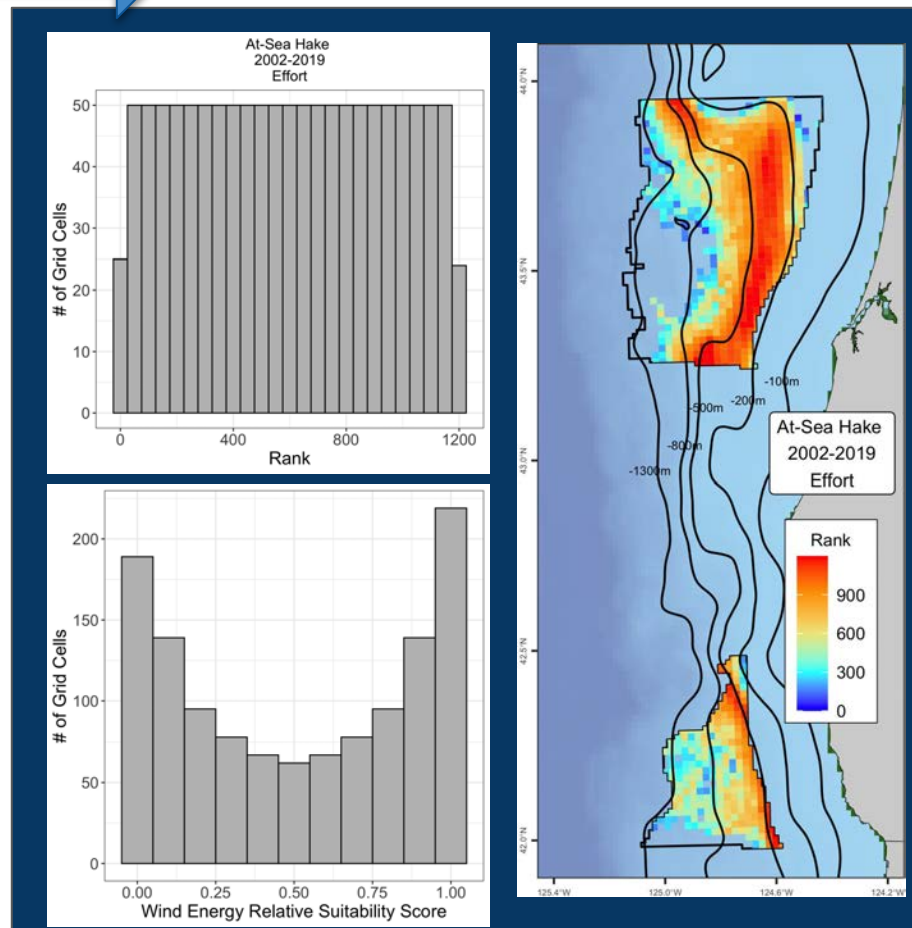
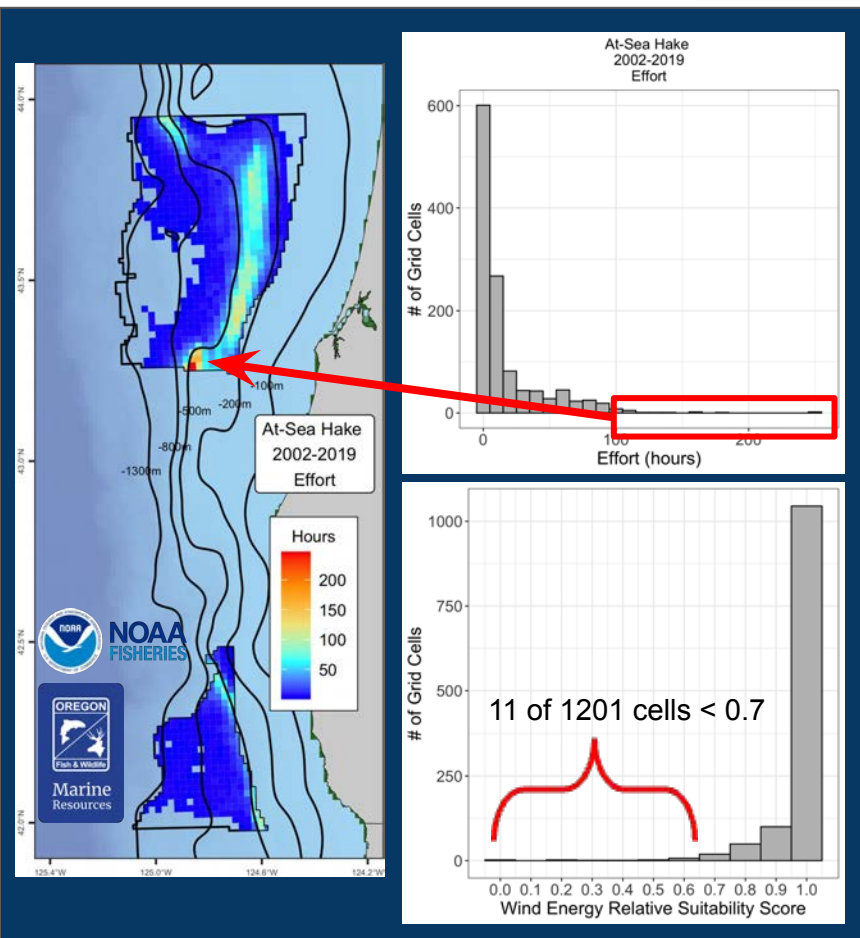
These very few, really high values **de-emphasize** the amount of space used by the fishery...

- Transformations of data are common in fisheries science
- Rank transform effort and revenue data

Raw data

Rank Transform

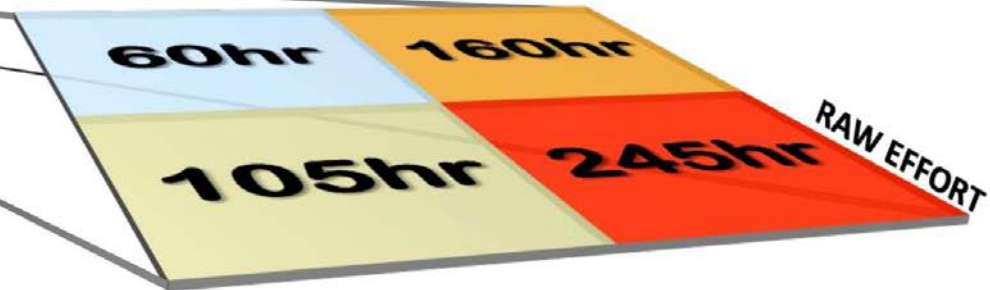
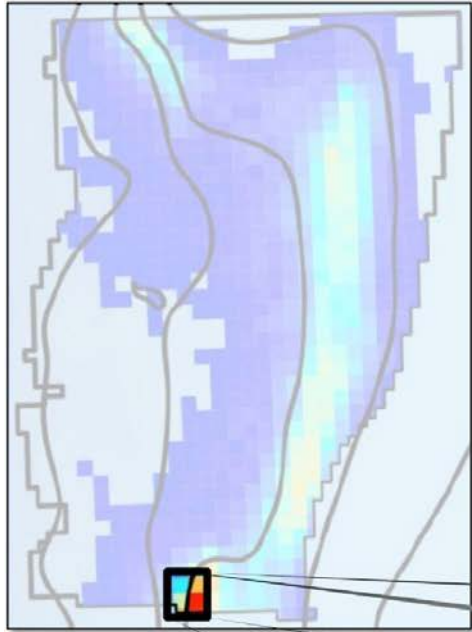
Ranked data



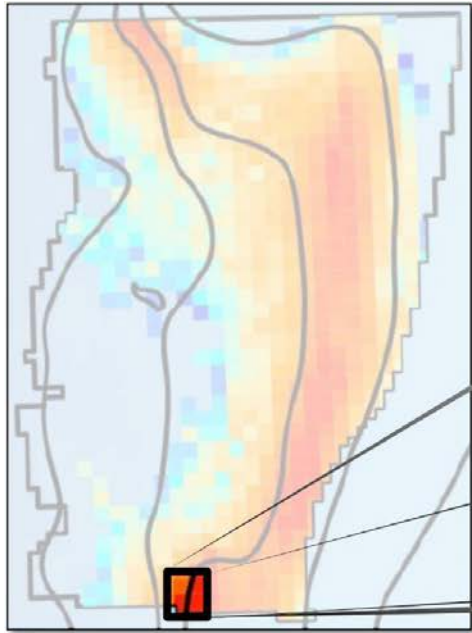
Using both effort **and** revenue data in the model

- Both metrics (effort and revenue) are generally correlated, but there are some important outliers.
- Here, we combine effort and revenue in a way that keeps the most important metric
 1. Rank each metric
 2. Normalize each metric between 0 and 1
 3. Combine metrics

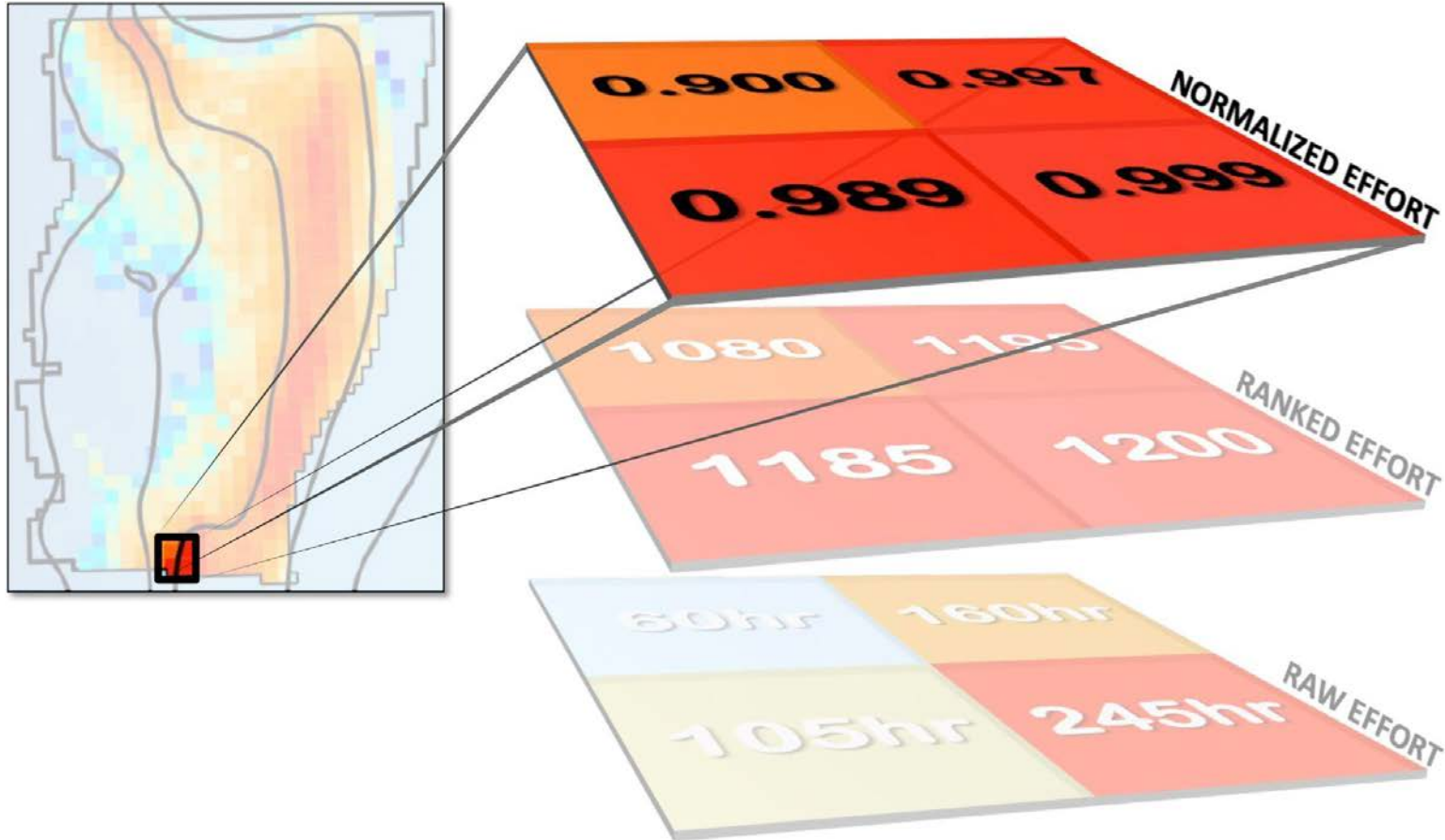
Ranking and normalizing effort (at-sea whiting)



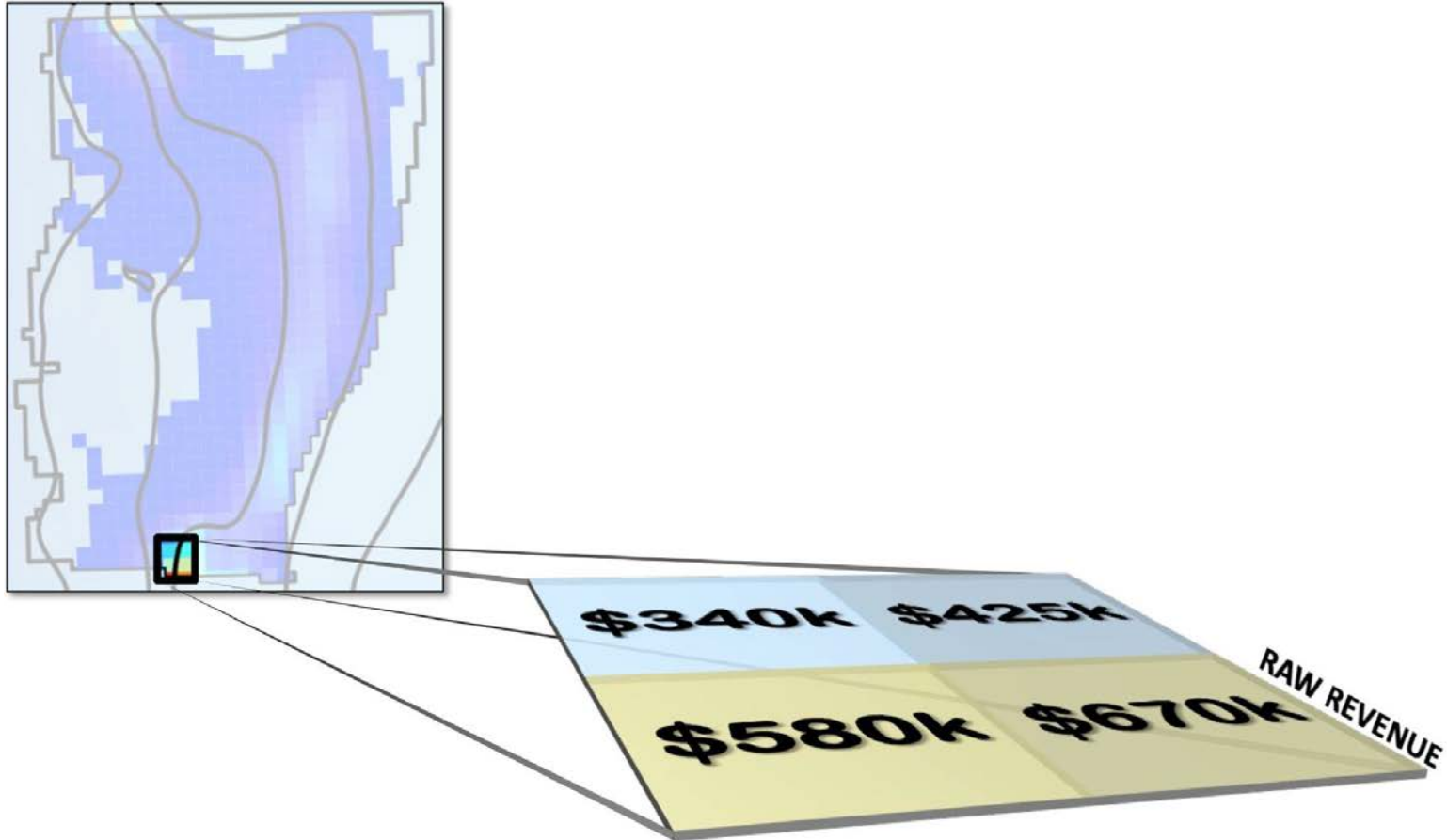
Ranking and normalizing effort (at-sea whiting)



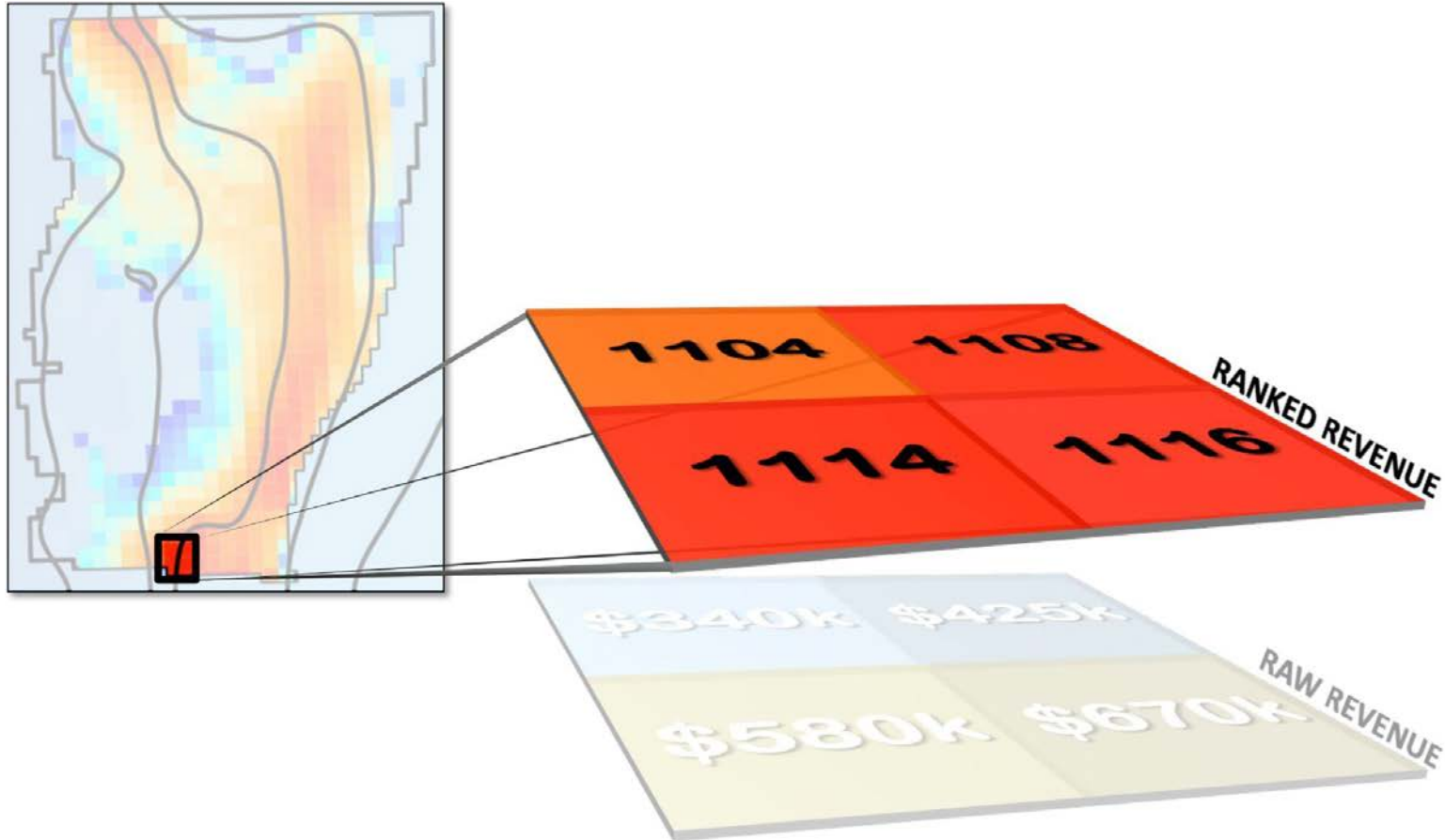
Ranking and normalizing effort (at-sea whiting)



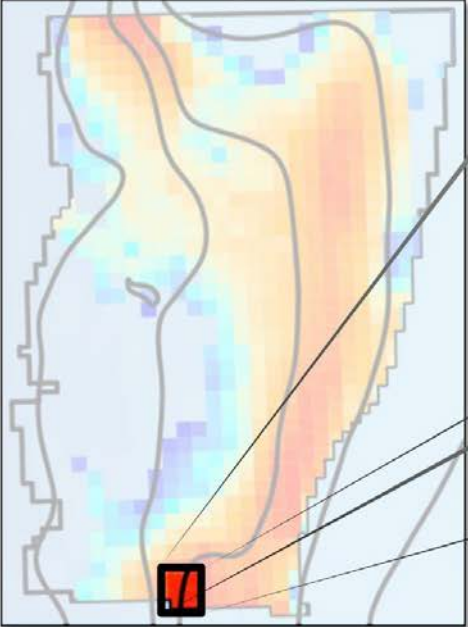
Ranking and normalizing revenue (at-sea whiting)



Ranking and normalizing revenue (at-sea whiting)

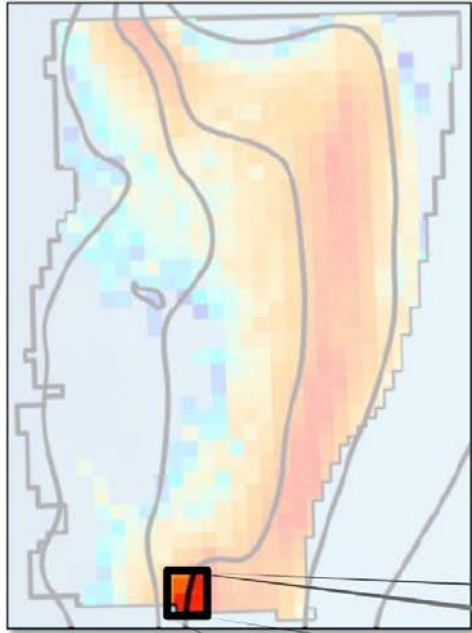


Ranking and normalizing revenue (at-sea whiting)

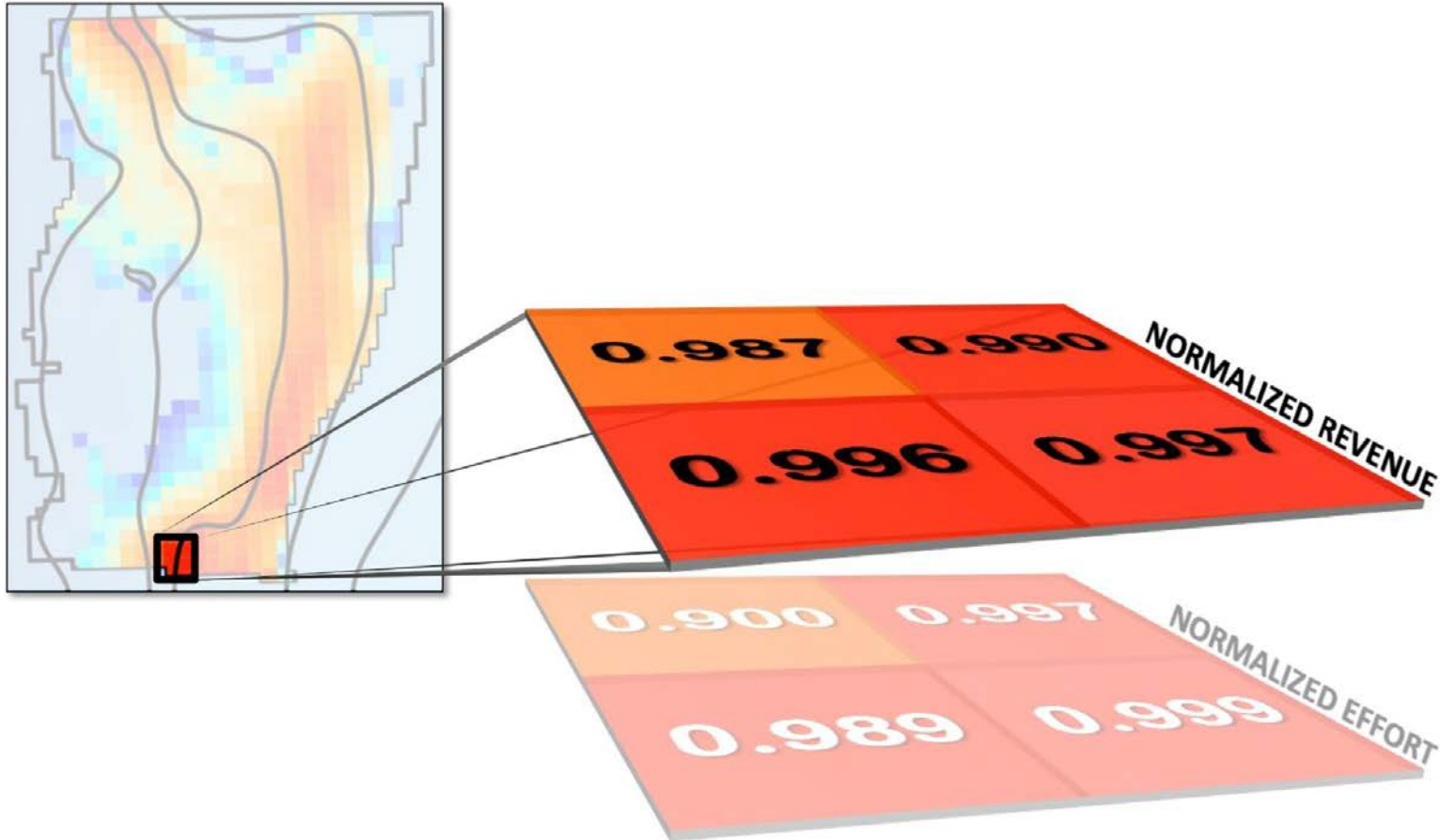


Now, we combine those two top layers...

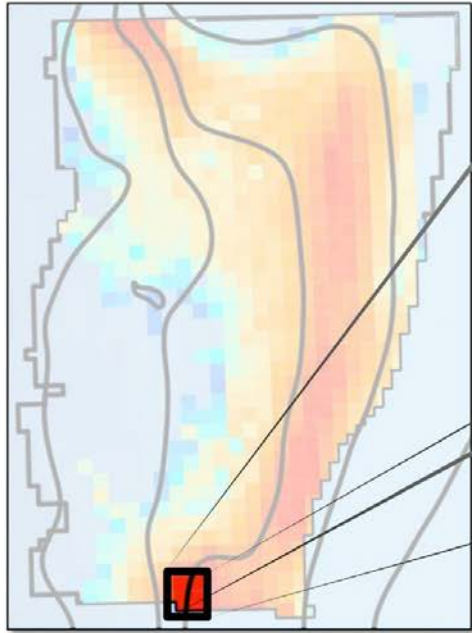
Combining normalized effort and revenue (at-sea whiting)



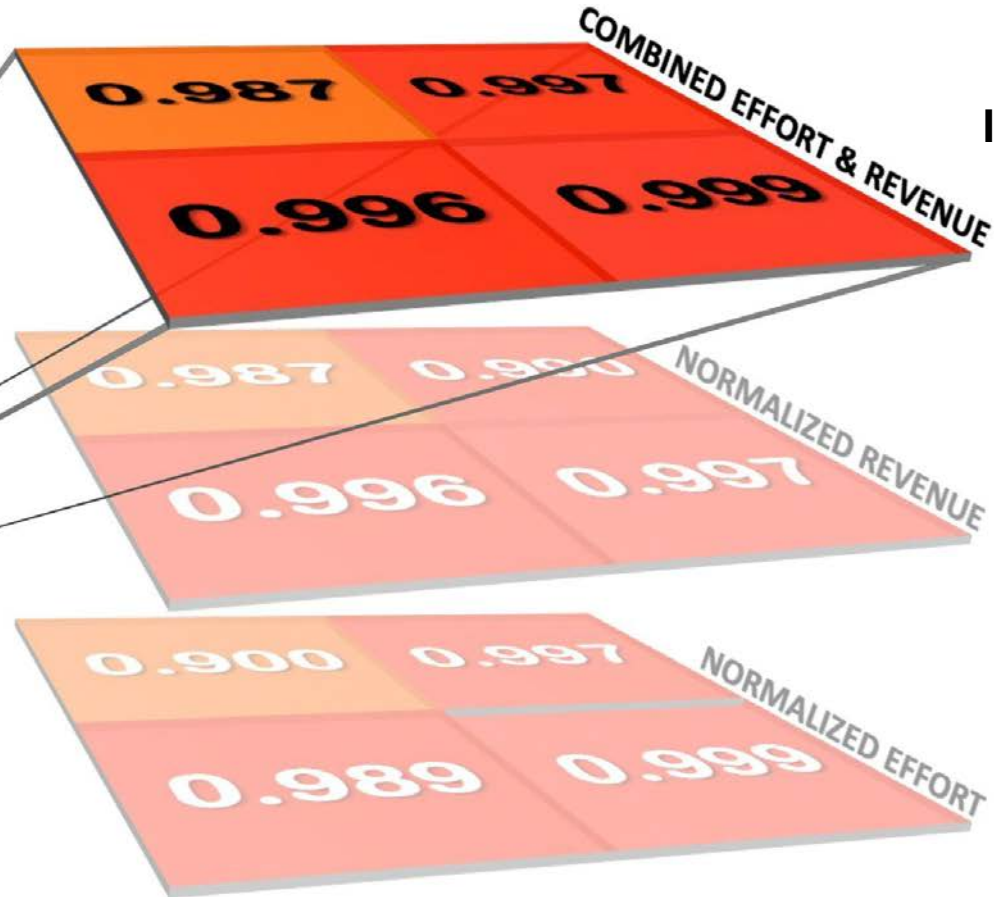
Combining normalized effort and revenue (at-sea whiting)



Combining normalized effort and revenue (at-sea whiting)



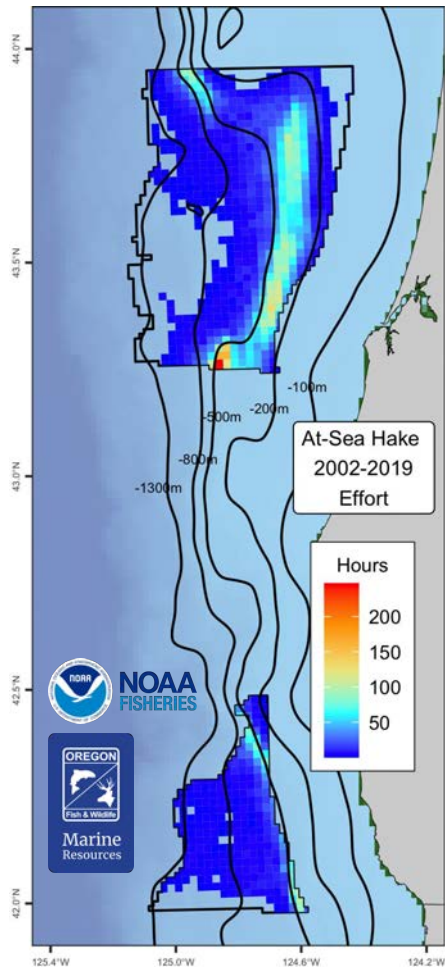
Select highest value from effort or revenue layer



“Ranked Importance”

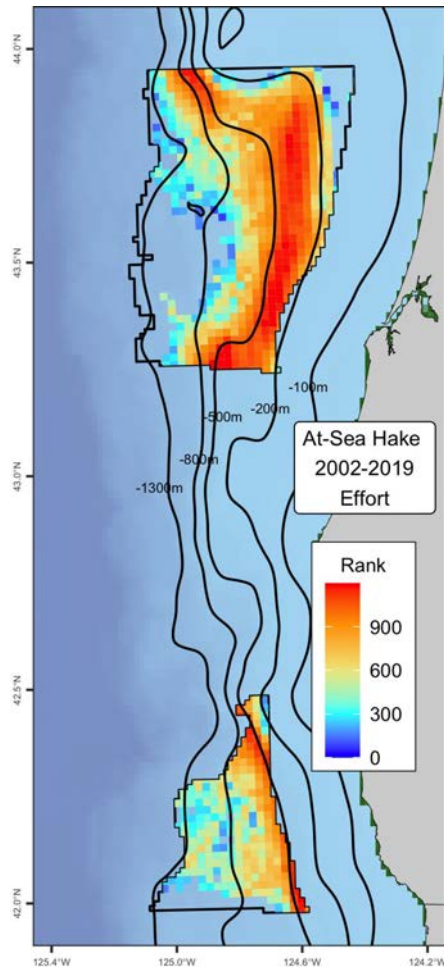
Combining effort and revenue using
maps of at-sea hake fishery

Raw effort



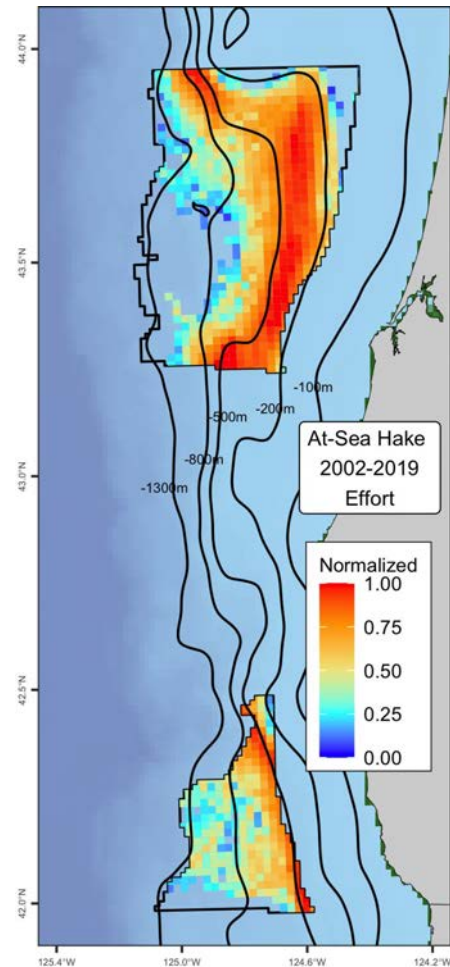
Rank transformed

Ranked effort

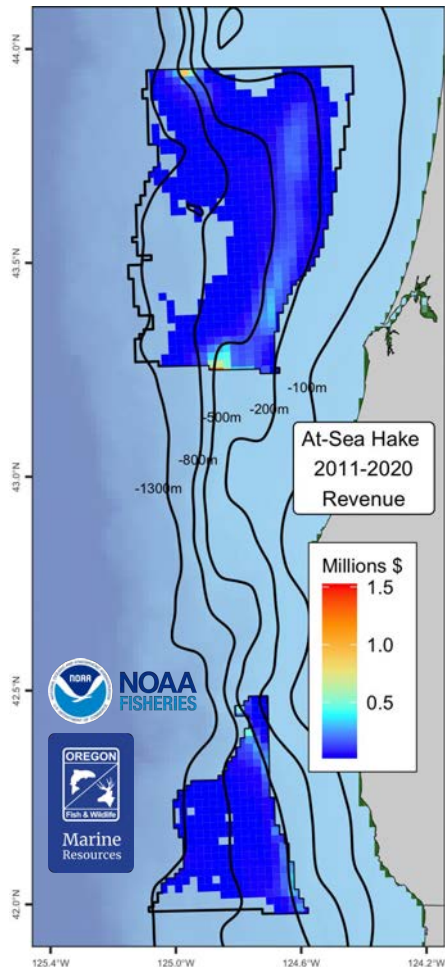


Normalized (0 - 1)

Normalized ranked effort

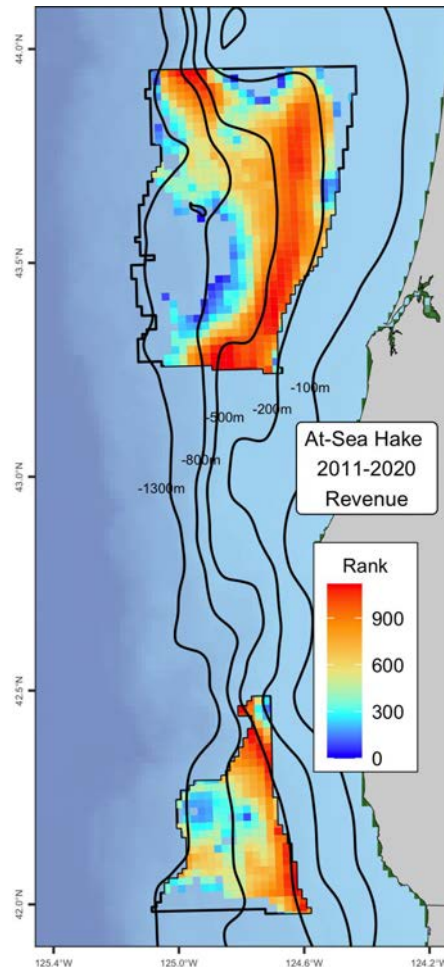


Raw revenue



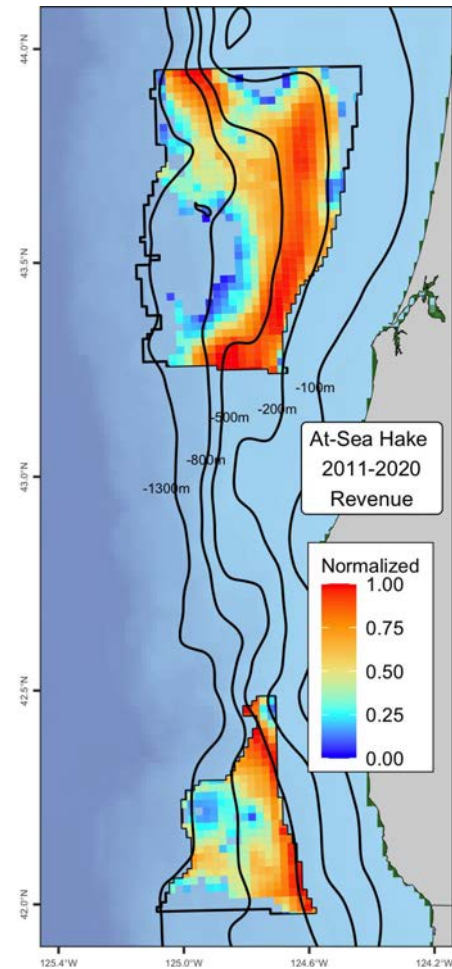
Rank transformed

Ranked revenue

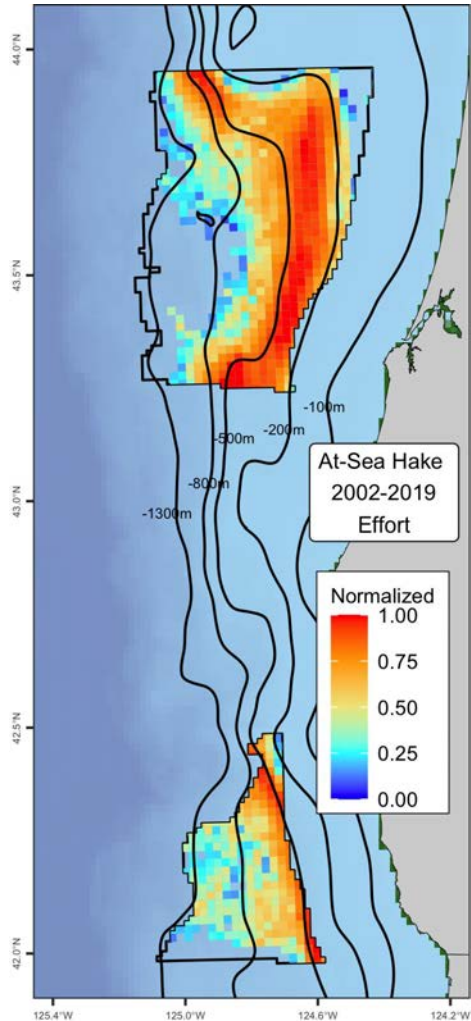


Normalized (0 - 1)

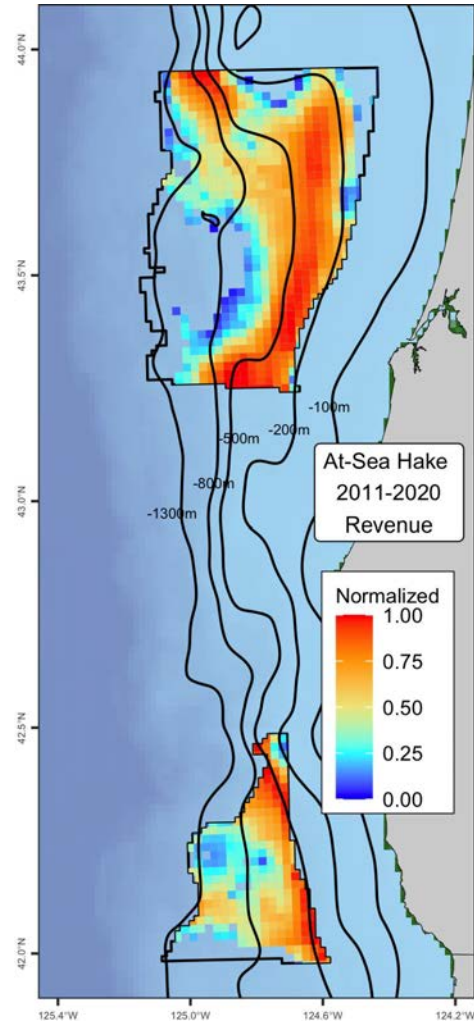
Normalized ranked revenue



Normalized ranked effort

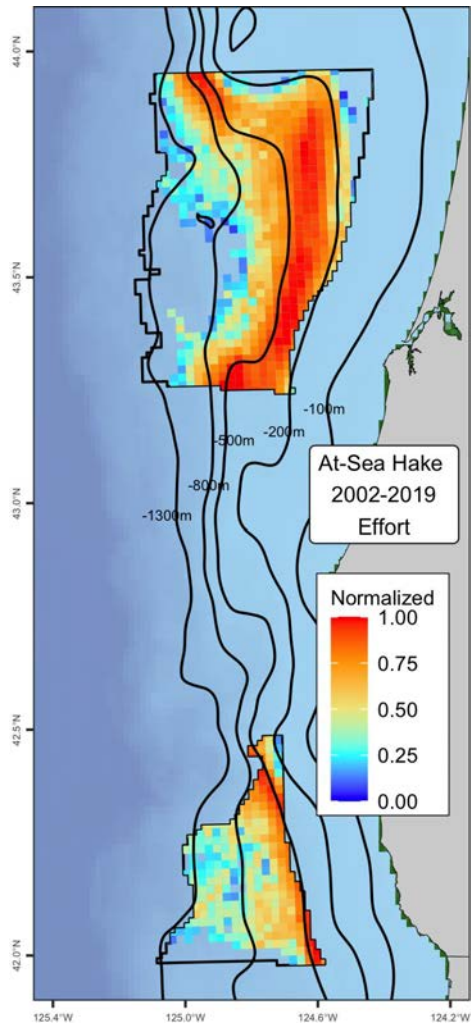


Normalized ranked revenue

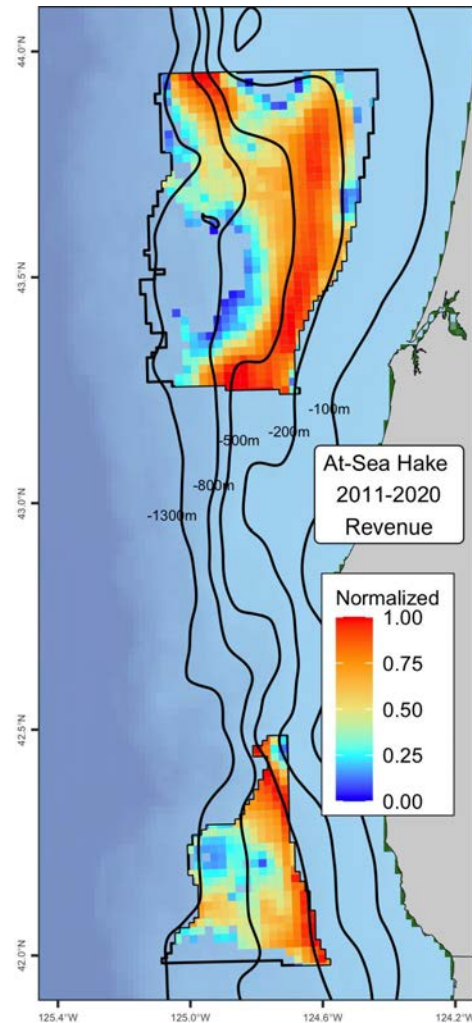


Select highest value from effort or revenue layer

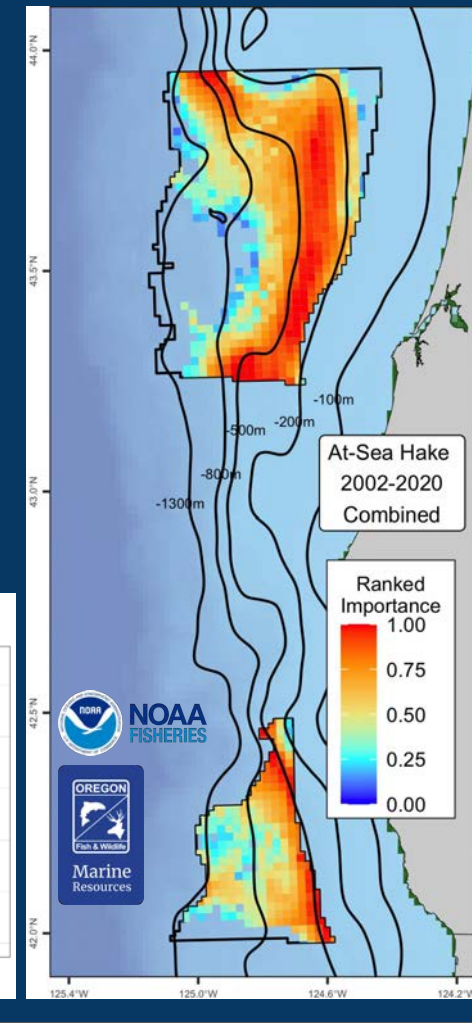
Normalized ranked effort



Normalized ranked revenue

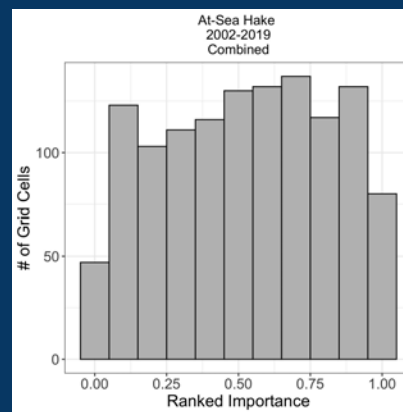


Combined effort & revenue

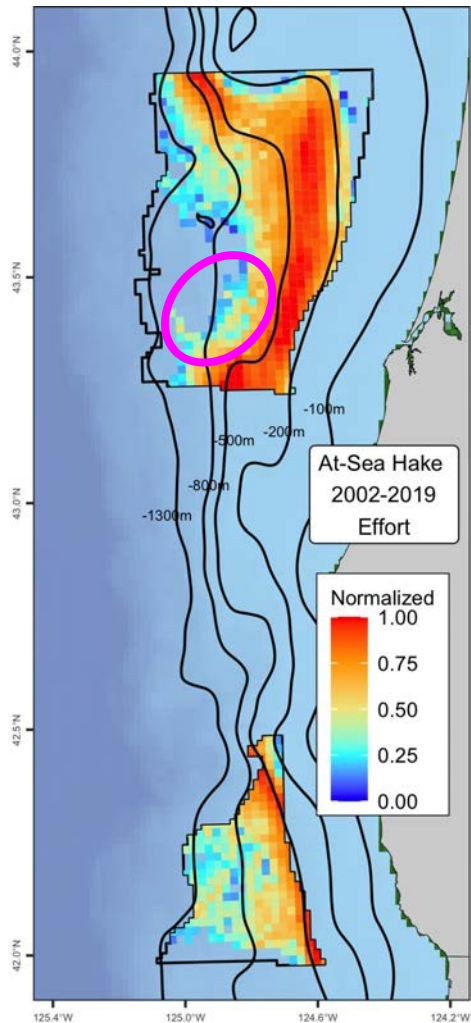


Select highest value from effort or revenue layer

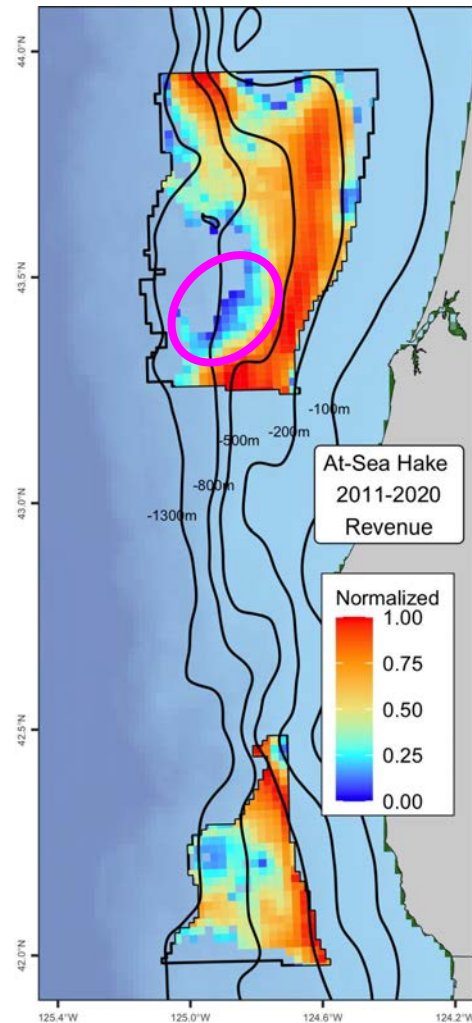
Data we provided to NCCOS/BOEM:



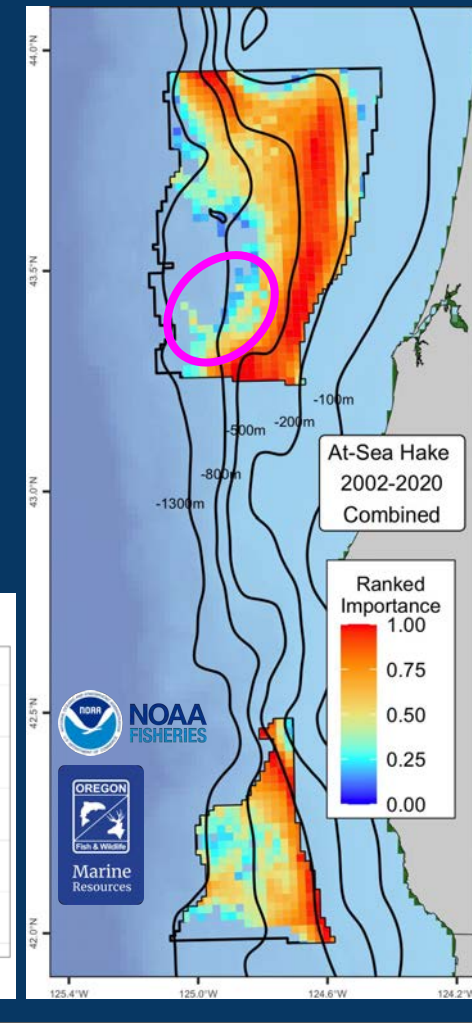
Normalized ranked effort



Normalized ranked revenue

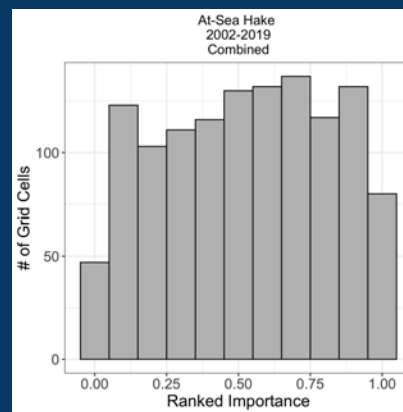


Combined effort & revenue



Select highest value from effort or revenue layer

Data we provided to NCCOS/BOEM:



Metrics of importance for each of the nine fisheries

****These non-confidential maps are available on OROWindMap****

<https://offshorewind.westcoastoceans.org/visualize/>

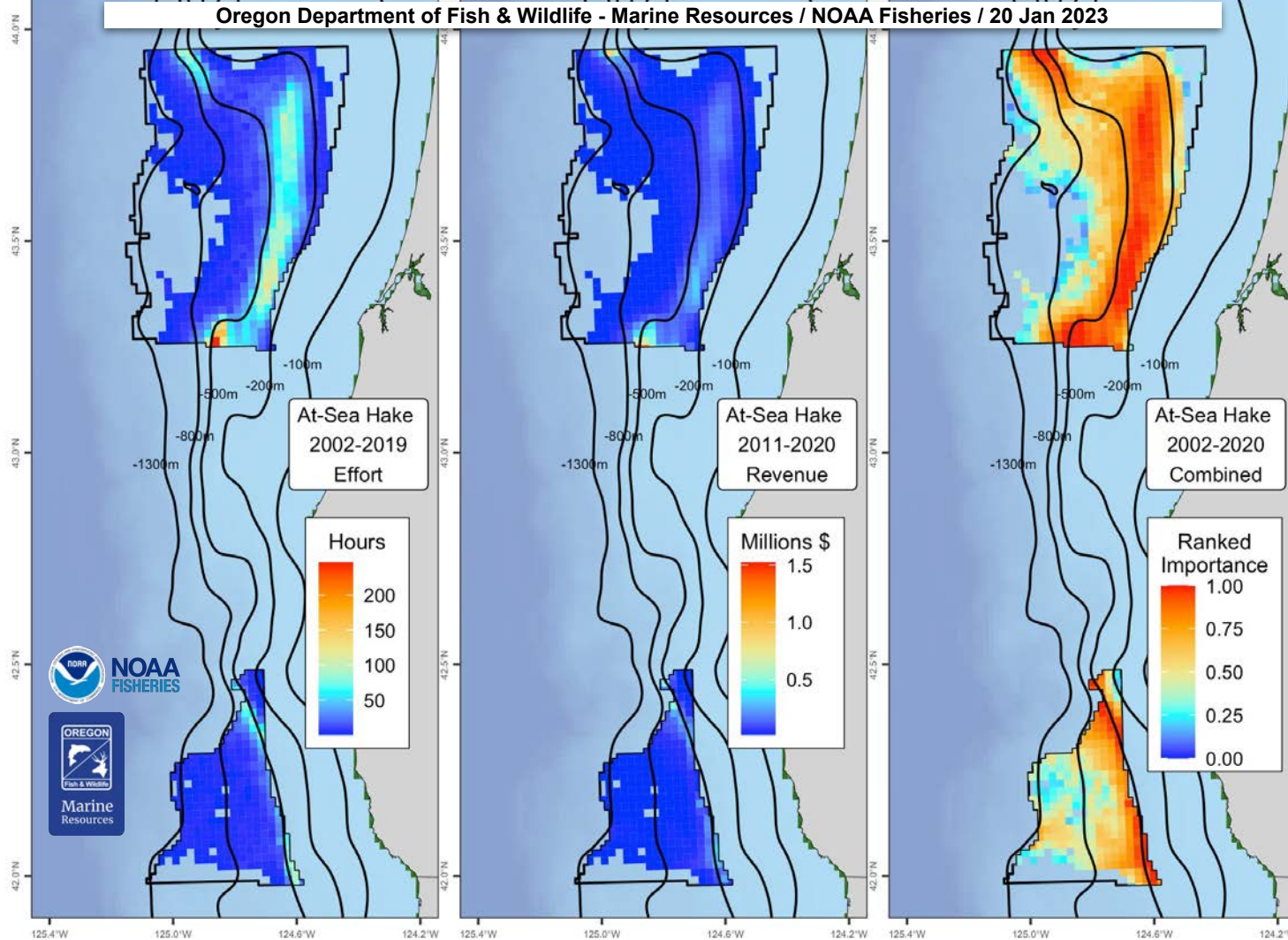
Click on Data tab/Human/FISHING ODFW NMFS CALL AREA SLIDERS

At-sea hake mid-water trawl

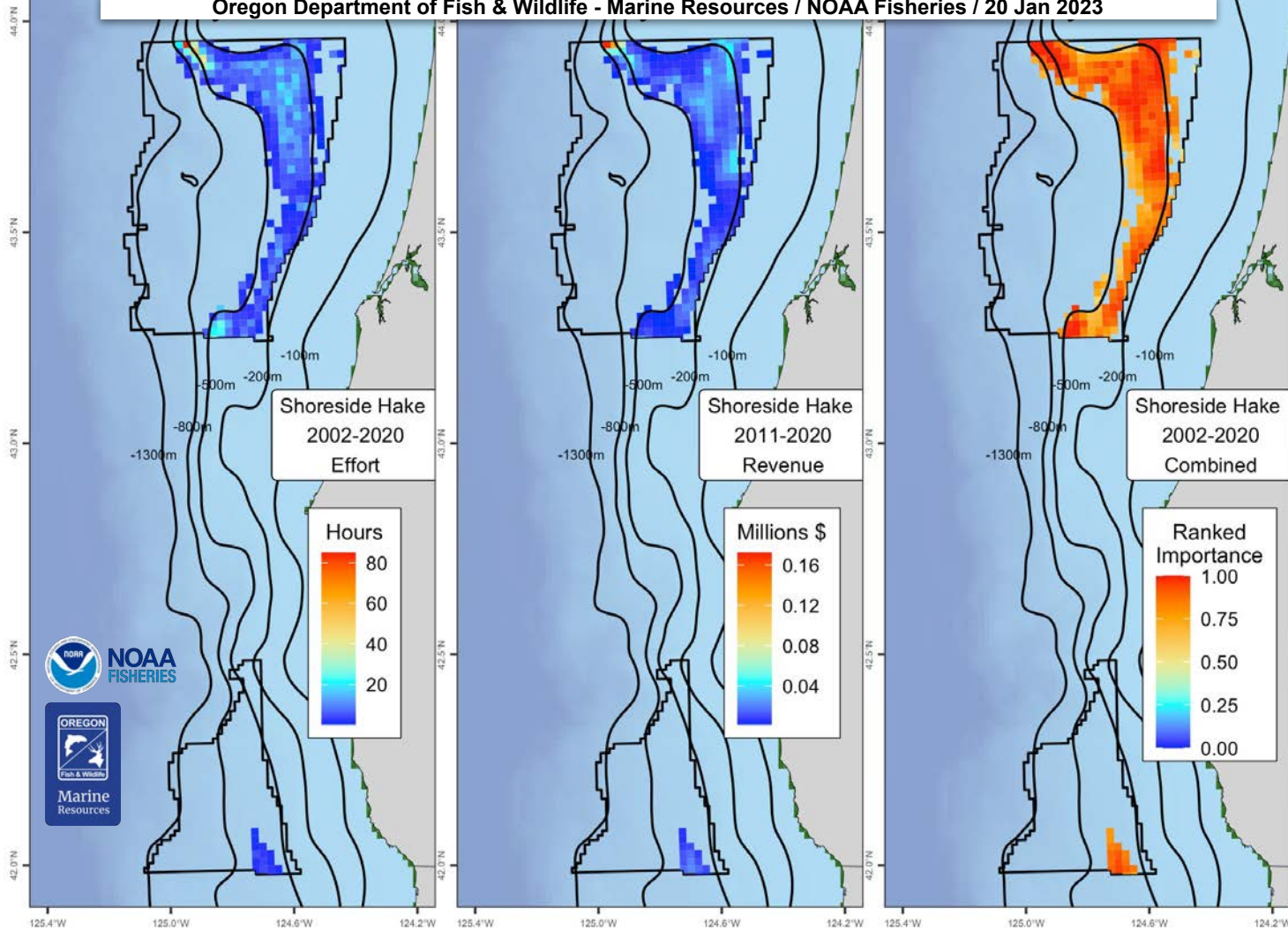
Data source:

Effort: NMFS At-Sea Hake Observer Program (nearly 100% coverage)

Revenue: NMFS At-Sea Hake Observer Program (nearly 100% coverage) & PacFIN



Shoreside hake mid-water trawl



Data Source:

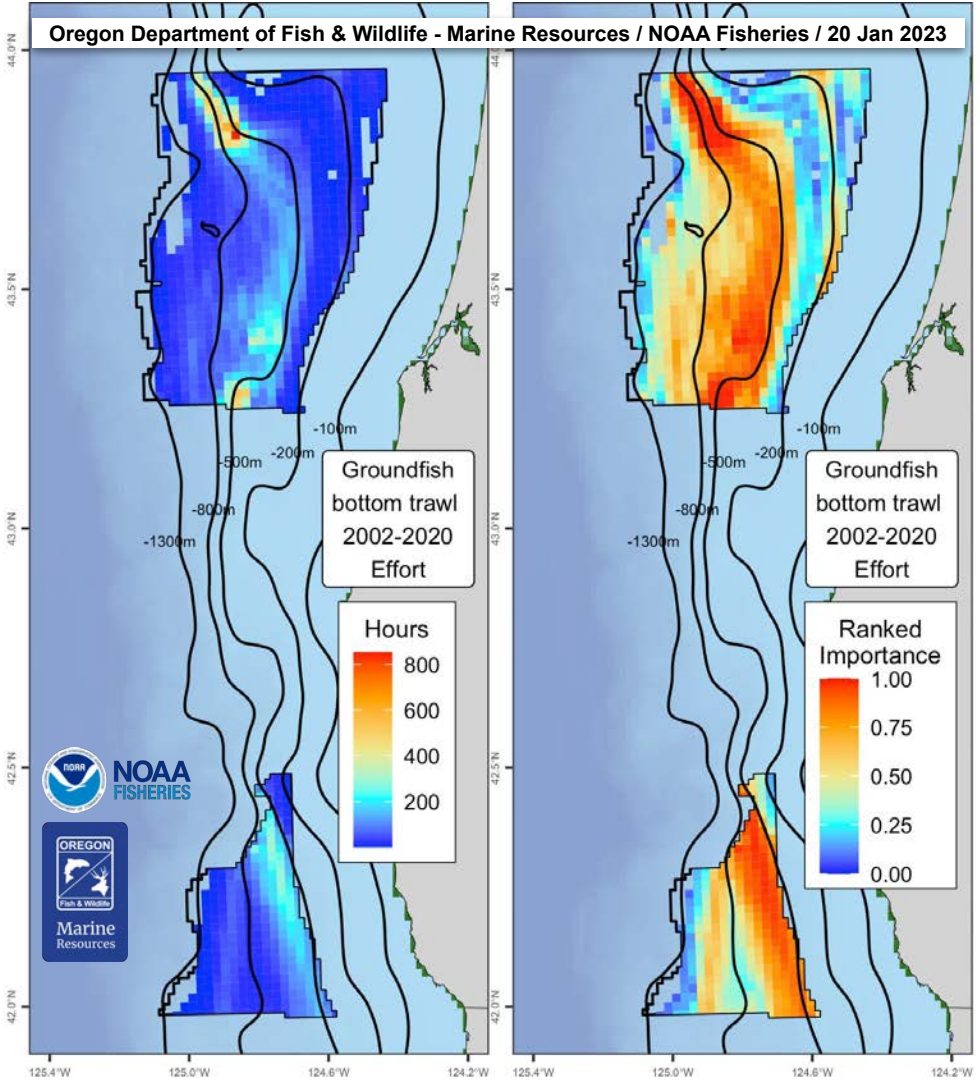
Effort: ODFW State (2002-2010, 2020) & PacFIN logbooks (2011-2019)

Revenue: NMFS West Coast Groundfish Observer Program & ODFW Fish Tickets in PacFIN

Groundfish bottom trawl

Data Source:

Effort: ODFW State
logbooks in PacFIN

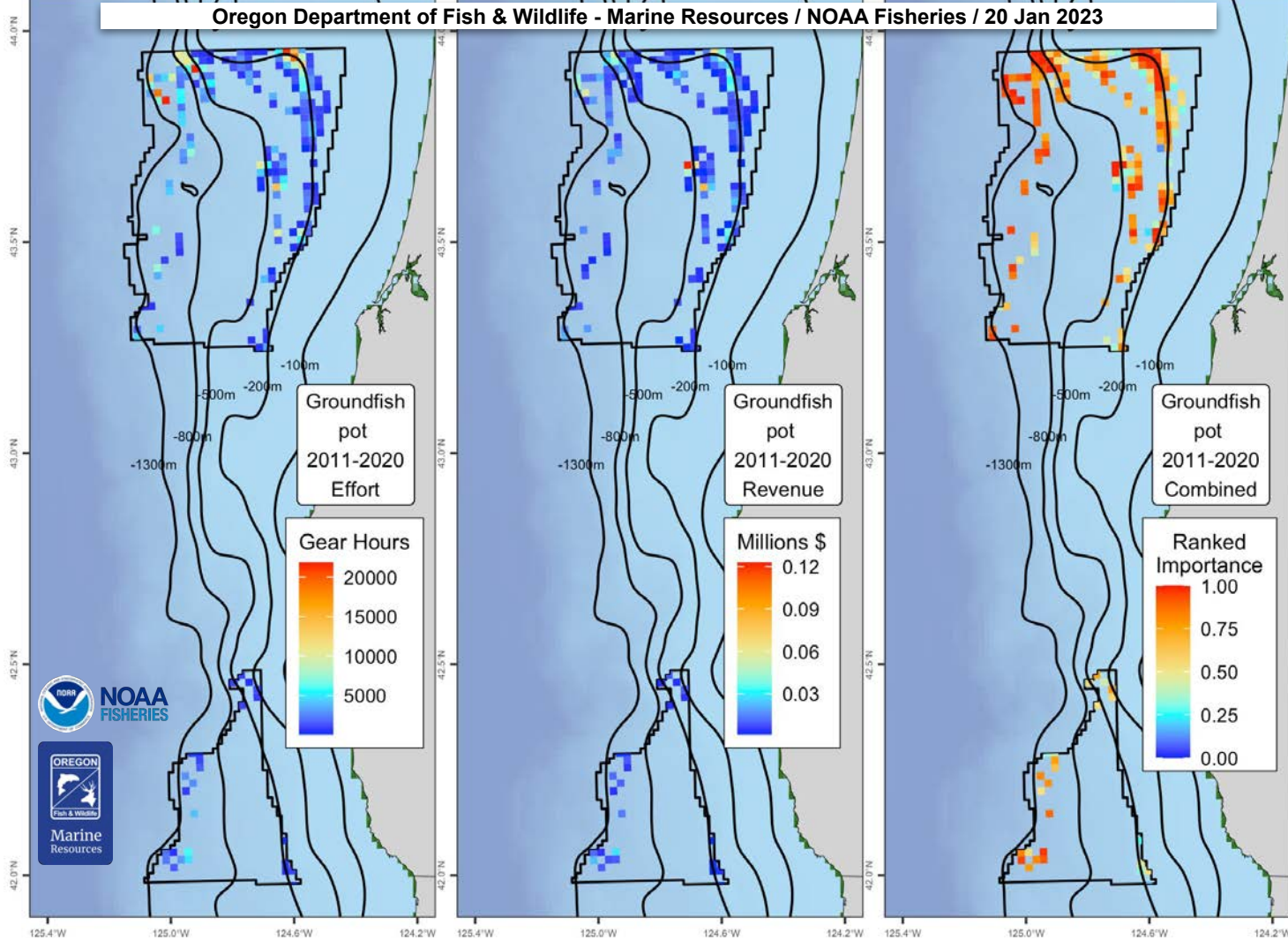


Groundfish fixed gear - pot

Data Source:

Effort: ODFW State
logbooks

Revenue: ODFW
State logbooks &
ODFW Fish Tickets
in PacFIN

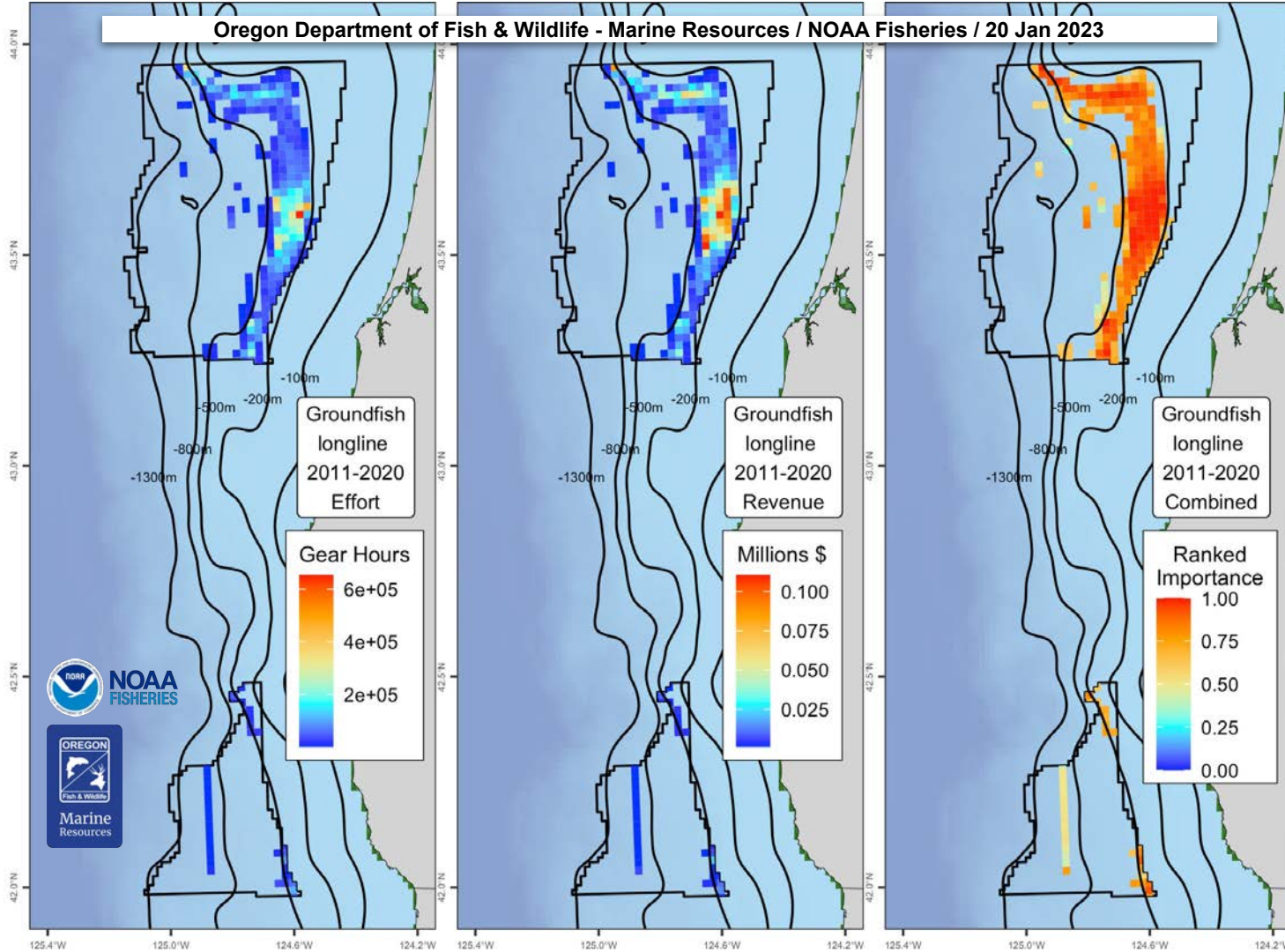


Groundfish fixed gear - longline

Data Source:

Effort: ODFW State
logbooks

Revenue: ODFW
State logbooks &
ODFW Fish Tickets
in PacFIN

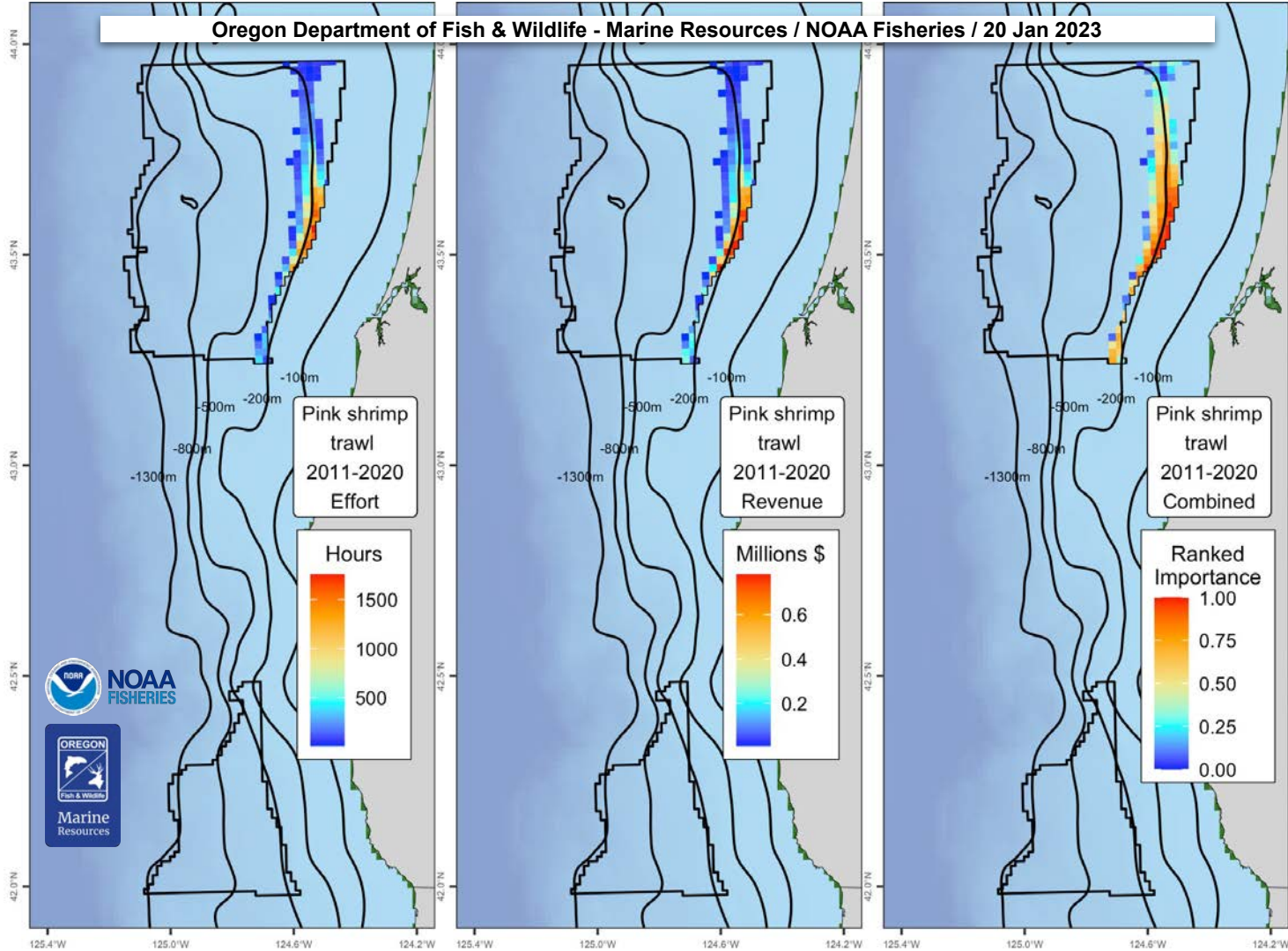


Pink Shrimp trawl

Data Source:

Effort: ODFW State logbooks

Revenue: ODFW State logbooks & ODFW Fish Tickets in PacFIN

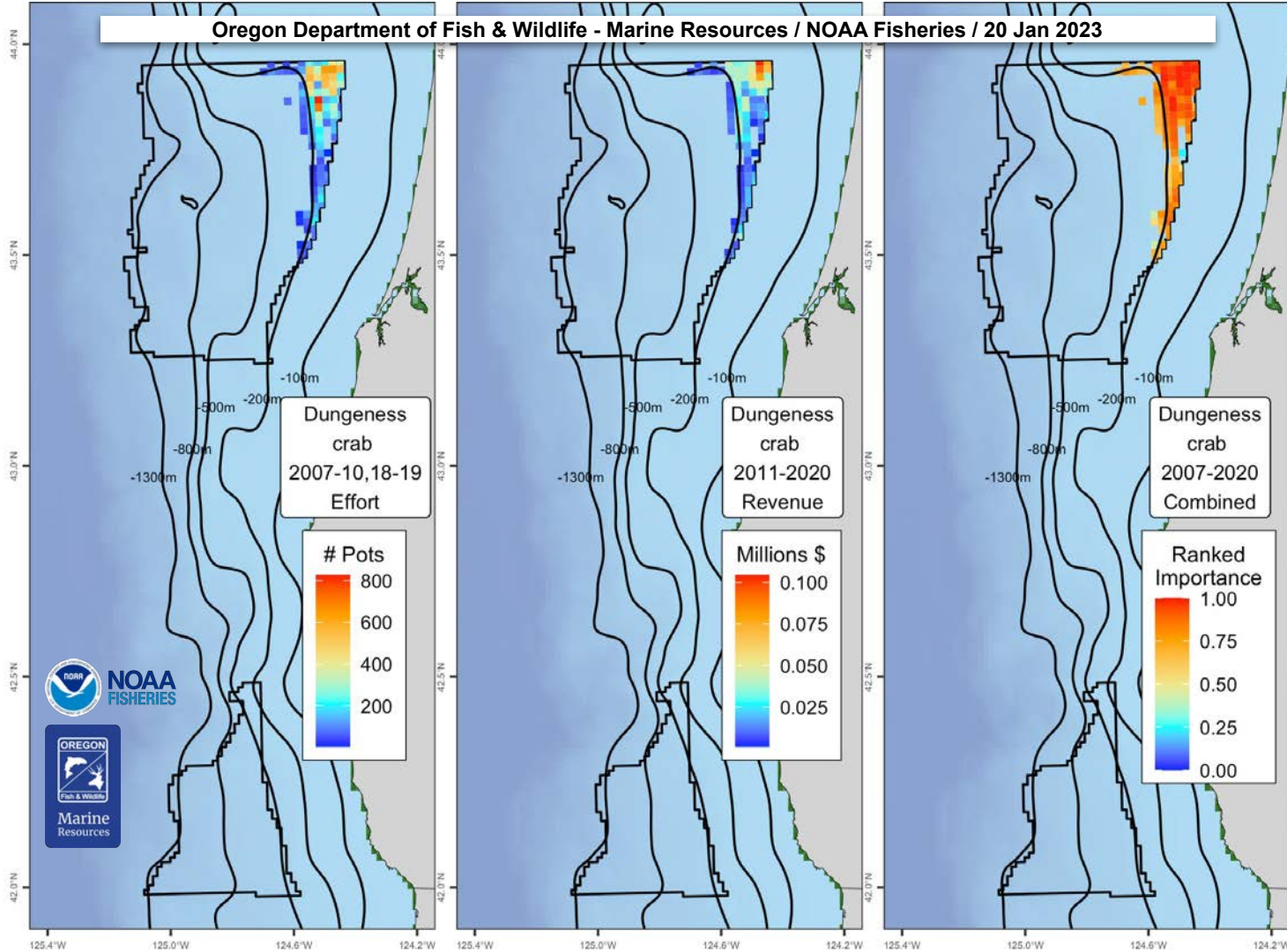


Dungeness crab

Data Source:

Effort: ODFW State logbooks

Revenue: ODFW State logbooks & ODFW Fish Tickets in PacFIN



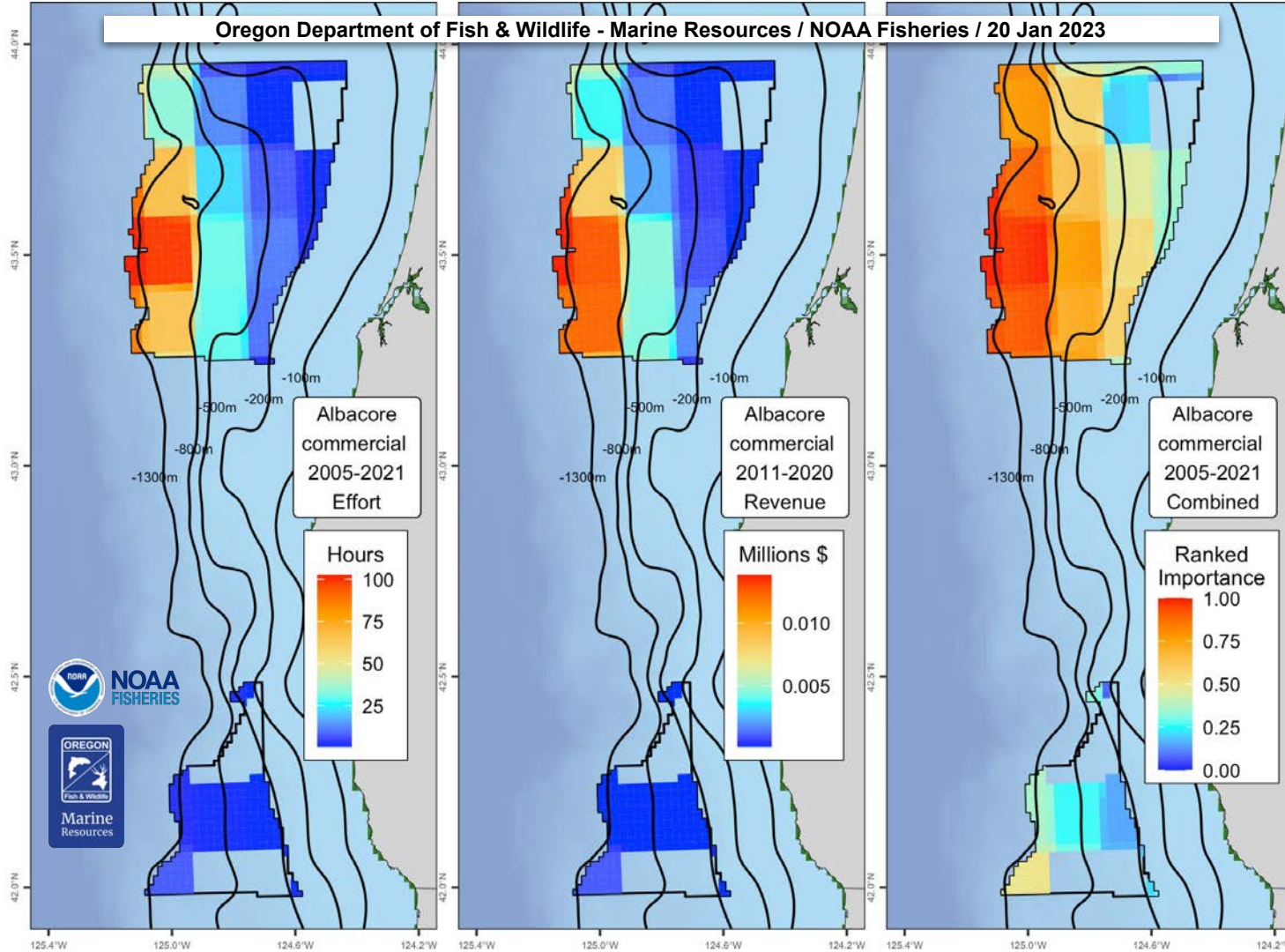
Albacore commercial

*Resolution of fishing coordinates was at 10 arcmin grid - we downscaled to 2x2-km grid

Data Source:

Effort: NMFS SWFSC federal logbooks

Revenue: NMFS SWFSC federal logbooks & ODFW Fish Tickets in PacFIN for revenue

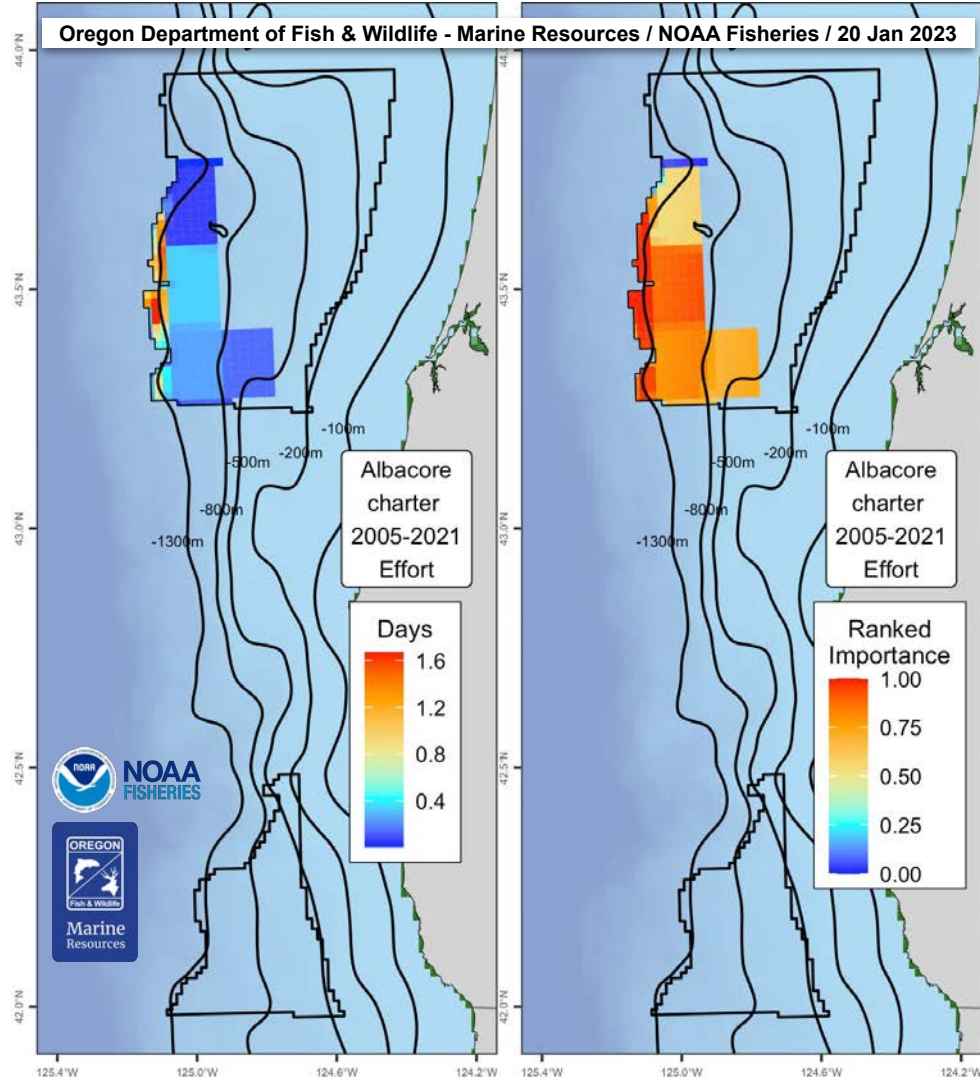


Albacore charter

*Resolution of fishing
coordinates was at 10
arcmin grid - we
downscaled to 2x2-km
grid

Data Source:

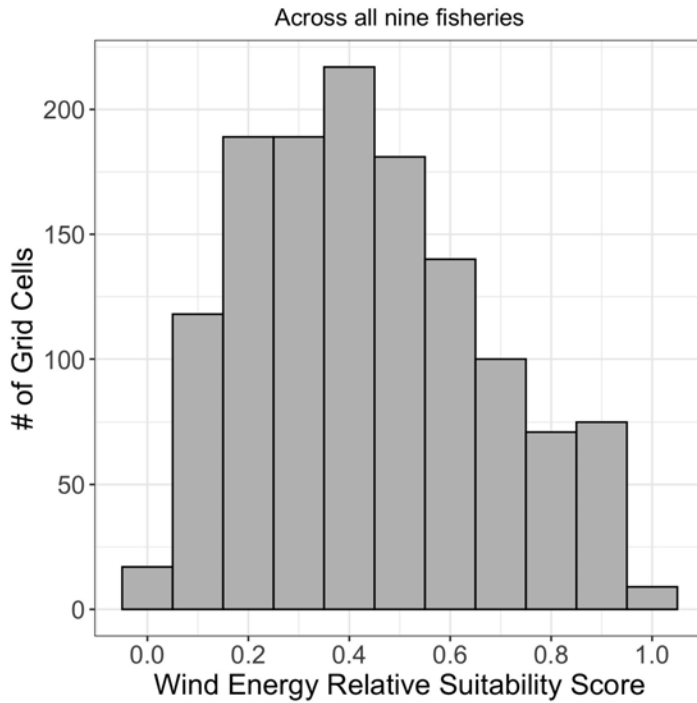
Effort: NMFS SWFSC
federal logbooks



Putting all the fisheries together:

Combined fisheries map

Combined fisheries submodel using ranked importance - “Baseline”



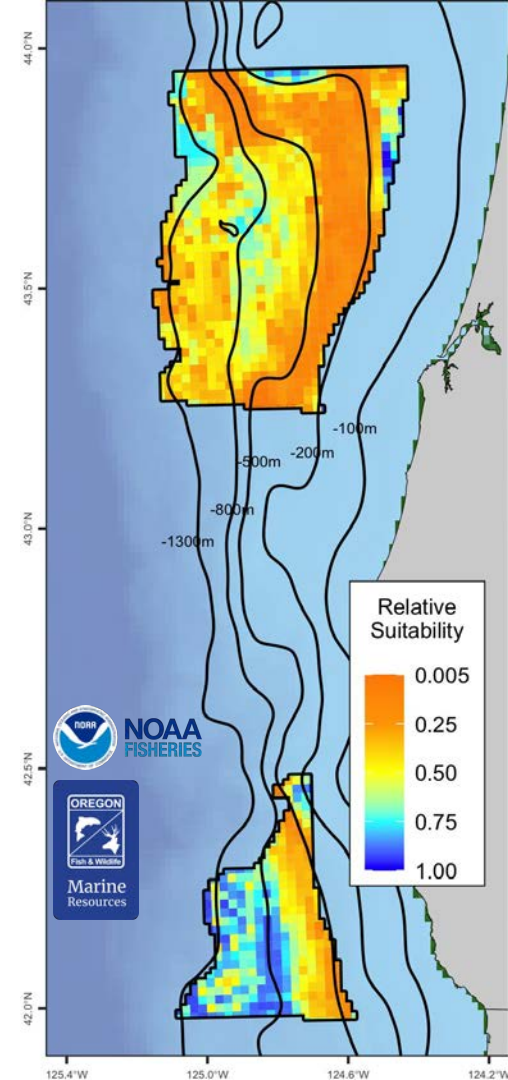
More overlap with fisheries

Less overlap with fisheries

Less suitable to OWE



More suitable to OWE



Fisheries Constraints Recommendations

Trawl Fisheries - Little Operational Flexibility

- Especially vulnerable to fragmentation of fishing grounds

Gear

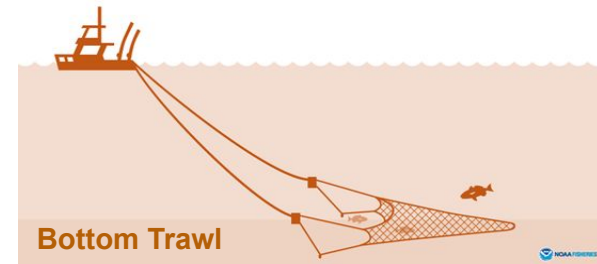
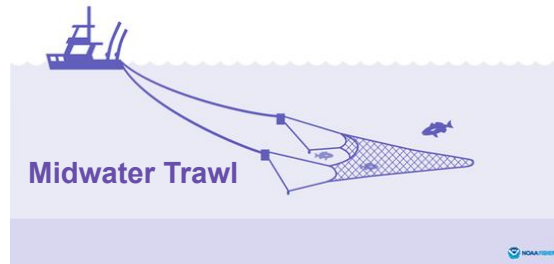
- Requires large spaces for maneuverability
- Incompatible with other structures and lines in the water (e.g., platforms, cables, anchors)

Target Species

- locations along the shelf and slope
- specific depth ranges

Four trawl fisheries operate within the two OR Call Areas

- Groundfish bottom trawl
- At-sea hake mid-water trawl
- Shoreside hake mid-water trawl
- Pink shrimp trawl (state)



Options for BOEM's Consideration

CONSTRAINT (score = 0)

Score = 0.001

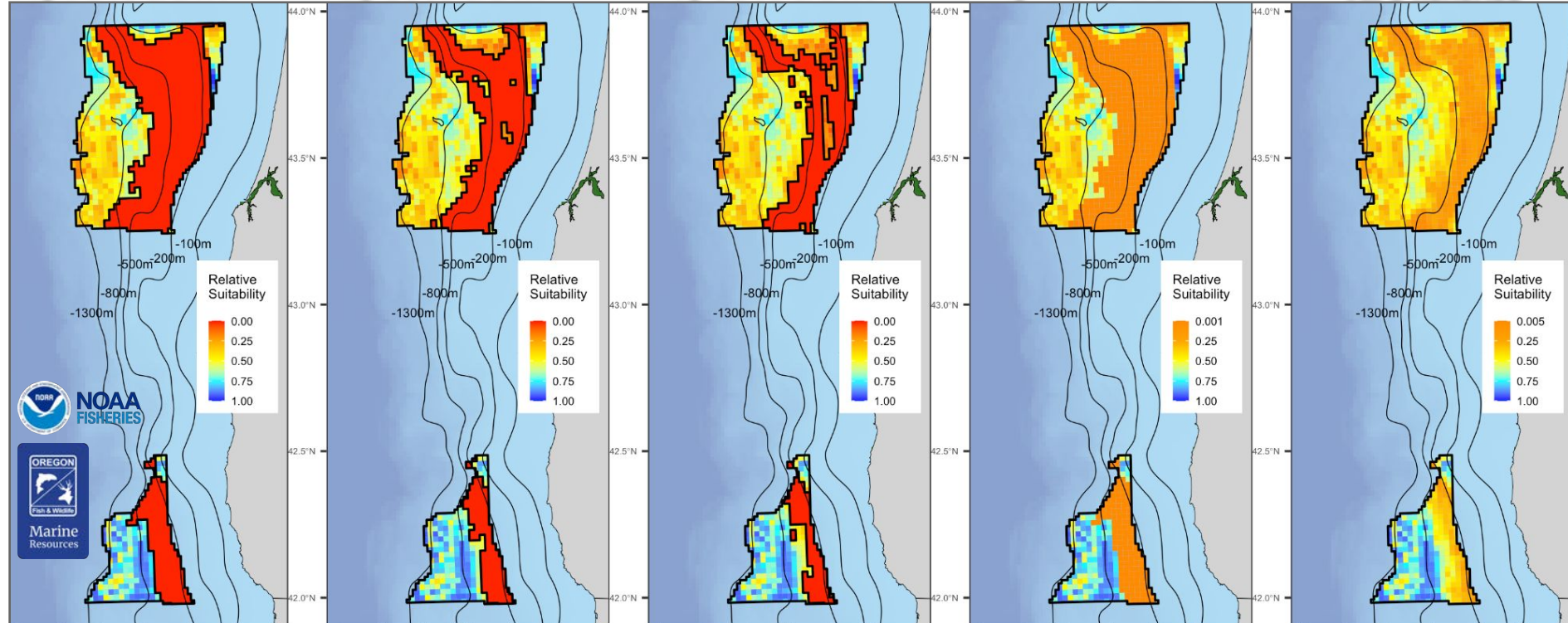
1) 75% trawl

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

Thank you. Questions...

Contact

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Delia.R.KELLY@odfw.oregon.gov

Additional slide to follow-up on MPC discussion. An MPC member asked to see DOD and USCG constraints areas (red cross-hatched and red regions below), which BOEM showed during their presentation, overlaid on the NMFS/ODFW baseline map (right). The purple outline at the NW region of the Coos Bay Call Area (right) is an **approximation** of the space remaining in the call area that is unconstrained by DOD/USCG.

Constraints

- For our modeling, a **constraint** is an area completely restricted from OSW development.
- DoD Exclusion Zone
- PacPARS –
 - Coast Guard Vessel Traffic Lanes
- Call Area \approx 1,170,000 acres
- Unconstrained \approx 500,000 acres

