Resource Selection Function Analyses:

Assessing habitat use relative to *behavior and resource characteristics/availability*

for five common marine mammal species in the Southern California Bight

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What is an RSF
(Resource Selection Function)?

Manly et al. 1993, 2002

1. Animals make choices re: resources
2. Resources **used disproportionately to availability**

Models choice using quantifiable habitat characteristics

Habitat use & impacts
fish, birds, mammals, polar bears
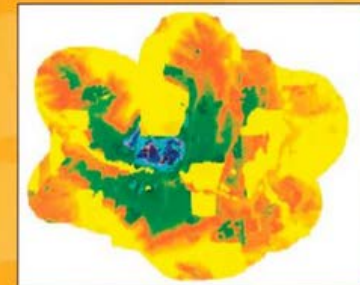- *oil / gas exploration*
- *global warming*

Resource Selection by Animals

Statistical Design and Analysis for Field Studies

Second Edition

Bryan F.J. Manly, Lyman L. McDonald,
Dana L. Thomas, Trent L. McDonald
and Wallace P. Erickson

Springer-Science+Business Media, B.V.

How do RSFs differ from density mapping?

* Density mapping estimates the **used** distribution only - - Not what's **available.**

* Ignoring *availability* can bias estimates of preference -- - *especially rare habitats*

Questions & Goals

Do marine mammals in U.S. Navy SOCAL Range Complex

* prefer certain habitat?
* *behave* differently in different habitats?
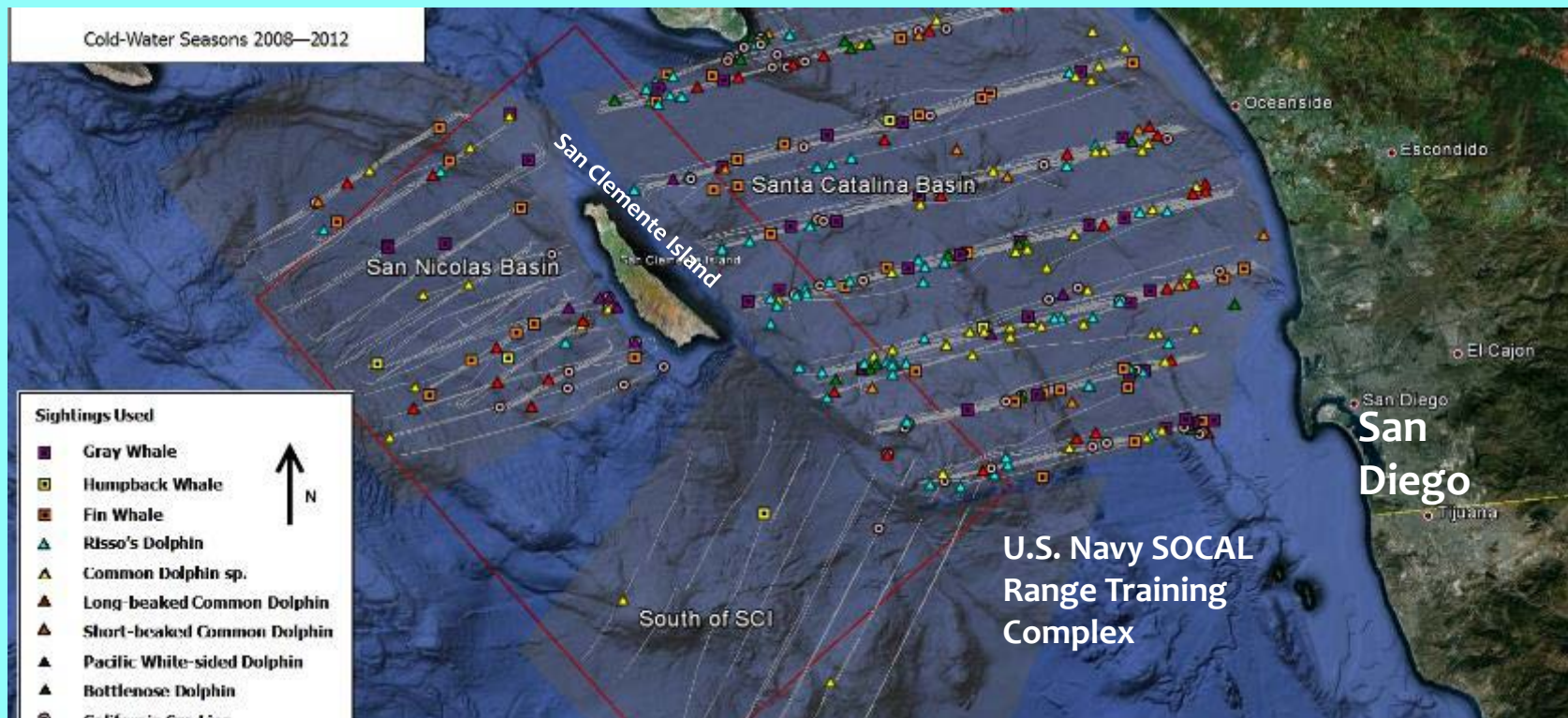
GOAL:

1. Establish "baseline"
   * future changes?
   * anthropogenic activities?

Approach

* 127 flights 2008-2012
* Systematic line-transect
* "First-observed" **behavior state**
    * **SLOW** = rest, mill, slow travel, social, feed
    * **FAST** = medium or fast travel

Cold-Water Seasons 2008—2012

San Clemente Island

Santa Catalina Basin

San Nicolas Basin

Oceanside

Escondido

El Cajon

San Diego

Tijuana

San Diego

U.S. Navy SOCAL Range Training Complex

South of SCI

Sightings Used

■	Gray Whale
▣	Humpback Whale
▤	Fin Whale
△	Risso's Dolphin
△	Common Dolphin sp.
▲	Long-beaked Common Dolphin
△	Short-beaked Common Dolphin
▲	Pacific White-sided Dolphin
▲	Bottlenose Dolphin
○	California Sea Lion

N

Statistics

* Standard logistic regression
* AIC ranking – 127 models

* *Randomly Selected* 35,167 points

* **7 habitat variables**
    1. *Depth*
    2. *Distance to shore*
    3. *Slope*
    4. "Northness"
    5. "Eastness"
    6. Latitude
    7. Longitude

5 Common Species

	# Sightings
California sea lion	157
Risso's dolphin	135
Fin whale	60
Gray whale	40
Bottlenose dolphin	31

Fin Whale

Overall
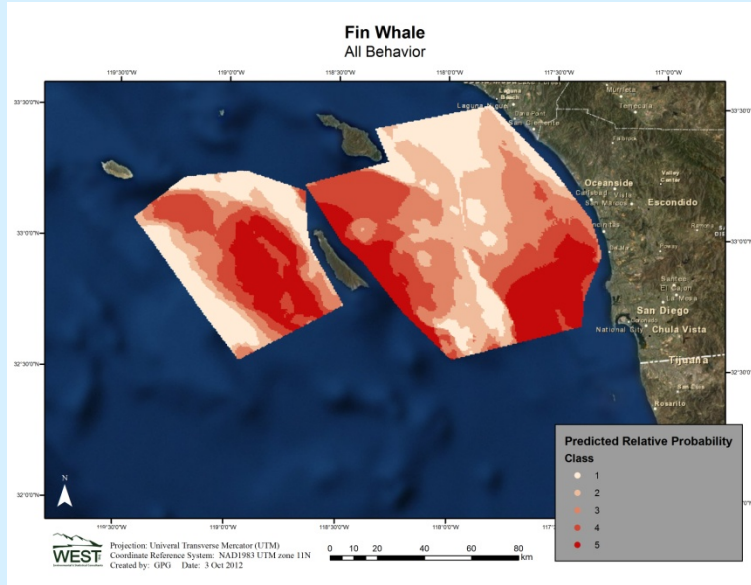
M. Smultea/NMFS permit 14451
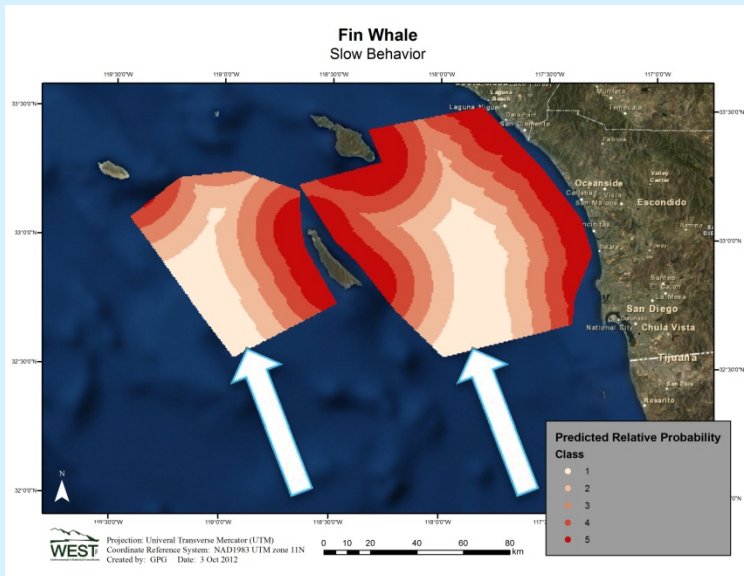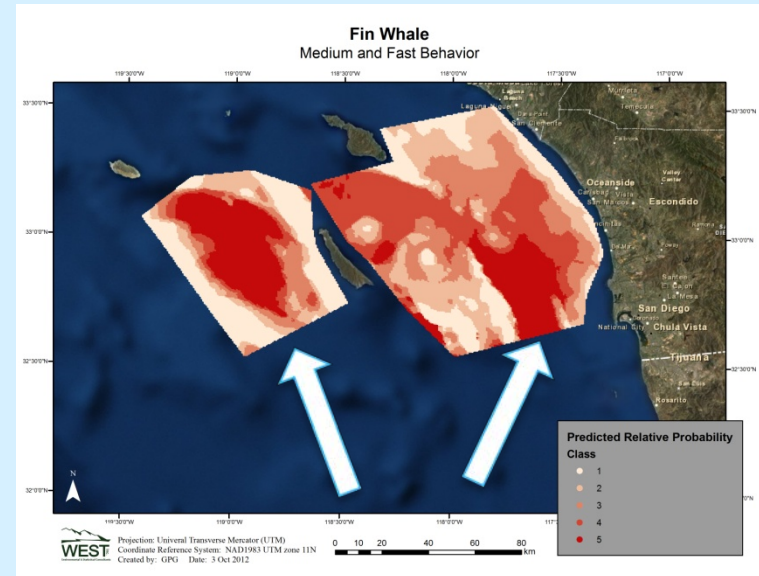
SLOW

FAST

Gray whale

Overall
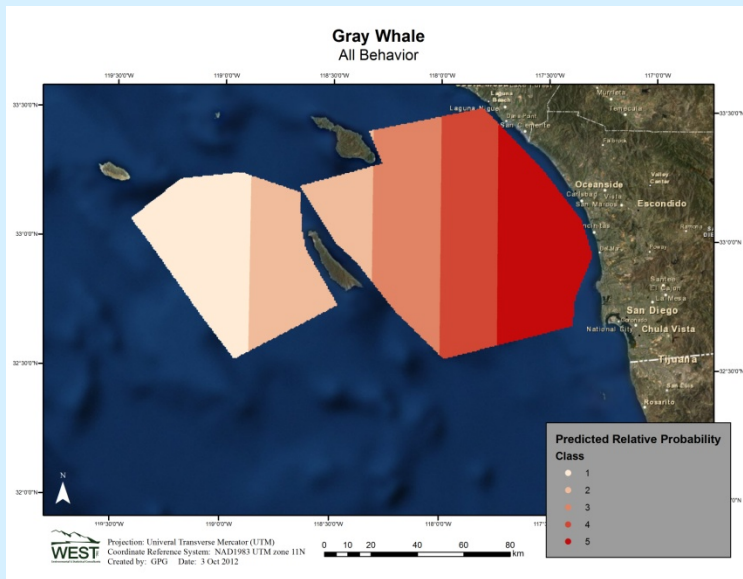
SLOW

FAST
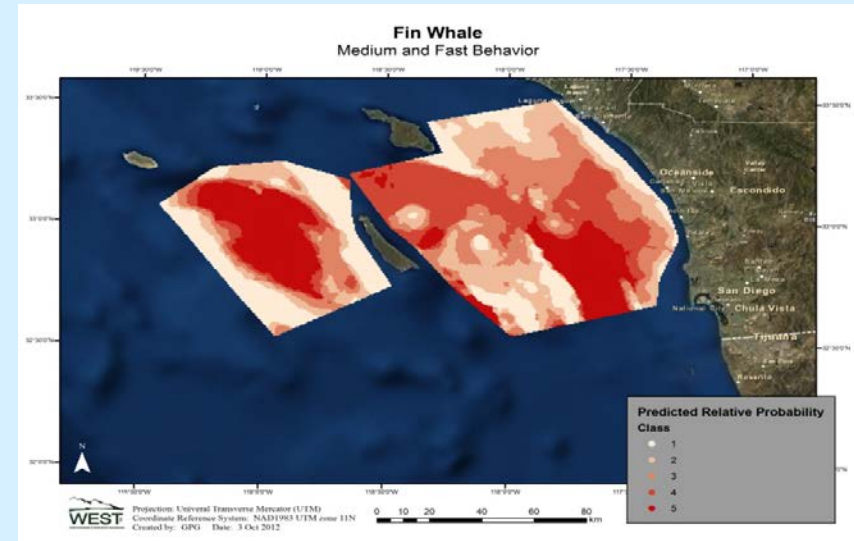
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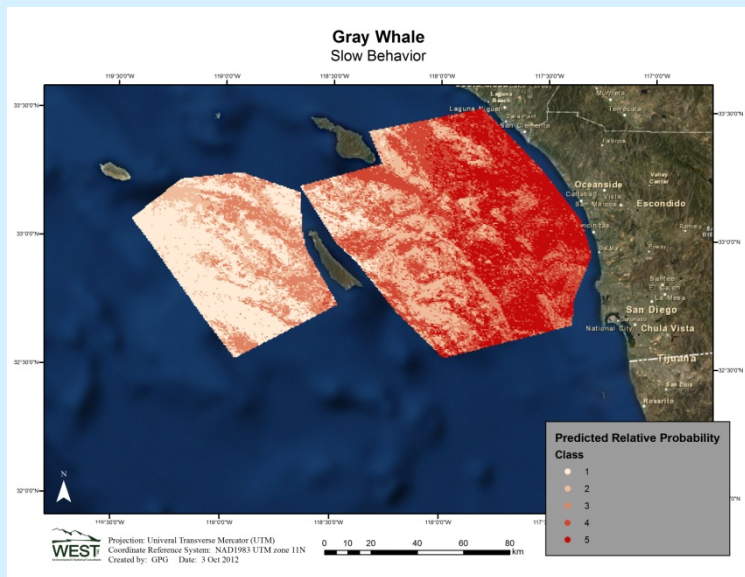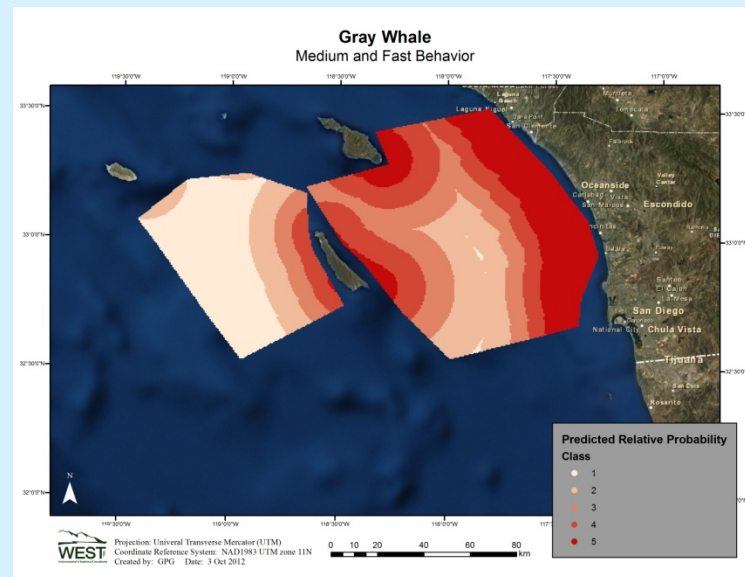
California sea lion

Overall

Main haul out
San Clemente Isld

2 CA Sea lions
mill w bait ball
(SLOW)
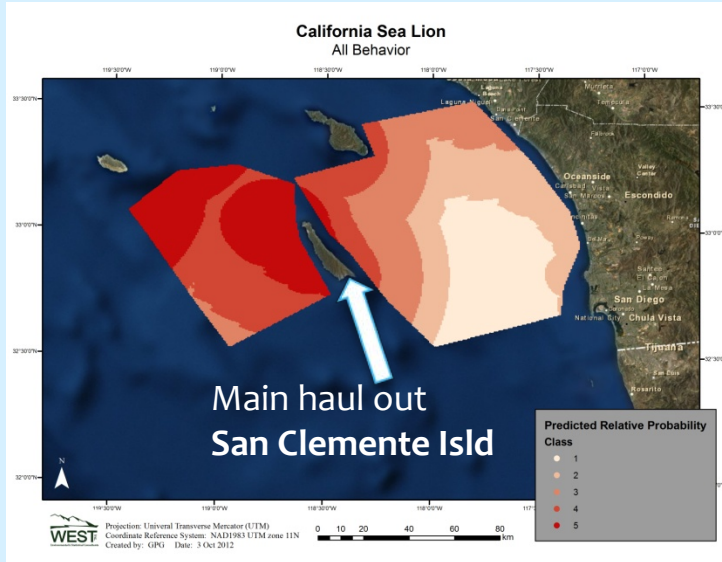
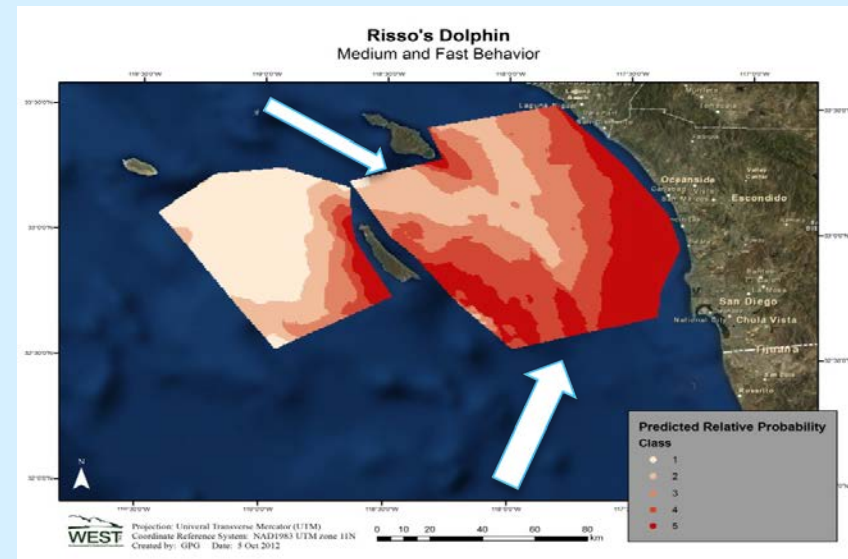*M. Smultea/NMFS permit 14451*
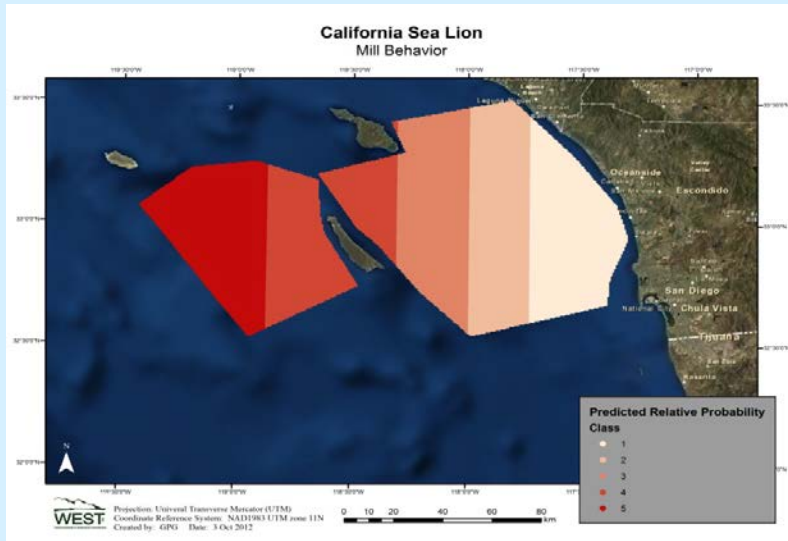
SLOW

FAST

Risso's dolphin
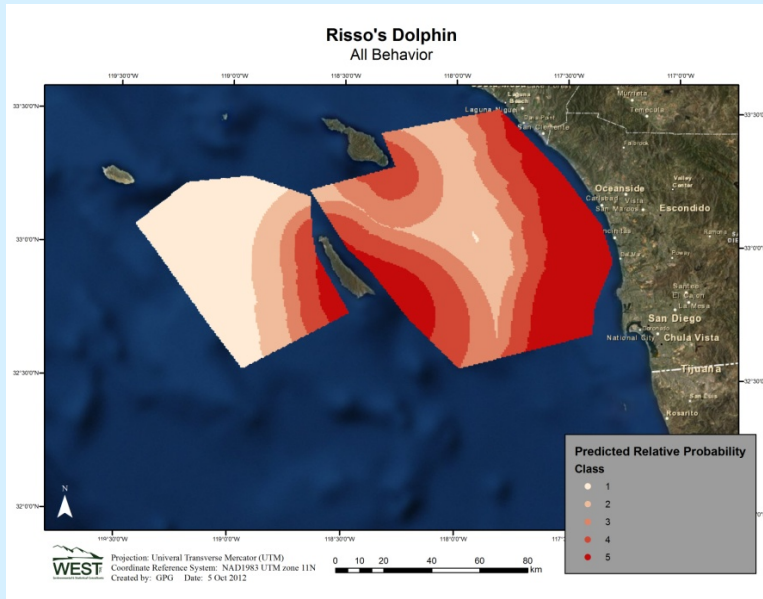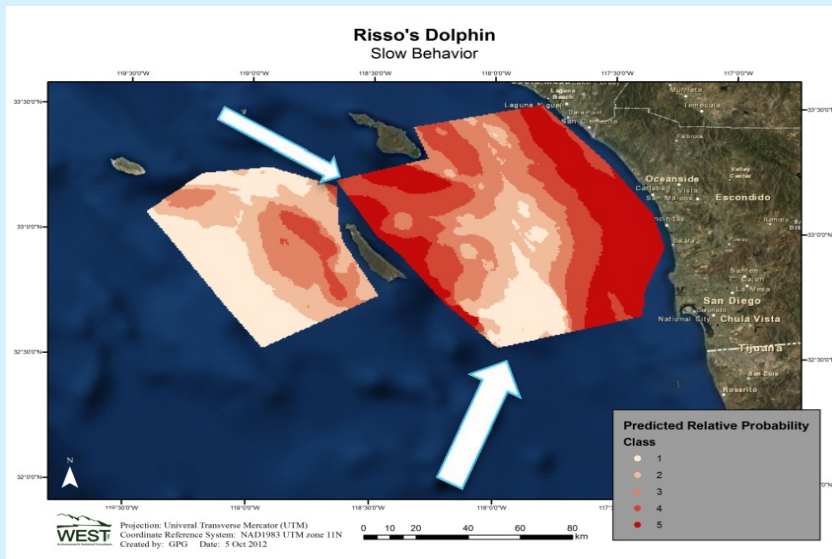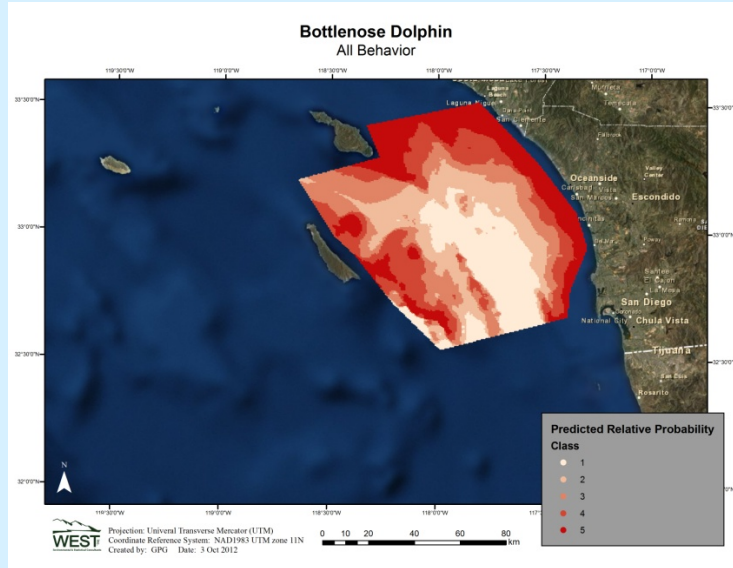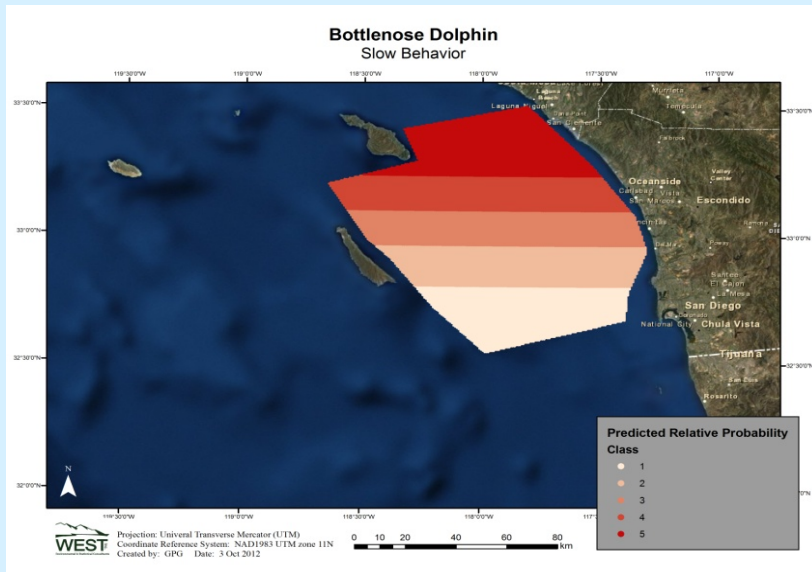

Overall

SLOW

FAST
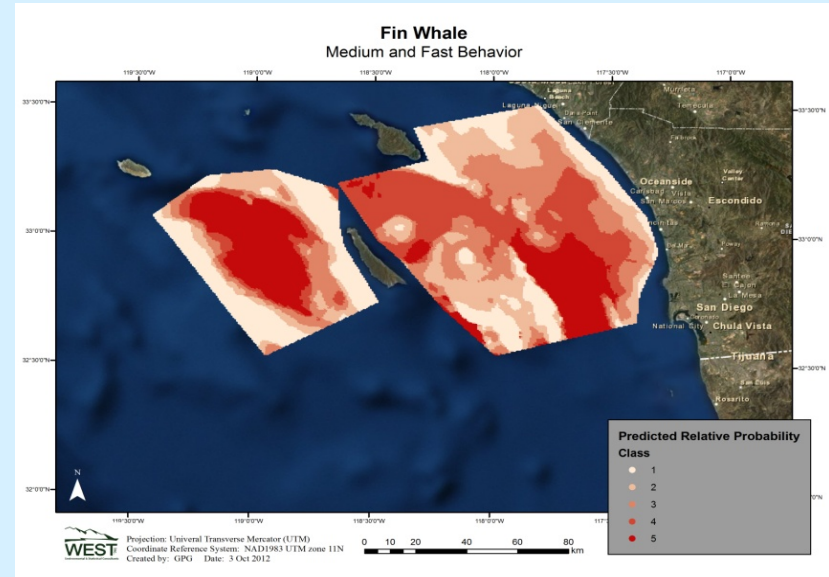
B. Würsig/NMFS permit 14451

Bottlenose dolphin

Conclusions

Fin whale & CA sea lion –
> SLOW steep slope
> FAST flat basin

Gray whale   -- FAST island edges & coastline

Risso's – SLOW nearshore slope, FAST offshore slope

Bottlenose – SLOW Santa Catalina Isld, FAST flat basin

Take Home Message

Habitat use related to *behavior*

Selection related to function
   * *(how it's used)*

Questions?

Thank you