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Swordfish and Leatherback Use of Temperate Habitat

Heidi Dewar
NOAA Southwest Fisheries Science Center, La Jolla California

<u>SLUTH Partners</u>
SWFSC: MMTD/FRD
WCR: PRD/SF
Local Fishers and Industry Reps
NGO's
Academia

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Science Center and Region were concerned about declining

1) leatherback populations
2) west coast swordfish landings

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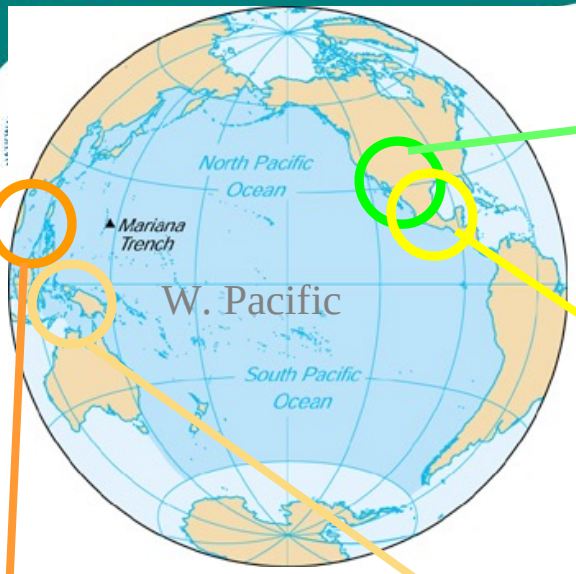
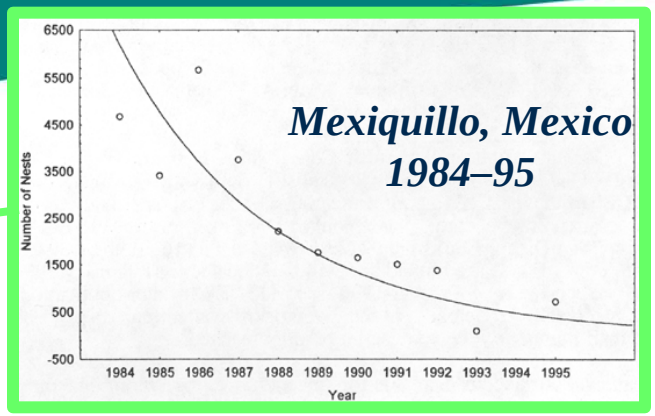
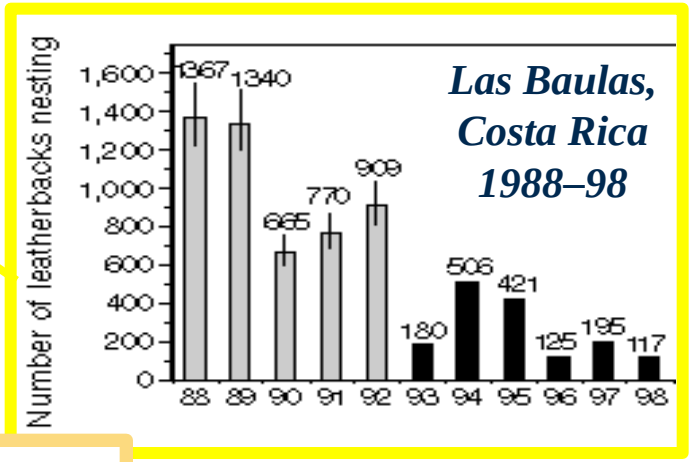
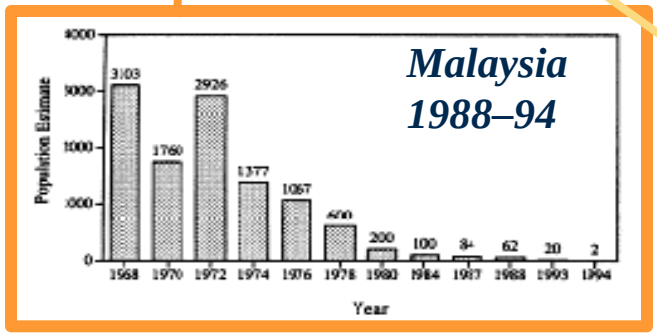


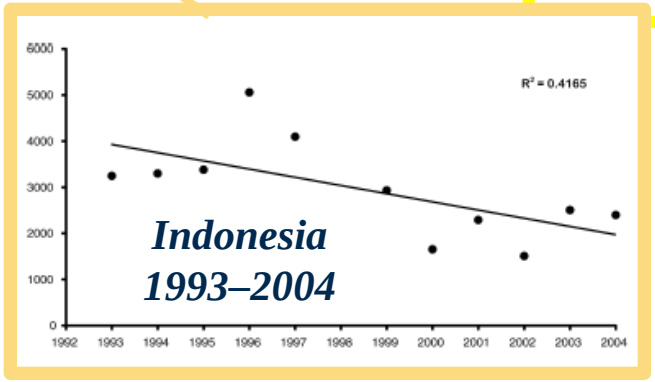


Sarti et al. 1996





Spotila et al. 1996



Hitipeuw et al. 2007

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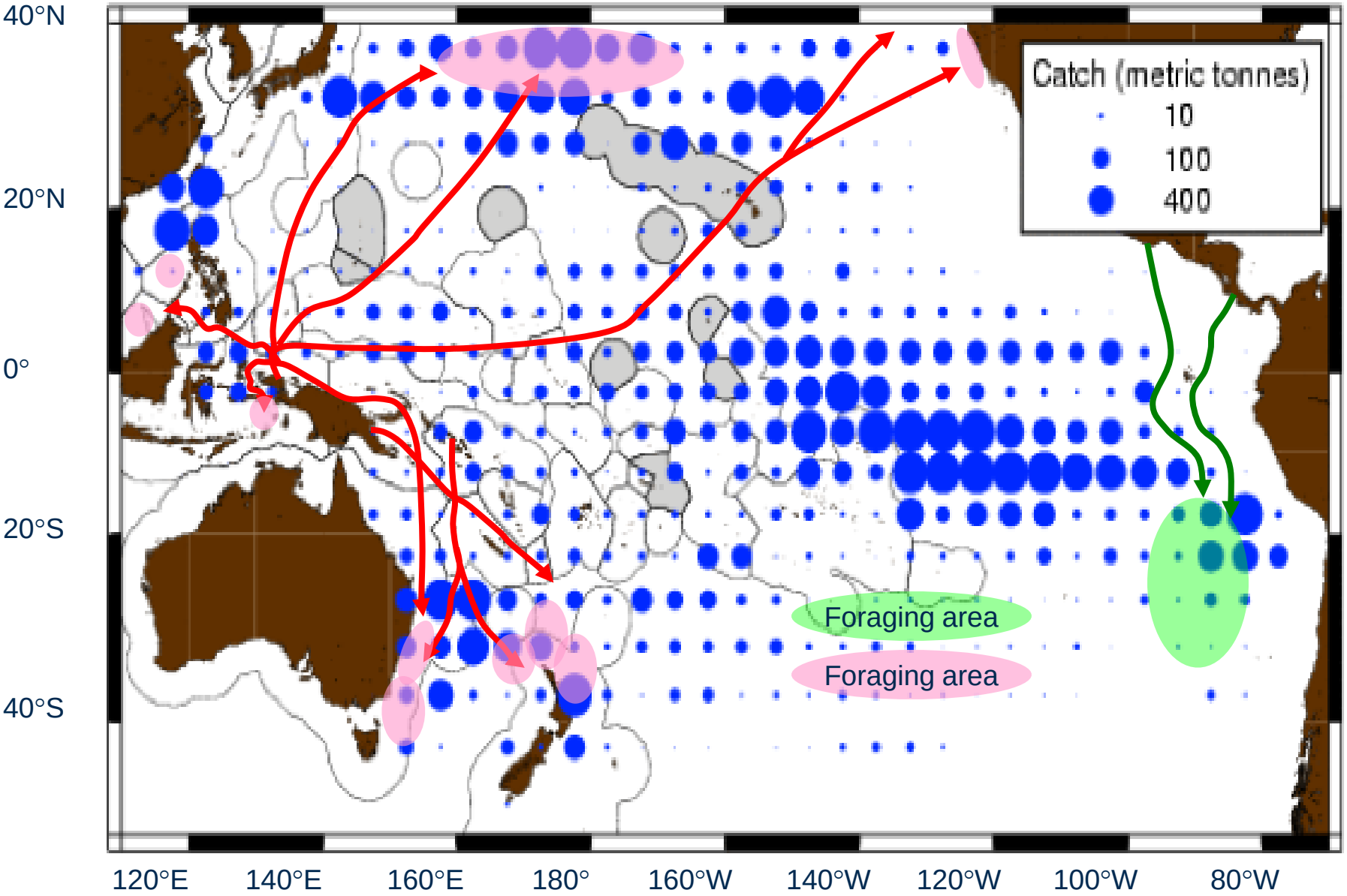
Multiple sources of mortality include

- Nesting site threats
- Coastal fisheries
- High seas fisheries from multiple nations

Distribution of longline catches of swordfish in the Pacific reported for 2004 and movements of western and eastern Pacific leatherback turtles 2005-2008



Source: Benson et al. unpublished; Shillinger 2008, modified from PFMC 2009.

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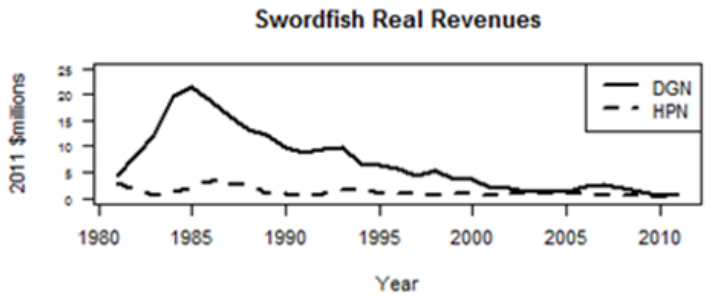
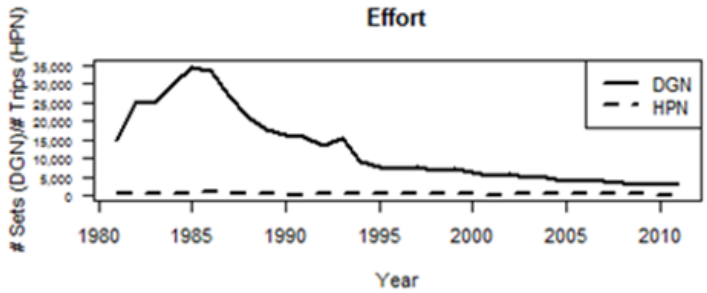
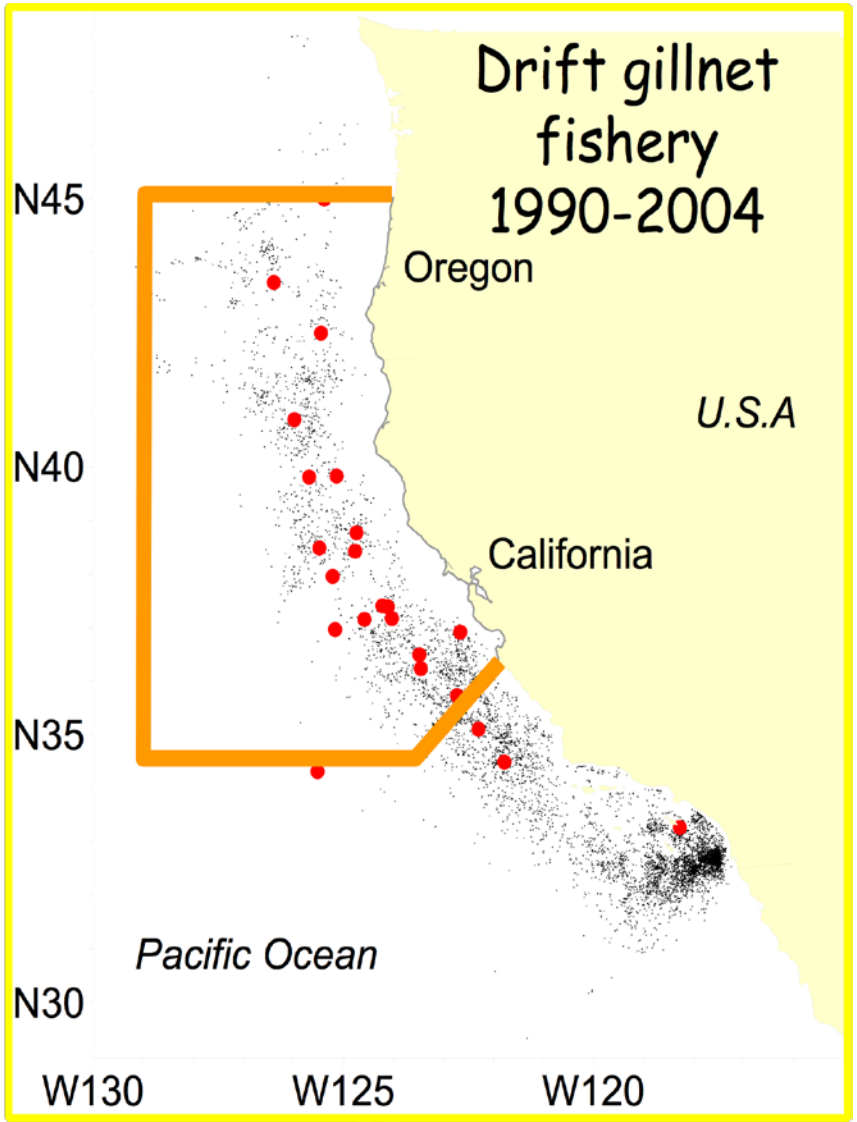
U.S. West Coast Swordfish Fishery

In 2001, prime fishing area was closed to reduce leatherback bycatch by 78%.

Regulations have translated into significant decline in landings and effort.







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Limitations of the current Management Plan:

Leatherback perspective:

U.S. action alone will not save leatherbacks

Swordfish fishery perspective:

Loss of local landings, revenue, etc…

Potential for increased imports that may come from fisheries with higher bycatch rates

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First step: Workshop in San Diego, CA May 2008

Goals

— Develop team of diverse stakeholders

— Identify data gaps and important research opportunities

Workshop Report: Benson, S., Dewar, H., Dutton, P., Fahy, C., Heberer, C., D. Squires, and S. Stohs. 2009. Swordfish and Leatherback Use of Temperate Habitat (SLUTH). Administrative Report LJ-09-06.

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Science Research Elements
(Biological and Economic)

How to reduce mortality?

— Fish where there are no turtles

— Change gear, bait, and practices (consider other potential bycatch e.g. sharks)

What are environmental costs of swordfish consumption in the U.S.?

— Ecological footprint

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How to reduce mortality

1) Modeling approach (R. Lewison and S. Maxwell)

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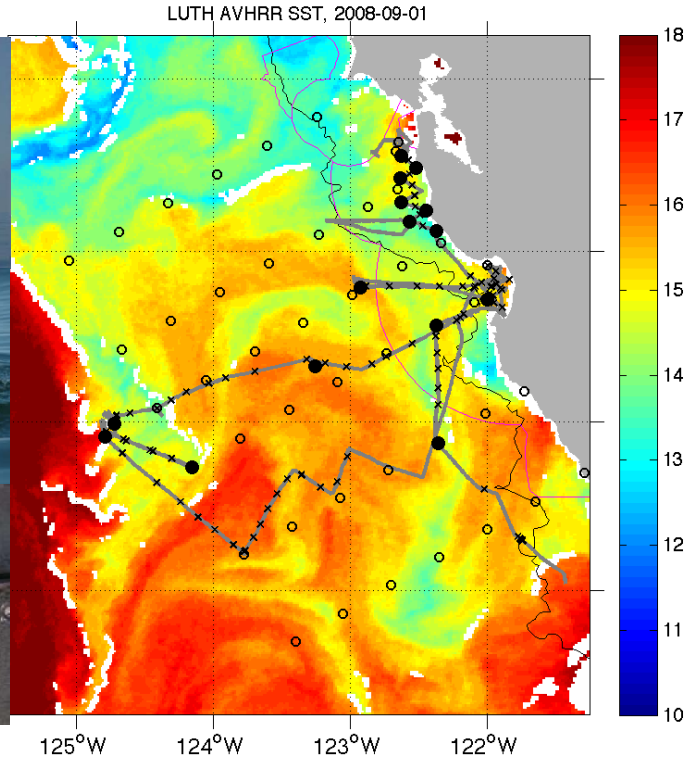
How to reduce mortality

1) Modeling approach

2) Habitat characterization
   1) SLUTH Cruise



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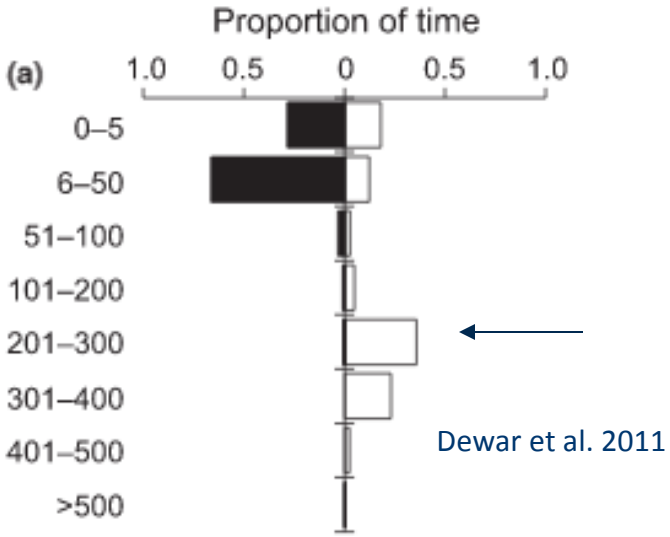
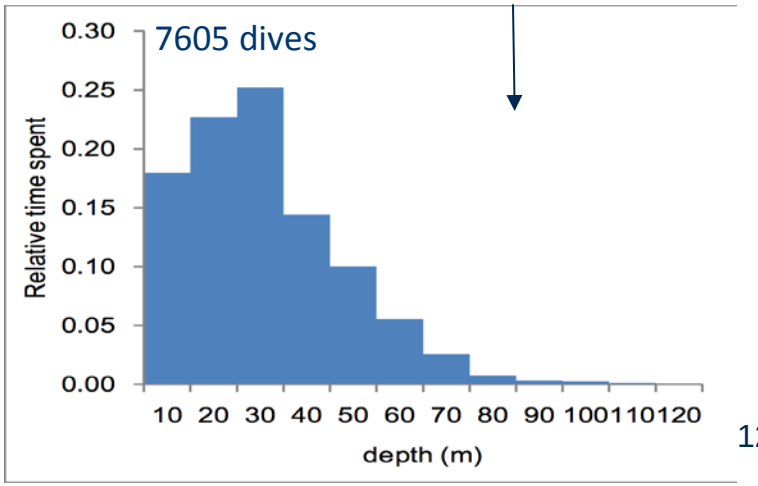
How to reduce mortality

1) Modeling approach

2) Habitat characterization
   1) SLUTH Cruise
   2) Tagging data
   (PIER and NOAA collaboration)



Dewar et al. 2011



Unpublished data: J. Okuyama, S. Benson, J. Seminoff, T. Eguchi, P. Dutton

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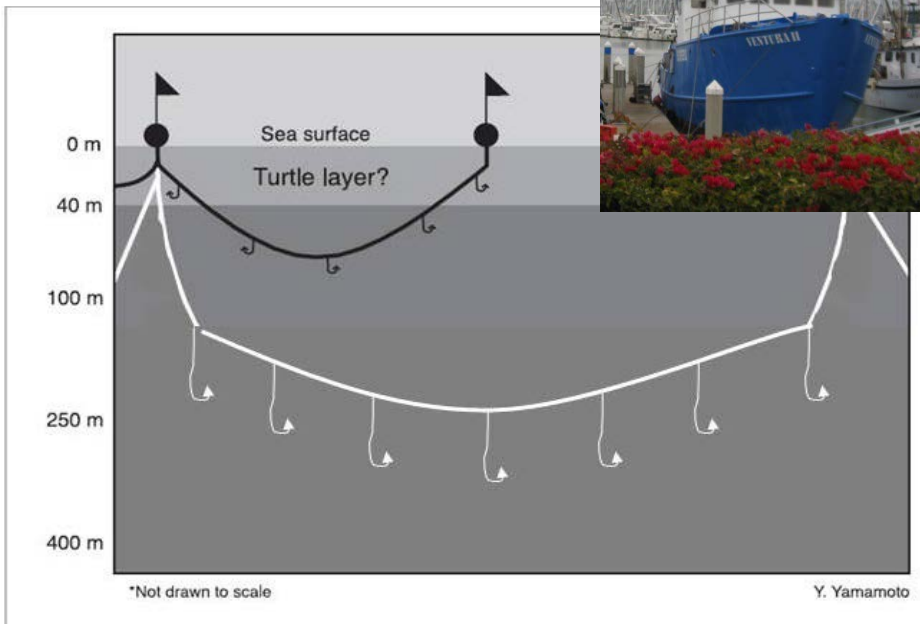
How to reduce mortality

1) Modeling approach

2) Habitat characterization
   1) SLUTH Cruise
   2) Tagging data
   (PIER and NOAA collaboration)

3) Gear research
   1) DSLL (2011-2014)



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How to reduce mortality

1) Modeling approach

2) Habitat characterization
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3) Gear research
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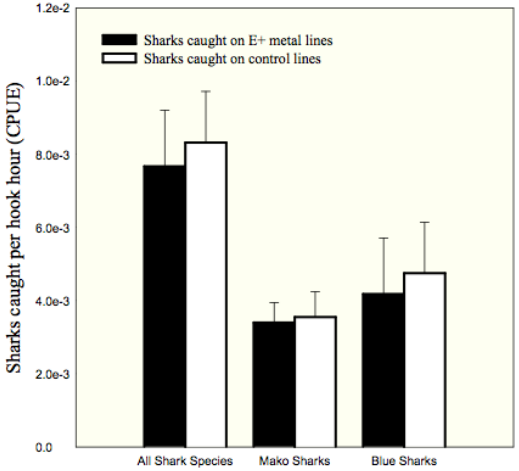
   2) Shark deterrents



Hutchinson et al. 2012

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How to reduce mortality

1) Modeling approach

2) Habitat characterization
   1) SLUTH Cruise
   2) Tagging data

3) Gear research
   1) DSLL
   2) Shark deterrents
   3) DSBG (C. Sepulveda, S. Aalbers, and C. Heberer)

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Economic Research Questions

- Demand and import analysis (Dale Squires)

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Economic Research Questions

- Demand and import analysis
- Least-cost conservation alternatives

Gjertsen et al. 2014

Table 4. Annual cost per adult female of leatherback protection strategies.

	Annual cost (2005 US$)	*Ratio of cost of fisheries interventions relative to nesting beach intervention (2005 US$)*
Jamursba Medi and Wermon nesting beach	1558	1558/1558 = 1
Hawaiian shallow-set longline fishery	28,054	28054/1558 = 18
California drift gillnet fishery	205,396	205396/1558 = 132

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Economic Research Questions

- Demand and import analysis
- Least-cost conservation alternatives
  - Orders of magnitude difference between nesting site and at-sea protection
- Economic viability of alternative gears and bycatch reduction measures (H. Gjertsen)

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Economic Research Questions

- Demand and import analysis
- Least-cost conservation alternatives
  - Orders of magnitude difference between nesting site and at-sea protection
- Economic viability of alternative gears and bycatch reduction measures
- Where are imported swordfish coming from and what is the associated ecological footprint? (S. Stohs)

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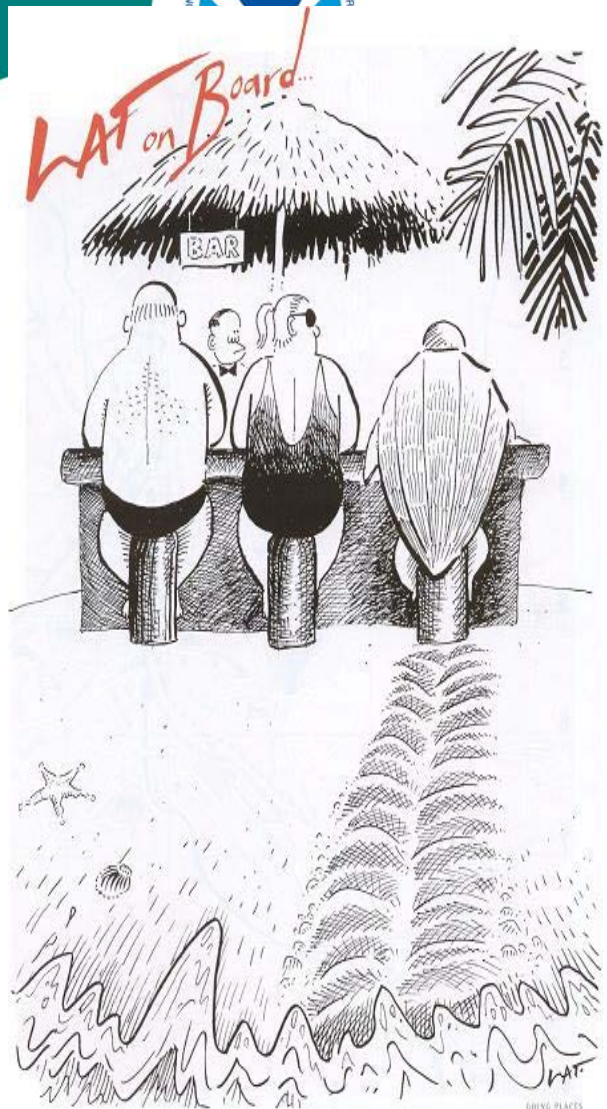
Questions?



<u>Thanks:</u>

Pete Dupuy

Captain and crew of the *F.V. Ventura II*

Owyn Snodgrass

James Wraith

Helena Aryafar

John Hyde

Russ Vetter

Nick Wegner

Emily Bell

Joel Van Noord

Nathan Mertz

Kevin Lewand

Billy Perry

Megan Ouyang

Suzy Kohin

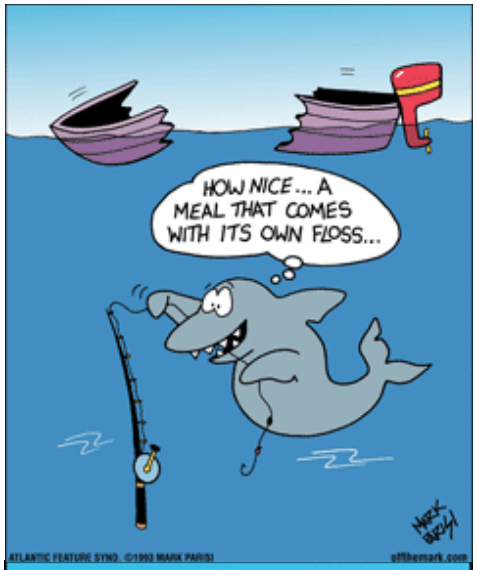
HMS team

Monterey Bay Aquarium

Scott Benson

Dave Foley (Sorely Missed)

CFR West/ CA Sea Grant



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Blue Shark post-release mortality

- Post release mortality 5-15% (Musyl et al. 2011, Moyes et al. 2006)
- DSLL study 15 of 328 were moribund (313 released)
- 5-15% mortality = 16-47 additional mortalities
- Total mortality 31-62 blue sharks*

* Small-scale research study, can't project bycatch rates to commercial fishery. Fishermen work to reduce blue shark bycatch. They are not marketable and take time and gear, reducing overall efficiency and increasing costs.

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Builds on previous research using gear modifications to reduce bycatch

- 2001 SSLL fisheries for SWO in Atlantic and Pacific shut down
- Research using circle hooks and finfish bait dramatically reduced bycatch

- Both fisheries reopened

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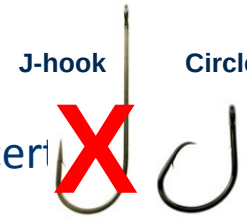

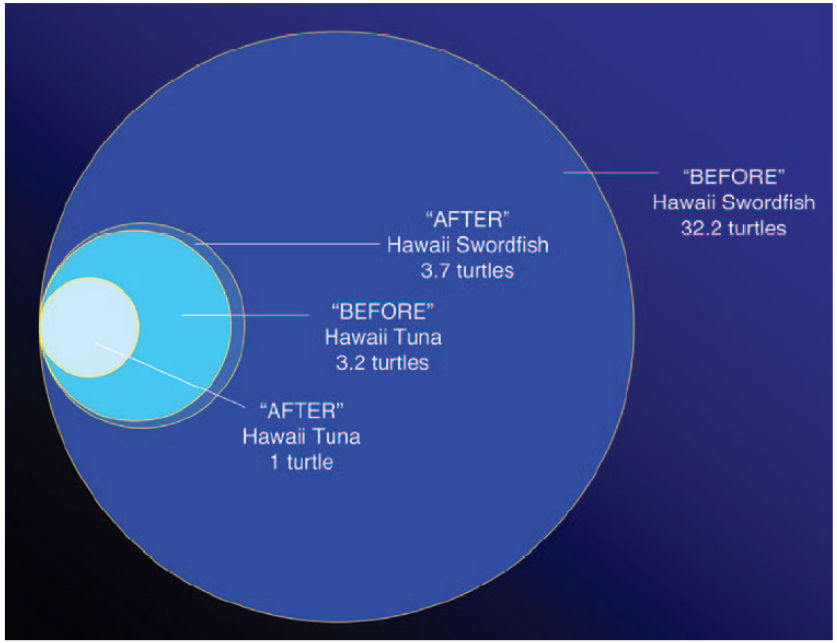

Figure 1. Computed Hawai'i longline tuna fisheries bycatch-to-catch (B/C) ratios were reduced after increased (to greater than 20 percent of the annual fishing trips) observer coverage documented a lower rate of sea-turtle interaction than had the lower previous observer coverage (of less than 5 percent of the annual fishing trips). Sea-turtle interactions were significantly reduced in the Hawai'i longline swordfish fishery as a result of revised hook-and-bait requirements required by federal regulations that took effect in mid-2004.

The area of the circles is proportional to the number of sea-turtle takes per 418,000 lb of target fish (tuna or swordfish) caught. The Hawai'i longline tuna fishery, with the lowest B/C ratio (for the 2003–2005 period studied) in this comparison, established the baseline of one sea-turtle take per 418,000 lb of tuna.

Bartram and Kaneko 2008

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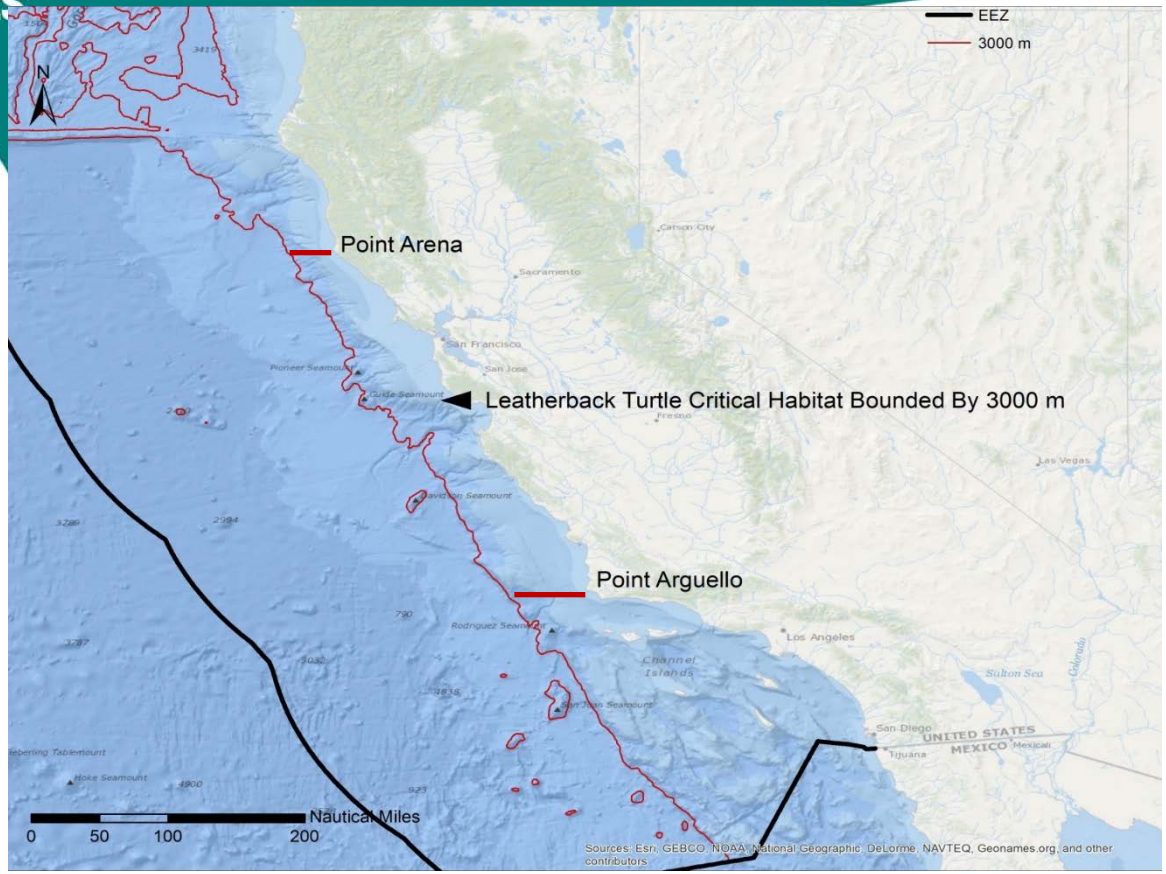

Potential boundaries for EFP:

Leatherback critical habitat: outer bound 3000 m isobath

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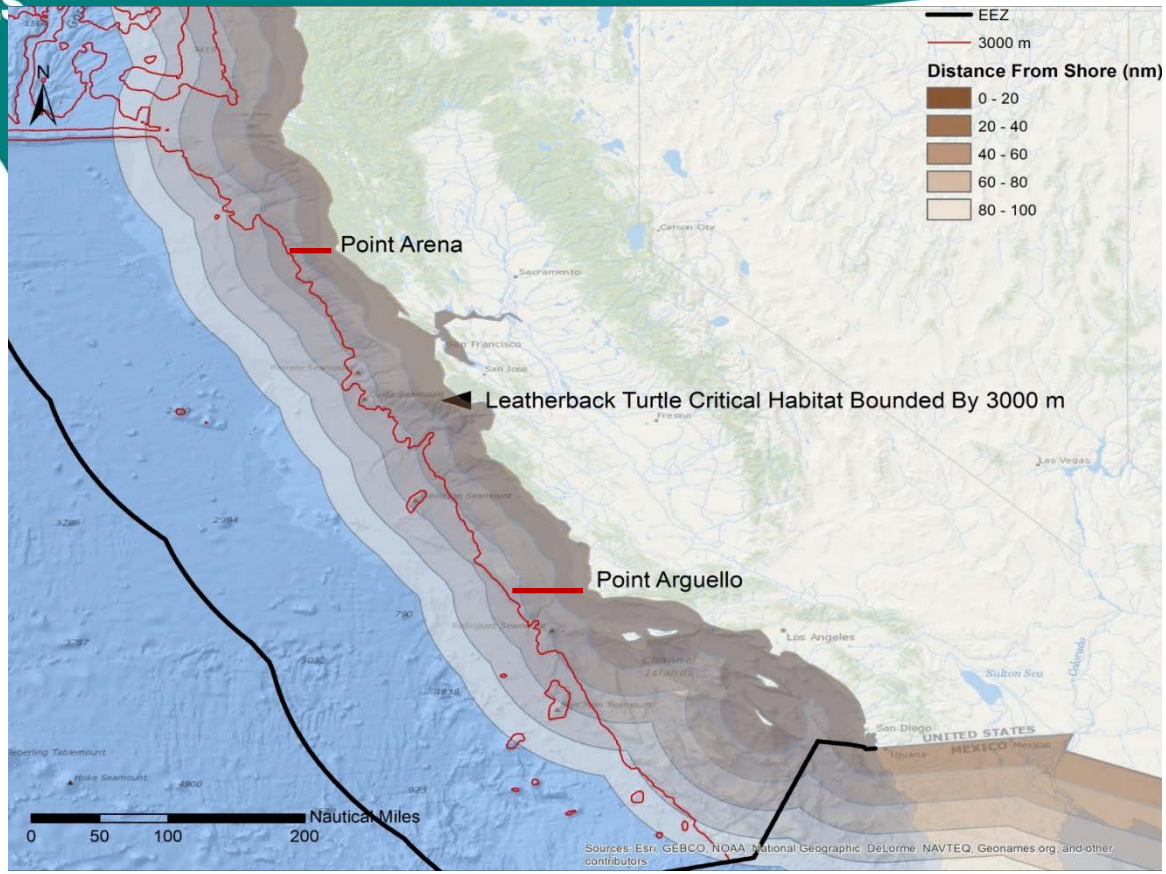

Potential boundaries for EFP:

Distance from Shore

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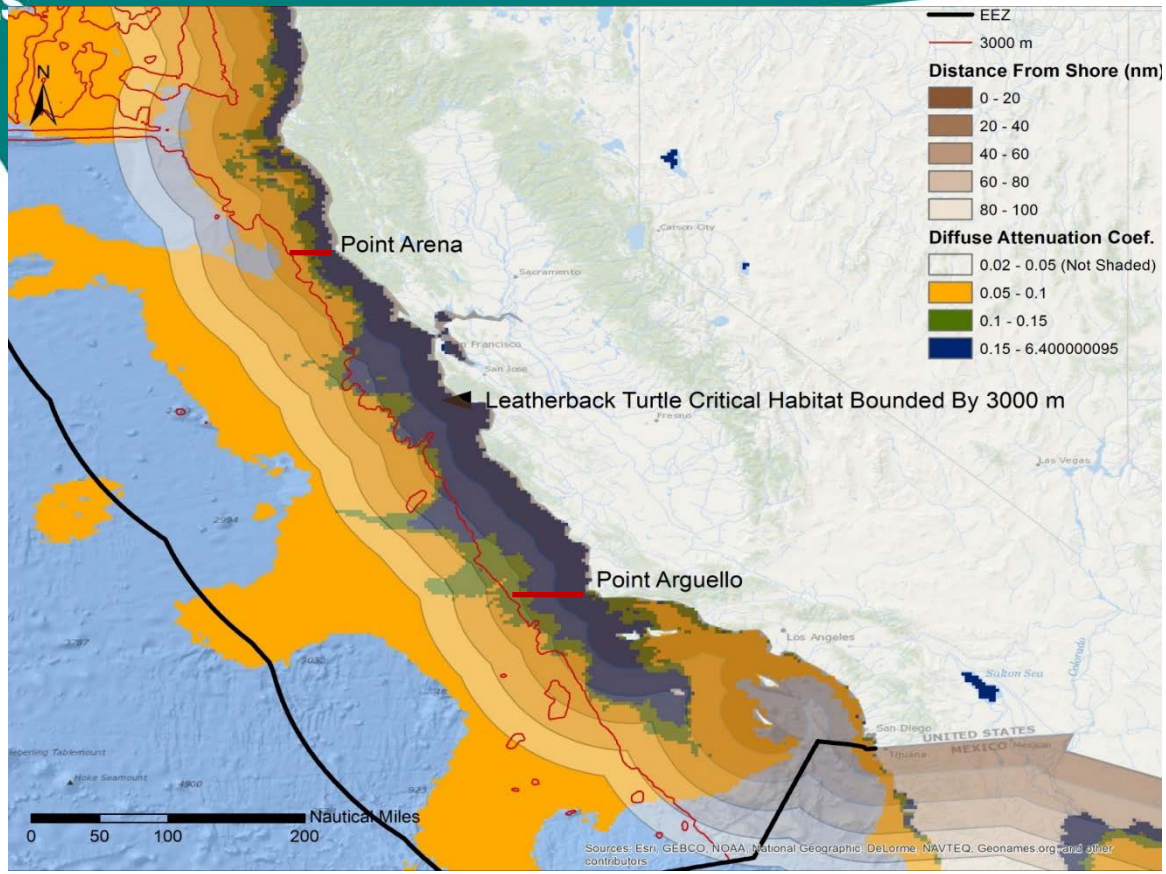

Opportunity to catch SWO:

Colored areas K490>0.05: Area where SWO should be within reach of DSLL

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Transfer effects
http://www.soest.hawaii.edu/pfrp/dec03mtg/bartram__baggage.pdf
http://www.soest.hawaii.edu/pfrp/newsletters/May-Aug2008.pdf