

## **Bren 2014-2015 Group Project Proposal: Evaluating the past, present, and future tradeoffs of differing management strategies in the commercial swordfish fishery off California**

### **Proposers:**

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2. Stephen Stohs, Economist, NOAA Southwest Fisheries Science Center, La Jolla: 858.546.7084; [Stephen.Stohs@noaa.gov](mailto:Stephen.Stohs@noaa.gov) ,
3. Melissa Stevens, Fisheries Project Director, The Nature Conservancy: [melissa\\_stevens@tnc.org](mailto:melissa_stevens@tnc.org), 831.332.0465

### **Client information**

Client 1: NOAA Southwest Fisheries Science Center (SWFSC), Stephen Stohs

Client 2: The Nature Conservancy (TNC), Melissa Stevens (see above for contact information)

**Bren faculty sponsor:** Christopher Costello, Resource Economics

### **Problem Statement**

Recent assessments indicate the swordfish stock off of California is healthy (ISC 2009). The primary environmental impact of the drift gillnet (DGN) fishery that targets the stock is the incidental capture of charismatic species such as leatherback sea turtles, sharks, and marine mammals. In order to satisfy the conservation requirements of the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA), federal and state agencies have adopted increasingly stringent restrictions for the DGN fishery such as time/area closures, mandatory education workshops, the use of acoustic pingers (to deflect cetaceans and mammals), limited soak time, and recently 100% observer coverage in deep water zones where sperm whale interactions are believed more likely (Fed Reg 2013). Although management measures have been effective at reducing sensitive species interactions over time, the socioeconomic consequence has been that swordfish landings and the number of DGN fishermen participating has declined significantly, with only approximately 19 California-based fishermen still active (Hellmers, 2014). The result is a 90% decrease in CA landings over the last 30 years (NOAA 2010), affecting fishermen livelihoods and local economies, and an increase in imported swordfish to fill consumer demand.

The bycatch problem in Pacific swordfish fisheries is not limited to the US West Coast alone. Foreign fleets operating in various regions of the Pacific Ocean are poorly regulated and have much higher bycatch rates, impacting the very same leatherback sea turtle populations that are protected in U.S. waters (Bartram and Kaneko 2010, Roe et al. 2014). One of the largest markets for foreign-caught swordfish is the US, which imported 77% of the 18,000 metric tons of swordfish it consumed in 2009 (NOAA 2010). Thus, US consumers' demand for swordfish is still contributing to ecological degradation and unnecessary bycatch. How can fishery managers, with the help of scientists, NGOs and the industry itself, find the right suite of policy initiatives, regulations, monitoring, and data collection programs to keep domestically caught swordfish, rather than imported swordfish (with potentially greater bycatch and carbon footprint associated with it) on the menu?

### **Project Objectives**

The goal of this project is to explore the various trade-offs of policies and regulations in order to describe effects of swordfish fishery management measures thus far, and to predict future scenarios and alternative options that might offer the best chance of improving both the conservation and economic performance of the fishery to the benefit of the marine ecosystem, participating fishermen, CA coastal communities and consumers. Specifically, this project aims to:

1. Characterize the cost/benefits of each major management strategy from an ecological and socio-economic perspective
2. Evaluate the conditions under which certain regulations were advanced, and what if any alternative policies and/or legal mechanisms could be applied to improve fishery conditions.

3. Consider alternative management strategies, such as enforcing US standards for well-managed fisheries, consistent with the World Trade Organization, on all imported swordfish, and thus incentivizing change on the high seas.
4. Compare, contrast and relate the CA DGN fleet activity with other US swordfish fleets, including Hawaii-based longline vessels that land catch in California ports.
5. Find policy alignments that could lead to one federal US Pacific swordfish fishery rather than the current complicated mix of state, federal and high seas management regimes.

### **Project Significance**

The current swordfish fishery is something of a political Rubik's cube, complicated by layers of state and federal management, litigation, and diverse stakeholder perspectives. Managers are required by law (see [MSA National Standards](#)) to protect fish stocks, minimize bycatch, and provide fishing opportunities – all while using the best available science. This has proven especially challenging for highly migratory species, which ultimately require the cooperation of other nations and their fleets' activities. For example, if the collective conservation interest is to protect turtles, reducing domestic catch alone does not advance our goals if we then simply increase our imports from poorly regulated foreign fleets with high bycatch. And, at current attrition rates (~10% annually over past two decades, NOAA 2010), it is possible the fishery will disappear and with it, an immense body of knowledge, experience and harvest potential on a healthy fishery resource. At this point in time, the US has an opportunity to advance fishery reform domestically through more innovative policy, research, and technology approaches. However, both federal and state agencies are at or above their resource capacity to move the needle any faster. This project will add needed horsepower to current efforts aimed at finding an environmentally, economically, and politically feasible solution for a sustainable west coast swordfish fishery.

### **Background**

The project location is in California; the majority of the swordfish fleet and landing activity occurs from Morro Bay south. Although too extensive to list in detail, the following timeline may offer a sense of actions to date:

- 1977 - Harpoon and set net fishery switch to DGN gear to target thresher sharks
- 1981 - DGN gear begins primarily targeting swordfish
- 1982 - CDFG adopts closures to protect pinnipeds
- 1984 - Within 12 miles closures created along CA coast
- 1986 - New time/area closures to protect gray whales.
- 1989 - Drift gillnets prohibited by Washington, Oregon restricted to 10 permits
- 1990 - Additional closures enacted over shark catch
- 1990 - Proposition 132 further restricts gillnet fishing in California
- 1997 - Marine mammal regulations require net extenders to lower than 36 feet, and pingers.
- 2001 - NMFS implements Pacific Leatherback Conservation Area
- 2004 - Management assumed by PFMC under HMS FMP
- 2008 - PFMC recommends longline EFP - denied by NMFS
- 2009 - Oregon prohibits drift gillnets
- 2013 - PFMC initiates consideration of changes to PLCA

### **Additional Stakeholders**

- Swordfish fisherman and other key industry stakeholders
- NOAA-NMFS
- CDFW
- Local and regional marine conservation groups and non-profit organizations
- The Pacific Fishery Management Council (PFMC) and other federal or state agencies engaged in fisheries management

### **Available Data**

Several data sets related to the historical U.S. west coast swordfish fishery will be used to look at the production side of the fishery. These include:

- California drift gillnet logbook database - documents self-reported information from fishing captains about catch amounts, fishing locations and timing of fishing effort and trip experience since 1981.
- The PacFIN landings database - documents all commercial fishery landings and revenues to west coast ports from 1981 to the present including information on gear used and vessel IDs.
- The NMFS drift gillnet observer data - documents times and locations of individual sets of drift gillnet fishing effort since 1990, including counts of catch and discards of all species caught in drift gillnets<sup>1</sup>.

This suite of data will support analysis of economic and environmental viability of different U.S. swordfish methods in use on the west coast in recent years. Published literature and reports on the history and management of the fishery are available through the PFMC website, and by request from CDFW.

### **Possible Approaches**

Since fishery data will be coming in from at least three different sources (as mentioned above), the first step would be to conduct a thorough review and where appropriate, aggregate datasets into one master database (*Checkpoint 1*). The group would then develop a preliminary analysis on trends, and formulate questions and hypotheses to test in a model framework (using mat lab, R, etc.) (*Checkpoint 2*). Once a base model of the fishery has been established (*Checkpoint 3*), the group begins to incorporate external factors such as 1) markets (data source: NMFS imports/export database, trade publications, prices etc.), 2) regulatory (e.g. when a closure reduced the spatial/temporal fishing footprint), 3) environmental (oceanographic data such as sea surface temperature, El Nino etc.). The model could evaluate, compare, and predict the relative performance and costs associated with prosecuting (fisherman perspective) and management (manager perspective) of this fishery depending on the changing factors (*Checkpoint 4*). Upon reaching checkpoint 4, an informal presentation to clients and discussion can inform the final project deliverables.

### **Client Commitment:**

NOAA-SWFSC and The Nature Conservancy and have agreed to share data, models, and expertise to support the project, subject to fulfillment of requisite NOAA-SWFSC data sharing and access protocols and requirements. All analyses and reports will be provided to NOAA and The Nature Conservancy at the conclusion of the project. See attached letters of support from Nature Conservancy and NOAA

### **Deliverables**

This project will provide both a written product and a presentation. Specific final products include:

- A concise regulatory history of the fishery through 2014
- An analysis of various management tradeoffs and potential scenarios to move towards a viable swordfish fishery off CA. The final document will be subject to the formal NOAA-SWFSC review process required of all documents originating from the SWFSC.
- A final presentation of these components to clients (informal or formal), the fishing community (if invited), and at the Pacific Fishery Management Council or related bodies.

### **Internship opportunities**

NOAA SWFSC has agreed to provide for at least 1 summer intern with a stipend cost covered by TNC. The internship will take place in La Jolla, California between the months of June and August. During this time, the intern will have the opportunity to work at the SWFSC under supervision by Stephen Stohs. The intern will have ability to access the multitude of other researchers at the center who are also working on highly migratory species (HMS) fishery. The internship goals would be to expose the intern to agency research and operations, and will provide the intern with access to data or software programs that may be proprietary or confidential in nature in order to further the project deliverables.

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<sup>1</sup> Observed effort varies over time due to vessel size and safety considerations in the active fleet, but the goal has been to observe at least 20% of the trips each year.

## **Citations**

- Bartram, P. K., J. J. Kaneko, and K Kucey-Nakamura. 2010. Sea turtle bycatch to fish catch ratios for differentiating Hawaii longline-caught seafood products. *Marine Policy* 34: 145-149.
- “Highly Migratory Fisheries; California Drift Gillnet Fishery; Sperm Whale Interaction Restriction”, 50 CFR Part 660, Vol. 78 Federal Register, No. 171, Sep. 4, 2013.
- Hellmers, E., Unpublished data set provided by CDFW, January 23, 2014
- ISC. 2009. ANNEX 7 (Report of the Billfish Working Group Workshop, May 19 - 26 2009, Busan Korea) of Report of the ninth meeting of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean, July 15-20, 2009 Kaohsiung, Taiwan.  
[http://isc.ac.affrc.go.jp/pdf/ISC9pdf/Annex\\_7\\_ISC9\\_BILLWG\\_May09.pdf](http://isc.ac.affrc.go.jp/pdf/ISC9pdf/Annex_7_ISC9_BILLWG_May09.pdf).
- NOAA, 2010. UNDERSTANDING KEY ISSUES FACING U. S. WEST COAST SWORDFISH FISHERIES AND CONSUMERS, A NOAA National Marine Fisheries Service White Paper
- Roe J.H et al. 2014, Predicting bycatch hotspots for endangered leatherback turtles on longlines in the Pacific Ocean. *Proc. R. Soc. B* 281: 20132559. <http://dx.doi.org/10.1098/rspb.2013.2559>
- SAFE 2013. Stock Assessment and Fishery Evaluation Report: Status of the U.S. West Coast Fisheries for Highly Migratory Species Through 2012. <http://www.pcouncil.org/highly-migratory-species/stock-assessment-and-fishery-evaluation-safe-documents/current-hms-safe-document/>

## **Budget and justification**

Project activities during the school year will require additional funding greater than the \$1,300 already provided by Bren. The Nature Conservancy will provide up to \$5,000 for travel expenses for meetings and presentations.

**Appendix A: Relevant fishery information for west coast swordfish (SAFE 2013)**

Table 1. West Coast commercial HMS landings (round mt), nominal revenue (\$1,000s), and average prices (\$/lb) by species, 2011-2012.

		2011			2012		
Species		Landings (mt)	Ex-vessel revenue (\$1000)	Average price (\$/lb)	Landings (mt)	Ex-vessel revenue (\$1000)	Average price (\$/lb)
<b>Tunas</b>	Albacore	11,050	\$43,390	\$1.78	13,904	\$45,745	\$1.49
	Bigeye Tuna	46	\$327	\$3.23	49	\$367	\$3.39
	Bluefin Tuna	118	\$247	\$0.95	43	\$96	\$1.02
	Skipjack Tuna	1	\$2	N.A.	1	\$2	N.A.
	Unspecified Tuna	*	*	N.A.			N.A.
	Yellowfin Tuna	4	\$14	N.A.	2	\$13	N.A.
<b>Swordfish</b>		619	\$3,353	\$2.46	403	\$2,092	\$2.36
<b>Sharks</b>	Blue	<0.5	<\$1	N.A.	<0.5	<\$1	N.A.
	Common Thresher	76	\$105	\$0.63	70	\$114	\$0.74
	Shortfin Mako	19	\$38	\$0.90	27	\$53	\$0.89
<b>Dorado</b>		3	\$11	N.A.	10	\$36	\$1.60
<b>Total HMS</b>		11,937	\$47,488		14,509	\$48,518	

\*Not reported due to data confidentiality requirements (less than three vessels).

Blank cells indicate null value (no data exist for that stratum).

If landings less than 5 mt average price per pound not reported.

Revenues are not adjusted for inflation.

Average prices are estimated as revenue divided by round pounds



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Southwest Fisheries Science Center  
8901 La Jolla Shores Drive  
La Jolla, CA 92037-1509

January 24, 2014

**Re:** Bren School research proposal to evaluate the past, present, and future tradeoffs of differing management strategies in the commercial swordfish fishery off California

To whom it concerns,

I am writing in support of the Bren School proposal to evaluate past, present and future tradeoffs of alternative management strategies for the commercial swordfish fishery off California. The U.S. has historically operated commercial swordfish fisheries off the Atlantic coast and in the Pacific waters between the West Coast and Hawaii. After several decades of regulatory changes to meet the conservation mandates of the Marine Mammal Protection Act and the Endangered Species Act, the Atlantic Coast and Hawaii have economically viable swordfish fisheries operating in compliance with federal protections to limit protected species bycatch to acceptable levels to avoid harm to vulnerable populations. By contrast, the west coast swordfish fishery has dwindled in recent years to very low levels of fishing effort, landings, and revenues, forcing west coast swordfish consumers to turn increasingly to the import markets to meet product demand, despite a healthy target swordfish stock.

The intern will have the opportunity to work at the SWFSC providing access to the multitude of other researchers at the center who are also working on highly migratory species (HMS) fisheries issues. The internship goals would be to expose the intern to agency research and operations, and will provide the intern with access to data or software programs that may be proprietary or confidential in nature in order to further the project deliverables.

The development of a revitalized west coast commercial swordfish fishery is an objective which has great potential benefits to the west coast fishing communities, U.S. swordfish consumers and producers, while helping to lead the way towards the development of economically and environmentally friendly capture fisheries methods. We expect the group product will enhance, improve and speed up research and analysis to provide a suite of possible solutions to current (and urgent) economic and environmental challenges facing the future of the west coast U.S. swordfish fishery. As the head of the economics group at the NOAA Southwest Fisheries Science Center, I offer my strong support of the Bren School proposal.

Sincerely,

A handwritten signature in black ink, appearing to read "Dale Squires".

Dale Squires  
Economist, Senior Scientist  
NOAA Southwest Fisheries Science Center

January 23, 2014

Bren School of Environmental Science & Management  
Bren Hall, University of California,  
Santa Barbara, CA 93106

Re: Support for Bren 2014-2015 Group Project Proposal: *Evaluating the past, present, and future tradeoffs of differing management strategies in the commercial swordfish fishery off California*

Dear Bren Group Project Review Committee:

I am writing to express The Nature Conservancy's (TNC) support of the Bren School proposal to evaluate alternative management strategies for the commercial swordfish fishery off California. In contrast to the US federal Atlantic and Hawaii swordfish fisheries, the swordfish fishery off California has dwindled in recent years to very low levels. This trend is largely due to regulatory constraints brought on by interactions with sensitive marine species and the conservation requirements of the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA). The outcome has been a decrease in domestic production of swordfish and subsequent economic losses to California fishing communities, and an increased consumer reliance on imports. Research has shown that foreign high-seas fisheries are often poorly regulated and tend to have greater environmental impacts on the same species being protected under US management regimes. We at TNC believe that a more holistic approach to the management of this fishery will help ensure that we are advancing our conservation goals, avoiding counterproductive impacts on our domestic fleet and fishing communities, and providing more sustainable, local swordfish to US consumers.

We are excited to partner with NOAA's Southwest Fisheries Science Center in La Jolla, who will be facilitating data access, supervising the work, and providing an internship for at least one student over the summer of 2014. For our part, TNC Fisheries project director Melissa Stevens can play an additional supervisory role, and we can cover up to \$5,000 of project-related expenses such as travel and meetings.

Thank you for considering this Bren School proposal, which we hope will enhance and catalyze working solutions for a viable West Coast swordfish fishery.

Sincerely,



Michael Bell  
Director, California Coastal & Marine Program