2015-2017 PIER Deep-Set Buoy Gear EFP Summary-June, 2018

2015-2017 EFP findings

Ongoing and proposed research

Chugey Sepulveda, PhD
Scott Aalbers, M.S.
Outline

- Background
- DSBG
- PIER DSBG EFP progress and findings
- Research update

PIER Goals
Provide data for better management and increase domestic opportunity for suppressed fishing communities
PIER Deep-set Buoy Gear (DSBG)
Designed for the west coast based on regional, species-specific data

- Rapid sink rate
- Consistent hook depth
- Strike indication
- Vertical orientation
- Max. - 30 hooks

**Negatives:** Artisanal in nature
Exempted Testing

Exempted trials were used to test DSBG:

Gear Selectivity

Seasonal catch performance

Economic viability

Fisher interest

PIER DSBG-EFP only used swordfish fisherman with SCB experience

Selection rubric to choose 5 cooperative fishers

We petitioned for 30% coverage based on:

1. PIER oversight
2. Daily check-in procedure
3. Logbook and observer record validation procedures

Collective EFP Observation Rate of 38% (range from 36 to 49%)
Vessel Sizes (~38-55’)
Avg. trip duration 3.9d
Avg. # hooks/set ~10
Trip characteristics
Late summer and fall
Capitalize on local market trends
3 consecutive seasons (June-January)

El Nino & Non-El Nino years

# sets made 743 in EFP
(>950 including research)

# buoys deployed in EFP
>7,300
(>9,000 including research)

# of pieces lost all sets (1)

Distribution of Effort
highly patchy
PIER EFP Catch Rates
Standardized to an 8-hr Fishing Day (2015-2017)

2015 range from 0.6 to 1.6 SF/8hr
(avg. ~1.3)

2016 range from 1.3 to 2.9 SF/8hr
(avg. ~1.9)

2017 range from 1.2 to 2.69 SF/8hr
(avg. ~1.9)

2015-2017 multi-season average 1.8 SF/8hr set

2015-2017 multi-season average 1.57 SF/fishing day (non-standardized)
## EFP Catch Composition (2015-2017)

<table>
<thead>
<tr>
<th>EFP Year</th>
<th>SF</th>
<th>other marketable</th>
<th>non-marketable</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>65%</td>
<td>33%</td>
<td>~2%</td>
</tr>
<tr>
<td>2016</td>
<td>88%</td>
<td>11%</td>
<td>~1%</td>
</tr>
<tr>
<td>2017</td>
<td>93%</td>
<td>6%</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

2015-2017 DSBG yielded ~86% swordfish and ~12% bigeye thresher shark.

### Protected species
- 1 elephant seal (alive)
- Extrapolated count <2.5

### Bigeye thresher

![Pie chart showing 86% Swordfish](image)
Market Outreach and Dynamics

• Avg. market price of ~$7/lb. (range ~$4-13)

• Traceability tags

• Effort trends
  • Market Price
  • DGN
  • Foreign product

Track Your Catch

Deep-set Buoy Gear (DSBG) is a low-impact fishing method that was designed for the West Coast. By setting hooks deep during the day, fishers are able to selectively target swordfish and avoid sensitive bycatch, like sea turtles and whales.

Deep-set swordfish is among the highest quality product on the market. It is caught at extremely cold temperatures and brought to market within days of capture. High quality coupled with environmental stewardship comes at a cost, so please support your local fishing community and buy local seafood.

Low impact methods like DSBG allow U.S. fishers to harvest healthy stocks one swordfish at a time.

To ensure consumers receive the product that they deserve, each deep-set swordfish is tagged with a traceability label that allows buyers and consumers to track down which vessel landed the fish.
Nocturnal shallow-set trials (FNA14NMF4270053)

Linked buoy gear research (NA13NMF4720272; FNA15NMF42720380; TNC)

Bigeye thresher survivorship (NA16NMF47220371; Pew Charitable Trust)

Swordfish stock structure-tagging and genetic assessment (FNA16NMF4270257; TNC)

Smart buoy development (NA17NMF4720257; TNC)
Nocturnal Trials
(FNA14NMF4270053)

Develop and test shallow-set configurations that are selective for swordfish

~20% marketable catch

~blue shark made up 76% of catch

high rates of bait predation

Sepulveda and Aalbers, in press
Linked Buoy Gear Research
(NA13NMF4720272; FNA15NMF42720380, TNC)

1. Design and test LBG
2. Configure to be compatible with DSBG
3. Test under exempted status

Conform:
- Strike detection
- Serviceability
- Hook type
- Depths fished
- Time of day
- # of hooks

Swordfish caught using Linked Buoy Gear were outfitted with electronic tags to assess stock structure (#FNA16NMF4270257)
# PIER Linked Buoy Gear

Attributes that distinguish PIER Linked Buoy Gear (NA15NMF4720380) from traditional longline

<table>
<thead>
<tr>
<th>Feature</th>
<th>PIER LBG</th>
<th>Traditional SS longline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal footprint</td>
<td>3 to 5 nm</td>
<td>40-60 nm</td>
</tr>
<tr>
<td>Hook count</td>
<td>30</td>
<td>800-1,000+</td>
</tr>
<tr>
<td>Tending</td>
<td>Active tending</td>
<td>Overnight soak / no tending</td>
</tr>
<tr>
<td>Hook depth</td>
<td>Below 250m</td>
<td>Surface waters</td>
</tr>
<tr>
<td>Time of set</td>
<td>Day</td>
<td>Night</td>
</tr>
<tr>
<td>Strike detection</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Serviceability</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Weighted vertical legs</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
PIER Linked Buoy Gear LBG

Rapid sink rate

Consistent hook depth

Strike indication

Vertical orientation

3.7nm in length

Hook count (Max. - 30 hooks)
73 % Swordfish
88% marketable catch

Watch the Pie CHART

Catch Composition
LBG ~ DSBG

Swordfish
Bigeye thresher shark
Opah
Escolar
Blue shark
Mola

13,386 hook soak hours

n= 75 LBG sets
Linked Buoy Gear Exempted Trials
(NA17NMF4270216, TNC)

- Funding in hand to initiate trials
- Importance of a full season
- Fishers are on hold

Need for linked option
- PLCA
- Offshore Conditions
- Accommodation for larger vessels
Assessing SCB migration patterns and Stock Structure
(FNA16NMF4270257)

Tag swordfish caught during research trials

Couple tagging & genetics data to assess swordfish migration corridors, spawning areas and stock structure

Use multiple tags/fish to assess annual migration patterns

Sample each fish and assess genetic differences using SNP’s.
(Alvarado-Bremer Laboratory)
Stock Structure

North Pacific Swordfish

2-Stock Hypothesis

ISC and IATTC

CA Swordfish

WCNP Stock

EPO Stock

2016-Overfishing is likely occurring

ISC, 2014
Southern California deployment and pop-off locations

Legend:
- Swordfish tag deployment
- Swordfish tag recovery
- World Exclusive Economic Zone Boundaries

20% WCNP

80% EPO
Swordfish Tagging and Stock Affiliation

Findings to date:
• ~111 swordfish tagged in SCB (2014-2017)
  ~80% EPO
• 16 tagged in PLCA
  ~94% WCNP

Preliminary data suggest high level of connectivity between SCB and EPO stock.

Management implications
Biological consideration for permitting
Next Steps

PIER will continue to improve upon the gear designs, better understand stock structure and strive to fill needed data gaps.

EFP’s are an important tool for testing new concepts and techniques.

We hope the Council will carefully consider the:

- Biological, social and economic factors
- Past performance history of open-access fisheries
- Potential impacts to California’s existing swordfish fleet
- Historical perspectives and lessons from the 1980’s
Acknowledgements & Support

NOAA

Saltonstall-Kennedy Grant Program
Cooperative Fisheries Grant Program
Southwest Fisheries Science Center
Bycatch Reduction and Engineering Program

George T. Pfleger Foundation
Pew Charitable Trust
The Nature Conservancy
Santa Monica Seafood
California Fisheries Research Program
NOAA WCR & CA DFW
HMS MT and HMSAS

Supporting partners and cooperative fishers