

# Seabird Bycatch Mitigation Experiments and Regulatory Updates in the Hawaii Longline Fishery

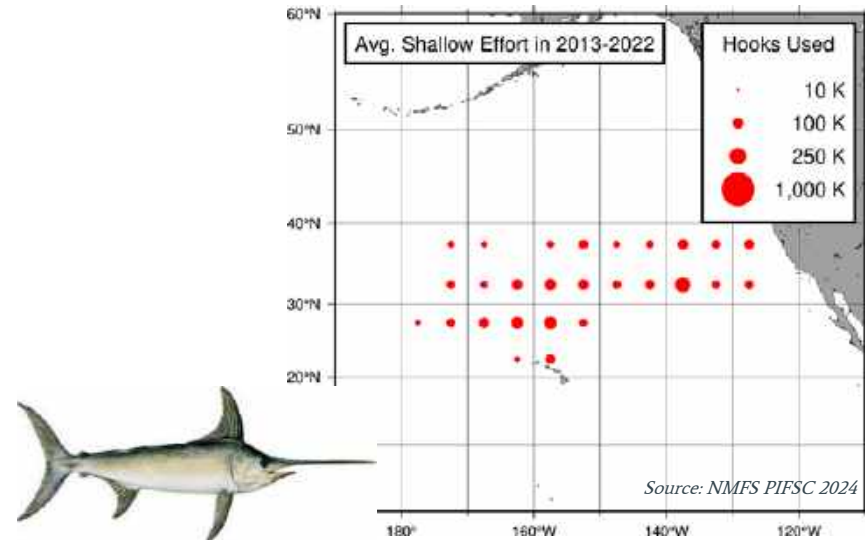
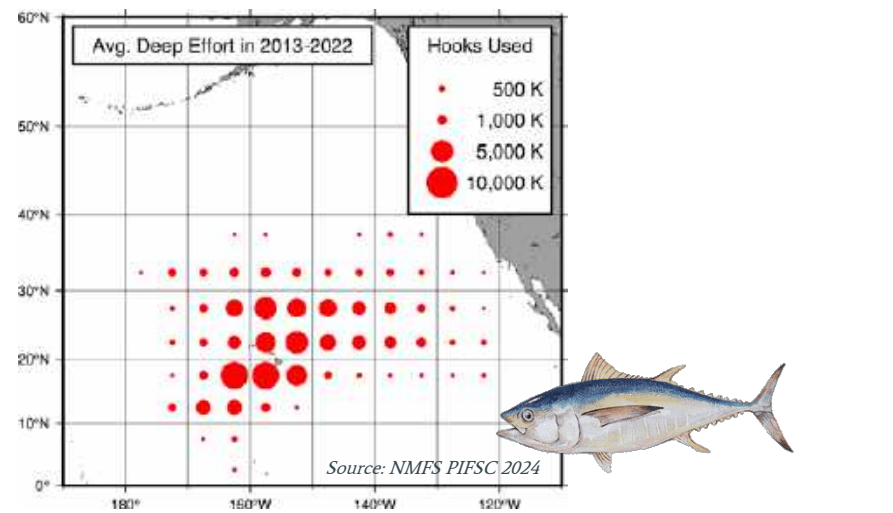


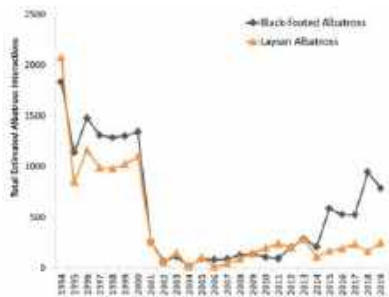
IATTC Working Group on Ecosystems and Bycatch  
June 5-6, 2024

Asuka Ishizaki, Western Pacific Regional Fishery Management Council

# Hawaii Longline Fishery

Bigeye tuna-targeting deep-set (DSSL)  
Swordfish-targeting shallow-set (SSL)





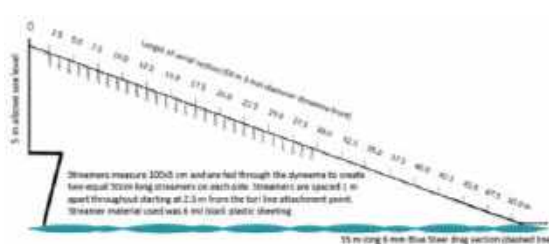
### Higher Albatross Interactions

Higher albatross interactions in the DSLL fishery observed.



### Council Second Workshop

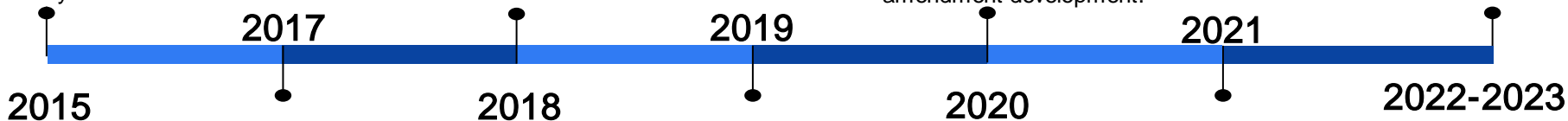
Review seabird measures. Tori line identified as high priority research for DSLL. Blue-dyed bait candidate for removal.



### Trial 1 Results & Council Direction on Regulatory Amendment

Council recommends initiation of regulatory amendment development.

### Tori line roll-out & Rulemaking



2015

**Council First Workshop**  
Workshop to improve understanding of factors underlying increased interactions.



2018

**Council Recommends Research & Cooperative Research Initiated**  
Tori line design development and first at-sea trial.



2019

2020

**Trial 2 & Council Action**  
Second trial to test tori line efficacy compared to blue-dyed bait under region's first EFP. Council takes final action in Dec.



2021

2022-2023

# Seabird Regulatory Requirements for US Hawaii DSLL Fishery (through 2023)

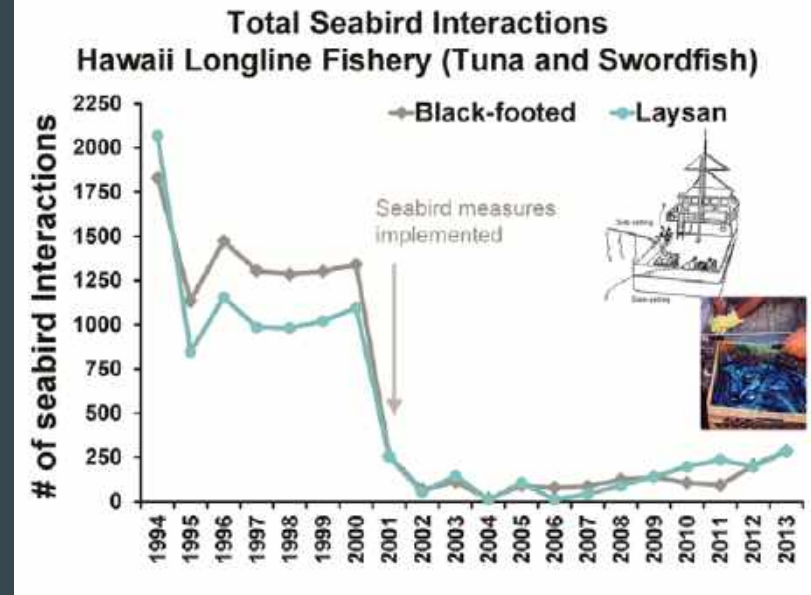
**DSL**: select from side-setting or stern-setting set of measures when fishing north of 23°N

When side-setting, also use:

Bird curtain  
+ >45g weight within 1m of hooks

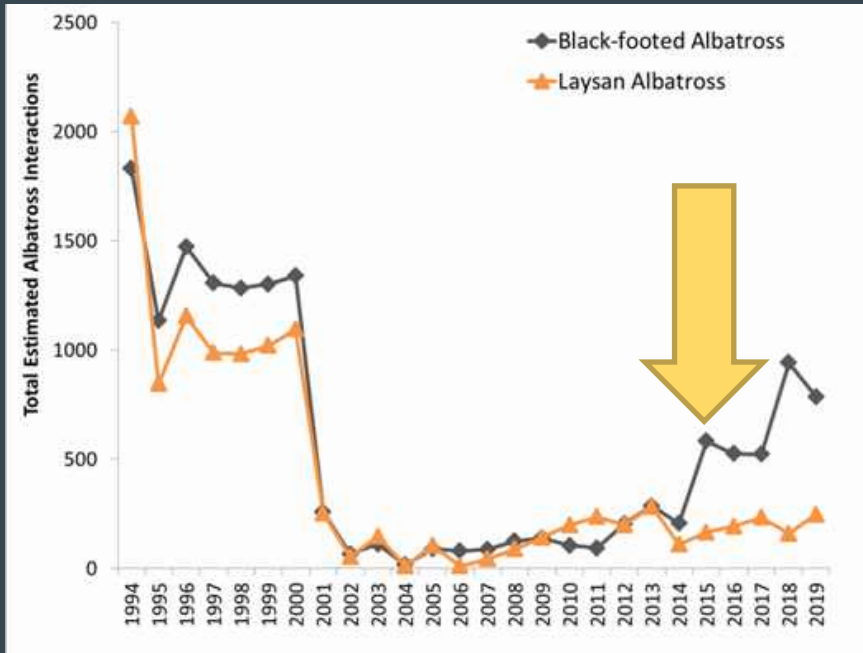
When stern-setting:

Blue-dyed thawed bait  
+ Strategic offal discards (when seabirds present)  
+ >45g weight within 1m of hooks  
+ Line shooter



- First implemented in 2001; modified in 2006
- Fishermen also required to handle live seabirds to maximize survival & owners/operators required to attend annual workshop
- Reduced seabird bycatch by 70-90%
- ~82% of DSLL vessels used stern-setting & blue-dyed bait option

Interactions gradually increased through 2014, and higher BFAL interactions in DSLL starting in 2015



**2017:** Council workshop to improve understanding of factors underlying increased interactions

**2018:** Council workshop to review existing Hawaii longline seabird measures and prioritize other measures warranting testing

- High priority = **TORI LINES**
- Candidate for removal = **Blue-dyed bait**
- Night setting not suitable for DSLL
- Side-setting still effective for DSLL

# Hawaii Deep-set Longline Tori Line Project

2019-2021

Collaboration between industry,  
Council, NMFS and researchers:

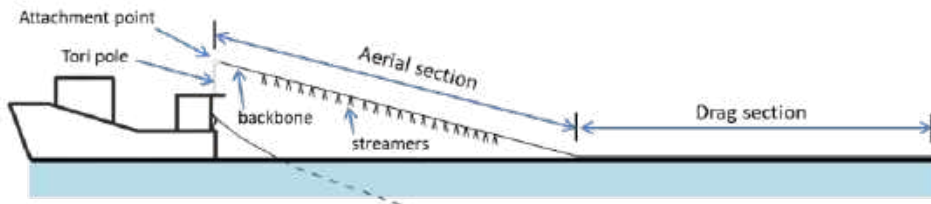
Eric Gilman, Milani Chaloupka,  
Holly Naholowaa, Asuka Ishizaki,  
Eric Kingma, Colby Brady,  
Matthew Carnes, Sarah Ellgen,  
John Wang, Yonat Swimmer

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# Hawaii Deep-set Longline Tori Line Project

- Tori lines previously tested in Hawaii longline fishery (McNamara et al. 1999, Boggs 2001) but not adopted due to entanglement and safety concerns
- Design and test tori line suitable for use in Hawaii deep-set longline fishery
- Input from Hawaii longline fishermen throughout project
- Trials conducted on commercial longline vessels



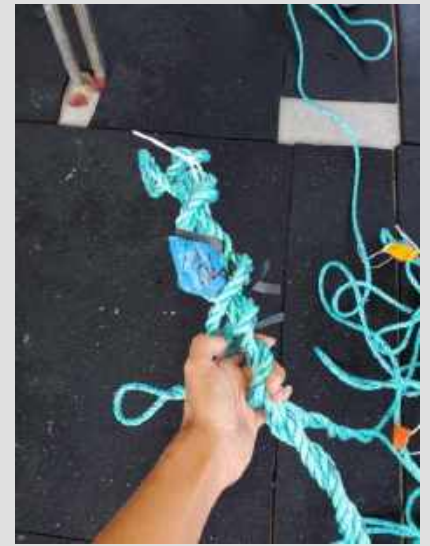
# Designing a tori line for the Hawaii deep- set longline fishery

- Relatively small vessels (<101ft/30.8m)
- No deep-diving birds
  - Primarily Laysan and black-footed albatrosses
  - Dive depth < 2m
  - ~40m aerial coverage needed
- Focus on minimizing tangles
- Light weight & streamlined
- Materials available from local vendors
- Input from Hawaii longline fishermen
- Input from NZ and Japanese tori line experts working with small vessels

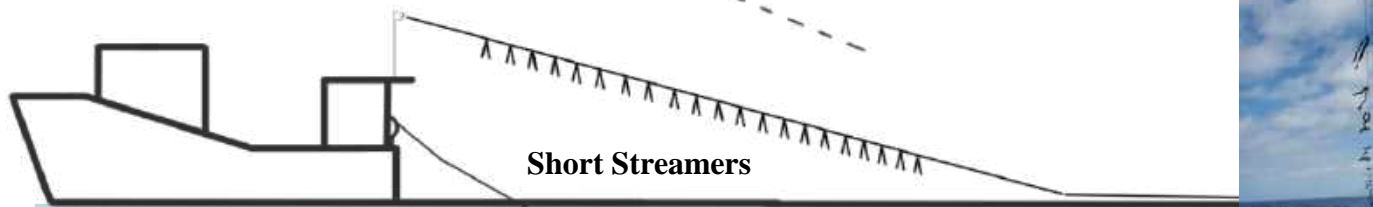
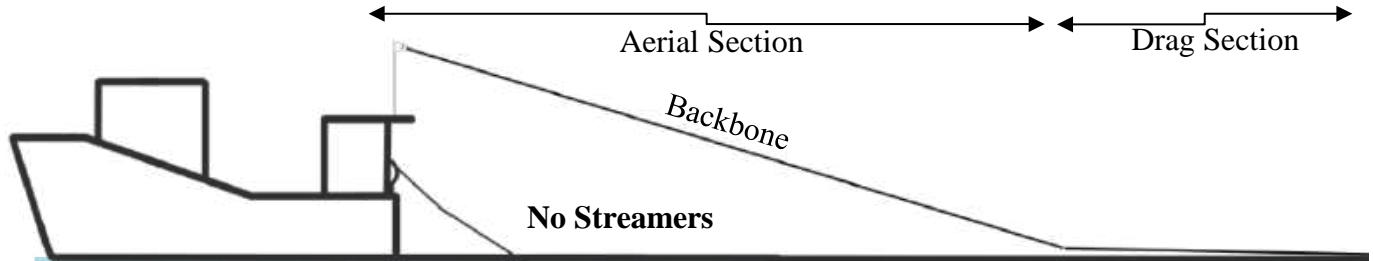


# Building & testing components

Detailed process described in  
Gilman et al. 2021 (WCPFC-SCI8-EB-IP-14)

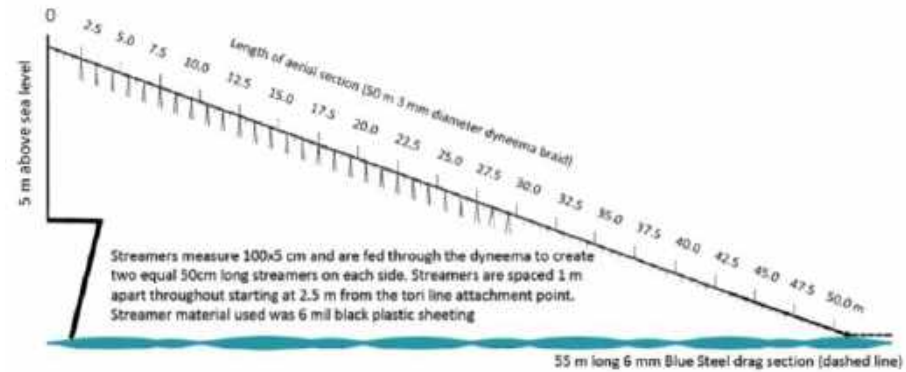
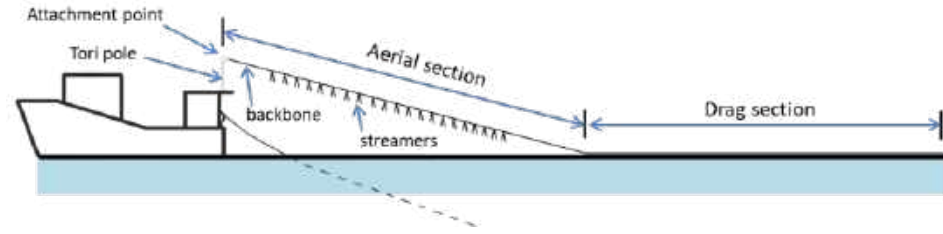


# Three Design Options: Streamerless, Short Streamers, Hybrid Streamers



# Tori Line Design

- Short steamer design selected for trials
- 50m aerial section (dyneema with short streamers spaced 1 m apart)
- 55m drag section (6mm braided rope only)
- Attached at 5m height
- Participating fishermen found design easy to use, safe, and durable
- Consistent with IATTC-C-11-02 & WCPFC-CMM 2018-03 short steamer specifications



# Field Trials in the Hawaii DSLL Fishery

## Trial 1 (Feb-July 2020)

- Used tori lines in conjunction with existing required seabird measures (blue-dyed bait, weights, line shooter, and strategic offal discharge when N of 23N)
- Alternating sets with/without tori line
- Data collected through stern-mounted EM camera
- 4 vessels, 16 trips, 189 sets
- Details in: WCPFC-SC18-EB-IP-21

## Trial 2 (Feb-June 2021)

- Test efficacy of tori lines compared to blue-dyed bait
- Alternating sets using tori lines or blue-dyed bait
- All sets using weights and line shooter
- No strategic offal discharge (eliminate confounding factor)
- Data collected through stern-mounted EM camera
- 3 vessels, 7 trips, 87 sets
- Details in: WCPFC-SC18-EB-IP-15

# Trial Results

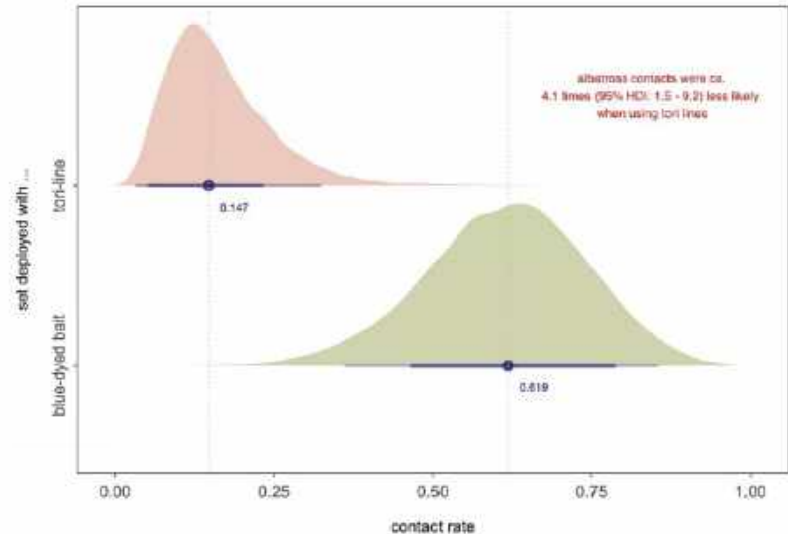
- Albatrosses 4x less likely to make contact with baited hooks, 14x less likely to get caught when tori lines used instead of blue-dyed bait (small sample size for captures)
- >99% of interactions <50m astern
- Trials did not test efficacy of blue-dyed bait compared to regular bait

Trial 1 results: see WCPFC-SC18-EB-IP-21

Trial 2 results: see WCPFC-SC18-EB-IP-15



GAMM adjusted marginal treatment effect  
density plots (with median and 80% & 95% HDI summaries)



# New Regulatory Requirements for Hawaii DSL (April 1, 2024)

## Stern-setting deep-set vessels must use (N of 23N):

| Old Requirements                                 | *NEW* Requirements             |
|--|--------------------------------|
| Blue-dyed thawed bait                            | <b>Tori line</b>               |
| Strategic offal discards (when seabirds present) |                                |
| >45g weight within 1m of hooks                   | >45g weight within 1m of hooks |
| Line shooter                                     | Line shooter                   |

- Tori line specifications included in regulations
- Tori line & pole free distribution with bilingual outreach in advance of rule change
- No change to side-setting option
- Best practices for offal management included in annual protected species workshop in lieu of regulatory requirement

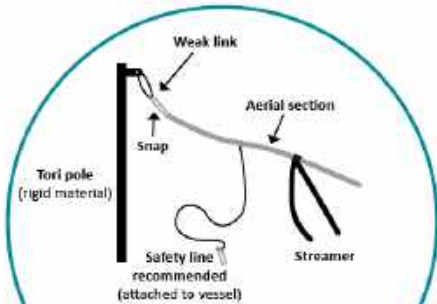
For detailed analysis on the regulatory change, see Regulatory Amendment and Environmental Assessment for the Modification of Seabird Interaction Mitigation Measures in the Hawaii Deep-set Longline Fishery <https://www.fisheries.noaa.gov/action/tori-line-requirement-stern-setting-vessels-hawaii-deep-set-longline-fishery>



NOAA  
FISHERIES

## Specifications for the Tori Line Requirement in the Hawaii Deep-set Longline Fishery

- Tori lines are required for Hawaii deep-set longline vessels that set fishing gear from the stern above 23° N. Tori lines must be used in conjunction with weighted branchlines (>45 g weight within 1 m of each hook) and line shooters.
- One tori line must be deployed every set before the first hook is set.
- Two tori lines must be on board the vessel at the start of every trip.
- Monofilament nylon is prohibited for use in the aerial and drag sections of the tori line. See the regulatory language for material specifications.
- \*If the tori line attachment point is greater than 2 m from the stern, the height would need to be increased by 1/2 m for every 5 m from the stern.



**Tori line attachment point**  
(must be 5 m above water if within 2 m from the stern\*)



Tori pole

**Aerial section**  
(must be at least 50 m long; made of ultra-high molecular weight polyethylene, or other NMFS-approved material)

**Drag section**  
(6 mm or larger braided material that floats in water)

**Streamers**  
(must be at least 30 cm long and must be spaced at least every 1 m along the aerial section)

Streamers are not required for the last 20 m of the aerial section

Aerial and drag section combined must be at least 100 m long



# Hawaii DSSL Tori Line Specifications

# Seabird Mitigation Measures for the US Hawaii SSL Fishery

## SSL Regulatory Requirements

(applies everywhere; most effort north of 23°N)

When side-setting,  
also use:

When stern-setting:

Bird curtain

+ >45g weight within  
1m of hooks

Blue-dyed thawed bait

+ Strategic offal  
discards (when  
seabirds present)

+ Night set

Operational differences in DSL vs SSL that affect seabird mitigation measure effectiveness and practicality

- Effort distribution: SSL fishery operates further north than DSL → rougher conditions; different seabird overlap (but same two species)
- Night vs day: SSL is primarily a night-setting fishery, DSL is a day-setting fishery
- Haul speed: SSL hauls gear at faster speed than DSL → greater safety concerns with branchline weighting
- Gear sink rate: SSL gear sinks at slower speed → greater aerial coverage needed for tori lines





# Hawaii Shallow-set Longline Tori Line Project (ongoing)

- Pilot Study
  - Improve seabird mitigation measures in the SSSL fishery while improving practicality and promote operational efficiency
  - Preliminary testing of tori lines in the SSSL fishery as an alternative to blue-dyed bait
  - Explore alternative combinations of seabird mitigation techniques to allow flexibility in start of set time (historically adjusted set time according to lunar phase to optimize catch)
- Study Design
  - 1 vessel, minimum target 40 sets (20 paired sets)
  - Alternate control and experimental sets
    - Control: blue-dyed bait & night set
    - Experimental: double tori lines & start set 1 hr before local sunset
  - No strategic offal discard during setting
  - EM stern camera & observer data collection
- Field trials recently completed & analysis underway

# References

- 2017 workshop report: Hyrenbach, K., Ishizaki, A., Polovina, J., and Ellgen, S. (Eds.) 2021. The factors influencing albatross interactions in the Hawaii longline fishery: towards identifying drivers and quantifying impacts: Report of a workshop in Honolulu, Hawaii, 7-9 November, 2017. U.S. Dept. of Commerce, NOAA Technical Memorandum NOAA-TM-NMFS-PIFSC-122, 163 p. doi:10.25923/nb95-gs31TM-PIFSC-122.
- 2018 workshop report: Gilman, E. and Ishizaki, A. (Eds.) 2018. Report of the Workshop to Review Seabird Bycatch Mitigation Measures for Hawaii's Pelagic Longline Fisheries, September 18-19, 2018. Available online at: [https://www.wpcouncil.org/wp-content/uploads/2018/11/WPRFMC\\_2018-Seabird-bycatch-mgmt-workshop\\_FinalReport.pdf](https://www.wpcouncil.org/wp-content/uploads/2018/11/WPRFMC_2018-Seabird-bycatch-mgmt-workshop_FinalReport.pdf)
- DSLL Trial 1 Full Report: Gilman, E., Naholowaa, H., Ishizaki, A., Chaloupka, M., Brady, C., Carnes, M., Ellgen, S., Wang, J., and Kingma, E. 2021a. Practicality and Efficacy of Tori Lines to Mitigate Albatross Interactions in the Hawaii Deep-set Longline Fishery. Western Pacific Regional Fishery Management Council. Honolulu, Hawaii, 48pp. Available online at: [https://www.wpcouncil.org/wp-content/uploads/2021/02/Hawaii-DSLL-Tori-Line-Cooperative-Research-Report\\_January2021\\_FINAL-C.pdf](https://www.wpcouncil.org/wp-content/uploads/2021/02/Hawaii-DSLL-Tori-Line-Cooperative-Research-Report_January2021_FINAL-C.pdf) [also available as SC18-EB-IP-14]
- Trial 1 Publication: Gilman, E., Chaloupka, M., Ishizaki, A., Carnes, M., Naholowaa, H., Brady, C., Ellgen, S., and Kingma, E. 2021b. Tori lines mitigate seabird bycatch in a pelagic longline fishery. *Reviews in Fish Biology and Fisheries*, pp.1-14. [also available as SC18-EB-IP-21]
- Trial 2 Full Report: Chaloupka, M., Gilman, E., Carnes, M., Ishizaki, A., Brady, C., Swimmer, Y., Wang, J., Ellgen, S., and Kingma, E. 2021. Could tori lines replace blue-dyed bait to reduce seabird bycatch risk in the Hawaii deep-set longline fishery? Western Pacific Regional Fishery Management Council. Honolulu, Hawaii. Available online at: [https://www.wpcouncil.org/wp-content/uploads/2021/09/Tori-Line-2021-Study-Report\\_Final.pdf](https://www.wpcouncil.org/wp-content/uploads/2021/09/Tori-Line-2021-Study-Report_Final.pdf) [also available as SC18-EB-IP-15]
- DSLL Regulatory Analysis: Regulatory Amendment and Environmental Assessment for the Modification of Seabird Interaction Mitigation Measures in the Hawaii Deep-set Longline Fishery. <https://www.fisheries.noaa.gov/action/tori-line-requirement-stern-setting-vessels-hawaii-deep-set-longline-fishery>
- Pelagic FEP SAFE Report: WPRFMC. 2023. Annual Stock Assessment and Fishery Evaluation Report for the Pacific Pelagic Fisheries Fishery Ecosystem Plan 2022. T Remington, M Fitchett, A Ishizaki (Eds.). Honolulu: Western Pacific Regional Fishery Management Council. Available online at: <https://www.wpcouncil.org/annual-reports/>
- Wren, J., Shaffer, S., and Polovina, J. 2019. Variations in black-footed albatross sightings in a North Pacific transitional area due to changes in fleet dynamics and oceanography 2006–2017. *Deep Sea Research Part II: Topical Studies in Oceanography*, 169, 104605.



**MAHALO!**

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