



Black Cod Almanac

MESA Program, Auke Bay Laboratories, NMFS, Juneau, AK

January 2019

Greetings!

We hope this New Year finds you in good health and thinking about the upcoming fishing season. This is the 6th installment of the Black Cod Almanac, which we started to improve communication and increase dialogue between scientists and members of the industry. The intent is to provide updates on relevant research, summarized highlights of both the Groundfish Plan Team and the North Pacific Fishery Management Council meetings, and news that may be of interest to those involved with the Federal sablefish fishery. Please feel free to pass on, or send us email addresses of others who may appreciate receiving these newsletters.



Crew member on the longline survey gaffing a sablefish to be sampled.

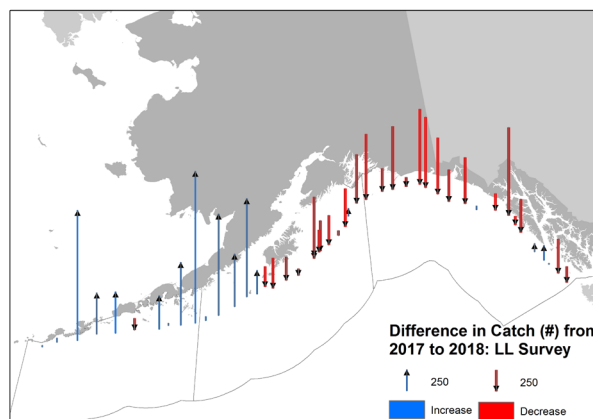
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2018 NMFS Longline Survey

The 2018 NMFS longline survey sampled waters throughout the entire Gulf of Alaska (GOA) and in the Aleutian Islands, from June 2018 – August 2018. During the survey, catch is recorded, a subset of sablefish otoliths is collected for age reading, sablefish are lengthed, and a subset of sablefish are tagged and released for movement research. The results of this survey are the most influential data source used in the sablefish assessment model, which estimates spawning biomass and is used to set harvest limits.

- LL Survey Relative Population Numbers (RPNs; area weighted measures of the catch rates) were up from 2017 in the WGOA region



The difference in catch (#) of fish at each slope station of the longline survey in the GOA from 2017 to 2018. Blue bars indicate an increase in catch from 2017 to 2018, and red bars indicate a decrease in catch from 2017 to 2018.

- The number of survey stations with orca whale depredation decreased from 2017, but sperm whale depredation was consistent with recent years in the GOA
- Total tagged fish: 3,608 sablefish, 738 shortspine thornyhead, 4 Greenland turbot, 32 spiny dogfish, and an additional 10 spiny dogfish and 14 sablefish with pop-off satellite tags

2018 November Groundfish Plan Team Meeting Highlights

<http://www.npfmc.org/fishery-management-plan-team/goa-bsai-groundfish-plan-team/>

Dana Hanselman presented the sablefish assessment during the November 2018 NPFMC Groundfish Plan Team meeting that was held at the Alaska Fisheries Science Center in Seattle, WA, November 13 – 16, 2018.

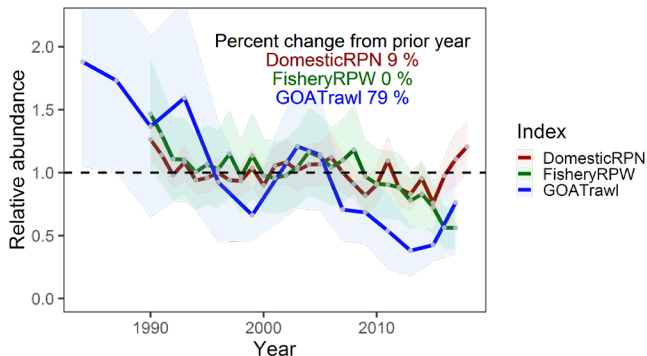
The 2018 assessment included the following new data:

- **Catch:** updated catch for 2017, new projected 2018 – 2020 catches
- **Relative abundance:** 2017 longline fishery, 2018 longline survey
- **Ages:** 2017 longline survey, 2017 fixed gear fishery
- **Lengths:** 2017 fixed gear fishery, 2017 trawl fishery, 2018 longline survey
- **Depredation:** estimates of killer and sperm whale depredation in the fishery were updated and projected for 2018 – 2020

Summarized results:

- **Abundance indices:** The 2018 longline survey relative abundance index was up 9% from 2017 (Domestic RPN, red line in figure). The fishery catch-rate/abundance index (Fishery RPW, green line in figure) stayed level from 2016 to 2017. The 2017 GOA trawl survey was up 79% (GOA Trawl, blue line in figure).

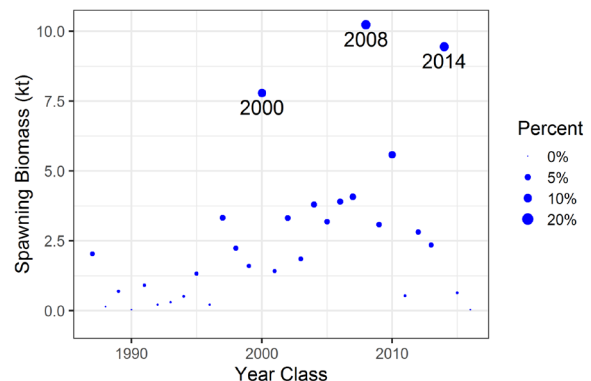
Sablefish abundance indices



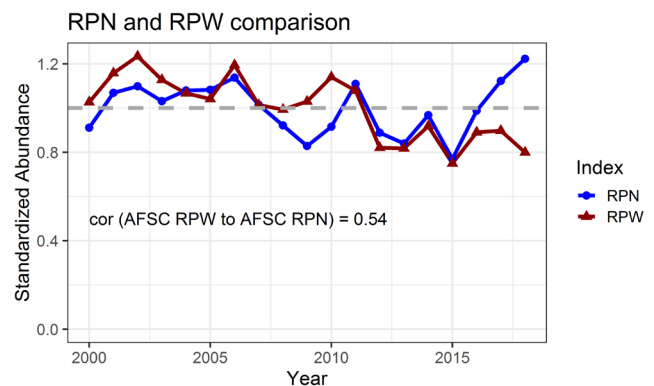
- **Recruitment:** The very large estimated 2014 year class is expected to comprise about 10% of the 2019 spawning biomass, despite being

Plan Team cont.

less than 20% mature. The following figure shows the percent contribution of each year class to total spawning biomass.



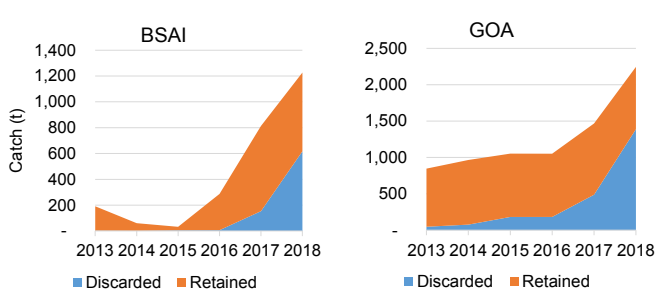
- **Change in Age Structure?** The longline survey Relative Population Weight (RPW) index, though no longer used in the assessment model, has strongly diverged from the Relative Population Number (RPN) index, **indicating fewer large fish in the population.**



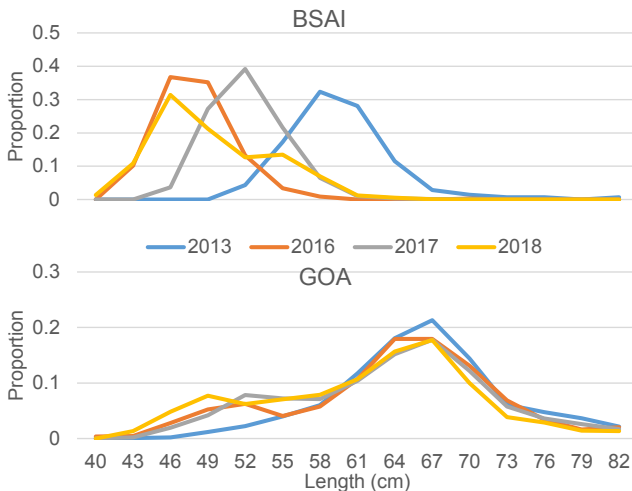
- **Model results:** Spawning biomass is projected to increase rapidly from 2019 to 2022, and then stabilize, **but is currently low; author recommended 2019 ABC (quota) is 15,068 t.** (similar to 2018). The 2014 year class is unusual and led to the model estimating a high maxABC recommendation, but numerous concerns led to the authors recommending a quota that was below the maxABC. We share 10 reasons of concern on the following page.
- **Apportionment:** Continuing with the fixed apportionment of ABC from 2018 fishery.

Author's Concerns and Reasons for the 2019 Quota Recommendation:

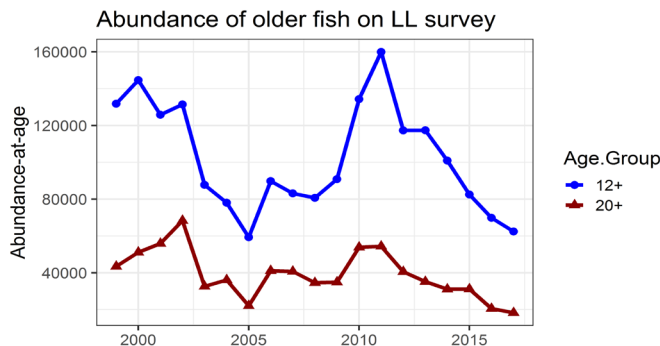
- 1. Trawl Catch and Release:** Because of the large abundance of small fish, we are seeing changes in fishing mortality. Namely, the trawl fleet is encountering them and in recent years has gone to PSC status earlier and is discarding. **The effect of this shifting fishing mortality spatially and to different ages needs to be analyzed.**



The length compositions in the trawl fishery seen below are very different in the BSAI than the GOA.

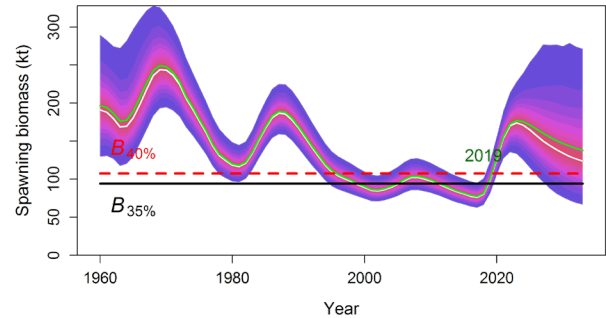


- 2. "Un-graying" of the Population:** The amount of older fish comprising the spawning biomass has been declining rapidly since 2011.



Author's Recommendation Cont.

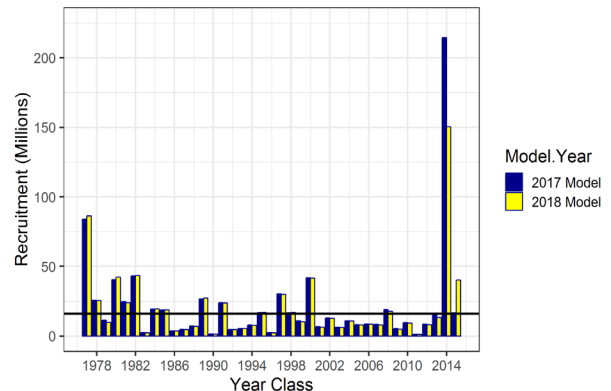
- 3. Fits to Indices are Poor:** Fits to survey abundance indices are poor for recent years.
- 4. Spawning Biomass is Still Low:** Updated reference points that include the 2014 year class put stock status quite low in 2018 (26%) and still below $B_{35\%}$ (33%) in 2019.



- 5. Retrospective Bias is Up:** The retrospective bias in the model has increased in the last two years, and the bias is positive (i.e., historical estimates of spawning biomass have been mildly overestimated).

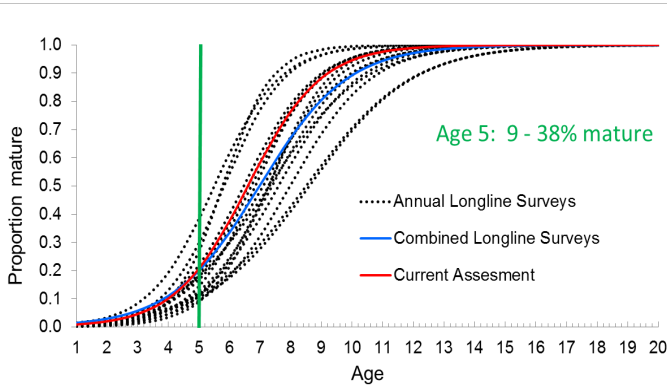
- 6. The 2014 Year Class!** The very large estimated year class for 2014 is expected to comprise about 10% of the 2019 spawning biomass, despite being less than 20% mature.

- 7. The 2014 Year Class has Decreased:** The estimate of the 2014 year class strength declined 30% from 2017 to 2018, and the estimate could drop more in the future.



Author's Recommendation Cont.

- 8. Heat Exhaustion:** Another marine heat wave may be forming based on fall 2018 sea surface temperatures. This may have been beneficial for sablefish recruitment in 2014, but it is unknown how it will affect the current population or future recruitments.
- 9. Body Condition is Poor:** In the recent years of high recruitment, body condition (weight-at-length) of maturing sablefish from the 2014 year class (age-4) has been lower than average, and much lower than during the previous period of strong recruitments.
- 10. Maturity Matters:** The projected increase in future spawning biomass is highly dependent on young fish maturing in the next few years; results are very sensitive to the **assumed** maturity rates.



THE BOTTOM LINE

- **Maximum permissible ABC is way up**
- **Author's ABC 2019 = ABC 2018 (recommending a reduction from maxABC as explained by 10 reasons of concern above)**
- **Rebuilding spawning biomass above target is the primary goal**



December 2018 NPFMC Meeting Highlights

The December NPFMC meeting was held in Anchorage, AK, December 3 – 11, 2018.

<https://www.npfmc.org/december-2018-newsletter/>

2019/2020 GOA Groundfish Specifications

The Council concurred with the author's recommended ABCs for the 2019 and 2020 groundfish fisheries including adjustments for whale depredation. Sablefish overfishing limits (OFL), acceptable biological catches (ABC), and total allowable catches (TAC) by area for 2019 are below:

Area	OFL (t)	ABC/TAC (t)
Gulf of Alaska	25,227	11,571
Western		1,581
Central		5,178
W. Yakutat		1,828
S.E. Outside		2,984
Bering Sea	3,221	1,489
Aleutians	4,350	2,008

Guidance for recommending an ABC below maximum permissible ABC

The Council was provided a report by a workgroup of the Plan Teams regarding recommending ABCs below the maximum permissible specified by the control rule within the groundfish Tier system. This report proposed **the use of a risk assessment table to list concerns related to assessments, population dynamics, and environmental and ecosystem considerations.** These tables are meant to provide transparency on some concerns that cannot be addressed within the assessment models directly. The risk table and the Ecosystem & Socioeconomic Profile described below was used for sablefish to provide rationale for recommendations below maxABC.



2018 GROUND FISH TAG PROGRAM RECAP

2018 APPROXIMATE NUMBER OF TAGS RETURNED:

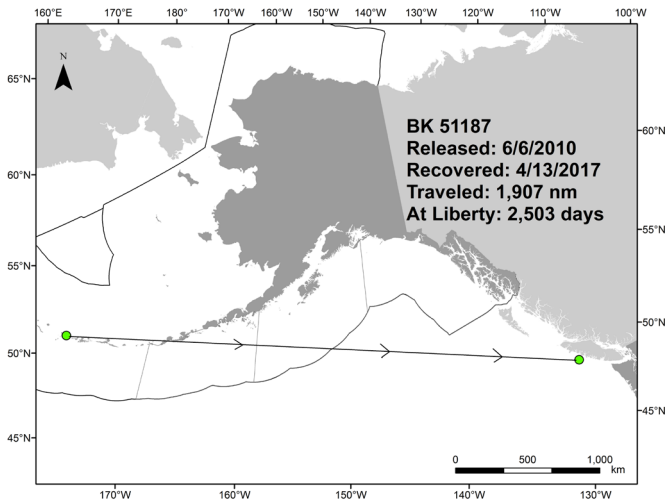
- 441 sablefish (4 electronic archival tags)
- 19 shortspine thornyheads
- 4 spiny dogfish (3 electronic archival tags)



Photo of sablefish tagged with a pop-off satellite tag on the longline survey. Photo credit: K. Fenske

OF THOSE SABLEFISH TAGS:

- Greatest time at liberty: 14,155 days (~39 yrs)
- Shortest time at liberty: 9 days
- Greatest distance traveled: 1,907 nmi



Make sure and get those tags turned in for the 2018 cash reward drawing in March!

Ecosystem & Socioeconomic

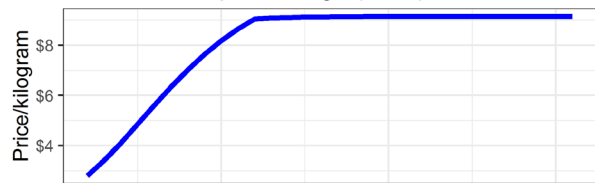
Profile (ESP)

- **Eco-Positives:** High young-of-the-year growth and high presence of 2016 year class in the ADF&G large mesh trawl survey
- **Eco-Negatives:** 4-year-old condition and benthic forager index is down
- **Socio-Positives:** TACs no longer declining
- **Socio-Negatives:** Value of small fish extremely low, increased incidental catch

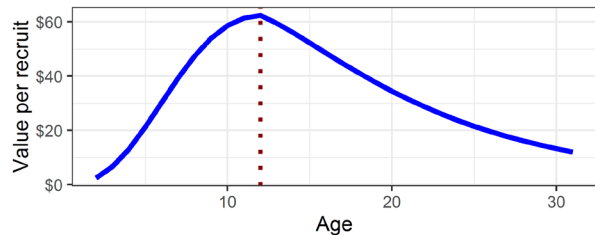
Size Matters:

The **maximum value occurs at about age 12**, that is, if you could choose when to extract all of the fish, age 12 (a 6-8 lb fish) would give you the best price while capturing fish before they die of natural mortality.

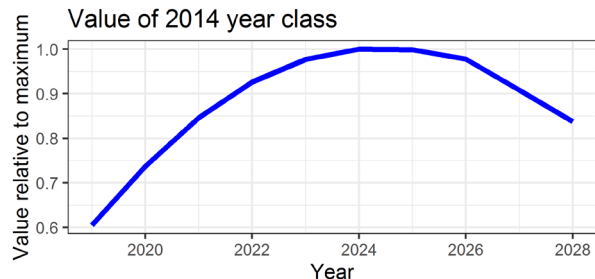
1st wholesale price at age (2018)



Age at maximum value (2018)



An example of the value of the 2014 year class shows that while it may not maximize until about 2024, 85% of the value could be obtained by 2021 as 7 year olds.

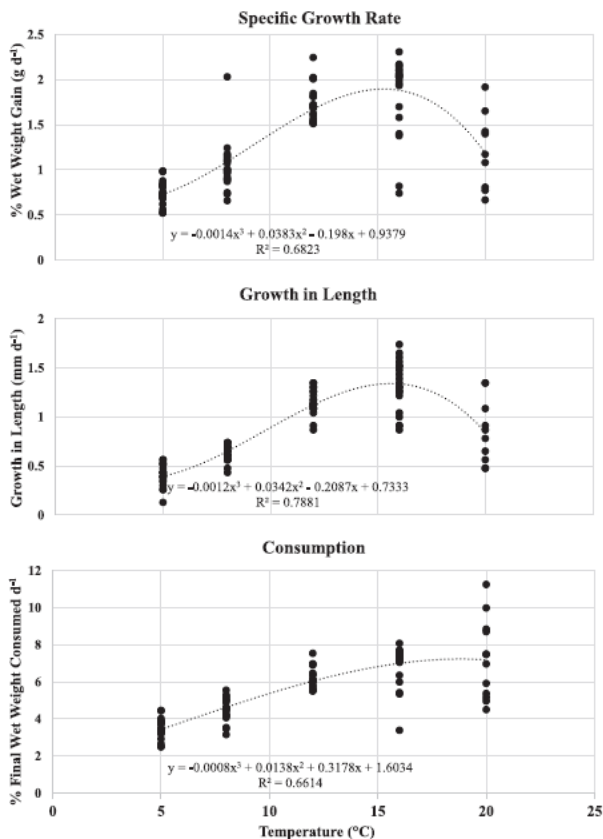


NEW AFSC LITERATURE AND RESEARCH

TEMPERATURE-DEPENDENT GROWTH AND CONSUMPTION OF YOUNG-OF-THE-YEAR SABLEFISH *ANOPILOPOMA FIMBRIA*: TOO HOT, TOO COLD OR JUST RIGHT?

Joseph R. Krieger, Ashwin Sreenivasan, Ron Heintz
(2019) Fisheries Research 209:32-39

- Study measured the effects of temperature on growth and consumption rates of YOY sablefish (218-289 mm total length) in lab trials with fish held over 5 temperature treatments (5°C, 8°C, 12°C, 16°C, and 20°C)
- Sablefish performance (% wet weight gain and condition) was optimum within a thermal range of 12°C-16°C. Outside of this range, dramatic declines in performance were observed with mortalities occurring following prolonged exposure to water temperature $\geq 20^\circ\text{C}$.
- The narrow thermal range facilitating higher than average condition and optimal specific growth rates indicates that **YOY sablefish growth and development may be dramatically influenced by relatively small shifts in water temperatures.**
- A shift with size in thermal performance was observed: **large fish perform better at colder temperatures compared to smaller fish.**
- The shift in thermal performance with size is an important consideration for understanding the result of environmental perturbation on recruitment.



NEW AFSC LITERATURE AND RESEARCH

PRELIMINARY OBSERVATIONS OF THE SKELETAL DEVELOPMENT IN PRE-FLEXION LARVAE OF SABLEFISH *ANOPILOPOMA FIMBRIA*

Alison Deary, Janet Duffy-Anderson, Annette Dougherty
Ichthyological Research August 2018

- Study examined the skeletal development of sablefish larvae and how environmental variability may impact survival in the early stages
- Sablefish larvae are characterized by early development of large pectoral fins to assist with swimming ability but **have delayed bone-development in their jaws, making them vulnerable to starvation prior to developing swimming capabilities.**
- Until sablefish larvae develop jaws and can swim they are only able to pick prey from the water that are small and prevalent. This means **they require zooplankton to be abundant so they have something to eat before they can swim.**
- This is likely why their prevalence in the surface waters matches very well with the onset of the zooplankton bloom.

HOT TOPIC



WHALE DEPREDAATION RESEARCH

- Sperm whale depredation on the survey has been corrected for since 2016
- Depredation in the fishery from both sperm and killer whales has been estimated and used in the model and ABC recommendations since 2016
- **WE'VE BEEN LISTENING:**
 - "Our fishery estimates are too small"
 - "More effort with fewer fish is resulting in higher depredation rates"
 - "Whales are getting more aggressive/smarter"
 - "The whale population is increasing"
- **WHAT ARE WE GOING TO DO:**
 - Examine effort as well as catch
 - See if effect size (the decrease in catch rates caused by whales) has increased since 2015
 - Compare new logbook data on whale interactions with observer data
 - Probable meeting of IFQ committee at April Council meeting in Anchorage to consider research ideas

REMINDER OF LONGLINE SURVEY!

It is important that vessels stay at least 5 nautical miles from each survey station for 7 days prior to the planned sampling date because the catch data will help determine the following year's quota. In recent years, the survey has been encountering an increasing number of boats fishing near survey stations. If the survey samples in an area that has already been fished, localized depletions may lower survey catch rates and negatively impact abundance estimates and your IFQ. The survey will be most accurate if there is no fishing for seven days prior to and during the survey of each station location. **During the months of June – August, please reference the 2019 longline survey calendar to be aware of the survey locations and dates.** The vessel contracted for the 2019 survey is the *F/V Ocean Prowler*. For questions during the survey, the vessel can be reached on VHF channel 16 or SSB frequency 4125. **THANK YOU!**



Congrats to the 2017 NMFS Sablefish Tag Recovery Prize Drawing Winners

Kurt Hansen – Seattle, WA **First Prize: \$1000**
Tag BK 74709 – at liberty for 453 days and traveled 2 nm

Seamus Hayden – Kodiak, AK **Second Prize: \$500**
Tag BK 38550 – at liberty for ~10.5 yrs and traveled 48.5 nm

Bill Widing – Woodway, WA **Third Prize: \$250**
Tag BK 71133 – at liberty for 792 days and traveled 927 nm

Kristopher Ramsey – Seward, AK **Fourth Prize: \$250**
Tag BK 51289 – recovery information unknown



CALENDAR OF EVENTS

SABLEFISH TAG REWARD DRAWING

TED STEVENS MARINE RESEARCH INSTITUTE, JUNEAU, AK
MARCH 20, 2019 @ 10:00 AM

Drawing held from all of the 2018 sablefish tag returns for cash rewards: 1st place - \$1,000; 2nd place - \$500; 3rd and 4th place - \$250. Do not need to be present to collect reward.

ALASKA MARINE SCIENCE SYMPOSIUM

[HTTPS://WWW.ALASKAMARINESCIENCE.ORG/HOME](https://www.alaskamarinescience.org/home)

CAPTAIN COOK HOTEL – ANCHORAGE, AK
JANUARY 29 – FEBRUARY 1, 2019

NORTH PACIFIC FISHERY MANAGEMENT COUNCIL MEETINGS

[HTTP://WWW.NPFMC.ORG/UPCOMING-COUNCIL-MEETINGS/](http://www.npfmc.org/upcoming-council-meetings/)

BENSON HOTEL – PORTLAND, OR
FEBRUARY 4 - 11, 2019

HILTON HOTEL - ANCHORAGE, AK
APRIL 1-9, 2019

CENTENNIAL HALL – SITKA, AK
JUNE 3 – 11, 2019

HOMER, AK
SEPTEMBER 30 – OCTOBER 8, 2019

HILTON HOTEL – ANCHORAGE, AK
DECEMBER 2 – 10, 2019

NPFMC GROUND FISH PLAN TEAM MEETINGS

[HTTPS://WWW.NPFMC.ORG/FISHERY-MANAGEMENT-PLAN-TEAM/GOA-BSAI-GROUND FISH-PLAN-TEAM/](https://www.npfmc.org/fishery-management-plan-team/goa-bsai-groundfish-plan-team/)

ALASKA FISHERIES SCIENCE CENTER - SEATTLE, WA
SEPTEMBER 10 - 14, 2019
NOVEMBER 12 - 15, 2019

CONTACTS

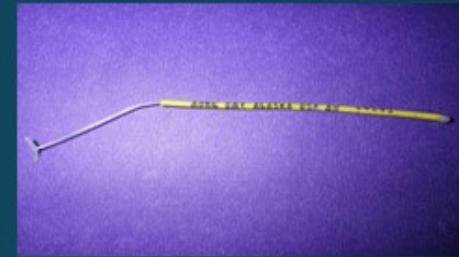
Chris Lunsford; Marine Ecology and Stock Assessment program manager
chris.lunsford@noaa.gov

Dana Hanselman; Lead sablefish assessment author
dana.hanselman@noaa.gov

Pat Malecha; Coordinator of the longline survey
pat.malecha@noaa.gov

Katy Echave; Sablefish Tag Program
katy.echave@noaa.gov

REWARD FOR TAGGED SABLEFISH



The U.S. National Marine Fisheries Service Auke Bay Laboratory in Juneau, AK tags sablefish (blackcod) in the Gulf of Alaska, Bering Sea and Aleutian Islands in order to study distribution and migration.

Tags may be yellow, red, or orange and are usually located below the first dorsal fin on the left side of the fish. In addition, sablefish are being tagged with $\frac{3}{4}$ inch diameter x $2\frac{1}{4}$ inch long electronic tags placed inside the fish with a 3 inch long fluorescent green and pink tag located near the dorsal fin of the fish. The external tag reads – "Reward for Depth Sensor Inside Fish." These electronic tags are worth monetary rewards of up to \$500 if returned.

Postage-paid envelopes are available in most areas. For a reward and information on the tagged fish, please send tags with as much of the following information as possible:

Name of vessel

Location of recovery

Fork length (from tip of snout to fork in tail)

Depth fished

Date of recovery

Sex of the fish

Round weight

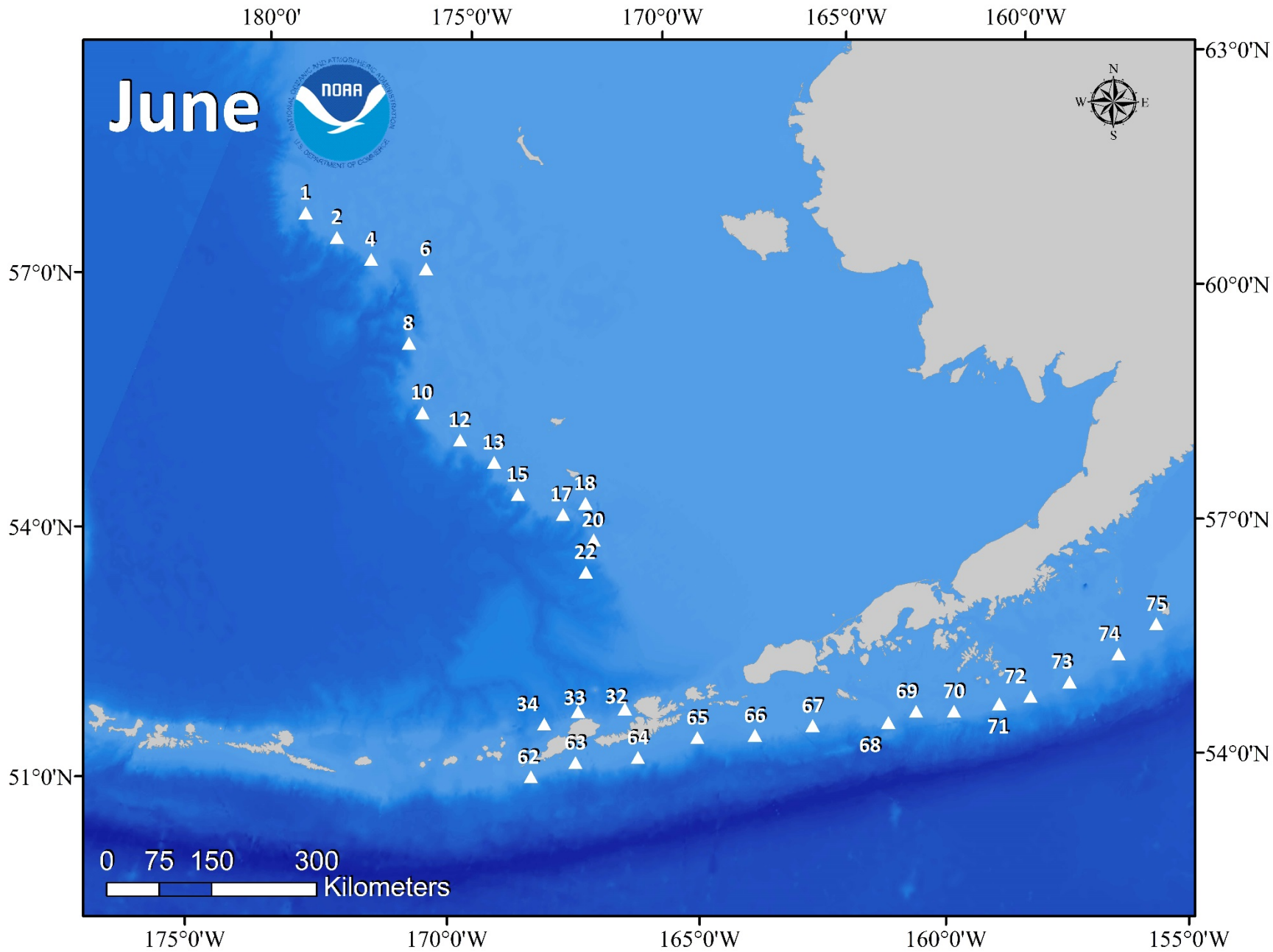
Type of gear


Sablefish Tag Program

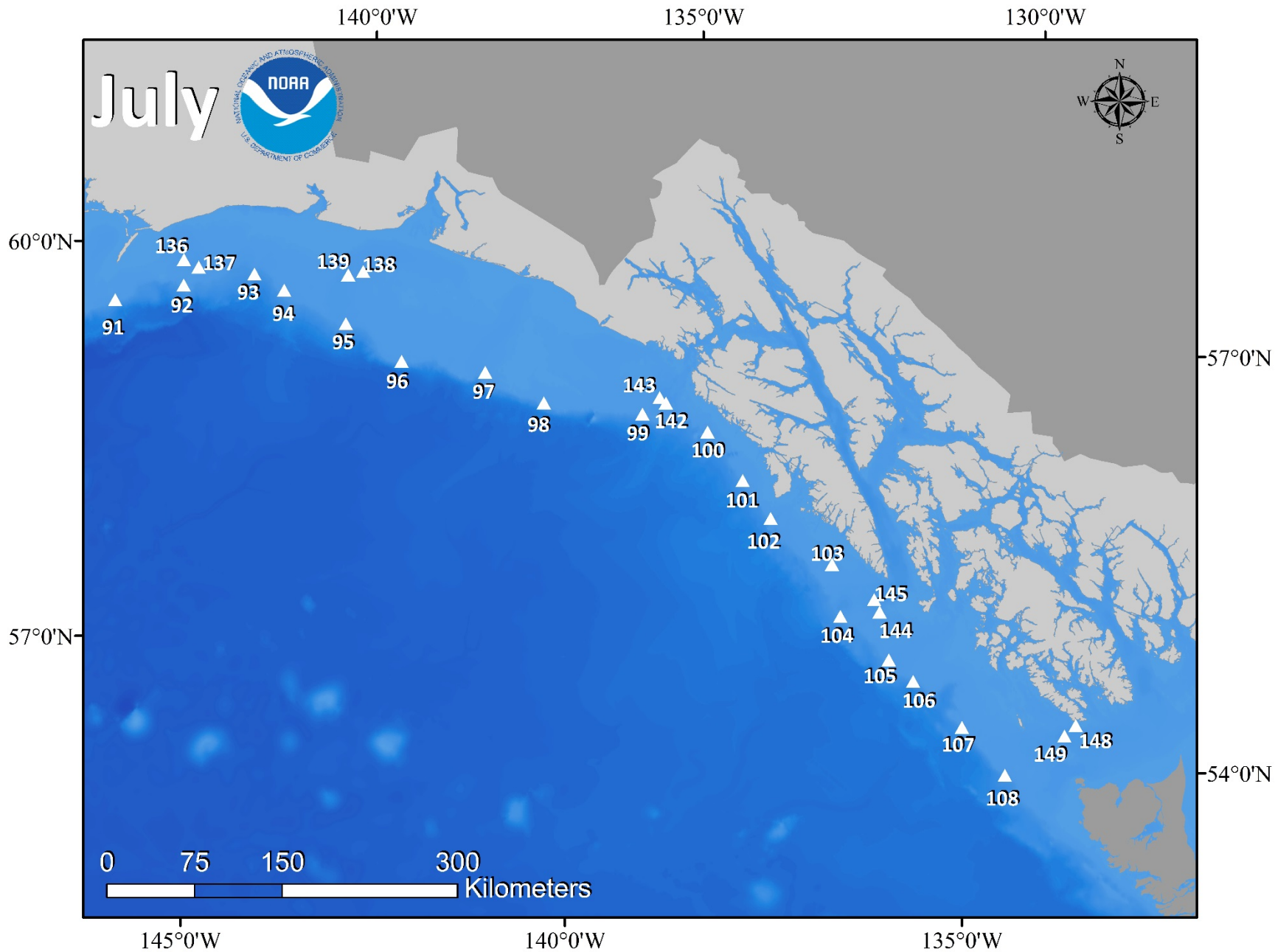
NOAA/NMFS Auke Bay Laboratories

17109 Pt. Lena Loop Rd.

Juneau, AK 99801


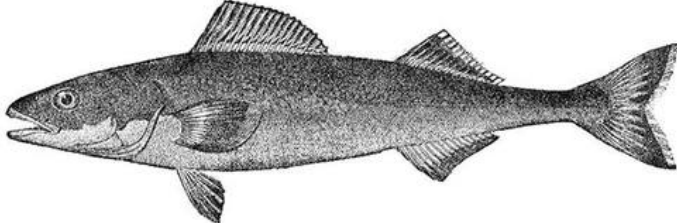


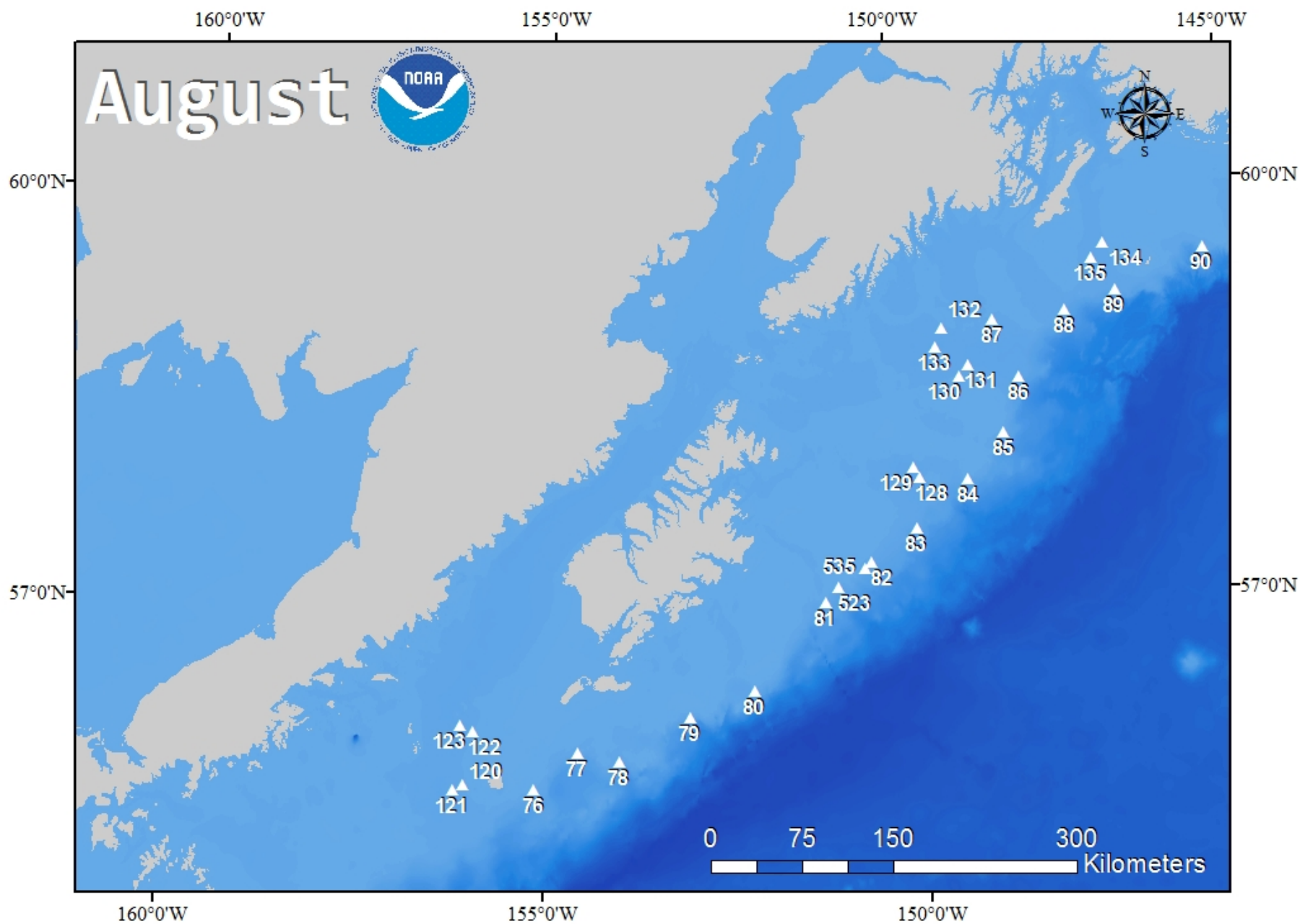
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				May 30 Station 17 56°02.3'x169°37.1' 55°59.2'x169°50.2'	May 31 Station 12 56°37.6'x172°21.2' 56°29.1'x172°31.2'	1 Station 8 57°37.7'x174°09.9' 57°46.2'x174°18.4'
2 Station 2 58°37.2'x176°38.5' 58°33.2'x176°53.9'	3 Station 1 58°46.7'x177°34.5' 58°54.4'x177°50.7'	4 Station 4 58°29.8'x175°40.2' 58°30.2'x175°57.3'	5 Station 6 58°20.0'x174°18.7' 58°23.1'x174°27.2'	6 Station 10 56°49.7'x173°22.7' 56°58.6'x173°28.9'	7 Station 13 56°28.0'x171°27.1' 56°27.3'x171°43.8'	8 Station 15 56°08.8'x170°43.9' 56°08.5'x170°42.9'
9 Station 18 56°14.6'x169°10.3' 56°07.6'x169°23.0'	10 Station 20 55°48.5'x168°48.1' 55°54.6'x169°00.9'	11 Station 22 55°27.5'x168°00.2' 55°23.5'x168°15.8'	12 Station 34 53°18.3'x168°53.9' 53°18.1'x168°54.2'	13 Station 33 53°36.7'x168°17.9' 53°37.8'x168°02.7'	14 Station 32 53°46.3'x167°19.8' 53°41.6'x167°30.3'	15 In Port Dutch Harbor
16 Station 62 52°39.6'x169°00.2' 52°34.0'x169°10.2'	17 Station 63 52°57.9'x168°08.1' 52°51.3'x168°12.6'	18 Station 64 53°11.5'x166°51.3' 53°03.0'x166°56.0'	19 Station 65 53°35.0'x165°41.1' 53°26.7'x165°46.8'	20 Station 66 53°44.2'x164°28.1' 53°37.6'x164°39.3'	21 Station 67 53°58.2'x163°15.8' 53°51.8'x163°24.1'	22 Station 68 54°08.0'x161°38.2' 54°03.5'x161°51.5'
23 Station 69 54°18.9'x161°03.6' 54°12.6'x161°13.2'	24 Station 70 54°21.9'x160°14.1' 54°13.9'x160°18.8'	25 Station 71 54°30.6'x159°15.3' 54°22.3'x159°25.9'	26 Station 72 54°38.0'x158°34.8' 54°29.5'x158°42.2'	27 Station 73 54°51.1'x157°44.2' 54°43.3'x157°51.6'	28 Station 74 55°14.4'x156°40.4' 55°06.6'x156°44.6'	29 Station 75 55°38.5'x155°50.9' 55°30.0'x155°50.0'
30 Travel to Ketchikan						





Alaska Fisheries Science Center

Longline Survey Station Schedule

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 Travel to Ketchikan	2 Travel to Ketchikan	3 Travel to Ketchikan	4 In Port Ketchikan	5 Station 148 54°38.9'x 132°50.3' 54°36.0'x 132°56.0' Station 149 54°35.9'x 133°01.4' 54°35.8'x 133°09.4'	6 Station 108 54°27.0'x 133°55.8' 54°32.2'x 134°04.1'
7 Station 107 54°54.0'x 134°17.2' 55°00.8'x 134°27.1'	8 Station 106 55°20.8'x 134°44.1' 55°23.3'x 134°56.8'	9 Station 105 55°33.5'x 134°58.0' 55°37.5'x 135°07.8'	10 Station 144 55°55.8'x 134°54.1' 56°00.0'x 134°54.8' Station 145 56°02.0'x 134°55.6' 56°05.6'x 135°01.7'	11 Station 104 55°59.0'x 135°26.2' 56°04.8'x 135°38.0'	12 Station 103 56°23.0'x 135°20.9' 56°22.1'x 135°36.8'	13 Station 102 56°51.1'x 135°59.8' 56°57.4'x 136°06.2'
14 Station 101 57°11.3'x 136°14.1' 57°14.9'x 136°24.7'	15 Station 100 57°37.1'x 136°32.2' 57°38.5'x 136°44.1'	16 Station 142 57°54.9'x 137°00.6' 57°55.2'x 137°08.4' Station 143 57°58.0'x 137°04.6' 57°58.2'x 137°12.6'	17 Station 99 57°52.7'x 137°22.7' 57°53.4'x 137°37.4'	18 Station 98 58°08.4'x 138°43.8' 58°10.3'x 138°55.9'	19 Station 97 58°28.1'x 139°28.0' 58°24.9'x 139°42.5'	20 In Port Yakutat
21 Research experiment near Yakutat	22 Research experiment near Yakutat	23 In Port Yakutat	24 Station 138 59°25.0'x 140°56.2' 59°25.6'x 141°04.6' Station 139 59°24.8'x 141°10.1' 59°21.5'x 141°14.9'	25 Station 96 58°41.1'x 140°38.4' 58°43.4'x 140°52.4'	26 Station 95 59°03.0'x 141°20.6' 59°02.9'x 141°38.1'	27 Station 94 59°23.3'x 142°09.8' 59°28.1'x 142°24.3'
28 Station 93 59°33.0'x 142°33.8' 59°34.8'x 142°47.4'	29 Station 136 59°44.8'x 143°35.2' 59°45.7'x 143°42.3' Station 137 59°40.4'x 143°22.9' 59°43.1'x 143°29.8'	30 Station 92 59°33.3'x 143°39.1' 59°35.1'x 143°57.1'	31 Station 91 59°31.3'x 144°42.7' 59°26.8'x 144°57.5'			



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				Station 90 59°30.0'x 145°31.5' 59°30.2'x 145°49.7'	Station 89 59°15.8'x 146°51.1' 59°09.7'x 147°04.5'	In Port Cordova
In Port Cordova	Station 134 59°36.9'x 146°58.0' 59°33.3'x 147°03.2' Station 135 59°30.9'x 147°09.2' 59°27.1'x 147°09.0'	Station 88 59°09.3'x 147°36.2' 58°59.6'x 147°37.8'	Station 87 59°07.6'x 148°39.0' 58°58.5'x 148°39.0'	Station 132 59°05.0'x 149°24.0' 59°02.0'x 149°31.9' Station 133 58°57.0'x 149°30.5' 58°55.2'x 149°38.1'	Station 130 58°43.6'x 149°11.8' 58°46.1'x 149°04.9' Station 131 58°48.1'x 149°02.9' 58°50.6'x 148°55.3'	Station 86 58°41.3'x 148°20.4' 58°32.5'x 148°19.0'
Station 85 58°17.6'x 148°37.0' 58°08.2'x 148°42.1'	Station 84 57°58.3'x 149°10.0' 57°50.9'x 149°20.0'	Station 128 58°00.0'x 149°50.5' 57°59.0'x 149°58.3' Station 129 58°05.0'x 149°54.5' 58°04.0'x 150°02.1'	Station 83 57°37.9'x 149°55.0' 57°28.0'x 149°59.0'	Station 82 57°24.1'x 150°34.4' 57°15.0'x 150°35.9'	In Port Kodiak	Station 535 57°21.6'x 150°39.8' 57°12.6'x 150°39.7'
Station 523 57°13.5'x 151°01.9' 57°03.4'x 151°02.4'	Station 81 57°07.1'x 151°13.3' 56°58.2'x 151°17.6'	Station 80 56°29.1'x 152°12.8' 56°21.1'x 152°21.0'	Station 79 56°18.2'x 153°04.6' 56°13.3'x 153°16.4'	Station 78 55°58.4'x 154°01.3' 55°49.9'x 154°01.9'	Station 77 56°02.5'x 154°34.0' 55°53.6'x 154°34.5'	Station 76 55°46.0'x 155°08.3' 55°37.9'x 155°15.7'
Station 122 56°11.2'x 155°57.8' 56°11.0'x 156°04.6' Station 123 56°13.9'x 156°07.8' 56°15.2'x 156°14.6'	Station 120 55°47.3'x 156°04.6' 55°45.8'x 156°11.9' Station 121 55°45.0'x 156°12.1' 55°43.8'x 156°20.0'	Travel to Dutch Harbor	Unload vessel Dutch Harbor			