U.S. DEPARTMENT OF COMMERCE
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NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Fisheries Science Center
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CRUISE REPORT[1]

VESSEL: *Oscar Elton Sette*, Cruise SE-08-05 (SE-62)

CRUISE PERIOD: 9 June to 4 July 2008

AREAS OF OPERATION: In and around the central Pacific Ocean targeting thermal fronts and eddies (Fig. 1)

TYPE OF OPERATION: In support of a Pacific Islands Fisheries Science Center (PIFSC) research project to conduct fishing operations as part of ongoing investigations of the pelagic shark, tuna, and billfish populations exploited by Hawaii-based longline fisheries.

ITINERARY:

09 Jun — Embarked scientists Abecassis, Curran, Choy, M^{c}Naughton, Musyl, Patterson, Wang, and Wegner aboard the NOAA Ship *Oscar Elton Sette* at Ford Island at 1500. Transited to an area ~ 20 nmi off the lee side of the Big Island. Exact operational area determined based on wind, sea, and fishing conditions. Conducted trolling operations during transit.

10 Jun — Conducted conductivity-temperature-depth (CTD) operation to 500 m at around 0821 at 19°14.609N, 156°22.013W. Temperature-Depth Recorders (TDRs) were affixed in order to calibrate the instruments. At 0927, deployed 443 baited longline droppers with sanma (*Colobias sauria*) confiugured in 20-hook baskets at 19°15.837N, 156°22.129W. Details of the longline sets are provided in Table 1. Each dropper of the longline was outfitted with hook timers, and TDRs were liberally spaced along the length of the longline. After longline was deployed around 1104, trolling operations near inshore buoys and fish aggregating devices (FADs) were conducted. Commenced haul back of the longline gear around 1833. Tables 1 and 2 provide details about the catch and Tables 3 and 4 give a list of biological and genetic samples collected, respectively. Table 4 lists genetic samples collected.

[1]PIFSC Cruise Report CR-08-009
Issued 10 February 2009

11-12 Jun At 0935, deployed 444 baited longline droppers at 18°00.003N, 154°59.937W (Table 1). Conducted CTD operation to 500 m at around 1157. After CTD operations commenced, conducted trolling operations near inshore buoys and FADs. Commenced haul back of the longline gear around 1939 with catch details provided in Table 1. Conducted CTD operations to 500 m after haul back at 2313. Started transit to an area ~ 50 nmi off the coast from Hilo, Hawaii. Exact operational area determined based on wind, sea, and fishing conditions.

12 Jun At 0825, deployed 540 baited longline droppers at 18°58.610N, 153°53.683W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 1042 and started trolling operations near inshore buoys and FADs along the windward (Hilo) side of the Big Island. Commenced haul back of the longline gear around 1844, and catch details are given in Table 1. Transited to an area near Hilo Harbor.

13 Jun At 0600, deployed safe boat to disembark scientists, Abecassis, Choy, M^{c}Naughton, Wang, and Wegner to Hilo Harbor. Embarked scientist Kikkawa around 1300. Continued transit to an area between approximately lat. 0°–12° N and long. 160°–165° W. Conducted trolling operations during transit. Exact operational area determined based on wind, sea, and fishing conditions principally using the Live Access Server (LAS) of the NOAA Ocean Watch, Pacific Islands Fisheries Science Center (Honolulu, Hawaii), Central Pacific web site at: http://oceanwatch.pifsc.noaa.gov.

~13-16 Jun Conducted daytime trolling operations during transit.

17 Jun At 0731, deployed 579 baited longline droppers at 06°45.910N, 149°53.960W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 1003 and started trolling operations. Commenced haul back of the longline gear around 1915, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2329.

18 Jun At 0832, deployed 556 baited longline droppers at 06°39.983N, 149°34.984W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 1049 and started trolling operations. Commenced haul back of the longline gear around 1809, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2150.

19 Jun At 0844, deployed 573 baited longline droppers at 08°03.593N, 148°29.732W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 1050 and started trolling operations. Commenced haul back of the longline gear around 1915, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2125.

20 Jun At 0731, deployed 527 baited longline droppers at 09°20.626N, 149°40.714W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 0928 and started trolling operations. Commenced haul back of the longline gear around 1820, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2141.

21 Jun At 0732, deployed 551 baited longline droppers at 09°20.239N, 149°40.503W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 0949 and started trolling operations. Commenced haul back of the longline gear around 1806, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2225.

22 Jun At 0734, deployed 575 baited longline droppers at 09°30.110N, 151°00.345W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 0934 and started trolling operations. Commenced haul back of the longline gear around 1804, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2302.

23 Jun At 0831, deployed 559 baited longline droppers at 09°19.874N, 151°30.234W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 1038 and started trolling operations. Commenced haul back of the longline gear around 1847, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2238.

24-25 Jun At 0733, deployed 550 baited longline droppers at 09°36.059N, 152°14.969W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 0933 and started trolling operations. Commenced haul back of the longline gear around 1812, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2150. Started transit to Tropical Atmosphere Ocean (TAO) buoys at approx. 8°N, 155°W. Conducted trolling operations during daylight hours along transit.

26 Jun At 0731, deployed 555 baited longline droppers at 07°51.666N, 155°08.870W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 0935 and started trolling operations. Commenced haul back of the longline gear around 1802, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2119. Starting transit northwards.

27 Jun At 0734, deployed 532 baited longline droppers at 09°26.512N, 155°59.928W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 0933 and started trolling operations. Commenced haul back of the longline gear around 1758, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2142.

28 Jun — At 0731, deployed 532 baited longline droppers at 11°04.039N, 155°58.990W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 0931 and started trolling operations. Commenced haul back of the longline gear around 1804, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2111.

29 Jun — At 0732, deployed 528 baited longline droppers at 11°12.142N, 155°01.134W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 0930 and started trolling operations. Commenced haul back of the longline gear around 1807, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2043.

30 Jun — At 0732, deployed 545 baited longline droppers at 12°51.732N, 154°29.826W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 0930 and started trolling operations. Commenced haul back of the longline gear around 1800, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2045.

1-2 Jul — At 0731, deployed 637 baited longline droppers at 13°44.962N, 153°59.884W (Table 1). Conducted CTD operations to 500 m after gear was deployed at 0947 and started trolling operations. Commenced haul back of the longline gear around 1758, and catch details are given in Table 1. Conducted CTD operations to 500 m after gear was picked up at 2131. Started transit to Cross Seamount. Conducted trolling operations during daylight hours along transit.

3 Jul — Arrived Cross Seamount at 18°40N, 158°,10W around 1030 and conducted trolling operations near and around seamount until about 1500 where transit to Pearl Harbor commenced.

4 Jul — Arrived Pearl Harbor. Disembarked scientists Curran, Kikkawa, Musyl, and Patterson. End of cruise.

MISSIONS AND RESULTS:

a. Test electropositive metals (attached near every baited hook) to determine if this measure reduces shark catch without affecting catch rate of target species on longline gear.

   Preliminary trials were evaluated investigating dissolution rates of the meta subjected to varying thermal and salinity regimes (see Appendix for more information).

b. Collect blood and tissue samples from sharks, tunas, billfishes for ongoing biochemical, physiological, ecological and genetic biology studies.

Ninety-two biological samples (Table 3) and 82 genetic samples (i.e., fin clips) were collected (Tables 3 and 4).

c. Measure in vivo read and muscle temperatures in live blue sharks. Minimally invasive techniques will be used to measure muscle temperatures of restrained live and moribund blue sharks to test the hypothesis of thermogenesis. For example, blue sharks display dive behavior (identified by electronic tags) that are very similar to several pelagic species (swordfish, mako, bigeye tuna, and bigeye thresher) that have specialized tissues and/or anatomical structures to maintain body temperature above ambient for extended periods. Measurement of in vivo read and muscle temperatures in live blue sharks: Minimally, invasive techniques will be used to measure muscle temperatures of restrained live and moribund blue shark to test the hypothesis of thermogenesis. For example, blue sharks display dive behaviour (identified by electronic tags) that are very similar to several pelagic species (swordfish, mako, bigeye tuna, and bigeye thresher) that have specialized tissues and/or anatomical structures to maintain body temperature above ambient for extended periods.

   Twenty-eight blue sharks were sampled and released. Some of these samples were taken from sharks captured beneath the thermocline. Currently, we are extracting ambient water temperature estimates for each of these sharks by hook (depth) position. When possible, hook timer data will be utilized but unfortunately we experienced a high failure rate of the timers. It's highly likely the age of timers (and hence battery) contributed to the failure. This analysis also incorporates TDR and CTD information to characterize the vertical profile of depth and temperature of the water column. Furthermore, depth estimates can be later refined by examining extent of deformation of the longline caused by current vectors using ADCP data which can be modeled within a catenary curve.

   On a previous cruise, red muscle temperatures were taken from six blue sharks captured in the uniform surface layer. Samples consisted of four female sharks and two males. Lengths of the sharks in the study ranged from 3.5 to ca. 6 ft. All six specimens exhibited significantly higher red muscle temperatures (mean 0.50±0.09) than ambient temperature (*t*-TEST, $P<<0.001$, ambient measured by nearest TDR and ship's thermosalinograph). This was true for specimens "soaking" on the longline for prolonged periods. For example, as identified by hook timer data, female blue shark no. 5 (ca. 5 ft TL) was soaking for 8 hrs. 4 min. Another female blue shark (no. 3, ca. 4-5 ft. TL) was soaking for 2 hrs. 3 min. With the addition of the 28 samples taken on the present cruise —some taken in or below the mixed layer— scientists can better assess the study question.

d. Collect detailed catch information and link this to CTD, TDR, acoustic Doppler current profiler (ADCP) and hook timer data for all pelagic species to determine habitat preferences and fish availability and catchability.

Seventeen operational longline sets were conducted. In total, 9,226 hooks were deployed with 223 fish and sharks captured. Catch details by set are provided in Tables 1 and 2. Thirty-three CTD casts were conducted to document vertical characteristics of the water column along with records for 197 TDR deployments spread across each of the 17 longline sets. ADCP data and Global Position System (GPS) positions (taken at hourly intervals) for GPS beacons placed on each longline set were used to characterize the shape of the gear (and hence catchability) over time and space. Further information is provided in the Appendix Section.

Acoustic Doppler Current Profiler

Leg II: One of the objectives of the cruise was to collect data necessary to better understand the effects of prevailing oceanic conditions on the dynamics of the longline gear. Physical conditions such as wind direction and speed, wave height and direction, temperature, and surface oceanic currents, and shipboard factors (i.e., ship speed, position, total length of the mainline, and line cast rate) all have an effect on the performance of the longline gear. In addition, TDR sensors attached to the mainline provided *in situ* monitoring in resultant effects to the gear in temporal and spatial changes. Other observational data such as prevailing weather and sea conditions provided the remaining supplemental information.

Data from ADCP and associated SIS (Shipboard Information System) were downloaded for post-cruise processing, and preliminary results showed some shortcomings in the data. One of the shortfalls was the irrational change in direction and magnitude of the current vectors relative to the change in the ship's heading. A technical representative of the company that makes the ADCP (RDI) suggested that a bad gyro-compass was probably influential in creating the spurious data. However, Mr. Mike Webb, NOAA Seattle thought that there were some interfacing problems between the sensors and the SIS and ADCP servers that were causing the problem.

It is beyond the scope of this report for the field party to come up with a solution but would recommend that this problem be addressed during the next shipyard service.

NARRATIVE SUMMARY:

A total of 17 operational longline sets were conducted during the cruise with catch details by gear provided in Tables 1 and 2. In total, 9226 hooks were deployed with 223 fish and sharks captured. Thirty-three CTD casts were conducted to document vertical characteristics of the water column. Records for 197 TDR deployments spread across 17 longline sets were archived as well as GPS positions (taken at hourly intervals), for GPS beacons were placed on each longline set to mark its location and to determine its horizontal shape over time. Biological samples (n = 174) for ongoing physiological, ecological and genetic studies were collected and details are provided in Tables 3 and 4. Narrative reports on the objectives and results from the various cooperative studies are provided.

RECORDS:

The following forms, logs, charts, and data records were kept and given to the Pacific Islands Fisheries Science Center upon termination of the cruise. These include all data captured onto computer storage media during the cruise. All the records are filed there unless indicated otherwise in parentheses.

SEAS system data files
Deck Log-Weather Observation Sheet
Marine Operations Log (NOAA)
Project Area and Operations Chartlets
Station Number and Activity Log
Fish catch record by species, hook number, bait disposition
Data from Temperature Depth Recorders
Geographical position data of longline gear archived from GPS beacons

SCIENTIFIC PERSONNEL:

Michael Musyl, Senior Research Scientist, Joint Institute for Marine and Atmospheric Research (JIMAR), University of Hawaii (UH)
Daniel Curran, Cooperating Scientist, Pacific Islands Fisheries Science Center (PIFSC), National Marine Fisheries Service (NMFS)
John Wang, Cooperating Scientist, JIMAR, UH
James Patterson, Cooperating Scientist, University of Massachusetts
Bert Kikkawa. Cooperating Scientist, PIFSC, NMFS
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Attachments

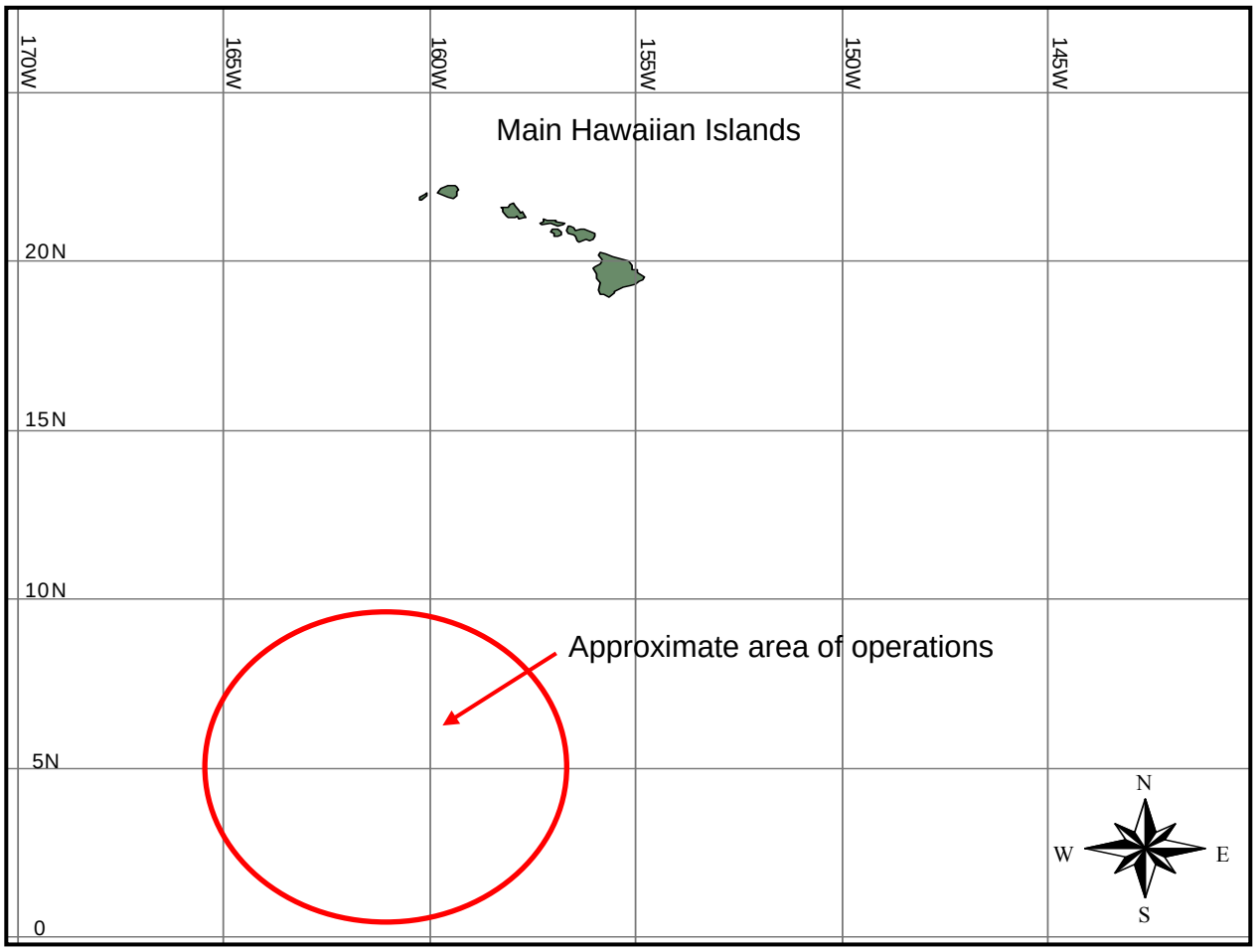

Figure 1.—Track of the NOAA Ship *Oscar Elton Sette* cruise SE-08-05 (SE-62), June 9 to July 4, 2008.

Appendix

Endothermic Capacity of the Thresher Shark

James Patterson
University of Massachusetts, Dartmouth

My study involves three species of the endothermic thresher shark comprising the genus *Alopias*: common (*Alopias vulpinus*), bigeye (*Alopias superciliosis*), and pelagic (*Alopias pelagicus*). Two species were collected during the cruise (pelagic and the bigeye). The goals of the study involve enzymatic characterization of red and white muscle tissue to determine function, and in vivo temperature readings taken along the axis of the shark to determine endothermic capacity. All muscle samples were frozen in liquid nitrogen and shipped back to Massachusetts on dry ice for enzymatic analysis at five isozymes: (1) citrate synthase, (2) lactate dehydrogenase, (3) creatine phosphokinase, (4) myofibrillar ATPase, and (5) total protein content. Data will be used in the completion of my Master's thesis and submitted for publication.

In the course of the cruise, many samples were obtained and invaluable field experience was gained. This cruise has enabled me, as a scientist, to more fully understand all of the aspects of the field of marine biology in both the lab and during the collection of data in the field.

Tropho-dynamics of Large Pelagic Fishes

Anela Choy
Department of Oceanography
University of Hawaii

Choy's research focus is on the tropho-dynamics of large pelagic fishes and their micronektonic prey. On the cruise, Choy was exposed to fishing techniques utilized by commercial and scientific longliners. In addition, Choy collected a number of stomach and muscle samples of yellowfin and skipjack tuna as well as mahimahi to be analyzed at a later date for her Master's research. This MS research utilized stomach content, stable isotope, and trace metal analyses to shed light on the structure and function of pelagic food webs in the waters surrounding Hawaii. From an ecosystem-based management perspective, it is crucial that we understand the ecology and connectivity of the large and very diverse forage base of large pelagic predators so that they may, in turn, be properly managed and conserved.

Using Highly Electropositive Metals as a Possible Shark Deterrent Strategy

John Wang
Joint Institute of Marine and Atmospheric Research
University of Hawaii

The incidental capture of sharks and rays is estimated at over 1,000,000 metric tons annually (approximately 40 million individual animals) (Bonfil, 1995). In several fisheries, it is common to have bycatch rates of sharks exceed the capture rates of targeted fish species (Bonfil, 1995). This problem of shark and ray incidental capture is a major concern, in particular, because of their importance as predators at the top of the marine food chain. A possible shark deterrent strategy is to use highly electropositive metals (e.g., Lanthanide metals). It is thought that these metals create a large electric field disrupting normal shark behavior.

Utility of these metals in pelagic fisheries depends on several factors including ease of use and longevity of metals in water. To this end, we examined the operational ease of attaching these metals as well as dissolution rates of these metals when soaked on longline gear. By pairing temperature depth recorders with each metal sample we were also able to determine the effects of temperature on the dissolution rates of the metals. Over the course of the cruise, we tested two different attachment methods, and deployed metals over a broad temperature spectrum. Analysis of dissolution rates is ongoing.

Analysis of Gill Tissue in High-energy Demand Fishes

Nick Wegner
Scripps Institution of Oceanography

My research focuses on the structural and functional evolution of the gills in high-energy demand fishes (namely tunas and their scombrid relatives), billfishes, and lamnid sharks. These studies examine the structural bases that enable such fishes to increase O_2 uptake at the gills and to maintain gill configuration under the high-pressure ventilatory flow associated with ram ventilation. During the cruise, I was able to collect gill tissue from yellowfin and skipjack tunas and a single bigeye thresher shark specimen. Excised gill tissue was fixed in 10% formalin buffered in seawater. In addition, the gills from *A. superciliosus* were perfused with a vascular casting solution to detail the vascular pathways and microvascular specializations of the gills. The fixed tissue and vascular replica casts are currently being analyzed using light and scanning electron microscopy at Scripps Institution of Oceanography. Results from this and other cruises will be published in two manuscripts in peer-reviewed scientific journals as partial completion of my doctoral dissertation.

Results from analyzing gill tissue from the 2006 cruise has allowed for interspecies comparisons of gill structure and function that is providing insight into the sequence of character acquisition within these high-energy demand fishes for increasing O_2 acquisition from the environment. In addition, gill dimensions determined from tissue samples collected in 2006 correlate with fish activity, and this research should thus provide important insight into both fish metabolic demands and habitat utilization, important parameters in fisheries modeling.

I am very grateful that I was able to participate in this year's cruise and plan to be involved in future cruises. The diversity and large size range of scombrids and billfishes caught during these cruises are extremely useful to my research. Many thanks are deserved to all who made the cruise possible, especially Mike Musyl and the crew of the NOAA Ship *Oscar Elton Sette*.

Tissue Samples of Pelagic Shark Species

John Hyde
Southwest Fisheries Science Center, NOAA Fisheries
La Jolla, California

Tissue samples were collected for genetic analysis of stock structure for several pelagic shark species (pelagic thresher, *Alopias pelagicus*; bigeye thresher, *A. superciliosus*; silky, *Carcharhinus falciformis*; oceanic whitetip, *C. longimanus*; and blue shark, *Prionace glauca*). These samples will be used to augment collections of these species from throughout the Pacific. These collections are being maintained at the NOAA Southwest Fisheries Science Center in La Jolla and are made available to outside researchers.

Traditional thought has been that panmictic pelagic species, such as these pelagic species, should exhibit little to no geographic partitioning. However, genetic analyses in other pelagic species have found that this may not always be the case and that there can actually be a fair degree of population structure due to a variety of factors (e.g. natal philopatry, habitat discontinuity, cryptic speciation, vast distances between archipelagoes). Due to global declines in shark abundance and the relatively high-rate of occurrence of these species as bycatch in the tuna purse seine and longline fisheries, we feel that it's prudent to examine their genetic connectivity throughout the Pacific Ocean in order to understand how their bycatch may affect regional stocks of these sharks.

Currently, there are active projects examining the genetic stock structure of blue and silky sharks. The blue shark study is being conducted in cooperation with Sean Fitzpatrick, graduate student at Queen's University Belfast, and involves examination of the global population structure of blue sharks by examining genetic polymorphism at several nuclear microsatellite loci. John Hyde is conducting the silky shark study as the focus of a National Research Council postdoctoral fellowship. Similar to the blue shark study, Hyde is examining population genetic structure using samples collected throughout the Pacific Ocean and assessing polymorphism at multiple nuclear microsatellite loci, two mitochondrial genes, and multiple AFLP loci. In addition, there are projects in the early planning stages to examine stock structure in the thresher and oceanic whitetip sharks.

Collection of Data on the Effects of Environmental Conditions

Bert Kikkawa
Pacific Islands Fisheries Science Center, NOAA Fisheries
Honolulu, Hawaii

One of the objectives of this study was to collect data to better understand the effects of the environmental conditions and shipboard factors in gear deployment, position, direction, and speed. These elements can influence the shape of the mainline and affect the targeted fishing depths. During the cruise in situ data were rigorously collected from onboard sensors and monitoring devices on the NOAA Ship *Oscar Elton Sette*. Data included information on prevailing sea conditions i.e., salinity, sea surface temperature, oceanic and surface wind driven currents, and ship's position, speed and heading. Also included were data gathered by the officers and crew in their hourly assessments of the weather and sea conditions. During longline deployment operations, a cyclometer integrated into the system provided accurate extrusion rate of the mainline from the line-shooter and the length of mainline between float. A handheld Global Positioning System (GPS) unit was also used to supplement the data with real time ship's position, speed, and heading. Within a longline set, several miniature disposable TDRs (time, temperature, and depth recorders) were systematically deployed to gather fishing depth data of the mainline between floats. Low profile GPS buoys with satellite communication capabilities were attached to each of the ends and middle of the longline; each buoy was programmed to store position data at regular intervals while the gear was in the water.

With the 14 longline sets a total for 46 deployments of GPS buoys were conducted. Speed and distance traveled by each buoy were highly correlated to the attachment position on the longline. These were greatest for the trailing buoy and lowest for the leading buoy. Units that were attached in the middle of the line incurred moderate distance and speed. Uncorrected for the soak time, the distance traveled by the leading buoy ranged from 4.17 to13.64 km with an average speed of 0.057 m/s (0.11 knots) and distance of the trailing buoy ranged 4.63 to19.21 km with an average velocity of 0.0928 m/s (0.181 knots). The length of the mainline per set ranged from 17.9 to 24.6 km with the extrusion rates of 3.11-3.89 m/s (uncorrected for number of hooks set and distance between hooks).

Typically, five depth recorders were equally spaced between the two floats to provide empirical data of the catenary. From the results of the TDRs, the longline sets can be classified as shallow or deep sets with the shallow sets ranging in maximum depths from 100 to179 m and deep sets from 180 to 260 m. For the eight shallow sets and six deep sets the maximum and minimum depths are presented in Table 1.

Table 1.--Daily maximum and minimum depths (m) of the mainline (uncorrected and unextrapolated).

Date		Depth (m)	
Month	Day	Maximum	Mininum
June	17	110	35
June	18	185	80
June	19	130	45
June	20	140	50
June	21	210	35
June	22	260	90
June	23	180	70
June	24	145	75
June	26	210	105
June	27	140	60
June	28	150	60
June	29	130	55
June	30	160	70
July	1	190	80

Data from the Acoustic Doppler Current Profiler (ADCP) combined with weather observations on wind direction and speed, and wave height will provide insight to their effects on the longline in the magnitude and direction of travel. As an example, on June 17, 2008, the wind speed and direction were about 17 knots at 60°, wave height was 1.5-2.1 m at 60°. The ADCP showed that in the upper 50 m of the water column that the magnitude and direction for the wind driven current were 0.83 knots in the direction of 235°. The conjugate current profile down to 400 m had a magnitude of about 0.32 knots in the direction of 180°. The resultant speed of the effected longline was 0.65 knots at 235°.

Table 1.--Catch summary of individual longline sets.

Date	LL Set#	# Hooks	Hooks/Bskt	Lat. (N)	Long. (W)	Common Name	Hook #	Disposition
6/10/2008	1	443	20	19° 15.8'	156° 22.1'	Mahimahi	3	Head only
						Mahimahi	7	Kept
						Silky shark	8	Kept
						Silky shark	17	Kept
						Silky shark	20	Kept
						Silky shark	8	Released
						Silky shark	13	Released
						Silky shark	19	Released
						Silky shark	n.a.	Released
						Yellowfin tuna	2	Head only
						Yellowfin tuna	5	Head only
						Yellowfin tuna	18	Head only
						Yellowfin tuna	n.a.	Head only
						Yellowfin tuna	9	Kept
						Yellowfin tuna	11	Kept
						Yellowfin tuna	20	Kept
6/11/2008	2	444	20	18° 00.0'	154° 59.9'	Bigeye thresher shark	12	Kept
						Blue shark	11	Released
						Blue shark	19	Released
						Longnose lancetfish	9	Released
						Silky shark	5	Released
						Yellowfin tuna	16	Kept
6/12/2008	3	540	25	18° 58.6'	153° 40.9'	Blue shark	18	Released
						Blue shark	22	Released
						Blue shark	24	Released
						Longnose lancetfish	12	Kept
						Mahimahi	n.a.	Kept
						Pompano dolphinfish	1	Kept
						Skipjack tuna	11	Kept
6/17/2008	4	579	25			Blue shark	3	Released
						Longnose lancetfish	16	Kept
						Mahimahi	8	Kept
						Mahimahi	12	Kept
						Mahimahi	18	Kept

Date	LL Set#	# Hooks	Hooks/Bskt	Lat. (N)	Long. (W)	Common Name	Hook #	Disposition
						Oceanic whitetip shark	14	Released
						Pelagic thresher shark	12	Kept
						Pelagic thresher shark	n.a.	Released
						Silky shark	1	Released
						Silky shark	13	Released
						Squid	17	Kept
						Yellowfin tuna	n.a.	Kept
6/18/2008	5	556	25	6° 40.0'	148° 34.5'	Blue shark	17	Released
						Longnose lancetfish	7	Kept
						Longnose lancetfish	9	Kept
						Longnose lancetfish	19	Kept
						Longnose lancetfish	19	Kept
						Longnose lancetfish	20	Kept
						Longnose lancetfish	23	Released
						Mahimahi	1	Kept
						Oceanic whitetip shark	2	Released
						Pelagic thresher shark	8	Kept
						Pelagic thresher shark		Kept
						Silky shark	1	Released
						Silky shark	4	Released
6/19/2008	6	573	25	8° 03.7'	148° 29.4'	Blue shark	16	Released
						Longnose lancetfish	8	Kept
						Longnose lancetfish	9	Kept
						Longnose lancetfish	16	Kept
						Yellowfin tuna	15	Kept
6/20/2008	7	527	25	9° 20.7'	149° 40.7'	Blue shark	17	Released
						Blue shark	17	Released
						Longnose lancetfish	4	Kept
						Longnose lancetfish	4	Released
						Longnose lancetfish	7	Released
						Longnose lancetfish	15	Released
						Longnose lancetfish	16	Released
						Silky shark	1	Released
						Silky shark	8	Released
						Silky shark	16	Released
						Silky shark	23	Released
						Yellowfin tuna	9	Kept
						Yellowfin tuna	9	Kept

Date	LL Set#	# Hooks	Hooks/Bskt	Lat. (N)	Long. (W)	Common Name	Hook #	Disposition
						Yellowfin tuna	12	Kept
6/21/2008	8	551	25	9° 20.2'	149° 40.5'	Blue shark	14	Released
						Blue shark	17	Released
						Longnose lancetfish	6	Released
						Longnose lancetfish	6	Released
						Longnose lancetfish	8	Released
						Longnose lancetfish	9	Released
						Longnose lancetfish	12	Released
						Longnose lancetfish	23	Released
						Mahimahi	1	Head only
						Mahimahi	4	Kept
						Mahimahi	23	Released
						Oceanic whitetip shark	4	Released
						Sickle Pomfret	9	Released
						Silky shark	1	Released
						Silky shark	3	Released
						Silky shark	7	Released
						Silky shark	13	Released
						Silky shark	16	Released
						Skipjack tuna	1	Kept
						Skipjack tuna	2	Kept
						Skipjack tuna	22	Kept
						Yellowfin tuna	7	Kept
						Yellowfin tuna	17	Kept
						Yellowfin tuna	14	Released
6/22/2008	9	575	25	9° 30.2	150° 58.6	Blue shark	1	Released
						Blue shark	5	Released
						Blue shark	21	Released
						Blue shark	23	Released
						Longnose lancetfish	3	Kept
						Longnose lancetfish	19	Kept
						Longnose lancetfish	21	Kept
						Longnose lancetfish	4	Released
						Pelagic thresher shark	7	Kept
						Pelagic thresher shark	7	Kept
						Pelagic thresher shark	10	Kept
						Pelagic thresher shark	18	Kept
						Pelagic thresher shark	6	Kept

Date	LL Set#	# Hooks	Hooks/Bskt	Lat. (N)	Long. (W)	Common Name	Hook #	Disposition
						Pelagic thresher shark	13	Kept
						Pelagic thresher shark	15	Released
						Pelagic thresher shark	16	Released
						Pelagic thresher shark	17	Released
						Pelagic thresher shark	20	Released
						Pelagic thresher shark	21	Released
						Silky shark	2	Released
						Silky shark	23	Released
						Yellowfin tuna	9	Kept
						Yellowfin tuna	10	Kept
						Yellowfin tuna	13	Kept
						Yellowfin tuna	17	Kept
6/23/2008	10	559	25	9° 19.9	151° 30.2	Blue shark	7	Released
						Blue shark	7	Released
						Blue shark	8	Released
						Blue shark	9	Released
						Blue shark	11	Released
						Broadbill swordfish	18	Kept
						Longnose lancetfish	3	Released
						Longnose lancetfish	18	Released
						Longnose lancetfish	21	Released
						Longnose lancetfish	23	Released
						Mahimahi	1	Kept
						Mahimahi	24	Released
						Oceanic whitetip shark	3	Released
						Oceanic whitetip shark	19	Released
						Pelagic thresher shark	11	Released
						Yellowfin tuna	20	Kept
6/24/2008	11	550	25	9° 36.2	152° 14.8	Blue shark	19	Released
						Longnose lancetfish	11	Released
						Longnose lancetfish	14	Released
						Longnose lancetfish	17	Released
						Longnose lancetfish	12	Released
						Longnose lancetfish	8	Released
						Longnose lancetfish	11	Released
						Longnose lancetfish	17	Released
						Longnose lancetfish	1	Released
						Longnose lancetfish	8	Released

Date	LL Set#	# Hooks	Hooks/Bskt	Lat. (N)	Long. (W)	Common Name	Hook #	Disposition
						Longnose lancetfish	20	Released
						Pelagic thresher shark	3	Kept
						Pelagic thresher shark	7	Kept
						Pelagic thresher shark	18	Kept
						Pelagic thresher shark	12	Kept
						Pelagic thresher shark	13	Released
						Pelagic thresher shark	1	Released
						Pelagic thresher shark	19	Released
						Pelagic thresher shark	17	Released
						Pelagic thresher shark	11	Released
						Pelagic thresher shark	7	Released
						Pelagic puffer	5	Released
						Wahoo	23	Kept
						Wahoo	24	Kept
6/26/2008	12	555	25	7° 51.6	155° 08.9	Blue shark	6	Released
						Blue shark	13	Released
						Blue shark	18	Released
						Broadbill swordfish	16	Kept
						Longnose lancetfish	4	Released
						Longnose lancetfish	7	Released
						Longnose lancetfish	8	Released
						Longnose lancetfish	13	Released
						Longnose lancetfish	22	Released
						Longnose lancetfish	23	Released
						Longnose lancetfish	25	Released
						Longnose lancetfish	n.a.	Released
						Longnose lancetfish	n.a.	Released
						Mahimahi	2	Released
						Mahimahi	24	Released
						Silky shark	25	Kept
						Silky shark	8	Released
						Silky shark	21	Released
						Silky shark	1	Released
6/27/2008	13	532	25	9° 26.5	155° 59.9	Bigeye thresher shark	7	Kept
						Blue shark	4	Released
						Blue shark	12	Released
						Blue shark	19	Released
						Longnose lancetfish	8	Released

Date	LL Set#	# Hooks	Hooks/Bskt	Lat. (N)	Long. (W)	Common Name	Hook #	Disposition
						Longnose lancetfish	20	Released
						Mahimahi	18	Released
						Pelagic thresher shark	10	Released
						Sickle Pomfret	12	Kept
						Sickle Pomfret	14	Kept
						Silky shark	2	Released
						Silky shark	17	Released
						Yellowfin tuna	19	Kept
6/28/2008	14	532	25	11° 04.1	155° 59.0	Pelagic puffer	10	Released
						Pelagic puffer	4	Released
						Pelagic puffer	20	Released
						Pelagic puffer	20	Released
						Pelagic puffer	12	Released
						Pelagic puffer	19	Released
						Pelagic puffer	5	Released
						Pelagic puffer	20	Released
						Pelagic puffer	2	Released
						Pelagic thresher shark	12	Released
						Skipjack tuna	7	Kept
						Skipjack tuna	1	Released
6/29/2008	15	528	25	11° 12.1	155° 01.1	Longnose lancetfish	15	Released
						Pelagic puffer	2	Kept
						Pelagic puffer	7	Kept
						Pelagic puffer	18	Kept
						Pelagic puffer	4	Released
						Pelagic puffer	4	Released
						Pelagic puffer	5	Released
						Skipjack tuna	1	Kept
6/30/2008	16	545	25	12° 51.7	154° 29.8	Blue shark	19	Released
						Longnose lancetfish	7	Released
						Longnose lancetfish	14	Released
7/1/2008	17	637	25	13° 44.9	153° 59.8	Blue shark	6	Released
						Blue shark	16	Released
						Longnose lancetfish	n.a.	Released
						Mahimahi	7	Released
						Mahimahi	10	Released
						Pelagic stingray	7	Released
						Wahoo	9	Kept

Table 2. OES 08-05 Longline catch totals by species		
Common Name	Species	Total
Biegeye thresher shark	*Alopias superciliosus*	2
Blue shark	*Prionace glauca*	31
Broadbill swordfish	*Xiphias gladius*	2
Longnose lancetfish	*Alepisaurus ferox*	56
Mahimahi	*Coryphaena hippurus*	17
Oceanic whitetip shark	*Carcharhinus longimanus*	5
Pelagic puffer	*Lagocephalus lagocephalus*	16
Pelagic stingray	*Dasyatis violacea*	1
Pelagic thresher shark	*Alopias pelagicus*	27
Pompano dolphinfish	*Coryphaena equiselis*	1
Sickle pomfret	*Taractichthys steindachneri*	3
Silky shark	*Carcharhinus falciformis*	29
Skipjack tuna	*Katsuwonus pelamis*	7
Squid	Sthenoteuthis	1
Wahoo (ono)	*Acanthocybium solandri*	3
Yellowfin tuna	*Thunnus albacares*	22
Total Sets	**Total hooks**	**Catch**
17	**9,226**	**223**

Table 3.--Biological samples taken on cruise.

Date	Gear	Set#	Latitude	Longitude	Species	Length (cm)	Weight (kg)	Materials Collected
6/10/2008	Troll		19° 15.3	156° 23	Yellowfin tuna	152		
6/10/2008	Troll		19° 15.3	156° 23	Yellowfin tuna	83.9	11.1	
6/10/2008	Troll		19° 15.3	156° 23	Yellowfin tuna	96.4	16	
6/10/2008	Troll		19° 15.3	156° 23	Mahimahi	76	3.4	
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Silky shark	200(est)		Female (released)
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Silky shark			Fin clip (released)
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Yellowfin tuna			head only
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Yellowfin tuna			head only
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Silky shark			Released
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Yellowfin tuna			head only
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Silky shark	173.5		head of fish#10; mt; 7 pups
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Silky shark	189.7		Muscle tissue (mt); 13 pups
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Mahimahi			head only
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Yellowfin tuna			shark eaten
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Silky shark			
6/10/2008	LL	1	19° 15.8'	156° 22.1'	Yellowfin tuna			head only
6/11/2008	LL	2	18° 02.4	155° 03.7	Yellowfin tuna	87.7	12.1	mt; stomach (st);
6/11/2008	LL	2	18° 02.4	155° 03.7	Silky shark	160 (est)		Fin clip (fc) (released)
6/11/2008	LL	2	18° 02.4	155° 03.7	Blue shark	198		fc; temperatures (temp)
6/11/2008	LL	2	18° 02.4	155° 03.7	Blue shark	189		fc;temp; blood
6/11/2008	LL	2	18° 02.4	155° 03.7	Bigeye thresher shark			fc; temp; mt; heart; gills
6/12/2008	LL	3	18° 57.8	153° 53.1	Mahimahi	78.5		
6/12/2008	LL	3	18° 57.8	153° 53.1	Blue shark	199		fc;blood; temp
6/12/2008	LL	3	18° 57.8	153° 53.1	Skipjack tuna	74	8.6	
6/12/2008	LL	3	18° 57.8	153° 53.1	Mahimahi	72.5	3.3	Female
6/12/2008	LL	3	18° 57.8	153° 53.1	Pompano dolphinfish	65.4	3.6	
6/12/2008	LL	3	18° 57.8	153° 53.1	Longnose lancetfish	37.5		
6/12/2008	LL	3	18° 57.8	153° 53.1	Blue shark	180 (est)		Female; fc;temp
6/12/2008	LL	3	18° 57.8	153° 53.1	Blue shark	229		Male; fc, temp; blood
6/13/2008	Troll		19° 21	154° 40	Mahimahi	57.6	1.4	female; mt (Choy)
6/15/2008	Troll		13° 11	152° 19	Mahimahi	70.4	2.7	female; mt (Choy)
6/15/2008	Troll		12° 41	152° 08	Mahimahi	74.5	3.7	female; mt (Choy)
6/16/2008	Troll		09° 45	151° 03	Wahoo (ono)	122	12	blood
6/16/2008	Troll		09° 22	150° 54	Mahimahi	77.5		female;mt;st
6/16/2008	Troll		09° 22	150° 54	Mahimahi	84.5	3.8	female;mt;st

Date	Gear	Set#	Latitude	Longitude	Species	Length (cm)	Weight (kg)	Materials Collected
6/16/2008	Troll		09° 10	150° 50	Mahimahi	79	3.7	female;mt;st
6/16/2008	Troll		09° 45	151° 03	Mahimahi	83.5	5	female;mt;st
6/16/2008	Troll		09° 45	151° 03	Wahoo (ono)	97.6	5.2	mt;blood
6/16/2008	Troll		09° 45	151° 03	Mahimahi	69.4	2.5	female
6/16/2008	Troll		09° 45	151° 03	Mahimahi	79.1	4	male
6/16/2008	Troll		09° 45	151° 03	Mahimahi	72.5	3.2	female
6/17/2008	Troll		07° 02	149° 26	Mahimahi	74.1	3.9	female
6/17/2008	LL	4	06° 39	149° 54	Longnose lancetfish	147	5.5	
6/17/2008	LL	4	06° 39	149° 54	Mahimahi	84	4.5	male
6/17/2008	LL	4	06° 39	149° 54	Pelagic thresher shark			female;mt; pups
6/17/2008	LL	4	06° 39	149° 54	Blue shark			male;mt
6/17/2008	LL	4	06° 39	149° 54	Oceanic whitetip shark			mt
6/17/2008	LL	4	06° 39	149° 54	Mahimahi			
6/17/2008	LL	4	06° 39	149° 54	Yellowfin tuna	62.9	5	
6/18/2008	LL	5	06° 38	148° 36	Longnose lancetfish	118	4.3	whole
6/18/2008	LL	5	06° 38	148° 36	Longnose lancetfish	118	3.2	whole
6/18/2008	LL	5	06° 38	148° 36	Longnose lancetfish	115	4.5	whole
6/18/2008	LL	5	06° 38	148° 36	Longnose lancetfish	58	0.8	whole
6/18/2008	LL	5	06° 38	148° 36	Longnose lancetfish	94	3	whole
6/18/2008	LL	5	06° 38	148° 36	Longnose lancetfish	95	2.7	whole
6/19/2008	LL	6	08° 07	148° 33	Longnose lancetfish	76	3.2	
6/19/2008	LL	6	08° 07	148° 33	Longnose lancetfish	69	1.7	
6/19/2008	LL	6	08° 07	148° 33	Longnose lancetfish			
6/19/2008	LL	6	08° 07	148° 33	Yellowfin tuna	110		
6/20/2008	LL	7	09° 22	149° 38	Longnose lancetfish			whole
6/20/2008	LL	7	09° 22	149° 38	Longnose lancetfish			whole
6/20/2008	LL	7	09° 22	149° 38	Longnose lancetfish			whole
6/20/2008	LL	7	09° 22	149° 38	Yellowfin tuna	145		
6/20/2008	LL	7	09° 22	149° 38	Yellowfin tuna	134		
6/20/2008	LL	7	09° 22	149° 38	Yellowfin tuna	106		
6/20/2008	LL	7	09° 22	149° 38	Yellowfin tuna	109		
6/20/2008	LL	7	09° 22	149° 38	Yellowfin tuna	106.5		
6/21/2008	LL	8	09° 26	149° 38	Yellowfin tuna	151		
6/21/2008	LL	8	09° 26	149° 38	Yellowfin tuna	144		
6/22/2008	LL	9	09° 37	150° 52	Yellowfin tuna	137.5		male; head
6/22/2008	LL	9	09° 37	150° 52	Yellowfin tuna	128		

Date	Gear	Set#	Latitude	Longitude	Species	Length (cm)	Weight (kg)	Materials Collected
6/22/2008	LL	9	09° 37	150° 52	Yellowfin tuna	155		male; head
6/22/2008	LL	9	09° 37	150° 52	Yellowfin tuna	161.2		male
6/22/2008	LL	9	09° 37	150° 52	Yellowfin tuna	155		
6/23/2008	Troll		09° 29	151° 13	Mahimahi	85		female
6/23/2008	Troll		09° 28	151° 15.4	Yellowfin tuna	163.5		
6/23/2008	LL	10	09° 19	151° 24	Broadbill swordfish	108.6		89.6 EOFL 108.6 LJFL
6/23/2008	LL	10	09° 19	151° 24	Yellowfin tuna	138.5		head
6/24/2008	LL	11	09° 42.5	152° 12.6	Wahoo (ono)	134.5		
6/24/2008	LL	11	09° 42.5	152° 12.6	Wahoo (ono)	145		
6/25/2008	Troll	TAO	07° 57.9	154° 59.6	Mahimahi	101.5		
6/25/2008	Troll	TAO	07° 57.9	154° 59.6	Yellowfin tuna	53.8	3.2	mt
6/25/2008	Troll	TAO	07° 57.9	154° 59.6	Yellowfin tuna	67.1	6	mt
6/25/2008	Troll	TAO	07° 57.9	154° 59.6	Yellowfin tuna	59.5	4.8	mt
6/25/2008	Troll	TAO	07° 57.9	154° 59.6	Yellowfin tuna	66.5	5.7	mt
6/26/2008	Troll	TAO	07° 57.9	154° 59.6	Yellowfin tuna	63.5	5	mt; heart
6/26/2008	Troll	TAO	07° 57.9	154° 59.6	Yellowfin tuna	59.7	4.5	mt;heart
6/26/2008	Troll	TAO	07° 57.9	154° 59.6	Yellowfin tuna	54	3.6	mt
6/26/2008	LL	12	07° 56.4	155° 05.0	Broadbill swordfish	147.2		mt; st;
6/27/2008	LL	13	09° 31.5	155° 59.2	Sickle pomfret			
6/27/2008	LL	13	09° 31.5	155° 59.2	Sickle pomfret	63.4		
6/27/2008	LL	13	09° 31.5	155° 59.2	Yellowfin tuna	60.4	4	mt;heart

Table 4.--Genetic samples taken from longline gear

Date	Lat(N)	Lon(W)	Species	Length (cm)	sex
6/10/2008	19° 8	156° 15	silky	c. 6ft.	F
6/10/2008	19° 8	156° 15	silky	c. 6ft.	F
6/10/2008	19° 8	156° 16	silky	c. 5-6 ft.	F
6/10/2008	19° 8	156° 16	silky		F
6/11/2008	18° 2	155° 4	silky		F
6/11/2008	18° 2	155° 4	blue		M
6/11/2008	18° 2	155° 1	blue	c. 5-6 ft.	M
6/11/2008	18° 2	155° 1	bigeye thresher		M
6/12/2008	18° 56	153° 53	blue	199cm	F
6/12/2008	18° 54	153° 49	blue		F
6/12/2008	18° 54	153° 49	blue	90inches	M
6/17/2008	6° 40	149° 52	blue	75inches	F
6/17/2008	6° 39	149° 51	oceanic white-tip	c. 3ft.	M
6/17/2008	6° 39	149° 51	silky		F
6/17/2008	6° 39	149° 54	pelagic thresher		
6/18/2008	6° 38	148° 36	blue	76.25inches	M
6/18/2008	6° 38	148° 34	oceanic white-tip	102cm	M
6/18/2008	6° 38	148° 34	silky	161cm	M
6/18/2008	6° 38	148° 33	pelagic thresher		M
6/18/2008	6° 39	148° 34	silky		
6/18/2008	6° 39	148° 33	silky		M
6/18/2008	6° 39	148° 31	pelagic thresher		F
6/19/2008	8° 5	148° 34	blue	67inches	F
6/20/2008	9° 22	149° 38	silky	80cm	F
6/20/2008	9° 22	149° 38	silky	c. 3ft.	F
6/20/2008	9° 23	149° 36	blue	68inches	F
6/20/2008	9° 24	149° 36	silky	56inches	M
6/20/2008	9° 25	149° 35	silky	34inches	F
6/20/2008	9° 26	149° 33	blue		M
6/21/2008	9° 21	149° 43	silky	48.5inches	F
6/21/2008	9° 21	149° 43	blue		M
6/21/2008	9° 22	149° 42	oceanic white-tip		
6/21/2008	9° 22	149° 42	silky		F
6/21/2008	09° 23	149° 41	silky		F
6/21/2008	09° 26	149° 38	blue		F
6/21/2008	09° 26	149° 38	silky		M
6/22/2008	09° 31	150° 59	silky	72inches	F
6/22/2008	09° 32	150° 57	silky	53inches	
6/22/2008	09° 33	150° 56	blue		M
6/22/2008	09° 33	150° 55	pelagic thresher		M
6/22/2008	09° 34	150° 55	pelagic thresher		F
6/22/2008	09° 34	150° 55	blue		
6/22/2008	09° 35	150° 54	pelagic thresher		M
6/22/2008	09° 35	150° 53	pelagic thresher		F
6/22/2008	09° 35	150° 53	pelagic thresher		F
6/22/2008	09° 36	150° 52	blue		M
6/22/2008	09° 36	150° 51	pelagic thresher		M
6/22/2008	09° 37	150° 51	blue		M
6/22/2008	09° 37	150° 51	pelagic thresher		M
6/23/2008	09° 17	151° 28	blue		M
6/23/2008	09° 17	151° 27	blue		F

Date	Lat(N)	Lon(W)	Species	Length (cm)	sex
6/23/2008	09° 18	151° 26	blue		F
6/23/2008	09° 18	151° 26	pelagic thresher		F
6/23/2008	09° 18	151° 24	blue		M
6/23/2008	09° 19	151° 23	blue		M
6/23/2008	09° 19	151° 22	oceanic white-tip		M
6/23/2008	09° 19	151° 22	silky		M
6/24/2008	09° 38	152° 17	blue		F
6/24/2008	09° 38	152° 16	blue		M
6/24/2008	09° 40	152° 14	pelagic thresher		F
6/24/2008	09° 40	152° 14	pelagic thresher		F
6/24/2008	09° 40	152° 14	pelagic thresher		F
6/24/2008	09° 40	152° 14	pelagic thresher		M
6/24/2008	09° 41	152° 13	pelagic thresher		M
6/24/2008	09° 41	152° 13	pelagic thresher		M
6/24/2008	09° 41	152° 13	pelagic thresher		F
6/26/2008	07° 53	155° 10	blue		M
6/26/2008	07° 53	155° 9	silky		M
6/26/2008	07° 54	155° 8	silky		F
6/26/2008	07° 54	155° 8	blue		M
6/26/2008	07° 54	155° 7	silky	c2-3ft.	M
6/26/2008	07° 55	155° 6	blue		F
6/26/2008	07° 56	155° 5	silky		M
6/27/2008	09° 27	156° 1	silky		F
6/27/2008	09° 29	156° 0	blue		M
6/27/2008	09° 29	156° 0	blue		M
6/27/2008	09° 29	156° 0	blue		F
6/27/2008	09° 29	156° 0	bigeye thresher	c.300#	M
6/27/2008	09° 30	155° 59	silky		M
6/30/2008	12° 54	154° 31	blue	c.8ft.	F
7/1/2008	13° 45	154°0	blue		M
7/1/2008	13° 46	153°58	blue	c.4-5ft.	M