

Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission



Overview of the 2020 IATTC Tuna Tagging Cruise

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Introduction

- Purse-seine fleet capacity in the eastern Pacific Ocean (EPO) has increased substantially since 1995, along with catches of skipjack tuna (*Katsuwonus pelamis*) and bigeye tuna (*Thunnus obesus*)
- Recent changes in the fishery dynamics have made it difficult to assess its effect on tropical tuna stocks
- Assessments have shown the need for caution in managing this fishery, but above all else, they demonstrated the urgent need for better scientific information on which to base management decisions
- Purse-seine fishing has become increasingly efficient due to new technology and higher proportions of sets occurring on tunas associated with drifting fish-aggregating devices
- These changes in fishery dynamics have created problems for scientists in calculating indices of species-specific catches per unit of effort, increasing uncertainty, thus effecting management recommendations for these species
- Knowledge of current levels of movement, growth, natural mortality, abundance, selectivity, and exploitation rates of tunas in the EPO are essential for reliable stock assessments
- Since tagging experiments can provide the data for estimation of those parameters the IATTC, with financial assistance from the European Union and IATTC budget, initiated a Regional Tuna Tagging Program in the EPO in 2019, with an emphasis on skipjack
- **The principle objective of the 2020 tagging cruise was to focus effort and resources on tagging skipjack ($n=10,000$) in the equatorial EPO, to provide a direct means for estimating their abundance and exploitation rate, deemed essential to produce a reliable stock assessment**



Materials and methods

- The live-bait pole-and-line tuna fishing vessel *FV Her Grace* (diesel, steel hull, 72'OL, 99GT, 75 ton carrying capacity, cruising speed 8 kn), with home port of San Diego, CA, was chartered by the IATTC for the 89 d period, 1 February to 30 April 2020, to undertake a tuna tagging cruise in the EPO
- Nine men were aboard the vessel throughout the charter: Captains/Brothers Bobby and Bernie Blocker, a bait chumer, four pole-and-line fisherman, and two IATTC scientists. There were also two observers aboard, at different times, during operations within the Galapagos National Park (GNP)
- Fiberglass lift poles and small Japanese Mount Fuji pipe squids with chrome heads (size: 9), with either scampi tails (white, green, or blue) or white chicken feathers attached were used, except when live-bait fishing, Owner ringed size 5 live bait hooks were used
- Tunas caught by pole-and-line fishing were measured and tagged in three aluminum cradles, lined with high-density foam padding, with 1-cm graduations marked on a smooth liner, mounted on the stern combing of the vessel directly behind the fishing racks

Materials and methods

F/V Her Grace



Materials and Methods

- Permits were acquired before the cruise for catching bait in Mexico, Panama, and the GNP, as well as for fishing and tagging tunas within the 200 nm EEZ's of Ecuador, Mexico, Panama, and within the 40 nm boundary of GNP
- Pacific sardine (*Sardinops sagax*) was captured for bait in Elizabeth Bay, Isabela Island, GNP, during the night, when attracted to the lights of the vessel by men standing in the stern racks using a bait crowder along with scoop nets
- Pacific anchoveta (*Centengraulis mysticetus*) was captured for bait in the Gulf of Panama, during the day, using a bait skiff outfitted with a hydraulic net puller and a lampara net



Materials and Methods

Catching anchoveta in the Gulf of Panama using a bait skiff and lampara net

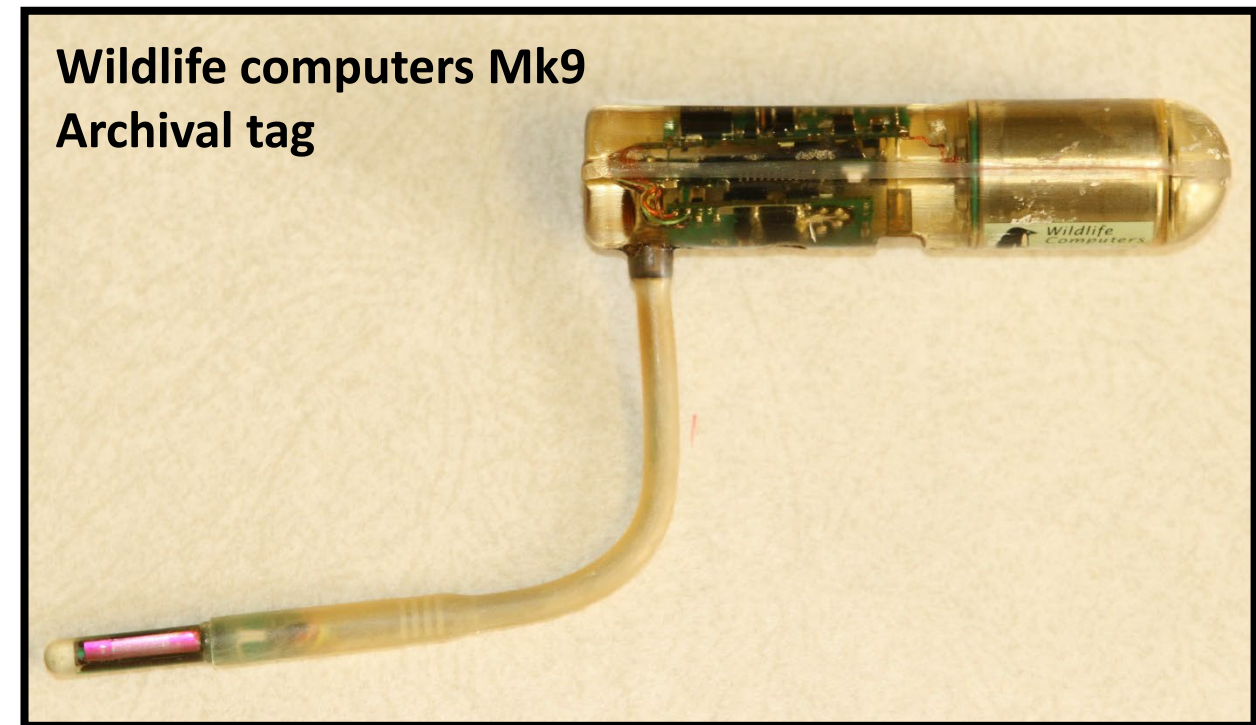
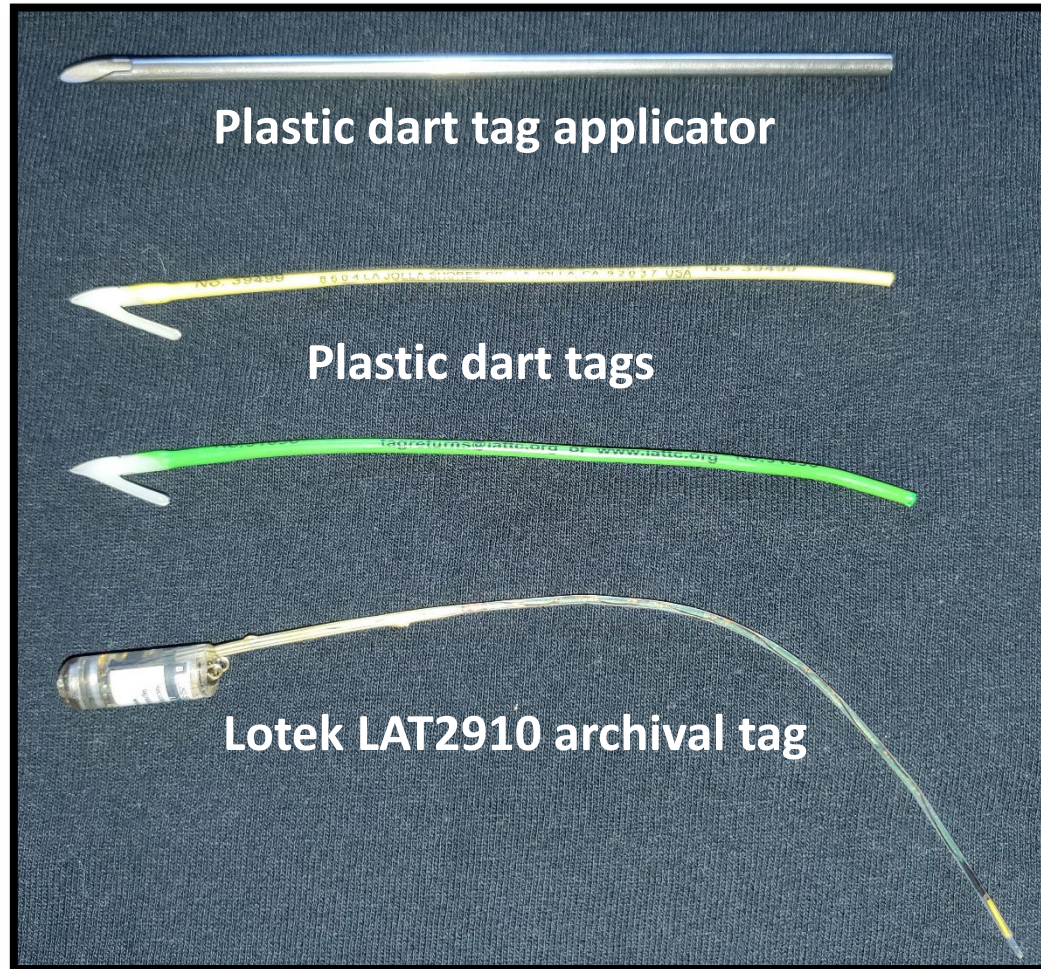


Materials and Methods

- Hallprint 12 cm plastic dart tags serially-numbered, with an IATTC website address and “reward” printed on them, were attached to tunas using tubular stainless steel applicators, with the barbed heads of the tags passing between the pterygiophores below the base of the second dorsal fin. Single yellow tags were used, aside from when green tags were used for tunas which had archival tags implanted
- LOTEK wireless LAT2910 archival tags were surgically implanted in the coelomic cavities of skipjack captured by trolling or rod and reel fishing. The tags were rapidly implanted (<30 s); noting the gills were not irrigated with seawater, the eyes were not covered with a synthetic shammy, and the abdominal incisions were closed using a surgical staple gun
- Wildlife computers MK9 archival tags were surgically implanted in the coelomic cavities of yellowfin captured by trolling. The tags were implanted in < 2 min; noting the gills were not irrigated with seawater, the eyes were covered with a synthetic shammy, and the abdominal incisions were closed with two sutures



Materials and methods



Materials and Methods

- An extensive international publicity campaign to inform captains and crews of purse-seine and longline vessels, cannery managers and workers, and unloaders of purse-seine vessels about the tagging cruise, including the rewards offered for the return of tags was initiated in advance of the previous tagging cruise in 2019. Reward posters and flyers were widely distributed at the major tuna fishing ports, and to the distant water fishing nations and coastal fishing nations of the Americas.
- Three tag recovery specialists (TRSs) are working full time at major purse-seine vessel unloading ports in Mexico and Ecuador, which is essential for collecting high-confidence tag recapture data. Tag recovery specialists are stationed at IATTC field offices; one in Mazatlan, Mexico, and one each in Manta and Playas, Ecuador. The responsibility of the TRSs is to collect high-confidence tag recapture information at the time vessels are unloading, including vessel names and well numbers where tagged tunas are found, and taking length measurements of recovered tunas with tags still attached
- A greater cash reward is paid (US\$15) for plastic dart tags from tunas presented to TRSs at the time of detection, which are considered high-confidence tag returns, versus the reward paid for normal tag returns (US\$10). The reward paid for return of archival tags is US\$250. In addition, annual lotteries are held one year following tagging cruises and five US\$1000 rewards paid to individuals randomly drawn whom have returned tags in both Ecuador and Mexico



Materials and methods

Live-bait pole-and-line fishing and tagging of skipjack with plastic dart tags aboard *Her Grace*

[Click image to view video](#)



Materials and methods

Surgical implantation of a Lotek LAT2910 Archival tag in a 45 cm Skipjack

[Click image to view video](#)



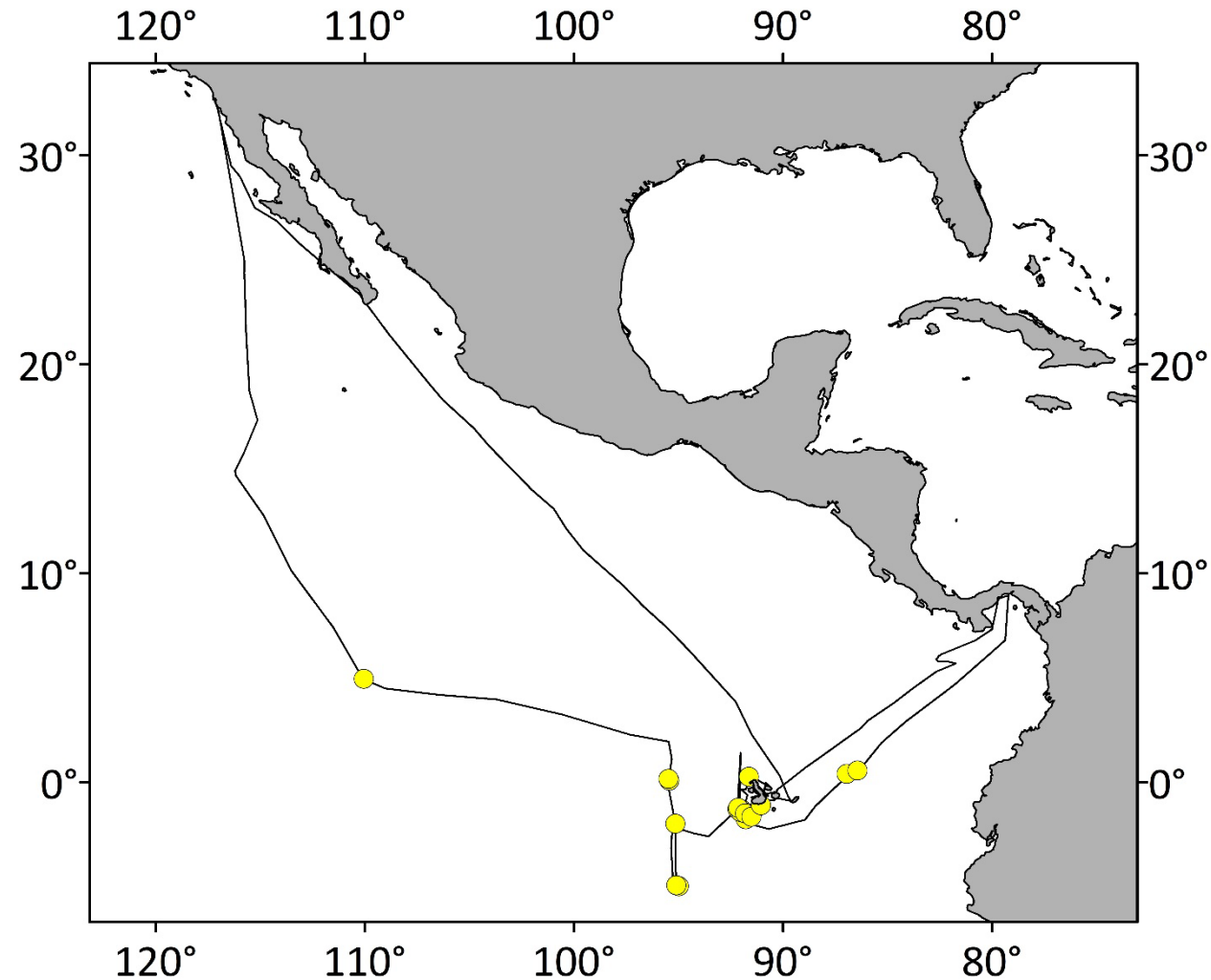
Results

- During the period of 20-22 February a partial load of about 500 scoops of optimal size small Pacific sardine (avg: 8.3 cm TL) were captured in the GNP
- With the load of sardines 203 skipjack (3.5% of total) were captured, tagged, and released with plastic dart tags inside the south-western boundary of GNP, and 2,021 skipjack (34.2 % of total) were captured, tagged, and released with plastic dart tags and 25 skipjack (13.5% of total) with archival tags, from 3 - 10 nm outside the south-western boundary of GNP
- Throughout an extensive search effort in the GNP, during the period of 11-17 March, no additional Pacific sardines were located
- During the period of 27-29 March a load of about 800 scoops of optimal size small anchoveta (avg: 12.5 cm TL) were captured in the Gulf of Panama
- With the load of anchoveta, 3,650 skipjack (62.4% of total) were captured, tagged, and released with plastic dart tags and 160 skipjack (86.5% of total) with archival tags in four discrete areas of the equatorial EPO: 1) 1°N 86°W, 2) 5°S 95°W, 3) 0° 95°W, and 4) 5°N 110°W



Results

Cruise track during 1 February to 30 April 2020. The yellow dots are where tagging events occurred



Results

Summary of 6328 plastic dart tag releases by species, tag type, and fishing method

Area	Species	Date Range	Tag Type	Gear	Number	Length Range (cm)	Mean Length (cm)
East Galapagos	Skipjack	4/2/2020	Plastic Dart	Pole and Line	238	40 – 58	49.5
East Galapagos	Skipjack	4/2/2020	Archival	Trolling	5	48 – 60	54.4
Other	Skipjack	2/25 – 2/29/2020	Plastic Dart	Pole and Line	23	43 - 64	48.2
Other	Yellowfin	4/11/2020	Plastic Dart	Pole and Line	3	38 - 45	41.0
South Galapagos	Skipjack	3/1 – 3/10/2020	Plastic Dart	Pole and Line	2179	39 - 69	48.1
South Galapagos	Yellowfin	3/2 – 3/10/2020	Plastic Dart	Pole and Line	89	38 – 75	61.6
South Galapagos	Skipjack	3/6/2020	Archival	Rod and Reel	2	45 – 50	47.5
South Galapagos	Yellowfin	3/4 – 3/5/2020	Plastic Dart	Trolling	2	59 – 71	65.0
South Galapagos	Yellowfin	3/8 – 3/9/2020	Archival	Trolling	9	57 – 67	63.4
South Galapagos	Skipjack	3/1 – 3/2/2020	Plastic Dart	Trolling	2	49 – 53	51.0
South Galapagos	Skipjack	3/6/2020	Archival	Trolling	23	42 – 54	47.6
TAO 5S/95W	Skipjack	4/8 – 4/10/2020	Plastic Dart	Pole and Line	1423	37 - 68	48.0
TAO 5S/95W	Yellowfin	4/8 – 4/10/2020	Plastic Dart	Pole and Line	28	35 – 57	40.9
TAO 5S/95W	Skipjack	4/8 – 4/10/2020	Archival	Pole and Line	131	39 – 63	49.2
TAO 0/95W	Bigeye	4/15/2020	Plastic Dart	Pole and Line	1	50	50.0
TAO 0/95W	Skipjack	4/12 – 4/15/2020	Plastic Dart	Pole and Line	1189	32 - 74	64.7
TAO 0/95W	Yellowfin	4/12 – 4/15/2020	Plastic Dart	Pole and Line	20	38 – 76	56.4
TAO 0/95W	Skipjack	4/13 – 4/15/2020	Archival	Rod and Reel	18	50 – 72	65.9
TAO 0/95W	Skipjack	4/12 – 4/13/2020	Archival	Trolling	6	58 – 70	67.2
TAO 5N/110W	Bigeye	4/20/2020	Plastic Dart	Pole and Line	7	40 – 50	46.3
TAO 5N/110W	Skipjack	4/20/2020	Plastic Dart	Pole and Line	800	36 – 68	53.9
TAO 5N/110W	Yellowfin	4/20/2020	Plastic Dart	Pole and Line	123	32 – 74	45.9
TAO 5N/110W	No ID	4/20/2020	Plastic Dart	Pole and Line	7	NA	NA



Results

Summary of 194 archival tags deployed in skipjack and yellowfin tunas

Date	Tag Type	Species	Latitude	Longitude	Number	Length Range (cm)	Mean Length (cm)
6-Mar-2020	Lotek LAT2910	Skipjack	1.42 S	92.03 W	25	42 - 54	47.6
8-Mar-2020	Wilidlife Computers Mk9	Yellowfin	1.48 S	91.82 W	1	66	66
9-Mar-2020	Wilidlife Computers Mk9	Yellowfin	1.65 S	91.52 W	8	57 - 67	63.1
2-Apr-2020	Lotek LAT2910	Skipjack	0.40 N	86.95 W	5	48 - 60	54.4
8-Apr-2020	Lotek LAT2910	Skipjack	4.97 S	94.98 W	44	44 - 63	49.6
9-Apr-2020	Lotek LAT2910	Skipjack	4.97 S	94.98 W	61	39 - 61	49
10-Apr-2020	Lotek LAT2910	Skipjack	4.92 S	95.10 W	26	44 - 58	48
12-Apr-2020	Lotek LAT2910	Skipjack	0.08 N	95.43 W	5	58 - 70	66.6
13-Apr-2020	Lotek LAT2910	Skipjack	0.08 N	95.43 W	10	50 - 70	65.2
14-Apr-2020	Lotek LAT2910	Skipjack	0.17 N	95.48 W	8	64 - 72	68.4
15-Apr-2020	Lotek LAT2910	Skipjack	0.17 N	95.48 W	1	57	57

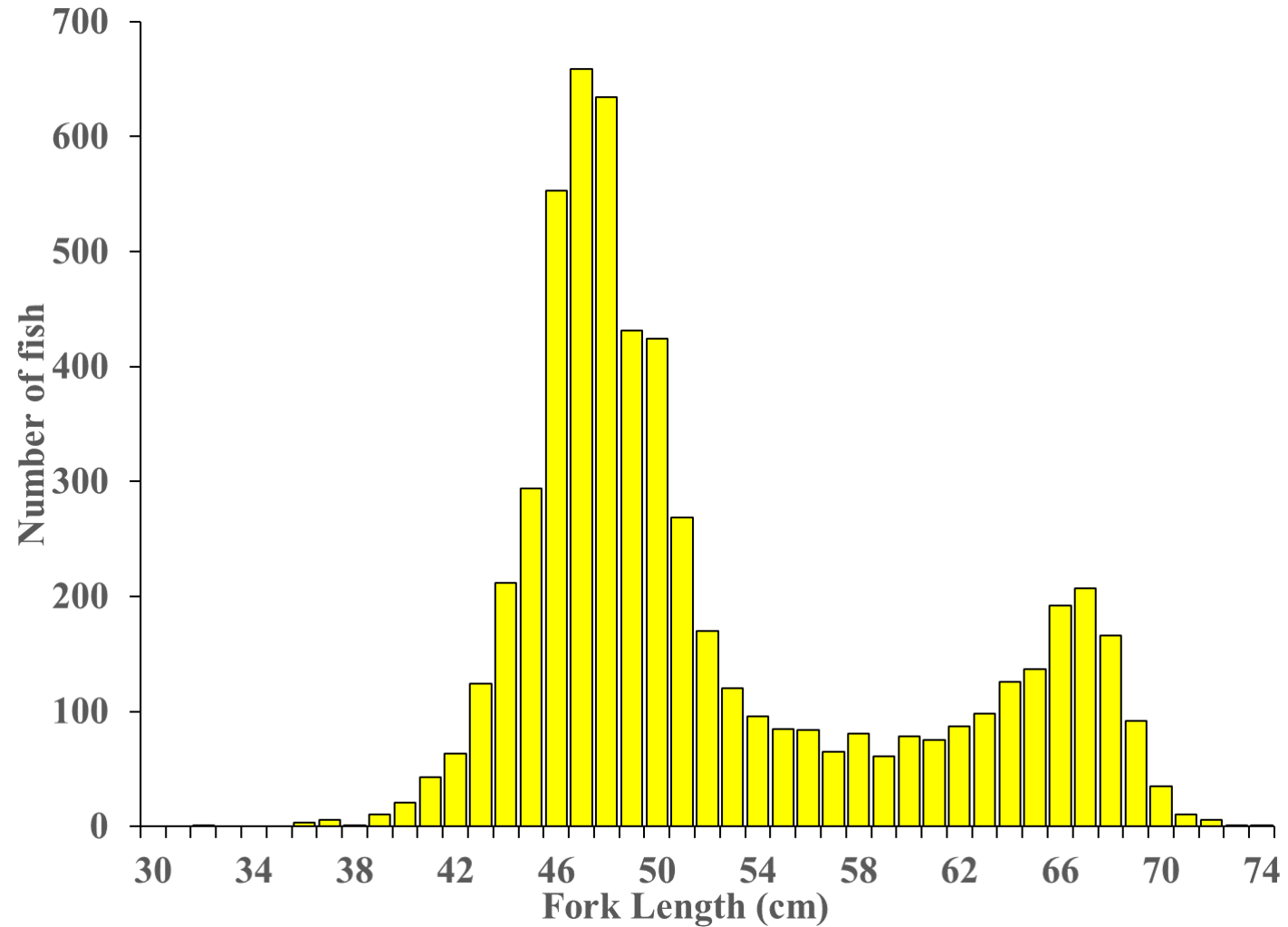
Results

- During the tagging cruise a total of 6,328 tunas were tagged and released
- 6,039 total skipjack were tagged and released, including 185 with archival tags
- 59.3% of the total skipjack tagged and released were captured in association with the Tropical Atmosphere Ocean (TAO) moored buoys
- 274 total yellowfin were tagged and released, including 9 with archival tags
- 8 bigeye and 7 unidentified tunas were also tagged and released



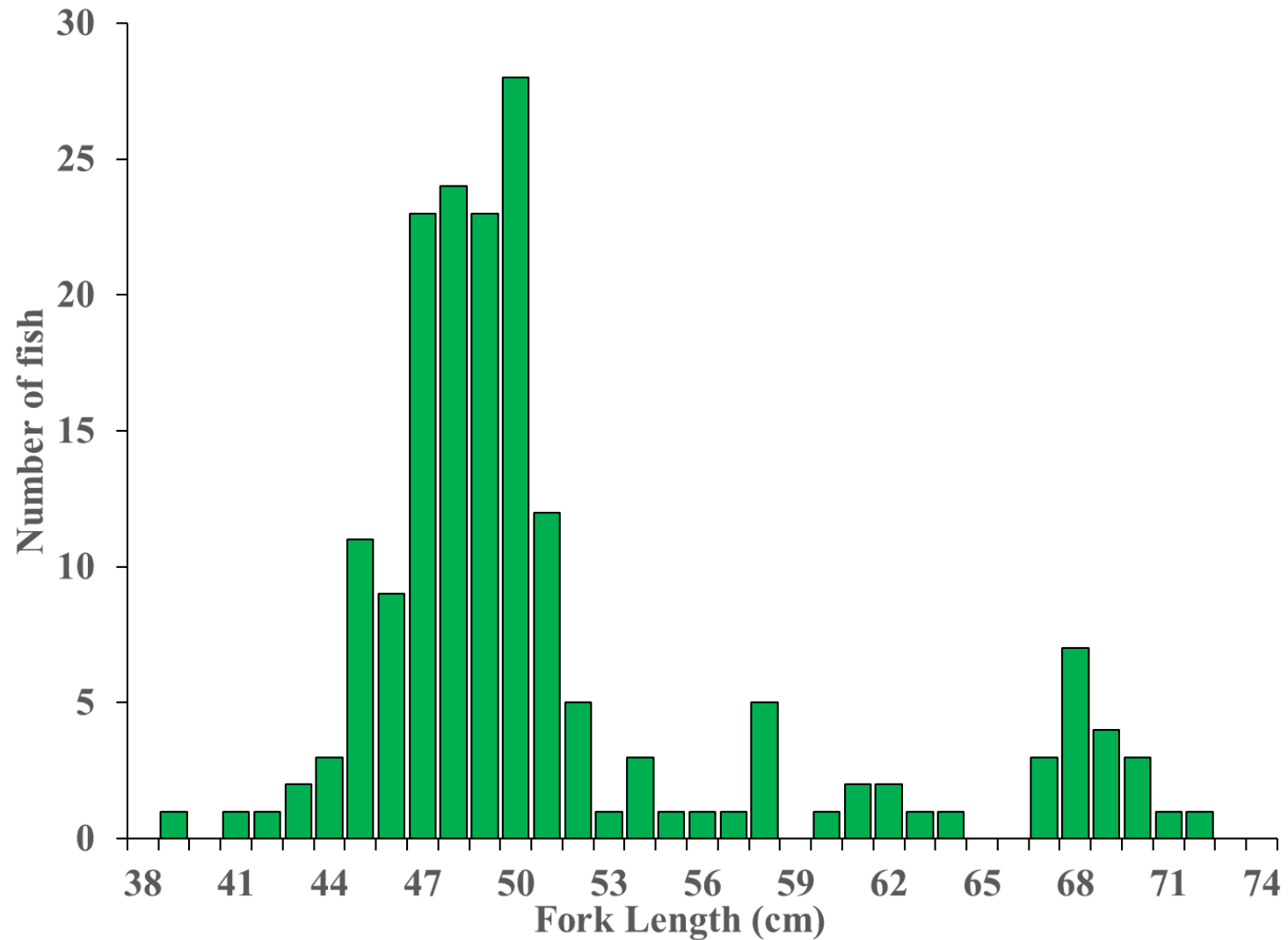
Results

Length frequency distribution of 5,821 skipjack tagged and released with plastic dart tags



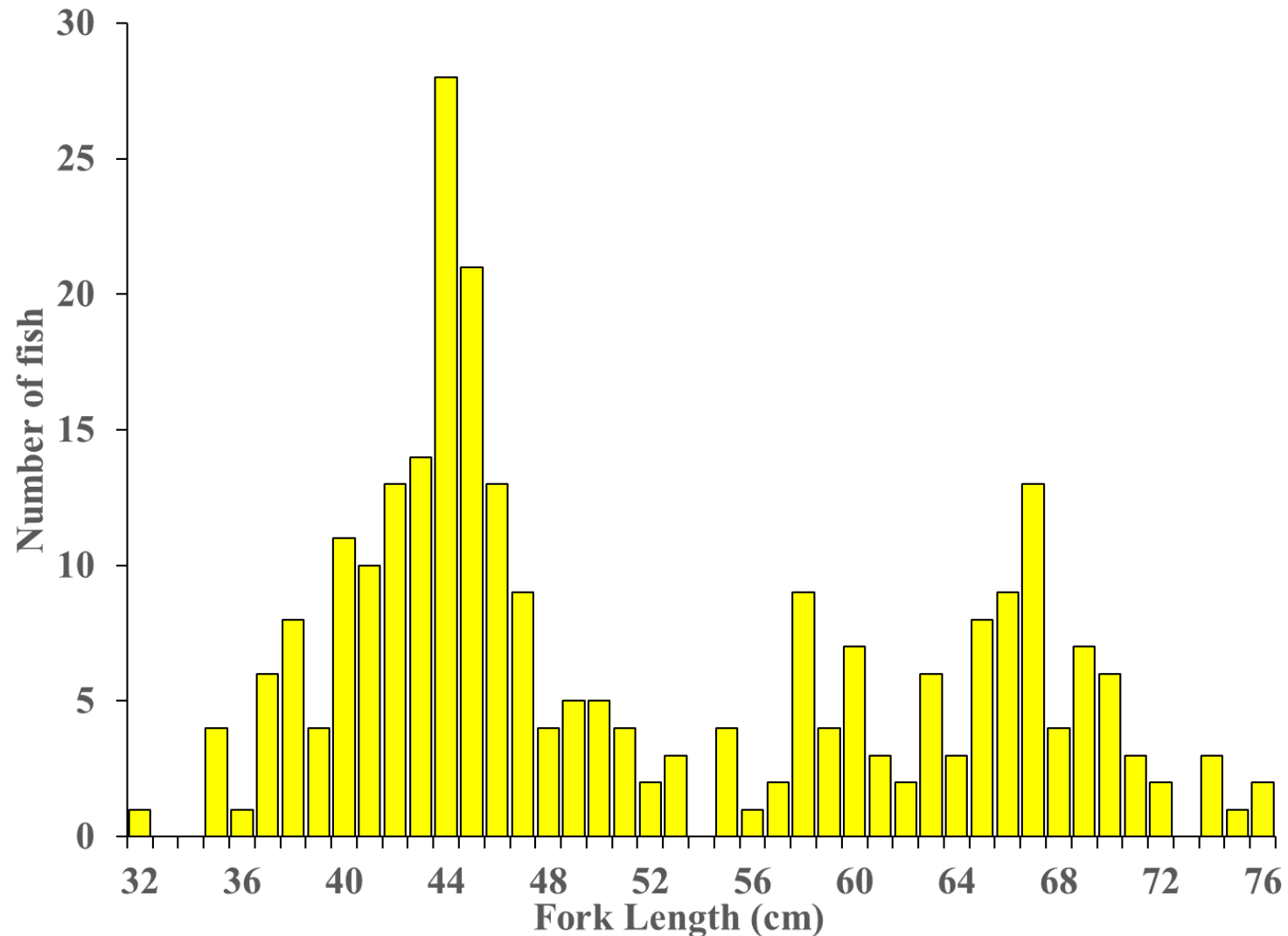
Results

Length frequency distribution of 185 skipjack tagged and released with archival tags



Results

Length frequency distribution of 265 yellowfin tagged and released with plastic dart tags



Discussion

- The 2020 tagging cruise was overall relatively successful at meeting the cruise objectives
- Although a substantial number of skipjack were tagged in a widespread area of the equatorial EPO from 5°S to 5°N and 86°W to 110°W, the total numbers of tunas tagged and released by species were less than the cruise target numbers
- There were some unexpected events which occurred during the cruise, which created challenges and substantially reduced the number of fishing days by about three weeks, impacting the potential total numbers of tunas tagged including: 1) absence of suitable quantities of sardines for live-bait in the Galapagos, 2) two weeks spent transiting to and from the Gulf of Panama for live-bait, 3) purse-seine vessels setting on tuna aggregations associated with TAO buoy moorings in the equatorial EPO, and 4) unable to fish and potentially tag skipjack at Roca Partida, Revillagigedo Islands National Park (RINP), Mexico, due to restrictions resulting from the COVID-19 pandemic



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Questions