Fishery-independent 2023 bottom longline survey for the Mid-Atlantic Golden Tilefish (*Lopholatilus chamaeleonticeps*) stock

Collaborating Partners:

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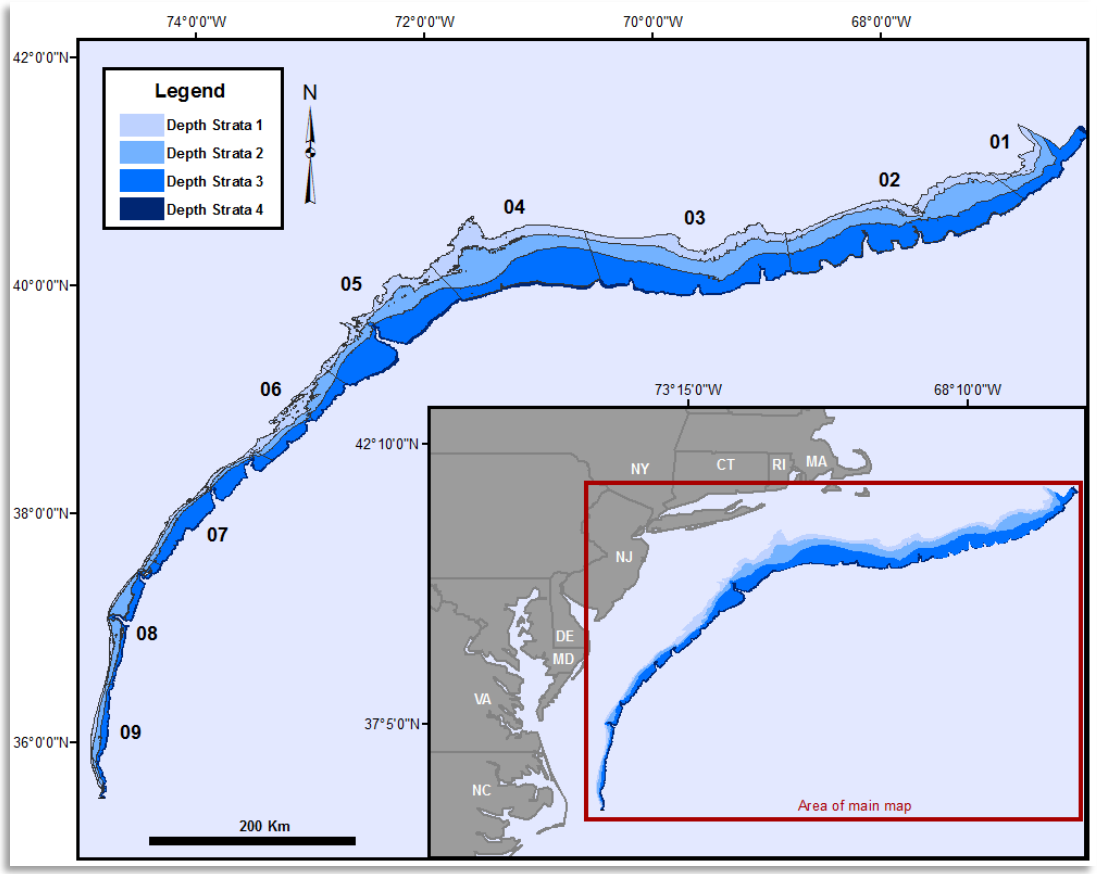
2017 Pilot Survey Design

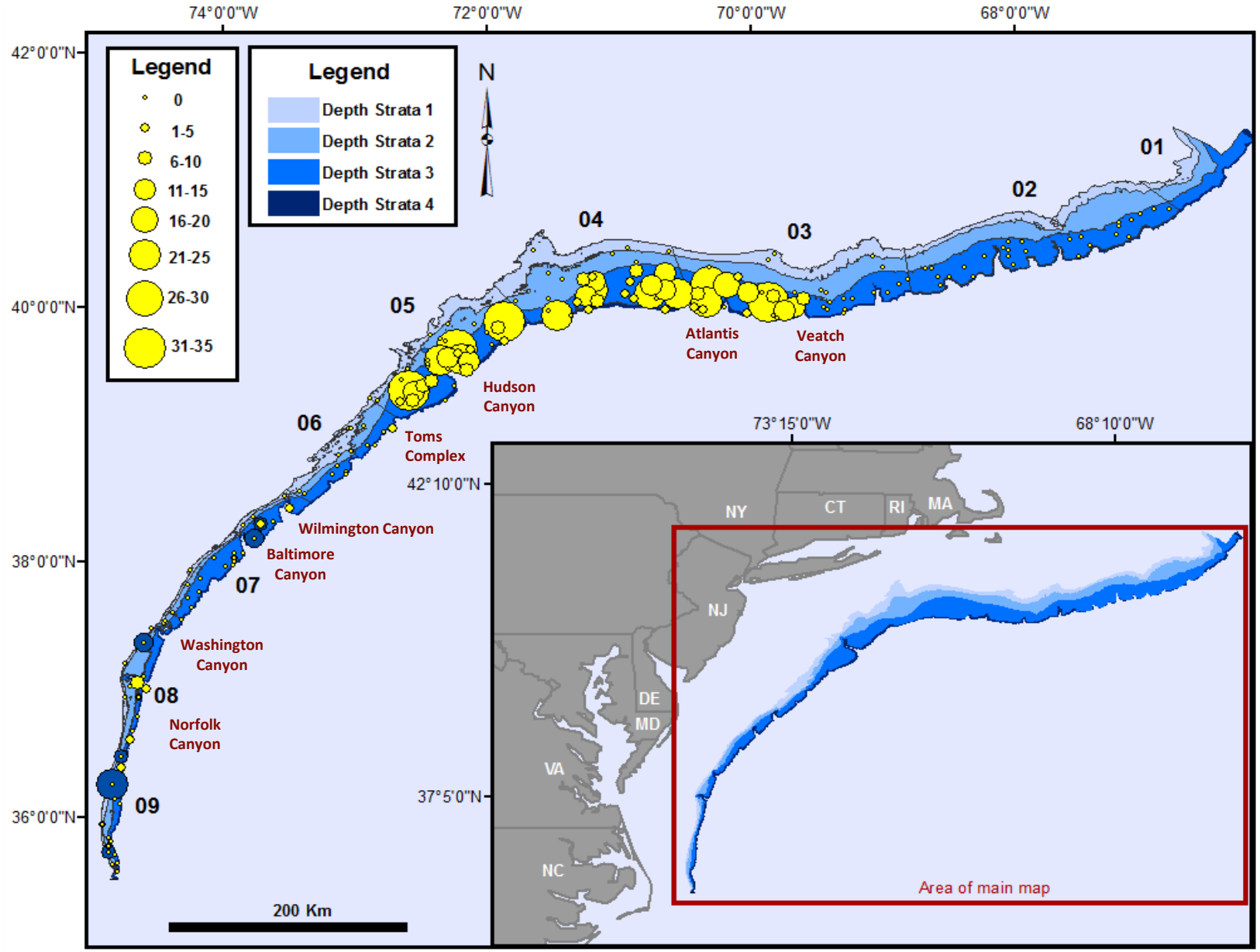
Survey design: Consisted of sampling stations representing the “core” fishing areas and deeper/shallower “expanded” region to evaluate areas outside of the traditional fishery.

- Stratified random sampling design
  - 9 north-south regions & 4 depth ranges
    - 41-44.9 fa (75-82 m)
    - 45-53.9 fa (82-97 m)
    - 54-137.9 fa (97-252 m)
    - 138-166 fa (252-304 m)
  - Stations were allocated to strata in proportion to area
  - No stations allocated to most northern N-S strata (01)
  - Minimum of 3 stations per depth strata (01,04)



2017 Pilot Distribution of GTF & BTF

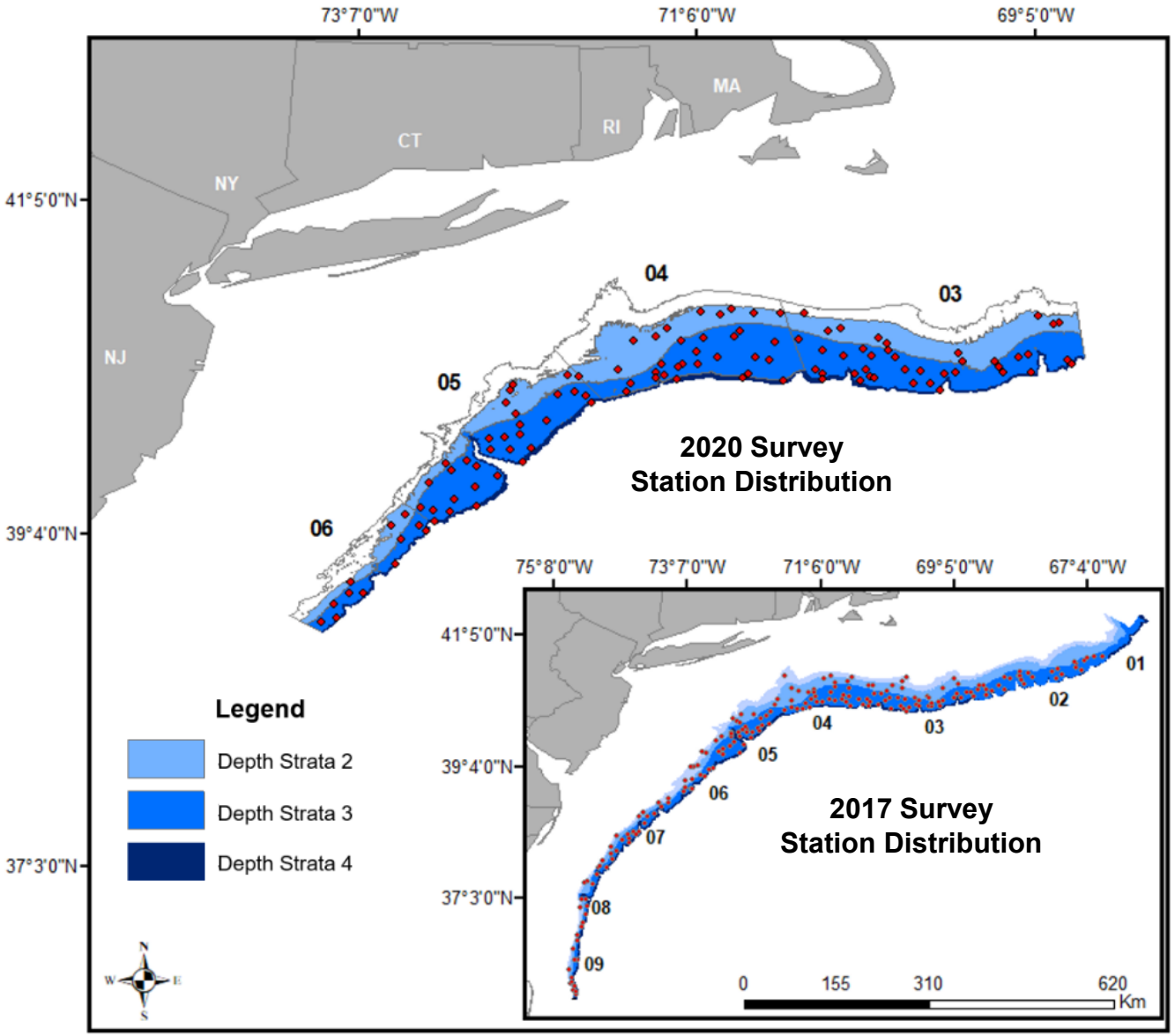
- Survey:
  - 194 stations
  - 25 days
  - July-August



2020 Survey Design Modifications

- Target “CORE” area of GTF abundance
  - Low incidence of Blueline
  - No catch in Strata 1 (75-82 m)
  - Reduce number of stations: 115
  - Reduce effort: Single 14-day cruise

Strata	Area (km^2)	% Total Area	# Proposed	# Actual
03--2	2320.7	14.3	9	10
03--3	3184.3	19.6	27	27
03--4	177.3	1.1	3	4
04--2	2167.4	13.4	10	9
04--3	2538.4	15.7	20	19
04--4	240.7	1.5	3	2
05--2	1236.1	7.6	6	7
05--3	2720.4	16.8	22	22
05--4	208.6	1.3	3	3
06--2	630.7	3.9	3	3
06--3	727.7	4.5	6	6
06--4	57.3	0.4	3	3



2023 Survey Design

- Target “CORE” area of GTF abundance
  - Number of stations: 115
  - Effort: Single 14-day cruise
  - Timing: June 19-30

Stratum	Area (km^2)	% Total Area	# Proposed Stations	# Actual Stations
03--2	2320.7	14.3	9	8
03--3	3184.3	19.6	27	27
03--4	177.3	1.1	3	3
04--2	2167.4	13.4	10	10
04--3	2538.4	15.7	20	22
04--4	240.7	1.5	3	3
05--2	1236.1	7.6	6	5
05--3	2720.4	16.8	22	23
05--4	208.6	1.3	3	2
06--2	630.7	3.9	3	3
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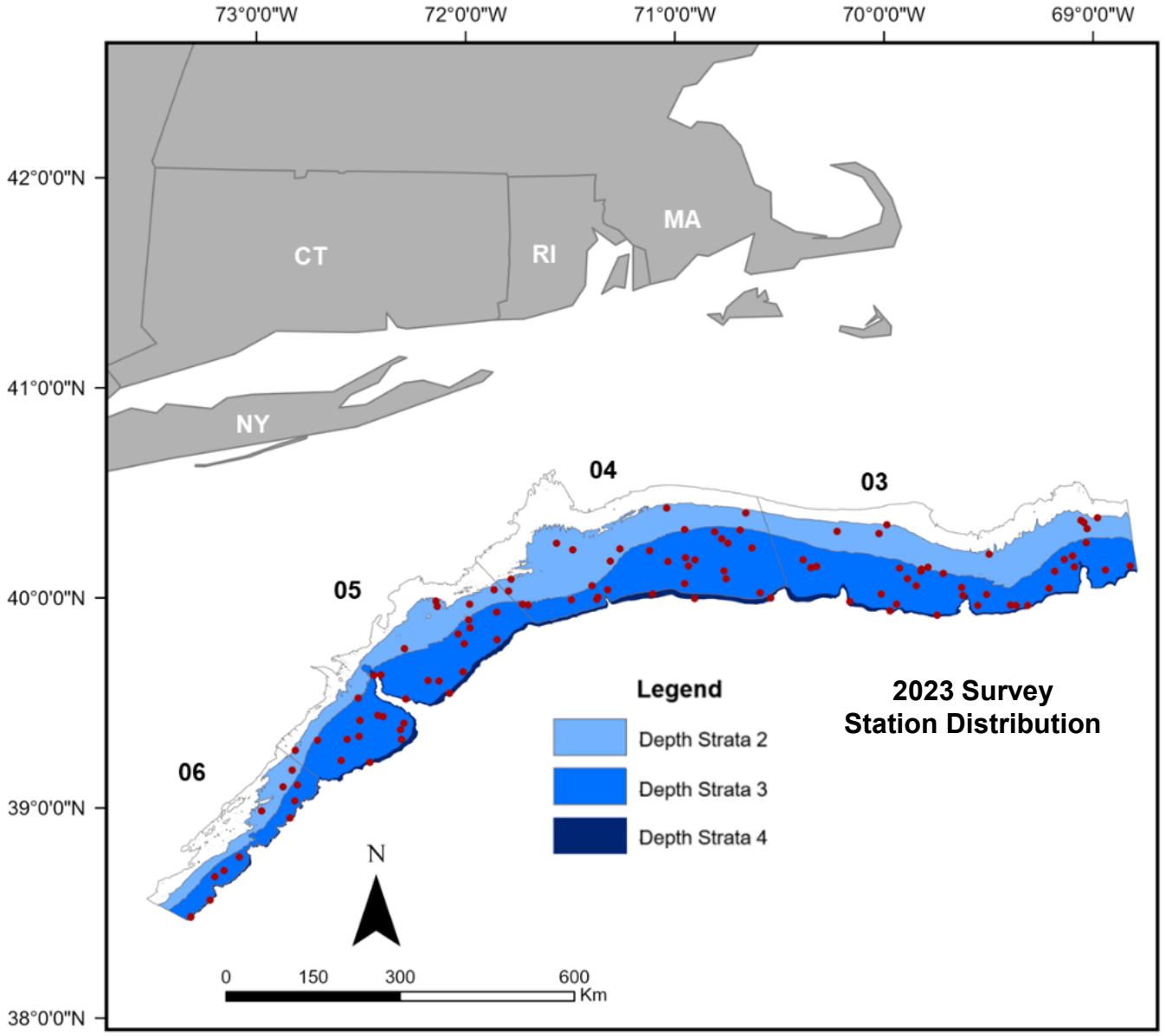
06--4	57.3	0.4	3	2



2023 Survey Gear & Deployment Modifications

- Hook sizes: distributed by a ratio of 50-50
  - Small = 8/0
  - Industry = 12/0
- Bait sized relative to hook size
- Minimum soak duration = 50 minutes
- Sets between sunrise and sunset
- Bait outcome
- Star-Oddi CTD per set

Image credit: P. Nitschke

Catch Summary

Survey:

- 114 stations
- 14 days

2020 Survey:

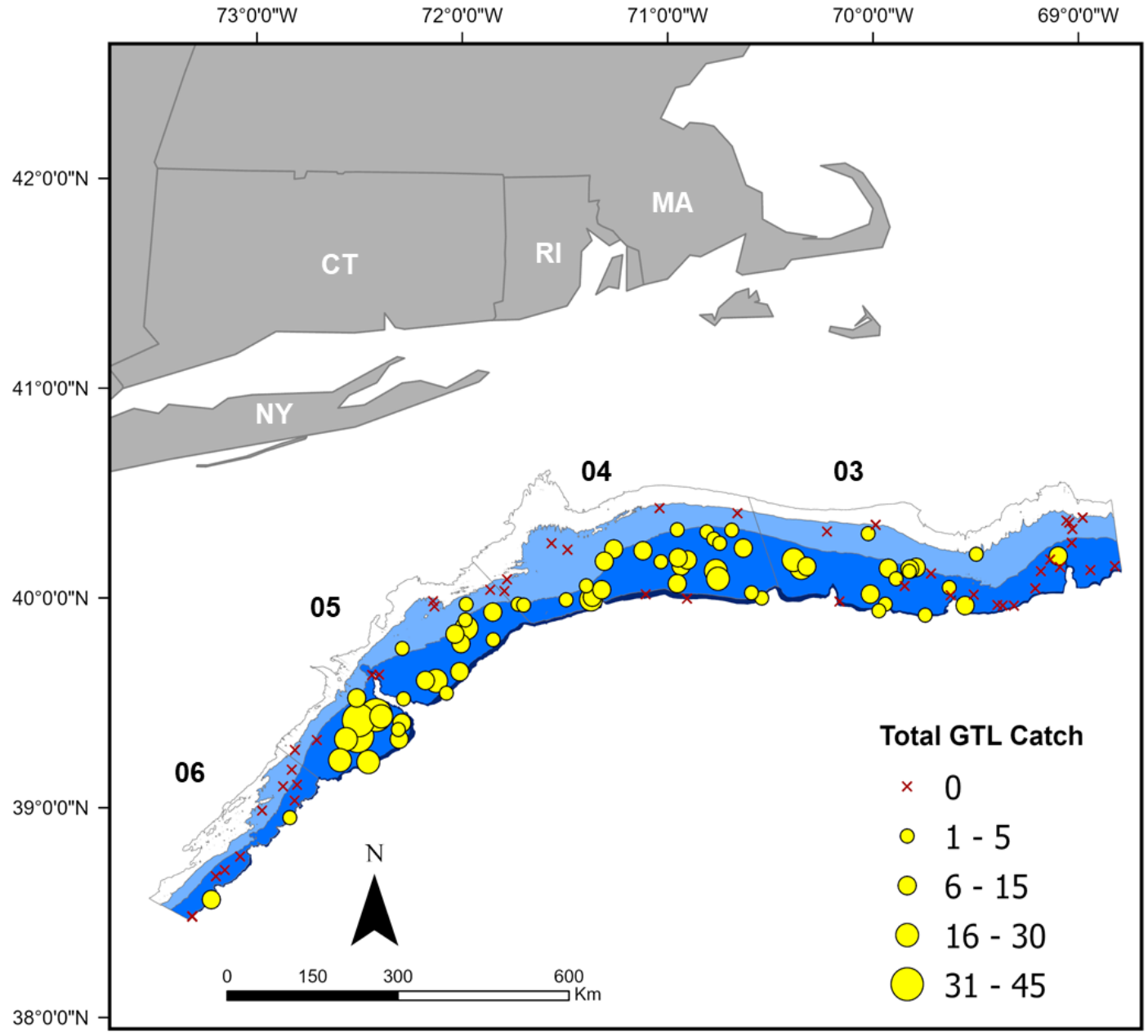
- GTF: 971
- Dogfish: 521

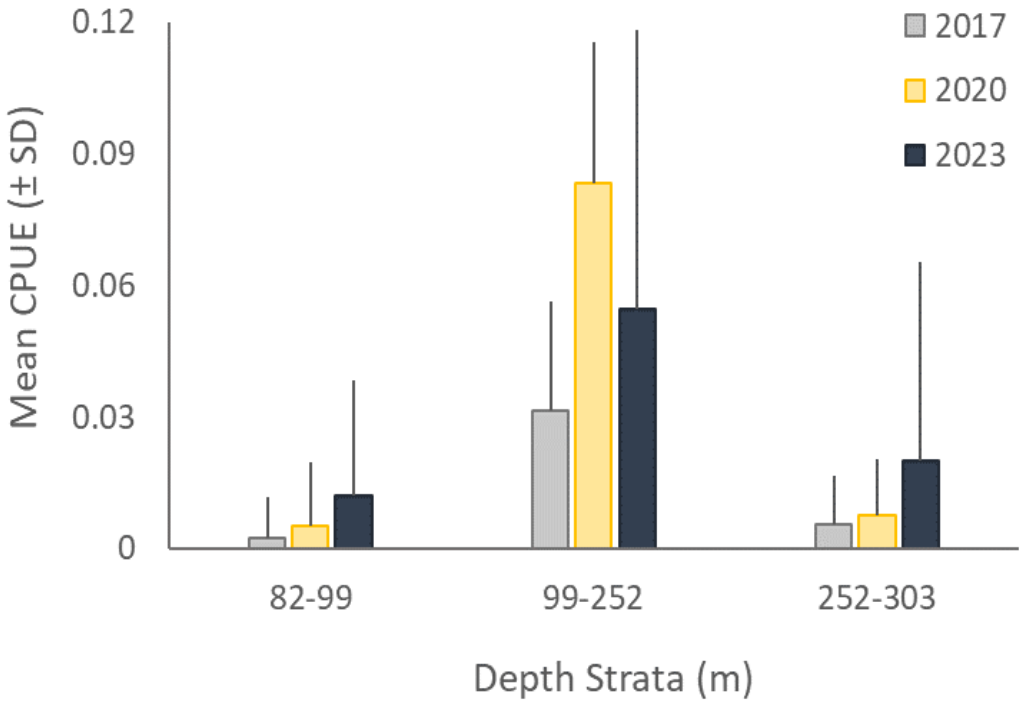
Otolith Collection:

- 2023: 384
- 2020: 184
- 2017: 438

Species	Common Name	Hook Size		
		Small	Industry	Total
Dipturus laevis	Barndoor Skate	0	2	2
Helicolemus dactylopterus	Black-bellied Rose	8	4	12
Caulolatilus microps	Blueline Tilefish	2	1	3
Scyliorhinus retifer	Chain Dogfish	35	23	58
Congridae	Conger Eel	1	4	5
Lopholatilus chamaeleonticeps	Golden Tilefish	498	218	716
Carcharhinus plumbeus	Sandbar Shark	1	0	1
Merluccius bilinearis	Silver Hake	5	4	9
Mustelus canis	Smooth Dogfish	390	415	805
Squalus acanthias	Spiny Dogfish	55	36	91
Urophycis regia	Spotted Hake	151	70	221
Merluccius albidus	Offshore Hake	5	2	7
	TOTAL	***1151***	***779***	***1930***

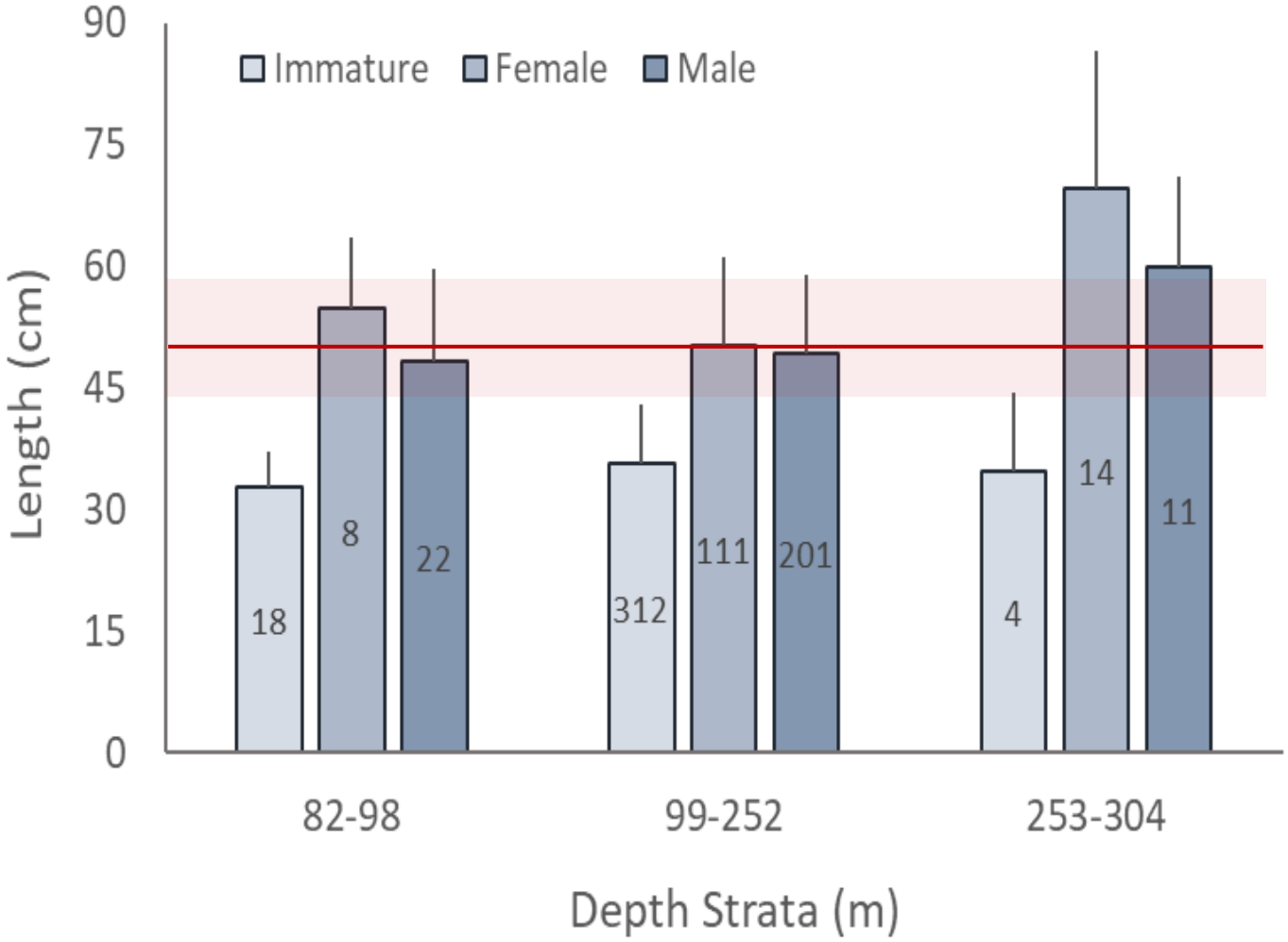
GTF Abundance & Distribution





GTF Size-Structure & Maturity

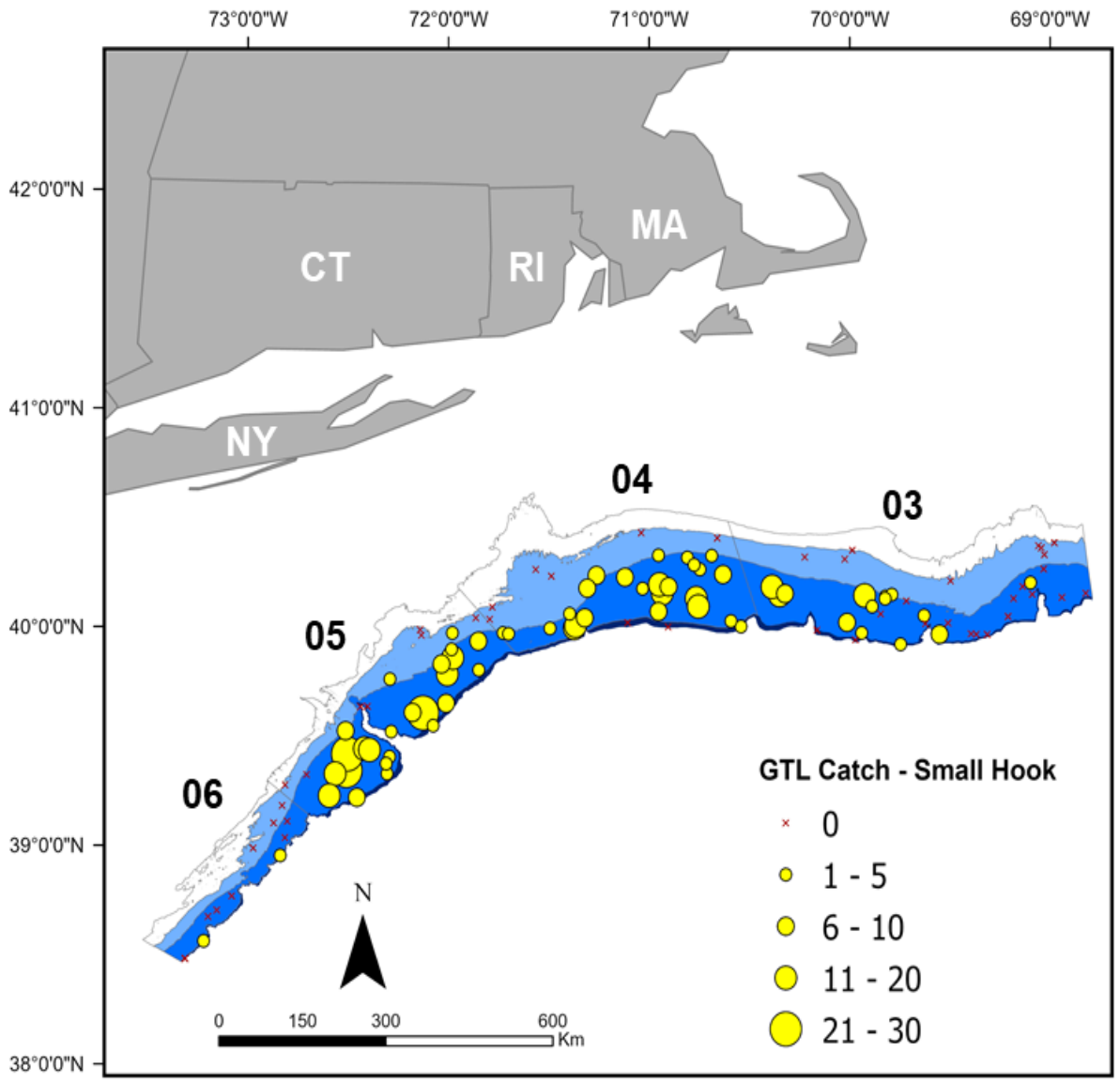
- Size Range:
  - 2023: 20-110 cm; 0.1-17.0 kg
  - 2020: 21-87 cm; 0.2-6.0 kg

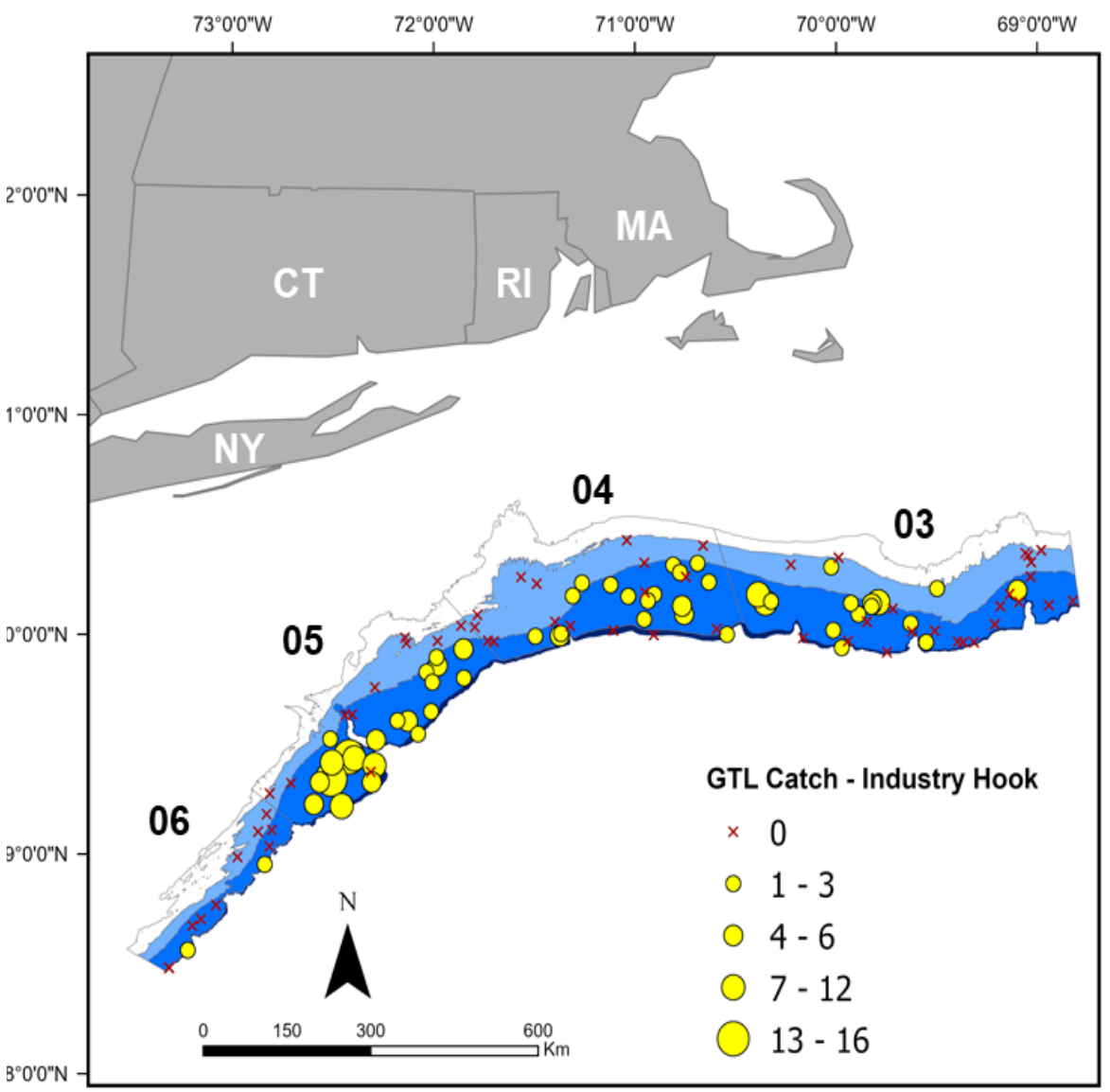


Hook Deployment & Retrieval

Strata	# Hooks Deployed	# Returned Bait	# Returned Bait SM/IND	% Empty	Total Catch	Total GTF Catch	GTF Catch 2023 SM/IND	GTF Catch 2020 SM/IND
3--2	1200	310	225/85	74	72	15	4/11	16/4
3--3	4050	613	349/264	85	375	126	81/45	159/68
3--4	450	51	24/27	89	15	2	1/1	0/0
4--2	1500	781	390/391	48	106	26	22/4	1/1
4--3	3300	833	425/408	75	335	179	147/32	254/117
4--4	450	159	78/81	65	18	2	1/1	3/0
5--2	750	509	269/240	32	50	7	6/1	0/0
5--3	3450	1082	562/520	69	692	329	222/107	234/103
5--4	300	116	71/45	61	32	26	13/13	6/4
6--2	450	299	149/150	34	7	0	0/0	0/0
6--3	900	376	211/165	58	225	4	1/3	0/0
6--4	300	41	35/6	86	3	0	0/0	0/1
Total	***17100***	***5170***	***2788/2382***	**70**	***1930***	***716***	***498/218***	***673/298***

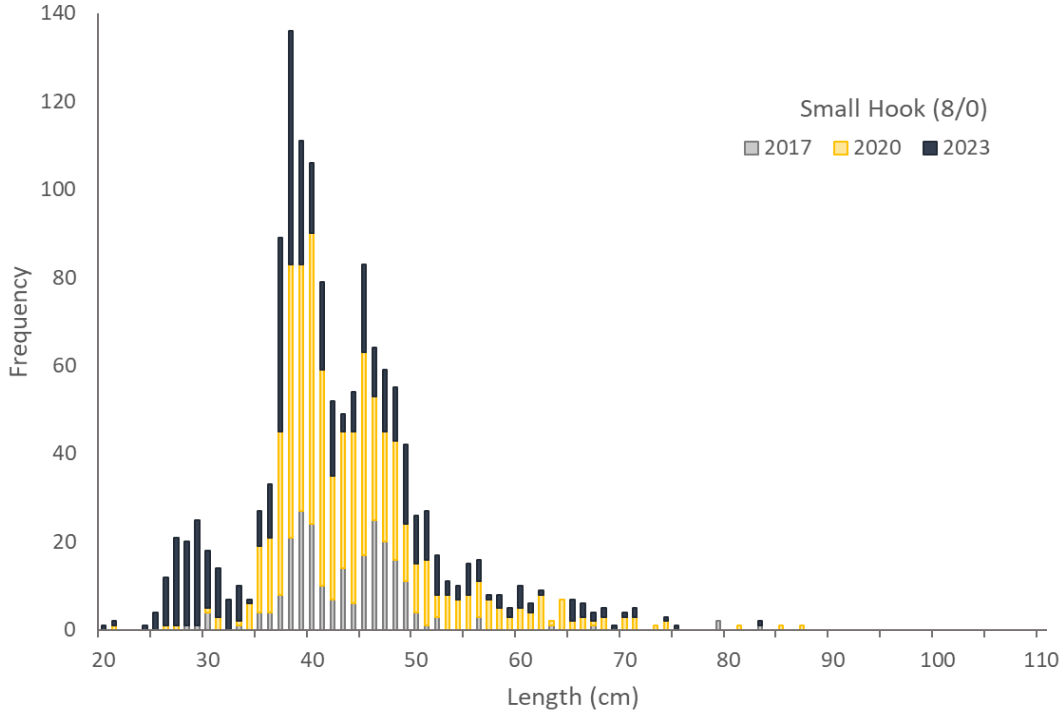
GTF Catch Distribution by Hook Size

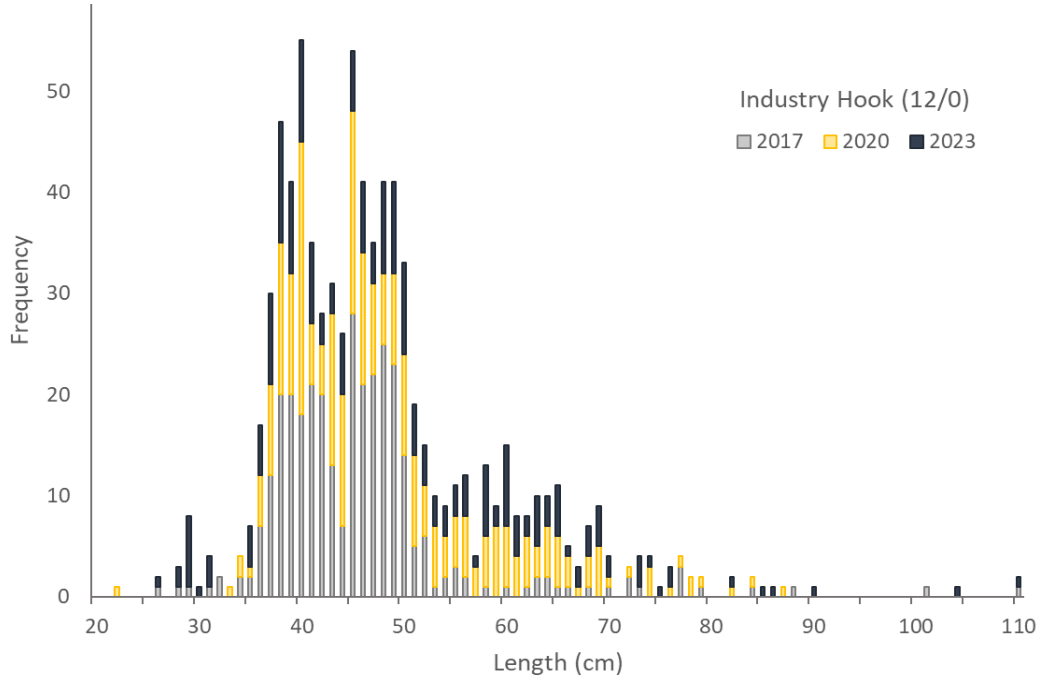




GTF Length Frequency

- Small hooks: 20-85 cm
- Industry hooks: 27-110 cm
- The highest catch for both hook sizes was of 30-40 cm which differs from the highest catch of 40-50 cm in 2020.
- All three surveys showed that on average small hooks had higher catch rates than industry hooks**.





2023 Survey Summary

- Consistency with the 2020 survey
  - Core area of abundance – between Hudson Canyon and Veatch
  - Dominant depth strata – 03: 54-137.9 fa (97-252 m)
  - Catch dominated by smaller GTF – > 45 cm
  - Small hooks had higher catch – 498 vs. 218
  - No relationship between GTF catch and soak duration or time of deployment
  - No relationship between soak duration and bait return for either hook size
- Departure from 2020 survey
  - Lower CPUE
  - Broader GTF size range; highest catch was individuals 30-40 cm for both hook sizes
  - 34% of the hooks retained bait or GTF upon retrieval (16% in 2020)
  - Industry hooks retained bait at a higher frequency
  - Small hooks captured a greater number of small GTF

Considerations for Future Surveys

- Plans underway to conduct the survey in 2025
- Combined survey data provide information to track cohorts and to inform assessment model selectivity (i.e., domed shaped selectivity) for GTF in the core region of abundance.
  - Aging individuals is underway to aid in confirming selectivity differences with hook size
- Combined survey data can serve to address the tradeoff between using a single hook verses multiple hook sizes.
- Future surveys focused on the core region of GTF abundance (depth strata 2 and 3) conducted annually using only small hooks could provide data on pre-recruits (year class strengths before they are fully recruited to the fishery) than a full survey conducted in alternate years.