Length frequency distributions for Hogfish collected by TIP in the Southeast from 1984 to 2024

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Introduction
This report documents changes in the length frequency distributions (LFDs) of hogfish samples collected from the Southeastern United States from 1984 to 2024. The 2017 hogfish update for SEDAR 37 produced length frequency distributions (LFDs) for fork length (FL). In this document, LFDs for FL using the hogfish regions described below were created for assessment staff to use in the assessment.

Materials and Methods
Length samples from commercial fisheries were obtained from the Trip Interview Program (TIP) database housed at the NOAA Fisheries Southeast Fisheries Science Center. Data were provided in a Microsoft Excel CSV file with TIP data from the various tables present (interview, effort, landings, sample, observation, and observation sample) and imported and formatted with a SAS program (04-TIP_lengths.sas). The program brings in the data while defining variable names and types. The program looks for errors (odd length types, units, extreme values, etc) and corrects them. Errors were also reported to TIP to ensure that the same corrections are not needed for the next assessment. Assessment staff will also use length/length and length/weight regressions to create FL and weight for each record when values are missing using data from the data workshop.

Finally, the SAS program sets up the LFDs and fits the data into the hogfish regions (As defined by Chris Swanson). The regions are North of Florida (Florida Georgia border northwards) [North of FL], East Florida and Florida Keys [EFL & Keys], West Florida [WFL], and West of Florida (West of the Florida/Alabama border) [West of FL]. Data was moved into the regions first by area fished and then county landed if area fished was not available.

Fork lengths greater than 810 mm were investigated to ensure accuracy, this is 100 mm less than the maximum total length reported to fishbase.org. Checks were performed for the fishery (commercial or non-commercial), randomness of sampling, bias type, and sample method type.

Data were exported using the provided SEDAR data format requested by assessors with the addition of some extra fields for clarity. Descriptive statistics (PROC Means) of trimmed values for FL were generated for each hogfish region over all years and for each year/hogfish region. LFDs were visually represented (PROC Univariate and Proc Chart) with values for observed FL for each hogfish region over all years and for each year/hogfish region (all using 2 cm length bins).

Results and Discussion
There were no records for which a hogfish region could not be assigned. All records provided by NOAA were commercial records and were indicated to be a random sample. When samplers reported if there was a bias in the sampling 99.8 % of the 8,041 records had no known bias type and the rest had no information on bias type. The sampling method type was mostly landed unsorted (95.92%) followed by landed sorted (2.54%), and then at sea unsorted and unknown (both less than 1%). The state where the samples were landed from most to least were Florida (43.52%), North Carolina (31.59%), South Carolina (24.83%), Georgia (0.05%), and Louisiana (0.01%). Sex, based on the gonads, was able to be determined for 30.22% of the samples. Secondary sex characteristics were reported for 429 fish, of which 49.42% were female and the remaining 51.58% were male.

Assessment staff requested a non-weighted dataset with all fields retained. Table 1 shows the proc means output for all hogfish observed FL by year (quantity multiplier applied). Most quantity values, the frequency multiplier in TIP data, were 1 (95.80%) and 4.2% of quantity values were over 1 (Table 2). Table 3 shows the means and standard deviations for each observed FL in every hogfish region. The number of observed FL records for each hogfish region and year combination are shown in Tables 4. Hook and line gear comprised 46.77% of TIP samples with Diving gears being the second most abundant at 33.64% (Table 5). Length distributions for each of the hogfish regions across all years for observed FL

are shown in Figure 1. Length distributions for each year across all regions for observed FL is shown in Figure 2. Length distributions for each gear across all regions and years for observed FL is shown in Figure 3. Mean and median weights were calculated for hogfish across all years for each hogfish region in kilograms and pounds (Table 6). Average weights for each year were used to turn pounds of whole fish in landings into numbers of fish for the assessment staff. Average weights were calculated across all gears and regions because the data were insufficient for subdividing by hogfish region, gear, or both. For years without TIP data adjacent years were used to convert pounds of fish into numbers of fish.

Table 1. TIP fork length (FL) records by year across all hogfish regions (East Florida and Florida Keys [EFL & Keys], North of Florida [N of FL], West of Florida [W of FL], and West Florida [WFL]).

Year	N Obs	Mean	Std Dev	Minimum	Maximum	N
1984	54	619.537	81.433	460	780	54
1985	79	599.684	74.362	425	750	79
1986	15	602.692	106.314	390	750	13
1987	52	596.200	71.325	440	720	50
1988	84	588.582	76.346	410	725	67
1989	98	564.150	90.379	370	770	80
1990	272	507.523	129.057	226	790	239
1991	183	492.252	124.547	271	925	139
1992	342	427.326	110.442	235	970	341
1993	367	440.273	116.697	266	740	330
1994	210	460.005	117.735	272.5	762.5	204
1995	205	528.034	96.501	302	770	203
1996	174	496.750	128.008	282.5	790	120
1997	347	497.682	112.363	243	790	256
1998	557	436.072	136.303	212.5	802.5	513
1999	740	507.636	121.995	156.5	865	740
2000	732	486.191	121.753	205	840	732
2001	408	505.504	131.563	250	800	408
2002	462	472.461	134.204	250	960	461
2003	302	477.589	128.112	200	820	302
2004	180	528.578	139.268	250	880	180
2005	154	513.094	115.267	235	767.5	154
2006	134	542.022	136.650	293	828	134
2007	67	581.134	118.374	286	776	67
2008	265	420.909	140.893	211	950	265
2009	273	533.363	136.974	289	830	273
2010	443	458.070	149.045	270	840	443
2011	318	502.006	146.406	280	860	318
2012	208	488.880	151.886	280	762	208
2013	313	459.684	137.553	281	810	313
2014	593	470.575	141.663	211	886	593
2015	374	432.992	128.124	260	829	374
2016	300	459.247	127.850	275	824	300
2017	488	485.857	117.957	292	850	488
2018	218	540.729	101.474	328	850	218
2019	233	541.648	98.930	244	797	233
2020	192	466.870	114.731	346	794	192
2021	141	462.723	102.129	278	760	141
2022	67	567.522	97.246	334	733	67
2023	120	589.967	103.105	342	794	120
2024	223	574.004	93.869	325	778	223

Table 2. Quantity [frequency] values (mean, std dev, min, max, n, and percentage) for TIP FL data values.

Quantity	Mean	Std Dev	Minimum	Maximum	N	Percentage
1	490.063	132.280	156.5	970	9604	95.80%
2	493.690	118.986	222.5	780	305	3.04%
3	470.417	136.805	232.5	690	72	0.72%
4	410.517	163.626	232.5	800	29	0.29%
5	508.333	65.243	440	630	6	0.06%
6	482.083	100.280	282.5	540	6	0.06%
7	267.500	.	267.5	267.5	1	0.01%
8	411.250	153.796	302.5	520	2	0.02%

Table 3. TIP FL data values (number of observations, mean, median, std dev, min, max, and n) by hogfish region (East Florida and Florida Keys [EFL & Keys], North of Florida [N of FL], West of Florida [W of FL], and West Florida [WFL]).

Region	N Obs	Mean	Median	Std Dev	Minimum	Maximum	N
N of FL	6,302	566.120	560.0	96.310	244	970	6,263
EFL and Keys	3,067	375.604	348.5	88.380	211	828	2,842
WFL	1,614	382.083	365.0	95.695	156.5	780	1,526
W of FL	1	496.000	496.0	.	496	496	1

Table 4. Sampled frequencies for each year by hogfish region (East Florida and Florida Keys [EFL & Keys], North of Florida [N of FL], West of Florida [W of FL], and West Florida [WFL]) for TIP observed FL data values.

Year	N of FL	EFL and Keys	WFL	W of FL	Total
1984	54	0	0	0	54
1985	79	0	0	0	79
1986	15	0	0	0	15
1987	52	0	0	0	52
1988	74	10	0	0	84
1989	96	2	0	0	98
1990	148	124	0	0	272
1991	95	80	8	0	183
1992	91	249	2	0	342
1993	141	201	25	0	367
1994	92	115	3	0	210
1995	188	17	0	0	205
1996	85	55	34	0	174
1997	151	147	49	0	347
1998	232	203	122	0	557
1999	514	72	154	0	740
2000	485	144	103	0	732
2001	284	50	74	0	408
2002	225	110	127	0	462
2003	190	81	31	0	302
2004	140	40	0	0	180
2005	108	44	2	0	154
2006	77	55	2	0	134
2007	56	6	5	0	67
2008	84	163	18	0	265
2009	224	38	11	0	273
2010	182	220	41	0	443
2011	189	110	19	0	318
2012	97	80	31	0	208
2013	126	111	76	0	313
2014	226	233	133	1	593
2015	119	146	109	0	374
2016	166	70	64	0	300
2017	352	40	96	0	488
2018	151	17	50	0	218
2019	201	17	15	0	233
2020	75	5	112	0	192
2021	58	6	77	0	141
2022	58	2	7	0	67
2023	107	4	9	0	120
2024	215	0	5	0	220

Table 5. Gear distributions (Entered TIP gear and Gear Group) across all years for TIP FL data values. Gear groups: Diving Gear [DV], Hook and Line Gear [HL], Longline Gear [LL], Other Gear [OT], Trap Gear [TR], and Unknown Gear [UN].

Gear	Gear Group	N Obs	Mean	Std Dev	Minimum	Maximum	N	Percentage
BY HAND, DIVING GEAR	DV	31	400.577	65.940	337.5	547.5	13	0.30%
ELECTRIC/HYDRAULIC, BANDIT REELS	HL	3978	563.566	91.183	244	960	3940	38.42%
GILL NETS	OT	2	.	.	.	.	0	0.02%
GILL NETS, OTHER	OT	24	327.500	14.142	317.5	347.5	4	0.23%
HAND LINE	HL	339	419.079	94.360	252	707	267	3.27%
HOOK AND LINE	HL	488	374.537	123.774	212.5	970	418	4.71%
HOOK AND LINE, ELECTRIC	HL	10	572.300	95.129	370	690	10	0.10%
HOOK AND LINE, MANUAL	HL	17	537.029	95.507	390	710	17	0.16%
LONG LINES	LL	3	337.000	53.113	286	392	3	0.03%
LONG LINES, BOTTOM	LL	171	585.391	74.943	360	767.5	170	1.65%
LONG LINES, VERTICAL	LL	8	373.000	54.827	304	442	8	0.08%
NOT CODED	UN	508	566.225	101.961	268	850	506	4.91%
OTHER TRAWLS	OT	5	420.000	62.197	372	529	5	0.05%
POTS AND TRAPS	TR	2	394.500	57.276	354	435	2	0.02%
POTS AND TRAPS, FISH	TR	1087	363.066	81.121	156.5	745	1030	10.50%
POTS AND TRAPS, SPINY LOBSTER	TR	218	345.156	48.152	235	573	218	2.11%
SCUBA	DV	1812	443.302	140.136	211	880	1779	17.50%
SPEARS	DV	1632	443.709	123.774	211	886	1593	15.76%
TROLL LINES	HL	11	596.273	84.300	431	713	11	0.11%
UNSPECIFIED GEAR	DV	8	360.375	13.948	340	378	8	0.08%

Table 6. Hogfish mean and median weights in pounds by hogfish regions (East Florida and Florida Keys [EFL & Keys], North of Florida [N of FL], West of Florida [W of FL], and West Florida [WFL]), all years combined.

	N of FL	EFL and Keys	WFL	W of FL
Mean	7.892	2.982	3.496	.
Median	6.607	1.811	2.420	.

Figure 1. Proportion of observed fork lengths by hogfish region fished (East Florida and Florida Keys [EFL & Keys], North of Florida [N of FL], West of Florida [W of FL], and West Florida [WFL]) using 2 cm bins.

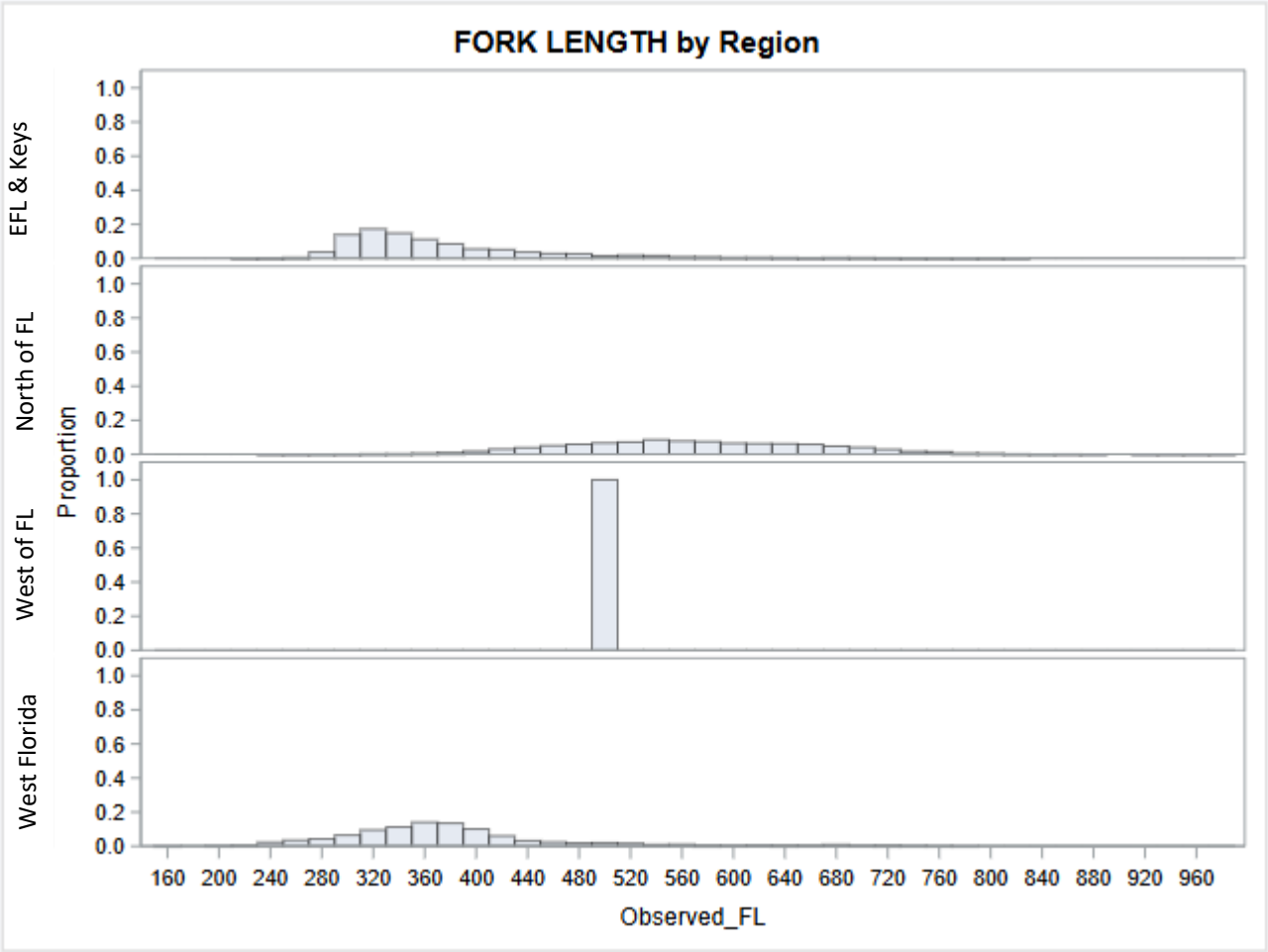

Figure 2a. Proportion of observed fork lengths by year (1984 – 1987) using 2 cm bins.

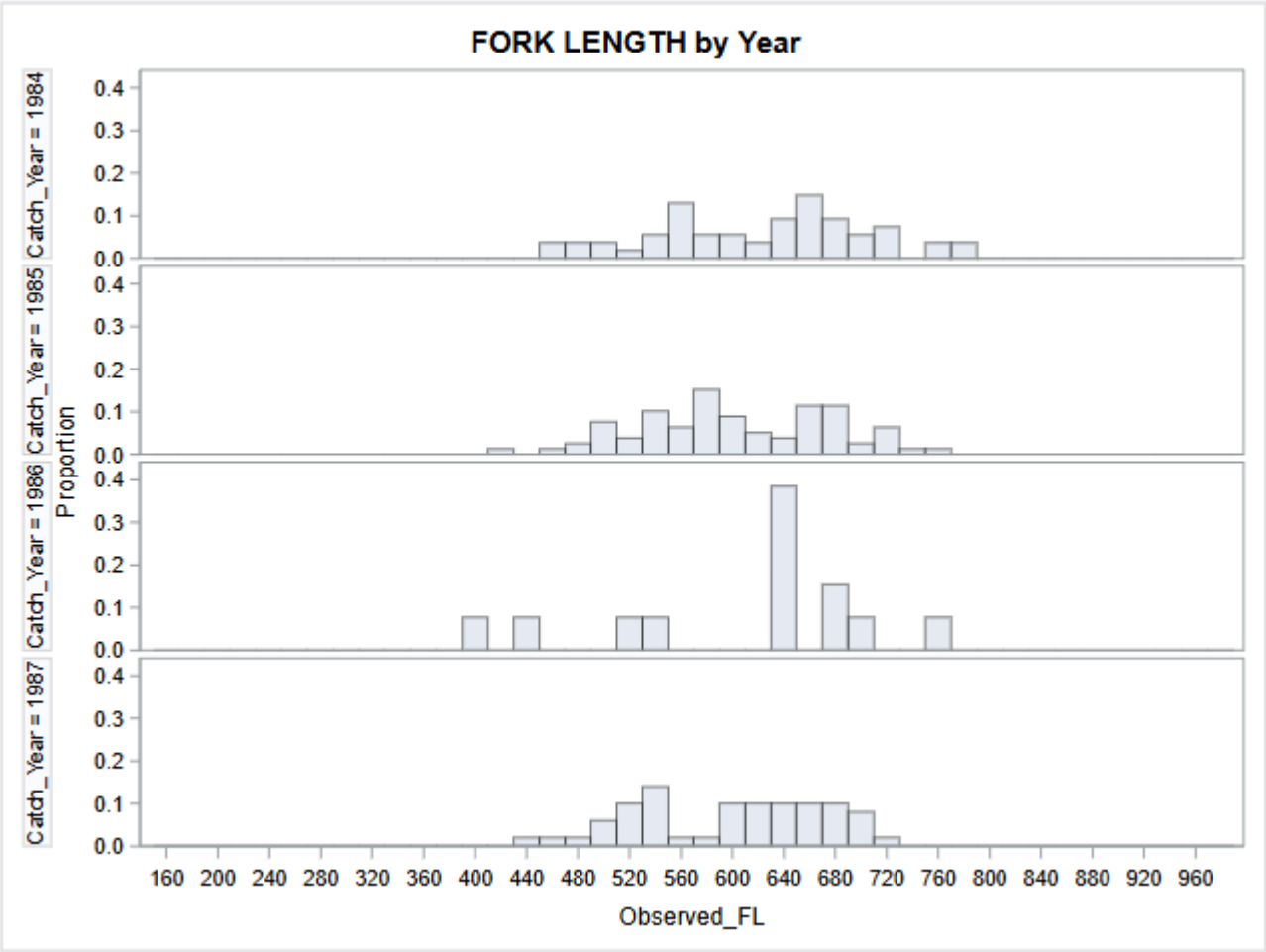

Figure 2b. Proportion of observed fork lengths by year (1988 – 1991) using 2 cm bins.

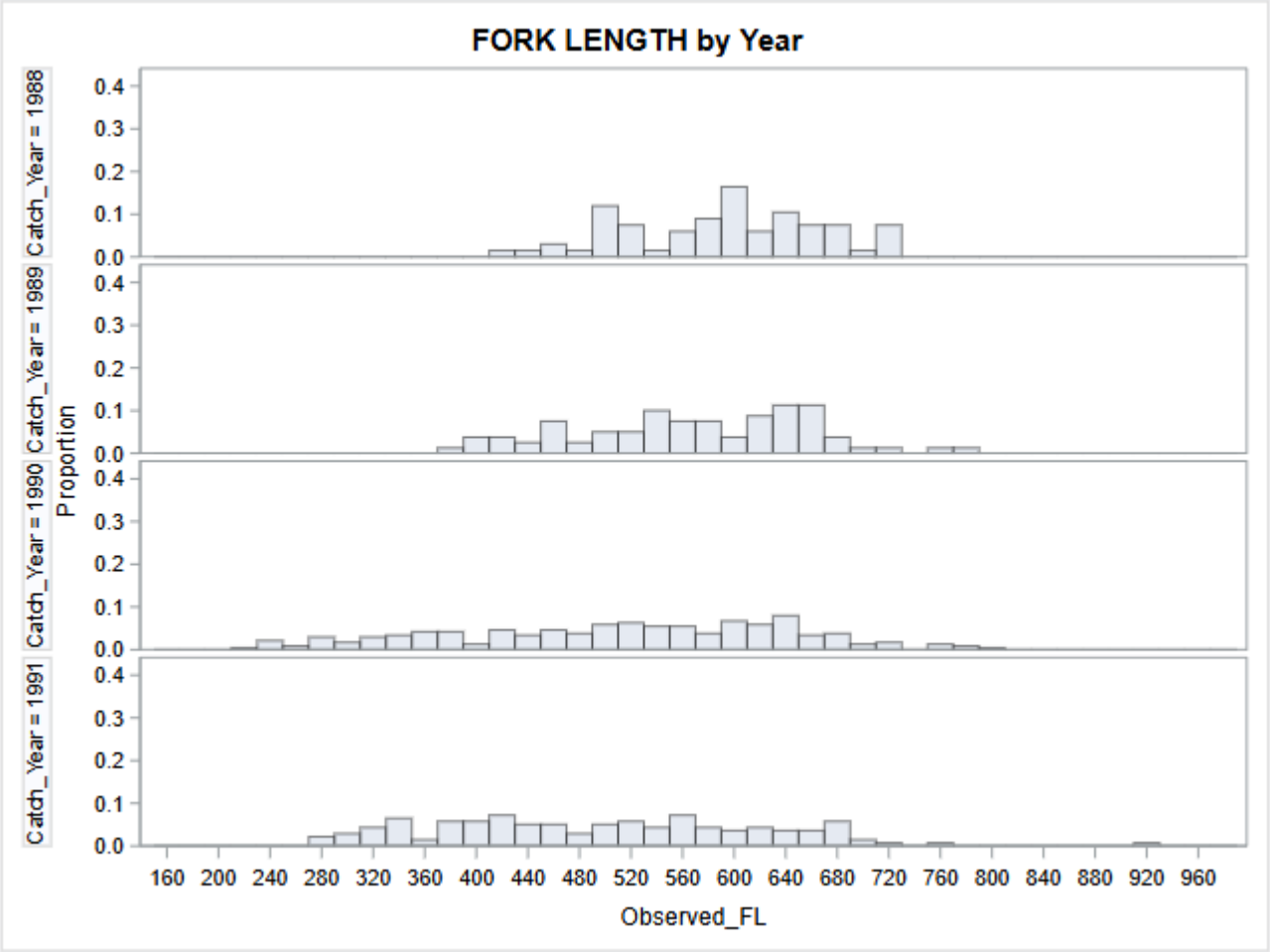

Figure 2c. Proportion of observed fork lengths by year (1992 – 1995) using 2 cm bins.

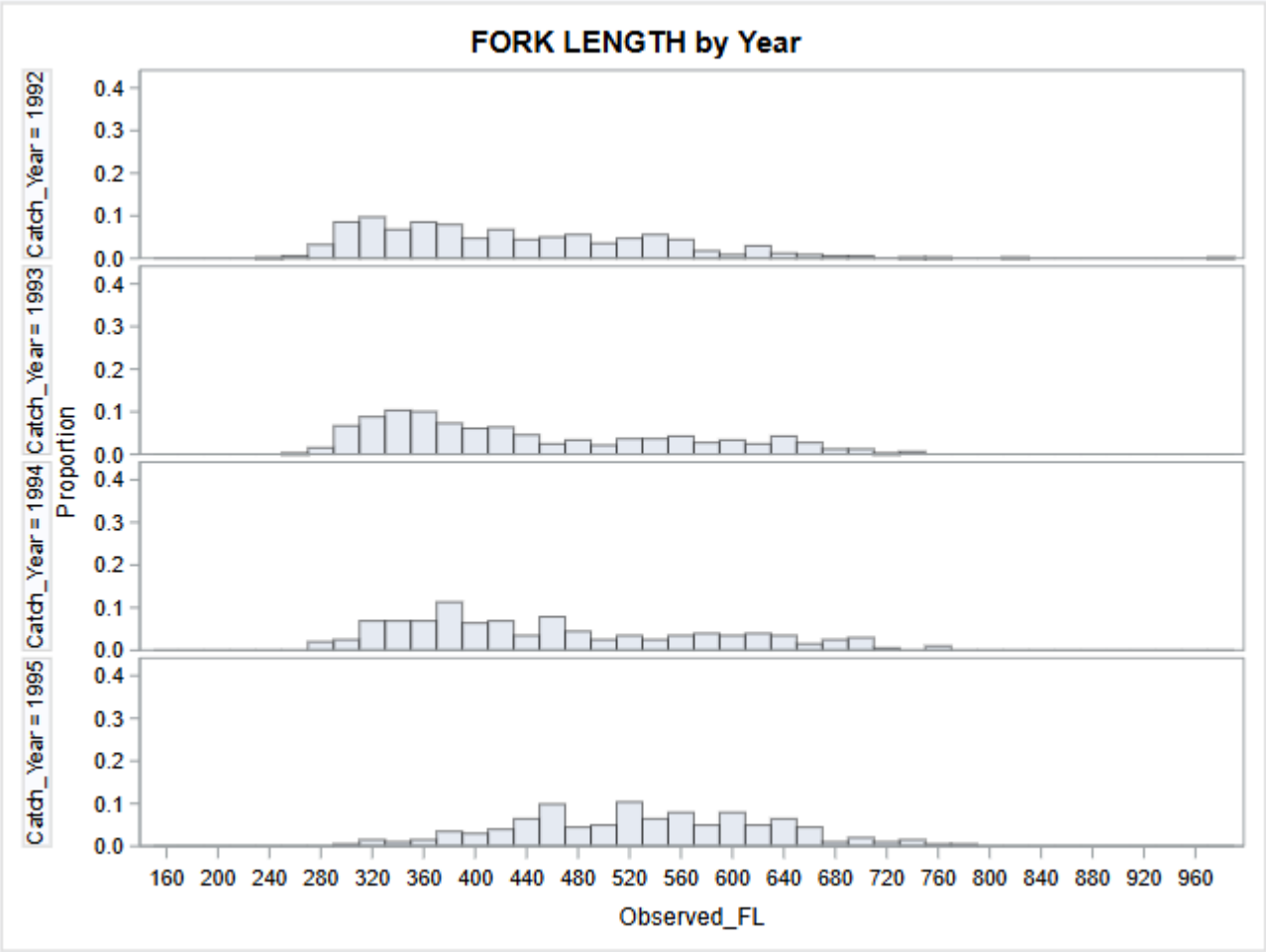

Figure 2d. Proportion of observed fork lengths by year (1996 – 1999) using 2 cm bins.

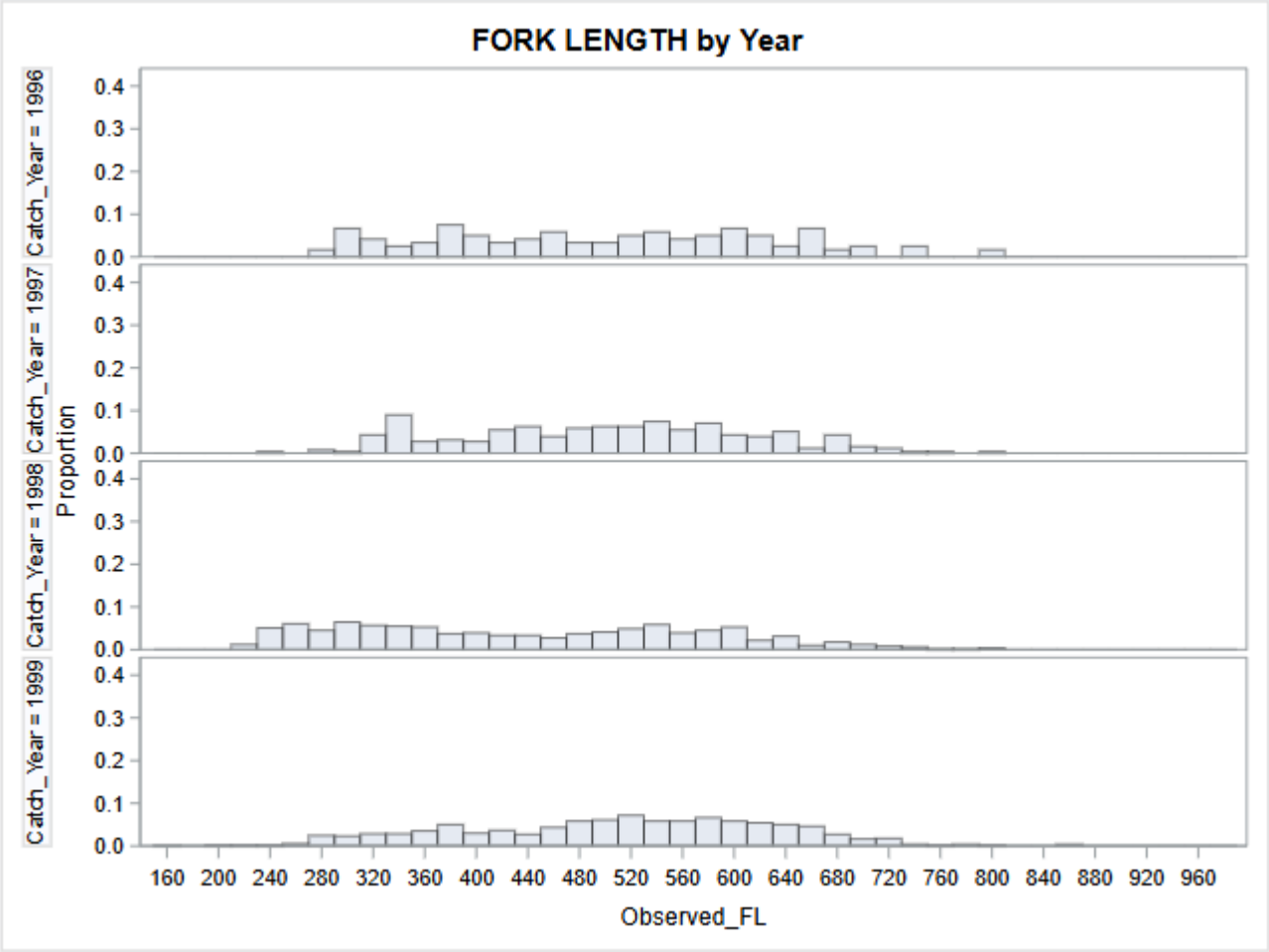

Figure 2e. Proportion of observed fork lengths by year (2000 – 2003) using 2 cm bins.

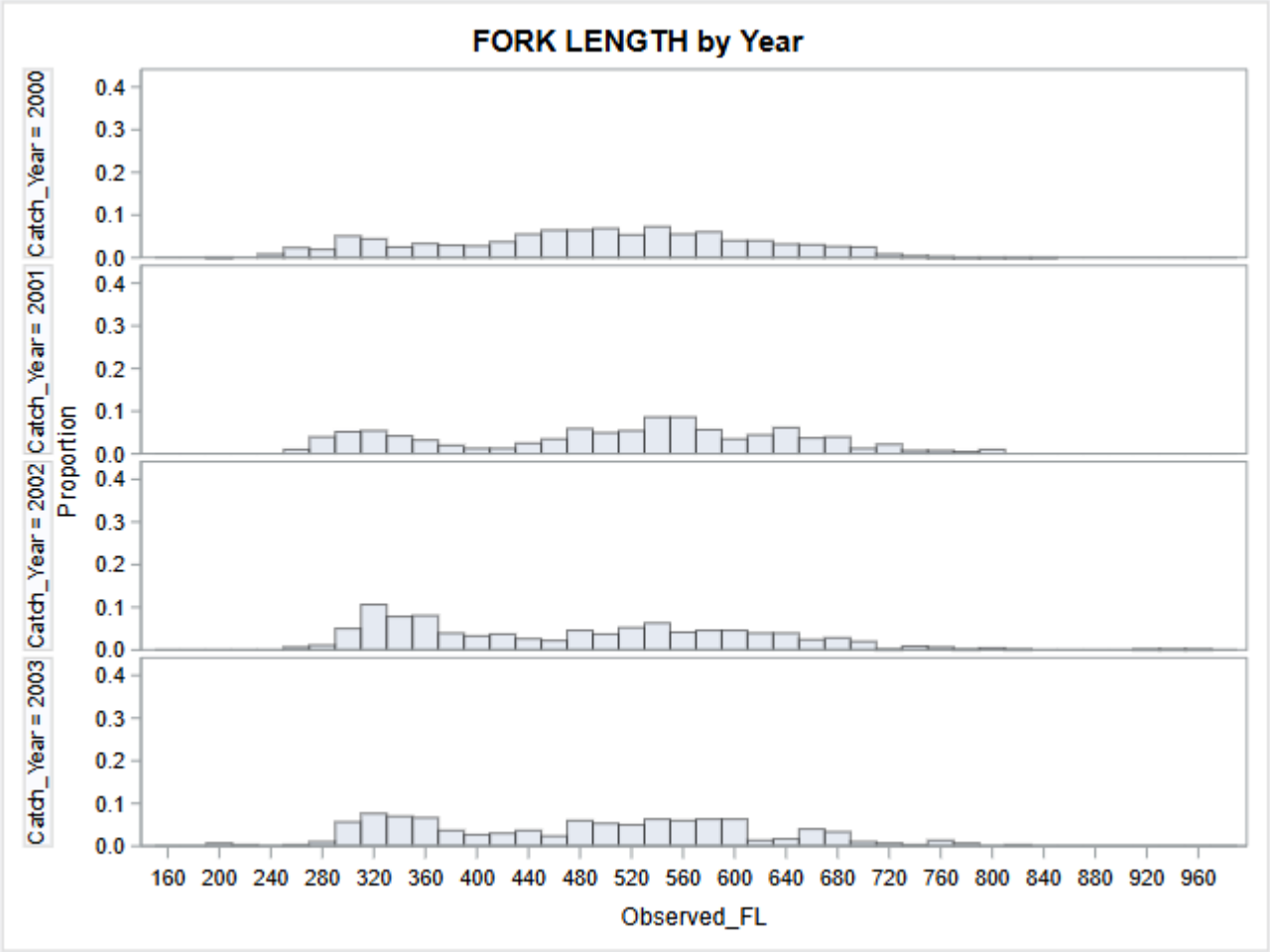

Figure 2f. Proportion of observed fork lengths by year (2004 – 2007) using 2 cm bins.

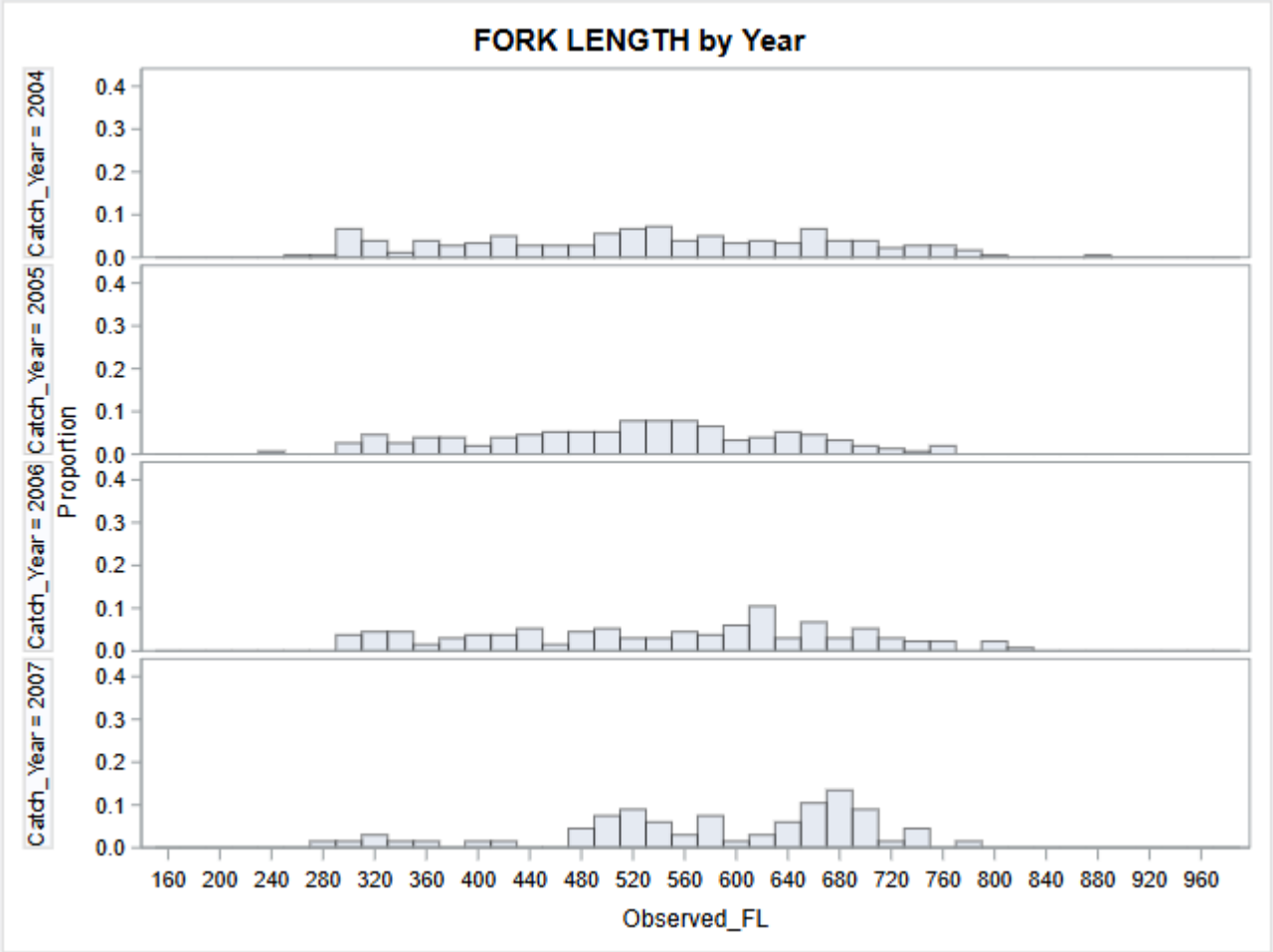

Figure 2g. Proportion of observed fork lengths by year (2008 – 2011) using 2 cm bins.

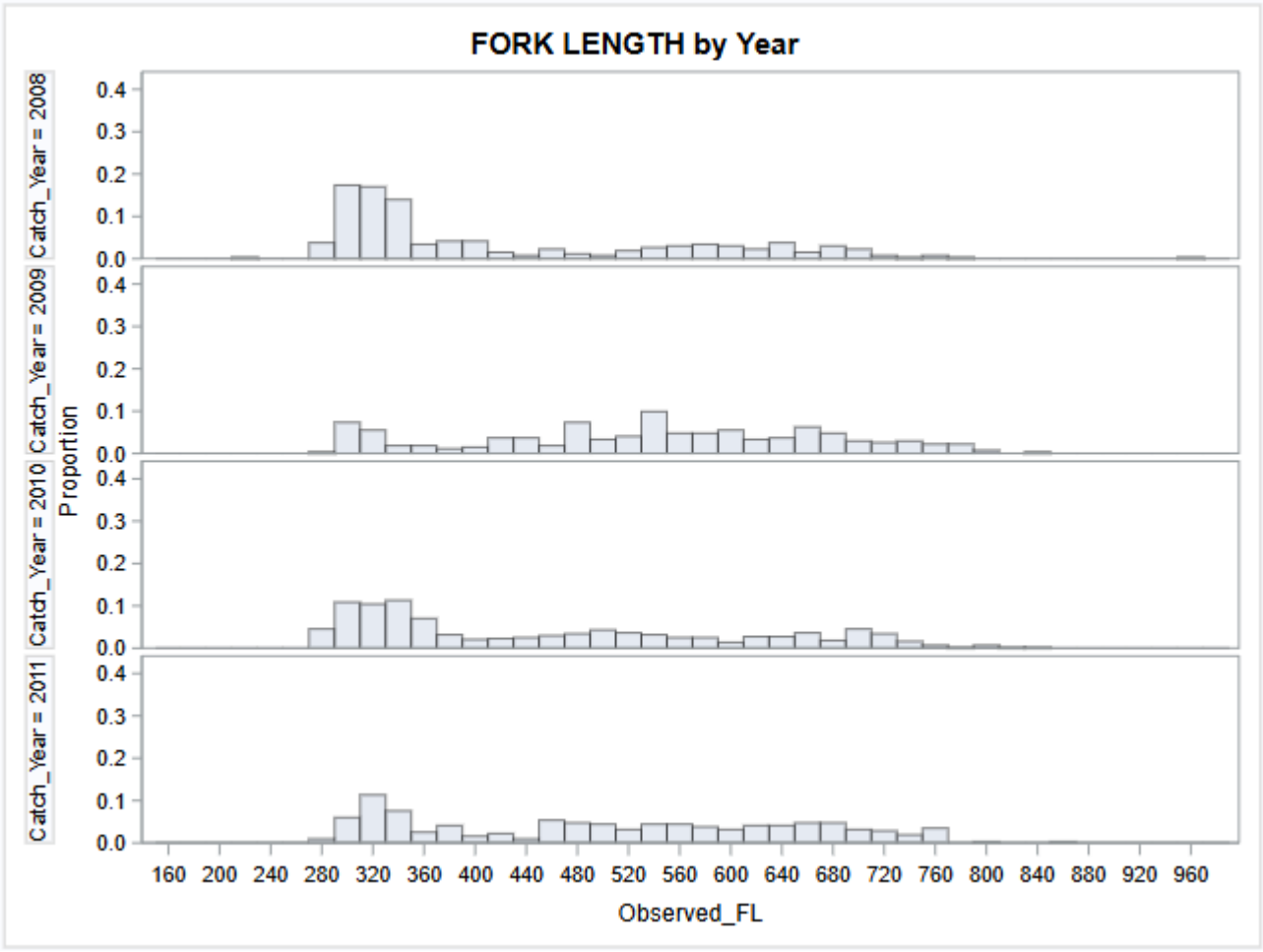

Figure 2h. Proportion of observed fork lengths by year (2012 – 2015) using 2 cm bins.

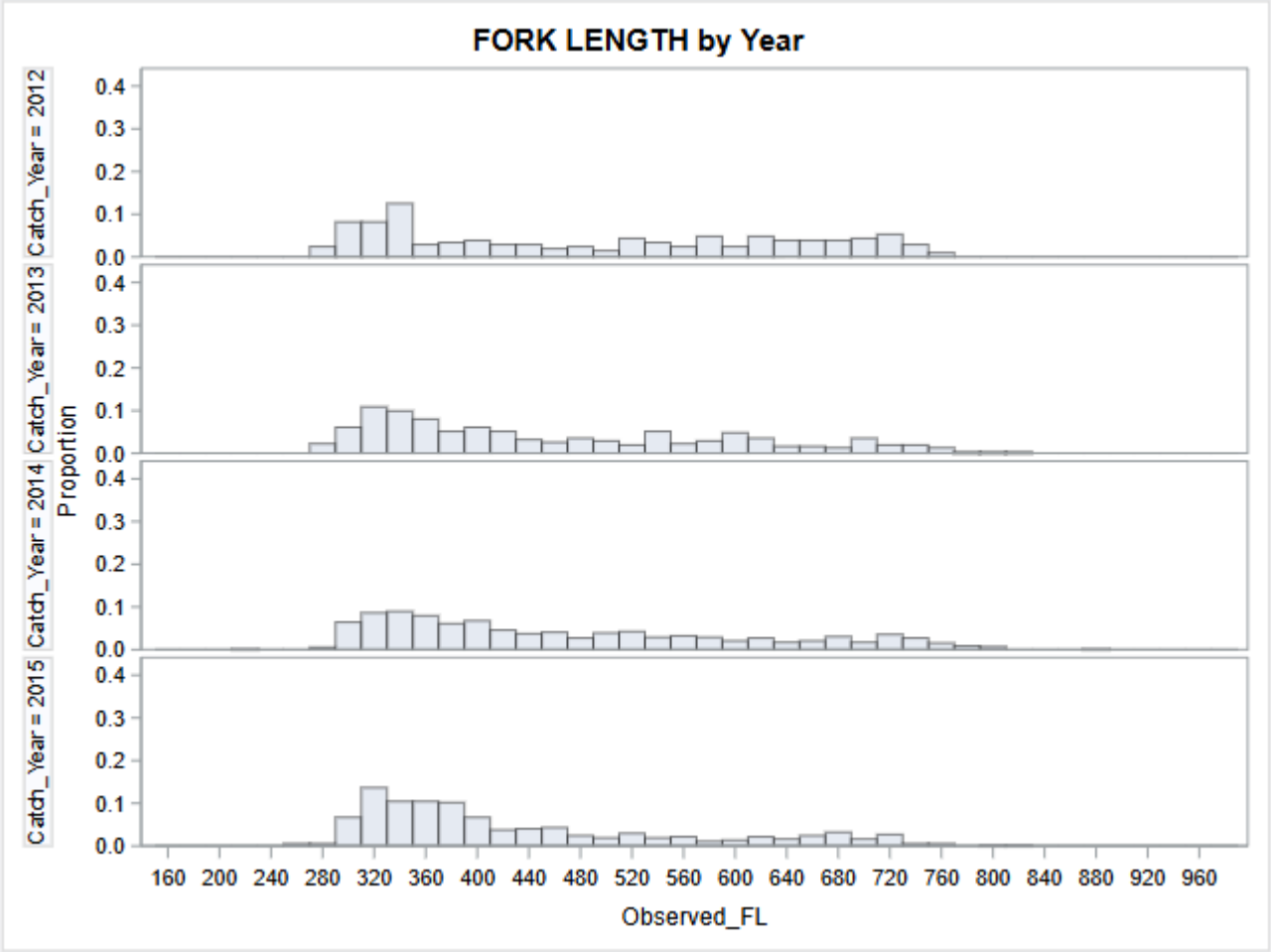

Figure 2i. Proportion of observed fork lengths by year (2016 – 2019) using 2 cm bins.

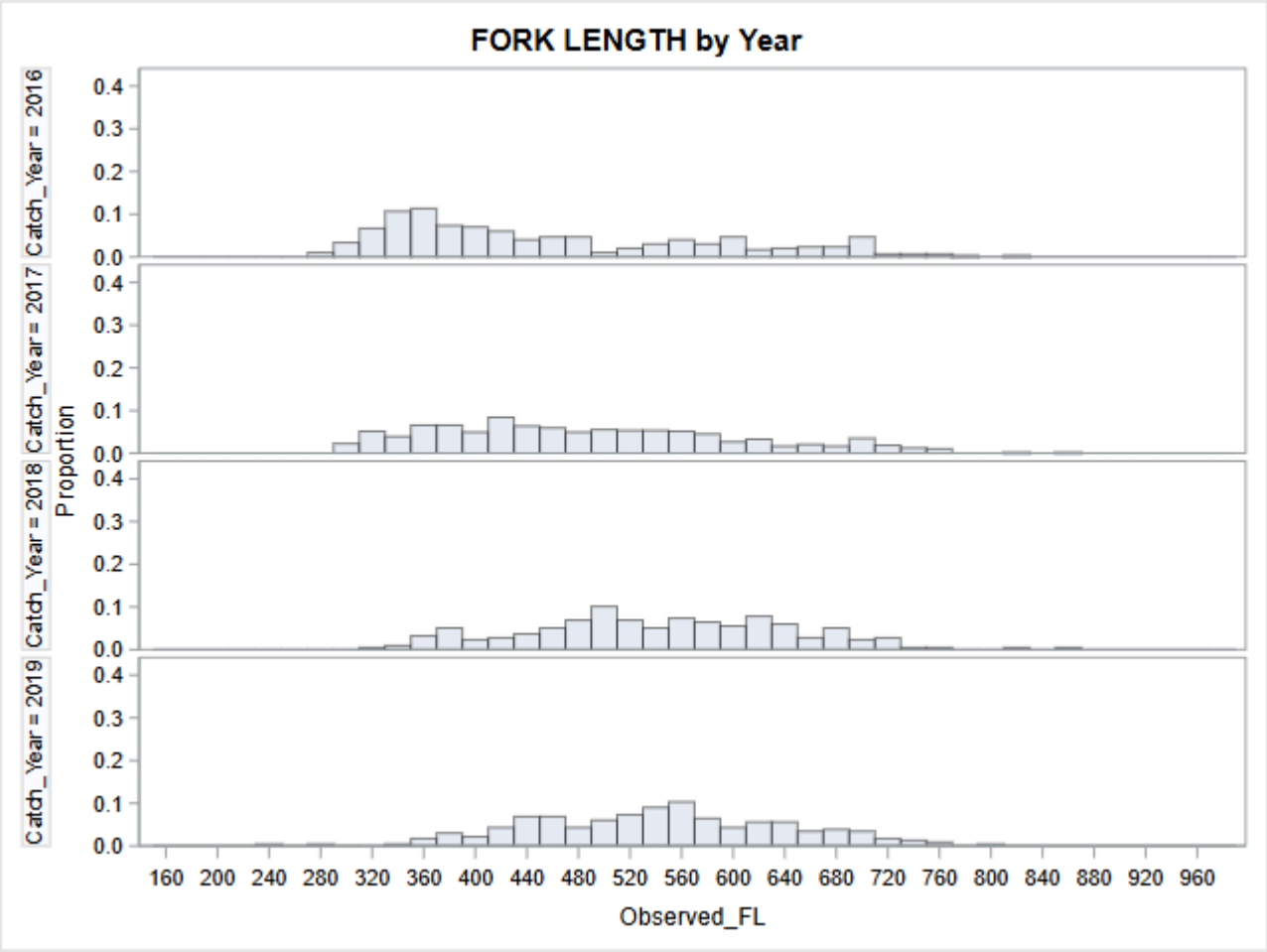

Figure 2j. Proportion of observed fork lengths by year (2020 – 2023) using 2 cm bins.

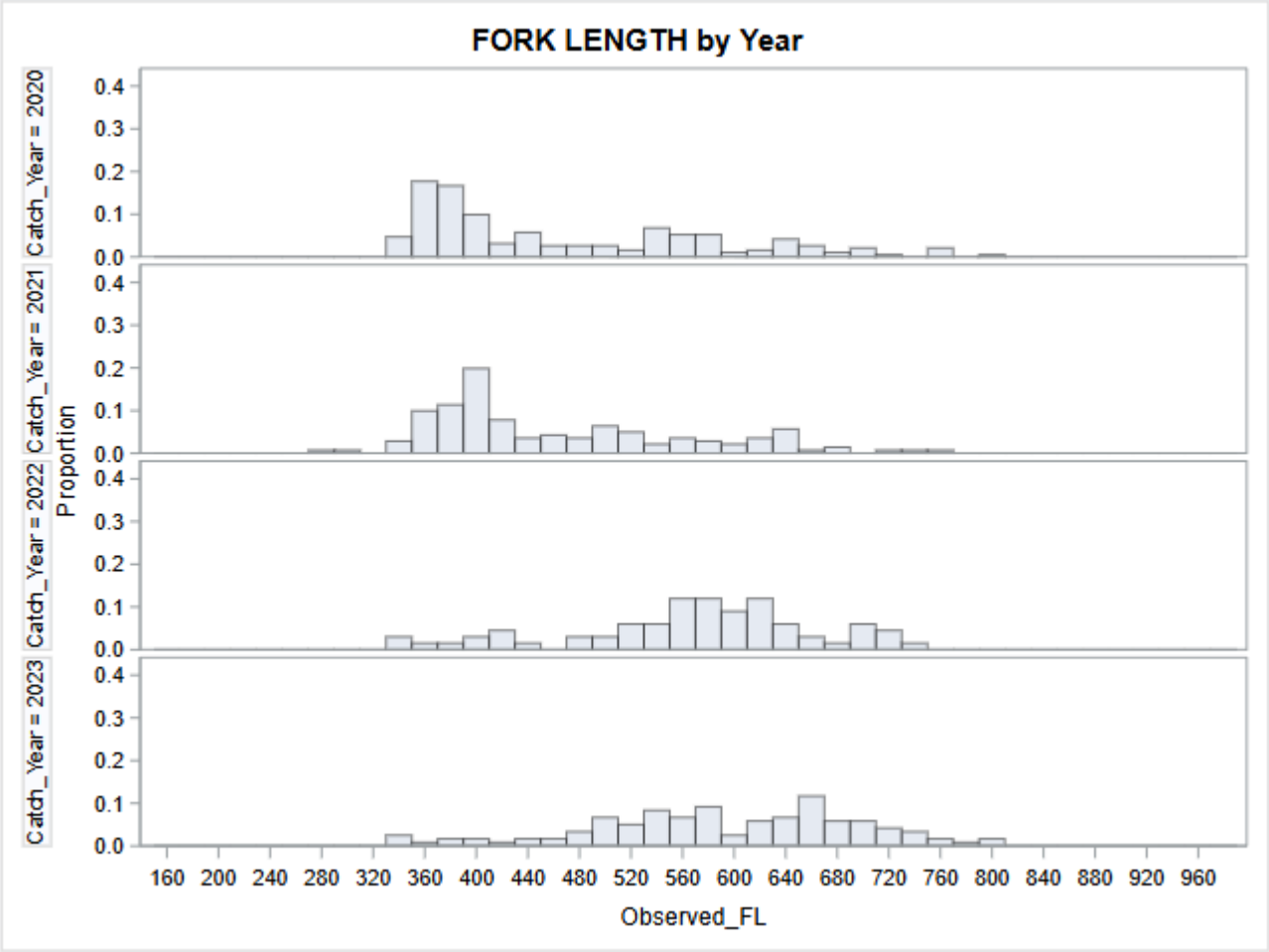

Figure 2k. Proportion of observed fork lengths by year (2024) using 2 cm bins.

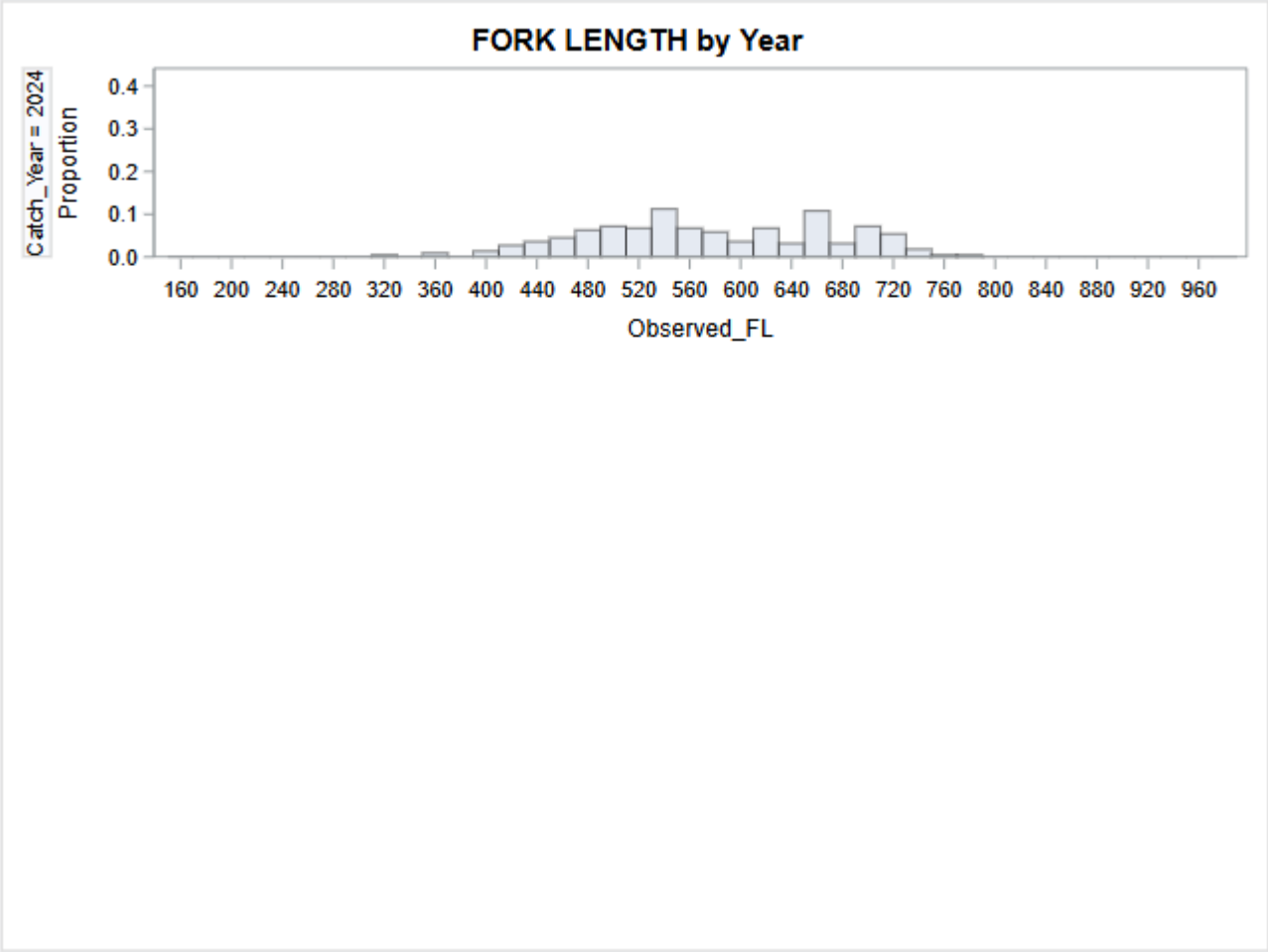

Figure 3a. Proportion of observed fork lengths for gear (Diving Gear [DV], Hook and Line Gear [HL], and Longline Gear [LL]) across all regions and years using 2 cm bins.

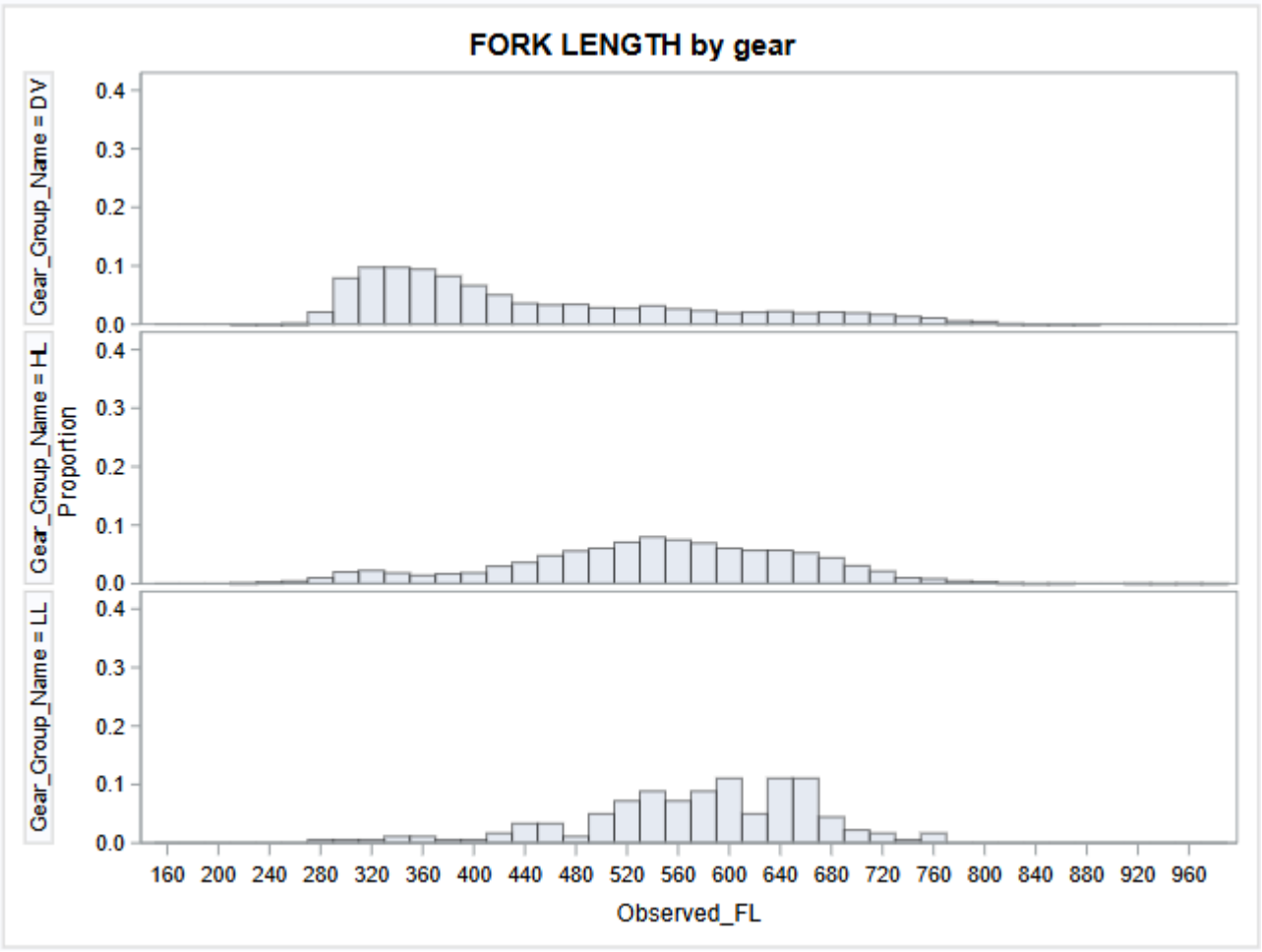

Figure 3b. Proportion of observed fork lengths for gear (Other Gear [OT], Trap Gear [TR], and Unknown Gear [UN]) across all regions and years using 2 cm bins.