Summary of Golden Tilefish (*Lopholatilus chamaeleonticeps*) Length Composition Sampling from the Trip Interview Program (TIP) 1981-2010

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By

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Description of Trip Interview Program (TIP)
The Trip Interview Program (TIP), was developed and facilitated by the National Marine Fisheries Service Southeast Fisheries Science Center collects data on fishing effort, species composition of the catch, size frequency of the catch and collect age and tissue samples for analysis at one of the NMFS laboratories. Port agents in the southeastern United States visit docks and fish houses where they interview the fisherman and take length and weight measurements of the catch. Port agents are either stationed at the location where the fish are unloaded and are able to measure each fish as it is landed, or if the fish have already been unloaded, the port agents then measure a sample of the catch from the storage containers within the fish house. Whenever possible, a captain or crewmember are interviewed to obtain information about the fishing trip, including area fished, gear, etc. Hard part and tissue samples are sometimes obtained from species and sent to the lab for age based or genetic analysis. Like the other statistics gathering programs, this one is also a joint or cooperative effort with the state fishery agencies in the Southeast Region.

The dock-side sampling for this program is conducted at ports located in coastal areas in the South Atlantic (North Carolina through Florida Keys) and Gulf of Mexico as well as Puerto Rico and the US Virgin Islands. When the catch is intercepted it is sampled on a random basis. Sampling is done according to the market categories that make up the landings. A market category is any combination of species, species group, or size that occurs within the catch and is distinctly marketed (i.e., large red snapper, groupers, porgies). The TIP protocol is to obtain 30 length measurements in each sample. The entire catch of a market group will be sampled if it is less than 30 individuals. In the case of large catches where there is a variety in sizes for a species the sampler may take up to 50 length measurements in a sample.

When hard parts or tissue samples are taken, they are processed according to established procedures and sent to either the Panama City Laboratory or the Beaufort Laboratory for analysis. The age, reproductive maturity, sex and other life history data are entered into databases maintained by the individual Laboratories.

Tip data entry
Once a port agent returns after an interview, they enter the data into the TIP database using the TIP Online interface. The first screen collects basic data on the interview, such as date, landings location, sampling location, vessel number, fishing mode, type of interview, days out and days fished (Figure 1). If effort information were collected, this information is entered on the effort screen (Figure 2). Each effort record is tied to the interview with the interview number. If landings data were collected, the agent enters the landings information in the landings screen (Figure 3). Each species, market, grade, condition and weight is entered on this screen. In the past, if no landings information was available, the port agent created a dummy record with no weight to attach to the sample. Currently, samplers are strongly encouraged to collect landings information for each interview. The sampler begins entry of the sample information by selecting the landings record from which the sample was drawn (Figure 4). This creates a link between the weight of the landings and the sample. This link allows for weighting of the sample by the appropriate landings. The sampler then enters the size of the sample for each species, market and grade as well as the type of sampling used (sampled from unsorted catch, sorted catch, etc.). The sampler then enters the information

collected from each fish in the observation screen (Figure 5). The port agent begins by selecting the sample from which the individual fish was derived, which is then saved in the individual length data. The port agent then enters the species, size, grade, sex, length, type of length, length measurement type, weight, weight type and enters information otolith or tissue samples if taken. After all information is entered the data is saved and is written to Oracle tables on the SEFSC server.

TIP data used for length frequencies

Biological sample data were obtained from the TIP sample data at NMFS/SEFSC. Data were filtered to eliminate those records that included a size or effort bias, non-random collection of length data, were not from commercial trips, fish were selected by quota sampling or the data was not collected shore-side. Data that were not from the South Atlantic were dropped. These data were further limited to those that could be assigned a year, gear, and state. Data that had an unknown sampling year, gear, or sampling state were deleted from the file. These data must be weighted by trip, so where no trip landings data were available, the sample was excluded. TIP data must also be weighted spatially by the landings for the particular year, state and gear stratum. TIP data were joined with landings data by year, gear, and state. Landings data were also limited to only those data that could be assigned a year, gear, and state. Landings and biological data were assigned a state based on landing location or sample location if there was no landing location assigned.

Reason for weighting samples

Although every attempt is made to standardize sampling, different locations may require deviation from TIP protocols, so there may be differences in the methods used to collect samples. These differences could create biases when using raw length frequencies (Chih, 2006). First, there may differences in sampling fractions between trips due to the sampling environment or time limitations that differ in each location. A small catch may have all the fish sampled and a large catch may have equal or fewer fish sampled, resulting in a smaller proportion of the fish sampled. If we use the raw lengths, then the overall length distribution will overemphasize the lengths from the small catch. For example, if small catches for some reason have larger fish than large catches, this would result in a length distribution shifted toward larger fish than were actually present in the universe of fish landed. To correct for this type of bias, we weight the samples by the catch from which the sample was drawn for each trip, so the lengths from a large catch contribute more to the overall length composition than those from a small catch.

Second, there may be differences in sampling intensity between areas. North Carolina may sample more trips than South Carolina, resulting in more fish sampled in NC even though SC may have more landings. Using raw length data to develop a length composition would bias the length composition toward samples obtained in NC. If there happens to be a size difference between fish landed in NC and those in SC, then the sample will not be representative of the overall landings and will biased toward the sizes of fish landed in NC. To correct this bias we weight the samples by the total landings in each state, so the proportion of the lengths included in the length composition are proportional to the landings from each area.

Using the weighting methods established in SEDAR 10 and used in SEDAR 15 and 19 (SEDAR, 2006; SEDAR, 2008a; SEDAR, 2008b; SEDAR, 2010a; SEDAR, 2010b) , the length compositions were weighted by the product of the landings in numbers for the year, state, and gear stratum and trip catch in numbers.

Landings used for weighting
Golden tilefish landings were compiled by the commercial group during the Data Workshop. The final landings by year, state and gear were used to weight the length composition data.

Sampling frequency
The number of trips with useable samples ranged from a high of 141 for hand line gear in 1993 to a low of zero for other gear in most years (Table 1). The number of trips with useable samples was consistently greater than 10 trips for long line gear except 1987-1990. Hand line trips with useable samples were consistently less than 10 trips except for 2002 (13). Other gears were rarely sampled. Table 3 displays number of trips that caught golden tilefish, number of trips targeting golden tilefish, number of valid samples and number of samples used (trip weights available).

The number of fish sampled had a high of 26,441 for long line gear in 1993 to lows of zero for many years in the other gear (Table 2). The number of lengths sampled was predominantly greater than 100 for long line, while hand line gear only had samples of greater than 100 for 1991, 1995, 2000, 2002 and 2005. For other gears, the numbers of length samples available were all below 100, as there were only samples available in 1997 and 2007. Table 4 displays the number of valid samples and number of samples used (trip weights available).

Length distributions
All lengths were converted to TL in mm using the formula provided in the SEDAR 4 Stock Assessment Report 1 (SEDAR, 2004) and binned into one centimeter groups with a floor of 0.6 cm and a ceiling of 0.5 cm. Length was converted to weight (whole weight in pounds) using conversions provided by the life history group for the SEDAR 4 Stock Assessment Report 1 (SEDAR, 2004). The length data and landings data were divided into hand line, long line, and other gears. Length compositions were weighted by the trip landings in numbers and the landings in numbers by strata (state, year, gear). Annual length compositions of golden tilefish are summarized in Figures 6-8.

Landings in numbers
The weight in pounds for each sample was calculated and the mean weight by gear and year (weighted by weight of fish in the sample at length in pounds whole weight, trip weight in pounds whole weight and landing weight in pounds whole weight) were calculated. Where the sample size was less than 20, the mean across all years for that gear was used (Table 3). The landings in pounds whole weight were then divided by the mean weight for that stratum to derive landings in numbers (Table 4).

Adequacy for characterizing catch
Length sampling has been inadequate for gears other than hand line and long line for a large fraction of years. Sampling fractions are less than 0.05 for many years in the hand line and long line gear categories. Sample size needs to be paid particular attention when using the length compositions. Length sampling fractions are displayed in Table 5. The number of samples for

other gears may indicate that length compositions for this gear category should be supplemented with hand line and long line length compositions to obtain a reasonable sample size.

Literature Cited

Chih, C. 2006. Effect of Some Variations in Sampling Practices on the Length Frequency Distribution of Gag Groupers Caught by Commercial Fisheries in the Gulf of Mexico (http://www.sefsc.noaa.gov/sedar/download/S10DW23%20TIP%20sampling.pdf?id=DOCUMENT).

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SEDAR. 2010b. SEDAR 19 Stock Assessment Report 1: South Atlantic Red Grouper. (http://www.sefsc.noaa.gov/sedar/download/Red_grouper_SAR_FINAL.pdf?id=DOCUMENT).

Table 1. Number of trips from logbooks landing any amount of golden tilefish, where golden tilefish was targeted (golden tilefish was at least 30% of catch) and the number of trips with valid samples (no biases) and number of trips with samples usable for analysis (trip weights available) by year and gear.

	HAND LINES				LONG LINES				OTHER			
YEAR	ALL LOGBOOK	LOGBOOK TARGET	TRIPS WITH VALID SAMPLES	TRIPS WITH SAMPLES FOR ANALYSIS	ALL LOGBOOK	LOGBOOK TARGET	TRIPS WITH VALID SAMPLES	TRIPS WITH SAMPLES FOR ANALYSIS	ALL LOGBOOK	LOGBOOK TARGET	TRIPS WITH VALID SAMPLES	TRIPS WITH SAMPLES FOR ANALYSIS
1983			0	0			0	0			0	0
1984			2	2			24	24			0	0
1985			6	6			37	37			0	0
1986			2	2			25	25			0	0
1987			2	2			7	7			0	0
1988			1	1			8	8			0	0
1989			1	1			5	5			0	0
1990			4	1			7	7			0	0
1991	0	0	7	7	**	**	40	40	0	0	0	0
1992	68	35	1	1	251	219	100	100	**	**	0	0
1993	176	71	3	3	641	545	141	141	14	**	0	0
1994	213	141	2	2	528	438	59	59	15	**	0	0
1995	229	132	5	5	453	361	64	64	6	**	2	0
1996	176	82	2	2	327	250	30	30	8	**	0	0
1997	250	125	5	5	295	188	19	19	**	**	1	1
1998	185	117	2	2	253	190	15	15	**	**	0	0
1999	243	169	8	8	263	203	26	26	38	26	0	0
2000	334	237	8	8	341	286	13	13	34	20	0	0
2001	169	81	7	7	282	223	23	23	**	**	0	0
2002	298	197	13	13	247	184	19	19	22	11	0	0

	HAND LINES				LONG LINES				OTHER			
YEAR	ALL LOGBOOK	LOGBOOK TARGET	TRIPS WITH VALID SAMPLES	TRIPS WITH SAMPLES FOR ANALYSIS	ALL LOGBOOK	LOGBOOK TARGET	TRIPS WITH VALID SAMPLES	TRIPS WITH SAMPLES FOR ANALYSIS	ALL LOGBOOK	LOGBOOK TARGET	TRIPS WITH VALID SAMPLES	TRIPS WITH SAMPLES FOR ANALYSIS
2003	170	92	1	1	211	153	10	10	**	**	0	0
2004	193	136	1	1	142	106	15	15	**	**	1	0
2005	224	163	5	5	118	89	16	16	13	6	2	0
2006	165	101	2	2	149	116	36	36	17	9	0	0
2007	302	228	1	1	**	**	35	35	**	**	1	1
2008	144	109	1	1	**	**	20	20	22	6	6	0
2009	117	78	1	1	**	**	25	25	5	**	2	0
2010	126	106	2	2	212	209	24	24	11	**	13	0

**=data deemed confidential have been removed

Table 2. Number of length samples used for analysis and number of valid (no biases) length samples collected by year and gear.

	GEAR					
	HANDLINE		LONGLINE		OTHERS	
YEAR	SAMPLES USED	VALID SAMPLES	SAMPLES USED	VALID SAMPLES	SAMPLES USED	VALID SAMPLES
1983	0	0	0	0	0	0
1984	19	19	2,335	2,335	0	0
1985	52	53	5,267	5,362	0	0
1986	79	80	5,335	5,335	0	0
1987	58	58	484	484	0	0
1988	3	3	1,057	1,057	0	0
1989	5	5	328	829	0	0
1990	3	17	738	738	0	0
1991	134	138	5,291	6,024	0	0
1992	8	49	12,558	14,316	0	0
1993	54	54	26,441	29,152	0	91
1994	68	76	9,943	11,924	0	23
1995	438	443	7,473	11,049	0	530
1996	13	19	1,847	2,933	0	0
1997	84	141	1,388	2,559	70	88
1998	43	92	881	1,714	0	0
1999	84	140	2,807	3,757	0	0
2000	322	854	1,603	4,991	0	102
2001	66	361	1,488	2,189	0	0
2002	160	365	987	1,937	0	104
2003	1	77	254	693	0	0
2004	1	1	356	795	0	255
2005	103	145	404	429	0	241
2006	59	59	821	888	0	211

	GEAR					
	HANDLINE		LONGLINE		OTHERS	
YEAR	SAMPLES USED	VALID SAMPLES	SAMPLES USED	VALID SAMPLES	SAMPLES USED	VALID SAMPLES
2007	1	1	945	994	24	339
2008	1	1	554	577	0	162
2009	7	7	880	880	0	54
2010	13	13	703	703	0	377

Table 3. Mean weights in pounds whole weight used to derive landings in numbers by year and gear.

	GEAR		
YEAR	HAND LINES	LONG LINES	OTHER
1983	11.891	11.545	11.478
1984	11.891	14.654	11.478
1985	13.484	13.914	11.478
1986	11.952	12.274	11.478
1987	13.330	13.408	11.478
1988	11.891	11.125	11.478
1989	11.891	12.726	11.478
1990	11.891	13.573	11.478
1991	13.226	10.747	11.478
1992	11.891	11.671	11.478
1993	21.079	10.940	11.478
1994	7.474	8.497	11.478
1995	9.743	9.521	11.478
1996	11.891	11.668	11.478
1997	11.274	10.667	11.477
1998	13.328	8.735	11.478
1999	20.899	10.301	11.478
2000	9.629	9.951	11.478
2001	19.484	10.419	11.478
2002	15.849	11.320	11.478
2003	11.891	7.757	11.478
2004	11.891	14.814	11.478
2005	20.285	11.837	11.478
2006	9.597	13.760	11.478
2007	11.891	12.257	11.478
2008	11.891	12.487	11.478
2009	11.891	14.487	11.478
2010	11.891	13.868	11.478

Table 4. Commercial landings by gear and year in numbers (thousands).

	GEAR		
YEAR	HAND LINES	LONG LINES	OTHER
1983	24.366	155.408	3.201
1984	18.813	83.473	1.861
1985	11.970	78.125	2.172
1986	12.289	88.094	2.238
1987	2.050	20.369	0.376
1988	4.647	44.770	0.871
1989	8.528	64.011	1.818
1990	7.916	61.420	1.468
1991	6.621	81.413	4.457
1992	7.059	78.281	7.634
1993	8.771	85.538	3.570
1994	15.763	92.321	0.183
1995	9.503	69.543	0.034
1996	3.205	29.846	**
1997	3.346	34.020	0.465
1998	2.421	42.782	0.098
1999	2.018	50.912	0.580
2000	6.263	74.559	0.468
2001	2.209	41.753	0.124
2002	4.069	36.420	**
2003	1.767	32.087	0.001
2004	2.741	17.516	0.023
2005	2.287	25.144	**
2006	3.102	30.869	0.023
2007	4.685	23.809	0.001
2008	3.192	26.953	**
2009	2.582	23.245	**
2010	2.844	27.116	**

**=data deemed confidential have been removed

Table 5. Commercial length sampling fractions by gear and year.

	GEAR		
YEAR	HAND LINES	LONG LINES	OTHER
1983	0.000	0.000	0.000
1984	0.001	0.028	0.000
1985	0.004	0.067	0.000
1986	0.006	0.061	0.000
1987	0.028	0.024	0.000
1988	0.001	0.024	0.000
1989	0.001	0.005	0.000
1990	0.000	0.012	0.000
1991	0.020	0.065	0.000
1992	0.001	0.160	0.000
1993	0.006	0.309	0.000
1994	0.004	0.108	0.000
1995	0.046	0.107	0.000
1996	0.004	0.062	**
1997	0.025	0.041	0.151
1998	0.018	0.021	0.000
1999	0.042	0.055	0.000
2000	0.051	0.021	0.000
2001	0.030	0.036	0.000
2002	0.039	0.027	**
2003	0.001	0.008	0.000
2004	0.000	0.020	0.000
2005	0.045	0.016	**
2006	0.019	0.027	0.000
2007	0.000	0.040	1.000
2008	0.000	0.021	**
2009	0.003	0.038	**
2010	0.005	0.026	**

**=data deemed confidential have been removed

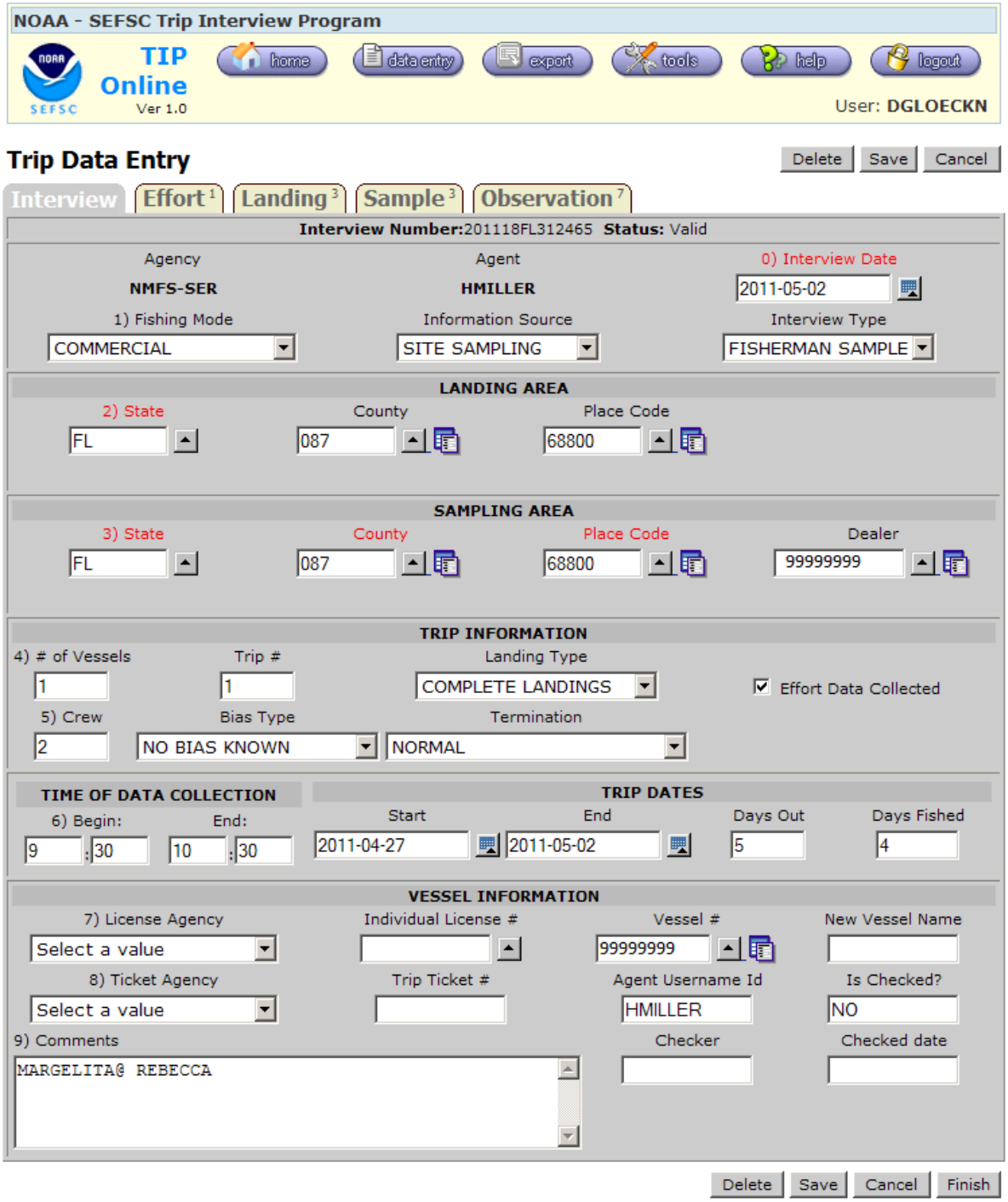

Figure 1. Screen shot of the interview screen as presented during data entry to TIP Online.

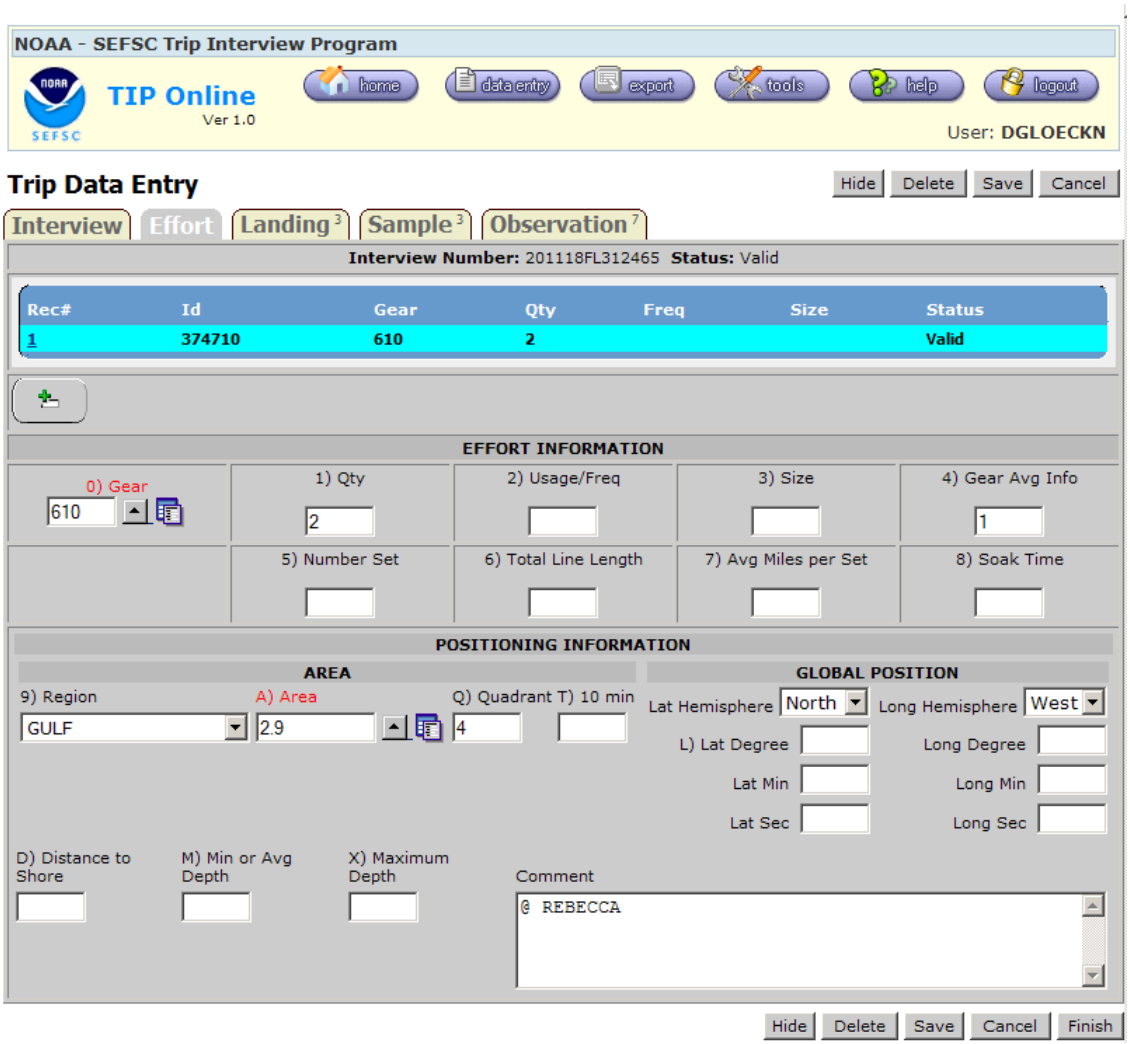

Figure 2. Screen shot of the effort screen as presented during data entry to TIP Online.

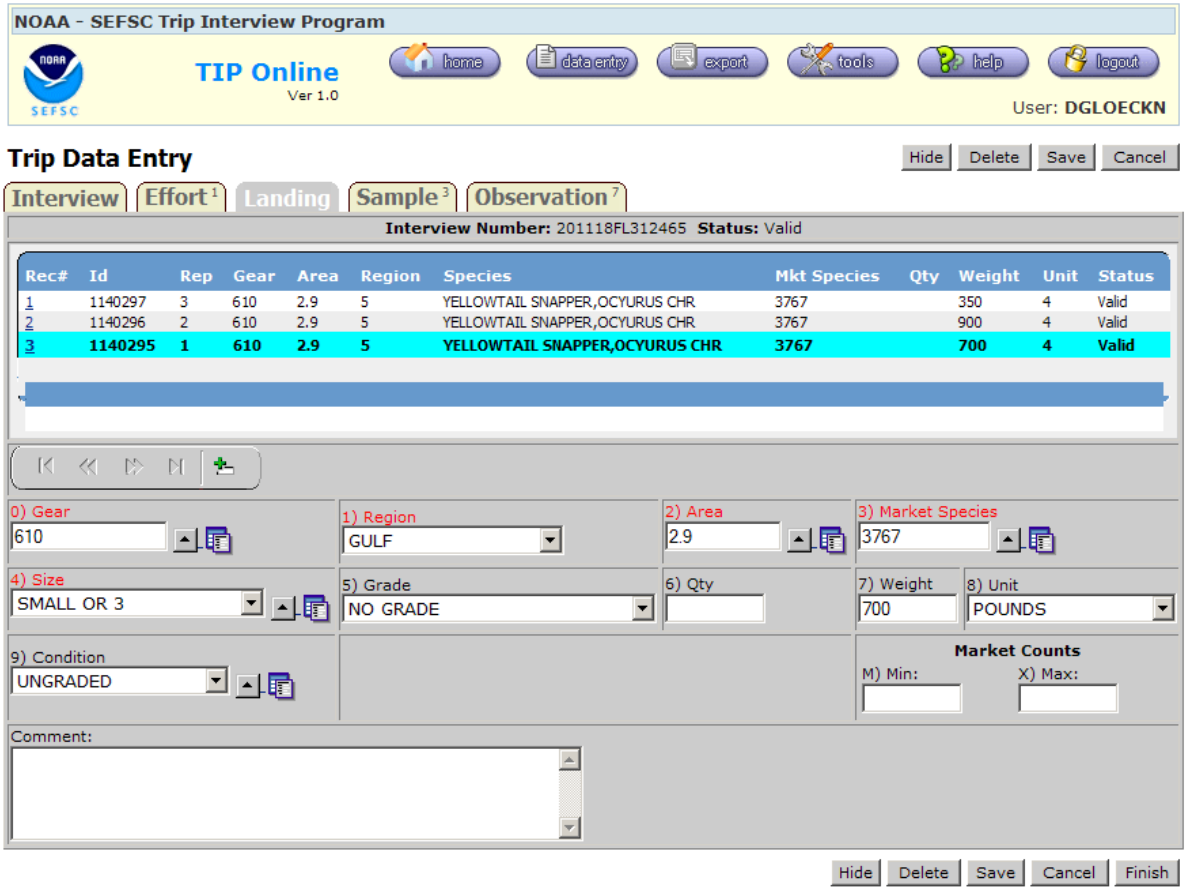

Figure 3. Screen shot of the landing screen as presented during data entry to TIP Online.

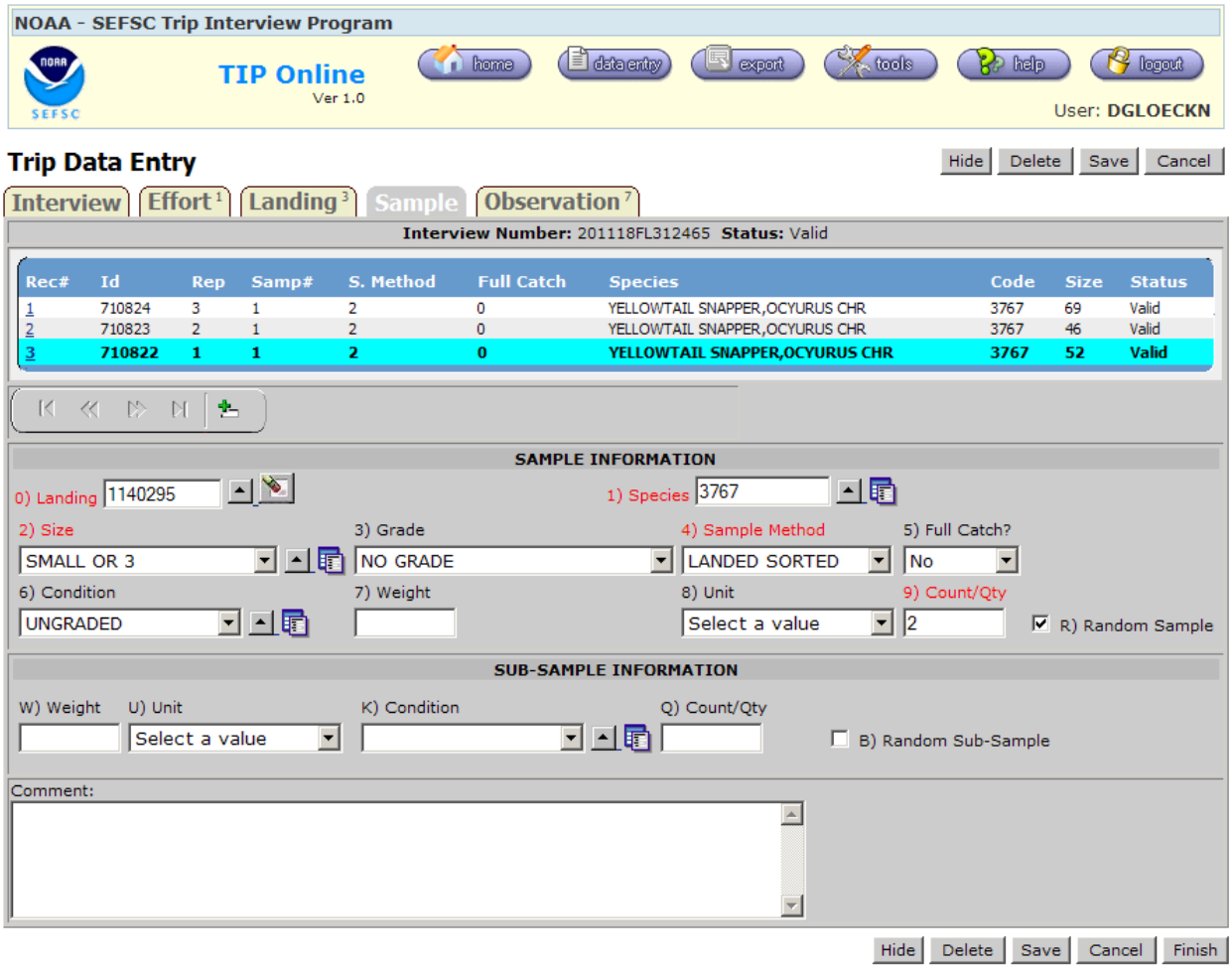

Figure 4. Screen shot of the sample screen as presented during data entry to TIP Online.

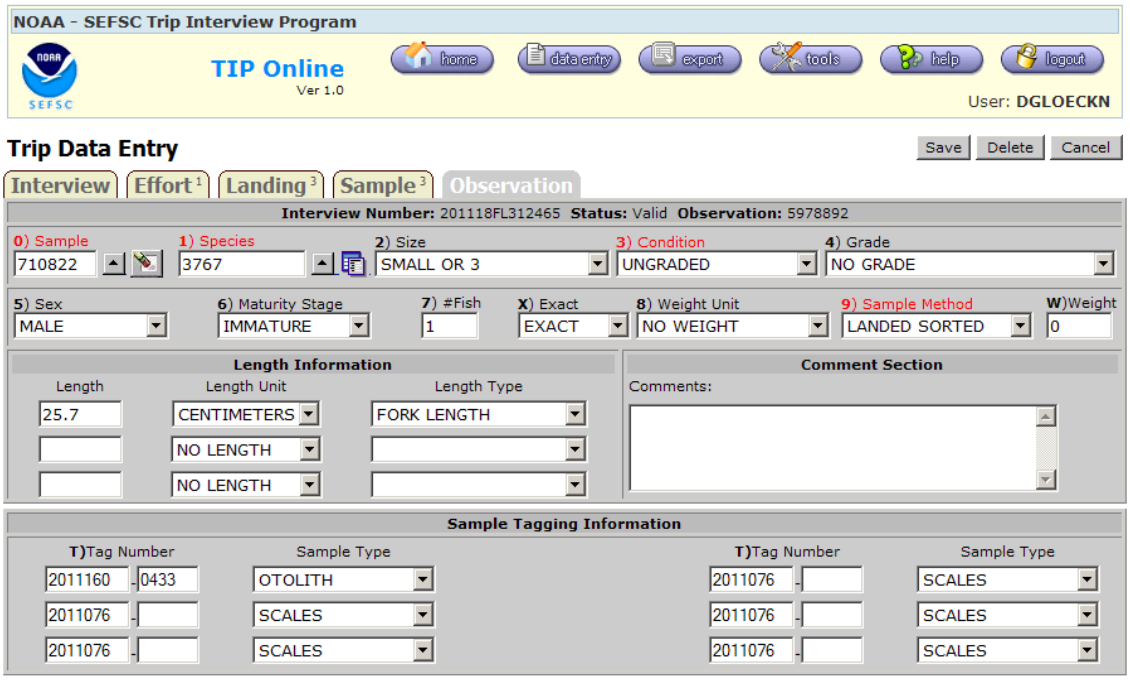

Figure 5. Screen shot of the observation screen as presented during data entry to TIP Online.

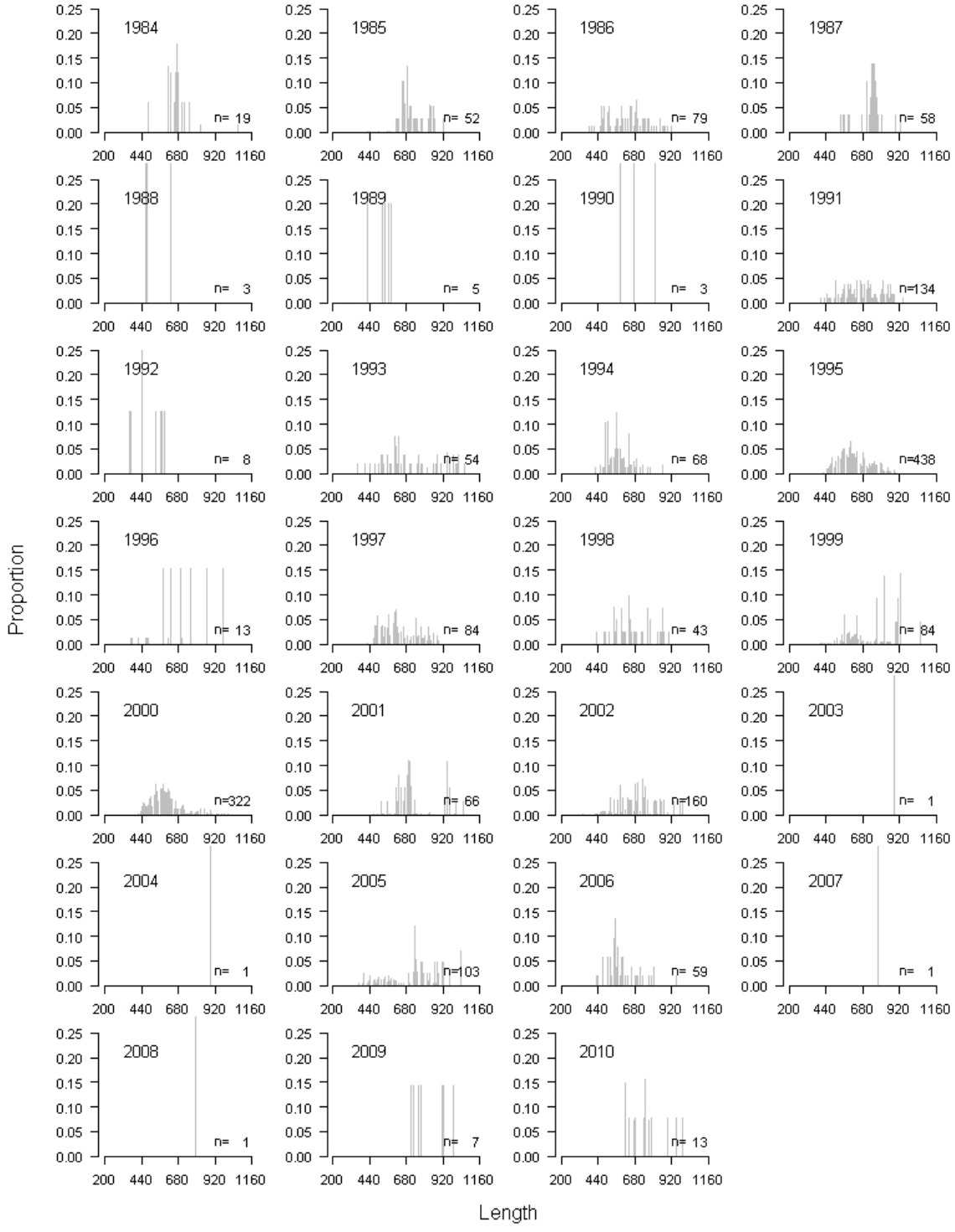

Figure 6. Relative length composition (TL in mm) of commercial length samples by year for hand line.

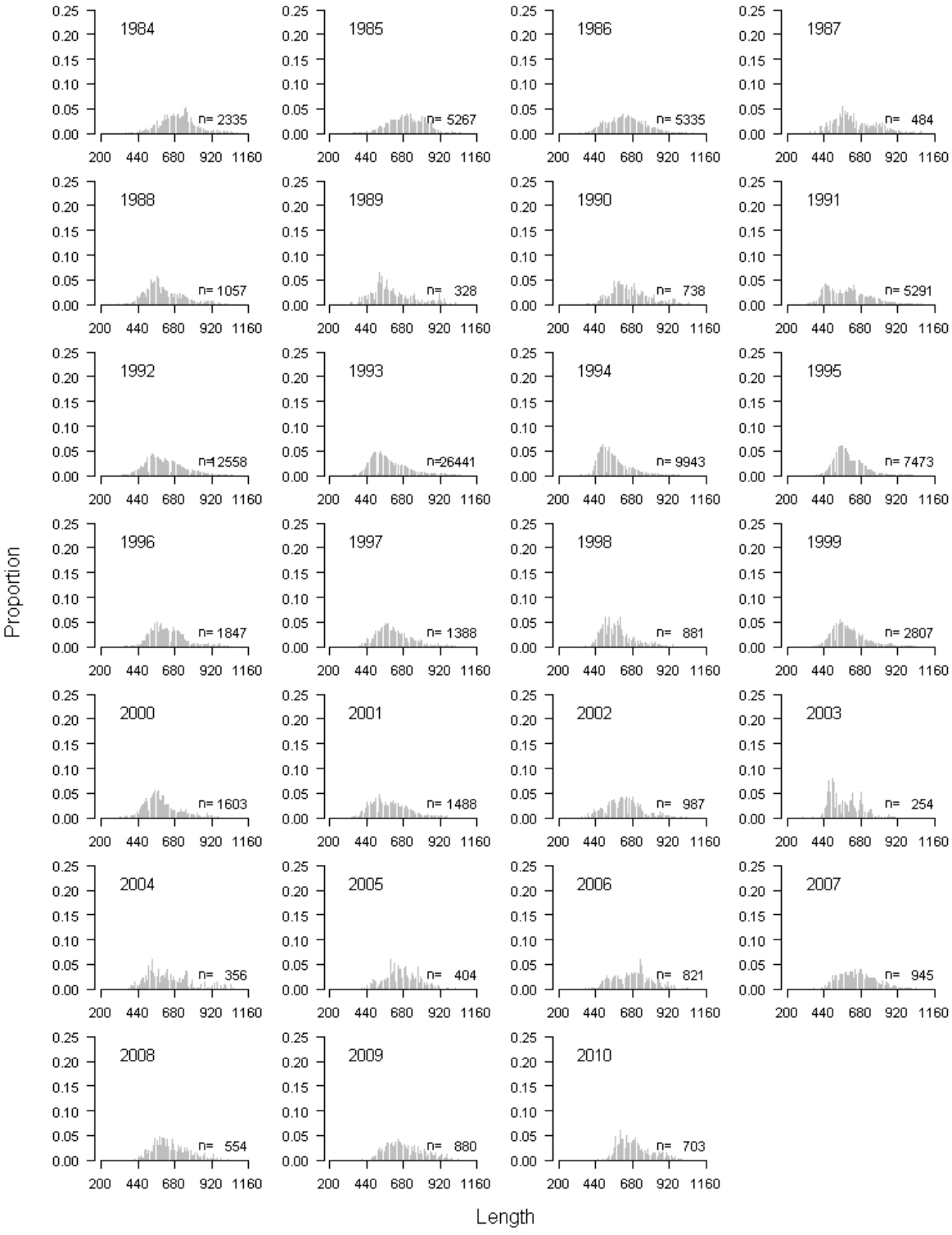

Figure 7. Relative length composition (TL in mm) of commercial length samples by year for long line gear.

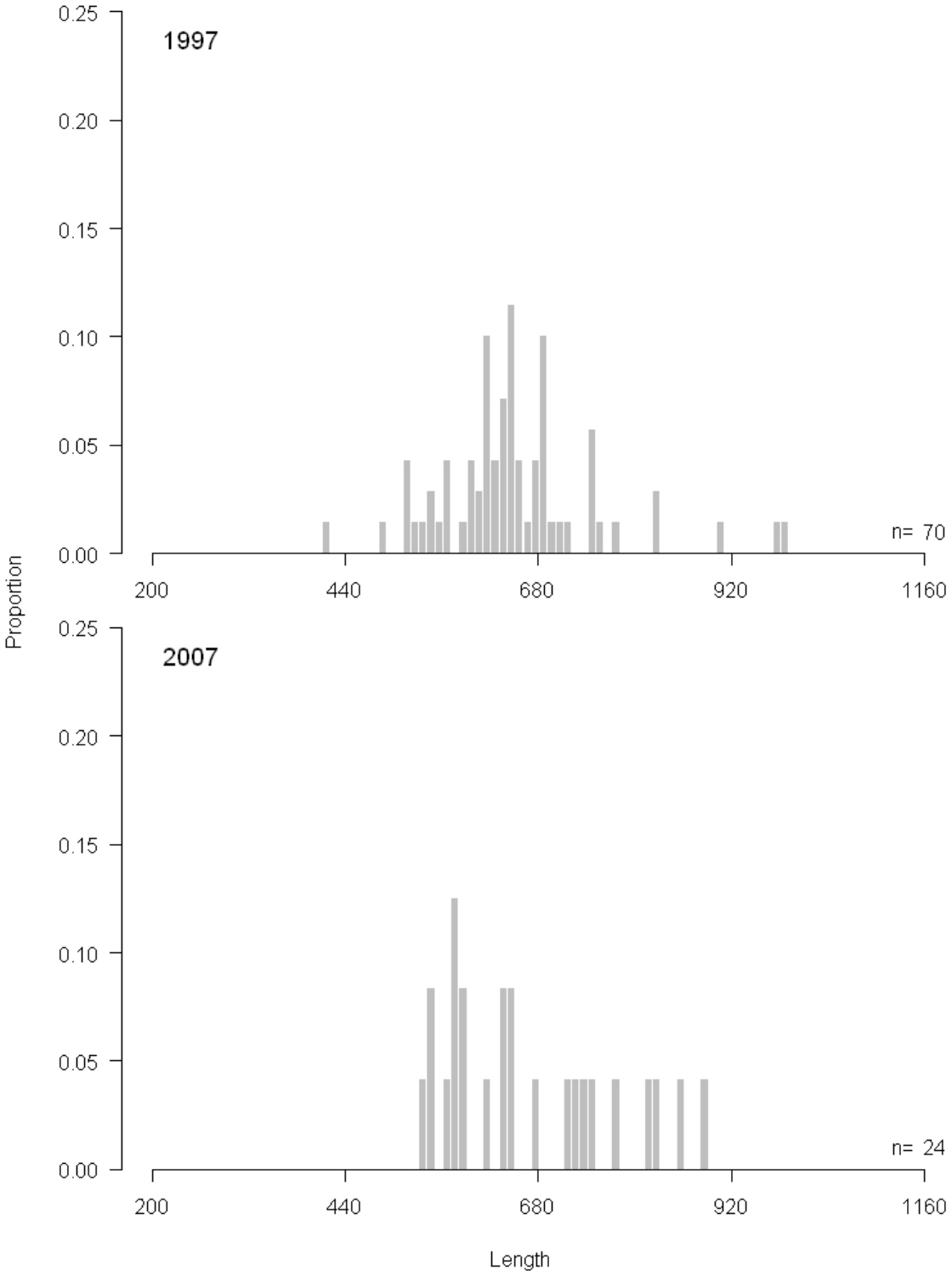

Figure 8. Relative length composition (TL in mm) of commercial length samples by year for other gear.