Brief Summary of SEAMAP Data Collected in the Caribbean Sea from 1975 to 2002

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Description of Data

Caribbean SEAMAP data consists of two sources. The first source of data was collected from 1646 stations from 1975 to 1984. Sampling methodologies differed greatly both between and within cruises (Table 1). Most stations were conducted using longline sampling. However, the lack of knowledge of longling gear standardization (i.e., the number of hooks per set) precludes any meaningful analyses at this time. If one assumes a common number of hooks per set, then the longline-collected portion of this early data could possibly yield useful information, and should be the focus of future analyses of the Caribbean SEAMAP database.

Only the second source of data was used for analyses in this summary. It consisted of data collected from 6432 stations around Puerto Rico and the Virgin Islands. The sampling methods for the majority of these stations consisted of either fish traps and/or handlines (Table 2). The data was analyzed separately for each area (i.e., Puerto Rico or the Virgin Islands) and each of the aforementioned sampling methods (i.e., fish traps or handlines).

Catch rates

Overall catch rates were calculated for each area-method combination (i.e., Puerto Rico, handline; Puerto Rico, fish trap; Virgin Islands, handline; or Virgin Islands, fish trap). This was accomplished by standardizing catch at each station by time fished. The assumption made was that handline and fish trap methods between and within surveys were standardized. Also, the assumption was made that all samples taken were done so randomly. Tables 3-6 list the 20 species with highest catch rates plus any of the species of management interest not already included in the top 20. This was done for each area-method combination.

Regardless of area or collection method, except for fish traps in the Virgin Islands, red hind, *Epinephelus guttatus*, and coney, *E. fulvus*, had the highest catch rates. Of the species of management interest the sand tilefish, *Malacanthus plumieri*, had the highest catch rates, in fish

traps around Puerto Rico. Silk snapper, *Lutjanus vivanus*, and blackfin snapper, *L. buccanella*, had higher catch rates with handlines than in fish traps. Queen snapper, *Etelis oculatus*, and blackline tilefish, *Caulolatilus cyanops*, had consistently low catch rates.

Yearly catch rates were estimated for red hind, coney, graysby (*Epinephelus cruentatus*), and sand tilefish for all area-method combinations (Figures 1-8). Due to low occurrences in the Virgin Islands, yearly catch rates for silk and blackfin snappers were only estimated for Puerto Rico (Figures 9-10).

Length Frequencies of Selected Species

The majority of sand tilefish were collected using handlines. Therefore, length frequency graphs were made for those collected by handlines in each area (Figure 11). A comparison between the two areas indicates that sand tilefish collected by handlines in the Virgin Islands tend to be larger than those collected by handlines in Puerto Rico.

The majority of the silk and blackfin snappers were collected in Puerto Rico. Therefore, length frequency graphs were made for each species collected by each method around Puerto Rico (Figures 12-13). For both species, larger specimens tend to be collected with handlines than with fish traps.

Table 1. Caribbean SEAMAP data collection efforts from 1975 to 1984 (1646 stations). Cruise description indicates vessel/cruise number, the timeframe, and name of the cruise. Questionable gear codes indicated by "?".

Cruise Description	Gear Type Used	Number of Stations
28/857	BOTTOM LONGLINE	49
	MISCELLANEOUS?	11
09/22/1975 - 10/30/1975 US Reeffish Survey	OFF-BOTTOM LONGLINE	48
	SHRIMP TRAWL	3
	FISH TRAP	60
04/097	BOTTOM LONGLINE	59
	HAND LINE	29
06/13/1979 - 08/03/1979 US Reeffish Habitat/Miami Swordfish	FISH TRAP	4
	TRAP VIDEO	270
04/108	BOTTOM LONGLINE	105
	CG?	1
06/17/1980 - 07/24/1980 US Caribbean Reeffish Survey	EG?	23
	HAND LINE	23
	SURFACE LONGLINE	1
	FISH TRAP	13
04/119	BOTTOM LONGLINE	13
	HAND LINE	1
07/13/1981 - 08/28/1981 US Caribbean Reeffish Survey	FISH TRAP	1
21/824	CTD	17
	BOTTOM LONGLINE	28
06/14/1982 - 07/16/1982 East Coast Cooperative	IT?	1
	SHRIMP TRAWL	17
	TUMBLER DREDGE	110
	FISH TRAP	4
04/129	BOTTOM LONGLINE	111
	HAND LINE	4
09/01/1982 - 09/30/1982 US Deepwater Snapper/Grouper	OFF-BOTTOM LONGLINE	111
	FISH TRAP	18
04/132	SURFACE LONGLINE	21
01/13/1983 - 02/11/1983 US Deepwater Snapper/Grouper		
21/836	BB?	1
	BOTTOM LONGLINE	139
05/25/1983 - 07/20/1983 US Deepwater Snapper/Grouper	OFF-BOTTOM LONGLINE	138
	PLANKTON, BONGOS	16
	FISH TRAP	12
21/844	BOTTOM LONGLINE	90
	FA?	2
04/10/1984 - 05/14/1984 US Deepwater Snapper/Grouper	HAND LINE	1
	OFF-BOTTOM LONGLINE	90
	FISH TRAP	1

Table 2. Caribbean SEAMAP data collection efforts from 1991 to 2002 (6432 stations). Cruise description indicates vessel/cruise number, the timeframe, and name of the cruise. Gear types used were coded as follows: HL, handline; TR, fish trap; and TRHL, a combination.

Cruise Description	Gear Type Used	Number of Stations
56/911 9/17/91 - 12/19/91 PR Caribbean Survey	HL	78
	TR	339
56/921 1/22/92 - 6/24/92 PR Caribbean Survey - Part 1	HL	158
	TR	442
56/922 6/24/92 - 10/1/92 PR Carribean Survey - Part 2	HL	129
	TR	518
56/931 3/2/93 - 8/5/93 PR Caribbean Survey - Part 1	HL	108
	TR	492
56/932 8/5/93 - 12/22/93 PR Caribbean Survey - Part 2	HL	95
	TR	468
56/941 1/18/94 - 2/22/94 PR Caribbean Survey	HL	50
	TR	120
57/912 9/17/91 - 9/25/91 PR Carribean Survey	HL	15
	TR	87
57/922 9/8/92 - 11/16/92 PR Caribbean Survey	HL	66
	TR	24
57/932 3/16/93 - 5/25/93 PR Caribbean Survey - Part 1	HL	84
	TR	415
57/933 5/25/93 - 11/10/93 PR Caribbean Survey - Part 2	HL	103
	TR	458
60/932 12/14/93 - 12/24/93 PR Caribbean Survey – Part 3	HL	6
	TR	18
57/942 3/3/94 - 6/22/94 PR Carribean Survey - Part 1	HL	98
	TR	401
57/943 6/23/94 - 12/22/94 PR Caribbean Survey - Part 2	HL	202
	TR	393
57/952 1/11/95 - 3/30/95 PR Caribbean Survey	HL	82
	TR	268
58/922 10/27/92 - 12/1/92 VI Reeffish Survey	HL	15
	TR	48
58/931 9/21/93 - 9/21/93 VI Reeffish Survey	HL	3
	TR	12
59/922 10/21/92 - 10/21/92 VI Reeffish Survey	HL	4
	TR	12
59/932 9/23/93 - 12/15/93 VI Reeffish Survey	HL	6
	TR	24
59/941 1/18/94 - 3/4/94 VI Reeffish Survey	HL	17
	TR	72
60/001 1/13/00 - 4/4/00 VI Winter/Spring Reeffish	TRHL	127
60/941 1/3/94 - 2/11/94 VI Reeffish Survey	HL	7
	TR	27
60/991 8/31/99 - 10/14/99 VI Summer Reeffish Survey	TRHL	86
70/021 1/29/02 - 7/9/02 VI Summer Reeffish Survey St.Croix	TRHL	149

Table 3. List of top 20 species with highest catch rates (number per 1000 hours fished) collected using hand lines during surveys around Puerto Rico (1271 stations). Species of management interest were also included with this list if not already in the top 20 species. Species of management interest are shown in bold.

Species	Common Name	Mean Catch Rate	Standard Error
Epinephelus guttatus	red hind	1032.31	41.30
Epinephelus fulvus	coney	560.18	24.90
Malacanthus plumieri	**sand tilefish**	140.86	7.19
Holocentrus adscensionis	squirrelfish	48.34	3.36
Epinephelus cruentatus	graysby	38.46	3.74
Holocentrus rufus	longspine squirrelfish	20.83	2.06
Lutjanus vivanus	**silk snapper**	20.25	3.28
Lutjanus buccanella	**blackfin snapper**	16.95	2.44
Rhoboplites aurorubens	vermilion snapper	16.09	3.82
Caranx lugubris	black jack	13.32	1.75
Melichthys niger	black durgon	12.72	2.14
Calamus pennatula	pluma	11.10	1.46
Canthidermis sufflamen	ocean triggerfish	10.55	2.06
Seriola rivoliana	almaco jack	6.09	1.06
Balistes vetula	queen triggerfish	6.09	1.11
Caranx crysos	blue runner	5.14	0.95
Apsilus dentatus	black snapper	5.03	1.68
Caranx latus	horse-eye jack	4.39	1.08
Sphyraena barracuda	great barracuda	3.39	0.75
Lutjanus synagris	lane snapper	3.17	0.76
Caulolatilus cyanops	**blackline tilefish**	0.26	0.26
Etelis oculatus	**queen snapper**	0.17	0.17

Table 4. List of top 20 species with highest catch rates (number per 1000 hours fished) collected using fish traps during surveys around Puerto Rico (4442 stations). Species of management interest were also included with this list if not already in the top 20 species. Species of management interest are shown in bold.

Species	Common Name	Mean Catch Rate	Standard Error
Epinephelus guttatus	red hind	36.40	2.40
Epinephelus fulvus	coney	19.43	1.18
Chaetodon striatus	banded butterflyfish	12.27	0.99
Balistes vetula	queen triggerfish	6.63	0.73
Holocentrus adscensionis	squirrelfish	3.85	0.56
Chaetodon capistratus	foureye butterflyfish	3.35	0.60
Holocentrus rufus	longspine squirrelfish	3.29	0.43
Acanthurus bahianus	ocean surgeonfish	2.09	0.42
Scarus taeniopterus	princess parrotfish	1.92	0.48
Rhoboplites aurorubens	vermilion snapper	1.51	0.76
Lutjanus vivanus	**silk snapper**	1.44	0.66
Pseudupeneus maculatus	spotted goatfish	1.43	0.43
Ocyurus chrysurus	yellowtail snapper	1.39	0.30
Haemulon plumieri	white grunt	1.34	0.27
Lutjanus buccanella	**blackfin snapper**	1.27	0.71
Calamus pennatula	pluma	1.26	0.34
Epinephelus cruentatus	graysby	0.88	0.23
Lutjanus apodus	schoolmaster	0.83	0.79
Cantherhines macrocerus	whitespotted filefish	0.80	0.20
Chaetodon ocellatus	spotfin butterflyfish	0.59	0.17
Malacanthus plumieri	**sand tilefish**	0.30	0.14
Caulolatilus cyanops	**blackline tilefish**	0.00	
Etelis oculatus	**queen snapper**	0.00	

Table 5. List of top 20 species with highest catch rates (number per 1000 hours fished) collected using handlines during surveys around the Virgin Islands (104 stations). Species of management interest were also included with this list if not already in the top 20 species. Species of management interest are shown in bold.

Species	Common Name	Mean Catch Rate	Standard Error
Epinephelus fulvus	coney	1079.32	213.85
Epinephelus guttatus	red hind	212.07	33.88
Malacanthus plumieri	**sand tilefish**	153.91	37.89
Caranx crysos	blue runner	105.51	30.60
Lutjanus vivanus	**silk snapper**	56.09	56.09
Balistes vetula	queen triggerfish	51.46	16.36
Epinephelus cruentatus	graysby	33.54	13.01
Holocentrus rufus	longspine squirrelfish	24.29	9.20
Holocentrus sp.	squirrelfishes	19.21	15.58
Canthidermis sufflamen	ocean triggerfish	15.95	8.22
Chaetodon sedentarius	reef butterflyfish	7.73	7.73
Remora remora	remora	7.64	5.45
Alectis ciliaris	African pompano	5.95	4.20
Ocyurus chrysurus	yellowtail snapper	5.90	4.22
Calamus calamus	saucereye porgy	5.27	3.02
Halichoeres poeyi	blackear wrasse	4.98	3.59
Aluterus monoceros	unicorn filefish	4.81	4.81
Haemulon plumieri	white grunt	4.07	2.90
Gymnothorax moringa	spotted moray	3.85	3.85
Melichthys niger	black durgon	3.67	2.59
Lutjanus buccanella	**blackfin snapper**	1.91	1.91
Caulolatilus cyanops	**blackline tilefish**	0.00	
Etelis oculatus	**queen snapper**	0.00	

Table 6. List of top 20 species with highest catch rates (number per 1000 hours fished) collected using fish traps during surveys around the Virgin Islands (503 stations). Species of management interest were also included with this list if not already in the top 20 species. Species of management interest are shown in bold.

Species	Common Name	Mean Catch Rate	Standard Error
Epinephelus fulvus	coney	130.48	19.64
Chaetodon capistratus	foureye butterflyfish	34.59	7.58
Balistes vetula	queen triggerfish	30.72	6.79
Epinephelus guttatus	red hind	24.29	3.24
Haemulon flavolineatum	french grunt	17.35	5.94
Ocyurus chrysurus	yellowtail snapper	13.89	4.27
Chaetodon striatus	banded butterflyfish	13.47	3.38
Holocentrus rufus	longspine squirrelfish	12.68	4.51
Holocentrus adscensionis	squirrelfish	8.54	3.56
Acanthurus bahianus	ocean surgeonfish	7.66	3.47
Acanthurus coeruleus	blue tang	7.46	2.61
Malacanthus plumieri	**sand tilefish**	6.31	6.31
Pseudupeneus maculatus	spotted goatfish	5.16	2.04
Scarus taeniopterus	princess parrotfish	4.72	1.55
Epinephelus cruentatus	graysby	4.51	1.70
Acanthurus chirurgus	doctorfish	4.27	1.76
Chaetodon sedentarius	reef butterflyfish	3.23	1.51
Calamus calamus	saucereye porgy	3.05	1.21
Mycteroperca venenosa	yellowfin grouper	2.71	0.96
Pomacanthus arcuatus	gray angelfish	1.66	1.10
Lutjanus buccanella	**blackfin snapper**	1.57	1.02
Caulolatilus cyanops	**blackline tilefish**	0.00	
Etelis oculatus	**queen snapper**	0.00	
Lutjanus vivanus	**silk snapper**	0.00	

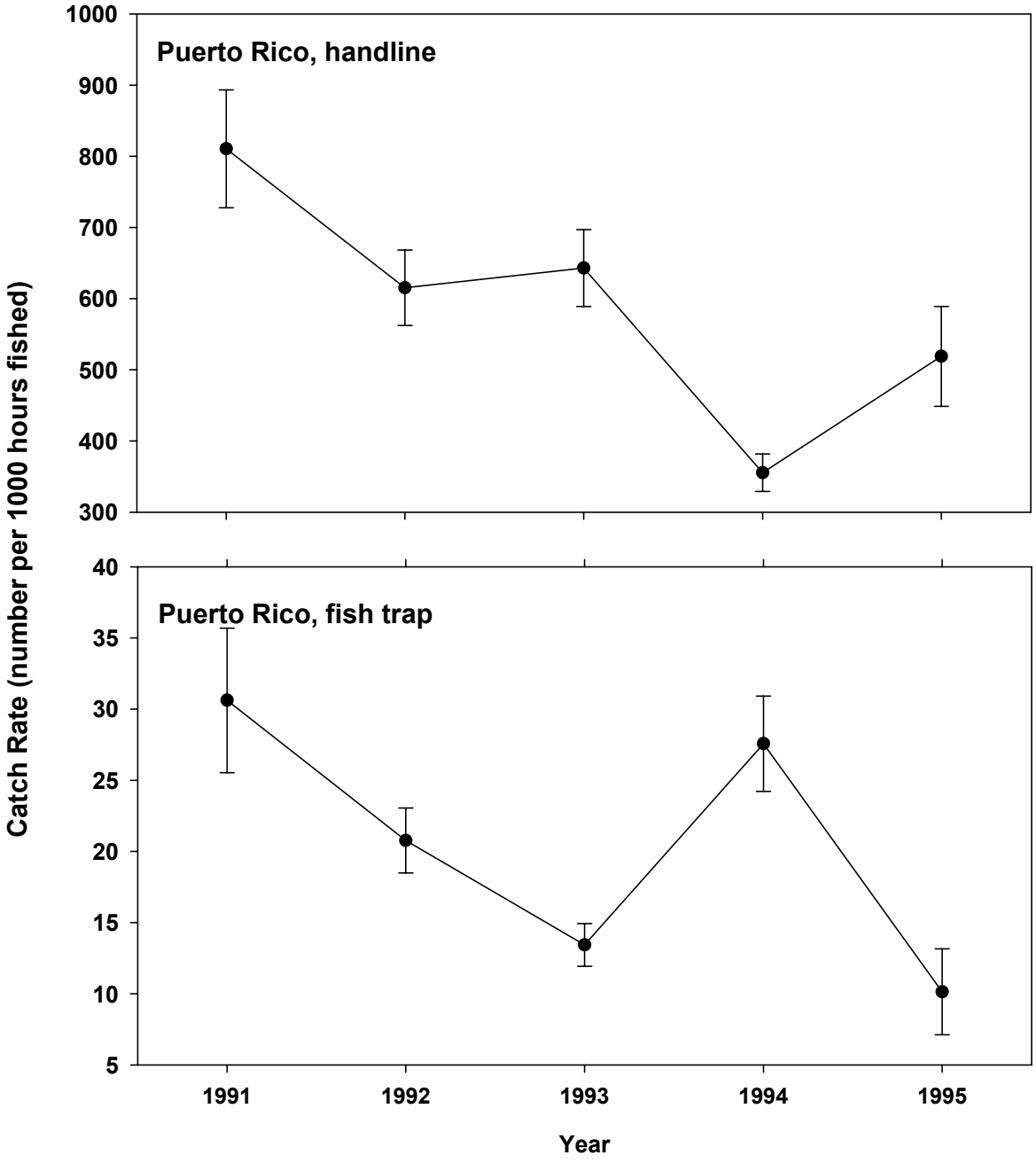

Figure 1. Yearly catch rates for coney collected in Puerto Rico. Error bars represent one standard error.

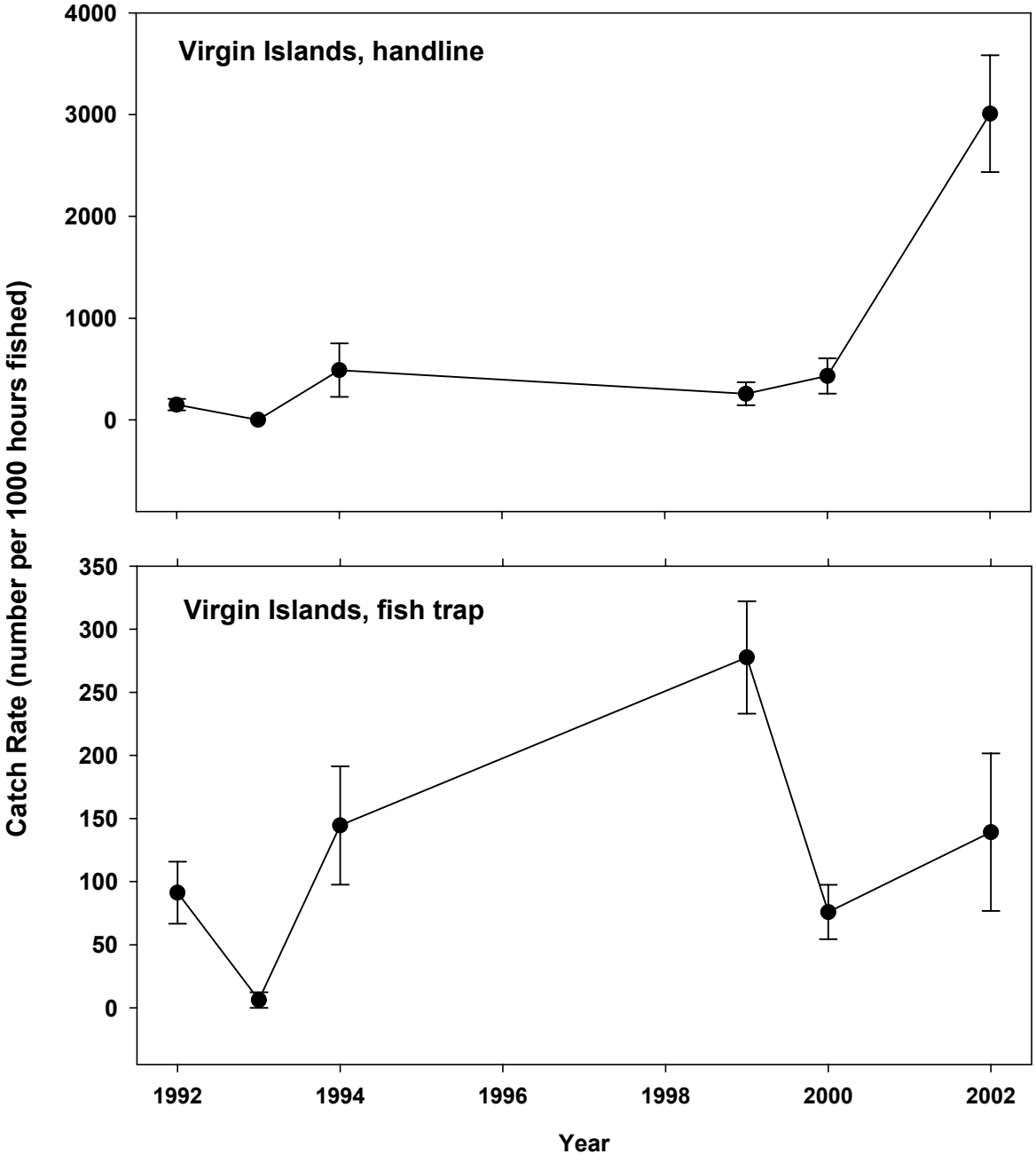

Figure 2. Yearly catch rates for coney collected in the Virgin Islands. Error bars represent one standard error.

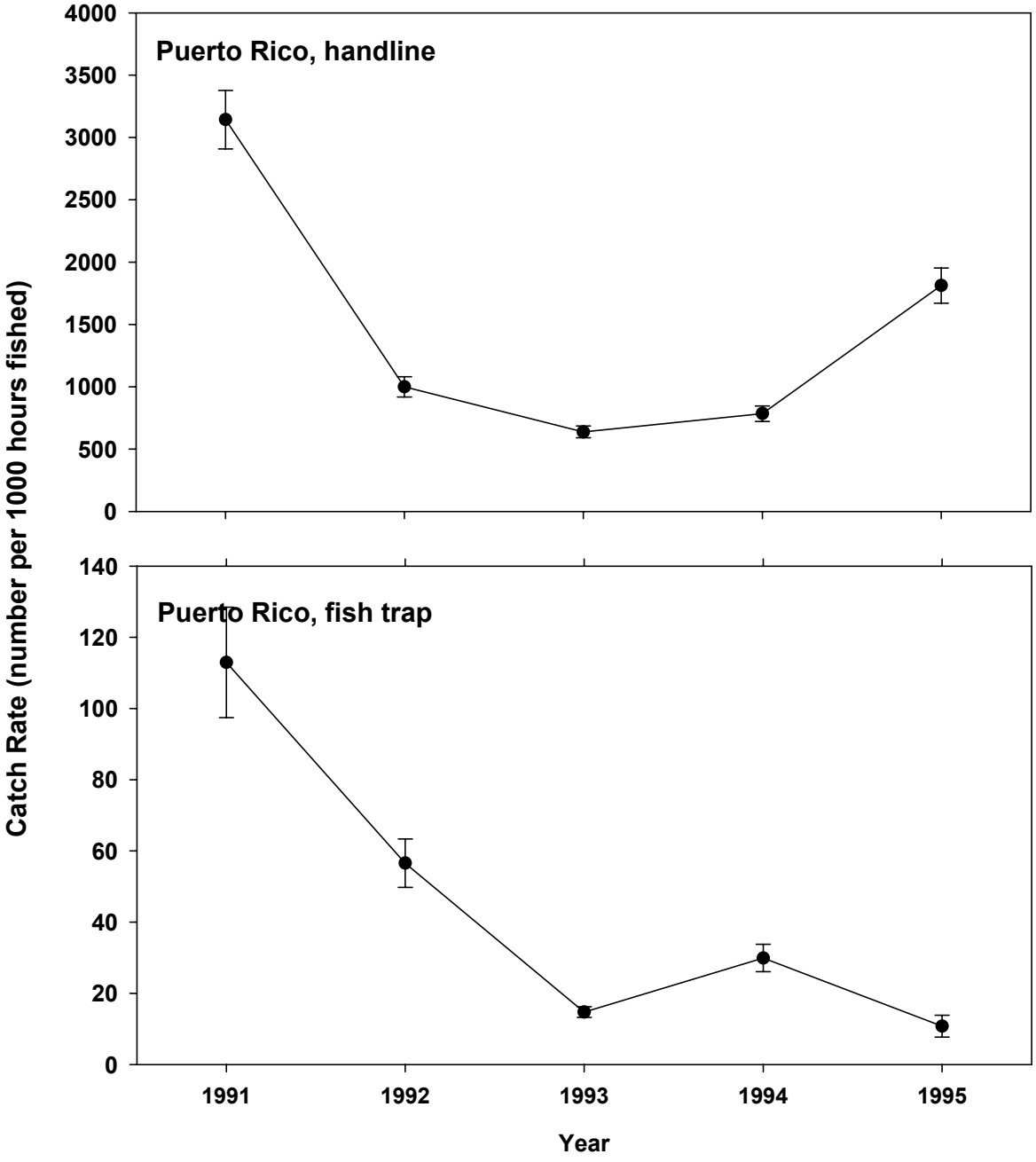

Figure 3. Yearly catch rates for red hind collected in Puerto Rico. Error bars represent one standard error.

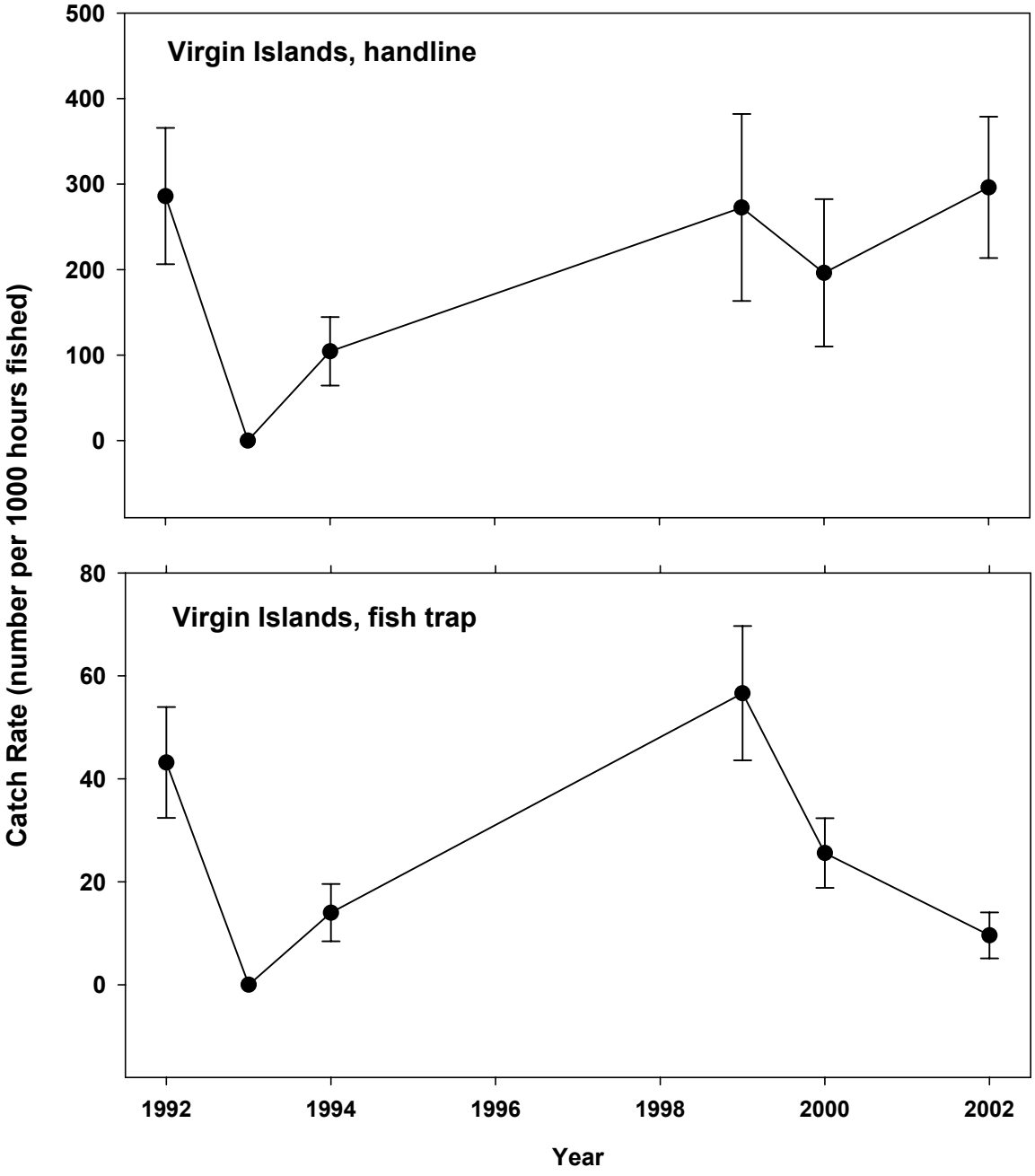

Figure 4. Yearly catch rates for red hind collected in the Virgin Islands. Error bars represent one standard error.

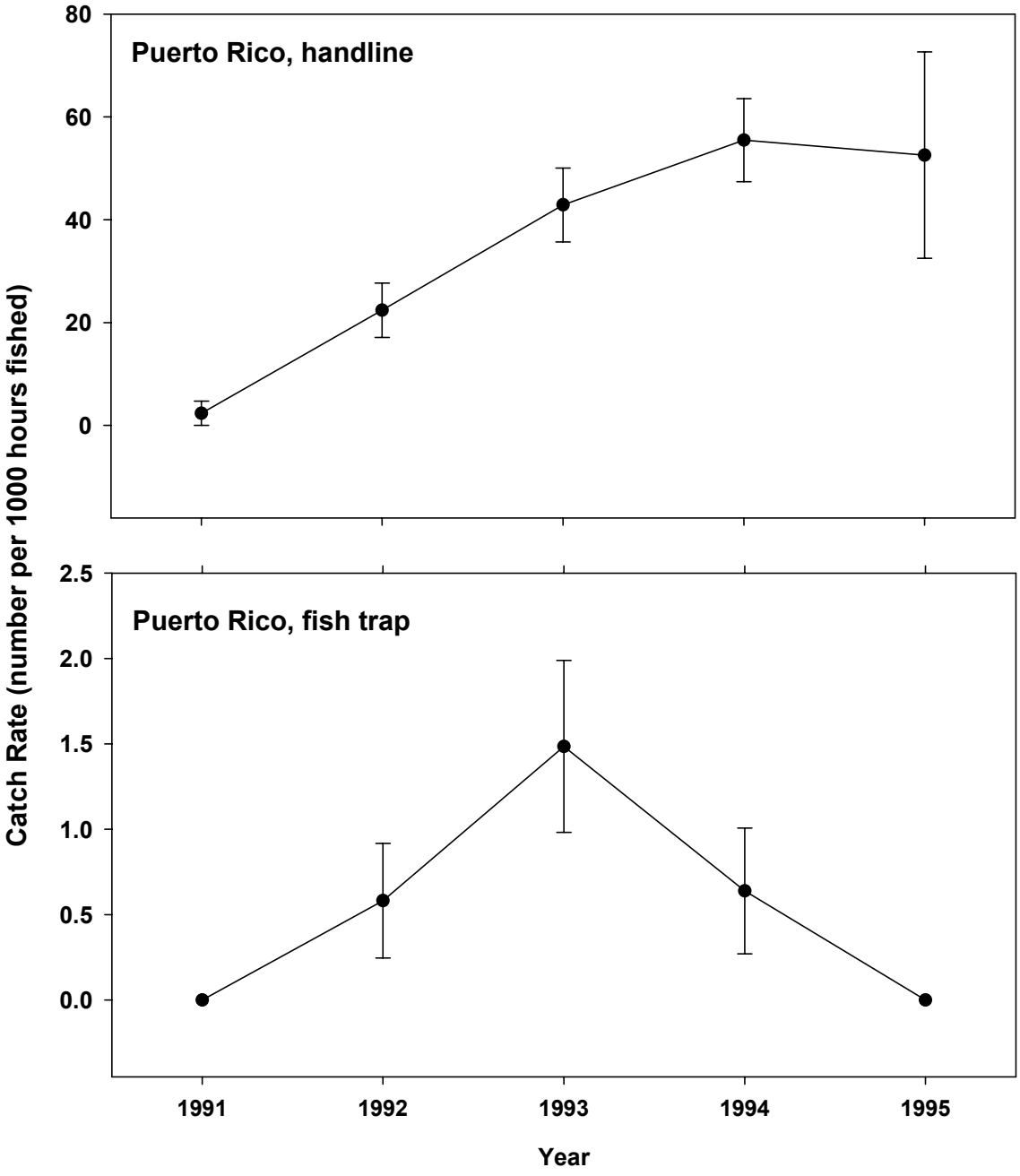

Figure 5. Yearly catch rates for graysby collected in Puerto Rico. Error bars represent one standard error.

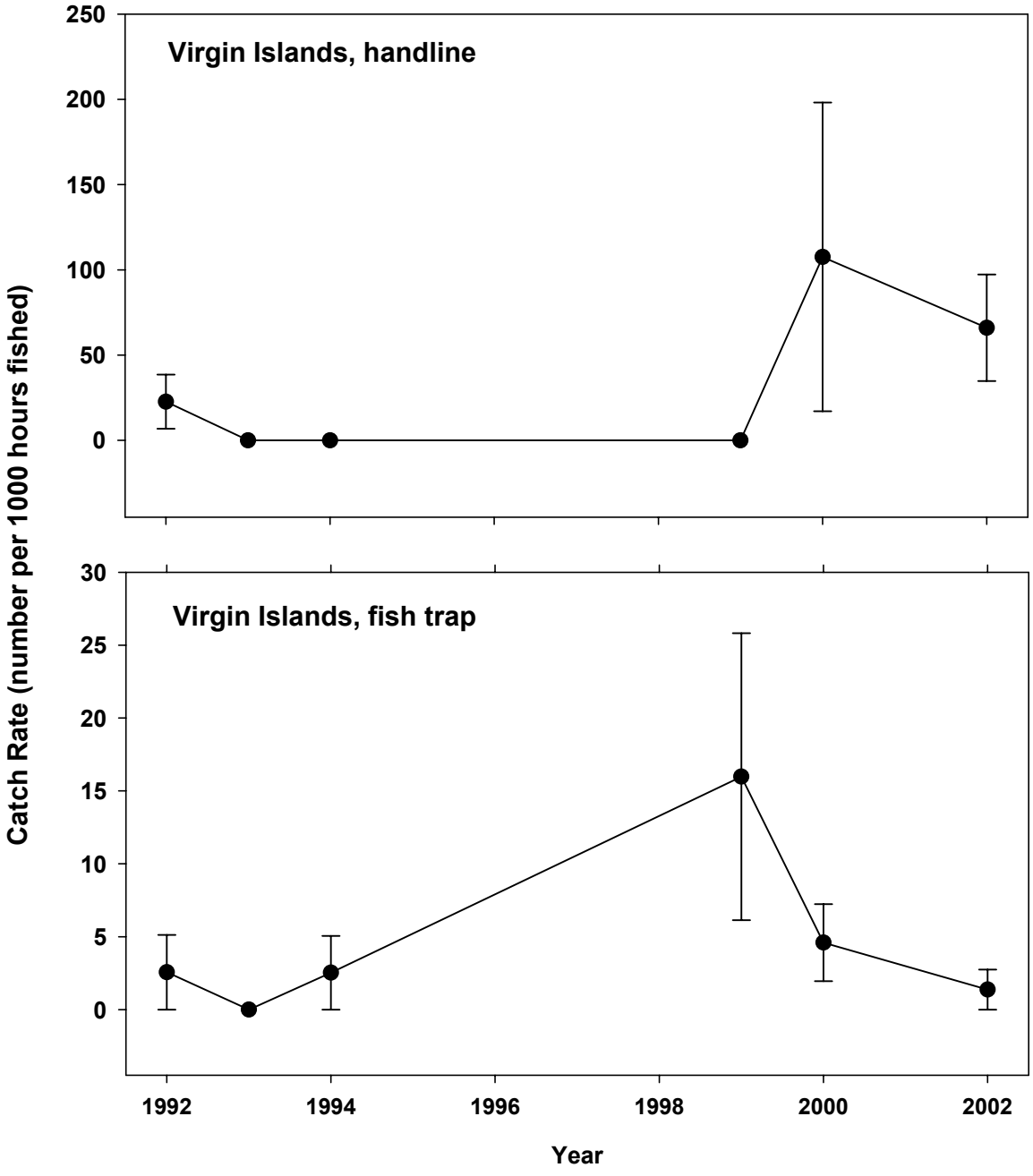

Figure 5. Yearly catch rates for graysby collected in the Virgin Islands. Error bars represent one standard error.

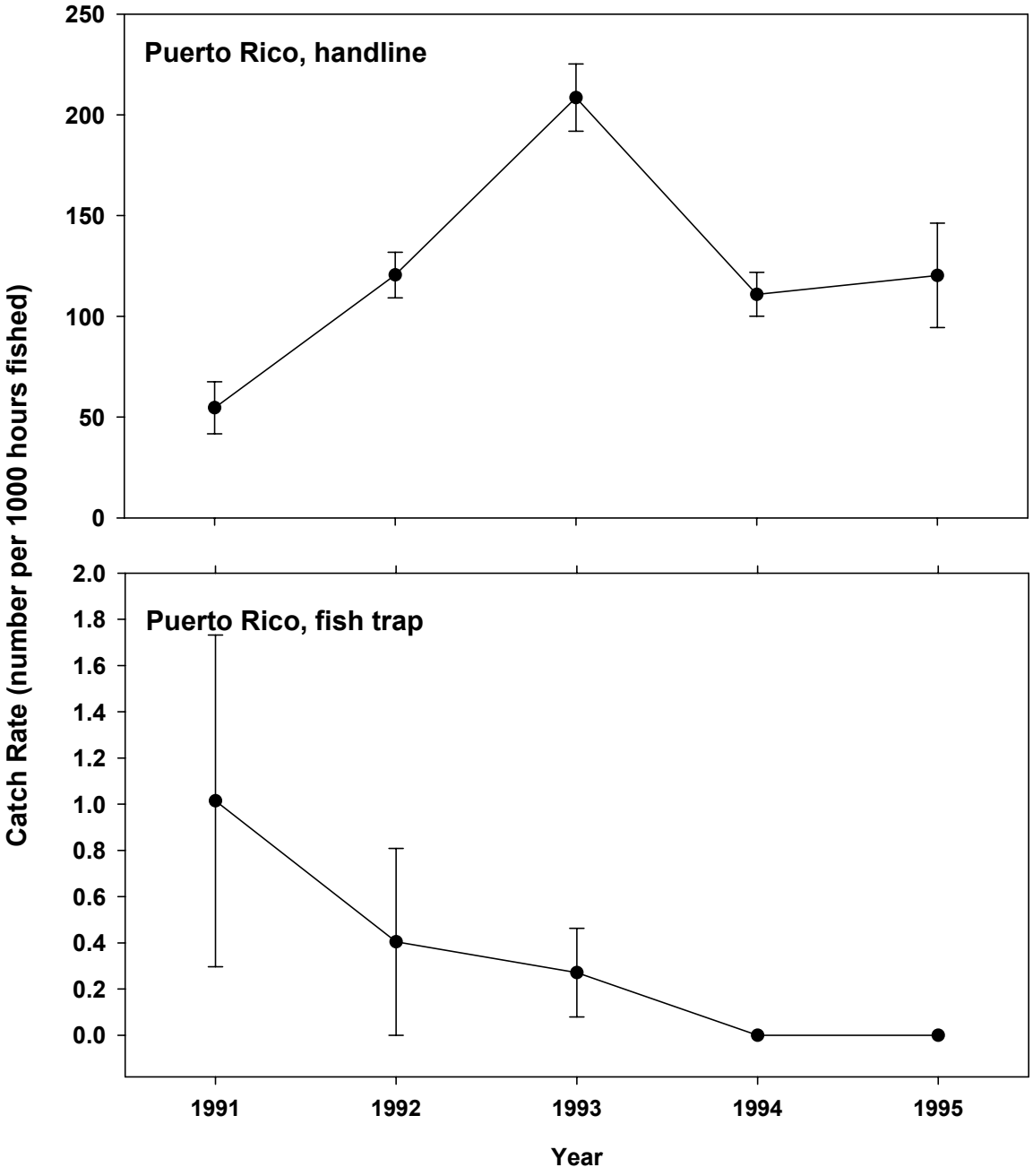

Figure 7. Yearly catch rates for sand tilefish collected in Puerto Rico. Error bars represent one standard error.

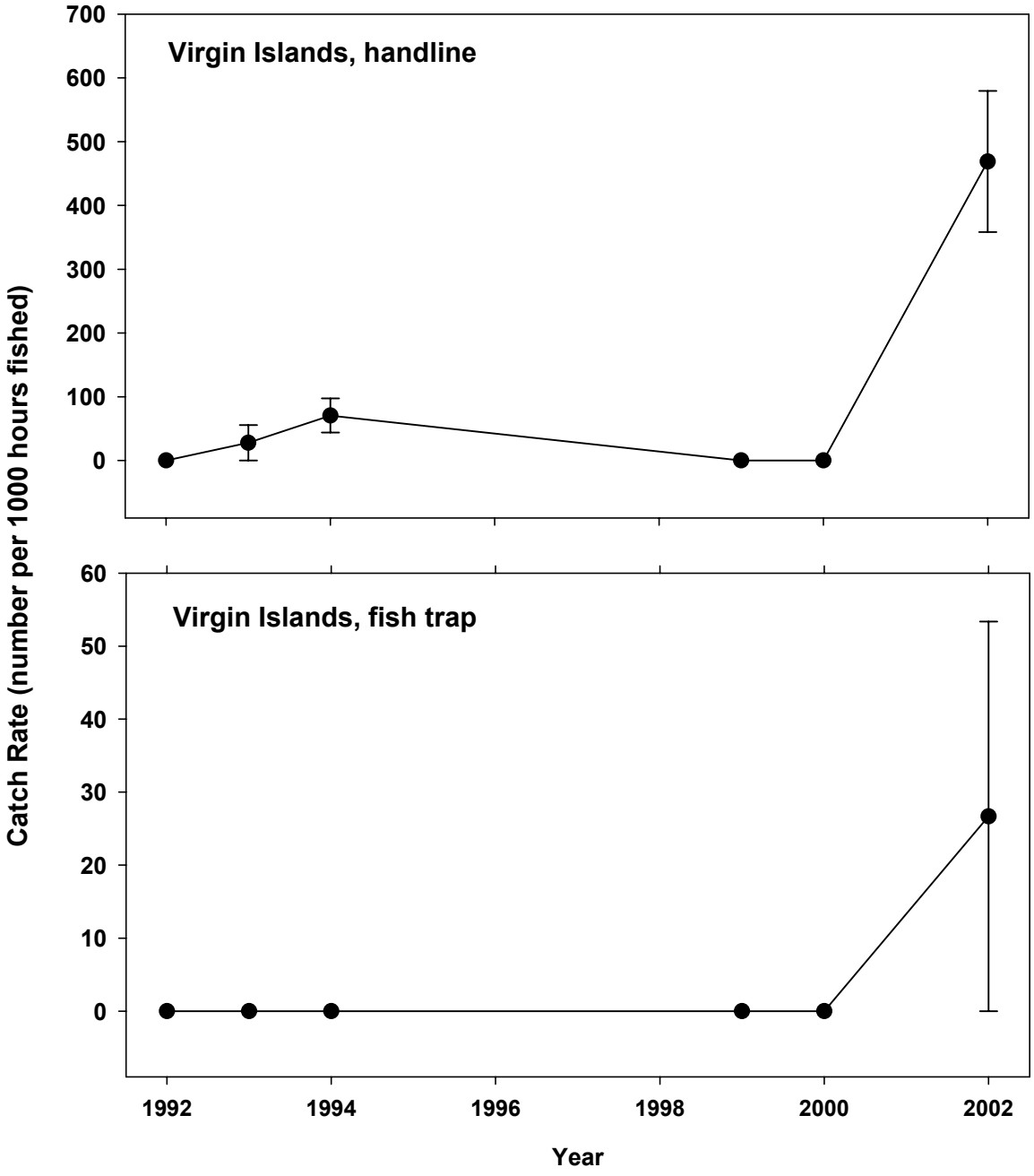

Figure 8. Yearly catch rates for sand tilefish collected in the Virgin Islands. Error bars represent one standard error.

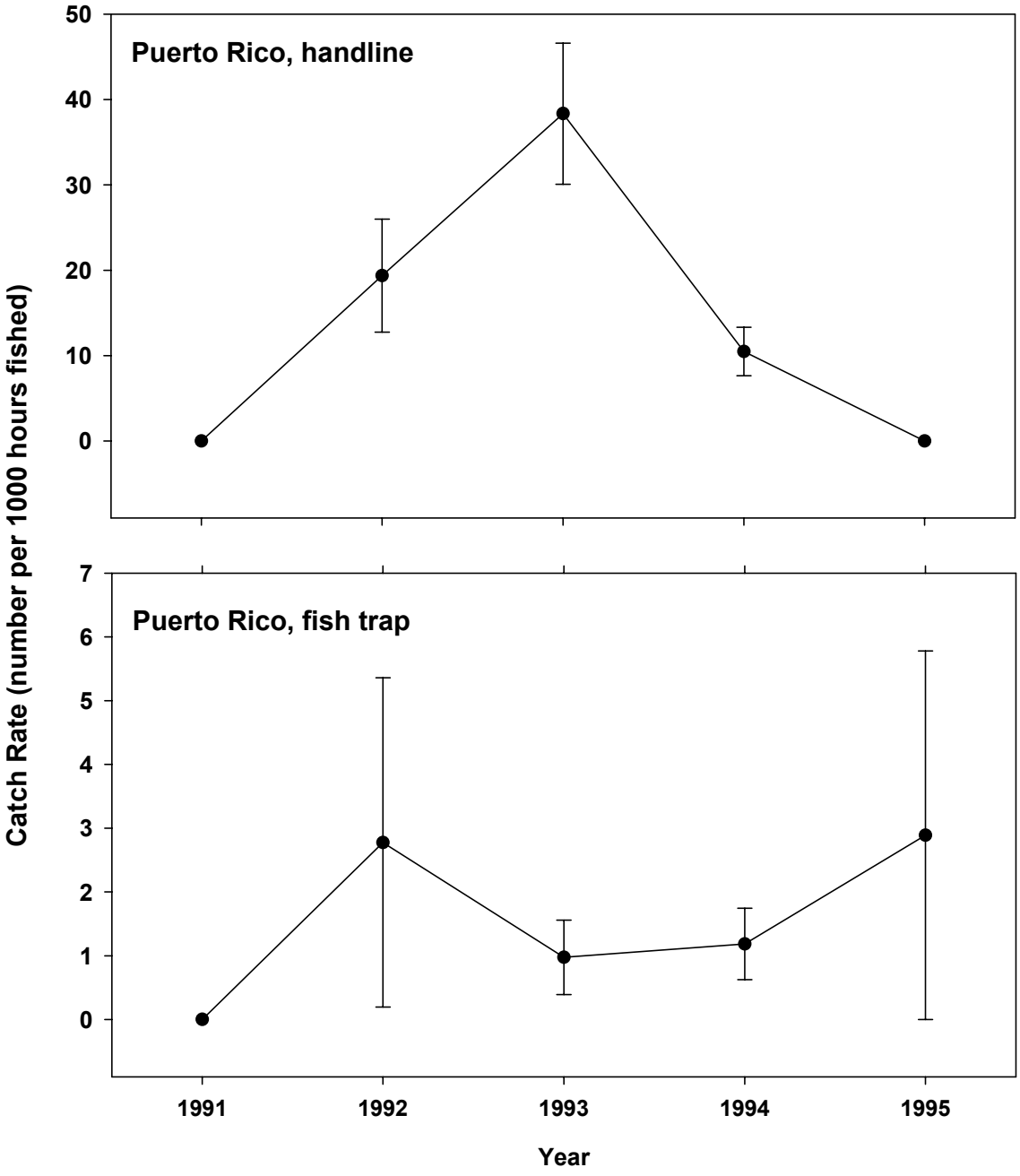

Figure 9. Yearly catch rates for silk snapper collected in Puerto Rico. Error bars represent one standard error.

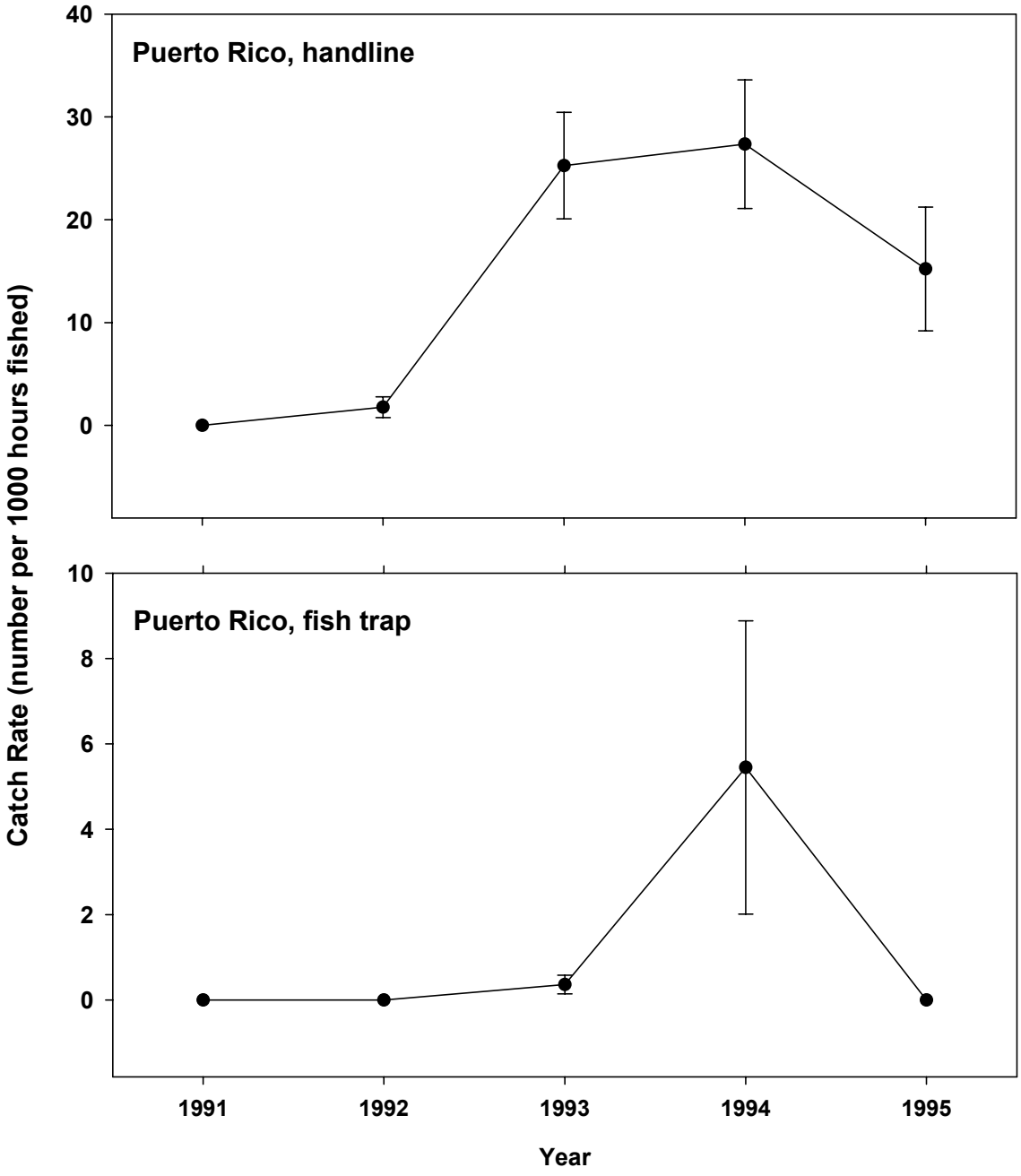

Figure 10. Yearly catch rates for blackfin snapper collected in Puerto Rico. Error bars represent one standard error.

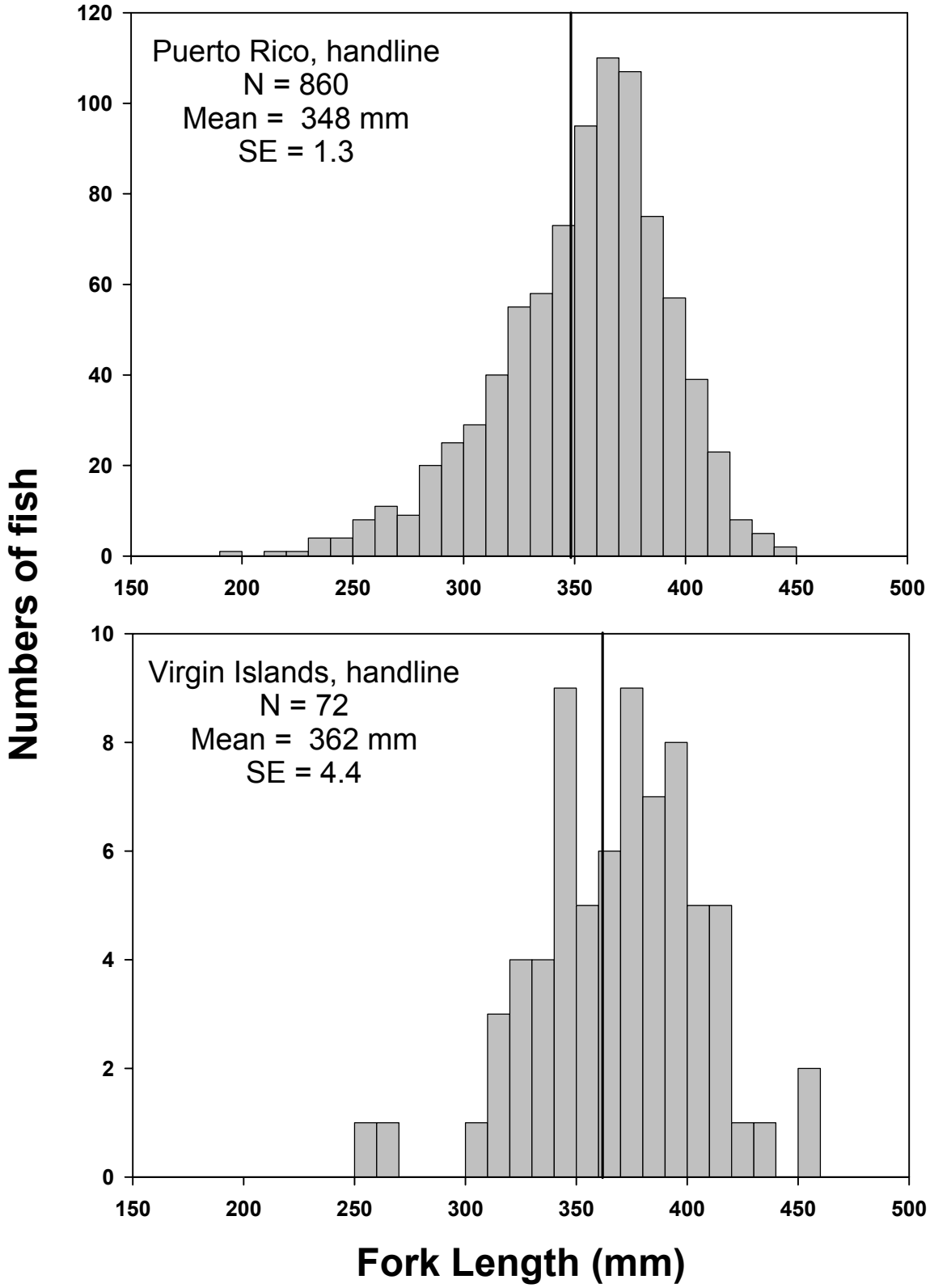

Figure 11. Length frequency distribution of sand tilefish collected by handlines around Puerto Rico and the Virgin Islands. Vertical lines indicate mean fork lengths.

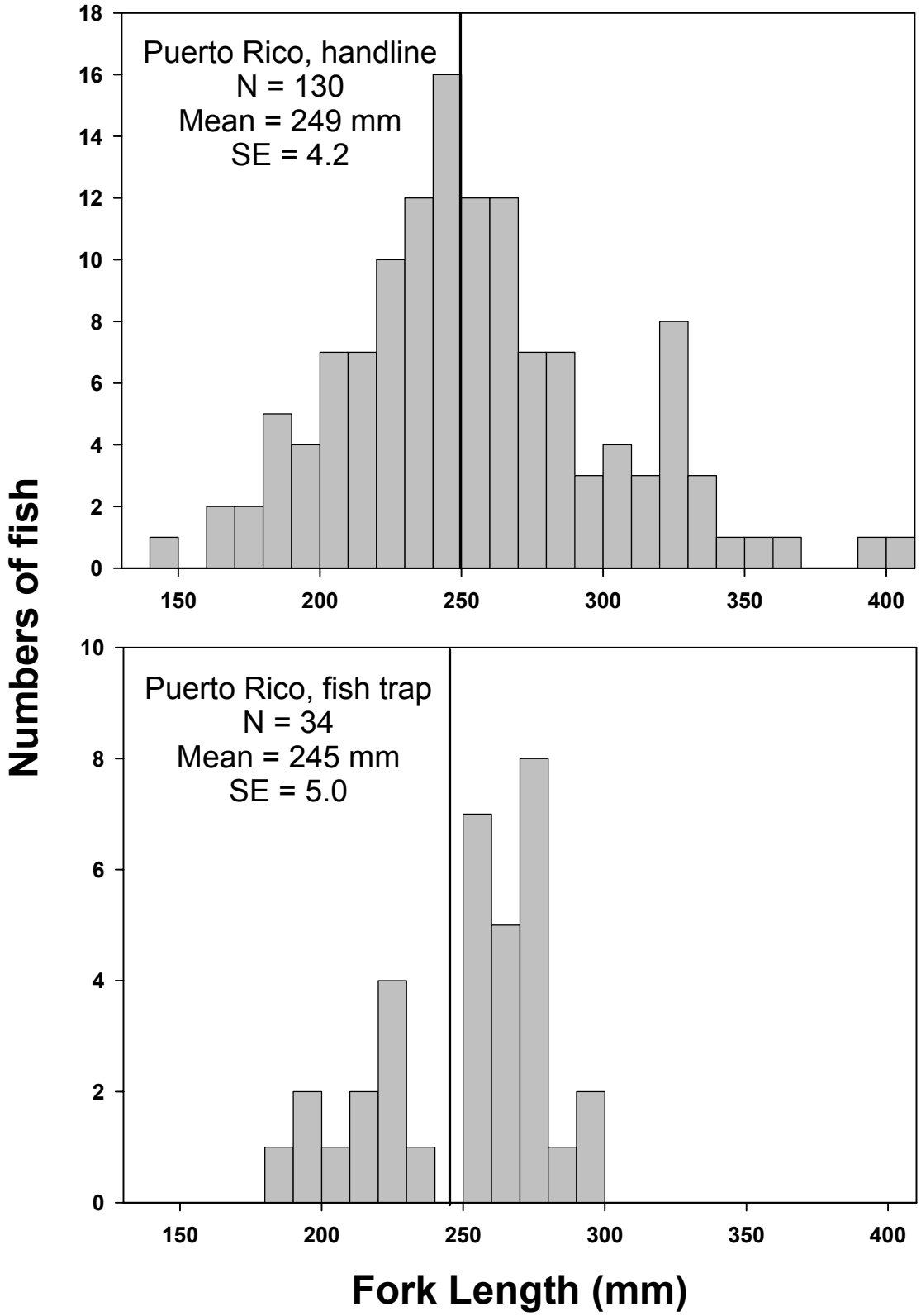

Figure 12. Length frequency distribution of silk snapper collected by handlines and fish traps around Puerto Rico. Vertical lines indicate mean fork lengths.

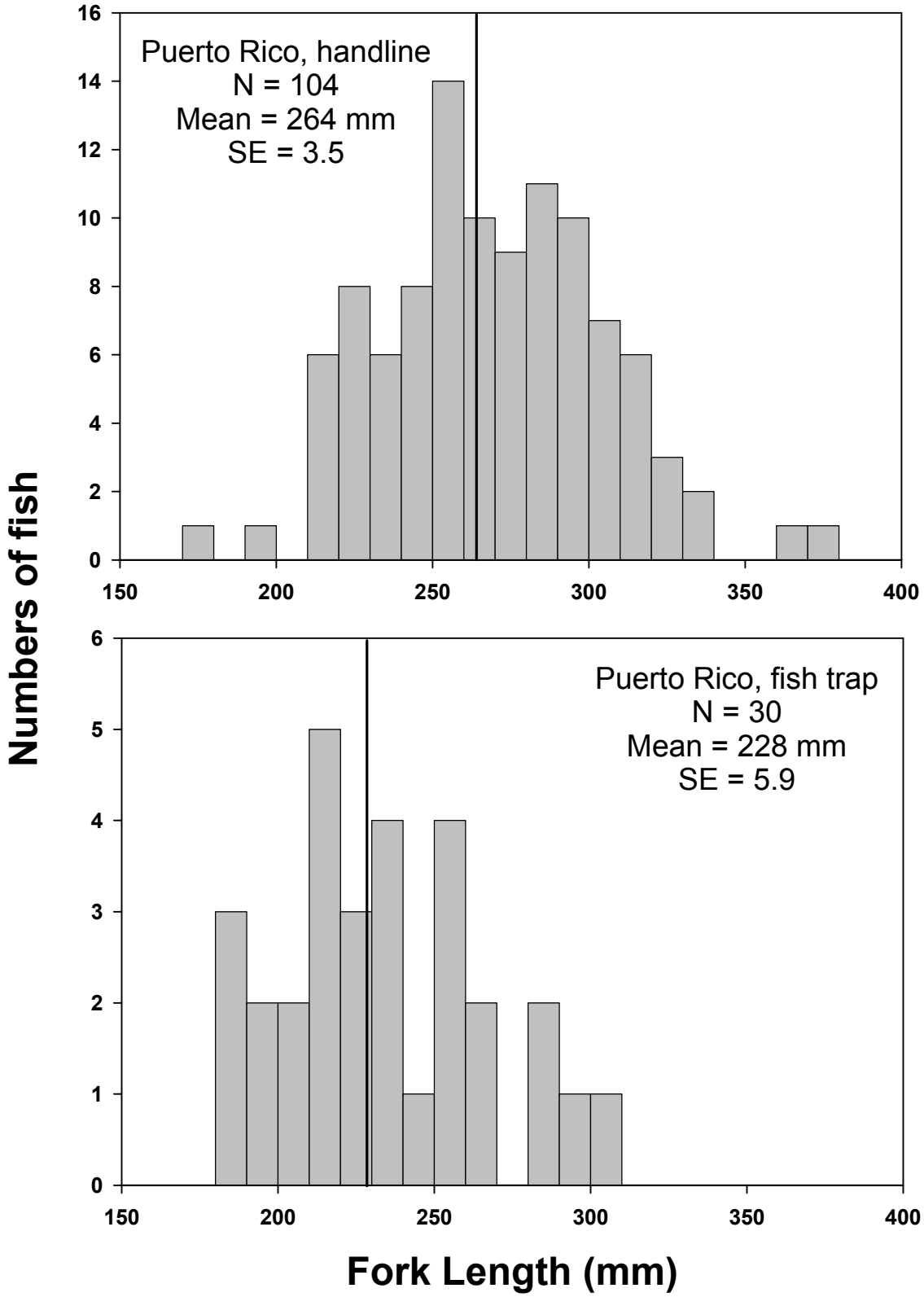

Figure 13. Length frequency distribution of blackfin snapper collected by handlines and fish traps around Puerto Rico. Vertical lines indicate mean fork lengths.