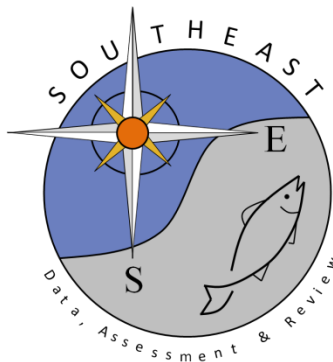


SEDAR 91 Commercial Landings of Caribbean Spiny Lobster (*Panulirus argus*, *Panulirus guttatus*) in St. Thomas and St. John, US Caribbean, 1975-2023

M. Refik Orhun<sup>1</sup> \*, Katherine Godwin<sup>3</sup>, Kim Johnson<sup>2</sup>, and Stephanie Martínez Rivera<sup>1</sup>

SEDAR91-DW-08

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# SEDAR 91 Commercial Landings of Caribbean Spiny Lobster (*Panulirus argus*, *Panulirus guttatus*) in St. Thomas and St. John, US Caribbean, 1975-2023

M. Refik Orhun<sup>1</sup>, Katherine Godwin<sup>3</sup>, Kim Johnson<sup>2</sup>, and Stephanie Martínez Rivera<sup>1</sup>

November 18, 2024

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## 1. Introduction

Commercial fishery landings in St. Thomas and St. John (STTJ) were obtained from self-reported fisher logbook data (Caribbean Commercial Logbook, CCL). Logbook reporting began in 1974, however, landings were initially reported by gear type (e.g., net fish, hook fish, pot fish, and spear fish) and as either snapper/grouper or as other fin fish group during the period 1974-1995 (Valle-Esquivel and Díaz 2004). Beginning in 1996 (St. Croix) and 1997 (St. Thomas and St. John) part of commercial landings were reported by species group (e.g., snappers, groupers, parrotfishes, surgeonfishes, etc.), and by gear (hook and line, gill net, SCUBA, trap, etc.). All commercial fishery data reports included species groups beginning in 1998 (St. Croix) and 2000 (St. Thomas and St. John). Classification of Caribbean Spiny Lobster by species, however, began in 1974 (partial year, changes to reporting forms are usually implemented in July). Commercial fishery landings data for Caribbean Spiny Lobster in STTJ were available for the years 1975-2023.

## 2. Methods

Commercial landings of Caribbean Spiny Lobster were compiled from 1975 to 2023 for STTJ. The commercial landings were provided in pounds and the number of trips with reported Spiny Lobster landings were summed by year and fishing gear group.

### 2.1 Gear groups

Individual fishing gear names used by Caribbean Spiny Lobster fishers in STTJ logbooks (1975-2023) are shown in a column titled “GEAR NM” in Table 1. In order to classify the landings into gear groups by the individual gears (or GEAR NMs) with similar size selectivity, length composition data of Caribbean Spiny Lobster from the Fishery Dependent (FD) Trip Interview Program (TIP) database were analyzed using generalized linear models (GLMs). The statistical analysis conducted by Godwin et al. (2024) showed which gears had significantly different length distributions.

Based on the result of the GLMs and reported commercial landings, commercial landings of Caribbean Spiny Lobster were classified into 2 gear groups (Table 1).

Table 1: The classification of the commercial logbook gears into gear groups.

<b>GEAR NM</b>	<b>GEAR GROUP</b>
LOBSTER TRAP	TRAPS ALL
DIVING BY HAND	DIVING
DIVING	DIVING
TRAPS	TRAPS ALL
LINE FISHING	TRAPS ALL
COMBINED GEARS	TRAPS ALL

SEINE NET	TRAPS ALL
CASTNET	TRAPS ALL
UNKNOWN	TRAPS ALL
TRAMMEL NET	TRAPS ALL
FISH TRAP	TRAPS ALL
BY HAND	DIVING
TRAP-UNKNOWN TYPE	TRAPS ALL
BY HAND WITH SCUBA	DIVING
BY HAND WHILE SKIN DIVING	DIVING
SPEAR OR BY HAND-UNKNOWN TYPE	DIVING
HAND SNARE WHILE SKIN DIVING	DIVING
BY SNARE WITH SCUBA	DIVING
SKIN DIVING AND SCUBA	DIVING
ROD AND REEL	TRAPS ALL
HAWAIIAN SLING WITH SCUBA	DIVING
SPEARFISHING WITH SCUBA	DIVING
HANDLINE	TRAPS ALL
SPEARFISHING WHILE SKIN DIVING	DIVING

## 2.2 Outliers

Outlier removal was conducted by using a mean and standard deviation method. We calculated the values to define outliers by gear group and island (Table 2). If the landings of Caribbean Spiny Lobster reported on a trip were greater than three standard deviations from the mean (i.e., 99.73% quantile), they were removed from the dataset. Due to the outlier removal, the yearly commercial landings for Caribbean Spiny Lobster compiled in SEDAR91 may not match with previous SEDARs. However, we provided the commercial landings for Caribbean Spiny Lobster in STTJ with outliers removed and with outliers included in the total landings compilations.

Table 2: Commercial landings of Caribbean Spiny Lobster in pounds equal to three standard deviations from the mean (i.e., 99.73% quantile) by gear group used for the outlier analysis. Trips with pounds landed greater than the indicated value were removed from the dataset.

<b>GEAR NAMES</b>	<b>99.73% Quantile</b>
TRAPS	373
LOBSTER TRAP	490
DIVING BY HAND	858
TRAP-UNKNOWN TYPE	488
FISH TRAP	306
BY HAND WHILE SKIN DIVING	444
COMBINED GEARS	395
UNKNOWN	308
SEINE NET	207
LINE FISHING	183
BY SNARE WITH SCUBA	150
DIVING	124
CASTNET	119
BY HAND WITH SCUBA	114
BY HAND	86
HAND SNARE WHILE SKIN DIVING	84
SKIN DIVING AND SCUBA	54
TRAMMEL NET	50
SPEAR OR BY HAND-UNKNOWN TYPE	45
HAWAIIAN SLING WITH SCUBA	36
SPEARFISHING WITH SCUBA	35
HANDLINE	20
ROD AND REEL	18
SPEARFISHING WHILE SKIN DIVING	12

### *2.3 Confidentiality*

Confidential data were determined based on the number of fishers that reported commercial landings by year and gear group. If the number of fishers reporting Spiny Lobster landings within a particular year and gear group was less than 3 then those data were considered confidential and were not shown in any tables or figures.

### *2.4 Discards*

Species-specific commercial discard reporting started in 2003 in STTJ for Caribbean Spiny Lobster.

## **3. Results**

### *3.1 Commercial landings*

Commercial landings of Caribbean Spiny Lobster in St. Thomas and St. John from 1975 to 2023, were approximately 6,741-13,6028 pounds per year (Table 3, Figure 1). Trips per year varied between approximately 200-1,717 (Table 3, Figure 2). The commercial landings by year and gear group are shown in Table 4 and Figure 3, and the number of trips in Figure 4.

Table 3: Commercial landings of Caribbean Spiny Lobster in pounds and the number of trips that reported Caribbean Spiny Lobster landings in St. Thomas and St. John .

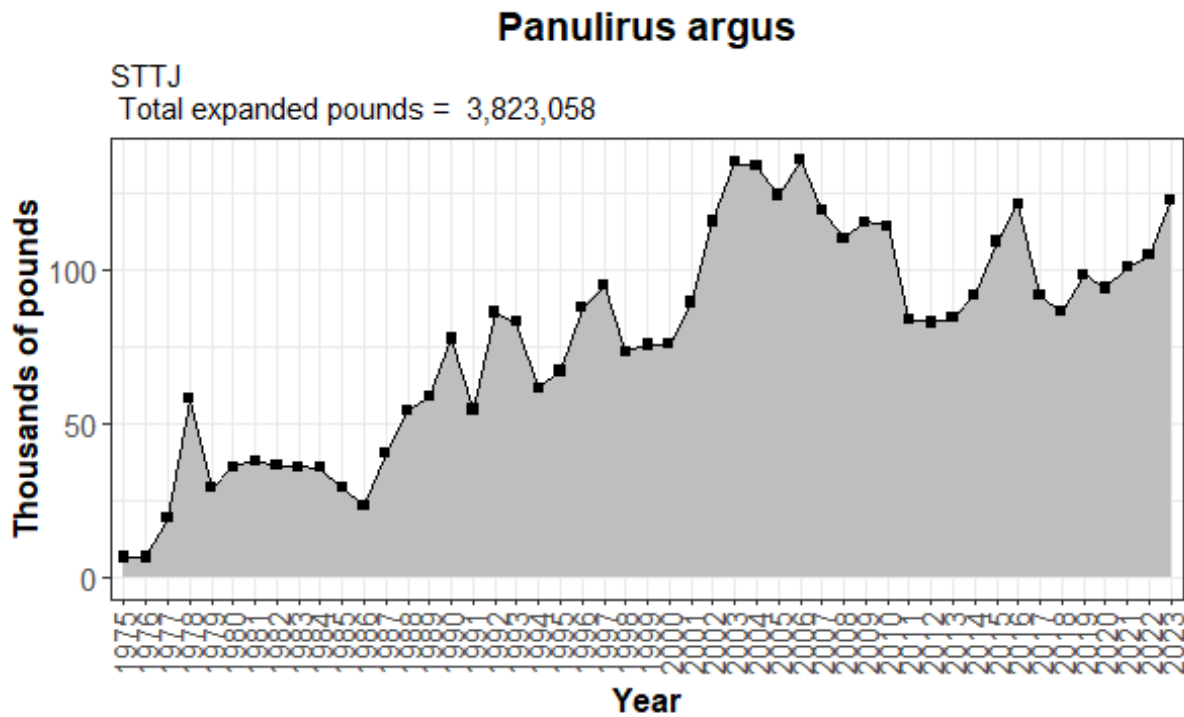
Year	Landings (lbs)	Trips (n)
1975	6,795	268
1976	6,741	200
1977	19,461	477
1978	58,311	744
1979	29,385	644
1980	36,089	534
1981	38,068	638
1982	36,662	595
1983	36,140	628
1984	35,976	621
1985	29,357	689
1986	23,637	608
1987	40,666	712

1988	54,679	852
1989	58,856	779
1990	77,836	960
1991	54,798	969
1992	86,413	1,390
1993	83,260	1,285
1994	61,774	1,129
1995	67,392	1,050
1996	87,932	1,187
1997	95,094	1,338
1998	73,715	1,134
1999	75,828	1,221
2000	76,151	1,218
2001	89,707	1,412
2002	115,973	1,583
2003	135,290	1,704
2004	133,982	1,717
2005	124,641	1,605
2006	136,028	1,495
2007	119,640	1,428
2008	110,465	1,453
2009	115,761	1,397
2010	114,572	1,256
2011	84,301	1,087
2012	83,156	1,062
2013	84,514	1,012
2014	92,260	941
2015	109,454	1,029



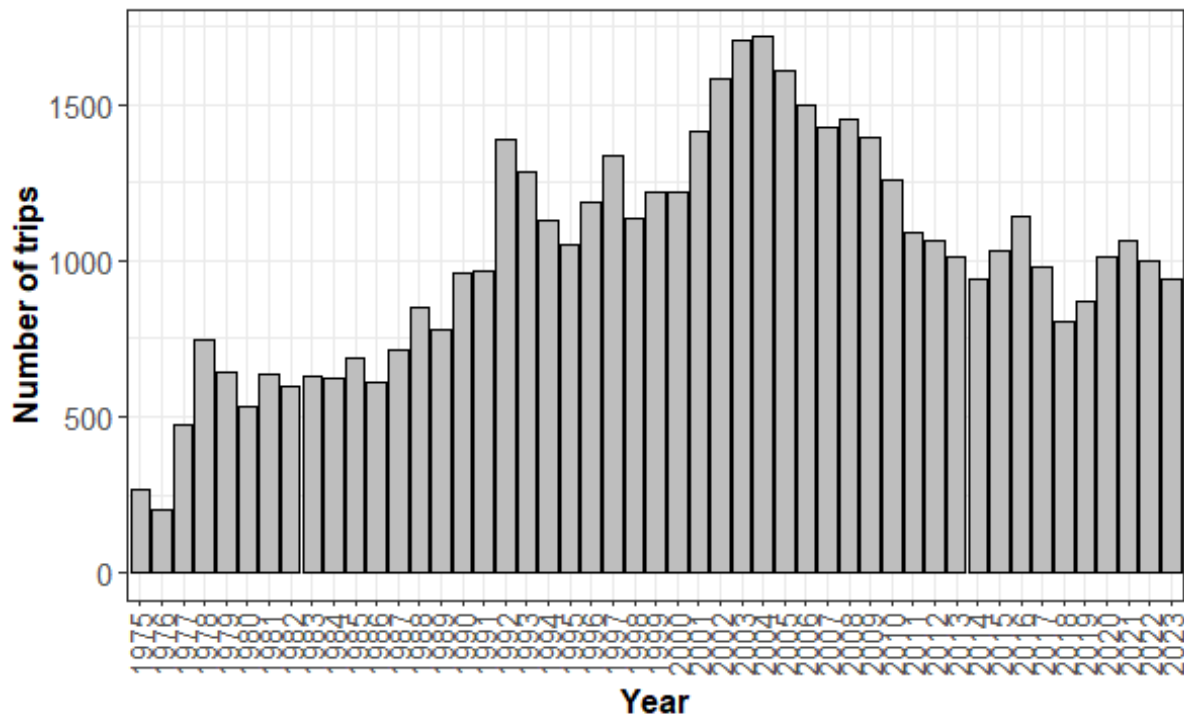
2016	121,695	1,144
2017	91,913	982
2018	86,708	806
2019	98,609	867
2020	94,333	1,014
2021	101,108	1,067
2022	104,905	1,001
2023	123,027	943
Total	3,823,058	49,875

\*Data are not confidential by year.



Data are not confidential by year.

Figure 1: The time series of commercial landings in pounds of Caribbean Spiny Lobster in St. Thomas and St. John.



Data are not confidential by year.

Figure 2: The time series of number of trips with reported Caribbean Spiny Lobster landings in St. Thomas and St. John.

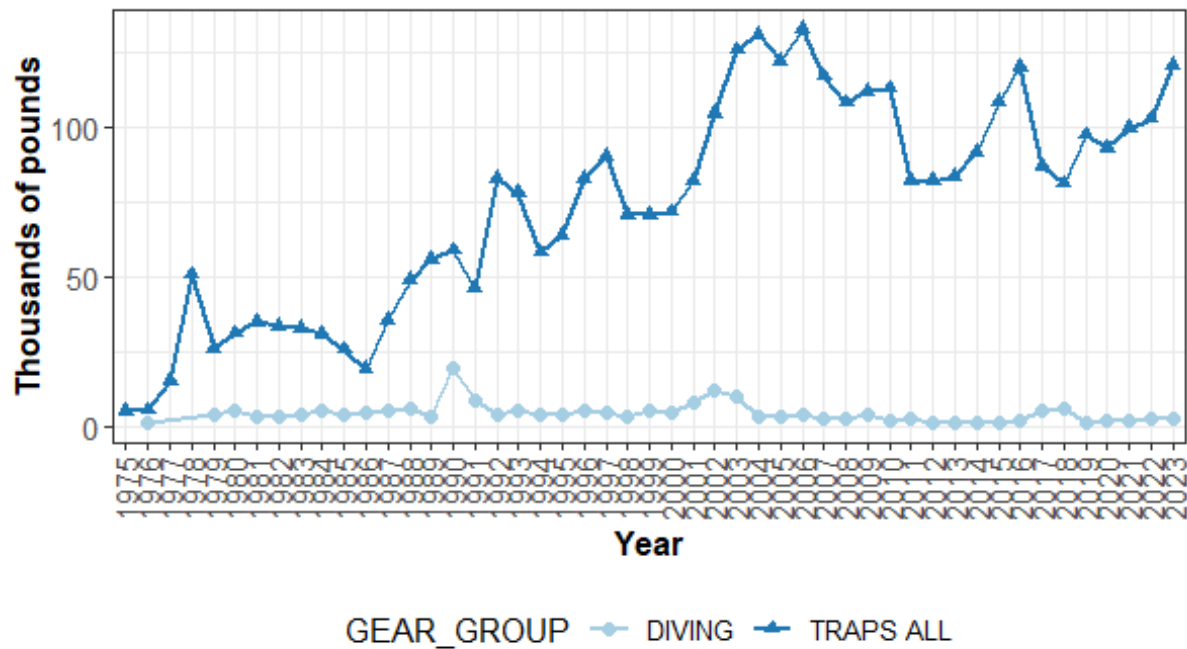
Table 4: Commercial landings of Caribbean Spiny Lobster in pounds by gear group that reported Caribbean Spiny Lobster landings in St. Thomas and St. John .

TRIP YEAR	TOTAL LBS TRAPS ALL	TRIPS TRAPS ALL	TOTAL LBS DIVING	TRIPS DIVING
1975	4,908	212	*	*
1976	5,404	176	1,337	24
1977	14,964	407	*	*
1978	50,524	612	*	*
1979	25,868	547	3,517	97
1980	30,989	462	5,100	72
1981	34,919	543	3,149	95
1982	33,612	510	3,050	85
1983	32,614	474	3,526	154

1984	30,889	394	5,087	227
1985	25,557	527	3,800	162
1986	19,020	439	4,617	169
1987	35,319	518	5,347	194
1988	48,681	670	5,998	182
1989	55,554	640	3,302	139
1990	58,707	813	19,129	147
1991	46,060	805	8,738	164
1992	82,558	1,244	3,855	146
1993	77,816	1,079	5,444	206
1994	58,116	945	3,658	184
1995	63,646	904	3,746	146
1996	82,722	1,025	5,210	162
1997	90,299	1,136	4,795	202
1998	70,484	1,033	3,231	101
1999	70,619	1,068	5,209	153
2000	71,605	1,053	4,546	165
2001	82,136	1,180	7,571	232
2002	104,071	1,288	11,902	295
2003	125,641	1,451	9,649	253
2004	130,759	1,615	3,223	102
2005	121,759	1,524	2,882	81
2006	132,513	1,395	3,515	100
2007	116,855	1,352	2,785	76
2008	108,042	1,353	2,423	100
2009	111,599	1,277	4,162	120
2010	112,833	1,180	1,739	76
2011	81,994	981	2,307	106

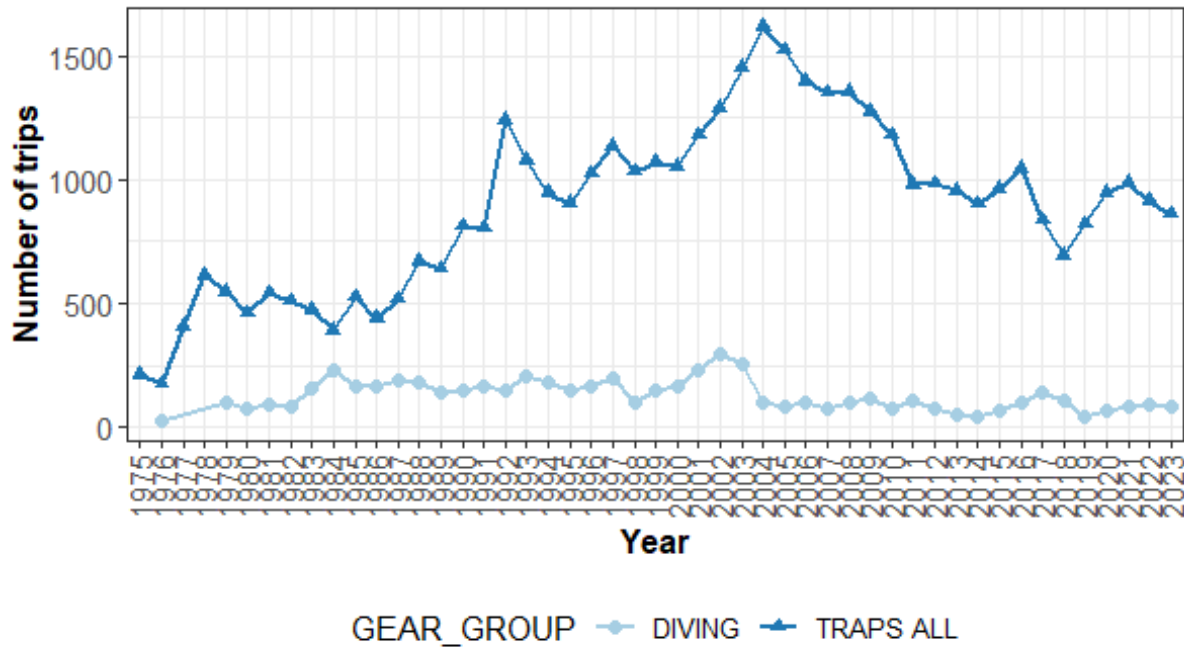
2012	81,766	985	1,390	77
2013	83,349	958	1,165	54
2014	91,337	902	923	39
2015	108,170	961	1,284	68
2016	119,817	1,048	1,878	96
2017	86,728	838	5,185	144
2018	81,004	694	5,704	112
2019	97,247	821	1,362	46
2020	92,683	948	1,650	66
2021	99,403	986	1,705	81
2022	102,582	912	2,323	89
2023	120,545	862	2,482	81
Total	3,614,287	43,747	194,600	5,870

\*Confidential data were removed. Total landings (lb) of confidential data by year and gear is 14,171. Total number of trips of confidential data is 258.



Confidential data were removed.  
 Total landings (lb) of confidential data by year and gear is 14,171.  
 Total number of trips of confidential data is 258.

Figure 3: Commercial landings in pounds of Caribbean Spiny Lobster by year and gear group in St. Thomas and St. John.



Confidential data were removed.  
 Total landings (lb) of confidential data by year and gear is 14,171.  
 Total number of trips of confidential data is 258.

Figure 4: Number of trips with reported landings of Caribbean Spiny Lobster by year and gear group in St. Thomas and St. John .

### 3.2 Commercial landings after outlier analysis by gears

Commercial landings of Caribbean Spiny Lobster in St. Thomas and St. John from 1975 to 2023, were approximately 6,741-133,232 pounds per year (Table 5, Figure 5). Comparison of commercial landings after outlier analysis is shown in Table 7. Trips per year varied between approximately 200-1,714 (Table 5, Figure 6). The commercial landings by year and gear group are shown in Table 6 and Figure 7, and the number of trips in Figure 8.

Table 5: Commercial landings of Caribbean Spiny Lobster in pounds and the number of trips that reported Caribbean Spiny Lobster landings in St. Thomas and St. John following outlier removal.

Year	Landings (lbs)	Trips (n)
1975	6,795	268
1976	6,741	200
1977	19,461	477
1978	50,501	730

1979	27,815	642
1980	30,429	530
1981	38,068	638
1982	35,094	592
1983	36,140	628
1984	34,156	618
1985	29,357	689
1986	23,637	608
1987	37,406	706
1988	54,136	851
1989	57,768	777
1990	68,581	952
1991	53,758	967
1992	84,073	1,386
1993	82,007	1,283
1994	61,774	1,129
1995	67,392	1,050
1996	87,932	1,187
1997	95,094	1,338
1998	72,727	1,131
1999	73,675	1,214
2000	76,030	1,217
2001	88,242	1,408
2002	114,048	1,578
2003	133,014	1,697
2004	132,852	1,714
2005	124,641	1,605
2006	133,232	1,489

2007	117,904	1,424
2008	110,465	1,453
2009	113,663	1,392
2010	108,700	1,248
2011	82,896	1,084
2012	82,641	1,061
2013	83,976	1,011
2014	92,173	940
2015	109,454	1,029
2016	120,755	1,142
2017	90,711	980
2018	84,078	798
2019	97,694	864
2020	94,008	1,013
2021	100,501	1,066
2022	101,273	994
2023	120,001	936
Total	3,747,469	49,734

\*Data are not confidential by year.



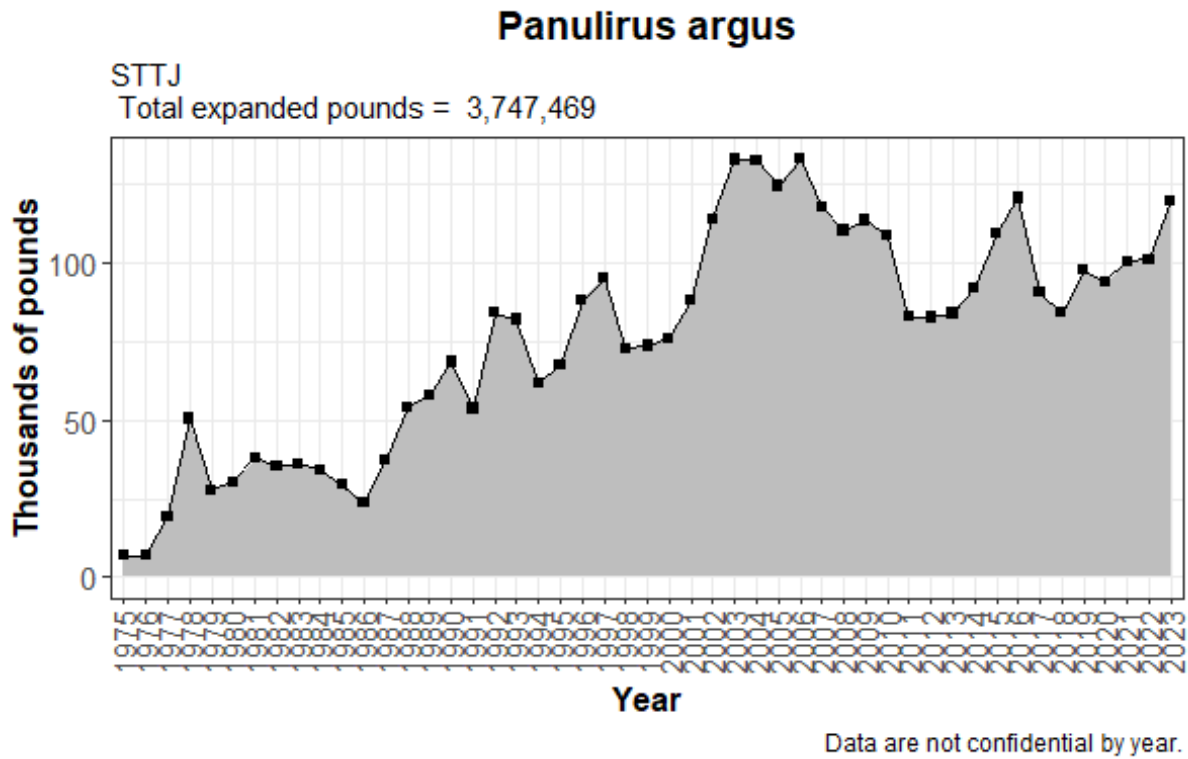
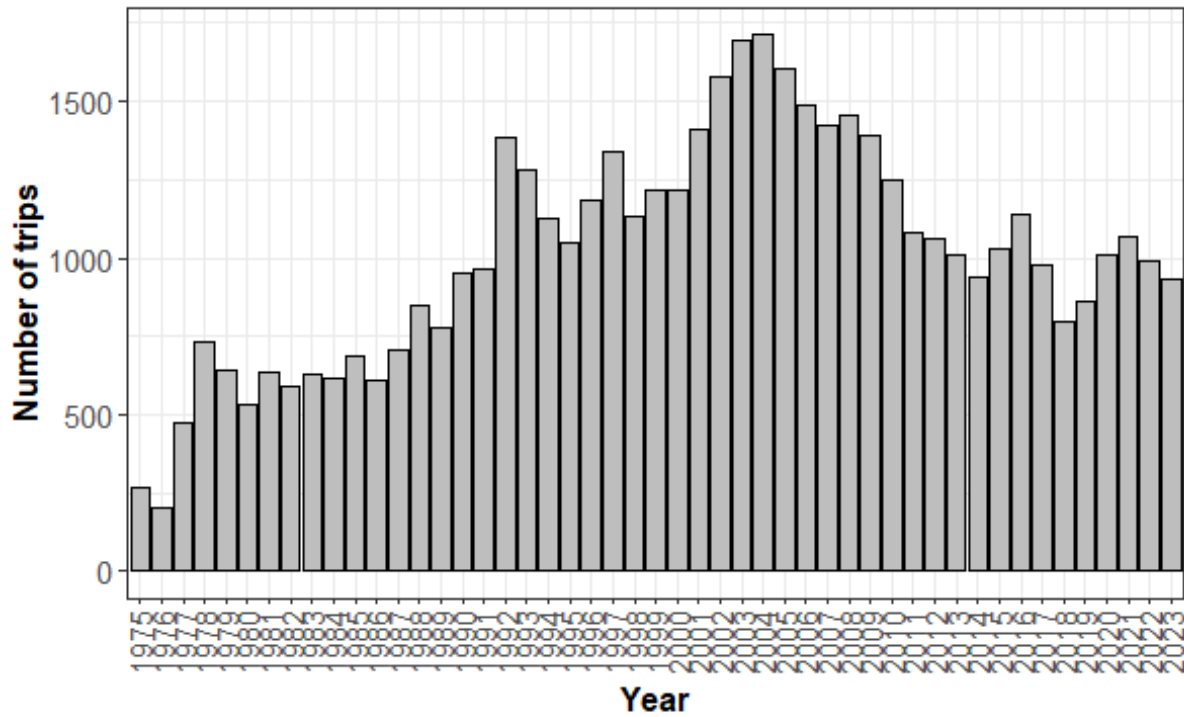


Figure 5: The time series of commercial landings in pounds of Caribbean Spiny Lobster in St. Thomas and St. John following outlier removal.



Data are not confidential by year.

Figure 6: The time series of number of trips with reported landings of Caribbean Spiny Lobster in St. Thomas and St. John following outlier removal.

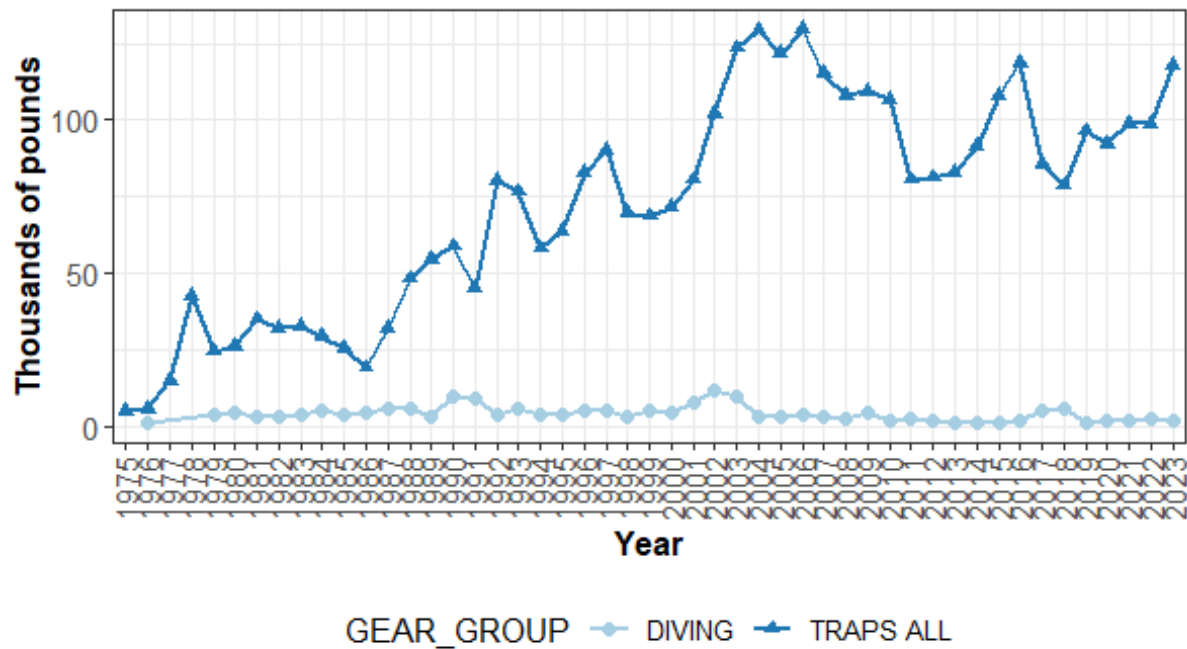
Table 6: Commercial landings of Caribbean Spiny Lobster in pounds by gear group that reported Caribbean Spiny Lobster landings in St. Thomas and St. John following outlier removal.

TRIP YEAR	TOTAL LBS TRAPS ALL	TRIPS TRAPS ALL	TOTAL LBS DIVING	TRIPS DIVING
1975	4,908	212	*	*
1976	5,404	176	1,337	24
1977	14,964	407	*	*
1978	42,714	598	*	*
1979	24,298	545	3,517	97
1980	26,189	459	4,240	71
1981	34,919	543	3,149	95
1982	32,044	507	3,050	85
1983	32,614	474	3,526	154

1984	29,069	391	5,087	227
1985	25,557	527	3,800	162
1986	19,020	439	4,617	169
1987	32,059	512	5,347	194
1988	48,138	669	5,998	182
1989	54,466	638	3,302	139
1990	58,707	813	9,874	139
1991	45,020	803	8,738	164
1992	80,218	1,240	3,855	146
1993	76,563	1,077	5,444	206
1994	58,116	945	3,658	184
1995	63,646	904	3,746	146
1996	82,722	1,025	5,210	162
1997	90,299	1,136	4,795	202
1998	69,496	1,030	3,231	101
1999	68,759	1,063	4,916	151
2000	71,484	1,052	4,546	165
2001	80,671	1,176	7,571	232
2002	102,281	1,284	11,767	294
2003	123,631	1,446	9,383	251
2004	129,629	1,612	3,223	102
2005	121,759	1,524	2,882	81
2006	129,717	1,389	3,515	100
2007	115,119	1,348	2,785	76
2008	108,042	1,353	2,423	100
2009	109,501	1,272	4,162	120
2010	106,961	1,172	1,739	76
2011	80,589	978	2,307	106

2012	81,251	984	1,390	77
2013	82,811	957	1,165	54
2014	91,337	902	836	38
2015	108,170	961	1,284	68
2016	118,877	1,046	1,878	96
2017	85,526	836	5,185	144
2018	78,666	688	5,412	110
2019	96,417	819	1,277	45
2020	92,358	947	1,650	66
2021	98,796	985	1,705	81
2022	98,950	905	2,323	89
2023	118,120	857	1,881	79
Total	3,550,572	43,626	182,726	5,850

\*Confidential data by year and gear were removed. Total landings (lb) of confidential data is 14,171. Total number of trips of confidential data is 258.



Confidential data by year and gear were removed.  
 Total landings (lb) of confidential data is 14,171.  
 Total number of trips of confidential data is 258.

Figure 7: Commercial landings in pounds of Caribbean Spiny Lobster after outlier removal by year and gear group in St. Thomas and St. John.

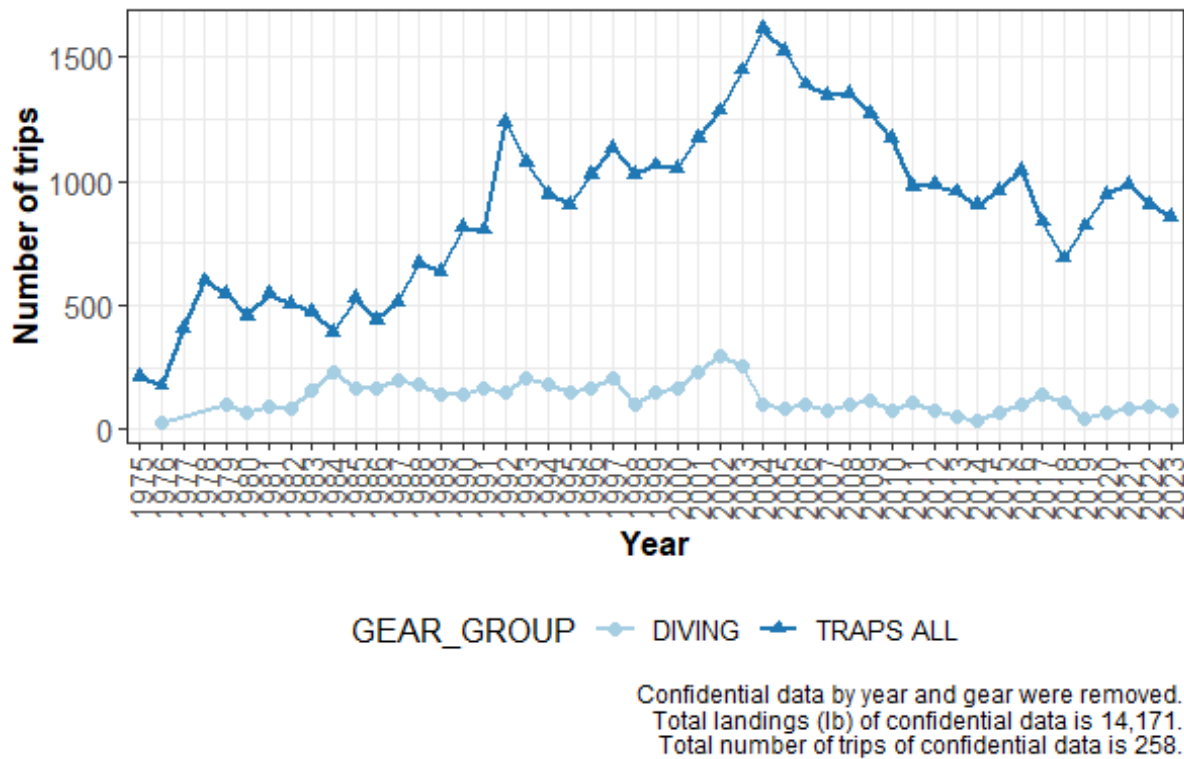


Figure 8: Number of trips with reported landings of Caribbean Spiny Lobster after outlier removal by year and gear group in St. Thomas and St. John.

Table 7: Comparison of all reported commercial fishery landings and commercial landings after outlier removal of Caribbean Spiny Lobster in pounds for St. Thomas and St. John.

Year	Landings (lbs)	Landings outlier analysis (lbs)	Difference (%)
1975	6,795	6,795	0.0
1976	6,741	6,741	0.0
1977	19,461	19,461	0.0
1978	58,311	50,501	13.4
1979	29,385	27,815	5.3
1980	36,089	30,429	15.7
1981	38,068	38,068	0.0
1982	36,662	35,094	4.3
1983	36,140	36,140	0.0

1984	35,976	34,156	5.1
1985	29,357	29,357	0.0
1986	23,637	23,637	0.0
1987	40,666	37,406	8.0
1988	54,679	54,136	1.0
1989	58,856	57,768	1.8
1990	77,836	68,581	11.9
1991	54,798	53,758	1.9
1992	86,413	84,073	2.7
1993	83,260	82,007	1.5
1994	61,774	61,774	0.0
1995	67,392	67,392	0.0
1996	87,932	87,932	0.0
1997	95,094	95,094	0.0
1998	73,715	72,727	1.3
1999	75,828	73,675	2.8
2000	76,151	76,030	0.2
2001	89,707	88,242	1.6
2002	115,973	114,048	1.7
2003	135,290	133,014	1.7
2004	133,982	132,852	0.8
2005	124,641	124,641	0.0
2006	136,028	133,232	2.1
2007	119,640	117,904	1.5
2008	110,465	110,465	0.0
2009	115,761	113,663	1.8
2010	114,572	108,700	5.1
2011	84,301	82,896	1.7

2012	83,156	82,641	0.6
2013	84,514	83,976	0.6
2014	92,260	92,173	0.1
2015	109,454	109,454	0.0
2016	121,695	120,755	0.8
2017	91,913	90,711	1.3
2018	86,708	84,078	3.0
2019	98,609	97,694	0.9
2020	94,333	94,008	0.3
2021	101,108	100,501	0.6
2022	104,905	101,273	3.5
2023	123,027	120,001	2.5
Total	3,823,058	3,747,469	2.0

### *3.3 Commercial discards*

Few reports of discarded lobster are available. Following the recommendation of SEDAR 57, lobster discard mortality is presumed to be negligible.

## **4. Literature Cited**

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