

**COMPILATION OF FISHING AREA MAPS USED IN
COMMERCIAL CATCH REPORTING IN THE U.S.
VIRGIN ISLANDS (1974/75 TO 2004/05)
INCLUDING SUBAREA CONVERSION
FACTORS BETWEEN MAPS**

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BACKGROUND

The Division of Fish and Wildlife is in the process of identifying and organizing historical data from the U.S. Virgin Islands commercial fisheries. Thirty years of commercial catch data can be used to analyze the health and status of these fisheries. An important element of commercial fisheries data is the catch location or area.

Each fishing district (St. Thomas/St. John and St. Croix) has its own fishing area map divided into separate subareas. Commercial fishers are required to record the area they fished on their commercial catch reports.

The objective of this report is to document the various fishing area maps for St. Thomas/St. John and St. Croix for the 1974/75 to 2003/04 fishing years. The fishing year is from July 1 to June 30 the following year.

Additionally, in order to accurately compare past and present commercial catch data, conversion ratios between old fishing areas and current areas need to be developed. This report presents these ratios and the methodology for developing them.

METHODOLOGY

Comparison of fishing area maps

As part of the identification and organization of old files, hard copies of commercial catch reports were identified. Included with catch reports for some years were maps of the U.S. Virgin Islands divided into fishing areas. Each fishing subarea had its own code. St. Thomas/St. John district had one set of codes. St. Croix district had separate area codes.

Fisher information booklets (see Bureau of Environmental Enforcement and Division of Fish and Wildlife 1981 and 1982; Department of Conservation and Culture Affairs 1985 and 1987; Department of Planning and Natural Resources, Division of Fish and Wildlife ca late 1980's, 1992 and 1993; . Department of Planning and Natural Resources, Division of Fish and Wildlife 1995; Department of Planning and Natural Resources 1996, 1997, 1998, and 2000; and Department of Planning and Natural Resources 2001, 2002, 2003, and 2004) are also part of the commercial catch report package. Often, these fisher information books include the fishing area map. These booklets were reviewed to identify which fishing area map was in use for that particular fishing year.

Fishing area maps were identified and compiled for both St. Thomas/St. John and St. Croix for fishing years between 1974/75 and 2003/04. Maps could not be located for fishing years 1975/76, 1976/77, 1977/78, 1979/80, 1980/81, 1982/83, 1983/84, 1984/85, and 1985/86. However, the data files for these years were consulted to determine which area codes were used. This identified which fishing area map was used that year.

Conversion between different area maps

To convert the old fishing areas to those currently being used, the percentage of the old subareas contained in each of the current fishing subareas was determined. To do this, boundary lines for the subareas were mapped in ArcView®. In most cases, little information exists about the actual locations of the boundaries, so a best estimate based on the maps given to fishers was used.

The land boundary and the boundary line between fishing areas are provided in the various fishing area maps provided to commercial fishers over the years. However, the fourth side, the outside boundary, was never defined for any of these subareas (except some of those subareas adjacent to the BVI international boarder). Fishers can travel many miles offshore to fish. In order to standardize the outside limit, two different definitions for the outer boundary were considered here. The first was to define the outer boundary as the 100 fathom drop-off. The second was to define the outer boundary as the 3 mile territorial waters boundaries. These definitions were needed of the outside boundary so that the area of each subarea could be calculated and compared.

For St. Thomas/St. John two different approaches were taken to define the outside boundary of subareas. The first approach was defining the outside boundary of fishing subareas as the territorial boundaries (3 miles from shore). In this case, the British Virgin Islands international boundary to the east and north of St. John, and Puerto Rico territorial water boundary to the west of St. Thomas were used as east and west boundaries.

The second approach used for St. Thomas/St. John was to define the outside boundary of fishing subareas as the 100 fathom depth drop-off. Again, the east and west boundaries were defined as the territorial water boundaries between Puerto Rico, the USVI, and BVI.

The 100 fathom drop-off is very close to the shore in St. Croix. In some locations it is only a few hundred yards from the shore, in other shore areas it is a few miles offshore. As such, it was not an appropriate measure for use in determining the outer boundary of St. Croix waters. Instead, the territorial water boundary was used to estimate conversion factors between old and new fishing area map subareas.

Polygons based on the fishing subareas were created and the area of each subarea was measured for each of the districts (St. Thomas/St. John and St. Croix). Conversion factors were calculated by determining the percentage of overlap of old subareas contained in current subareas.

RESULTS

Examples of each of the fishing area maps used between 1974/75 and 2004/05 are presented in Appendices A to F. Table 1 indicates the fishing years each of these maps were used. Since 1974/75, St. Thomas/St. John has used various fishing area maps divided into two distinct sets of subareas. The more recent set of subareas, first introduced in 1987/88 and originally consisting of five subarea codes, has been further divided in subsequent years into more subareas. The earliest fishing area map for St. Thomas/St. John and the British Virgin Islands was divided into

nine separate subareas: T1, T2, T3, T4, T5, B1, B2, B3 and B4 (see Appendix A). Range markers were used to designate the subareas. Signal Hill TV Tower was the range marker for St. Thomas and St. John's range marker was its highest peak. The two highest peaks on Peter Island, BVI also served as range markers. All other range markers were small cays or tips of larger cays and islands.

The second fishing map for St. Thomas/St. John used only five separate subareas: TNW, TSW, TNE, TSE and BBB (see Appendix B). No written record of land marks could be found indicating the exact boundaries or how they were selected.

In 1992, many fishers who regularly fished in St. John waters were confused by the area map and were unsure of their location (Barshinger 1992). Therefore, in the 1992/93 St. Thomas/St. John area map, sections of the TSE and TNE areas around St. John were divided into new subareas: JN and JS (see Appendix C). This was later changed to JN, JSW and JSE in 1994 (see Appendix D). No documentation could be found indicating the exact boundaries for the new areas and how they were chosen.

St. Croix has used two different fishing area maps, each with their own subarea codes, since 1974/75 (see Appendices E and F). The first code divided the map into six separate subareas: C1, C2, C3, C4, C5 and C6 (see Appendix E). The range markers were peaks, bays and points as indicated on the map and the ship channel at Hess Oil Virgin Island Corporation.

The second map and code used in St. Croix divided the fishing area map into only four separate subareas: XNE, XNW, XSW and XSE (see Appendix F). No written record could be found indicating the exact boundaries.

Table 2 indicates the conversion factors between subareas of old St. Thomas/St. John fishing area maps (A to C, see Appendices A to C) and the subareas of the currently used map (D, see Appendix D) using the territorial boundaries as the outer limit. Table 3 indicates the conversion factors between subareas of old St. Thomas/St. John fishing area maps (A to C, see Appendices A to C) and the subareas of the currently in used map (D, see Appendix D) using the 100 fathom drop off as the outer limit.

Table 4 indicates the conversion factors between subareas of a previously used St. Croix fishing area map (F, see Appendices F) and the subareas of the currently in used map (E, see Appendix E) using the 100 fathom drop off as the outer limit.

DISCUSSION

Fishing area maps changed several times in the 30 year period from 1974/75 to 2004/05. There was no clear transition between maps, and in some years two different area maps were used (1987/88 and 1997/98 for St. Thomas/St. John and 1987/88 for St. Croix). It is possible that some fishers did not look at the area map associated with a particular fishing year and recorded their fishing areas based on a previous year's area map.

In the late 1980s and early 1990s, the maps issued for St. Croix were switched back and forth several times. In 1994/95, St. Croix returned to using the original fishing subareas and continues to use these subareas. St. Thomas/St. John has used four different maps between 1974/75 to 2004/05.

Although the use of the different maps should ultimately result in an improved system of reporting, it presents some difficulties when examining trends throughout the years in the catch data. Fishing subareas in old maps are not equal to the currently used subareas. To translate old catch information so that it can be compared throughout the years, conversion factors were developed. These ratios indicate the percentage of each of the old fishing subareas that comprise the currently used fishing subareas. Catch data from old fishing subareas can be multiplied by these ratios to compare with current catch data and then used to determine trends. The one drawback to this method is that it assumes that there is an equal distribution of fish catches throughout each fishing subarea.

When St. Thomas/St. John conversion factors in Table 2 and 3 are compared, it is apparent that using the territorial boundary or 100 fathom drop off will result in a slightly different allocation of catches between subareas. Since fishing on St. Thomas/St. John typically extends to the drop off, it may be more appropriate to use the 100 fathom drop off conversion factors (see Table 3) in allocating catches between St. Thomas/St. John subareas.

In the St. Croix case, since the drop off can be very close to the shore line (perhaps a hundred yards) on the north side of St. Croix, it may be more appropriate to use the territorial boundary conversion factors (see Table 4) in allocating catches between subareas of St. Croix.

However, if a standard definition of the outer boundary is desired, then perhaps the territorial boundary could be used for both St. Thomas/St. John (see Table 2) and St. Croix (see Table 4) fishing areas.

REFERENCES CITED

Barshinger, C.W. ca 1993. State/Federal Commercial Fishery Statistics Project #SF-42 (NA90AAHSF228) Annual Summary Report, U.S. Virgin Islands 1991-1992. Department of Planning and Natural Resources, Division of Fish and Wildlife, St. Thomas, U.S. Virgin Islands.

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Table 1. Fishing Area Maps Used by St. Thomas/St. John and St. Croix commercial fishers in the 1974/75 to 2004/05 fishing years *

Fishing Year	St. Thomas/St. John	St. Croix
74/75	A	E
75/76	A	E
76/77	A	E
77/78	A	E
78/79	A	E
79/80	A	E
80/81	A	E
81/82	A	E
82/83	A	E
83/84	A	E
84/85	A	E
85/86	A	E
86/87	A	F
87/88	A, B	E, F
88/89	A	E
89/90	B	F
90/91	A	E
91/92	A	E
92/93	C	F
93/94	C	F
94/95	D	E
95/96	D	E
96/97	D	E
97/98	A, D	E
98/99	D	E
99/00	D	E
00/01	D	E
01/02	D	E
02/03	D	E
03/04	D	E
04/05	D	E

*note: Fishing year from July 1 to June 30 the following year.

TABLE 2. Conversion factors between old fishing area maps and map D currently used for St. Thomas/St. John (Appendix D) using territorial boundaries as the outer limit			
Old Map	Old map subarea	Old map subarea conversion factors to current Map D (see Appendix D) subarea	Current Map D (see Appendix D) Subarea
Map A (see Appendix A)			
	B1, B2, B3, B4, T3, T4	$(1.00 \times B1) + (1.00 \times B2) + (1.00 \times B3) + (1.00 \times B4) + (0.63 \times T3) + (0.27 \times T4)$	BBB
	T4, T5	$(0.35 \times T4) + (0.51 \times T5)$	TNW
	T1, T5	$(0.63 \times T1) + (0.49 \times T5)$	TSW
	T4	$0.31 \times T4$	TNE
	T1, T2	$(0.37 \times T1) + (0.39 \times T2)$	TSE
	T4	$0.07 \times T4$	JN
	T2, T3	$(0.24 \times T2) + (0.37 \times T3)$	JSE
	T2	$0.37 \times T2$	JSW
Map B (see Appendix B)			
	BBB	$1.00 \times BBB$	BBB
	TNW	$1.00 \times TNW$	TNW
	TSW	$1.00 \times TSW$	TSW
	TNE	$0.79 \times TNE$	TNE
	TSE	$0.52 \times TSE$	TSE
	TNE	$0.21 \times TNE$	JN
	TSE	$0.23 \times TSE$	JSE
	TSE	$0.25 \times TSE$	JSW
Map C (see Appendix C)			
	BBB	$1.00 \times BBB$	BBB
	TNW	$1.00 \times TNW$	TNW
	TSW	$1.00 \times TSW$	TSW
	TNE	$1.00 \times TNE$	TNE
	TSE	$1.00 \times TSE$	TSE
	JN	$1.00 \times JN$	JN
	JS	$0.49 \times JS$	JSE
	JS	$0.51 \times JS$	JSW

TABLE 3. Conversion factors between old fishing area maps and map D currently used for St. Thomas/St. John (Appendix D) using the 100 fathom drop off as the outer limit

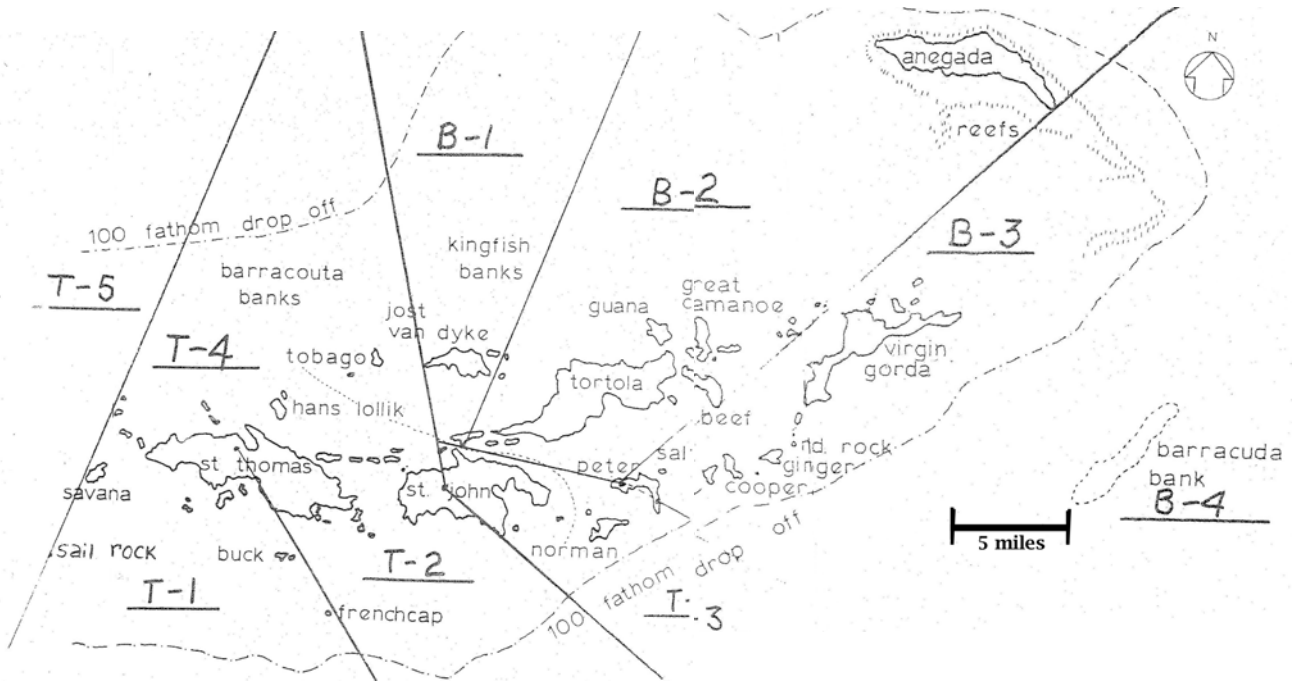
Old Map	Old map subarea	Old map subarea conversion factor to current Map D subarea	Current Map D (see Appendix D) subarea
Map A (see Appendix A)			
	B1, B2, B3, B4, T3, T4	$(1.00 \times B1) + (1.00 \times B2) + (1.00 \times B3) + (1.00 \times B4) + (0.63 \times T3) + (0.39 \times T4)$	BBB
	T4, T5	$(0.38 \times T4) + (0.51 \times T5)$	TNW*
	T1, T5	$(0.70 \times T1) + (0.49 \times T5)$	TSW*
	T4	$0.20 \times T4$	TNE
	T1, T2	$(0.30 \times T1) + (0.23 \times T2)$	TSE
	T4	$0.03 \times T4$	JN
	T2, T3	$(0.29 \times T2) + (0.37 \times T3)$	JSE
	T2	$0.48 \times T2$	JSW
Map B (see Appendix B)			
	BBB	$1.00 \times BBB$	BBB
	TNW	$1.00 \times TNW$	TNW*
	TSW	$1.00 \times TSW$	TSW*
	TNE	$0.86 \times TNE$	TNE
	TSE	$0.43 \times TSE$	TSE
	TNE	$0.14 \times TNE$	JN
	TSE	$0.32 \times TSE$	JSE
	TSE	$0.25 \times TSE$	JSW
Map C (see Appendix C)			
	BBB	$1.00 \times BBB$	BBB
	TNW	$1.00 \times TNW$	TNW*
	TSW	$1.00 \times TSW$	TSW*
	TNE	$1.00 \times TNE$	TNE
	TSE	$1.00 \times TSE$	TSE
	JN	$1.00 \times JN$	JN
	JS	$0.56 \times JS$	JSE
	JS	$0.44 \times JS$	JSW

*note: There is no drop off between Puerto Rico and western St. Thomas. Territorial boundaries were used as the outer limit.

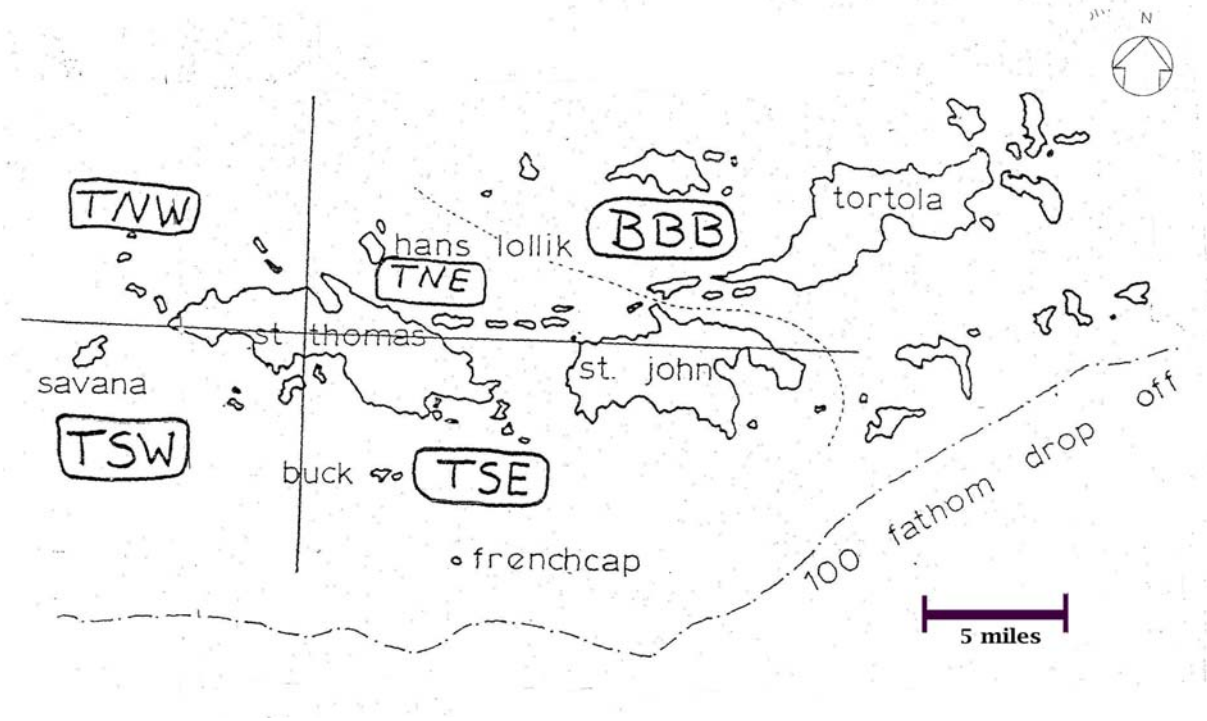
TABLE 4. Conversion factors between old fishing area Map E (see Appendix E) and Map F currently used for St. Croix (see Appendix F) using territorial boundaries as outer limit.

Old Map E	Current Map F
$0.38 \times \text{XSW} + 0.45 \times \text{XNW}$	C1
$0.14 \times \text{XSE} + 0.62 \times \text{XSW}$	C2
$0.72 \times \text{XSE}$	C3
$0.14 \times \text{XSE} + 0.34 \times \text{XNE}$	C4
$0.63 \times \text{XNE}$	C5
$0.03 \times \text{XNE} + 0.55 \times \text{XNW}$	C6

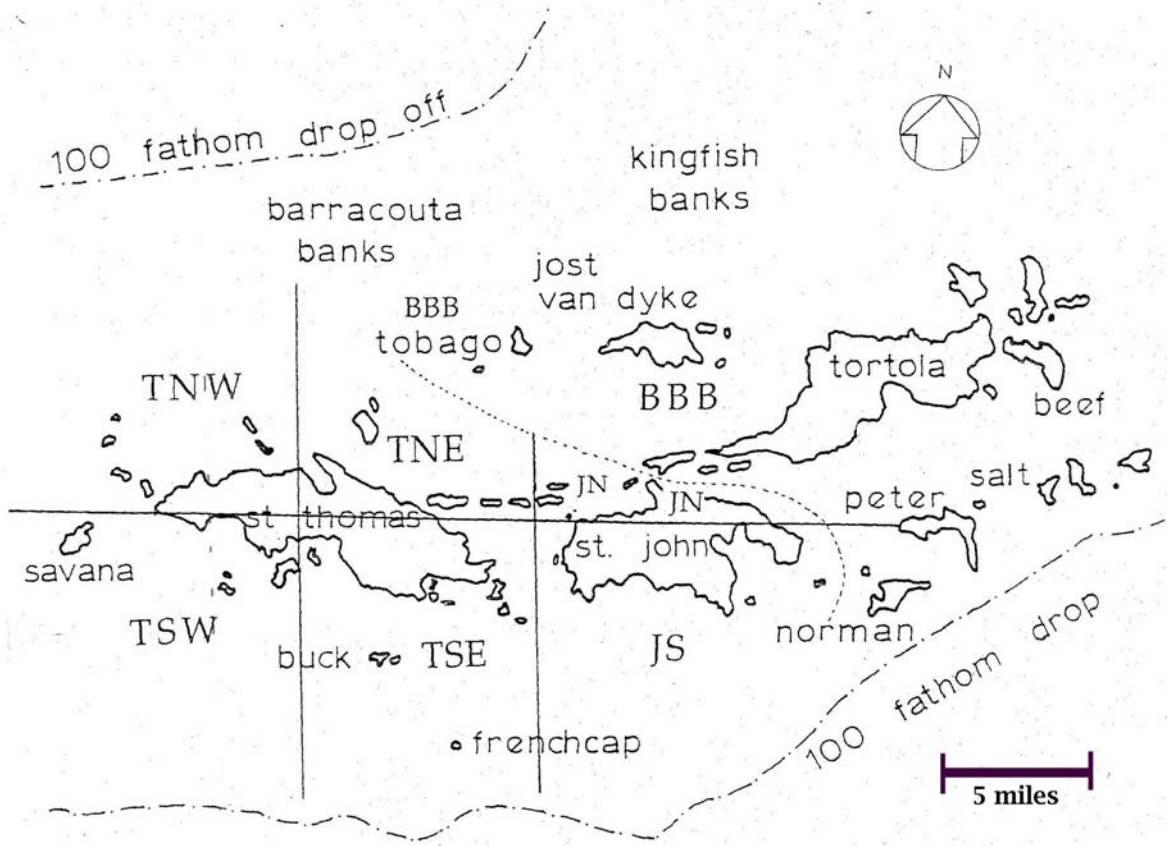
Appendix A. St. Thomas/St. John Fishing Area Map A
(1974-89, 1990-1992, 1997-98)



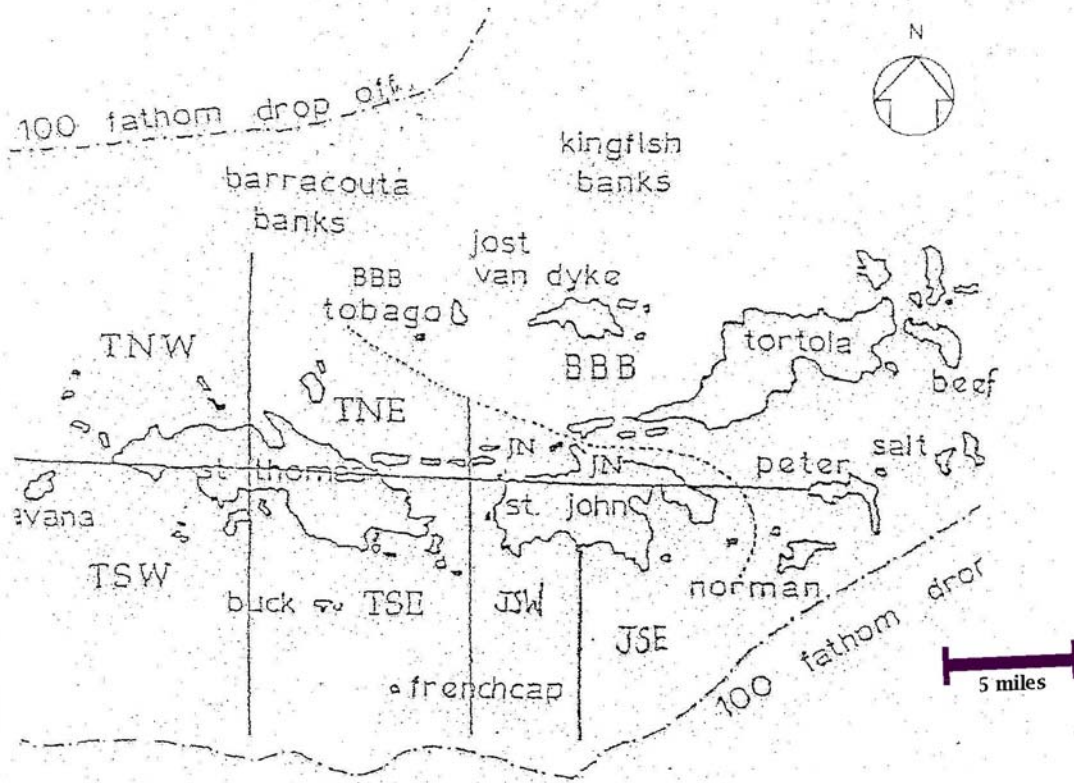
Appendix B. St. Thomas/ St. John Fishing Area Map B
(1987-88, 1989-90)



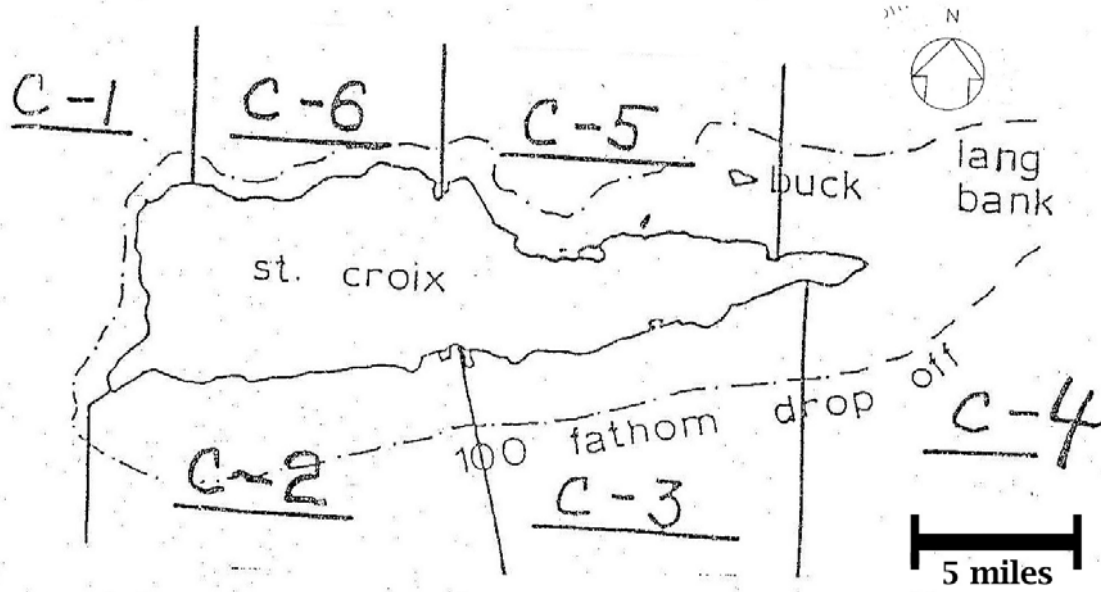
Appendix C. St. Thomas/St. John Fishing Area Map C
(1992-94)



Appendix D. St. Thomas/St. John Fishing Area Map D
(1994-2005)



Appendix E. St. Croix Fishing Area Map E
(1974-89, 1990-92, 1994-2005)



Appendix F. St. Croix Fishing Area Map F
(1987-88, 1989-90, 1992-94)

