Population Size, Growth, Mortality and Movement Patterns of Yellowtail Snapper (Ocyurus chrysurus) in the U.S. Virgin Islands Determined Through a Multiinstitutional Collaboration

St. Thomas Fishermen's Association

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As with all STFA projects, the involvement of the fishermen is key to success. Winston Ledee, Robert Berry, Julian Magras, David Lanclos, Daryl and Jessica Bryan, Gerald Greaux, Derek and Ernie Quetel, provided the expertise and patience during the many night time fishing trips.

Tagging teams endured many nights of inclement weather, sea sickness and general frustration waiting for the fish to bite. Gerald Greaux, Eric Maddox, Erica Palmer, Jake Rosner, Zach Whitener, Ernest Quetel Sr., Clyde Maddox, Rhianna, Katherine Reed, Tyler Grechen and Carolina Cruz all spent time tagging a releasing the fish.

Eric Maddox, carried out the Coral World tag loss studies which were made possible by the Coral World manager Lee Keller.

The Project especially benefited from the tenacity of the entire Quetel clan whose determination and hard work resulted in the successful tagging of 4,077 yellowtail snappers.

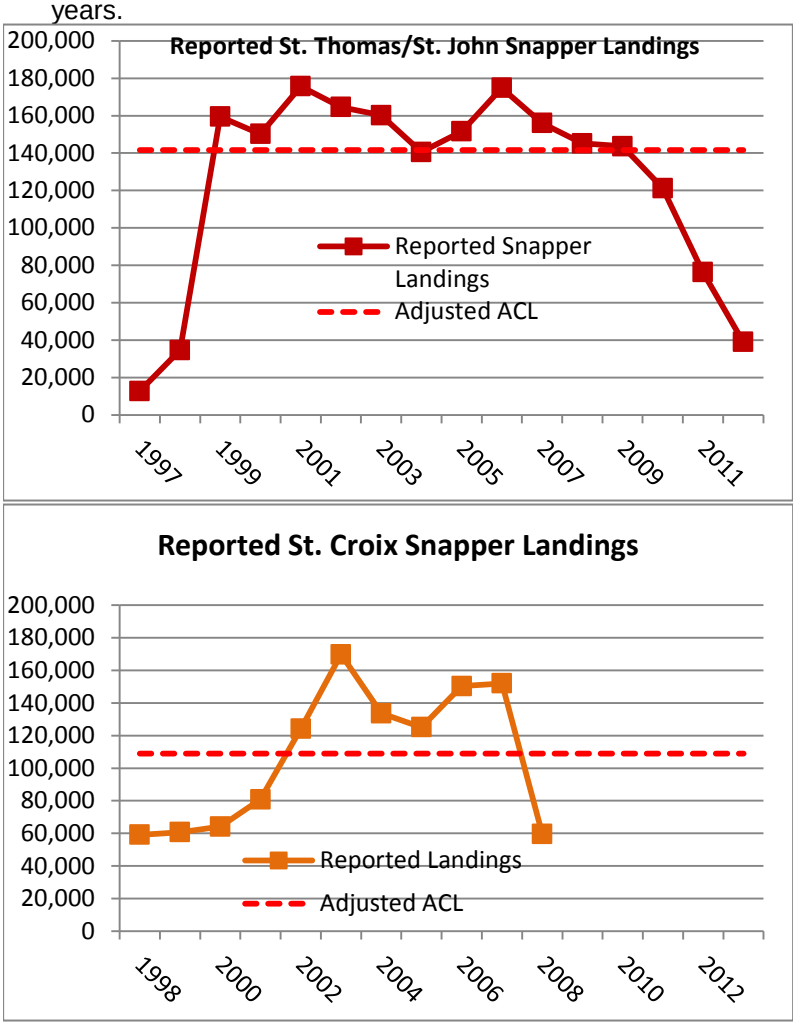
As always, the NMFS supervising scientist, Ron Hill provided valuable guidance and a shoulder to cry on when problems arose.

Background

The St. Thomas Yellowtail Snapper Fishery

Yellowtail snapper (*Ocyurus chrysurus*) are a highly prized component of the Virgin Islands landings. In St. Thomas they are the only member of the snapper family that constitutes an insignificant risk of Ciguatera fish poisoning (Olsen, 1988). As such, they offer the single current alternative for sale of high quality, liability-free local fisht for local restaurants. As a result, an estimated 100,000 yellowtail snapper totaling around 150,000 lbs. are landed annually in St. Thomas/St. John and St. Croix (Figure 1[2]).

Figure 1. Snapper Landings Reported by Virgin Islands Fishermen. Data for 2011 and 2012 are incomplete reporting years.



In St. Croix Ciguatera is much less of a problem and fishermen land many species of snappers that St. Thomas fishermen do not market.

Despite the importance of yellowtail snapper within the fishery, little information regarding basic life history parameters required to inform management decisions exists.

In its 2005 response to the Sustainable Fishery Act, the Council listed snapper as species undergoing overfishing. A 2005 SEDAR effort[3] failed to arrive at any management recommendations, thus the Council's determination that Virgin Islands snappers were undergoing overfishing was basically an attempt to adopt a precautionary approach to the species' management, including the development of thresholds and targets.

[2] Virgin Islands fishermen have been self-reporting their landings since 1974. In 1997, the catch report form was changed to include reporting by family groups. In 2011, and additional change in reporting was made in order to provide greater species detail.

[3] http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=08 A

In the 2010 Amendment of Council management plans[4], an overfishing limit (OFL)was determined to be 157,385 lbs and because snappers were considered to be undergoing overfishing the OFL was reduced by 15% and the Allowable Catch Limit (ACL) was determined to be 133,777 lbs in the St. Thomas/St. John district. In St. Croix the OFL was calculated at 121,113 lbs and the ACL was determined to be 102,946 lbs.

In its 2013 report to the Congress, the Status of Stock Report[5], NMFS removed Virgin Islands snappers from the list of species undergoing overfishing. At a one day meeting in July of 2013, the CFMC voted to change the precautionary "buffer" to 10% from 15% thus raising the ACL to 141,647 lbs in St. Thomas and 109,002 lbs in St. Croix.

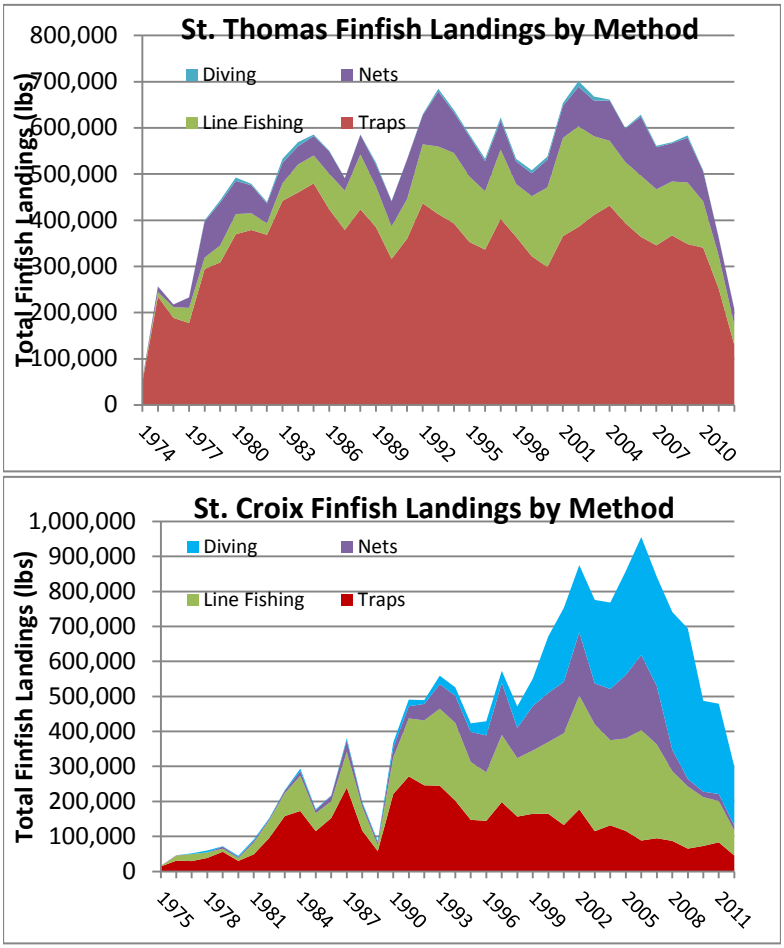
Currently, there is also a regulation specific to the species is a minimum size limit of yellowtail snapper of 12 inches (30.5 cm) total length (Federal Register 2010).

As can be seen from Figure 1, both St. Thomas and St. Croix snapper landings have exceeded the ACL for much of the past decade. Fishermen in the both islands, however believe the resource is at a healthy state in that there are numerous individuals of large size and pre-reproductive sized fish are generally released. This is borne out by recent STFA studies which have shown pre-reproductive size fish are released by fishermen as bycatch[6]. Thus the STFA is carried out the current study in order to determine more accurately the local (St. Thomas/ St. John shelf) resource status.

The Virgin Islands employs four main fishery methods (figure 2):

- Traps (fish and lobster trap)
- Line fishing(mostly hand line with some trolling and minimal longline)

Figure 2. Landings by fishing method for St. Thomas/St. John and St. Croix districts



[4] CFMC. Dec. 2011. 2010 CARIBBEAN ANNUAL CATCH LIMIT AMENDMENT FREQUENTLY ASKED QUESTIONS

[5] *www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm*

[6] http://www.stfavi.org/Reports.html

- Net[7]
- Diving

The "species" composition of each of these fisheries is shown in figure in Annex 1 for each island and for each method.

Figure 2 highlights some of the differences between the two island districts.

Trap Fishery

The St. Thomas fisheries are dominated by trap fisheries while trap fishing in St. Croix is less frequently used. Fishermen in this fishery employ the standard West Indian fish trap, either baited or unbaited. It is generally set for a period of one week although studies by Munro 1974) and more recently Olsen, Hill, Arnold and Bryan, 2012) demonstrated that the catch rate is not dependent upon the set length but rather fish are constantly recruiting and leaving the traps regardless of how long they are set. Fishermen in St. Thomas also employ plastic lobster traps in a directed lobster fishery that is absent in St. Croix.

Line Fishery

The line fisheries also differ between the two islands. In St. Thomas this fishery is primarily a hand-line fishery and takes place mostly at night. Fishermen use spooled hand-lines with mostly squid for bait. They chum to attract the fish with a "mash" made up of sand "mashed" together with fry (sardines) which they catch with cast nets. Fishing never begins before full darkness as there are a number of species which will gather and interfere with the desirable species if fishing begins too early. Line fishing accounts for the majority of yellowtail harvest. There is a seasonal fishery for Red Hind (*Epinephelus guttatus*) which occurs during the day time primarily during the January to March spawning season.

In St. Croix, fishermen generally report that the "fry" used by St. Thomas fishermen are generally not abundant and the night time fishing method employed there are not possible. In contrast, St. Croix fishermen actively fish for other snapper species and offshore for migratory pelagics such as tuna, wahoo and mahi mahi. This difference in species composition of the line catch is apparent in Annex 1.

Net Fishery

The St. Thomas seine net fishery was brought to the island by fishermen of French origin who migrated in the mid-nineteenth century. It is an extremely small boat fishery with the boats seldom being as large as 20 feet. The fishermen carry a nylon net of approximately 600 feet in length by 40 feet deep and 1.5 inch square mesh. They track schools of yellowtail and jacks around the keys until they figure out the school's feeding pattern. When the school enters a small inlet or cove suitable for capture, the fishermen surround them against the land with the net and free dive the net into the shape of a "six" before pursing it and putting the fish into the boat.

[7] The net fishing between the two islands differs in that the St. Thomas/St. John net fishery employs nylon seine nets which are set around schools of fish that are "stalked" in order to determine their feeding patterns while the St. Croix net fishery employs nets set as a trap for primarily parrotfish which are herded into the net by divers. A gill/trammel net fishery was shut down in 2008.

St. Croix fishermen have developed a number of techniques which are primarily directed at harvesting parrotfish species. Until 2008 when the Territorial government closed the fishery, fishermen would set gill and trammel nets across the shelf in areas when parrotfish daily migrations occurred. They would then herd the fish into the nets using SCUBA techniques.

Following the closure, fishermen developed a method using smaller mesh nets set in a similar fashion as before but with a "bag" where the fish were aggregated before it was emptied into the boat.

Diving

In St. Thomas, most of the limited diving activities are directed towards spiny lobster harvest. Although there is some capture of yellowtail (and other species) by spearfishing, it is inconsequential.

This is in sharp contrast to St. Croix where, since the early 1990s, diving techniques (primarily using SCUBA) have been the most common method employed (Figure 2). In addition to SCUBA use with nets, St. Croix divers pursue spiny lobster, conch (*Strombus gigas*) and spearfish. This diversity of targets has proved difficult for consideration of measures of diver fishing effort.

The species composition of each of these fisheries and each district is provided in Annex 1.

Project Background

Given the importance of yellowtail snapper to the St. Thomas fishery, the current study attempted to create information upon which management decisions could be made.
In order to accomplish this goal, the study consisted to three main elements:

- A mark-recapture tagging study of yellowtail snapper (*Ocyurus chrysurus*). The primary objectives are to determine the population size, growth, fishing mortality rate and movement patterns over a one year period.
- Assemble and evaluate existing information regarding yellowtail snapper in the Virgin Islands.
    - These data included evaluation of nearly 700,000 catch reports submitted by Virgin Islands fishermen between 1971 and 2012.
    - Approximately 15,000 port samples carried out between 1979 and 2012 under NMFS' Trip Interview Program.
    - Studies carried out by the St. Thomas Fishermen's Association in 2004-5, 2006, 2008, 2010-2012 and the current study.
- Use the available information to undertake a stock evaluation with the intention of providing management recommendations.

Most data available for yellowtail snapper has been collected by the Virgin Islands Division of Fish and Wildlife and deposited with the National Marine Fisheries Service (NMFS) Southeast

Fisheries Science Center (SEFSC) Trip Interview Program (TIP). These (TIP) data as well as the fisherman catch reports are being analyzed in order to assess stock status.

In general, increasing catch per unit effort and mean length are considered to indicate a steady population with stable age/size over the past 20+ years for the St. Thomas/St. John shelf. Indeed, stock structure and growth of southern Florida yellowtail snapper has not changed over two decades of heavy fishing, although fewer older fish were present (Garcia et al. 2003). High fishing mortality, based on Puerto Rico data, is a concern, but large differences amongst islands limit transferability across the region (SEDAR 2005). Deficiencies in local data availability led the SEDAR (Southeast Data, Assessment and Review) consensus statement to declare that for "Caribbean yellowtail snapper, the data were deemed insufficient to provide a signal to underpin management advice" (SEDAR 2005).

A variety of research initiatives were recommended by the stock assessment panel for yellowtail snapper, including population surveys, collection of age and length data from commercial and recreational catches and mark-recapture studies (SEDAR 2005). Final recommendations involved improving the data availability for yellowtail stock assessment. SEDAR (2005) recommended that "Mark recapture techniques could be used to estimate abundance and learn more about the movements and habitat preferences of yellowtail snapper. However, such studies should focus on movement patterns as well as recapture rates to avoid potential misinterpretation especially if fish show site fidelity. This project could be performed cooperatively between scientists and local fishers. Important components would include communicating and educating the fishermen such that they are encouraged to return the tags. The current STFA proposal exactly addresses this SEDAR recommendation.

As noted, mark-recapture studies could help identify movements and migrations, generate estimates of fishing mortality and population size, and help elucidate stock structure. This project will collect data required to assess stock status by providing estimates of missing population parameters. The results of the proposed study will aid in the development of realistic targets and thresholds towards sustainable fisheries harvests for the yellowtail snapper population on St. Thomas/St. John shelf, such that management can be based on current data collected at the appropriate scale.

Project Objectives

There are four primary objectives of the proposed work; the first three related to mark-recapture and the latter is for a future analysis. They are:

(1) estimation of mortality rates and population size,
(2) determining growth patterns,
(3) estimating among-reef movements, and
(4) collection of genetic material for later employing genetic tagging techniques.

Mortality rates and population size

Both fishing (F) and natural (M) mortality rates are critical parameters for developing a stock assessment and a sustainable fishery. There is little information on natural mortality for yellowtail snapper in general, and no such information for populations on the St. Thomas/St.

John shelf. In developing any assessment, substantial variation (0.15 - 0.25) exists and there is no information to estimate any values with any certainty (SEDAR 2005).

Growth patterns

Growth analysis, in relation to movement, re be possible using capture and recapture length differences. We anticipated, from the results of other yellowtail snapper studies (Lindholm et al. 2005), that differences will exist with respect to site fidelity and movement with some individuals undergoing regular movements. Changes in length will be analyzed while considering distance from tagging location. Further, season and size (length) of individuals recaptured will also be considered. Size-frequency analysis will also be used.

Among-reef movements

St. Thomas seine net fishermen report that inshore schools migrate along the islands. Although there is no direct evidence of movements, adults have been caught over a variety of habitats, including hard rocky bottom patch reef and rubble, but also algal sand flats in the US Virgin Islands (Mateo and Tobias 2001; Pittman et al. 2008). Further, individual yellowtail snapper have been shown, using acoustic tagging, to have considerable site fidelity and have also been demonstrated to move at least 4 km across featureless habitat in the Florida Keys National Marine Sanctuary (Lindholm et al. 2005).

In addition evidence of both residence and movements by adults, genetic analysis for yellowtail snapper demonstrates very little differentiation into local populations (Cummings 2004; Vasconcellos et al. 2008), thus individuals likely mix at regional scales during some part of life-histories. Without understanding the spatial ecology of the species, any MPA designs will be based on incomplete data. Under those circumstances it is unlikely that the appropriate spatial scale(s) will be used. If yellowtail snapper presumably move among reefs, delineation of movement patterns can inform MPA design and help determine model assumption of open versus closed populations. We intended to identify the fishing grounds where tagging occurred and then that of the recapture to determine the proportion of fish with "no movement", the maximum distance of movement and if certain grounds are more connected. The results will help design an acoustic tagging study that will be capable of tracking movements with more certainty. For the current proposal, site fidelity and movement pathways will be estimated using distances between tagging and recapture.

Materials and Methods

Tagging

Yellowtail fishing in St. Thomas takes place mainly at night. STFA members supplied boats which were anchored at known yellowtail fishing sites. Fishermen then "chum" to attract fish with a mix of sand and sardines ("fry") throughout the night. Once caught, the fish were held in a live well until tagging.

Tagging consisted of bringing the fish to the taggers for measurement and injection of Biomark pit tags into the belly cavity. A fin clip was collected for later genetic analysis. In the later

phases of the project Floy "spaghetti tags" were also injected below the dorsal fin to improve the likelihood that tagged fish would be identifiable if recaptured. Figure 3 shows the various steps in tagging.

Fin clips were taken from each fish both so that the tagged fish would have some external indication of tagging and for use in a planned genetic stock evaluation to be carried out by Eric Saillant of the University of Southern Mississippi.

Catch weights were calculated from a weight/length equation based upon 653 yellowtail measured during an earlier STFA/MRAG Americas study of bycatch[8]

Figure 3. (A) Pit tag injected into the body cavity. (B) Bringing the fish for processing. (C) Measuring and (D) Tagging and measuring (note tail clip) .

Port Sampling

Port sampling took place at the two main yellowtail landing sites, Frenchtown and Smith Bay. At these sites, catches were scanned for the presence of tag using a Biomark 2001 loop scanner (figure 6) which could scan full ice chests. Initially tests were undertaken in which tags were placed in the ice chests and were detected by the scanner.

Fishermen reported their landings and indicated location from the gridded map used by the VI Division of Fish and Wildlife catch report program (Annex 3). These data were transferred as GIS features and are only approximate locations.

Analysis of Historical Data

Historical data were assembled with the cooperation of the Southeast Fishery Science Center. These data included:

- Catch Reports (Snapper/Grouper) 1974-1999
- Catch Reports (by Fishing Method) 1974-2012
- Catch Reports (Snapper Landings) 1997-2012
- Port Sampling (TIP) 1979-2012
- STFA Studies (2005-6, 2006, 2008, 2010-2012)

These data were used to estimate landings of yellowtail over the course of the catch reporting program. Port sampling data were used by creating size frequency distributions which were analyzed to estimate mortality as well as for stock evaluation analysis.

Mortality Analysis

Total mortality rate (Z) was calculated from size frequency distributions from the current study and from a CRP funded study carried out by MRAG Americas in 2006 as well as the current study

[8] (http://www.stfavi.org/files/STTPilotObserversFinalReport-V1-nophotos.pdf)

$$(1)\quad N_t = N_{(t-1)}e^{-Zt}$$

Where: N_t is the number of fish at time (t) and
Z is the rate of total mortality.

An age specific instantaneous rate of Z was calculated by solving the Von Bertalanffy growth equations for t (median age of the size class in the frequency distribution. Growth parameters using in the analysis came from Manooch and Drennan (1987).

$$(2)\quad l_{(t)} = L_\infty(1 - e^{-k(t-t_0)})$$

Where: $l_{(t)}$ is the length (in mm) at age (t).
L_∞ is the asymptotic length at which growth is zero.
t_0 is included to adjust the equation for the initial size of the organism and is defined as age at which the organisms would have had zero size.

Solving equation for t (age) allows for calculation of the age (in years) of each size class.

$$(3)\quad t = t_0 - \frac{(\ln(L_\infty - l_t)}{k} + \frac{\ln(L_\infty)}{k}$$

The VonBertalanffy growth parameters used were from a study of yellowtail otoliths carried on by Manooch, C.S. III and C.L. Drennon, (1987). They found that $L_\infty$was equal to 50.5 cm k was equal to 0.14 and t_0 was equal to -.96 yrs. Their values are somewhat problematical in that our sampling included many individual fish that were larger than their value for L_∞.

Figure 4.Coral World's "octagon" tank used in mortality/tag retention studies.

Mortality/Tag Loss Study.

The purpose of this study was to evaluate the rate at which tags were lost and mortality.

It was originally planned to hold the fish at the University of the Virgin Islands Marine Laboratory in order to assess mortality of tagged fish. However discussions there at their facilities led to the conclusion that there wasn't sufficient water flow available. Consequently arrangements were made with Coral World[9] to utilize the facilities there which are shown in figure 4.

[9] http://www.coralworldvi.com/

Eventually three mortality/tag loss series were run at Coral World. Coral World staff also participated in tagging trips throughout the project.

Table 1. Summary of Field Activities.

Fishing Method	# Trips	# Fish	Total Lbs	Average (lbs)
Hand line	48	3959	4767	1.20
Traps	12	118	134	1.14
Total	60	4077	4901	1.20
Port Sampling	279	20,497	27,177	1.33

During the studies, initial mortality from fishing and transport was 9.6%. This process was considered to be extremely stressful, involving capture of the fish, offloading from the capture vessel, transport to the holding tank and final release or tagging. It certainly appeared to stress the fish. At the very least it may well represent initial mortality including loss to predatory fish during release.

In every case, after the initial mortality, the fish appeared healthy, retained their natural color and ate voraciously.

Three series of experiments were run:

Series 1 all 43 fish tagged.
Series 2 39 fish tagged and 11 left untagged.
Series 3 28 fish untagged and another 11 untagged in Coral World's "Quarantine" pool.

Genetic Sample Archiving

Genetic Sample Archiving. A total of 2348 tail clipped genetic samples were been collected and preserved in DMSO. Dr. Eric Saillant of the University of Southern Mississippi who which would undertake genetic stock differentiation based on these samples.

Results

Tagging

A total of 60 tagging trips were completed between September 2011 and November 2012. The distribution of these trips by fishing method is shown in Table 1.

Port samplers did not encounter a single tagged yellowtail while scanning catches. Possible explanations will be discussed subsequently.

Table 2. Summary of tagging and genetic sampling.

Sample	Number
Pit Tags Only	1,989
Pit Tags + Spaghetti Tags	1,346
Spaghetti Tags Only	742
Genetic Samples	2,724
Total	4,077

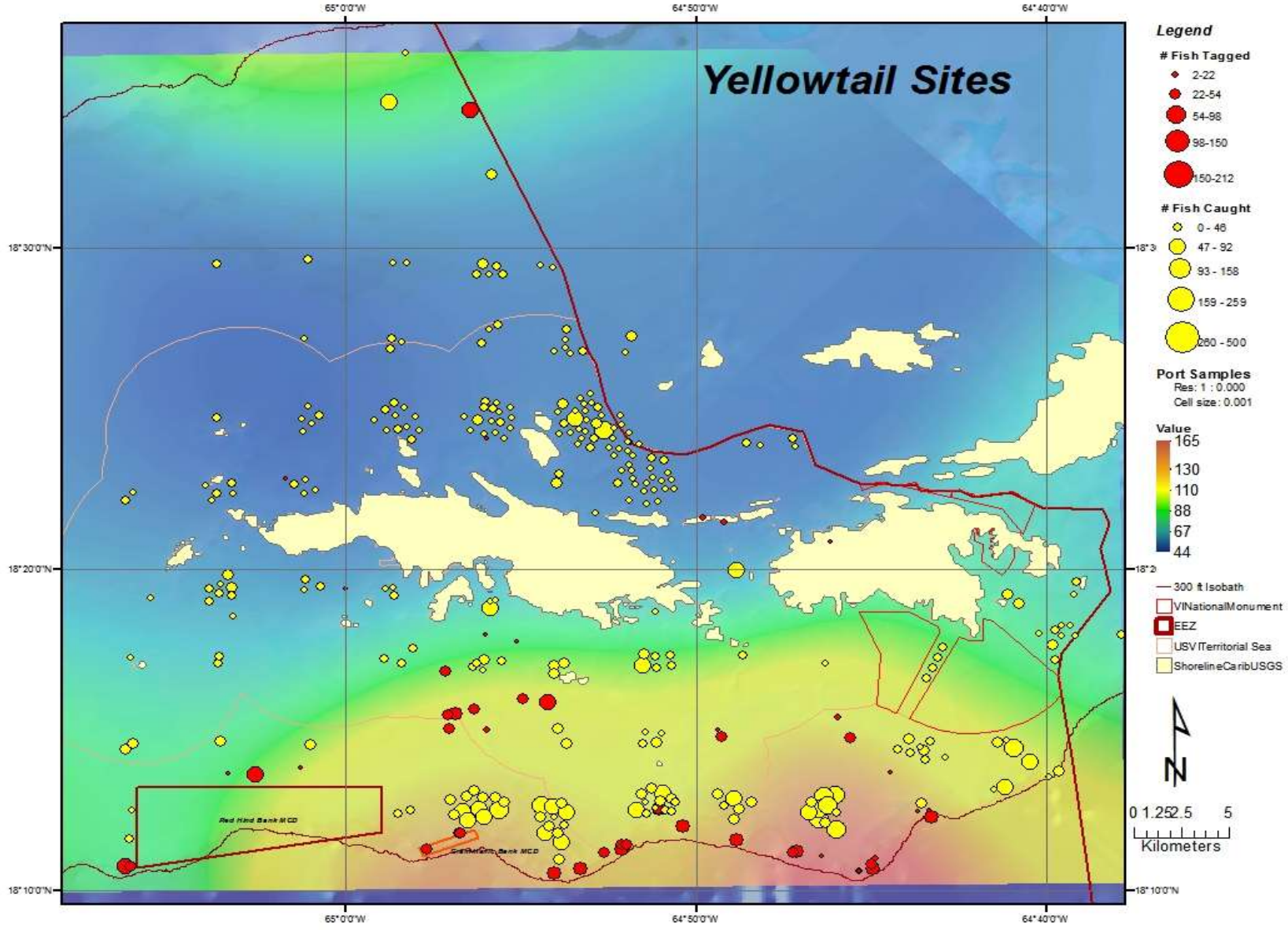
In order to address concerns that the pit tags were not visible to fishermen landing yellowtail. We began tagging with both pit tags and Floy spaghetti tags. At the end of the study we tagged 854 fish with only spaghetti tags. These datare shown in Table 2

Port Sampling

Port Sampling Results are shown in Annex 2. In all, a total of 279 Trips, 20,497 fish totaling 27,177 lbs were sampled. The average size port sampled was nearly identical to those tagged. Additionally, approximately 17% of the estimated total yellowtail landings were sampled.

Location of port sampled trips and tagging trips is shown in figure 5. The color gradient shown in this figure is constructed from the catch numbers for each port sample. Red areas show where the largest catches occurred and blue where the lowest were. The yellow dots show location of port sampled trips and the red dots show where tagging was done.

Figure 5. Location of tagging sites and port sampled catches. The port sample gradient layer illustrates average catch levels for the catches sampled.

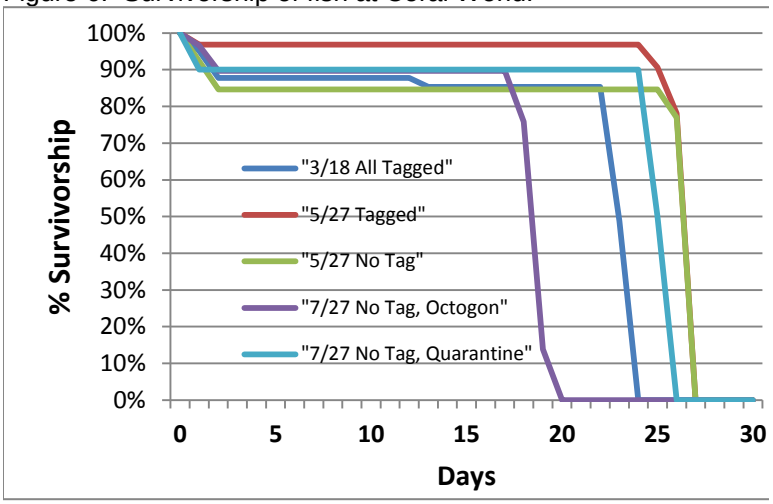


Mortality/Tag Loss Study. .

Initial mortality from fishing and transport was 9.6%. This process was considered to be extremely stressful and may well represent initial mortality including loss to predatory fish during release.

Series 1 all 43 fish tagged.
Series 2 39 fish tagged and 11 left untagged.
Series 3 28 fish untagged and another 11 untagged in Coral World's "Quarantine" pool.

Figure 6. Survivorship of fish at Coral World.



Only one fish died in the interval between initial mortality and the catastrophic mortality. This was equivalent to a Total Mortality Rate (Z) =0.208.

In every series there was total morality after three weeks (figure 6). Necropsy revealed that almost all of the dead fish had reduced liver size and heavy infestation with liver flukes. It is not clear whether this was an effect of the very stressful transport from catching to the tanks or if there is some problem with the holding facilities at Coral World. What is clear is that the mortality was not due to the tags themselves since both tagged and untagged fish died.

Analysis of Historical Data

Landings

An estimate of snapper landings from 1974 to 2012 was by multiplying the reported landings for each fishing method by the per cent of the TIP values which were snapper (Annex figures 1-2 and 1-3). This "estimated" landings value was them compared to the actual reported landings from 1996 when fishermen were required to report by family group. After the first two years, it can be seen that the "estimated" value and the reported values were in close agreement (figure 7). In Annex figures 10 these "estimated" landings are compared to "Snapper/Grouper" landings where the snapper portion was estimated from the percent snapper from TIP samples and from CCR data where fishermen reported by family group. In both cases, during periods when full reporting was taking place, the estimated values are very close to the reported values.

Landings of yellowtail snapper were then developed by multiplying the percentage of snapper landings for each fishing method that were yellowtail (figure 4). The results are shown in figure 11.

As can be seen from figure xxx, the bulk of yellowtail snapper landings in St. Thomas are harvest by line fishermen with the seine net fishery contributing. Each of these fisheries land about 45% of the total with traps landing around 10%. Divers harvest less than 0.1%.

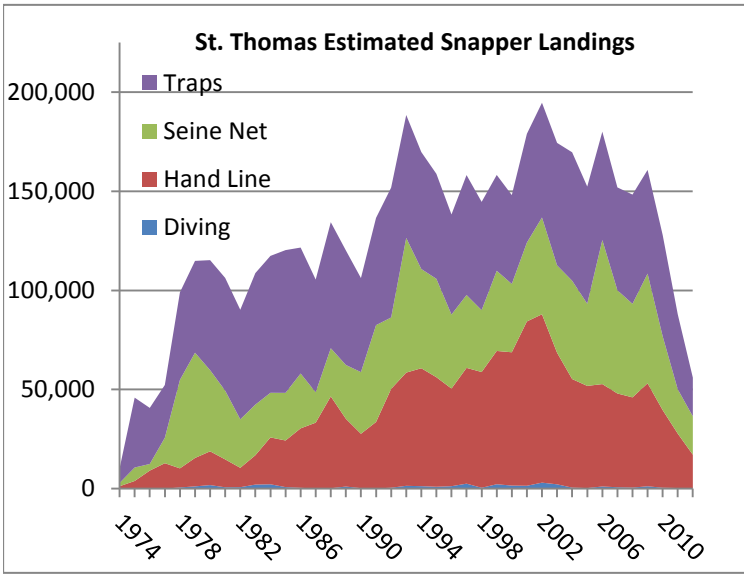
Analysis of Port Sampling (TIP) Data

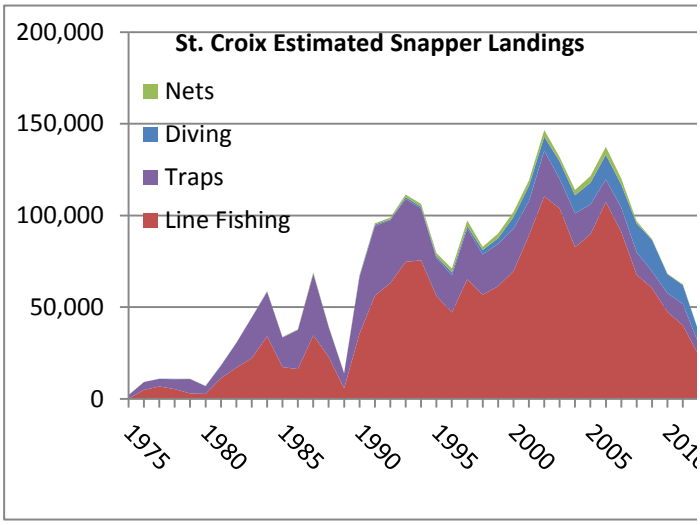
Size-Frequency distributions were constructed from all of the TIP data from both islands. In addition STFA data from St. Thomas studies including the current tag-recapture study and studies in 2005, 2008 and 2010-2012.

Length measurements from TIP data and STFA studies were assembled into Size-Frequency distributions for both the St. Thomas/St. John district and St. Croix. Total mortality (Z) rates were calculated for each year by the method outlined in equations 1 through 3.

The data used for these calculations came from the catch curve following full recruitment.

Figure 10. Estimated and reported landings of snappers in St. Thomas and St. Croix.





St. Thomas

In figure 12 the average fork length of St. Thomas yellowtail snappers decreased from the 1980s high of 343 mm to a low of around 250 mm by the end of the decade. Thereafter, average size increased until the present period average size of around 310 mm.

Total mortality (Z) was low during the early 1980s, generally less than 0.2. Thereafter it climbed during the period between 1990 and 2005 to around 0.55 before declining again to around 0.15 at the present time.

St. Croix

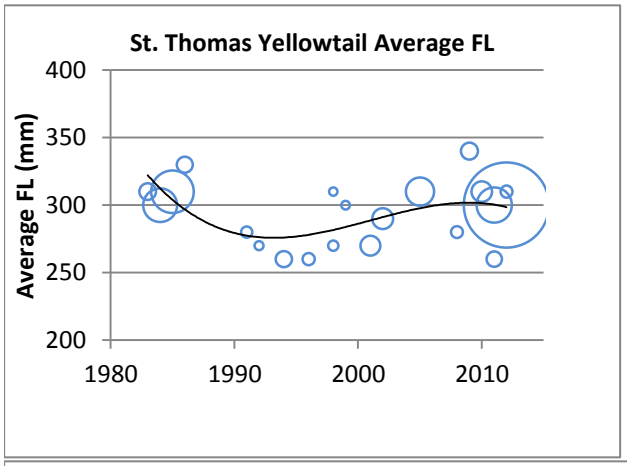
St. Croix presents a very different picture regarding the yellowtail snapper fishery. In the early 1980s, the average size (297 mm FL) was 45 mms smaller than in St. St. Thomas. Like St. Thomas, the average size condinued to decline during the 1990s until beginning to rise around 2003 to the present average around 320 mm. This is nearly a full cm larger than in St. Thomas (figure 13).

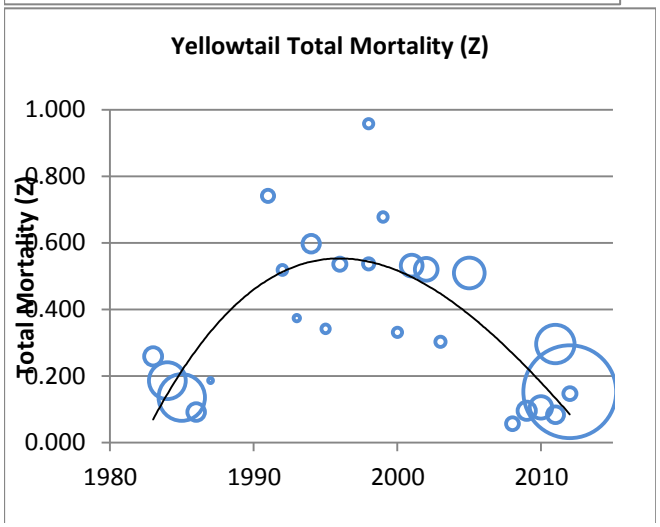
This is somewhat surprising since total mortality rates in St. Croix are approximately ten times those in St. Thomas and the increase in average size came during a period where the mortality rate was also increasing.

When the average fork length is plotted against average mortality rate (figure 14) for both islands, the relationship is very similar despite the between the islands. Trend lines (both significant at the 0.01 level) are almost exactly the same indicating that although the

mortality rates differ between the islands, the relationship between mortality and average length is similar.

Figure 13. Average annual fork length and total mortality (Z) of yellowtail snappers from St. Thomas.





Discussion

Tagging

The absence of recaptures from the tagging study is problematic to say the least. Randall (1964) tagged 343 yellowtail in the St. John National Park with a mix of Floy, dart, and button tags. He had 13 recaptures, two of them twice. All of Randall's tagging was carried out in the shallow near shore and examination of his recaptures reveals a number of fish that were recaptured multiple times which we interpret to represent that these fishes were resident in the near-shore reefs.

We have considered the following possible explanations for the lack of recaptures:

- Tags were lost following tagging.
- The fish died following tagging from injuries suffered during the tagging process.
- The fish died following tagging from delayed stress associated with tagging.
- Predators ate the fish upon their release.
- The fish migrated outside of the port sampling area.
- Port sampling was insufficient to recapture the fish because the population size was too great.

Tag Loss

During the coral world tag loss studies only one pit tag which was incompletely injected was lost out of a total of 82 fish that were tagged. All of the remaining tags were retained by the fish and recovered when the fish were necropsied following mortality. Those fish which were tagged with Floy spaghetti tags were carefully examined before release and it is unlikely that spaghetti tag loss was significant.

Tagging Mortality

During the Coral World studies there was a 9.6% mortality immediately after the fish were established in the holding pool. While some part of this was certainly due to the stress associated with catching, transport and movement into the pool both tagged and untagged fish exhibited similar mortality rates.

Delayed Stress

We do not believe that we can rule our delayed stress as a significant source of mortality. In the Coral World studies, there was total mortality after approximately three weeks for:

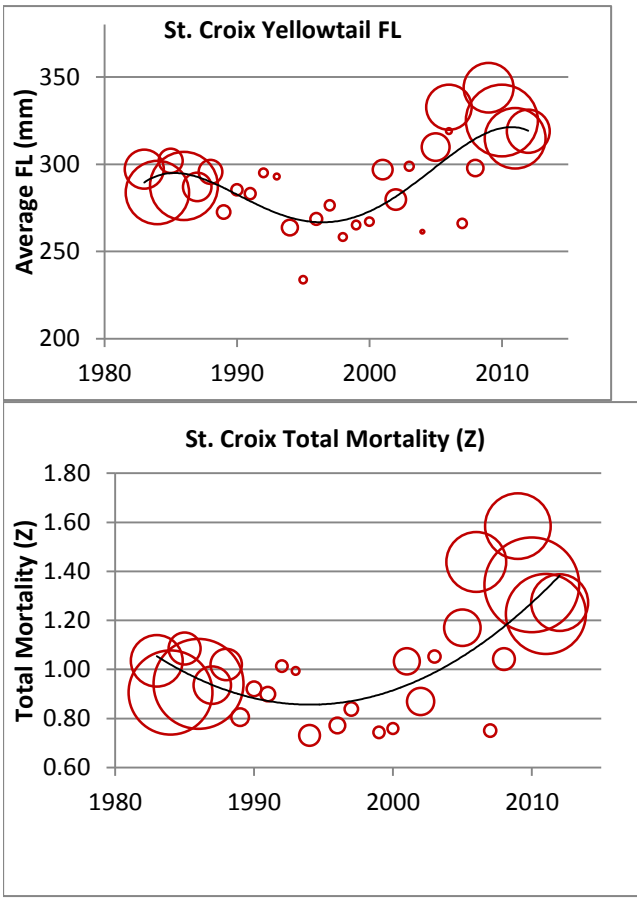
- Tagged fish in the Octagon pool.
- Untagged fish in the Octagon pool.
- Untaggd fish in the "Quarantine" pool.

Thus, regardless of tagging status or holding facility, there was a total mortality.

However, during the tagging operations the fish were held immediately following capture in a live well and were only tagged when they appears active. Following that they were tagged and released within less than two minutes. They were watched upon release to make sure that they swam actively towards the bottom. Only three fish (out of 4062 fish tagged) did not swim actively when released.

We feel that the level of stress experienced by the fish in Coral World was many times greater than during our tagging operations and while delayed stress cannot be eliminated, the Coral World studies were in no way analogous to what the fish experienced during normal tagging operation.

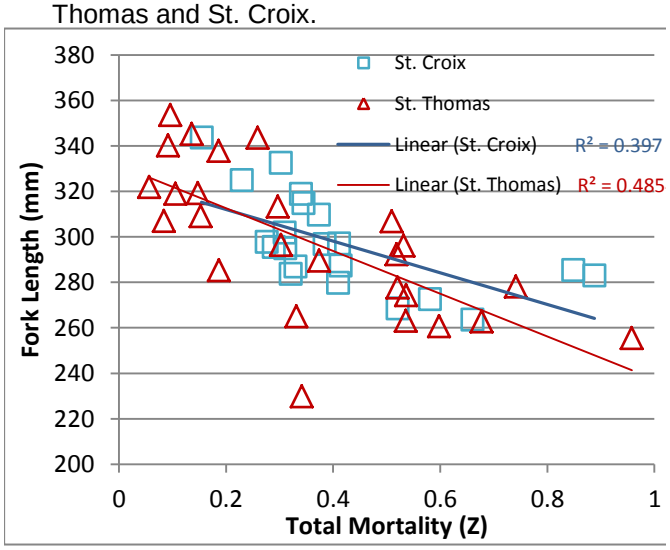
Figure 14. Average annual fork length and total mortality (Z) of yellowtail snappers from St. Croix.



Predatory Mortality

During sixty tagging trips, one was terminated when Cubera Snapper (*Lutjanus cyanopterus*) attacked the fish as soon as they were hooked. On three more trips sharks and other predators captured a total of 15 fish. Thus, while predation was present, it appeared to be entirely directed towards hooked fish that were being brought to the boat. We do not feel that predation was a significant source of mortality for the tagged fish.

Figure 15. Average Fork Length (mm) and Total Mortality Rate (Z) for yellowtail snapper from St. Thomas and St. Croix.



Migration

In the absence of recaptures, comments about migration are purely conjectural. Randall (1964) appeared to have some evidence that the fish he tagged may have been resident. His fish were all tagged in 40-60 feet of water. On the contrary,

all of our tagging was carried out offshore, mostly near the edge of the southern St. Thomas/St. John shelf (figure 8) so the two studies may not be comparable.

Port Sampling and Population Size

In the course of the study, port samplers examined approximately 25% of the probable landings based on the 2011 reported landings which are the most recent complete year. Mortality calculated from the TIP port sampling program and our effort was approximately 0.100 which indicates that current landings are a relatively small portion of the general population but any attempt to actually calculate an estimated population size would be entirely conjectural

Thus, while the proposed attempts to develop growth, mortality and population estimates from tag recapture results have not been satisfied.

Historic Data Analysis

Estimation of yellowtail snapper landings on both island districts indicates that St. Thomas/St. John fishermen land significantly (as much as seven times) higher numbers of yellowtail than do their St. Croix counterparts. Some of the reasons for this are discussed in Annex 1.

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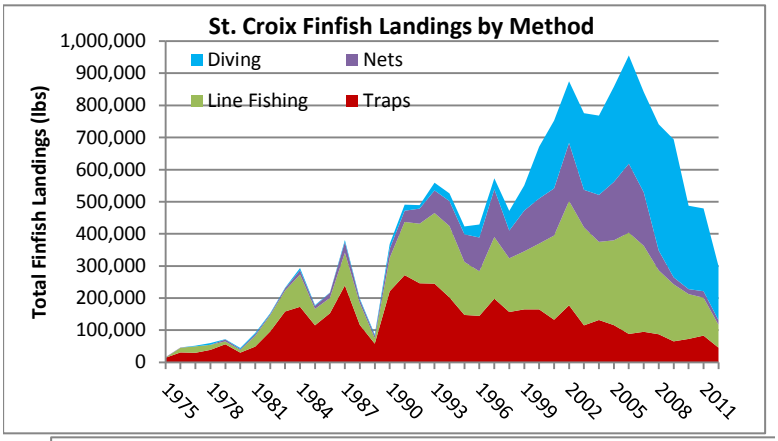
Annexes

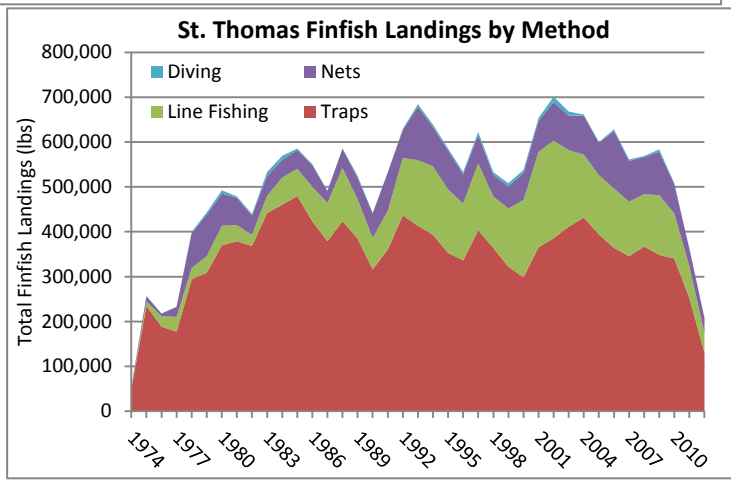
Annex 1: Calculation of Yellowtail Landings:

Yellowtail snapper landings were calculated from a combination of catch report data and port sampling results. The estimated resulted were "confirmed" by comparing the predicted landings to catch report data from 1997 to 2012 when the catch report form was expanded to included data on "species (actually family groups).

The analysis utilized finfish landings data by catch method from catch reports (Annex figure 1-1).

Annex figure 1-1. Finfish landings by method from catch report data 1974-2012





Snapper Landings

Port sampling data were then examined to determine the (average) percentage of each species group for each fishing method (Annex figures 1-2 and 1-3). The percentages for snappers was then multiplied by the landings by method data for each year to obtain the annual landings in the snapper species group (Annex figure 1-5).

These results were compared to the reported snapper landings from the catch report data. An additional "confirmation" was made by using port sampling data to separate the "snapper/grouper" reported landings from 1974-1992 into the snapper and grouper components. There were apparent problems in non-reporting of snapper/grouper during a significant portion of this period. However during periods when snapper/grouper were being reported, there was agreement between out "estimated" landings and this component of the catch. These comparisons are shown in Annex figure 1-6). Although not exact, both of these "reported" landings values were in reasonable agreement with the estimated values.

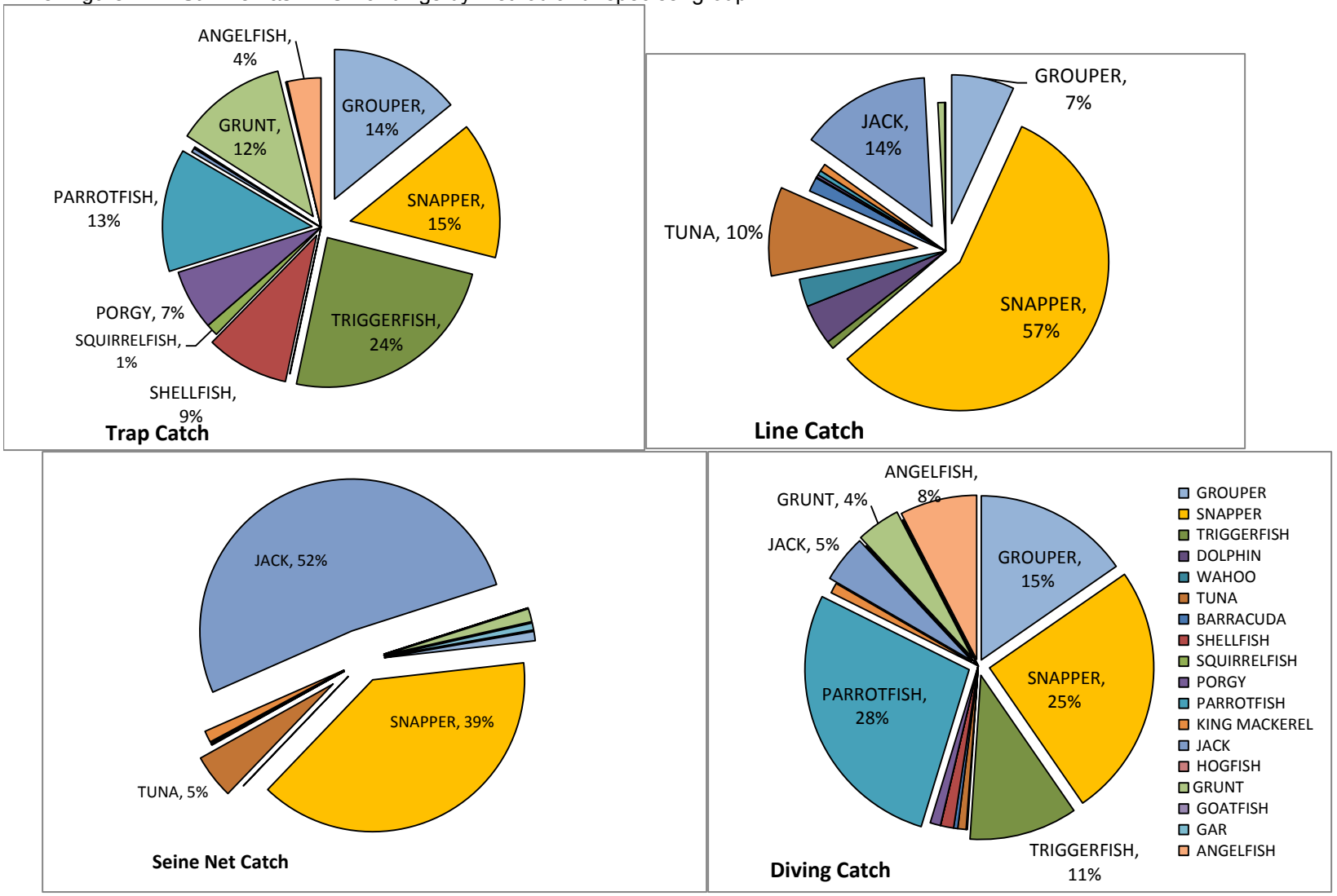
Yellowtail landings.

Yellowtail snapper landings were estimated by utilizing the yellowtail proportions from the port sampling data for each fishing method and the estimated snapper values (Annex figures 1-4 and 1-5).

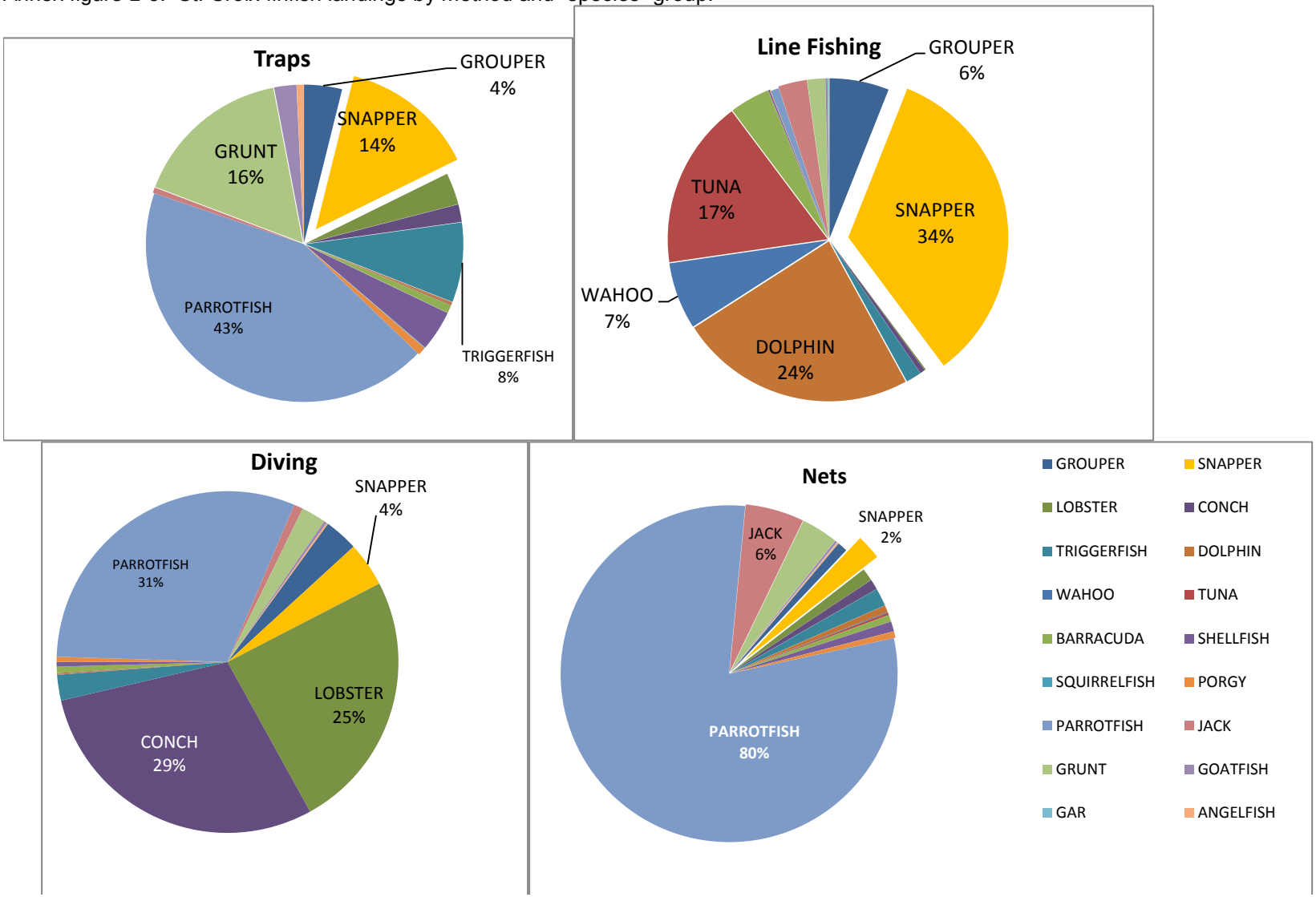
This analysis (Annex 1-7) indicates that yellowtail snapper landings in St. Thomas/St. John are nearly seven times higher than in St. Croix. In part the St. Thomas seine net fishery provides significant landings. This fishery is not present in St. Croix and, as was previously mentioned,

the absence of the “fry” used as chum by St. Thomas fishermen limits the St. Croix line fishery. The relative absence of ciguatera on that island also means that other snapper species which are not generally marketed on St. Thomas, supply much of the demand for snapper there..

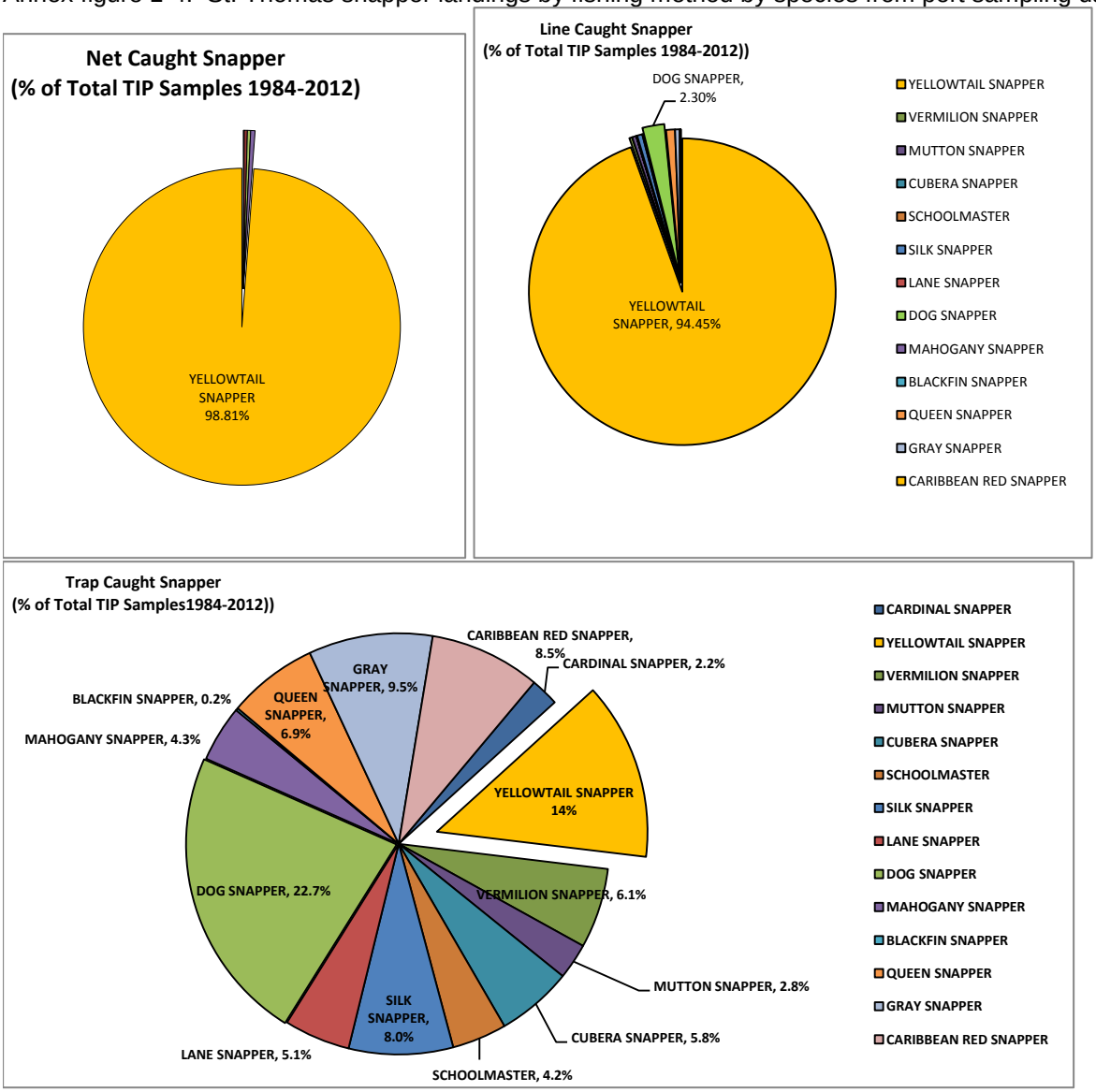
Annex figure 1-2. St. Thomas finfish landings by method and “species” group.



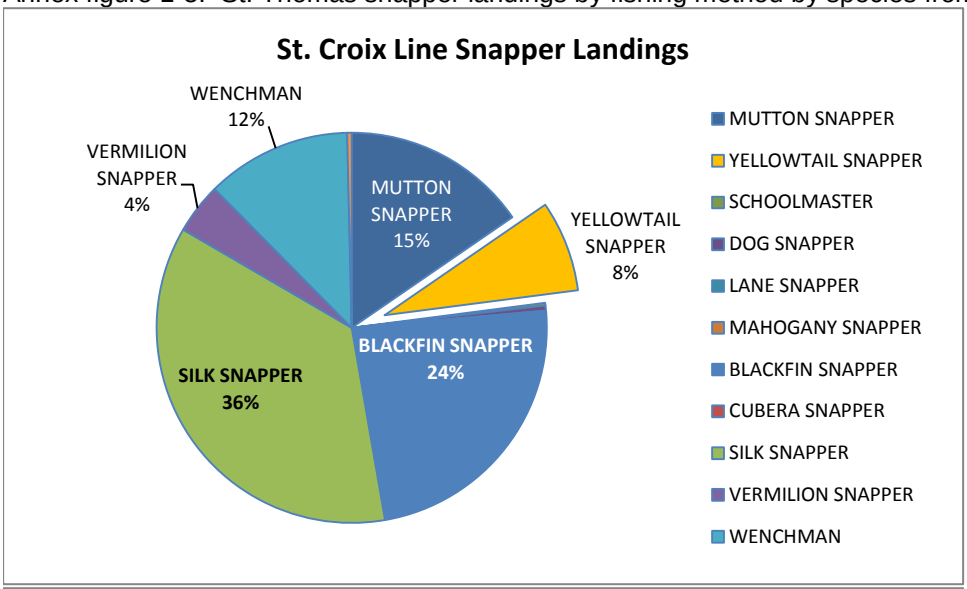
Annex figure 1-3. St. Croix finfish landings by method and “species” group.

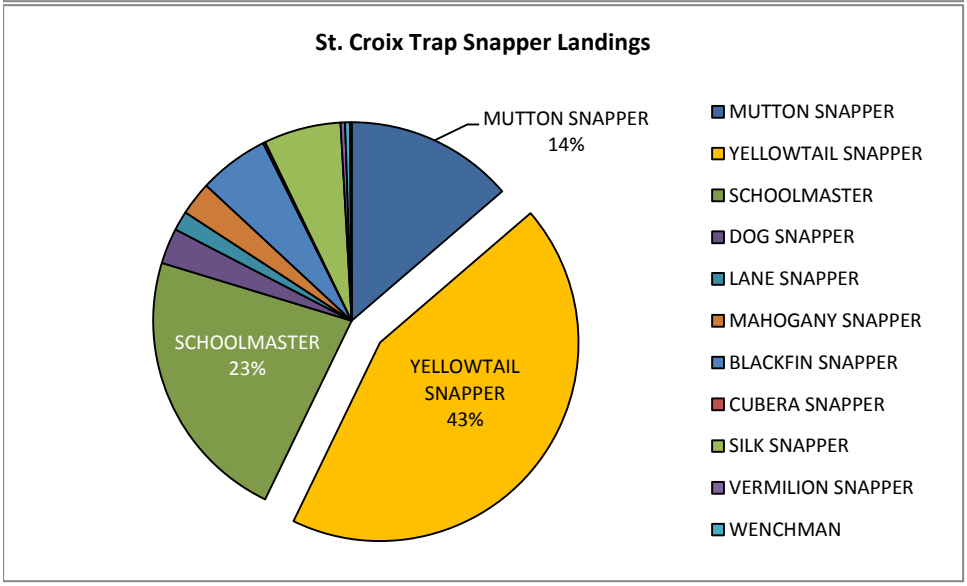


Annex figure 1-4. St. Thomas snapper landings by fishing method by species from port sampling data.

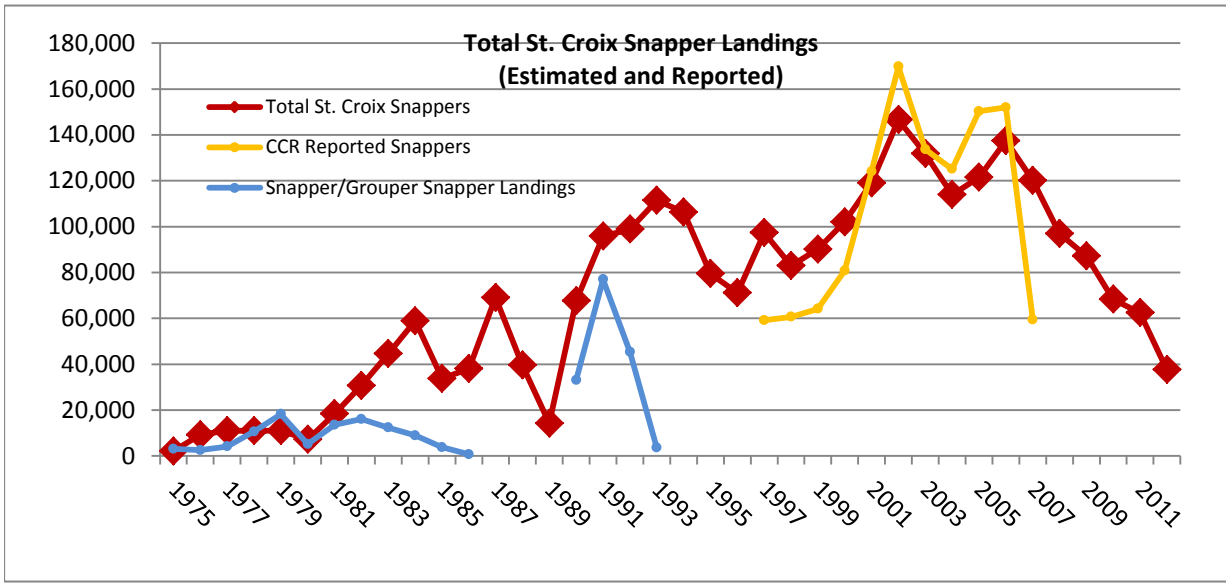


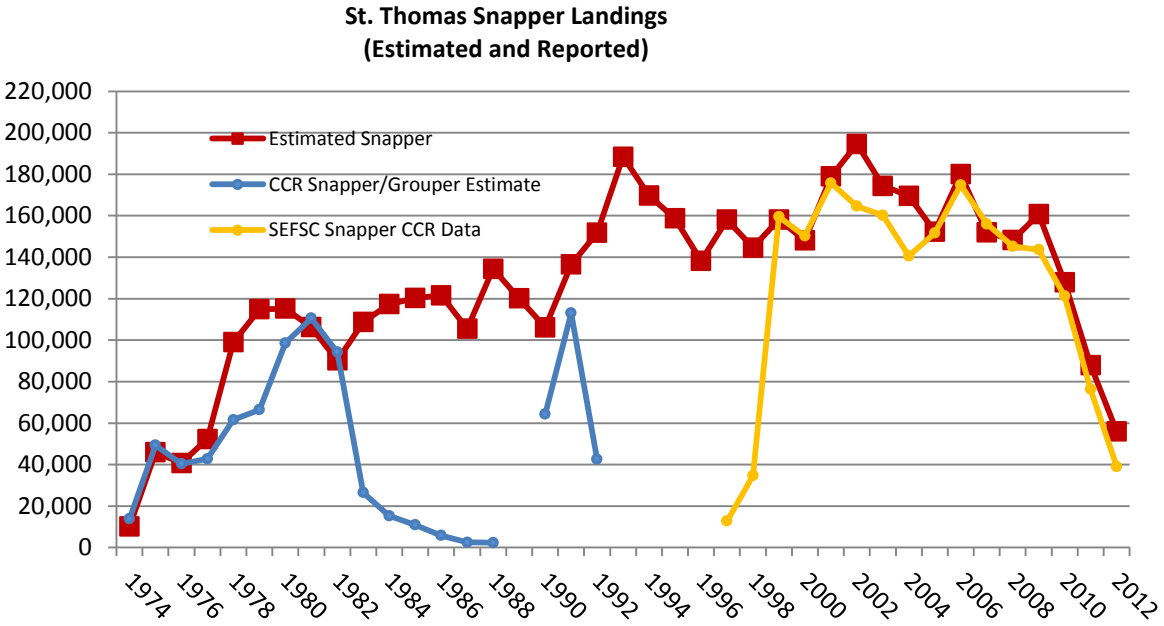
Annex figure 1-5. St. Thomas snapper landings by fishing method by species from port sampling data.



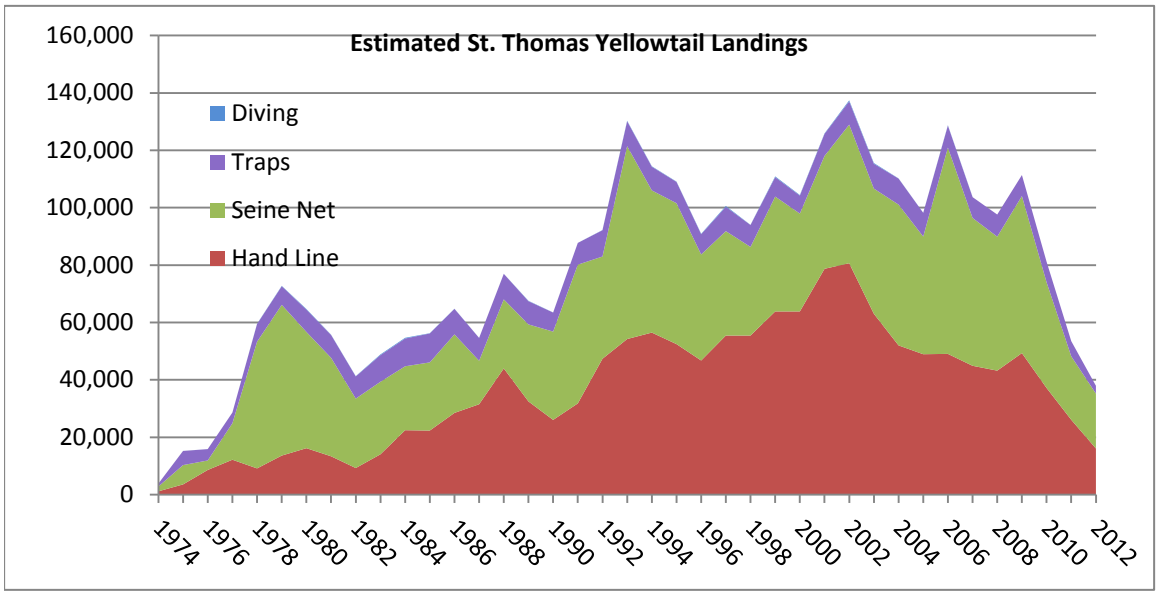


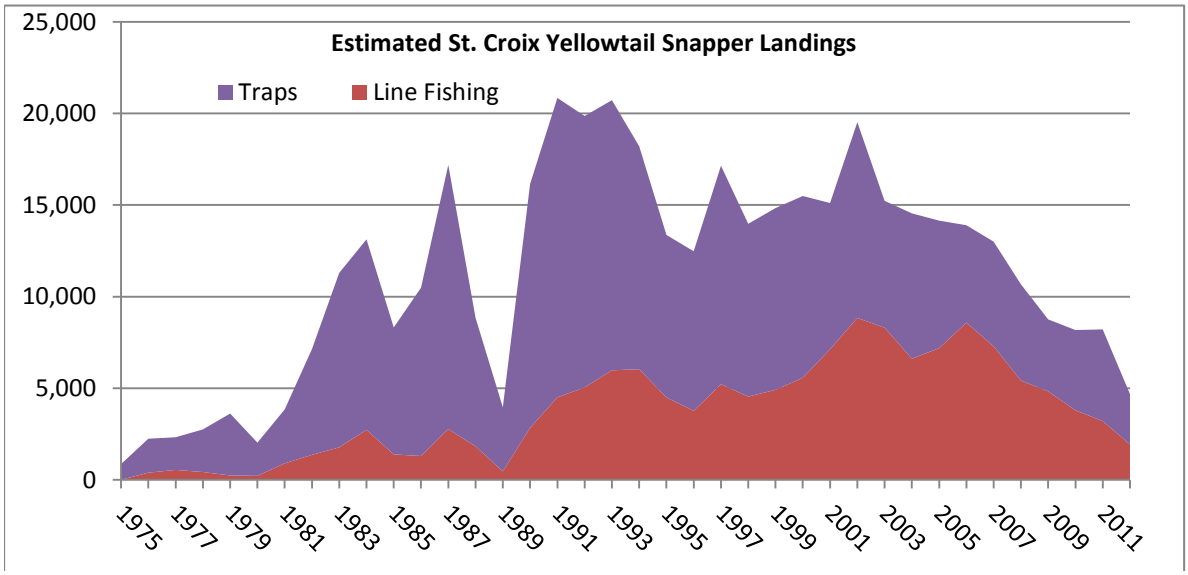
Annex figure 1-6. Estimated snapper landings derived from landings by method compared to estimates from CCR snapper/grouper data (1974 -1992) and reported landings by family group (1996-2012).





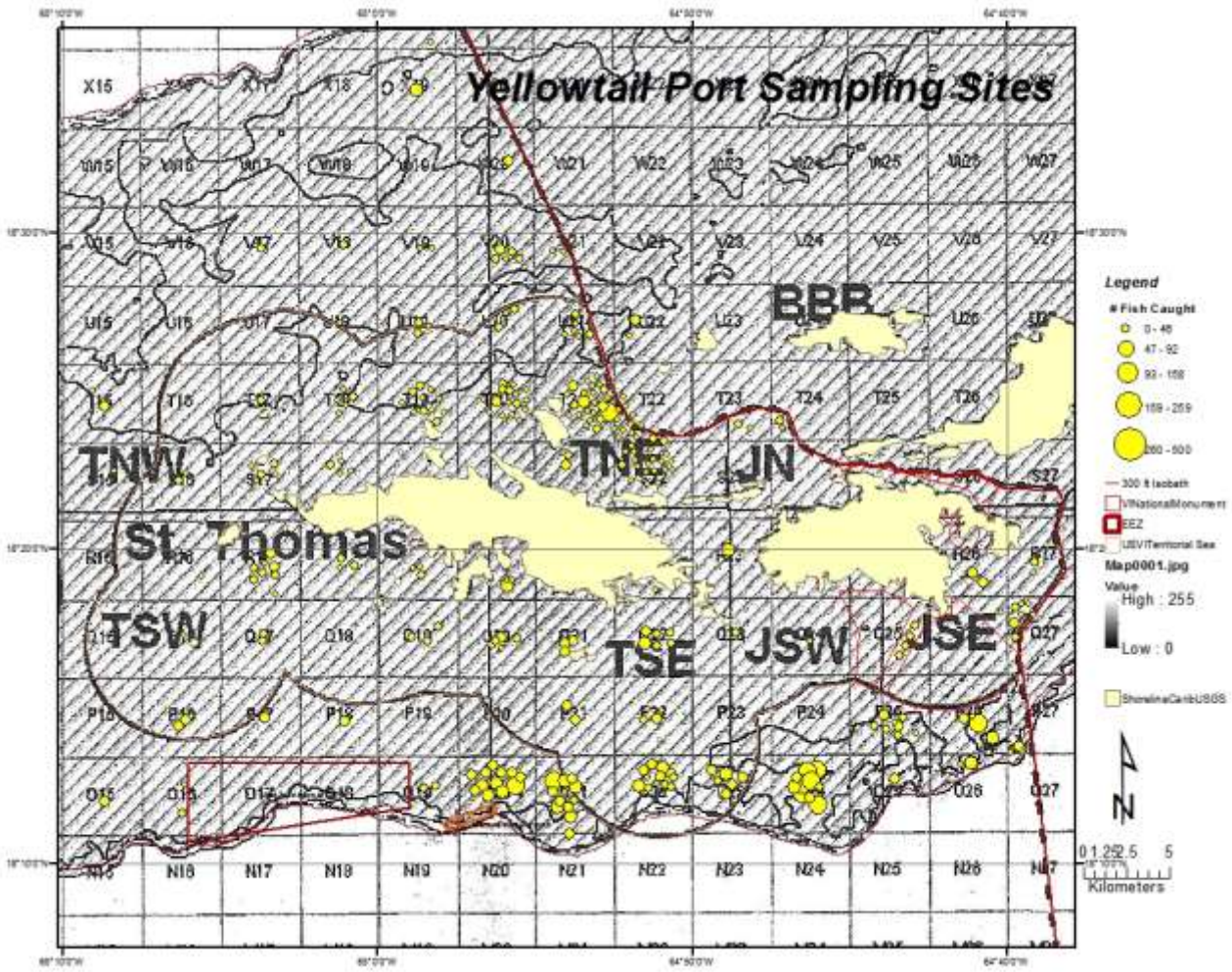
Annex figure 1-7. Estimated yellowtail snapper landings for St. Thomas/St. John and St. Croix districts.





Annex 2. Port Sampling Data

Annex figure 2-1. Location of port samples and Division of Fish and Wildlife grid map.



Annex Table 2-1. Port Sampling Data.

PortSample Query					
ID	FishingDate	Sampler	Location	# Fish	AverageWt
1	28-Sep-11	Olsen	P26	120	1.25
2	27-Sep-11	Olsen	O26	120	1.25
3	29-Sep-11	Olsen	P26	83	1.20
4	30-Sep-11	Olsen	O22	80	1.25
5	30-Sep-11	Olsen	O21	82	2.20
6	29-Sep-11	Olsen	P26	120	1.42
7	01-Sep-11	Olsen	P22	28	1.42
8	30-Sep-11	Olsen	T21	26	1.75
9	30-Sep-11	Olsen	P26	34	1.75
10	04-Oct-11	Olsen	O22	128	1.18
11	05-Oct-11	Olsen	O21	79	1.20
12	30-Sep-11	Olsen	O22	86	1.75
13	07-Oct-11	Julian, Buffy	T21	45	1.78
14	07-Oct-11	Olsen	O20	167	1.50
15	07-Oct-11	Julian, Buffy	S22	44	1.14
16	07-Oct-11	Julian Buffy	021	40	1.75
17	07-Oct-11	Julian, Buffy	t19	65	1.20
18	13-Oct-11	Olsen	S21	40	1.05
19	13-Oct-11	Olsen	O24	152	1.05
20	13-Oct-11	Olsen	Y19	154	1.17
21	16-Oct-11	Julian, Buffy	O20	179	1.40
22	17-Oct-11	Olsen	T20	15	1.30
23	11-Oct-11	Julian, Buffy	Q20	18	1.70
24	14-Oct-11	Julian, Buffy	T20	165	1.20
25	17-Oct-11	Olsen	T20	12	1.25
26	20-Oct-11	Olsen	O20	208	1.25
27	21-Oct-11	Olsen	W19	109	1.10
28	28-Oct-11	Olsen	O20	254	1.18
29	22-Oct-11	Julian, Buffy	O21	31	1.86
30	25-Oct-11	Julian, Buffy	O21	78	1.62
31	25-Oct-11	Julian, Buffy	R17	51	1.18
32	01-Nov-11	Olsen	T21	17	1.80
33	01-Nov-11	Olsen	O20	133	1.20
34	01-Nov-11	Olsen	O26	33	1.20
35	04-Nov-11	Olsen	T19	20	3.75

PortSample Query					
ID	FishingDate	Sampler	Location	# Fish	AverageWt
36	08-Nov-11	Olsen	Q18	53	0.94
37	04-Nov-11	Julian, Buffy	R20	44	0.98
38	05-Nov-11	Julian, Buffy	R18	63	0.83
39	06-Nov-11	Julian Buffy	R19	28	1.63
40	10-Nov-11	Julian, Buffy	S17	60	1.05
41	10-Nov-11	Julian, Buffy	O26	259	1.16
42	10-Nov-11	Julian, Buffy	R20	165	0.85
43	01-Nov-11	Julian, Buffy	R17	75	1.46
44	01-Nov-11	Julian, Buffy	T18	46	1.40
45	03-Nov-11	Julian, Buffy	R19	51	1.18
46	14-Nov-11	Olsen	P22	71	1.75
47	15-Nov-11	Olsen	P22	71	1.40
48	19-Nov-11	Julian, Buffy	R20	27	1.50
49	24-Nov-11	Olsen	P25	57	1.05
50	24-Nov-11	Olsen	P25	57	1.05
51	25-Nov-11	Olsen	R16	35	1.10
52	02-Dec-11	Olsen	P25	83	1.20
53	02-Dec-11	Olsen	O21	152	1.32
54	02-Dec-11	Olsen	X19	182	1.10
55	30-Nov-11	Olsen	P25	83	1.20
56	02-Dec-11	Olsen	O21	105	0.95
57	29-Nov-11	Olsen	O21	167	1.20
58	06-Dec-11	Olsen	Q19	91	1.10
59	08-Dec-11	Olsen	U19	22	1.80
60	12-Dec-11	Olsen	O15	117	1.20
61	14-Dec-11	Olsen	O24	140	1.00
62	04-Jan-12	Olsen	O20	97	1.55
63	06-Jan-12	Olsen	P22	42	1.20
64	08-Jan-12	Olsen	P26	213	1.18
65	11-Jan-12	Olsen	P26	273	1.10
66	11-Jan-12	Olsen	J14	16	1.90
67	11-Jan-12	Olsen	P14	50	1.60
68	18-Jan-12	Olsen	T20	50	1.60
69	16-Jan-12	Olsen	J14	15	2.00
70	19-Jan-12	Olsen	N21	101	0.99
71	20-Jan-12	Olsen	P26	118	0.85
72	01-Jan-12	Luther Aubrey	Q27	67	1.50

PortSample Query					
ID	FishingDate	Sampler	Location	# Fish	AverageWt
73	03-Jan-12	Luther Aubrey	V19	30	2.00
74	05-Jan-12	Luther Aubrey	S22	35	1.70
75	07-Jan-12	Luther Aubrey	V23	25	1.60
76	08-Jan-12	Luther Aubrey	R27	44	1.60
77	09-Jan-12	Luther Aubrey	T20	40	1.50
78	28-Nov-12	Luther Aubrey	P22	33	1.50
79	30-Nov-11	Luther Aubrey	S22	31	1.60
80	15-Dec-11	Luther Aubrey	R27	46	1.30
81	09-Feb-12	Olsen	P26	24	1.25
82	24-Jan-12	Luther Aubrey	S22	27	1.50
83	25-Jan-12	Luther Aubrey	Q27	54	1.30
84	26-Jan-12	Luther Aubrey	T21	50	1.20
85	28-Jan-12	Luther Aubrey	S22	36	1.40
86	01-Feb-12	Luther Aubrey	T23	40	1.50
87	12-Dec-11	Julian Magras	O20	55	1.45
88	16-Dec-11	Julian Magras	O20	71	1.38
89	26-Dec-11	Julian Magras	U19	62	2.98
90	27-Dec-11	Julian Magras	P21	110	1.48
91	28-Dec-11	Julian Magras	P21	103	1.46
92	28-Dec-11	Julian Magras	R17	60	1.00
93	16-Jan-12	Julian Magras	P22	59	1.70
94	18-Jan-12	Julian Magras	R17	50	0.90
95	19-Jan-12	Julian Magras	O20	105	1.30
96	24-Jan-12	Julian Magras	O19	72	1.00
97	26-Jan-12	Julian Magras	O22	116	1.35
98	30-Jan-12	Julian Magras	O19	69	1.28
99	07-Jan-12	Julian Magras	R19	34	0.81
100	11-Feb-12	David Olsen	O22	242	1.02
101	11-Feb-12	Julian Magras	T17	60	1.80
102	12-Feb-12	Julian Magras	T18	14	0.90
103	12-Feb-12	David Olsen	O24	75	1.56
104	12-Feb-12	David Olsen	N14	82	1.56
105	15-Feb-12	Julian Magras	T17	18	1.30
106	16-Feb-12	Julian Magras	T17	22	1.76
107	09-Feb-12	Luther Aubrey	T22	18	2.50
108	16-Feb-12	David Olsen	T20	40	1.50
109	18-Feb-12	Luther Aubrey	S22	46	1.30

PortSample Query					
ID	FishingDate	Sampler	Location	# Fish	AverageWt
110	25-Feb-12	Luther Aubrey	T19	29	1.70
111	02-Mar-12	Luther Aubrey	S22	20	1.50
112	29-Feb-12	David Olsen	Q19	50	0.80
113	02-Mar-12	David Olsen	T20	63	1.60
114	16-Feb-12	David Olsen	P16	95	1.47
115	17-Feb-12	David Olsen	P26	98	1.22
116	18-Feb-12	David Olsen	P16	133	1.50
117	09-Feb-12	Luther Aubrey	T22	18	2.50
118	16-Feb-12	Luther Aubrey	T20	40	1.50
119	18-Feb-12	Luther Aubrey	S22	45	1.30
120	25-Feb-12	Luther Aubrey	T19	29	1.70
121	28-Feb-12	Luther Aubrey	S22	28	1.80
122	02-Mar-12	Luther Aubrey	S22	20	1.50
123	18-Mar-12	David Olsen	N20	316	0.95
124	27-Feb-12	David Olsen	O24	138	1.45
125	29-Mar-12	Luther Aubrey	P26	114	2.20
126	26-Mar-12	Luther Aubrey	Q25	67	1.50
127	27-Mar-12	Luther Aubrey	T22	30	2.00
128	06-Apr-12	Luther Aubrey	U21	33	1.50
129	05-Apr-12	Luther Aubrey	T22	39	1.30
130	06-Apr-12	Luther Aubrey	Q25	75	2.00
131	14-Apr-12	Luther Aubrey	T23	60	1.50
132	08-May-12	David Olsen	R23	163	1.23
133	17-Apr-12	Luther Aubrey	U-18	38	1.40
134	08-May-12	Luther Aubrey	T-22	25	1.50
135	12-May-12	Luther Aubrey	V-21	25	1.20
136	26-Apr-12	Luther Aubrey	T-19	38	1.30
137	03-May-12	Luther Aubrey	T-20	18	13.00
138	04-May-12	Luther Aubrey	V-19	30	1.50
139	16-Apr-12	Luther Aubrey	Q-25	67	1.50
140	18-Apr-12	Luther Aubrey	Q-25	62	1.30
141	20-Apr-12	Luther Aubrey	T-21	29	1.70
142	21-Apr-12	Luther Aubrey	U-20	50	1.50
143	23-Apr-12	Luther Aubrey	T-20	33	1.80
144	23-Apr-12	Luther Aubrey	U-20	35	2.00
145	18-May-12	Luther Aubrey	S-18	27	1.50
146	27-May-12	Luther Aubrey	T-22	38	1.60

PortSample Query					
ID	FishingDate	Sampler	Location	# Fish	AverageWt
147	26-May-12	Luther Aubrey	Q-16	40	2.00
148	01-Jun-12	Luther Aubrey	S-22	27	1.50
149	02-Jun-12	Luther Aubrey	Q27	50	2.00
150	03-Jun-12	Luther Aubrey	S-17	15	1.00
151	03-Jun-12	Luther Aubrey	Q-27	111	1.80
152	09-Jun-12	Luther Aubrey	T-22	39	1.30
153	08-Jun-12	Luther Aubrey	Q-27	30	1.50
154	15-Jun-12	Luther Aubrey	T-18	43	1.40
155	15-Jun-12	Luther Aubrey	T-22	31	1.30
156	25-Mar-12	Julian Magras	O-20	92	1.58
157	25-Mar-12	Julian Magras	R-17	95	1.07
158	25-Mar-12	Julian Magras	O-23	110	1.12
159	26-Mar-12	Julian Magras	O-20	100	1.65
160	27-Mar-12	Julian Magras	O-20	120	1.40
161	27-Mar-12	Julian Magras	R-17	114	1.06
162	15-Apr-12	Julian Magras	O-20	136	1.36
163	17-Apr-12	Julian Magras	O-23	146	1.20
164	16-May-12	Julian Magras	0-23	57	1.24
165	16-Apr-12	Julian Magras	O-23	158	1.33
166	20-May-12	Julian Magras	O-23	238	1.30
167	25-May-12	Julian Magras	O-23	165	1.18
168	24-May-12	Julian Magras	O-22	67	1.20
169	31-May-12	Julian Magras	S-16	42	1.78
170	01-Jun-12	Julian Magras	Q-22	69	1.23
171	07-Jun-12	Julian Magras	Q-23	73	1.45
172	14-Jun-12	Julian Magras	R-18	73	1.17
173	22-Jun-12	Julian Magras	R-17	81	0.96
174	09-Mar-12	David Olsen	O-26	22	2.75
175	13-Jul-12	David Olsen	O-14	130	1.30
176	19-Jun-12	Luther Aubrey	T-20	46	1.30
177	22-Jun-12	Luther Aubrey	S-22	27	1.50
178	24-Jun-12	Luther Aubrey	Q-27	33	1.50
179	24-Jun-12	Luther Aubrey	T-21	21	1.30
180	29-Jun-12	Luther Aubrey	T-22	27	1.50
181	01-Jul-12	Luther Aubrey	R-26	142	1.40
182	03-Jul-12	Julian Magras	Q-22	87	1.03
183	03-Jul-12	Julian Magras	O-22	110	1.12

PortSample Query					
ID	FishingDate	Sampler	Location	# Fish	AverageWt
184	05-Jul-12	Julian Magras	Q-22	96	0.94
185	04-Jul-12	Julian Magras	O-21	141	1.10
186	06-Jul-12	Julian Magras	O-22	180	0.99
187	06-Jul-12	Julian Magras	O-21	120	1.27
188	10-Jul-12	Julian Magras	Q-22	50	1.07
189	09-Jul-12	Julian Magras	O-21	116	1.21
190	11-Jul-12	Julian Magras	O-22	94	1.52
191	23-Jul-12	Luther Aubrey	T-22	38	1.30
192	24-Jul-12	Luther Aubrey	T-19	40	1.50
193	25-Jul-12	Luther Aubrey	U-22	50	2.00
194	25-Jul-12	Luther Aubrey	T-22	27	1.50
195	27-Jul-12	Luther Aubrey	T-18	21	1.40
196	27-Jul-12	Luther Aubrey	U-22	17	1.80
197	28-Jul-12	Luther Aubrey	T-21	40	1.50
198	28-Jul-12	Luther Aubrey	U-21	31	1.60
199	30-Jul-12	Luther Aubrey	U-20	75	2.00
200	31-Jul-12	Luther Aubrey	T-19	80	2.50
201	01-Aug-12	Luther Aubrey	T-21	38	1.30
202	01-Aug-12	Luther Aubrey	T-22	43	1.40
203	04-Aug-12	Luther Aubrey	T22	25	2.00
204	04-Aug-12	Luther Aubrey	T-24	27	1.30
205	04-Aug-12	Luther Aubrey	S-22	27	1.50
206	08-Aug-12	Luther Aubrey	T-19	28	1.80
207	09-Aug-12	Luther Aubrey	Q-25	27	1.50
208	09-Aug-12	Luther Aubrey	T-19	43	1.40
209	21-Sep-12	David Olsen	T-21	261	0.88
210	02-Sep-12	Luther Aubrey	T-20	40	1.50
211	03-Sep-12	Luther Aubrey	T-19	42	1.20
212	04-Sep-12	Luther Aubrey	S-22	47	1.50
213	22-Aug-12	Luther Aubrey	R-29	67	1.50
214	29-Aug-12	Luther Aubrey	U-22	43	1.40
215	01-Sep-12	Luther Aubrey	S-17	92	1.30
216	25-Mar-12	Julian Magras	O-20	92	1.58
217	25-Mar-12	Julian Magras	R-17	95	1.07
218	25-Mar-12	Julian Magras	O-23	110	1.18
219	20-Sep-12	David Olsen	V-20	165	0.85
220	12-Sep-12	Luther Aubrey	T-21	60	1.00

PortSample Query					
ID	FishingDate	Sampler	Location	# Fish	AverageWt
221	14-Sep-12	Luther Aubrey	V-20	38	1.30
222	15-Sep-12	Luther Aubrey	T-19	27	1.50
223	16-Sep-12	Luther Aubrey	T-20	38	1.60
224	18-Sep-12	Luther Aubrey	V-18	33	1.80
225	20-Sep-12	Luther Aubrey	Q-25	60	1.50
226	26-Sep-12	Luther Aubrey	U-22	38	1.60
227	27-Sep-12	Luther Aubrey	V-17	33	1.50
228	28-Sep-12	Luther Aubrey	T-21	31	1.30
229	22-Sep-12	Luther Aubrey	T-22	31	1.30
230	24-Sep-12	Luther Aubrey	T-21	33	1.50
231	25-Sep-12	Luther Aubrey	V-18	44	1.60
232	06-Oct-12	Luther Aubrey	S-17	39	1.05
233	07-Oct-12	Luther Aubrey	T-18	38	1.30
234	15-Oct-12	Luther Aubrey	T-21	27	1.50
235	18-Oct-12	Luther Aubrey	S-21	43	1.40
236	21-Oct-12	Luther Aubrey	U-23	33	1.80
237	23-Oct-12	Luther Aubrey	R-22	21	1.20
238	30-Oct-12	Luther Aubrey	T-19	31	1.30
239	30-Oct-12	Luther Aubrey	T-20	24	1.50
240	02-Nov-12	Luther Aubrey	T-24	40	1.50
241	04-Nov-12	Luther Aubrey	S-22	42	1.20
242	06-Nov-12	Luther Aubrey	T-15	67	1.50
243	06-Nov-12	Luther Aubrey	T-20	43	1.40
244	14-Aug-12	Julian Magras	O-24	226	1.25
245	15-Aug-12	Julian Magras	O-24	117	1.33
246	16-Aug-12	Julian Magras	O-24	219	1.50
247	16-Aug-12	Julian Magras	O-21	360	1.00
248	16-Aug-12	Julian Magras	O-24	286	1.05
249	22-Aug-12	Julian Magras	O-24	120	1.83
250	06-Sep-12	Julian Magras	O-24	211	1.52
251	09-Sep-12	Julian Magras	O-21	79	1.46
252	11-Sep-12	Julian Magras	O-24	184	1.58
253	18-Sep-12	Julian Magras	O-21	103	1.21
254	18-Sep-12	Julian Magras	O-24	250	1.23
255	21-Sep-12	Julian Magras	O-21	156	1.38
256	25-Sep-12	Julian Magras	O-21	118	1.40
257	20-Oct-12	Julian Magras	O-22	157	1.15

PortSample Query					
ID	FishingDate	Sampler	Location	# Fish	AverageWt
258	22-Oct-12	Julian Magras	Q-17	60	1.60
259	24-Dec-12	Luther Aubrey	R-16	67	1.50
260	26-Dec-12	Luther Aubrey	T-21	45	1.30
261	29-Dec-12	Luther Aubrey	S-22	33	1.50
262	30-Dec-12	Luther Aubrey	T-21	36	1.40
263	31-Dec-12	Luther Aubrey	T-20	40	1.50
264	02-Jan-13	Luther Aubrey	R-15	31	1.60
265	20-Dec-12	Luther Aubrey	U-22	28	1.80
266	20-Dec-12	Luther Aubrey	R-15	38	1.60
267	21-Dec-12	Luther Aubrey	T-21	36	1.40
268	10-Jan-13	Luther Aubrey	S-22	17	1.50
269	13-Jan-13	Luther Aubrey	T-21	24	1.70
270	16-Jan-13	Luther Aubrey	T-21	46	1.30
271	17-Jan-13	Luther Aubrey	T-20	21	1.40
272	17-Jan-13	Luther Aubrey	S-22	30	1.50
273	21-Jan-13	Luther Aubrey	T-22	38	1.30
274	21-Jan-13	Luther Aubrey	T-21	40	1.50
275	22-Jan-13	Luther Aubrey	S-17	31	1.60
276	22-Jan-13	Luther Aubrey	T-20	50	1.40
277	27-Jan-13	Luther Aubrey	O-27	33	1.50
278	28-Feb-13	Luther Aubrey	T-21	38	1.60
279	01-Feb-13	Luther Aubrey	T-22	42	1.20

Annex 3: Size/Frequency Data.

Annex Table 3-1. St. Thomas Size/Frequency Data.

FL	Age	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
180	4.15	6	0	17	1	2	0			0	0	0	0
190	4.38	0	1	0	0	0	1			0	0	0	0
200	4.62	0	1	0	0	0	0			0	0	0	1
210	4.86	2	1	1	0	0	1			0	0	0	6
220	5.11	2	6	5	0	0	2			0	0	0	8
230	5.37	0	5	5	3	0	3			0	1	0	17
240	5.64	0	9	11	2	0	0			2	0	0	17
250	5.92	2	18	16	2	0	1			2	1	0	18
260	6.21	3	34	11	1	1	0			15	4	2	19
270	6.51	3	19	29	0	0	0			13	11	4	12
280	6.83	3	21	30	2	0	0			16	5	5	12
290	7.16	5	23	47	3	1	0			10	5	3	6
300	7.51	4	44	77	6	1	1			2	3	2	9
310	7.87	17	38	86	11	3	0			2	4	1	11
320	8.26	8	31	73	13	0	1			4	3	0	1
330	8.67	13	39	56	19	0	0			2	2	0	2
340	9.10	9	43	60	15	2	0			0	2	1	3
350	9.56	15	35	48	17	0	0			1	0	0	0
360	10.04	5	29	57	9	2	0			1	0	1	1
370	10.57	9	29	50	5	0	0			1	1	0	1
380	11.14	6	67	42	5	0	0			0	1	1	1
390	11.75	7	57	73	7	0	0			0	0	0	0
400	12.42	5	37	50	2	0	0			0	0	0	0
410	13.17	3	11	47	3	0	0			0	0	0	0
420	14.00	5	12	16	1	0	0			0	0	0	0
430	14.93	5	7	22	3	0	0			0	0	0	0
440	16.01	2	4	19	0	0	0			0	0	0	0

FL	Age	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
450	17.27	1	2	15	1	0	0			0	1	0	0
460	18.81	1	4	12	4	0	0			0	0	0	0
470	20.76	0	3	2	1	0	0			0	0	0	0
480	23.46	0	5	8	3	0	0			0	0	0	0
490	27.82	0	1	3	1	0	0			0	0	0	0
500	40.71	1	0	1	1	0	0			0	0	0	0
510		0	0	3	0	0	0			0	0	0	0
520		1	0	2	0	0	0			0	0	0	0
530		0	0	5	1	0	0			0	0	0	0
540		2	0	5	1	0	0			0	0	0	0
550		0	1	6	1	0	0			0	0	0	0
560		3	2	5	0	0	0			0	0	0	0
570		1	0	0	1	0	0			0	0	0	0
580		2	0	3	0	0	0			0	0	0	0
590		2	0	2	0	0	0			0	0	0	0
600		0	0	1	0	0	0			0	0	0	0
Total		153	639	1021	145	12	10			71	44	20	145
Full Recruit		310	300	310	330					280	270		260
Max FL		460	490	560	550					370	380	380	370
AverageFL		343.6	337.9	345.3	340.2	285.3	240.0			278.2	292.3	289.6	260.7
Average Wt		623.0	593.3	631.8	605.1	363.3	219.9			337.5	389.8	379.1	279.6
Z		0.259	0.186	0.136	0.092	0.187				0.741	0.519	0.374	0.598
Landings		48,867	54,662	56,266	64,796	54,630	76,972	67,535	63,497	87,741	92,210	130,303	114,433
# Fish		35,611	41,832	40,434	48,620	68,272	158,948			118,016	107,399	156,051	185,836

FL	Age	1995	1996	1998	1998	1999	2000	2001	2002	2003	2005	2006
180	4.15	7	1	0	5	0	0	0	0	0	1	0
190	4.38	5	1	0	6	0	0	0	1	0	1	0
200	4.62	3	0	1	1	0	0	0	2	0	2	0
210	4.86	0	10	1	0	2	2	0	5	0	0	0
220	5.11	0	6	3	1	2	2	1	6	0	3	0
230	5.37	2	3	4	1	8	8	1	18	1	5	0
240	5.64	4	7	2	0	3	2	8	20	0	6	0
250	5.92	2	8	5	3	3	4	8	14	5	11	0
260	6.21	2	12	4	2	5	4	22	16	4	21	2
270	6.51	4	4	8	3	3	1	35	24	6	32	2
280	6.83	1	3	8	3	3	5	20	33	3	42	2
290	7.16	0	4	5	3	3	5	23	35	5	40	5
300	7.51	1	4	3	2	4	2	31	20	6	59	3
310	7.87	1	9	7	5	3	1	19	16	2	63	0
320	8.26	0	1	3	0	0	0	18	8	6	37	0
330	8.67	0	2	3	1	1	2	13	9	1	34	2
340	9.10	0	4	2	2	1	1	14	9	2	14	1
350	9.56	0	2	0	1	1	2	3	2	2	16	0
360	10.04	1	0	0	0	0	0	1	0	1	10	0
370	10.57	1	0	0	0	0	0	2	2	2	7	0
380	11.14	0	0	0	0	0	0	3	0	2	8	0
390	11.75	0	0	0	0	0	0	0	1	0	6	1
400	12.42	0	1	0	1	0	0	0	0	0	9	0
410	13.17	0	0	0	0	0	0	0	1	0	1	0
420	14.00	0	0	0	0	0	0	0	1	0	3	0
430	14.93	0	0	0	0	0	0	1	0	0	4	0
440	16.01	0	0	0	0	0	0	0	1	0	1	1
450	17.27	0	0	0	0	0	0	0	0	0	0	0
460	18.81	0	0	0	0	0	0	1	0	0	0	0
470	20.76	0	0	0	0	0	0	1	1	0	0	0
480	23.46	0	0	0	0	0	0	0	0	0	0	0
490	27.82	0	0	0	0	0	0	0	0	0	2	0

FL	Age	1995	1996	1998	1998	1999	2000	2001	2002	2003	2005	2006
500	40.71	0	0	0	0	0	0	0	0	0	1	0
510		0	0	0	0	0	0	0	0	0	1	0
520		0	0	0	0	0	0	0	0	0	0	0
530		0	0	0	0	0	0	0	0	0	1	0
540		0	0	0	0	0	0	0	0	0	1	0
550		0	0	0	0	0	0	0	0	0	0	0
560		0	0	0	0	0	0	0	0	0	0	0
570		0	0	0	0	0	0	0	0	0	0	0
580		0	0	0	0	0	0	0	0	0	0	1
590		0	0	0	0	0	0	0	0	0	0	0
600		0	0	0	0	0	0	0	0	0	0	0
Total		34	82	59	40	42	41	225	245	48	442	20
Full Recruit			260	270	310	300		270	290		310	
Max FL		36	340					380	420	380	440	
AverageFL		229.9	263.1	274.3	255.4	262.8	265.0	296.1	277.7	296.5	306.9	317.4
Average Wt		194.0	287.0	324.1	263.4	286.1	293.3	404.6	335.7	406.1	448.8	494.9
Z		0.342	0.536	0.537	0.958	0.678	0.331	0.531	0.520	0.303	0.509	
Landings		109,106	90,910	100,602	94,027	110,909	104,417	125,908	137,422	115,573	110,215	98,248
# Fish		255,311	143,818	140,937	162,050	176,015	161,638	141,268	185,837	129,202	111,490	90,129

FL	Age	2008	2009	2010	2011	2011	2012	2012
180	4.15	0	0	0	0	0	0	0
190	4.38	0	0	0	0	0	0	0
200	4.62	0	0	1	0	0	0	1
210	4.86	0	0	0	0	0	0	0
220	5.11	0	1	1	0	0	0	15
230	5.37	0	0	2	1	0	0	28
240	5.64	1	1	4	2	0	3	68
250	5.92	2	1	7	7	5	0	115
260	6.21	7	0	9	18	7	2	229
270	6.51	6	8	11	11	18	4	282
280	6.83	6	10	18	14	71	9	423
290	7.16	6	8	22	11	77	6	463
300	7.51	6	8	23	13	113	6	479
310	7.87	3	11	32	9	98	10	448
320	8.26	7	9	23	7	73	7	327
330	8.67	5	10	17	8	65	7	327
340	9.10	5	12	13	8	51	8	254
350	9.56	7	8	14	7	49	4	161
360	10.04	2	6	6	5	11	1	106
370	10.57	1	8	6	1	16	2	91
380	11.14	3	9	5	2	11	2	74
390	11.75	1	6	2	2	9	2	48
400	12.42	3	9	1	0	6	2	35
410	13.17	1	7	2	0	2	1	22
420	14.00	4	7	3	1	5	2	19
430	14.93	0	5	1	0	2	1	17
440	16.01	0	3	3	1	3	0	7
450	17.27	0	3	1	0	1	0	6
460	18.81	0	3	2	0	0	2	0
470	20.76	0	2	0	0	0	0	3
480	23.46	0	1	2	0	1	0	5
490	27.82	0	2	1	2	0	0	3

FL	Age	2008	2009	2010	2011	2011	2012	2012
500	40.71	0	0	1	1	0	0	4
510		1	2	0	1	0	0	3
520		1	1	3	1	0	0	2
530		0	0	0	0	0	0	2
540		0	0	0	0	0	0	4
550		0	0	0	0	0	0	2
560		0	0	1	0	0	0	2
570		0	0	0	0	0	0	1
580		0	0	0	0	0	0	0
590		0	0	0	0	0	0	1
600		0	0	0	0	0	0	0
								0
Total		78	161	237	133	694	81	4077
Full Recruit		280	340	310	260	300	310	300
Max FL		400	470	500	500	490	470	570
AverageFL		321.9	353.6	318.9	306.9	313.3	319.2	309.2
Average Wt		515.5	677.3	501.8	449.0	476.4	503.2	458.5
Z		0.057	0.096	0.106	0.084	0.296	0.147	0.153
Landings		128,736	103,785	97,690	111,537	81,218	53,538	37,969
# Fish		113,371	69,567	88,376	112,781	77,394	48,304	37,595

Annex Table 3-2: St. Croix Size/Frequency Data

FL	Age Yrs	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
180	3.30	0	0	0	10	0	0	1	0	0	0	0	0	7	0	0
190	3.51	4	2	0	14	0	0	0	0	0	0	0	0	5	1	0
200	3.74	8	10	0	15	2	1	1	0	0	0	0	1	3	0	1
210	3.97	28	32	3	35	6	1	2	0	0	0	0	6	0	10	1
220	4.20	52	110	15	76	25	11	2	0	0	0	0	8	0	6	3
230	4.45	72	203	25	130	31	13	8	0	0	1	0	17	2	3	4
240	4.70	83	231	26	162	48	25	9	0	2	0	0	17	4	7	2
250	4.95	50	186	19	185	43	34	7	4	2	1	0	18	2	8	5
260	5.22	46	174	20	250	41	32	11	7	15	4	2	18	2	12	4
270	5.50	51	186	25	311	58	30	16	18	13	11	4	12	4	4	8
280	5.78	48	170	29	290	43	33	14	13	16	5	5	13	1	3	8
290	6.07	68	181	22	245	30	26	14	12	10	5	3	6	0	4	5
300	6.38	76	169	25	215	27	12	6	9	2	3	2	9	1	4	3
310	6.70	23	158	20	179	11	14	4	5	2	4	1	11	1	9	7
320	7.03	19	155	20	111	11	15	2	0	4	3	0	1	0	1	3
330	7.37	22	93	20	110	16	13	3	2	2	2	0	2	0	2	3
340	7.73	44	48	11	84	13	8	2	2	0	2	1	3	0	4	2
350	8.10	20	60	10	59	10	8	1	0	1	0	0	0	0	2	0
360	8.49	19	41	4	32	5	5	0	1	1	0	1	1	1	0	0
370	8.90	18	31	5	36	8	8	0	1	1	1	0	1	1	0	0
380	9.33	16	15	2	29	6	6	1	0	0	1	1	1	0	0	0
390	9.79	27	15	7	17	3	5	1	0	0	0	0	0	0	0	0
400	10.27	21	11	2	20	6	3	0	0	0	0	0	0	0	1	0
410	10.78	15	15	3	12	3	7	0	0	0	0	0	0	0	0	0
420	11.33	14	9	2	14	4	6	0	0	0	0	0	0	0	0	0
430	11.91	9	4	6	11	2	4	0	0	0	0	0	0	0	0	0
440	12.54	2	8	3	9	2	4	0	0	0	0	0	0	0	0	0
450	13.22	7	3	4	5	2	2	0	0	0	1	0	0	0	0	0
460	13.95	7	9	2	3	2	0	0	0	0	0	0	0	0	0	0
470	14.76	7	2	3	7	3	2	0	0	0	0	0	0	0	0	0
480	15.66	3	6	1	0	0	0	0	0	0	0	0	0	0	0	0

FL	Age Yrs	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
490	16.67	2	0	1	3	1	0	0	0	0	0	0	0	0	0	0
500	17.81	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0
510	19.13	7	2	1	1	0	0	0	0	0	0	0	0	0	0	0
520	20.71	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
530	22.66	1	0	2	3	2	0	0	0	0	0	0	0	0	0	0
540	25.20	0	1	0	3	2	0	0	0	0	0	0	0	0	0	0
550	28.88	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0
560	35.64	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0
570		0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
580		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
590		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
610		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
620		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
630		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
640		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
650		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
660		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
670		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
680		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
690		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
710		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		890	2344	341	2692	469	328	105	74	71	44	20	145	34	81	59
AverageFL		297.1	283.8	301.9	287.5	287	295.6	272.6	285.4	283.1	295	293	263.7	233.8	268.6	276.4
Average Wt		1.04	0.91	1.08	0.94	0.94	1.02	0.81	0.92	0.90	1.01	0.99	0.73	0.51	0.77	0.84
Sample >40		1.04	0.91	1.08	0.94	0.94	1.02	0.81	0.92	0.90	1.01	0.99	0.73		0.77	0.84
Full Recruit		240	240	280	280	270	250	270	270	280	270		280		260	
Max Length		500	480	490	500	500	470	390	370	370	380		390		400	
Z		0.411	0.3208	0.3093	0.4137	0.3298	0.2888	0.5805	0.8484	0.888	0.3106		0.6599		0.5203	

FL	Age Yrs	1998	1999	2000	2001	2002	2003	2004	2005	2006	2006	2007	2008	2009	2010	2011	2012
180	3.30	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
190	3.51	6	0	0	0	1	0	0	1	0	0	0	0	0	4	0	0
200	3.74	1	0	0	0	2	0	0	2	0	1	6	1	0	6	0	0
210	3.97	0	2	2	0	5	0	0	0	0	4	1	4	2	2	1	0
220	4.20	1	2	2	1	6	0	0	3	0	5	1	1	4	5	2	0
230	4.45	1	8	8	1	18	1	1	5	0	9	2	8	2	9	7	0
240	4.70	0	3	2	8	20	0	1	6	0	13	8	7	13	37	21	18
250	4.95	3	3	4	8	14	5	1	11	0	13	3	7	29	92	55	35
260	5.22	2	5	4	22	16	4	2	21	2	30	4	14	51	157	125	51
270	5.50	3	3	1	35	24	6	1	32	2	66	3	20	105	250	186	70
280	5.78	3	3	5	20	33	3	0	42	2	70	7	16	128	300	205	119
290	6.07	3	3	5	23	35	5	2	41	5	104	5	9	118	296	227	115
300	6.38	2	4	2	31	20	6	0	59	3	126	2	11	99	277	218	79
310	6.70	5	3	1	19	16	2	0	63	0	119	2	7	108	239	199	111
320	7.03	0	0	0	18	8	6	0	37	0	99	2	12	93	178	163	88
330	7.37	1	1	2	13	9	1	0	34	2	105	2	8	70	182	154	74
340	7.73	2	1	1	14	9	2	0	14	1	77	2	7	67	133	114	55
350	8.10	1	1	2	3	2	2	0	16	0	60	1	7	67	117	98	53
360	8.49	0	0	0	1	0	1	0	10	0	40	0	2	48	78	86	45
370	8.90	0	0	0	2	2	2	0	7	0	39	0	2	52	104	49	34
380	9.33	0	0	0	3	0	2	0	8	0	30	0	3	47	76	45	19
390	9.79	0	0	0	0	1	0	0	6	1	36	0	1	37	71	39	15
400	10.27	1	0	0	0	0	0	0	9	0	17	0	3	39	57	28	22
410	10.78	0	0	0	0	1	0	0	1	0	21	0	1	29	46	29	14
420	11.33	0	0	0	0	1	0	0	3	0	10	0	4	21	49	22	6
430	11.91	0	0	0	1	0	0	0	4	0	15	0	0	18	25	12	7
440	12.54	0	0	0	0	1	0	0	1	1	15	0	0	12	24	8	5
450	13.22	0	0	0	0	0	0	0	0	0	5	0	0	9	14	12	4
460	13.95	0	0	0	1	0	0	0	0	0	7	0	0	13	15	5	5
470	14.76	0	0	0	1	1	0	0	0	0	4	0	0	14	14	2	5
480	15.66	0	0	0	0	0	0	0	0	0	3	0	0	13	14	3	3
490	16.67	0	0	0	0	0	0	0	2	0	6	0	0	24	15	2	3

FL	Age Yrs	1998	1999	2000	2001	2002	2003	2004	2005	2006	2006	2007	2008	2009	2010	2011	2012
500	17.81	0	0	0	0	0	0	0	1	0	4	0	0	20	19	4	2
510	19.13	0	0	0	0	0	0	0	1	0	3	0	1	15	10	3	2
520	20.71	0	0	0	0	0	0	0	0	0	3	0	1	15	21	3	3
530	22.66	0	0	0	0	0	0	0	1	0	3	0	0	15	16	2	3
540	25.20	0	0	0	0	0	0	0	1	0	1	0	0	20	15	1	1
550	28.88	0	0	0	0	0	0	0	0	0	3	0	0	8	8	1	2
560	35.64	0	0	0	0	0	0	0	0	0	2	0	0	6	4	1	1
570		0	0	0	0	0	0	0	0	0	4	0	0	4	5	0	2
580		0	0	0	0	0	0	0	0	1	3	0	0	1	3	0	0
590		0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0
600		0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
610		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
620		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
630		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
640		0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
650		0	0	0	1	0	0	0	0	0	4	0	0	0	0	0	0
660		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
670		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
680		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
690		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
700		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
710		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		36	42	41	226	245	48	8	443	20	1188	51	157	1436	2991	2132	1071
AverageFL		258.3	265.2	267.1	296.9	279.8	298.8	261.3	309.8	319	332.6	266.1	297.8	343.8	325	314.9	318.9
Average Wt		0.69	0.74	0.76	1.03	0.87	1.05	0.71	1.17	1.27	1.44	0.75	1.04	1.58	1.34	1.23	1.27
Sample >40			0.74	0.76	1.03	0.87	1.05		1.17		1.44	0.75	1.04	1.58	1.34	1.23	1.27
Full Recruit					270	290	310		310		300	240	270	280	280	290	280
Max Length					480	470	380		500		500	350	420	500	500	500	500
Z					0.3836	0.4092			0.3728		0.3019		0.276	0.1543	0.2294	0.3442	0.3397

Annex 4. Summary of Trips

Trip Date	Boat	Captain	Fishermen	Samplers	Longitude	Latitude	Fish Tagged
19-Sep-11	Great White	Winston	Julian, Buffy, Winston	David, Chub	-64.75593	18.17685	22
27-Sep-11	Friendship	Robert	Robert, Julian, Buffy	Olsen, Chub	-64.8769333	18.186317	79
04-Oct-11	Friendship	Robert	Chub and Robert	Daryl, Jessica, David	-64.75973	18.24558	66
04-Oct-11	Friendship	Robert	Magras, Buffy	Olsen, Chub, Robert	-64.83977	18.2	106
12-Oct-11	Friendship	Robert Berry	Magras, Buffy	Chub, David	-64.76603	18.256117	36
14-Oct-11	Friendship	Robert	Robert	Olsen	-64.773317	18.184183	18
19-Oct-11	Daryl	Daryl	Daryl	Olsen	-64.9335	18.299	13
21-Oct-11	Friendship	Robert	Robert	Olsen	-65.021533	18.2303	10
28-Oct-11	Daryl	Daryl	Daryl	Olsen	-64.74093	18.22755	6
28-Oct-11	Friendship	Robert	Robert	Olsen	65.1	18.24	7
01-Nov-11	Friendship	Robert	Chub. Robert	Olsen, Daryl, Jessica	-64.74817	18.1829	54
02-Nov-11	Daryl	Daryl		Jessica	-64.72793	18.20775	19
06-Nov-11	Friendship	Robert	Robert, Julian, Buffy	Daryl, Olsen	-64.94077	18.571	200
08-Nov-11	Daryl	Daryl	Daryl	Daryl	-64.76917	18.3476	2
08-Nov-11	Friendship	Robert Berry	Robert Berry, Gerald Greaux		-64.82287	18.24967	14
12-Nov-11	Daryl	Daryl	Daryl	Jessica	-64.7223	18.20845	20
19-Nov-11	Daryl	Daryl	Daryl	Jessica	-64.9188	18.295717	14
09-Dec-11	Daryl	Daryl	Daryl	Jessica	-65.000466	18.32315	15
18-Mar-12	Rambo	Ernie Quetel	Ernie Quetel, Derek Quetel	Olsen	-64.82	18.3575	41
23-Apr-12	Rambo	Derek Quetel	Ernie Quetel, Derek Quetel	Eric Maddox, Erica Palmer, David Olsen	-64.90068	18.1756	126
26-Apr-12	Rambo	Derek Quetel	Derek Quetel, Ernie Quetel	Eric Maddox, Zach Whitener, David Olsen	-64.851352	18.208711	76
04-May-12	Rambo	Derek Quetel	Derek Quetel, Ernie Quetel	Jake Rosner, Eric Maddox, Zach Whitener	-64.868536	18.187658	139
09-May-12	Rambo	Derek Quetel	Derek Quetel, Ernest Quetel	Zach Whitener, David Olsen, Ernest Quetel Sr.	-64.961507	18.188001	73
10-May-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Zach Whitener, Eric Maddox, Ernest Quetel Sr.	-64.81415	18.19276	132
14-May-12	Rambo	Derek Quetel	Derek Quetel, Ernie Quetel	Michelle, David Olsen, Jake Rosner	-64.945888	18.195976	74
15-May-12	Rambo	Derek Quetel	Derek Quetel, Ernie Quetel	Eric Maddox, Ernest Questel Sr., Clyde	-64.749	18.178	124
27-May-12	Rambo	Derel Quetel	Ernie Quetel, Derek Quetel	Coral World	-64.83	18.36	43
28-May-12	Rambo	Derek Quetel	Derek Quetel, Ernie Quetel	Zach, Jake and Ernest Sr.	-64.74955	18.17993	68

Trip Date	Boat	Captain	Fishermen	Samplers	Longitude	Latitude	Fish Tagged
29-May-12	Rambo	Derek Quetel	Derek Quetel, Ernie Quetel	Eric, Erica, Ernest Sr.	-65.029	18.38	16
29-May-12	Rambo	Derek Quetel	Derek Quetel, Ernie Quetel	Eric, Erica, Ernest Sr.	-64.933	18.401	19
04-Jun-12	Rambo	Derek Quetel	Ernie Quetel, Derek Quetel	Eric Maddox, Erica Palmer, Ernest Quetel Sr.	-64.787	18.186	66
10-Jun-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Zach Whitener, Olsen, Rhianna	-64.755485	18.17684	30
29-Jun-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Eric Maddox, Erica Palmer, Ernest Quetel St.	-65.6	18.1	139
12-Jul-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Ernest Quetel Sr., David Olsen, Carolina Cruz	-64.961372	18.3366	66
17-Jul-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Ernest Quetel Sr., Carolina Cruz, Zach Whitener	-64.86863	18.190317	72
27-Jul-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Katherine Reed, Eric Maddox	-64.83	18.36	39
15-Aug-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Zach Whitener, Ernest Quetel Sr., Carolina Cruz	-64.82107	18.2465	92
31-Aug-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Tyler Grechen, Ernest Quetel Sr.' Carolina Cruz	-64.49224	18.14852	22
01-Sep-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	David Olsen, Ernest Quetel Sr.' Carolina Cruz	-64.720909	18.204892	108
03-Sep-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Zach Whitener, Ernest Quetel Sr.' Carolina Cruz	-64.95185	18.25783	98
04-Sep-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Eric Maddox, Ernest Quetel Sr.' Carolina Cruz	-64.9333	18.25	45
05-Sep-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Zach Whitener, Ernest Quetel Sr., Carolina Cruz	-64.86673	18.1904	62
09-Sep-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Zach Whitener, Ernest Quetel Sr.' Carolina Cruz	-65.104917	18.1792	212
12-Sep-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Tyler Grechen, Ernest Quetel Sr.' Carolina Cruz	-65.04903	18.15483	166
14-Sep-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Tyler Grechen, Ernest Quetel Sr.' Carolina Cruz	-65.4391	18.17731	132
16-Sep-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Zach Whitener, Ernest Quetel Sr.' Carolina Cruz	-64.88848	18.17808	106
19-Sep-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Tyler Grechen,Ernest Quetel Sr., Carolina Cruz	-65.0542	18.15098	2
20-Sep-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Tyler Grechen,Ernest Quetel Sr., Carolina Cruz	-64.45315	18.10629	13
06-Oct-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Ernest Quetel Sr., Carolina Cruz	-64.785417	18.18697	117
07-Oct-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Ernest Quetel Sr., Carolina Cruz	-65.10265	18.17925	91
30-Oct-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Ernest Quetel Sr., Carolina Cruz	-64.851117	18.209	111
31-Oct-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Tyler Grespin, Ernest Quetel Sr., Carolina Cruz	-64.51071	18.12532	87
01-Nov-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Ernest Quetel Sr., Carolina Cruz	-64.946383	18.19637	92
04-Nov-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Ernest Quetel Sr., Carolina Cruz	-64.91583	18.26615	72
05-Nov-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Ernest Quetel Sr., Carolina Cruz	-64.948	18.25817	150
07-Nov-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Ernest Quetel Sr., Carolina Cruz	-64.90403	18.26402	162
09-Nov-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Ernest Quetel Sr., Carolina Cruz	-64.939133	18.2603	84
11-Nov-12	Rambo	Derek Quetel	Ernest Quetel, Derek Quetel	Ernest Quetel Sr., Carolina Cruz	-64.953033	18.280283	66