DRAFT Observations on yellowtail snapper caught in US Virgin Islands' commercial fisheries from 1983 to 2003

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Methods

Biostatistical sampling data through the Trip Intercept Program (TIP) were examined. These data are collected by sampling fish from catches of fishers. In the case of the US Virgin Islands (USVI), all of the sampling comes from commercial fisheries.

Interviewers identify fish to species, record the gear used, the location sampled, and various aspects of the effort expended on the fishing trip (e.g., number of gear units, soak time). In addition, the date of sampling is recorded.

These data provide an opportunity to examine a few different aspects of the commercial fisheries in the USVI. These data could possibly allow partitioning of landings by species. For the most part, USVI landings are reported by broad species groups, gear types, or some combination of both. These data also allow us to examine the size composition of the catch of many species. Such an analysis was performed for yellowtail snapper (*Ocyurus chrysurus*). Finally, these data allow us to examine catch per unit effort, and we have also done so for yellowtail snapper.

Weaknesses of this analysis include that many trips are only partially sampled, especially when they have caught a substantial number of a species. This limitation might possibly be addressed by linking the TIP data back to the landings report. A second weakness, which applies only to the catch per unit effort analyses, is that trips were only included if yellowtail snapper were caught. Another complimentary measure would be proportion of trips that caught yellowtail snapper and could be achieved through additional analysis of the TIP data. Finally, a number of TIP samples may have coding errors, particularly with respect to length and weight type, that would influence these results. If corrections were made to the dataset, these analyses would need to be rerun.

Size Composition of Catch

TIP samples were identified from the USVI, and categorized by island (St. Croix versus St. Thomas and St. John) and gear (pot, handline, and other). Samples were excluded if lengths or island were not recorded. If more than one yellowtail snapper was caught on an individual trip, those fish were averaged to avoid pseudo-replication. Sample sizes by month, island, and gear, are shown in Table 1.

The results of this analysis are presented in Figs. 1 and 2. Figure 1 shows the average length of yellowtail snapper sampled from various gear types on each of the three islands. This figure illustrates that there was minimal, if any decline, in the average length of yellowtail snapper

sampled from 1983 to 2003. Linear regressions were fit to the four most prevalent sample strata: pot and handline catches from St. Croix and from St. Thomas/St. John. All of these showed non-

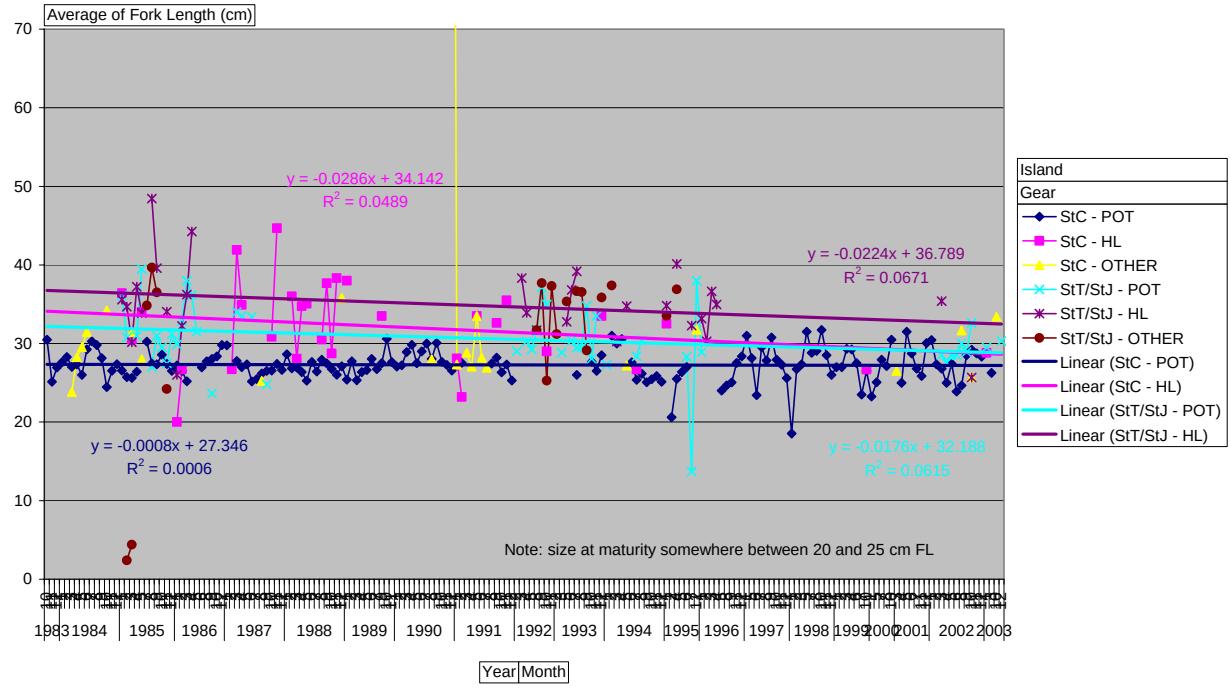

Fig. 1—Average Fork Length (cm). TIP data show a very slight, but not significant downward trend in the average size of yellowtail snapper caught in the USVI between 1983 and 2003.

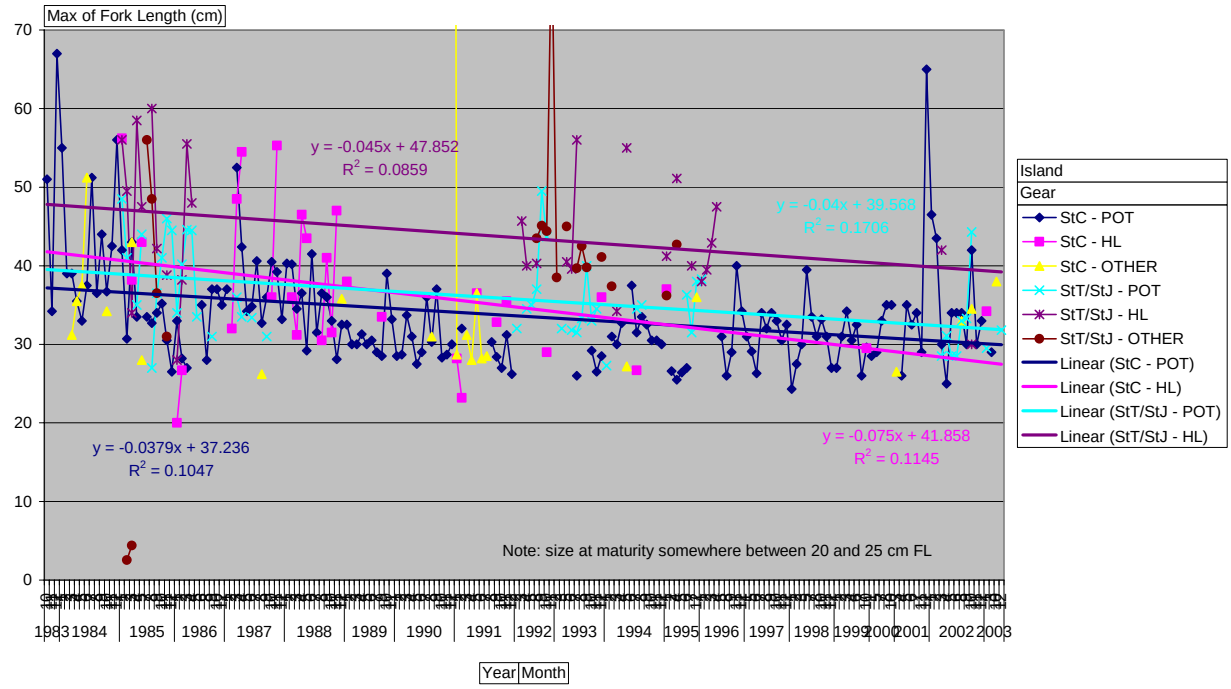

Fig. 2—Maximum Fork Length (cm). TIP data show a slight downward trend in the maximum size of yellowtail snapper caught in the USVI between 1983 and 2003.

significant trends downward, which only explained between 6.7% (StT/StJ HL) and 0.06% (StC pot) of the observed variation. When maximum length was examined, it showed a slightly greater trend, again downward, accounting for between 8.6% (StT/StJ HL) and 17.1% (StT/StJ pot) of the observed variation.

None of these trends were substantial, but it is worth noting that all were downwards. These data will allow the assessment to examine any evidence of stock growth or decline, as observed from the size composition of fish caught. They will also allow for an estimation of population status by comparing the size distribution of fish being caught to the size composition possible under more or less fishing.

Catch Per Unit Effort

Catch per unit effort (CPUE) were also examined with these data. In this case, samples were excluded if island was not identified or if effort data were incomplete. As with the size composition data, trips were treated independently but multiple fish caught on the same trip were combined. Sample sizes by month, island, and gear, are enumerated in Table 2.

The results, shown after being logarithmically-transformed (Fig. 3), show conflicting information. The linear regression of transformed CPUE values indicates a decline in both the St. Croix and St. Thomas/St. John pot fisheries. The trend line for St. Croix explained nearly 30% of variation while that for St. Thomas/St. John explained over 20%. However, the handline fisheries showed non-significant trends upward, but these trends explained little of the variation (2.9% on St. Croix and 0.17% on St. Thomas/St. John).

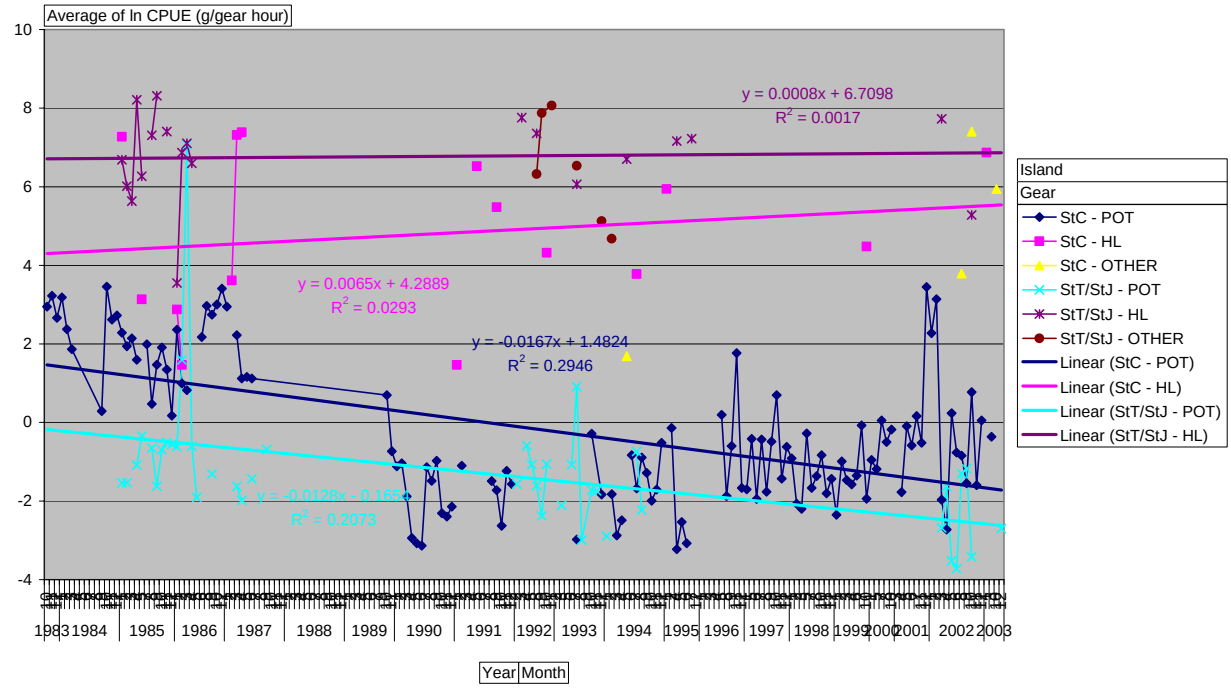

Fig. 3.—Average Logarithmically-Transformed Catch Per Unit Effort (g/gear hour). Data from pot-caught fish indicate a decline, while sparser data from handline-caught fish suggest stability or a slight increase.

Summary

Length frequency analysis would indicate that the yellowtail snapper populations off St. Croix and St. Thomas/St. John have been relatively stable since 1983, with perhaps a slight decline. Catch per unit effort analyses of the pot fisheries off these islands provide stronger evidence for a decline. On St. Croix, the pot CPUE dropped from 4.4 to 0.17 g/gear hour. It appears the pot CPUE bottomed out in the early 1990s and has been recovering slowly since then. On St. Thomas and St. John, the pot CPUE dropped from 1.18 to 0.1 g/gear hour. Sparser data makes it difficult to see more detailed patterns. However, CPUE from handline fisheries on both islands suggest stability or possibly even a very modest increase. Though the trends were very slight and explained minimal variation, they would represent substantial increases if they were verified, from 73 to 261 g/gear hour on St. Croix and from 820 to 960 g/gear hour on St. Thomas. While it would be tempting to dismiss these trends because of their relatively small sample sizes and poor statistical fit, it should also be noted that these CPUEs are substantially higher than pot CPUEs, suggesting it is the preferred method for catching yellowtail snapper.

This evidence needs to be reviewed to ensure that it is reasonable before moving forward. The discussion should focus especially on the validity of TIP data for quantifying effort and catch. Additional analyses, as identified in the methods section, may also provide insightful.

Table 1—Length frequency sample sizes, with rows corresponding to month within year and columns to island (St. Croix vs St. Thomas and St. John) and gear (fish pot, hand line, and other).

		StC			StT/StJ			
Year	Month	POT	HL	OTHER	POT	HL	OTHER	Total
1983	10	382						382
	11	335						335
	12	115						115
1984	1	849						849
	2	102						102
	3	195		43				238
	4	246		27				273
	5	61		167				228
	6	177		53				230
	7	142						142
	8	86						86
	9	125						125
	10	168		1				169
	11	110						110
	12	102						102
1985	1	50	98		18	88		254
	2	45			8	148	15	216
	3	37	25	5		33	1	101
	4	17			7	186		210
	5		4	1	7	70		82
	7	5					138	143
	8	3			1	26	19	49
	9	23			10	79	1	113
	10	20			72			92
	11	7			34	15	18	74
	12	1			45			46
1986	1	26	1		9	2		38
	2	8	1		24	34		67
	3	5			15	36		56
	4				5	8		13
	5				3			3
	6	23						23
	8	7						7
	9	20			8			28
	10	52						52
	12	10						10
1987	1	17						17
	2		9					9
	3	44	11		3			58
	4	36	50		1			87
	5	15						15
	6	43			1			44
	7	46						46
	8	29		2				31
	9	55			7			62
	10	50	6					56
	11	35	9					44
	12	26						26

		StC			StT/StJ			
Year	Month	POT	HL	OTHER	POT	HL	OTHER	Total
1988	1	23						23
	2	30	1					31
	3	32	3					35
	4	14	22					36
	5	14	21					35
	6	24						24
	7	10						10
	8	10	1					11
	9	22	3					25
	10	22	3					25
	11	3	27					30
	12	22		1				23
1989	1	29	1					30
	2	7						7
	3	13						13
	4	4						4
	5	15						15
	6	5						5
	7	5						5
	9	2	1					3
	10	7						7
	11	16						16
1990	1	5						5
	2	7						7
	3	12						12
	4	3						3
	5	1						1
	6	1						1
	7	8						8
	8	9		3				12
	9	6						6
	10	2						2
	11	6						6
	12	7		4				11
1991	1		2	9				11
	2	18	2					20
	3			2				2
	4			3				3
	5		4	4				8
	6			1				1
	7			7				7
	8	8						8
	9	3	2					5
	10	3						3
	11	11	1					12
	12	4						4
1992	2				4			4
	3					49		49
	4				9	24		33
	5				4			4
	8				8	37	71	116

Year	Month	StC			StT/StJ			Total
		POT	HL	OTHER	POT	HL	OTHER	
1992	9				3		13	16
	10		1		13		27	41
	11						16	16
1993	2						80	80
	3				6			6
	5					112	19	131
	6				3	2		5
	7	1			2	37	6	46
	8				9		18	27
	9				12		39	51
	10	6			10			16
	11	1			4			5
	12	1	2				2	5
1994	1				1			1
	2	1					1	2
	3	1				10		11
	4	3						3
	5			1		142		143
	6	27						27
	7	17	1		15			33
	8	30			3			33
	9	34						34
	10	11						11
	11	7						7
	12	12						12
1995	1		3			54	7	64
	2	25						25
	4	1				30	13	44
	5	2						2
	6	1			22			23
	7				3	60		63
	12			2	1			3
1996	1				6	26		32
	2					20		20
	3					14		14
	4					122		122
	5	20						20
	8	8						8
	9	4						4
	11	46						46
	12	4						4
1997	1	1						1
	5	5						5
	6	3						3
	7	6						6
	8	3						3
	9	4						4
	10	16						16
	11	5						5
	12	16						16

Year	Month	StC			StT/StJ			Total
		POT	HL	OTHER	POT	HL	OTHER	
1998	1	14						14
	2	2						2
	3	2						2
	5	6						6
	7	4						4
	8	5						5
	10	3						3
	11	2						2
	12	2						2
1999	1	1						1
	2	4						4
	3	8						8
	4	2						2
	6	4						4
	7	15						15
	10	4	4					8
2000	1	7						7
	5	9						9
	7	8						8
	8	8						8
	10	7						7
2001	3			1				1
	4	2						2
	5	6						6
	6	4						4
	7	15						15
	11	10						10
	12	188						188
2002	1	13						13
	2	38						38
	3	10			1	22		33
	4	1			5			6
	5	17			1			18
	6	22			1			23
	8	12		3	8			23
	9	2			11			13
	10	102		20	5	15		142
	11	2						2
	12	3						3
2003	1		33		1			34
	3	4						4
	10			11				11
	12				2			2
Total		5283	352	371	451	1501	504	8462

Table 2—Catch per unit effort sample sizes, with rows corresponding to month within year and columns to island (St. Croix vs St. Thomas and St. John) and gear (fish pot, hand line, and other).

		StC			StT/StJ			
Year	Month	POT	HL	OTHER	POT	HL	OTHER	Total
1983	10	48						48
	11	18						18
	12	15						15
1984	1	35						35
	2	6						6
	3	6		3				9
	4	6		4				10
	5	1		10				11
	6	1		8				9
	7	6						6
	8	1						1
	9	10						10
	10	11		1				12
	11	20						20
	12	8						8
1985	1	5	3		8	4		20
	2	6			5	7	1	19
	3	5	1	2		1	1	10
	4	4			2	2		8
	5		1	1	2	3		7
	7	1					4	5
	8	2			1	1	2	6
	9	5			4	1	1	11
	10	4			9			13
	11	3			6	1	2	12
	12	1			4			5
1986	1	4	1		3	1		9
	2	3	1		1	1		6
	3	2			1	1		4
	4				1	2		3
	5				2			2
	6	5						5
	8	2						2
	9	4			3			7
	10	8						8
	12	1						1
1987	1	4						4
	2		1					1
	3	6	1		3			10
	4	9	2		1			12
	5	3						3
	6	11			1			12
	7	7						7
	8	8		1				9
	9	8			2			10
	10	8	2					10
	11	7	1					8
	12	5						5

		StC			StT/StJ			
Year	Month	POT	HL	OTHER	POT	HL	OTHER	Total
1988	1	6						6
	2	11	1					12
	3	8	1					9
	4	6	2					8
	5	7	2					9
	6	7						7
	7	5						5
	8	4	1					5
	9	3	2					5
	10	7	1					8
	11	1	2					3
	12	7		1				8
1989	1	7	1					8
	2	4						4
	3	3						3
	4	2						2
	5	3						3
	6	3						3
	7	2						2
	9	1	1					2
	10	1						1
	11	4						4
1990	1	2						2
	2	1						1
	3	3						3
	4	2						2
	5	1						1
	6	1						1
	7	1						1
	8	2		1				3
	9	1						1
	10	1						1
	11	3						3
	12	2		2				4
1991	1		1	2				3
	2	3	2					5
	3			1				1
	4			1				1
	5		1	1				2
	6			1				1
	7			3				3
	8	2						2
	9	1	1					2
	10	2						2
	11	2	1					3
	12	2						2
1992	2				1			1
	3					1		1
	4				2	1		3
	5				1			1
	8				3	1	3	7

		StC			StT/StJ			
Year	Month	POT	HL	OTHER	POT	HL	OTHER	Total
1992	9				2		1	3
	10		1		2		1	4
	11						1	1
1993	2						2	2
	3				3			3
	5					4	1	5
	6				1	1		2
	7	1			2	4	1	8
	8				3		1	4
	9				1		2	3
	10	1			2			3
	11	1			1			2
	12	1	1				1	3
1994	1				1			1
	2	1					1	2
	3	1				1		2
	4	3						3
	5			1		5		6
	6	3						3
	7	2	1		1			4
	8	3			1			4
	9	2						2
	10	3						3
	11	2						2
	12	1						1
1995	1		1			2	1	4
	2	1						1
	4	1				1	1	3
	5	1						1
	6	1			2			3
	7				1	1		2
	12			2	1			3
1996	1				4	1		5
	2					1		1
	3					2		2
	4					2		2
	5	1						1
	8	2						2
	9	1						1
	11	1						1
	12	3						3
1997	1	1						1
	5	1						1
	6	2						2
	7	1						1
	8	2						2
	9	1						1
	10	1						1
	11	2						2
	12	2						2

		StC			StT/StJ			
Year	Month	POT	HL	OTHER	POT	HL	OTHER	Total
1998	1	2						2
	2	1						1
	3	2						2
	5	1						1
	7	2						2
	8	2						2
	10	1						1
	11	1						1
	12	1						1
1999	1	1						1
	2	2						2
	3	2						2
	4	1						1
	6	2						2
	7	1						1
	10	3	1					4
2000	1	2						2
	5	2						2
	7	1						1
	8	1						1
	10	1						1
2001	3			1				1
	4	1						1
	5	1						1
	6	1						1
	7	1						1
	11	1						1
	12	1						1
2002	1	1						1
	2	1						1
	3	3			1	1		5
	4	1			1			2
	5	1			1			2
	6	2			1			3
	8	2		1	1			4
	9	1			1			2
	10	5		1	2	1		9
	11	1						1
	12	1						1
2003	1		1		1			2
	3	1						1
	10			1				1
	12				1			1
Total		575	40	50	104	55	28	852