



SEDAR 46 Stock Assessment Review Workshop

**NOAA
FISHERIES**

Sustainable Fisheries Division
Southeast Fisheries Science Center,
Miami, Florida

**Data Overview
February 23, 2016**

Data Overview

Section 3.1 of SAR

- Terms of Reference
- Summary Pages
- Species Selection
- Life History
- Fishery Statistics
- CPUE
- Fishing Effort
- Length Frequency

Lit. Review

Com. Logbooks & MRIP/MRFSS

Com. Logbooks

Com. Logbooks

TIP



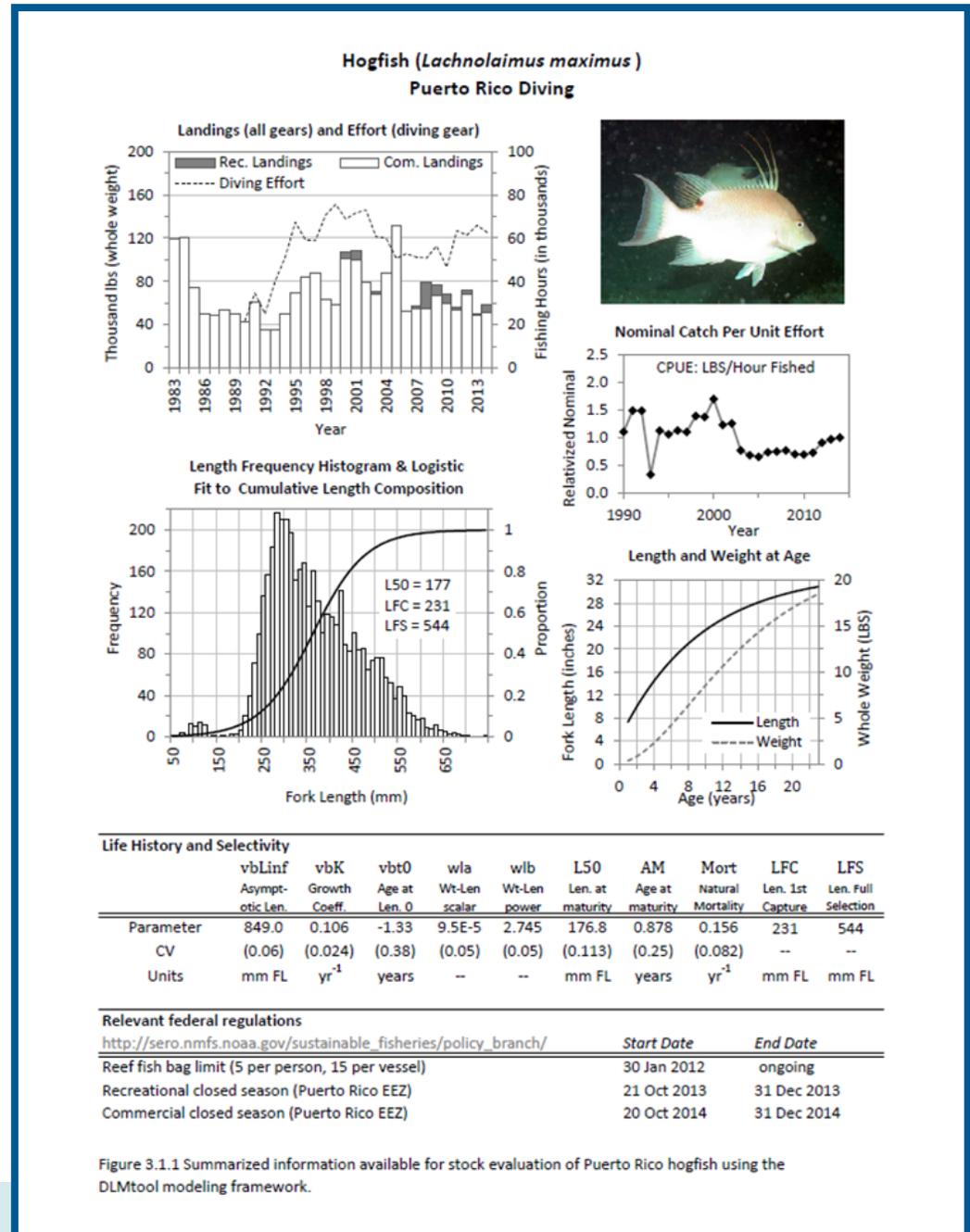
Terms of Reference

- i. **Review the results of the Data Triage conducted by the SEFSC, documenting available data sources for US Caribbean species managed by the Caribbean Fishery Management Council.**
- ii. **Discuss and recommend which species have data suitable for evaluation using data-limited stock assessment modeling techniques.**
- iii. Apply various data-limited modeling techniques, as appropriate, to the recommended species in order to provide management advice.
- iv. Prepare Workshop report providing complete documentation of workshop actions and decisions in accordance with project schedule deadlines.



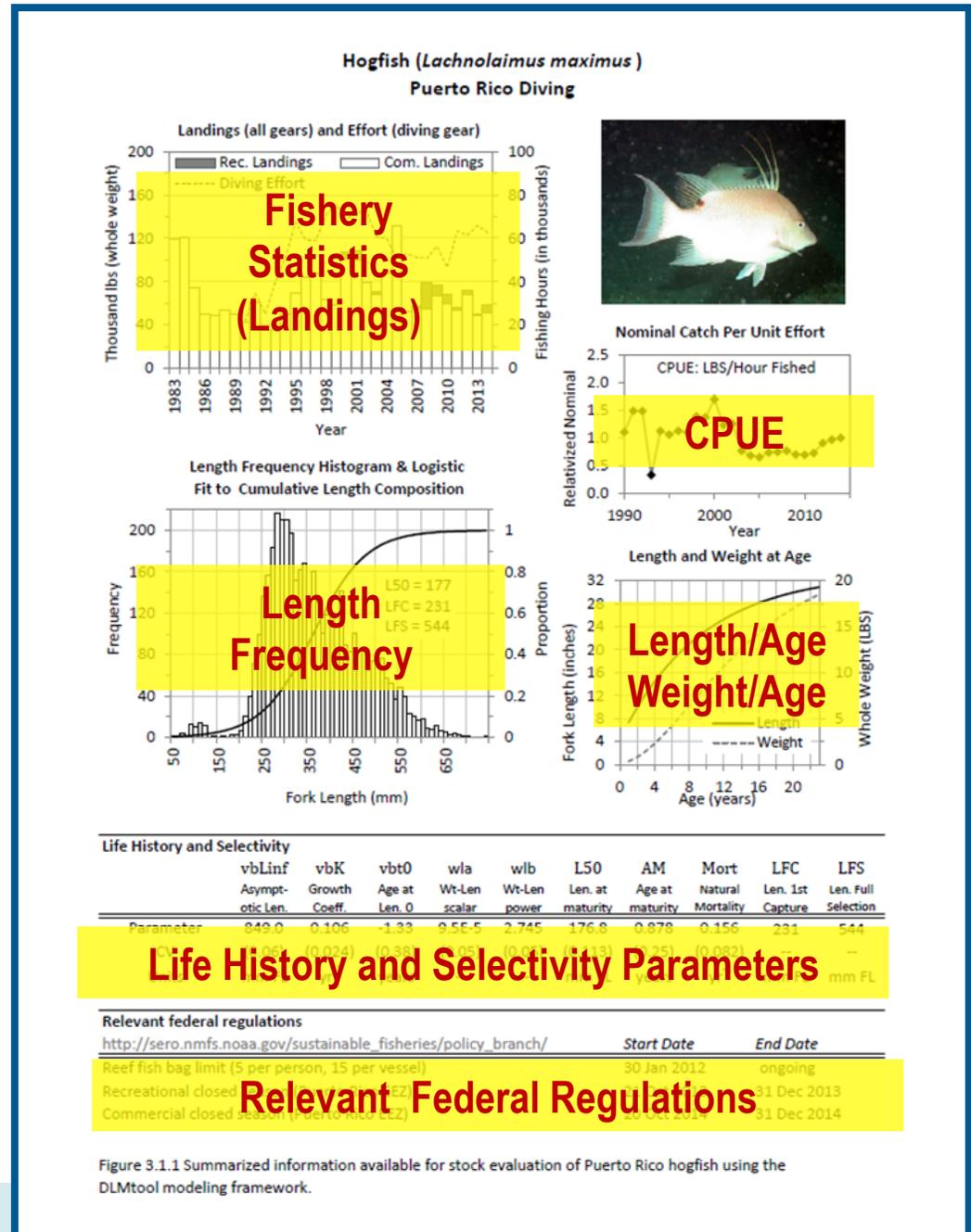
Summary Pages

- Figures 3.1.1 – 3.1.6
- Specific to each species and island unit assessed



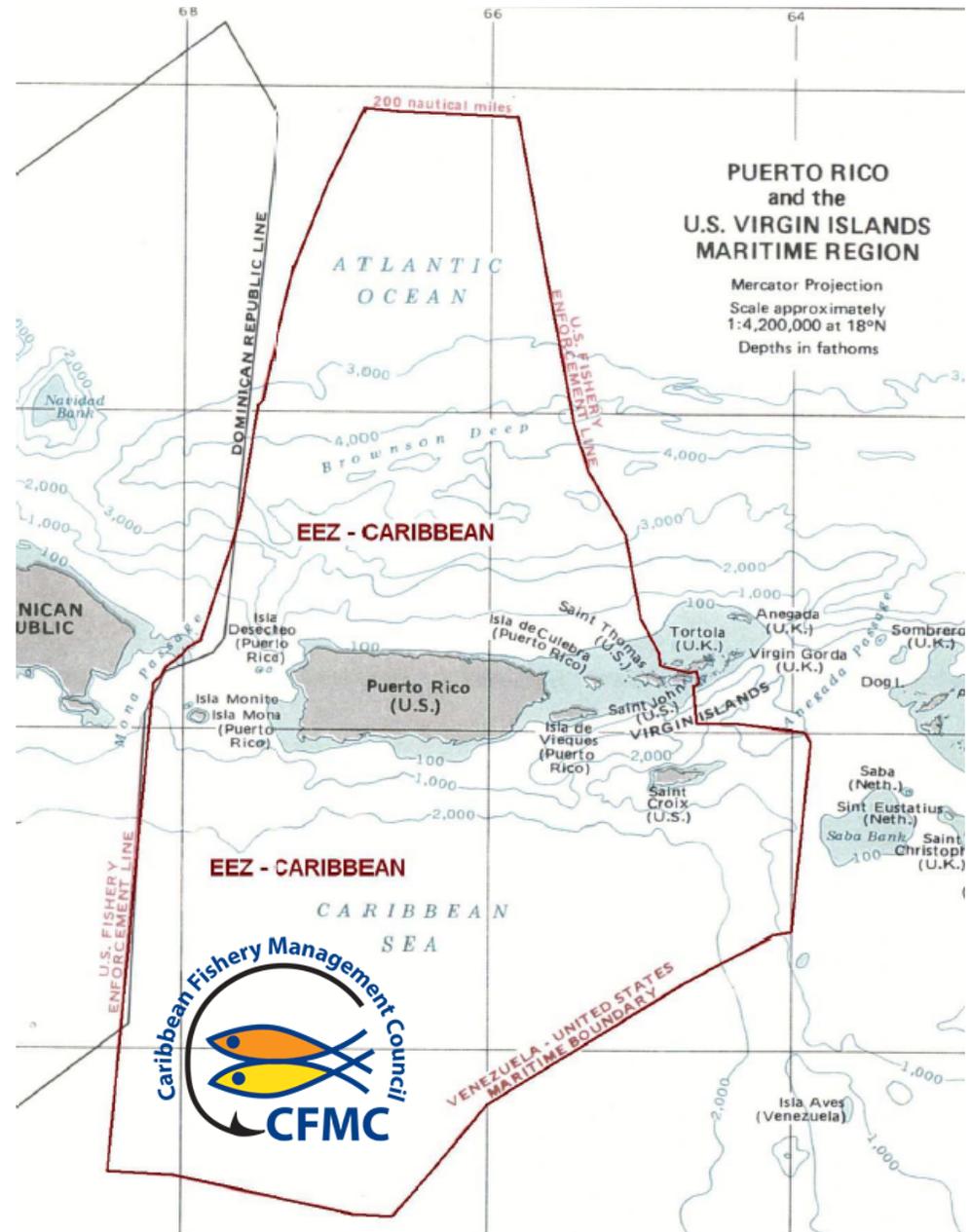
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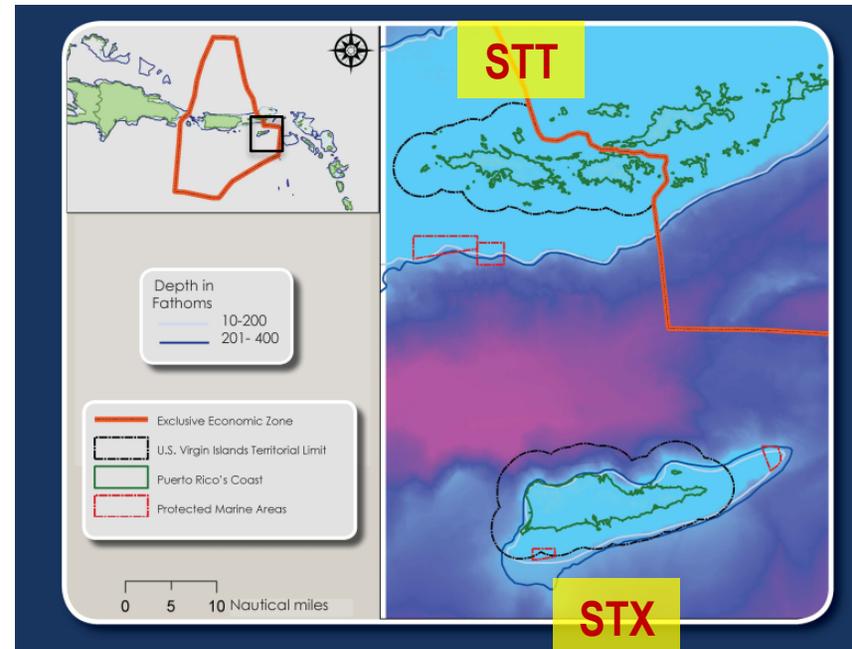
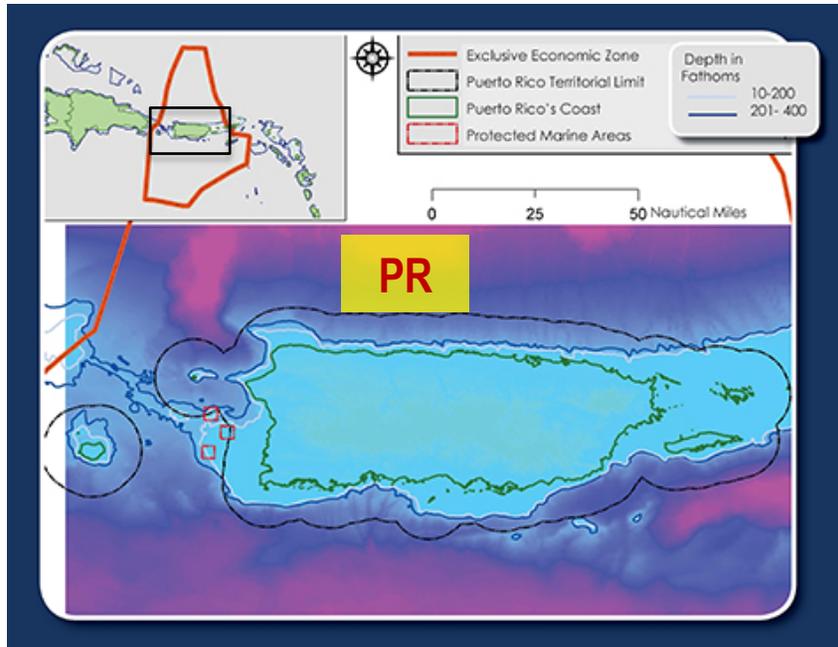


Species Selection Island Units

- US EEZ
- 3 Island Units
 - Puerto Rico (PR)
 - St. Thomas & St. John (STT)
 - St. Croix (STX)
- Multi-Species Fisheries
- Fisheries Managed by Island Units
 - Conduct analyses and provide management advice



Species Selection Island Units



Candidate Species

36 Species/Island Unit Candidates Identified

- Species that were frequently reported in landings, logbook, MRIP or TIP in each island unit

Additional Considerations

- Available life history information
- Regional Importance
- Attempting species with different data limitations

Puerto Rico		St. Thomas		St. Croix	
1	Yellowtail snapper	1	Spiny lobster	1	Spiny lobster
2	Spiny lobster	2	Queen triggerfish	2	Queen conch
3	Silk snapper	3	Red hind	3	Dolphin
4	Queen conch	4	Yellowtail snapper	4	Stoplight parrotfish
5	Lane snapper	5	White grunt	5	Queen parrotfish
6	White grunt	6	Blue tang	6	Queen triggerfish
7	King mackerel			7	Redtail parrotfish
8	Dolphin			8	White grunt
9	Queen snapper				
0	Mutton snapper				
11	Queen triggerfish				
12	Hogfish				
13	Red hind				
14	Cero				
15	Blackfin tuna				
16	Vermilion				
17	Coney				
18	Wahoo				
19	Great barracuda				
20	Tripletail				
21	Stoplight parrotfish				
22	Crevalle jack				

Species sorted by average annual commercial landings
Table 2.1.1 provides actual tabulations



Selected Species

- 6 Species Island Units Attempted In SEDAR 46
- 2 Species per Island Unit

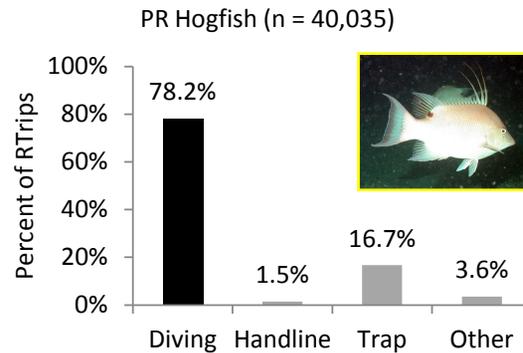
Puerto Rico		St. Thomas		St. Croix	
1	Yellowtail snapper	1	Spiny lobster	1	Spiny lobster
2	Spiny lobster	2	Queen triggerfish	2	Queen conch
3	Silk snapper	3	Red hind	3	Dolphin
4	Queen conch	4	Yellowtail snapper	4	Stoplight parrotfish
5	Lane snapper	5	White grunt	5	Queen parrotfish
6	White grunt	6	Blue tang	6	Queen triggerfish
7	King mackerel			7	Redtail parrotfish
8	Dolphin			8	White grunt
9	Queen snapper				
0	Mutton snapper				
11	Queen triggerfish				
12	Hogfish				
					
					

Species sorted by average annual commercial landings
Table 2.1.1 provides actual tabulations

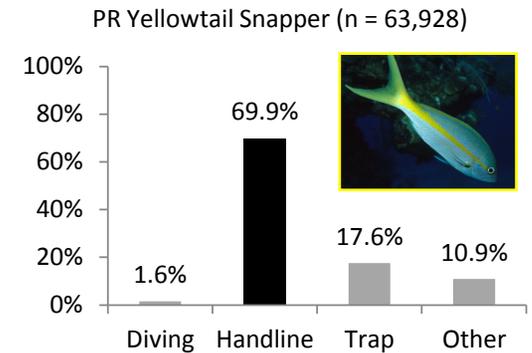
Identifying Representative Fleets

- SEDAR 46 methods limited to modeling a single fleet
- Selected fleet with largest percentage of trips in commercial logbook data

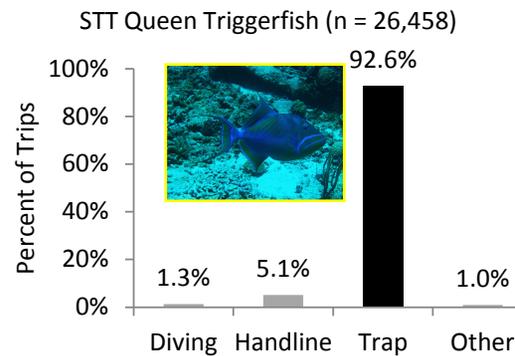
a)



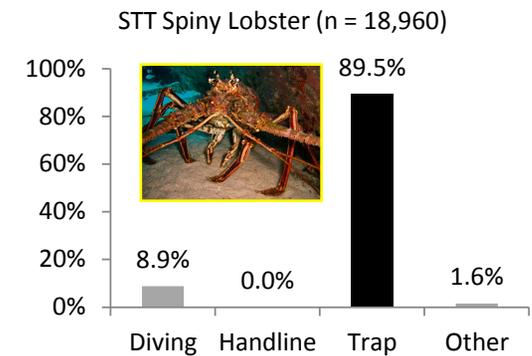
b)



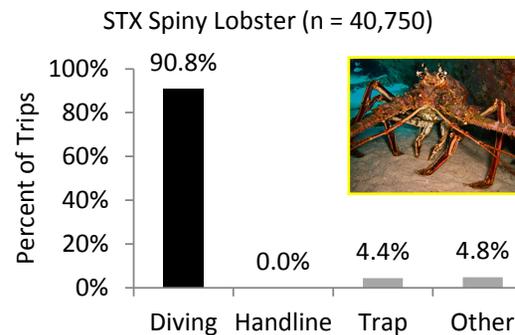
c)



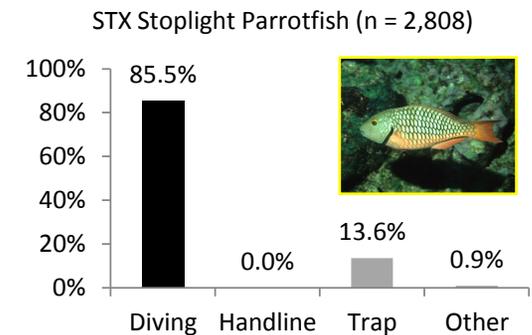
d)



e)



f)



Percentage of commercial trips by gear group



Life History

- SEDAR 46 methods require point estimates of life history parameters and measures of uncertainty
- When parameters did not have estimates of uncertainty, LH group provided plausible levels
- Justifications for each parameter estimate and associated CVs are provided in the text

Parameter	Definition
Linf	Asymptotic length
K	Brody growth coefficient
t0	Theoretical age at length 0
a	Weight-length scalar
b	Weight-length power
L50	Length at 50% maturity
maxage	Maximum age
M	Natural mortality

Parameter estimates and uncertainty are summarized in Table 2.2.2
Source and study area of LH inputs provided in Table 2.2.3
Justifications for each parameter estimate are provided in the text



Life History Demographic Functions

Length/Age:

The von Bertalanffy model

$$L(t) = L_{\infty} (1 - e^{-K(t-t_0)})$$

Length/Weight:

Allometric function

$$W = \alpha L^{\beta}$$

Natural Mortality:

Mean of 2 mortality estimates

Ault et al. 1998, Nadon et al. 2015

$$S_{\lambda} = 0.05 = e^{-\text{Mort } t_{\lambda}}$$

Hoenig 1983

$$\text{Mort} = e^{(1.46 - 1.01 \ln(t_{\lambda}))}$$



Life History Parameter Estimates



Parameter	Hogfish	Yellowtail Snapper	Queen Triggerfish	Spiny Lobster*	Stoplight Parrotfish*	Units
Linf	849.0	502.5	605.3	183.0	631.6	mm FL (lobster CL)
K	0.106	0.139	0.214	0.240	0.250	year ⁻¹
t0	-1.33	-0.96	0.00	0.440	0.00	years
a	9.50E-05	3.45E-05	8.64E-05	9.21E-03	3.70E-05	
b	2.745	2.859	2.784	2.480	2.905	
L50	176.8	248	215	65.79	205	mm FL (lobster CL)
maxage	23	19	14	20	12	years
M	0.156	0.189	0.257	0.350	0.300	year ⁻¹



Fishery Statistics

- **Commercial**

 - Commercial Logbooks**

- **Recreational (PR only)**

 - Marine Recreational Fisheries Statistical Survey (MRFSS)**

 - Marine Recreational Information Program (MRIP)**



PR – Commercial Fishery Statistics

Commercial Logbooks

2012 – Present

Commercial Sales Receipts

1983 – 2011

- Data reported by species*, gear and fishing center
- Limited discard data (2011-Present)
- Incompletely reported landings
- Correction/Expansion Factors (by coast since 2004)

- ❖ 1983-1989 Snapper Caution
 - only one line for specifying snapper species
 - uncertain how multiple snappers species would have been reported



PR – Recreational Fishery Statistics

MRFSS/MRIP

2000 – Present

Two Components:

1. On-site fisher survey

- ❖ Numbers of fish
 - landed and observed
 - reported killed
 - reported released alive
- ❖ Length and weight of obs. fish

2. Telephone survey

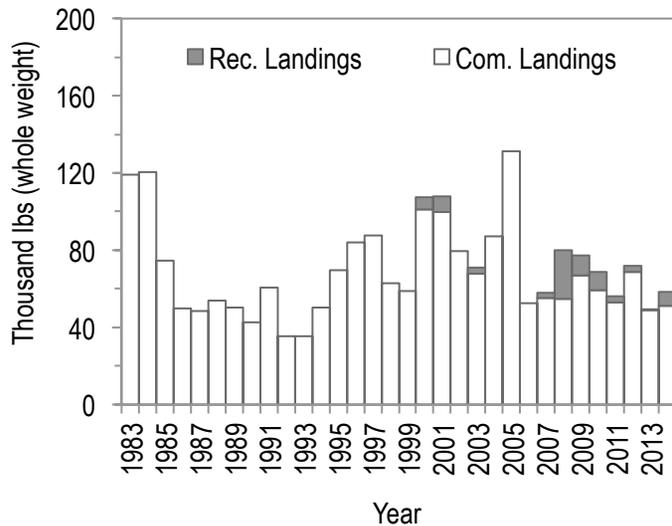
- ❖ Estimate of fishing effort (number of trips) used to expand catch estimates from intercept survey catch rate data.



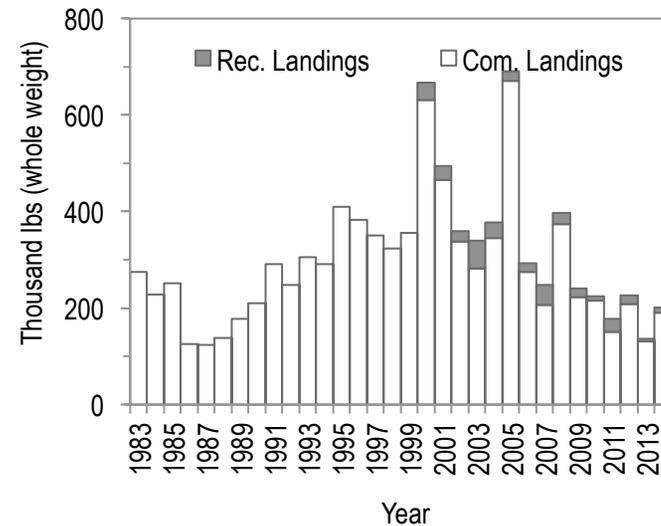
PR – Landings (all gears)



Hogfish – PR



Yellowtail Snapper – PR



STT – Commercial Fishery Statistics

Commercial Logbooks

1975 – Present

- Spiny lobster reported by species throughout time series
- Finfish initially reported by gear types (pot fish, spear fish, etc.) then as ‘Snapper/Grouper’ or ‘other finfish’
- Landings by species group started in 1997
 - ‘Triggerfish’ group considered all queen triggerfish (1998-2014)
- Species specific data began in 2011
 - Queen trig. >96% of annual triggerfish landings (2012-2014)
- Limited discard data since 2011



STT – Commercial Fishery Statistics

Commercial Logbooks

1975 – Present

- Spiny lobster reported by species throughout time series
- Finfish initially reported by gear types (pot fish, spear fish, etc.) then as ‘Snapper/Grouper’ or ‘other finfish’
- Landings by species group started in 1997
 - All ‘triggerfish’ landings considered queen triggerfish (1998-2014)
- Species specific data began in 2011
 - Queen Trig. >96% of annual triggerfish landings (2012-2014)
- Limited discard data since 2011

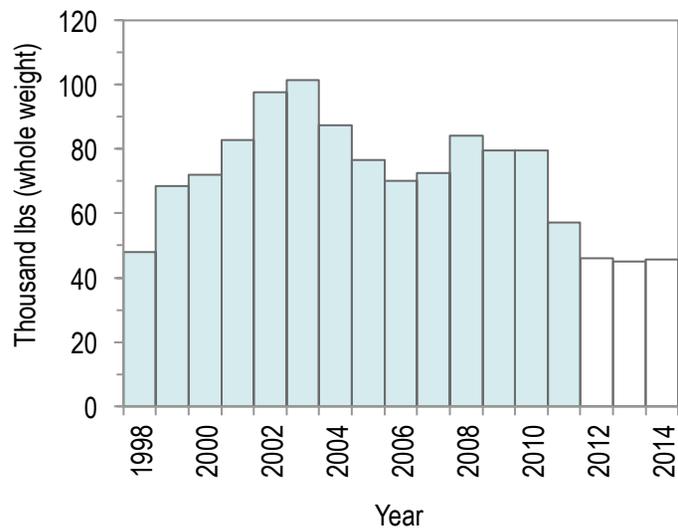
- ❖ 1998-1999 Triggerfish Caution
 - two forms in use
 - one form still reported landings by gear type
 - incomplete ‘triggerfish’ species group



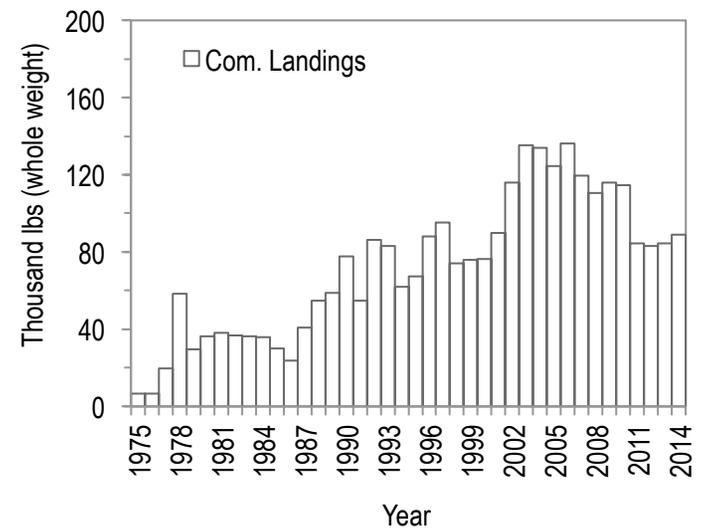
STT – Landings (all gears)



Queen Triggerfish* – STT



Spiny Lobster – STT



STX – Commercial Fishery Statistics

Commercial Logbooks

1976 – Present

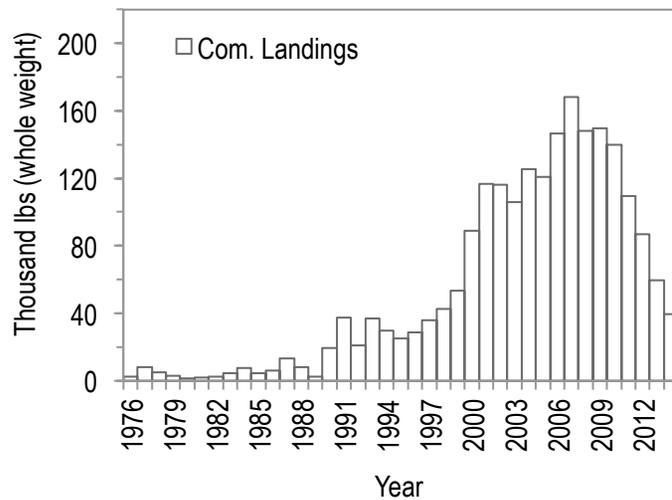
- Spiny lobster reported by species throughout time series
- Landings by species group started in 1996
 - 38% of 'parrotfish' considered stoplight parrotfish (1996 - 2011)
- Species specific data began in 2011
 - Stoplight ~38% of annual parrotfish landings (2012 - 2014)
- Limited discard data since 2011



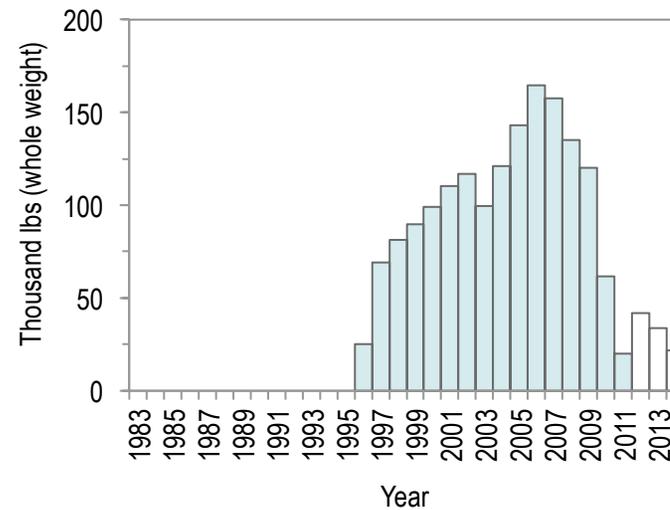
STX – Landings (all gears)



Spiny Lobster – STX



Stoplight Parrotfish* – STX



Measures of CPUE

- Fishery Dependent
Commercial Logbook Data
- Fishery Independent
SEAMAP - C



Commercial Logbook

Island	Gear	Species	Years	CPUE Units	Variables Explored
PR	Diving	Hogfish	1990-2014	Pounds/Hour	Year, Month, Coast
	Handline	Yellowtail Snapper			
STT	Trap	Spiny Lobsters	2000-2014	Pounds/Trap	Year, Month
		Triggerfishes			
STX	Diving	Spiny Lobsters	2000-2014	Pounds/Dive	Year, Month
		Stoplight Parrotfish	2012-2014		

- Standardized indices developed after DW/AW
- DW/AW Panel recommended using nominal's in current assessment
- DW/AW Panel recommended improvements to standardization methods



SEAMAP – C

Island	Gear	Species	Years	Variables Explored
PR (west)	Handline	Yellowtail Snapper	1991-1995, 1997-2001, 2004-2006, 2009-2010	Year, bottom, depth, closed area
PR (east)	Handline	Yellowtail Snapper	2009-2011	Year, depth
STT	Trap	Queen Triggerfish	1992-1994, 1999-2000	Year, depth

- Not recommended for SEDAR 46
- Characterized by low numbers of positive stations
- Larger number of survey stations needed



Fishing Effort

Commercial Logbook Program

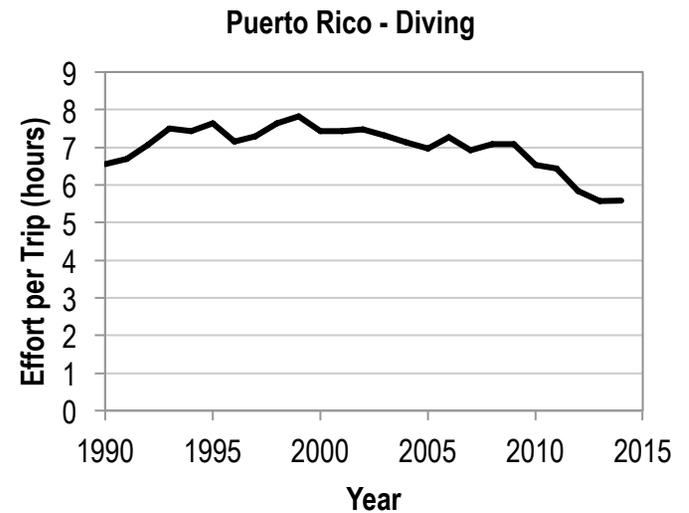
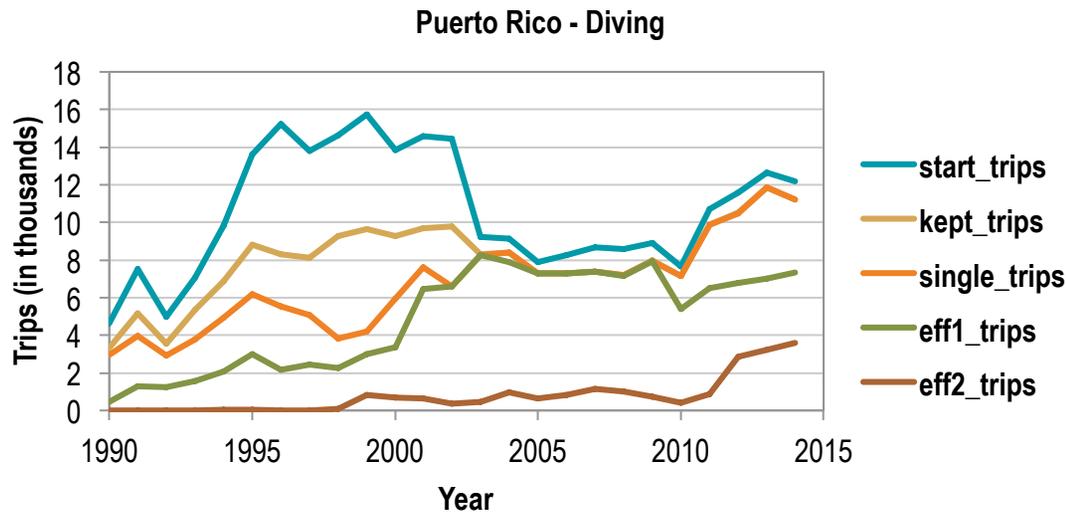
- Trends in total effort were estimated using the self-reported commercial logbook data
- Many logbook entries have incomplete effort information, especially for diving trips in PR
- The total reported logbook effort was adjusted to account for trips that did not report any effort data
- The units of reported effort were hours fished in Puerto Rico and number of gear in the US Virgin Islands



Fishing Effort

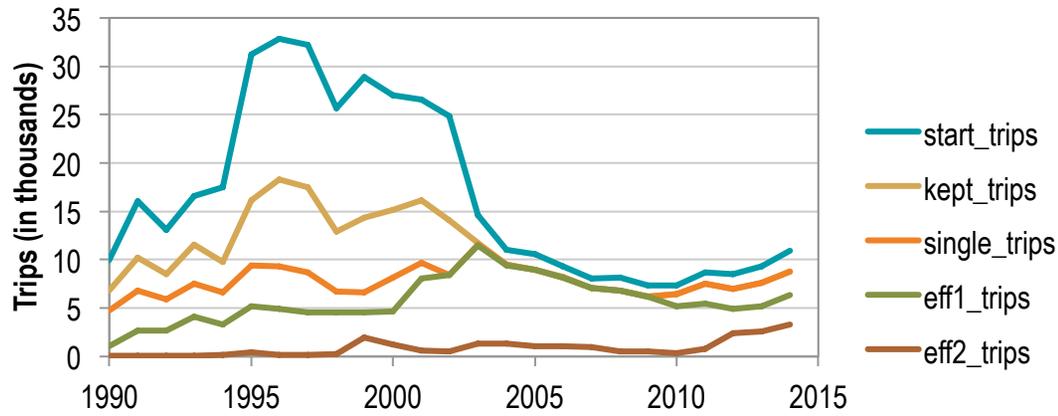
Annual adjusted effort =

$$\text{Annual kept trips} * \frac{\text{Total reported annual effort from kept trips}}{\text{Annual number of kept trips that reported effort}}$$

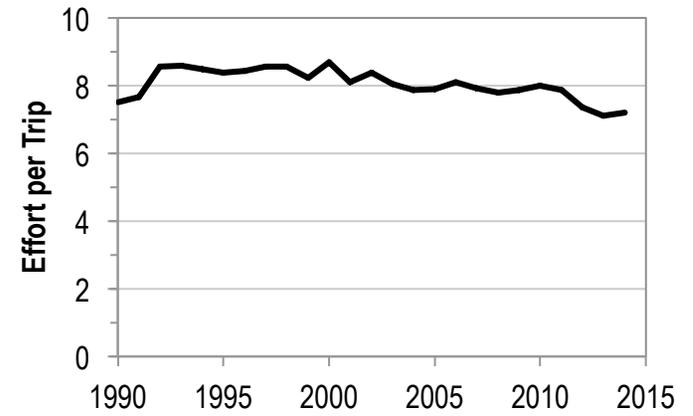


Fishing Effort

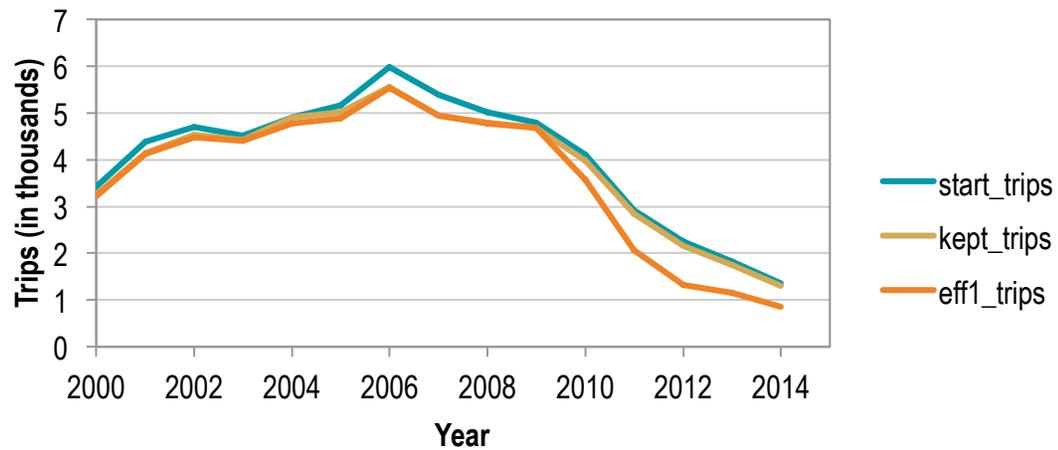
Puerto Rico - Handline



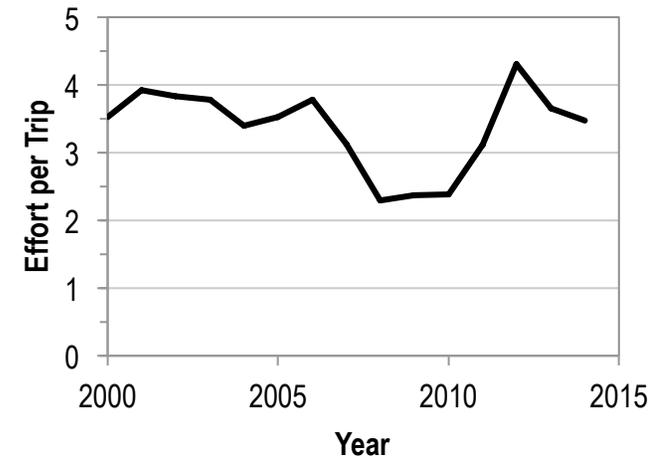
Puerto Rico - Handline



St. Croix - Diving

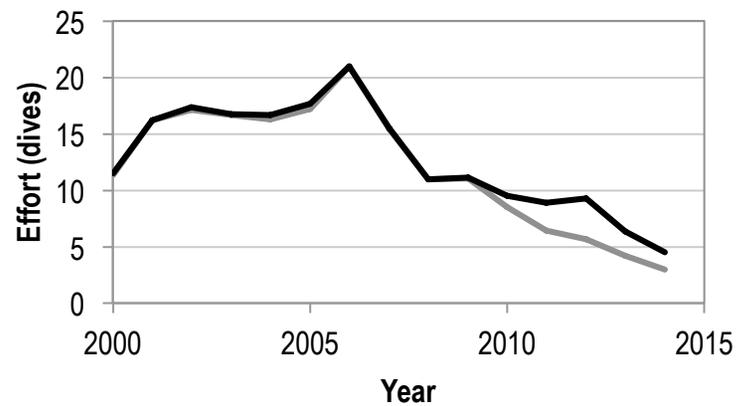
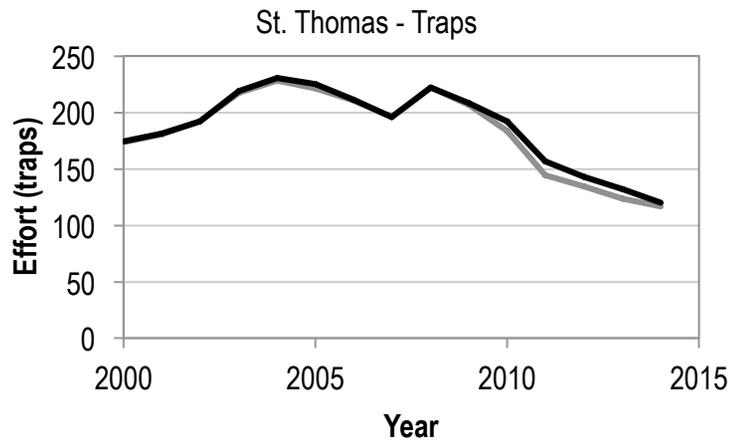
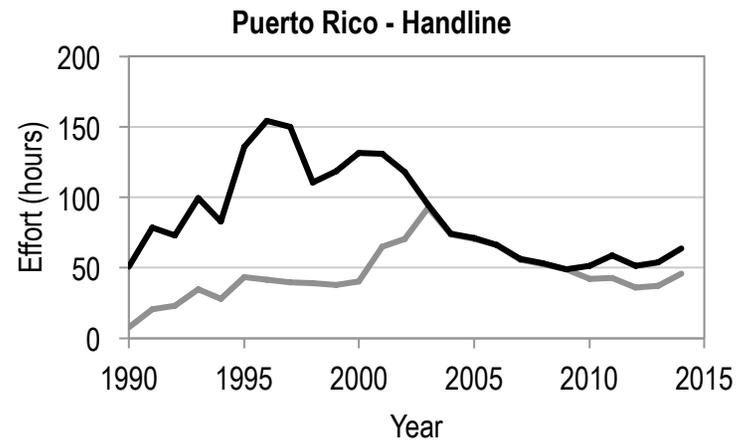
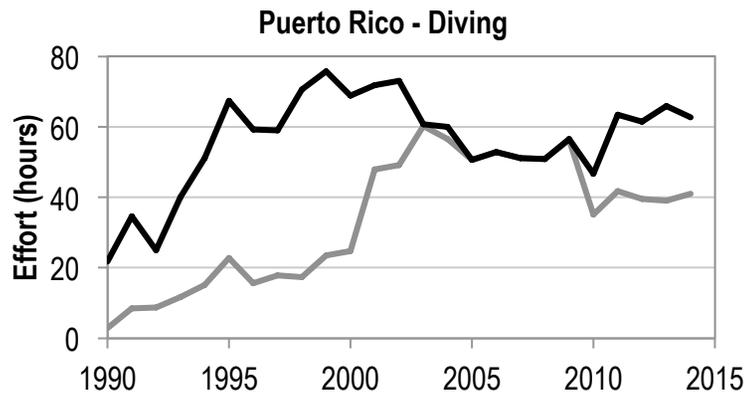


St. Croix - Diving



Fishing Effort

- Reported Effort
- Adjusted Effort



Length Frequency

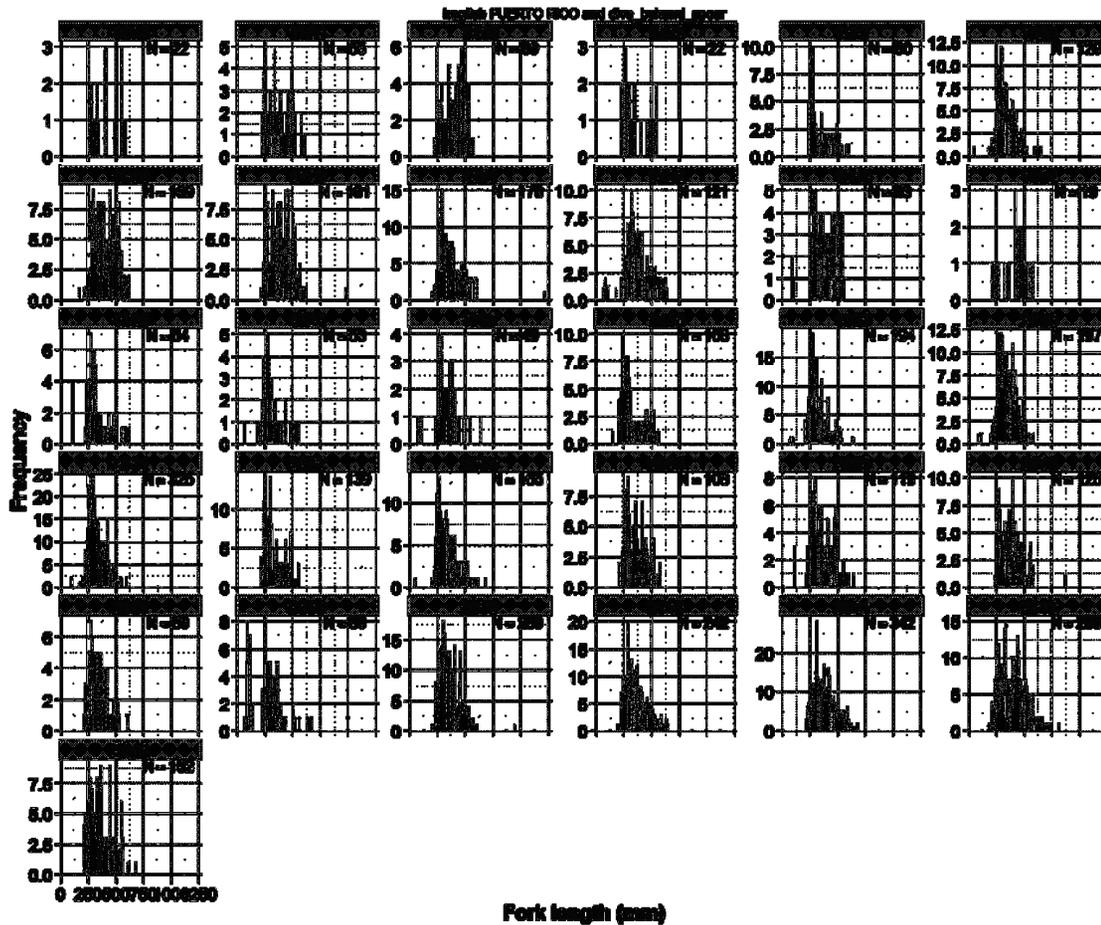
Trip Interview Program (TIP)

- Shore-based, fishery-dependent sampling program
- Supplemental to commercial logbook program
- Data collected by port samplers
 - **Length** and some weight information
 - Biological samples (occasionally)
 - Species composition of catch
 - Until 2011, this is the only species-specific information from the USVI
 - Fishing descriptors
 - Dates fished
 - **Gears fished**
 - Some area information (fished or landed)
 - Some depth information



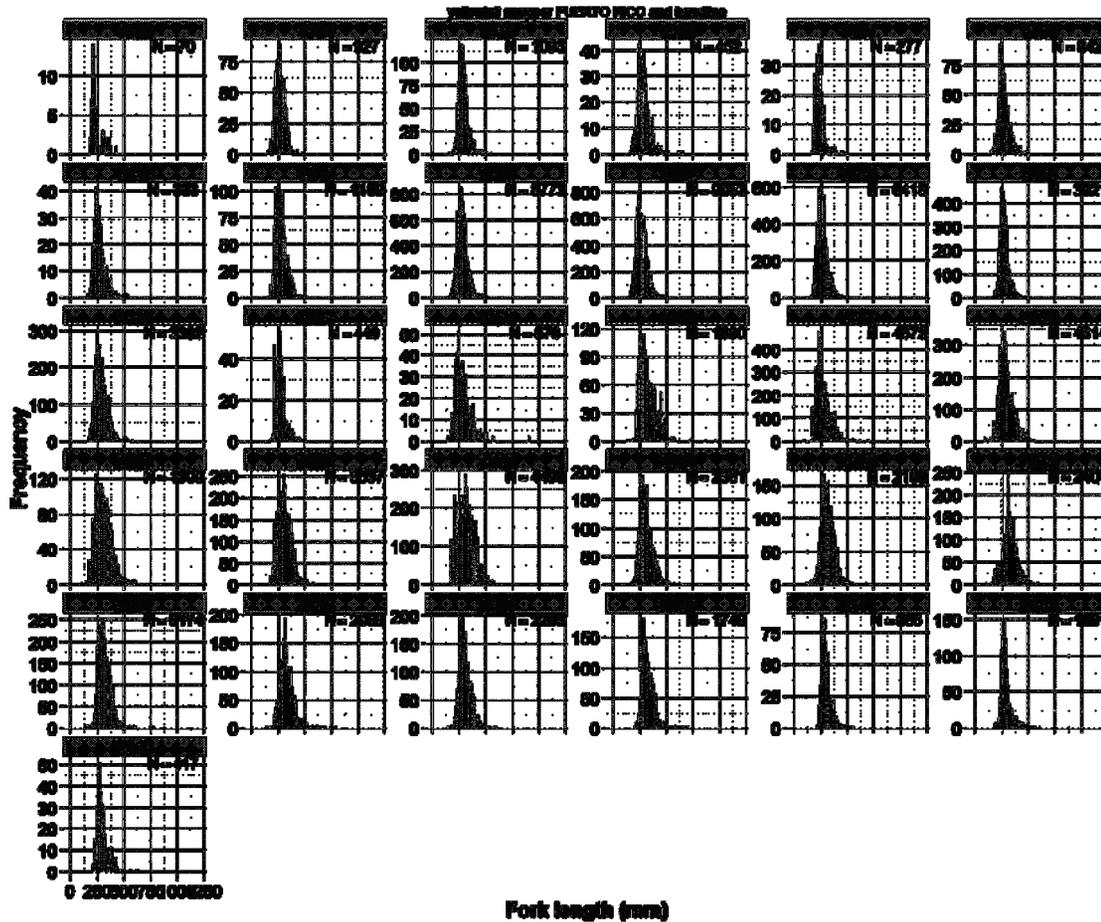
Length Frequency

Annual Length Composition Hogfish – PR – Diving

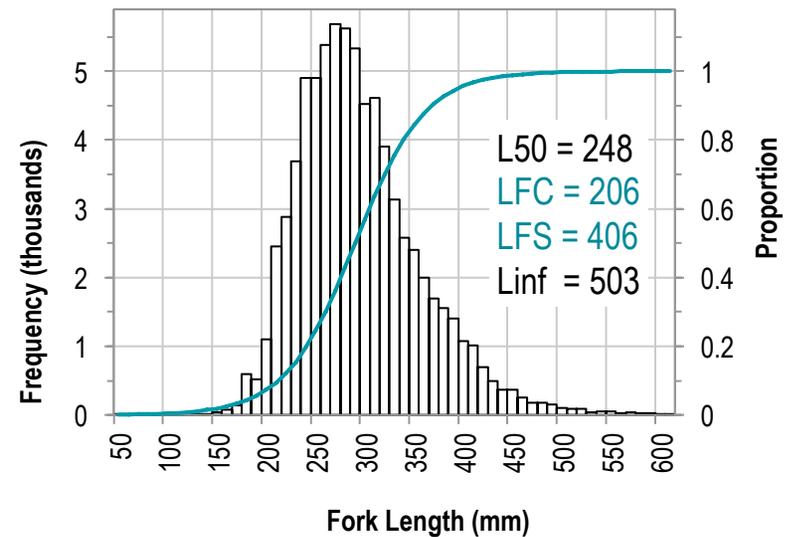


Length Frequency

Annual Length Composition Yellowtail Snapper – PR – Handline

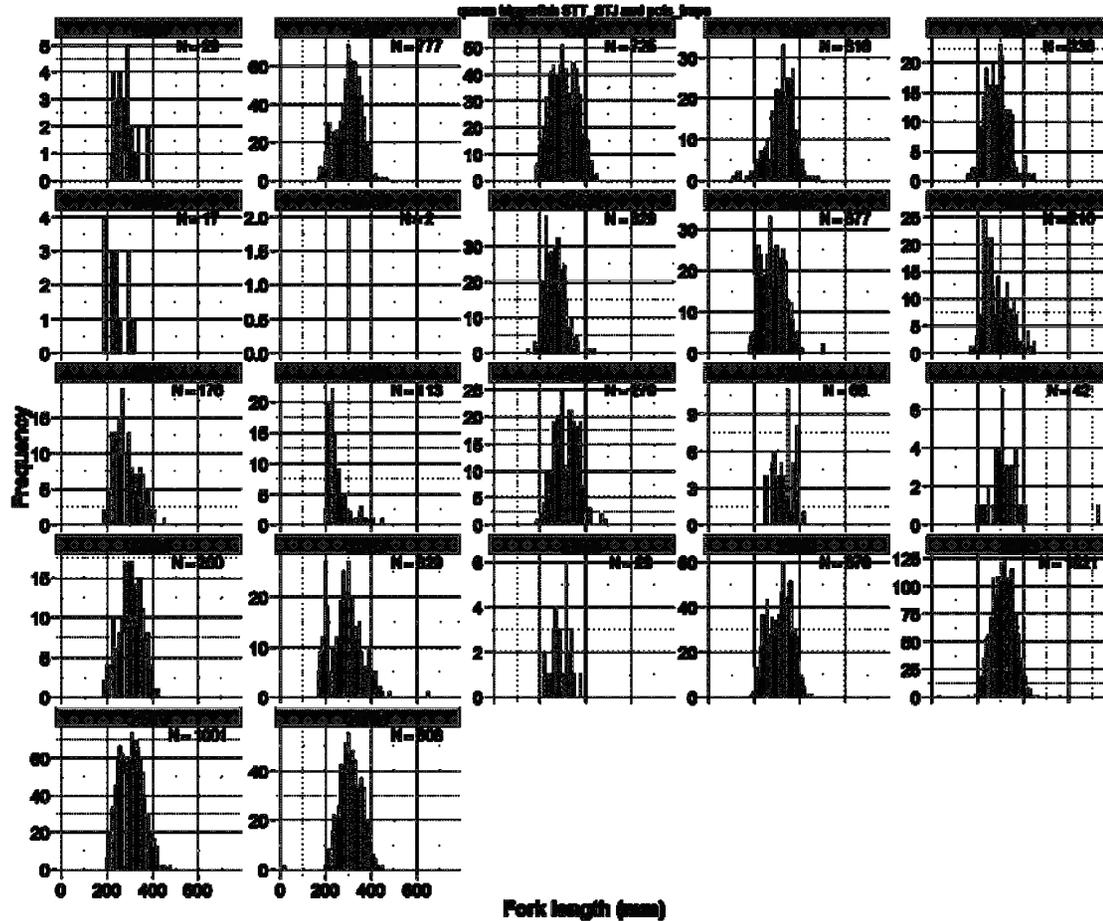


Logistic Fit to the Cumulative Length Composition

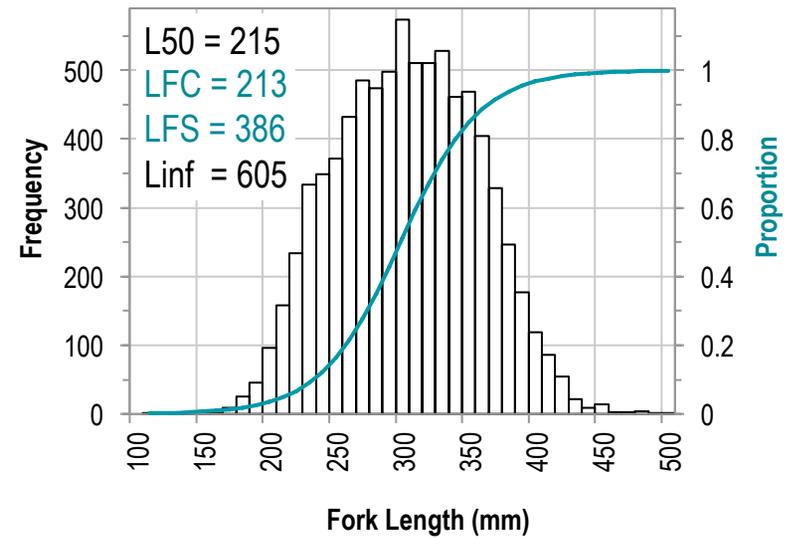


Length Frequency

Annual Length Composition Queen Triggerfish – STT – Traps

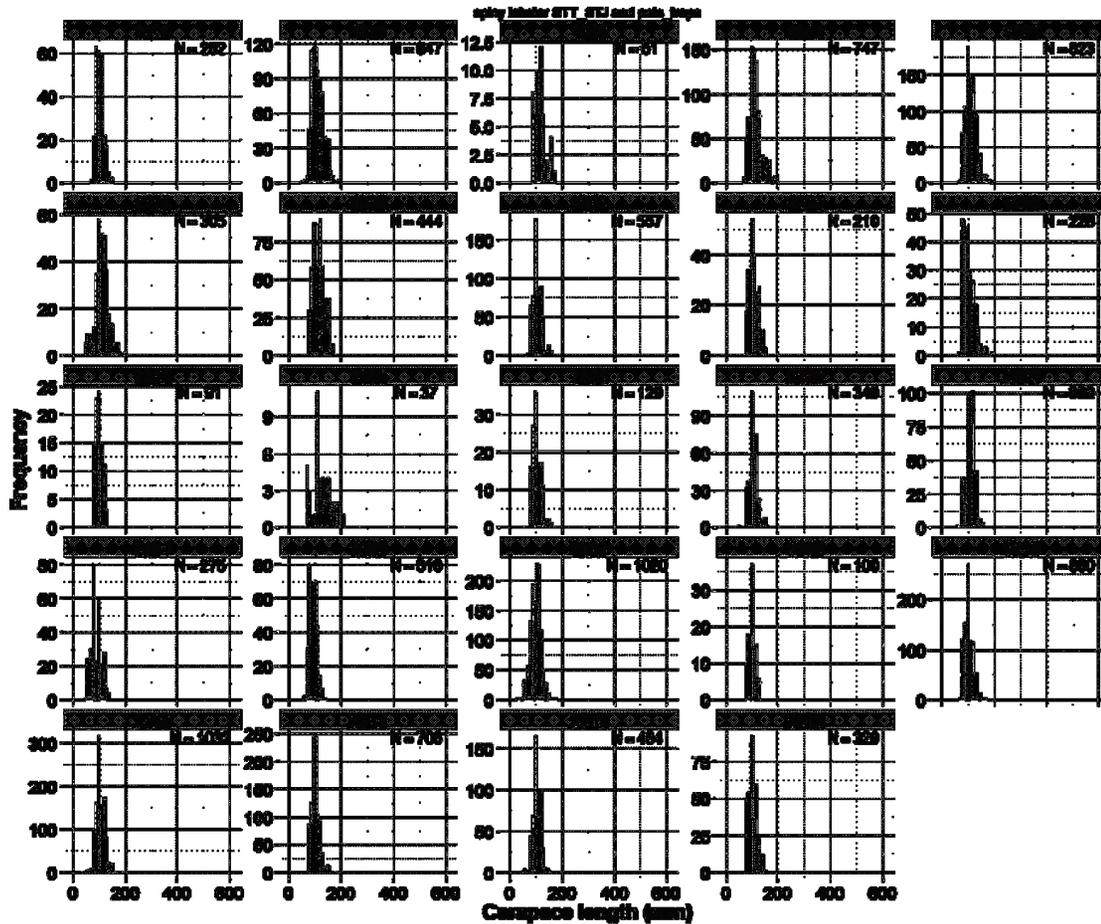


Logistic Fit to the Cumulative Length Composition

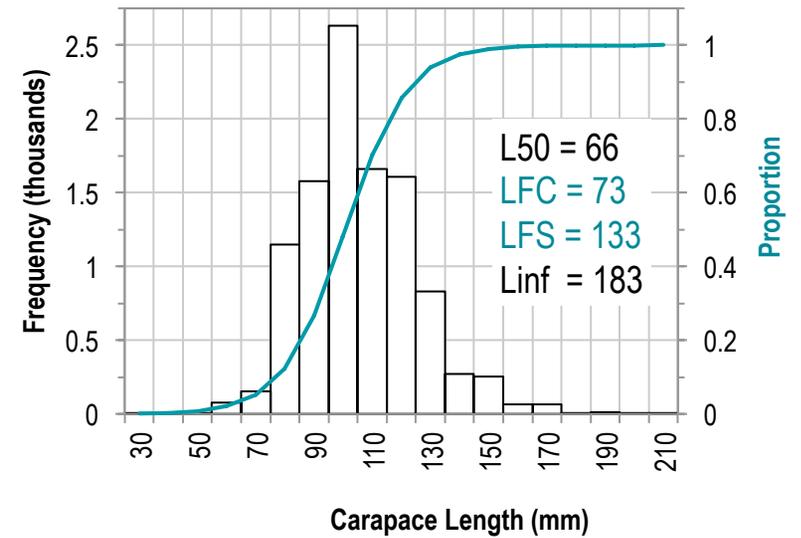


Length Frequency

Annual Length Composition Spiny Lobster – STT – Traps

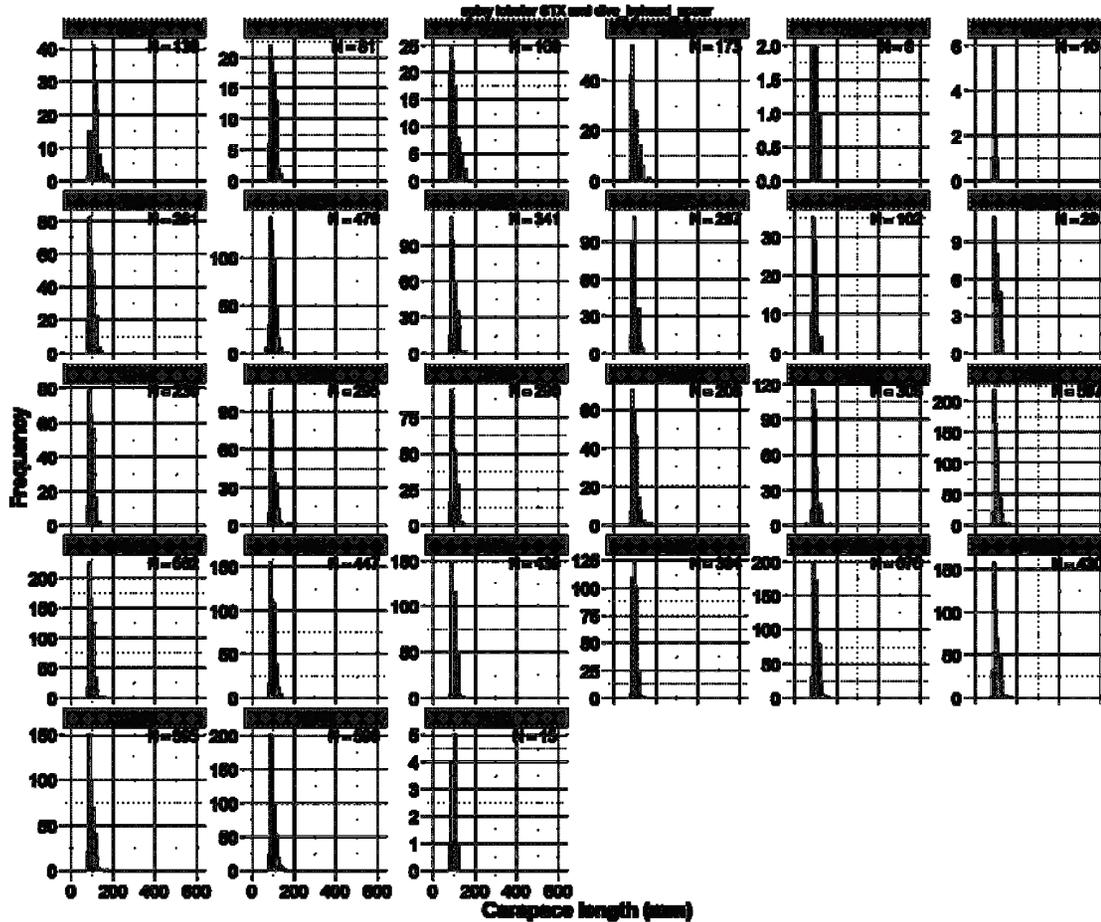


Logistic Fit to the Cumulative Length Composition

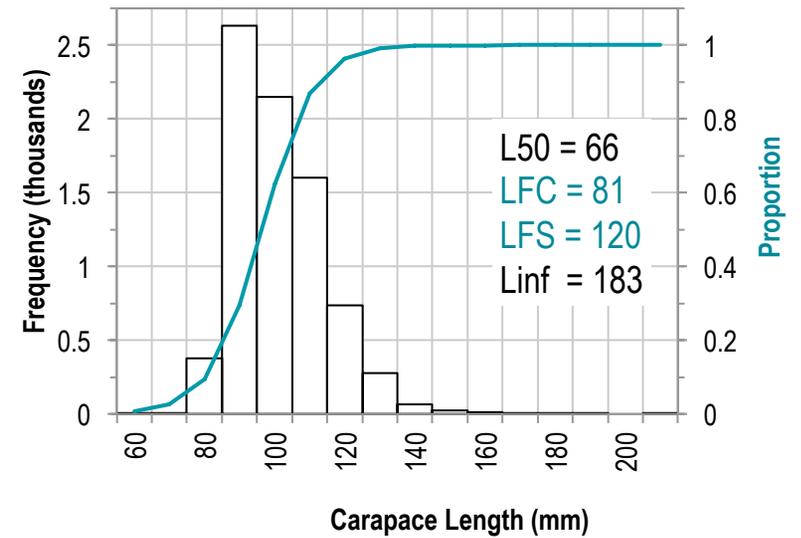


Length Frequency

Annual Length Composition Spiny Lobster – STX – Diving

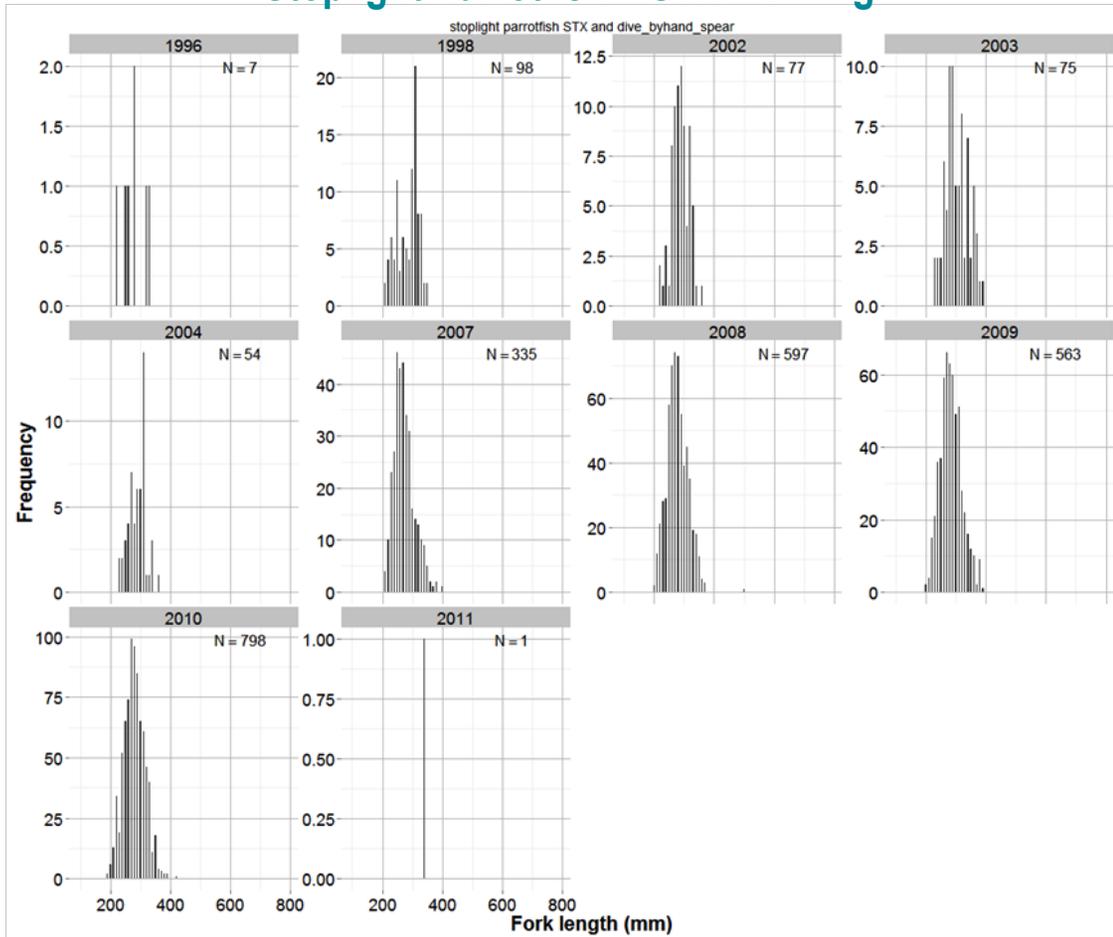


Logistic Fit to the Cumulative Length Composition

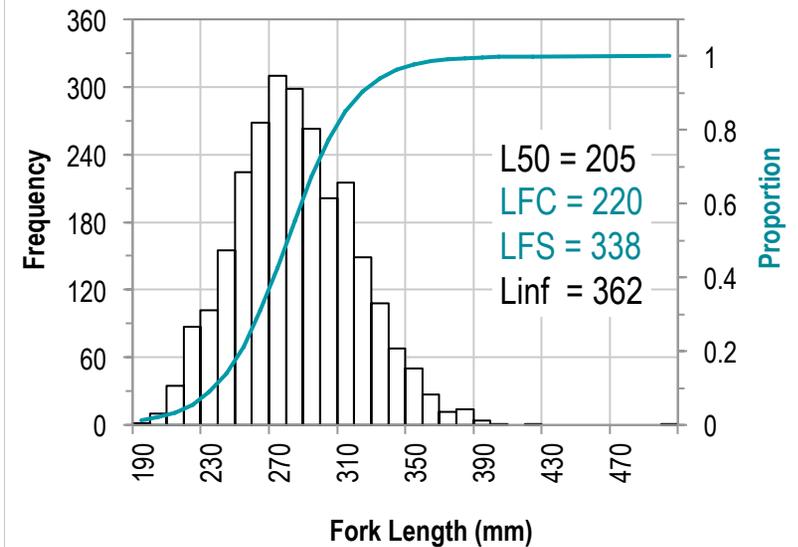


Length Frequency

Annual Length Composition Stoplight Parrotfish – STX – Diving



Logistic Fit to the Cumulative Length Composition



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Research Recommendations

Species Selection

- Consider additional datasets

- Integrate and comprehensively summarize data to facilitate future comparisons

Life History

- Update size/age studies and address sampling issues for under-sampled species

- Conduct sampling and analyses to obtain robust estimates of length at maturity

- Continue compiling demographic parameters across the region



Research Recommendations

Fishery Statistics

- Evaluate commercial landings expansion factors in PR
- Verify self-reported commercial landings in USVI
- Obtain species-specific commercial discard information
- Increase recreational sampling in PR and expand to USVI
- Evaluate 2014 MRFSS/MRIP changes in PR
- Include spiny lobster and queen conch in MRIP

CPUE

- Investigate additional variables to consider in index standardization
- Obtain compilation of state regulations
- Expand development of fishery-independent indices for use in assessments
- Evaluate gear groupings and clarify changes in gear reporting over time



Research Recommendations

Fishing Effort

- Investigate incomplete effort reporting

- Investigate caveats for species with more than one dominant fishery

- Investigate caveats for species with shifts in from one dominant fishery to another

Length Frequency

- Review representativeness

- Incorporate supplemental length information

- Evaluate gear groupings and clarify changes in gear reporting over time

- Address inconsistent time series of area assignments for St. Thomas and St. John



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TIP

