SEDAR 49 Assessment Data Review

SEDAR 49 Review Workshop

November 1, 2016

Southeast Fisheries Science Center,
Sustainable Fisheries Division,
Miami, FL

Skyler Sagarese, Jeff Isely, and Matthew Smith

Outline

- Terms of Reference (Data)
- Data requirements for SEDAR 49 approach
- Data review for SEDAR 49 species

Data Workshop Terms of Reference

1. Review ***stock structure*** and unit stock definitions
2. Review, discuss, and tabulate available ***life history*** information
3. Consider ***measures of population abundance*** that are appropriate for stock assessment
4. Provide ***estimates of harvest*** (in weight) from landings
5. Provide ***estimates of discards*** (in weight) from commercial discards, recreational discards, and other bycatch as appropriate
6. Provide ***length and/or age distributions*** for both landings and discards if feasible
7. In cooperation with stakeholders and fisheries experts, develop estimates of the central tendency and variability (CV) as feasible for: length at first capture and full selection, current stock depletion, and depletion over time
8. Prepare the Data Workshop Report

Overview of required data inputs

NOAA FISHERIES

Management strategy evaluation (MSE)

Catch recommendations (“real data”)

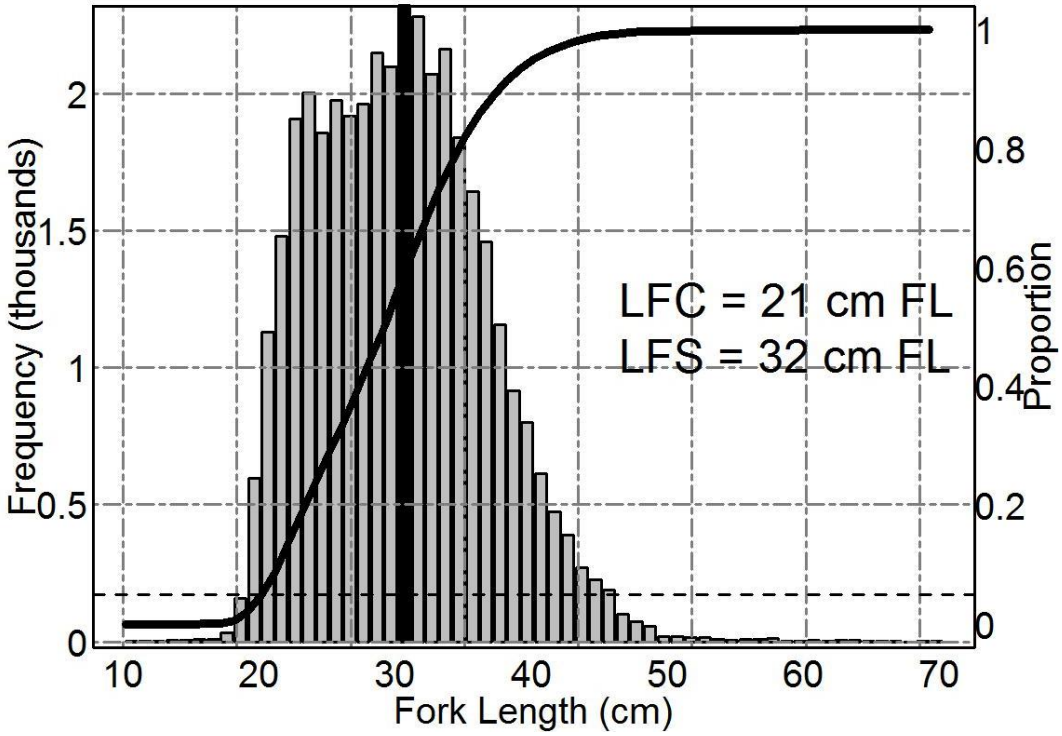
Life History (MSE & real data)

Life History inputs obtained from SEDAR 49 Data Workshop

Input	Definition	DLMtool	
		(1) MSE stock input range (lower bound, upper bound)	(2) Real world input (point estimate & CV)
Von Bertalanffy Growth	Asymptotic length	Linf	vbLinf
	Brody growth coefficient	K	vbK
	Theoretical age at length 0	t0	vbt0
Weight-length	Weight-length scalar	a	wla
	Weight-length power	b	wlb
Maturity	Length at 50% maturity	L50	L50
	Length at 95% maturity	L50_L95	NA
Maximum age	Maximum age	maxage	MaxAge
Natural mortality	Natural mortality	M	Mort
Steepness	Steepness of the spawner-recruitment curve	h	NA

Fleet selectivity* (MSE & real data)

- Derived from length composition of representative fishery
- Length at first capture (LFC)
- Length at full selectivity (LFS)

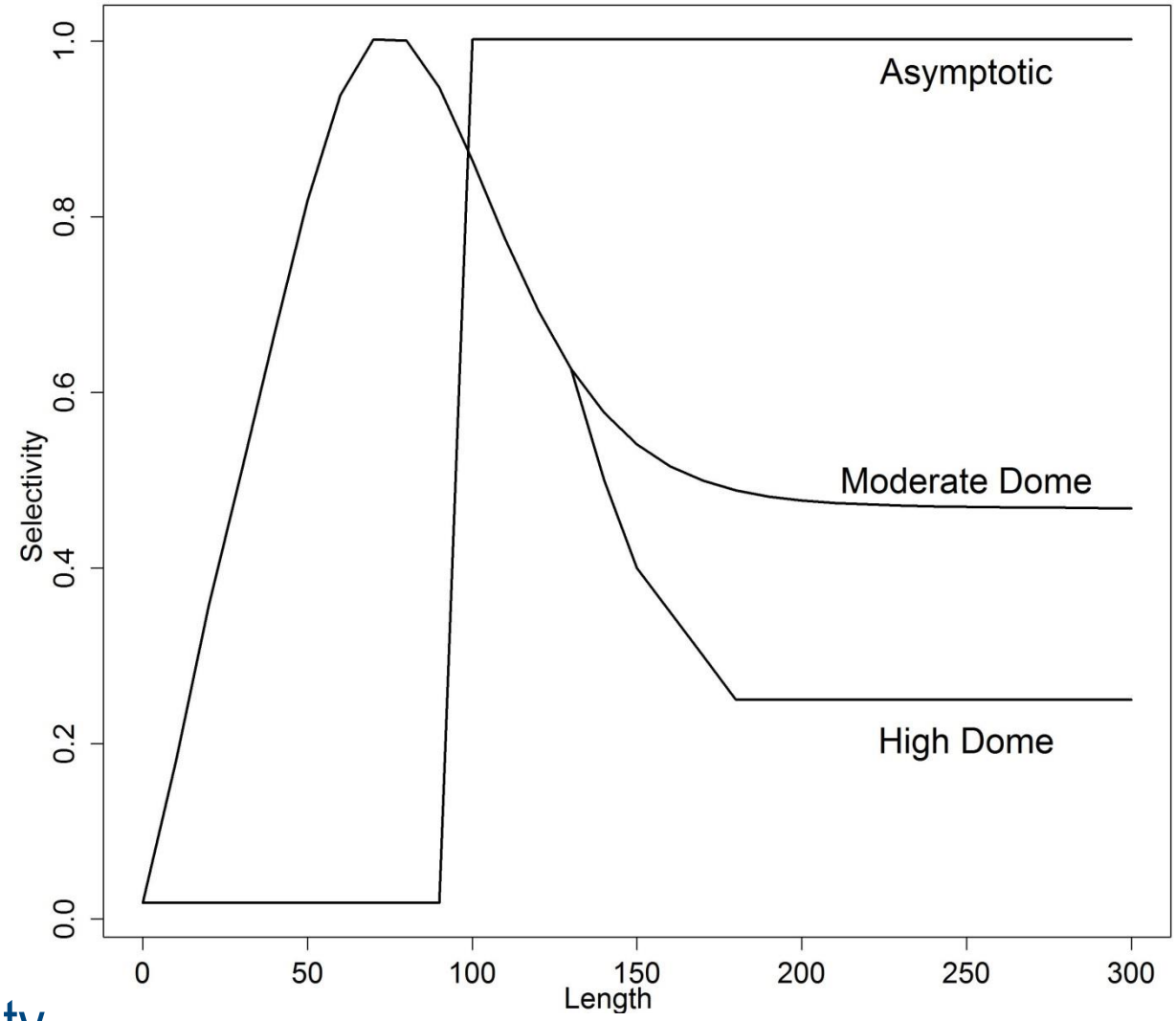


*Industry input critical in determining fleet selectivity

Fleet selectivity* (MSE only)

- Vulnerability of oldest age class
  - Controls extent of dome-shaped selectivity

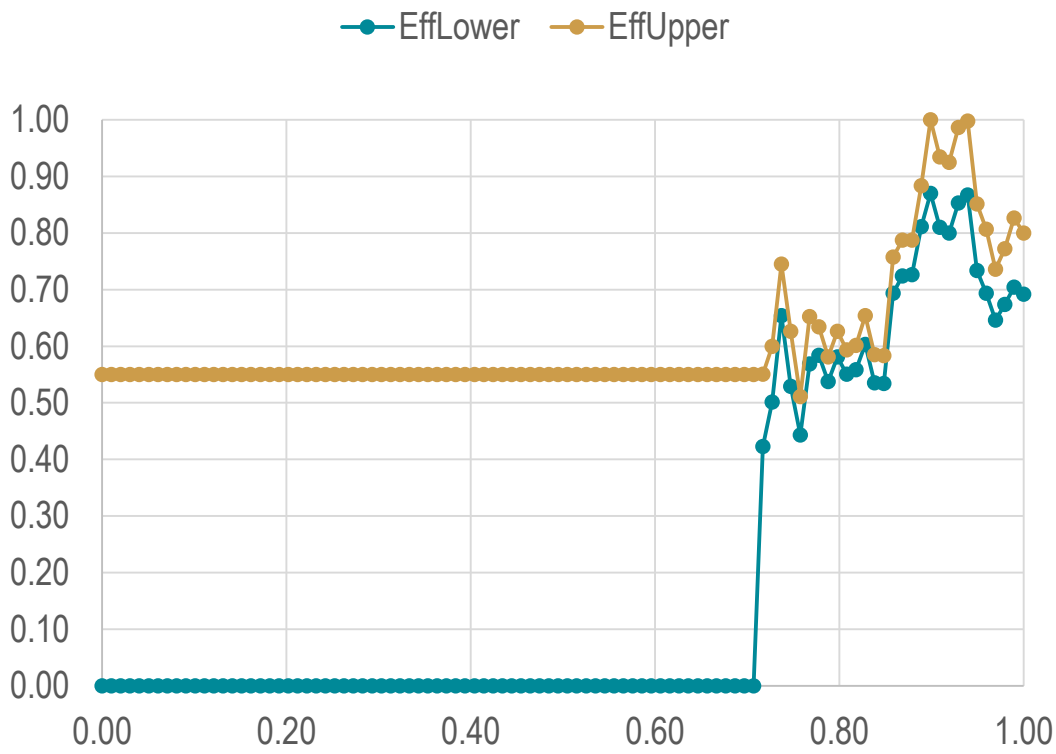
=1	Asymptotic
<1	Dome-shaped



*Industry input critical in determining fleet selectivity

Effort (MSE only)

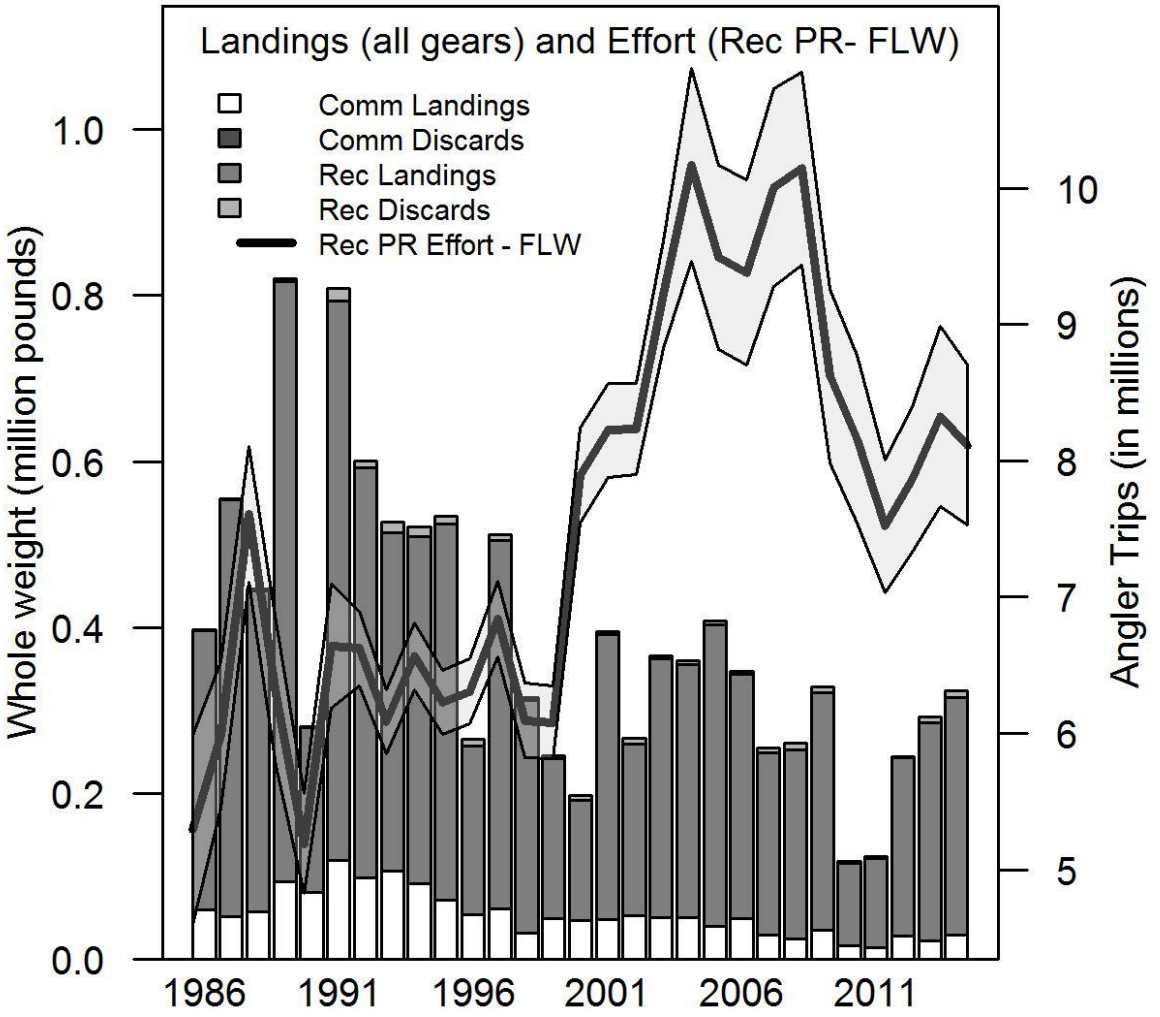
- Index of fishing effort
  - Upper and lower bounds
- Derived from most representative fleet discussed at Data Workshop



Example setup

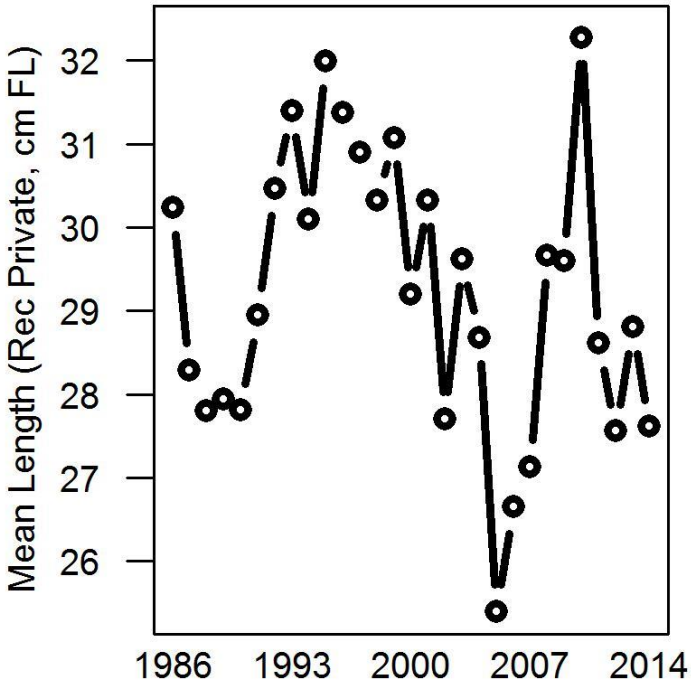
Catch (real data)

- Total removals
  - Landings
  - Dead discards
  - Dead bycatch
- Average catch
- CV (also used in MSE)



Length and age data (real data)

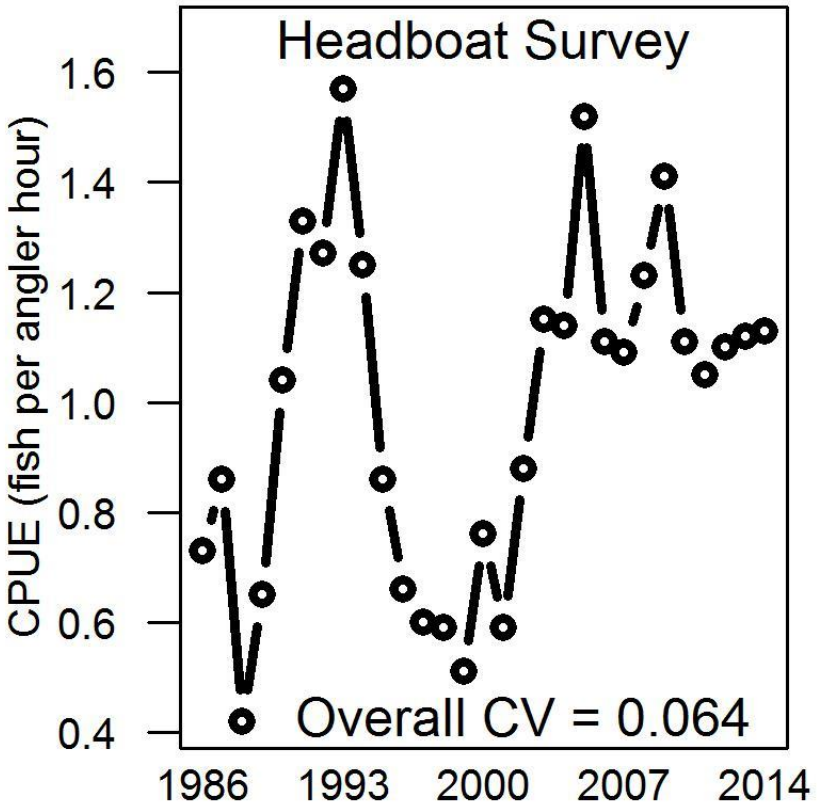
- Mean length over time
  - Considered representative of trend in resource
- Composition data
  - Length
  - Age



CAA	1	2	…	maxage
CAA 1983	200	150	80	40
CAA … terminal year	250	180	100	35

Index of abundance (real data)

- Considered most representative of trend in resource
- *Fishery-independent*
  - Preferred if available
- *Fishery-dependent*
  - Dominant fishery
    - Trend could be biased
- CV (also used in MSE)



Depletion (MSE & real data)

- Borrowed from similar species
- *Highly uncertain* estimate obtainable using ML2D function in DLMtool using:
- Operating model parameters
  - Maximum age
  - Natural mortality
  - Steepness
  - Growth (Linf, K, t0)
  - Length at full selection
  - Length at first capture
  - Selectivity
  - Length at maturity
  - Weight-length (a,b)
- Catch at size reduction analysis
  - Uses mean length of current catch to find depletion level and equilibrium F

Summary

From literature review and discussions at Data Workshop:

1. Assigned "species-like" stock, fleet, and observation (i.e., bias) dynamics ***in MSE***

2. Obtain point estimates and CVs for obtaining ***catch recommendations***

- Selected gear considered most representative for species under assessment
    - Indices of abundance
    - Fishing effort
    - Size composition

Data inputs for SEDAR 49

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Species selection

Brief review by species

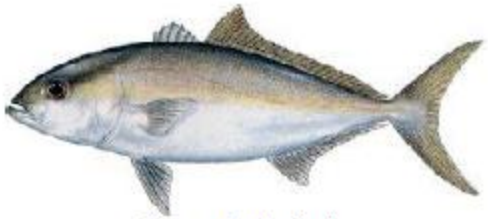
Issues to consider during assessment

Overall reliability of data types

SEDAR 49 species selection

- Eight species chosen by the GMFMC
  - Based on data availability & quality

Almaco Jack
Seriola rivoliana



Lesser Amberjack
Seriola fasciata
Image Credit: © Diane Rome Peebles

Snowy Grouper
Hyporthodus niveatus

Yellowmouth Grouper
Mycteroperca interstitialis
Photo by W Toller.

Lane Snapper
Lutjanus synagris
Photo by W Toller.

Red Drum
Sciaenops ocellatus
Image Credit: © Diane Rome Peebles

Speckled Hind
Epinephelus drummondhayi
Image Credit: © Duane Raver

Wenchman
Pristipomoides aquilonaris
Photo by W Toller.

SEDAR 49 Red Drum

- Considered data-limited due to:
  - Lack of commercial landings since moratorium in federal waters
  - Lack of recent life history studies (e.g., maturity)
  - Composition data for adults

Red Drum
Sciaenops ocellatus
Image Credit: © Diane Rome Peebles

- **Goal for SEDAR49**: Synoptic picture of Gulf-wide stock
  - For assessment inputs considered representative, will focus on offshore population (adults)

SEDAR 49 Red Drum

- **Outcome for SEDAR49**:
  - DLMtool will produce a Gulf–wide catch recommendation that will include state waters

Red Drum
Sciaenops ocellatus
Image Credit: © Diane Rome Peebles

  - For SEDAR49, total removals include removals from state and federal waters:
    - Given current data-limited setting (i.e., 8 species), data providers unable to separate landings from offshore/inshore locations

Red Drum

Red Drum
Sciaenops ocellatus
Image Credit: © Diane Rome Peebles

- **Life history**:
  - Maximum age: Wilson and Nieland (2000)
  - M: Updated Hoenig (Then et al. 2014)
  - Maturity: Wilson and Nieland (1994)
  - Growth and meristics: Re-estimated using the comprehensive data sets provided at SEDAR49 (n = > 8,000 otoliths)
  - Steepness: Based on range of values in other red drum assessments
    - SEDAR, FWC (see SEDAR49-DW05 for specifics)

Red Drum

Red Drum
Sciaenops ocellatus
Image Credit: © Diane Rome Peebles

- **Total removals (1981-2014) (landings + dead discards):**

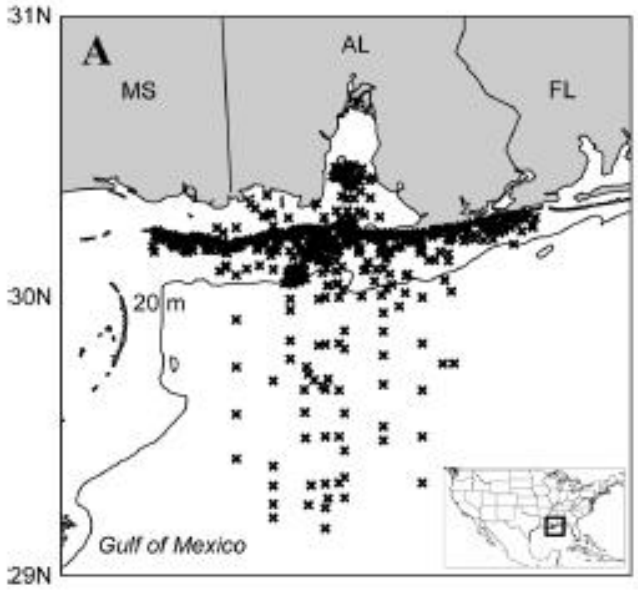
Commercial		Recreational		Total Removals
Landings	Dead discards	Landings	Dead discards	
6.02%	--	**82.77%**	11.21%	100.00%

  - Primarily inshore since federal closure in 1987
  - Landings in state waters included in SEDAR49
    - No catch in federal waters (will result in no catch levels)
- **Representative fleet/fishery**: Recreational private (1981-2014)

Red Drum

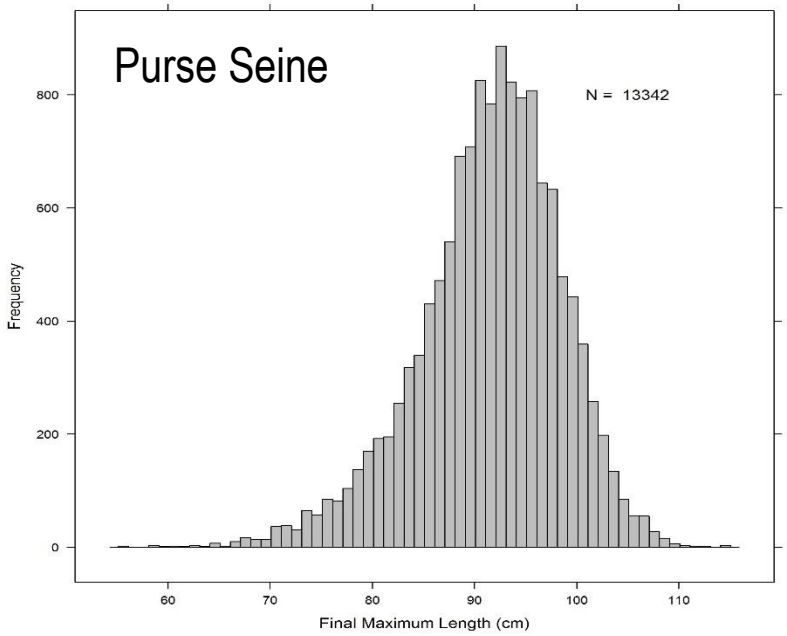
- **Index of abundance**:
- Dauphin Island Sea Laboratory bottom longline survey (2006-2014)
- **Available length data**:
  1. FI purse seine
  2. FI BLL (sensitivity)
  3. Overall FD length composition weighted by landings
- **Available age data**:
  1. FI purse seine
  2. FI BLL (sensitivity)

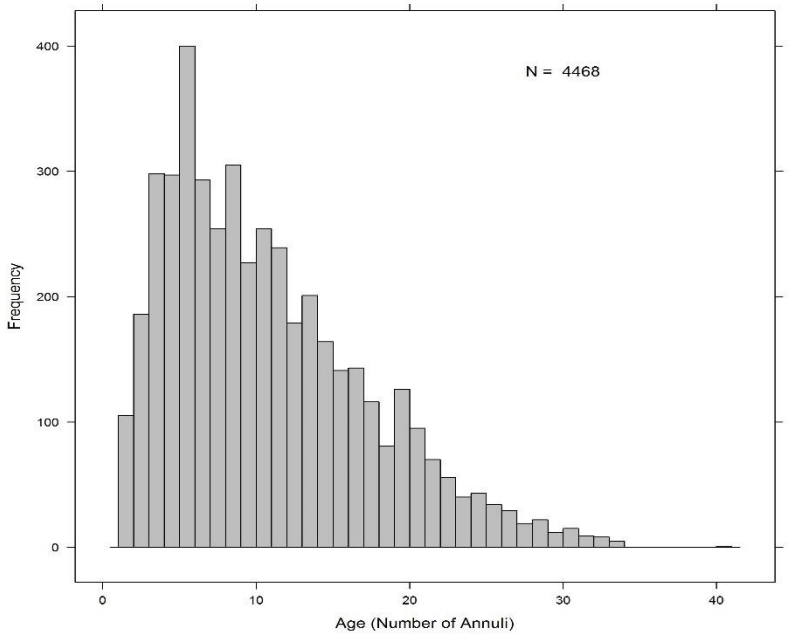
Red Drum
Sciaenops ocellatus
Image Credit: © Diane Rome Peebles

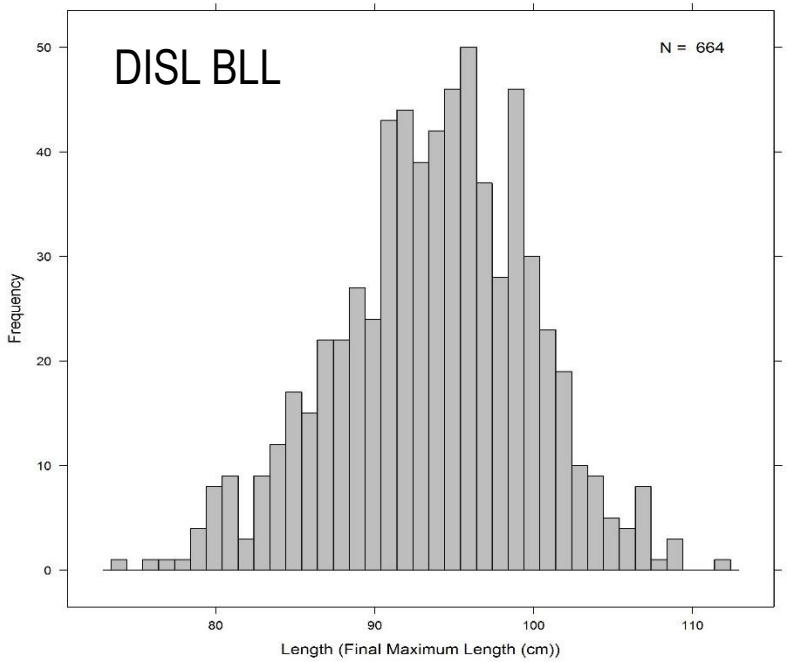


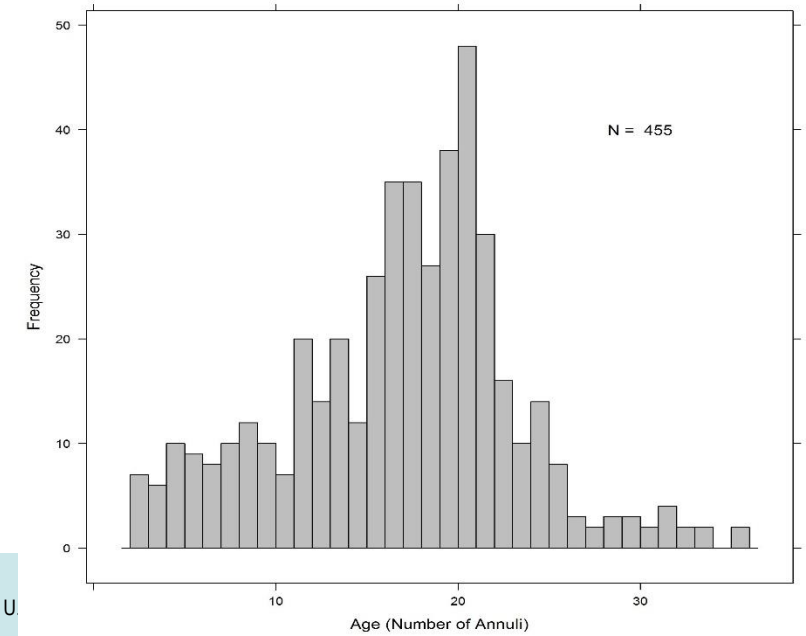
Sampling areas for DISL BLL survey (Powers et al. 2012); also see Hightower et al. (2016)

Red Drum


Purse Seine
N = 13342
Frequency
Final Maximum Length (cm)


N = 4468
Frequency
Age (Number of Annuli)


DISL BLL
N = 664
Frequency
Length (Final Maximum Length (cm))


N = 455
Frequency
Age (Number of Annuli)

Issues to consider: Red Drum

Red Drum
Sciaenops ocellatus
Image Credit: © Diane Rome Peebles

1. Recent life history studies lacking

2. Representative fleet (recreational private)
   - Selectivity of fleet in MSE will need to account for slot limits

3. Spatial/temporal limitations in composition data

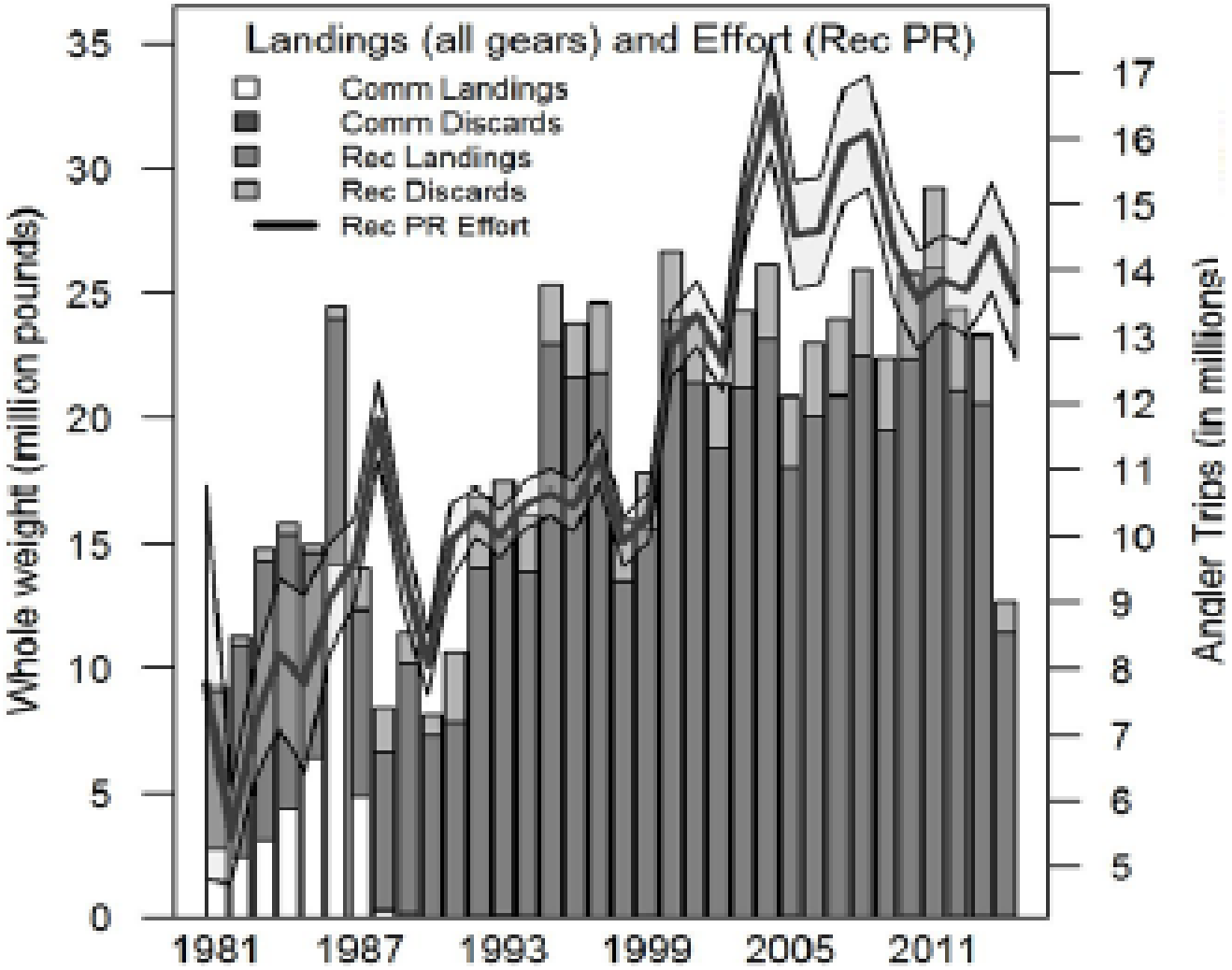
4. Modeling limitations: Von Bertalanffy growth in DLMtool
   - Not accounting for sex-specific or regional differences
   - 5-parameter Von Bertalanffy growth curve not currently implemented due to time limitations

Red Drum

Total removals

- Landings
- Discards

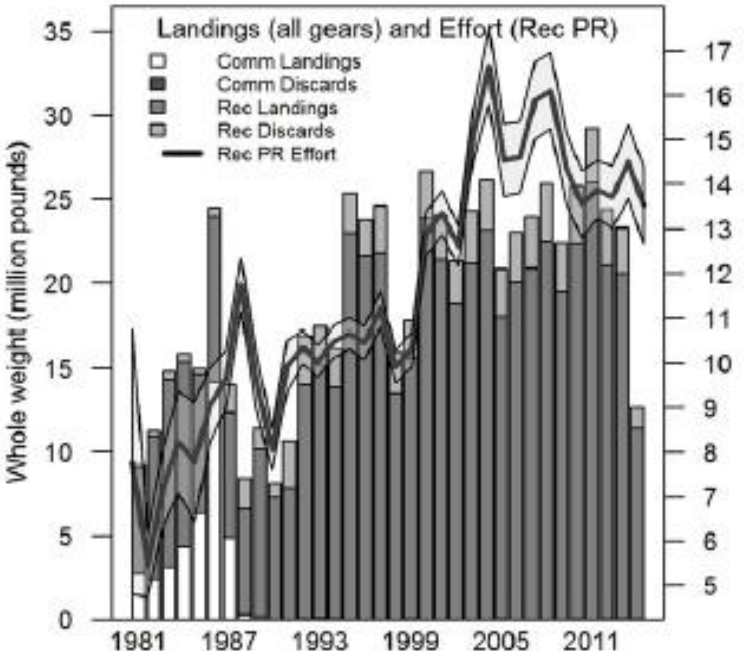
Effort

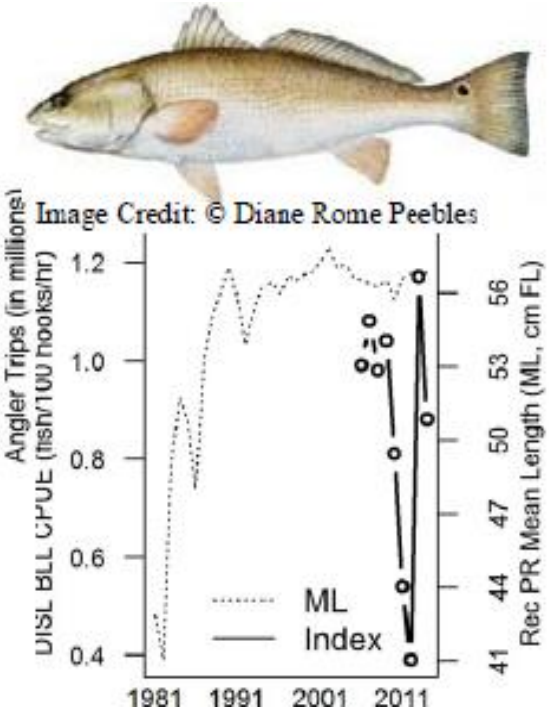


Red Drum

Index of abundance

Index of mean length



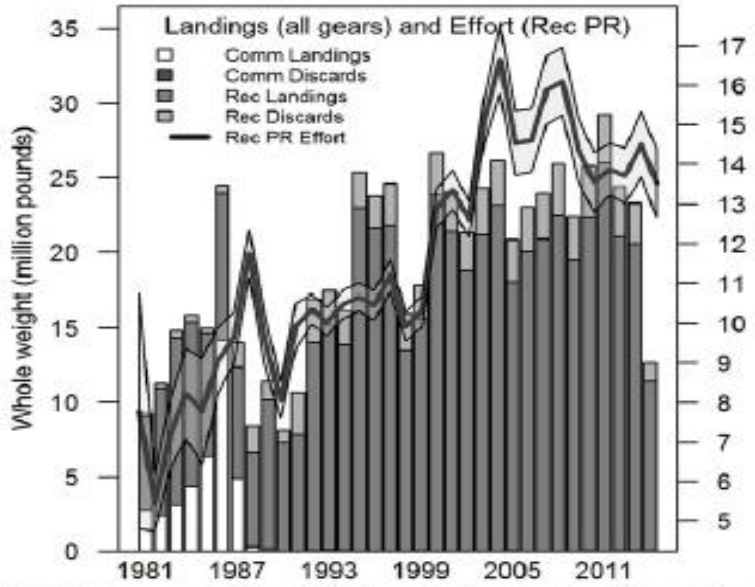


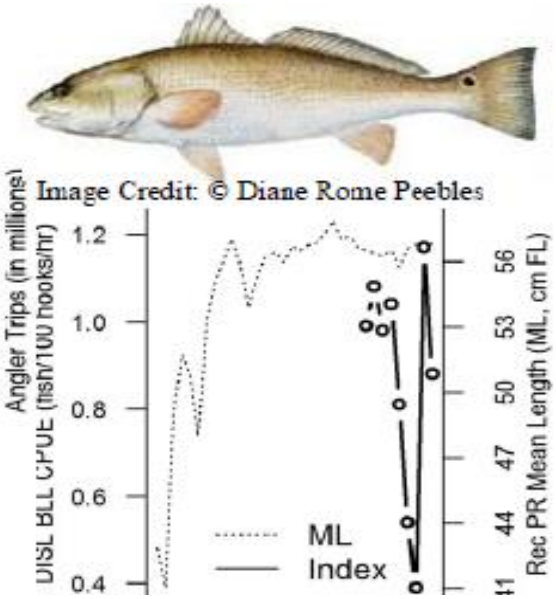
Red Drum

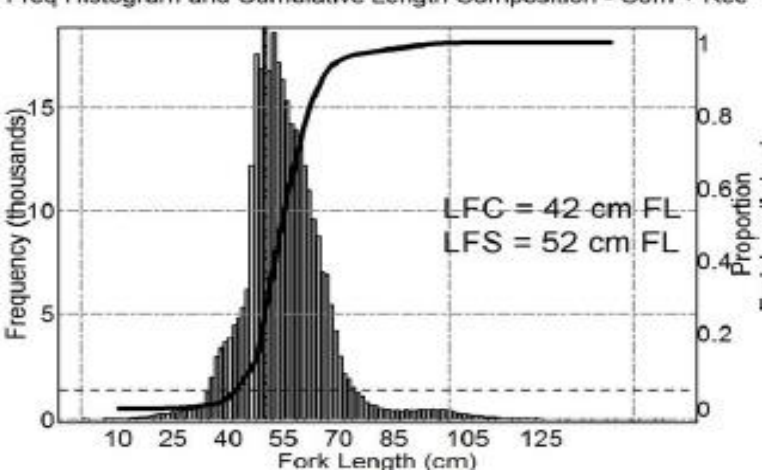
Length composition

Selectivity

- Length at first capture
- Length at full selection







Red Drum

Age and growth

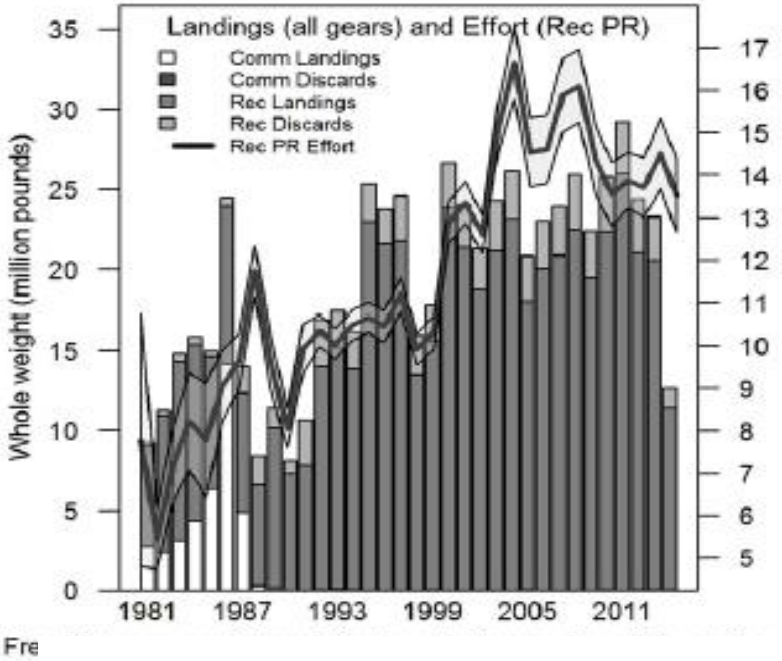
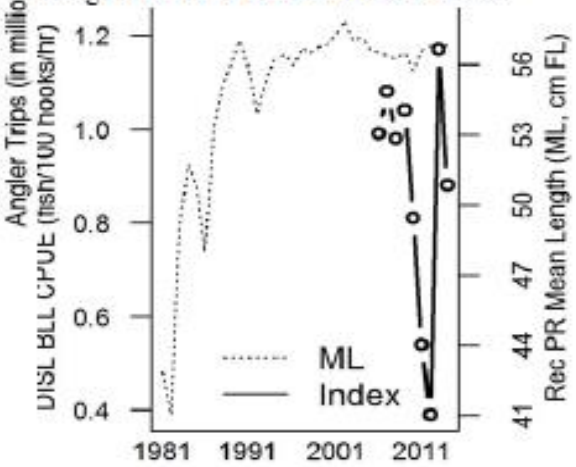
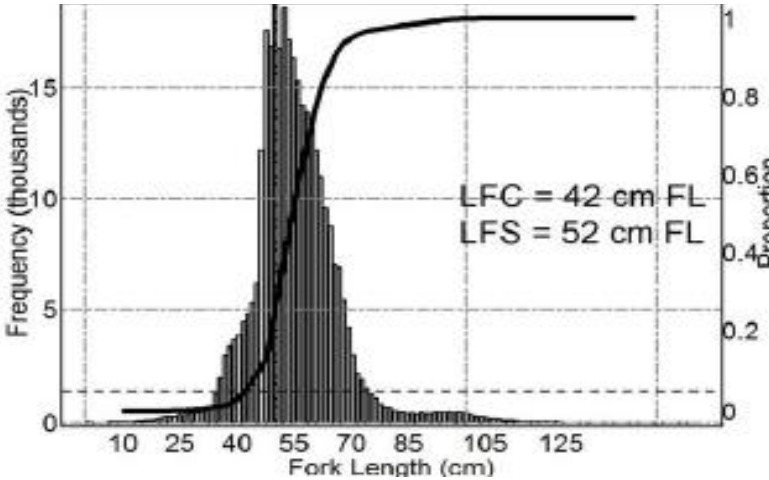
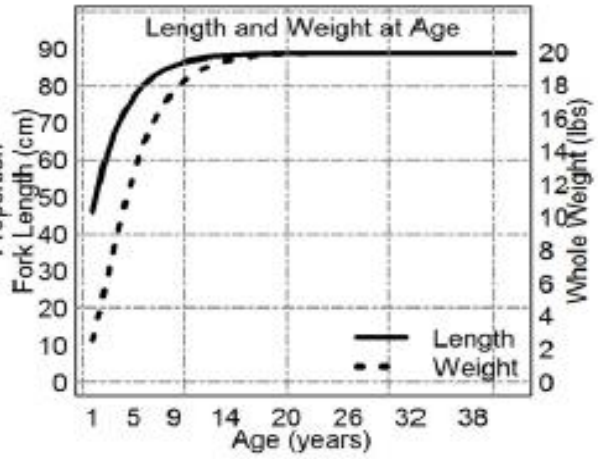


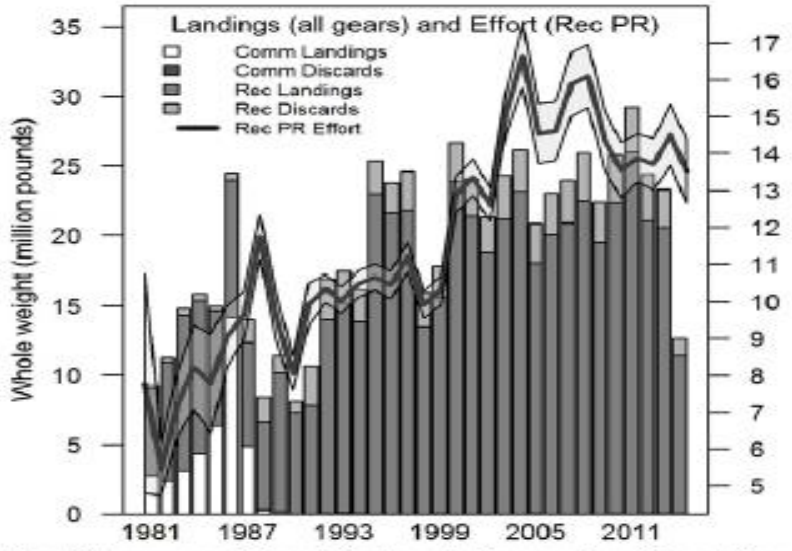
Image Credit: © Diane Rome Peebles







Red Drum



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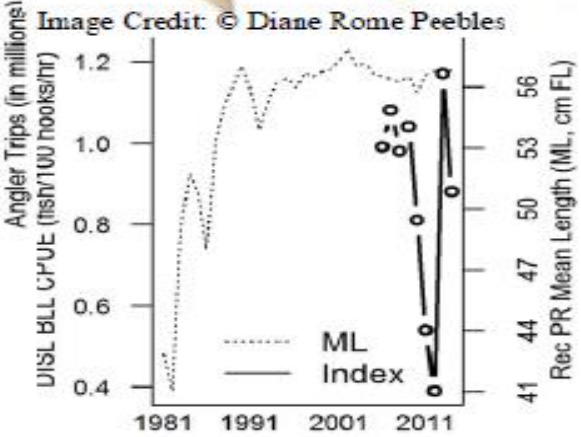
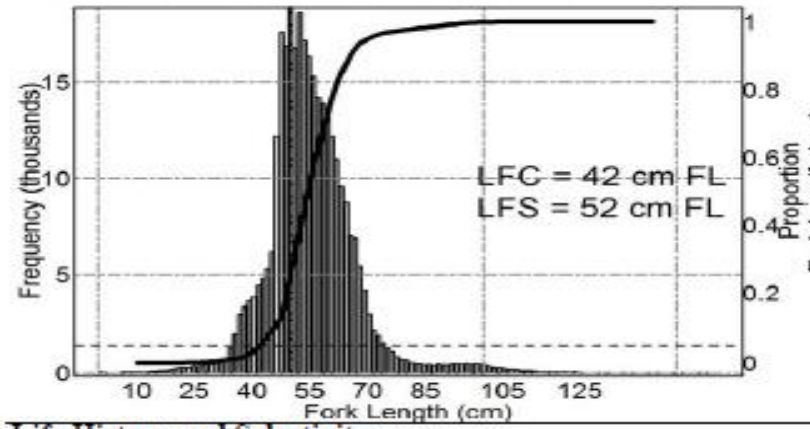
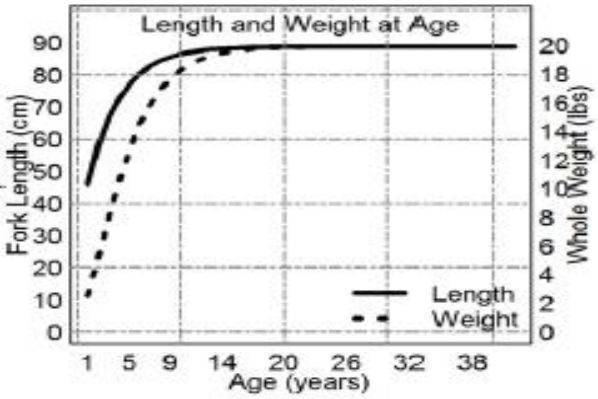






Parameter Review

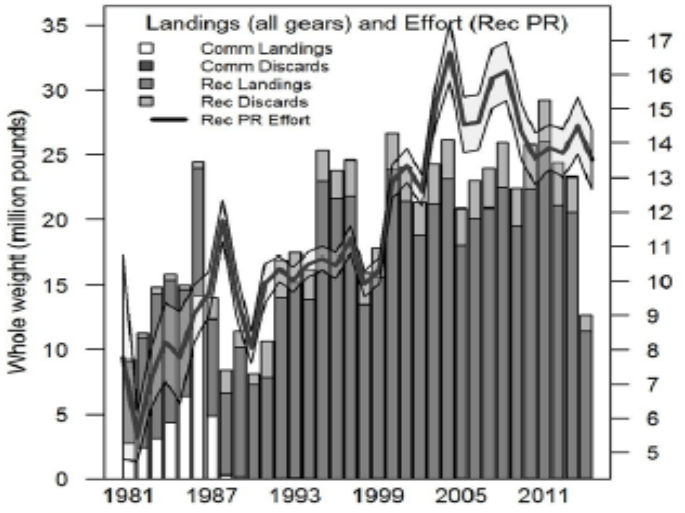
Life History and Selectivity

	MaxAge Maximum Age	vbLinf Asympt-otic Len.	vbK Growth Coeff.	vbt0 Age at Len. 0	wla Wt-Len scalar	wlb Wt-Len power	L50 Len. at Matur.	L95 Len. at Full Matur.	Mort Natural Mortality	LFC Len. 1st Capture	LFS Len. Full Selection
Parameter	42	88.1	0.32	-1.29	1.43E-05	3.15	68	81	0.16	42	52
CV	--	(0.001)	(0.01)	(0.03)	(0.08)	(0.01)	(0.3)	(0.3)	(0.32)	(0.5)	(0.5)
Units	y	cm FL	y^{-1}	y	cm-lbs	cm-lbs	cm FL	cm FL	y^{-1}	cm FL	cm FL

Red Drum

Red Drum (*Sciaenops ocellatus*)

Representative Fleet: Recreational Private (Rec PR)



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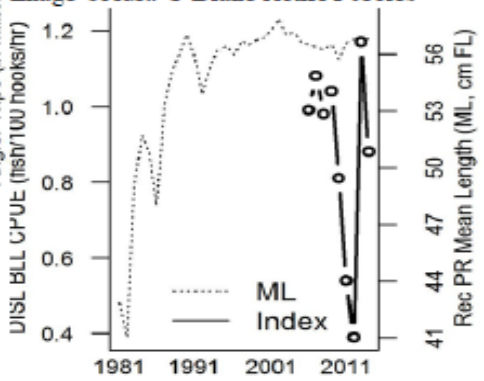
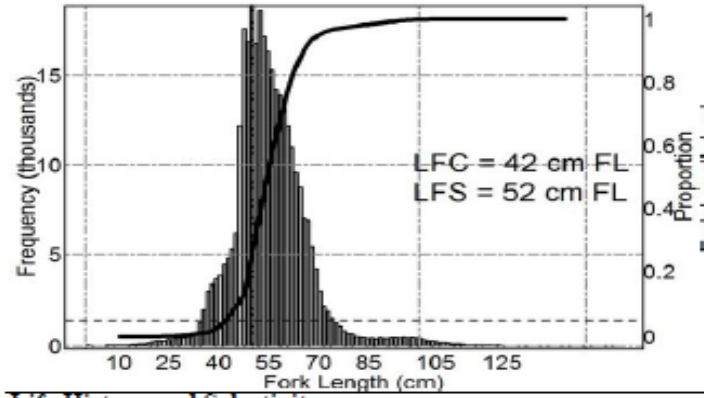
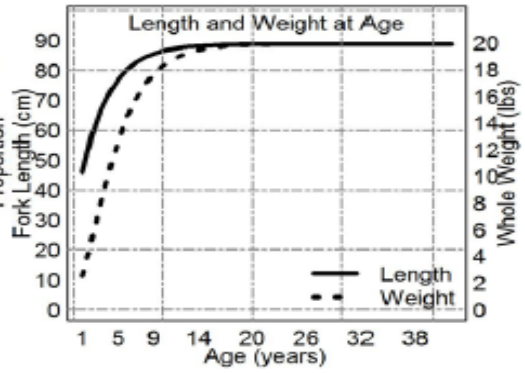


Freq Histogram and Cumulative Length Composition - Com + Rec





Life History and Selectivity

	MaxAge	vbLinf	vbK	vbt0	wla	wlb	L50	L95	Mort	LFC	LFS
	Maximum Age	Asympt-otic Len.	Growth Coeff.	Age at Len. 0	Wt-Len scalar	Wt-Len power	Len. at Matur.	Len. at Full Matur.	Natural Mortality	Len. 1st Capture	Len. Full Selection
Parameter	42	88.1	0.32	-1.29	1.43E-05	3.15	68	81	0.16	42	52
CV	--	(0.001)	(0.01)	(0.03)	(0.08)	(0.01)	(0.3)	(0.3)	(0.32)	(0.5)	(0.5)
Units	y	cm FL	y^{-1}	y	cm-lbs	cm-lbs	cm FL	cm FL	y^{-1}	cm FL	cm FL

Relevant federal regulations

http://sero.nmfs.noaa.gov/sustainable_fisheries/policy_branch/

	Start Date	*End Date*
Bag limit (Comm 0 per person/day, Rec 1 per person/day)	19 Dec 1986	15 Oct 1987
Bag limit (Comm 0 per person/day, Rec 1 per person/day)	16 Oct 1987	28 Jun 1988
Fishery closure - quota (Com, Gulf of Mexico EEZ)	20 Jun 1986	22 Dec 1986
Fishery closure - ban (Com & Rec, EEZ off Florida and Texas)	16 Oct 1987	28 Jul 1988
Fishery closure - ban (Com & Rec, Gulf of Mexico EEZ)	29 Jul 1988	Ongoing

NOAA FISHERIES

Lane Snapper

Lane Snapper
Lutjanus synagris
Photo by W Toller.

- **Life history**:
  - Maximum age: Luckhurst et al. (2000) (Bermuda)
  - M: Updated Hoenig (Then et al. 2014)
  - Maturity: Luckhurst et al. (2000) (Bermuda)
  - Growth: Re-estimated using Johnson et al. (1995) data
  - Meristics: Re-estimated using the FD & FI data sets provided at SEDAR49
  - Steepness: Meta-analysis (Lutjanidae; Myers et al. 1999)

Lane Snapper

Lane Snapper
Lutjanus synagris
Photo by W Toller.

- **Total removals (1986-2014) (landings + dead discards):**

Commercial		Recreational		Total Removals
Landings	Dead discards	Landings	Dead discards	
14.2%	?	**84.4%**	1.49%	100.00%

- **Representative fleet/fishery**: Recreational private (1986-2014)
  - Chosen due to larger range of sizes sampled, considered more reflective of fishing pressure

Lane Snapper

Lane Snapper
Lutjanus synagris
Photo by W Toller.

- **Index of abundance**: Headboat

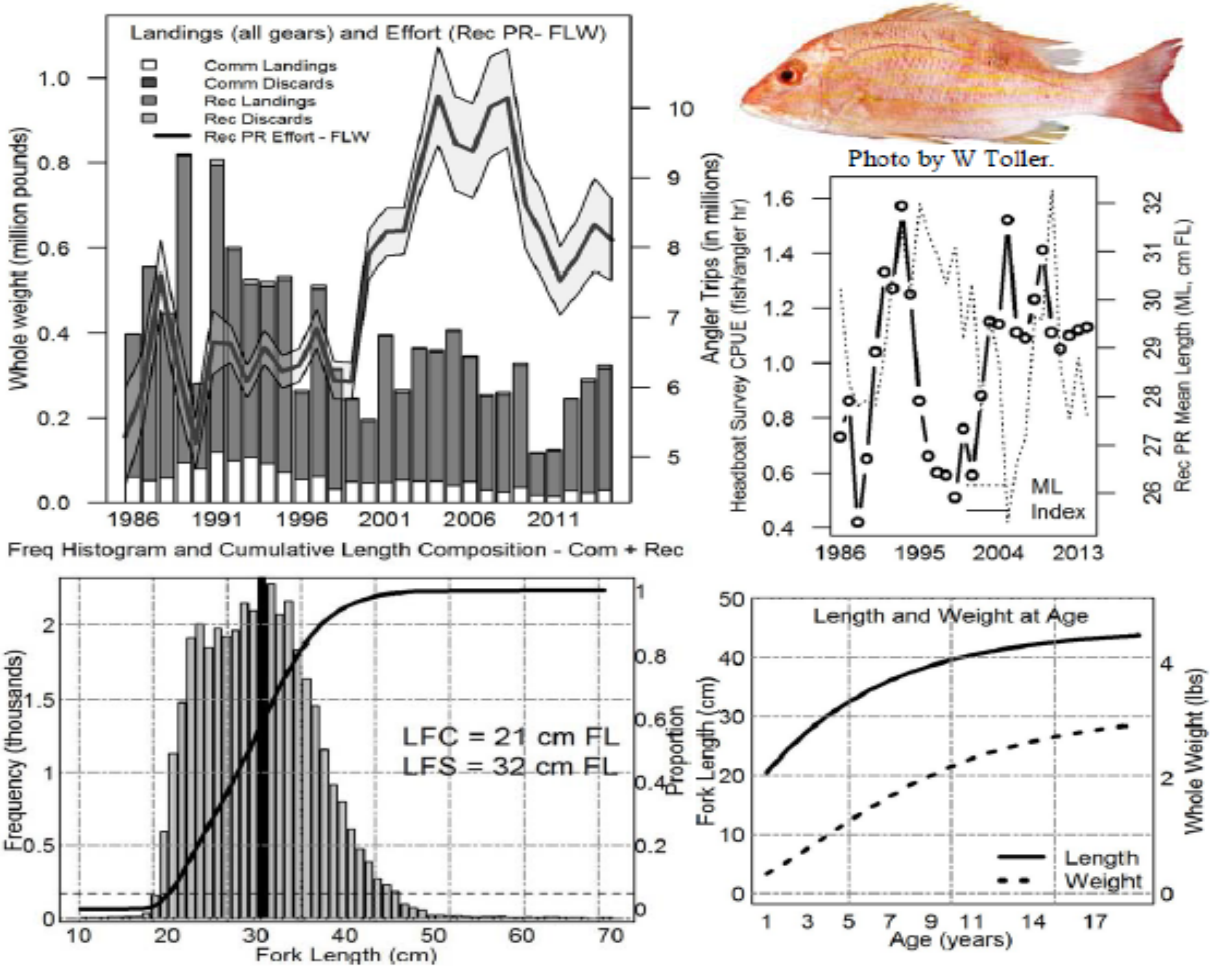
- **Length data**:
  1. Overall FD length composition weighted by landings
  2. Annual mean length from representative fishery

- **Issues to consider**: Bycatch in shrimp fishery
  - Initial analyses indicate bycatch may be substantial

Lane Snapper

Lane Snapper (*Lutjanus synagris*)

Representative Fleet: Recreational Private (Rec PR)



Life History and Selectivity

	MaxAge	vbLinf	vbK	vbt0	wla	wlb	L50	L95	Mort	LFC	LFS
	Maximum Age	Asympt-otic Len.	Growth Coeff.	Age at Len. 0	Wt-Len scalar	Wt-Len power	Len. at Matur.	Len. at Full Matur.	Natural Mortality	Len. 1st Capture	Len. Full Selection
Parameter	19	44.9	0.17	-2.59	5.92E-05	2.86	24	27	0.33	21	32
CV	--	(0.04)	(0.16)	(0.26)	(0.06)	(0.01)	(0.3)	(0.3)	(0.32)	(0.5)	(0.5)
Units	y	cm FL	y^{-1}	y	cm-lbs	cm-lbs	cm FL	cm FL	y^{-1}	cm FL	cm FL

Relevant federal regulations

http://sero.nmfs.noaa.gov/sustainable_fisheries/policy_branch/

	Start Date	*End Date*
Bag limit (Rec, 20 reef fish aggregate per person per day)	15 Jan 1997	Ongoing
Size limit (Com and Rec, 8 inches Total Length)	21 Feb 1990	Ongoing

NOAA FISHERIES

Wenchman (snapper)

Wenchman
Pristipomoides aquilonaris
Photo by W Toller.

- **Life history**:
  - Maximum age: Anderson et al. (2009)
  - M: Updated Hoenig (Then et al. 2014)
  - Maturity: None
  - Growth: Anderson et al. (2009)
  - Meristics: Re-estimated using the FD & FI data sets provided at SEDAR49
  - Steepness: Meta-analysis (Lutjanidae; Myers et al. 1999)

Wenchman (snapper)

Wenchman
Pristipomoides aquilonaris
Photo by W Toller.

- **Total removals (1997-2014) (landings + dead discards):**

Commercial		Recreational		Total Removals
Landings	Dead discards	Landings	Dead discards	
99.96%	?	0.04%	0.00%	100.00%

- **Representative fleet/fishery**: Commercial fish trawl (1997-2014)
  - Chosen due to larger range of sizes sampled, considered more reflective of fishing pressure

Wenchman (snapper)

Wenchman
Pristipomoides aquilonaris
Photo by W Toller.

- **Index of abundance**: SEAMAP small pelagics survey
- **Length data**:
  1. Annual mean length from SEAMAP small pelagics survey
  2. Overall FD length composition weighted by landings

Issues to consider: Wenchman

Wenchman
Pristipomoides aquilonaris
Photo by W Toller.

1. Life history parameters (Maximum age, M, Growth):
   - Anderson et al. (2009) - 2 months sampled, N = 115
2. Maturity

Species	Max Age	vonB K	vonB Linf	Lmaturity	Reference
Wenchman (GOM)	14 y	0.18	240 mm FL	NA	Anderson et al. (2009)
Wenchman (*P. macrophthalmus*) (Caribbean)	23 y*	NA	NA	F 170 mm FL M 200 mm FL	Rosario et al. (2006)
Crimson Jobfish (*P. filamentosus*) (Indo-Pacific)	44 y	0.29	817 mm FL	F 36-38 cm FL M 40-42cm FL	Andrews et al. (2012) Mees (1993)
Goldbanded Jobfish (*P. multidens*) (Indo-Pacific)	30 y	0.19	600 mm FL	50 cm FL	Newman and Dunk (2003) Kailola et al. (1993)

Wenchman

Wenchman Snapper (*Pristipomoides aquilonaris*)

Representative Fleet: Commercial Fish Trawl

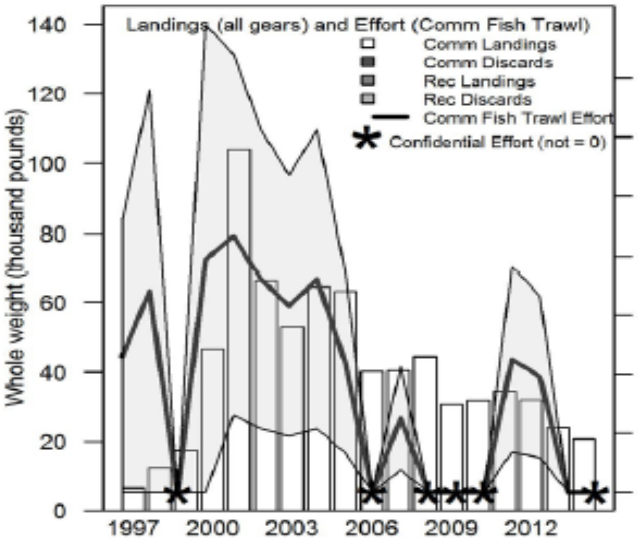
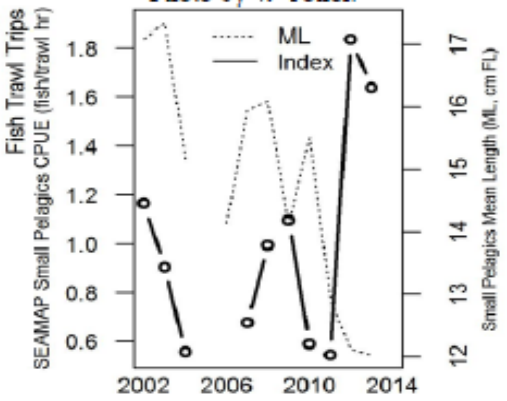
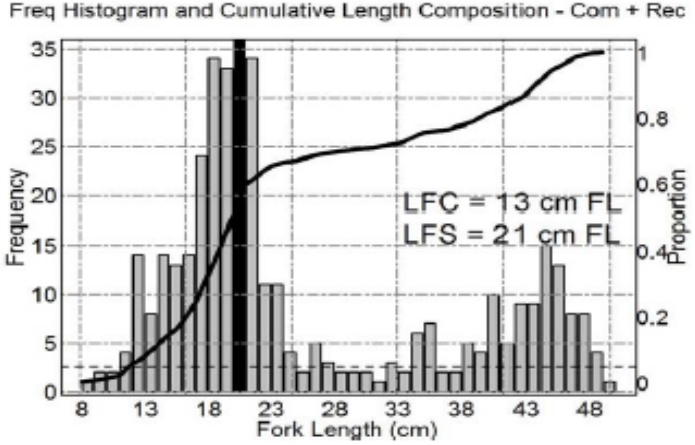
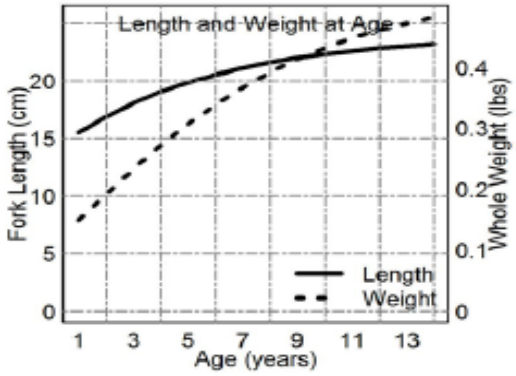


Photo by W Toller.







Life History and Selectivity

	MaxAge	vbLinf	vbK	vbt0	wla	wlb	L50	L95	Mort	LFC	LFS
	Maximum Age	Asympt-otic Len.	Growth Coeff.	Age at Len. 0	Wt-Len scalar	Wt-Len power	Len. at Matur.	Len. at Full Matur.	Natural Mortality	Len. 1st Capture	Len. Full Selection
Parameter	14	24	0.18	-4.75	5.30E-05	2.9	--	--	0.437	13	21
CV	--	(0.2)	(0.2)	(0.5)	(0.04)	(0.004)	--	--	(0.32)	--	--
Units	y	cm FL	y^{-1}	y	cm-lbs	cm-lbs	cm FL	cm FL	y^{-1}	cm FL	cm FL

Relevant federal regulations

http://sero.nmfs.noaa.gov/sustainable_fisheries/policy_branch/

	Start Date	*End Date*
Bag limit (Rec, 20 reef fish aggregate per person per day)	15 Jan 1997	Ongoing

NOAA FISHERIES

Issues to consider: Wenchman

Wenchman
Pristipomoides aquilonaris
Photo by W Toller.

3. Substantial (?) removals from bycatch in shrimp fishery

4. Very little known about representative fleet (commercial trawl)
   - Some years of effort are confidential
   - Mostly caught as bycatch in butterfish trawl fishery

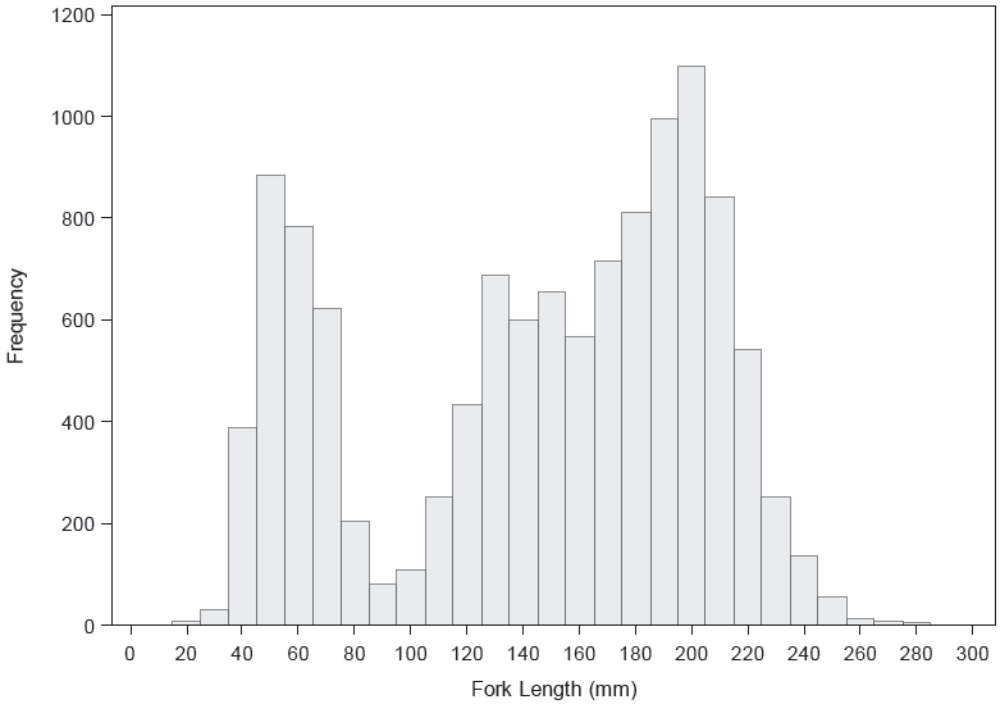


Figure 2. Length frequency histograms for Wenchman captured during MSLABS Small Pelagics surveys from 2002-2014.

Maximum sizes of GOM wenchman: 471 mm FL (NMFS Groundfish survey) and 560 mm FL (Commercial longline)

Yellowmouth Grouper

Yellowmouth Grouper
Mycteroperca interstitialis
Photo by W Toller.

Removed from analysis:

1. Lack of recent life history studies

2. Removals are sporadic and highly uncertain in both commercial and recreational fisheries due to similarity in appearance to Scamp

3. Reef fish video survey (small sample size, low proportion positive)

4. Limited length composition samples (also potential for misidentification)

Yellowmouth Grouper

Yellowmouth Grouper (*Mycteroperca interstitialis*)

Representative Fleet: Recreational Combined (Charterboat, Private, Headboat)

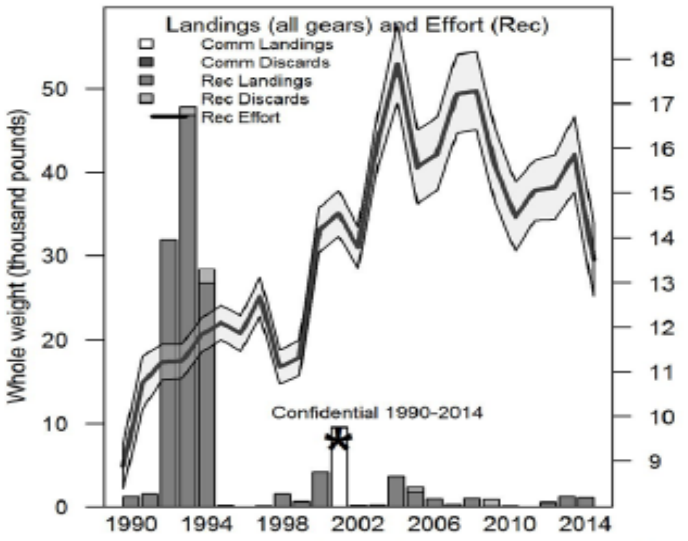
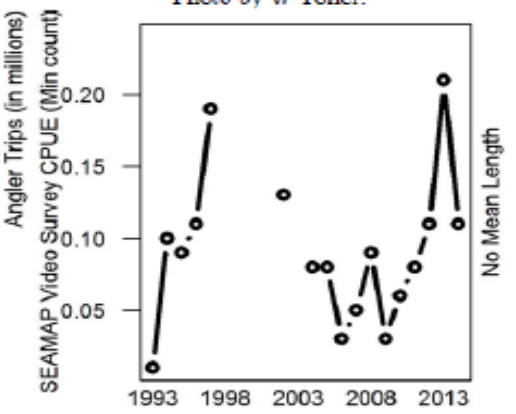
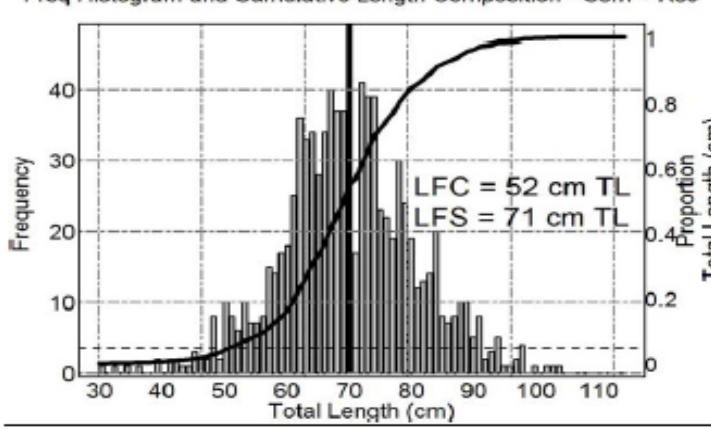
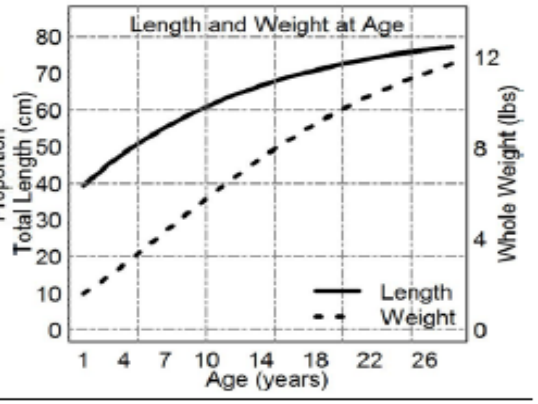


Photo by W Toller.







Life History and Selectivity

	MaxAge	vbLinf	vbK	vbt0	wla	wlb	L50	L95	Mort	LFC	LFS
	Maximum Age	Asympt-otic Len.	Growth Coeff.	Age at Len. 0	Wt-Len scalar	Wt-Len power	Len. at Matur.	Len. at Full Matur.	Natural Mortality	Len. 1st Capture	Len. Full Selection
Parameter	28	82.8	0.076	-7.50	2.77E-05	2.98	42.5	47.5	0.231	52	71
CV	--	(0.05)	(0.21)	(0.21)	(0.25)	(0.02)	(0.3)	(0.3)	(0.32)	(0.5)	(0.5)
Units	y	cm TL	y^{-1}	y	cm-lbs	cm-lbs	cm TL	cm TL	y^{-1}	cm TL	cm TL

Relevant federal regulations

http://sero.nmfs.noaa.gov/sustainable_fisheries/policy_branch/ *Start Date* *End Date*

NOAA FISHERIES

Snowy Grouper


Snowy Grouper
Hyporthodus niveatus

- **Life history**:
  - Maximum age: SEDAR36 (2013) (S. Atl)
  - M: Updated Hoenig (Then et al. 2014)
  - Maturity: SEDAR36 (2013) (S. Atl)
  - Growth: SEDAR36 (2013) (S. Atl)
  - Meristics: Re-estimated using the FD & FI data sets provided at SEDAR49
  - Steepness: Meta-analysis (Reef fish; Shertzer and Conn 2012)

Snowy Grouper

- **Total removals (1990-2014) (landings + dead discards):**

Snowy Grouper
Hyporthodus niveatus

Commercial		Recreational		Total Removals
Landings	Dead discards	Landings	Dead discards	
84.05%	2.71%	9.87%	3.37%	100.00%

- Primarily commercial (bottom longline)
- **Representative fleet/fishery**: Commercial longline (1990-2014)

Snowy Grouper

Snowy Grouper
Hyporthodus niveatus

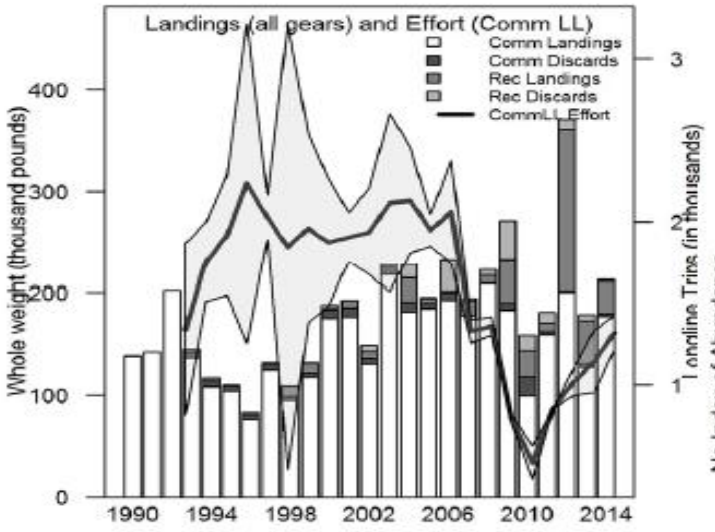
- **Index of abundance**: Commercial logbook
- **Length composition**:
  1. Overall FD length composition weighted by landings
  2. Annual mean length from representative fishery

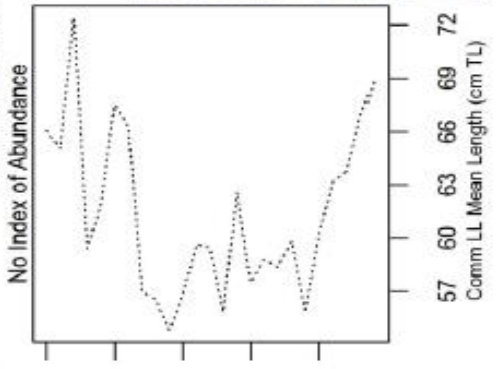
Issues to consider: LH borrowed from South Atlantic, concerns over longevity, representativeness of commercial longline data from logbook (shift in fishery distribution, selectivity)

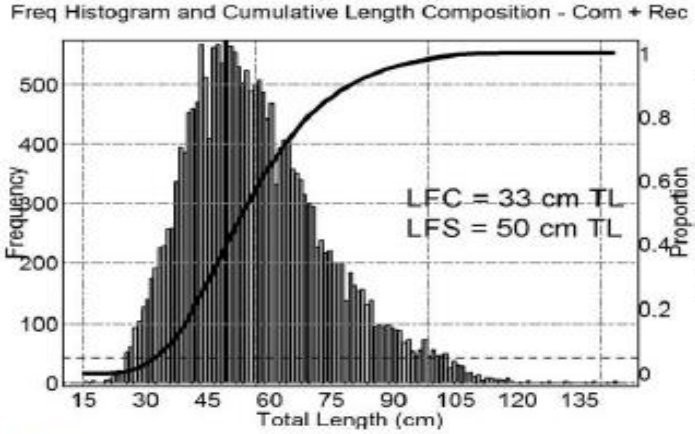
Snowy Grouper

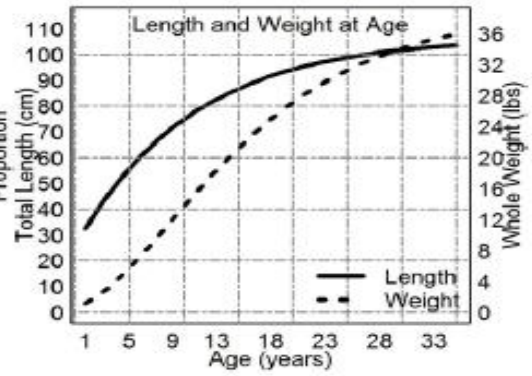
Snowy Grouper (*Hyporthodus niveatus*)

Representative Fleet: Commercial Bottom Longline (Comm LL)









Life History and Selectivity

	MaxAge	vbLinf	vbK	vbt0	wla	wlb	L50	L95	Mort	LFC	LFS
	Maximum Age	Asympt-otic Len.	Growth Coeff.	Age at Len. 0	Wt-Len scalar	Wt-Len power	Len. at Matur.	Len. at Full Matur.	Natural Mortality	Len. 1st Capture	Len. Full Selection
Parameter	35	106.5	0.094	-2.88	3.56E-05	2.98	60	75	0.189	33	50
CV	--	(0.06)	(0.22)	(0.33)	(0.2)	(0.02)	(0.3)	(0.3)	(0.32)	(0.5)	(0.5)
Units	y	cm TL	y^{-1}	y	cm-lbs	cm-lbs	cm TL	cm TL	y^{-1}	cm TL	cm TL

Relevant federal regulations

http://sero.nmfs.noaa.gov/sustainable_fisheries/policy_branch/ *Start Date* *End Date*

NOAA FISHERIES

Speckled Hind

Speckled Hind
Epinephelus drummondhayi
Image Credit: © Duane Raver

- **Life history**:
  - Maximum age: Andrews et al. (2013)
  - M: Updated Hoenig (Then et al. 2014)
  - Maturity: Ziskin et al. (2011) (SE US)
  - Growth: Ziskin et al. (2011) (SE US)
  - Meristics: Re-estimated using the FD & FI data sets provided at SEDAR49
  - Steepness: Meta-analysis (Reef fish; Shertzer and Conn 2012)

Speckled Hind

Speckled Hind
Epinephelus drummondhayi
Image Credit: © Duane Raver

- **Total removals (1997-2014) (landings + dead discards):**

Commercial		Recreational		Total Removals
Landings	Dead discards	Landings	Dead discards	
55.29%	14.90%	7.55%	22.25%	100.00%

- Primarily commercial (bottom longline)
- **Representative fleet/fishery**: Commercial longline (1997-2014)
  - Note later start date due to misidentification concerns and "unidentified grouper" landings

Speckled Hind

Speckled Hind
Epinephelus drummondhayi
Image Credit: © Duane Raver

- **Index of abundance**: Commercial logbook

- **Length composition**:
  1. Overall FD length composition weighted by landings
  2. Annual mean length from representative fishery

Issues to consider: Growth and maturity borrowed from South Atlantic, concerns over longevity, representativeness of commercial longline data from logbook (shift in fishery distribution, selectivity)

Speckled Hind

Speckled Hind (*Epinephelus drummondhayi*)

Representative Fleet: Commercial Bottom Longline (Comm LL)

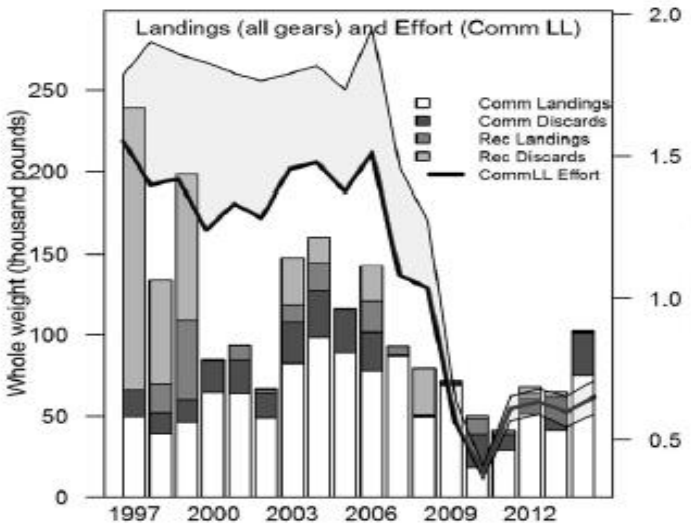
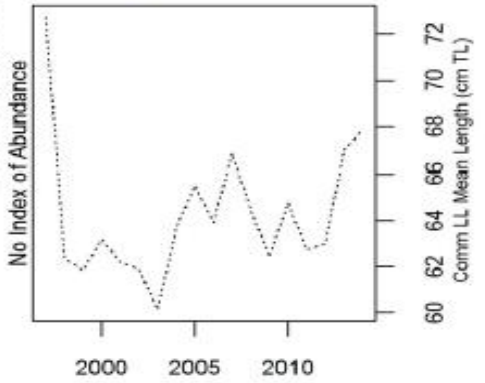
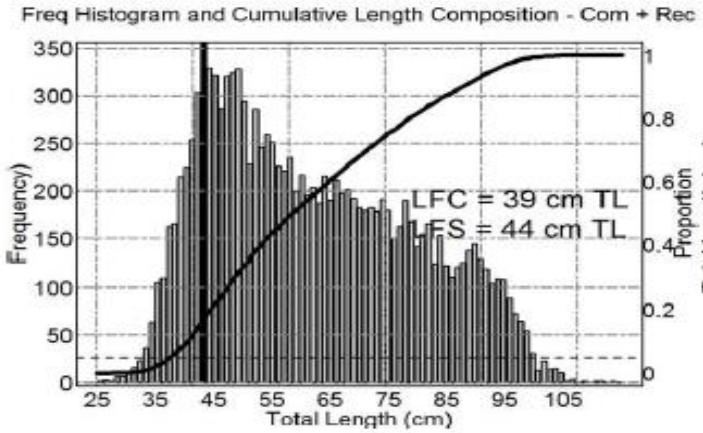
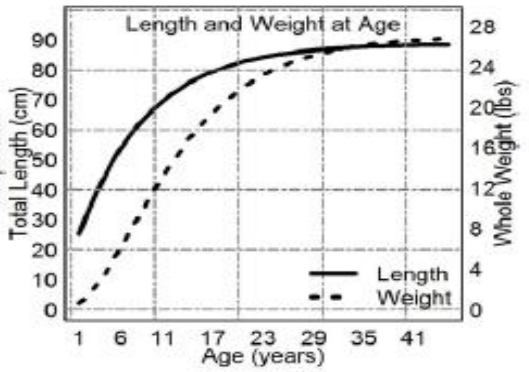


Image Credit: © Duane Raver







Life History and Selectivity

	MaxAge	vbLinf	vbK	vbt0	wla	wlb	L50	L95	Mort	LFC	LFS
	Maximum Age	Asympt-otic Len.	Growth Coeff.	Age at Len. 0	Wt-Len scalar	Wt-Len power	Len. at Matur.	Len. at Full Matur.	Natural Mortality	Len. 1st Capture	Len. Full Selection
Parameter	45	88.8	0.12	-1.80	4.42E-05	2.97	53.2	67.5	0.15	39	44
CV	--	(0.08)	(0.17)	(0.5)	(0.33)	(0.03)	(0.3)	(0.3)	(0.32)	(0.5)	(0.5)
Units	y	cm TL	y^{-1}	y	cm-lbs	cm-lbs	cm TL	cm TL	y^{-1}	cm TL	cm TL

Relevant federal regulations

http://sero.nmfs.noaa.gov/sustainable_fisheries/policy_branch/

Start Date *End Date*

NOAA FISHERIES

Lesser Amberjack

Lesser Amberjack
Seriola fasciata
Image Credit: © Diane Rome Peebles

- **Life history**: none recommended (only have L-W from literature)
  - No consensus on a species with similar characteristics
  - No age-length pairs to create growth curve
    - Difficult to age, no standardized methodology for reading *Seriola* spp. otoliths
- **Removals**: highly uncertain due to misidentification

Commercial		Recreational		Total Removals
Landings	Dead discards	Landings	Dead discards	
89.19%	--	10.36%	0.45%	100.00%

Lesser Amberjack

Lesser Amberjack
Seriola fasciata
Image Credit: © Diane Rome Peebles

- **Index of abundance**: Reef fish video survey
- **Representative fleet/fishery**: Commercial handline (1991-2009)
- **Length composition**:
  1. Overall FD length composition weighted by landings

Lesser Amberjack

Lesser Amberjack (*Seriola fasciata*)

Representative Fleet: Commercial Handline (Comm HL)

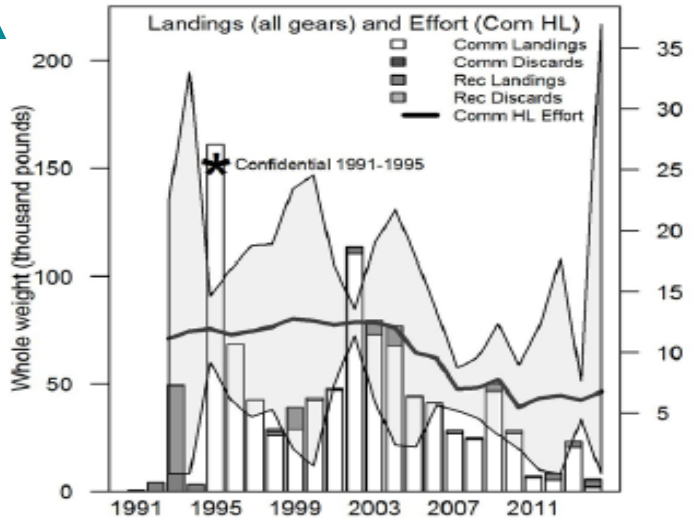
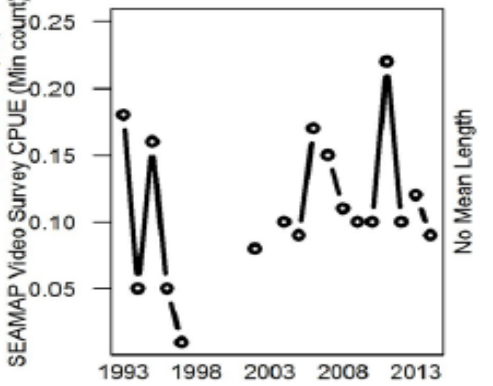
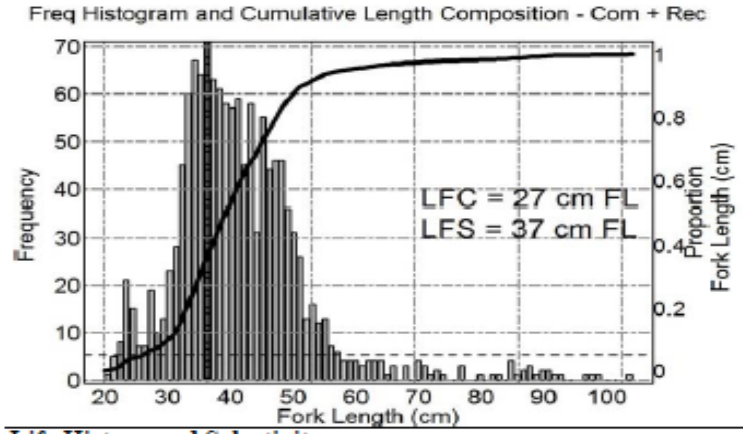
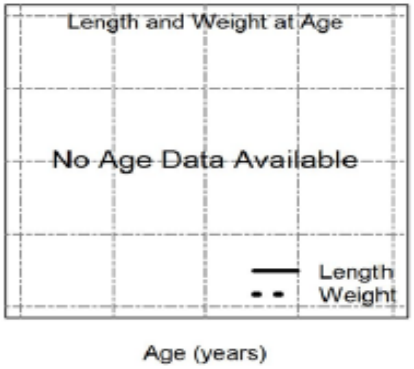


Image Credit: © Diane Rome Peebles







Life History and Selectivity

	MaxAge Maximum Age	vbLinf Asympt-otic Len.	vbK Growth Coeff.	vbt0 Age at Len. 0	wla Wt-Len scalar	wlb Wt-Len power	L50 Len. at Matur.	L95 Len. at Full Matur.	Mort Natural Mortality	LFC Len. 1st Capture	LFS Len. Full Selection
Parameter	--	--	--	--	1.68E-05	2.6	--	--	--	27	37
CV	--	--	--	--	(1.04)	(0.01)	--	--	--	(0.5)	(0.5)
Units	y	cm FL	y^{-1}	y	cm-lbs	cm-lbs	cm FL	cm FL	y^{-1}	cm FL	cm FL

Relevant federal regulations

http://sero.nmfs.noaa.gov/sustainable_fisheries/policy_branch/

	Start Date	*End Date*
Bag limit (Rec, 20 reef fish aggregate per person per day)	15 Jan 1997	23 Nov 1999
Bag limit (Rec, 5 aggregate with Banded Rudderfish per person per day)	24 Nov 1999	Ongoing
Size limit (Com and Rec, 14 - 22 inches Fork Length)	24 Nov 1999	Ongoing

NOAA FISHERIES

Almaco Jack


Almaco Jack
Seriola rivoliana

- **Life history**: none recommended (only have L-W from literature)
  - No consensus on a species with similar characteristics
  - No age-length pairs to create growth curve
    - Difficult to age, no standardized methodology for reading *Seriola* spp. otoliths
- **Removals**: highly uncertain due to misidentification

Commercial		Recreational		Total Removals
Landings	Dead discards	Landings	Dead discards	
28.84%	--	**61.83%**	9.33%	100.00%

Almaco Jack

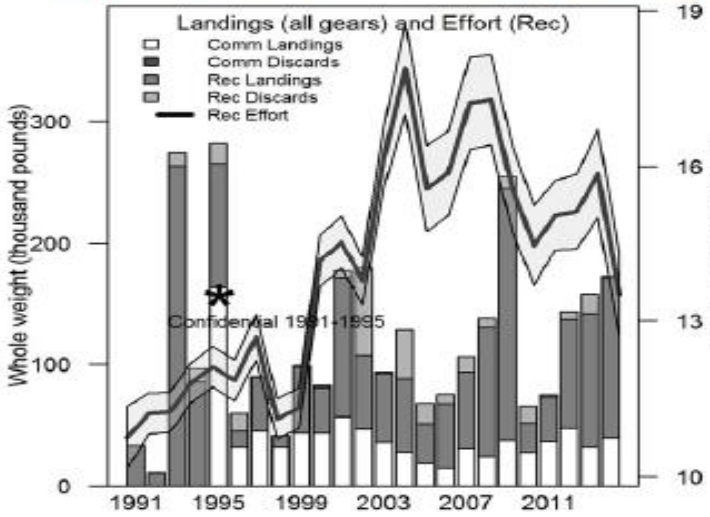
Almaco Jack
Seriola rivoliana

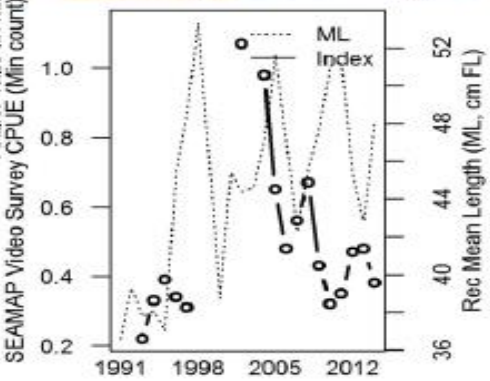
- **Index of abundance**: Reef fish video survey
- **Representative fleet/fishery**: Combined recreational (CH, PR, HB)
- **Length composition**:
  1. Overall FD length composition weighted by landings
  2. Annual mean length from representative fishery

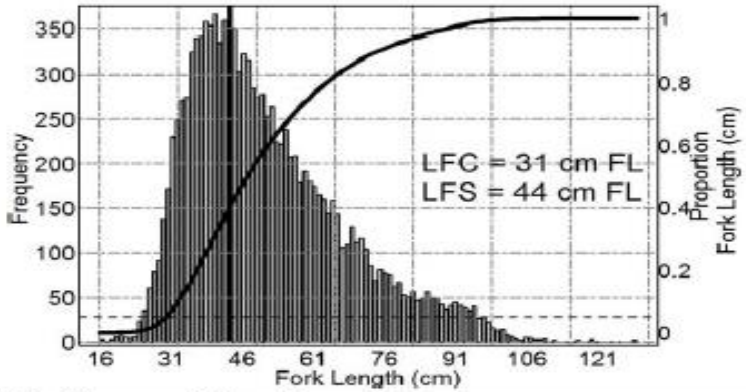
Almaco Jack

Almaco Jack (*Seriola rivoliana*)

Representative Fleet: Recreational Combined (Charterboat, Private, Headboat)







Life History and Selectivity

	MaxAge	vbLinf	vbK	vbt0	wla	wlb	L50	L95	Mort	LFC	LFS
	Maximum Age	Asympt-otic Len.	Growth Coeff.	Age at Len. 0	Wt-Len scalar	Wt-Len power	Len. at Matur.	Len. at Full Matur.	Natural Mortality	Len. 1st Capture	Len. Full Selection
Parameter	--	--	--	--	9.09E-05	2.76	--	--	--	31	44
CV	--	--	--	--	(0.10)	(0.01)	--	--	--	(0.5)	(0.5)
Units	y	cm FL	y^{-1}	y	cm-lbs	cm-lbs	cm FL	cm FL	y^{-1}	cm FL	cm FL

Relevant federal regulations

http://sero.nmfs.noaa.gov/sustainable_fisheries/policy_branch/

	Start Date	*End Date*
Bag limit (Rec, 20 reef fish aggregate per person per day)	15 Jan 1997	23 Nov 1999
Bag limit (Rec, 5 aggregate with Banded Rudderfish per person per day)	24 Nov 1999	Ongoing
Size limit (Com and Rec, 14 - 22 inches Fork Length)	24 Nov 1999	Ongoing

NOAA FISHERIES

Issues to consider: Lesser Amberjack & Almaco Jack

1. Lack of life history data to parameterize stock dynamics in operating model
   - LHWG suggested building an "amberjack" stock type using greater amberjack, however, analysts should exercise caution in applying results to Lesser Amberjack and Almaco Jack
   - Incorporated results from Farmer et al. (2016) to cover recommended range of growth parameters

2. Large uncertainty in removals
   - Misidentification of *Seriola* spp.

Issues to keep in mind

1. Effort time series ***for MSE***
   - Focused on trips, not subset for targeting due to time limitations for data analysts

2. Depletion ***for MSE***
   - Borrowed from similar species or
   - Estimated using mean length in DLMtool

3. Discards
   - Lack of discard mortality for SEDAR49 species, used proxies from similar species

Reliability score for data inputs: Life history

Species	Overall Life History Reliability of Data Used					
	Age	Growth	Length-Weight	Maturity	Mortality	Steepness
Red Drum	Fair	Good	Good	Good	Fair	Fair
Lane Snapper	Good	Good	Good	Poor	Good	Poor
Wenchman	Fair	Fair	Good	Poor	Fair	Poor
Yellowmouth Grouper	Good	Good	Poor	Fair	Good	Poor
Snowy Grouper	Good	Good	Poor	Good	Good	Fair
Speckled Hind	Fair	Good	Poor	Good	Fair	Poor
Lesser Amberjack	Poor	Poor	Poor	Poor	Poor	Poor
Almaco Jack	Poor	Poor	Good	Poor	Poor	Poor

Source	Scoring
Growth	LH score derived from study used or 1.0 for using recent data
Length-Weight	Poor = <500 overall samples
	Fair = 500-1,000 overall samples
	Good = >1,000 overall samples
Steepness	Poor = no information
	Fair = steepness from previous assessment

Poor: 0-0.33

Fair: 0.34-0.67

Good: 0.68-1.0

Reliability score for data inputs: Total removals

- Propose (1 – CV from Total Removals) as an indicator of reliability

Species	Overall (1-CV)
Red Drum	Good
Lane Snapper	Good
Wenchman	Fair
Snowy Grouper	Good
Speckled Hind	Good
Lesser Amberjack	Fair
Almaco Jack	Good

Poor: 0-0.33
Fair: 0.34-0.67
Good: 0.68-1.0

Reliability score for data inputs: Index

Species	Average (2010 - 2014)					Overall Rating
	Selected Index	Proportion positive	Avg. Annual Sample Size	Range (CV)	Avg. CV	
Lane Snapper	Headboat	0.60 (SMAC)	2245 (SMAC)	(0.040 - 0.048)	0.043	Good
Almaco Jack	SEAMAP Video	0.23	319	(0.285 - 0.355)	0.321	Good
Red Drum	DISL Bottom Longline	0.33	32	(0.65 - 1.18)	0.93	Good (because MRFSS confirms trends)
Snowy Grouper	SEAMAP Video	0.008	290	(0.14 - 0.145)*	0.14*	Poor
Speckled Hind	SEAMAP Video	0.042	290	(1.01 - 1.36)	1.18	Poor
Yellowmouth Grouper	SEAMAP Video	0.064	223	(0.326 - 0.473)	0.403	Poor
Lesser Amberjack	SEAMAP Video	0.036	442	(0.13 - 0.145)	0.138	Fair (use with caution)
Wenchman	SEAMAP Small Pelagics	0.54 (2009 - 2013)	121 (2009 - 2013)	(0.188 - 0.259)	0.223	Good

***(CV low and consistent due to very low proportion positive)**

Qualitative Scoring Criteria determined by IWG Leader

Metric	Poor	Fair	Good
Proportion Positive	< 5%	5% - 15%	> 15%
Annual Sample Size	< 250	250 - 1000	> 1000
CV	> 0.5	0.5 - 0.25	< 0.25

Reliability score for data inputs: Composition

- Length and age composition

Species	Data Source	Source	Sampling Gear	Spatial Coverage	Annual Mean Sample Size	Selectivity (asymptotic)	Overall Length	Overall Age
Red Drum	Recreational Private/Charter	0.5	0.5	1	1	0	Fair	-
	Purse Seine	1	1	0.5	0.75	1	Good	Good
	Bottom Longline	1	0.5	0.5	0	0	Fair	Fair
Lane Snapper	Commercial Longline & Handline	0.5	0.5	1	0.25	1	Fair	-
	Recreational Private & Headboat	0.5	0.5	1	0.5	1	Good	-
Wenchman	NMFS Small Pelagics	1	1	1	0.5	0	Good	-
Almaco Jack	Recreational Charterboat, Private and Headboat	0.5	0.5	1	0	0	Fair	-

Source	Scoring
Source	0.5 = fishery-dependent 1 = fishery-independent
Sampling gear	0.5 = Passive gear (e.g., hook and line) 1 = Active gear (e.g., nets, seines)
Spatial Coverage	0.5 = limited (region-specific) 1 = broad (samples from all Gulf states)
Annual Mean Sample Size	0 = <250 average samples per year 0.25 = 250-500 average samples per year 0.5 = 500-1,000 average samples per year 0.75 = 1,000-5,000 average samples per year 1.0 = >5,000 average samples per year
Selectivity (asymptotic)	0 = no, dome-shaped pattern or double logistic 1 = yes

LOW (0-0.33)
MEDIUM (0.34-0.67)
HIGH (0.68-1.0)

Reliability score for data inputs: Composition

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