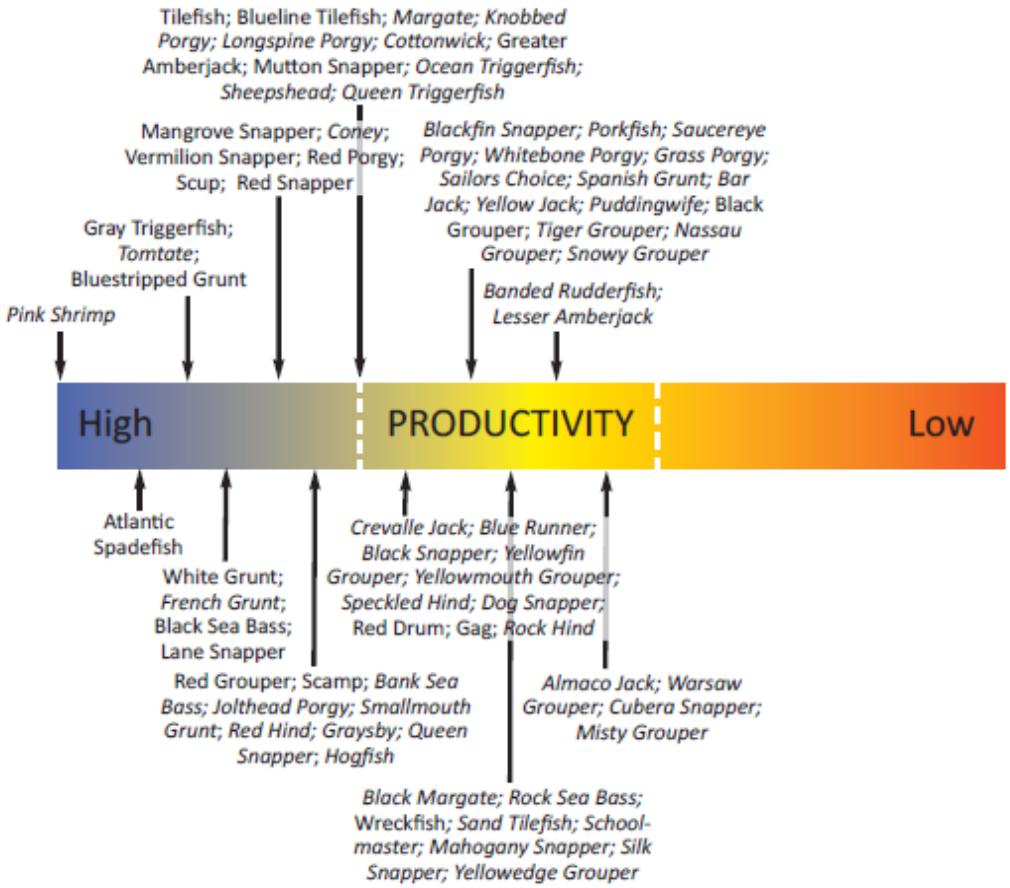
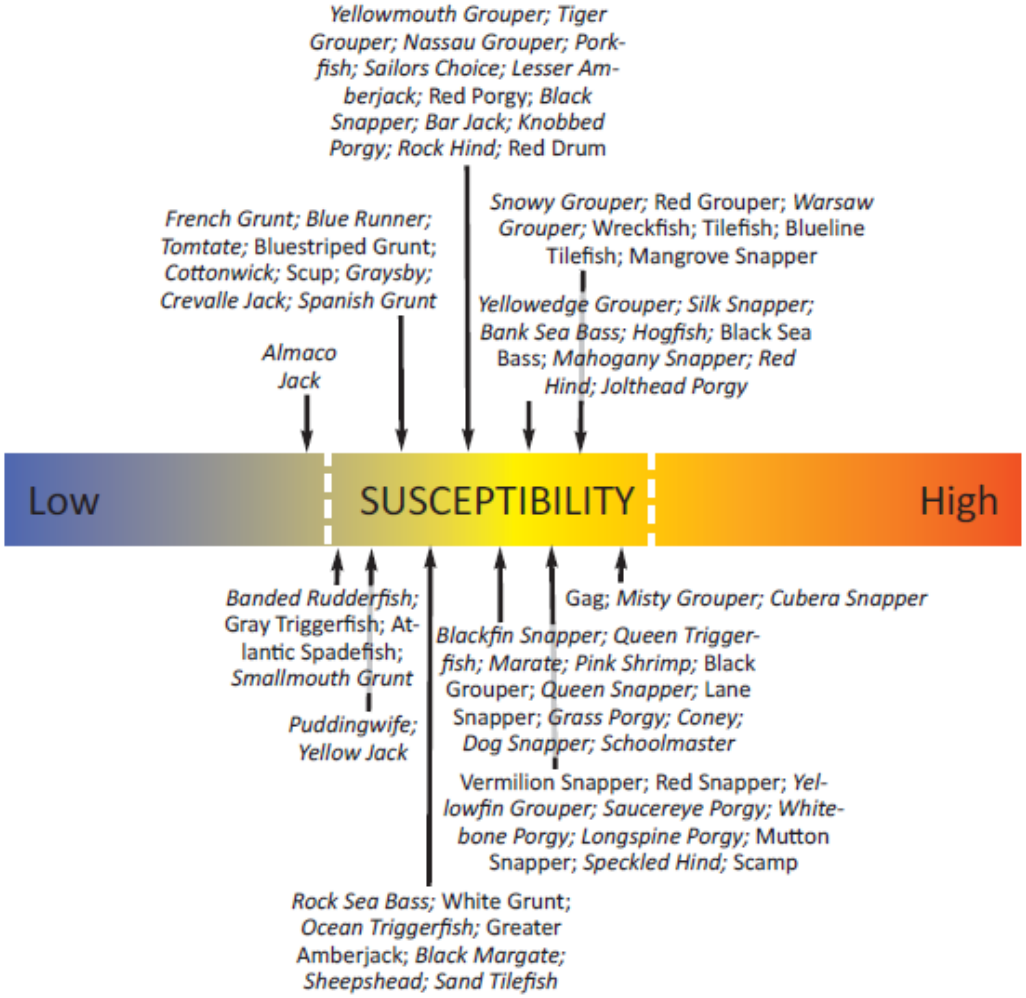
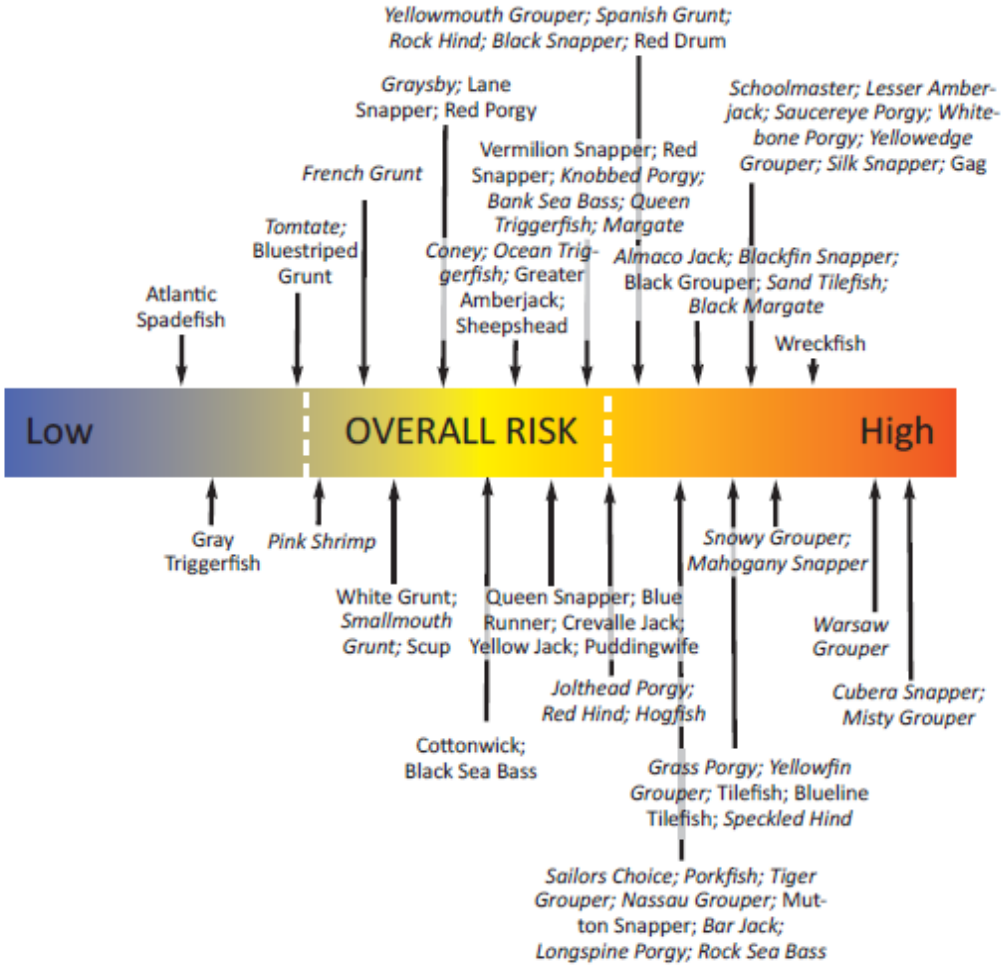
Productivity and Susceptibility Analyses: South Atlantic

Productivity and susceptibility analyses (PSA) were conducted for 73 species management by the South Atlantic Fishery Management Council (SAFMC). Of these, 71 are managed under the Snapper Grouper Fishery Management Plan (FMP). The other two are pink shrimp and red drum, (note that red drum management is being transferred to the Atlantic States Marine Fisheries Commission). Many species in the Snapper/Grouper complex are valuable to commercial and/or recreational fisheries, others are bycatch species retained for food or aquarium use. Management of a large mixed-species complex poses considerable challenges. Below we present findings from Productivity-Susceptibility Analysis of 71 snapper/grouper species (excluding goliath grouper and yellowtail snapper, the latter of the two is jointly managed by the SAFMC and GMFMC and was assessed with the Gulf group of species).

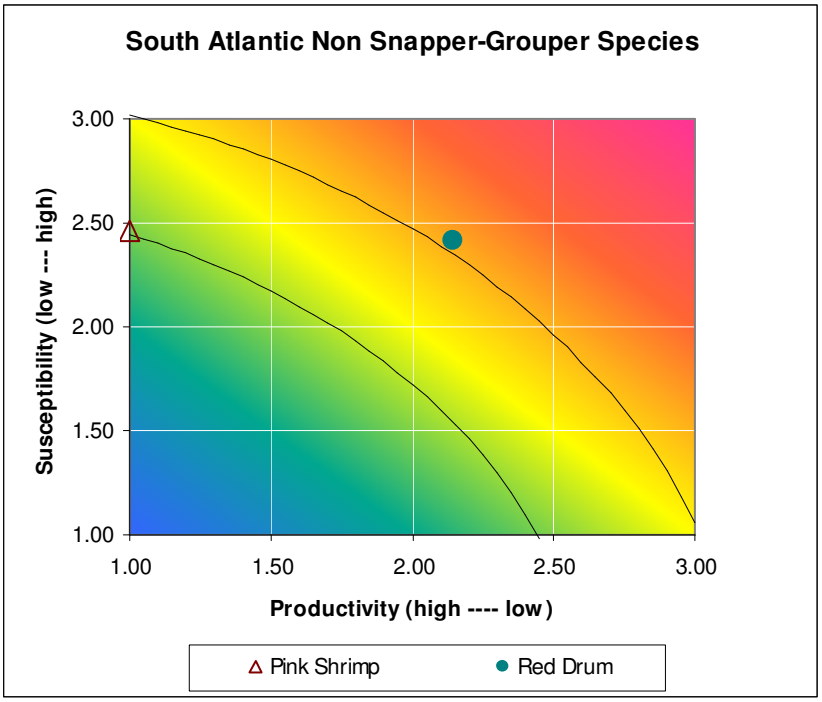
Of these 73, four scored low overall risk, twenty-five scored moderate overall risk, and forty-four scored high overall risk. Of the fort-four high risk scores, thirty-three are missing information for at least one attribute. Of those thirty-three, nineteen are missing information for three or more attributes (that's 43% of the stocks that scored high risk). In the following figures, the italicizes stock names are those stocks where at least one attribute is missing information and was given a high score due to that uncertainty, in accordance with the CSIRO's treatment of uncertainty in their ERAEF methodology. In the plotted results below, open symbols indicate uncertainty.




Yellowmouth Grouper; Tiger Grouper; Nassau Grouper; Porkfish; Sailors Choice; Lesser Amberjack; Red Porgy; Black Snapper; Bar Jack; Knobbed Porgy; Rock Hind; Red Drum
French Grunt; Blue Runner; Tomtate; Bluestriped Grunt; Cottonwick; Scup; Graysby; Crevalle Jack; Spanish Grunt
Snowy Grouper; Red Grouper; Warsaw Grouper; Wreckfish; Tilefish; Blueline Tilefish; Mangrove Snapper
Yellowedge Grouper; Silk Snapper; Bank Sea Bass; Hogfish; Black Sea Bass; Mahogany Snapper; Red Hind; Jolthead Porgy
Almaco Jack
Low
SUSCEPTIBILITY
High
Banded Rudderfish; Gray Triggerfish; Atlantic Spadefish; Smallmouth Grunt
Puddingwife; Yellow Jack
Blackfin Snapper; Queen Triggerfish; Marate; Pink Shrimp; Black Grouper; Queen Snapper; Lane Snapper; Grass Porgy; Coney; Dog Snapper; Schoolmaster
Gag; Misty Grouper; Cubera Snapper
Vermilion Snapper; Red Snapper; Yellowfin Grouper; Saucereye Porgy; Whitebone Porgy; Longspine Porgy; Mutton Snapper; Speckled Hind; Scamp
Rock Sea Bass; White Grunt; Ocean Triggerfish; Greater Amberjack; Black Margate; Sheepshead; Sand Tilefish



Non Snapper Grouper: Pink Shrimp, Red Drum

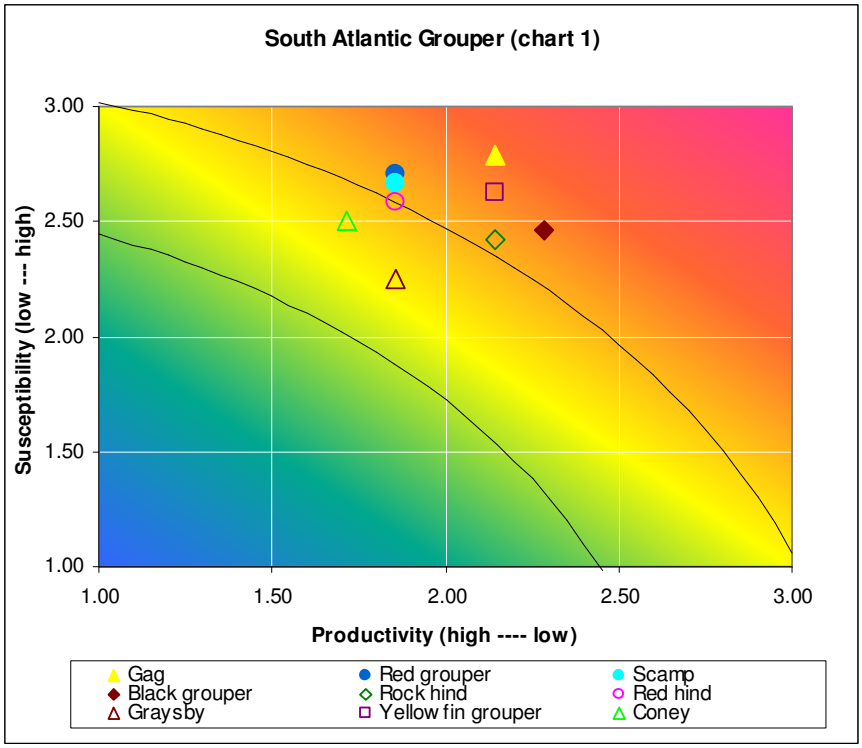


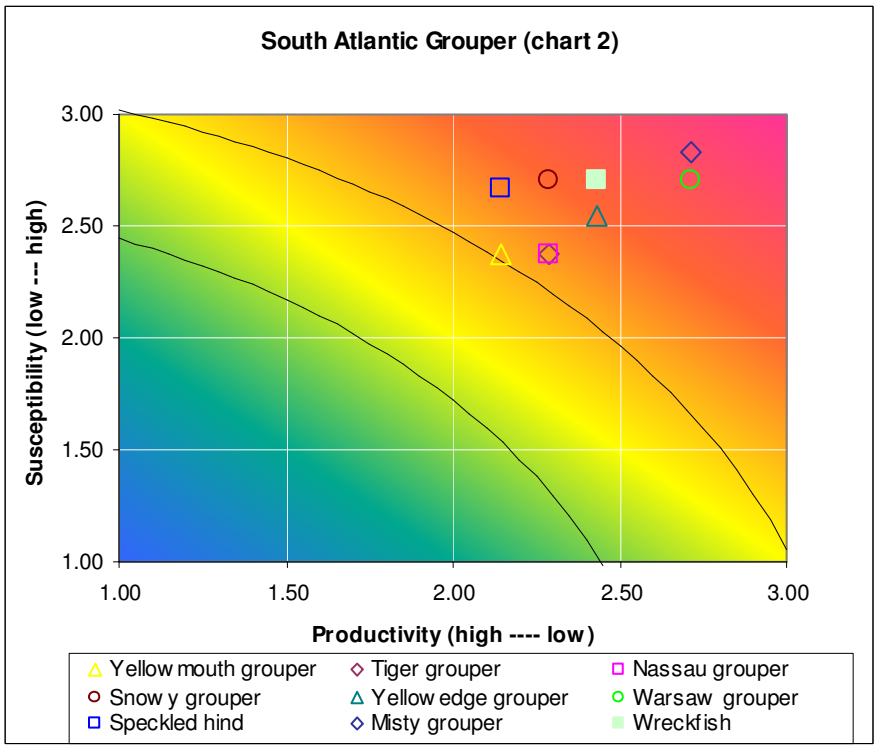
			Pink Shrimp	Red Drum
Productivity	Age at maturity		low	med
	Size at maturity		low	high
	Maximum age		low	high
	Maximum size		low	med
	Fecundity		low	low
	Reproductive strategy		low	low
	Trophic level		low	high
Productivity Score			1.00	2.14
Susceptibility	Availability	Global Dist	high	high
		Behavior	med	high
	Encounterability	Habitat	high	high
		Bathymetry	high	high
	Selectivity	Size at Mat	low	med
		Max Size	low	med
		Desirability	med	med
	Post Capture Mortality		high	med
Susceptibility Score			2.46	2.42
Overall Risk Score			2.65	3.23
Risk Ranking			Med	High
Overfishing			no	yes
Overfished (Depleted)			yes	unk

unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown

low, med, high = risk score for attribute value

Snapper/Grouper Complex, Grouper: Gag, Red Grouper, Scamp, Black Grouper, Rock Hind, Red Hind, Graysby, Yellowfin Grouper, Yellowmouth Grouper, Tiger Grouper, Nassau Grouper, Snowy Grouper, Yellowedge Grouper, Warsaw Grouper, Speckled Hind, Misty grouper, Wreckfish





			Groupers (Table 1)								
			Gag	Red Grouper	Scamp	Black Grouper	Rock Hind	Red Hind	Graysby	Yellowfin Grouper	Coney
Productivity	Age at maturity		med	med	med	high	high	high	med	unk	unk
	Size at maturity		high	med	med	high	low	low	low	high	low
	Maximum age		high	med	med	high	med	med	med	med	med
	Maximum size		med	med	med	med	med	med	low	med	low
	Fecundity		low	low	low	low	unk	low	unk	low	low
	Reproductive strategy		low	low	low	low	low	low	low	low	low
	Trophic level		high	high	high	high	high	high	high	high	high
Productivity Score			2.14	1.86	1.86	2.29	2.14	1.86	1.86	2.14	1.71
Susceptibility	Availability	Global Dist	high	high	high	high	high	high	high	med	high
		Behavior	high	high	high	high	high	high	high	high	high
	Encounterability	Habitat	high	high	high	high	high	high	high	high	high
		Bathymetry	high	high	high	high	high	high	high	high	high
	Selectivity	Size at Mat	high	med	med	high	low	low	low	high	low
		Max Size	med	med	med	high	med	med	low	med	low
		Desirability	high	high	high	low	low	high	low	low	low
	Post Capture Mortality		high	high	high	high	high	high	med	high	high
Susceptibility Score			2.79	2.71	2.67	2.46	2.42	2.58	2.25	2.63	2.50
Overall Risk Score			3.52	3.28	3.25	3.36	3.23	3.18	2.92	3.39	3.03
Risk Ranking			High	High	High	High	High	High	Med	High	Med
Overfishing			yes	yes	unk	yes	unk	unk	unk	unk	unk
Overfished (Depleted)			no	unk	unk	unk	unk	unk	unk	unk	unk

unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown

low, med, high = risk score for attribute value

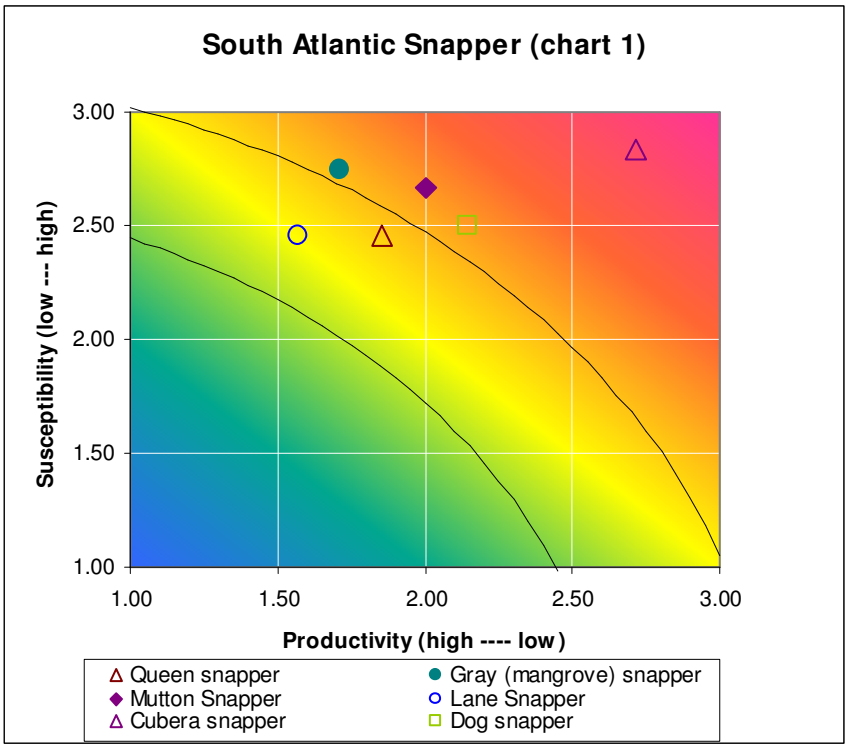
			Groupers (Table 2)								
			Yellowmouth Grouper	Tiger Grouper	Nassau Grouper	Snowy Grouper	Yellowedge Grouper	Warsaw Grouper	Speckled Hind	Misty Grouper	Wreckfish
Productivity	Age at maturity		med	high	high	high	high	high	med	unk	unk
	Size at maturity		med	med	med	med	med	high	med	high	high
	Maximum age		med	med	med	med	high	high	med	unk	high
	Maximum size		med	med	med	med	med	high	med	high	high
	Fecundity		unk	unk	unk	unk	unk	unk	unk	unk	low
	Reproductive strategy		low	low	low	low	low	low	low	low	low
	Trophic level		high	high	high	high	high	high	unk	high	high
Productivity Score			2.14	2.29	2.29	2.29	2.43	2.71	2.14	2.71	2.43
Susceptibility	Availability	Global Dist	med	med	med	med	med	med	high	high	med
		Behavior	high	high	high	high	high	high	high	unk	high
	Encounterability	Habitat	high	high	high	high	high	high	high	high	high
		Bathymetry	high	high	high	high	high	high	high	high	high
	Selectivity	Size at Mat	med	med	med	med	med	high	med	high	high
		Max Size	med	med	med	med	med	high	med	high	high
		Desirability	low	low	low	high	low	low	low	low	low
	Post Capture Mortality		high	high	high	high	high	high	high	high	high
Susceptibility Score			2.38	2.38	2.38	2.71	2.54	2.71	2.67	2.83	2.71
Overall Risk Score			3.20	3.30	3.30	3.45	3.52	3.83	3.42	3.92	3.64
Risk Ranking			High	High	High	High	High	High	High	High	High
Overfishing			unk	unk	no	yes	no	yes	yes	unk	no
Overfished (Depleted)			unk	unk	unk	yes	unk	unk	unk	unk	unk

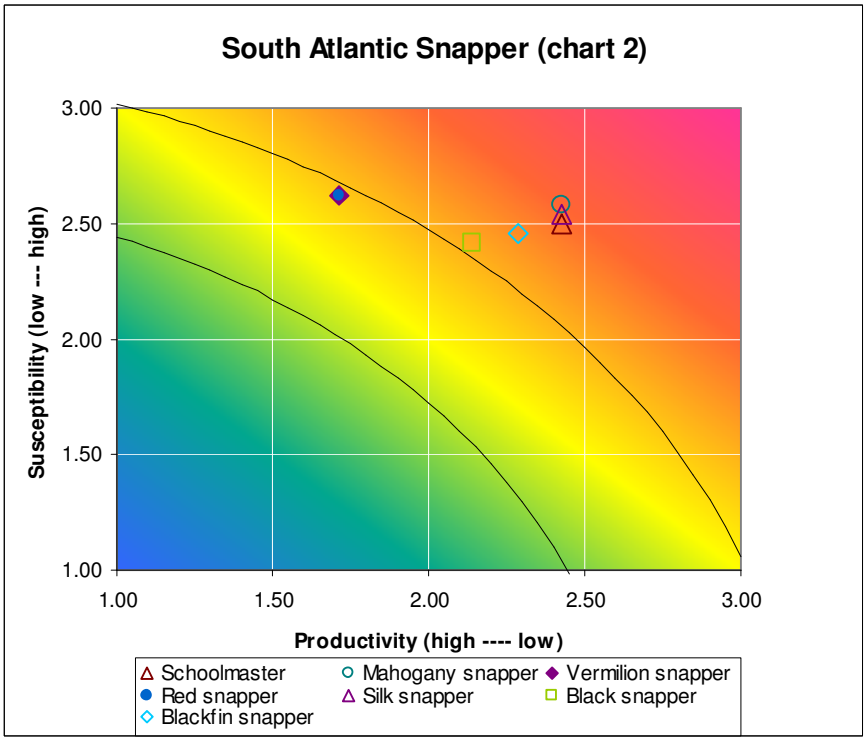
unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown

low, med, high = risk score for attribute value

RED = overfished and overfishing is occurring

Snapper/Grouper Complex, Snapper: Queen Snapper, Gray (mangrove) Snapper, Mutton Snapper, Lane Snapper, Cubera Snapper, Dog Snapper, Schoolmaster, Mahogany Snapper, Vermilion Snapper, Red Snapper, Silk Snapper, Black Snapper, Blackfin Snapper





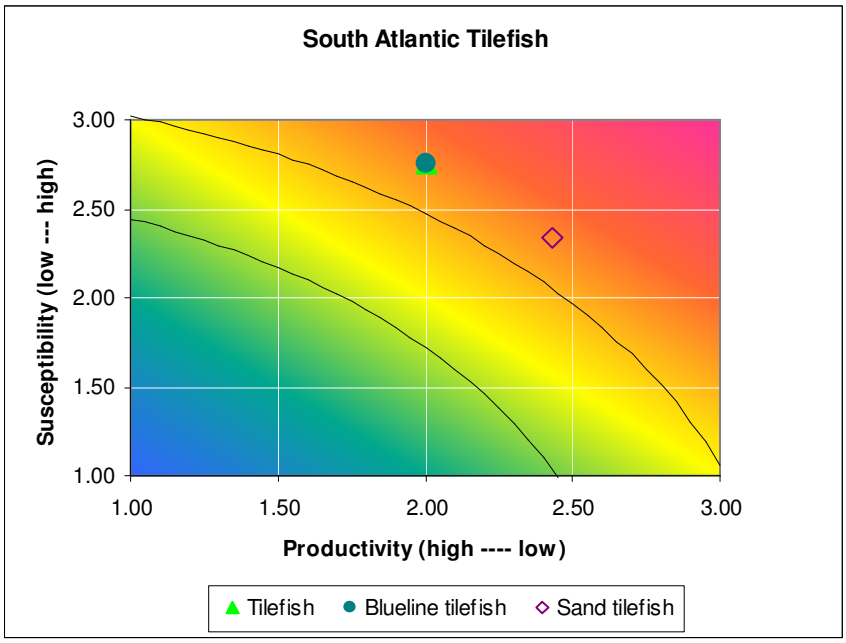
			Snapper												
			Queen Snapper	Gray Snapper	Mutton Snapper	Lane Snapper	Cubera Snapper	Dog Snapper	Schoolmaster	Mahogony Snapper	Vermilion Snapper	Red Snapper	Silk Snapper	Black Snapper	Blackfin Snapper
Productivity	Age at maturity		low	med	med	low	unk	high	unk	unk	med	low	high	low	unk
	Size at maturity		med	low	med	low	unk	med	med	unk	low	low	med	med	low
	Maximum age		low	med	high	med	unk	med	unk	unk	med	high	unk	unk	unk
	Maximum size		med	med	med	med	high	med	med	low	med	med	med	med	med
	Fecundity		unk	low	low	low	unk	unk	unk	unk	low	low	unk	unk	unk
	Reproductive strategy		low	low	low	low	low	low	low	low	low	low	low	low	low
	Trophic level		high	high	high	high	high	med	high	high	high	high	high	high	high
Productivity Score			1.86	1.71	2.00	1.57	2.71	2.14	2.43	2.43	1.71	1.71	2.43	2.14	2.29
Susceptibility	Availability	Global Dist	high	high	high	med	high	high	high	high	med	med	med	high	med
		Behavior	med	high	high	high	high	high	high	high	high	high	high	high	high
	Encounterability	Habitat	high	high	high	high	high	high	high	high	high	high	high	high	high
		Bathymetry	med	high	high	high	high	high	high	high	high	high	high	high	high
	Selectivity	Size at Mat	med	low	med	low	unk	med	med	unk	low	low	med	med	low
		Max Size	med	med	med	med	high	med	med	low	med	med	med	med	med
		Desirability	low	high	low	low	low	low	low	low	high	high	low	low	low
	Post Capture Mortality		high	high	high	high	high	high	high	high	high	high	high	med	high
Susceptibility Score			2.46	2.75	2.67	2.46	2.83	2.50	2.50	2.58	2.63	2.63	2.54	2.42	2.46
Overall Risk Score			3.08	3.24	3.33	2.92	3.92	3.29	3.49	3.55	3.14	3.14	3.52	3.23	3.36
Risk Ranking			Med	High	High	Med	High	High	High	High	Med	Med	High	High	High
Overfishing			unk	no	no	no	unk	unk	unk	unk	unk	yes	unk	unk	unk
Overfished (Depleted)			unk	unk	unk	unk	unk	unk	unk	unk	yes	yes	unk	unk	unk

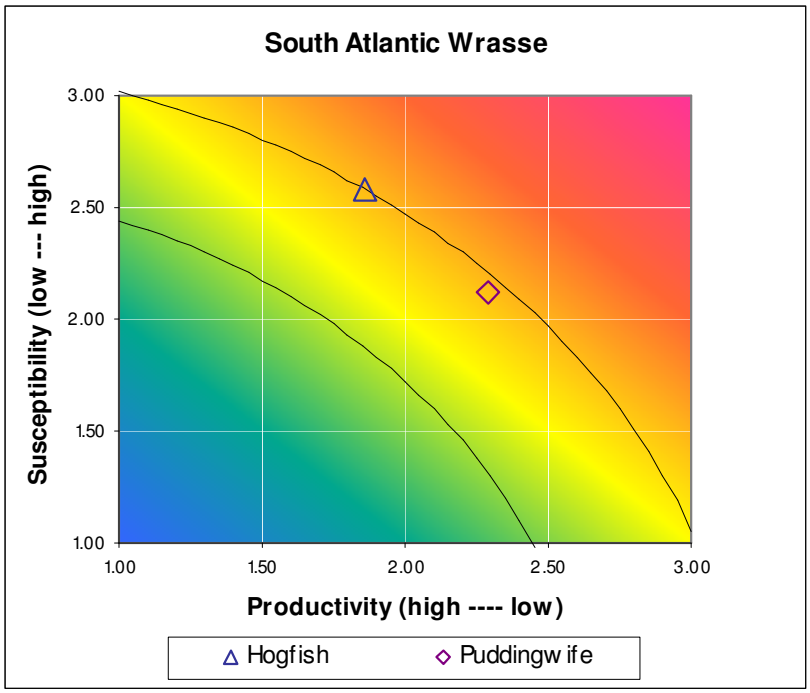
unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown

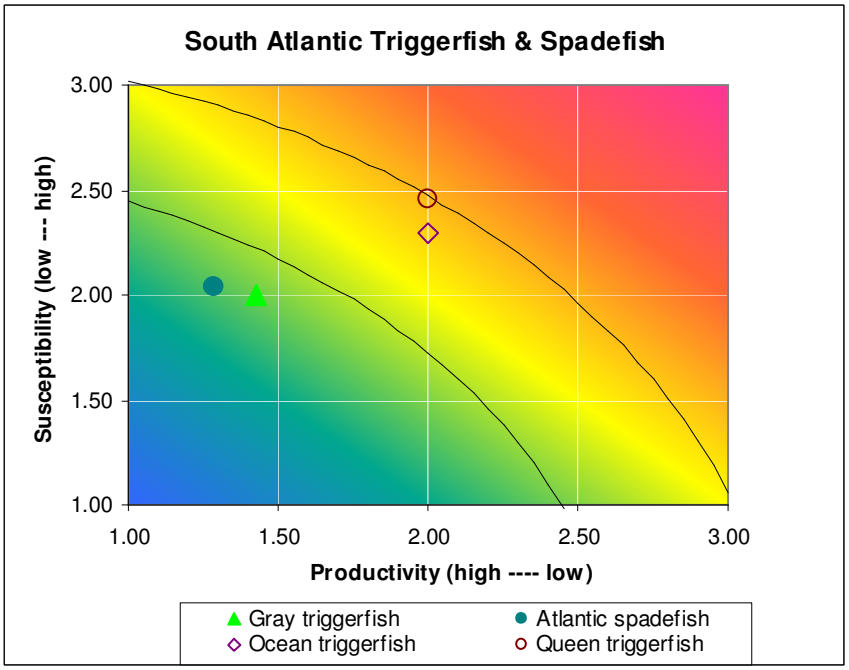
low, med, high = risk score for attribute value

RED = overfished and overfishing is occurring

Snapper/Grouper Complex, Tilefish: Tilefish, Blueline Tilefish, Sand Tilefish
Snapper/Grouper Complex, Wrasses: Hogfish, Puddingwife
Snapper/Grouper Complex, Triggerfish and Spadefish: Gray Triggerfish, Ocean Triggerfish, Queen Triggerfish, Atlantic Spadefish




South Atlantic Wrasse
Susceptibility (low --- high)
3.00
2.50
2.00
1.50
1.00
1.00
1.50
2.00
2.50
3.00
Productivity (high ---- low)
Hogfish
Puddingwife


South Atlantic Triggerfish & Spadefish
Susceptibility (low --- high)
3.00
2.50
2.00
1.50
1.00
1.00
1.50
2.00
2.50
3.00
Productivity (high ---- low)
Gray triggerfish
Atlantic spadefish
Ocean triggerfish
Queen triggerfish

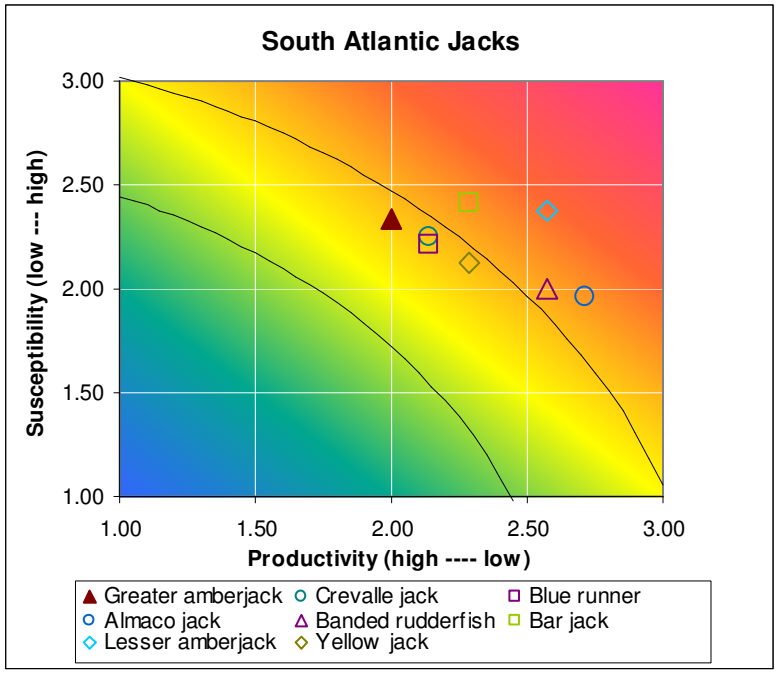
			Tilefish			Wrasses		Triggerfish & Spadefish			
			Tilefish	Blueline Tilefish	Sand Tilefish	Hogfish	Puddingwife	Gray Triggerfish	Ocean Triggerfish	Queen Triggerfish	Atlantic Spadefish
Productivity	Age at maturity		high	med	unk	unk	unk	low	unk	unk	low
	Size at maturity		med	med	unk	low	unk	low	low	low	low
	Maximum age		high	high	unk	med	unk	med	unk	med	low
	Maximum size		med	med	med	med	low	low	med	med	med
	Fecundity		low	low	unk	low	unk	low	low	med	low
	Reproductive strategy		low	low	low	low	low	med	med	med	low
	Trophic level		med	high	med	high	med	med	med	med	med
Productivity Score			2.00	2.00	2.43	1.86	2.29	1.43	2.00	2.00	1.29
Susceptibility	Availability	Global Dist	high	high	med	high	med	med	high	med	med
		Behavior	high	high	med	high	high	med	med	high	high
	Encounterability	Habitat	high	high	high	high	high	high	high	high	high
		Bathymetry	high	high	high	high	high	high	high	high	high
	Selectivity	Size at Mat	med	med	unk	unk	unk	low	low	low	low
		Max Size	med	med	med	med	low	low	med	med	med
		Desirability	high	med	low	high	low	low	low	low	low
	Post Capture Mortality		high	high	high	high	med	med	high	high	med
Susceptibility Score			2.75	2.75	2.33	2.58	2.13	2.00	2.29	2.46	2.04
Overall Risk Score			3.40	3.40	3.37	3.18	3.12	2.46	3.04	3.17	2.41
Risk Ranking			High	High	High	High	Med	Low	Med	Med	Low
Overfishing			yes	unk	unk	unk	unk	no	unk	unk	unk
Overfished (Depleted)			no	unk	unk	unk	unk	unk	unk	unk	unk

unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown

low, med, high = risk score for attribute value

RED = overfished and overfishing is occurring

Snapper/Grouper Complex, Jacks: Greater Amberjack, Crevalle Jack, Blue Runner, Almaco Jack, Banded Rudderfish, Bar Jack, Lesser Amberjack, Yellow Jack

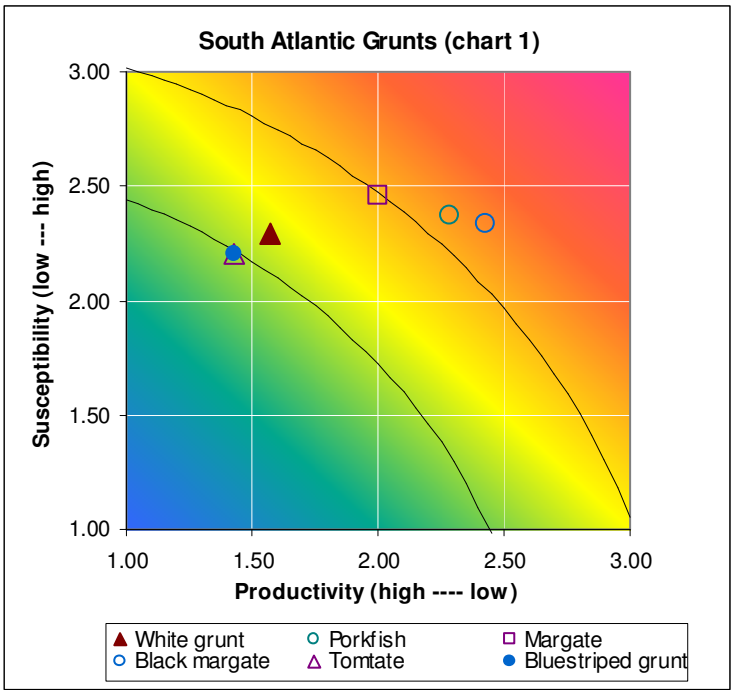


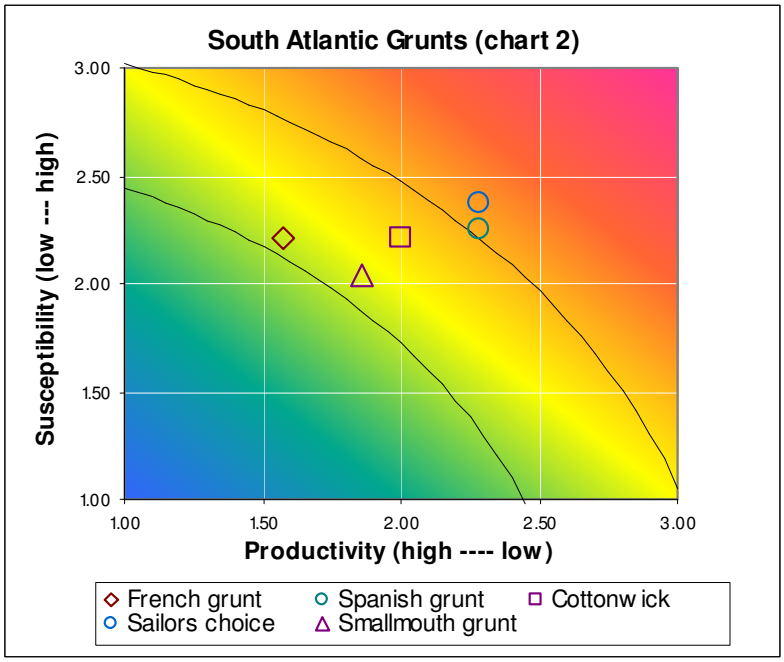
			Jacks							
			Greater Amberjack	Crevalle Jack	Blue Runner	Almaco Jack	Banded Rudderfish	Bar Jack	Lesser Amberjack	Yellow Jack
Productivity	Age at maturity		low	med	unk	unk	unk	unk	unk	unk
	Size at maturity		high	high	low	high	unk	low	unk	low
	Maximum age		med	med	med	unk	unk	unk	unk	unk
	Maximum size		high	med	med	high	med	med	med	med
	Fecundity		low	unk	unk	unk	unk	unk	unk	unk
	Reproductive strategy		low	low	low	low	low	low	low	low
	Trophic level		high	med	high	high	high	high	high	high
Productivity Score			2.00	2.14	2.14	2.71	2.57	2.29	2.57	2.29
Susceptibility	Availability	Global Dist	low	low	med	low	med	high	high	high
		Behavior	high	high	high	med	med	high	med	med
	Encounterability	Habitat	low	low	low	low	low	high	high	low
		Bathymetry	high	high	high	high	high	high	high	high
	Selectivity	Size at Mat	high	high	low	high	unk	low	unk	low
		Max Size	high	med	med	high	med	med	med	med
		Desirability	low	low	med	low	low	low	low	low
	Post Capture Mortality		high	high	high	med	med	high	med	high
Susceptibility Score			2.33	2.25	2.21	1.96	2.00	2.42	2.38	2.13
Overall Risk Score			3.07	3.11	3.08	3.35	3.26	3.33	3.50	3.12
Risk Ranking			Med	Med	Med	High	High	High	High	Med
Overfishing			no	unk	unk	unk	unk	unk	unk	unk
Overfished (Depleted)			no	unk	unk	unk	unk	unk	unk	unk

unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown

low, med, high = risk score for attribute value

Snapper/Grouper Complex, Grunts: White Grunt, Porkfish, Margate, Black Margate, Tomtate, Bluestriped Grunt, French Grunt, Spanish Grunt, Cottonwick Grunt, Sailors Choice, Smallmouth Grunt



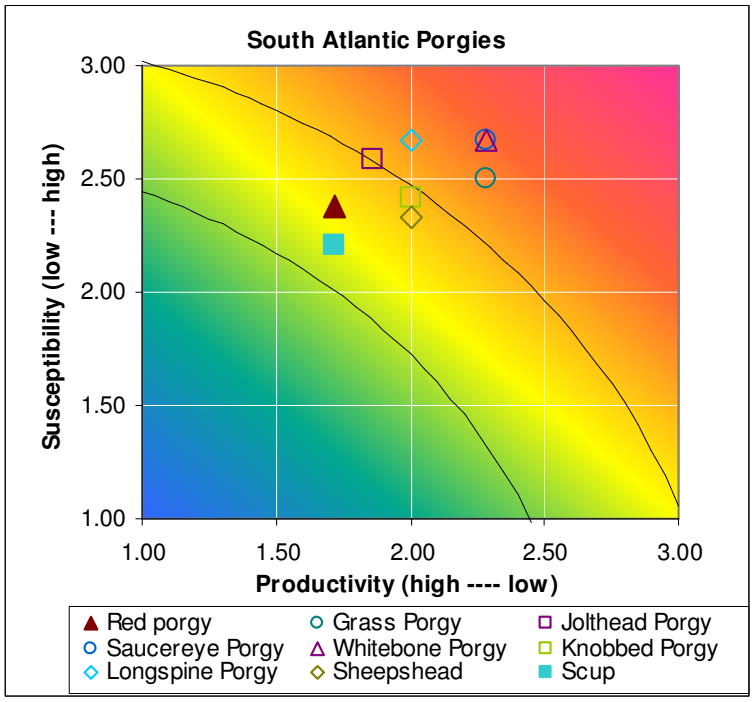


			Grunts										
			White Grunt	Porkfish	Margate	Black Margate	Tomtate	Bluestriped Grunt	French Grunt	Spanish Grunt	Cottonwick Grunt	Sailors Choice	Smallmouth Grunt
Productivity	Age at maturity		low	unk	med	unk	unk	med	med	unk	unk	unk	unk
	Size at maturity		low	unk	high	unk	low	low	low	unk	low	unk	low
	Maximum age		med	unk	unk	unk	low	med	unk	unk	unk	unk	unk
	Maximum size		low	low	med	med	low	low	low	low	low	low	med
	Fecundity		med	unk	low	unk	low	low	low	unk	unk	unk	low
	Reproductive strategy		low	low	low	low	low	low	low	low	low	low	low
	Trophic level		high	med	med	med	med	med	med	med	med	med	med
Productivity Score			1.57	2.29	2.00	2.43	1.43	1.43	1.57	2.29	2.00	2.29	1.86
Susceptibility	Availability	Global Dist	med	med	med	med	med	med	med	med	med	med	med
		Behavior	high	high	high	unk	high	high	high	med	high	high	high
	Encounterability	Habitat	high	high	high	high	high	high	high	high	high	high	high
		Bathymetry	high	high	high	high	high	high	high	high	high	high	high
	Selectivity	Size at Mat	low	unk	high	unk	low	low	low	unk	low	unk	low
		Max Size	low	low	med	med	low	low	low	low	low	low	med
		Desirability	low	low	low	low	low	low	low	low	low	low	low
	Post Capture Mortality		high	high	high	high	high	high	high	high	high	high	med
Susceptibility Score			2.29	2.38	2.46	2.33	2.21	2.21	2.21	2.25	2.21	2.38	2.04
Overall Risk Score			2.78	3.30	3.17	3.37	2.63	2.63	2.71	3.21	2.98	3.30	2.76
Risk Ranking			Med	High	Med	High	Low	Low	Med	High	Med	High	Med
Overfishing			no	unk	unk	unk	unk	unk	unk	unk	unk	unk	unk
Overfished (Depleted)			unk	unk	unk	unk	unk	unk	unk	unk	unk	unk	unk

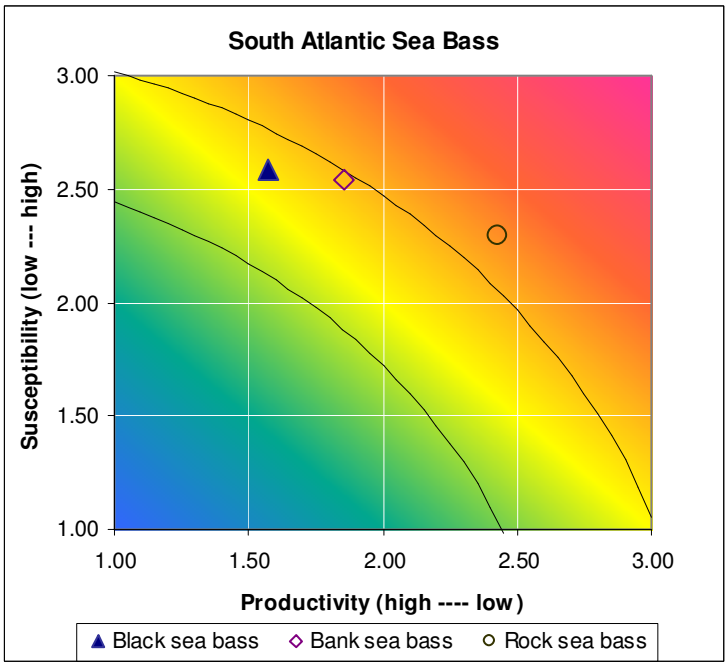
unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown

low, med, high = risk score for attribute value

Snapper/Grouper Complex, Porgies: Red Porgy, Grass Porgy, Jolthead Porgy, Saucereye Porgy, Whitebone Porgy, Knobbed Porgy, Longspine Porgy, Sheepshead, Scup



Snapper/Grouper Complex, Sea Basses: Black Sea Bass, Bank Sea Bass, Rock Sea Bass



			Porgies									Sea Basses		
			Red Porgy	Grass Porgy	Jolthead Porgy	Saucereye Porgy	Whitebone Porgy	Knobbed Porgy	Longspine Porgy	Sheepshead	Scup	Black Sea Bass	Bank Sea Bass	Rock Sea Bass
Productivity	Age at maturity		med	unk	med	unk	unk	high	unk	low	med	low	med	unk
	Size at maturity		low	unk	low	unk	unk	low	unk	unk	low	low	unk	unk
	Maximum age		med	unk	med	unk	med	med	low	med	med	med	low	unk
	Maximum size		med	low	med	low	low	low	low	med	low	med	low	low
	Fecundity		low	unk	unk	unk	unk	unk	unk	med	med	low	med	unk
	Reproductive strategy		low	low	low	low	low	low	low	low	low	low	low	low
	Trophic level		high	med	med	med	high	unk	med	high	high	high	unk	unk
Productivity Score			1.71	2.29	1.86	2.29	2.29	2.00	2.00	2.00	1.71	1.57	1.86	2.43
Susceptibility	Availability	Global Dist	med	high	high	high	high	high	high	med	med	high	med	med
		Behavior	high	high	high	high	high	high	unk	med	high	high	high	high
	Encounterability	Habitat	high	high	high	high	high	high	high	high	high	high	high	high
		Bathymetry	high	high	high	high	high	high	high	high	high	high	high	high
	Selectivity	Size at Mat	low	unk	low	unk	unk	low	unk	unk	low	low	unk	unk
		Max Size	med	low	med	low	low	low	low	med	low	med	low	low
		Desirability	med	low	low	low	low	low	low	low	low	high	low	low
	Post Capture Mortality		high	high	high	high	high	high	high	high	high	high	high	med
Susceptibility Score			2.38	2.50	2.58	2.67	2.67	2.42	2.67	2.33	2.21	2.58	2.54	2.29
Overall Risk Score			2.93	3.39	3.18	3.51	3.51	3.14	3.33	3.07	2.80	3.02	3.15	3.34
Risk Ranking			Med	High	High	High	High	Med	High	Med	Med	Med	Med	High
Overfishing			no	unk	unk	unk	unk	unk	unk	unk	unk	yes	unk	unk
Overfished (Depleted)			yes	unk	unk	unk	unk	unk	unk	unk	unk	yes	unk	unk

unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown

low, med, high = risk score for attribute value

RED = overfished and overfishing is occurring