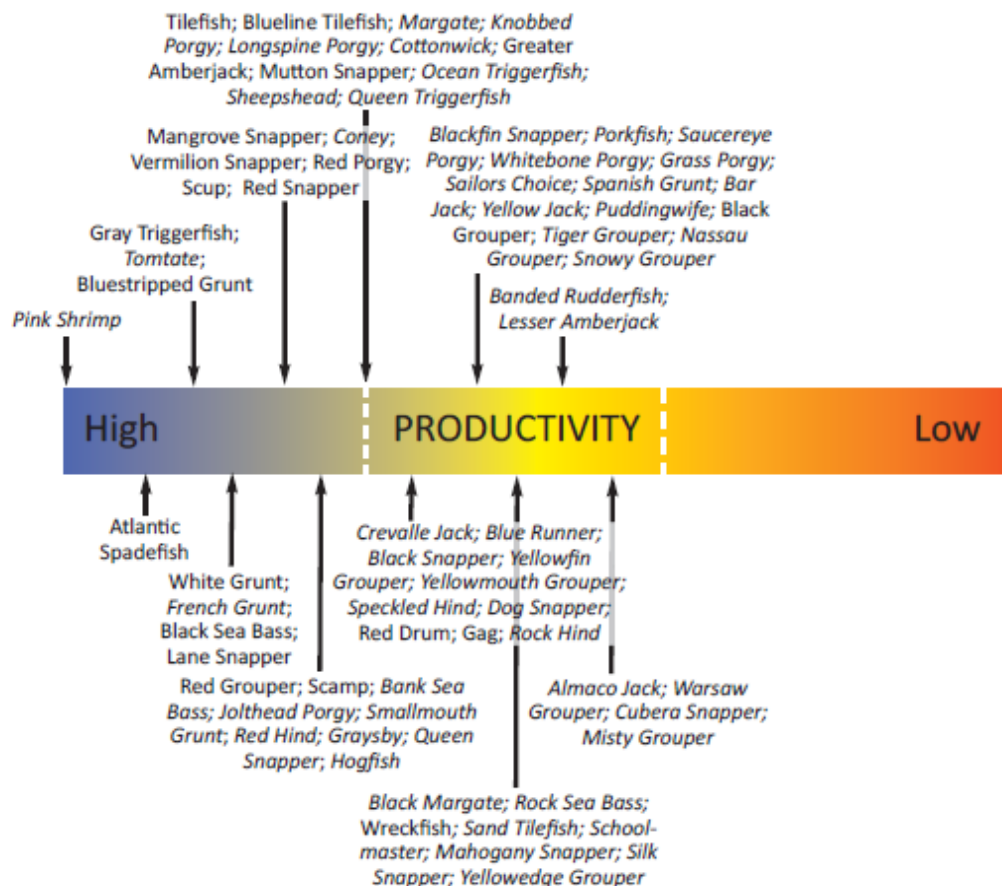
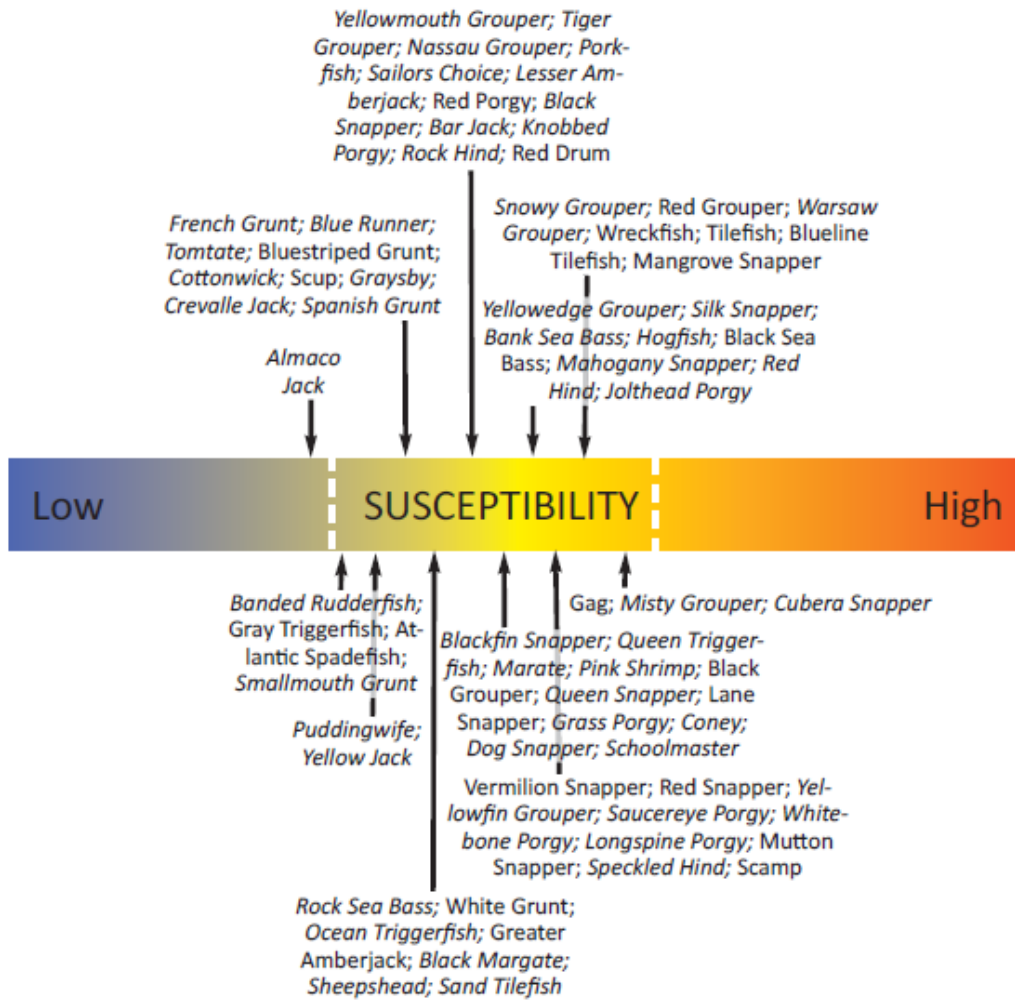


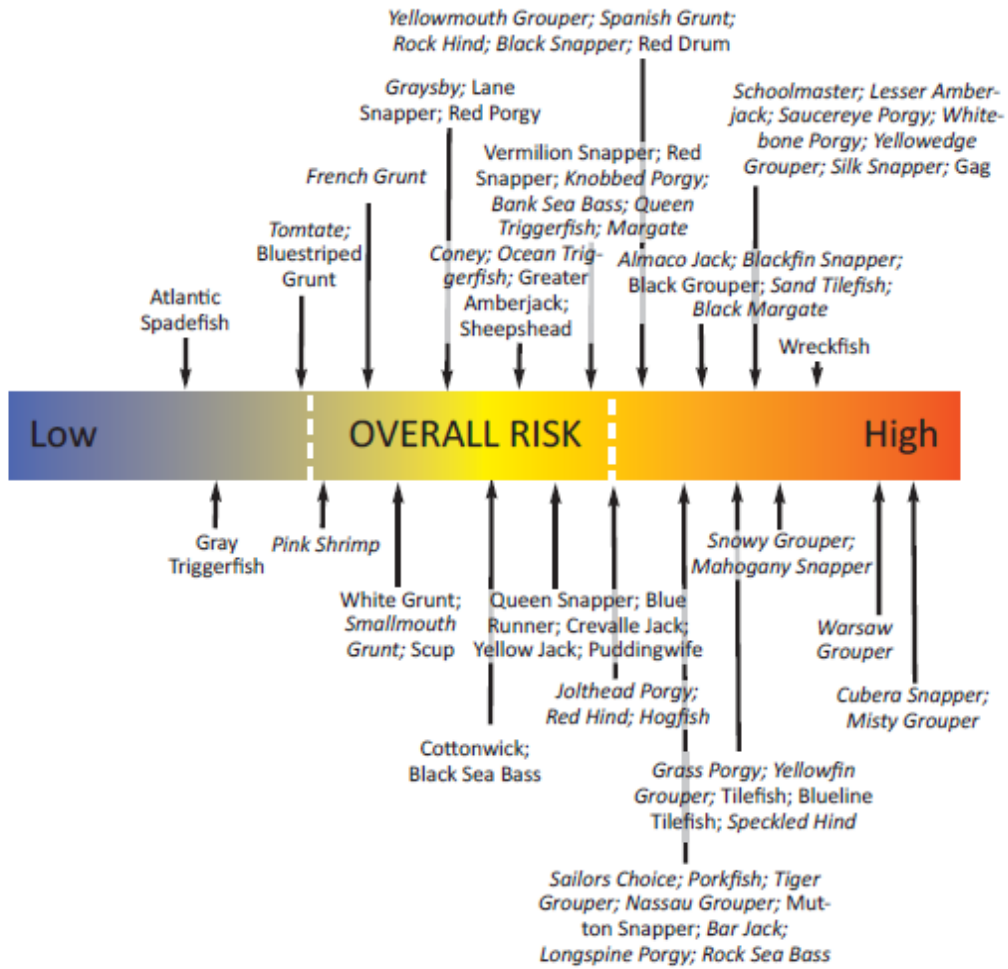
Productivity and Susceptibility Analyses: South Atlantic

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).

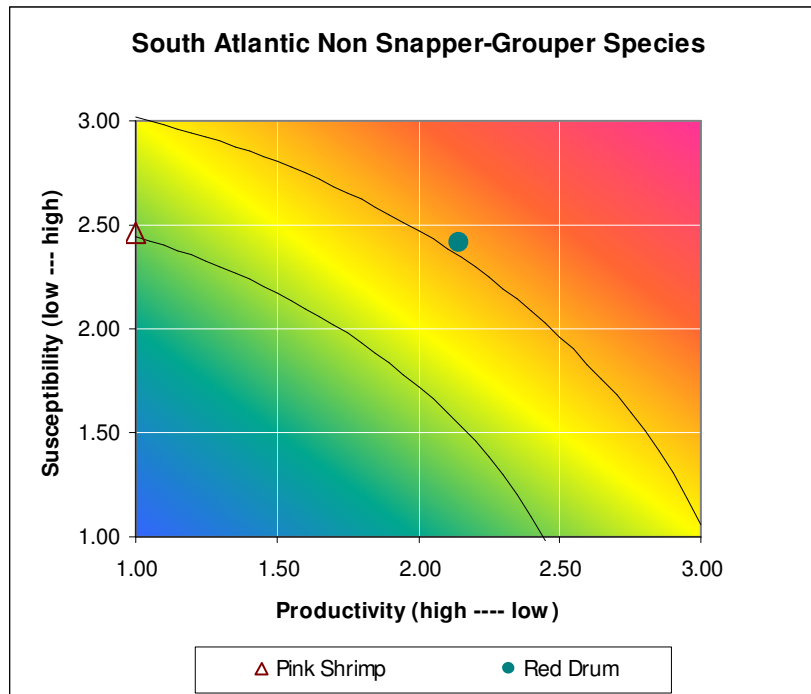
Of these 73, four scored low overall risk, twenty-five scored moderate overall risk, and forty-four scored high overall risk. Of the forty-four high risk scores, thirty-three are missing information for at least one attribute. Of those thirty-three, nineteen are missing information for three or more attributes (that's 43% of the stocks that scored high risk). In the following figures, the italicized 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.







Non Snapper Grouper: Pink Shrimp, Red Drum

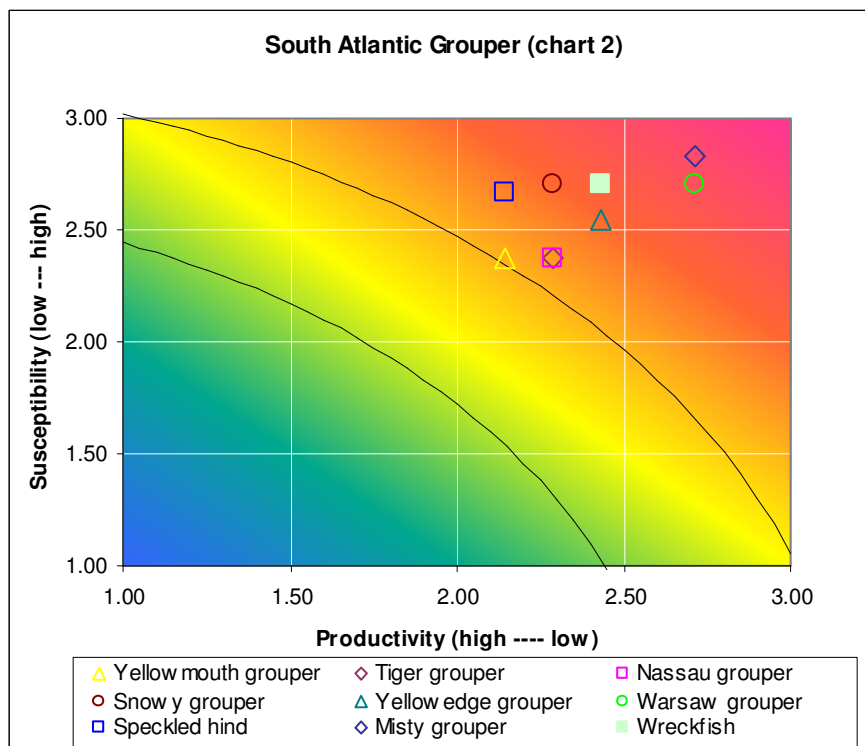
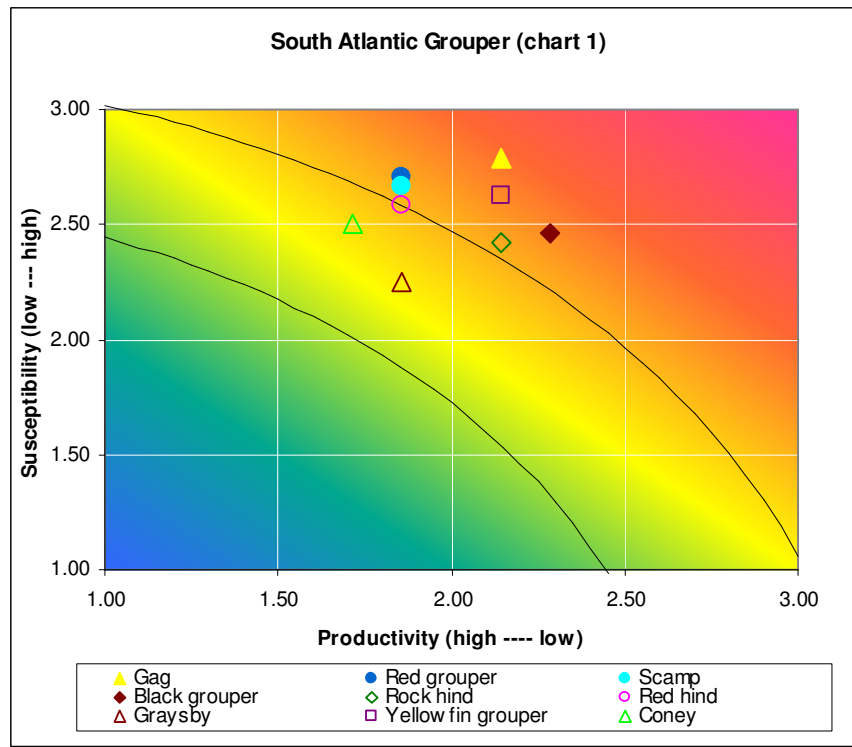


		Pink Shrimp	Red Drum	
Productivity	Age at maturity	low	med	
	Size at maturity	low	high	
	Maximum age	low	high	
	Maximum size	low	med	
	Fecundity	low	low	
	Reproductive strategy	low	low	
	Trophic level	low	high	
	Productivity Score	1.00	2.14	
Susceptibility	Availability	Global Dist	high	high
		Behavior	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

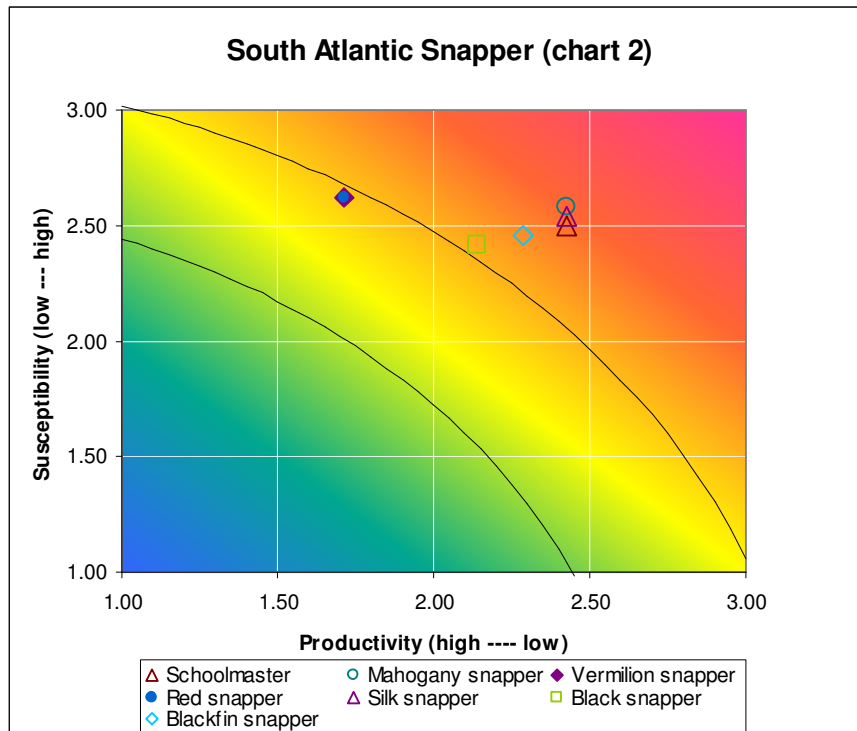
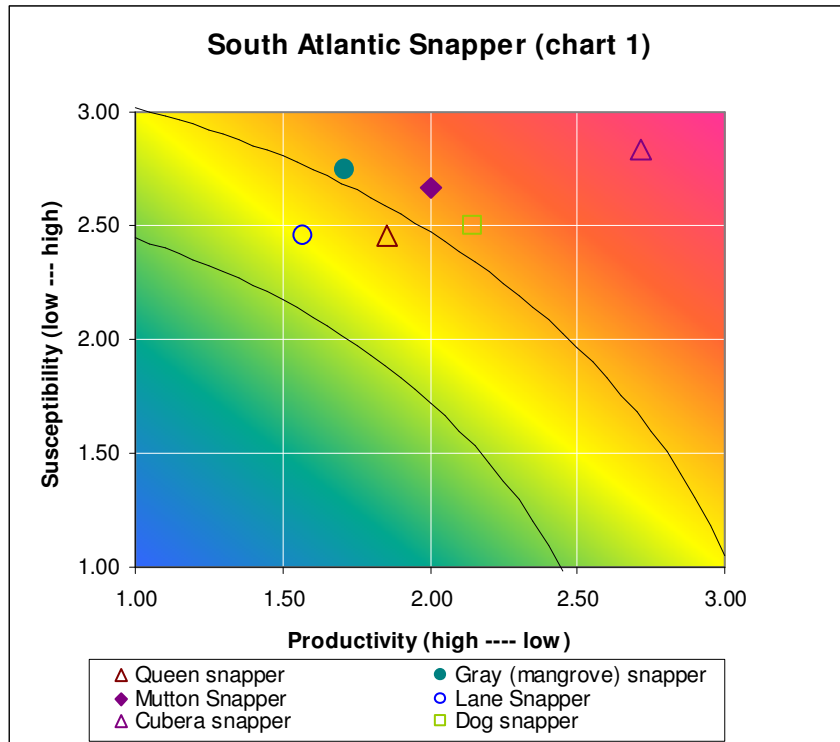
		Groupers (Table 2)									
		Yellowmouth Grouper	Tiger Grouper	Nassau Grouper	Snowy Grouper	Yellowedge Grouper	Warsaw Grouper	Speckled Hind	Misty Grouper	Wreckfish	
Productivity	Age at maturity	med	high	high	high	high	high	med	unk	unk	
	Size at maturity	med	med	med	med	med	high	med	high	high	
	Maximum 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	Mahogany 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

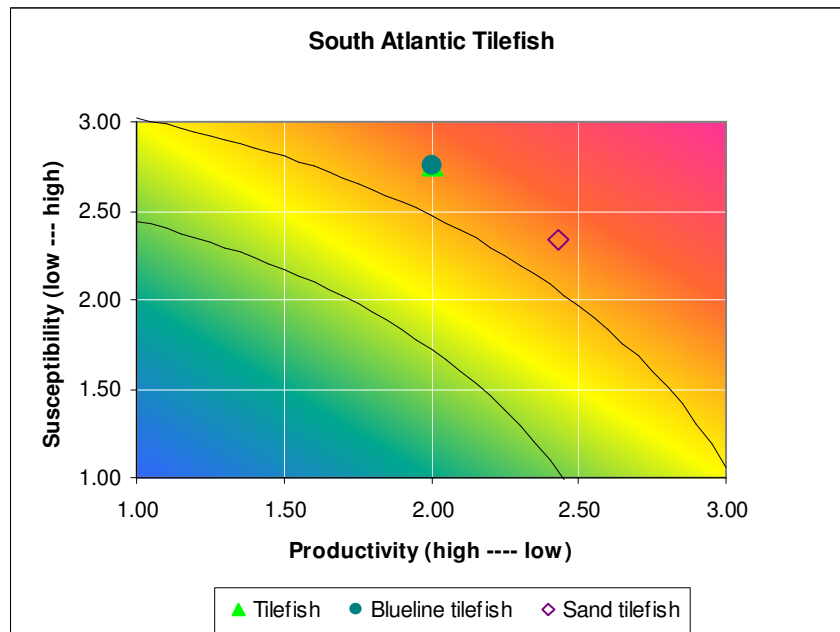
low, med, high = risk score for attribute value

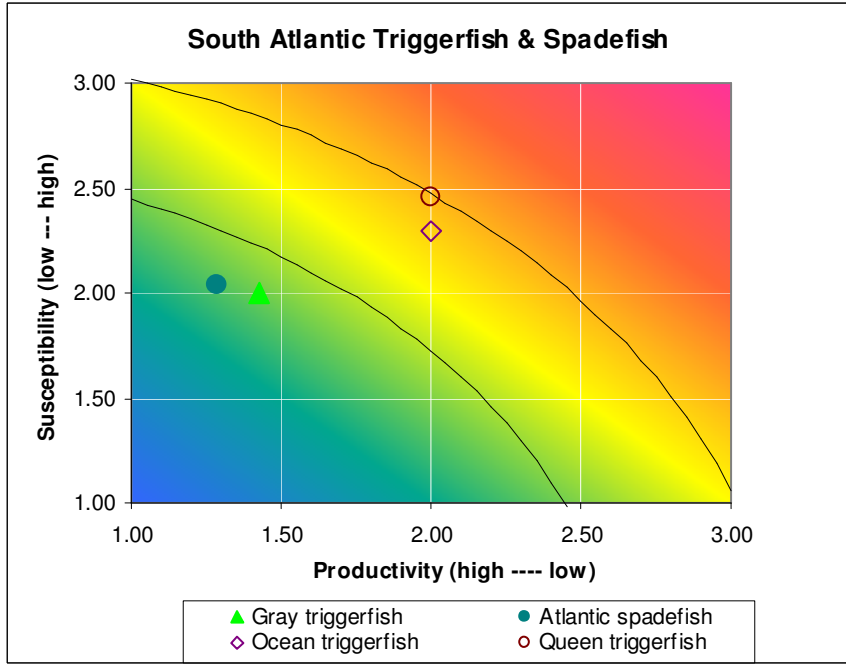
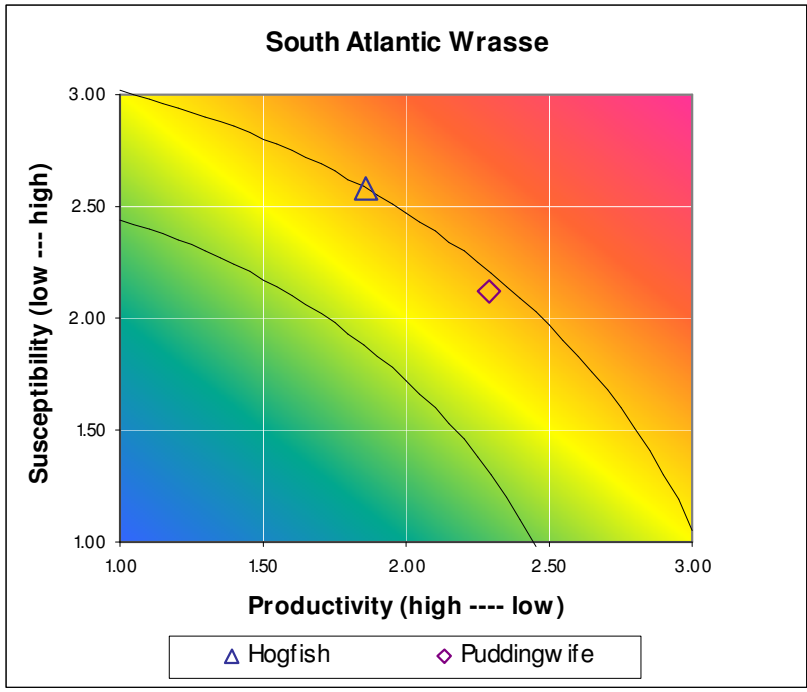
RED = overfished and overfishing is occurring

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





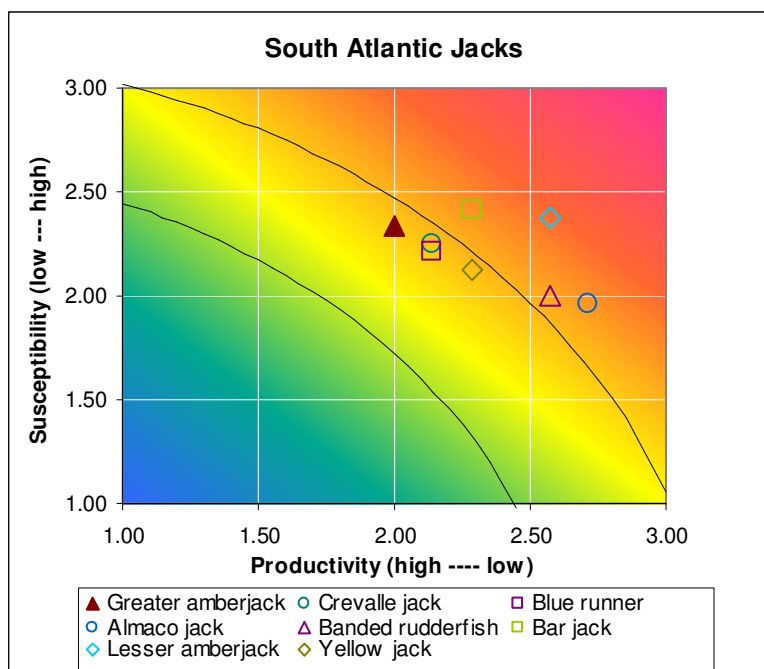
		Tilefish			Wrasses		Triggerfish & Spadefish				
		Tilefish	Blueline Tilefish	Sand Tilefish	Hogfish	Puddingwife	Gray Triggerfish	Ocean Triggerfish	Queen Triggerfish	Atlantic Spadefish	
Productivity	Age at maturity	high	med	unk	unk	unk	low	unk	unk	low	
	Size at maturity	med	med	unk	low	unk	low	low	low	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

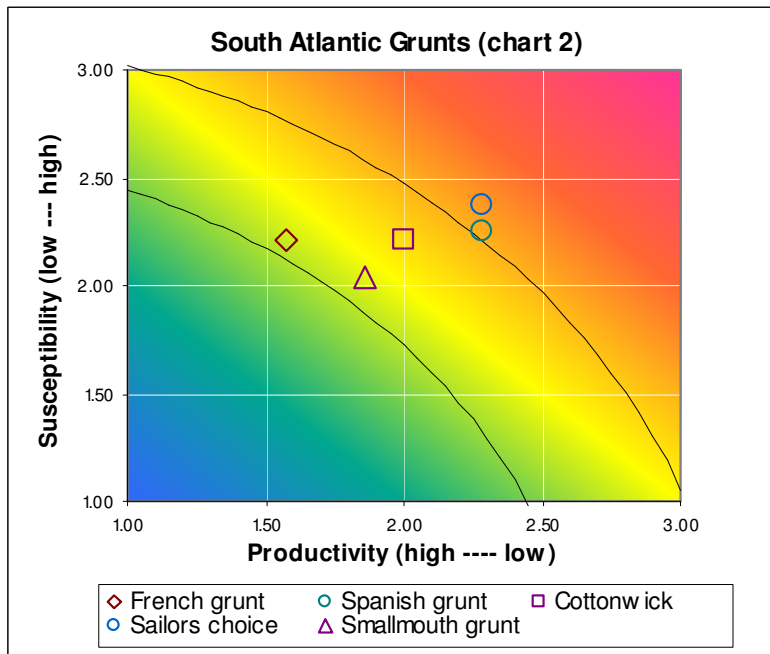
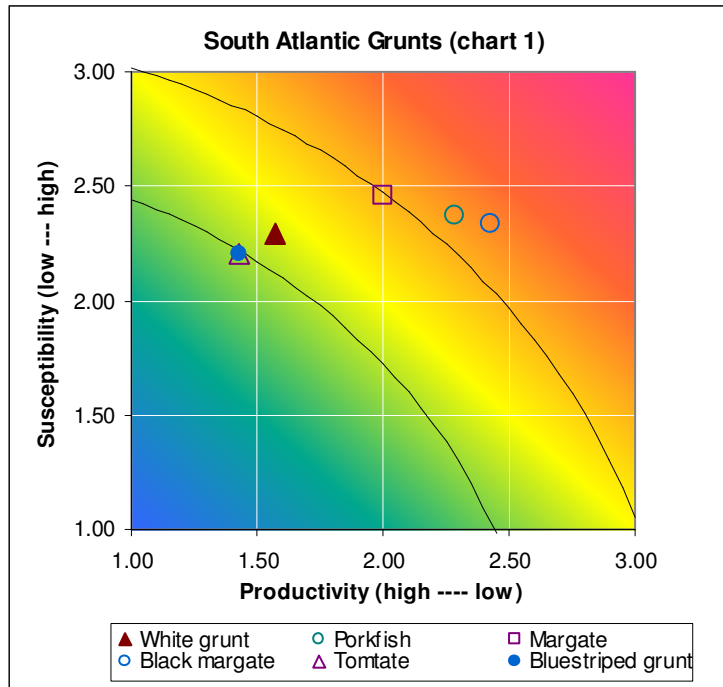


		Jacks								
		Greater Amberjack	Crevalle Jack	Blue Runner	Almaco Jack	Banded Rudderfish	Bar Jack	Lesser Amberjack	Yellow Jack	
Productivity	Age at maturity	low	med	unk	unk	unk	unk	unk	unk	
	Size at maturity	high	high	low	high	unk	low	unk	low	
	Maximum age	med	med	med	unk	unk	unk	unk	unk	
	Maximum size	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

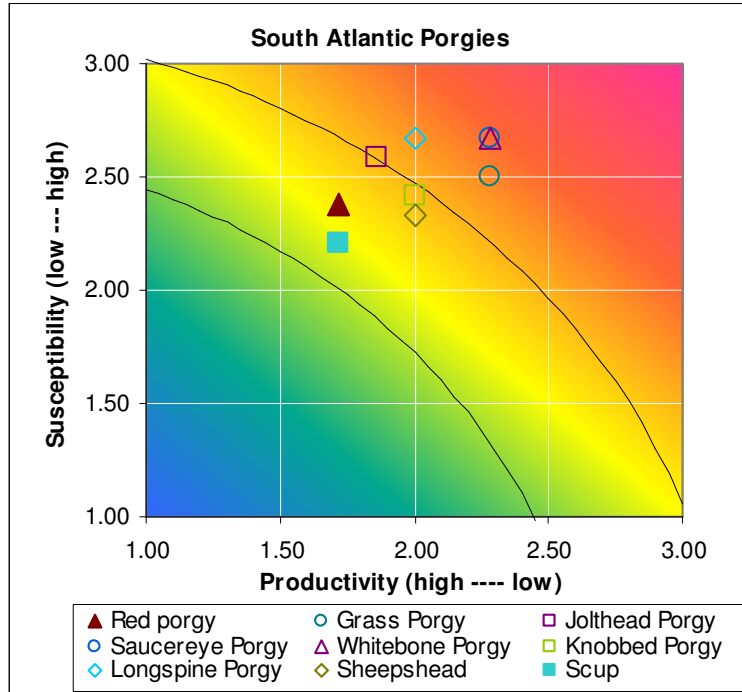


		Grunts											
		White Grunt	Porkfish	Margate	Black Margate	Tomtate	Bluestriped Grunt	French Grunt	Spanish Grunt	Cottonwick Grunt	Sailors Choice	Smallmouth Grunt	
Productivity	Age at maturity	low	unk	med	unk	unk	med	med	unk	unk	unk	unk	
	Size at maturity	low	unk	high	unk	low	low	low	unk	low	unk	low	
	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	
		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	

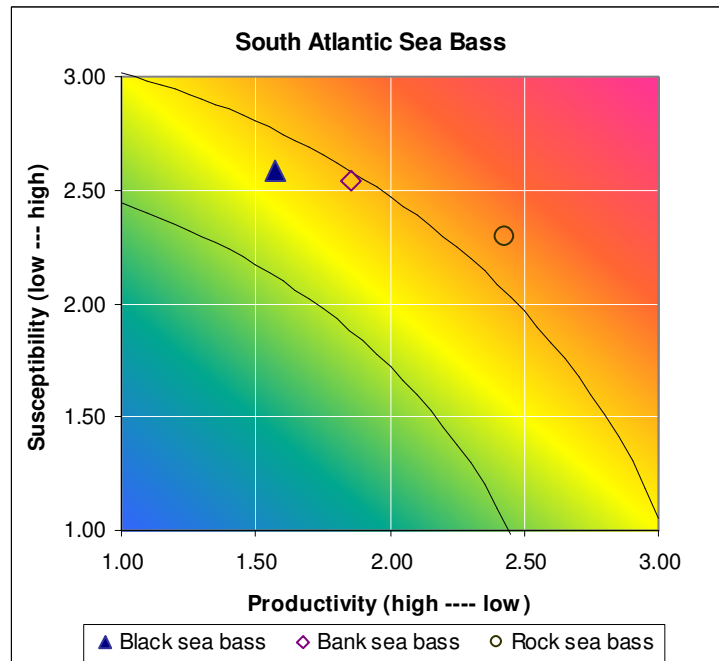
unk = unknown attribute values are treated with precaution and assigned high risk; stock status unknown

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 Bases: 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