

Managing Marine Fisheries Notes

1	Title Slide
2	Outline
3	<p>From http://www-personal.umich.edu/~rdeyoung/tragedy.html, "Ecologist Garrett Hardin's "tragedy of the commons" (Hardin, 1968) has proven a useful concept for understanding how we have come to be at the brink of numerous environmental catastrophes. People face a dangerous situation created not by malicious outside forces but by the apparently appropriate and innocent behaviors of many individuals acting alone. Hardin's parable involves a pasture "open to all." He asks us to imagine the grazing of animals on a common ground. Individuals are motivated to add to their flocks to increase personal wealth. Yet, every animal added to the total degrades the commons a small amount. Although the degradation for each additional animal is small relative to the gain in wealth for the owner, if all owners follow this pattern the commons will ultimately be destroyed. And, being rational actors, each owner adds to their flock."</p> <p>The same theory can be applied to fisheries. Oceans, and the fish that live in them, are considered a common resource. Individuals will fish to their maximum extent if the resource is not managed.</p> <p>From: Understanding Fisheries Management: A Manual for understanding the Federal Fisheries Management Process, Including Analysis of the 1996 Sustainable Fisheries Act (MS, AL, Auburn University Sea Grant)</p> <p>To prevent "the tragedy of the commons" most common property resources are held in trust and managed for the people by state or federal government agencies. Fish living in public waters are a common property resource. The government has the responsibility of managing the fish for the benefit of all citizens, even those who do not fish.</p> <p>So who owns the fish? You do — along with the other 275 million citizens of the U.S. In order for all to benefit from this renewable resource, the fish are managed using some basic principles.</p>
4	<p>In the US fisheries are managed by government entities. Federal waters begin at 3 nautical miles on the Atlantic and 9 nautical miles in the Gulf of Mexico. In federal waters fisheries are managed by the National Oceanic and Atmospheric Administration under the Department of Commerce. In Florida, fisheries in state waters are managed by the Florida Fish and Wildlife Conservation Commission.</p>
5	<p>The Optimum Sustainable Yield for fisheries is the management of a fish stock that allows the maximum yearly harvest that can be sustained through time (Maximum Sustainable Yield) that also considers a broad range of other considerations, economic, sociological and ecological. Fisheries managers use many tools to manage fisheries including total allowable catch for the entire fishery, seasons, size limits and limits in the amount each individual fisher can keep.</p>

6	<p>Florida has over 1300 miles of coastline (over 8,000 if you include backwaters), hundreds of different species of fish with different life histories numerous habitat, is surrounded by Atlantic, Gulf, and Caribbean is contending with increased angler pressure, habitat destruction/alteration, pollution</p> <p>From FWC; Many of Florida's economically important marine species have declined in abundance due to over-fishing, habitat loss, and environmental disturbances such as chemical spills, cold kills, and red tide</p> <p>Any fishery has three components: fish, habitat, and people. To effectively address the issues of a particular fishery, natural resource managers must have information on all three of these components. Resource managers ask many questions: How many fish are people catching? What size are the fish? Are people satisfied with the fishery? Are the fish growing fast? Is there enough food for the fish to eat? Is the habitat suitable for fish growth and reproduction?</p>
7	No Notes
8	No Notes
9	<p>From: Understanding Fisheries Management: A Manual for understanding the Federal Fisheries Management Process, Including Analysis of the 1996 Sustainable Fisheries Act (MS, AL, Auburn University Sea Grant)</p> <p>To complete a stock assessment fisheries biologists need to know:</p> <ol style="list-style-type: none"> 1. The age structure of the stock. 2. The age at first spawning. 3. Fecundity (average number of eggs each age fish can produce). 4. Ratio of males to females in the stock. 5. Natural mortality (the rate at which fish die of natural causes). 6. Fishing mortality (the rate at which fish die of being harvested). 7. Growth rate of the fish. 8. Spawning behavior (time and place). 9. Habitats of recently hatched fish (larvae), of juveniles and of adults. 10. Migratory habits. 11. Food habits for all ages of fish in the stock. 12. Estimate of the total number or weight of fish in the stock <p>Before you can manage any fishery, you must know about its life history, how fast it grows, behavior, how much is it fished.</p> <p>You also need to determine if:</p> <ol style="list-style-type: none"> 1. the fishery needs to be managed, 2. it doesn't need to be managed, or 3. data are too limited to make a decision
10	<p>From: Understanding Fisheries Management: A Manual for understanding the Federal Fisheries Management Process, Including Analysis of the 1996 Sustainable Fisheries Act (MS, AL, Auburn University Sea Grant)</p> <p>Fisheries managers also need information from the anglers</p> <ol style="list-style-type: none"> 1. The kinds of fishermen in the fishery (longliners, rod and reel, netters, recreational anglers, etc.). 2. Pounds of fish caught by each kind of fisherman over many years. 3. Fishing effort expended by each kind of fisherman over many years. 4. The age structure of the fish caught by each group of fishermen.

	<p>5. The ratio of males to females in the catch.</p> <p>6. How the fish are marketed (preferred size, etc.).</p> <p>7. The value of fish to the different groups of fishermen.</p> <p>8. The time and geographic area of best catches.</p>
11	<p>Some Basics</p> <p>Stock assessments often consist of two nearly separate activities. One is to learn as much as possible about the biology of the species in the stock. The other is to learn about the fishing activities for the stock. Historically, the demand for a stock assessment has usually come after a stock is already in decline. When a stock assessment begins, there may be little or no information on the biology of the species or the fishery. Meanwhile, there is pressure to complete some kind of stock assessment so that the stock can be managed. This leads to preliminary stock assessments which provide or initial management recommendations until more information is available.</p>
12	<p>General procedure used in fisheries biology</p> <p>Stock Assessment: report on the health of the stock including recommendations for actions to maintain or restore stock- FMP</p> <p>Populations fluctuate around carrying capacity-continued harvesting lowers populations below carrying capacity- For harvesting to continue, populations have to replenish themselves by producing enough offspring to meet carrying capacity.</p>
13	No Notes
14	Fisheries management must recognize the economic, social, and cultural interest of all stakeholders in a fishery and how these interests affect resource management.
15	No Notes
16	<p>Quoted from http://www.gulfcouncil.org/</p> <p>The Magnuson-Stevens Fishery Conservation and Management Act was passed by the U.S. Congress in 1976. It created a 200-mile limit of U.S. control over waters once heavily fished by foreign fleets. It also set up a federal management system for fishing between three and 200 nautical miles. States continue to manage fishing out to about three miles but now must coordinate what they do with federal management. One of the special features of the Magnuson-Stevens Act is that it encourages local-level participation and representative democracy.</p> <p>The Magnuson Act requires that the membership of each council reflect the expertise and interest of the states and specifies how many members each council shall have. Voting members serve three-year terms (for a maximum of three consecutive terms). Council members who vote include:</p> <ol style="list-style-type: none"> a. Each state's director of marine fisheries or equivalent as designated by the Governor; b. One individual from each state, nominated by that state's governor and selected from a list of at least three such people by the Secretary of Commerce, who are knowledgeable or experienced in recreational or commercial fishing, or marine conservation; c. At-large members from any of the states in the region and who are nominated by the state governors and appointed by the Secretary of Commerce; d. The regional director of the National Marine Fisheries Service for the area covered by the council. If two such directors are within such geographical area, the Secretary of Commerce designates which of the directors shall be the voting member. It is important to note that the

	<p>National Marine Fisheries Service regions do not coincide with council regions. For example, the Southeast Regional Office of the NMFS covers the South Atlantic Council, the Gulf of Mexico Council and the Caribbean Council.</p> <p>Advisory Panels: recreational and commercial fishermen, charter boat operators, buyers, sellers and consumers who are knowledgeable about a particular fishery.</p> <p>Scientific, Management and Statistical Committees: economists, biologists, sociologists and natural resource attorneys who are knowledgeable about the technical aspects of fisheries in the particular region.</p> <p>Stock Assessment Panels: biologists who are trained in the specialized field of population dynamics, and who assess the available biological data and advise the councils on the status of stocks and level of acceptable biological catch</p>
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25	<p>Mature at 5-6 years Can live over 35 years Spawn July-Sept Spawning aggregations of over 100 individuals Maximum length 8 feet Up to 880 lbs</p> <p>The body color is brownish yellow, grey or greenish, with black spots appearing on the topside of its head, body and fins. Mangrove habitat is thought to be the primary habitat for juveniles (up to approximately three feet), and adults are often found on artificial reefs, overhangs, bridges, piers and shipwrecks. In the western Atlantic Ocean, this species ranges from Bermuda and the Carolinas (though rarely) down through the coast of Brazil, including the Gulf of Mexico and the Caribbean Sea.</p> <p>From NOAA:</p> <ul style="list-style-type: none"> • Goliath • Goliath grouper is the largest of the western north Atlantic groupers. It can reach about 455 kg (800 lbs) and over 2 m total length. • Fish mature at 5 or 6 years of age at about one meter in length. They are relatively long lived, with individuals at least 37 years old found in exploited populations. It is possible, however, that older fish occurred in unfished populations. This species is very vulnerable to cold temperatures and red tide • Most adults are found on shallow reefs, the deepest being about 150 feet. They form spawning aggregations of about 100 individuals at consistent sites from July through September. Fish may move up to 100 km from inshore reefs to these spawning sites, which typically occur on rock ledges, isolated patch reefs, and even on ship wrecks. • Goliath grouper have a pelagic larval duration of approximately 6 weeks. They settle in shallow mangrove habitat, first in mangrove leaf litter, and then along mangrove shorelines. The juvenile stage lasts 5 or 6 years in this mangrove habitat, after which

	<p>fish egress to shallow reefs, eventually joining adult populations offshore. Their distribution in mangroves depends on local water quality, particularly dissolved oxygen content (> 4 ppm) and mid-range salinities (> 10 ppt).</p>
26	<p>From Koenig: Historically, goliath grouper were found in tropical and subtropical waters of the Atlantic Ocean, both coasts of Florida, and from the Gulf of Mexico down to the coasts of Brazil and the Caribbean. Most adults are found on shallow reefs, the deepest being about 150 feet.</p> <p>With the help of the Florida Wildlife Research Institute (see FWRI Hotline), we are developing a catalogue of goliath grouper sightings throughout the southeastern United States. These efforts so far have concentrated in Florida, but we are slowly obtaining information from other sites. Periodic updates will be made to this distribution map.</p>
27	<p>Spawning in aggregations – most are found to date of SWFL but additional ones have been found off the central east coast.</p> <p>Fish may move up to 100 km from inshore reefs to these spawning sites, which typically occur on rock ledges, isolated patch reefs, and even on ship wrecks.</p> <p>Contain less than 100 individuals</p> <p>Late summer/early fall</p> <p>Dark nights (new moon particularly) between 10 pm and 3 am – likely an adaptation to avoid egg predation</p> <p>Note: Photo is a Nassau Grouper Spawning Aggregation</p>
28	<p>From Koenig: Goliath grouper have a pelagic larval duration of approximately 6 weeks. They settle in shallow mangrove habitat, first in mangrove leaf litter, and then along mangrove shorelines. The juvenile stage lasts 5 or 6 years in this mangrove habitat, after which fish egress to shallow reefs, eventually joining adult populations offshore. Their distribution in mangroves depends on local water quality, particularly dissolved oxygen content (> 4 ppm) and mid-range salinities (> 10 ppt).</p>
29	No Notes
30	<p>Dr. Koenig found that 85% of the diet of GG is crustaceans – most of which were crabs. The remaining 15% of their diet was primarily slow moving fish such as burrfish, catfish, toadfish etc. They forage in the daylight and are mostly inactive at night.</p> <p>Aside from their natural feeding behavior, goliath grouper are also opportunistic predators (Sadovy and Eklund, 1999).</p> <p>They will readily strike at a struggling fish on a line and feed on numerous species in this fashion including snapper, grouper, snook, amberjack, and even small sharks.</p>
31	No Notes
32	<p>Both commercial and recreational goliath grouper landings have occurred since at least the 1800s. This species had been caught traditionally by hook and line, speargun, and as bycatch from traps and trawls (GMFMC, 1990). The majority of commercial and recreational goliath grouper landings were reported during the species' reproductive season (August-September).</p> <p>Goliath grouper are particularly susceptible to overexploitation. This is due in part to their slow growth, longevity, and large size at sexual maturity. In addition, because they aggregate to spawn, they are easy targets. This is true for any species in which large numbers of otherwise widely-dispersed fish become concentrated in predictable areas and times. Fishing on spawning aggregations increases catch per effort to the point of population collapse, removing reproductive individuals that are usually the largest fish in the</p>

	population. Indeed, intense recreational and commercial fishing pressure contributed to the population decline of goliath grouper in the 1980s.
33	No Notes
34	No Notes
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36	No Notes
37	<ul style="list-style-type: none"> • The goliath grouper fishery expanded quickly and dramatically through the 1980s, which required the introduction of conservation and management measures for the species. The • SAFMC prohibited the spearing of goliath grouper in March 1983 • 1985, the state of Florida implemented an 18-inch minimum size limit for goliath grouper to help prevent the harvest of juvenile fish. • In 1989, the GMFMC implemented a 50-inch (1,270-mm) TL minimum size limit for goliath grouper (GMFMC, 1989). This measure was originally considered conservative enough to restore the stock. However, additional information revealed the stock was more depleted than previously thought, so March 1990 the GMFMC prohibited the harvest and possession of goliath grouper in federal waters of the Gulf of Mexico • Likewise, the SAFMC prohibited the harvest and possession of goliath grouper from federal waters (i.e., > 3 nm offshore) off North Carolina southward through Florida in November 1990 • Florida prohibited the harvest and possession of goliath grouper from state waters in 1990. • Eventually, all other coastal states from North Carolina to Texas implemented regulations to prohibit the harvest or possession of goliath grouper.
38	No Notes
39	<p>References: The majority of info on Goliath Grouper, including many of the images, is from Dr. Koenig at FSU</p> <p>http://www.flmnh.ufl.edu/fish/gallery/Descript/GoliathGrouper/GoliathGrouper.html</p> <p>http://www.bio.fsu.edu/coleman_lab/goliath_grouper.php</p> <p>http://www.bio.fsu.edu/ifre/ifre_research_jewfish.html</p> <p>References on Fisheries Management</p> <p>http://www.nmfs.noaa.gov/sfa/magact/</p> <p>http://www.gulfcouncil.org/</p> <p>http://www.nmfs.noaa.gov/</p> <p>http://www.olemiss.edu/orgs/SGLC/Fisheries/fishman.pdf</p>