GOLDEN TILEFISH

Lopholatilus chamaeleonticeps

Sometimes known as Tilefish

SUMMARY

The Golden Tilefish is a long-lived and slow growing deep-water species that lives near the bottom of the sea. It is found along the Atlantic coast of North America and throughout the Gulf of Mexico. The population is divided into three regions for management purposes: the mid-Atlantic, South Atlantic, and the Gulf of Mexico. For all regions there are uncertainties as to what the current abundance level is, but overall abundance appears to be at medium levels. Management measures for this species include annual catch quotas, limited entry into the fishery, gear restrictions, and protected areas. The majority of Golden Tilefish are taken with bottom longlines, which likely has moderate habitat impacts. Bycatch in this fishery appears to be relatively low.

Criterion	Points
Life History	1.00
Abundance	2.00
Habitat Quality and Fishing Gear Impacts	2.50
Management	2.75
Bycatch	3.50
Final Score	**2.35**
Color	

Final Score	Color
2.40 - 4.00	
1.60 - 2.39	
0.00 - 1.59	

LIFE HISTORY

Core Points (only one selection allowed)

If a value for intrinsic rate of increase ('r') is known, assign the score below based on this value. If no r-value is available, assign the score below for the correct age at 50% maturity for females if specified, or for the correct value of growth rate ('k'). If no estimates of r, age at 50% maturity, or k are available, assign the score below based on maximum age.

1.00 Intrinsic rate of increase <0.05; OR age at 50% maturity >10 years; OR growth rate <0.15; OR maximum age >30 years.

The Golden Tilefish is the largest and longest lived of the tilefish species (Family: Malacanthidae). Golden Tilefish are slow growing with a growth rate, k, of approximately 0.13 throughout its distribution (Vidal 2009, Lombardi et al. 2010, Palmer et al. 1998). Maximum reported ages of Tilefish for various regions range from 40 to 46 years and maximum sizes from 38 to 44 inches (96.5-111.9cm), with males attaining larger sizes than females (SAFMC 2011a, Lombardi et al. 2009, Turner 1986, SEDAR 2004, Steimle et al. 1999). In the southern New England/Mid-Atlantic region, most Golden Tilefish mature between the ages of 5-7 (Grimes et al. 1988), with 50% of females mature by 46 cm and 5 years of age and 50% of males mature by 56 cm and 6 years of age (Vidal 2009). In the South Atlantic, recent work indicates that 50% of males and females are mature at age 3, and the smallest observed immature females and males were 33 cm and 31 cm, respectively (SEDAR25 2011-In review). In Gulf waters, 50% of fish were estimated to be mature at 34.4 cm and 2 years of age, however, there is some uncertainty in this estimate (Lombardi et al. 2010/SEDAR 2010). Spawning females were not detected until age 6 (Lombardi et al. 2010). For both the Mid Atlantic and South Atlantic regions, there is evidence that the age/size at maturity has declined over time (Vidal 2009, Palmer et al. 1998). Although the Golden Tilefish appears to mature relatively early, since it is long-lived and a slow grower, a score of 1 is awarded.

2.00 Intrinsic rate of increase = 0.05-0.15; OR age at 50% maturity = 5-10 years; OR a growth rate = 0.16–0.30; OR maximum age = 11-30 years.

3.00 Intrinsic rate of increase >0.16; OR age at 50% maturity = 1-5 years; OR growth rate >0.30; OR maximum age <11 years.

Points of Adjustment (multiple selections allowed)

-0.25 Species has special behaviors that make it especially vulnerable to fishing pressure (e.g., spawning aggregations; site fidelity; segregation by sex; migratory bottlenecks; unusual attraction to gear; etc.).

-0.25 Species has a strategy for sexual development that makes it especially vulnerable to fishing pressure (e.g., age at 50% maturity >20 years; sequential hermaphrodites; extremely low fecundity).

-0.25 Species has a small or restricted range (e.g., endemism; numerous evolutionarily significant units; restricted to one coastline; e.g., American lobster; striped bass; endemic reef fishes).

Golden Tilefish is distributed along the coast of North America from Nova Scotia to Florida, throughout the Gulf of Mexico, and south to Venezuela (SAFMC 2011a, Nitschke 2006). It is a deep-water demersal species, primarily found on the outer continental shelf and upper continental slope from depths of 250 to 1,500 feet at temperatures of 49-58°F (9-14°C) (SAFMC 2011a, Nitschke 2006). It tends to live in silt and clay habitats, where it constructs and occupies burrows (Grimes et al. 1986, Able et al. 1993). It may also be associated with other habitats that provide shelter, such as clay outcrops along submarine canyons and rocks or boulders (Grimes et al. 1986, Steimle et al. 1999). Relative to other species widely distributed throughout the world's oceans, suitable Golden Tilefish habitat is restricted to specific temperature and substratum conditions, and thus we consider this to be a small range.

-0.25 Species exhibits high natural population variability driven by broad-scale environmental change (e.g. El Nino; decadal oscillations).

+0.25 Species does not have special behaviors that increase ease or population consequences of capture OR has special behaviors that make it less vulnerable to fishing pressure (e.g., species is widely dispersed during spawning).

The Golden Tilefish does not have special behaviors that make it vulnerable to capture during spawning events. It is a deep water species found from depths of 250-1,500 ft (76-460 m), and lives inside burrows in small groups or pods (SAFMC 2011a, Nitschke 2006). It is not known to migrate (Steimle et al. 1999) and spawning is thought to occur in pairs (Grimes et al. 1988).

+0.25 **Species has a strategy for sexual development that makes it especially resilient to fishing pressure (e.g., age at 50% maturity <1 year; extremely high fecundity).**

The spawning season for Golden Tilefish varies among regions. Spawning in the mid Atlantic occurs from May-September (Grimes et al. 1988), in the south Atlantic from March-November with a peak in April and June (Palmer et al. 1998), and in the Gulf of Mexico from January-June with a peak in April (Lombardi et al. 2010). Tilefish spawn multiple batches throughout the spawning season. It was estimated that they spawn approximately every 4 days for a total of 34 times per year (Palmer et al. 1998). Annual fecundity has been estimated to range from 195,000 to 8 million eggs per female, depending on size (Grimes et al. 1988, Palmer et al. 1998, SAFMC 2011a).

Reproductive studies on golden Tilefish in the mid-Atlantic and South Atlantic regions suggest that that they have separate sexes (i.e. gonochorists) (Erickson and Grossman 1986, Grimes et al. 1988, Palmer et al. 1998). However, recent work on Golden Tilefish in the Gulf of Mexico provides some evidence of sequential hermaphrodism, indicating that a sex change from female to male may occur (Lombardi et al. 2010, SEDAR 2010); but whether this is the case or not remains uncertain. Males do attain larger sizes than females though, and thus may be more vulnerable to fishing pressure (Grimes and Turner 1999). It has been speculated the removal or large males could potentially disrupt behaviorally mediated spawning in this species (Grimes and Turner 1999).

Since fecundity in the Golden Tilefish is highly variable and it is unclear whether this species undergoes a sex change in some regions, points are neither added nor subtracted.

+0.25 Species is distributed over a very wide range (e.g., throughout an entire hemisphere or ocean basin; e.g., swordfish; tuna; Patagonian toothfish).

+0.25 Species does not exhibit high natural population variability driven by broad-scale environmental change (e.g., El Nino; decadal oscillations).

1.00 Points for Life History

ABUNDANCE

Core Points (only one selection allowed)

Compared to natural or un-fished level, the species population is:

1.00 Low: Abundance or biomass is <75% of BMSY or similar proxy (e.g., spawning potential ratio).

2.00 Medium: Abundance or biomass is 75-125% of BMSY or similar proxy; OR population is approaching or recovering from an overfished condition; OR adequate information on abundance or biomass is not available.

The Golden Tilefish population in the United States is divided into three regions: the mid-Atlantic, the South Atlantic, and the Gulf of Mexico. In the mid-Atlantic landings increased in the 1970s to 3,900 metric tons, stabilized around 2,000 metric tons in the 1980s, and since 2001 have mostly been below 900 metric tons (NEFSC 2009). In 1999, Golden Tilefish in this region were declared overfished and a rebuilding plan was implemented in 2001. The population showed signs of recovery in 2005, and the 2009 assessment indicated biomass has been increasing since 2000 and is currently at 104% of

the biomass at maximum sustainable yield (BMSY) (NEFSC 2009). However, scientists cautioned that the model used may be over-optimistic. The model did not match the indices of abundance based on catch per unit effort data from the commercial fishery, which increased from 2000 to 2005, but subsequently declined to near the 2000 level. In addition, strong year classes were seen in the 1990s, which may have helped the population to rebuild, but these year classes are now disappearing. It was concluded that the population is unlikely to be completely rebuilt (NEFSC 2009).

In the South Atlantic, landings increased in the early 1980s to 1,500 metric tons, but then declined substantially and fluctuated throughout the 1990s and early 2000s between 200-400 metric tons (SEDAR 2004). In recent years landings have ranged from 80-150 metric tons (NOAA 2010). Spawning stock biomass showed a decline from the early 1980s until 1987, but has since been relatively level and right around the spawning stock biomass at maximum sustainable yield (SEDAR 2004). As of 2004, the last year a population assessment was conducted, the spawning stock biomass was at 95% of BMSY, but overfishing was occurring. It was thought that strong recruitment classes in that late 1980s and early 1990s may have kept the population from declining further, and noted that if above average recruitments do not occur in the coming years declines may be seen (SEDAR 2004). The population is currently being assessed (SEDAR25 2011).

In the Gulf of Mexico catch increased in the 1980s to 500 metric tons, then declined in the 1990s, and in the last decade has ranged from 140-270 metric tons (NOAA 2010). This population is currently being assessed (SEDAR 2011). Indices of abundance for the most part show an increase in recent years, but data were sparse (SEDAR 2011). Two models were used to assess the population. One model shows a decline in vulnerable biomass throughout the 1980s, but that it has been relatively level since, while the other model shows an overall decline in biomass from 1960-2010 in the eastern Gulf and a recent increase in the western Gulf (SEDAR 2011). Neither model indicated that the population was overfished, but it is possible that overfishing may be occurring. Biomass relative to biomass at maximum sustainable yield was not estimated in either model, but maximum sustainable yield (MSY) estimates indicated that catch in the eastern Gulf may be exceeding MSY in recent years, but catch in the western region is not (SEDAR 2011). Overall though, there is a lack of sufficient data, so results from the population assessment should be interpreted with caution (SEDAR 2011).

For all regions there are uncertainties in what the current abundance level is, but overall abundance appears to be at medium levels.

3.00 High: Abundance or biomass is >125% of BMSY or similar proxy.

Points of Adjustment (multiple selections allowed)

-0.25 **The population is declining over a generational time scale (as indicated by biomass estimates or standardized CPUE).**

In the mid-Atlantic, abundance indices based on standardized catch per unit effort (CPUE) from the commercial fishery show a large decline from 1980 to 1994, then an increase from 2000 to 2005, but a subsequent decline through 2008. Biomass estimates predicted from the analytical model, however, show a decline through the 1980s and then an increase from 2000 to 2008. The model does not appear to be able to accurately depict the recent decline in CPUE and is likely over optimistic (NEFSC 2009).

In the South Atlantic indices of abundance from fishery dependent and fishery independent data were variable and showed differing trends. Biomass estimates indicated a decline from the early 1980s to 1987, but have been stable since (SEDAR 2004).

In the Gulf of Mexico, indices of abundance from fishery dependent and fishery independent data showed an increase in recent years for the most part, but data were sparse. One biomass estimate shows a decline during the 1980s, but a level biomass since, while the other showed an overall decline from 1960-2010 in the east region and decline from 1960 to 1990 in the west region followed by an increase through 2010 (SEDAR 2011).

Overall clear trends in long term population abundance in these regions are not evident; therefore, points are not subtracted.

-0.25 Age, size or sex distribution is skewed relative to the natural condition (e.g., truncated size/age structure or anomalous sex distribution).

Length distribution information mainly comes from the commercial fishery. In the mid-Atlantic and the Gulf of Mexico there is no clear evidence that distributions are skewed. In the South Atlantic length distributions are skewed toward smaller sizes relative to the natural condition, although they are similar to the length distributions predicted for a population that is being fished at maximum sustainable yield (SEDAR 2004). Smaller sizes at age were observed in 1996-1998 compared to 1980-1987 and the sex distribution was also skewed toward more females (1 male: 1.35 females) (Palmer et al. 1998).

Declines in age and size at maturity in the Golden Tilefish may also be occurring. In the mid-Atlantic, smaller sizes and younger ages at maturity were observed in 2008 compared to the 1980s (Vidal 2009), and in the South Atlantic recent estimates of age/size at maturity were also younger and smaller than those previously reported in the 1980s (SEDAR 2011, Erickson and Grossman 1986). Furthermore, very few immature fish were observed in either the South Atlantic or Gulf of Mexico population assessments, even with additional sampling surveys (SEDAR 2004, SEDAR 2010, SEDAR 2011-In review).

Points are subtracted since there is evidence that size and sex distributions may be skewed in some regions and that the age/size at maturity is declining.

-0.25 Species is listed as "overfished" OR species is listed as "depleted", "endangered", or "threatened" by recognized national or international bodies.

-0.25 Current levels of abundance are likely to jeopardize the availability of food for other species or cause substantial change in the structure of the associated food web.

+0.25 The population is increasing over a generational time scale (as indicated by biomass estimates or standardized CPUE).

+0.25 Age, size or sex distribution is functionally normal.

+0.25 Species is close to virgin biomass.

+0.25 Current levels of abundance provide adequate food for other predators or are not known to affect the structure of the associated food web.

The Golden Tilefish are ecologically important because they modify and create habitat when the build their burrows (Steimle et al. 1999). They feed primarily on benthic invertebrates, including crustaceans, clams, snails, worms, anemones, and sea cucumbers (SAFMC 2011a). Juvenile Golden Tilefish are preyed upon by spiny dogfish, conger eels, and also larger Tilefish (Steimle et al. 1999). Little is known about predators of adult Tilefish; goosefish and sharks of the genus *Carcharhinus* are listed as predators (Freeman and Turner 1977, Steimle et al. 1999).

Information on the state of Tilefish predators is not known for the most part, but dogfish abundance has been increasing (NEFSC 2009); therefore current Tilefish abundance levels are likely to provide enough food for their predators, so points as added.

2.00 Points for Abundance

HABITAT QUALITY AND FISHING GEAR IMPACTS

Core Points (only one selection allowed)

Select the option that most accurately describes the effect of the fishing method upon the habitat that it affects

1.00 The fishing method causes great damage to physical and biogenic habitats (e.g., cyanide; blasting; bottom trawling; dredging).

2.00 The fishing method does moderate damage to physical and biogenic habitats (e.g., bottom gillnets; traps and pots; bottom longlines).

Total Golden Tilefish catch in the United States has been around 1,000 metric tons (2,000,000-3,000,000 lbs) over the last decade (NOAA 2010). The majority of the landings come from the mid-Atlantic region, which accounts for 700-900 metric tons (NOAA 2010, NEFSC 2009). 75-95% of these landings are taken with bottom longlines, while approximately 1-10% is taken with trawls as bycatch (NEFSC 2009). Landing in the South Atlantic have been between 80-180 metric tons (NOAA 2010). In the South Atlantic longlines account for 91-96% of the catch and hand-lines 3-8% (SEDAR 2004). Gulf of Mexico landings have ranged from 140-260 metric tons, and about 99% are taken with longlines while 1% is taken with vertical lines (hook-and-line or bandit gear) (NOAA 2010, SEDAR 2010).

Golden Tilefish is a demersal (bottom) species and therefore is typically targeted with bottom longlines. Since bottom longlines make contact with the seafloor they may cause moderate habitat damage. In both the South Atlantic and Gulf of Mexico bottom longline gear is restricted to deeper waters so that shallow water habitats are protected (SAFMC 2011a, GMFMC 2011a). Hook and line gear typically does not make contact with the seafloor; therefore it is likely to result in minimal habitat damage. Since most of the Golden Tilefish is caught with bottom longlines, a score of 2 is awarded.

3.00 The fishing method does little damage to physical or biogenic habitats (e.g., hand picking; hand raking; hook and line; pelagic long lines; mid-water trawl or gillnet; purse seines).

Points of Adjustment (multiple selections allowed)

-0.25 Habitat for this species is so compromised from non-fishery impacts that the ability of the habitat to support this species is substantially reduced (e.g., dams; pollution; coastal development).

-0.25 Critical habitat areas (e.g., spawning areas) for this species are not protected by management using time/area closures, marine reserves, etc.

-0.25 No efforts are being made to minimize damage from existing gear types OR new or modified gear is increasing habitat damage (e.g., fitting trawls with roller rigs or rockhopping gear; more robust gear for deep-sea fisheries).

-0.25 If gear impacts are substantial, resilience of affected habitats is very slow (e.g., deep water corals; rocky bottoms).

+0.25 Habitat for this species remains robust and viable and is capable of supporting this species.

Golden Tilefish is primarily found on the outer continental shelf and upper continental slope from depths of 250 to 1,500 feet at temperatures of 49-58°F (9-14°C) (SAFMC 2011a, Nitschke 2006). It is found in silt and clay habitats, where it constructs and occupies burrows (Grimes et al. 1986, Able et al. 1993). It may also be associated with other habitats that provide shelter, such as clay outcrops along submarine canyons and under rocks and boulders (Grimes et al. 1986, Steimle et al. 1999). Golden Tilefish has specific habitat preferences and several protected areas have been established to protect this habitat. There is no indication that the habitat is not viable enough to support this species.

+0.25 Critical habitat areas (e.g., spawning areas) for this species are protected by management using time/area closures, marine reserves, etc.

There are no principal spawning grounds for this species. Spawning is thought to occur in pairs, since males and females are often observed sharing a burrow (Grimes et al. 1988, Steimle et al. 1999). Juveniles have been observed over small burrows, and also in shelter providing habitats, such as pots, traps, ship wrecks, and other solid structures (Able et al. 1982, Freeman and Turner 1977, Cooper et al. 1987). The Mid-Atlantic Fishery Management Council (MAFMC) has defined habitats areas of particular concern for juvenile and adult Tilefish as those in the outer continental shelf and slope that have clay outcrop habitats (MAFMC 2009).

Several protected areas have been established throughout the Golden Tilefish's distribution. In the mid-Atlantic four submarine canyon areas, which are known to have clay outcrop tilefish habitats, have been protected from fishing with mobile bottom tending gear (MAFMC 2009). In the South Atlantic 8 deepwater fishing marine protected areas have been created. These protected areas coincide with the depth range of the Golden Tilefish and several of the areas are known to be places were Tilefish reside (SAFMC 2011a).

+0.25 Gear innovations are being implemented over a majority of the fishing area to minimize damage from gear types OR no innovations necessary because gear effects are minimal.

+0.25 **If gear impacts are substantial, resilience of affected habitats is fast (e.g., mud or sandy bottoms) OR gear effects are minimal.**

Tilefish are found in deep waters, primarily in silt and clay habitats. In the mid-Atlantic they occur in and around submarine canyons, which may be sensitive to habitat destruction (MAFMC 2009). Since gear effects on the habitat and resilience of the affected habitat are both likely moderate, points are neither added nor subtracted.

2.50 Points for Habitat Quality and Fishing Gear Impacts

MANAGEMENT

Core Points (only one selection allowed)

Select the option that most accurately describes the current management of the fisheries of this species.

1.00 Regulations are ineffective (e.g., illegal fishing or overfishing is occurring) OR the fishery is unregulated (i.e., no control rules are in effect).

2.00 Management measures are in place over a major portion over the species' range but implementation has not met conservation goals OR management measures are in place but have not been in place long enough to determine if they are likely to achieve conservation and sustainability goals.

Golden Tilefish are managed by three different management councils: the Mid-Atlantic Fishery Management Council (MAFMC), the South Atlantic Fishery Management Council (SAFMC), and the Gulf of Mexico Fishery Management Council (GMFMC). Management regulations common to all three regions include limited entry into the fishery, commercial catch quotas, recreational bag limits, and gear restrictions.

In the Mid Atlantic, the Golden Tilefish fishery management plan was implemented in 2001 and a 10 year plan was established to rebuild the population from its overfished condition. This plan included a commercial catch quota of 905 metric tons and trip limits for incidental catch (MAFMC 2001). In 2009, an individual fishing quota system was implemented, which divided and allocated the annual quota among individuals. In addition, four areas with tilefish habitat where protected from mobile bottom tending gear (MAFMC 2009). Since the implementation of the management plan in 2001, the fishing level for Golden tilefish has decreased and biomass seems to have increased, but the population is not yet considered to be fully rebuilt (NEFSC 2009).

In the South Atlantic, Golden Tilefish are managed under that snapper-grouper management plan. Management measures to protect the Golden Tilefish population were first enacted in 1993 and included catch quotas and trip limits. The measures were modified in 2006 and again in 2010 (SAFMC 2011b). As of 2011, the annual commercial catch quota is 282,819 lbs (128 metric tons) and the trip limit is 4,000 lbs, which may be reduced if too much of the quota is taken too soon. There is also a recreational catch quota of 1,578 fish (SAFMC 2011a). In addition, eight deep water marine protected areas were created in 2009 (SAFMC 2011b). As of 2004, the Golden Tilefish in the south Atlantic was considered to be undergoing overfishing, but not overfished (SEDAR 2004). The population is being assessed again in 2011.

In the Gulf of Mexico, Golden Tilefish has been managed under the reef fish management plan since 1990. In 2004, a catch quota of 0.44 million pounds was set (200 metric tons) for all tilefish species combined (GMFMC 2011b), and in 2009 an individual fishing quota system was implemented (GMFMC 2011a). This population is currently undergoing assessment, but due to a lack of data there are many uncertainties regarding the population status.

For all regions management measures are in place, but the status of the Golden Tilefish populations are uncertain. New management measures have been implemented within the last few years, so it has yet to be determined whether they will be able to meet sustainability goals; therefore a score of 2 is awarded.

3.00 Substantial management measures are in place over a large portion of the species range and have demonstrated success in achieving conservation and sustainability goals.

Points of Adjustment (multiple selections allowed)

-0.25 There is inadequate scientific monitoring of stock status, catch or fishing effort.

-0.25 Management does not explicitly address fishery effects on habitat, food webs, and ecosystems.

-0.25 This species is overfished and no recovery plan or an ineffective recovery plan is in place.

-0.25 Management has failed to reduce excess capacity in this fishery or implements subsidies that result in excess capacity in this fishery.

+0.25 **There is adequate scientific monitoring, analysis and interpretation of stock status, catch and fishing effort.**

The mid-Atlantic and South Atlantic Golden Tilefish populations have each been assessed a few times since the late 1980/early 1990s. The mid-Atlantic population was last assessed in 2009 and the South Atlantic population in 2004. The South Atlantic

population is being assessed again in 2011. The Gulf of Mexico population is currently being evaluated for the first time.

In all regions, commercial catch and effort data are available, as well as length distributions of the catch (SEDAR 2004, SEDAR 2010, NEFSC 2009). Fishery independent surveys to evaluate abundance and length distributions are also conducted in the south Atlantic and Gulf of Mexico, although data are scarce (SEDAR 2004, SEDAR 2010). While there is scientific monitoring, additional data are needed for the Gulf region, and there are uncertainties in the population analysis for both the mid-Atlantic and the Gulf of Mexico (SEDAR 2011, NEFSC 2009), so points are neither added nor subtracted.

+0.25 Management explicitly and effectively addresses fishery effects on habitat, food webs, and ecosystems.

Management in all regions considers habitat and ecosystem effects. In both the South Atlantic and Gulf of Mexico, the use of bottoms longlines is restricted to deeper waters to protect inshore habitats (SAFMC 2011a, GMFMC 2011a), and several protected areas have been created to protect essential fish habitat (SAFMC 2011b). In the mid-Atlantic a standardized bycatch reporting methodology was initiated in 2007 (MAFMC 2007) and in the Gulf of Mexico measures have recently been implemented to help minimize sea turtle interactions with longlines (GMFMC 2009).

+0.25 This species is overfished and there is a recovery plan (including benchmarks, timetables and methods to evaluate success) in place that is showing signs of success OR recovery plan is not needed.

The mid-Atlantic Golden Tilefish was previously considered to be overfished. In 2001 a 10 year rebuilding plan was implemented. The population was last evaluated in 2009, and had shown signs of recovery, but was not yet considered to be completely rebuilt (NEFSC 2009). The South Atlantic and Gulf of Mexico populations are not considered to be overfished.

+0.25 Management has taken action to control excess capacity or reduce subsidies that result in excess capacity OR no measures are necessary because fishery is not overcapitalized.

For all regions entry into the fishery is limited (SAFMC 2011b, GMFMC 2011a, MAFMC 2009). In addition, in the mid-Atlantic and the Gulf of Mexico they have implemented an individual fishing quota system, in which the annual quota is divided among individuals; this helps reduce overcapitalization and prevent derby fishing (when individuals race to catch as many fish as possible before the quota is met) (MAFMC 2009, GMFMC 2011a).

2.75 Points for Management

BYCATCH

Core Points (only one selection allowed)

Select the option that most accurately describes the current level of bycatch and the consequences that result from fishing this species. The term, "bycatch" used in this document excludes incidental catch of a species for which an adequate management framework exists. The terms, "endangered, threatened, or protected," used in this document refer to species status that is determined by national legislation such as the U.S. Endangered Species Act, the U.S. Marine Mammal Protection Act (or another nation's equivalent), the IUCN Red List, or a credible scientific body such as the American Fisheries Society.

1.00 Bycatch in this fishery is high (>100% of targeted landings), OR regularly includes a "threatened, endangered or protected species."

2.00 Bycatch in this fishery is moderate (10-99% of targeted landings) AND does not regularly include "threatened, endangered or protected species" OR level of bycatch is unknown.

3.00 Bycatch in this fishery is low (<10% of targeted landings) and does not regularly include "threatened, endangered or protected species."

Golden Tilefish are primarily caught with bottom loglines, but also with some hook and line gear. Specific information on bycatch rates in the fishery are lacking, but overall bycatch appears to be low. In the mid-Atlantic regions the longline fishery is very directed, with 95% of the catch comprising tilefish species, 78% of which are golden tilefish (MAFMC 2007). Information on discarded species in the mid-Atlantic longline fishery is not available, but in the New England longline fishery dogfish and skates are the most common discarded species (MAFMC 2007). In the South Atlantic and Gulf of Mexico, bycatch species may include other deepwater snapper/grouper species, but discards are likely few since discard mortality would likely be 100% (SAFMC 2010, SEDAR 2011, Hale 2011). In the South Atlantic deepwater grouper snapper fisheries, discards were reported only for speckled hind, Warsaw grouper, and low amounts of snowy grouper (SEDAR 2004). Discards for speckled hind and Warsaw grouper were only reported for the vertical line fisheries, and are unlikely to be caught in the Golden Tilefish fishery since they have different habitat preferences (SEDAR 2004, SAFMC 2010). In the Gulf of Mexico discards of yellowedge grouper occur during the grouper closed season, but this fishery is thought to be distinct from the Golden Tilefish fishery (SEDAR 2010).

There is some concern about interactions with threatened sea turtles in bottom longlines fisheries in the Gulf of Mexico (GMFMC 2009), and interactions with sea turtles in bottom longline and vertical line gear have also been reported in the South Atlantic (SAFMC 2010). However, the majority of these sea turtle interactions have occurred in shallower waters of less than 210 ft (GMFMC 2009), whereas Golden Tilefish is fished in deep waters greater than 250 feet (SAFMC 2011a, Nitschke 2006); therefore while

there is the potential for sea turtle interactions to occur, boats targeting Golden Tilefish are unlikely to significantly affect sea turtle populations.

Since bycatch and interactions with protected species are likely low in the Golden Tilefish fishery, a score of 3 is awarded.

Points of Adjustment (multiple selections allowed)

-0.25 Bycatch in this fishery is a contributing factor to the decline of "threatened, endangered, or protected species" and no effective measures are being taken to reduce it.

-0.25 Bycatch of targeted or non-targeted species (e.g., undersize individuals) in this fishery is high and no measures are being taken to reduce it.

-0.25 Bycatch of this species (e.g., undersize individuals) in other fisheries is high OR bycatch of this species in other fisheries inhibits its recovery, and no measures are being taken to reduce it.

-0.25 The continued removal of the bycatch species contributes to its decline.

+0.25 **Measures taken over a major portion of the species range have been shown to reduce bycatch of "threatened, endangered, or protected species" or bycatch rates are no longer deemed to affect the abundance of the "protected" bycatch species OR no measures needed because fishery is highly selective (e.g., harpoon; spear).**

Bycatch of threatened loggerhead sea turtles in the bottom longline fishery is a concern in the Gulf of Mexico and may be contributing to the decline of the species (GMFMC 2009). However, since Golden Tilefish are deep-water fish and most sea turtle interactions occur in shallow waters, it unlikely that the targeted Golden Tilefish fishery contributes significantly to loggerhead mortalities (GMFMC 2009). In addition, to address this issue new gear regulations were implemented in 2010, which restricted fishing to waters deeper than 35 fathoms (210 ft) between the months of June-August (fishing for Golden Tilefish already occurs in waters deeper than this), and limited the number of hooks that may be fished with (GMFMC 2009). Other measures to protect sea turtles in the South Atlantic and Gulf of Mexico include the requirement for reef fish vessels with longline and/or hook line gear to have sea turtle release gear on board, as well as information about how to properly release them (NMFS 2011).

As stated above, sea turtle interactions are unlikely to be a major concern in the Golden Tilefish fishery and thus points are neither added nor subtracted.

+0.25 There is bycatch of targeted (e.g., undersize individuals) or non-targeted species in this fishery and measures (e.g., gear modifications) have been implemented that have been shown to reduce bycatch over a large portion of the species range OR no measures are needed because fishery is highly selective (e.g., harpoon; spear).

Discards of Golden Tilefish in the directed longline fishery are thought to be low in all regions (SEDAR 2004, SEDAR 2010, NEFSC 2009, Hale 2011). In the mid-Atlantic discards of Golden Tilefish were estimated to be less than 1% (NEFSC 2009) and in the South Atlantic they were estimated to be less than 2% (Hale 2011). Discards of non-targeted species also seem to be low in all regions, although specific rates are not available.

+0.25 Bycatch of this species in other fisheries is low OR bycatch of this species in other fisheries inhibits its recovery, but effective measures are being taken to reduce it over a large portion of the range.

Golden Tilefish are caught as bycatch in the mid-Atlantic trawl fishery (NEFSC 2009). The catch in the trawl fishery accounts for approximately 1-10% of the total landings in this region (NEFSC 2009). Discard to kept ratios ranged from 0 to 1.4 for the trawl fishery between 1989 and 2008 (NEFSC 2009). In other regions discards of Golden Tilefish are thought to be low (SEDAR 2004, SEDAR 2010).

+0.25 The continued removal of the bycatch species in the targeted fishery has had or will likely have little or no impact on populations of the bycatch species OR there are no significant bycatch concerns because the fishery is highly selective (e.g., harpoon; spear).

3.50 Points for Bycatch

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