National Marine
Fisheries Service
NOAA

Fishery Bulletin
established in 1881

Spencer F. Baird
First U.S. Commissioner
of Fisheries and founder
of *Fishery Bulletin*

Abstract—A standard method used by fisheries managers to decrease catch and effort is to shorten the length of a fishery; however, data on recreational angler response to this simple approach are surprisingly lacking. We assessed the effect of variable season length on daily fishing effort, measured by using numbers of boat launches per day, anglers per boat, and anglers per day from video observations, in the recreational sector of the federal fishery for red snapper (*Lutjanus campechanus*) in coastal Alabama. From 2012 through 2017, season length fluctuated from 3 to 40 d. Daily effort, measured by using mean number of boat launches per day (coefficient of multiple determination [R^2]=0.58) and mean number of anglers per day (R^2=0.67), increased linearly with season shortening, indicating effort compression. In 2017, 2 seasons were allowed: an early season (3 d) and an unanticipated late season (39 d). Daily effort decreased during the late season, indicating that effort can also be relaxed if anglers anticipate longer seasons. Model fit for mean number of anglers per day improved with the addition of a daily wind factor (R^2=0.94). The results of this study indicate that responses of anglers to changing fishing seasons are dynamic.

Manuscript submitted 5 May 2018.
Manuscript accepted 24 October 2018.
Fish. Bull. 117:1–7 (2019).
Online publication date: 16 November 2018.
doi: 10.7755/FB.117.1.1

Compression and relaxation of fishing effort in response to changes in length of fishing season for red snapper (*Lutjanus campechanus*) in the northern Gulf of Mexico

Sean P. Powers (contact author)[1]
Kevin Anson[2]

Email address for contact author: spowers@disl.org

[1] Department of Marine Sciences
University of South Alabama and
Dauphin Island Sea Lab
101 Bienville Boulevard
Dauphin Island, Alabama 36528

[2] Marine Resources Division
Alabama Department of Conservation and Natural Resources
P.O. Drawer 458
Gulf Shores, Alabama 36547

Fisheries managers have several options to reduce effort and decrease catch in a fishery. Among the most popular of these options is limitation of the length of the fishing season. Shortening the length of a fishing season is assumed to reduce catch because effort is reduced; however, the response of anglers may not be proportional to the reduction in season length (Powers and Anson, 2016). The advent of derby-style fisheries (in which anglers race to take their catch and fish at an ever increasing rate; Chu, 2009) resulted in part from the reduction in season length in several commercial fisheries. Such a race to fish compromises angler safety. The adoption of individual fishing quotas has eliminated many derby-style fisheries in the commercial sector and has resulted in increased economic yields and greater angler safety (Costello et al., 2008; Chu, 2009). In a marine recreational fishery, Powers and Anson (2016) documented effort compression (i.e., increases in per unit effort in response to decreasing season length); however, that study did not address whether effort compression was reversible. In the study described in this paper, we used the unique conditions of the federal seasons of the recreational fishery for red snapper (*Lutjanus campechanus*) in 2017, including both the short season (3 d) and the long season (39 d), to not only further examine effort compression in response to shortened seasons but also to determine if relaxation in effort can be measured in response to extended season lengths.

The management of the fishery for red snapper in the northern Gulf of Mexico is highly controversial (Strelcheck and Hood, 2007; Cowan et al., 2011). After decades of overfishing, the stock in the Gulf of Mexico is currently classified as not experiencing overfishing and recently was declared no longer overfished (SEDAR, 2013, 2018). This stock is expected to be fully rebuilt at a spawning potential ratio of 26% in 2032. The fishery is composed of both commercial and recreational sectors, which share the overall quota on a 51% to 49% split.

Since 2007, the commercial sector of the fishery for red snapper has been managed under an individual fishing quota system with no overage on the sector quota. In 2015, the recreational sector was divided into a charter and for-hire sector and a private recreational sector with each sector sharing a percentage of the recreational annual catch limit (ACL). The for-hire sector is a closed fishery with a defined number of permits, and the length of the season is set each year on the basis of the sector's share of the recreational quota and recent catch history. The private recreational sector is an open fishery, and the length of the season is based on the same inputs as the for-hire sector. Because of several factors, such as additional fishing days for the state season and large estimates of daily catches, the federal season for the private recreational sector has been reduced to a derby-style fishery.

Increasingly restrictive regulations designed to limit catch of red snapper in the private recreational fishery, which has routinely exceeded its share of the ACL, have been enacted over the last decade, progressively shortening the season from 194 d in 2007 to 11 d in 2016. Growing frustration by recreational anglers, who see clear signs of recovery of the stock as it rebuilds (higher catch per unit of effort and larger sized red snapper) yet face shorter federal seasons, has led to public questioning of the stock assessment and management process. Public frustration rose to its highest level in 2017, when the National Marine Fisheries Service initially set the recreational season for red snapper in federal waters at 3 d. Logical reasons existed for the shortened federal season in earlier federal regulations, including the existence of separate recreational fisheries in state regulated waters, which increased in 2015 from 4.8 to 14.5 km, or from 3 to 9 mi, from the shoreline. However, demands of anglers and policy makers to extend the season grew. An appeal by state management agencies from all 5 Gulf states to the secretary of the U.S. Department of Commerce resulted in the National Marine Fisheries Service setting a second season of 39 d for 2017 (Fridays, Saturdays, Sundays, and federal holidays from 16 June through 4 September). In exchange for the extended federal season, most of the Gulf states agreed to close state waters outside of the federal season for the remainder of 2017. Of relevance to this study is that anglers had little prior notice (2–3 d) of the second season and had no reasonable expectation a second season would be adopted for 2017 at the time of the initial 3-d season. Hence, the 2 seasons in 2017 provided a unique opportunity to assess angler effort during 2 seasons of different lengths.

Materials and methods

Study site

We counted boat launches and anglers viewed in videos recorded in 2012–2017 by cameras installed at 6 public launch sites throughout coastal Alabama. We used these counts to quantify total daily effort of anglers in the private recreational sector of the fishery for red snapper who used those monitored public boat launches. The 6 boat ramps are located at Bayou La Batre, Billy Goat Hole, Little Billy Goat Hole, Fort Morgan, Boggy Point, and Cotton Bayou. The private recreational community is made up of anglers who tow and launch boats at public boat launches and those who have private marina or dock access. In 2015, approximately 60% of anglers were estimated to have used public boat launches (K. Anson, unpubl. data). Recreational anglers have a limited number of public boat launches that are used to launch vessels to fish for red snapper in offshore waters, and video cameras were installed at the majority of these public launches. Boaters leave these offshore boat launches to fish for reef-associated fishes, including red snapper, in the Alabama Artificial Reef Zone—a 2670 km^2 area encompassing a network of thousands of artificial reefs and scattered natural reefs beginning 25 km south of the Alabama coast (Minton and Heath, 1998; Patterson et al., 2001). Because of their affinity for structured habitats, red snapper are relatively easy to target on artificial and natural reef habitats (Gallaway et al., 2009; Powers et al., 2018).

Angler and boat counts

Since 2012, each of the 6 public boat launches has been monitored by MIC412[1] video cameras (Bosch Security Systems, Inc., Fairport, NY) that aid law enforcement activities. During the federal recreational fishery for red snapper, the video recordings are archived and available for analysis of angler effort. Powers and Anson (2016) demonstrated the efficacy of the analysis of these archived videos in estimating angler effort. We used the data available in Powers and Anson (2016) for the federal fishery for red snapper in 2012–2015 and collected additional data by using identical methods for the federal fishery seasons for red snapper in 2016 and 2017. Season lengths varied each year: 40 d in 2012, 28 d in 2013, 9 d in 2014, 10 d in 2015, 11 d in 2016, 3 d in the short season of 2017, and 39 d in the long season of 2017.

Analysis of video footage followed 1 of 2 protocols depending on season length: short (≤11 d) and long (>11 d) seasons. For both protocols, analysts counted boat launches and anglers per boat while viewing the archived videos for randomly chosen 5-min periods in each hour of footage recorded from 0500 to 2059 at each public boat ramp. For the short seasons (2014, 2015, 2016, and the short season of 2017), counting was done every day of the federal season. For the long seasons (2012, 2013, and the long season of 2017), 20% of the days were selected at random for counting. Choosing days randomly does have the potential to bias our data

[1] Mention of trade names or commercial companies is for identification purposes only and does not imply endorsement by the National Marine Fisheries Service, NOAA.

because effort probably is not similar between weekend days and holidays and weekdays. This issue applies only to the 2012 and 2013 seasons because in 2017 the season was opened only on Friday–Sunday (considered weekend days) and major holidays (e.g., the Fourth of July). For the seasons in 2012 and 2013, we used the modeled estimates directly from Powers and Anson (2016) that included a weekend and holiday factor (for further details, see Powers and Anson, 2016). For the other seasons in the time series (2014, 2015, 2016, and the short season of 2017), fishing days were consecutive from 0000 on 1 June to 1159 on the last day. Finally, for the seasons in 2014–2017, the frequency of 5-min intervals analyzed for each hour from 0500 to 1000 was increased from 1 interval to 5 intervals to better capture the increased boat traffic during these hours.

When watching the videos, analysts recorded the number of boats launched and the number of anglers on each boat. For a boat launch to have been counted, the analyst had to have observed the boat coming off the trailer during the 5-min interval. To count the total number of potential anglers, the analyst was allowed to observe the boat outside of the 5-min interval to account for the time anglers might have taken to return from parking the towing vehicle. Analysts classified boats into 1 of 4 categories: offshore fishing, inshore fishing, non-fishing, and unknown. Categorization was based on the size and design of fishing vessel as well as on the presence and type of fishing gear. All analysts were trained on videos recorded prior to the study period by an experienced staff member before they began analyzing video recordings from the study period. All videos were viewed by a second analyst, and the 2 sets of observations were averaged to estimate the number of boat launches per 5-min interval per ramp and the number of potential anglers per 5-min interval. The averaged observations were then transformed to hourly estimates depending on the number of 5-min intervals observed within the designated hour. Daily estimates were made by summing the hourly estimates for each day. Finally, the daily estimates for each of the 6 boat launches were summed across all days to calculate the potential numbers of anglers and offshore boats during the short seasons. For the long seasons, a daily average of potential numbers of anglers and offshore boats was calculated by multiplying the average of each metric from observed days at each boat ramp by the total number of days in the season and then summing estimates for all boat launches to provide an estimate for the season (see Powers and Anson, 2016).

Because weather may affect angler effort (Fraidenburg and Bargmann, 1982; Powers and Anson, 2016), observations of weather conditions were gathered by the analyst watching the videos as well as from nearby monitoring stations. Analysts recorded precipitation events and cloud cover as binary responses (1 for rain, 0 for no rain; 1 for dark clouds present, 0 for dark clouds not present). Maximum nearshore hourly wind speed and daily precipitation were obtained from the weather station located near the public boat ramp at Billy Goat Hole on Dauphin Island (Mobile Bay Estuary Program, website). Offshore hourly maximum wind speed and sea height were obtained from the sea buoy located 22 km offshore from Orange Beach, Alabama (station 42012; National Data Buoy Center, website).

Analyses

We used linear and nonlinear regression analyses of the estimates for mean number of anglers per day and of boat launches per day during each season to examine the relationship between angler effort and season duration. Mean daily numbers of boat launches and anglers were normally distributed; hence, no transformation was applied (Shapiro–Wilk test for both dependent variables: $P>0.90$). Next, multiple linear regressions were used to determine if the model prediction could be improved by the addition of weather variables. Because of the limited number of years in our study, interactions of main effects could not be included in the models. The corrected Akaike's information criterion (AICc) was used to compare model fits and determine the most parsimonious model. Because nearshore and offshore winds were expected to be strongly correlated and nearshore winds may influence anglers' decisions to fish for reef fishes more than offshore wind speeds, only wind data from the nearshore weather station at Dauphin Island were used in calculating the daily average wind speed. Previous work has indicated that the nearshore wind measurements were the better predictor of daily effort (Powers and Anson, 2016). Both wind speeds and offshore sea heights from Dauphin Island were explored in the models because the 2 conditions were not found to be significantly correlated.

To estimate total harvest of red snapper in the segment of the recreational sector that used public boat launches, seasonal estimates of the number of anglers were multiplied by the observed average number of red snapper harvested per angler and average weight of red snapper. Estimates of average number of red snapper caught per angler and average weight were derived from dockside intercepts of anglers interviewed at the 6 boat ramps included in this study. In 2012 and 2013, data necessary to produce these averages for each year were collected as part of the Marine Recreational Information Program of the National Marine Fisheries Service. For 2014–2017, data collected as part of dockside surveys conducted by the Marine Resources Division of the Alabama Department of Conservation and Natural Resources to complement a new mandatory reporting program were used to calculate the average number of red snapper harvested per angler and the average weight of red snapper for each year. Once these seasonal estimates of harvest in number and weight were calculated, the relationship between these estimates and season duration were examined by linear regression. The seasonal estimates of number and weight of red snapper were normally distributed (Shapiro–Wilk test for both dependent variables: $P>0.70$), and no trans-

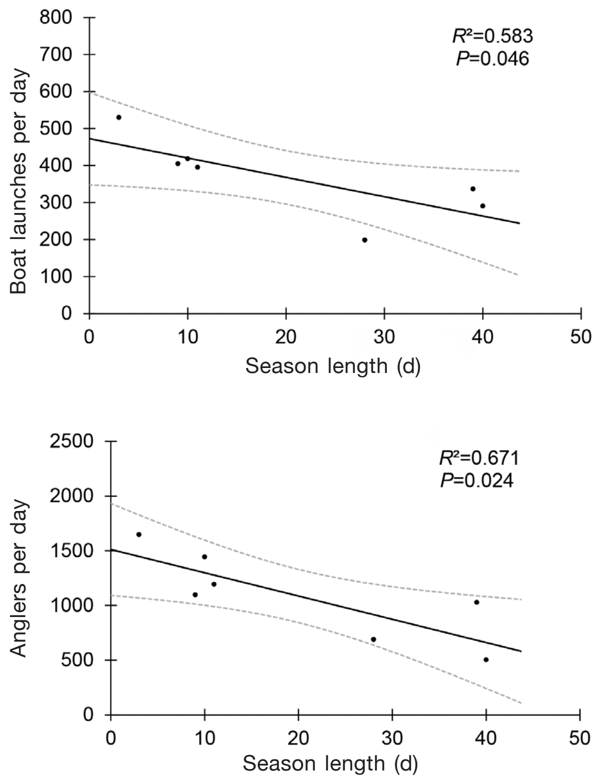

Figure 1

Effort as measured by mean number of boat launches per day (upper panel) and mean number of anglers per day (lower panel) leaving public boat launches in coastal Alabama during the 2012–2017 federally regulated fishing seasons for red snapper (*Lutjanus campechanus*). The gray dashed lines indicate 95% confidence intervals. R^2=coefficient of multiple determination.

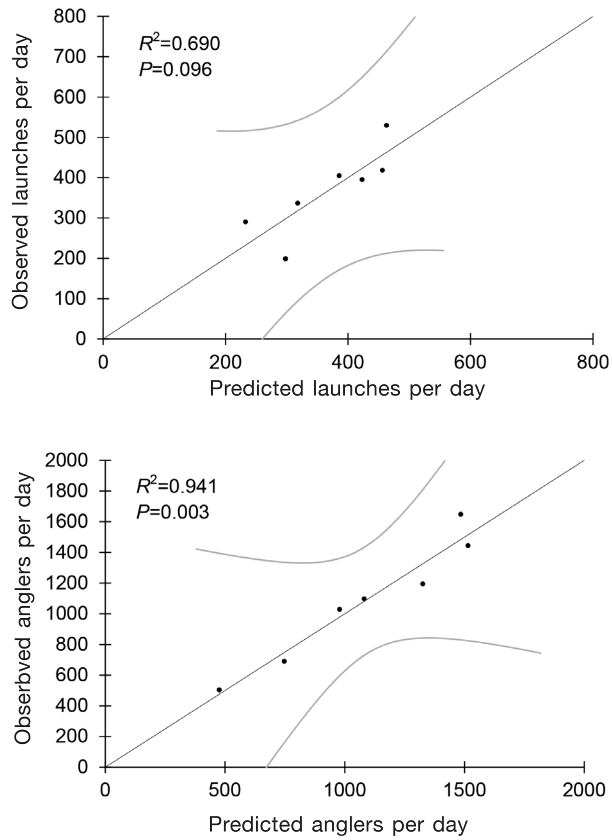

Figure 2

Predicted versus observed mean number of boat launches per day (upper panel) and mean number of anglers per day (lower panel) leaving public boat launches in coastal Alabama during the 2012–2017 federally regulated fishing seasons for red snapper (*Lutjanus campechanus*). The model predictions include length of season and mean daily wind speed. The gray lines indicate 95% confidence intervals. R^2=coefficient of multiple determination.

formation was necessary. All statistics were calculated using statistical software JMP, vers. 11.2.1 (SAS Institute, Inc., Cary, NC).

Results

The relationship between mean daily numbers of boat launches and anglers of red snapper per season and length of the federal season for red snapper was best described by linear regressions (highest R^2, lowest AICc score). Season length alone explained a significant amount of variation in mean daily number of boat launches per season (R^2=0.583, P=0.046) and mean daily number of anglers per season (R^2=0.671, P=0.024) (Fig. 1). Inclusion of weather conditions through multiple regression improved the predictive capacity of the model as indicated by AICc scores (Table 1). The addition of mean wind speed across each season increased the variability explained by the model for mean number of anglers per day (R^2=0.94, P=0.003) (Fig. 2). The best model was mean anglers per day=2076−(14×season length)−(84×wind speed). A similar, although nonsignificant, trend was seen for the model of mean number of boat launches (R^2=0.69, P=0.092). The best model was mean boat launches per day=566−(4×season length)−(14×wind speed).

The mean daily wind speed at Dauphin Island ranged from a low of 1.3 m/s (5.0 mph) in 2015 to a high of 5.5 m/s (12.3 mph) in 2012 (Table 2). Wind speed and offshore sea height at Dauphin Island were not significantly correlated (coefficient of correlation [r]=0.39, P=0.38); therefore, offshore sea height was added as an additional factor in the model. However, comparisons of model fits indicate that the addition of offshore sea height did not improve model fit and that it was not as strong of an explanatory variable as wind speed (Table 1).

Table 1

Linear regression model fits for the relationship between mean number of boat launches per day and mean number of anglers per day for each season and the length of the federal seasons of the fishery for red snapper (*Lutjanus campechanus*) in the northern Gulf of Mexico during 2012–2017. Model fits that include weather variables (mean daily wind speed at Dauphin Island, Alabama [wind speed], and mean daily sea height at the offshore buoy at Orange Beach, Alabama [sea height]) as additional main effects are also presented. Values include coefficient of multiple determination (R^2), adjusted coefficient of multiple determination (Adj. R^2), and corrected Akaike's information criterion (AICc).

Factor	R^2	Adj. R^2	AICc	P
Mean boat launches per day				
Season length	0.58	0.49	91.85	0.046
Season length + wind speed	0.69	0.54	103.77	0.096
Season length + sea height	0.58	0.38	105.83	0.173
Season length + wind speed + sea height	0.69	0.39	145.68	0.260
Mean anglers per day				
Season length	0.67	0.61	108.84	0.024
Season length + wind speed	0.94	0.91	110.78	0.003
Season length + sea height	0.72	0.58	121.76	0.080
Season length + wind speed + sea height	0.95	0.89	152.18	0.021
Daily harvest (no. of individuals)				
Season length	0.61	0.53	164.96	0.039
Season length + wind speed	0.88	0.81	170.98	0.016
Season length + sea height	0.63	0.45	178.49	0.134
Season length + wind speed + sea height	0.87	0.75	212.97	0.072

Table 2

Estimates of harvest of red snapper (*Lutjanus campechanus*) by private recreational anglers who used 6 public access boat launches on the coast of Alabama during the federal seasons of the fishery for red snapper from 2012 through 2017. Standard errors of the mean are given in parentheses after mean values. In 2017, anglers could fish 2 seasons, one long and another short.

Season	Season length (d)	Mean wind speed (m/s)	Mean no. of boat launches per day	Mean no. of anglers per day	Total no. of angler trips per season	Mean catch per angler (no. of individuals)	Harvest (no. of individuals)	Mean weight (kg)	Harvest (kg)	Daily harvest (kg)
2012	40	5.49 (0.12)	291 (32)	504 (83)	20,160	1.65 (0.08)	33,264	4.36 (0.17)	145,300	3632
2013	28	4.95 (0.08)	199 (30)	690 (109)	19,327	1.32 (0.12)	25,511	4.37 (0.11)	111,668	3988
2014	9	4.60 (0.05)	405 (26)	1097 (88)	9876	1.74 (0.02)	17,184	3.60 (0.06)	61,889	6876
2015	10	2.23 (0.02)	419 (17)	1444 (70)	14,438	1.67 (0.04)	24,111	3.14 (0.13)	75,791	7579
2016	11	3.16 (0.03)	396 (16)	1194 (55)	13,136	1.66 (0.02)	21,805	3.36 (0.09)	73,193	6654
2017 (short)	3	2.91 (0.02)	530 (25)	1648 (98)	4945	1.69 (0.03)	8357	4.25 (0.17)	35,594	11,865
2017 (long)	39	2.90 (0.02)	337 (9)	1029 (31)	40,136	1.77 (0.02)	71,040	3.02 (0.09)	214,608	5503

Coupling the estimates for mean number of anglers per day with the estimates of the number and average weight of red snapper landed allowed us to calculate the total potential harvest for the segment of the recreational fishery that used public boat launches. Total harvest increased with the length of season from a low of 8357 red snapper for the 3-d season of 2017 to a high of 71,040 red snapper in the 39-d season of 2017 (Table 2). The rate of harvest was highest for the shortest season with 2786 red snapper harvested per day in the short season of 2017 (3 d) and lowest for the longest season with 831 red snapper harvested per day in the season of 2012 (40 d). The relationship between number of red snapper harvested per day and season length was described by a linear regression (R^2=0.61, P=0.039). The relationship was improved, on the basis of R^2 or adjusted R^2 values, with the addition of mean daily wind speed for each season (R^2=0.88, P=0.016); however, on the basis of AICc scores, the most parsimonious model included only season length.

Discussion

The intensity of derby-style fisheries has increased as fishing seasons shorten. In accordance with this notion, recreational anglers in coastal Alabama have responded to the shortening of the fishery for red snapper by increasing daily effort. We observed the highest daily effort during the shortest season on record (3 d). The late season in 2017 offered a test of whether daily effort would relax, given that this additional (long) season was unanticipated. Daily effort decreased in this long season in number of boat launches and anglers per day. The estimate for number of anglers per day was 60% higher during the short season in 2017. The 3-d season, which represented 7.7% of the long season in 2017, resulted in a harvest, estimated by using landings by weight, that was 16.6% of the harvest of the long season. This nonproportional response in harvest to the difference in length of fishing season must be considered when examining the potential of changes in recreational season length to reduce catch. More broadly, the results of our analysis provide another example of dynamic responses of anglers to changes in fishing regulations (Johnson and Carpenter, 1994). Such outcomes are likely difficult to predict at the onset of a regulatory change; therefore, intensive monitoring of angler response following such a regulatory change is needed.

In addition to season length, one weather condition was a significant factor in explaining fishing effort. Higher wind speeds decreased daily effort. Although this pattern is not surprising for an offshore-based fishery, it does provide some insight into the applicability of these findings to study of fishing effort in future years. Both the short and long seasons of 2017 were characterized by modest winds throughout the season (mean of 2.9 m/s, or 6.5 mph, per day for both seasons); hence, this weather condition did not confound our predictions for 2017. In earlier years of the study period, higher winds (4.5–5.4 m/s or 10–12 mph) were recorded and dampened daily effort. Currently, there are not sufficient data to determine the effects of high winds on angler effort during an extremely short season; however, the negative relationship between wind speed and effort in our study period indicates that most anglers would not go fishing under conditions with high wind speeds.

The red snapper is an immensely popular target species in the Gulf of Mexico. For recreational anglers with boats capable of going out to offshore waters, catching red snapper is almost viewed as a fundamental right. The controversy over the management of this fishery will likely persist as the stock rebuilds because anglers will continue to observe first-hand signs of recovery while they remain under the restrictive regulations of a stock rebuilding plan. As more fisheries experience stock rebuilding, similar issues involving a perceived disconnect between angler experiences and rebuilding regulations are likely to arise. Our analysis indicates that achieving rebuilding targets is even more challenging when fishing effort is compressed—when anglers take more trips over a short period of time as they anticipate shortened seasons. Effort compression and the fact that this compression varies with wind speed contributes to management uncertainty and must be considered in formulations of management strategies designed to maintain landings of red snapper below ACLs. The results of this study indicate that, as ACLs increase and longer seasons are warranted, effort compression may be relaxed and afford even longer seasons.

Acknowledgments

We thank C. Hightower for coordinating the many analysts who examined hundreds of hours of video footage for this project. Funding was provided by grants from the National Fish and Wildlife Foundation's Gulf Environmental Benefit Fund through subawards from the Alabama Department of Conservation and Natural Resources, Marine Resources Division.

Literature cited

Chu, C.
2009. Thirty years later: the global growth of ITQs and their influence on stock status in marine fisheries. Fish Fish. 10:217–230. Crossref

Costello, C., S. D. Gaines, and J. Lynham.
2008. Can catch shares prevent fisheries collapse? Science 321:1678–1681. Crossref

Cowan, J. H., C. B. Grimes, W. F. Patterson III, C. J. Walters, A. C. Jones, W. J. Lindberg, D. J. Sheehy, W. E. Pine III, J. E. Powers, M. D. Campbell et al.
2011. Red snapper management in the Gulf of Mexico: science- or faith-based? Rev. Fish Biol. Fish. 21:187–204. Crossref

Fraidenburg, M. E., and G. G. Bargmann.
1982. Estimating boat-based fishing effort in a marine recreational fishery. North Am. J. Fish. Manage. 2:351–358. Crossref

Gallaway, B. J., S. T. Szedlmayer, and W. J. Gazey.
2009. A life history review for red snapper in the Gulf of Mexico with an evaluation of the importance of offshore petroleum platforms and other artificial reefs. Rev. Fish. Sci. 17:48–67. Crossref

Johnson, B. M., and S. R. Carpenter.
1994. Functional and numerical responses: a framework for fish-angler interactions. Ecol. Appl. 4:808–821. Crossref

Minton, R. V., and S. R. Heath.
1998. Alabama's artificial reef program: building oases in the desert. Gulf Mex. Sci. 16:105–106. Crossref

Patterson, W. F., III, J. H. Cowan Jr., C.A. Wilson, and R. L. Shipp.
2001. Age and growth of red snapper, *Lutjanus campechanus*, from an artificial reef area off Alabama in the northern Gulf of Mexico. Fish. Bull. 99:617–627.

Powers, S. P., and K. Anson.
2016. Estimating recreational effort in the Gulf of Mexico Red Snapper fishery using boat ramp cameras: reduction in federal season length does not proportionally re-

duce catch. North Am. J. Fish. Manage. 36:1156–1166. Crossref

Powers, S. P., J. M. Drymon, C. L. Hightower, T. Spearman, G. S. Bosarge, and A. Jefferson.
2018. Distribution and age composition of Red Snapper across the inner continental shelf of the north-central Gulf of Mexico. Trans. Am. Fish. Soc. 147:791–805. Crossref

SEDAR (Southeast Data Assessment and Review).
2013. SEDAR 31—Gulf of Mexico red snapper stock assessment report, 1103 p. SEDAR, North Charleston, SC. [Available from website.]
2018. SEDAR 52—Gulf of Mexico red snapper stock assessment report, 277 p. SEDAR, North Charleston, SC. [Available from website.]

Strelcheck, A. J., and P. B. Hood.
2007. Rebuilding red snapper: recent management activities and future management challenges. Am. Fish. Soc. Symp. 60:385–396.