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"WE'RE GONNA NEED A BIGGER BOAT":
HOW FEDERAL REGULATIONS OF SHARK FISHING
TOURNAMENTS COULD SHIFT THE TIDES
OF CONSERVATION INITIATIVES¹

*"Many men go fishing all their lives without knowing
that it is not the fish they are after."*²

I. INTRODUCTION

The lure began in 1916, when a savage beast in the water attacked five New Jersey beach-goers, inducing panic and pandemonium; twelve days of terror that would one day be part of the inspiration behind Peter Benchley's iconic novel, *Jaws*.³ The movie, much like the 1916 attacks sparked a reprise of fear, and led to mass hunting of sharks.⁴ Thousands of anglers set out to reel in their own trophy shark to proudly display on the docks.⁵ Soon after, shark fishing tournaments became popular.⁶ For participants, there was no greater thrill than landing the big fish to be weighed and measured for crowds on the boardwalk.⁷ But forty years later,

1. *JAWS* (Universal Studios 1975).

2. See MICHAEL BAUGHMAN, *A RIVER SEEN RIGHT* 68 (1995) (paraphrasing HENRY DAVID THOREAU, *JOURNAL* (1938)). Thoreau is often mistakenly attributed to the above quote. This misattribution paraphrases the following passage from *JOURNAL*:

I am encouraged when I see a dozen villagers drawn to Walden Pond to spend a day in fishing through the ice, and suspect that I have more fellows than I knew, but I am disappointed and surprised to find that they lay so much stress on the fish which they catch or fail to catch, and on nothing else, as if there were nothing else to be caught.

HENRY DAVID THOREAU, *JOURNAL* 480 (1938)

3. See Megan Gambino, *The Shark Attacks That Were the Inspiration for Jaws*, *SMITHSONIAN* (Aug. 6, 2012), <http://www.smithsonianmag.com/history/the-shark-attacks-that-were-the-inspiration-for-jaws-15220260/?no-ist> (describing public response to 1916 attacks on five New Jersey beachgoers).

4. See Stefan Lovgren, *"Jaws" at 30: Film Stoked Fear, Study of Great White Sharks*, *NAT'L GEOGRAPHIC NEWS* (June 15, 2005), http://news.nationalgeographic.com/news/2005/06/0615_050615_jawssharks.html (quoting University of Florida biologist George Burgess).

5. See *id.* (describing displaying trophy sharks on boardwalks and docks post-*Jaws*).

6. See *id.* (noting estimated thirty to fifty percent population decline of various species of sharks corresponding to number of shark fishing tournaments spiking in the late 1970s). For further discussion, see *infra* Part II (discussing impact of recreational shark fishing and tournament fishing on shark populations).

7. See Lovgren, *supra* note 4 (discussing social and ecological impact of *Jaws*). As described by George Burgess, University of Florida shark biologist and director

it is becoming more clear that “[t]he real aggressor in this relationship isn’t the shark, it’s the human.”⁸

Almost one hundred years after the 1916 attacks, there are plenty of reasons sharks draw so much attention. Some people find sharks absolutely terrifying—but, like watching a car crash, they just cannot look away.⁹ There are those who see sharks as a whole different animal: near evolutionary perfection, the embodiment of mankind’s primal fears, and a mysterious creature with extraordinary predatory instincts and techniques.¹⁰ Then there are those who find them fascinating because so little is known about them.¹¹

Sharks, as apex predators, are vital to maintaining the balance of marine ecosystems.¹² That ecological balance markedly impacts

of the International Shark Attack File at the Florida Museum of Natural History: “There was a collective testosterone rush that went through the U.S. in the years following *Jaws*. Guys just wanted to catch these sharks so they could have their pictures taken with their foot on the head of a man-eater and the jaws later displayed on their mantle.” Martha Sorren, *PETA Responds to ‘Eaten Alive’ & Calls Attention to Horrible Trend in Media’s Representation of Animals*, BUSTLE (Nov. 6, 2014), <http://www.bustle.com/articles/47917-peta-responds-to-eaten-alive-calls-attention-to-horrible-trend-in-medias-representation-of-animals> (quoting Burgess to draw attention to how media impacts attitude towards animals). *See also Staff Spotlight – George Burgess*, FLORIDA MUSEUM OF NATURAL HISTORY, <http://www.flmnh.ufl.edu/museum-voices/george-burgess/> (last visited Feb. 9, 2016) (identifying George Burgess as Director of Florida Program for Shark Research).

8. *See* Hilary Hanson, *Selfie Accidents Have Killed More People Than Sharks This Year*, HUFFINGTON POST (Sept. 23, 2015, 1:46 P.M.), http://www.huffingtonpost.com/entry/selfie-deaths-shark-attacks_5602c0c5e4b0fde8b0d09cbe (quoting ISAF director George Burgess).

9. *See* PETER BENCHLEY, SHARK LIFE 40 (2007) (discussing fear and fascination of sharks which contributed to shark attack hysteria in 2001).

10. *See Great White Shark (Carcharodon carcharias)*, SMITHSONIAN NAT’L MUSEUM OF NATURAL HISTORY, <http://ocean.si.edu/great-white-shark> (last visited Feb. 9, 2016) [hereinafter *Great White Smithsonian*] (describing sharks as “one of evolution’s greatest success stories”); JEFF BELANGER & KIRSTEN DALLEY, THE NIGHTMARE ENCYCLOPEDIA: YOUR DARKEST DREAMS INTERPRETED 196 (2006).

11. Despite the valuable Discovery Channel contributions towards bringing sharks to the forefront of conservation initiatives, recent years of Shark Week have focused more on ratings, such as another episode of *Air Jaws*, rather than cutting-edge scientific discovery. *See* BENCHLEY, *supra* note 9, at 44–49 (discussing how little is known about sharks and why). Benchley noted that “[t]he knowledge we’ve gained since the mid-1970s has convinced me that almost all of the great white shark behaviors I described in *Jaws* do happen in real life. But I’m also convinced that almost none of them happen for the reasons I described.” *See id.* at 48. Shark Week 2015 changed its focus to the most recent discoveries, highlighting how much was not known or incorrectly assumed to be true and what we are learning today. *See infra* notes 61–78 and accompanying text.

12. *See Dead or Alive: The Promise of Tourism for Shark Conservation*, NAT’L GEOGRAPHIC (May 8, 2013), <http://voices.nationalgeographic.com/2013/05/08/dead-or-alive-the-promise-of-tourism-for-shark-conservation/> (hereinafter “Conservation Tourism”) (discussing role of sharks in ecological food chain).

the tourism-driven economy of many coastal communities.¹³ Despite our awareness of the critical importance of maintaining that balance, an estimated *seventy-three million* sharks are killed by humans each year.¹⁴ Those sharks would probably have a different take on who warrants fear.¹⁵

Extensive overfishing has resulted in massive population declines and near-catastrophic ecological effects.¹⁶ Although shark fishing has been part of Atlantic coast fishing communities for many years, the practice has become significantly more widespread over the past few decades.¹⁷ Correspondingly, worldwide studies increasingly demonstrate how over-fishing and environment destruction, among other things, drastically impact shark populations across the board.¹⁸

The Magnuson-Stevens Fishery Conservation and Management Act ("Magnuson-Stevens Act") and the regulations promulgated by the National Marine Fisheries Service, Highly Migratory Species Division are designed to change the course of population decline, aimed at maintaining healthy ecosystems.¹⁹ For example, the United States imposes regulations on shark fisheries, both commercially and recreationally, in the form of gear requirements, licenses

13. *See id.* (discussing local shore community economic dependence on health of ecosystem).

14. *See* PROJECT AWARE, AWARE SHARK CONSERVATION: INSTRUCTOR GUIDE 19 (2012), available at http://www.projectaware.org/sites/default/files/AWARE_Shark_Cons_Instructor_Guide_V1.03_English.pdf (discussing discrepancies in estimated number of sharks killed annually due to differing reporting requirements internationally). One study that analyzed "shark fin trade records estimated that the weight of sharks killed annually to support the global shark fin trade is between 1.21 and 2.29 million tons with a median of 1.70 million tons." *Id.* That figure translates to roughly "between 26 and 73 million sharks killed every year with a best estimate of 38 million individual sharks." *See id.*

15. *See Status of the Shark*, DISCOVERY CHANNEL, <http://www.discovery.com/tv-shows/shark-week/save-the-sharks/shark-conservation-infographic/> (last visited Mar. 7, 2015) (juxtaposing human deaths attributed to sharks to number of sharks killed by humans annually).

16. For example, populations of smooth hammerhead, bull, and dusky sharks are estimated to have plummeted by ninety-nine percent between 1970 and 2005. *See id.* (exploring causes and significance of shark population decline). *See also* Lovgren, *supra* note 4 (discussing shark population decline despite conservation efforts).

17. *See* S. Offshore Fishing Ass'n v. Daley, 995 F. Supp. 1411, 1415 (M.D. Fla. 1998) (discussing "U.S. government[']s active[] promot[ion of] commercial exploitation of the Atlantic shark fishery").

18. *See infra* Part II and accompanying text (exploring sharks' role in ecosystem).

19. *See infra* Part III and accompanying text (describing shark fishing tournament structures).

and permits, and annual catch quotas.²⁰ These measures are in place to ensure shark fisheries are able to maintain a healthy population in a balanced ecosystem.²¹

However, one of the biggest challenges policymakers face when deciding how to better manage fisheries is the “strong need for more and better [scientific] data and information exchanges to properly assess fish stocks.”²² One of the strongest advocates for shark conservation has emphasized how critical sharks are to the ecosystem’s balance.²³ Noting how much humans have learned in the last forty years, Benchley argued in favor of stronger protection measures because it is now believed that a shark is of “critical[] importan[ce] to the health of the oceans and the balance of nature in the sea.”²⁴ However, due to the lack of data available, policymakers have not been able to adequately protect threatened species of sharks.²⁵ Those who love recreational fishing could prove to be vital contributors to providing data and developing more effective fishery management strategies.²⁶

Part II of this comment describes the vital role sharks play in the ecosystem, specifically along the United States’ Atlantic Ocean shorelines, to show the dire need for regulatory modifications.²⁷ Part III describes shark fishing tournaments and the different formats.²⁸ Part IV presents the legal framework of the Magnuson-Stevens Act and the regulations promulgated by the National Marine

20. See *infra* Part IV and accompanying text (describing regulations on marine fisheries).

21. See *infra* Part IV and accompanying text (discussing statutory goals and guidelines applicable to fishery management regulations).

22. See *Conservation History*, INTERNATIONAL GAME FISH ASSOCIATION (Feb. 2, 2015), <http://www.igfa.org/Conserve/Conservation-History.aspx> (discussing importance of recreational fishermen contributing to research of fishery managers and scientists to “ensure that the game fish we cherish will survive and thrive for future generations”).

23. See BENCHLEY, *supra* note 3, at 49 (“We knew so little back then and have learned so much since, I couldn’t possibly write [*Jaws*] today.”).

24. See *id.* (describing arguments for further conservation initiatives).

25. See Neil Hammerschlag, *Shark Tagging & Tracking: Separating Fact from Fiction*, NAT’L GEOGRAPHIC (Jan. 30, 2014), <http://voices.nationalgeographic.com/2014/01/30/shark-tagging-tracking-separating-fact-from-fiction/> (discussing need for more comprehensive and complete population and environmental data).

26. See *infra* Part V and accompanying text (positing recreational anglers are integral in developing effective fishery management strategies).

27. See *infra* Part II and accompanying text (exploring sharks’ role in ecosystem and need for increased conservation efforts).

28. See *infra* Part III and accompanying text (describing fishing tournament structures).

Fisheries Service, Highly Migratory Species Division.²⁹ Part V proposes modifications of, and expansions to, existing regulations specifically aimed at shark fishing tournaments.³⁰ This section explains why the outlined proposals are needed, the benefits that would accompany these minor changes, and the possible shortcomings of each proposal.³¹ The proposed regulatory changes are small tools to help protect these organisms and ensure future generations understand what it means to “live every week like it’s Shark Week.”³²

II. SHARKS: THEIR IMPACT AND IMPORTANCE TO THE ECOSYSTEM

A. At the Top of the Food Chain: Sharks Ecological Role³³

Due to the facts that sharks are long-lived, take many years to sexually mature, and give birth to few offspring, these fish are especially susceptible to human threats, particularly overfishing.³⁴ The health of one species population can seriously impact other facets of its environment. To some extent, every plant and animal de-

29. See *infra* Part IV and accompanying text (discussing statutory authority to regulate fisheries and agency rulemaking guidelines).

30. See *infra* Part V and accompanying text (proposing additional regulatory action).

31. See *infra* Part V and accompanying text (discussing benefits of proposed regulatory actions).

32. This is one of Discovery Channel’s Shark Week slogans. See DISCOVERY CHANNEL, http://store.discovery.com/media/index.php?v=discovery_shows_shark-week_dvds-books (last visited Feb. 9, 2016) (displaying slogan across bottom of page). “Indulge in your serious hunger for all things shark related . . . so you can live every week like Shark Week.” *Id.* (emphasis added).

33. For a simple illustration of shark’s role in the food chain, see Peter Benchley, *The Day All the Sharks Died*, in BENCHLEY, *supra* note 9, at 116–25 (explaining domino effect and environmental impact of sharks disappearing from the ecosystem).

34. See AWARE Instructor Guide, *supra* note 19, at 15. For example, dusky sharks can take nearly twenty years to reach sexual maturity. See *id.* Additionally, while most bony fish “release millions of eggs in a lifetime,” most shark species give birth to two to twenty pups after an eight-to-twelve-month gestation period. See *id.* (comparing reproduction strategies of cartilaginous and bony fish). Overfishing makes it more difficult for dwindling populations to recover. See *generally Conservation Tourism*, *supra* note 13 (discussing complexities of population recovery given differing reproductive strategies and human impact).

depends on another plant or animal for its survival.³⁵ Every part of the food chain is important.³⁶

Predatory sharks, for example, prey on the sick and the weak members of their prey populations, and some scavenge the sea floor to feed on dead carcasses.³⁷ By removing the sick and the weak, sharks not only prevent potentially devastating disease outbreaks, but also strengthen the gene pools of the prey species.³⁸ Since the largest, strongest, and healthiest fish generally reproduce in greater numbers, the outcome is larger proportions of healthier fish.³⁹

When predators are removed, prey species become overpopulated.⁴⁰ When the predatory species become too populated, the lower tropic levels—or prey species lower on the food chain—cannot support it because there is not enough food.⁴¹ This causes predator population to collapse and the next lower link in the chain to experience a population boom.⁴² The environmental impacts can devastate and destroy local industry dependent on that resource.⁴³

35. Plants—in the form of phytoplankton (algae) or dinoflagellates in the ocean—convert sunlight into energy by the process of photosynthesis. See Robert Stewart, *Marine Fisheries Food Webs*, OUR OCEAN PLANET (Aug. 3, 2009), <http://oceanworld.tamu.edu/resources/oceanography-book/marinefoodwebs.htm>. Phytoplankton absorb sunlight, nutrients, and carbon dioxide, and produce oxygen for other organisms. See *id.* Phytoplankton are eaten by herbivores, like copepods; copepods are consumed by a bigger organism, like a sunfish, and that organism is eaten by some bigger organism, and so forth up to the top of the food chain. See *id.* Energy transferred from the smaller one to the bigger one through consumption. See *id.*

36. See *Shark Conservation*, U.S. DEP'T OF STATE, <http://www.state.gov/e/oes/ocns/fish/bycatch/shark/> (last visited Feb. 10, 2016) (discussing importance of every organism to food chain and overall health of ecosystem).

37. See GENE HELFMAN & GEORGE H. BURGESS, *SHARKS: THE ANIMAL ANSWER GUIDE* 111 (2014) (discussing various hunting strategies of predatory sharks).

38. See *id.* (noting weak and sick sharks are often preyed upon before having opportunity to reproduce, preventing passage of weak genes).

39. See *id.* In addition, it results in fewer genetic defects in prey species. See *id.*

40. See *id.* (discussing effect of removing predator species on the ecosystem).

41. See *id.* The quintessential example of this concept involves a popular ocean critter: the sea otter. Sea otters were hunted to near extinction in the northern Pacific Ocean in the early 1990s. See *id.* Sea otters feed primarily on sea urchins, so in the absence of sea otters, the urchin population increased dramatically and rapidly. See *id.* Urchins feed on algae—kelp in this case—which provides safety and protection for a “vast array of nearshore fishes and invertebrates.” See *id.* Without the kelp to provide protection, these populations soon too drastically plummeted. See *id.*

42. See *id.*

43. See *id.* A great example of this is the collapse of the Atlantic northwest cod fishery. Small towns on the East coast of Newfoundland, Canada relied almost

Additionally, through intimidation, sharks regulate the behavior of prey species, and prevent them from overgrazing vital habitats.⁴⁴ Some scientists argue that this intimidation factor may have a greater impact on the ecosystem than what sharks eat.⁴⁵ For example, scientists in Hawaii found that presence of tiger sharks had a positive impact on the health of sea grass beds.⁴⁶ Turtles, which are one of tiger sharks' prey, graze on sea grass.⁴⁷ In the absence of tiger sharks, the turtles spent were able to graze on the best quality, most nutritious sea grass.⁴⁸ However, turtles consequently destroyed the sea grass beds by overgrazing.⁴⁹ When tiger sharks are in the area, however, turtles graze over a broader area, and, thus, do not overgraze a single smaller area.⁵⁰

Marine biologists and ecologists refer to the changes in marine ecosystems due to over-fishing as "fishing down the marine food web."⁵¹ After the large fish at the top of the food web are fished

exclusively on the cod fishery to support the economy. See Lawrence C. Hamilton & Melissa J. Butler, *Outport Adaptations: Social Indicators Through Newfoundland's Cod Crisis*, 8 HUMAN ECOLOGY REV., no. 2, 2001, at 1, available at <http://www.humanecologyreview.org/pastissues/her82/82hamiltonbutler.pdf>. The cod populations reached peak levels in the late 1960s, before falling abruptly. See *id.* In 1992, the population collapsed and reduced to one percent of its earlier level. See *id.* The Canadian government ordered a moratorium, ending the region's cod fishery which had existed since the land was habited by Native Americans nearly five hundred years prior. See *id.* Over 35,000 fishers and plant workers from over 400 coastal communities became unemployed. See Holly Dolan et al., *Restructuring and Health in Canadian Coastal Communities*, 2 ECOHEALTH 195, 203 (2005), available at <http://link.springer.com/article/10.1007%2Fs10393-005-6333-7#/page-1>. Newfoundland has since experienced a dramatic environmental, industrial, economic, and social restructuring, including considerable emigration. See Lan Gien, *Land and Sea Connection: The East Coast Fishery Closure, Unemployment and Health*, 91 CAN. J. OF PUB. HEALTH 121, 123-24 (2000), available at <http://journal.cpha.ca/index.php/cjph/article/view/81/81>; Hamilton & Butler, *supra* (analyzing Canadians' outmigration of fishery-dependent localities after cod fishery collapse). Twenty years later, the northwest cod population has not rebounded and the fishery remains closed. See Gien, *supra*.

44. See Mark Heithaus, *Trophic Cascades and Tiger Sharks*, FLA. INT'L UNIV. SHARK BAY ECOSYSTEM RESEARCH PROJECT, <http://www2.fiu.edu/~heithaus/SBERP/projects/indirectres.html> (last visited Feb. 10, 2016) (describing shark behavior and its impact on other organisms).

45. See *id.* (hypothesizing intimidation prevents overgrazing).

46. See *id.* (opining tiger sharks are vital to balance of ecosystem in Hawaii).

47. See *id.* (describing sea turtles food source).

48. See *id.* (observing sea turtles overgraze sea kelp when tiger sharks are absent from environment).

49. See *id.* (observing sea turtles overgraze sea kelp when tiger sharks are absent from environment).

50. See *id.* (describing change in sea turtle behavior in presence of tiger sharks).

51. See M. Scheffer & S. Carpenter, et al., *Cascading Effects of Overfishing Marine Systems*, 20.11 TRENDS IN ECOLOGY & EVOLUTION 579-581 (2005) (analyzing "cascading" indirect ecosystem effects of overfishing have been shown for coastal systems

out, anglers go after smaller fish and invertebrates at lower levels in the food web while their trawling destroys animals and plants on the sea floor.⁵² A number of studies demonstrate that depleting the shark population causes the loss of commercially important fish and shellfish species down the food chain, including key fisheries like tuna, which maintain the health of coral reefs.⁵³ Thus, as apex predators, sharks are critically important to the health of the saltwater ecosystem.⁵⁴ Because sharks play such a vital ecological role, which is tied to significant economic implications, it is critical to protect these organisms.⁵⁵

B. Conservation Efforts

In the summer of 1975, the movie *Jaws* created hysteria that changed the fate of sharks.⁵⁶ For millions of years, sharks were uncontested in their place at the top of the ecosystem.⁵⁷ That hysteria, which has since become known as the so-called “*Jaws* effect,” led to mass shark hunting.⁵⁸ On the East Coast in particular, sharks

such as coral reefs and kelp forests), available at www.vliz.be/imisdocs/publications/139210.pdf.

52. See *id.* (analyzing ripple effect of overfishing on ecosystem).

53. See J.D. Stevens, et al., *The Effects of Fishing on Sharks, Rays, and Chimaeras (Chondrichthyans), and the Implications for Marine Ecosystems*, 57 ICES JOURNAL OF MARINE SCIENCE 476, 488 (2000) (“From the removal of tiger sharks some unexpected outcomes also occurred: a total and rapid crash in the abundance of tuna and jacks, and an increase in bottom fishes.”); Ransom A. Myers, *Cascading Effects of the Loss of Apex Predatory Sharks from a Coastal Ocean*, DALHOUSIE UNIVERSITY (2007) (suggesting declines in large shark populations on the East Coast of the U.S. led to the collapse of North Carolina’s century-old bay scallop fishery); Mike Bennett, *The Role of Sharks in the Ecosystem*, SCHOOL OF BIOMEDICAL SCIENCES, THE UNIVERSITY OF QUEENSLAND (2005); E. Griffin, et al., *Predators as Prey: Why Healthy Oceans Need Sharks*, 2008.

54. An “ecological pyramid” is a graphical representation designed to show the biomass productivity at each trophic level in a given ecosystem. See Ecology Edu. Consulting, *Ecological Pyramids in an Ecosystem*, http://www.ecologyedu.com/education_resources/what_is_an_ecological_pyramid.html (last visited Aug. 21, 2015). Biomass is the amount of living or organic matter in an organism. *Id.* Simply put, it shows the flow of energy through an ecosystem. *Id.*

55. See *Conservation Tourism*, *supra* note 13 (discussing economic importance of sharks).

56. See Gambino, *supra* note 3 (describing public response to 1916 attacks on five New Jersey beachgoers).

57. See Great White Smithsonian, *supra* note 10 (discussing natural history of sharks).

58. *Jaws* was released in 1975. The societal fear, which was once felt, seems to be diminishing. After all, more people died in “selfie-related” accidents than as a result of a shark attack in 2015. See Hanson, *supra* note 8 (describing six confirmed shark attacks resulting in deaths compared to twelve selfie-related deaths). A “selfie” is “[a] photograph that one has taken of oneself, typically one taken with a smartphone or webcam and shared via social media.” See *Selfie*, OXFORD DICTIONARY

were targeted for a number of reasons; safety for swimmers and grandiose notions of wanting to be the man catching the biggest, fiercest shark in the waters were the top reasons.⁵⁹ As a result, many types of shark species plummeted by fifty percent, some as much as ninety percent.⁶⁰ Although there is "considerable disagreement" as to the state of large pelagic fish populations, the scientific community generally agrees that large apex predators, particularly sharks, are at the greatest risk and in need of the greater protection.⁶¹

The International Union for the Conservation of Nature (IUCN) is a leading authority on the status of the world's plant and animal species, and identifies those in danger of extinction.⁶² Their findings are published in the *IUCN Red List of Threatened Species*.⁶³ The IUCN considers all species designated "Critically Endangered," "Endangered" or "Vulnerable" to be "Threatened."⁶⁴ The Red List review of more than one thousand species of sharks, rays and chimaeras found that twenty-nine percent are Threatened or

RIES, available at http://www.oxforddictionaries.com/us/definition/american_english/selfie (last visited Oct. 12 2015).

59. See JAMES E. S. HIGHAM & MICHAEL LÜCK, MARINE WILDLIFE AND TOURISM MANAGEMENT 54–55 (James Highman & Michael Lück eds., 2008), available at <https://books.google.com/books?id=lzA9GoxpuMC&pg=PA54&lp=PA54&dq=shark+fishing+tournament+popularity&source=bl&ots=5m2EKYdQK4&sig=qxLo8uhZwSlvvEfrRhZDzbyd-XjU&hl=en&sa=X&ei=LGrzVOjPPJCiyATGuILQBw&ved=0CGUQ6AEwDA#v=onepage&q=shark%20fishing%20tournament%20popularity&f=false> (discussing shark tournament competitors who seek the largest sharks in order to maximize chance of winning prize money and trophies).

60. See Charles Choi, *How 'Jaws' Forever Changed Our View of Great White Sharks*, LIVE SCIENCE (June 20, 2013, 3:16 AM), <http://www.livescience.com/8309-jaws-changed-view-great-white-sharks.html>. For a concise summary of the impacts on specific shark populations, see *Shark Biology Contributes to Population Decline and Fishery Collapses*, HUMANE SOC'Y INT'L (2015), http://www.hsi.org/issues/shark_fishing/facts/shark_biology.html.

61. See Christopher D. Moyes et al., *Predicting Postrelease Survival in Large Pelagic Fish*, 135 TRANSACTIONS OF THE AMERICAN FISHERIES SOCIETY 1389 (2006), available at http://www.academia.edu/6720181/Predicting_Postrelease_Survival_in_Large_Pelagic_Fish. See also *Shark Conservation*, supra note 36 (describing need for further regulatory protection of sharks).

62. See generally INT'L UNION FOR CONSERVATION OF NATURE, <http://www.iucn.org/> (last visited Feb. 10, 2016).

63. See Overview, IUCN RED LIST OF THREATENED SPECIES, <http://www.iucnredlist.org/about/overview> (last visited Feb. 10, 2016) ("The IUCN Red List of Threatened Species is widely recognized as the most comprehensive objective global approach for evaluating the conservation status of plant and animal species.").

64. See *IUCN Red List of Threatened Species*, INT'L UNION FOR CONSERVATION OF NATURE, <http://www.iucnredlist.org/> (last visited Feb. 10, 2016) (hereinafter "IUCN Red List").

Near Threatened by extinction.⁶⁵ A further forty-five percent are categorized as “Data Deficient,” meaning that more information is required to place them in a threat category.⁶⁶ Shark species, by comparison, account for 370 of the group.⁶⁷ Forty-six percent are Threatened or Near Threatened with extinction, and twenty-six percent are “Data Deficient.”⁶⁸

Because recovery from overfishing can take years or decades for many shark species, regulatory action is necessary to protect shark populations.⁶⁹ Some nations—including the United States—have begun taking steps to address these issues.⁷⁰ For example,

65. See Sharks, *IUNC Red List*, *supra* note 64 (search “Enter Red List search term(s)” for “Sharks”; then refine “habitat” and select “Marine Neritic,” “Marine Oceanic,” “Marine Deep Benthic,” “Marine Intertidal,” and “Marine Coastal/Supratidal”; then refine “taxonomy” and select “Chondrichthyes”) (returning 1,043 results to show species assessments within Elasmobranchii and Holocephali subclasses). If the search is further refined by assessment, results indicate nineteen species are “Critically Endangered,” thirty-nine are “Endangered,” one hundred fourteen are “vulnerable,” and one hundred thirty-one are “Near Threatened,” for a total of three hundred three species. See *id.* (refine further “assessments” individually by “Critically Endangered,” “Endangered,” and “Near Threatened”). In comparison, two hundred and seventy-one species – or twenty-six percent – are designated “Least Concern.” See *id.* (refine further “assessments” by “Least Concern”).

66. The search conducted above indicated 469 species are classified as data deficient. See *id.* (search query n. 64) (noting number of species classified as “data deficient” species).

67. *IUNC Red List*, *supra* note 64. (search “Enter Red List search term(s)” for “Sharks”; then refine “fish”; then refine “habitat” and select “Marine Neritic,” “Marine Oceanic,” “Marine Deep Ocean Floor,” “Marine Intertidal,” “Marine Coastal,” and “Unknown”).

68. See *id.* One hundred and fifty-nine species – or twenty-nine percent – are classified as data deficient. *Id.* Eighteen species are “Critically Endangered,” or “Endangered,” thirty-six are “vulnerable,” and fifty are “Near Threatened,” for a total of one hundred four species, twenty-eight percent of the total. *Id.* In comparison, 107 species – or twenty-eight percent – are designated “Least Concern.” *Id.*

69. See AWARE Instructor Guide, *supra* note 19, at 15 (detailing efforts of NOAA Fisheries to promote national and international shark conservation); Moyes, *supra* note 61, at 1389 (suggesting “prolonged effects” such as substantial reductions in “reproductive biomass” will be “seen locally in predator hotspots or ecosystem-wide” because sharks are “long-lived” and “late-maturing”). See generally *Conservation Tourism*, *supra* note 13 (proposing ecotourism as one way to fund shark research and preservation).

70. See Shark Conservation Act, 16 U.S.C. § 1857(1)(P) (2011) (requiring all sharks in United States – except dogfish sharks – to be brought to shore with their fins naturally attached); 50 C.F.R. § 635.20(e) (2013) (“All sharks landed under the recreational retention limits . . . must have . . . fins naturally attached.”); 50 C.F.R. § 635.30 (2011) (“[A] person who owns or operates a vessel issued a Federal Atlantic commercial shark permit . . . must maintain all the shark fins including the nail naturally attached . . . until the shark has been offloaded from the vessel.”).

shark finning practices have been banned in a number of nations.⁷¹ Shark finning is the removal of only the shark fins.⁷² It is an ancient practice that has been subject to strong criticism because often the de-finned sharks are tossed back into the water—alive—and slowly sink and suffocate, assuming the shock does not kill them first.⁷³

Recovery initiatives, however, are often difficult to formulate or project effectiveness because little is known about “maximum age, age at maturity, growth rate, and differences in growth between males and females” for many species of sharks.⁷⁴ Peter Benchley described the factors contributing to the little knowledge of sharks we have.⁷⁵

Shark Week 2015 highlighted many of those issues.⁷⁶ For example, new species of sharks are still being discovered, in part because humans have only been able to explore a small portion of the oceans.⁷⁷ This year featured the work of marine biologist, Paul Clerkin, who has discovered multiple species of bioluminescent deep-water sharks—sharks that glow-in-the-dark.⁷⁸

Additionally, sharks are more difficult to study than mammals because sharks do not come up for air.⁷⁹ It was not long ago that biologists could only speculate about great whites’ mating habits

71. See Caty Fairclough, *Shark Finning: Sharks Turned Prey*, SMITHSONIAN NAT'L MUSEUM OF NATURAL HISTORY, <http://ocean.si.edu/ocean-news/shark-finning-sharks-turned-prey> (last visited Oct. 11, 2015). These fins have a high retail sale value – as much as \$500 per pound – especially in China, where shark fin soup also has cultural value. See *id.* (discussing economic and cultural motivation behind shark finning). Shark fins were thought to have medicinal benefits. See *id.* (explaining development of valuing shark fins in Chinese culture).

72. See *id.* (describing practice of shark finning).

73. See *id.* (detailing history of shark finning).

74. *Age and Growth in Sharks*, NAT'L OCEANIC AND ATMOSPHERIC ADMIN., <http://nefsc.noaa.gov/nefsc/Narragansett/sharks/age.html> (last visited Feb. 10, 2016).

75. See BENCHLEY, *supra* note 9, at 44–49 (discussing amount and variety of sharks worldwide).

76. For episode and information on Shark Week 2015, visit <http://www.discovery.com/tv-shows/shark-week/>.

77. See BENCHLEY, *supra* note 9, at 47 (explaining why humans have limited knowledge of sharks).

78. See Paul J. Clerkin, *Paul J. Clerkin Online CV*, <http://pauljclerkin.com/> (last visited Feb. 10, 2016) (listing Clerkin's accomplishments). See also ALIEN SHARKS, Discovery Channel 2015 (featuring luminescent lanternsharks). The author has wondered why Discovery Channel did not feature Clerkin's discovery and research given the catchiness of potential ads and the ease of capitalizing on the discovery with various toys and shirts: Clerkin discovered *glow-in-the-dark sharks!*

79. See BENCHLEY, *supra* note 9, at 47 (comparing amount of knowledge known about sharks to that of other fish and mammals).

and where their birthing grounds may be.⁸⁰ Last year, OCEARCH researchers believed that Mary Lee, the great white and social media super-shark, was pregnant based on her changes in movement, and now speculate she dropped as many as a dozen pups in the estuaries off the Kiawah Island coast.⁸¹ This hypotheses may never have been developed without the use of satellite tracking tags.⁸² Moreover, there is less support to study sharks in comparison to dolphins or orcas because humans tend to project human characteristics on mammals—such as being nurturing and protective of the young and working together in a family.⁸³

III. SHARK FISHING TOURNAMENTS

A. Introduction to Fishing Tournament Formats

On both coasts of the United States, recreational shark fishing has become increasingly “popular and prevalent.”⁸⁴ Recreational fishing is any nonprofessional fishing with a rod.⁸⁵ “Recreational

80. See Bo Petersen, *Mary Lee a Mom? Great White Shark's Track Raises Researcher's Suspicions*, POST AND COURIER (July 16, 2014, 1:38 PM), <http://www.postandcourier.com/article/20140715/PC1610/140719558> (discussing increase in human knowledge of sharks). Bryan Frazier, South Carolina Department of Natural Resources marine biologist, remarked, “We’re learning we don’t know as much as we thought we did.” *Id.*

81. See *infra* notes 278–299 and accompanying text (discussing use of GPS technology and social media to benefit conservation initiatives). See also Petersen, *supra* note 80 (reporting on new data and understanding of great white mating and birthing grounds); Linsey Davis & Meredith Frost, *Tracking Great White Sharks: Innovative GPS-Tagging Program Reveals Sharks; Swim Patterns*, ABC NEWS (Feb. 26, 2013), <http://abcnews.go.com/US/stalking-great-white-sharks-innovative-gps-tagging-project/story?id=18549565> (quoting marine biologist, Greg Skomal, postulating Cape Cod may be breeding ground for great whites sometime in fall and early winter).

82. See Linsey Davis & Meredith Frost, *Tracking Great White Sharks: Innovative GPS-Tagging Program Reveals Sharks; Swim Patterns*, ABC NEWS (Feb. 26, 2013), <http://abcnews.go.com/US/stalking-great-white-sharks-innovative-gps-tagging-project/story?id=18549565> (quoting marine biologist, Greg Skomal, postulating Cape Cod may be breeding ground for great whites).

83. See BENCHLEY *supra* note 9, at 47 (explaining why humans have limited knowledge of sharks); *id.* at 114 (noting “sharks do not breathe air, do not nurse their young, do not communicate with one another in an audible ‘language,’ and do not interrelate with humans at all. Consequently, people can’t easily identify with sharks.”).

84. See Pete Cooper, *Shark Fishing in U.S. Territorial Waters*, ICHTHYOLOGY FLA. MUSEUM OF NATURAL HISTORY, <https://www.flmnh.ufl.edu/fish/education/sharks/sharkfishing.html> (last visited Feb. 15, 2016) (discussing shark fishing trends in United States).

85. See DAVID POLICANSKY, *Catch-and-Release Recreational Fishing: a Historical Perspective*, in RECREATIONAL FISHERIES: ECOLOGICAL, ECONOMIC, AND SOCIAL EVALUATION 75 (Tony J. Pitcher et al. eds., 2002), available at <https://docs.google.com/file/d/0B0FxFxGINvSi59bGJUTJJOaEhxSGc/edit> (citing J. McDONALD, THE ORIGINS OF ANGLING AND A NEW PRINTING OF THE TREATISE OF FISHING WITH AN ANGLE AT-

shark anglers mainly use rod and reel with one baited hook at the end of the line.”⁸⁶ “On the west coast and East Coast, north of Cape Hatteras, makos, threshers and blue sharks are mainly sought after by these anglers while blacktip, bull, blacknose, sandbar, tiger and Atlantic sharpnose sharks are caught south of Cape Hatteras and in the Gulf of Mexico.”⁸⁷

At the time *Jaws* was released in 1975, recreational shark fishing and “boats targeting large trophy sharks” on the East Coast were on the rise.⁸⁸ “Over the last twenty years recreational [anglers’] target has shifted to smaller species of shark.”⁸⁹ Recreational shark anglers mainly catch shark for the thrill of the catch, trophies, or personal consumption.⁹⁰ Because “the motivations driving commercial and recreational shark fishing differ, so do . . . the regulations they [are required] to follow.”⁹¹

B. Traditional Catch and Kill Tournaments

Shark fishing tournaments have been popular, especially on the East Coast, since the mid-1970s.⁹² The most well-known is the traditional catch-and-kill format, where the shark is landed and brought to a weigh station.⁹³ The structure of catch-and-kill tournaments has remained virtually the same since the 1970s.⁹⁴

TRIBUTED TO DAME JULIANA BERNERS (Doubleday 1963) and P. SCHULLERY, AMERICAN FLY FISHING: A HISTORY (Lyons and Burford 1987)).

86. Cooper, *supra* note 84.

87. *Id.*

88. *See id.*

89. *Id.*

90. *See* Higham & Lück, *supra* note 59, at 55 (describing anglers’ motivation to participate in shark fishing tournaments).

91. Cooper, *supra* note 84.

92. *See* Higham & Lück, *supra* note 59, at 54–55 (discussing rise of shark fishing tournament popularity after release of summer blockbuster *Jaws*).

93. *See* Jim Rutenberg, *Rethinking Tournaments Where Sharks Always Lose*, N.Y. TIMES (July 22, 2013), http://www.nytimes.com/2013/07/23/nyregion/rethinking-tournaments-where-sharks-always-lose.html?pagewanted=all&_r=0 (discussing catch and kill tournaments).

94. *Compare* Frank Meyer, *Saltwater Summary*, SARASOTA HERALD-TRIBUNE, Dec. 23, 1975, at 4C, *available at* https://news.google.com/newspapers?nid=1755&dat=19751223&id=PUk0AAAAIIBAJ&sjid=_J2cEAAAAIIBAJ&pg=4491,3694231&hl=en. (“The Old Salt Fishing Club is sponsoring four monthly shark tournaments Tournaments are open to the public, with an entry fee of \$10 for members and non-members. . . . Trophies will be awarded on the basis of the heaviest shark caught in total pounds. Sharks can be either caught from a boat or from land. All sharks must be caught on a manually operated rod and reel. The fishing line may be of no more than 130-pounds test. The angler must hook, fight and bring the fish to gaff without the aid of any other person. . . . Awards will include a monthly trophy, an overall heaviest shark trophy, and fishoff [sic] trophies of 1st, 2nd and 3rd place with cash awards . . .”), *with 30th Annual Shark Tournament*, STAR ISLAND

Weighing the shark on the pier is known for drawing a huge crowd, and turning the spectacle into a tourist attraction of its own.⁹⁵ Fishermen string up the shark by its caudal fin, and then weigh it as it dangles lifelessly on the pier.⁹⁶ A hook pierces the shark's bloodied nostril, and keeps the mouth open wide so that the jaw size can be measured.⁹⁷ Spectators see row after row of razor sharp teeth, rendered harmless by death. The angler proudly has his picture taken with his carcass-trophy. In fact, the Ocean City Shark Tournament still uses the dock weigh station because it is so popular with spectators, and front row seats are always reserved for children.⁹⁸

C. Catch and Release Tournaments

The next type of tournament, which is gaining notoriety, is the catch and release format.⁹⁹ Recreational fishing has been in the

YACHT CLUB & MARINA, <http://www.starislandyc.com/sport-fishing-competition/shark-tournament-montauk-long-island-ny> (last visited Feb. 15, 2016) (“Entry Fee \$1,250.00 per boat There are 12 tournament prizes, including \$30,000 for the Heaviest Qualifying Shark of the Tournament; \$5,000 each day for the Heaviest Qualifying Shark of the day; \$5,000 for the Heaviest Qualifying Mako [A]ll anglers can contribute to the study of the shark by tagging and releasing sharks that do not meet strict weight requirements.”).

95. As barbaric as catch-and-kill tournaments are by nature, some tournaments require participants to release all sharks under a minimum specified weight, reducing the number of sharks slaughtered. *See, e.g., 30th Annual Shark Tournament*, STAR ISLAND YACHT CLUB & MARINA (2015), <http://www.starislandyc.com/sport-fishing-competition/shark-tournament-montauk-long-island-ny> (presenting tournament rules). Additionally, some tournaments donate the meat of sharks which are killed and brought onto the weigh station. *Id.* The Star Island Yacht Club tournament donated over 750 pounds of shark meat to a local food pantry at the conclusion of the June 2015 tournament. *Id.*

96. *See The Demons of Durban Part IV – The End of Days*, TEAM REBEL FISHING (Nov. 5, 2010, 12:40 PM), <http://teamrebel fishing.com/httpwwwteamrebel fishingco/2010/11/5/the-demons-of-durban-part-iv.html> (“The weigh station was constructed of three metal beams in a pyramid like structure, with a scale attached to the centerpoint [sic] to accurately weigh the fish.”). Team Rebel Fishing is self-described as “group of extreme anglers” and “experts in the department of shark fishing, land-based fishing, as well as shark fishing historians.” *Id.* According to the group, they have a “strong message of conservation about the wildlife” and who “fight for anglers rights.” *Id.*

97. *See, e.g., Jen Carlson, Graphic Photos From This Weekend’s Shark Fishing Tournament In Montauk* (June 18, 2012, 3:41 PM), http://gothamist.com/2012/06/18/montauk_shark_fishing.php#photo-1 (describing personal experience observing tournament and weigh station).

98. *See The Early Years, supra* note 93 (explaining enduring popularity of tournament).

99. *See generally* TEXAS SHARK RODEO, <http://texassharkrodeo.com/> (last visited Feb. 15, 2016) (self-describing tournament as “a catch - photo - release team oriented shark fishing tournament with an emphasis on tagging and collecting data for the conservation of sharks”); *Rules*, BLACKTIP CHALLENGE, <http://blacktipchallenge.com/about/rules> (last visited Mar. 1, 2015) [hereinafter “Blacktip

history books “for at least several centuries.”¹⁰⁰ So too has the notion of conserving common resources.¹⁰¹ A fifteenth century manuscript advised anglers not to take more fish than they need because “[t]hat could easily be the occasion of destroying your own sport and other men’s also.”¹⁰² The catch and release trend did not truly surface until the mid to late nineteenth century, when anglers began advocating for more conservation efforts and tighter restrictions.¹⁰³ By the 1930s, catch and release made its way into popular literature, where it was eloquently stated that “[g]ame fish are too valuable to be caught only once The fish you release is your gift to another angler, and, remember, it may be have someone’s similar gift to you.”¹⁰⁴

Consistent with this mantra, competitors catch sharks and are required to take photographs of the shark, which they then submit to the tournament.¹⁰⁵ Rather than killing the sharks, they are released for future anglers, perhaps themselves again, to conquer.¹⁰⁶ There appears to be growing recognition of the environmental importance of release, and most traditional tournaments are providing an incentive to release sharks.¹⁰⁷ Presently, some catch and kill

Challenge”] (stating “[a]ll sharks *must* be released” (emphasis added)); *Monster Shark Tournament Facts*, BOSTON BIG GAME FISHING CLUB, <http://www.bbafc.com/Monster%20Shark%20Tournament%20Facts.html> (last visited Mar. 1, 2015) (claiming “participants have historically released over 97% of the total number of sharks that are caught” during the Monster Shark Tournament). *See also* 2014 Del. Fishing Guide, DEL. DEPT. OF NAT’L RES. AND ENVIRO. CONTROL, at 5, *available at* <http://www.dnrec.delaware.gov/fw/Fisheries/Documents/2014%20Fishing%20Guide.pdf> (encouraging anglers to use catch and release practices “to maximize angling success”).

100. POLICANSKY, *supra* note 85, at 75.

101. *See id.* (providing history of recreational fishing).

102. *See id.* at 76 (citing J. McDONALD, *THE ORIGINS OF ANGLING AND A NEW PRINTING OF THE TREATISE OF FISHING WITH AN ANGLE ATTRIBUTED TO DAME JULIANA BERNERS* (1963)).

103. *See id.* (describing history of recreational fishing).

104. *Id.* at 78 (citing LEE WULFF, *LEE WULFF’S HANDBOOK OF FRESHWATER FISHING* (1939)).

105. *See Rules*, *supra* note 99 (describing requirements of tournaments). Competitors are required to take photographs of:

(1) Angler fighting the fish with the rod and reel (rod tip must be visible in photo); (2) angler behind the fish holding the Blacktip Challenge flag in front of the dorsal fin; (3) a wide shot photograph of the overall length measurement; (4) close-up photograph of the overall length measurement; (5) wide shot photograph of the fork length measurement; (6) close-up photograph of the fork length measurement; (7) photograph of the girth measurement.

Id.

106. *See* POLICANSKY, *supra* note 85 (discussing historic practice of catch and release fishing).

107. *See id.* (discussing historic attitudes towards catch and release fishing).

tournaments even have awards for the angler or team who releases the most sharks.¹⁰⁸ However, the prize is minimal in comparison to the award for the biggest catch.¹⁰⁹

While most catch and release tournaments involve open water fishing from a boat, there are also a few “land-based shark fishing” tournaments.¹¹⁰ Land-based shark fishing is done from the beach, and the sharks are landed on the sand, where the angler takes the required photographs before releasing the shark.¹¹¹

Land-based catch and release has attracted negative attention recently. The Blacktip Challenge, a tag and release, land-based shark fishing tournament in Florida, came under fire after a shark died.¹¹² Land-based catch and release is uncommon because there are serious safety concerns for the angler, health risks for the sharks, and most species targeted by shark tournaments are found in deeper waters.¹¹³

108. For example, the Monster Shark Tournament—a partial release, partial landing tournament—emphasizes landing only large, sexually mature sharks to “ensure a sustainable population” by giving most sharks “the opportunity to reproduce.” See *Monster Shark Tournament Facts*, *supra* note 99. The tournament takes this seriously by “redefin[ing] the concepts of a trophy shark” with some of the highest minimum weights required by any U.S. tournament before the shark may be landed. See *id.* (noting tournaments standards are “four times greater than the minimum size standard set forth by the NMFS for sharks caught in the Northern Atlantic”). See also *Montauk Marine Basin Tournament - Rules*, MONTAUK MARINE BASIN (Mar. 1, 2015), <http://www.marinebasin.com/tournaments&key=010> (“Tag and Release Tags will be supplied at captains meeting with limited amount. Prizes for tag and release category will be [sic] awarded.”); *South Jersey Tournaments Presents The 35th Annual South Jersey Tournament*, SOUTH JERSEY TOURNAMENTS, http://www.southjerseytournaments.com/images/printable/2015/Bro_2015_Shark_email.pdf (last visited Mar. 1, 2015) (specifying rules for most mako sharks released award).

109. See, e.g., *South Jersey Tournaments Presents the 35th Annual South Jersey Tournament*, *supra* note 108 (noting \$323,273 paid out in prizes in 2014, but winner of most sharks released only receives a trophy); *Montauk Marine Basin Tournament*, *supra* note 108 (awarding \$500 for most sharks tagged and released, and \$7,500 for landing largest mako and blue shark to angler for each category).

110. See *Rules*, *supra* note 99 (mandating “[a]ll fishing must be conducted exclusively from the beach. Every fish must be hooked and landed on the beach”).

111. See *id.* (describing rules of fishing tournament).

112. See *Controversial Amateur Shark Fishing Tournament Criticized After Hammerhead Shark Dies Before It Could Be Released Back into Sea*, DAILY MAIL (Feb. 1, 2015), 10:06 AM, <http://www.dailymail.co.uk/news/article-2935266/Shark-tournament-draws-criticism-Hammerhead-dies-catch-release-process.html> (describing death of shark during challenge).

113. See *id.*

D. "Tag and Release" Tournaments

Finally, a few tournaments have adopted the tag and release format.¹¹⁴ These tournaments voluntarily partner with the National Marine Fisheries Service ("NMFS") and participate in the Cooperative Shark Tagging Program ("CSTP").¹¹⁵ The tagging program is an important conservation initiative orchestrated by NMFS, and offers anglers the opportunity to contribute to data collection.¹¹⁶ It is a "collaborative effort" between NMFS and fishing industries, both recreational and commercial.¹¹⁷ The program has been successful—tagging over 242,000 sharks of more than fifty species over the last fifty-two years, collecting data on "stock identity, movements and migration . . . abundance, age and growth . . . mortality, and behavior."¹¹⁸

Under this program, when certain target species of sharks are caught, a GPS tag is attached to the dorsal fin of the shark, measurements are taken and recorded, and this information is submitted to the program for further analysis.¹¹⁹ Those anglers who voluntarily participate in the program are given the tags for free.¹²⁰ "Numbered tags are sent to volunteer participants on self-addressed return post cards for recording tagging information (date, location, gear, size and sex of shark), along with a tagging needle, tagging instructions, current management information, and shark ID placards."¹²¹

114. See, e.g., *The 2015 Carl Darenberg Memorial Shark's Eye All-Release Tournament: Tournament Rules*, SHARK'S EYE, <http://www.sharkseyetournament.com/> (last visited Mar. 1, 2015) [hereinafter "Darenberg Memorial All-Release Tournament"] (proclaiming to be "[a] fishing tournament designed to save sharks").

115. See *NMFS Shark Tagging Program*, NAT'L OCEANIC AND ATMOSPHERIC ADMIN. NE. FISHERIES SCI. CTR. (Aug. 25, 2014), <http://nefsc.noaa.gov/nefsc/Narragansett/sharks/tagging.html> [hereinafter "NMFS Tagging Program"] (describing history, procedures, and benefits of Cooperative Shark Tagging Program).

116. See *id.* (describing history, procedures, and benefits of Cooperative Shark Tagging Program).

117. See *id.*

118. *Id.* NOAA has emphasized that the success of the program has provided so much information previously entirely unknown that the "need for international cooperation" is readily apparent. *Id.*

119. See *id.* (describing Shark Tagging Program).

120. See *id.* (describing Shark Tagging Program).

121. Nat'l Marine Fisheries Serv., *Cooperative Shark Tagging Program*, NAT'L OCEANIC AND ATMOSPHERIC ADMIN. NE. FISHERIES SCI. CTR., 1, May 21, 2014, available at <http://nefsc.noaa.gov/nefsc/Narragansett/sharks/cstpbooklet.pdf> [hereinafter "Cooperative Tagging Booklet"].

1. *Tagging Great White Sharks for Research*

The process of tagging great sharks for research makes the phrase “[w]e’re gonna need a bigger boat” a bit of an understatement.¹²² Researchers have developed a hydraulic platform to lift sharks out of the water.¹²³ A hose is put into the shark’s mouth so that saltwater can continue to run through the gills, while shark-sized towel is typically put over its head.¹²⁴ The satellite tag is then bolted to the shark’s dorsal fin.¹²⁵

During the approximate fifteen minutes the shark is on the platform for tagging, other members of the research team work quickly to collect samples and take measurements.¹²⁶ As many as twelve separate studies are conducted before the shark is then released back into the water and begins transmitting location and environmental data to satellites.¹²⁷ “The research projects include parasite collection in gills and oral cavity, ultrasounds on females, monitoring swimming behavior and learning more about the diet of great whites.”¹²⁸

2. *Tagging Sharks at Tournaments*

The process for recreational fishers tagging is similar to that used when tagging great whites for research.¹²⁹ The biggest differ-

122. *Cf.* JAWS, *supra* note 1.

123. *See* Sarah Kaplan, *Meet Mary Lee, the Friendly Neighborhood Shark*, WASH. POST (May 8, 2015), <http://www.washingtonpost.com/news/morning-mix/wp/2015/05/08/meet-mary-lee-the-east-coasts-friendly-neighborhood-great-white-shark/> (discussing tagging process involving large sharks).

124. Running water over the gills ensures that the shark can breathe while everything else is going on. Placing a towel over its head helps calm down the shark – it’s scary to be a fish out of water. *See id.*

125. *See id.* (explaining how tags are attached to shark dorsal fin).

126. *See id.* (discussing multitasking research projects). *See also* Charles Poladian, *Shark Tracking Goes Viral: Everyone Is Following Mary Lee the Great White Shark And You Should Too*, INT’L BUS. TIMES (May 19, 2015, 12:37 PM), <http://www.ib-times.com/pulse/shark-tracking-goes-viral-everyone-following-mary-lee-great-white-shark-you-should-1929352> (detailing cutting-edge research projects conducted during tagging).

127. *See* Poladian, *supra* note 126 (describing process of tagging great white sharks).

128. *Id.*

129. *See* Kaplan, *supra* note 123. The process of applying the tag is essentially the same. *See id.* The way in which anglers catch the fish does not change from what would normally be done in the course of leisure fishing. *See id.* The biggest difference from tagging of great white sharks for research is that hydraulic platforms are not necessary. *See id.* Recreational fishers are prohibited from landing great white sharks. *See* 50 C.F.R. § 635.22(c)(4). *See also supra* note 123. Moreover, the species targeted by tournament fishers are smaller, and can be brought onboard the vessel as is traditionally done in catch-and-kill tournaments. *See supra*

ence is that recreational fishers do not need the hydraulic platform.¹³⁰ Smaller species of sharks can be landed and brought onto the boat using standard rod-and-reel.¹³¹ NMFS provides a comprehensive guide to volunteer taggers about how to properly apply the tags.¹³²

3. *Benefits of Tagging*

Tag and release is an attractive format to conservationists and competitors alike for a number of reasons.¹³³ First, the data collected from these expeditions aids conservation efforts for sharks and enables a better understanding of these apex predators and their role in the ecosystem.¹³⁴ Increased knowledge helps NOAA adjust existing regulations.¹³⁵

Additionally, once the shark is tagged and the information is submitted, the information is posted online for the public to view.¹³⁶ OCEARCH is a non-profit organization “with a global reach for unprecedented research on great white sharks and other large apex predator . . . [by] enabl[ing] leading researchers and institutions to generate previously unattainable data on the movement, biology and health of sharks to protect their future while enhancing public safety and education.”¹³⁷ Their Global Shark

note 123. As such, changes in equipment, like hydraulic platforms, are not necessary.

130. Because no changes in equipment are necessary, the proposal described in Part IV would not impose additional costs on the angler, which is consistent with the principles of the Magnuson-Stevens Act. *See infra* notes 159–164 and accompanying text (describing regulatory goals and general guidelines as specified by Congress).

131. *See generally* NMFS Tagging Program, *supra* note 115 (describing history, procedures, and benefits of Cooperative Shark Tagging Program).

132. *See id.* (describing history, procedures, and benefits of Cooperative Shark Tagging Program).

133. *See infra* notes 134–144 and accompanying text (describing benefits of tag and release fishing).

134. *See* Poladian, *supra* note 126 (expanding on purpose of expeditions).

135. The Magnuson-Stevens Fishery Conservation and Management Act requires NOAA to base regulations on, in part, “based upon the best scientific information available.” *See infra* Part IV and accompanying text. By expanding the number of sharks that get tagged, scientists will get “more in-depth information on the sharks’ movement patterns to better manage and conserve them.” *See* Chris Joseph, *You Can Bet on Shark Racing Starting Next Month*, BROWARD PALM BEACH NEW TIMES (Feb. 17, 2015), http://blogs.browardpalmbeach.com/pulp/2015/02/you_can_bet_on_shark_racing_thanks_to_nova_southeastern_university.php.

136. *See generally* OCEARCH GLOBAL SHARK TRACKER, <http://www.ocearch.org/> (last visited Mar. 3, 2015) (tracking sharks throughout the world).

137. *See generally* OCEARCH, <http://sportfishcenter.org/about-us/partners/ocearch> (last visited Mar. 4, 2016) (discussing organization purpose).

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Tracker website allows anyone “to [follow] sharks in real-time.”¹³⁸ Every time a shark breaks the surface, the tracking device “pings” a satellite, “sending location data to researchers, who add it to the site.”¹³⁹ This serves as a fun educational tool, and even allows some tournaments to extend the duration of the competition.¹⁴⁰ These tournaments award an additional prize to the angler whose shark travels the farthest during a set period of time.¹⁴¹

Even though the tag and release format is promising as a conservation strategy due to the relative ease and significant benefits, financial constraints limit its application.¹⁴² Tags are typically expensive.¹⁴³ As such, most tournaments limit the number of tags provided to competitors.¹⁴⁴

IV. LEGAL FRAMEWORK

A. Statutory Authority

Atlantic sharks fisheries are managed under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (“Magnuson-Stevens Act”).¹⁴⁵ Through that legislation, Congress

138. See Kaplan, *supra* note 123.

139. See *id.*

140. See, e.g., *The Guy Harvey Great Shark Race*, NOVA SE. UNIV., <http://www.greatsharkrace.com/> (last visited Mar. 3, 2015) [hereinafter “Great Shark Race”]. The Guy Harvey Great Shark Race is not a fishing tournament. *Id.* Instead, it is a race based on the distance travelled by the sharks, where people (or businesses) can sponsor and name a shark fitted with a tag by researchers. See *id.* Anyone can see online how far each of the sharks has travelled. *Id.*

141. See, e.g., *Great Shark Race*, *supra* note 140. At the end of the six-month “race” a prize is awarded to the person or group whose shark swam the farthest. *Id.*

142. See *infra* notes 143–144 and accompanying text (discussing cost of tags and limited availability of tags and tournaments).

143. See Moyes, *supra* note 61 (noting “[d]ue to the high costs of the tags, [post-release] studies have focused on high-profile species, such as . . . great white sharks (*Carcharodon carcharias*)” (citation omitted)). These tags can run anywhere from \$500 to upwards of \$4,000 each. See, e.g., University of Miami, *Tracking Sharks on Google Earth*, R.J. DUNLAP MARINE CONSERVATION PROGRAM, <https://rjd.miami.edu/education/virtual-learning/tracking-sharks> (last visited Mar. 3, 2015) (noting \$2,500 tax-deductible donation covers the cost of one new SPOT shark tag); Boston Big Game Fishing Club, *supra* note 99 (noting tags used by tournament “cost over \$2,000 each”). Pop-up satellite archival tags (“PSATs”) that can measure ambient light are on pricier side. See, e.g., *Join the Race*, THE GUY HARVEY GREAT SHARK RACE, <http://www.greatsharkrace.com/index.php/join-the-race> (last visited Mar. 3, 2015) (noting \$5,000 donation covers cost of satellite tag, fees, and sponsorship).

144. See, e.g., Darenberg Memorial All-Release Tournament, *supra* note 114 (limiting each team to ten tags); Blacktip Challenge, *supra* note 99 (limiting each team to two tags).

145. See 16 U.S.C. § 971 (1998); Magnuson-Stevens Act, 16 U.S.C. § 1801 (1976). The Magnuson-Stevens Act was adopted in 1976 to reduce foreign ex-

delegated "broad authority" to National Oceanic and Atmospheric Administration ("NOAA") to issue regulations designed to "manage and conserve coastal fisheries."¹⁴⁶ This includes preparation of "fishery management plans which will achieve and maintain, on a continuing basis, the optimum yield from each fishery," including highly migratory species.¹⁴⁷ The National Marine Fishery Service ("NMFS") is a subdivision within NOAA, and is responsible for fishery management, including regulation promulgation and enforcement.¹⁴⁸

The purpose of the Magnuson-Stevens Act is to protect highly migratory species ("HMS") in waters extending two hundred miles from the United States coast through conservation and management measures.¹⁴⁹ The legislative history reflects Congress' concern that many HMS were "overfished" and inadequately protected.¹⁵⁰ Congress also found that other species, although not technically "overfished," were facing such severe population declines due to fishing pressures that they were on a fast-track to becoming threatened.¹⁵¹ Accordingly, NMFS has the authority to

ploitation of fisheries close to the United States' shores and to encourage the development of a domestic fishing industry. *See id.*

146. *See* § 971; *Kramer v. Mosbacher*, 878 F.2d 134, 135 (4th Cir. 1989); *S. Offshore Fishing Ass'n v. Daley*, 995 F. Supp. 1411, 1416 (M.D. Fla. 1998); *Recreational Fishing Alliance v. Evans*, 172 F. Supp. 2d 35, 38 (D.D.C. 2001); *Coastal Conservation Ass'n v. Locke*, No. 2:09-CV-641-FTM-29, 2011 WL 4530631, at *1 (M.D. Fla. Aug. 16, 2011) *report and recommendation adopted sub nom*, *Coastal Conservation Ass'n v. Blank*, No. 2:09-CV-641-FTM-29, 2011 WL 4530544 (M.D. Fla. Sept. 29, 2011). *See generally Atlantic Highly Migratory Species*, NAT'L OCEANIC AND ATMOSPHERIC ADMIN., <http://www.nmfs.noaa.gov/sfa/hms/> (last visited Mar. 1, 2015).

147. 16 U.S.C. §§ 1801(b)(4), 1854(g)(1).

148. *See id.* *See generally Atlantic Highly Migratory Species*, *supra* 146 and accompanying text.

149. *See* 16 U.S.C. §§ 1801(a)–(b) (2007). "The term 'highly migratory species' means tuna, marlin, oceanic sharks, sailfishes, and swordfish." *See* § 1802(21). The term "conservation and management" refers to all of the rules, regulations, conditions, methods, and other measures (A) which are required to rebuild, restore, or maintain, and which are useful in rebuilding, restoring, or maintaining, any fishery resource and the marine environment; and (B) which are designed to assure that: (i) . . . and that recreational benefits may be obtained, on a continuing basis; (ii) irreversible or long-term adverse effects on fishery resources and the marine environment are avoided; and (iii) there will be a multiplicity of options available with respect to future uses of these resources." § 1802(5).

150. *See Evans*, 172 F. Supp. 2d at 38–39 (citing 16 U.S.C. § 1801(a)) (discussing legislative history).

151. *See id.* at 39 (citing 16 U.S.C. §§ 1801(a)–(b)) (noting Congress determined "other species were 'so substantially reduced in number that they could become similarly threatened'").

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enact regulations protecting overfished species and to *prevent* overfishing.¹⁵²

Any regulatory actions must be consistent with the ten national standards articulated in § 1851(a) of the Magnuson-Stevens Act.¹⁵³ Three provisions are pertinent to this discussion.¹⁵⁴ First, when NMFS determines a new regulation is necessary or existing regulations need to be updated, the final regulation promulgated must be based upon the best scientific information available.¹⁵⁵ NMFS may implement precautionary measures based on scientific information that is known to be outdated or incomplete if that is what the best available scientific information is at the time the rule is promulgated.¹⁵⁶

152. *See id.* at 42 (“Conservation and management measures shall prevent overfishing.” (quoting 16 U.S.C. § 1851(a)(1))).

153. *See* 16 U.S.C. § 1851(a). Conservation and management measures shall: (1) . . . prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry; (2) . . . be based upon the best scientific information available; (3) [t]o the extent practicable, manage[] [individual stocks of fish] as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination; (4) . . . not discriminate between residents of different States [unless necessary, and if necessary, the allocation must be fair]; (5) . . . where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose; (6) . . . take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches; (7) . . . where practicable, minimize costs and avoid unnecessary duplication; (8) . . . take into account the importance of fishery resources to fishing communities by utilizing economic and social data . . . in order to [ensure community participation and minimize adverse economic impacts to the extent practicable]; (9) . . . to the extent practicable . . . minimize bycatch [where bycatch cannot be avoided]; (10) . . . to the extent practicable, promote the safety of human life at sea.

Id.

154. *See infra* notes 150–153 and accompanying text (discussing provisions regarding ten national standards).

155. *See* 16 U.S.C. § 1851(a)(2).

156. *See Evans*, 172 F. Supp. 2d at 43–44 (noting ten-year-old data substantiating NMFS rule was best scientific information available at time of promulgation). *See also* 50 C.F.R. § 600.315(b) (2016) (“The fact that scientific information concerning a fishery is incomplete does not prevent the preparation and implementation of an FMP.”); *Massachusetts v. Daley*, 170 F.3d 23, 30 (1st Cir. 1999) (holding NMFS may regulate species even if it lacks complete information); *A.M.L. Int’l v. Daley*, 107 F. Supp. 2d 90, 101 (D. Mass. 2000) (“The fact that scientific information is incomplete, however, does not prevent the implementation of a fishery management plan.”); *Parravano v. Babbitt*, 837 F. Supp. 1034, 1046 (N.D. Cal. 1993), *aff’d*, 70 F.3d 539 (9th Cir. 1995), *cert. denied*, 518 U.S. 1016 (1996) (“By requiring that decisions be based on the best scientific information available, the [Magnuson-Stevens] Act acknowledges that such information may not be exact or totally complete.”); *Nat’l Fisheries Inst. v. Mosbacher*, 732 F. Supp. 210, 220 (D.D.C. 1990) (“[T]he Court will not construe the Magnuson[-Stevens] Act to tie the Secretary’s hands and prevent him from conserving a given species of fish

Second, the NMFS regulation must be crafted to ensure the fishery produces the optimum yield without being overfished.¹⁵⁷ NMFS must use the best scientific information available to set appropriate quotas to stabilize marine fisheries.¹⁵⁸

Finally, NMFS must also “take into account the importance of fishery resources to fishing communities by utilizing economic and social data . . . to . . . minimize adverse economic impacts on such communities.”¹⁵⁹ Regulations need not eliminate all economic impact on the fishing communities, but NMFS must weigh possible negative economic impact against the conservation benefit.¹⁶⁰ This determination requires NMFS to consider the best scientific information as well.¹⁶¹ However, the economic impact on recreational fishers and related industries is difficult to assess.¹⁶²

The NMFS may simply predict what impact on revenue is expected based on prior experience and the data that is available.¹⁶³ Moreover, because economic effects “were not meant to trump the real purpose of the Magnuson-Stevens Act,” NMFS is only required to “minimize adverse impacts on fishing communities ‘to the extent practicable.’”¹⁶⁴

In sum, NMFS has the authority to adjust regulations, particularly in regard to catch size and limits, taking the most recent scientific data available into account.¹⁶⁵ This ensures the fishery is economically viable and sustainable for both commercial and recreational anglers.¹⁶⁶ NMFS may impose precautionary regulations to

whenever its very nature prevents the collection of complete scientific information.”).

157. *See* 16 U.S.C. § 1851(a)(1) (describing how conservation measures should be prepared).

158. *See* § 1851(a)(2) (stating qualifications for conservation measures used).

159. § 1851(a)(8).

160. *See Evans*, 172 F. Supp. 2d at 45–46 (explaining balance between economic impact and conservation benefit).

161. *See id.* (explaining best scientific evidence available requirement).

162. *See Evans*, 172 F. Supp. 2d at 46 (explaining difficulty of assess economic impact). The economic impact of regulations on recreational fishing is more difficult to assess than commercial impact. There is no purchase of the “good,” in this case, the shark; rather, a large web of transactions for the various goods and services involved. *See supra* notes 254–259 and accompanying text. Each impacted industry should be considered in NMFS’ assessment. *See id.*

163. *See Evans*, 172 F. Supp. 2d at 46 (holding economic impact prediction is sufficient).

164. *Id.* at 46 (citing 16 U.S.C. § 1851(a)(8)).

165. *See id.* (discussing NMFS’s authority).

166. *See id.* (explaining purpose behind adjusting regulations).

prevent overfishing, even when the scientific information available is incomplete or outdated.¹⁶⁷

B. Current Regulations on Shark Fishing

The United States places a “high priority on achieving effective conservation and management of sharks” because so many sharks are “particularly susceptible to overexploitation.”¹⁶⁸ Conservation and shark fishery management is important because many sharks are apex predators vital to the health of the ecosystems in which they live.¹⁶⁹

The NMFS’s HMS Division sets restrictions regarding what species can be caught, seasonal quotas, and defines seasons for shark fishing.¹⁷⁰ For example, NMFS regulations limit recreational anglers by the number of sharks per trip and size of shark caught.¹⁷¹ Similarly, large coastal sharks are required to be over four-and-a-half feet and each vessel can only take one shark per day.¹⁷² Small coastal sharks, however, do not have to reach a certain size but anglers are restricted to landing one shark per boat, per day.¹⁷³

V. PROPOSED REGULATIONS

A. Require Tournaments to Follow Catch and Release Practices

The “keep only what you need and release the rest” mantra still exists today.¹⁷⁴ As decades passed, the catch and release format has become widespread and controversial.¹⁷⁵ Catch and release is one

167. *See id.* (citing 16 U.S.C. § 1851(a)(8)) (noting regulations may be precautionary).

168. *Shark Conservation*, *supra* note 36.

169. *See id.* (explaining importance of sharks in ecosystem).

170. *See* 50 C.F.R. § 635, App’x. A (specifying which species of shark are permissible and prohibited to catch); 50 C.F.R. § 635.22 (imposing seasonal quota); § 635.2 (defining “fishing year” for sharks as Jan. 1 through Dec. 31).

171. *See* § 635.20(e); *cf.* § 635 (mandating commercial shark fishing is limited by weight quotas).

172. *See* § 635.20(e) (explaining size limits on sharks).

173. *See id.*; *see also* Cooper, *supra* note 84 (summarizing section 635 regulations). For example, Hammerhead sharks caught recreationally must be at least seventy-eight inches long, but Atlantic sharpnose and bonnethead sharks are not subject to any size restrictions. *See* 50 C.F.R. § 635.20(e)(3)–(4).

174. *Cf. Handling and Releasing Fish*, VA. MARINE RES. COMM’N, <http://www.mrc.virginia.gov/vswft/vsft4.shtm> (last visited Feb. 22, 2015).

175. *See* POLICANSKY, *supra* note 85, at 74 (giving historical explanation of catch and release); Higham, *supra* note 59, at 55 (describing increasing adoption of “conservation-oriented catch and release ethos”).

of a number of tools available to fishery managers.¹⁷⁶ Indeed, many North American fishing tournaments which have adopted the catch and release approach.¹⁷⁷ Some of these tournaments are nonetheless “very lucrative.”¹⁷⁸

Catch and release seems like a preferable management method, but it is not without flaws.¹⁷⁹ One of the biggest concerns associated with catch and release is hooking mortality—or the number of fish that do not survive the stress of being hooked, man-handled, and then tossed back into the water.¹⁸⁰ If having the sharks’ body unwillingly pierced, then being torn out of its aquatic safe haven, just to be fondled by some huge, foreign creature as it suffocates is not bad enough, then all of a sudden it is tossed back into the water, shocking its senses in an unpleasant manner.¹⁸¹

From the fish’s perspective, catch and release is still not fun. But how this translates to a calculable figure—hooking mortality—is complex because it is difficult to track and compile the necessary data reliably.¹⁸² While the data is not as neat and tidy as typically

176. See POLICANSKY, *supra* note 85, at 79 (citing Nobel, R.L., et al., *Managing Fisheries with Regulations*, in INLAND FISHERIES MANAGEMENT IN NORTH AMERICA 455–77 (C. Kohler, et al., eds. 1999)). Other management tools include: permit requisites and fees, size limits, bag limits, fishery closures and restrictions, and gear restrictions. See *id.*

177. See 50 C.F.R. § 635.2 (defining “tournament” as “any fishing competition involving Atlantic HMS in which participants must register or otherwise enter or in which a prize or award is offered for catching or landing such fish”); *Id.* (defining “Atlantic HMS” as “Atlantic tunas, billfish, sharks, and swordfish.”).

178. POLICANSKY, *supra* note 85, at 81 (citing HUGHES, R., A JERK ON ONE END: REFLECTIONS OF A MEDIOCRE FISHER (1999)); LYONS, J., et al., *An Evaluation of Recreational Fishing in England and Wales*, in RECREATIONAL FISHERIES: ECOLOGICAL, ECONOMIC, AND SOCIAL EVALUATION 144 (Tony J. Pitcher et al., eds. 2002)). See also *supra* note 109 and accompanying text (discussing disparity in prizes awarded for sharks landed and killed, compared to sharks released).

179. See generally Ø. Aas, et al., *Controversies over Catch-and-Release Recreational Fishing in Europe*, in RECREATIONAL FISHERIES: ECOLOGICAL, ECONOMIC, AND SOCIAL EVALUATION 75, (Tony J. Pitcher et al., eds. 2002) (discussing various perspectives contributing to debate on catch and release fishing practices); Kirk Deeter, *Getting Real About the Virtues of Catch-and-Release Fishing*, FIELD & STREAM MAGAZINE (June 26, 2012), <http://www.fieldandstream.com/blogs/flytalk/2012/06/getting-real-about-virtues-catch-and-release> (discussing pros and cons of selective harvest for population benefit and whether catch and release is “more humane act”).

180. Delaware specifically prohibits releasing sharks “in a manner that will not ensure sharks the maximum probability of survival.” See 7 DEL. ADMIN. CODE § 3541 (2015).

181. See POLICANSKY, *supra* note 85, at 80 (citing Cox-Rogers, S. et al., *A Review of Hooking Mortality Rates for Marine Recreational Coho and Chinook Salmon Fisheries in British Columbia*, in CANADIAN STOCK ASSESSMENT SECRETARIAL RESEARCH DOCUMENT (Ottawa, Ontario, 1999)).

182. See *id.* The complexity and number of factors, such as fishing gear type, water temperature, length of time being reeled in and out of water, angler experience, and hook size, make determining hooking mortality “difficult to estimate

preferred, the general consensus is that hooking mortality rates are low enough to justify catch and release as an effective management tool.¹⁸³

A common observation among experienced anglers about the general fishing community is that the majority of anglers are not releasing fish correctly.¹⁸⁴ Recently, the Blacktip Challenge shark tournament drew criticism after a Hammerhead shark died while it was being released back into the ocean.¹⁸⁵ While it is not entirely clear whether the death was the result of improper handling, this highlights the importance of expanding existing safe handling and release courses for commercial anglers to include recreational fishermen.¹⁸⁶ Though anglers are not excluded from these courses, and many, especially competitive anglers, do take the initiative to familiarize themselves with these practices, there is still room for expansion and availability of these courses.¹⁸⁷ There are plenty of resources available to fisherman to help educate themselves on proper catch and release procedures.¹⁸⁸

Additionally, catch and release is associated with behavioral changes in fish studied.¹⁸⁹ These changes are intuitive: fish in catch and release waters learn to avoid fishing gear or “otherwise change

accurately.” See *id.* See also Moyes, *supra* note 61 (emphasizing “uncertainty about postrelease survival is a management challenge in many fisheries for large pelagic fish” including sport fisheries).

183. See POLICANSKY, *supra* note 85, at 81 (citing *Catch-and-Release Fishing: As a Management Tool*, in A NATIONAL SPORT FISHING SYMPOSIUM (Barnhart and Roelofs, eds. 1977); *Catch-and-Release Fishing: A Decade of Experience*, in A NATIONAL SPORT FISHING SYMPOSIUM (Barnhart and Roelofs, eds. 1987); J.S. Griffith, *Coldwater Streams*, in INLAND FISHERIES MANAGEMENT IN NORTH AMERICA 481–504 (C. Kohler, et al., eds. 1999); R.L. Nobel, et al., *Managing Fisheries with Regulations*, in INLAND FISHERIES MANAGEMENT IN NORTH AMERICA 455–77 (C. Kohler, et al., eds. 1999)).

184. See *Skillful Angler Recognition Program*, NEW JERSEY MARINE DIGEST, May 2014, at 24, available at <http://www.state.nj.us/dep/fgw/pdf/2014/digmar14.pdf> (explaining common observations of anglers).

185. See *Controversial Amateur Shark Fishing Tournament Criticized*, *supra* note 112 (discussing recent Blacktip Challenge).

186. See 50 C.F.R. § 635.8(a)(1) (2013) (stating that “[b]oth the owner and operator of a vessel that fishes with longline or gillnet gear must be certified by NMFS, or its designee, as having completed a workshop on the safe handling, release, and identification of protected species before a shark or swordfish limited access vessel permit, pursuant to § 635.4(e) and (f), is renewed in 2007”).

187. See § 635.8(a)(2) (noting that “NMFS, or its designee, will issue a protected species safe handling, release, and identification workshop certificate to any person who completes a protected species safe handling, release, and identification workshop”).

188. See, e.g., *Handling and Releasing Fish*, *supra* note 174.

189. See POLICANSKY, *supra* note 85, at 81 (citing *Catch-and-Release Fishing: A Decade of Experience*, in A NATIONAL SPORT FISHING SYMPOSIUM 16–32 (Barnhart and Roelofs, eds. 1987)).

their behavior."¹⁹⁰ Arguably, this positively impacts competitive angling by making the catch a little harder, and all the more satisfying.¹⁹¹

It is argued by many that catch and release is "critical" to "modern recreational fishery management."¹⁹² Many "traditionalists" simply do not like catch and release tournament fishing as a concept.¹⁹³ Despite their opposition that amounts to no more than resistance to departing from tradition, catch and release would further conservation efforts which will allow all anglers to fish in the future.¹⁹⁴ The concerns highlighted by opponents to any change are generally accepted as harms that far from outweigh the multiplicity of benefits.¹⁹⁵ Any long-term environmental benefits realized go hand-in-hand with the benefits of stimulating local economies.¹⁹⁶

The benefits of catch and release would be limited because only a portion of all recreational fishing—that is, tournaments—would be subject to the requirement. As a result, the benefits would not be as drastic as it would be if all recreational fishing had to be catch and release.¹⁹⁷ NMFS in all likelihood could not adopt a blanket release requirement for all recreational fishing except

190. *See id.*

191. *See id.*

192. *Id.* at 82 (citing R. D. Clark, Jr., *Potential Effects of Voluntary Catch-and-Release of Fish on Recreational Fisheries*, in *NORTH AMERICAN JOURNAL OF FISHERIES MANAGEMENT* 306–13 (1983)) and M. I. Muoneke & W. M. Childress, *Hooking Mortality: A Review for Recreational Fisheries*, in *REVIEWS IN FISHERIES SCIENCE* 123–156 (1994)).

193. "Traditionalists" refers to the anglers who prefer the traditional catch and kill tournament format. *See* Jim Rutenberg, *Rethinking Tournaments Where Sharks Always Lose*, *N.Y. TIMES* (July 22, 2013), <http://www.nytimes.com/2013/07/23/nyregion/rethinking-tournaments-where-sharks-always-lose.html?pagewanted=all&r=0>. Rutenberg described the local response to one major tournament's decision to switch to the catch and release format:

It is enough to make some of the old fishermen here wonder what is happening to the world. They lament that their friends are letting the environmentalists get to them, and predict that a shark contest without a winning carcass on the dock will not be viewed as a shark contest at all by the hundreds who still come for them. "People want to see sharks," Jack Passie, [a charter boat captain], declared emphatically.

Id.

194. *See* POLICANSKY, *supra* note 85, at 81 (citing *Catch-and-Release Fishing: A Decade of Experience*, in *A NATIONAL SPORT FISHING SYMPOSIUM* 16-32 (Barnhart and Roelofs, eds. 1987)).

195. *See supra* notes 50–57 and accompanying text (discussing various benefits).

196. *See supra* notes 50–57 and accompanying text (discussing environmental and economic benefits).

197. *See supra* Part I and accompanying text (discussing further benefits).

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under extreme circumstances because some anglers use their catch for personal consumption.¹⁹⁸ A blanket release requirement could have such a significant adverse impact on the local economy that it would not be in accordance with the ten Magnuson-Stevens Act principles.¹⁹⁹ Such a regulation would be exceptionally vulnerable if challenged.²⁰⁰

B. Modified Catch and Release Requirements Based on Shark Size

In the alternative, NMFS could impose “modified” forms of the catch and release requirement based on shark size.²⁰¹ A “modified” catch and release requirement for tournaments could offer a more modest step towards complete conversion to catch and release tournament formatting. For example, a minimum size to land requirement could be implemented and applied to all recreational fishing, or all fishing of sharks, whereby specimens under a certain length must be released.²⁰²

Currently, most sharks caught recreationally and retained must be at least fifty-four inches, measured from nose to tail-fork.²⁰³ However, this blanket size limit does not appropriately consider the fact that different species come in different shapes and sizes, and will not be at or near a uniform length upon reaching sexual maturity.²⁰⁴ Therefore, the size limits should be reevaluated and adjusted accordingly.²⁰⁵ With those adjustments, a size-based release requirement would ensure that juvenile sharks are released and given

198. See POLICANSKY, *supra* note 85 (explaining NMFS and its regulations).

199. See *supra* notes 89–94 and accompanying text (mandating NOAA to also consider financial impact on communities and individuals).

200. See *supra* Part IV and accompanying text. Analysis of the doctrines applicable to challenging agency action exceeds the scope of this Comment. For further discussion, see E. Donald Elliott, *Chevron Matters: How The Chevron Doctrine Redefined The Roles of Congress, Courts, And Agencies In Environmental Law*, 16 VILL. ENVTL. L.J. 1 (2005). See also Todd S. Aagaard, *Factual Premises of Statutory Interpretation in Agency Review Cases*, 77 GEO. WASH. L. REV. 366 (2009).

201. See 50 C.F.R. § 635.20(e) (2013) (imposing retention limits based on specimen size).

202. See *id.* (imposing retention limits based on specimen size).

203. See *id.* Atlantic sharpnose and bonnethead sharks caught recreationally and retained are not subject to any size limitation. See § 635.20(e)(4) (addressing size limits).

204. See generally LEONARD J.V. COMPAGNO, SHARKS OF THE WORLD: AN ANNOTATED AND ILLUSTRATED CATALOGUE OF SHARK SPECIES KNOWN TO DATE 6 (Food and Agriculture Organization of the United Nations (“FAO”) 2001) (reporting that “[s]ometimes size at sexual maturity for either or both sexes is not known”).

205. See *supra* Part IV and accompanying text (requiring NOAA to base regulations on “best available scientific data”).

the opportunity to reproduce in the future.²⁰⁶ Given the inherent management difficulties posed by lengthy gestational periods common in many shark species, a size-based release requirement that is specific to the species would help ensure long-term sustainability.²⁰⁷

Arguably, those size thresholds would be difficult to assess and make the necessary revisions, and may be difficult to enforce recreational angler compliance.²⁰⁸ It may not be entirely feasible to make such a drastic change in one sweep, where anglers would be required to identify the species caught, and then recall what length of that species they are allowed to retain.²⁰⁹ However, studies have shown that anglers, especially those targeting a specific catch, such as sharks, are knowledgeable of identification and regulatory requirements.²¹⁰ Additionally, by expanding identification courses and utilizing technology more effectively, it would be more likely that anglers will abide by adjusted restrictions and make it easier for them to do so.²¹¹

206. See Moyes, *supra* note 61, at 1389 (suggesting “prolonged effects” such as substantial reductions in “reproductive biomass” will be “seen locally in predator hotspots or ecosystem-wide” because sharks are “long-lived” and “late-maturing”).

207. See *Age and Growth in Sharks*, NAT’L OCEANIC AND ATMOSPHERIC ADMIN. NE. FISHERIES SCIENCE CTR. (Jan. 9, 2013), <http://nefsc.noaa.gov/nefsc/Narragansett/sharks/age.html> (describing sexual maturity and growth rates of sharks).

208. See, e.g., Adrian Arias & Stephen G. Sutton, *Understanding Recreational Fishers’ Compliance with No-take Zones in the Great Barrier Reef Marine Park*, 18.4 ECO. AND SOC. 18 (2013), available at <http://www.ecologyandsociety.org/vol18/iss4/art18/> (stating “[e]stimating noncompliance of recreational fishers with spatial zoning in an area the size of the GBRMP is difficult”). This study summarized the current compliance monitoring methodology as:

Includ[ing] aerial and vessel-based surveillance, indirect observation, e.g., discarded gear on reefs, and reports of illegal activity from GBRMP users. However, these methods can be logistically and *economically inefficient and potentially misleading* if reported or interpreted outside of the context in which the information was collected.

See *id.* (citations omitted) (emphasis added).

209. However, it is worth noting, that of the roughly five hundred and five described species of sharks, only a handful are targeted by shark fishing tournaments, and a number of species are prohibited from being caught entirely. See *supra* Part III and accompanying text (describing shark fishing tournaments). Realistically, tournament participants may only have to recall the minimum lengths of three or four species. See, e.g., Vivian M. Nguyen et al., *Recreational Anglers’ Attitudes, Beliefs, and Behaviors Related to Catch-and-Release Practices of Pacific Salmon in British Columbia*, 128 J. ENVTL. MGMT. 852, 852–65 (2013) (analyzing knowledge of anglers).

210. See, e.g., Nguyen, *supra* note 209 at 852–65 (analyzing knowledge of anglers).

211. See *id.* at 857–65 (analyzing knowledge of anglers). See also *supra* notes 184–188 and accompanying text (describing anglers’ familiarity with proper catch and release procedures and willingness to learn).

For example, it would be relatively easy and cost effective to develop an app to help identify the species caught.²¹² After determining the species, the app could display the most up-to-date size and catch number restrictions. For recreational fishers, a smartphone or device is often accessible and still in a service area since most recreational fishing occurs relatively close to the shoreline.²¹³ Accordingly, this would be an easy twenty-first century solution to alleviate misidentification concerns.²¹⁴ Moreover, charging a nominal rate for the app could also help defer some of the costs that would otherwise fall on the taxpayer.²¹⁵

C. Requiring Shark Fishing Tournaments to Participate in the Cooperative Tagging Program

NMFS should also consider expanding the shark tagging program by requiring shark tournaments targeting certain species of sharks to switch to a tag and release format, or increasing the number of tournaments selected for tagging.²¹⁶ Additionally, NMFS should helping to reduce the cost of tags to ensure maximum participation and minimal financial burden on the anglers.²¹⁷

Tagging and tracking sharks will help policymakers determine which areas are being used for mating, feeding, or as a nursery, and, therefore, need to be a priority protection area.²¹⁸ Additionally, this will help evaluate whether the existing area of protection is sufficiently sized and appropriately located, and can be useful for predicting how shark movement and distributions may be impacted

212. NOAA has already developed an App which allows anglers to report the release of any mako sharks caught. *See Recreational Shark Fishing – Health Catch & Release*, NOAA, http://www.fisheries.noaa.gov/stories/2013/08/best_fishing_practices_sharks.html (last visited Feb. 23, 2016) (describing new app for reporting mako shark releases).

213. *See id.* The mako shark release app can be used while still on the water. *Id.* Accordingly, NOAA is already using the proposed technology and it could be expanded to basic species identification with relative ease.

214. *See id.*

215. This would also help alleviate added costs on the anglers, which is consistent with the principles of the Magnuson-Stevens Act. *See supra* notes 159–164 and accompanying text (describing principles NOAA regulations must consider and balance).

216. *See infra* notes 217–300 and accompanying text (arguing tag and release would enhance scientific research, expand knowledge of general public in an interactive forum, and promote shark-based tourism which would benefit local economies).

217. *See supra* notes 159–164 and accompanying text (describing principles NOAA regulations must consider and balance).

218. *See Hammerschlag, supra* note 25 (arguing tagging data will help identify sharks' habitats which is necessary for appropriate fishery management).

by climate change.²¹⁹ Finally, by comparing real-time tracking data to movements of vessels via satellite, NMFS can better determine whether there is an overlap between these areas that needs to be better protected.²²⁰

1. *Anglers Have Significant Interest in Cooperative Shark Tagging Program*

Due to the growing concern of the decline in shark populations, the number of catch and release shark tournaments is increasing and moving towards incorporating scientific tagging programs in support of shark conservation and management.²²¹ NMFS currently operates a voluntary shark tagging program.²²² This initiative is important to compiling the necessary data for appropriate fishery management.²²³ However, more can be done in a manner that is safe for anglers, economically sensible with respect to the costs that will fall on the tournament and anglers, as well as with the allocation of taxpayer dollars, and without taking away the spirit of the competition.²²⁴ "Historically, species-specific landings data from recreational fisheries is lacking for sharks."²²⁵ Since the early 1960s, NMFS has attended tournaments in order to collect "data on species, sex, and size composition from individual events."²²⁶

Under the existing regulatory scheme, those tournaments can elect to participate in tagging.²²⁷ Tournament operators are re-

219. *See id.*

220. *See id.*

221. *See supra* notes 114–144 and accompanying text (describing development of tag and release tournaments).

222. *See generally*, *NMFS Tagging Program*, *supra* note 115 and accompanying text (describing history, procedures, and benefits of Cooperative Shark Tagging Program).

223. *See* Poladian, *supra* note 126 and accompanying text (discussing importance of using technology to advance shark conservation research).

224. *See infra* Notes 225–245 and accompanying text (analyzing opportunity and need for Cooperative Shark Tagging Program Expansion).

225. When sharks, or any other organism, are caught and brought onto the vessel the fish has been "landed." "Landings data" includes species identification, specimen measurements, results of tested tissue or blood samples, environmental metrics, such as water temperature or weather conditions, or other data compiled from the landed specimens. *See Tournament Sampling*, NAT'L OCEANIC AND ATMOSPHERIC ADMIN. NORTHEAST FISHERIES SCIENCE CENTER (Sept. 13, 2011), <http://nefsc.noaa.gov/nefsc/Narragansett/sharks/tourney.html> (describing nature of data compilation from shark fishing tournaments).

226. *See id.* (describing Cooperative Shark Tagging Program history).

227. *See NMFS Tagging Program*, *supra* note 115 (describing voluntary Cooperative Shark Tagging Program).

quired to register their competition with NMFS.²²⁸ Some tournament operators may be selected for scientific research or reporting.²²⁹ For example, the Blacktip Challenge shark tournament in Florida has voluntarily switched to the tag and release format.²³⁰ The participants, who must have a valid Florida fishing license, work in teams of up to five people to catch a shark, measure it, photograph it, place a tracking tag on it, and release it.²³¹ The land-based tournament still attracts considerable attention, despite the shift to the tag and release format.²³²

In comparison to recreational anglers who fish purely for leisure, tournaments are valuable and ideal collaborative partners for species-specific data collection because they often target by design certain species of sharks.²³³ Accordingly, these anglers are particularly well-suited to provide “additional information on movements that complement the NMFS Cooperative Shark Tagging Program.”²³⁴

Participation at recreational shark tournaments and the resultant information is very valuable as a monitoring tool to provide long-term data for pelagic and some coastal sharks that is “critical” for shark management.²³⁵ This data can detect trends in species

228. See 50 C.F.R. § 635.2 (2016) (defining “tournament operator” as “a person or entity responsible for maintaining records of participants and results used for awarding tournament points or prizes, regardless of whether fish are retained”). See § 635.5(d) (requiring tournament operators to register at least four weeks in advance of tournament).

229. See § 635.7 (specifying vessels which do not volunteer to carry observers may still be selected and required to do so); § 635.5(d) (requiring tournaments selected for reporting to use NMFS forms and to submit completed forms within seven days after last date of tournament); see also § 635.5(c) (describing permissible alternative reporting procedures, such as mail-in or phone-in surveys and reports). Tournament operators must report the catch and effort. See § 635.5(d). The “effort” includes the number of participants, how long they were actively fishing, and the number of fish that took bait but “escaped” landing. See *id.*

230. See, e.g., *History*, BLACKTIP CHALLENGE TOURNAMENT, <http://blacktipchallenge.com/about/history> (last accessed Feb. 7, 2015) [hereinafter “Blacktip Challenge Tournament”] (detailing development of tournament from 2008 to current day).

231. See *supra* Part III and accompanying text (discussing history and development of shark fishing tournaments).

232. See, e.g., *Blacktip Challenge Tournament*, *supra* note 230 (detailing development of tournament from 2008 to current day).

233. See *Tournament Sampling*, *supra* note 225 and accompanying text (describing shark fishing tournament structure).

234. *Id.* (describing tournaments as “a monitoring tool to provide long-term data that can detect trends in species and size composition, provide valuable specimens and tissue for life history and genetic studies”).

235. See *id.* For example, in 2009, samples from more than two hundred sharks were collected to study “life history studies[,] and catch and morphometric

and size composition, as well as provide valuable specimens and tissue for life history and genetic studies.²³⁶

"Between 1962 and 2013, over 243,000 sharks of fifty-two species have been tagged and more than 14,000 sharks of thirty-three species have been recaptured."²³⁷ Data from tagging programs, such as the NMFS Cooperative Shark Tagging Program, "provide valuable information on migration and the extent of fish movements."²³⁸ Additionally, it provides information on "movements and migration . . ., abundance, age and growth . . ., mortality, and behavior."²³⁹

In 2013, the Montauk Marine Basin hosted a "tag and release" competition for the first time.²⁴⁰ The tournament changed their format hoping to bring more awareness to shark population decimation and the needed research, while demonstrating that the catch and release format is equally successful.²⁴¹ The tournament uses "a system of best practices and modern catch and release protocols that have been engineered into this tournament format to maximize the post-release welfare and survivability of all sharks," which includes the mandatory use of inline circle hooks, "heavy tackle and line strengths," and other specific handling procedures. Competitors must immediately notify the committee boat upon catch.²⁴² The committee will then determine if the specimen is

data." *Id.* These samples were collected at ten recreational fishing tournaments in the northeastern United States. *See id.*

236. *See id.*

237. NMFS Tagging Program, *supra* note 115 (presenting cooperative data compilation effort results).

238. *Id.* (describing intrinsic value of data compiled through Cooperative Shark Tagging Program).

239. *Id.* (describing specific biological data obtained through collaborative compilation effort).

240. *See* Emily Tripp, *No-Kill Shark Tournament in Montauk*, MARINE SCI. TODAY (May 2, 2013), <http://marinesciencetoday.com/2013/05/02/no-kill-shark-tournament-in-montauk/> (reporting on first known tag release tournament).

241. *See* Darenberg Memorial All-Release Tournament, *supra* note 114; *see also* Tripp, *supra* note 240. Carl Darenberg, the Montauk Marine Basin owner, said, "Each time the dorsal fin breaks the surface, . . . there is a ping which will be picked up via satellite. The best part is that school kids will be able to follow the sharks' journey across the ocean. They'll get a shark's eye perspective." *See* Andrew Nachemson, *Groundbreaking Catch and Release Shark Fishing Tournament Comes to Montauk*, <http://www.hampton.com/Community/Community-News/18339/Groundbreaking-Catch-And-Release-Shark-Fishing.html#.VM6gNul0zIU> (last visited Feb. 23, 2016) (describing multi-day event which is only of its kind on east coast).

242. A circle hook is "a fishing hook originally designed and manufactured so that the point is turned perpendicularly back to the shank to form a generally circular, or oval, shape." *See* 50 C.F.R. § 635.2 (2016). *See also* *Circle Hooks*, UNIV. OF FLA., http://catchandrelease.org/circle_hooks.shtml (last visited Sept. 22, 2015).

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suitable for tagging.²⁴³ If the shark is a tagging candidate, the shark will be handed off by the team to researchers, who will place the satellite tag, further document and then release the animal.²⁴⁴ The sharks are photographed before being released, as different species are awarded a different amount of points for the competition.²⁴⁵

2. *Ecotourism, Economics, and Conservation Management*

An expanded tagging program could be used to enhance shark-based ecotourism by drawing increased attention to the shark fishing tournaments.²⁴⁶ Ecotourism is one strategy that enables greater protection and research of sharks due to its ability to raise awareness and educate tourists, provide a platform for scientific research and carry out lobbying activities.²⁴⁷ This strategy is gaining popularity, in part, because of the corresponding economic incentives it provides.²⁴⁸ “Shark-tourism encounters” include “passive encounters via viewing tunnels and windows in aquaria” and “naturalistic active encounters where sharks are encountered by chance as a part of the natural marine fauna.”²⁴⁹

Some shark populations are economically valuable as a tourist attraction, such as cage diving with great white sharks.²⁵⁰ In fact, recent studies have shown it is clear that sharks have a much higher

“The principal advantage to using circle hooks is that fish are almost never deep-hooked.” *Id.* Thus, “circle hooks are more likely to hook a fish in the mouth rather than the gut, making [the hooks] easier to remove and reducing harm to the fish.” *Id.* Using circle hooks helps improve the survivability of fish which are released. *Id.* (arguing this helps prevent internal hooking). *See also* Darenberg Memorial All-Release Tournament, *supra* note 114 (noting this helps to reduce a shark’s time on line).

243. *See id.* (explaining tournament rules).

244. *See id.* (describing tagging selection process and application at tournament).

245. *See id.* (presenting post-tag application tournament rules).

246. Expanding the program would draw greater attention to the tournaments as a tourist attraction to people less familiar with this type of fishing, typically people who live in land-locked states.

247. *See Conservation Tourism, supra* note 13 (discussing economic benefits of sharks to local fishing and tourism-based economies); *see also* Higham, *supra* note 59 (discussing multifaceted value of ecotourism).

248. *See Conservation Tourism, supra* note 13 (discussing value added to local economy by using cage diving with sharks as tourist attraction).

249. *See Higham supra* note 59, at 62 (describing different types of shark-based tourist attractions).

250. *See generally*, Denise Chow, *Why Sharks Generate More Money Alive Than Dead*, LIVE SCI. (May 21, 2013, 3:08 P.M.), <http://www.livescience.com/37048-shark-economic-value.html> (reporting research study indicating “shark ecotourism brings in \$314 million annually worldwide, and this sector is expected to continue growing”).

value alive than dead.²⁵¹ Shark ecotourism generates roughly \$171.2 million in expenditures in North America.²⁵² Thus, dive tourism can lead to improved protection for shark species by incentivizing the creation of shark sanctuaries and placing economic value on that protection.²⁵³

For different reasons, recreational fishing can positively contribute to local economies.²⁵⁴ Expenditures made by anglers for the goods and services directly related to their fishing activities are the source of the greatest economic impact.²⁵⁵ The economic benefits from “direct purchases of fishing equipment and trip-related spending for food, fuel, lodging,” retail to custom boat sales, marine maintenance, boat storage and so forth “supports jobs and income.”²⁵⁶ As money is spent by anglers, additional economic contributions result in “providing a greater level of jobs, income

251. See *Shark Finning: Sharks Turned Prey*, *supra* note 71. One study suggests a live hammerhead shark has a \$1.6 million value to ecotourism over its lifetime—significantly higher than the \$200 price tag for its fins. See *id.* (citing *Conservation Tourism*, *supra* note 13). A recent study from the University of British Columbia projected that shark ecotourism will be worth more than the global shark fisheries in just a few years. See *id.* (citing Andres M. Cisneros-Montemayor et al., *Global Economic Value of Shark Ecotourism: Implications for Conservation*, 47.03 FAUNA & FLORA INTERN., 381 (July 2013), available at <http://journals.cambridge.org/action/displayFulltext?type=1&fid=8956432&jid=ORX&volumeId=47&issueId=03&aid=8956430>).

252. See Andres M. Cisneros-Montemayor et al., *Global Economic Value of Shark Ecotourism: Implications for Conservation*, 47.03 FAUNA & FLORA INTERN. 381, 384 (July 2013), available at <http://journals.cambridge.org/action/displayFulltext?type=1&fid=8956432&jid=ORX&volumeId=47&issueId=03&aid=8956430> (describing world economic data relevant to shark fishing). See also *Ecotourism: Dollars and Sense*, WILDAID: SHARK SAVERS, <http://www.sharksavers.org/en/education/the-value-of-sharks/sharks-and-ecotourism/> (last visited Mar. 8, 2015) (summarizing nine studies of local economy and impact of shark tourism).

253. See *Ecotourism: Dollars and Sense*, *supra* note 252. For example, Whale Shark populations in India decreased, and in response to the problem, “The Whale Shark Campaign” was developed to “overhaul” the sharks’ public image. See *id.* This included giving the shark a new name and a national holiday festival. See *id.* “The shark received national protection, the government increased efforts in scientific studies, and compensating fishermen that cut their nets to release whale sharks alive. Now, whale sharks are the flagship species to develop marine tourism” in India. See *id.*

254. See BENCHLEY, *supra* note 9, at 103 (“Conclusion: preserve your local sharks and you’ll attract tourist dollars.”); SOUTHWICK ASSOCS., *Comparing NOAA’s Recreational and Commercial Fishing Economic Data 4* (2013), available at http://asafishing.org/uploads/Comparing_Recreational_and_Commercial_Marine_Fishing_Data_Report_May_2013.pdf (comparing economic effects of recreational and commercial marine fishing).

255. See *id.* (describing secondary and indirect economic benefits associated with marine fishing).

256. *Id.* (describing direct economic benefits associated with marine fishing).

and other benefits.”²⁵⁷ Atlantic marine anglers spent nearly \$10.9 billion in 2011.²⁵⁸ Including multiplier effects, these purchases resulted in more than \$9.72 billion in sales, \$3.29 billion in income, \$5.6 billion in value added (GDP), and supported over 88,000 jobs.²⁵⁹

By stabilizing fisheries, which will provide better fishing opportunities, increase the current economic impact that results from recreational angling and create new avenues to capitalize on shark fishing tournaments specifically, the costs will be outweighed by the return on the investment.²⁶⁰ Moreover, using catch-and-tag tournaments as an ecotourist attraction helps support local economies by using sharks as a flagship species.²⁶¹ By creating more opportunities for people to interact with sharks, people will come more familiar with the creatures that once scared them.²⁶² Exposure will lead to a positive shift in people’s attitudes towards shark, and ultimately result in greater support of shark conservation initiatives because sharks will have a tangible benefit to the local communities.²⁶³

Utilizing an ecotourism strategy is somewhat controversial.²⁶⁴ In particular, many people have expressed concern that shark-based tourism results in more shark attacks.²⁶⁵ During the summer of 2001—dubbed by *Time* magazine as “The Summer of the Shark”—a number of commentators and shore community locals believed that shark-based tourism caused the increase of shark at-

257. *Id.* (describing benefits associated with direct and indirect economic contributions by marine fishers). See also BENCHLEY *supra* note 9, at 116–25 (illustrating environmental and economic impact of sharks disappearing from ecosystem).

258. See SOUTHWICK ASSOCS., *supra* note 254, at 9–11. The figure is the total value for the New England, Mid-Atlantic, and South Atlantic regions. *Id.*

259. See *id.* The figure is also the total value for the New England, Mid-Atlantic, and South Atlantic regions. *Id.*

260. See *supra* notes 247–259 and accompanying text (discussing direct and indirect economic benefits associated with marine fishing).

261. A “flagship species” is one which is iconic to the area. See Higham, *supra* note 59, at 55. Flagship species are those which are “capable of generating public interest in conservation and increasing funding opportunities.” See *id.* Adding economic value to local communities would help also alleviate added costs on the anglers, which is consistent with the principles of the Magnuson-Stevens Act. See *supra* notes 159–164 and accompanying text (mandating NOAA to refrain from imposing regulations which would result in exorbitant costs on anglers).

262. See Higham, *supra* note 59, at 55 (presenting psychology of exposure to stimuli which results in familiarity and acceptance of the stimuli).

263. See *id.* (arguing public exposure to sharks will shift attitude towards sharks and further conservation initiatives).

264. See *id.* at 60 (discussing public concerns associated with shark-based tourism).

265. See *id.*

tacks.²⁶⁶ Some argued that sharks became too familiar with people, which emboldened the sharks.²⁶⁷ Others argued that permitting people to feed sharks for fun conditioned sharks to associate people with food.²⁶⁸ Yet another group simply attributed the spike in attacks to having more people in the water and the increased popularity of water sports, resulting in a greater likelihood of attacks.²⁶⁹

In response to these concerns, NOAA proposed regulations which would have required boats to stay at least 50 meters away

266. See *id.* See also Terry McCarthy, *Why Can't We Be Friends?*, TIME (July 30, 2001), <http://content.time.com/time/magazine/article/0,9171,1000420,00.html> (describing new research on shark behavior). The sensationalist media coverage of the "Summer of the Shark" is regarded as perpetuating a meritless story because there was no actual increase in the number of attacks. See William J. Broad, *Scientists Say Frenzy Over Shark Attacks Is Unwarranted*, N.Y. TIMES (Sept. 5, 2001), <http://www.nytimes.com/2001/09/05/us/scientists-say-frenzy-over-shark-attacks-is-unwarranted.html> (quoting John Allen Paulos, a math professor at Temple University). Dr. Paulos argued that "nothing really significant [statistically] [was] going on," but rather "vivid television images were overpowering small statistics to produce a false nightmare." See *id.* According to the International Shark Attack File, there were seventy-six shark attacks that occurred in 2001, lower than the eighty-five attacks documented in 2000. See BENCHLEY, *supra* note 9, at 39 (presenting annual shark attack data to contextualize the "Summer of the Shark"). Although five people were killed in attacks in 2001, this was less than the twelve deaths caused by shark attacks the previous year. *Id.* See also *Worldwide Unprovoked Shark Attacks and Rate of Fatality*, FLA. MUSEUM OF NATURAL HISTORY, <https://www.flmnh.ufl.edu/fish/sharks/statistics/Trends2.htm> (last visited Feb. 23, 2016) [hereinafter "*Shark Attack File*"] (presenting shark attack statistics). As John Stossel explained:

Instead of putting risks in proportion, [reporters] hype *interesting* ones. Tom Brokaw, Katie Couric, and countless others called 2001 the 'summer of the shark In truth, there wasn't a remarkable surge in shark attacks in 2001. There were about as many in 1995 and 2000, but 1995 was the year of the O.J. Simpson trial, and 2000 was an election year. The summer of 2001 was a little dull, so reporters focused on sharks.

JOHN STOSSEL, *GIVE ME A BREAK: HOW I EXPOSED HUCKSTERS, CHEATS, AND SCAM ARTISTS AND BECAME THE SCOURGE OF THE LIBERAL MEDIA* 75 (Harper Collins 2004).

267. See Higham *supra* note 59, at 60.

268. See *id.* This argument was largely undermined by a study conducted by Dr. Neil Hammerschlag and a University of Miami team of researchers. See Austin J. Gallagher & Neil Hammerschlag et al., *Biological Effects, Conservation Potential, and Research Priorities of Shark Diving Tourism*, 184 BIOLOGICAL CONSERVATION 365, 369 (2015), available at https://www.rsmas.miami.edu/assets/Gallagher_et_al._2015_-_Tourism.pdf.

Empirical studies on learning show that it is strongly influenced by the frequency and intensity of reinforcement and by the temporal and spatial contiguity of events, yet, in general most studies on shark provisioning tourism are either unable or do not to monitor the amount and frequency of food rewards that individual animals receive. Without such information it is particularly difficult to interpret and assess the effects of conditioning on target animals and to identify the mechanisms underlying such behaviors.

Id. (citations omitted).

269. See Higham, *supra* note 59, at 60. See also Broad, *supra* note 266 (presenting argument that human activity contributed to change in shark behavior).

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from sharks and prohibiting the use of any method of attracting sharks to tour boats.²⁷⁰ NOAA's attempt to regulate shark tourism was unsuccessful because it undermined the "financial viability of shark-based tourism in the area."²⁷¹ But the U.S. is not alone in being unable to find the best regulatory solution. Worldwide, current "regulation is sporadic, ranging from licensing and permit schemes through to adopting a precautionary approach and banning certain activities to attract sharks to boats."²⁷²

Professor James Higham argued that any regulation should ensure both shark and tourist safety without diminishing the "financial viability" of the industry.²⁷³ Professor Higham suggested that "a multidisciplinary approach" to research is necessary because shark-based tourism is "diverse . . . in terms of locations, species used and impacts caused."²⁷⁴ That research could help develop the appropriate strategies to "encourage[] and assist[] in moving away from shark fishing" to "non-consumptive shark-based tourism."²⁷⁵ If catch and release shark fishing was the rule, rather than the exception, the tournament itself could become the tourist attraction and the use of live-tracking tags turns it into a web-based attraction.²⁷⁶ We would benefit from both the added knowledge and economic value.²⁷⁷

3. *Using Social Media and Web-Based Platforms*

NMFS should use social media and other web-based platforms, such as real-time tracking online, to increase participation of the public and anglers in a tag and release program expansion.²⁷⁸ Australia's SharkSmart initiative, which functions similarly to NMFS,

270. See Higham, *supra* note 59, at 61.

271. See *id.*

272. *Id.*

273. See Higham, *supra* note 59, at 62. Professor Higham specializes in sport, tourism and environmental change. See *Professor James Higham*, UNIV. OF OTAGO, <http://www.otago.ac.nz/tourism/staff/otago062325.html> (last visited Oct. 12, 2015). Professor Higham is widely published and regarded as the leading authority in this area of research. *Id.*

274. Higham, *supra* note 59, at 62 (positing shark-based tourism "would benefit from further academic scrutiny").

275. See *id.*

276. See *supra* notes 261–263 and accompanying text (discussing flagship species and tournaments as tourist attraction).

277. See *supra* notes 255–263 and accompanying text (discussing economic value of sharks through direct and indirect expenditures).

278. See *supra* Part III(C) and accompanying text (discussing potential viability of conservation initiatives utilizing social media or other web-based platforms).

provides interactive online resources, including real-time tracking, to the public.²⁷⁹

A number of recent viral stories highlight the positive impact potential of social media on public perception of sharks and conservation efforts.²⁸⁰ For example, there has been a significant increase in the interest and excitement for shark tagging, thanks in part to Mary Lee and Twitter.²⁸¹ Mary Lee is a sixteen-foot, 3,456-pound female great white shark, tagged by OCEARCH, a nonprofit that tracks Mary Lee and a number of other sharks using satellite tags.²⁸² She was named after one of the researcher's mothers when she was tagged in 2012.²⁸³ She became a Twitter sensation in the months before summer 2015, with 75,000 followers.²⁸⁴ Mary Lee is the "Taylor Swift of shark celebrities, constantly interacting with her adoring fans," famous for her sense of humor, and tweeting every time she comes to the ocean surface.²⁸⁵ Most of the time, she is in the waters off the East Coast, but has swam as far east as Bermuda.²⁸⁶ While Mary Lee has traveled an impressive 19,000 miles since being tagged, Lydia, another social media star shark, made her way into the record books as the first great white to be tracked crossing the Atlantic Ocean.²⁸⁷

The Twitter accounts are "not affiliated with OCEARCH . . . [b]ut it does the same work that OCEARCH is trying to do—make sharks seem less scary."²⁸⁸ But @MaryLeeShark and other "shark

279. See Western Australia Department of Fisheries, *Research & Initiatives*, SHARKSMART, <http://www.sharksmart.com.au/research/> (last visited Aug. 21, 2015) (describing research projects being supported by Western Australian Department of Fisheries).

280. See Kaplan, *supra* note 123 (discussing public interest in tracking project of Mary Lee and other great white sharks).

281. See *id.*

282. See *id.*

283. See *id.* Coincidentally, a woman named Mary Lee is the subject of one of Captain Quint's iconic limericks. See *JAWS* (Universal Studios 1975) ("Here lies the body of Mary Lee, died at the age of 103. For 15 years she kept her virginity, not a bad record for this vicinity.").

284. @MaryLeeShark had about 44,000 followers in mid-May, and has since doubled her fan base. See *Great White Shark Cruising East Coast Becomes Twitter Star*, NBC NEWS (May 18, 2015, 10:21 A.M.), <http://www.nbcnews.com/science/science-news/great-white-shark-cruising-east-coast-becomes-twitter-star-n360611>.

285. See Kaplan, *supra* note 123.

286. See *id.*

287. See *id.*

288. See *id.* Ocearch President Chris Berger told the Christian Science Monitor, "The ultimate goal is to replace fear with fascination and curiosity." See *id.* The head of the social media market company oneQube and Ocearch board member, Peter Boards, said "these 'celebrity sharks' are helping to form passionate, caring communities around these often-demonized fish." See *id.* See also Petersen,

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celebrities” did more than gain a cult following. Giving the public a way to interact with the sharks “very likely saved the research program by attracting corporate funders.”²⁸⁹ Private funding is critical to help finance many research projects and could be used to pay all or a portion of the costs of tags, rather than relying solely on tax dollars.²⁹⁰ By freeing up some tax dollars and deferring costs, which may fall on anglers, catch-and-tag could become the most economically sensible solution.²⁹¹ That blueprint has already helped researchers make significant gains in understanding “about [sharks] fine and broad scale movements along the east coast.”²⁹²

Along the same line, tagging can be used to extend the life of the competition.²⁹³ Some tournaments already electing to use tagging practices have a “race” tracking the distance a shark, named by the angler, travels over a set period of time, and offering a prize for the angler whose shark travels the farthest.²⁹⁴ The tournament’s webpage has a map and everyone can see which shark is “pinging” where, and how far the shark has travelled.²⁹⁵ This gives anglers another way to not only to enjoy their big catch, but also incentivizes participation because an angler can win without having landed the largest shark.²⁹⁶

While contributing to the much needed data collection, it also can serve as a fun educational tool to promote conservation efforts.²⁹⁷ Finally, beyond the social media and online tracker hype, some anglers have expressed that receiving a notification letter

supra note 80 (noting social media helped “accomplish[] a chief research goal: changing people’s perception of the animal with a sinister reputation”).

289. *See* Petersen, *supra* note 80 (discussing various benefits of shark tagging program and social media impact).

290. *See id.* (describing impact of private funding of research projects); BENCHLEY, *supra* note 9, at 114 (discussing lack of funding to study sharks).

291. This would also help alleviate added costs on the anglers, which is consistent with the principles of the Magnuson-Stevens Act. *See supra* notes 159–164 and accompanying text.

292. *See* Doreen Leggett, *Great White Shark Season Has Begun on Cape*, WICKED LOCAL ORLEANS (June 13, 2015, 7:40 A.M.), <http://orleans.wickedlocal.com/article/20150613/NEWS/150618358>. Cynthia Wigren, president of the Atlantic White Shark Conservancy, an Orleans-based nonprofit, said, “Now many of these sharks have names and . . . [r]esearch is opening a window into the lives of these sharks that will hopefully reveal their critical habitats. By building on our base of knowledge of white sharks we are working to ensure this important species thrives.” *Id.*

293. *See, e.g.,* *Great Shark Race*, *supra* note 141.

294. *See id.*

295. *See id.* *See also* Montauk Marine Basin, *supra* note 108 (linking to tracking data).

296. *See supra* notes 86–89 and accompanying text.

297. *See supra* notes 86–89 and accompanying text.

from NMFS that "their" shark has been recaptured and released is another small, yet satisfying, thrill.²⁹⁸

Such targeting of recreational shark fishing tournaments for critical research initiatives must be paired with public educational outlets through the internet and social media. This joint effort has the potential to become viable and sustainable as a fun, interactive public educational forum.²⁹⁹ There is serious potential to change the way in which we think about and protect sharks by making the research and conservation aspects more appealing to all impacted: It gets the public more involved, contributes to research initiatives, and incentivizes competitor participation.³⁰⁰

D. Expanding Completion Requirements and Availability of Shark Identification, and Safe Handling and Release Courses

Section 635.8(a) requires all owners and operators of vessels using certain gear types seeking a shark permit to complete a safe handling and release, and identification course before the permit will be issued.³⁰¹ Additionally, 653.8(b) requires all Federal Atlantic shark dealers to complete identification courses.³⁰² NOAA offers these courses free of charge to those who are required to take it.³⁰³ Because safety of the angler and fish are important, these courses should be required for recreational anglers targeting sharks to ensure recreational fisherman are able to safely catch, identify, tag, and release sharks in accordance with this proposal.³⁰⁴

However, recreational anglers may be less than receptive to having their permits contingent on a course completion requirement. Because the courses are offered at a limited number of locations and on select dates, it would burden anglers with travel costs.³⁰⁵ Accordingly, narrowing the course requirement to those

298. See, e.g., Charles Witek III, *Shark Tagging 101*, ON THE WATER (Mar. 6, 2014), <http://www.onthewater.com/shark-tagging-101/> (describing tagging program since 1962 from angler's prospective).

299. See *id.* (describing tagging program).

300. See *id.* (describing tagging program from public perspective).

301. See 50 C.F.R. § 635.8(a) (2015).

302. See *id.* § 635.8(b).

303. See Schedules for Atlantic Shark Identification Workshops and Protected Species Safe Handling, Release, and Identification Workshop, 80 Fed. Reg. 12152 (Mar. 6, 2015) [hereinafter "Shark Identification Workshop Notice"].

304. See *supra* notes 120–28 and accompanying text.

305. See Shark Identification Workshop Notice, *supra* note 303 (notifying anglers of available class dates and locations).

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recreational anglers who intend to target sharks would limit the burden.³⁰⁶

E. Impose Mandatory Landings Reporting Requirements on Tournament Participants

Reporting should be made mandatory in order to fully and effectively use mandatory catch and release for data collection and conservation.³⁰⁷ The lack of shark species-specific reporting is a huge hindrance to shark population assessments and conservation worldwide.³⁰⁸ Supplementing a catch and release tournament requirement with mandatory reporting would also provide more of the missing data.³⁰⁹ This will help NMFS adjust quotas to better manage species-specific fisheries, which, in turn, will provide long-term ecological and economic benefits.³¹⁰ Additionally, it will help compile the data needed to start shifting towards a species-specific management approach.³¹¹

Tournament anglers are a valuable and underutilized resource, optimal for mandatory reporting as compared to all recreational anglers for a few reasons. First, many tournaments target certain species of sharks based on their migratory patterns.³¹² While recreational fishing is not done to the extent of commercial fishing, this, nonetheless, makes such tournaments optimal for gathering data. Additionally, the data provided would be more reliable than if obtained from amateur anglers, who may not be as knowledgeable

306. This would help also alleviate added costs on the anglers, which is consistent with the principles of the Magnuson-Stevens Act. *See supra* notes 159–164 and accompanying text.

307. *See supra* notes 212–214 and accompanying text (describing mako shark release reporting app). If reporting were made mandatory for all tournaments, NOAA could expand the existing app to make reporting even easier for anglers. *See id.*

308. *See supra* Part IV and accompanying text (describing legal framework). Recall that NMFS may impose precautionary regulations despite having incomplete data. *See* Mary Lack, *Challenges for International Governance*, in *SHARKS: CONSERVATION, GOVERNANCE AND MANAGEMENT* (Erika J. Techera & Natalie Klein eds., 2014) (discussing lack of “species-specific data” on sharks and resulting “generic” shark management approaches). Lack emphasizes that generalized management approaches fail to consider “fundamental differences in shark species’ life history and relative vulnerability to overfishing,” and calls for a shift towards species-specific management measures. *See id.*

309. *See supra* Part I and accompanying text.

310. *See supra* Part I and Part III(A) and accompanying text.

311. *See supra* Part II and accompanying text.

312. *See, e.g.*, Blacktip Challenge Tournament, *supra* note 230.

ble with shark identification.³¹³ After all, winning the tournament is dependent on reeling in the correct catch.³¹⁴

Moreover, recreational anglers are already subject to random reporting requirements.³¹⁵ This proposal seeks to expand the already existing scheme to all tournament participants, while still requiring all other recreational anglers to submit the necessary information when randomly selected.

Moreover, taking measurements and photographs of the sharks is necessary in catch and release tournaments in order to determine the winner.³¹⁶ For example, the Blacktip Challenge works with both the NOAA and the International Land-Based Shark Fishing Association and contributes towards such data collection.³¹⁷ Measurements taken in the catches are used by researchers in estimated weight formulas.³¹⁸ The information necessary for competitive purposes gets put to double use with relative ease. It would impose minimal, or no, additional burden on tournament participants and operators to essentially forward the information already gathered to NMFS.³¹⁹

Finally, NOAA and the tournaments could embark on a joint reporting effort using technology.³²⁰ NOAA already has an app to report the release of mako sharks.³²¹ The existing app could be expanded to report the same metrics of sharks caught at tournaments.³²² Additionally, NOAA could develop an app function that would send the same information to the tournament operators instantly.³²³ With the press of a few buttons on a smartphone, a tournament participant could send the information about the shark

313. See *supra* notes 233–234 and accompanying text.

314. See, e.g., Blacktip Challenge Tournament, *supra* note 230.

315. See 50 C.F.R. § 635.5 (2016). Additionally, alternative methods of reporting, such as phone or mail-in surveys, are permitted, subject to prior approval from NMFS. See *id.* § 635.5(c). This makes other forums of reporting possible, and, with a digitized format, possibly even easier. See *id.*

316. See *supra* Part II(C) and accompanying text.

317. See Blacktip Challenge Tournament, *supra* note 230.

318. See *id.*

319. See *supra* notes 159–164 (describing principles NOAA regulations must consider and balance), and 311–328 and accompanying text (analyzing overlap of tournament required metrics and data needed by NMFS).

320. See § 635.5(c) (permitting alternative reporting methods, including phone and mail-in surveys).

321. See *supra* notes 213–15 and accompanying text (describing NOAA's mako shark release reporting app).

322. See *supra* notes 316–319 and accompanying text (describing overlap of data reported to NOAA with metrics required by tournaments).

323. This would create a single, streamlined system used by both NOAA and the tournament operators.

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required for the tournament to the tournament operators and NOAA.³²⁴

VI. CONCLUSION

Much has changed since the 1916 Jersey Shore Attacks that led to mass shark-hunts.³²⁵ Creatures that were once labeled ruthless man-eaters, slaughtered in droves, are making their way to the forefront of conservation efforts.³²⁶ But while Shark Week, *Jaws*, and popular science have tricked society into thinking it knows everything about sharks, it is clear that there is still much to be discovered.³²⁷ The information currently lacking is necessary to appropriately and adequately protect sharks, their marine ecosystems, and the tourism and recreation driven economies of the communities dependent on the sustainability of those fisheries.³²⁸ Therefore, NMFS must leverage the power of the media and technology to better serve the principles articulated in the Magnuson-Stevens Act through more nuanced regulation.³²⁹ After all, “[i]f you want to have fish around to catch in the future, you have to make adjustments.”³³⁰

First, NMFS could make shark identification and safe handling and release course completion a prerequisite for all recreational anglers specifically targeting sharks.³³¹ In order to ensure the prerequisite does not become overly burdensome, NMFS could make those courses more accessible to all recreational saltwater anglers.³³² If the course availability remains the same, NMFS risks forcing some anglers to stay home, which deprives local coastal communities of revenue incidental to recreational activity, such as

324. See *supra* notes 212–215 and accompanying text (describing NOAA’s mako shark release reporting app).

325. See *supra* Part I and accompanying text (describing *Jaws* effect).

326. See *supra* Part I and II(C) (describing conservation initiatives) and accompanying text.

327. See *supra* Part II(C) and IV and accompanying text (describing statutory framework).

328. See *supra* Part II(C) and accompanying text (describing conservation initiatives).

329. See *supra* note 153 and accompanying text (describing statutory authorization to regulate fisheries and guiding principles).

330. See Jim Rutenberg, *supra* note 193 (quoting Carl Darenberg, Montauk Marine Basin owner).

331. See *supra* Part IV(D) and accompanying text (describing fish identification courses).

332. See *supra* Part IV(D) and accompanying text (discussing expansion of safe handling and release, and identification courses).

food or boating supplies.³³³ Moreover, course completion is critical to ensure post-release mortality is minimized as much as possible, and arms anglers with the information needed to abide by the proposed regulations.³³⁴

Tightening existing size, quantity, and species landing and fishing regulations would ensure that shark populations are not further diminished.³³⁵ Imposing reporting requirements for various environmental metrics, and data specific to the shark specimen landed will enable NMFS to modify those regulations based on the most up-to-date data.³³⁶ This would also help NMFS compile more data for important ecosystem health research necessary for future conservation initiatives.³³⁷

NMFS could also consider expanding the shark-tagging program by requiring that shark tournaments targeting certain species of sharks switch to a "tag and release" format.³³⁸ The added costs of tags could be defrayed by capitalizing on the educational opportunity through web-based and social media platforms.³³⁹ Doing so would enable NMFS to create a new tourist attraction that will not only economically benefit local fishing communities, but would extend beyond the boardwalk to anyone's computer or device.³⁴⁰ Finally, shark fishing tournaments not selected for tagging could be required to switch to the catch and release format.³⁴¹ Catch and release is more consistent with historic mantra that NMFS has the power to protect sharks—and therefore coastal community economies—by mandating this format would keep the spirit of the com-

333. *See supra* Part IV(D) and notes 155–167 and accompanying text (suggesting reasons for increasing availability of fish identification courses).

334. *See supra* Part IV(D) and accompanying text (discussing importance of safe handling and release courses).

335. *See supra* Part V and accompanying text (suggesting promulgating modified catch restrictions based on shark size).

336. *See supra* Part II(C) and accompanying text (describing conservation initiatives).

337. *See supra* Part IV and accompanying text (analyzing NMFS' duty to impose regulations based on best available scientific data).

338. *See supra* Part V(C) and accompanying text (describing tag and release proposal).

339. *See supra* Part V(C)(3) and accompanying text (describing potential program expansion and cost reduction through use of web-based and social media platforms).

340. *See supra* Part V(C)(3) and accompanying text (presenting economic value of ecotourism).

341. *See supra* Part V(A) and accompanying text (describing proposed catch and release mandate for shark fishing tournaments).

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petition alive by placing the sharks back where they belong: in the water.

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* J.D. Candidate 2016, Villanova University Charles Widger School of Law; B.A. English and Aquatic Biology (minor), Millersville University of Pennsylvania, 2011. I dedicate this Comment to my father, who once told his eight-year-old to turn off *Jaws* as it was too scary and was not mad when she did not listen; to my mother, who is the strongest, most passionate woman I know; to my friends and family for their endless support and encouragement; to my Jedi calculus teacher and soccer coach with a love for shark fishing, who taught me the limit does not exist; to Dr. Jean Boal, who provided insight and research guidance; and to Bruce Rammer.