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Good morning Chairman Hastings, Ranking Member DeFazio, and members of the Committee. Thank you for inviting me to appear before you today. I appreciate the opportunity to offer my perspectives on the discussion draft circulated by Chairman Hastings to amend the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and my recommendations for the next reauthorization of this critical law.

I am a Professor and the Founder and Executive Director of the Institute for Ocean Conservation Science at Stony Brook University.[1] The Institute conducts world-class scientific research in order to increase our knowledge about critical threats to the ocean and its inhabitants, provide the foundation for smarter ocean policy, and establish new frameworks for improved ocean conservation. A primary focus of our work is to advance ecosystem-based fishery management, or put another way, to support the progression of fishery science and management from its current species-by-species emphasis to a more comprehensive and realistic approach. Importantly, an ecosystem-based methodology accounts for the interactions among marine species, their habitat requirements and environment, and the people who depend upon them. There is a growing consensus among scientists that this approach to management is the necessary next step to ensure sustainable stewardship of our ocean resources.

As such, I am very concerned about the Chairman's discussion draft, as it roll backs many of the important provisions of the Magnuson-Stevens Act that have led to recent improvements in the health of the nation's fisheries. Rather than relapse to using policies and practices that were not successful when widely applied in the past, we should use this opportunity to move forward, adopt ecosystem-based fisheries management, and better equip our fishery managers to address future challenges facing our oceans.

Throughout my professional career, I have been deeply involved in fishery conservation and fisheries management science. As an Assistant Professor at Oregon State University in the early 1980s, I conducted cooperative research with the commercial fishing industry focusing on Pacific coast groundfish assessments and complex management issues (such as bycatch and discards) arising from the multispecies nature of the trawl fishery. Much of this work took place aboard commercial fishing vessels operating under commercial fishing conditions. Later, while on the faculty of the University of

[1] The views expressed in this testimony are mine. They do not necessarily reflect the views of Stony Brook University.

Washington, I directed the Fisheries Research Institute and expanded my research program into Alaskan waters. I served on the Pacific Regional Fishery Management Council's Scientific and Statistical Committee between 1989 and 1994, and chaired its Groundfish Subcommittee in 1993 and 1994. I also served as chairman of the New England Regional Fishery Management Council's Scientific and Statistical Committee from 1998 to 2000. I have been a member of several advisory panels convened by the National Academy of Sciences to research sustainable fishery management issues. I have conducted field research, in the United States and overseas, on many iconic fish species, including sturgeon, sharks, and several species of groundfish.

In the late 1980s and 1990s, I witnessed firsthand how regional fishery management councils used flexibility to avoid addressing the difficult problems affecting many of our nation's important fisheries. Scientific advice was often ignored. Political pressure was applied to delay action desperately needed to prevent overfishing and rebuild depleted fish populations. So, overfishing continued, even on stocks experiencing substantial population declines. In many areas along our nation's coastline, fishing-dependent communities faced economic hardships due to collapsing fish populations.

Congress took notice. In 1996 and 2006, a bipartisan group of Senators and Representatives, led by the late U.S. Senator Ted Stevens, amended the law to establish clearer provisions to prevent overfishing, rebuild fish populations, and ensure scientific advice provides a solid foundation for our nation's fishery management system. In 1996, Congress added a requirement that overfished fish stocks be rebuilt in as short as time as possible but not to exceed 10 years, with certain limited exceptions. A decade later, Congress amended the law to require science-based catch limits and accountability measures in order to restore and maintain fish populations.

Due to the hard work of managers, fishermen, scientists, conservationists, and others, we are turning the corner in fishery management. Although we certainly have more work to do, the state of our fisheries is improving – it is certainly stronger now than at any time during my professional career.

In December of 2013, the National Marine Fisheries Service reported that 34 fish stocks have been rebuilt since 2000.[2] These include Pacific Coast lingcod, Georges Bank haddock, Southern Atlantic black

[2] NOAA Fisheries. Status of U.S. Fisheries. 2013 Quarter 4 Update through Dec. 31, 2013. Available at http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm

sea bass, and Gulf of Mexico red grouper. In addition, the number of stocks experiencing overfishing has declined from 72 in 2000 to 28 by the end of 2013.[3] Science-based catch limits, designed to prevent overfishing, are in place for all federally-managed fish populations.

According to National Marine Fisheries Service testimony submitted to this Committee last September, "U.S. commercial fishermen landed 9.9 billion pounds of seafood valued at $5.3 billion in 2011, which reflects an increase of 1.6 billion pounds (20 percent) and $829 million (18 percent) over 2010 figures. 2011 was the highest landing volume since 1997 and highest value in nominal terms ever recorded." The agency went on to report that jobs generated by recreational fishing represented a 40 percent increase between 2010 and 2011.[4]

I proudly share these facts, along with stories detailing how much we have accomplished, with my students. The improvements we are making are not only benefitting fish populations and ocean ecosystems but also making important economic contributions through jobs and more profitable fisheries. The U.S. has one of the best management systems in the world thanks to our commitment to follow scientific recommendations, prevent overfishing, and rebuild fish populations. As we consider modifications to the Magnuson-Stevens Act, it is imperative that we maintain and build upon this recent progress.

Concerns with the Discussion Draft

Unfortunately, the draft proposal circulated in December would jeopardize the hard-earned progress the U.S. has made in recent years. It would undercut the very requirements of the Magnuson-Stevens Act that are largely responsible for the recent turn-around. It fully embraces and re-institutes many 20th Century management policies that, in the 1980s and 1990s, failed to promote sustainable fish populations and foster long-term productivity for fisheries and coastal communities. It is not the forward-looking vision we need to ensure our fishery management system can respond to and overcome challenges of changing oceans in the 21st Century. Among its shortcomings, the draft proposal would:

[3] NOAA Fisheries. Status of U.S. Fisheries. Data from 2000 and 2013 updates. Available online at http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm

[4] Rauch, Samuel D. 2013. Written Testimony by Samuel D. Rauch III, Acting Assistant Administrator for the National Marine Fisheries Service. For a Hearing on Magnuson-Stevens Fishery Conservation and Management Act before the Committee on Natural Resources. September 11, 2013.

- Weaken the Act's rebuilding requirements. The proposal would allow overfishing to continue by delaying the onset of rebuilding measures in a rebuilding plan for five, and perhaps up to seven years, once a population has been declared to be below healthy levels. There are both ecological and economic arguments to begin rebuilding overfished populations immediately. Allowing depleted fish populations to further decline may reduce survival of early life stages, decrease genetic diversity, and cause shifts in ecosystem structure and function. Extending overfishing will, at worst, increase the risk of severe collapse for some fish populations, and, at best, greatly delay their recovery – jeopardizing both the resiliency of the fish population and the long-term economic viability of businesses and communities that rely upon them.[5] [6] For species like forage fish, continued overfishing or extended periods of depletion jeopardizes not only the target species, but also the health of the entire food web of marine species.

  In addition, the discussion draft would eliminate the target to rebuild an overfished stock within 10 years if biologically possible and add a number of new, broad exceptions for setting any timeline. My research and that of others concludes that it is biologically possible for the majority of fish species to recover in 10 years, even if they were significantly depleted at the start of rebuilding.[7] [8] Moreover, rapid rebuilding confers long-term economic benefits because the sooner a population approaches a sustainable level, the sooner catches (and hence revenues generated by the fishery) can increase.[9] In a comparison of rebuilding strategies, my colleagues and I concluded that the best strategy to ensure healthy populations and economic returns was to employ both a 10 year rebuilding target as well as management strategies called harvest control rules that set varying levels of catch in accordance with the abundance (or size) of the fish population. [10]

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[5] Pikitch, Ellen K. 2003. The Scientific Case for Precautionary Management: Current Fishery Problems Traced to Improper Use of Science. In: Managing Marine Fisheries in the United States. Proceedings of the Pew Oceans Commission Workshop on Marine Fishery Management.

[6] Babcock, Elizabeth A., McAllister, Murdoch K. and Pikitch, Ellen K. 2007. Comparison of Harvest Control Policies for Rebuilding Overfished Populations within a Fixed Rebuilding Time Frame. *North American Journal of Fisheries Management*. 27: 1326-1342.

[7] Safina, Carl, et al. 2005. U.S. Ocean Fish Recovery: Staying the Course. *Science*. 309: 707-708. 29 July 2005;

[8] Babcock, McAlister and Pikitch, 2007.

[9] Babcock, McAlister and Pikitch, 2007.

[10] Babcock, McAlister and Pikitch, 2007.

In addition, the discussion draft includes several broad exceptions that would give regional fishery management councils the option not to set any rebuilding target date. If these exceptions were to be used, I would be concerned that rebuilding a stock to a sustainable level could be delayed indefinitely. This would risk the long-term economic benefits associated with a rebuilt, sustainable fishery.

Current provisions of the Act already permit sufficient flexibility including the ability to deviate from the 10 year time frame in appropriate circumstances, such as if biological conditions of the stock would require a longer period. In fact, the majority of stocks currently undergoing rebuilding have plans that exceed 10 years.[11] The Natural Resources Defense Council (NRDC) analyzed 44 fish stocks that had been put in rebuilding plans since 1996 and had sufficient information to evaluate progress. In its 2013 report, NRDC found that the average rebuilding time periods for these plans is close to 20 years.[12]

- Reverse recent gains in better incorporating science in our fishery management system. The proposal would make significant changes to existing requirements for science-based fishery management. For example, it would allow regional fishery management councils to dismiss recommendations of the council's scientific and statistical committees in setting annual catch limits by providing them with opportunities to elevate short-term economic issues, jeopardizing the sustainability of fish populations and sacrificing long term economic benefits.

- Diminish the ability of managers to prevent overfishing of forage fish. The proposal includes provisions that would exempt forage fish species from the Act's requirements to establish science-based catch limits that prevent overfishing. As a food source of larger fish and other marine wildlife, forage fish play a critical role in marine ecosystems. Because of this, they contribute to many economically-important coastal activities, including commercial fisheries, recreational fishing, whale watching, and bird viewing. It would be a mistake to sideline consideration of this crucial link in the ocean food web by excluding forage fish from requirements to set science-based limits that would help manage their populations.

[11] NOAA Fisheries. Status of U.S. Fisheries. Available online at http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm

[12] Natural Resources Defense Council. Bringing Back the Fish: An Evaluation of U.S. Fisheries Rebuilding Under the Magnuson-Stevens Fishery Conservation and Management Act. 2013. Appendix A.

- Put basic fishery data, including information collected using taxpayer support, off limits to the general public. The proposal would reduce public access to data collected by on-board observers and through cooperative research projects involving fishermen and scientists. University and independent scientists rely on this data, typically shared in ways to maintain privacy and confidential information, to conduct research that helps improve knowledge of fish populations and efficacy of management measures. Keeping vast amounts of this information out of the public domain will not only be a set-back to fishery science but also undermines our nation's commitment to open government, particularly for managing public resources such as fish.

I am also concerned about provisions in the discussion draft that would weaken core environmental laws, including the National Environmental Policy Act, the Endangered Species Act, the National Marine Sanctuaries Act, and the Antiquities Act, as they would apply to fishery management decisions.

Recommendations for Magnuson-Stevens Reauthorization

Instead of these regressive changes, Congress, the Administration, and those of us involved in fishery management and science should be considering and implementing ways to build on the success of the Magnuson-Stevens Act. We have unfinished business, such as how to minimize bycatch, protect and restore fish habitat, and invest in science.

No fish is an island. A species may be in good shape from a single species perspective – but may be overfished from an ecosystem perspective.

We must shift our focus from managing fish as separate, individual species with a primary goal of maintaining populations of key target species, and move towards recognizing they are part of an interacting web of marine life, an ecosystem. We need to stop using scientific uncertainty as an excuse for inaction, and instead see it as an indicator that precautionary care is needed to sustainably manage the interconnecting parts of ecosystem. In addition, we must confront new challenges, such as the impacts of a changing climate on fish populations.

The concept of ecosystem-based fisheries management is not new. In fact, in 1996 Congress called for an expert panel to offer recommendations "to expand the application of ecosystem principles in fishery

conservation and management activities."[13] In its subsequently released report to Congress the Ecosystem Principles Advisory Panel set forth core recommendations for incorporating ecosystem principles in fishery management, including: that each regional fishery management council be required to develop a fishery ecosystem plan for the ecosystem(s) under its jurisdiction; that the Secretary of Commerce should establish guidelines for developing fishery ecosystem plans, and; that management measures consider predator-prey interactions, consider the impact of bycatch to the ecosystem, and minimize the impacts of fishing operations on essential fish habitat.[14]

In 2004, several colleagues and I further analyzed and outlined this approach.[15] We identified several key components of Ecosystem-based Fishery Management including:

- Consideration of the overall state of the ecosystem, habitat, protected species, and non-target species when designing precautionary fishery management plans;
- Identification, restoration and conservation of essential habitat to ensure spawning and other crucial life stages of species are protected;
- Reduction of bycatch, or the killing of non-target species or undersized individuals;
- Accounting for direct and indirect impacts on endangered and protected species, including ecological processes essential for their recovery;
- Requirements that new and developing fisheries first prove that fishing pressure will have minimal direct or indirect effects on ecosystem function; and
- Management of forage fish with special consideration that accounts for their role as prey for marine predators.

Subsequent, peer-reviewed scientific papers have been published, exhibiting a strong and growing scientific consensus supporting a more integrated ecosystem-based approach to fishery management.

In addition, in 2003 the Pew Oceans Commission recommended that the principal objective of our nation's fishery policy should be "to protect the long-term health and viability of fisheries by protecting, maintaining, and restoring the health, integrity, productive capacity and resilience of the marine

[13] Magnuson-Stevens Fishery Conservation and Management Act, Section 406 (a) – (e) , 16 U.S.C. 1882.
[14] Ecosystem-based Fishery Management, A Report to Congress by the Ecosystem Principles Advisory Panel as mandated by the Sustainable Fisheries Act amendments to the Magnuson-Stevens Fishery Conservation and Management Act 1996. 1998. pp. 3-5.
[15] Pikitch, E. K. et al. 2004. Ecosystem-Based Fishery Management. *Science.* 305: 346-347. 16 July 2004.

ecosystems upon which they depend."[16] And, in 2004, the U.S. Commission on Ocean Policy, established by the U.S. Congress and appointed by President George W. Bush, called for managers to begin moving toward a more ecosystem based fishery management approach.[17]

Ecosystem-based fishery management will be our best tool for ensuring productive and economically-viable fisheries in the face of stressors like climate change, ocean acidification, pollution, habitat destruction, and the long-term consequences of fishing pressure. Using ecosystem-based fishery management, we can sustain the long-term socioeconomic benefits of fisheries without compromising the ecosystem. In fact – we are likely to be able to enhance socioeconomic benefits of fisheries as well.

I recommend that during this reauthorization of the Magnuson-Stevens Act, Congress firmly establish ecosystem-based fishery management approaches in the law. More specifically, this would include measures to:

- sharpen existing provisions in the Act to protect habitat needed for fish, including habitat adversely affected by non-fishing activities;
- enhance existing provisions to reduce bycatch;
- ensure that forage fish are managed to account for the important role they hold in our ocean; and
- require councils to prepare and implement fishery ecosystems plans.

Each of these elements is important, but due to my recent experience chairing an expert panel of 13 marine and fisheries scientists that examined the unique role of forage fish in sustaining ocean food webs, I would like to briefly discuss why these small fish matter so much to marine ecosystems and coastal economies. This project, conducted as the Lenfest Forage Fish Task Force, undertook a comprehensive worldwide analysis of the science and management of forage fish populations. Our findings were released in a report[18] and a peer-reviewed paper in 2012.[19]

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[16] Pew Oceans Commission. America's Living Oceans: Charting a Course for Sea Change. A Report to the Nation. May 2003. p.109

[17] U.S. Commission on Ocean Policy. An Ocean Blueprint for the 21st Century. Final Report. 2004. p.295

[18] Pikitch, E., Boersma, P.D., Boyd, I.L., Conover, D.O., Cury, P., Essington, T., Heppell, S.S., Houde, E.D., Mangel, M., Pauly, D., Plagányi, É., Sainsbury, K., and Steneck, R.S. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs. Lenfest Ocean Program. Washington, DC. 108 pp.

[19] Pikitch, E. K., Rountos, K. J., Essington, T. E., Santora, C., Pauly, D., Watson, R., Sumaila, U. R., Boersma, P. D., Boyd, I. L., Conover, D. O., Cury, P., Heppell, S. S., Houde, E. D., Mangel, M., Plagányi, É., Sainsbury, K., Steneck, R. S., Geers, T. M., Gownaris, N. and Munch, S. B. (2012), The global contribution of forage fish to marine fisheries and ecosystems. *Fish and Fisheries*. doi: 10.1111/faf.12004

Forage fish are small to medium-sized fish, such as sardines, anchovies, and menhaden, that provide a primary food source for marine mammals, sea birds, and larger commercially and recreationally important fish, such as cod, salmon, and tuna. Forage fish play a key function in transferring energy from the plankton they feed on to the larger animals that prey on them and thus are essential to ensuring productive, resilient ocean ecosystems. Scientists have estimated that the world's marine mammals consume up to 20 million tons of forage fish annually.[20] A 2011 study examining 14 species of seabirds, including puffins, penguins, and terns, in seven ecosystems around the world concluded that when the supply of forage fish drops to less than one-third its maximum historic level, seabird breeding success is greatly reduced which threatens the entire ecosystem.[21] Because many marine ecosystems have predators highly dependent on forage fish, it is biologically imperative that we develop improved management strategies for these small but significant species.

Forage fish mature early, live short lives, and produce substantial numbers of offspring. But, because of their short life span, they are susceptible to significant population fluctuations. In addition, forage fish are often found in large shoals. These characteristics make these fish highly detectable and catchable. About one-third of wild marine fish caught globally are forage fish. However, most forage fish are not used directly as human food. Rather, an estimated 90 percent is processed as feed for fish farms, poultry, and livestock, as well as human nutritional supplement.[22]

Our panel synthesized 72 Ecopath models representing marine and estuarine ecosystems from around the world. Our panel's final report concluded that, in most ecosystems, at least twice as many forage fish should be left in the ocean as typically are now in order to account for their critical role as food for fish, seabirds, and marine mammals. Our analysis found that conventional management approaches of forage fish species did not "adequately account for the population dynamics of forage fish and their role

[20] Kaschner, K., Karpouzi, V., Watson, R., and Pauly, D., "Forage fish consumption by marine mammals and seabirds," pp. 33-46. In: Alder, J., and Pauly, D. (Eds.). On the multiple uses of forage fish: from ecosystems to markets. Fisheries Centre Research Reports 14(3) (2006), Fisheries Centre, University of British Columbia. Centre, University of British Columbia.

[21] Cury, Phillppe M. et al. 2011. Global Seabird Response to Forage Fish Depletion – One Third for the Birds. *Science* 334: 1703-1706. 23 December 2011.

[22] Tacon, A. G. J., and Metian, M. 2008. Global overview on the use of fish meal and fish oil in industrially compounded aquafeeds: trends and future prospects. *Aquaculture, 285*(1-4),146–158.

in the ecosystem," thereby making these small species top candidates to lead the transition to ecosystem-based fishery management.[23]

There are several examples of current management regimes that have taken the step to account for the essential role forage fish play in marine ecosystems. For example, in the Barents Sea, in order to ensure an adequate food supply for cod, Norway and Russia established a threshold to limit direct fishing on capelin if its spawning stock biomass, a strong indicator of the population, falls below 200,000 tonnes. In addition to using other standard management tools, such as minimum landing size and fishing seasons, managers have instituted conservative catch levels for capelin, and ecosystem and multispecies models are used as part of a comprehensive assessment methodology. As these measures have been put in place, capelin populations have not collapsed, as they have done in the past and the cod fishery is improving.[24] In fact, the cod fishery is the most valuable fishery in the Barents Sea and is the largest stock of cod in the world.[25] [26]

And, it is important to manage forage fish from a more holistic vantage point not only for the sake of the ecosystem – but for the economic vitality of our nation. Using the Ecopath models, our panel estimated the economic importance of forage fish to global commercial fisheries. We estimated the total ex-vessel value of forage fish to global commercial fisheries to be an impressive $16.9 billion (2006 USD) annually, yet only about one-third ($5.6 billion) of this value derives from catches of forage fish themselves. The value of the supportive role of forage fish as food for larger commercially important fishes (estimated at $11.3 billion annually) is more than twice their value as direct targets of harvesting.[27] In other words, we estimated that forage fish are worth twice as much when left in the water as they are taken out in a net.

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[23] Pikitch, E., Boersma, P.D., Boyd, I.L., Conover, D.O., Cury, P., Essington, T., Heppell, S.S., Houde, E.D., Mangel, M., Pauly, D., Plagányi, É., Sainsbury, K., and Steneck, R.S. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs. Lenfest Ocean Program. Washington, DC. 108 pp. At 86.

[24] Pikitch, E., Boersma, P.D., Boyd, I.L., Conover, D.O., Cury, P., Essington, T., Heppell, S.S., Houde, E.D., Mangel, M., Pauly, D., Plagányi, É., Sainsbury, K., and Steneck, R.S. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs. Lenfest Ocean Program. Washington, DC. 108 pp. At 31, 36-37.

[25] Pikitch, E., Boersma, P.D., Boyd, I.L., Conover, D.O., Cury, P., Essington, T., Heppell, S.S., Houde, E.D., Mangel, M., Pauly, D., Plagányi, É., Sainsbury, K., and Steneck, R.S. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs. Lenfest Ocean Program. Washington, DC. 108 pp. At 37.

[26] The IndiSeas Project. Indicators for the Seas. http.//www.indiseas.org/

[27] Pikitch, E. K., Rountos, K. J., Essington, T. E., Santora, C., Pauly, D., Watson, R., Sumaila, U. R., Boersma, P. D., Boyd, I. L., Conover, D. O., Cury, P., Heppell, S. S., Houde, E. D., Mangel, M., Plagányi, É., Sainsbury, K., Steneck, R. S., Geers, T. M., Gownaris, N. and Munch, S. B. (2012), The global contribution of forage fish to marine fisheries and ecosystems. *Fish and Fisheries*. doi: 10.1111/faf.12004

The economic impact of wildlife viewing provides another compelling reason to ensure management of forage fish accounts for their vital ecological role. A recent report by Audubon Florida and The Pew Charitable Trusts examined the importance of forage fish to Florida's coastal waterbirds. The report cited Florida Fish and Wildlife Conservation Commission figures estimating the economic impact of bird watching and other wildlife viewing in Florida to be $4.9 billion in 2011.[28] This is another example of how conservation of little fish translates into large economic gains.

Conclusion

My work has taken me to many countries around the globe, conducting research and helping to establish best practices for conserving and sustaining fisheries. But I love these shores like nowhere else in the world and it is my urgent concern that our nation's fisheries and oceans, and all the families who depend upon them, remain healthy and strong, now and for generations to come.

It is plain – without fish, there are no fishermen. In recent years, our nation has taken steps to implement science-based fishery management and there is considerable progress to report. We are rebuilding fish populations and providing more opportunities for fishermen. Unfortunately, we still have work to do to and are facing new trials, such as changing ocean conditions due to warmer oceans and ocean acidification. We need a Magnuson-Stevens Act that can help us confront these challenges.

That is why I am so concerned about the Hastings draft proposal. It would roll back the progress we have made in recent years and endanger the long-term health, sustainability and productivity of our oceans. Instead, we should be adopting an ecosystem-based fishery management approach, that includes enhancing protections for habitat, reducing bycatch, requiring fishery ecosystem plans, and ensuring we manage forage fish to account for the vital support they provide to ocean ecosystems and national and global economies.

Let's not undo the work we have accomplished that is widely regarded as a great success story. We must ensure the health of our fisheries – It is good for fishermen, it is good for the nation, and we should be moving forward not retreating backwards. Thank you again for the opportunity to share my views.

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[28] Florida Fish and Wildlife Conservation Commission. Overview – Fast Facts. Updated Oct 2013. Available online at http://myfwc.com/about/overview