

Electronic Reporting and Monitoring in Fisheries: Data Privacy, Security, and Management Challenges and 21st-Century Solutions

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Summary

As human populations have more than doubled since 1960, pressure on wild fish stocks has increased dramatically. This Article argues that the establishment of an electronic reporting and monitoring regime in U.S. fisheries is both necessary to ensure compliance with statutory imperatives to manage them according to best available science, and essential for continued long-term viability of the U.S. fishing industry. While privacy issues pose some challenge to adoption of emerging technologies, these are not insurmountable, and generally can be addressed with existing legal mechanisms and commonsense improvements to regulation.

Unless someone like you cares a whole awful lot, nothing is going to get better. It's not.

—Dr. Seuss, *The Lorax*¹

The damage caused by overfishing extends beyond the future prospects of all of us to eat seafood, and beyond the survival of the particular fish or seafood stock that we harvest. . . . There is also heavy damage to marine habitats, notably to the seabed by trawlers and to coral reefs by dynamite and cyanide fishing. Finally, overfishing damages fishermen, by ultimately eliminating the basis of their livelihood and costing them their jobs.

—Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed*²

Since time immemorial, humans have relied on the bounty of the oceans for sustenance. Over the course of the past 164,000 years, many societies have relied on wild-caught fish and shellfish as either a primary or secondary protein source.³ Through most of human history, humanity's relationship with the ocean has been a sustainable one—debts drawn from the ocean were more than justly offset by the fecundity of the species consumed.

In just the past 50 years, however, *Homo sapiens* have had a profound impact on the ability of fisheries resources to renew themselves. As human populations have more than doubled since 1960, pressure on wild fish stocks has increased dramatically.⁴ This population boom, coupled with the emergence of other environmental stressors (e.g., habitat loss, water quality impairments, etc.) and new fishing technologies allowing for massive catches in even more inhospitable conditions, has led to the collapse of a number of important species on which humans historically relied.⁵ In turn, fishing fleets have been forced to venture further offshore in order to find new species to harvest so as to meet consumer demand.⁶

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1. DR. SEUSS, *THE LORAX* (1971).
 2. JARED DIAMOND, *COLLAPSE: HOW SOCIETIES CHOOSE TO FAIL OR SUCCEED* 480-81 (2005).
 3. See John Noble Wilford, *Eating of Shellfish Linked to Survival of Early Man*, N.Y. TIMES, Oct. 17, 2007.
 4. See, e.g., DIAMOND, *supra* note 2, at 479 (noting that “[w]hile seafood consumption is high and rising in the First World, it is even higher and rising faster elsewhere, e.g., having doubled in China within the last decade” and noting that “[f]ish now account for 40% of all protein (of both plant and animal origin) consumed in the Third World and are the main animal protein source for over a billion” people in Asia).
 5. See *id.* at 480 (noting that “the majority of the world’s commercially important marine fisheries have either collapsed to the point of being commercial extinct, or have been severely depleted, are currently overfished to the limit, are recovering only slowly from past overfishing, or are otherwise in urgent need of management”).
 6. See generally PAUL GREENBERG, *FOUR FISH: THE FUTURE OF THE LAST WILD FOOD* (2010).

More recently, thanks to improvements in fisheries science, management, and recordkeeping, a number of countries—including the United States—have come to understand the profoundly deleterious impact that overfishing has had on fish stocks.⁷ Many countries when faced with rapidly declining stocks have taken steps to curb overfishing through enactment of complex management regimes, which established permitting and quota systems. In the United States, the Magnuson-Stevens Fishery Management and Conservation Act (MSA) has served as the national framework under which American (and foreign) fishers must operate in U.S. waters.⁸ While the MSA has certainly helped to reduce overfishing in U.S. waters, U.S. fishery resources still could be better managed—particularly when it comes to data gathering, stock assessments, monitoring, and enforcement.

The current U.S. monitoring regime is handicapped by a dearth of up-to-date information related to the quantity and location of catches and bycatches. The lack of quality data, in turn, compromises the quality of fishery management plans (FMPs) and means that federal regulators cannot meet the mandate outlined in the MSA to base conservation and management measures on the best scientific information available.⁹

Part of this problem stems from antiquated reporting protocols, whereby fishers self-report required information using pen-and-ink logbooks that are then transmitted to regulators after a fishing trip. This procedure means that data are often unreliable and “stale” from a dynamic management perspective by the time they are forwarded to regulators. Additionally, the MSA imposes stringent confidentiality requirements, which arguably have impeded effective management and transparency at the expense of the protection of allegedly confidential business information and proprietary data. Finally, individual fishers themselves have resisted more modern reporting and monitoring procedures out of a fear that new systems will constitute an invasion of their personal privacy, since they live for days or weeks at a time on their vessels when at sea.

Fishing as a business has become increasingly industrialized in recent years, with significant improvements in both the safety and efficiency of fishing. The management and reporting of fishing catches, however, has remained solidly in the 20th (or even the 19th) century, making it impossible to report the chain of custody and traceability of fish catches either precisely or in real time. Nevertheless, the archaic data systems and management practice of the fisher-

ies sector may actually prove to be an advantage. While the dearth of quality data is certainly a problem, it also presents a tremendous opportunity to modernize fisheries management in exciting ways that are unencumbered by newer but now fading data-gathering technologies and systems.

To date, the U.S. fishing industry has not seen deep penetration of emerging technology inputs into their operations. Thus, the incorporation of a range of technologies—from electronic reporting and monitoring devices to predictive big data analytics—has the potential to radically transform both the rapidity and accuracy by which regulators manage the fisheries and the methodologies that fishers utilize to harvest the resource. Further, incorporation of electronic monitoring devices into fishing vessels themselves has the potential to transform the vessels into giant sensors capable of collecting a range of environmental data—data that could ultimately prove as valuable as the fish themselves and that could make fishing an even more efficient and sustainable business for the long run.

This Article argues that the establishment of an electronic reporting and monitoring regime in U.S. fisheries is not only necessary to ensure compliance with statutory imperatives to manage them according to best available science, but also essential for the continued long-term viability of the U.S. fishing industry. Simply put, implementation of electronic reporting and monitoring in fisheries management presents an unparalleled opportunity to truly achieve maximum sustainable yield. As climate change, increased consumer demand, and other pressures continue to tax already strained resources, electronic reporting and monitoring and associated big data analytics will allow managers to respond in real time to both enable sustainable harvest of fisheries resources and alleviate pressure on fish stocks to allow them appropriate time to recover from man-made and environmental pressures. These technologies are not expensive and can more than pay for themselves and even create new jobs and commercial opportunities to use the data in marketable ways.

Of course, incorporation of electronic reporting and monitoring will lead to some fundamental changes in how regulators, fishers, and the general public conceive of fisheries data and privacy. While these issues pose some challenge to the adoption of emerging technologies in the fishing industry, they are not an insurmountable barrier to change, and generally can be addressed with existing legal mechanisms and commonsense improvements to regulation. Moreover, there are ways that the fishing industry can mitigate unintended consequences and capitalize on lessons learned from other industries that have undergone the big data revolution sooner.

Part I of the Article provides necessary background, including an overview of fisheries generally, a summary

7. See DIAMOND, *supra* note 2, at 480 (“Among the most important fisheries that have already collapsed are Atlantic halibut, Atlantic bluefin tuna, Atlantic swordfish, North Sea herring, Grand Banks cod, Argentine hake, and Australian Murray River cod.”).

8. 16 U.S.C. §§1801-1891d.

9. See *id.* §1851(2).

of the federal government's role in managing fisheries, an analysis of current deficiencies in the federal government's management of fisheries, a summary of how current data management practices jeopardize the future health of fisheries resources, an articulation of the promise inherent in innovating fisheries management, and a description of the challenges facing modernization.

Parts II through IV directly address the issues of privacy and data security in the fisheries context. Part II provides a survey of the relevant federal laws governing privacy and data security in the fisheries management context, detailing the relevant statutory, regulatory, and administrative authorities that have governed for the past quarter-century. Part III considers the privacy rights of fishers, concluding that existing laws and regulations afford sufficient protection of fishers' personal privacy rights. Part IV outlines data rights governing fisheries management, discussing how existing law provides sufficient protection of confidential business information, but noting that a new data protection regime may be necessary and appropriate in an era of changing environmental conditions and a greater desire from the consuming public for traceability of fish.

Finally, Part V offers a suite of recommendations on how federal regulators can amend existing laws, policies, and incentives to encourage the adoption of electronic monitoring and reporting technologies. Part VI concludes.

I. Background

A. *The Fragility and Resiliency of Fisheries*

Fisheries pose one of the most difficult resource management challenges facing governments large and small. In particular, the status of fish stocks is difficult to assess because the resource resides below the surface and is always in motion.¹⁰ And although fish stocks are renewable, they also can be devastated due to poor management and overfishing.

Overfishing is extremely difficult to stop because demand for fish products is high and management failures are the result of an "extensive global web of interdependencies stemming from economic, political, social, and ecological relations between fish, fishers, industries, governments, and consumers, which is also referred to as the 'seafood supply chain.'"¹¹ While many have attempted to identify the single root cause of overfishing, in truth it is impossible to ascribe causation to any single factor.¹² Rather, in a race

to the bottom (literally and figuratively), "the obduracy of overfishing seems to be . . . a result of a lack of social cohesion and discipline."¹³ Consequently, humans continue to engage in the wild harvest of approximately 90 million tons of fish per year,¹⁴ which is insufficient to keep pace with demand as global population continues to rise.¹⁵ If left unchecked, over time, sustained overfishing will result in both economic damage and ecological harm, just as it has in the past.¹⁶

Even where there are limits in place to check overfishing, it is still exceptionally difficult to monitor and enforce those checks because of a dearth of financial and human resources and, until now, the absence of adequate technological capabilities to observe fishing practices without an independent observer actually on board each vessel. Fortunately, fisheries are also surprisingly resilient, capable of bouncing back when aided by proper management or a reduction in fishing pressure.¹⁷ For most fish stocks, if left to their own devices, "[t]he many cycles and sub cycles that spin and generate food . . . require absolutely no input from us in order to continue, other than restraint."¹⁸ As Paul Greenberg has noted, "[i]n cases where grounds have

all fishing capacity, as the main cause of overfishing. Another cause is found in the collective amnesia and shortsightedness when it comes to the perception and valuation of marine biomass and biodiversity. Included here is Pauly's shifting baseline syndrome, but also the failure to economically value marine ecosystem services. Another cause for overfishing is found in perverse subsidies, when from the 1950s several states used subsidies to modernize fishing fleets. These subsidies encouraged the growth of fishing capacity and, in so doing, contributed to overfishing. These answers are not wrong, to be sure, but they tend to highlight only one or a few single factors that are then supposed to be applicable in all cases all the time. Conventional diagnosis of overfishing tends to focus on separate parts of the marine social-ecological systems (social, economic, political or ecological aspects), and assume that fixing these will solve the issue, while overfishing develops from a complex, historical concatenation of social and ecological aspects.

(Internal citations omitted.)

13. *Id.* at 2-3. See also GREENBERG, *supra* note 6, at 33: What we have seen up until now, with both the exploitation of wild fish and the selection and propagation of domestic fish, is a wave of psychological denial of staggering scope. With wild fish, we have chosen, time after time, to ignore the fundamental limits the laws of nature place on ecosystems and have consistently removed more fish than can be replaced by natural processes.
14. GREENBERG, *supra* note 6, at 32.
15. Daniel Pauley & Dirk Zeller, *Catch Reconstructions Reveal That Global Marine Fisheries Catches Are Higher Than Reported and Declining*, 7 NATURE COMM. 7 (2016) (noting that global catches peaked in 1996 at 130 million tons and have fallen since then due to lack of fish to catch).
16. See Boonstra & Österblom, *supra* note 11, at 2: Indeed, overfishing has been a consistent theme throughout human history. It occurred perhaps for the first time during the Middle Ages when fishers emptied European rivers and estuaries of sturgeon and salmon. In 1289, King Philip IV of France complained: "every river and waterside of our realm, large and small, yields nothing due to the evil of fishers and devices of their contriving." The ensuing crisis in the European freshwater fish supply in the 11th and 12th century was a prelude to a cascade of similar stories of overfishing in seas around the globe: from the collapse of whaling in the 19th century to the cod crisis in Newfoundland in the beginning of the 1990s.
(Internal citations omitted.)
17. See GREENBERG, *supra* note 6, at 32.
18. *Id.* It is important to note, however, that some fish stocks are harder to recover than others. For example, tuna are hard to recover because they are a large species with a long gestation period. There also may be climate reasons

10. See, e.g., Peter A. Larkin, *An Epitaph for the Concept of Maximum Sustained Yield*, 106 TRANSACTIONS AM. FISHERIES SOC'Y 1-11 (1977); Carl Walters & Jean-Jacques Maguire, *Lessons for Stock Assessment From the Northern Cod Collapse*, 6 REVS. FISH BIOLOGY & FISHERIES 125-37 (1996).

11. Wiebren J. Boonstra & Henrik Österblom, *A Chain of Fools: Or, Why It Is So Hard to Stop Overfishing*, 13(15) MAR. STUD. 3 (2014).

12. See *id.*

Economists, for example, have argued that overfishing is primarily the result of a political failure to radically privatize the use of marine environments, which they consider as an "open access property." Others point to technological creep, the continued growth of over-

been seemingly tapped out, ten years' rest has sometimes been enough to restore them to at least some of their former glory." Greenberg further notes:

World War II, while one of the most devastating periods in history for humans, might be called the "Great Fish Reprieve" if history were written by fish. With mines and submarines ready to blow up any unsuspecting fishing vessel, much of the North Atlantic's depleted fishing grounds were left fallow and fish increased their numbers significantly.¹⁹

U.S. fisheries provide an instructive case study that illustrates both the fragility and resiliency of fisheries and the pressure from the fishing industry on the government to permit high levels of fishing activity even when the stocks are in decline.²⁰ In order to build up the domestic fishing industry, in the 1980s, the U.S. government provided U.S. fishermen inexpensive government loans to replace or upgrade fishing vessels.²¹ This led to a wave of overfishing that resulted in the collapse of high-profile fisheries in New England and the Gulf of Mexico.²²

Recognizing the extensive ecological and economic damage wrought by overfishing, in 1996²³ and again in 2006,²⁴

the U.S. Congress enacted amendments to the MSA that each created increasing obligations on the government to reign in overfishing and rebuild overfished stocks.²⁵ The 1996 and 2006 MSA Amendments required fisheries managers to impose catch limits and to use best available science to establish "optimum yield" (i.e., the number of fish that commercial and recreational fishermen can catch sustainably each year).²⁶ As part of this process, fishery management councils (FMCs) were vested with authority to set "individual fishing quotas," a federal permit representing a portion of the total allowable catch within a particular fishery that could be held by a single fisher. The 1996 and 2006 MSA Amendments also introduced new concepts such as "bycatch," and established firm time lines to rebuild overfished populations.²⁷

In the two decades since Congress began tackling the issue of overfishing, the National Marine Fisheries Service (NMFS)—an entity within the National Oceanic and Atmospheric Administration (NOAA)—has worked to implement the MSA so as to achieve the law's stated purpose. Today, the United States has a comprehensive and relatively effective fisheries management regime, and has made progress toward rebuilding once-ravaged fish stocks in its waters. As of March 2017, 44 fish stocks have been rebuilt and only 35 stocks are not at maximum sustainable yield.²⁸ Of those 35 stocks, only 30 are still subject to overfishing.

However, there are many fisheries that, despite strict regulation and short-term commercial sacrifice, have not yet truly recovered and thus cannot support the same number of fishermen. These include some of the most commercially valuable species, such as cod in New England, coho salmon in the Pacific Northwest, dusky sharks in the Atlantic, striped marlin and bluefin tuna in the Pacific, and red snapper in the Gulf of Mexico.²⁹ The continued vulnerability of these vital fish stocks would suggest that the current legal and management regime is inadequate to achieve the complete recovery of these species, which reduces fishing income and jobs. Ultimately, new management techniques and new legal imperatives are necessary for these species to achieve their historic vitality, not to mention to revitalize many fishing communities and businesses.³⁰

why some stocks may be doomed; while species that can move north will be fine, some reef-dependent species that are fished out now may never recover. *Id.*

19. Ashleen Julia Benson et al., *An Evaluation of Rebuilding Policies for U.S. Fisheries*, 11(1) PLOS ONE (2016), <https://doi.org/10.1371/journal.pone.0146278>. MSA §304(e)(4)(A)(i)-(ii) requires that overfished stocks be rebuilt within 10 years or sooner if possible. Recent studies have shown that this rebuilding requirement improves stock outcomes in the long run, and that the sooner fisheries begin rebuilding the better the outcome of rebuilding plans. Fishermen have argued for greater flexibility in rebuilding time frames despite the fact that the near-term catches are equivalent and long-term outcomes are worse if rebuilding time frames are extended. *See, e.g.*, CONGRESSIONAL RESEARCH SERVICE, MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT (MSA): REAUTHORIZATION ISSUES FOR THE 115TH CONGRESS (2018), available at <https://fas.org/sgp/crs/misc/IF10267.pdf>.

20. Derek J. Dostal, *Global Fisheries Subsidies: Will the WTO Reel in Effective Regulations?*, 26 U. PA. J. INT'L L. 815, 826 (2005), available at <https://scholarship.law.upenn.edu/jil/vol26/iss4/6/>. Ironically, the initial 1976 Fisheries Conservation Management Act was passed by Congress out of a concern about the number of foreign fishing vessels. This original law sought to eliminate foreign fishing vessels from the United States' territorial sea zone so the law provided subsidies to domestic commercial fishermen, largely in the form of loan guarantees for vessel construction. *See also* Mansel Blackford, *A Tale of Two Fisheries: Fishing and Over-Fishing in American Waters*, 1(12) ORIGINS (2008):

American fishers, working through the New England Fishery Management Council (NEFMC, one of the United States' eight regional management councils) . . . simply replaced the foreigners. In an effort to create jobs for people in seaside communities that had few alternatives to fishing, both governments [U.S. and Canadian] urged the fishing on with low-interest loans available for the construction of new fishing vessels.

<http://origins.osu.edu/article/tale-two-fisheries-fishing-and-over-fishing-american-waters>. *See also* PEW OCEANS COMMISSION, AMERICA'S LIVING OCEANS: CHARTING A COURSE FOR SEA CHANGE 55-68 (2003) (discussing the problems facing America's oceans and making detailed recommendations), available at http://www.pewtrusts.org/pdf/env-pew_oceansfinal-report.pdf.

22. Ted Morton, *U.S. Ocean Fishing Law Forged by Cold War Politics*, PEW, July 14, 2015, <https://www.pewtrusts.org/en/research-and-analysis/articles/2015/07/14/us-ocean-fishing-law-forged-by-cold-war-politics>.

23. Pub. L. No. 104-297, 110 Stat. 3607 (1996).

24. Pub. L. No. 109-479, 120 Stat. 3613 (2007).

25. 16 U.S.C. §§1801 et seq.

26. *See, e.g.*, 110 Stat. at 3572 (amending §302(h) to mandate the preparation and submission of FMPs); *id.* at 3574-75 (establishing §108 FMP requirement and detailing required provisions of FMP); *id.* at 3577 (mandating individual fishing quota reports).

27. Morton, *supra* note 22.

28. NOAA FISHERIES, STATUS OF STOCK 2017: ANNUAL REPORT TO CONGRESS ON THE STATUS OF U.S. FISHERIES (2018), available at <https://www.fisheries.noaa.gov/national/2017-report-congress-status-us-fisheries#benefits-of-sustainable-fisheries-management>.

29. *Id.*

30. *See, e.g.*, Zoeann Murphy & Chris Mooney, *Gone in a Generation*, WASH. POST, Jan. 29, 2019 (noting that the state of Maine's lobster haul "peaked at over 8 million pounds in 1999 . . . hasn't exceeded 3 million since 2005. And in 2017, it barely reached 2 million. As a result, a way of life is rapidly changing and, for some, ending").

B. Government's Role in Fisheries Management

As noted above, the federal government plays a vital role in managing fisheries resources. Among other things, the MSA mandates that the United States “conserve and manage the fishery resources found off the coasts of the United States, and the anadromous species and Continental Shelf fishery resources of the United States, by exercising . . . sovereign rights for the purposes of exploring, exploiting, conserving, and managing all fish, within the exclusive economic zone.”³¹ Through the MSA, Congress vested with the Secretary of Commerce authority over fisheries management.³² The Secretary has delegated this role to NOAA, which established NMFS to oversee fisheries management.³³

The MSA articulates 10 “national standards for fishery conservation management.”³⁴ The national standards are set forth in §301 of the MSA and mandate that

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
2. Conservation and management measures shall be based upon the best scientific information available.
3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.
4. Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
5. Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.
6. Conservation and management measures shall take into account and allow for variations among,

and contingencies in, fisheries, fishery resources, and catches.

7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.
8. Conservation and management measures shall, consistent with the conservation requirements of this chapter (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.
9. Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
10. Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.³⁵

The MSA also established eight FMCs made up of fishermen, academics, and other stakeholders in the region, each of which has authority over a specific geographic area.³⁶ FMC members are nominated by the governor of their state and appointed by the Secretary of Commerce for their expertise in the issues facing the region.³⁷ However, they are not entirely disinterested in the management measures, and they also are performing this function in their “spare time.”³⁸ FMCs are supported by both regional NMFS staff and a dedicated council staff, and each FMC must abide by the operational guidelines promulgated by NMFS and the rules of the National Environmental Policy Act regarding transparency and public accountability of their management plans; but they are exempt from the Federal Advisory Committee Act (FACA) in order to allow fishermen to serve on councils even if they have conflicts of interest.³⁹

Each FMC is responsible for developing an FMP,⁴⁰ a document that “contain[s] conservation and management measures applicable to . . . fishing by vessels of the United States which are . . . necessary and appropriate for the conservation and management of the fishery, to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of

31. 16 U.S.C. §1801(b)(1). Under the 1982 United Nations Convention on the Law of the Sea (UNCLOS), a state has special rights regarding the exploration and use of marine resources over the “exclusive economic zone”—an area extending to 200 nautical miles from the coast. The United States has not ratified UNCLOS, but does recognize the treaty as customary international law.

32. *Id.* §1802(39).

33. NOAA has promulgated regulations implementing the MSA at 50 C.F.R. Part 600.

34. *See* 16 U.S.C. §1851.

35. *Id.* §1851(a)(1)-(10).

36. *See id.* §1852.

37. *See id.* §1852(b).

38. *See id.*

39. *Id.* §1852(i)(1), which states that FACA does not apply to the councils. NOAA Fisheries, *Operational Guidelines*, <https://www.fisheries.noaa.gov/national/partners/operational-guidelines> (last updated Jan. 31, 2018); 42 U.S.C. §§4321-4370h, ELR STAT. NEPA §§2-209.

40. *See* 16 U.S.C. §1852(h)(1).

the fishery.⁴¹ Any FMP prepared or any regulation promulgated to implement an FMP must be consistent with the national standards.⁴²

C. Current Deficiencies in Federal Fisheries Management

While the 1996 and 2006 MSA Amendments—and NMFS' efforts to implement these amendments—have led to marked improvements in the health and sustainability of many fish stocks, the current fisheries management regime is by no means perfect. One of the most significant gaps in the current regime is the dearth of up-to-date information related to the quantity and location of catches. The lack of quality data, in turn, compromises the quality of FMPs and means that NOAA is not meeting the mandates outlined in the national standards.

The lack of quality data stems from several issues. First, because of the lack of oversight resources in NMFS, the current management system relies upon fishers self-reporting the relevant information, including the type and quantity of fishing gear used, catch by species in numbers or weight, areas in which fishing was engaged, number of hauls, and so on.⁴³ This information is supplemented by data collected by human observers⁴⁴ who monitor a select few fishing trips, though most trips lack monitoring altogether and information gathered by observers is not publicly available and the coverage of observers varies greatly from region to region.⁴⁵ This self-reported data is recorded by fishers themselves in pen-and-ink fishing logs that are transmitted to the agency via antiquated electronic systems and even by U.S. mail.⁴⁶ The time lag in tabulating and analyzing catch data—as well as delays arising due to disputes between fishers and NOAA over the veracity of reports—significantly hinders NMFS' ability to effectively and efficiently monitor and enforce fishing infractions and to implement corrective management actions on a timely basis.

Second, the 1996 and 2006 MSA Amendments introduced expanded confidentiality requirements, which arguably have impeded effective management and transparency at the expense of the protection of confidential business information and proprietary data. For example, when enacted in 1976, the MSA protected the confidential-

ality of “statistics”⁴⁷—a term left undefined in the law, but which NOAA's implementing regulations define as information “submitted as a requirement of an FMP and that reveal the business or identity of the submitter.”⁴⁸ More helpfully, NOAA has interpreted the term “statistics” to include “information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing occurred, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by, U.S. fish processors.”⁴⁹

The 1996 MSA Amendments “substituted the word ‘information’ for ‘statistics’” so that “the statute's confidentiality requirements protected ‘any information submitted to the Secretary’ in compliance with an FMP.”⁵⁰ Moreover, the 1996 MSA Amendments “also expanded the confidentiality requirements to apply not just to information submitted in compliance with an FMP, but to information submitted in compliance with ‘any requirement or regulation’ under the Act.”⁵¹

The 2006 MSA Amendments “further broaden[ed] . . . the confidentiality requirements.”⁵² Before 2006, “the confidentiality requirement applied only to information submitted to the Secretary in compliance with any requirement or regulation under the [MSA].”⁵³ The 2006 MSA Amendments expanded this requirement “to include information submitted to a State fishery management agency or a Marine Fisheries Commission in compliance with a requirement or regulation under the Act.”⁵⁴ Further, the 2006 MSA Amendments “amended the confidentiality requirements to apply to any observer information.”⁵⁵

The emphasis placed on data security in the 1996 and 2006 MSA Amendments reflected the reality of fishing operations at that moment in history—an era before consumers valued traceability and before drones and other mobile technologies enabled fishers to monitor each other. Beyond this, however, the emphasis placed on data security also illustrated the tension inherent in the MSA itself (and in U.S. resource management statutes more generally)—that is, the dual mandate to protect and simultaneously exploit the public's fisheries resources, albeit in a “responsible” manner. With few specifics from Congress as to how to implement and achieve this balance, NOAA has been left to fill in the gaps through the promulgation of regulations and interpretive policies.⁵⁶

41. *Id.* §1853(a)(1)(A).

42. *See id.* §1851(a).

43. *See id.* §1853(a)(5).

44. *See id.* §1853(b)(8); *id.* §1881b.

45. *See* Oceana, *Fishery Observers: Eyes on the Ocean*, <https://usa.oceana.org/fishery-observers-eyes-ocean> (last visited May 7, 2019). According to the environmental nongovernmental organization Oceana, observer coverage is often less than 1% of fishing trips.

46. *See, e.g.*, NOAA Fisheries Bulletin, NMFS Paper Logbook Information for 2016 (Jan. 7, 2016), <https://www.fisheries.noaa.gov/bulletin/nmfs-paper-logbook-information-2016>. For example, the most recent fleetwide catch data for the longline tuna fishery based in Hawaii is from the year 2017 and is based on logsheets. NOAA, THE HAWAII LIMITED ACCESS LONGLINE LOGBOOK SUMMARY REPORT: JANUARY TO DECEMBER 2017 (2018), <https://repository.library.noaa.gov/view/noaa/17542>.

47. Pub. L. No. 94-265, 90 Stat. 352 (1976).

48. 50 C.F.R. §600.10.

49. *Id.* §600.405.

50. Confidentiality of Information; Magnuson-Stevens Fishery Conservation Management Reauthorization Act, 77 Fed. Reg. 30486, 30487 (May 23, 2012).

51. *Id.*

52. *Id.*

53. *Id.*

54. *Id.*

55. *Id.*

56. *See, e.g.*, *Chevron v. Natural Res. Def. Council*, 467 U.S. 837, 843-44, 14 ELR 20507 (1984):

If Congress has explicitly left a gap for the agency to fill, there is an express delegation of authority to the agency to elucidate a specific

While NOAA promulgated regulations implementing the 1996 MSA Amendments, the agency failed to promulgate rules following the 2006 MSA Amendments, muddying the waters and allowing varying approaches in implementation. Further confusing the situation, in 2012, NOAA published in the *Federal Register* a proposed rule that would have implemented the 2006 MSA Amendments and that sought “to balance the mandate to protect confidential information with exceptions that authorize disclosure of information to advance fishery conservation and management, scientific research, enforcement, and transparency in fishery management actions.”⁵⁷ With the proposed rule, NOAA offered three broad categories of changes to NMFS regulations: (1) changes concerning expanded confidentiality requirements, which had been added in the MSA Amendments; (2) changes regarding permissible disclosure of fisheries information; and (3) clarifications to the prior regulation.⁵⁸

With respect to expanded confidentiality requirements, NOAA’s proposed regulatory changes were specifically aimed at implementing the 2006 MSA Amendments by (1) “replacing the term ‘statistics’ with ‘information’ in 50 CFR 600.130 and in all regulations under 50 CFR subpart E”; (2) “[o]utlining procedures to preserve the confidentiality of all information submitted to the Secretary, a State fishery management agency, or a Marine Fisheries Commission by any person in compliance with the requirements of the [MSA]”; (3) “[d]eleting the definition of ‘confidential statistics’ and adding a definition for ‘confidential information’”; and (4) “[a]dding a definition for observer employer/observer provider.”⁵⁹

With respect to disclosure of fisheries information, NOAA sought to create some limited exceptions for release of information (1) required to be submitted for a determination under a limited access program; (2) under court order; (3) to aid law enforcement activity; and (4) pursuant to written authorization. NOAA also proposed new definitions to better protect business information, having found that under its historical interpretation of two *different* elements of §402(b)(3) of the MSA—“identity of any person” and “business of any person”—the agency was only protecting submitters’ information that would identify them personally or that would identify their businesses.⁶⁰

However, NMFS determined that this interpretation allowed the agency to make disclosures in “aggregate or summary form” of information that would otherwise be confidential—and valuable.⁶¹ The mere fact that the data were anonymized was not enough to protect the valuable data.⁶² To remedy this issue, NMFS proposed to revise

its definition of “aggregate or summary form” in order “to protect against the disclosure of the ‘business of any person’ and propose[d] to add a specific definition for ‘business of any person’ to include “financial and operational information.”⁶³

In addition, NOAA proposed changes to confidentiality requirement exceptions to “allow for information to be shared with other entities, provided that specified precautions protect the information.”⁶⁴ These included procedures: (1) authorizing sharing of observer information between observer employer/observer provider for observer training or to validate the accuracy of the observer information collected; (2) authorizing disclosure of confidential information in support of homeland and national security activities; (3) authorizing disclosure of confidential information to state employees responsible for fisheries management; (4) authorizing disclosure of confidential information to state employees responsible for FMP enforcement pursuant to a joint enforcement agreement with the Secretary of Commerce; (5) authorizing disclosure of confidential information to Marine Fisheries Commission employees; (6) revising procedures under which confidential information can be disclosed to council members for use by the council for conservation and management purposes; (7) authorizing the release of observer information when the information is necessary for proceedings to adjudicate observer certifications; and (8) authorizing release of confidential information to a council’s scientific and statistical committee (SSC).⁶⁵

Release of confidential information to SSCs was particularly important, since it would have allowed NOAA to better meet the mandate of National Standard 2. Moreover, release of confidential information to the SSCs would have enabled NOAA to address a problem that had been a cause of bottlenecks inside the agency and that had impeded (and continues to impede) the agency’s ability to perform its scientific mission. In particular, NOAA argued that release to SSCs was warranted because “[t]he role of the SSC is, among other things, to assist the Council in the development, collection, evaluation and peer review of statistical, biological, economic, social, and other scientific information as is relevant to the Council’s development and amendment of any FMP.”⁶⁶ In addition, NOAA noted that access to confidential information was warranted because “the SSC is required to provide its Council ongoing scientific advice for fishery management decisions, including, among other things, recommendations for acceptable biological catch and preventing overfishing and reports on stock status and health, bycatch, and social and economic impacts of management measures.”⁶⁷

NOAA’s proposed rule was met with resistance on both “sides”—from the fishing community and the environ-

provision of the statute by regulation. Such legislative regulations are given controlling weight unless they are arbitrary, capricious, or manifestly contrary to the statute.

57. 77 Fed. Reg. at 30487.

58. *See id.*

59. *Id.*

60. *See id.* at 30491.

61. *See id.*

62. *See id.*

63. *Id.*

64. *Id.* at 30492.

65. *See id.*

66. *Id.*

67. *Id.*

mental community.⁶⁸ Among other things, the fishing industry opposed NOAA's proposal (1) to create a confidentiality exception for limited access program determinations; (2) to release confidential information to the SSCs; and (3) to restrict industry access to observer information.⁶⁹ The environmental community, meanwhile, found that NOAA's proposed rule "failed to address and clarify some of the shortcomings of existing rules regarding data confidentiality and does not consider emerging issues in fishery modeling."⁷⁰ The environmental community also asserted that the proposed rule was "inconsistent with federal policies on scientific integrity, transparency, and openness in government."⁷¹

The proposed rule then languished for years—without amendment, adoption, or retraction—leading to further uncertainty. Ultimately, with a new administration about to take office and faced with resistance from both the commercial fishing sector and the environmental community, NOAA withdrew the proposed rule on January 13, 2017, immediately prior to President Barack Obama's exit from office, finding that "the changes covered in the proposed rule from 2012 are not warranted at this time," and deciding "to reevaluate the proposed revisions."⁷²

While that may have been the prudent choice at the time, NOAA's failure to revise its regulations nevertheless means that there currently is a major disconnect between the text of the MSA and NOAA's implementing regulations, which creates further challenges for resource managers. Moreover, the statute's emphasis on confidentiality continues to trump the resource management and transparency imperatives, further impeding efforts to sustainably manage fisheries.

Collectively, the current deficiencies in the present management regime create the potential for widespread violations in many regions. While an observer is required for every vessel trip in the Pacific groundfish fishery in California, only 10% of the trips in New England have observers. This disparity is extremely consequential for the viability of fishing businesses involved, and creates an "unlevel playing

field" for fishers around the country. The dearth of human observers means that it is difficult for NOAA itself to confirm the information provided to the agency by fishers, which in turn means that management decisions are made utilizing, at best, incomplete data, or, at worst, incorrect data. The lack of human monitors thus means that bycatch oftentimes goes unreported or underreported. This is particularly problematic in mixed-stock fisheries where the potential for bycatch and fraud is high.

Speculation about widespread violations is no mere academic exercise. Indeed, the current regime has enabled individual fishers to abuse and game the system, sometimes with devastating consequences for individual species. The infamous case of the "codfather," Carlos Rafael—one of the most powerful fishermen in the nation, who for years (maybe even decades) misreported the quantity of fish and their species his vessels caught in the New England groundfish fishery—is only the most extreme recent (and known) example of the range of problems resulting from monitoring failures.⁷³ Rafael's violations were so great that they likely rendered the stock assessments in the fishery invalid, making the entire management regime ineffective in that region for groundfish like cod.⁷⁴

D. *How the Lack of Data Transparency and Enforcement Is Jeopardizing the Future of Fisheries Management*

Lack of accountability and lax enforcement in most U.S. commercial fisheries is undermining the entire management regime, making governance less effective and more challenging. Even in isolation, these deficiencies leave the future of America's fisheries in a vulnerable state. But fisheries also face a range of new and evolving stressors, including climate change,⁷⁵ human population growth,⁷⁶ and species migrations,⁷⁷ that threaten to create new management challenges, including the potential for rising conflict over food security.⁷⁸ Given the high potential for conflict, governments must not resort to business as usual

68. See Regulations.gov, *Docket Folder Summary—Confidentiality of Information; Magnuson-Stevens Fishery Conservation and Management Reauthorization Act*, <https://www.regulations.gov/docket?D=NOAA-NMFS-2012-0030> (last visited May 7, 2019).

69. See, e.g., Letter from Ryan P. Steen, Stoel Rives, LLP, to Karl Moline, Fisheries Statistics Division, NMFS (Oct. 19, 2012) (comments of Hawaii Longline Association); Letter from Terri Lei Beideman, Executive Director, Bluewater Fishermen's Association, to Karl Moline, Fisheries Statistics Division, NMFS (Oct. 21, 2012); Letter from Jeff Reichle, President, Lund's Fisheries Inc., to Karl Moline, Fisheries Statistics Division, NMFS (Aug. 21, 2012); Letter from Stephanie Madsen, At-Sea Processors Association, Brent Paine, United Catcher Boats, and Lori Swanson, Groundfish Forum, to Karl Moline, Fisheries Statistics Division, NMFS (Aug. 20, 2012); Letter from Greg DiDomenico, Executive Director, Garden State Seafood Association, to Karl Moline, Fisheries Statistics Division, NMFS; Letter from Rod Moore, Executive Director, West Coast Seafood Processors Association, to Karl Moline, Fisheries Statistics Division, NMFS (June 5, 2012).

70. See Letter from Erika M. Feller, Program Director for North American Fisheries, the Nature Conservancy, to Karl Moline, Fisheries Statistics Division, NMFS (Oct. 21, 2012).

71. *Id.*

72. Confidentiality of Information; Magnuson-Stevens Fishery Conservation and Management Reauthorization Act, 82 Fed. Reg. 4278 (Jan. 13, 2017).

73. See Press Release, U.S. Department of Justice, *Owner of One of the Nation's Largest Commercial Fishing Businesses Sentenced for Falsifying Records & Smuggling Proceeds Abroad* (Sept. 25, 2017), <https://www.justice.gov/usao-ma/pr/owner-one-nation-s-largest-commercial-fishing-businesses-sentenced-falsifying-records>.

74. See W. Jeffrey Bolster, *Where Have All the Cod Gone*, N.Y. TIMES, Jan. 1, 2015, <https://www.nytimes.com/2015/01/02/opinion/where-have-all-the-cod-gone.html>.

75. See, e.g., U. Rashid Sumaila et al., *Climate Change Impacts on the Biophysics and Economics of World Fisheries*, 1 NATURE CLIMATE CHANGE 449-56 (2011), available at <https://www.nature.com/articles/nclimate1301>.

76. See, e.g., FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, *THE STATE OF WORLD FISHERIES AND AQUACULTURE 3-4* (2018), available at <http://www.fao.org/3/i9540en/i9540EN.pdf>.

77. James W. Morley et al., *Projecting Shifts in Thermal Habitat for 686 Species on the North American Continental Shelf*, 13(5) PLOS ONE (2018), <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0196127>.

78. Conflict over fisheries resources is already occurring in certain geographic areas, including the English Channel, where French and British vessels have clashed over the harvest of scallops. See, e.g., *Scallop War: French and British Boats Clash in Channel*, BBC NEWS, Aug. 29, 2018, <https://www.bbc.com/news/world-europe-45337091>.

and treat resources management as of lesser importance than national security. Instead, the United States should recognize food security and resources management as increasingly important elements of national security and recognize that addressing these challenges will demand the best available data to ensure that management decisions can be adapted quickly to respond to species needs.⁷⁹

Recognizing the faults in the current management system, a coalition of experts from the commercial and recreational fishing sectors, conservation community, and technology industry in 2016 called on the self-appointed Fishing Data Innovation Task Force to study the use of better technology in fisheries management.⁸⁰ Late in 2016, the task force issued a report entitled “Improving Net Gains: Data-Driven Innovation for America’s Fishing Future” (Net Gains Report).⁸¹ The Net Gains Report laid bare some of the current problems NOAA and the industry face with respect to data management and concluded that “[a]t the regional and national levels, we have been saddled with an array of legacy data collection and management systems, practices and policies that prevent us from taking full advantage of modern technology and other tools to deliver better science, business and management products.”⁸²

Specifically, the Net Gains Report identified three issues: (1) inadequate data availability; (2) outdated and fragmented data management systems; and (3) legal concerns about data confidentiality and the exposure of proprietary business information that continue to hamper the sharing of data even among those authorized in NOAA to have it.⁸³ Notwithstanding the fact that the task force found pockets of interest from fishermen⁸⁴ and the full support of NOAA⁸⁵ to modernize monitoring and reporting sys-

tems, NOAA has not yet pushed forward a comprehensive new policy to address data collection, management, and protection. Thus, NMFS’ failure to promulgate a revised data management and privacy rule means that “fishery data remain slow to compile, incomplete, expensive, and often inaccurate.”⁸⁶

E. Innovating Fisheries Management

While in the past it may have been difficult to acquire high-quality fisheries data in real time, recent advances in technology now make it possible to drastically improve the data reporting, collection and oversight systems, and processes currently employed by fishers and NOAA. If effectively implemented in the fisheries management context, today’s technologies could translate into the promise of better and more timely management decisions by FMCs and NOAA, and would result in more equitable and timely enforcement of fisheries regulations.

Anyone familiar with the rise of the smartphone and the application economy likely understands the benefits (and drawbacks) associated with new technologies and data-driven decisionmaking.⁸⁷ In the fisheries context, electronic monitoring and reporting technologies could better facilitate data-driven decisionmaking and result in dramatic improvements in fisheries management. Electronic monitoring offers myriad benefits to both NOAA and the fishing industry, including:

- Stronger seafood businesses that would be better able to compete both domestically and abroad;
- More opportunities for recreational fishermen instead of overly constrained and inflexible season and bag limits⁸⁸;

79. It is worth noting that certain U.S. strategic geopolitical competitors are already engaging in more robust use of data to influence fisheries management decisions. For example, China has created the China Intelligent Fisheries Association “to bring data specialists, fishing companies, and government officials together to harness data to improve management in both catch and farmed fisheries.” See Mark Godfrey, *China Looks to Big Data to Improve Fisheries, Aquaculture Management*, SEAFOODSOURCE, Jan. 21, 2019, <https://www.seafoodsource.com/news/supply-trade/china-looks-to-big-data-to-improve-fisheries-aquaculture-management>.

80. FISHING DATA INNOVATION TASK FORCE, IMPROVING NET GAINS: DATA-DRIVEN INNOVATION FOR AMERICA’S FISHING FUTURE (2017) [hereinafter NET GAINS REPORT], available at https://fishingnetgains.files.wordpress.com/2017/05/netgainsreport-rv-singlepages_lowres.pdf.

81. *Id.*

82. *Id.* at 4.

83. *Id.* at 4-5.

84. For example, the Atlantic States Marine Fisheries Commission recently recommended, in order to help avoid onerous regulations to protect against endangered whales that become entangled in lobster fishing gear, a requirement for highly accurate, electronic real-time vessel monitoring and tracking units that could “not only track movement but also identify where gear is hauled or how many traps are fished,” on all boats lobstering in federal waters. It also recommended reporting landings by 100% of harvesters, whether they fish in state or federal waters. Currently, Maine requires reporting of 10% of its licensed harvesters chosen at random each year. See Stephen Rappaport, *Lobstermen Face More Gear Restrictions to Protect Whales*, ELLSWORTH AM., Feb. 7, 2019, <https://www.ellsworthamerican.com/maine-news/waterfront/lobstermen-face-more-gear-restrictions-to-protect-whales>.

85. NOAA has provided approximately \$27 million since 2006 to develop and implement electronic technologies, including supporting preimplementation of new electronic monitoring programs and more than 30 pilot projects

to experiment with various technologies. See NOAA Fisheries, *Electronic Monitoring*, <https://www.fisheries.noaa.gov/national/fisheries-observers/electronic-monitoring> (last updated May 31, 2018).

86. NET GAINS REPORT, *supra* note 80, at 4.

87. While the authors of this Article are indeed encouraged by the potential of big data and data-driven decisionmaking to improve resource management processes, we are fully cognizant of the dark side of the big data ecosystem and the potential for abuse. See, e.g., James Vincent, *Tim Cook Warns of “Data-Industrial Complex” in Call for Comprehensive US Privacy Laws*, VERGE, Oct. 24, 2018, <https://www.theverge.com/2018/10/24/18017842/tim-cook-data-privacy-laws-us-speech-brussels>. As the role of big data grows in the resource management context, it will be imperative for government to act to ensure that use of this data is adequately policed. It will also be imperative that government work to prevent any single entity from gaining too much power or influence over the collection and processing of resources data.

88. Note that on December 31, 2018, President Donald Trump signed the Modernizing Recreational Fisheries Management Act of 2018. See Pub. L. No. 115-405. Under §201(b) of the Act:

The Secretary of Commerce shall take into consideration and, to the extent feasible, implement the recommendations of the National Academy of Sciences in the report entitled “Review of the Marine Recreational Information Program (2017),” and shall submit, every 2 years following the date of enactment of this Act, a report to the appropriate committees of Congress detailing progress made implementing those recommendations. Recommendations considered shall include—

(1) prioritizing the evaluation of electronic data collection, including smartphone applications, electronic diaries for prospective data

- Better and more timely management decisions based on accurate information that will allow the government to adapt management decisions more effectively to changing conditions;
- Efficiency for the government and fishers due to lack of time-consuming and costly red tape and paperwork.⁸⁹

Given these obvious benefits, NOAA has made some efforts to encourage the adoption of electronic reporting and monitoring in fisheries across the country. Since 2006, the agency has spent \$27 million to develop and implement electronic technologies.⁹⁰ This investment has supported the incorporation of electronic reporting and monitoring into five U.S. fisheries, and has facilitated more than 30 pilot projects experimenting with various technologies.⁹¹ The most permanent electronic reporting system was implemented with little fuss in 2015 in the highly migratory species (HMS) fishery, which because it crosses council jurisdictions is managed by NMFS—meaning that no FMC approval was required.⁹²

The HMS electronic monitoring program deploys on-board cameras to track the bycatch of bluefin tuna on boats in the Atlantic pelagic longline fishery.⁹³ In 2018, the practice was implemented in Alaska in the small-boat fixed-gear and pot fisheries.⁹⁴ In the New England region, NMFS has approved pilot projects in the groundfish fishery and the midwater trawl herring/mackerel fishery.⁹⁵ These pilots are ongoing.⁹⁶ On the West Coast, electronic monitoring will be fully implemented by 2019 in the whiting and fixed-gear fisheries, and in the bottom trawl fishery and non-whiting midwater trawl fisheries.⁹⁷

Several other regions and fisheries are in the midst of implementing electronic monitoring, including the South Atlantic, Gulf of Mexico, and Mid-Atlantic regions.⁹⁸ Electronic reporting has also been approved for use in the New England region, but only on a voluntary basis.⁹⁹ The numerous pilots and small-scale projects make it difficult for NMFS to create a coherent and uniform policy on electronic monitoring and reporting.

Further, NMFS has recognized the need to modernize policies related to the handling of the enormous quantity of data that the agency would take in under an electronic monitoring regime, including policies governing the confidentiality of data.¹⁰⁰ Notwithstanding these various efforts, NOAA has not done nearly enough to innovate fisheries management or to capture the advantages of electronic monitoring. Existing efforts to institute electronic monitoring have done little to incentivize or encourage the integration of electronic monitoring into U.S. fisheries, and instead have been little more than one-off and uncoordinated pilot projects that have not comprehensively addressed the underlying data management, sharing, and transparency issues. By focusing myopically on individual technology, data collection, and capacity issues, NMFS has ignored the broader systemic problems inherent within the current management regime, including the fact that those entities within FMCs responsible for providing ongoing scientific advice—the SSCs—cannot even gain access to this data.¹⁰¹

NOAA's incremental progress toward implementing electronic monitoring also fails to account for rapidly changing conditions in fisheries themselves. For example, the Gulf of Maine is warming faster than any other part of the Atlantic Ocean, and fish stocks are already reacting.¹⁰² Last spring, a study sponsored by NMFS and published in the journal *PLOS ONE* provided the first major projections of where U.S. fish species populations may shift under future climate scenarios.¹⁰³ Real-time data would permit fisheries managers to adjust their catch limits based on annual projections of climate conditions like El Niños.¹⁰⁴ Moreover, having available more timely data regarding seasonal catches could allow fishermen to fish longer into a season or in previously closed areas—the kind of tailored management that can only be imagined under the current system in which data and analysis of previous catches lags by a year or more.

Given the urgency surrounding the need to update fisheries management practices, it behooves both government and industry to work proactively to facilitate a successful shift to widespread electronic monitoring and uniform

collection, and an internet website option for panel members or for the public;

(2) evaluating whether the design of the Marine Recreational Information Program for the purposes of stock assessment and the determination of stock management reference points is compatible with the needs of in-season management of annual catch limits; and (3) if the Marine Recreational Information Program is incompatible with the needs of in-season management of annual catch limits, determining an alternative method for in-season management.

89. NET GAINS REPORT, *supra* note 80, at 2.

90. NOAA Fisheries, *supra* note 85.

91. *Id.*

92. *Id.*

93. *Id.*

94. *Id.*

95. *Id.*

96. Meg Wilcox, *The Future of Fishing Is Big Data and Artificial Intelligence*, PRI, May 10, 2018, <https://www.pri.org/stories/2018-05-10/future-fishing-big-data-and-artificial-intelligence>.

97. *Id.*

98. *Id.*

99. *Id.*

100. *Id.*

101. *See, e.g.*, 50 C.F.R. §600.425(c) (noting that “NOAA does not release or allow access to confidential information in its possession to members of Council advisory groups, except as provided by law”).

102. *See* Andrew Pershing et al., *Slow Adaptation in the Face of Rapid Warming Leads to Collapse of the Gulf of Maine Cod Fishery*, 350 SCIENCE 809-12 (2015); *see also* Laura Poppick, *Why Is the Gulf of Maine Warming Faster Than 99% of the Ocean?*, EOS EARTH & SPACE SCI. NEWS, Nov. 12, 2018, <https://eos.org/features/why-is-the-gulf-of-maine-warming-faster-than-99-of-the-ocean>.

103. *See* Morley et al., *supra* note 77.

104. The potential is there and scientists could use more data to better manage fisheries. The *Washington Post* reports that “[w]ith the government’s towering stockpiles of ocean data, scientists can use weather and ocean chemistry to predict where fishermen are likely to catch their intended targets, including swordfish or tuna, and avoid protected species, such as marine mammals, sharks or manta rays.” Andrew Van Dam, *Big Sea, Bigger Data: How Analytics Are Making Peace Between Fishermen and Turtles*, WASH. POST, Feb. 4, 2019, https://www.washingtonpost.com/us-policy/2019/02/04/big-sea-bigger-data-how-analytical-biologists-are-making-peace-between-fishermen-turtles/?utm_term=.66ea5814b63d.

data management. Failure to adapt and put to work the newly available and vastly improved technologies not only would represent a tremendous lost opportunity, but also could consign U.S. fisheries to second-tier status, with fishers and fish products from currently developing countries passing the United States in fisheries exports and in the U.S. domestic market. The time to begin to make the change is now, before it is too late.

F. Challenges Facing Fisheries Modernization

While implementation of electronic monitoring and reporting holds the promise of better management decisions—with benefits accruing to both fishers and fish—fulfilling this promise will require government, stakeholders, and others to address five general legal and policy challenges: (1) the privacy concerns of fishers; (2) data security concerns among fishers and companies; (3) outdated and complex data collection and management methods; (4) a lack of technical know-how among fishers; and (5) general reticence to change and expanded government oversight among fishers. While these challenges are formidable and require careful consideration, they are not insurmountable and do not preclude the development and implementation of electronic monitoring and reporting.

Far from being a liability, the fact that fisheries management presently employs outdated data collection and reporting methodologies presents a tremendous opportunity to craft a new management paradigm that allows fishers, the government, and the technology sector to collaborate on a creative 21st-century solution to address one of the trickiest environmental resource management challenges on earth. Moreover, electronic monitoring presents the U.S. government, the fishing industry, and other interested parties with the opportunity to explore, discuss, and implement a new, responsible, and forward-thinking privacy and data security regime—one that shifts from the unequal power dynamics that have arisen incident to the proliferation of social media toward a dynamic that respects the personal privacy of fishers and incentivizes the collection of fisheries data by fairly compensating fishers.

What follows is a brief overview of the five challenges facing implementation of electronic monitoring, as well as a discussion of the opportunities to address each challenge.

Challenge One: Privacy Concerns of Fishers

Before fishers will be willing to embrace the potential benefits associated with electronic monitoring, they will insist that NOAA address their concerns over potential government intrusion into their personal privacy while working on board ships.¹⁰⁵ This is an extremely sensitive issue to fishers, particularly because they live on fishing boats while

at sea and have come to expect a high degree of privacy in their “home away from home.” Fishers understandably fear that electronic monitoring technology utilizing cameras will result in their images being sent to the government, and further fear that these images might be released to the broader public under the Freedom of Information Act (FOIA) or used in some other way against them by the government without their approval.¹⁰⁶ Currently, there is no specific protection in NOAA regulations that addresses the personal privacy rights of fishers.

While these concerns are understandable, fishers’ personal privacy should be protected under specific provisions of the U.S. Constitution and federal privacy laws, including the MSA and FOIA. Nevertheless, NOAA can and should do more to reinforce its commitment to safeguarding the personal privacy of fishers, and should recognize that the rise of electronic monitoring presents a tremendous opportunity to engage in a renewed effort to craft smart, forward-thinking regulations and policies that appropriately address personal privacy holistically. NOAA should also recognize that this challenge presents the opportunity to make an affirmative commitment by regulation to define and provide protections for fishers’ privacy and to limit the agency’s use of images and corresponding data for the very specific purpose for which it was collected (i.e., managing fisheries—barring some public safety need or other narrow exception).¹⁰⁷ Ultimately, fishers should have a high degree of certainty that their personal information will not make it into the public domain.

Challenge Two: Security of Fishers’ Data

The second challenge facing the widespread implementation of electronic monitoring concerns the right of data ownership and use, given that fish stocks are a public resource and not private property.¹⁰⁸ Fisheries data is incredibly valuable. For example, location data for a particular stock can give an individual fisher a tremendous market advantage. In framing their opposition to electronic monitoring, fishers cite concerns over the security of this type of proprietary and confidential business data. Effectively, fishers fear that electronic monitoring will lead to the government releasing to the public (and their competitors) their confidential business information related to their fishing methods and locations.

Like fishers’ concerns over personal privacy, concerns over data security are also exaggerated and find protection

105. See NOAA FISHERIES, NATIONAL OBSERVER PROGRAM: SECOND NATIONAL ELECTRONIC MONITORING WORKSHOP—TRANSCRIPTS, VIDEO LINKS, AND PROGRAM SUMMARIES 29, 31 (2017), available at <https://www.fisheries.noaa.gov/resource/document/second-national-electronic-monitoring-workshop-report>.

106. Currently, cameras are necessary to provide visual confirmation of the species and quantities harvested. Cameras are also used to determine if other bycatch was accidentally harvested or if endangered species were impacted. However, this could change in the future if advances in machine learning and computer vision better allow on-board sensors to identify fish; 5 U.S.C. §552.

107. See, e.g., *Carpenter v. United States*, 138 S. Ct. 2206 (2018) (“One well-recognized exception [to Fourth Amendment search doctrine] applies when the exigencies of the situation make the needs of law enforcement so compelling that [a] warrantless search is objectively reasonable under the Fourth Amendment.” (internal citations and quotations omitted)).

108. See NATIONAL RESEARCH COUNCIL, SHARING THE FISH: TOWARD A NATIONAL POLICY ON INDIVIDUAL FISHING QUOTAS 39 (1999).

in existing legal mechanisms, including the MSA and certain exemptions under FOIA. However, it may be the case that the present legal and regulatory regime—conceived during a much different moment in the history of the fishing industry—prioritizes the wrong elements of data security, ultimately at the expense of better management decisions, which in turn hurts not only the species, but also the fishers themselves.

While principles governing proprietary information and confidential business information likely made sense at the time they were conceived, it may be that they are less relevant in today's era of open information and trend toward traceability. In the past, it was possible for fishers to hide the locations of their fishing operations from each other as if they were “trade secrets” so that disclosure of proprietary information and confidential business information could negatively impact an individual fisher's business. It was for this very reason that the MSA provided for the “confidentiality of information.”¹⁰⁹ It was also for this reason that NOAA instituted a policy, known as the “Rule of Three,” which permits the agency to withhold information requested about fewer than three fishing vessels fishing in a particular area.

While it may have made sense at the time, the Rule of Three is no longer relevant, and the notion that fishery information must be afforded ironclad protection for months and years into the future without sunset seems overbroad and contrary to the countervailing need for accountability and transparency of a public resource. The present contours of the MSA confidentiality provision may actually be impeding effective management of fisheries resources by limiting access of fisheries data to researchers.

For example, pre-eminent fisheries scientist Ray Hillborn of the University of Washington complained that he would love to get his hands on observer reports and data for some fisheries he works on, “but most jurisdictions prohibit releasing information on fishing vessels unless it is aggregated into more than three vessels.”¹¹⁰ Marine ecologist Larry Crowder of Stanford University has argued that fisheries data are far less useful when aggregated, especially looking at how to improve management of a specific fishery. Crowder notes that management can only improve “if we can access high-resolution data. Having to ask the fishing community for specifics would lead to an incomplete picture. In most cases, our only reliable peek at what's going on in fisheries is the observer data.”¹¹¹

Moreover, market mechanisms seem to have diminished the significance of and need for the Rule of Three, as greater maritime domain awareness (made possible by better geolocation and tagging technology) and a greater desire for traceability of the fish products “from hook to plate” have motivated fishers to provide more information about sourcing to the consuming public. Increasingly,

fishers are providing the public with once-proprietary vessel monitoring system (VMS) data—formerly exclusively used for fisheries monitoring and enforcement—along with the location of the catch.¹¹² Consequently, consumers are now able to use a computer application to trace the origin of fish purchased in the grocery store,¹¹³ and increasingly, large retail buyers—including Walmart and Costco—are seeking this information to build consumer confidence in their products.

It now seems that the value of transparent fisheries data has fundamentally changed. Catch location data are no longer something to be jealously guarded in fear that a competitor might swoop in and upset a market advantage; rather, data serve multiple purposes, including as a market validator that gives consumers confidence that a particular fish was caught in a legal and sustainable manner. Such traceability data—disclosing location and gear—are increasingly becoming necessary for U.S. products to compete abroad—or even to be exported.¹¹⁴

For example, the European Union's (EU's) Common Fisheries Policy requires certain certifications—including the area in which the fish product was caught—to be on the package of imported fish.¹¹⁵ There are stricter traceability requirements for fish products sold within the EU, but to compete on a level playing field, U.S. products increasingly need the same information.¹¹⁶ Moreover, for high-end, niche markets in restaurants and certain retail stores in Europe, data regarding the location of catch are required more and more.¹¹⁷ Further illustrating this concept, Ecotrust Canada is currently piloting a system called ThisFish, which allows Canadian consumers to go online and enter a code found on the fish they purchase to learn who caught their fish, how it was caught, and where it was caught.¹¹⁸ In certain circumstances, consumers also may be able to watch a clip of the fish being caught.¹¹⁹

In the United States, traceability information is becoming more important to the government in order to establish a chain of custody for health, safety, and anti-fraud purposes, as well as to verify sustainability. Records and recordkeeping—and the verification of the validity of the records—is a critical feature of any traceability system, starting with the vessel that caught the fish.¹²⁰ Thus, insisting upon the protection of proprietary information and

109. 16 U.S.C. §1881a.

110. Erik Stokstad, *NOAA Rule Would Restrict Access to Fisheries Data*, SCIENCE, Oct. 19, 2012.

111. *Id.*

112. NOAA ENFORCEMENT: VESSEL MONITORING, <https://www.fisheries.noaa.gov/topic/enforcement#vessel-monitoring>.

113. Chicken of the Sea, *Dive Into the Story of Your Seafood*, <https://chickenofthesea.com/trace> (last visited May 7, 2019).

114. Centre for the Promotion of Imports From Developing Countries, *What Requirements Should Your Product Comply With to Be Allowed on European Markets?*, <https://www.cbi.eu/market-information/fish-seafood/buyer-requirements/> (last visited May 7, 2019).

115. EUROPEAN COMMISSION, A POCKET GUIDE TO THE EU'S NEW FISH AND AQUACULTURE CONSUMER LABELS (2014).

116. *Id.*

117. *Id.*

118. *See* ThisFish, *Home Page*, <https://thisfish.info/> (last visited May 7, 2019).

119. Wilcox, *supra* note 96. Ecotrust is currently one of the technology partners in the New England pilot program.

120. ARNI PETERSEN & DAVID GREEN, SEAFOOD TRACEABILITY: A PRACTICAL GUIDE FOR THE U.S. INDUSTRY 19 (2016).

confidential business information regarding the location of fishing operations may soon become passé, as transparency and information regarding the legality of the fish become mandatory in other parts of the world and in certain jurisdictions within the United States.

In addition to serving as a market validator, fisheries data or data gathered by fishing vessels or even fishing gear could acquire new value for governments, companies, and others seeking to manage, study, or address the impacts of climate change or other environmental phenomena, or the behavior of endangered species, or even weather patterns, currents, or wind speed. For example, ocean temperature data taken from sensors on board a vessel could prove useful in predicting hurricanes, coral bleaching, or migratory patterns of various species. The highly endangered North Atlantic right whale's migration patterns appear to have shifted due to changing ocean conditions, but it is unclear how or why.¹²¹ With the potential for real-time data from microphones or other sensors on fishing vessels or lobster gear that sit on the seafloor, there are many things that scientists could learn from gathering and analyzing this kind of data.

Beyond this use, data will continue to serve a commercially valuable purpose, but likely in a different way. Machine learning and big data analytics have the potential to drastically improve efficiency, fishing gear effectiveness, and profitability and minimize fishery problems like bycatch, particularly if the fishermen or a third party can aggregate data within a fishery or a region. Armed with these tools, data gathered in the course of individual fishing trips could be compiled into larger data sets to reveal exciting new insights into how best to manage and harvest this renewable resource. Insights gleaned from the application of big data analytics to fisheries could fundamentally change how fishing companies and individual fishers engage in their craft.

It is clear that NMFS and the fishing community must do a better job of articulating where and how data will be protected, as well as the types of data that should be collected by the government and afforded protection. But one thing is clear: the current data protection system based on 20th-century assumptions and methodologies no longer makes sense in the 21st-century economy and environment. The incorporation of electronic monitoring into fisheries thus presents a tremendous opportunity to revisit some of our long-held assumptions and negative attitudes related specifically to precise accountability for all fisheries catch data (and to natural resources data more broadly) and to potentially shape new (to fisheries) data security technology and paradigms that are agreeable to all parties involved.

121. Murray Carpenter, *In Changing Climate, Endangered Right Whales Find New Feeding Grounds*, NAT'L PUB. RADIO, Oct. 9, 2018, <https://www.npr.org/2018/10/09/652281781/in-changing-climate-endangered-right-whales-find-new-feeding-grounds>.

Challenge Three: Outdated and Complex Data Collection and Management Methods in NMFS

As has been noted above, the current system of fisheries monitoring and oversight—which involves a combination of (1) human monitors on board ships; (2) a VMS providing ship-locating technology; and (3) electronic reporting to NOAA fisheries once the vessel returns to port after the trip is completed—is outdated, often inaccurate, and—with respect to observers—often unsafe.¹²² Further, NOAA's rules frustrate data sharing both within the agency and with the FMCs, meaning that entities with a congressionally recognized management role are often left without access to critical data that should be available to inform management decisions.

Adding to the complexity of the problem of implementing electronic reporting and monitoring is the fact that such a shift will involve either building up or totally replacing outdated data management systems. The current fisheries management regime is hamstrung by “multiple hardware and software systems, dispersed offices, and blurred lines of responsibility for data analysis and sharing as mission shifts require new lines of information flow.”¹²³ This makes it extraordinarily difficult for NOAA to share fisheries data both within the agency and with the fishermen themselves.

A wholesale paradigm shift—one in which a digital system becomes the norm and human monitors become the exception—is essential if electronic monitoring is to reach its full potential. Certainly, the conditions exist for this paradigm shift to take place, particularly with the ever-growing global ubiquity of smart technologies and high-speed Internet, which now enable fishers to provide NMFS at-sea reporting in real time. Likewise, the government must address the challenges inherent in the storage and processing of data gathered on vessels, particularly since electronic monitoring systems will generate vast quantities of data, images, and video, which could be cost-prohibitive for NMFS.

While big data analytics and machine learning will certainly alleviate this problem in the near to mid-term, NOAA currently lacks these capabilities for dealing with

122. Recently, the health and safety risks to human monitors on fishing ships have come to light. In 2016, NMFS conducted a sweeping program review after three U.S. observers died on fishing vessels under mysterious circumstances. KURT J. HEINZ ET AL., REVIEW OF NOAA FISHERIES SAFETY POLICIES AND PROCEDURES IN U.S. REGIONAL AND INTERNATIONAL OBSERVER PROGRAMS (2017), <https://www.fisheries.noaa.gov/resource/document/observer-safety-program-review-report>. The NMFS investigation revealed significant issues with respect to the safety of on-board observers, with NMFS Deputy Assistant Administrator Sam Rauch admitting that “human observers and at-sea monitors are in vulnerable situations [because the] role [in] monitoring compliance puts them at odds with a crew [and] can lead to a hostile workplace.” Sam Rauch, *Observer Safety Is Our Priority*, NOAA FISHERIES, Sept. 8, 2016, <https://www.fisheries.noaa.gov/leadership-message/observer-safety-our-priority>. Given the documented safety risks, not to mention the potential for human error or intimidation, electronic monitoring technologies increasingly may be more desirable from a management perspective than human observers. See Observer Safety Program Review Report (May 11, 2018), <https://www.fisheries.noaa.gov/resource/document/observer-safety-program-review-report>.

123. NET GAINS REPORT, *supra* note 80, at 7 (quoting PACIFIC ISLANDS FISHERY SCIENCE CENTER, REVIEW OF INFORMATION FOR FISHERY STOCK ASSESSMENTS (2013)).

potentially enormous sets of fisheries data in-house.¹²⁴ The Pacific States Marine Fisheries Commission, a quasi-governmental organization, fulfills this function now for the West Coast groundfish fisheries, and that model could be replicated in other regions. The fishermen may desire to become their own data managers within fisheries cooperatives as well, and use or sell the aggregated data themselves. Thus, the government may need or want to outsource the review and processing of this data, creating yet another challenge for the maintenance of fishers' privacy and confidential business information.

However, it would be insufficient and a wasted opportunity to simply swap the present reporting and monitoring system for electronic monitoring technology (hardware and software) and leave the current regulatory system in place unchanged. Ultimately, NOAA must undertake thoughtful and wholesale changes to the current regulatory structure to ensure that the incorporation of these new technologies ultimately facilitates better holistic management of the resource. These changes include mandating standards for real-time shipboard reporting via satellite networks and the Internet to connect fishing vessels to the government while they are out at sea. As with the challenges related to data security, the challenges related to data collection and management provide the opportunity to completely revisit long-held assumptions and to scope 21st-century solutions.

Challenge Four: Fishers' Lack of Technical Expertise/ Know-How and Implementation Costs

Yet another challenge to the incorporation of electronic monitoring into NOAA fisheries management policy is that fishermen currently lack the technical skill and know-how to incorporate and utilize electronic monitoring systems on their vessels.¹²⁵ Moreover, many fishers have grown accustomed to the current system, which is lax and imposes very low costs on fishers. Under the current management regime, FMCs set minimums on the number of trips that must have an observer (which is often at a very low number) while NOAA has subsidized the installation of VMS systems on each vessel and in some cases even pays all the costs of the human observers.¹²⁶ Ultimately, transitioning to an electronic system that replaces human observers will require a robust program that incentivizes (or requires) that fishers install and use electronic monitoring technologies that meet government standards for electronic monitoring, and that educates fishers on how to use those systems. On each set of issues, there are several different options.

First, NOAA could mandate that the fishers themselves select and pay for compliant electronic monitoring systems on their vessels, which are not generally prohibitively expensive. This approach may lead to some fishers retiring or ceasing operations due to the incremental costs of implementing monitoring, so NOAA should also consider and attempt to anticipate the consequences of such a big shift and how they might assist through loans or grants to fishers who meet a financial needs test, looking to examples where regulators have mandated the adoption of emerging technologies into other industries.¹²⁷ However, NOAA would be within its authority and could defend pursuing this course, particularly since electronic monitoring would, over time, likely reduce operating costs for fishers and allow the agency to better align its management of fisheries in accordance with National Standard 2. Moreover, a system in which fishers pay for electronic monitoring systems could mean that the fishers own and control the rights to use and provide access to the data collected by those systems and reap the economic benefits inuring from this data.

The second option would be for the government to pay for the electronic monitoring equipment and its installation, and either lend it to fishers or provide it for a subsidized fee or even give it to fishers in order to ensure high levels of compliance. While this option would likely avoid the retirements and job losses associated from implementation if fishers were forced to buy their own systems, it is also likely that the government would then be able to also claim ownership of at least some of the data collected. Even so, it would still be necessary to institute a short-term program to help subsidize the cost of purchasing and installing electronic monitoring systems. To the extent the government pays for electronic monitoring equipment, it will also be necessary to provide clear delimits over who owns and who has a right to use data collected by electronic monitoring systems.

A third option would be for a third party (e.g., a technology company or quasi-governmental organization) to pay for installation of electronic monitoring systems. This option might be attractive to both government and fishers because neither party would be entirely responsible for footing the bill for expensive electronic monitoring systems. However, under this option, the third-party provider may insist upon data ownership as a condition of installation, (subject, of course, to limited disclosure requirements under the MSA and FOIA), as well as payment for incidental charges for services related to the system.¹²⁸

124. NOAA does have some of this capacity in-house within the National Weather Service and its climate data centers. Moreover, there is some experience with fisheries data collection, analysis, and storage in the electronic monitoring pilots taking place currently.

125. PROCEEDINGS OF THE 8TH INTERNATIONAL FISHERIES OBSERVER AND MONITORING CONFERENCE 319-33 (Steve Kennelly ed., 2016).

126. *NOAA Fisheries Announces Reimbursement of Sector At-Sea Monitoring Costs*, NOAA FISHERIES, Aug. 14, 2018, <https://www.fisheries.noaa.gov/feature-story/noaa-fisheries-announces-reimbursement-sector-sea-monitoring-costs>.

127. For example, the adoption of mandatory electronic logbooks for truck drivers in the United States may have caused a wave of retirements by older truck drivers who were at or approaching retirement age and decided not to continue under a new regime. The retirements in turn caused shortages in the number of trucks available to pick up jobs, which led to an increase in the cost of shipping by truck. And all this was exacerbated by the fact that truck drivers could no longer "cheat" and work more hours than was permitted by safety regulations.

128. For example, in Alaska, the Pollock Conservation Cooperative has teamed up with a data analytics firm to identify hot spots for bycatch to avoid and provides that information to the entire fleet. Even more opportunistically,

Challenge Five: Changing Hearts and Minds

In addition to the technical challenges articulated above, advocates for electronic monitoring also face the hurdle of convincing fishers that the benefits of electronic monitoring outweigh the drawbacks. This will be no easy task, since by providing NOAA with the potential to engage in oversight of *all* trips and vastly improving its monitoring and enforcement capabilities, electronic monitoring will fundamentally disrupt the status quo.¹²⁹ Convincing fishers that this oversight is in their best interest will be a challenge and it will take time for fishers to accept (or at least tolerate) the incorporation of this new technology.

Ultimately, changing hearts and minds will require NOAA to “inspir[e] the enthusiastic embrace of change among people who aren’t that interested in changing.”¹³⁰ To do this, NOAA must “tell [its] story more effectively, loudly, and have it resonate with enough people to carry the day.”¹³¹ Electronic monitoring must be “explained before [it] can be accepted.” It must be “experienced before [it] can be believed.”¹³² And NOAA and other proponents of electronic monitoring must ensure that the benefits to fishers are “communicated repeatedly.”¹³³

In practice, this means that NMFS must be able to articulate the potential economic benefits associated with electronic monitoring. NMFS may need to provide the industry with an opportunity to experience the technology in order for fishers to see for themselves the underlying benefits of innovating fisheries management, which include traceability, and improved ease of compliance with reporting requirements. Only when fishers start recognizing the inherent efficiency and advantages of electronic monitoring will the industry fully support the technology.¹³⁴ For this, it may be instructive to look at the example of Apple’s iPhone and how, in less than a decade, the hardware went from novel to indispensable.¹³⁵

a tuna company operating in the western Pacific is providing Chinese researchers with the data it gathers—they then pair electronic monitoring data with oceanographic information to generate business insights for its fishing operations. The Nature Conservancy, in a report entitled “Catalyzing the Growth of Electronic Monitoring in Fisheries,” states that “[electronic monitoring] could be particularly valuable for companies that own multiple fishing vessels; the data could yield insights about which vessels are most efficient and why.” THE NATURE CONSERVANCY, CATALYZING THE GROWTH OF ELECTRONIC MONITORING IN FISHERIES 22 (2018).

129. The Pacific groundfish fishery being the one outlier because that fishery requires 100% monitoring coverage. See <https://www.pcouncil.org/groundfish/rawl-catch-share-program-em/>.

130. BETH COMSTOCK, IMAGINE IT FORWARD: COURAGE, CREATIVITY, AND THE POWER OF CHANGE 226 (2018).

131. *Id.* at 199.

132. *Id.*

133. *Id.*

134. *Id.*

135. See, e.g., *Apple’s iPhone: A Definitive History in Pictures*, TELEGRAPH, Sept. 12, 2018, <https://www.telegraph.co.uk/technology/0/apples-iphone-definitive-history-pictures/>.

II. Legal Regime Governing Privacy and Fisheries Data Confidentiality and Transparency

The five challenges above illustrate the inherent tensions facing fisheries managers. These include the desire among fishers to operate without government interference versus the need of government to ensure and enforce accountability, as well as the mandate to protect proprietary/confidential business data versus the desire to foster further transparency for better management decisions and outcomes. These tensions are woven within the legal fabric—codified in both fisheries management statutes and regulations—and create conflicts for resource managers.

Nevertheless, the impediments facing managers as they seek to balance confidentiality versus transparency are likely overstated, with existing law already providing many protections in a balanced manner. This is not to suggest that a more comprehensive revision to NOAA’s existing regulations is unnecessary—it is sorely needed. But with the collective efforts and willingness of fishers, government, and the public, resolving these challenges is feasible. What follows is a brief overview of the laws most relevant to addressing the confidentiality and transparency challenges that are impeding the implementation of electronic monitoring.

A. The Fourth Amendment

One of the major impediments to electronic monitoring is a fear among fishers that the technology will lead to greater government intrusion into their personal lives. While this concern is understandable, the privacy threat posed by electronic monitoring is certainly more limited than the privacy incursions wrought by smartphones and the Internet of Things.¹³⁶ Indeed, when viewing concerns over electronic monitoring in the broader societal context, in which government and third-party methods of obtaining personal and sensitive information about citizens is growing ever more intrusive and sophisticated, one finds that fishers’ concerns about privacy intrusions are not really in line with the broader privacy landscape—one dominated by the proliferation of smartphones and social media,¹³⁷ the ubiquity of public surveillance,¹³⁸ generational shifts,¹³⁹ and the rise of the application/platform economy.¹⁴⁰

136. Davey Alba, *FTC Warns of Huge Security Risks in the Internet of Things*, WIRED, Jan. 27, 2015.

137. Lee Rainie, *Americans’ Complicated Feelings About Social Media in an Era of Privacy Concerns*, PEW RES. CENTER, Mar. 27, 2018, <http://www.pewresearch.org/fact-tank/2018/03/27/americans-complicated-feelings-about-social-media-in-an-era-of-privacy-concerns/>.

138. See, e.g., John Naughton, “*The Goal Is to Automate Us*”: Welcome to the Age of Surveillance Capitalism, GUARDIAN, Jan. 20, 2019, <https://www.theguardian.com/technology/2019/jan/20/shoshana-zuboff-age-of-surveillance-capitalism-google-facebook>.

139. See, e.g., Mary Madden et al., *Teens, Social Media, and Privacy*, PEW RES. CENTER, May 21, 2013, <http://www.pewinternet.org/2013/05/21/teens-social-media-and-privacy/>.

140. Martin Kenney & John Zysman, *The Rise of the Platform Economy*, 32(3) ISSUES SCI. & TECH. 61 (2016), available at <https://issues.org/>

This is not to say that fishers' stated objections to electronic monitoring are disingenuous, illegitimate, or unfounded. In fact, it is clear that the general public, government, and technology companies are still not fully aware of the risks—or the extent—of the data economy.¹⁴¹ But it is fair to say that fishers' objections have not kept pace with the world around them; they continue to operate using 20th-century technologies based on 20th-century assumptions, at a time when 21st-century solutions are desperately needed to ensure the future viability of U.S. fisheries and fishing businesses. Certainly, the low penetration of emerging technologies into the commercial fishing industry means that both the regulators and the regulated can engage in a thoughtful dialogue to frame the application of technology in fisheries in the least intrusive manner. But privacy concerns should not serve as the reason that the fishing industry stymies innovation.

Moreover, fishers appear to be ignoring the fact that the Fourth Amendment of the Constitution provides a fundamental right to privacy from the government,¹⁴² even in the face of rapidly evolving technology and surveillance.¹⁴³ And while the limits of this constitutionally protected right have evolved over the past century in response to the emergence of new technologies, the Fourth Amendment continues to ensure that citizens—including fishers—enjoy some personal expectation of and constitutionally protected right to privacy, even on a federally permitted and monitored fishing vessel.

While no federal court has directly addressed the issue of privacy rights and electronic monitoring on a fishing vessel, three Fourth Amendment doctrines are instructive and could help NMFS to craft a regulation or policy aimed at protecting the personal privacy of fishers on fishing vessels. These doctrines—the “open field” doctrine, the “curtilage” doctrine, and the “third-party” doctrine—are discussed in more detail below.

I. The Open Field Doctrine

Under the open field doctrine, the U.S. Supreme Court has held that an information-gathering intrusion on an “open field” does not constitute a Fourth Amendment search, even though it would have been a trespass under common law. An open field, according to the Court, is not like the “curtilage” of a private home, and thus is not protected by the Fourth Amendment.¹⁴⁴ Therefore, the government's physical intrusion with a camera on such an area that can be observed with the naked eye—unlike its intrusion in a personal home where there is an expectation of privacy—is

not prohibited by the Fourth Amendment.¹⁴⁵ The fact that the government utilizes a camera rather than a person is not dispositive for the purposes of the Fourth Amendment.¹⁴⁶

The government's use of visual surveillance techniques in the open can be contrasted with efforts to surveil individuals using electronic means. For example, in *United States v. Jones*, the Court struck down a drug trafficking conviction based on the warrantless collection of 28 days' worth of vehicle movement data that the police had obtained from a global positioning satellite (GPS) device attached to Antoine Jones' automobile.¹⁴⁷ The majority agreed that significant Fourth Amendment concerns would arise if the police were to “[s]urreptitiously activat[e] a stolen vehicle detection system in Jones' car to track Jones himself, or conduct[] GPS tracking of his cell phone.”¹⁴⁸ Extending this concept, the Court concluded that since GPS monitoring of a vehicle tracks “every movement” a person makes in that vehicle, “longer term GPS monitoring investigations of most offenses impinges on expectations of privacy,” and use of such electronic methods constituted an illegal “search” and therefore violated the Fourth Amendment.¹⁴⁹

2. The Curtilage Doctrine

The second doctrine that is instructive in the context of electronic monitoring for fisheries relates to the definition of “curtilage”—in essence, a home or other private space where a person has a reasonable expectation of privacy covered by the Fourth Amendment. As it relates to electronic monitoring of fisheries, two court cases are instructive.

In *Dow Chemical Co. v. United States*, an industrial plant complex under aerial surveillance by the U.S. Environmental Protection Agency (EPA) sought declaratory and injunctive relief, arguing that “EPA's aerial photography was a ‘search’ of an area that, notwithstanding the large size of the plant, was within an ‘industrial curtilage,’ rather than an ‘open field,’ and that it had a reasonable expectation of privacy from such photography protected by the Fourth Amendment.”¹⁵⁰ The Court disagreed, holding that an industrial complex is not analogous to the “curtilage” of a dwelling, which is entitled to protection as a place where the occupants have a reasonable and legitimate expectation of privacy that society is prepared to accept.¹⁵¹ The Court explained that “[t]he intimate activities associated with family privacy and the home and its curtilage simply do not reach the outdoor areas or spaces between structures and buildings of a manufacturing plant.”¹⁵² And “[t]he mere fact that human vision is enhanced somewhat . . . does not give rise to constitutional problems.”¹⁵³

the-rise-of-the-platform-economy/.

141. See, e.g., JOINT COMMITTEE OF THE EUROPEAN SUPERVISORY AUTHORITIES, JOINT COMMITTEE FINAL REPORT ON BIG DATA 13, 53 (2018), available at <https://eba.europa.eu/documents/10180/2157971/Joint+Committee+Final+Report+on+Big+Data+%28JC-2018-04+%29.pdf>.

142. U.S. CONST. amend. IV.

143. See *infra* Part III.

144. *Oliver v. United States*, 104 S. Ct. 1735 (1984).

145. *United States v. Vankesteren*, 553 F.3d 286, 290 (4th Cir. 2009).

146. “That the agents chose to use a more resource-efficient surveillance method does not change our Fourth Amendment analysis.” *Id.* at 291.

147. *United States v. Jones*, 565 U.S. 400 (2012).

148. *Id.* at 426.

149. *Id.* at 430.

150. 476 U.S. 227, 232, 16 ELR 20679 (1986).

151. *Id.*

152. *Id.*

153. *Id.*

A year later, in *United States v. Dunn*, the Court established a four-factor test that must be employed when determining the physical boundaries of curtilage.¹⁵⁴ They determined that these are “the proximity of the area claimed to be curtilage to the home, whether the area is included within an enclosure surrounding the home, the nature of the uses to which the area is put, and the steps taken by the resident to protect the area from observation by people passing by.”¹⁵⁵

3. The Third-Party Doctrine

The third-party doctrine is also instructive in the context of electronic monitoring. Under this rubric, the Court has consistently held that a person has no legitimate expectation of privacy with respect to information voluntarily turned over to third parties, even in cases where there is an assumption that the information will only be used for limited purposes.

The origins of the third-party doctrine can be traced to two Supreme Court cases: *United States v. Miller*¹⁵⁶ and *Smith v. Maryland*.¹⁵⁷ In *Miller*, the government subpoenaed Miller’s bank incident to a tax evasion investigation, seeking canceled checks, deposit slips, and bank statements.¹⁵⁸ Miller asserted that the government’s action amounted to an unlawful search in violation of the Fourth Amendment. The Court rejected Miller’s position, holding that bank records were not subject to an expectation of privacy.¹⁵⁹ According to the Court, the bank documents were “business records of the bank,”¹⁶⁰ for which Miller could “assert neither ownership nor possession.”¹⁶¹ Far from being “confidential communications,”¹⁶² the checks were “negotiable instruments to be used in commercial transactions.”¹⁶³ Likewise, the bank statements were documents routinely “exposed to [bank] employees in the ordinary course of business.”¹⁶⁴

In *Smith*, a telephone company installed, at the police’s request, a pen register to record the numbers dialed from the telephone at Smith’s home.¹⁶⁵ Smith moved to suppress “all fruits derived” from the pen register, arguing that the installation of the pen register constituted an unlawful search in violation of the Fourth Amendment.¹⁶⁶ While the Court held that the government was prohibited from eavesdropping on a phone call—even one placed from a public phone booth—the Court also found that the government could lawfully obtain phone numbers dialed on a phone

without a warrant, reasoning that the Fourth Amendment does not foreclose the government’s acquisition of information necessary to relay communications.¹⁶⁷

A third, more recent, Supreme Court decision, *Carpenter v. United States*,¹⁶⁸ is also instructive with respect to how the third-party doctrine might relate to electronic monitoring. In *Carpenter*, the Federal Bureau of Investigation (FBI) obtained cell site location information (CSLI) from wireless carriers.¹⁶⁹ While the FBI did secure a court order under the Stored Communications Act, it did not secure a warrant.¹⁷⁰ The CSLI obtained on Carpenter provided the FBI with 12,898 location points cataloguing Carpenter’s movements for 127 days.¹⁷¹ Carpenter moved to suppress this data, arguing that the government’s seizure of this data constituted an unlawful search in violation of the Fourth Amendment.¹⁷²

The *Carpenter* Court acknowledged that “the fact that [an] individual continuously reveals his location to his wireless carrier implicates the third-party principle of *Smith* and *Miller*.”¹⁷³ But the Court also admitted that, “while the third-party doctrine applies to telephone numbers and bank records, it is not clear whether the logic extends to the qualitatively different category of cell-site records.”¹⁷⁴ The Court’s rationale for the difference was one of time and penetration of new technology, noting that, “[a]fter all, when *Smith* was decided in 1979, few could have imagined a society in which a phone goes wherever its owner goes, conveying to the wireless carrier not just dialed digits, but a detailed and comprehensive record of the person’s movement.”¹⁷⁵

Importantly, the Court acknowledged that Fourth Amendment protection never completely vanishes—even where the third-party doctrine is implicated—noting that “the fact that . . . information is held by a third party does not by itself overcome the user’s claim to Fourth Amendment protection.”¹⁷⁶ On the basis of this understanding, the Court held “that an individual maintains a legitimate expectation of privacy in the record of his physical movements as captured through CSLI.”¹⁷⁷ The Court reasoned that “[a] person does not surrender all Fourth Amendment protection by venturing into the public sphere.”¹⁷⁸ Rather, “what [one] seeks to preserve as private, even in an area accessible to the public, may be constitutionally protected.”¹⁷⁹

Recognizing that rapidly developing and continuously evolving “technology has enhanced the Government’s

154. 480 U.S. 294 (1987).

155. *Id.*

156. 425 U.S. 435 (1976).

157. 442 U.S. 735 (1979).

158. *See Miller*, 425 U.S. at 440.

159. *See id.*

160. *Id.*

161. *Id.*

162. *Id.* at 442.

163. *Id.*

164. *Id.*

165. *See Smith v. Maryland*, 442 U.S. 735, 737 (1979).

166. *Id.*

167. *See id.* at 742.

168. 138 S. Ct. 2206 (2018).

169. *See id.* at 2212.

170. *See id.*

171. *See id.*

172. *See id.*

173. *Id.* at 2216-17.

174. *Id.*

175. *Id.*

176. *Id.* at 2217.

177. *Id.*

178. *Id.*

179. *Id.* (quoting *Katz v. United States*, 389 U.S. 347, 351-52 (1967)).

capacity to encroach upon areas normally guarded from inquisitive eyes,” the Court acknowledged its critical role of ensuring the “preservation of that degree of privacy against government that existed when the Fourth Amendment was adopted.”¹⁸⁰ And because CSLI technology gives the government “a detailed chronicle of a person’s physical presence compiled every day, every moment, over several years” and occurs “without any affirmative act on the part of the user beyond powering up,” the Court concluded that “[s]uch a chronicle implicates privacy concerns far beyond those considered in *Smith* and *Miller*.”¹⁸¹

Admittedly, *Carpenter* is a “narrow”¹⁸² decision, and the Court declined to “disturb the application of *Smith* and *Miller* or call into question conventional surveillance techniques and tools such as security cameras.”¹⁸³ Even so, *Carpenter* provides valuable context into how the Court thinks about the privacy implications of emerging technologies and the decision may prove instructive to an agency contemplating thoughtful regulation to address personal privacy concerns that arise incident to the incorporation of new technologies into specific industries.

B. Magnuson-Stevens Act

The MSA is first and foremost a resource management statute. Specifically—and in order to effectively manage fisheries and fulfill the best available scientific information requirement of National Standard 2—the MSA authorizes the government to collect information about catches from fishers.¹⁸⁴ Through the MSA, Congress explicitly acknowledged that “the collection of reliable data is essential to the effective conservation, management, and scientific understanding of the fishery resources of the United States.”¹⁸⁵ The statute prescribes specifics with regard to the type of information that all fishing vessels must submit to the Secretary of Commerce.¹⁸⁶ Additionally, the MSA outlines discretionary elements that an FMC or the Secretary may require in the FMP, including a provision requiring that one or more observers be carried on a fishing vessel for the purpose of collecting the necessary scientific data.¹⁸⁷

While the MSA requires the collection of fisheries data—including proprietary data and confidential business information—the statute nevertheless contains prescriptions on the “confidentiality of information.”¹⁸⁸ Pursuant to §301(b)(1) of the MSA, “[a]ny information submitted to the Secretary, a State fishery management agency, or a marine fisheries commission by any person . . . shall be confiden-

tial and shall not be disclosed[.]”¹⁸⁹ The same protection extends directly to information collected by observers.¹⁹⁰

While the MSA does provide for eight exceptions to this rule,¹⁹¹ §301 also mandates that NOAA promulgate regulations outlining procedures

to preserve the confidentiality of information submitted in compliance with any requirement or regulation under this chapter, except that the Secretary may release or make public any such information in any aggregate or summary form which does not directly or indirectly disclose the identity or business of any person who submits such information.¹⁹²

Further, §301(b)(3) states:

Nothing in this subsection shall be interpreted or construed to prevent the use for conservation and management purposes by the Secretary, or with the approval of the Secretary, the Council, of any information submitted in compliance with any requirement or regulation under this chapter or the use, release, or publication of bycatch information[.]¹⁹³

189. *Id.* §1881a(b)(1).

190. *See id.* §1881a(b)(2) (“Any observer information shall be confidential and shall not be disclosed.”). In case there was any doubt, the term “observer information” is defined as

any information collected, observed, retrieved, or created by an observer or electronic monitoring system pursuant to authorization by the Secretary, or collected as part of a cooperative research initiative, including fish harvest or processing observations, fish sampling or weighing data, vessel logbook data, vessel or processor-specific information (including any safety, location, or operating condition observations), and video, audio, photographic, or written documents.

Id. §1802(32). Thus, the MSA explicitly provides that “observer information” can come from a camera as well as a person.

191. The eight exceptions are:

(A) to Federal employees and Council employees who are responsible for fishery management plan development, monitoring, or enforcement;

(B) to State or Marine Fisheries Commission employees as necessary to further the Department’s mission, subject to a confidentiality agreement that prohibits public disclosure of the identity or business of any person;

(C) to State employees who are responsible for fishery management plan enforcement, if the States employing those employees have entered into a fishery enforcement agreement with the Secretary and the agreement is in effect;

(D) when required by court order;

(E) when such information is used by State, Council, or Marine Fisheries Commission employees to verify catch under a limited access program, but only to the extent that such use is consistent with subparagraph (B);

(F) when the Secretary has obtained written authorization from the person submitting such information to release such information to persons for reasons not otherwise provided for in this subsection, and such release does not violate other requirements of this chapter;

(G) when such information is required to be submitted to the Secretary for any determination under a limited access program; or

(H) in support of homeland and national security activities, including the Coast Guard’s homeland security missions as defined in section 468(a)(2) of title 6.

Id. §1881a(b)(1)(A)-(H).

192. *Id.* §1881a(b)(3).

193. *Id.*

180. *Id.* at 2214 (citing *Kellogg v. United States*, 553 U.S. 27 (2001)).

181. *Id.* at 2220.

182. *Id.*

183. *Id.*

184. *See* 16 U.S.C. §1881a(a).

185. *Id.* §1801(a)(8). *See also* 77 Fed. Reg. at 30486 (acknowledging that “[i]nformation collection is an important part of the fishery management process”).

186. *See* 16 U.S.C. §1881(a).

187. *See id.* §1881(b).

188. *Id.*

Thus, while the government must protect information from public release to prevent an invasion of privacy or loss of the proprietary business information of the submitter, fisheries information and data should be available and used freely within the agency by those fisheries managers with a need for it, and shared with certain permitted third parties (state agencies, regional fisheries commissions) to achieve the purpose of better fisheries management and achieving maximum sustainable yield.¹⁹⁴ However, as noted above, NOAA's existing regulations and policies implementing §301 make it very difficult for NOAA to share data within the agency or with FMCs and state fishery managers.

C. NOAA Regulations

I. MSA Confidentiality Regulations

NOAA addresses confidentiality of fisheries data in Subpart E of its Part 600 regulations. Section 600.405 addresses the “[t]ypes of statistics covered” and notes that “NOAA is authorized under the [MSA] to collect proprietary or confidential commercial or financial information.”¹⁹⁵ Section 600.405 states that the Subpart E regulations apply

to all pertinent data required to be submitted to the Secretary with respect to any FMP including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing occurred, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by, U.S. fish processors.¹⁹⁶

Section 600.410, which covers “[c]ollection and maintenance of statistics,” requires the NOAA Assistant Administrator to apply “[a]ppropriate safeguards . . . to the collection and maintenance of all statistics, whether separated from identifying particulars or not, so as to ensure their confidentiality.”¹⁹⁷ Section 600.410 also permits NMFS to enter into agreements with states that permit those states to collect statistics on behalf of NOAA.¹⁹⁸ However, NMFS may not enter into such an agreement “unless the state has authority to protect the statistics from disclosure in a manner at least as protective as these regulations.”¹⁹⁹

Section 600.415 of NOAA's Subpart E regulations governs access to statistics.²⁰⁰ Pursuant to §600.415, “[i]n determining whether to grant a request for access to confidential data,” NOAA must consider (1) the specific types of data required; (2) the relevance of the data to conservation and management issues; (3) the duration of time access will be

required: continuous, infrequent, or one-time; and (4) an explanation of why the availability of aggregate or nonconfidential summaries of data from other sources would not satisfy the requested needs.²⁰¹ Section 600.415 places limits on those federal employees permitted to access confidential statistics submitted pursuant to an FMP. These include:

1. Personnel within NMFS responsible for the collection, processing, and storage of the statistics.
2. Federal employees who are responsible for FMP development, monitoring, and enforcement.
3. Personnel within NMFS performing research that requires confidential statistics.
4. Other NOAA personnel on a demonstrable need-to-know basis.
5. NOAA/NMFS contractors or grantees who require access to confidential statistics to perform functions authorized by a Federal contract or grant.²⁰²

Section 600.415 places even more stringent limits on state employees permitted to access confidential statistics, limiting those statistics only to those state employees that “demonstrate a need for confidential statistics for use in fishery conservation and management,” and only where the state has entered into a written agreement that “contains a finding by the NOAA Assistant Administrator that the state has confidentiality protection authority comparable to the Magnuson-Stevens Act and that the state will exercise this authority to limit subsequent access and use of the data to fishery management and monitoring purposes.”²⁰³

Section 600.415 also places limits upon access to confidential data by FMCs.²⁰⁴ Under NOAA's regulations, access to confidential data will be granted to council employees responsible for FMP development and monitoring.²⁰⁵ The council may also request confidential information for conservation and management purposes provided that no member “gain personal or competitive advantage from access to the data,” and provided that suppliers of the data are not “placed at a competitive disadvantage by public disclosure of the data at Council meetings or hearings.”²⁰⁶ Finally, a contractor of the council may be granted access to confidential statistics “for use in such analysis or studies necessary for conservation and management purposes, with approval of the Assistant Administrator and execution of an agreement with NMFS.”²⁰⁷

NOAA's Subpart E regulations also require the agency to maintain a control system to protect the identity of submitters.²⁰⁸ Pursuant to §600.420, the control system must (1) identify the persons with access to statistics; (2) contain

194. *See id.*

195. 50 C.F.R. §600.405.

196. *Id.*

197. *Id.* §600.410(a)(3).

198. *See id.*

199. *Id.* §600.410(b)(2).

200. *See id.* §600.415.

201. *See id.* §600.415(a)(1)-(4).

202. *See id.* §600.415(b)(1)-(5).

203. *Id.* §600.415(c)(1)-(2).

204. *See id.* §600.415(d).

205. *See id.* §600.415(d)(1).

206. *Id.* §600.415(d)(2)(i)-(ii).

207. *Id.* §600.415(d)(3).

208. *See id.* §600.420.

procedures to limit access to confidential data to authorized users; and (3) provide safeguards for the data.²⁰⁹

Finally, §600.425 outlines the conditions for the release of statistics.²¹⁰ The default rule is that NOAA “will not release to the public any statistics required to be submitted under an FMP in a form that would identify the submitter, except as required by law.”²¹¹ Section 600.425 further provides that “[a]ll requests from the public for statistics submitted in response to a requirement of an FMP will be processed consistent with the NOAA FOIA regulations (15 CFR part 903), NAO 205-14, Department of Commerce Administrative Orders 205-12 and 205-14 and 15 CFR part 4.”²¹² The section also states that “NOAA does not release or allow access to confidential information in its possession to members of Council advisory groups, except as provided by law.”²¹³ While this might seem unduly constraining, the explanation is that the FMCs are made up, in large part, of fishers who are intended to have a strong hand in managing the fishery despite their obvious conflict of interest. Too much information shared with the public or the FMCs would in theory give the members of the councils a decided competitive advantage.

2. MSA National Standard 2 Implementing Regulations

To illustrate the inherent tension between confidentiality and transparency within NOAA’s regulations, one need only look to the agency’s provision implementing National Standard 2.²¹⁴ Section 600.315(a) explicitly states that MSA “[c]onservation and management measures shall be based upon the best scientific information available.”²¹⁵ The regulation recognizes that “[f]ishery conservation and management require high quality and timely biological, ecological, environmental, economic, and sociological scientific information to effectively conserve and manage living marine resources[,]”²¹⁶ and further recognizes that “[s]uccessful fishery management depends, in part, on the thorough analysis of this information[.]”²¹⁷

Importantly, §600.315 acknowledges the constantly evolving state of fisheries management, which is informed by the dynamics of the scientific process and “new scientific findings [that] constantly advance the state of knowledge.”²¹⁸ NOAA’s National Standard 2 implementing regulation also highlights the congressional commitment to transparency inherent within the MSA, noting:

The Magnuson-Stevens Act provides broad public and stakeholder access to the fishery conservation and manage-

ment process, including access to the scientific information upon which the process and management measures are based. Public comment should be solicited at appropriate times during the review of scientific information. Communication with the public should be structured to foster understanding of the scientific process.²¹⁹

The regulation further mandates that “[f]or information that needs to be updated on a regular basis, the temporal gap between information collection and management implementation should be as short as possible[.]”²²⁰

It is also clear from the regulation that fisheries management—and review of the underlying data—should be conducted on an ongoing basis. Pursuant to the regulation, SSCs must provide FMCs with “ongoing scientific advice for fishery management decisions, including recommendations for acceptable biological catch, preventing overfishing, maximum sustainable yield, achieving rebuilding targets, and reports on stock status and health, bycatch, habitat status, social and economic impacts of management measures, and sustainability of fishing practices.”²²¹

The regulation also requires FMCs to prepare stock assessment and fishery evaluation (SAFE) reports,

a public document or a set of related public documents, that provides the Secretary and the Councils with a summary of scientific information concerning the most recent biological condition of stocks, stock complexes, and marine ecosystems in the fishery management unit (FMU), essential fish habitat (EFH), and the social and economic condition of the recreational and commercial fishing interests, fishing communities, and the fish processing industries.²²²

The regulation requires that each SAFE report “contain, or be supplemented by, a summary of the information and an index or table of contents to the components of the report. Sources of information in the SAFE report should be referenced, unless the information is proprietary.”²²³

The regulation also states that FMPs must take into account best available science.²²⁴ In addition, the “FMP must specify whatever information fishermen and processors will be required or requested to submit to the Secretary.”²²⁵ With regard to FMPs, any “information submitted by various data suppliers should be comparable and compatible, to the maximum extent possible.”²²⁶ Further, “FMPs should be amended on a timely basis, as new information indicates the necessity for change in objectives or management measures[.]”²²⁷

209. *See id.* §600.420(a)(1)-(3).

210. *See id.* §600.425.

211. *See id.* §600.425(a).

212. *See id.* §600.425(b).

213. *See id.* §600.425(c).

214. *See id.* §600.315.

215. *Id.* §600.315(a).

216. *Id.* §600.315(a)(1).

217. *Id.*

218. *Id.* §600.315(a)(5).

219. *Id.* §600.315(a)(6)(iv).

220. *Id.* §600.315(a)(6)(v)(A).

221. *Id.* §600.315(c).

222. *Id.* §600.315(d).

223. *Id.* §600.315(d)(3)(ii).

224. *Id.* §600.315(e)(1).

225. *Id.* §600.315(e)(3).

226. *Id.* §600.315(e)(5).

227. *Id.* §600.315(e)(6).

NOAA's National Standard 2 implementing regulation clearly establishes a mandate for transparency and iterative resource management. Regrettably, the agency itself frustrates progress toward achieving this mandate through dated confidentiality regulations that fail to adequately balance the needs for transparency with the needs for data security and that have not been amended to account for the dramatic changes that have occurred within the fishing industry over the past two decades.

D. NOAA Interpretive Guidance

In addition to the regulations above, NOAA has also instituted several policies and pronouncements related to fisheries information and data. Though characterized here as interpretive guidance or general statements of policy, it is unclear whether these policies would survive judicial scrutiny under a legal challenge brought pursuant to the Administrative Procedure Act, because they arguably create “rights and obligations” inherent in “legislative rules” that must be promulgated under notice-and-comment rulemaking.²²⁸ Moreover, NOAA's policies are arguably “arbitrary, capricious, an abuse of discretion and otherwise not in accordance with the law” since they clearly contradict the underlying text of the MSA—not to mention NOAA's own regulations—and frustrate the intent of Congress.

I. Rule of Three

As noted above, NOAA has relied on the so-called Rule of Three as a means of ensuring that fisheries data are released to the public in “aggregate or summary form.” The regulated fishing community has come to rely on the Rule of Three for its simplicity and its overbroad implementation to shield information from the public and even within NMFS. NOAA articulates its reasoning for this “rule”—which is not codified in regulation—in an online posting on the commercial data section of the NMFS website, explaining:

Under the [MSA], the government cannot make public any data that can be linked to individual people or businesses. Currently, this is achieved through applying the “Rule of Three,” wherein any data presented to the public must have been reported by at least three fishermen or dealers. Those data that can only be attributed to two or fewer are aggregated to a higher level (e.g.: Unclassified Finfish or Unclassified Shellfish). This aggregation makes it very difficult to identify how much an individual might have reported, while preserving state, regional and national totals.²²⁹

228. 5 U.S.C. §§500-559.

229. NOAA Office of Science and Technology, *Commercial Data*, <https://www.st.nmfs.noaa.gov/data/fis/about/commercial-data> (last visited May 7, 2019).

As previously discussed, the Rule of Three arguably runs counter to the management goals outlined in the MSA, including National Standard 2. For example, when applied to small, regional fisheries—fisheries for which there are not three data points to merge—the Rule of Three can be restrictive, bordering on absurd, because there are often few secrets among fishermen working in the same port or location. Thus, the Rule of Three fails in the goal of preserving confidential business information, all the while frustrating management through a lack of transparency that results in a lack of effective public oversight and robust external science.

2. NOAA Administrative Order 216-100

In addition to the Rule of Three, NMFS relies on NOAA Administrative Order (AO) 216-100, which (1) prescribes policies and procedures for protecting the confidentiality of data submitted to and collected by NMFS; (2) informs authorized users of their obligations for maintaining the confidentiality of data received by NMFS; (3) provides for operational safeguards to maintain the security of data; and (4) states the penalties provided by law for disclosure of confidential data.

Compared with the Rule of Three, AO 216-100 appears to take a fairly liberal view of data disclosure, stating that confidential business data can be disclosed under the FOIA, the Privacy Act, or by court order.²³⁰ Moreover—and seemingly in direct conflict with the Rule of Three—AO 216-100 states that “individual identifiers shall be retained with data, unless the permanent deletion is consistent with the needs of NMFS and good scientific practice.”²³¹

E. FOIA

The FOIA requires government agencies to disclose “agency records”²³² to the public based on the premise that the public is entitled to know what the government is doing.²³³ In the context of fisheries management, this would suggest that information relevant to the furtherance of the goals

230. NOAA AO 216-100 (1994).

231. Limitations of deletion are stated in §6.02(c) of AO 216-100:

The permanent deletion of individual identifiers from a database shall be addressed on a case-by-case basis. Identifiers may only be deleted after:

- (1) future uses of data have thoroughly been evaluated, e.g., the need for individual landings records for allocating shares under an individual transferable quota program;
- (2) consultation with the agency(s) collecting data (if other than NMFS), the relevant Council(s), and NMFS Senior Scientist; and
- (3) concurrence by the Assistant Administrator has been received prior to deletion.

232. Agency records are defined in the Records Disposal Act as “books, papers, maps, photographs, machine readable materials, or other documentary materials, regardless of physical form or characteristics, made or received by an agency.” 44 U.S.C. §3301. The FOIA also makes clear that electronic records including audio and videotapes are covered, as long as they are maintained by an agency in some format—electronically or paper copies. 5 U.S.C. §552(f)(2).

233. U.S. Department of Justice, *FOIA*, <https://www.justice.gov/archives/open/foia> (last updated Oct. 30, 2018).

set forth in the MSA—including catch data—be disclosed to the public, especially since fisheries are a public resource.

Nevertheless, there are exceptions to this basic legal tenet, and the FOIA provides nine exceptions under which the government may withhold disclosure to the public.²³⁴ With respect to fisheries management data, at least three exemptions are relevant: Exemption 3, which prohibits the disclosure of “[i]nformation that is prohibited from disclosure by another federal law”; Exemption 4, which prohibits the disclosure of “[t]rade secrets or commercial or financial information that is confidential or privileged”; and Exemption 6, which prohibits disclosure of “[i]nformation that, if disclosed, would invade another individual’s personal privacy[.]”²³⁵ Under these nine exemptions, the government’s rationale for promoting confidentiality trumps the public’s underlying expectation for transparency in government.

Moreover, NOAA has affirmatively stated that “[w]hen responding to FOIA requests for MSA confidential information, NMFS takes into consideration FOIA Exemption Three, 5 U.S.C. 552(b)(3), and other relevant FOIA exemptions.”²³⁶ According to NOAA, “NMFS interprets MSA section 402(b) to exempt from disclosure information that would directly or indirectly disclose the identity or business of any person.”²³⁷

III. Privacy Rights of Fishers

The issue of fishers’ privacy rights can be divided into two distinct questions. The first question is whether a fisher enjoys an expectation of privacy from the government while he or she is living and working aboard a fishing vessel. The second question is whether the personal information of fishers, including images that may be provided to the government in the form of video or still photos collected incident to observation activities, can be shielded from public release.

Ultimately, if NOAA is truly committed to implementing a successful and effective electronic reporting and monitoring regime, it must be able to assure fishers that they are vested with a high degree of personal privacy both from the government and from other entities (including

the public) that may have a legitimate interest in certain, but not all, fisheries data.

A. *The Right to Privacy From the Government Is Strong*

The bogeyman of government intrusion has long served as a unifying theme underlying fishers’ opposition to electronic monitoring, and as a result has served as a major impediment in NOAA’s efforts to modernize fisheries management.²³⁸ In reality, questions surrounding governmental intrusion need not serve as an impediment to innovation in fisheries management, as one can make a strong claim that fishers retain a strong constitutional right to privacy, even when they are on board their vessels operating in federal waters.

As discussed above, three Supreme Court doctrines inform the extent to which fishers enjoy an expectation of privacy while on board a vessel. These three doctrines in turn raise three important questions informing the ultimate analysis. The first question is whether the deck of a fishing vessel is more like an open field than a private home for the purposes of a fishers’ expectation of privacy from a surveillance video camera. The second is whether there are places on a fishing vessel that would amount to a home or its curtilage where a fisher would have an expectation of privacy. The third question is whether (and to what extent) the third-party doctrine applies to information gathered while on board a vessel.

Since no court has adjudicated these questions, there is no way to definitively answer them. Moreover, the particular facts of a case could be dispositive—especially regarding the locations on a vessel where a fisher would have a strong expectation of privacy. Nevertheless, an analysis of these questions is instructive and allows both NOAA and fishers to better understand and delimit where and when one could expect to enjoy a right to privacy when on board a fishing vessel.

Turing to the first question—whether the open field doctrine would apply to the deck of a vessel—the answer is likely yes. Since the deck (and other places where fishing occurs) is a place that can be visually monitored by a human observer, the fact that the observer is replaced by a camera should be of no consequence as a matter of Fourth Amendment law.²³⁹ It is therefore unlikely that a fisher would have an expectation of privacy in a location on a ship that would surely be covered by an observer operating in that capacity.

The fact that not every fishing trip will actually have an observer should not create a higher expectation of personal privacy on a fishing vessel, because any vessel could be assigned to have an observer on board for any trip—and one could technically observe the operations of an open-deck fishing vessel from another vessel, or via a

234. 5 U.S.C. §552(b).

235. *Id.* FOIA Exemption 7 may also be relevant. That provision prohibits disclosure of information compiled for law enforcement purposes that if released to the public:

(A) could reasonably be expected to interfere with enforcement proceedings, (B) would deprive a person of a right to a fair trial or an impartial adjudication, (C) could reasonably be expected to constitute an unwarranted invasion of personal privacy, (D) could reasonably be expected to disclose the identity of a confidential source . . . , (E) would disclose techniques and procedures for law enforcement investigations or prosecutions, or would disclose guidelines for law enforcement investigations or prosecutions if such disclosure could reasonably be expected to risk circumvention of the law, or (F) could reasonably be expected to endanger the life or physical safety of any individual.

Id. §552(b)(7).

236. 77 Fed. Reg. at 30491.

237. *Id.*

238. See NOAA FISHERIES, *supra* note 105, at 29, 31.

239. See *supra* Section II.A.

drone or airplane, similar to the situation in *Vankesteren* and *Dow Chemical Co.* The only real issue is whether the constant presence of a camera is the same as the occasional presence of an observer for the purposes of whether the open field doctrine applies to surveillance of fishing activities on a fishing vessel. On this question the answer is also most likely yes, because the fishing areas of a ship are open and more like a factory than a private home; thus, any activities undertaken in these areas of a vessel are likely not subject to an expectation of privacy, barring some extenuating circumstance.

With regard to the second question—whether any parts of a vessel would constitute curtilage or areas where a fisher would have a reasonable expectation of privacy—the answer is likely yes. The common refrain of fishers when it comes to electronic monitoring on fishing vessels is that the vessels are out at sea for days and possibly even weeks at a time, so the vessel is more than just where they work, it is also their home during their time at sea. Some areas of a vessel seem obviously covered by the curtilage doctrine, including sleeping births, showers, and bathrooms or “heads,” and perhaps even common living areas like the galley or sitting areas where fishers spend their non-fishing hours.

Other areas, such as the bridge or the bow of a ship—common areas that either are more open and observable or are part of the working areas of a fishing vessel—may be interpreted as not constituting curtilage because the fishers can expect to have a reduced expectation of privacy since those are areas that probably could be monitored by electronic surveillance equipment such as a camera, small drone, or audio recording device. But where the “line” is should be the subject of public debate and discussion and fact-finding by the agency. This determination is likely highly fact-specific depending on the vessel, the equipment and gear, and other factors that the agency could consider when developing a rule.

On the third question of whether fishers’ personal information would be subject to release under the third-party doctrine, *Carpenter* may be instructive. Even though the Court was careful to describe its decision as “narrow” and was explicit in articulating that the decision would not disrupt existing Fourth Amendment doctrine with respect to video surveillance, *Carpenter* nevertheless affirms several important precedents that are applicable and relevant in the context of electronic monitoring of fisheries.

As a general matter, *Carpenter* reaffirms the long-standing principles that the Fourth Amendment “protects people and not places”²⁴⁰ from government surveillance, and that “individuals have a reasonable expectation of privacy in the whole of their physical movements.”²⁴¹ More specifically, as it relates to the rise of ubiquitous surveillance and the proliferation of emerging technologies, *Carpenter* provides some useful insights. For example, the *Carpenter* Court recognizes that new technologies have created the

possibility of a new surveillance regime that was previously impossible—and probably unimagined—just a few decades ago. Thus, like the CSLI at issue in *Carpenter*, electronic monitoring creates an “exhaustive chronicle of location information casually collected”²⁴² by the electronic monitoring camera and sensors. And “[u]nlike the nosy neighbor who keeps an eye on comings and goings, [electronic monitoring devices] are ever alert, and their memory is nearly infallible.”²⁴³

For this reason, electronic monitoring data are distinct from the more “limited types of personal information addressed in *Smith* and *Miller*.”²⁴⁴ And in many ways, one can argue that electronic monitoring data—more than CSLI or GPS information—“provides an intimate window into a person’s life, revealing not only his particular movements, but through them his ‘familial, political, professional, religious, and sexual associations.’”²⁴⁵ Moreover, as with CSLI, “the retrospective quality of the data . . . gives police access to a category of information otherwise unknowable.”²⁴⁶ This is particularly relevant in the context of monitoring individual fishers while on board a vessel, as access to this type of information gives the government the ability to “travel back in time to retrace a person’s whereabouts, subject only to the retention policies” of the government or third-party contractor.²⁴⁷

Of course, given that electronic monitoring technologies collect both commercial and personal information, it likely will be necessary to distinguish between these two data categories with respect to Fourth Amendment protections. Commercial data will likely continue to be assessed under *Miller* and its progeny, while personal information will be afforded greater Fourth Amendment protections given the fact that a record “generated for commercial purposes . . . does not negate [a party’s] anticipation of privacy in his physical location.”²⁴⁸ Thus, while in the fisheries context it may be fair to classify certain proprietary/confidential business information documents as business records (to which *Miller* might apply), the same claim cannot (or should not) be made with regard to the personal information and privacy of individual fishers.

There is yet another strong argument for preserving the personal privacy of fishers while on board, one reflected in *Carpenter* and in Justice Felix Frankfurter’s majority opinion in *Northwest Airlines, Inc. v. Minnesota*²⁴⁹—that is, the admonition not to “embarrass the future” when “considering new innovations.”²⁵⁰ As discussed in greater detail above, electronic monitoring is critical to innovating fisheries management and to meeting the mandates of the MSA. But achieving successful integration of electronic

242. *Id.* at 2219.

243. *Id.*

244. *Id.*

245. *Id.* at 2217 (quoting *Jones*, 565 U.S. at 415).

246. *Id.* at 2218.

247. *Id.*

248. *Id.*

249. *Northwest Airlines, Inc. v. Minnesota*, 322 U.S. 292, 300 (1944).

250. *Carpenter*, 138 S. Ct. at 2220 (quoting *Northwest Airlines*, 322 U.S. at 300).

240. *Carpenter v. United States*, 138 S. Ct. 2206, 2213 (2018).

241. *Id.* at 2217 (quoting *United States v. Jones*, 565 U.S. 400, 430 (2012)).

monitoring will require the full buy-in of fishers who jealously guard their privacy. Thus, NMFS must be willing to acknowledge fishers' legitimate expectation of privacy and work to address their concerns. Otherwise the agency risks embarrassing the future, because a failure to modernize management in the face of growing threats and stressors could lead to the collapse of some of the most economically significant fish species.

While fishers likely have a strong constitutional basis for arguing that they have a legitimate expectation of privacy in at least some areas of the vessel, it is understandable that they might be uncomfortable supporting electronic monitoring given the lack of legal certainty in the agency's rules and policies, much less the case law. This, however, is not an insurmountable obstacle, for NOAA could easily allay fishers' concerns by promulgating a privacy and data security rule. NOAA's rule could take many forms. For example, the agency could pursue a rule that plainly articulates the areas of a ship that would be subject to electronic monitoring and those areas that are off-limits, and that clearly states the extent to which video or other digital evidence could be used in an enforcement action against an individual fisher. Alternatively, NOAA could look to other jurisdictions to scope a novel new regulatory regime for how personal information is handled by the agency. For example, NOAA could incorporate certain principles outlined in the EU's General Data Protection Regulation (GDPR),²⁵¹ the California Consumer Privacy Act,²⁵² or other proposed legislation.²⁵³

Yet another alternative would be for NOAA to use public-private partnerships or third-party agreements to provide an additional layer of privacy and security between fishers and the government. For example, NOAA could mandate that all electronic monitoring data be held by a third-party processor for a certain period of time. Such a rule would preserve the agency's ability to use electronic equipment to monitor fishing activity and bring enforcement cases when they are fully developed without risk of losing critical evidence and yet minimizing the possibility of potential violations to fishers' Fourth Amendment rights.

B. Privacy Rights From Public Disclosures Are Strong

We next turn to the issue of fishers' right to privacy vis-à-vis governmental disclosure to the public—including images that might be captured by a video camera on a vessel or in an electronic record. On this issue, it is clear

that the MSA and FOIA work in concert to provide strong protections. As discussed above, NOAA has affirmatively stated that “[w]hen responding to FOIA requests for MSA confidential information, NMFS takes into consideration FOIA Exemption Three, 5 U.S.C. 552(b)(3), and other relevant FOIA exemptions.”²⁵⁴ Accordingly, where personal privacy is implicated, NMFS will clearly take into account and comply with FOIA Exemption 6, which prohibits the dissemination of private information such as social security numbers, addresses, and similar details that are personal identifiers.²⁵⁵

It is important to note, however, that before an agency may withhold information, the FOIA requires that an agency balance the “privacy interest that would be infringed by disclosure [against the] public interest that weighs in favor of disclosure.”²⁵⁶ The key question in this balancing test is, what is the public interest in disclosure? Courts generally have said that the public interest is limited to information that assists the public in conducting oversight of government.²⁵⁷ As the U.S. Court of Appeals for the Eleventh Circuit held in *Cochran v. United States*, “the balance struck under FOIA exemption six overwhelmingly favors the disclosure of information relating to a violation of the public trust by a government official.”²⁵⁸ *Cochran*, like many of the cases addressing the Exemption 6 balancing test, involved the release of personal private information about government employees, rather than release of personally identifiable information of nongovernmental third parties.

Nevertheless, because U.S. fisheries are a public trust resource, instances may arise where private parties request information in order to verify that the government is properly managing the resource. In response to such a request, NOAA may feel inclined to permit the release of information that verifies fishers' and observers' recorded landings, including video or electronic records. And while it is possible that certain personal information might be released in connection with such a request, it is likely that information released would have to be directly related to the act of fishing.

Thus, any information released to the public would have to be limited to activities occurring, for example, on the deck of a vessel during the act of fishing rather than in private spaces of the vessel or during non-fishing hours. Moreover, prior to release of any information, NOAA would still need to take steps to protect information that would otherwise be protected under FOIA Exemption 6. Accordingly, NOAA would need to utilize tools to ensure that fishers' identities remained anonymous, including tools that blur faces in video and adjust the sound of voices.

251. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons With Regard to Processing of Personal Data and on the Free Movement of Such Data, 2016 O.J. (L 119) [hereinafter GDPR]. For further discussion on the EU GDPR, see *infra* Part V.

252. California Consumer Privacy Act of 2018.

253. See, e.g., Consumer Data Protection Act, S. ___, 115th Cong., <https://www.wyden.senate.gov/imo/media/doc/Wyden%20Privacy%20Bill%20Discussion%20Draft%20Nov%20201.pdf>; see also Data Care Act of 2018, S. 3744, 115th Cong. (2018), <https://www.schatz.senate.gov/imo/media/doc/Data%20Care%20Act%20of%202018.pdf>.

254. 77 Fed. Reg. at 30491 (emphasis added).

255. See *id.*

256. DEPARTMENT OF JUSTICE GUIDE TO THE FREEDOM OF INFORMATION ACT Exemption 6, at 3, available at <https://www.justice.gov/sites/default/files/oip/legacy/2014/07/23/exemption6.pdf>.

257. See, e.g., *National Labor Relations Bd. v. Robbins Tire & Rubber Co.*, 437 U.S. 214, 242 (1978).

258. 770 F.2d 949, 956 (11th Cir. 1985) (emphasis added).

Given that both the MSA and FOIA provide robust protection of personal information, NOAA should be able to provide fishers with broad assurances that the presence of electronic monitoring devices on fishing vessels will not adversely impact their personal right to privacy as it relates to public requests to the federal government for fisheries records in their possession. The government is likely required to withhold such information from the public to the extent that it reveals the identity of individuals involved. Such information, if it were ever released to the public, would have to be redacted by the agency so as to shield all personal identifiers such as addresses, social security numbers, or even faces on a videotape.

IV. Data Rights Governing Fisheries Information

A. Legal Protections for Commercial Data Are Strong But May Not Be Indefinite

Under both the MSA and FOIA, NOAA has broad authority to protect proprietary information and confidential business information submitted by fishers incident to the agency's role in managing and overseeing fisheries. These strong mandates should alleviate any fears fishers have that data and information provided to the government through electronic reporting and monitoring will be released to the public in a way that harms their businesses.

While §303 of the MSA clearly allows NOAA to collect confidential data, §402 also explicitly provides that information given to NOAA by fishers is categorically deemed to be confidential simply by virtue of what it is—information about where, when, how, and how many fish were caught and even vessel operations on a particular trip.²⁵⁹ Similarly, NOAA's dated confidentiality regulations establish a baseline rule for the types of information the agency must protect, and the mechanisms for protecting an individual fisher's potential market advantage by ensuring that any public release of data is done "in a form that would not identify the submitter."²⁶⁰ AO 216-100 and the Rule of Three, while outdated and deficient in their own ways, further articulate how NOAA will manage data to ensure that information is disseminated in a way so as to not adversely impact fishers' business advantages.

Likewise, FOIA Exemption 3, when read together with MSA §402(b), makes it clear that fisheries data and associated observer data are afforded broad protection under the law.²⁶¹ Further, under FOIA Exemption 4, anything that would be confidential business information, even if not a "trade secret" per se, could be withheld from release by the government.²⁶² Exemption 4 is intended to safeguard the submitter from the competitive disadvantages

that could result from disclosure to competitors or other interested parties.²⁶³

It should be noted that these arguments are based on a presumption that the fishers own the data they collect under MSA and NOAA mandates, even though fish are a public trust resource. That said, NOAA's approach to handling proprietary information and confidential business information in the fisheries context—which reveals agency assumptions over data ownership—is little different from other resource agencies' procedures for protecting this data.²⁶⁴

Of course, even if it is clear that the MSA and FOIA provide robust protections over commercial fishing data, it does not necessarily mean that the statutes should provide these protections indefinitely. This is particularly true in an era of rapidly warming oceans where species' migratory patterns and/or population densities dramatically change from year to year—suggesting that trade secrets mean less and less as the years pass. This is also true in an era where evolving legal mandates and consumer preferences are forcing fishers to completely revisit long-held assumptions about what constitutes a market advantage. And it is likely that the older the information is, the less likely that its disclosure would be harmful to the business and financial interests of fishers. At some point, the importance of transparency outweighs the need to continue to cloak such information in order to protect the proprietary interests of fishers.

B. New Legal Mandates and Market Incentives Should Promote Transparency

While it is clear that the MSA and FOIA provide appropriate safeguards to ensure the protection of proprietary information and confidential business information, fishers are increasingly divulging some or all of the information they report to NOAA in order to meet other regulatory requirements and market standards for sustainability and traceability of fisheries products. For example, in 2009, the EU adopted Council Regulation No. 1224/2009, which established a control system for ensuring compliance with the rules of the Common Fisheries Policy and mandated the transparency of much of the information provided by fishers operating within that jurisdiction.²⁶⁵ The EU also requires that fishers seeking to export their product to the

259. Compare 16 U.S.C. §1853, with 16 U.S.C. §1881a.

260. See 50 C.F.R. §600.425(a).

261. See 5 U.S.C. §552; 16 U.S.C. §1881a.

262. See 5 U.S.C. §552.

263. DEPARTMENT OF JUSTICE GUIDE TO THE FREEDOM OF INFORMATION ACT Exemption 4, at 263, available at https://www.justice.gov/sites/default/files/oip/legacy/2014/07/23/exemption4_0.pdf.

264. See, e.g., 30 C.F.R. §250.197(c) (regulation of the Bureau of Safety and Environmental Enforcement governing "[d]ata and information to be made available to the public for limited inspection"); *id.* §550.197(c) (regulation of the Bureau of Ocean Energy Management governing "[d]ata and information to be made available to the public for limited inspection").

265. Council Regulation (EC) 1224/2009 of 20 November 2009 Establishing a Community Control System for Ensuring Compliance With the Rules of the Common Fisheries Policy, 2009 O.J. (L 343), <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=L:2009:343:0001:0050:EN:PDF>.

EU divulge a subset of this information.²⁶⁶ Thus, certain jurisdictions already are moving in the direction of transparency, with markets forced to move with them. This trend is only likely to accelerate as more countries undertake efforts to safeguard fish stocks as part of a broader national security, food security, or environmental strategy.²⁶⁷

Likewise, growing consumer demand for traceability and transparency—colloquially referred to as from “bait to plate”—suggests that public attitudes are forcing the fishing industry to undertake a seismic shift in how it conducts business.²⁶⁸ As a result, values and practices that fishing businesses once viewed as sacrosanct are no longer so. Collectively, these trends suggest that the fishing industry may be open to supporting government efforts—such as the adoption of electronic monitoring in the United States—that facilitate better fisheries management and that could go a long way toward ending illegal, unreported, and unregulated fishing worldwide.

C. *Alternative Models for Data Management Are a Potential Win-Win*

Beyond legal mandates and market incentives, it is also possible that the fishing industry will find that an open-source approach to fisheries data management provides greater value than the present system, which regards this data as “proprietary information.” As the present data-driven era has shown, large data sets can provide extraordinary insights.²⁶⁹ The same will be true with fisheries data—the more data that are available, the better the federal government can manage the resource and the better fishers can scope their efforts. Thus, it may become the case that traditional business advantages—which have been preserved in the present regulatory structure with respect to protections for proprietary information and confidential business information—will no longer be needed to maintain a commercially competitive fishing company. Instead, competitive advantages may arise from how a company is able to interpret data and scope trips to maximize catch in a sustainable manner.

266. Stricter traceability rules for seafood products within the EU went into effect in December 2014 (Regulation (EU) 1379/2013, 2013 O.J. (L 354), <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32013R1379>). Under these rules, labels must provide precise information on the harvesting and production of the seafood. This applies to all unprocessed seafood, as well as to some processed seafood, regardless of whether it is prepacked. The new labeling system offers consumers the opportunity to select seafood harvested with more sustainable methods and from specific sources. One of the most significant changes concerns the requirement to specify the fishing gear used and the harvesting area.

267. See, e.g., GREGORY B. POLING & CONOR CRONIN, CENTER FOR STRATEGIC & INTERNATIONAL STUDIES, *ILLEGAL, UNREPORTED, AND UNREGULATED FISHING AS A NATIONAL SECURITY THREAT* (2017), available at <https://www.csis.org/analysis/illegal-unreported-and-unregulated-fishing-national-security-threat>.

268. See FISH 2.0, *TRACEABILITY: AN INVESTOR UPDATE ON SUSTAINABLE SEAFOOD* (2015), available at https://www.fish20.org/images/Fish2.0MarketReport_Traceability.pdf.

269. EY, *BIG DATA: CHANGING THE WAY BUSINESSES COMPETE AND OPERATE* (2014), available at [https://www.ey.com/Publication/vwLUAssets/EY_-Big_data:_changing_the_way_businesses_operate/\\$FILE/EY-Insights-on-GRC-Big-data.pdf](https://www.ey.com/Publication/vwLUAssets/EY_-Big_data:_changing_the_way_businesses_operate/$FILE/EY-Insights-on-GRC-Big-data.pdf).

NOAA and fishing businesses also could devise a system of reporting requirements that permits fishers to hold on to a great amount of their own fishing data—data that have value to them—never needing to report it to the government at all. The more data are used and commercially valuable in and of itself, the more they are an asset that can be divided among users with differing needs. Indeed, data companies and other organizations could serve as middlemen who review, manage, and store trip data on behalf of fishers over and above what is required to be provided to the government.

The government could require that only a small subset of this data be turned over, while the rest could be held by fishers or their data storage firm(s) for a certain amount of time. If there was an alleged violation of the MSA for which additional information is needed, or if more information was needed to understand a stock’s status, then NOAA could request that fishers promptly provide this information to the agency or risk the agency subpoenaing it. This system could reduce storage and administrative costs and minimize FOIA responsibilities for the government, and provide fishers with more control over the use of data.

In this way, fishers would only furnish data that the government would need to manage the resource, but the government would still have access to any other data it needs to perform an investigation or conduct a longer-term study of the status of a fishery. This model would consider any additional data turned over to the government as intellectual property, which could be governed by contractual rules instead of the MSA and FOIA. Fishers could allege that since they are giving the government something of value—their data—they can by agreement grant the government’s additional uses of the data beyond fisheries management, and likewise contractually restrict the government’s right to disseminate it.

In sum, a paradigm shift by fishers to an electronic reporting and monitoring regime has the potential to change both the way the government manages fisheries resources and the underlying business model for commercial fishing. The issues with respect to data uses and rights are much easier to deal with when the data are considered intellectual property—an asset with a value—as opposed to information stored by the government for a regulatory or enforcement purpose. Thus, there is an incentive for fishers to collect, manage, and store the data, regardless of whether it is in the form of videotapes or electronic records, so that it can be used for commercial purposes by the fishers in the course of their business. But even under the current regulatory regime, the government has a clear obligation under relevant laws to safeguard fishers’ commercial and proprietary data regardless of the form in which it is provided to the government.

V. Recommendations

Innovating U.S. fisheries management is no small task. Regulators face a litany of constraints—including lim-

ited funding, understaffing, and the need to make tough choices on policy priorities. Fishers likewise face increased global competition, dwindling stocks, shifting species, and tighter margins. Finding the necessary support to effectuate meaningful and lasting change, then, will be a tremendous challenge, but one that is necessary if the U.S. fishing industry is to remain globally competitive and if U.S. fish stocks are to remain sufficiently healthy to permit continued harvest at the levels needed to meet U.S. and global demand.

Data-driven decisionmaking—enabled by electronic reporting and monitoring—has the potential to provide resource managers and fishers with unparalleled insights and could lead to a resurgent U.S. fishing industry that serves as a model for other countries around the globe. What follows are five privacy and data security policy recommendations for taking innovation in U.S. fisheries management from concept to reality.

1. NOAA should update its Part 600 regulations to ensure consistency with the national standards, and mandate the use of electronic reporting and monitoring technologies as the mechanism to ensure compliance with National Standard 2.

To effectively manage U.S. fisheries and to ensure the long-term health and sustainability of U.S. fishery resources, NOAA must insist upon a new nationwide management regime that more effectively achieves the mandates outlined in the MSA national standards—particularly the charge in National Standard 2 to base conservation and management measures “upon the best scientific information available.”²⁷⁰ To that end, NOAA must update its Part 600 regulations—including the Subpart E confidentiality regulations—to ensure that it is equipping resource managers—including FMP SSCs—with the data they need to properly scope and amend FMPs.

Further, recognizing that technology has changed dramatically in the past two decades—such that the ever-evolving standard for “best scientific information available” has also changed drastically—NOAA must amend its regulations regarding the manner in which fishers collect confidential information and the mechanism by and frequency with which fishers transmit that information to the agency. Accordingly, NOAA must mandate that fishers incorporate electronic reporting and monitoring systems on their vessels in order to provide the agency with real-time data that better allow the agency and FMCs to respond to the dynamically changing conditions below the surface.

In addition to mandating electronic reporting and monitoring in all regions, NOAA must undertake significant process changes to centralize and streamline data management policies to ensure that data can be submitted easily by fishers, and securely accessed, stored, and shared within the agency and with FMCs and state fishery management

agencies.²⁷¹ As discussed above, NOAA can adopt one of several options toward this goal—from managing, storing, and processing the data itself, to working third-party entities that may be better equipped to address the associated challenges arising from big data analytics.

Regardless of the path that NOAA ultimately pursues, implementing this new system will take time and patience and will require NOAA to actively engage with stakeholders of all stripes. In addition, the agency will need to comply with the procedural requirements of the Administrative Procedure Act, including the mandate to engage in notice-and-comment rulemaking to update the Part 600 regulations. Notwithstanding the long procedural road ahead, there are steps that NOAA can take in the near term to socialize the concept of widespread electronic reporting and monitoring within the fishing community, including crafting an effective narrative that articulates the tangible benefits of electronic monitoring to all parties and sanctioning more purposeful and integrated pilot projects that address data management challenges while also recognizing the unique needs of individual fisheries.

In addition to articulating the rights of NOAA, fishers, FMCs, and state fishery management agencies, NOAA must also recognize that the MSA “provides broad public and stakeholder access to the fishery conservation and management process, including access to the scientific information upon which the process and management measures are based.”²⁷² Accordingly, NOAA must revise its confidentiality regulations to better promote public transparency when it comes to obtaining aggregate fisheries data and reporting.²⁷³ While NOAA should protect individual businesses’ confidential commercial information, the agency cannot sanction a regime in which fishing businesses can flout the law and violate management measures with no public accountability. There must be some level of transparency so that the public can serve as a check on the agency to vigilantly guard against corruption, mismanagement, or both. Given their already fragile state, U.S. fisheries cannot survive another “codfather” incident.

To that end, NOAA should strive to make available to the public as much information necessary for the management of the resource. While fishers’ personal information must be withheld, the agency should develop a process and schedule for the timely release of confidential data. This recommendation is based on the realities of the modern data-driven world. In the near future, real value of fisheries data will not come from simply hoarding that data to protect prior year fishing locations, but instead in being able to interpret the data to better plan future year hauls in a way that maximizes profits (i.e., fish out of the water) and minimizes expenses (e.g., fuel costs, trip days). Ultimately, the algorithms that interpret the raw data will become the real thing of value and can remain proprietary to individual fishers and companies.

271. See, e.g., NET GAINS REPORT, *supra* note 80.

272. 50 C.F.R. §600.315.

273. 16 U.S.C. §1881a(b)(3).

270. 16 U.S.C. §1851.

Finally, recognizing the increasing public demand for traceability and sustainability of seafood—as well as industry trends to comply with consumer wishes—NOAA should revise its regulations to clearly state that once certain confidential information is made public by the fishing business, the government is no longer obligated to protect that information. Indeed, in fashioning a new confidentiality rule, the agency should find ways to encourage and facilitate traceability from boat to plate by “certifying” or “validating” the correctness or accuracy of certain fisheries reporting data in order to ensure that consumers can trust that the fish they are buying is what it is purported to be. That would indeed be a new paradigm in reporting and monitoring of fisheries data.

2. NOAA should update its Part 600 regulations to ensure uniform nationwide standards and applicability of its electronic monitoring mandate.

As NOAA undertakes a comprehensive revision of its Part 600 regulations and policies, the agency should ensure that the mandate to incorporate electronic reporting and monitoring technologies applies uniformly across the nation. Uniform applicability of electronic reporting and monitoring—as well as uniform data management protocols—is critical to ensuring that fisheries managers across the country are able to function in accordance with the National Standard 2 mandate to base management decisions on the “best scientific information available.” It is fundamentally unfair for some fishers to bear a heavier burden than others, which gives certain fisheries and certain regions a decided market advantage. The current regional pilots must be replaced with a policy that applies nationwide, even while providing a certain amount of flexibility in its implementation regionally.

Of course, uniform applicability of electronic reporting and monitoring does not suggest that management decisions must also be uniform. Each fishery is unique and has vastly different management needs.²⁷⁴ However, far from contradicting the need for uniform technologies and data management procedures, the unique nature of individual fisheries underscores the importance of electronic reporting and monitoring, as real-time data will better allow managers to understand the challenges they face, thereby allowing them to effectively tailor management goals to the needs of individual fisheries.

3. NOAA should update its Part 600 regulations to explicitly state that fishers’ personal privacy will be protected and to define the extent of that protection.

While this Article suggests that the MSA and FOIA provide ample protection over individual fishers’ personal privacy, NOAA’s regulations provide inadequate certainty on the issue. This regulatory uncertainty threatens to derail any chance that the agency has to successfully implement electronic reporting and monitoring. Consequently, NOAA should amend its regulations to clarify

that it will respect the privacy of individual fishers while on vessels and protect fishers’ personal information from public dissemination once the data are in the hands of the agency. Properly scoped, NOAA’s rulemaking offers a valuable mechanism to foster trust among fishers who are mistrustful of the power of these new technologies and wary of being exposed in ways that are embarrassing, or worse, unconstitutional.

As NOAA contemplates scoping a new privacy regime to enable electronic monitoring in commercial fisheries, it should take advantage of the wealth of recent thought leadership undertaken both domestically and internationally with regard to the issue of personal privacy. The agency also should consider incorporating novel privacy concepts from other legal regimes/jurisdictions, including the EU and the state of California. In particular, NOAA might consider incorporating the following concepts from the EU’s General Data Protection Regulation:

a. Privacy by design and default

Pursuant to Article 25 of the GDPR, entities charged with the “control” of personal information must design data management regimes that ensure the privacy rights of individuals. Under this concept of “privacy by design and default,” a controller must “implement appropriate technical and organisational measures, such as pseudonymisation . . . in an effective manner and to integrate the necessary safeguards into the processing in order to . . . protect the rights of data subjects.”²⁷⁵ Additionally, a controller “shall implement appropriate technical and organisational measures for ensuring that, by default, only personal data which are necessary for each specific purpose of the processing are processed.”²⁷⁶

Applied to the fisheries context, NOAA should consider scoping a privacy regime in which the agency guarantees that it will never release the name of an individual fisher to third parties, without the express consent of the fisher. Moreover, recognizing that it is the fisheries data—catch quantities, gear descriptions, and so on—that really matter in the management context, NOAA should implement procedures to expunge personal information before releasing it to the public. In practice, this could mean mandating blurring of faces in any videos released to the public, deleting all sound files associated with video or sensor data, and so forth. With these safeguards, fishers would be assured that any potentially embarrassing video or audio would be sheltered from public release.

b. Collection of data for a specific purpose

Pursuant to GDPR Article 5(b), personal data must be “collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes.”²⁷⁷ Further, pursuant to Article 5(c), processing of data must be “adequate, relevant and limited

275. GDPR, *supra* note 252, art. 25.

276. *Id.*

277. *Id.* art. 5(b).

274. NOAA Fisheries, *supra* note 85.

to what is necessary in relation to the purposes for which they are processed ('data minimisation')."²⁷⁸

As it relates to fisheries, NOAA must recognize that the purpose of data collection under the MSA (with or without electronic reporting and monitoring) is to meet the mandate of National Standard 2 to manage fisheries using the best scientific information available. While the use of electronic reporting and monitoring systems may result in the collection of personal data *incident to the collection of fisheries data*, NOAA should recognize that any processing of personal data must be undertaken in a manner compatible with that purpose (i.e., managing fisheries). Incorporating the GDPR's Article 5(b) mandate would mean that NOAA could not use any data to prosecute crimes that are not related to the management of fisheries. Thus, while NOAA could use data derived from electronic monitoring to enforce violations of bycatch requirements, the agency could not use the data to prosecute fishers for the illegal use of drugs.

4. NOAA should update its Part 600 regulations to ensure protection of proprietary information and confidential business information, but only as warranted and for a limited time period.

As noted above, NOAA's 2012 proposed regulation identified numerous deficiencies between the text of the MSA and NOAA's regulations. Among the deficiencies was the agency's finding that under its historical interpretation of two *different* elements of §402(b)(3) of the MSA the agency was disclosing in "aggregate or summary form" certain confidential and valuable information that, even in anonymized form, threatened to dilute certain market advantages.²⁷⁹ To remedy this issue, NMFS proposed to revise its definition of "aggregate or summary form" in order to "to protect against the disclosure of the 'business of any person' and propose[d] to add a specific definition for 'business of any person'" to include "financial and operational information."

Since withdrawing the proposed rule in 2017, NOAA has done nothing to address the deficiencies identified in the 2012 proposed rule. In that time, however, electronic monitoring and reporting technologies have developed sufficiently to warrant widespread deployment across all fisheries. In order for fishing businesses to embrace electronic monitoring and reporting requirements fully, they must know that the use of these new monitoring and reporting technologies will not put them at risk of commercial harm due to transparency of legitimate competitive advantages. Accordingly, NOAA should amend its Part 600 regulations to better align with the 2006 MSA Amendments as they relate to confidentiality of information. By revising the Part 600 regulations to be more in line with the 2006 MSA Amendments, NOAA will no longer need to rely on the arbitrary and capricious Rule of Three. Instead, the agency will be able to utilize the

Administrative Procedure Act public comment process to construct a thoughtful, considered, commonsense rule that better balances the tension between transparency and confidentiality.

5. NOAA should engage in a constructive dialogue with fishers, technology companies, and the public about the importance of fisheries data and how we value and protect it.

While in the near term NOAA should work to ensure that its Part 600 confidentiality regulations better align with congressional intent outlined in the 2006 MSA Amendments, over the mid- to long term, NOAA and Congress should engage in a constructive dialogue with fishers, technology companies, and the public and revisit assumptions over the value of natural resources data and how, if at all, we limit the dissemination of that data. Recognizing the dramatic impacts that machine learning and big data analytics have had in other sectors, NOAA must recognize that the U.S. fishing industry (and resource managers) risks being left behind if it does not similarly incorporate these emerging technologies into their operations.

Ultimately, any change in how we value and protect natural resources data will constitute a massive paradigm shift and thus will require buy-in from all interested parties—government, industry, and the public. Achieving consensus on this matter will require each interested party to set aside potential near-term gains, be they political or economic, in the name of long-term success—the health and sustainability of America's fishery resources. Given the dynamic and uncertain state of environmental, economic, and geopolitical conditions, operating under that status quo can only persist for so long. Thus, the United States really has no choice but to pursue innovation in fisheries management. The question is whether people recognize the need to innovate before it is too late.

VI. Conclusion

The legal issues surrounding fisheries data confidentiality and privacy are often used as a rationale to slow or block NOAA from instituting a new oversight and management regime powered by more timely and accurate data collected through the use of new technologies that are rapidly advancing our ability to better monitor and manage this country's precious fisheries resources. These legal issues and corresponding rules are intimidating, implicating personal privacy, constitutional rights, and potentially irreversible commercial harm. But issues of confidentiality and privacy surrounding the use of electronic monitoring and reporting are hardly insurmountable.

The recommendations above are balanced and measured and are entirely consistent with the MSA as currently drafted. What is really needed now is leadership and partnership. The fishing industry, nongovernmental organizations, technology companies, and NOAA must embrace technological change together. Industry must be willing to incorporate improved methods of holding themselves accountable. The government

278. *Id.* art. 5(c).

279. *See* 77 Fed. Reg. at 30491.

and nongovernmental organizations must recognize that a transition period and compliance assistance programs are needed for fishers to adopt and adapt to the new technology.

The kind of trust needed to successfully innovate U.S. fisheries management may be the hardest thing of all to achieve—and is what has heretofore constrained greater adoption of

electronic monitoring and reporting, despite increasing availability and affordability of the technology. If NOAA were to take action to clarify the confidentiality and privacy rules surrounding fisheries data, it would go a long way to building the needed trust and would likely speed the adoption and acceptance of electronic monitoring and reporting nationwide.