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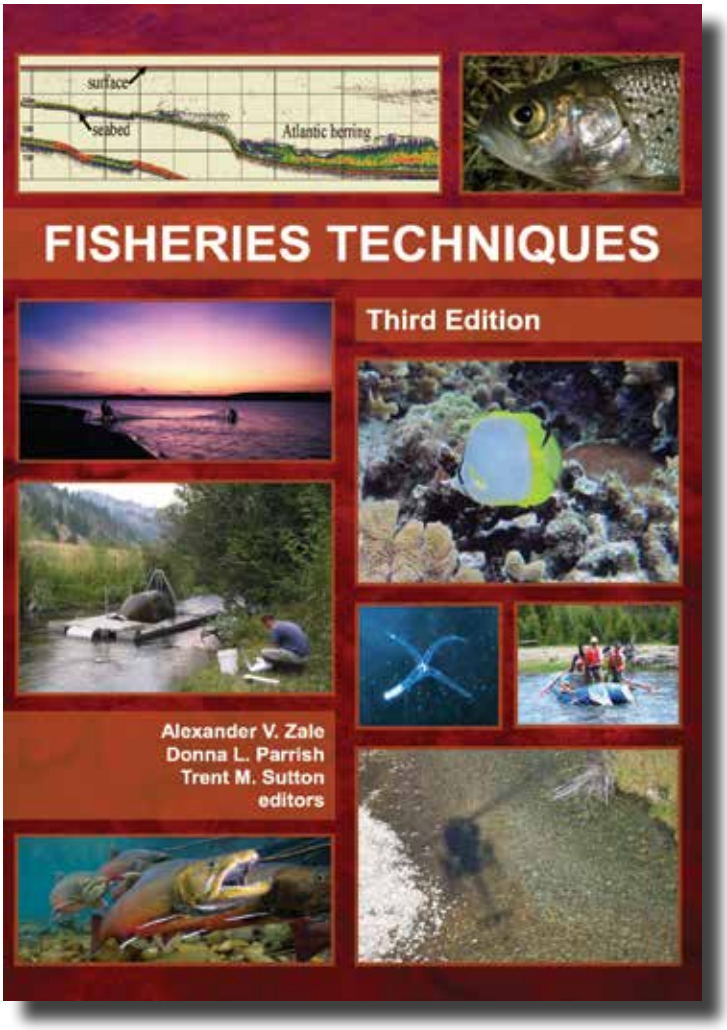

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On Behalf of the Fish

John Boreman, President

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Although it is still May when I'm writing this column, it will appear in the August issue of *Fisheries* and be my last "President's Hook." The "President's Hook" has given me an opportunity to voice my observations and opinions on a number of topics, including volunteering, mentoring, using social media, sponsoring of and attendance at our annual meetings, expanding our role as a global partner, governing the American Fisheries Society (AFS), and enhancing the AFS's relevance to our membership. The normal course of action for past presidents was to use their last monthly column to sum up their year in office, note their major accomplishments, and provide some sage advice for the future. Rather than follow suit, I urge you to read my annual report to the Governing Board that I will prepare in August, which will better reflect the full range of accomplishments of AFS staff, units, committees, and liaisons during my administration. Instead, I would like to use my last column to discuss a difference I have observed in philosophies of AFS leaders that might eventually lead to a loss of membership.

In my early years of employment in the federal government I was involved with assessment of power plant impacts on fish and wildlife resources. More than once during that time my boss chided me for getting "too emotional" about environmental issues. Fresh out of graduate school, I saw everything as being either black or white—people were either for environmental conservation or against it. My boss told me, in no uncertain terms, that my role as a federal scientist was to present the best science information available and not take sides on issues; science is only one part of the decision-making process and, oftentimes, other overriding issues (employment, cultural history, international agreements, etc.) are at play. As a federal employee I strived to separate my professional opinion from my personal one on issues affecting the environment and encouraged others to do the same.

Now free of the federal reins, I am more sympathetic to those AFS members who do not want the Society sitting on its proverbial hands when serious environment issues affect the well-being of our fisheries and the cultures that they support. On one hand, we have members who feel that the AFS should be taking positions on important environmental decisions affecting fisheries policy and legislation. They call for "advocacy on behalf of the fish." On the other hand, we also have members who feel that the role of the AFS, as a professional society, is to ensure that the best science is used in those decisions, but AFS should not go so far as to support a position for or against them. Strong arguments exist for supporting either philosophy, and it is engendering a dynamic tension (tension that pulls one way, then the other) within the leadership and membership as a whole, as well as potentially alienating our partners and stakeholders when we go too far (or not far enough).

A 1993–1995 Task Force on Advocacy developed guidelines for AFS members who propose or take advocacy positions on behalf of the Society or its subunits (fisheries.org/policy_advocacyguidelines). The guidelines define "advocacy," list criteria for advocacy at the Society level, suggest a procedure for developing advocacy positions at the subunit level, and address oversight and accountability for advocacy-related activities. These guidelines were prepared at a time when many AFS members, including myself, felt that the Society was moving too far in the direction of advocating for or against positions on public policy issues that affect fisheries conservation. I have come to realize in my role as an AFS officer that publication of the guidelines did not lay the advocacy issue to rest, and it remains a sensitive issue among many AFS members. Moving the AFS entirely in one philosophical direction or the other will undoubtedly cause a drop in membership, so we should confront this difference of opinion on the use of advocacy head on, either through a debate among members of the AFS Governing Board, an issue paper or point–counterpoint article for *Fisheries*, or as a topic for a symposium, workshop, or a Governing Board retreat. We cannot keep straddling the fence on the degree to which we advocate for fisheries conservation if we wish our Society to remain relevant to its membership.

There is one kind of advocacy that the AFS should be undertaking upon which we can probably all agree: advocacy for the fisheries profession. Our profession needs a voice in legislative chambers throughout North America—a voice that will support undergraduate and graduate education, on-the-job training, distance learning opportunities, internship and mentorship programs, diversity in the workforce, the best possible technological tools, and a host of other activities related to recruitment and retention of and the best possible work environment for our fisheries professionals. Future leaders of the AFS must ensure that advocacy for the profession remains a top priority for the Society as we prepare for and meet the challenges that lie ahead.

The Ecosystem Perspective

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Hopefully you have been reading this column since it debuted in May. So far we have established habitat as a common link throughout the American Fisheries Society (AFS) and to its members. We have also tackled habitat semantics so you will understand the subtleties between common terms such as "protection" and "restoration." And last month's column made the case for timely action while touching an important factor that is the central theme for this column—geographic and ecological scale.

Ecology 101 taught us that habitats vary greatly across space. Home can be a fine-scaled niche for a stone fly, a lake–stream–ocean complex for diadromous eels, or a huge gyre for a school of Albacore Tuna. Across those geographic scales our training and experience now urge us to think about habitat from an ecosystem perspective. Instead of thinking local and acting small, as if we were a Grayling after that stone fly, habitat aficionados now tend to think large. Although small scales remain crucial, we now hear often about ecosystem approaches to habitat work and fishery management. For examples, see the proceedings of an AFS symposium on the Gulf of Maine edited by Stephenson et al. (2012), Link's (2010) book on ecosystem-based fishery management, and Christensen and Maclean (2011). Because the concept of an ecosystem approach is perceived as vague, there is much that the AFS can offer as guidance and leadership.

Ecosystem-based approaches to fishery management are steeped in simple assumptions. Predators need prey. Plants stabilize sediments. Chemistry and physics affect organism health and survival. Interconnectedness is crucial. Together the mosaic of disciplines and connections represents an ecosystem. Similar theories and associations are evident on land, where ecosystem approaches should apply to forests and deserts.

With a framework available for ecosystem approaches, the challenge appears to be how to entice traditionalists to move away from conventional habitat approaches. With a growing literature on ecosystem approaches to fishery management we should expect to see a growing link between the habitat arena (science, policy, regulatory matters) and fishery management. I look forward to an ecosystem approach for five reasons:

1. Ecosystem approaches that embrace habitat are more realistic; species do not live in isolation. They are connected through interspecific interactions and are affected by common environmental and anthropogenic factors.
2. An ecosystem approach provides a more effective management framework. Single-species approaches often work at cross-purposes when interacting species are covered by individual plans within the same region.
3. Ecosystems include humans. An inclusive approach captures the human motivations and environmental perspectives. An ecosystem approach offers the best prospects for active, public participation in conservation activities, resulting in better management outcomes.
4. A broad framework enables decision makers to account for and adapt to the ongoing effects of major drivers such as climate change, which can affect fish habitat on all geographic and ecological scales.
5. An ecosystem approach establishes the basis for scientific, administrative, and regulatory efficiency. Multispecies approaches, ecosystem models, and consistent methods across regions offer an integrated framework for system-wide decision making related to habitat and other ecosystem features necessary for the persistence of aquatic organisms.

An ecosystem approach to managing fish habitat would include a sound scientific basis, a management vision, and perhaps policy direction. New staff and funds may be needed, but not necessarily. All habitat enthusiasts need to approach this challenge with fresh ideas as we start down that path with existing dollars. Experts and funds can be shifted from traditional work on individual species or habitat components. Those new efforts, people, and dollars should be converted into ecosystem assets that yield ecosystem level benefits.

Because we are still coming to grips with what an ecosystem approach is, maybe a few more suggestions will help us to narrow our focus. These ideas reflect goals rather than the general rationale:

- Try not to focus on one habitat type in a diverse community when considering an ecosystem approach to habitat ——— (fill in the blank—science, management, policy, budgets, goals, etc.). For example, salt marshes are highly valued but the entire estuarine or coastal ecosystem deserves attention. Another example would be considering upland landscapes or watersheds when protecting wild and scenic rivers. Chemistry connects to hydrology and then to habitat and finally to fish and fishery management; our approach should reflect those connections.
- Build off the National Ocean Policy Implementation Plan, which advances regional ecosystem protection and restoration and coastal and marine spatial planning to urge us beyond traditional approaches as we seek to enhance our efforts. Those policies apply in the Great Lakes, not just

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Super Trawler Scuppered in Australian Fisheries Management Reform

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ABSTRACT: *In response to an intense social media campaign led by international conservation groups, Green politicians, and recreational fishers, the Australian government imposed a moratorium on the operations of a large factory trawler. This moratorium overrode the government's own independent fisheries management process by making amendments to its key environmental legislation just days prior to the commencement of fishing by this vessel. Concurrently, the government announced a comprehensive review of Australia's fisheries management legislation. Whereas science is usually deployed in support of conservation in natural resource conflicts, in this case science-based fisheries management advice took a back seat to vociferous protest by interest groups, perpetuated by the media (in particular social media), ultimately culminating in a contentious political decision.*

The depletion of fish stocks and the ecological sustainability of global fisheries are issues of international concern (Worm and Branch 2012). Fisheries management involves balancing risks and uncertainty against benefits, with decision makers ideally assessing this risk based on the best available science in combination with social and economic values to derive a precautionary and adaptive management approach.

The management of Australia's Commonwealth fisheries falls under the Fisheries Management Act 1991 (Commonwealth of Australia 1991), which is administered by the Australian Fisheries Management Authority (AFMA), a statutory authority responsible for the day-to-day management of fisheries under commonwealth jurisdiction. Strategic environmental impact assessments are undertaken for all commonwealth fisheries under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act; Commonwealth of Australia 1991), providing further scrutiny on the ecosystem impacts of a given fishery. This management framework requires independent stock assessments to set catch levels using prescribed rules along with an assessment of the fisheries management plans against an ecologically sustainable development framework by the environment agency that considers impacts on nontarget species and habitats. This management system has been recognized internationally as having a rigorous base of scientific research and extensive monitoring and compliance (Costello et al. 2012).

Revocación al uso de un mega-barco arrastrero en la reforma australiana de manejo de pesquerías

RESUMEN: *En respuesta a las intensas campañas de los medios sociales, dirigidas por grupos de conservación internacionales, políticos de tendencia verde y pescadores recreativos, el gobierno australiano impuso una moratoria a las operaciones de un mega-barco arrastrero. Esta moratoria ignora el proceso de manejo pesquero desarrollado de forma independiente por el propio gobierno, modificando la legislación ambiental días previos a que la embarcación comenzara sus actividades de pesca. Actualmente, el gobierno anunció que se haría una revisión exhaustiva de la legislación de manejo de las pesquerías australianas. Si bien la ciencia se utiliza con frecuencia para apoyar la conservación de los conflictos concernientes a los recursos naturales, en este caso, las recomendaciones de manejo basadas en evidencia científica fueron relegadas por protestas vociferantes de grupos de posición y perpetuadas por los medios (particularmente por los medios sociales), culminando finalmente en una decisión política.*

The Commonwealth Small Pelagic Fishery (SPF) encompasses commonwealth waters (3–200 NM from the Australian coastline) from southeast Queensland around southern Australia to Western Australia and is divided into two management subareas (Figure 1). Purse seine and midwater trawling are permitted fishing methods and target species include Blue Mackerel (*Scomber australasicus*), Jack Mackerel (*Trachurus declivis*), Redbait (*Emmelichthys nitidus*), and Australian Sardine (*Sardinops sagax*). Although sporadic fishing activity has been undertaken since the mid-1980s, the SPF is still very much in a developmental phase. Most previous activity has been centered off Tasmania and has involved both purse seine (targeting Jack Mackerel) and midwater trawl activity (targeting Redbait and Jack Mackerel). Fishing activity since the mid-2000s has been limited, with five or fewer vessels operating (out of over 70 licenses) and taking less than about 5,000 tons per annum since 2007–2008 out of the combined fishery total allowable catch (TAC) of over 35,000 tons (Moore et al. 2011).

A formal management plan for the SPF was enacted in late 2009, and individual transferable quota (ITQ) statutory fishing rights (SFR) were allocated in May 2012. Individual transferable quota SFRs are the preferred output control approach for managing commonwealth fisheries, allowing for autonomous structural adjustment as well as certainty for future investment in fisheries. Total allowable catches are set annually in the SPF and are defined by management subareas (east and west of Tasmania) and by species. Individual transferable quota SFRs, with their catch entitlements, can be bought, sold, or leased among fishers, but total catches remain constrained by the TACs.

The use of large factory trawlers in the SPF was first proposed in 2004. At that time, the AFMA refused this application, citing insufficient scientific information on the target fish stocks and the lack of an adequate management framework. By 2012 considerable progress had been made in these areas, with research on key stocks, ecosystems, and the formalization and strengthening of management arrangements. Coinciding with the introduction of the ITQ SFRs, an Australian fishing company with a long history in the fishery and a major quota holding engaged a large factory trawler to fish in the SPF ostensibly with the full support of the AFMA and the Commonwealth government.

The decision to bring the 142-m-long, Dutch-owned factory trawler FV *Margiris* from The Netherlands was largely an economic one. Previous fishing in this fishery was from smaller vessels without onboard processing or freezing capability. This limited onboard processing capability restricted the area of operations to waters close to land-based processing facilities and rendered catches suitable only for aquaculture feed or bait. Onboard processing meant that the operators could range widely throughout the fishery zone and the fish could be processed for human consumption, with the goal to provide low-priced seafood in West Africa. The vessel arrived in Australia in September 2012, where it was reflagged and renamed as the Australian vessel FV *Abel Tasman*. The intent was to immediately start harvesting the company's quota of almost 18,000 tons (about half of the total quota allocated in the fishery) and, if possible, additional quota leased from other operators through the ITQ system.

While the vessel was in transit from Europe, public opposition, driven by conservation groups and recreational fishers, intensified through political lobbying and social media campaigns (Figures 2 and 3). This campaign included full-page advertisements in the main national newspaper, a National Day of Action with rallies (such as a flotilla of recreational fishing boats), and an online petition that attracted over 95,000 supporters. Sixteen nongovernmental organizations (NGOs), including Greenpeace,

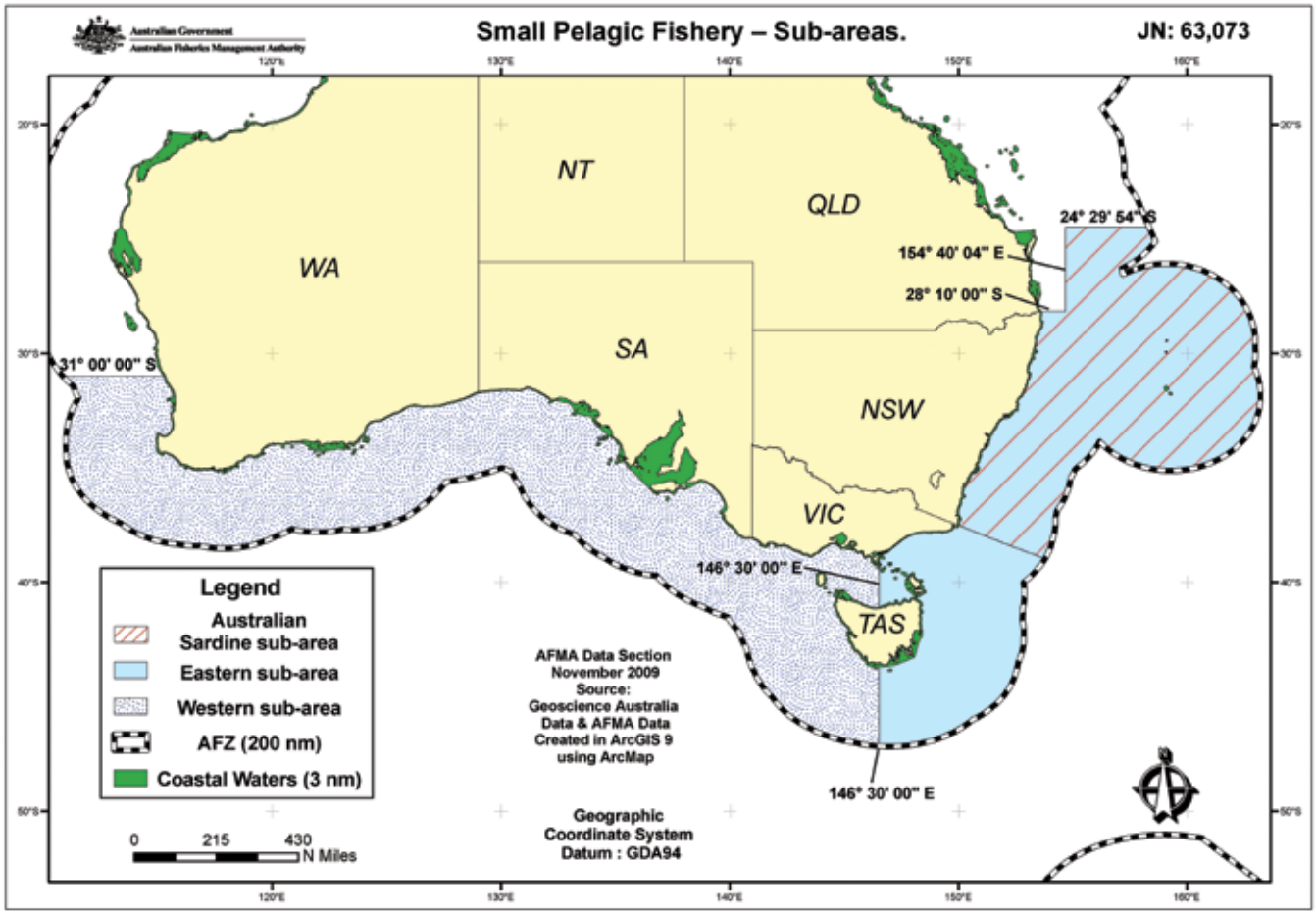

Figure 1. Map of the Commonwealth Small Pelagic Fishery showing management boundaries. (Map provided by the Australian Fisheries Management Authority.)

the Australian Conservation Foundation, and the Sea Shepherd Conservation Society, combined to rally public support against a vessel of this size operating in Australia.

The reputation of large factory trawlers in other fisheries around the world was integral to the campaign led by Greenpeace and other NGOs (Greenpeace et al. 2012). The campaign used the size of the vessel to engage public fear about the capacity of the FV *Abel Tasman* to overfish the target stocks and the ability for such vessels to expedite overfishing relative to a fleet of smaller vessels. In regards to the SPF, specific concerns were expressed over the size of the catch quota, the catching capacity of the vessel, the impact of catches on ecosystem function and potential for localized stock depletion, bycatch of marine mammals, and the currency of the stock assessments (Greenpeace et al. 2012).

Since the 1950s there has been a global trend toward improving efficiencies by increasing the scale of fishing operations using large factory trawlers (Dorn 1997). These larger vessels have a smaller carbon footprint (Parker and Tyedmers 2012) and increased economic efficiency and through onboard processing are capable of producing seafood suitable for human consumption rather than for animal feed (Tacon and Metian 2009). Campaign marketing by Greenpeace (Greenpeace et al. 2012) selectively focused on overfished stocks where factory trawlers have operated (such as the South Pacific Mackerel Fishery), yet avoided mention of well-managed, sustainable fisheries harvested with factory trawlers, such as the Marine Stewardship Council (MSC)-accredited Alaskan Pollock Fishery (MSC 2012). It is generally accepted that overfishing by factory trawlers has been due to inadequate governance and enforcement rather than the use of large vessels per se (e.g., Glubokov and Kremenyuk 2011; Trouillet et al. 2011). Nevertheless, the anti-trawler campaign focused on factory trawlers as the cause of overfishing, with the likelihood of overfishing in the SPF occurring due to the FV *Abel Tasman*'s size, despite robust management and monitoring controls in place for the fishery.

In setting TACs in the SPF, an explicit harvest strategy framework based on biological data and clearly defined decision rules has been developed, preventing undue influence of vested parties or politics in the management of the fishery. The harvest strategy uses a tiered approach that recognizes the ecological importance of the small pelagic species and takes an explicitly conservative approach to setting harvest levels (i.e., proportion of spawning biomass). The tiered approach recognizes that harvest rates must be low when there is limited information available on the status of the stocks but can be increased as improved information becomes available.

Because the most recent stock assessments were 6 to 10 years old (depending on the species), annual catch limits for the SPF were set at less than 10% of the estimated available biomass, which is more conservative than recommendations of recent scientific reviews for forage fish (Pikitch et al. 2012) and the requirements of MSC accreditation. Recognizing the need to update the stock assessments, a program of industry-funded

Figure 2. Greenpeace protest as the FV *Margiris* arrives in Australia. Photo credit: Greenpeace.

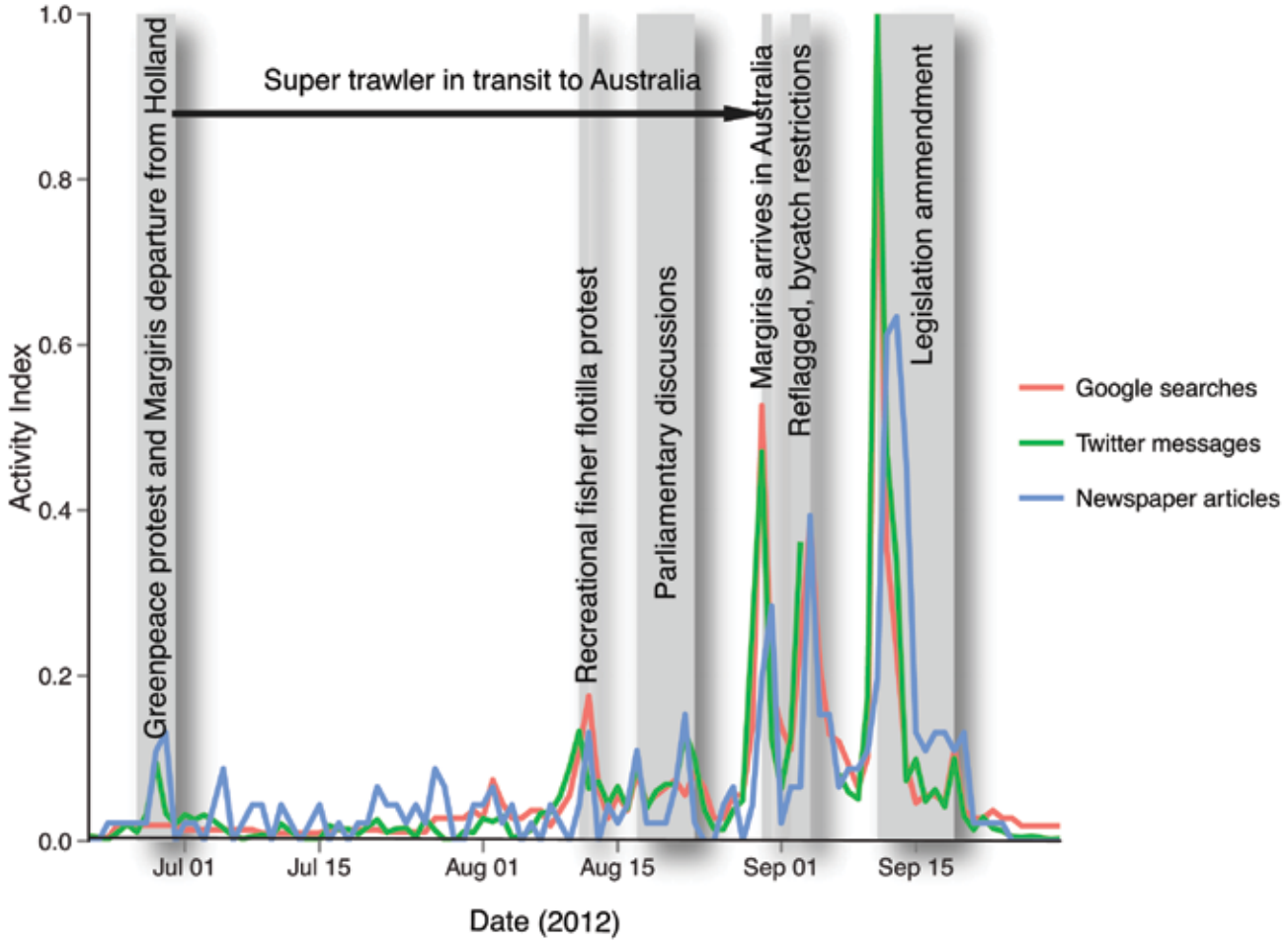

Figure 3. Social and print media interest in the super trawler (colored lines) in relation to key events (shaded bars). Public interest in the super trawler grew slowly during its transit from Europe to Australia. Local protests and parliamentary debate resulted in clear peaks of media interest. Interest spiked with the arrival of the super trawler in Australia and its reflagging (which suggested impending commencement of fishing). Interest peaked dramatically as legislation was amended to permit a moratorium on the trawler. In Australia this peak is on par with other major issues during this period, for example, a similar number of Google searches related to the collapse of Australia's biggest forestry company and twice as many related to the worst day of Australian casualties in the Afghan conflict.

biomass surveys based on the daily egg production method (see Stratoudakis et al. [2006] for a review) was seen as integral to the introduction of the factory trawler and future development of the fishery. Formal arrangements were in fact close to finalization with an independent research agency set to conduct biomass surveys for key eastern zone stocks, the results of which were expected to be used in the setting of the 2013–2014 TACs.

The public was, however, encouraged to believe that the combined quota of the 36,000 tonnes of *all* species was unsustainably high, despite being lower than past catches and historical TACs from the SPF (Williams and Pullen 1993). This perception was perpetuated by selective media reporting of information given by anti-trawler groups over information provided by the research groups involved in the fishery and related ecosystem studies (Buxton et al. 2012).

In August 2012 the Australian Prime Minister, the Fisheries Minister, and the Environment Minister affirmed their confidence in the AFMA's process to sustainably manage Australia's fisheries when faced with questions regarding the pending introduction of a super trawler into the SPF.

The SPF is located within one of the best-studied and best-understood ecosystems in the world, and current ecosystem models suggest that the ecological risks of the proposed fishery are not significant (Smith et al. 2011). Notwithstanding this, and in response to community concern over localized depletion, the trawler operator formally proposed operating conditions to the Fisheries Minister to reduce the potential of concentrating large catches in localized areas as precautionary measures. These conditions included spatially explicit catch trigger levels and move-on provisions. Ultimately, defining acceptable levels of depletion in space and time is a problem common to *all* fisheries and harvesting methods, because fishing is by its nature an exercise in removal and therefore depletion.

Bycatch of marine mammals (seals and dolphins) and other large fauna (such as sharks and rays) has previously been recorded in midwater trawls in this fishery (Lyle and Willcox 2009). Recognizing this, independent observer coverage to monitor bycatch and deployment of a bycatch exclusion device to direct large animals out of the net were stated requirements for the vessel to operate. The Environment Minister also acted to impose additional conditions on the vessel, including under-

water net cameras to monitor marine mammal interactions in situ, closure of grounds overlapping with foraging areas for the endangered Australian sea lion, and cessation of fishing and moving 50 NM if one dolphin or three seals were caught (Burke 2012a).

These conditions did not quell public concerns, and in the face of unprecedented public opposition to the super trawler, the Environment Minister, shortly after imposing the conditions relating to bycatch, announced that he planned to amend Australia's environmental legislation to impose a 2-year moratorium on the operation of large factory trawlers in Australia. The main premise for this decision was the degree of uncertainty relating to the environmental impacts of such a vessel fishing in Australian waters (Burke 2012b). Despite the detailed knowledge of the ecosystem and the proposed fishing arrangements, the Environment Minister declared that there remained sufficient risk of localized depletion and uncertainly about bycatch to consider banning the vessel from fishing until further research was conducted. At the same time as the Environment Minister's announcement, the Fisheries Minister announced a comprehensive review of Australia's fisheries management legislation, citing changing industry and community expectations in relation to fisheries management and the need for fisheries management legislation to reflect the objective of a precautionary principle (Ludwig 2012).

The decision to amend Australia's environment legislation to prevent the super trawler from fishing and to review the Fisheries Management Act are seen as triumphs by the conservation groups and recreational fishers and sets a significant precedent for future fisheries decisions. The lack of a social license to operate a factory trawler in Australian waters appeared to be based on both perceived deficiencies in the science underpinning harvest management and negative perceptions about the use of large factory trawlers more broadly. All of the circumstances combined to give the NGOs leverage to successfully impart to the public the view that super trawlers are an ecological disaster waiting to happen. Some may consider this legislative override as the appropriate outcome in broad democratic terms—the ultimate avenue through which to reflect public concern. The ministers' actions are, however, highly unusual in Australian environmental law. The enactment of a special moratorium amendment to the EPBC Act sets a concerning precedent and is especially curious given that other avenues were potentially available by which to defer approval of the vessel. Under the EPBC Act's Environmental Impact Assessment provisions, the minister has the power to request a more detailed assessment of environmental impacts to protect "matters of national environmental significance."

Both the conservation groups and recreational fishers have been empowered by this success, and we can now expect to see a much greater degree of influence through social media on natural resource management. Though it can be a positive that interest groups are becoming more engaged, if they are misinformed or if they misinform the general public their influence may be negative on the established governance systems, potentially leading to undesirable outcomes for society as a whole.

Yet the decision to prevent the vessel fishing pending further research raises the question of whether it is ever possible to reach the level of certainty the general public and decision makers would require and the impossibly high bar this now seems to set for ecosystem-based fisheries management. It is hard to see how additional research can address uncertainties about the impact of factory trawlers without actually allowing a factory trawler to operate under very strict conditions and then assessing those impacts.

Untangling the process related to the attempt to introduce what was termed the super trawler into the Australian small pelagic fishery provides broader lessons. We suggest that to successfully navigate such a difficult policy–science interface, closer integration of the underpinning research, governance, and communication with the public are necessary. Such collaborations and interagency working arrangements are likely to provide a model of international best practice in fisheries and wider resource management.

Postscript

In January 2013 the operators of the *Abel Tasman* put forward an alternative proposal that would allow the vessel to operate as a factory–freezer mothership, with smaller vessels licensed to operate in the fishery transhipping product to the vessel at sea. Again the Environment Minister intervened to have the proposed activity banned, citing the same environmental concerns used to justify the initial fishing ban. The vessel has now been deregistered as an Australian vessel and departed Australian waters in early March 2013.

The operators have recently launched federal court action challenging the government's decision to ban the vessel's operation in Australian waters.

MATERIAL AND METHODS

Social Media Analysis—News Stories

Relevant news stories were extracted from the Australian and New Zealand printed newspapers indexed by EBSCO HOST (www.ebscohost.com). All articles published in 2012 before October 27, 2012, containing "super trawler" or "Margiris" anywhere in the text were extracted, yielding 969 articles.

These articles were filtered to exclude articles that mentioned the super trawler issue in a cursory fashion (e.g., in a single sentence). The criteria used to exclude certain articles were as follows:

- Australian Associated Press articles were excluded (these are primarily circulated to the press and form the basis of many newspaper stories).

- Casual articles including letters to the editor and "street talk" quotes were excluded, due to less exposure and because they are indexed inconsistently across papers.

- Articles that did not mention super trawler issues in the title or summary provided by EBSCO Host were excluded.

After excluding the above articles, there were a total of 341 printed newspaper articles that substantially related to the introduction of the super trawler to Australia.

Social Media Analysis—Twitter

Trends in Twitter posts (tweets) containing "super trawler," "supertrawler," or "Margiris" were obtained using peoplebrowsr.com. Super trawler is a term rarely used outside of Australia; consequently, very few tweets unrelated to the introduction of the super trawler in Australia matched this query. This is supported by a geographical analysis of tweet origin and by the almost complete lack of matches prior to the proposal of Margiris fishing in Australia.

Social Media Analysis—Google Searches

Activity in Google searches was measured using Google Trends (trends.google.com). Any searches containing either "Margiris" or "super trawler" were matched (using the query Margiris + "super trawler"). Data prior to the July 27, 2012, were only available at a weekly resolution. Google Trends provides data in a normalized format; hence, the weekly data were placed on the same scale as the daily data by matching the overlapping period.

Normalization of Data

The three time series are on vastly different scales. To facilitate visual comparison of the trends, each time series was divided by its mean.

ACKNOWLEDGMENTS

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Correction

Kurzawski, K. F., W. L. Fisher, D. Miller, and J. M. Long. The 2012 Salary Survey of Public and Private Sector Fisheries Employers in the United States and Canada. Fisheries 38:169–178.

Iowa's salary information was incorrectly listed in Tables 1 and 5. The correct entries for "Average salary" and "Number of staff" in Table 1 are: Level 1 – Not applicable; Level 2 - $66,000/30; Level 3- $78,500/5; Level 4 - $82,000/2; and Level 5 - $92,000/1.

The correct entries for "Adjusted average salary" and "Rank" in Table 5 are: Level 1 – Not applicable; Level 2 - $75,234/1; Level 3- $85,493/4; Level 4 - $93,472/4; and Level 5 - $104,872/5.

Rankings for other states in Table 5 for Levels 1, 3, and 4 should be adjusted based on their relative ranking to Iowa's corrected rankings for those levels.

Pressures to Publish: Catalysts for the Loss of Scientific Writing Integrity?

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ABSTRACT: *Publishing research is the final step in the scientific process and is used as the primary means for disseminating research findings to the scientific community. Publishing can embody many personal motivations (e.g., gratification, seeing a finished product in print, desire to further science) for authors as well as professional benefits (e.g., promotion, tenure, future funding opportunities). As the scientific workforce and competition for jobs and funding increase, publishing productivity has become a driving factor for many authors, which may lead to writing practices that violate integrity. In this essay, we discuss writing actions that may be considered a violation of integrity in the context of traditional manuscript sections (introduction and discussion, methods, and results). We define "integrity" as consistency of actions that reflect honesty and truthfulness. Writing the introduction and discussion can be compared to an artistic creation because the rendition of the data may vary depending on the intentions and experience of the author. Some authors may be tempted to relate their research to a hot topic (e.g., climate change, model selection) in an attempt to increase publication success or maximize visibility in search engines, despite not having sufficient data to support their conclusions. Caution must be taken to not overextend the "story" beyond the bounds of the data. Modification of the methods and results sections contains the most extreme cases of scientific integrity violations (e.g., changing an alpha level, only presenting positive results, running numerous tests until desired outcome). Manipulation of methods or results is more difficult to detect by peer review. We believe that however destructive integrity violations may be, despite benefits to the author (e.g., accolades, publication, potential citations, promotion, etc.), the individual scientist should hold him- or herself accountable and to a high standard to avoid sacrificing integrity.*

Presión para publicar: catalizadores de la pérdida de integridad en la publicación científica

RESUMEN: *La publicación es la etapa final del proceso científico y se utiliza como el medio principal para diseminar los hallazgos de una investigación. Para los autores, publicar puede implicar distintas motivaciones tanto personales (p.e. satisfacción, ver un producto final impreso, deseo de hacer más ciencia) como profesionales (p.e. promoción interna, basificación, oportunidades de financiamiento). A medida que se incrementa la fuerza laboral científica y la competencia por trabajo y financiamiento, la productividad en cuanto a las publicaciones se ha convertido en un factor determinante para muchos autores, lo cual puede dar pie a prácticas de publicación que comprometen la integridad. En este ensayo se discuten aquellas prácticas de publicación que se considera que comprometen la integridad en el contexto de las secciones habituales que conforman un artículo (introducción y discusión, métodos y resultados). Se define la integridad como la consistencia en acciones que reflejan honestidad y veracidad. Escribir la introducción y discusión se compara con una creación artística en cuanto a que la interpretación de los datos puede variar dependiendo de las intenciones y experiencia del autor. Algunos autores pueden estar tentados a relacionar su investigación a un tópico de actualidad (p.e. cambio climático, selección de modelos) en un intento por incrementar el éxito de la publicación y maximizar la posibilidad de ser encontrados mediante motores de búsqueda, a pesar de que no cuentan con suficientes datos como para apoyar sus conclusiones. Se debe tener cuidado para no extender la historia más allá de los límites que establecen los datos. La modificación de las secciones de métodos y resultados implica los casos más extremos de violaciones a la integridad (p.e. cambiar el nivel de alfa, presentar sólo resultados positivos, realizar numerosas pruebas hasta que salga el resultado esperado). La manipulación de los métodos o los resultados resulta particularmente difícil de detectar durante el proceso de revisión por pares. Creemos que no obstante lo destructivas que puedan ser las violaciones a la integridad y a pesar de los beneficios que obtengan los autores (p.e. premios, potencial de citación, promociones, etc.), el individuo científico debe mantener su sentido de responsabilidad y sus estándares en alto con el fin de evitar sacrificar su integridad.*

Publishing research results is the final step in the scientific process and is used as the primary means for disseminating research findings to the scientific community and society at large. Publishing provides authors the opportunity to demonstrate the context of previous research and to show how their current research will advance our knowledge or understanding of a certain topic, theory, or phenomenon. Perhaps most important, publications allow readers to formulate new hypotheses about current issues

or challenges facing science, generate discussion about research results from other studies, and aid in future project designs and development. Publishing moves science forward.

Publishing also embodies many personal motivations for the authors, such as gratification, pride, or satisfaction in viewing research in print and/or cited, as well as the fulfillment of a completed project (Bennett and Taylor 2003). Additionally, the writing process allows authors to call upon their creative side, and it allows authors to believe that publishing their results will further benefit science and society in their particular field or related field (Bennett and Taylor 2003). Similarly, publishing translates to professional benefits as well. Promotion and tenure are determined in part by publications (De Rond and Miller 2005; Strange 2008). Publications can also help with future funding opportunities because publications demonstrate scientific ability, research innovation, and productivity (De Rond and Miller 2005; De Vries et al. 2006; Strange 2008).

As the scientific workforce and competition for jobs and funding increases (Strange 2008), publishing productivity has become a driving factor for many authors (Fang and Casadevall 2012). Young professionals (e.g., graduate students and assistant professors) are impacted the most by these increased pressures to publish to ultimately build their reputation in the scientific community (DeRond and Miller 2005). As such, graduate students are repeatedly advised that to become successful, publishing is the area where most effort should be allocated (De Rond and Miller 2005; Jolley and Graeb 2007). In fact, Statzner and Resh (2010) suggested that graduate students in ecology should publish 15 scientific articles to obtain a professional position. Therefore, publishing is held in much higher regard than any other activity (e.g., teaching, professional service, coursework). For these reasons, publications could essentially represent the currency or capital (De Rond and Miller 2005) within our profession.

As the pressures to publish increase, authors may publish only positive or significant results (Angell 1986; Fanelli 2010), publish numerous papers (resulting in least publishable units or "salami slicing"; Broad 1981; Statzner and Resh 2010), and/or relate their study or topic to some "grand ecological theory" that is more likely to be published (Hillborn 2006) over a less popular idea. In some instances, these publishing actions may be considered a form of scientific fraud and may be considered a violation of scientific integrity (e.g., Angell 1986; Martinson et al. 2005). In this essay, we further discuss writing actions that may be considered a violation of this integrity. These actions may present greater threats to scientific integrity than outright fraud (e.g., fabrication, falsification, plagiarism; Martinson et al. 2005; De Vries et al. 2006). In light of increasing publishing demands, students and young professionals may adopt publishing strategies that may not result in sound scientific manuscripts. For this essay, we define "integrity" as consistency of actions that reflect honesty and truthfulness. Our approach is to discuss these strategies in each of four traditional publication sections (i.e., introduction, methods, results, discussion). Additionally, we provide recommendations and strategies for authors on how to maximize publishing success while upholding the values and purposes of scientific writing. After all, scientists should strive to maintain integrity because this upholds all the positive benefits of the publishing process and allows for the dissemination of credible and useful information. We want to encourage students and professionals alike to engage in discussion on the publishing pressures, the potential temptations to violate scientific integrity, and strategies to overcome these pressures.

ISSUES IN THE INTRODUCTION AND DISCUSSION SECTIONS

Many actions associated with writing scientific manuscripts that are considered acceptable by some, but not by others, appear in the introduction and discussion sections of an article. Writing the introduction and discussion can be compared to an artistic creation. The rendition of an object (e.g., scenery, animal, scientific topic) may vary depending on the intentions and experience of the artist. Analogous to the artist example, the same data and/or results can be molded into numerous and sometimes conflicting stories. Essentially, the introduction and the discussion allow the most freedom in terms of creativity without jeopardizing the integrity of the study (i.e., compared to the methods and results sections).

The introduction section sets the stage for the manuscript and is where authors first "sell" their science to the reviewers and, pending manuscript acceptance, to the scientific world. The writer has free reign to focus the reader's attention on the broad, sometimes farfetched application or grander idea of the study. The discussion section attempts to finalize the "sale," interprets the meaning of the results, and relates the results to other studies or real-world phenomena. This is where the broad or global issue "buzzwords" are usually found (e.g., climate change, model selection), which have become increasingly popular over the past decade. As such, some authors may be tempted to relate their research to one of these hot topics in an attempt to increase publication success or maximize visibility in search engines, despite not having sufficient data to support these conclusions (Hillborn 2006). These actions may be the result of the increased pressures to publish and the competitive nature of our field.

Framing a study in a broad context so it relates to many different research arenas (e.g., relating mountain lion research to trout research) may foster or advance science and ultimately allow many of the positive benefits of the publishing process to be reached sooner or to a greater extent. However, caution must be taken to not overextend the "story" beyond the bounds of the data. Generating a conclusion not supported by the information provided in the study could jeopardize many of the positive benefits of the publishing process. Ultimately, we believe that some of the complexity behind this issue stems from who defines the story and how it is interpreted by peer reviewers, editors, and the readers.

ISSUES IN THE METHODS AND RESULTS SECTIONS

Modification of the methods and results sections after a study has been completed contains the most extreme cases of violations of scientific integrity (e.g., falsification, fabrication; Martinson et al. 2005). Scientific journals favor positive or significant results over negative or nonsignificant results (Fanelli 2010), which may lead authors to change an alpha level (e.g., 0.05 to 0.10) post hoc or run numerous statistical analyses until the desired "positive" outcome is met. Other examples include the failure to present data or previous research that contradicts the desired outcome or withholding details of the methods or results (Martinson et al. 2005; De Vries et al. 2006). These are only a couple examples that may fully maximize publishing success, but modifications to the methods and results section are deliberate and result in the loss of integrity (Martinson et al. 2005).

IMPLICATIONS

In any scientific manuscript, the introduction and discussion sections represent the overall story being told by the researcher, and any loss of integrity (e.g., extending beyond the scope of the study) can usually be detected and addressed through the peer review process. However, manipulation of methods or results (e.g., altering the alpha level, running numerous statistics) are more difficult to detect by peer review (Broad 1981). Ownership should be placed on the author(s) and we believe that however destructive integrity violations may be, despite benefits to the author (e.g., accolades, publication, potential citations, promotion, etc.), the individual scientist (or scientists) should hold himself accountable and to a high standard to avoid sacrificing integrity. A compromise in integrity not only demoralizes the scientific process as a whole and brings shame upon one's self and one's institution, but it may also cause a loss of public trust, with one consequence being that funding agencies and other constituents might be weary of funding future projects, thus threatening the forward momentum of science (Fang et al. 2012).

Violations of scientific integrity and fraudulent behavior have been exposed in other professions, such as medicine and engineering (e.g., see Claxton [2005] for examples; Martinson et al. 2005; De Vries et al. 2006; Steneck 2006), and some violations are considered to be related to the increased pressures to publish (Angell 1986; Martinson et al. 2005; Fang and Casadevall 2012). We also believe that these violations were an attempt to strategically meet the increased pressures to publish (Angell 1986; Martinson et al. 2005; De Vries et al. 2006; Davis et al. 2007; Fang and Casadevall 2012). In light of the perceived pressure to publish, various strategies can be used to maximize publishing success while maintaining scientific integrity (e.g., collaborate, work with extant datasets, conduct laboratory experiments; Table 1). For example, collaborating with other scientists could foster future relationships and not only result in manuscripts but also in future projects and a broadened research background. We have provided only a short list of ways to ethically maximize publishing; undoubtedly, many more exist.

CONCLUSION

We postulate that true scientific greatness can only occur when nested in integrity and agree with Lee (1999), "that the most important trait in a scientist is integrity; this is above intelligence, creativity, or determination" (Brown and Guy 2007, p. 3). One of the primary missions of the American Fisheries Society is to advance fisheries and aquatic science and promote

Table 1. Recommendations and publishing strategies to maximize publishing success while maintaining scientific integrity and their associated benefits.

Recommendations	Benefits
Be creative and think "big picture" topics	If your manuscript applies to many different research topics, it may be cited more
Prepare a well-designed project	Will save time at the end of the project
Don't be afraid to move on when a paper gets rejected	Time can be spent on other (better) projects
Be patient and work hard	The publications will come
Establish a research niche early in your career	The researcher becomes more familiar with the literature, thus making it easier to gain funding, design experiments, and write up the manuscript for publication
Publishing Strategies	**Benefits**
Collaborate, collaborate, collaborate	Coauthors often have less work than the primary author. It will broaden your research background. It also allows researchers to develop professional relationships that may foster future projects or manuscripts
Work with extant data sets (students: ask your advisors if they have any of these lying around)	Fast turnaround rates because time is not spent collecting and processing data
Publish short communication briefs or notes	Often less time is spent on the manuscript and they have faster turnaround times than a full manuscript
Publish in peer-reviewed open access journals	Faster publication rate and impact factors may eventually rival traditional journals because they are more accessible
Conduct laboratory experiments and publish	Faster turnaround time than traditional field studies, and significant discoveries can be made in the laboratory
Publish class projects (for students and professors) or term papers	The work is already being done to complete the project for a grade and this is a way to boost manuscript quantities

the development of fisheries professionals—these goals are impossible without integrity at the heart of the scientific process. We recommend holding science at the same level or ahead of personal or professional benefits, and we never recommend placing personal or professional gains as a priority, because this will no doubt result in a sacrifice of sound science.

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WINNER
One Fish, Two Fish, Where Fish for Whitefish?

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DESIGNING A CLIMATE CHANGE DECISION-SUPPORT TOOL FOR GREAT LAKES LAKE WHITEFISH

Imagine you are playing a game of *Monopoly* and are investing wisely for the future. You have numerous hotels on "Boardwalk" and are raking in the dough any time another player lands on your valuable property. Then, the rules of the game unexpectedly change. "Baltic Place" is the hot commodity and all of your painstaking investments in "Boardwalk" are for naught. Now, imagine this is not a game and your actual livelihood and family depend on your success.

Currently, the Great Lakes Lake Whitefish fishery is the most economically valuable commercial fishery in the upper Great Lakes. But, like the modified *Monopoly*, this fishery could face new "rules of the game" from climate change. My dissertation research is developing a decision-support tool to ensure that the fish, the fishery, and the livelihoods dependent upon them remain sustainable in the face of climate change.

"A BETTER FISH CANNOT BE EATEN!"

Lake Whitefish, a member of the salmon family, are found in coldwater lakes throughout much of northern North America. Like many salmon species, they are highly valued as food fish: fresh fillets, smoked fillets, frozen fillets, fish cakes, spread, and sausage. Lake Whitefish have been a staple of native communities in the Great Lakes for thousands of years and were a particular favorite of early French explorers—one even wrote that "a better fish cannot be eaten!" They are a favorite still today; over 15 million pounds of Lake Whitefish are consumed each year in the Great Lakes region alone.

AIMING FOR 20/20 VISION OF LAKE WHITEFISH RECRUITMENT

To reach someone's dinner plate, a Lake Whitefish must survive a treacherous journey from an egg to a larvae to a juvenile and, finally, recruit to the fishery. Ultimately, we want to know how many Lake Whitefish enter the fishery so that we can determine how many can be harvested without negatively impacting future populations and harvest. But, it is next to impossible to know how many Lake Whitefish are actually out there. So, we estimate the population size using mathematical modeling.

You can think of mathematical modeling of fish populations like a visit to the eye doctor. For many of us, perfect 20/20 vision is as unobtainable as knowing true population abundance is for fishery managers. But, with corrective lenses and modeling approaches, we can get pretty close to estimating (or seeing) those realities. Like adjusting the lenses in an eye exam, including biologically relevant variables in the model can often improve our ability to predict fish populations.

My dissertation research does just that. I am examining which climate factors influence recruitment of Lake Whitefish to the commercial fishery. Because Lake Whitefish spawn in the fall and hatch as larvae in the spring, these time periods are critical to the survival of Lake Whitefish.

My preliminary results indicate that fall and spring water temperatures are particularly important influences on Lake Whitefish recruitment.

COULD WARMER TEMPERATURES BE GOOD FOR A COLDWATER FISH?

The relationship between water temperatures and Lake Whitefish recruitment has significant implications for the fishery in the context of climate change. Climate change is expected to increase surface temperatures of the Great Lakes by as much as 7°F. The positive relationship between spring temperatures and recruitment suggests the potential for increased Lake Whitefish production in the Great Lakes, if food resources are available for larval Lake Whitefish. However, the negative relationship between fall temperatures and recruitment, possibly reflective of increased storm events, may inhibit egg survival and Lake Whitefish production.

PREDICTING THE *MONOPOLY* BOARD

These potential changes in Lake Whitefish populations have significant repercussions for fishermen and the communities dependent upon this fishery. Returning to the *Monopoly* analogy, if you could predict changes to the game, you would change your strategy and invest differently. Likewise, my research will help the Lake Whitefish fishery adapt to anticipated climate change. I am developing a decision-support tool from my Lake Whitefish modeling efforts to assist fishermen and fishery managers. This tool will tell fishermen if it's better to give up on the "Boardwalk" fishery locations and focus their investments on "Baltic Place" for a more sustainable and prosperous fishery. Because, ultimately, who doesn't want to win *Monopoly*?

RUNNER UP (Tied)
Fish Go Wild in California

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Eagle Lake is certainly not your average lake. Its isolation at the edge of a great basin, its very large expanse, the lack of outlets, and the alkaline waters make this lake like no other in California. Yet what makes it special for me is to be among a group of people gathered together at the lakeshore, getting ready for a day of work. In the midst of a positive atmosphere, people are laughing and chatting and, at the same time, sharing their different views from a wide range of cultures. Rob, a Native American, puts on his waders; Gerry, a lifetime fly fisherman, carries nets over his shoulder; and Karen, an undergraduate, organizes data sheets. Loggers and biologists are also here, all of them volunteers united in a cause: to restore the wild populations of Eagle Lake Rainbow Trout. My professor, Peter Moyle, has been working on this issue for more than 30 years, and today he wears a big smile because one of his plans is coming to fruition. I am also excited to be a part of all this because the project for my master's degree has definitely begun!

Rainbow Trout have lived in Eagle Lake and its tributary, Pine Creek, for millennia and have developed some unique traits enabling them to survive in a unique environment. Historically, these trout migrated over 50 km upstream from Eagle Lake to reproduce in the headwaters of Pine Creek, and juveniles spent their first years in the stream before moving back to the lake. Unfortunately, the Pine Creek habitat became increasingly inaccessible for spawning as the result of degradations brought on by logging, road building, and heavy animal grazing.

By the 1950s, Eagle Lake Rainbow Trout were on the verge of extinction when a weir was built at the mouth of the creek. Today, because spawning trout cannot overcome the weir, fish are removed from the river and taken to a hatchery for reproduction. Such measures have necessarily become part of the "natural" life cycle of these fish because of the drastic alterations and blockages in their habitat. With the survival of the species dependent on hatchery production, and hatchery operation dependent on funding and management, the Eagle Lake Rainbow Trout could become extinct unless a naturally reproducing population can be once again introduced.

Fortunately, Pine Creek is recovering from a century of inflicted damage after the completion of several restoration projects. But further efforts will be required to achieve the primary goal of reestablishing the wild trout populations. We took steps in this direction by capturing mature trout in the embayment at the mouth of Pine Creek and transporting them to the headwaters above the weir. A month after releasing the fish in the headwaters, our volunteer team came together again, and despite being exhausted after a long workday, we were exuberant; the project was a success. The creek was teeming with young trout full of life!

Our accomplishments have shown that *trapping and trucking* is a viable means of restoring a naturally reproducing fish population. Transporting Eagle Lake Rainbow Trout from the lake to the headwaters will be necessary as long as the weir continues to totally block the migration of spawning fish. However, if the weir were modified to allow free passage, the trout would once again be able to migrate to the headwaters on their own, where they could reproduce and grow in the wild. This project is, in fact, the first of more to come, and the positive results of our team's efforts will have provided a basis on which to build.

The volunteers have scattered now, but I believe all of us will tell others of our experience and continue to spread the message that a restoration project can be successful if we work together to make it happen. This kind of education, one person passing on the mission to another, may be one of the most effective means to achieving conservation of native species. I hope that one day Rob will be showing his grandchildren runs of wild trout in Pine Creek that their ancestors once depended upon centuries ago.

From the Archives

To get truthful stories, go to the recording secretary, but if you want to learn how to lie, that matter is within the province of the corresponding secretary, and all information will be cheerfully furnished by him. (Great applause and laughter.)

John E. Gunckel (1902): Transactions of the American Fisheries Society, Transactions of the American Fisheries Society, 31:1, 34.

RUNNER UP (Tied)
A Southern Revival: Researchers and Young Anglers Contribute to the Revival of Southern Appalachian Trout Fishing

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Flame azalea blooms blanketed the opposite river bank in vibrant orange while long morning shadows still harbored temperatures that required a warm beverage to chase away the chills of the Appalachian Mountains. A gaggle of kids, warm with excitement, flanked the close shoreline like a battalion ready to face its adversary. The bell chimed, children cheered, and the Trout-tacular commenced.

In a flash I spotted the 9-foot 5-weight fly rod dance in a deep arc that needs only be described by two words: Fish on! I bolted in the direction of the action like an ice fisherman going full steam to tend to a sprung tip-up at a hundred paces. During my pursuit, the youngster positioned himself on a recently deposited gravel bar and demonstrated he was a worthy adversary in the battle of reeling in a trout. The Brook Trout danced on the end of the line and yanked its head violently from side to side like a dog attempting to yank the head off of a stuffed toy. The fish put up a stellar fight, but the young angler's efforts proved victorious. It was the first trout of hundreds the kids caught that fine June day, all representing the revitalization of something that was lost generations ago.

Going back to the late 1800s, the virgin timber along the spine of the Appalachian Mountain Range was a treasure trove for entrepreneurial mountaineers. Short-term financial gains were made by clear-cutting the timber, but youngsters of today still feel the repercussions of resource depletions made by those whose gravestones now wear smooth with time.

For more than 100 years, native Southern Appalachian Brook Trout populations have been suppressed by historic logging practices that left bare soils to erode and smother stream habitat while robbing streams of cooling shade. Many streams that once held vibrantly colored "Brookies" are now unable to sustain wild fish populations, leading to barren streams and lost angling opportunities.

In an effort to revive trout angling in the Southern Appalachians, nearly a million trout are raised in hatcheries each year in North Carolina to stock streams and rivers. Many of these trout are destined for waters regulated as Delayed Harvest, where all fishing is catch-and-release from October to June. This regulation provides longer angling seasons than traditional put-and-take stockings but also provides a situation where movement, survival, habitat selection, and food acquisition of trout all play a crucial role in the long-term success of the stocking program.

To best understand trout behavior in Delayed Harvest waters, I surgically implanted 3,000 microchips and 120 radio tags inside the abdomen of hatchery-raised trout and released them into the wild. Antennas were constructed along river bottoms to record the movement of tagged fish as they swam beyond regulated waters, while floating antennas were paddled down the rivers with a raft to reveal habitats where tagged trout congregated. Understanding the behavior of these fish has enhanced angling opportunities by promoting stocking in areas that demonstrate long-term trout survival combined with a high abundance of optimal habitat, therefore ensuring the long-term viability of Mountain Trout angling.

Back at the Trout-tacular, hundreds of young anglers were elated to be scientists for a day and play an active role in my research. They used scientific equipment to scan their hooked fish for implanted microchips. Those fish with tags were weighed and measured, and children were taught to calculate how much the fish had grown and how far the fish had moved from its original stocking location. Not only did this encourage an active role of young anglers in science, but the information they collected proved instrumental in the success of the project.

As the Trout-tacular progressed and the sun rose overhead, I settled into a prime spot to watch the hypnotic cadence of young anglers cast perfect bends of line over their heads, then back down to the water as gently as they would lay a sleeping baby in its crib. With a new cohort of young scientist anglers taking to the streams, I have no doubt that the revival of trout angling in the Southern Appalachian Mountains will continue to thrive.

Science Communication in a Digital Age: Social Media and the American Fisheries Society

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ABSTRACT: *Social media platforms are effective tools used to help communicate and increase involvement in cultural, political, and scientific circles. In 2012, an ad hoc committee was established to explore online fisheries science communication and how social media platforms can be utilized by the American Fisheries Society (AFS). A survey was disseminated to all AFS units (chapters, sections, divisions) and student subunits to better understand the current use of social media within the AFS. A relatively high response rate (82%) provided some confidence in the survey results—namely, that nearly 69% or more of units and subunits used social media. Facebook was the dominant platform used (59%; all others < 15%) and almost exclusively (97%) for the purpose of communication. Education, outreach, and member recruitment were other reasons for social media use. Finally, whether units currently use social media or not at all, it was recommended that AFS-led workshops and assistance would increase the usefulness of social media.*

ONLINE SCIENCE COMMUNICATION AND THE AMERICAN FISHERIES SOCIETY

> *"... if scientists could communicate more in their own voices—in a familiar tone, with a less specialized vocabulary—would a wide range of people understand them better? Would their work be better understood by the general public, policymakers, funders, and, even in some cases, other scientists?"* *Alan Alda*

The What and Why of Social Media

The term "social media" describes the various forms of online technologies—often referred to as "platforms"—that were developed to form virtual communities for sharing information, cultivating discussions, and building relationships. For example, Facebook, Twitter, and blogging are all common forms of social media used both in popular culture and science. Though social media platforms were designed for the purpose of individuals engaging socially online, these tools have grown far beyond displaying that perfect batch of French toast to your friends. With their almost-instant popularity and growth, businesses; nongovernmental organizations; local, state, and federal agencies; and professional societies have discovered the benefits of tailoring these platforms for their own uses as a powerful and cost-effective method of reaching the masses and building an audience.

The choice to delve into social media is a personal decision, and some fisheries scientists will see it as a hindrance to their already overloaded schedules, whereas others view its use as a vital part of their career enhancement. There have been a number of recent articles, including those in peer-reviewed journals, that stress the benefits of the scientist taking an active role in

online communications (Regenberg 2010; Fausto et al. 2012; Bik and Goldstein 2013; Ogden 2013). Social media platforms (see text box) have been likened to office water-cooler discussions, or a virtual cocktail party, where you can listen in or take part in a variety of conversations. The ability to "eavesdrop" on these conversations provides insight into what is being said, who is saying it, and who is listening. It is the scale of this virtual party that gives social media its power. How many cocktail parties have you attended where established scientists, early career biologists, undergraduates, graduate students, teenagers, general public, authors, conservationists, anglers, etc., all convene and exchange information in one place?

Whether you view social media as a colossal waste of time or a remarkably advantageous tool, it is the way the world is networking and communicating. The data showing its usage can be a bit staggering (Foster 2012; The Nielsen Company 2012), with over a billion active Facebook users in 2012, 23% of whom check Facebook five or more times daily. In the United States alone there are over 100 million active Twitter users and, of these, 40% do not use Twitter to post but, rather, use their Twitter feed to gather information. Most enlightening is the analysis on what Twitter users retweet (information they pass along to others). The number one item users shared was interesting content, beating out humor, celebrity status, and personal connections. Think of that trout fisherman trolling (pun intended) his Twitter feed looking for new information on his favorite sportfish to share with other anglers. In the 2012 Nielsen report, the State of the News Media, Pew Research Center's Project for Excellence in Journalism, listed social media, with Facebook in the lead, as a critical news source. If the growing trend continues, most of the world will go to social media as *the* way to get information, including scientific news.

Though there is much to be written about the benefits of the individual fisheries professionals engaging in online communication, the topic we address here is how the American Fisheries Society (AFS) can directly benefit from an active presence in social media communities. In light of the increasing role of social media in science, AFS President John Boreman appointed an ad hoc science communication committee to assess how the society (1) could use social media to communicate and connect membership and (2) could leverage social media platforms to share member-generated scientific information with those *outside* the society.

The discussion about how the AFS can best communicate both among its membership and beyond the society (i.e., committee objective 1) is not a new one. The history on the development of society guidelines for advocacy (which addresses education and outreach) is an interesting one and can be reviewed on the society's website (fisheries.org/policy_advocacyguidelines). Effective communication, education, and outreach have been a reoccurring theme in the society's strategic plans, including the current one (*AFS Strategic Plan 2009–2014*, Objectives 1.1, 3.1, 3.2, 3.4), and are often included in the yearly plan of work. With the rapid growth of new online tools for networking, there are many questions to tackle when considering social media and the AFS: How do other professional societies benefit? Is the current level of engagement enough?

WHAT IS SOCIAL MEDIA?

Definition: ***Term used to describe a variety of Internet-based platforms, applications, and technologies that enable people to interact. Platforms are meant to be community-based, through which users create online communities to interact, collaborate, and share information, content, ideas, and personal messages.***

Prominent examples of social media:

- **Blogs**: Short for ***Web log***; a blog is a publicly accessible webpage that provides commentary on a particular subject or theme.
- **Facebook**: A free social networking website that allows registered users to create profiles, pages, and groups to post messages and share content, such as websites, photos, or video.
- **Flickr:** A free online service that allows registered users to upload and share photos and video clips.
- **Google Groups:** A free service from Google Inc. that provides a forum for collaboration and discussion groups.
- **Google+:** A free social networking service that allows users to share updates and communicate selectively with different groups (called "circles").
- **Google Hangout**: A free video chat service from Google that focuses on group interaction and enables group chats with up to ten people at a time.
- **HootSuite** (free and $): A social media management system that enables teams to collaboratively execute campaigns across multiple social networks from one dashboard.
- **Instagram:** A photo sharing platform, allowing users to follow and comment on uploaded images.
- **LinkedIn**: A free social networking site designed to allow registered members to establish and document networks of people they know and trust professionally.
- **Pinterest**: A free social curation website where the main focus is visually sharing and categorizing images found online.
- **Reddit:** A free new curation site, where readers vote on the best news and can set up subreddit news.
- **Scoop.it:** A publishing platform that allows anyone to create an online magazine centered around a particular topic.
- **Storify:** A social network service that allows the user to create stories by dragging individual elements from other stories from social media sites such as Facebook and Twitter.
- **StumbleUpon**: A free site that recommends websites, photos, and videos based on your usage and input.
- **Tumblr**: A free blogging platform that allows users to post text, images, videos, links, quotes, and audio to their tumblelog.
- **Twitter**: A free microblogging service that allows members to follow other users and/or broadcast their own character-limited posts called "tweets."
- **Vimeo:** A free service that allows users to upload and share videos.
- **Vine:** A free Twitter-like service that, instead of 140 characters, the user makes/posts 6-second videos.
- **Wikipedia**: A free, open content online encyclopedia created through the collaborative effort of a community of users.
- **YouTube:** A free service that allows registered users to upload and share videos.

Who should evaluate this engagement? What platforms best suit the AFS's needs? How can the AFS capitalize on the talents of our membership? What level of online science communication support should the parent society provide?

Our Members

The first step toward addressing these questions was to gather baseline information on the current status of social media use in the AFS. The science communication committee constructed a web-based survey to assess how individual AFS units and subunits use social media to connect to their membership. The survey was sent out to the presidents of all AFS units (chapters, sections, divisions) and student subunits (note: the sample of student subunits was limited by the contact information available and is admittedly underrepresented). Of the units and subunits contacted, we received an 82% survey response rate, providing the committee with numerous beneficial insights into social media usage. Overall, 74% of respondents reported that their units use some type of social media. Of those units that were not currently using social media, 28% said their membership indicated that they were interested in using it in the future. Student subunits comprised the largest percentage (90%) of AFS social media users, followed by sections (72%) and chapters (69%). The most popular form of social media use was Facebook (59%), followed by (in order of use) Twitter (14%), blogging (9%), Google Groups (7%), LinkedIn (5%), YouTube (5%), and Google+ (4%). Responses varied widely as to whether units had plans to integrate any of these platforms in the future.

The majority of units that engaged in some form of social media used it to communicate within their unit's membership (97%). Other reasons listed for units adopting social media included adapting to changing times (65%), education and outreach (49%), communicating with nonmembers (49%), attracting younger members (46%), and use requested by membership (16%). Fewer than 30% of respondents listed used social media to communicate with recreational anglers, the angling industry, the commercial community, or the media.

When asked what kind of content they provided through social media, AFS units indicated that they primarily provided information about unit meetings (85%) and activities (80%), fisheries-related news and studies (63%), jobs and graduate school positions (61%), national and regional meetings and conferences (51%), grants and scholarships (47%), and award announcements and nominations (47%).

THE PARENT SOCIETY

The survey also addressed what services and assistance the units would like the parent society to provide. The top two requests for assistance from units that currently use some form of social media were for workshops that provided guidance and tools for effective communication (60%) and articles in *Fisheries* that focused on online communication (60%). Other suggestions on how the parent society could support units' social media use were providing how-to guides on social media tools (47%), increasing the AFS's own presence on social media (45%), guidance on appropriate content to post via social media (40%), and personnel at the parent society to assist units with social media (28%). For units that did *not* use any form of social media, the top three requests for assistance included hosting workshops that provided guidance and tools for effective communication (59%), personnel assistance from the AFS to assist units (59%), and how-to guides (53%).

Three major themes emerged from this survey:

1. The majority of AFS units and subunits are engaged in social media at some level, indicating that this is currently an important form of communication for the membership;
2. Of those units not engaged, individual assistance, workshops, and how-to guides were listed as ways the AFS could help, suggesting that if this information was more readily available, social media may be useful to these units;
3. There is significant interest among AFS leadership for the parent society to provide assistance to units on the effective ways of using social media to communicate both within and outside of the society (i.e., an educational and outreach tool).

Although guidance on appropriate content to post to various social media platforms did not rank among the most important ways the parent society could help, the science communication committee is developing a policy for the parent society. The Oregon chapter, a very active user of social media, has already addressed this need and has approved its own social media policy, which will likely serve as a base model for this committee. Current AFS guidelines and policy statements for both advocacy and professional conduct do not address the modern forms of online communications. Those of you who are already engaged in social media are likely aware of differences in communication styles on the various social media platforms, which are typically friendlier, more approachable, and often jovial. Unlike peer-reviewed scientific publications, opinions and personal injections are often incorporated in social media posts; however, social media posts representing the society should stay objective, nonpolitical, and professional. The forthcoming social media policy will address these and provide some goalposts within which media originating from the society can operate.

The survey showed that many of the AFS units either have or are establishing an online presence and are tailoring it to suit their own purposes. Though the parent society has established a Facebook page and a Twitter account, activity has been mostly limited to posts by members and not directly from the AFS. Currently, there is no single strategy in place for how best to reach target audiences or to evaluate success.

Outside of AFS

Several professional societies and scientific organizations have firmly embraced social media, and many have several accounts for their various purposes. The American Association for the Advancement of Science has a strong Twitter following of 14,000+ individuals, as do the National Science Teachers Association and the Union for Concerned Scientists. The Twitter accounts for scientific journals also have strong followings

(Oxford Journals has a following of over 9,000, while the journal *Nature* has half a million followers of @NatureNews). The promotion of new journal publications has resulted in several assessments on the benefits of promoting publications on Twitter and increasing impact factors (Eysenbach 2011; Weller et al. 2011; Shuai et al. 2012; Darling et al. 2013).

In the wide-ranging world of fisheries, there is a strong online audience of anglers, many of whom have embraced social media as a way to gather information about their favorite sportfish. On Twitter alone, the popularity of online angling communities is evident, with the strong following of organizations like Trout Unlimited (>11,000), B.A.S.S. (> 100,000) and Orvis Flyfishing (>16,000). This popularity is not just tied to seeing who caught the biggest fish. Popularity of the accounts of The Wildlife Society (>13,500 Twitter followers), the Monterey Bay Aquarium (28,000 Twitter Followers), and Ducks Unlimited (626,000 Facebook likes) indicates that many people use social media as a source for their natural resource information. There is tremendous potential for the AFS to expand its role as a national resource for fisheries information.

OUR RECOMMENDATIONS

The AFS Science Communication Committee recommends a three-pronged approach for developing social media use by the society. First, to allow for maximum flexibility within a common framework, we recommend developing an AFS policy on the use of social media that can be adopted and adapted by the various units within the society. Second, given the relatively widespread desire among various AFS units, we recommend that the parent society dedicate resources to developing communication workshops and how-to guides for use by the various AFS units. Finally, given (1) the importance of communicating fisheries science with the public in an electronic age, (2) the underutilization of social media platforms by many AFS units, and (3) the relative lack of knowledge on how to best utilize social media among AFS units not currently adopting social media, we recommend developing a strategy for encouraging the judicious expansion of social media usage by all AFS units.

CONCLUSION

In this ever-evolving online world, if there is an unoccupied niche, it will likely be filled. There are currently several groups dedicated to science communication, but how many are focusing on aquatic and fisheries sciences? Are the many anglers who are already online looking for information to be better stewards for fisheries and aquatic environments? Early career fisheries professionals have several choices for being involved in an organization. Are they searching for a society that is relevant with the changing times? We suggest that the AFS use its substantial fisheries science knowledge and take advantage of the current trends in online science communication. If we do not, we may be missing out on an opportunity to promote and advance the exceptional work being done within the society—and, in the process, we might very well watch our membership fall behind.

How are individual AFS members using social media?

We don't know... yet! The Fisheries Information and Technology Section (FITS), in collaboration with the Electronic Services Advisory Board, is interested in how professional and student members of the AFS are using social media for personal and professional communications.

We have developed a survey, distributed to AFS members this summer, that focuses on individual use of social media to determine which platforms are most commonly used, frequency of use, and applications. The results of this survey will tell us how the society's members currently use social media and provide pathways for more effective and timely communications through social media in the future. We will be presenting these results at the social media symposium that FITS and the Electronic Services Advisory Board are sponsoring at the 143rd Annual Meeting in Little Rock. The symposium promises to be a great day for learning about the uses of various social media platforms and providing reasons why you might consider using social media.

The Fisheries and Information Technology Section is currently working to provide assistance to individual AFS members on the use of and best practices for social media. For more information on FITS or the survey, please contact Julie Marie Defilippi, Atlantic Coastal Cooperative Statistics Program, 1050 N. Highland St., Suite 200 A-N, Arlington, VA 22201 (julie.defilippi@accsp.org).

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Interview with Jason Link: Champion for Ecosystem Science and Management

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Editor's Note:
This is the first installment of a series of interviews conducted by American Fisheries Society (AFS) members with scientists at the forefront of fisheries management in the United States who have both a national perspective and experience producing solutions to some of our most difficult issues facing U.S. fisheries management. In this interview with Jason Link, the nation's first Senior Scientist for Ecosystem Management, we discuss the newly established role for National Oceanic and Atmospheric Association (NOAA) Fisheries and more broadly explore the state of ecosystem-based fisheries management. The interviewers have added in references to facilitate access to background information for those interested in further context.

What does it mean to be "senior scientist for ecosystem management" for the NOAA Fisheries?

In a word, to be a "champion" for ecosystem science and management.

Scientists in NOAA Fisheries, and more broadly the NOAA (and certainly across other partner agencies and institutions), are conducting cutting-edge, fantastic ecosystem science to better understand marine (and coastal and Great Lakes) ecosystems. How do we take this really amazing science and translate it into operational content to inform decisions for best managing these ecosystems? How do we take our science-based knowledge and wisely steward the goods and services associated with these ecosystems? In many respects we are doing so. Yet in other ways we need to explore more efficacious means for this translation. And, of course, we need to always keep striving to improve our knowledge of how marine ecosystems are structured, function, and respond to changes.

My role is to be a voice on behalf of that science and management—particularly in the context of managing living marine resources (LMRs)—to help create opportunities to do more of that ecosystem-based science and management, to ensure that we in NOAA Fisheries are connecting with all the right partnerships to do so, to help develop capacity to do an even better job 5–10–15 years from now, and to engage in conducting some of that scientific research and application of it myself.

Is the United States currently applying ecosystem-based fishery management (EBFM)? Is the U.S. approach truly "ecosystem based" or is it more of an "ecosystem approach" to fisheries management? How do we improve on what we are already doing?

I think the United States is off to a good start in implementing EBFM. A review Tony Pitcher did a few years ago (Pitcher et al. 2009) noted that the United States is in the top five for all categories and measures of implementing EBFM. Similarly, a couple years ago there was a 4th National SSC Workshop (Seagraves and Collins 2012) that described efforts to implement EBFM, which noted much of the work that is extant or being considered (www.nmfs.noaa.gov/sfa/reg_svcs/Councils/ccc_2012m/TAB%205/SSC_Workshop.pdf). Further, NOAA's Science Advisory Board's Ecosystem Science and Management Working Group has conducted reviews of NOAA Fisheries efforts to support EBFM in the FMC [Fishery Management Council] context (www.sab.noaa.gov/Working_Groups/standing/docs/2008/ESMWG_TOR_FINAL.pdf). In these and related instances, it is clear that there has been a lot of good work, but there is also much more to be done. So I would note that we are indeed making progress, but EBFM is still not fully applied.

The second part of your question highlights the different levels of ecosystem management in general. It highlights that we need to do both ecosystem approach to fisheries (EAF) and EBFM (as well as ecosystem-based management, EBM). Let me attempt to clarify, and add an EBM consideration to what you noted.

Our intended approach is to view marine ecosystem management at three levels:

1. Ecosystem-based management, where multiple ocean use sectors are discussed and strategic decisions made as to various tradeoffs among sectors.
2. Ecosystem-based fisheries management, which has facets of both strategic and tactical decisions solely within the fisheries sector.
3. Ecosystem approach to fisheries, which adds in ecosystem considerations to the stock assessment focus of efforts for

tactical management decisions, again solely within the fisheries sector. In this context it is largely fisheries taxa but could be expanded to any LMR species or stock focus more generally, such as protected species.

The reason I make distinctions among these three levels is that the analytical tools, governance bodies, degree of detail, mandates, venues for evaluating science, and venues for ultimately making decisions vary depending upon the issue at hand. So depending upon what one is most interested in, I might suggest employing technically different approaches, as appropriate, for any of these levels. Many of the existing analytical tools and venues are extant or being further developed and refined, but they may not be appropriate if applied at different levels of ecosystem management. A part of my new role will be to help develop new analytical capabilities and more clearly delineate at what level the range of a particular issue should be addressed.

For example, consider forage stocks such as small pelagic fishes. For EAF, one would need to consider the effects of environmental factors (e.g., temperature changes or El Niño events) and ecological factors (e.g., predatory removals) in addition to targeted fisheries removals to truly grasp the dynamics of such stocks. Using the same focal species as an example, for EBFM one would need to consider not only the impacts of other factors on these forage stocks but also the dynamics of these forage stocks on other parts of the ecosystem. For instance, if there are seabirds or marine mammals that have some form of protected or conservation status that are highly dependent upon small pelagic forage fishes, and there are commercially targeted groundfish that are also major predators of these small pelagic forage fishes, and there are multiple fisheries operating on both the groundfish and the small pelagics, then clearly a more integrated, "bigger picture" evaluation of the whole system and how it fits together is needed to address the potential tradeoffs among the different uses of and impacts to these forage stocks. Further, if these forage stocks represent a key pathway of energy from lower trophic levels to upper trophic levels, then systemic resilience and related considerations would need to be evaluated. Now consider the same example, but particularly where such small pelagic fishes are diadromous and may spawn in estuarine or riverine systems. For EBM, consideration of these small pelagics and their role in the ecosystem is warranted in a broader context for, say, power plant discharges (thermal impacts), eutrophication, toxin deposition, hydroelectric energy generation, dredging for navigation safety, and similar such uses that might impact the spawning habitats of these species. This example should serve to point out that there are no easy answers or solutions, and I would not presume to provide any for this hypothetical case without more specific details for a particular situation, but it should also highlight the need for considering these types of issues more systematically and across the range of ocean uses we commonly observe.

Do you see ecosystem science holding more relevance to fisheries stock assessment now than it has in the past in more traditional stock assessment approaches? If so, in what way?

Absolutely. And I see stock assessments holding relevance for ecosystem assessments. Again, they are both exploring different facets of marine ecosystems, their component LMRs, and how we manage them.

In the example I noted above for EAF on forage fishes, there is a clear need to include those factors that influence the dynamics of important forage stocks. The concern is that by not doing so we will miss important features of stock dynamics and perhaps misestimate key parameters in assessment models and thus potentially provide misleading management advice for these stocks. I am working very closely with the NOAA Fisheries' Senior Scientist for Stock Assessments, Rick Methot, to explore how we can better marry these "Tier 3" considerations in a stock assessment context, to improve how we do basic fisheries management via an EAF.

Several of us have published on this concept before (Bundy et al. 2012), but I view the issue you raised as a triad: with fisheries production in the center, as influenced by internal biological dynamics (e.g., ecological interactions), environmental factors (e.g., temperature), and fishing. The ultimate point being that we need to consider all factors that influence fisheries, and we need to consider how fisheries, as well as other human activities, influence marine ecosystems.

In your book, *Ecosystem-Based Fisheries Management: Confronting Tradeoffs* (Link 2010), you have a chapter addressing the need for further incorporating socioeconomic considerations in EBFM. Do you have specific plans in mind to facilitate socioeconomic considerations? Plans for integrating the work of fisheries biologists and economists? Specific tools?

You may also recall that in that chapter I acknowledged that I am a total amateur on the topic, so I am pretty certain that I am not the best person to develop such specific plans or tools. Just as I am working closely with the senior scientist for stock assessments, I am also working closely with NOAA's new Senior Scientist for Economics, Doug Lipton. He would be able to speak much more intelligently than I on this topic. That said, I would strongly advocate that considering a broader range of human-related issues is critical for successfully implementing EBFM.

I do want to acknowledge that just as we are integrating across the biological sciences, taxonomic resolutions, and natural sciences for ecosystem and stock assessments, we also very much need to integrate across natural and social disciplines to incorporate socioeconomic facets into EBFM. There are obvious, general areas where we can and need to do so. For example, exploring a broader range of valuation of nonmarket factors of an ecosystem, exploring the thinking behind decision-support systems, better defining what optimal yield is for an entire system, exploring behaviors of ocean users such as fishers, and so on are all critical elements we need to consider. Yet at its core, EBFM is ultimately about confronting tradeoffs. We absolutely need social scientists involved to help us best handle how to address these tradeoffs.

An example where I've seen this work well is by teams of ecosystem and economic scientists like Isaac Kaplan, Jerry Leonard, John Walden, Geret dePiper, Rob Gamble, Sarah Gaichas, and Gavin Fay, (e.g., Kaplan and Leonard 2012), who are exploring the full range of management tradeoffs—from biological to ecological to economic to social consequences—for a set of various management scenarios using coupled ecosystem–economic models. There are other instances we could note with a wide range of tools and models, but the key point is to ensure that there is engagement among these disciplines. My suspicion is that some modeling approaches, like Atlantis (Fulton et al. 2011) or risk analyses, might be one vehicle to bring these disciplines together.

Single-species fisheries management relies on reference points that are well grounded in policy (e.g., The Magnuson-Stevens Act). Such reference points (e.g., population targets and thresholds, overfishing limits) have been developed and tested in fisheries management for many years. Do you foresee a similar role for ecosystem-based management reference points? If so, how do you see these reference points being implemented?

Yes. They should be implemented in at least two ways. First, in an EAF context, I would envision an expansion of the reference points you noted to be calculated much more inclusive of ecosystem considerations. For example, the sardine fishery on the West Coast has, at least to some degree, always had some form of thermal consideration included in its assessment. How much that has actually altered the reference points at given times may be debatable, but it has certainly informed them and the decisions based off of them. I would note that there are more extant cases of this than people in our field are generally aware of, but there are many more that are equally feasible to do which we should be busy about implementing.

Second, in an EBFM context, we need to develop similar reference points (or similar such decision criteria) at the ecosystem level. In short, there is only so much productivity in any given ecosystem that can be transferred up the food web to upper trophic level species of interest to fisheries. If we erode those productions pathways and remove more than the system can produce, that has consequences. If we erode habitat or load too much toxins, similarly there are consequences for fishery production. But we've not typically been thinking about this systematically.

Over 10 years ago, Steve Murawski (2000) noted the need to define ecosystem overfishing (I would add that this consideration should probably be broadened to all ecosystem perturbations beyond simply overfishing), and much work has been conducted on that topic since then. Most of the work conducted on this topic in the past decade has focused on ecosystem indicators, and some has come from food web modeling, but the proverbial "holy grail" of delineating overfishing of an ecosystem has remained elusive. There have been many proposals for this definition in the past decade, but none have had both the theoretical and empirical rigor needed to be fully considered operational, at least not just yet. Some recent work, for example, by Jamael Samhouri et al. (2009, 2010), Fabio Pranovi et al. (2012), Simone Libralato et al. (2008), and Scott Large et al. (2013), has gotten us closer to this end. Though this remains an exciting area of research, we definitively need to nail this down, run all the sensitivity tests on it, capture sources of uncertainty, couple the theoretical underpinnings with empirical observations, test it in some of the scenario testing described above with coupled ecosystem–socioeconomic models, and begin to explore how we could make such a systemic-level reference point operational.

How these would be implemented would be in the context of executing EBFM and maybe EBM, but probably not at the EAF species or stock level. I am not sure that we have the full suite of venues and procedures to entirely explore, vet, and use these systemic-level reference points to make decisions just yet, but there are prior examples that could be informative. For instance, one could readily envision adapting the way the North Pacific Fisheries Management Council uses their total groundfish cap, or the way the Pacific FMC has their forage threshold, or the way CCAMLR [Commission for the Conservation of Antarctic Marine Living Resources] sets aside some krill for other taxa in the Antarctic, or CSIRO [The Commonwealth Scientific and Industrial Research Organisation, Australia] and the AFMA [The Australian Fisheries Management Authority] in Australia uses cumulative systemic risk to minimize overarching effects, or some regions take a place-based approach to reef management, and so on more broadly at other FMCs and regional fishery management organizations. The salient point being that this would probably need to be done in some overarching, coordinating fisheries "ecosystem plan" and not on a stock-by-stock basis by the FMCs. This is essentially what the Ecosystem Principles Advisory Panel suggested in 1999.

Let me also flag this observation. In his book, Tim Smith (1994) noted that it took a long time, as in multiple decades, to develop the basis and background for standard, species-focused living marine resource management. There were a lot of challenges and debates along the way. In my thinking, Peter Larkin's 1996 paper really codified the need to start the debate for EBFM. Thus, we've only been truly and intentionally focusing on making marine EBFM operational for one and half, maybe two decades tops. So in that context, I do think there has been significant progress, albeit slower than some might like but well-paced historically speaking.

NOAA fisheries stock assessment scientists are already frequently overburdened in the number and frequency of stock assessment commitments each year; do you see the inclusion of ecosystem science as an added responsibility for these scientists? If not, do you envision a mechanism by which the NOAA will need to add capacity for scientists whose role is explicitly to provide information on ecosystem stressors to the stock assessment process?

Imagine this instead. What about a multidisciplinary team working on joint or integrated assessments of targeted species,

protected species, endangered species, habitats, their overarching ecosystems, and the socioeconomics associated with them? This team would have a cross-fertilization of ideas, perspectives, and concepts to explore EAF or EBFM and allow a lot of quantitative firepower to be thrown at an issue on a short-term basis before moving on to the next set of issues. It would also provide an impetus for efficiencies so that methods and approaches developed in one discipline or for one type of species could be transferred to others. Skeptics of such an approach would, and should, note the logistical and organizational issues associated with such task-based teams, and I fully appreciated those concerns. But wouldn't this approach in large part mitigate the issue you raised, allowing us to address broader ecosystem considerations, increase analytical capacity working on a problem, cross-train our personnel, and ultimately provide improved management advice?

So let me note that we recognize and are sympathetic to the reality you describe. This reality confronts not only NOAA Fisheries assessment staff but NOAA Fisheries survey, sampling, oceanographic, ecological, legal, and social science staff that collectively support giving management advice under the NOAA Fisheries legal mandates and, more generally, most federal and state natural resource management agency personnel. I am aware of many national and regional efforts to mitigate this burden. But more specifically, the answer to your question is this: narrowly speaking, yes it may be an added consideration for stock assessment scientists in an assessment process, but it is not a responsibility they need to singularly bear. The best instances I've seen globally where ecosystem science has been included in a stock assessment context to do EAF have involved a team of scientists working together. Certainly there are disciplinary differences in jargon, standards, approaches, concerns over experience, concerns over scheduling and prioritization, etc., but the benefit of working together strongly outweighs those minor challenges. There are a plethora of excellent scientists working in NOAA Fisheries and more broadly other parts of NOAA and other, partner agencies and institutions that can bring a wide range of expertise to the process that can assist with, and not add to the burden of, conducting assessments. More so, some of these scientists bring a diverse set of complementary skills, especially quantitative tools, that can inform and further elucidate the process.

I would also add that perhaps not all stocks need ecological interactions or climate effects or oceanographic regimes or habitat considerations included for their assessments, because not all of those factors may be germane. Then again, not all stocks need to be assessed with the most complicated level of analytical assessment models either. Nor do all stocks need to be assessed at frequencies higher than is feasible to detect changes in stock dynamics. Thus, some form of "triage" of risk to these stocks is in order, and nascent efforts are underway nationally to explore how to do so.

So ultimately, in terms of scientific capacity for NOAA Fisheries, let me clearly agree that we do need to generally (and continually) build it up. This needed capacity development would particularly focus on the quantitative skills of our workforce. This area is one of my higher priorities. Many efforts are extant to increase training for current staff, increase training for students and future staff, and generally build capacity for conducting a wider range of integrated assessments as noted above. Certainly doing so in a challenging fiscal environment poses some difficulties, but looking 5–10 years down the road we need to make some level of investment in this now.

Largely, NOAA/NMFS [National Marine Fisheries Service] is focused on fish stocks in the exclusive economic zone (EEZ), yet much of the productive capacity of these stocks is in the inshore habitats (estuaries and tributaries) managed by state and other federal agencies. Holistic EBFM should take into account these ecological connections. What mechanisms (management, governance, and scientific) do you think are necessary for connecting inshore fisheries habitats to EEZ fisheries?

There are also stocks, and their ecosystems, that extend beyond our EEZ, for which we have some need to evaluate. The same is true for coral reef systems in state waters, and so on. The general point you flag is how do we address the management of species (and their supporting ecosystems) that reside in, and whose production may be dependent upon, habitats under different jurisdictions? This would be for both habitats inshore of and those that extend beyond our EEZ. The coral reef work Rusty Brainard and colleagues are doing (www.pifsc.noaa.gov/cred/index.php) or the salmon habitat work that Tim Beechie (www.nwfsc.noaa.gov/research/divisions/fed/wpg/ecosystem.cfm) and colleagues are doing are both excellent examples of establishing these broader partnerships to do EBFM under multiple jurisdictions. The ultimate answer to this question is to develop the most germane partnerships we can, both to support the best available science and to understand the connections, habitats, and determinants of production. In terms of management and governance, there are over 100 laws in the United States relating to the management of living marine resources, plus a lot of related treaties, so I suspect that the mechanisms for doing so are noted in them. This again highlights the need to do EBFM and take a broader, coordinated, holistic view as you note.

What is the biggest obstacle for EBFM in the United States? Has that obstacle been overcome anywhere else in the world? If so, how?

I made such a list, published in *Fisheries* in 2002 (Link 2002). Of those, in many respects we've nailed down the tools, analytics, data, methods, and similar technical issues that were perceived to be constraining the execution of EBFM at that time, even if those capabilities are not yet fully distributed nationally. So that is a positive development that has largely been overcome here in the United States, and a positive development worth noting.

Yet in my view three primary obstacles remain. One is the concern of being asked to do more with less, essentially the

consistent problem of limited resources (staff, time, funding) that you flagged in an earlier question. No doubt that remains a challenge, but there are ways around that and they largely involve some form of a risk and prioritization exercise. The examples I've seen from Australia have been particularly effective in implementing EBFM, by broadening the scope of what is examined but doing so at the appropriate level of analytical effort expended relative to some measures of risk tolerance, all while ensuring that none of the mandated requirements falls through the cracks.

Another obstacle is the need for a cultural shift among fisheries stakeholders, scientists, and managers in how we perceive that we should manage our living marine resources. There persists a perception that this "ecosystemy stuff" just isn't important, that it is a secondary or tertiary consideration. Some of this stems from a diversity of philosophical views, which is fine, and those debates are in fact healthy to have. But some of this perception stems from the perception that doing EBFM will make a situation too complex beyond what is feasible to address; we are technically incapable of addressing it; or the concern that there will be no benefits to the resource or stakeholders. Experience from many places shows there are means to address EAF and EBFM issues, they are not overly complicated, and they come with benefits. Further, the data are pretty clear that ignoring ancillary issues, such as climate change or predation, that affect stocks can result in misleading advice in an EAF context. Similarly, ignoring systemic level properties and associated trade-offs can lead to misleading and in some instances countermanding advice in an EBFM context. The philosophical debate really stems from differences in worldviews of how science should be conducted—generally with either a holistic or reductionist view. My sense is that we need both and the tension between them can be healthy if managed well, and if we recognize that for certain issues and questions either perspective may be more appropriate; a recent review of generally related topics in the journal *Science* (Milam 2013) captured this distinction nicely. So while the philosophical nature of the debate continues globally, my sense is that most people, even if reluctantly, recognize that of the triad of drivers impacting fish production, fishing is important but environmental or ecological considerations can also be as or more important under given circumstances. Many international working groups, such as a few examples from the IOC [Intergovernmental Oceanographic Commission] (www.unesco.org/new/en/natural-sciences/ioc-oceans/), CAMEO [Comparative Analysis of Marine Ecosystem Organization] (http://cameo.noaa.gov/index.html), or IndiSeas [Indicators for the Seas] (www.meece.eu/indiseas.html), efforts have notably elucidated the relative prominence among this triad.

The final major obstacle is a lack of clarity across our legislative mandates. After looking into it, I am of the opinion that we are not only allowed to but may in fact be compelled to take an ecosystem approach to management in order to address the myriad objectives under the many existing laws, regulations, orders and guidelines we have in the United States pertaining to living marine resources. As I noted above, there are over 100 such laws related to LMRs and their ecosystems, and EBFM in this context is apt to be confusing. Further, there is a concern that if we begin executing EBFM, we will not be able to meet our current mandates. So what I think we could use is some clarity of mandates regarding what we should do, in an operational sense, to implement EBFM, while maintaining our ability to manage LMRs and their associated ecosystems at the high standards we have come to expect. And I think we can obtain this clarification, we just need to see how this might play out in terms of the best ways to do so. Several other countries, including Canada, Australia, and the European Union have legislations, regulations and policies that serve as examples of how this clarification could be enacted.

In your view, what is the biggest benefit to EBFM for fishery managers? To society?

There are many. If managed as we have envisioned it as a coupled biological–ecological and socioeconomic system to implement EBFM, we get resources that should be in better shape, we get an understanding of resource dynamics that are less likely to miss major shifts or changes we might have omitted otherwise, we have more stable resource dynamics if taken at a systemic level, and we have the ability to explore biological tradeoffs in an ecosystem. From those things we get regulatory stability and efficiency, we get transparency in statements of competing objectives, we explore (social and economic) tradeoffs among the best possible scenarios cognizant of these multiple objectives, and we actually have more stable economics from which longer term and better business plans can be built. I've glossed over these topics here, but those who have looked at these topics in more detail—and very much analogous to a financial stock market—emphasize two things: (1) the value of minimizing risk and variance in any given stock by taking a "portfolio" approach across multiple stocks as a collective system and (2) the value of stability and efficiency engendered from coordinating across multiple stocks/sectors and considering metrics of information at a higher level of organization.

Ecosystem science and modeling for fisheries management has made some major strides over the last decade. Where do you see the state of the art being 5 years from now? A decade from now?

Agreed. As you and many others are well aware, there has indeed been a lot of progress in ecosystem modeling for living marine resources applications during the past decade, and we can build upon that progress. But I am not sure my "crystal ball" is that clear, and I recognize that there are too many unforeseen variables to accurately describe what the future state of the art will look like. I am confident that there are many young, enterprising, innovative minds (hopefully young minds we can get to come work with us) who will come up with novel tools and technologies that I can't even yet begin to imagine. So what I can note is what we need to be able to do in 5, 10, even 15 years from now.

What I envision for EAF is a series of extended stock assessment models and multispecies models being used routinely in an operational sense. These would include all of the salient ecosystem considerations and capitalize on the fuller range of the NOAA's data collection and observation systems. Incorporating these into Tier 3 assessments should become a regular practice, the norm, not the exception. This set of tools would be for fish stocks, protected species, and related issues that retain a stock or species focus but that have ecosystem consideration directly included in the models. Additionally, broader ecosystem considerations should be routinely and systematically examined in conjunction with those models, outside of their actual parameterization, calibration, and initialization but informing their structure. For example, each region should likely evaluate shifts in species distributions, and hence stock identification delineations, in the context of climate change effects and associated regime shifts. This obviously would not need to be done every year or even every 3 years, but it should not wait to be done every 20 years either. So there are both modeling approaches we'd want to expand and protocols we'd want to consider to ensure that we're not missing climate or ecology or other Tier 3 issues in our species-focused management.

What I envision for EBFM is that we would similarly use a suite of appropriate ecosystem models to delineate and use the ecosystem reference points noted above. And we would do so on a routine basis, complete with worked-through harvest control rules for any given ecosystem before we begin to implement such harvest control rules for specific groups of stocks. In particular, some metric of total, systemic fish production seems to be a major piece of information we can and need to better utilize. We would also use these models to explore various scenarios, in the sense of management strategy evaluation, to evaluate the collective risks, benefits, and outcomes of strategies to achieve multiple objectives. These scenario evaluations would address different levels of different choices across a range of tradeoffs and be executed routinely. These would naturally form the backdrop of policy priorities for any given region, perhaps being the primary contents of a fisheries ecosystem plan, and would provide constraining "floors and ceilings," as Mike Fogarty likes to call them. I also think we will need to do a better job of data and model output visualization, perhaps akin to "gaming" various scenarios, as a routine matter of course, and hopefully get to the point where such gaming animations can be run in near real-time with stakeholder groups.

Further, there are other mandates beyond the need to conduct typical stock or protected species assessments, which are still focused on fisheries and which require the use of these ecosystem-level tools. We would need to better recognize these efforts and ensure that they are coordinated in an EBFM context. For example, the ecotoxicology work of Nat Scholz, Gina Ylitalo, and colleagues (Incardona et al. 2012; Scholz et al. 2012; Ylitalo et al. 2012; Johnson et al. 2013) very much influences fish dynamics in an ecosystem context. Thus, assessing habitat, ecotoxicology, nonharvested resources, invasive species, emerging fisheries, and ecosystem status should also become even more routine and also perhaps part of fisheries ecosystem plans. Beyond the natural science and modeling, we particularly need to ramp up engagement with our partners and stakeholders to absolutely ensure that all of the tools, protocols, and approaches we develop will meet their needs and requirements. What I envision for EBM would actually be very similar to this description for EBFM but, of course, much broader, inclusive of many more partners and considering a wider range of ocean uses.

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AMERICAN FISHERIES SOCIETY
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Preparing for the Challenges Ahead

2012 ANNUAL REPORT

MISSION

The mission of the American Fisheries Society (AFS) is to advance sound science, promote professional development, and disseminate science-based fisheries information for the global protection, conservation, and sustainability of fisheries resources and aquatic ecosystems. The Society adopted a Strategic Plan for 2010–2014 with three overarching goals: (1) Global Fisheries Leadership—the AFS will be a global leader providing information and technical resources for the sustainability and conservation of fisheries resources; (2) Education/Continuing Education—the AFS will facilitate lifelong learning through world-class educational resources at all academic levels and provide training for practicing professionals in all branches of fisheries and aquatic sciences; and (3) Value of Membership—the AFS will serve its members and fisheries, aquaculture, and aquatic science constituencies to fulfill the mission of the Society. The members of the AFS are drawn together by a common interest in pursuing this mission and the goals of the Society. Our challenge is how to carry out the mission in an ever-changing world.

THEME FOR THE YEAR

The theme for the 2012–2013 year and the 2013 annual meeting in Little Rock is "Preparing for the Challenges Ahead." Conservation laws, technology, and the questions being asked of fisheries professionals are changing rapidly, as well as the nature of the fisheries discipline itself. In the past 20 years, we have witnessed increased accountability requirements for those managing our fisheries resources, not only in the United States but globally, putting more responsibility on the shoulders of fisheries professionals. We have seen the Internet and associated social media become a mainstay in communications among fisheries professionals and for keeping us in touch with decision makers and the public in general. We have seen computational power and associated data storage requirements increase by orders of magnitude, along with the development and use of sensors to measure the environment and its biota. Today's students (and many of today's faculty) were not yet born when our astronauts walked on the moon, when we used transistors in our radios, and spun 45s on our record players. What's in store for fisheries professionals the next 20 years? Will we be able to adapt to changes in everything affecting our lives and livelihoods? Will we be adequately prepared to do so?

ANNUAL MEETING

The 2013 annual meeting will be held September 8–12 in Little Rock, Arkansas. Building on the theme for the year, the meeting will address the various facets of preparing for the challenges ahead. In the opening plenary session, Pamela Mace, Principal Advisor for Fisheries Science in the New Zealand Ministry for Primary Industries, will present some plausible future scenarios to illustrate the potential state of marine fisheries. Dr. Mace will provide supporting arguments for the proposition that, if the world's fisheries are to continue to provide food and livelihoods without compromising biodiversity conservation and other services, a concerted effort will be required to formulate, and develop the means to implement, a common vision that balances utilization and sustainability. The second plenary speaker, Kelly Millenbah, Associate Dean and Director for Academic and Student Affairs in the College of Agriculture and Natural Resources at Michigan State University, will be characterizing fishery scientists of the future. She will touch on the importance of understanding the characteristics of the next generation of natural resource leaders (Millenials and NextGens) and the individuals with whom they will interact in pursuit of conservation, which is key to ensuring that they can meet the challenges of a new era in resources management.

WORLD COUNCIL OF FISHERIES SOCIETIES

The AFS continues to be an active member of the World Council of Fisheries Societies and participated in the 6th World Fisheries Congress in Edinburgh, Scotland, in 2012. The AFS Executive Director serves as the Executive Secretary of the World Council, and an AFS member, Doug Beard, is its current president. At the Congress, the AFS organized a session on natural and anthropogenic catastrophic events, their effects on fisheries and aquatic systems, and the management of such events. Officers of the AFS represented the Society at the annual meetings of the Japanese Society of Fisheries Science (JSFS) and the Fisheries Society of the British Isles (FSBI). Officers from those societies, as well as the Korean Society of Fisheries and Aquatic Science (KOFAS), will be attending our upcoming 2013 annual meeting in Little Rock. Additionally, formal memoranda of understanding have been signed with the FSBI and KOFAS, and one is also being developed with the JSFS, that foster exchange of ideas, resources, and people between them and the AFS.

SPECIAL PROJECTS

Three special projects were initiated during the 2012–2013 year: (1) alternative models for AFS governance; (2) assessment of educational requirements; and (3) use of social media.

AFS Governance

With over 30 people now serving on the AFS Governing Board and scores of AFS committees, it is an appropriate time to review the governance of AFS and determine whether it can be structured in a more efficient manner, especially in light of the growing use of Internet-based communications and virtual meeting technology. A special committee, chaired by Immediate Past President Bill Fisher, will be presenting several alternative governance models for the Governing Board to consider during its annual retreat at the meeting in Little Rock.

Educational Requirements

As a professional society, the AFS has a role to play in ensuring that people entering the future workforce will be prepared to tackle the issues that fisheries professionals will then be facing. In keeping with the annual theme "Preparing for the Challenges Ahead," a special committee chaired by AFS 2nd Vice President Ron Essig will undertake several tasks over the coming years. First, the committee will assemble a list of North American colleges and universities currently offering undergraduate and graduate degrees in fisheries-related disciplines (e.g., fisheries science, fisheries biology, fisheries ecology, fisheries management, fisheries policy, and fisheries economics) and publish the list on the AFS website. Second, the committee will oversee a survey of major employers that will be hiring graduates with degrees in fisheries-related disciplines in the next 5–10 years to determine what coursework those graduates will be expected to have taken that would be most germane to the positions being filled. The survey results and an evaluation of their implications will be published in *Fisheries*. Third, when the list and survey are completed, the committee will compare the coursework expectations of the employers with the current coursework requirements of a selected subset of colleges and universities offering fisheries degrees. If the comparison indicates a misalignment, the committee will recommend ways in which an alignment can be made, which could range from giving simple advice to the colleges and universities to instituting an accreditation program administered by the AFS (or something in between).

Use of Social Media

Within the AFS, there are several fisheries scientists and students who are active players in the social media arena and who directly see the benefits of its use both on the professional level and at the organizational level. To stay relevant among its members, as well as within the fisheries science community, the AFS should review how it is currently using social media and how the media can be further used to meet the society's goals. To this end, a third special committee, chaired by Julie Claussen, is developing recommendations for review by the AFS Governing Board on use of social media for internal communications among AFS subunits, as well as externally communicating scientific information developed by AFS members.

Climate Change

During the 2012–2013 year, the AFS was involved in encouraging the U.S. Government to take a more active approach to addressing the impacts of climate change on the world's fisheries resources. The Society delivered its climate change policy in a letter to President Obama and encouraged him to take several immediate actions to understand and mitigate climate change effects and offered the assistance of the AFS in doing so. With the help of the External Affairs Committee and the Potomac Chapter, the AFS also sponsored a special briefing for Congressional staffers on the impacts of climate change on our marine and freshwater fisheries, as well as the communities and cultures that rely of them.

MEMBERSHIP

The AFS is the oldest and largest professional society for fisheries professionals. We continue to have a vibrant Society with a stable membership of about 9,000 people, representing a wide range of scientific and managerial disciplines organized into four regional divisions, 48 chapters, 55 student subunits, and 22 sections. Membership by students and young professionals is increasing, indicating sound recruitment into our ranks and the potential for growth into the future.

We are a fiscally sound Society that has weathered the economic recession. There is substantial promise for the future as we continue to pursue the mission of the Society.

John Boreman
President

Gus Rassam
Executive Director

INTRODUCING THE NEW CHIEF SCIENCE EDITOR

This year *Fisheries* brought on Jeff Schaeffer to become chief science editor. Jeff is a research fishery biologist with the U.S. Geological Survey (Ann Arbor, MI). He has a B.S. in Fisheries Management, an M.S. in Zoology, and a Ph.D. in Natural Resources from the University of Michigan. Jeff has successfully established a mechanism to ensure and maintain the scientific integrity of the magazine. With his broad background in fisheries science, he has strengthened the review process, studying submissions for suitability, content, and potential member interest, and carefully screens and vets potentially controversial content prior to publication. Jeff is now responsible for maintaining communication for all editorial disputes, rejected articles, comments, and responses. He has not only added sound science to the editorial process but has offered good guidance and suggestions to the managing editor. Together, they collaborate to publish a magazine with a beautiful dual nature as both a high-impact peer-reviewed journal for timely topics and as a voice for members to share ideas and accomplishments. While working to keep these traditions, they continue try to embrace a modern look.

POLICY HIGHLIGHTS

In 2013, the American Fisheries Society (AFS):

- Sent a letter to President Obama urging him on behalf of the Society to "set our nation's course for the next four years … and support science, address the realities of global warming, and further expand efforts to move a clean energy economy forward in the United States."
- Sent a letter to Interior Secretary Ken Salazar expressing support for the recent conservation and rehabilitation proposal for the ecosystem rehabilitation, including dam removal, for the Klamath River Basin.
- Signed a joint letter (along with The Nature Conservancy, The Wildlife Society, the National Wildlife Federation, Trout Unlimited, and other important societies and associations) to President Obama urging swift action to restore the Clean Water Act protections for wetlands, lakes, and streams.
- Signed a joint letter of support (along with the Association of Fish & Wildlife Agencies, the Association of Zoos & Aquariums, the National Audubon Society, The Nature Conservancy, The Wildlife Society, and other important societies and associations) for the State and Tribal Wildlife Grants Program.
- Met in D.C., and, along with the Potomac Chapter, hosted the invigorating and very important congressional briefing: *Climate Change and Fisheries*.
- Had the membership vote to adopt another AFS Policy Statement on Lead in Sport Fishing Tackle at the end of 2012.
- Updated existing polices on topics such as surface mining, bycatch reduction devices, and commercial aquaculture via the Resource Policy Committee.
- Established an ad hoc committee, Hatcheries and Management of Aquatic Resources, to reengage the AFS in addressing current issues related to hatcheries and their roles in aquatic resource management.
- Was honored when Discovery World and the U.S. Forest Service partnered to mentor a Hutton junior fish biologist.

MAGAZINE HIGHLIGHTS

In 2013, *Fisheries* magazine:

- Introduced members to the theme of social media, addressing how it is used along with spotlighting members who use it.
- Joined other AFS publications in updating rules on the spelling of common names of fish (and we encourage our members to use the complimentary fish name spell-checker found at fisheries.org/fishnames).
- Introduced the first in a series of themed issues, beginning with the May 2013 Sturgeon issue.
- Published one of the first "fracking" articles by a fisheries scientist, Maya Weltman-Fahs, with her manuscript entitled: "Hydraulic Fracturing and Brook Trout Habitat in the Marcellus Shale Region: Potential Impacts and Research Needs" (Maya Weltman-Fahs and Jason M. Taylor. *Fisheries* Vol. 38, Iss. 1, 2013).
- Began to focus Spotlight articles on (1) our newest members and (2) our celebrity members (although all of our members are celebrities to us), starting with Rick Hansen, best known for his "Man in Motion" World Tour.

BRAVO TWIN CITIES—HOWDY LITTLE ROCK!

Kudos to the Minnesota Chapter of the AFS who, in partnership with the Minnesota Department of Natural Resources, set up local arrangements for the AFS 142nd Annual Meeting, held in the Twin Cities last August. Over 1,550 members from 19 different countries attended the meeting that focused on Fisheries Networks: Building Ecological, Social and Professional Relationships. Plenary speakers included Dr. Villy Christensen, Professor at the UBC Fisheries Centre, who gave a lecture on "Ecological Networks—From Who Did It to Future Food Webs;" Dr. Barbara A. Knuth (Past President of the AFS), who focused her lecture on "Expanding the Reach of Fisheries Science and Management through Strategic Social Networking;" and Dr. William W. Taylor (also a Past President of the AFS), who gave his talk on "Fisheries Sustainability: The Science and Art of Coupling Human and Natural Systems." We look forward to our next meeting, to be held this September in Little Rock, Arkansas, where papers and symposium will be presented and a great, southern time is expected to be had by all (afs2013.com).

The beginning of this year was a turning point for *Fisheries* and the AFS. The month will bring another transition when a new AFS president (Bob Hughes), a new executive director (Doug Austen), and several new members of the Publications Overview Committee come on board. We hope to bring as many people as possible together in Little Rock to begin a focused discussion of the future of *Fisheries*—what is going well and what we can do better to present our Society to the world.

AFS WEB SITE: WWW.FISHERIES.ORG

Visit www.fisheries.org for the latest on fisheries science and the profession.

AFS MAGAZINE: *FISHERIES*

The American Fisheries Society (AFS) membership journal, *Fisheries*, offers up-to-date information on fisheries science, management, and research, as well as AFS and professional activities. *Fisheries* features peer-reviewed scientific articles, analysis of national and international policy, chapter news, job listings, interviews with prominent professionals (as well as new members), archived content dating back to the beginning of the AFS, and more. *Fisheries* gives AFS members the professional edge in their careers as researchers, regulators, and managers of local, national, and world fisheries. *Fisheries* is available to members online at www.fisheries.org.

AFS JOURNALS

- TRANSACTIONS OF THE AMERICAN FISHERIES SOCIETY, bimonthly, Volume 142
- NORTH AMERICAN JOURNAL OF AQUACULTURE, quarterly, Volume 75
- NORTH AMERICAN JOURNAL OF FISHERIES MANAGEMENT, bimonthly, Volume 33
- JOURNAL OF AQUATIC ANIMAL HEALTH, quarterly, Volume 25

(Journals are also available to subscribing members online at afsjournals.org)

- MARINE AND COASTAL FISHERIES: DYNAMICS, MANAGEMENT, AND ECOSYSTEM SCIENCE, yearly, Volume 5. Online only, open access

The Fisheries InfoBase now includes all AFS journals back to 1872, including the complete contents of all issues of *Fisheries*.

AFS BOOKS: RECENT BOOK TITLES

Our new online bookstore at www.fisheries.org/shop now offers digital downloads of many books or just their individual chapters.

- *Biology and Management of Inland Striped Bass and Hybrid Striped Bass*
- *Common and Scientific Names of Fishes from the United States, Canada, and Mexico*, Seventh Edition
- *Native Fishes of Idaho*
- *Suggested Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens*, Blue Book 2012 Edition
- *Fisheries Techniques*, Third Edition
- *Small Impoundment Management in North America*
- *Advancing an Ecosystem Approach in the Gulf of Maine*
- *Telemetry Techniques: A User's Guide for Fisheries Research*
- *Guide to the Marine Fishes of the Gulf of California*

SOCIETY AWARDS

Congratulations to the 2012 American Fisheries Society (AFS) Award Recipients, who were announced during the AFS Annual Meeting in Saint Paul, Minnesota, this past August. They were honored for their contributions to the AFS, to their profession, and to resource conservation.

AWARD OF EXCELLENCE—Presented to an AFS member for original and outstanding contributions to fisheries science and aquatic biology.
David L. G. Noakes, Professor, Oregon State University

PRESIDENT'S FISHERY CONSERVATION AWARD—Presented in two categories: (1) an AFS individual or unit or (2) a non-AFS individual or entity for singular accomplishments or long-term contributions that advance aquatic resource conservation at a regional or local level.
AFS Member Category—Not awarded this year
Non-Member Category—Turner Enterprise's Biodiversity Division and the Turner Endangered Species Fund

WILLIAM E. RICKER RESOURCE CONSERVATION AWARD—Presented to an individual or organization for singular accomplishments or long-term contributions that advance aquatic resource conservation at a national or international level.
John (Jack) Halle, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, retired

CARL R. SULLIVAN FISHERY CONSERVATION AWARD—Presented to an individual or organization for outstanding contributions to the conservation of fishery resources.
The Alaska Salmon Program, University of Washington

MERITORIOUS SERVICE AWARD—Presented to an individual for loyalty, dedication, and meritorious service to the Society throughout the years and for exceptional commitment to the AFS's programs, objectives, and goals.
Patricia M. Mazik, West Virginia University, Fish & Wildlife Cooperative Unit

THE EMMELINE MOORE PRIZE—The AFS has established this award, named after the first female AFS president, Emmeline Moore (1927–1928), to recognize career achievement in the promotion of demographic diversity in the society.
Hiram W. Li, Oregon State University, retired

DISTINGUISHED SERVICE AWARD—Recognizes outstanding contributions of time and energy for special projects or activities by AFS members.
Andrew Loftus, principal, Andrew Loftus Consulting

HONORARY MEMBERSHIP—Presented to individuals who have achieved outstanding professional accomplishments or have given outstanding service to the Society.
Robert G. Piper, U.S. Fish and Wildlife Service, retired

OUTSTANDING CHAPTER AWARD—Recognizes outstanding professionalism, active resource protection and enhancement programs, and commitment to the mission of the Society.
Washington–British Columbia Chapter

OUTSTANDING STUDENT SUBUNIT AWARD—Recognizes outstanding professionalism, active resource protection and enhancement programs, and commitment to the mission of the Society.
North Carolina State University, Student Fisheries Society

EXCELLENCE IN PUBLIC OUTREACH AWARD—Presented to an AFS member who goes the "extra mile" in sharing the value of fisheries science/research with the general public through the popular media and other communication channels.
Jimmy Barnett, Arkansas Fish and Game Department

GOLDEN MEMBERSHIP AWARDS: THE CLASS OF 1963—Recognizes individuals who have been AFS members for 50 years.

Charles Anderson
James Avault
David Borgeson
Michael Dell
Joe Dillard
Arlo Fast
Russell Fieldhouse
Stephen Flickinger
James Fribourgh
Richard Gennings
John Gissberg
Ronald Goede
Don Helms
Ralph Hinton
Edward Holmes
Charles Larsen
Gary Mensinger
Bruce Miller
John Nickum
Anthony Novotny
Garland Pardue
Richard Parker
Edwin Pister
Gilbert Radonski
Martin Roessler
Bill Simco
Bruce Wing
Kenneth Witty
Richard Wydoski
Timothy Zeigler

EXCELLENCE IN FISHERIES EDUCATION—Recognizes excellence in organized teaching and advising in a field of fisheries.
Trent Sutton, professor, University of Alaska

SKINNER AWARD—The John E. Skinner Memorial Fund was established to provide monetary travel awards for deserving graduate students or exceptional undergraduate students to attend the AFS Annual Meeting.

Recipients:
Matthew Altenritter, The University of Maine
Chelsey Campbell, University of Florida
Jason Doll, Ball State University
Clifford Hutt, Mississippi State University
Mark Kaemingk, South Dakota State University
Stephen Klobucar, Utah State University
Jacob Krause, South Dakota State University
Michael Lowe, University of Southern Mississippi
Landon Pierce, University of Missouri
Shannon White, Virginia Polytechnic and State University

Honorable Mentions:
Courtnay Janiak, Delaware State University
Eric Meriam, West Virginia University
Brandon Peoples, Virginia Polytechnic and State University
Jessica Reilly, University of Alberta
Kristopher Stahr, South Dakota State University

J. FRANCES ALLEN SCHOLARSHIP—Awarded to a female AFS member and doctoral candidate who is conducting aquatic research.
Winner: Brooke Penaluna, Oregon State University
Runner-up: Erin Markin, University of Maryland

STEVEN BERKELEY MARINE CONSERVATION FELLOWSHIP
Winner: Tony Spitzack, Washington State University
Honorable Mention: Caitlin Cleaver, Island Institute
and **Geoffrey H. Smith,** University of Florida

STUDENT WRITING CONTEST
Co-Winners: Patrick Cooney, North Carolina State University, "Climbing the Slippery Slope," and **Brandon Peoples,** Virginia Tech Department of Fish and Wildlife Conservation, **"**Focus on the Positive: How One Little Fish Helps to Sustain Aquatic Biodiversity"

Runner-up: Mikaela Provost, Rutgers University, "Sex Change in Fish: Unique Problems for Fishery Managers"

2011 BEST PAPER AWARDS

MERCER PATRIARCHE AWARD FOR THE BEST PAPER IN THE NORTH AMERICAN JOURNAL OF FISHERIES MANAGEMENT
Michael J. Hansen, Andrew H. Fayram, and Steven P. Newman
Natural mortality in relation to age and fishing mortality on walleyes in Escanaba Lake, Wisconsin, during 1956–2009. North American Journal of Fisheries Management 31(3):506–514.

ROBERT L. KENDALL BEST PAPER IN TRANSACTIONS OF THE AMERICAN FISHERIES SOCIETY
S.T. Lindley et al.
Electronic tagging of Green Sturgeon reveals population structure and movement among estuaries.
Transactions of the American Fisheries Society 1:109–122.

BEST PAPER IN THE JOURNAL OF AQUATIC ANIMAL HEALTH
Maureen K. Purcell, Rodman G. Getchell, Carol A. McClure, and Kyle A. Garver
Quantitative polymerase chain reaction (PCR) for detection of aquatic animal pathogens in a diagnostic laboratory setting. Journal of Aquatic Animal Health 23(3):148–161.

BEST PAPER IN THE NORTH AMERICAN JOURNAL OF AQUACULTURE
Jesse Trushenski, J. Rosenquist, and B. Gause
Growth performance, tissue fatty acid composition, and consumer appeal of Rainbow Trout reared on feeds containing terrestrially derived rendered fats. North American Journal of Aquaculture 468–478.

SECTION AWARDS

The following AFS Sections announced award recipients at the Annual Meeting in Saint Paul, Minnesota:

CANADIAN AQUATIC RESOURCES SECTION
Peter A. Larkin Award:
Ph.D. level—Lee Gutowsky, Carleton University
M.Sc. level—Stephanie Avery-Gomm, University of British Columbia

EQUAL OPPORTUNITIES SECTION
Native People's Travel Award recipient: William Bernier

EDUCATION SECTION
AFS Best Student Poster Award—2011 Annual Meeting
Winner: Gerard Carmona-Catot, University of California–Davis
Honorable Mentions: Hillary A. Meyer, South Dakota State University and Joshua W. Morse, Oberlin College.

AFS/SEA Grant Best Student Paper—2011 Annual Meeting
Winner: Michael R. Lowe, University of Southern Mississippi
Honorable Mentions: Anthony R. Sindt, Iowa State University and Jonathan D. Carey, University of Massachusetts–Dartmouth

Young Professional Achievement Award: Justin VanDeHey

ESTUARIES SECTION
Distinguished Service Award: Thomas Bigford
Student Travel Award: Michelle Walsh, University of New Hampshire
Augustin Engman, North Carolina State University
Michael Lowe, University of Southern Mississippi

FISHERIES AND INFORMATION TECHNOLOGY SECTION
Best Student Poster Award: Matthew DeAngelo, St. Louis University

FISH CULTURE SECTION
Student Travel Award for Aquaculture America 2012:
Carlin Fenn, Southern Illinois University (*Joint FCS–U.S. Aquaculture Society Best Abstract Award*)
Blake Hauptman, Montana State University (*Best Abstract*)
Daniel Russo, University of North Carolina Wilmington (*Best Abstract*)
Student Travel Award for AFS 2012:
Brian Gause, Southern Illinois University (*Best Abstract*)
John Bowzer, Southern Illinois University (*Best Abstract*)

FISH HEALTH SECTION
Snieszko Student Travel Award:
Kamalakar Chatla, Mississippi State University
Jingun Lu, Mississippi State University
Robert (Adam) Ray, Oregon State University
Neeti Daha, Mississippi State University
Scott Jones, University of Arkansas at Pine Bluff
First Place Student Paper Award: Nicholas Phelps, St. Paul, MN
Second Place Student Paper Award: Amy Long, University of Idaho

FISHERIES ADMINISTRATION SECTION
2012 Standing Sport Fish Restoration:

Sport Fishery Development and Management Category: Kansas Department of Wildlife, Parks and Tourism, Project: Fishing Impoundments and Stream Habitats (FISH)

Research and Surveys Category: Idaho Department of Fish and Game, Project: "Tag-You're-It"

Aquatic Education Category: Iowa Department of Natural Resources, Project: Urban Fishing Program Development and Case Study–Fish Iowa!

FISHERIES MANAGEMENT SECTION
Award of Excellence: Dr. David Welch

Conservation Achievement Award: Muskies Canada Inc. and Muskies Inc.

Hall of Excellence: Phil Bettoli

GENETICS SECTION
James E. Wright Award: Joy Young
Stevan Phelps Memorial Award: Jeffrey F. Bromaghin, Danielle F. Evenson, Thomas H. McLain, and Blair G. Flannery for their paper "Using a Genetic Mixture Model to Study Phenotypic Traits: Differential Fecundity among Yukon River Chinook Salmon, Transactions of the American Fisheries Society," Transactions of the American Fisheries Society 140:235–249.

MARINE FISHERIES SECTION
Steven Berkeley Marine Conservation Fellowship: Tony Spitzack, Washington State University
Honorable Mention: Caitlin Cleaver, University of Maine and Geoffrey Smith, University of Florida
Oscar E. Sette award: Andre E. Punt
Student Travel award: Chelsey Campbell (University of Florida), Iris Kemp (University of Washington), Kostantine Rountos (SUNY–Stony Brook)

ASSOCIATE MEMBERS 2012

American Sport Fishing Association
Electric Power Research Institute
Northwest Marine Tech, Inc.

OFFICIAL MEMBERS 2012

Alabama Department of Conservation
Alaska Department of Fish & Game
Arizona Game and Fish Department
Arkansas Game & Fish Commission
Atlantic States Marine Fisheries Commission
Colorado Division of Wildlife
Connecticut Department of Environmental Protection
Delaware Division of Fish & Wildlife
Department of Environmental Management/Fish & Wildlife
Department of Marine Resources
Florida Fish & Wildlife Conservation Commission
Georgia Department of Natural Resources Wildlife Resources Division
Grand River Dam Authority
Great Lakes Fishery Commission
Idaho Fish & Game Department
Iowa Department of Natural Resources
Kansas Department of Wildlife/Parks
Louisiana Department of Wildlife & Fisheries
Maine Department of Inland Fish & Wildlife
Maryland Department of Natural Resources/Fisheries
Massachusetts Division of Marine Fisheries
Michigan Department of Natural Resources
Minnesota Department of Natural Resources
Mississippi Department of Marine Resources
Mississippi Department of Wildlife, Fish, & Parks
Missouri Department of Conservation
Montana Department of Fish, Wildlife, & Parks
National Marine Fisheries Service, National Oceanic and Atmospheric Administration/Office of the Assistant Administrator
Nebraska Game & Parks Commission
New Jersey Department of Environmental Protection
New Mexico Game & Fish, Department of Fish Management
North Carolina Wildlife Resources Commission
Ohio Department of Natural Resources
Oregon Department of Fish & Wildlife
Pennsylvania Fish & Boat Commission
South Dakota Game, Fish & Parks
State of Rhode Island
Tennessee Valley Authority
Tennessee Wildlife Resource Agency
Texas Parks & Wildlife Department
U.S. Bureau of Land Management
U.S. Fish & Wildlife Service
Utah Department of Natural Resources/Division of Wildlife Resources
Washington Department of Fish & Wildlife
West Virginia Department of Natural Resources
Wisconsin Department of Natural Resources, Attn: Director
Wyoming Game & Fish Department

SUSTAINING MEMBERS 2012

Abernathy Fish Technology Center
Advanced Technical Aquatic Control LLC
Advanced Telemetry Systems Inc.
AIS Inc.
Alaskan Observers Inc.
Alpha Mach Inc.
Amirix Systems, Inc. (VEMCO)
Analytical Environmental Services
Aquatic Eco-Systems, Inc.
Aquatic Ecology Lab/OSU
Arizona Coop Fish & Wildlife Research Unit
Armstrong-KETA Inc.
Bell Aquaculture
BioSonics
Christine Thomas
CNMI Division of Fish & Wildlife
Colville Tribes Fish and Wildlife Department.
Confederated Tribes of the Umatilla Indian Reservation
Confederated Tribes of Warm Springs Reservation
Douglas Island Pink & Chum
Environmental Defense Fund
Fishbio Environmental
Fisheries Division of the University of Alaska–Fairbanks
Fishways Global, LLC
Floy Tag & Manufacturing Co.
Gomez and Sullivan Engineers PC
Gulf Coast Research Lab
Gulf of Maine Research Institute
Gulf of Mexico Fisheries Management
Hallprint Pty Ltd.
Halltech Aquatic Research Inc.
Henry's Fork Foundation
Hoopa Valley Tribal Fisheries
Hydroacoustic Technology, Inc.
IAP World Services
Illinois Natural History Survey
Intake Screens, Inc.
JF New & Associates
Karuk Tribe of California
Kodiak Regional Aquaculture Association
Kootenai Tribe of Idaho
LOLIGO Systems
Marel
Michigan State University
Miller Net Company, Inc.
Mississippi Alabama Sea Grant
Muckleshoot Indian Tribe
National Oceanic and Atmospheric Administration, National Marine Fisheries Service
Native Village of Eyak
Nevada Department of Wildlife
New England Fishery Management Council
Normandeau Associates Inc.
Northeast Consortium
Northern Southeast Regional Aquaculture Association
Ocean Associates, Inc.
Ohio State University
Ohio State University, Hatfield Marine Science Center
Okanagan Nation Alliance
Oregon RFID
Oregon State University
Pacific States Marine Fish Commission
Prentiss Incorporated LLC
Prince William Sound Aquaculture Corporation
Pyramid Lake Fisheries
Quantech Inc.
Smith-Root Inc.
Solitude Lake Management
SP Cramer & Associates
Squaxin Island Tribe
Streamside Technology
Tanana Chiefs Conference
Terraqua Inc.
Trinity River Restoration Program
Trout Unlimited
University of Arkansas–Pine Bluff
University of Wisconsin–Stevens Point
Upper Columbia Salmon Recovery Board
U.S. Fish and Wildlife Service
Vermont Department of Fish & Wildlife
Versar Incorporated
West Virginia University
Wild Salmon Center
Wildlife International Ltd.
Yakama Indian Nation
Yurok Tribal Fisheries Program

PATRONS $2,000–$9,999

INDIVIDUALS

Lochie Allen

CONTRIBUTORS $1,000–$1,999

INDIVIDUALS

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SUPPORTERS $500–$999

INDIVIDUALS

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FRIENDS $25–$99

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CURRENT ASSETS	2012	2011	Variance
Petty Cash	$400	$400	
Checking	1,165,597	1,129,296	36,301
Certificate of Deposits	996,859	996,492	367
Accounts Receivable	81,130	171,737	(90,607)
Allowance of Doubtful Accounts	(7,761)	(30,163)	22,402
Investment–Short Term	2,622,608	2,333,044	289,564
Inventory	419,975	415,093	4,882
Prepaid Expenses	22,766	29,651	(6,885)
Total Current Assets	5,301,574	5,045,550	256,024
Property, Plant and Equipment	1,757,193	1,744,818	12,375
Accumulated Depreciation	(1,239,969)	(1,216,010)	(23,959)
Net Property, Plant & Equipment	517,224	528,808	(11,584)
Total Assets	$5,818,798	$5,574,358	$244,440
LIABILITIES AND NET ASSETS			
Current Liabilities			
Accounts Payable		($230)	$230
Accrued Expenses	223,249	475,850	(252,601)
Subunits Dues Payable	64,779	64,225	554
Subunits Book Profit Sharing	(7,806)	31,186	(38,992)
Deferred Revenues	1,030,304	1,199,137	(168,833)
Total Current Liabilities			
Net Assets	1,310,526	1,770,168	(459,642)
Net Assets–Unrestricted	2,267,893	2,263,068	4,825
Net Assets–Unrestricted–Board Designated	114,456	114,456	
Net Assets–Temp. Restricted	1,421,841	1,421,841	
Change in Unrestricted Net Assets–CY	704,082	4,825	699,257
Total Net Assets–Ending Balance	4,508,272	3,804,190	704,082
Total Liabilities and Net Assets	**$5,818,798**	**$5,574,358**	**$244,440**

SUNDAY, SEPTEMBER 8

7:00 p.m.–9:00 p.m.
Welcome Social, Little Rock Marriott

MONDAY, SEPTEMBER 9

9:00 a.m.–12:00 p.m.
Plenary Session, featuring:
Pamela M. Mace, New Zealand Ministry for Primary Industries
Kelly F. Millenbah, Michigan State University

11:30 a.m.–8:30 p.m.
Trade Show open

2:00 p.m.–4:00 p.m.
Student Colloquium/Mentor Event

6:00 p.m.–8:30 p.m.
Tradeshow and Poster Social, Statehouse Convention Center, Governors Hall I

TUESDAY, SEPTEMBER 10

9:00 p.m.–5:00 p.m.
Trade Show open

6:30 p.m.–10:00 p.m.
Student Social (students only), Museum of Discovery

WEDNESDAY, SEPTEMBER 11

7:00 a.m.–9:00 a.m.
Annual AFS 5K Spawning Run, Riverfront Park

9:00 a.m.–2:00 p.m.
Trade Show open

6:00 p.m.–10:00 p.m.
Grand Social, Arkansas River riverfront

THURSDAY, SEPTEMBER 12

6:00 p.m.–10:00 p.m.
Farewell Social, Clinton Presidential Center and Park

LITTLE ROCK•2013

Many other events are planned for AFS 2013. Please check the conference website—afs2013.com—for updated and more detailed information.

Plan to attend the 143rd Annual Meeting of the American Fisheries Society in Little Rock, Arkansas, from September 8 to 12, 2013.

The meeting theme is "Preparing for the Challenges Ahead." The 2013 AFS Annual Meeting will bring professionals together to network and share knowledge in fisheries science and management. Speakers will present a broad range of topics at the plenary session, technical symposia, and contributed oral and poster sessions. An array of continuing education courses will also be offered.

This year's meeting will be held at the Little Rock Marriott and the Statehouse Convention Center in the Little Rock River Market district along the banks of the Arkansas River. A number of historical, cultural, shopping, and dining options are located within walking distance of the meeting location.

Please visit the conference website to register, book your room, and learn more about the meeting, Little Rock, and Arkansas.

At the website you can also:

- Browse the conference program, including courses, workshops, symposia, poster sessions, and special events.
- Learn about—and sign up for—one of the AFS-sponsored tours to locations such as the Spa City of Hot Springs, Heifer International, Pinnacle Mountain State Park, or historic Little Rock. Visitors can also tour Little Rock by bike or travel to Lonoke to skeet shoot at Remington Arms.

CONGRATULATIONS TO THE HUTTON JUNIOR FISHERIES BIOLOGY PROGRAM CLASS OF 2013!

Hutton Scholars	Location	Hutton Mentors	Host Organizations
Thelma Aguilar-Rendón	Sinaloa, Mexico	Felipe Amezcua	Universidad Nacional Autonoma de MX
Levi Bachmann	Perryville, MO	Quinton Phelps	Missouri Department of Conservation
Shelby Blattner	Arco, ID	Bart Gamett	USDA Forest Service
Sharcara Bowman	Milwaukee, WI	Joseph Ewing	Discovery World
		John Rothlisberger	USDA Forest Service
Tyler Brenneman	Goshen, IN	Daragh Deegan	City of Elkhart, Public Works & Utilities
Allison Bryan	Weaverville, NC	Jason Farmer	USDA Forest Service
		Jacob Rash	NC Wildlife Resources Commission
Natasha Chawla	Ocean Springs, MS	Frank Hernandez	University of Southern Mississippi
Paige Crane	Blacksburg, VA	Emmanuel Frimpong	Virginia Tech University
Kevin Herrera-Uribe	South Lake Tahoe, CA	Maura Santora	USDA Forest Service
Adriona Horton	Ocean Springs, MS	Frank Hernandez	University of Southern Mississippi
Sara Kelso	Dafter, MI	Ashley Moerke	Lake Superior State University
Sophia Lopez	Saint Paul, MN	Loren Miller	MN Department of Natural Resources
Araceli Marín-Montes	Sinaloa, Mexico	Felipe Amezcua	Universidad Nacional Autonoma de MX
Rachel McDaniel	San Marcos, TX	Gordon Linam	Texas Parks and Wildlife Department
Tia Norris	Vancouver, WA	David Hu	USDA Forest Service
Xinyin Peng	Manitoba, Canada	Xinhua Zhu	Fisheries and Oceans Canada
Lily Qian	Columbia, MO	Robert DiStefano	Missouri Department of Conservation
Ruth Rojas-Figueroa	Sinaloa, Mexico	Felipe Amezcua	Universidad Nacional Autonoma de MX
Breilly Roy	Trenton, MO	Darby Niswonger	Missouri Department of Conservation
Edgar Sánchez-Medina	Sinaloa, Mexico	Felipe Amezcua	Universidad Nacional Autonoma de MX
Samantha See	Columbia, MO	Craig Paukert	USGS /University of Missouri
Blaise Stewart	Springfield, OR	Nikki Swanson	USDA Forest Service
Cassandra Wilke	Milwaukee, WI	Joseph Ewing	Discovery World
		John Rothlisberger	USDA Forest Service
Jonathan Yee	Sammamish, WA	Julian Olden	University of Washington
Dakota Zimmerman	Lapwai, ID	Robert Hills III	Nez Perce Tribe
		Miranda Main	Nez Perce Tribe

Mentor and Student Applications for the 2014 Hutton Program will be available online in October. For more information about the Hutton Program, please visit the AFS website: www.fisheries.org, or contact Kathryn Winkler at 301-897-8616 ext. 213 or via e-mail: hutton@fisheries.org.

Photo credit: Little Rock Convention and Visitors Bureau.

Membership and Communication: The Dual Benefits of Social Media for AFS

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Patrick Cooney

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Steve Midway and Patrick Cooney. Photo credit: Lindsay Campbell.

The American Fisheries Society (AFS)—like any large, dynamic organization of members—will have occasions that require a collective refocusing. Brand new approaches, or advances in existing methodologies, often require us to take stock of current practices and consider new beneficial alternatives. For example, field and lab advances such as electrofishing, telemetry, and otolith microchemistry have become well-accepted investigatory approaches, and in the office many of us now use high-end statistical and modeling software to crunch our numbers. Just as we have adopted these new tools, scientific communication is another need that has demonstrated opportunities for advancement. Many of us now rely on instantaneously downloadable electronic files when needing scientific information, or we talk directly to each other over cellular phone connections and e-mail—instead of posting letters. Likewise, social media is a rapidly developing tool that we as individuals are beginning to use and one that holds great potential for AFS.

Social media generally includes those quick interactions (mainly person-to-person or person-to-group) that take place electronically, often as a Facebook post, tweet, or blog entry. Social media has clearly made an impact in popular culture, and more recently scientific organizations have identified ways to use these media to improve communication. The National Oceanic and Atmospheric Administration, Sea Grant, U.S. Fish and Wildlife Service, and numerous state resource agencies are just a few examples of scientific groups that actively use social media (and have an active public following). More specifically, Ogden (2013) provided some interesting examples of social media uses in science. For example, she retold the story of a researcher sampling fish in Guyana, who was unaware that all 5,000 of his samples needed to be identified at the species level before they could leave the country (based on Guyanese law). Amazingly, this otherwise impossible identification task was accomplished through posting images to Facebook, whereby the researcher's entire network was able to comment on nearly all specimens within a single day! (Note: He did get the specimens and himself home.)

AFS has taken some initial steps to adopt social media. President Boreman (2013) recently highlighted the society's desire to "take advantage of social media as a means of recruitment" (p. 99), yet the society's strategic plan lacks a clear strategy toward that goal. The main AFS website has links to the society's social media accounts; however, it takes some snooping to find them and the content is not uniformly updated. (For example, the AFS Vimeo account highlights the videos from Seattle 2011 and the newest Flickr photos also dates back close to a year.) These efforts are a good start, but it may be time for the society to prioritize maintaining a social media presence.

Social media efforts hold the promise of several benefits to the AFS and its members. The most obvious benefit is the improved communication to be gained from responsible adoption of rapid communication methods. Martin et al. (2013) clearly demonstrated that, for fishing information, anglers now rely on the Internet and social media more than ever before. Why shouldn't we, too, as a group that often provides information for the very same demographic? Individually, successful efforts have been made to integrate social media into the work of some AFS members. Kopaska and Fox (2013) recently presented an unofficial inventory by social media uses of AFS members—several blogs and YouTube channels were featured and, we suspect, are subsequently on the radar of many more interested scientists. Though it is clear that independent grassroots efforts have been made (successfully) by members, we see numerous instances where the linkages provided by a dedicated society effort might create a responsible and more efficient means of communication that would be greater than the sum of its parts.

A second imperative for increased and dedicated social media efforts stems from the ongoing concerns regarding society

recruitment (e.g., Fisher 2012; Seitz et al. 2012; Wuellner and Jackson 2012) and the obvious need to understand the types of individuals we are trying to attract (Millenbah et al. 2011). In other words, as a society we are losing members—and the lifeblood of a healthy scientific society is the influx of new science and ideas that are generated by new members. The younger demographic we need to attract to the fisheries profession as the next cohort is the group that relies on (requires?) social media more than any other. Prospective AFS members—for example, high school and undergraduate students—have been raised on technology and thus are incredibly technology-savvy and group oriented. We see this not only in their use of social media but in the tremendous effort that universities and other institutions are now investing in Podcasts, eBooks, and online courses. If AFS wants to recruit this technologically efficient group as the next generation of fisheries problem solvers, it is our opinion that this effort will be led by the use of social media.

Naturally, there will be detractors to social media. Many society members operate external to social media and do fine recruiting students, publishing scientific articles, and attending conferences, among other activities. Our claim is that social media is not something to replace the existing framework; rather, it is an additional tool to improve communication. Content on social media is typically not subject to review yet can spread faster than nearly any other form of information. Additionally, the instantaneous nature of interactions on social media could create false expectations—a sense where individuals might feel entitled to immediate answers. This, of course, is rarely the case in fisheries science. So though we realize there are challenges as we move forward in the social media world, our observations suggest that the rewards greatly outweigh the risks and that the associated risks can be managed and reduced. And for those perhaps hung up on the notion that "I don't want to have to create multiple accounts in multiple social media just to stay current," we are not necessarily suggesting that individual members adopt Facebook and Twitter accounts but, rather, that the society's social media be publicly shared.

In reality, websites are the face of any company, institution, society, or group. Any organization—particularly a diffuse one, like AFS—needs to prioritize an online presence because it is often the first place a potential member might encounter the society. Although only our opinions (but based on conversations with other AFS members), specific improvements might include (1) an AFS homepage that has dedicated webpages not only for members but also for the public and potential members; (2) integration of member comments on a dedicated AFS social media page—something similar to a Twitter or Facebook feed; and (3) promotion and encouragement of chapter, section, and subsection social media accounts. It would also be useful to have continuing education workshops that assist members in developing personal or group social media accounts (and inline with the intended purpose, the AFS could create a YouTube account with similar social media tutorials for those not attending a workshop). For those attending the AFS annual meeting in Arkansas, we suggest you consider participating in the symposium "Using Social Media to Improve Communication in the Fisheries Profession and Engage the Public."

In summation, many scientific disciplines are benefiting from adopting social media, thus achieving greater spread of information and increased and more diverse involvement. For AFS specifically, it may also be the germ of a new member recruitment strategy. We understand that the scientific process is at the core of any scientific society, and the temporal scale upon which this process operates is not the same as for social media. Therefore, our ideas and suggestions are not intended as a radical change or one aimed at replacing any other specific modes of communication. If social media can assist us in improving AFS, we see the big-picture benefit as increased society communication and growth, which will ultimately strengthen and promote our rich traditions.

Steve Midway and Patrick Cooney, along with Dana Sackett and Brandon Peoples, operate The Fisheries Blog *(thefisheriesblog.com), a website featuring weekly content on a range of topical fisheries themes.*

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NEW AFS MEMBERS

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Bart Durham
Meghan Gahm
Joseph Gebryshak
Jo-Marie Kasiniak
Rajeev Kumar
David Marancik
Kia Marin
Roany Martinez Cabrera
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Dana McCanne
Sarah Moffitt
Sarah Evelyn Moffitt
Diem Thu Nguyen
Moses Ong
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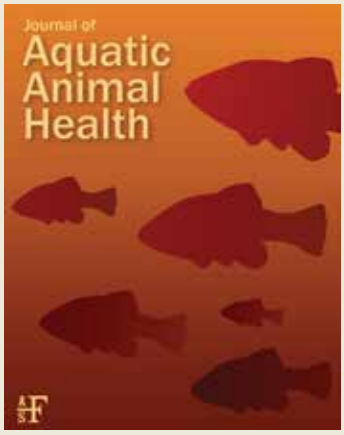
Tsigereda Shekib
Hillary Ward

JOURNAL HIGHLIGHTS

Journal of Aquatic Animal Health
Volume 25, Number 2, June 2013



Pharmacokinetics and Tissue Distribution of Thiamphenicol and Florfenicol in Pacific White Shrimp *Litopenaeus vannamei* in Freshwater following Oral Administration. *Wenhong Fang, Guolie Li, Shuai Zhou, Xincang Li, Linlin Hu, and Junfang Zhou*. 25:83–89.

Clupeid Response to Stressors: The Influence of Environmental Factors on Thiaminase Expression. *J. M. Lepak, C. E. Kraft, and M. J. Vanni*. 25:90–97.

[Communication] Effect of Dietary Herbal Supplements on Some Physiological Conditions of Sea Bass *Dicentrarchus labrax*. *Sevdan Yılmaz, Sebahattin Ergün, and Ekrem Şanver Çelik*. 25:98–103.

Prevalence of *Francisella noatunensis* subsp. *orientalis* in Cultured Tilapia on the Island of Oahu, Hawaii. *Esteban Soto, Kathleen McGovern-Hopkins, Ruth Klinger-Bowen, Bradley K. Fox, James Brock, Nathene Antonio, Zelda van der Waal, Stephen Rushton, Aileen Mill, and Clyde S. Tamaru*. 25:104–109.

Specific and Rapid Diagnosis of *Edwardsiella tarda* by a Novel Loop-Mediated Isothermal Amplification Targeting the Upstream Region of *hlyb* Gene. *Guo-Si Xie, Jie Huang, Qing-Li Zhang, Cheng-Yin Shi, Xiu-Hua Wang, and Qing-Hui Liu*. 25:110–118.

[Communication] A Comparison of Two Methods for Colorimetric in situ Hybridization Using Paraffin-Embedded Tissue Sections and Digoxigenin-Labeled Hybridization Probes. *Joe Marcino*. 25:119–124.

Toxicity of Copper Sulfate to *Flavobacterium psychrophilum* and Rainbow Trout Eggs. *Eric J. Wagner and Randall W. Oplinger*. 25:125–130.

Physiological Changes in the Red Drum after Long-Term Freshwater Acclimation. *Mariel Gullian-Klanian*. 25:131–141.

Efficacy of Spray Administration of Formalin-Killed *Streptococcus agalactiae* in Hybrid Red Tilapia. *O. Noraini, M. Y. Sabri, and A. Siti-Zahrah*. 25:142–148.

Continued from page 344

where the surf is salty. And similar landscape approaches apply to inland areas.

- Use the National Fish Habitat Partnership (regional partnerships), with its 18 regional partnerships spanning all 50 states, as one model to approach fish habitat based on ecosystems such as coastal waters or reservoirs and key species like Western Native Trout or Atlantic coastal species.
- Think about subregions or ecosystems in those National Ocean Policy or National Fish Habitat Partnership contexts. Major watersheds like the Susquehanna, Columbia, and Ohio offer excellent frames for habitat work.
- Be creative when investing precious dollars. Old regulatory requirements that agencies restore or protect on-site have given way to more flexible rules that allow us to move offsite to avoid recurring threats. Be strategic. Be a visionary. When the ports of Long Beach and Los Angeles wanted to expand their shoreside port facilities, they did not seek to build a salt marsh along the deepened channel in their ports. Instead, they moved a few miles and restored 880 acres of degraded habitats at Bolsa Chica Lagoon, which now is a productive ecosystem that supports native species and provides valued services.

So think of habitat in a broad context, both geographically and across disciplines. Evaluate connections within and between ecosystems, look for lessons from our terrestrial partners (human, feathered, and furred), and think beyond the niche.

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CALENDAR
Fisheries Events

To submit upcoming events for inclusion on the AFS web site calendar, send event name, dates, city, state/province, web address, and contact information to sgilbertfox@fisheries.org.

(If space is available, events will also be printed in Fisheries magazine.)

More events listed at www.fisheries.org

DATE	EVENT	LOCATION	WEBSITE
August 19–23, 2013	Aquatic Science at the Interface	Hamilton, New Zealand	aquascience.org.nz
September 23–25, 2013	2nd Annual World Congress of Mariculture and Fisheries-2013 (WCMF-2013)	Hangzhou, China	bitconferences.com/wcmf2013/default.asp
September 23–26, 2013	OCEANS '13 MTS/IEEE - The Largest Ocean Conference in U.S. History	San Diego, CA	oceans13mtsieeesandiego.org.
September 28–October 4, 2013	2013 World Seafood Conference	Newfoundland and Labrador, Canada	wsc2013.com
October 1–4, 2013	The Wild Trout Symposium XI	Yellowstone National Park, WY	wildtroutsymposium.com
October 7–11, 2013	AFS 40th Annual Meeting of the Alaska Chapter of AFS	Fairbanks, AK	afs-alaska.org/annual-meetings/2011-2
October 21–27, 2013	3rd International Marine Protected Areas Congress	Marseille, France	impac3.org
January 23–26, 2014	AFS Southern Division Spring Meeting	Charleston, SC	sdafs.org/meeting2014
April 7–12, 2014	2nd International Mangroves as Fish Habitat Symposium	Mazatlan, Mexico	fishconserve.org/email_messages/Mangrove_Symposium.html
August 3–7, 2014	International Congress on the Biology of Fish	Edinburgh, United Kingdom	icbf2014.sls.hw.ac.uk
August 17–21, 2014	AFS AFS Annual Meeting 2014	Québec City, Canada	afs2014.com
August 31–September 4, 2014	International Symposium on Aquatic Animal Health (ISAAH)	Portland, OR	afs-fhs.org/meetings/meetings.php

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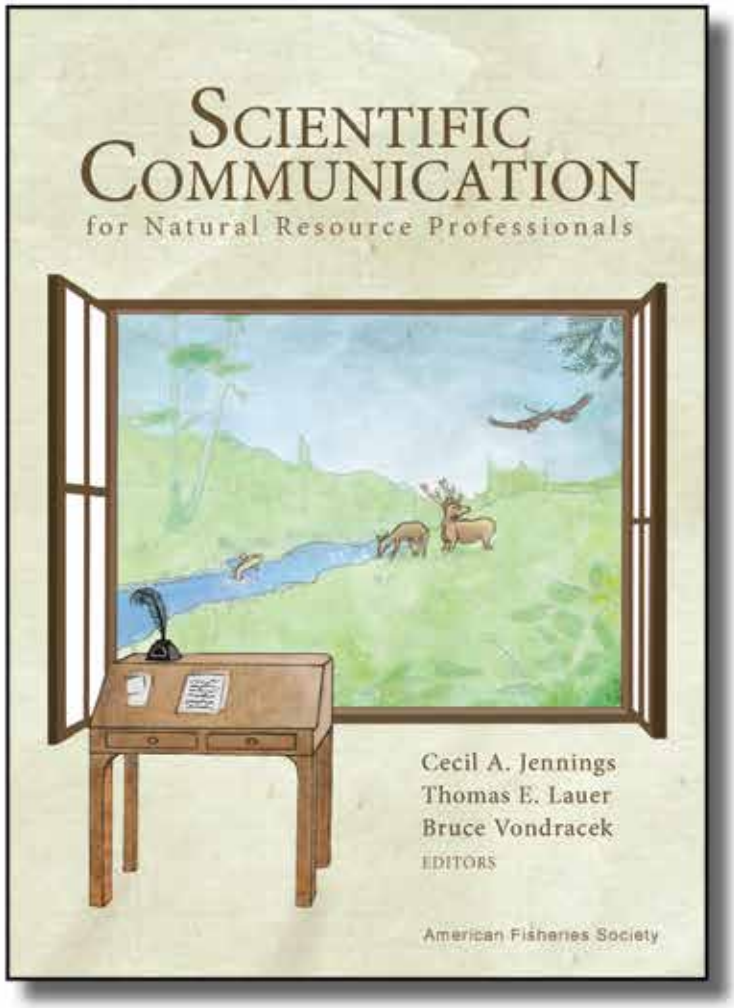

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This book is a "how to" guide to most forms of modern scientific communication, containing practical advice on improving communications and publishing success.

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