Happy New Year! Conservation of anadromous stocks in the Convention Area is the primary objective of the North Pacific Anadromous Fish Commission (NPAFC). I returned to the NPAFC as President in 2018 after a long absence from the Commission since 2010. I quickly realized that tremendous progress in science, enforcement, and collaboration with other agencies has been made to conserve Pacific salmon and trout. Based on many scientific achievements during the last two decades, the Anniversary book titled “The Ocean Ecology of Pacific Salmon and Trout” was published in 2018. Due to the systematic enforcement activity enhanced by the multilateral cooperation among members, the IUU fishery has been greatly reduced in our Convention Area. Furthermore, I am glad that ENFO/CSRS Working Group on Inter-committee Coordination (WGIC) has been recently formed to work toward improving coordination between two committees with the goal of improving enforcement effectiveness and collection of scientific data. All progress achieved within the NPAFC is due to sincere efforts from the Secretariat and all delegates of member countries, and I sincerely appreciate their efforts as they have contributed to making the NPAFC the strong organization it is.
Within the very short duration, since I was elected as NPAFC President in May 2018, many important events happened. There were several announcements for the International Year of the Salmon (IYS) by member countries. Especially, the Honorable Ilya Shestakov and Jonathan Wilkinson, the Fishery Ministers of the Russian Federation and Canada, declared the beginning of the IYS with several foreign delegates and International Organizations in fishery forums in September and October, respectively. Other member countries also carried out international symposiums on salmon or organized outreach activities to the public. Since the IYS involves not only the North Pacific Ocean but also includes the North Atlantic Ocean, we visited the NASCO Secretariat in Edinburgh, Scotland to discuss the IYS development with Mr. Jóhannes Hansen (President) and Dr. Emma Hatfield (NASCO Secretary), and exchanged ideas with Ms. Roseanna Cunningham (Scottish Cabinet Secretary for Environment, Climate Change, and Land Reform), officers at the Atlantic Salmon Trust, and Atlantic salmon scientists at the Marine Scotland Science Freshwater Fisheries Laboratory. In my New Year’s message in 2009, I had mentioned that there would be “the establishment of the Year of Salmon in the near future”, and this dream became true last autumn. Through all the IYS activities in the world’s ocean, I believe that our organization will be in the spotlight in international science and society.

Closer international collaboration with other agencies is the essential component to reach our Commission’s objective. In the Pacific Ocean, we have pursued collaborations with the PICES and NPFC on areas of mutual interest. Dr. Dae-Yeon Moon, NPFC Executive Secretary, attended our annual meeting in May 2018 on behalf of the organization. In October, Dr. Vladimir Radchenko, NPAFC Executive Director, and I visited the NPFC Secretariat office in Tokyo and met with Mr. Kenji Kagawa (Chairperson) and Dr. Moon to discuss issues of collaboration between two commissions, including a draft NPAFC/NPFC Memorandum of Cooperation (MOC). This fall, the PICES approved a joint theme session at their October 2019 annual meeting in Victoria, Canada. Mr. Mark Saunders (Director of the IYS, North Pacific Region) and I attended the NASCO annual meeting in Portland (Maine) last June and members of the NASCO Secretariat, Dr. Emma Hatfield, and Ms. Sarah Robinson participated in the opening event of the IYS in Vancouver in early October.

Since the completion of the last NPAFC annual meeting in Khabarovsk, Russia, many changes have happened inside the NPAFC. Mr. Doug Mecum (USA) was appointed Vice President, and the three new chairpersons of the CSRS (Masa-aki Fukuwaka, Japan), ENFO (Mike Carlson, Canada), and F&A (Vladimir Belyaev, Russia) started their terms immediately after the 2018 Annual Meeting. I welcome these new officers and appreciate the many past officers for their contributions to the organization.

In Asian societies, 2019 is regarded as the Year of the Pig which is the iconic indicator of wealth and the birth of a new life form. As an analogy, salmon are often used as a symbol of determination, renewal, and prosperity in Native North American societies. Therefore, I hope the entire NPAFC family enjoys the Year of the Pig, and a blessing of good fortune and luck.
The focus of this short paper on the North Pacific Fisheries Commission (NPFC) is on compliance challenges and mitigation mechanisms, and not on the science or general management components of the Commission. The former was addressed by my colleague, Dr. Aleksandr Zavolokin, in the NPAFC Newsletter No. 44, and the latter by our Executive Secretary Dr. Dae-Yeon Moon, in the NPAFC Newsletter No. 43.

For Canada, the Europeans were drawn to North America to fish, hunt and explore in the 1500s. The ‘boom and bust’ cycle evident in fisheries today was the cause of the first 16th century ‘competition’ between English and French in Canada. Was this the first of the Illegal, Unreported and Unregulated (IUU) fishing, or did it go back to the days of the first man when he ‘borrowed’ a fish from his neighbor to eat? We do not know; however, illegal fishing has been amongst us for thousands of years.

Illegalities in the fishing industry have persisted, and in fact, increased over the years up until the first major collapse of a fish stock, the Canadian Cod stock in 1992. However, concern had been raised earlier and international instruments were being developed based on the basic principles of the United Nations Convention on the Law of the Sea (UNCLOS) of December 10, 1982 to reduce and stop the high levels of illegal fishing activities in the early 1990s even before the term IUU fishing was first used in 1997 by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). These legal instruments included: the 1993 FAO Compliance Agreement, the 1995 United Nations Fish Stock Agreement (UNFSA), the 1995 FAO Code of Conduct resulting in the development in 1999 of International Plans of Action (IPOAs) to address IUU Fishing, Sharks, Seabirds and Fishing Capacity. It is the IPOA IUU that has come to the force in recent years and is being adopted by the many regional fisheries bodies, those already operational (NAFO; ICCAT, etc.), and those established in these years (WCPFC and on to NPFC), some with full management responsibility and referred to as regional fisheries management organizations (RFMOs).¹

Experience has demonstrated that one cannot look at IUU fishing in isolation for it is part of the triad of (i) IUU fishing, illegal fishing, unreported fishing and unregulated

¹ RFMOs have the authority given to them by their Members to make mandatory legal measures for the sustainable management and use of the fishery resources under their mandate.
fishing; (ii) fisheries related crimes such as document fraud, tax crimes, money laundering, and crimes against labour laws; and (iii) crimes associated with the fisheries sector, including drug, human and weapons trafficking and piracy, all which occur on some fishing vessels (Figure 1).

It is for this reason that we must establish strong links with appropriate agencies involved in the other two crime sectors and be prepared to call on such cooperation when we encounter a fishing vessel that may be involved in more than just IUU fishing. There are several organizations already involved in such collaboration such as the International Labour Organization (ILO), International Maritime Organization (IMO), INTERPOL, United Nations Office on Drugs and Crime (UNODC) working through the UN Convention Against Transnational Crime, and others, including private sector and civil society groups. Examples of the latter which come to mind include: FISH–i Africa which evolved from the Stop Illegal Fishing Programme under the African Union to share vessel tracking information in eastern Africa; and the Global Fishing Watch (GFW) which has become well known for its tracking of fishing vessels and fishing activities on a global scale. More will be noted on GFW later.

Sean Wheeler of DFO Canada highlighted in the NPAFC Newsletter No. 43 the fact that tracking fishing vessels using new technologies is much easier than in the past. Consequently, the ability of fishing vessels to evade detection, or their flag States to delay action with respect to their responsibility for flag State control of their nationals is greatly reduced and soon to be a factor of the past.

In the case of the North Pacific Fisheries Commission (NPFC), there are several challenges extending beyond the use of modern technologies. The first is the structure of the RFMO itself. NPFC is comprised of eight Members: Canada, China, Japan, the Republic of Korea, the Russian Federation, Chinese Taipei, the United States of America, and Vanuatu, all with varying interests in the NPFC. In addition, we have interest expressed by Uruguay, Ukraine, and the EU to join the Commission, either as full Contracting Parties or as Cooperating non-Contracting Parties (CNCPs). Five of the eight Members of the NPFC fish extensively in the western NPFC Convention Area (CA); the USA does not fish in the CA and Canada conducts minimal fishing in the eastern portion of CA. It is expected that Canada and USA shall focus more on ‘governance issues’, while the other Members have a mixed interest in ‘governance and fishing rights’.

The challenge for NPFC with this membership has been to keep the high commitment of all Parties to make NPFC, as a newer RFMO, an example for sustainable resource management and ecosystem protection by building on the success stories and lessons learned from older RFMOs. There is no need to re-invent the ‘compliance wheel’ to achieve sustainable management of the resources and protection of their ecosystems, the ‘wheel’ is there to be built upon if the commitment of all Members remains high.

The second challenge of any RFMO is its legal authority and assurance that at all times the Commission complies with the international legal framework upon which it was established, international principles of law and its own regulations, the latter often requiring legal interpretation to ensure said compliance. The evolution of international legal instruments impacting on fisheries management from 1982 to 2017 is summarized in Figure 2.

The solution to this challenge of legal correctness is quite standard in that RFMOs usually rely on an experienced, independent, international legal specialist on the laws of the sea, oceans, marine environment and fisheries law, e.g., UN and FAO legal instruments. RFMOs often tap into the legal advice from the FAO or have such legal specialists on retainer for consultation. Non-compliance with international laws, principles or its own regulations may have a negative impact on RFMO.
credibility respecting information sharing in its future.

The third challenge for all RFMOs, and definitely NPFC is the development and use of traditional and new monitoring, control and surveillance (MCS) tools for the implementation of the Commission’s conservation and management measures (CMMs). The status of the use of traditional and new MCS technologies is noted in Table 1.

The fourth challenge, especially for NPFC is that of location and overlapping jurisdiction with three other RFMOs. One can see the overlap of NPFC with NPAFC, WCPFC, and IATTC (Figure 3 and 4).

**Need For Cooperation, Collaboration and Coordination**

The overlapping jurisdictions become a challenge in the verification of the respective operational authorities of the thousands of fishing vessels, including the carrier vessels operating in the area. As IUU fishing has become one of the key issues for RFMOs to address, and transshipment has become one of the biggest challenges in this component, the cross-authorization of carrier vessels and/or fishing vessels has become a major compliance issue for NPFC and can only be addressed through formal cooperation between the pertinent RFMOs’ compliance programmes. This challenge is on two levels: first to establish common operational directives, or CMMs for management between the RFMOs so there are not different or potentially conflicting enforcement schemes that could confuse the fishers or the enforcement teams that operate in the overlapping areas; and second, to establish formal mechanisms for the timely exchange of management and operational information to enable the four RFMOs to deliver on their strategic management plans to their Members.

At present, this cooperation is still a challenge to NPFC, and it is one of the priorities in the NPFC Strategic Plan. The Tuna RFMOs have a formal mechanism for coordination for vessel registries (http://www.tuna-org.org/) and general operations (http://www.fao.org/3/a-i8146e.pdf) through the tuna compliance network (TCN) established with support from the FAO Areas Beyond National Jurisdiction (ABNJ) programme. At present, the General/Deep-Sea RFMOs do not have such a formal network, although the FAO is making efforts to establish a regular meeting mechanism through the FAO ABNJ system.

Deep-Sea Project. Up to the date of this writing, there is no mechanism for regular discussions of operational issues between the five Tuna RFMOs and the eight General/Deep-Sea RFMOs, including CCAMLR.

Inter-RFMO cooperation is usually through formal exchanges of memoranda that provide details of the levels of cooperation, and the development of such memoranda is especially important to NPFC’s future operational success, especially for areas of overlapping jurisdiction. Issues where there could be synergies of effort that could form the base for collective compliance operations in the four RFMOs might include the following:

1. **Air surveillance—dual or triple tasking of the aircraft.** Note: Canada now funds air patrols of the NPAFC Convention Area to ensure there are no drift nets fishing for anadromous fish. This includes the relocation of the aircraft to base it out of Japan for certain periods. This aircraft often flies directly over the key areas of NPFC fishing for pelagic stocks and also the seamounts where bottom fishing might be occurring. Joint or secondary tasking of these flights could provide additional benefits from Canadian funding to both NPAFC and NPFC. Such information could be used for follow-up at-sea patrol planning and tasking to specific areas or to positions of ‘vessels of interest.’

2. **Full exchange between all overlapping RFMOs of data** such as: vessel registrations, IUU listings, Automatic Identification System (AIS) and Vessel Monitoring System (VMS) data, patrol vessels plans and operational areas, air surveillance assets and patrol areas, coupled with regular, quarterly or semi-annual compliance meetings with WCPFC and possibly the Pacific Islands Fisheries Forum Agency (FFA) Regional Operations Centre in Solomon Islands, or IATTC, etc., could facilitate the following:

   a. **identification of active areas by season and/or fishery;**

   b. **identify ‘vessels of interest’ for targeting high seas boarding and inspections, thus greatly enhancing the cost-effectiveness of at-sea operations; and**

   c. **planning of joint monitoring, control and**

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2 Apologies as the Convention Area for NPAFC is not included in the figures, however it extends north of 33°N in the ABNJ, thus overlapping NPFC, WCPFC, and IATTC. Although sometimes not recognized as an RFMO, it is considered by the RSN to have all the responsibilities for management of the anadromous stocks as an RFMO and is noted here due to the overlapping jurisdiction.

3 The five Tuna RFMOs cover 90% of the ABNJ and the seven General/Deep-Sea RFMOs and CCAMLR cover 77% of the ABNJ.

4 Where possible common formats for data collection, sightings, boarding reports, etc. could be used, however it must be accepted that different data may be collected for each RFMO.
<table>
<thead>
<tr>
<th>No.</th>
<th>MCS Tool</th>
<th>NPFC MCS TOOLS</th>
<th>Use in NPFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regional MCS Strategic Plan</td>
<td>TCC Work Plan—short term only</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Vessel registration/Licenses for authorized fishing vessels, including fish carriers from Members, and where authorized, non-Member carriers</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Entry and exit monitoring or reporting systems</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Vessel monitoring systems/Satellite technologies</td>
<td>Not yet, SWG working on VMS/ using free AIS by GFW</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>High seas boarding and inspection procedures</td>
<td>In final development, not yet implemented</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Observers</td>
<td>Bottom Fisheries only and for scientific purposes only (5 vessels)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Air surveillance</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Sea surveillance</td>
<td>- (No regional plans, individual Members only)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Spatial closures</td>
<td>No bottom fishing above 45°N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>C-H seamount and Southeastern part of Koko seamount are closed precautionary for potential VME</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Seasonal Limitations</td>
<td>Bottom fisheries closure November—December annually</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Mesh/Gear limitations</td>
<td>No bottom fishing below 1,500 m. For bottom fisheries, only trawl, gillnet, longline and pot can be used. 130 mm mesh for North Pacific Armorhead (NPA) and alfonsinos</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Catch/Fish size/Quotas/ITQs/trip limits</td>
<td>Input control only: Vessel limits to number in February 2007 for bottom fisheries; No increased vessel numbers for Pacific saury and mackerel from 2016</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Vessel Sightings Reports</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Port State Controls</td>
<td>- (4 of 8 Members ratified, but no CMM in force)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Compliance Monitoring System</td>
<td>-</td>
<td>Under development</td>
</tr>
<tr>
<td>16</td>
<td>Management/industry consultation</td>
<td>NPA only through Scientific Committee</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Inter-intra agency liaison</td>
<td>Ongoing with PICES for science and NPAFC (under development)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. NPFC monitoring, control, and surveillance tools and their use by the organization.

Such exchanges can be conducted directly in face-to-face meetings or combined with the use of media exchange mechanisms such as WebEx to reduce costs.

3. Special agreements for cross-authorization of Observers (WCPFC-IATTC example) could serve to eliminate the need for different observer programmes, save funds and result in a highly professional level of observers knowledgeable of the regulatory requirements of all of the North Pacific overlapping RFMOs.

4. Liaison to establish common compliance operations procedures where possible would serve to set common inter-regional standards for such activities as high seas boarding and inspections thus minimizing any confusion by fishers and inspectors of differences between RFMOs.

5. Similar cross-authorization, and joint tasking of at-sea patrol assets and inspectors could also greatly enhance our collective operations and reduce
common procedures for investigation to then be turned over to appropriate authorities for prosecution and sanctioning of vessels.

Globally

1. Sean Wheeler pointed out in his earlier article that the civil society and private sector are ‘cross cueing’ (linking) and making good use of various satellite tracking applications to ‘paint’ fishing vessels and carriers in the oceans. This is of significant benefit to RFMOs if they choose to use these applications as a cross-check of other systems, or as an indicator of activities and possible ‘hot spots’ for further investigation. One of the more useful of these tools is the AIS introduced by the International Maritime Authority (IMO) in the mid-1990s as a safety mechanism to avoid collisions at sea. AIS is now being used for vessel monitoring purposes, and civil societies are using the information to publicly disclose possible non-compliant behavior.

6. Such cross-authorization would necessitate common training programmes for inspectors, observers and also patrol vessel crews, and it would also strengthen the ideas noted earlier for harmonious and common compliance mechanisms in the overlapping Convention Areas, so fishermen and the inspection parties do not become confused by differing systems.

7. Recognizing the fact that Members of NPFC are, for the most part, also members of WCPFC, NPAFC, and IATTC, then common compliance procedures, e.g., high seas boarding and inspections would facilitate the input of third party enforcement organizations in cases where fishing vessels were involved in either, or both of the other triad of criminal offences, e.g., compliance costs, with the joint tasking possibly using the US Coast Guard Ship-Rider Agreements as a model, however, widening the scope of authorization for approved patrol vessels to inspect fishing vessels operating under any of the RFMO schemes.

Figure 3. The geographic coverage of General RFMOs. The map was prepared by the FAO.

Figure 4. Map of Global Tuna Management by RFMOs (PEW Charitable Trusts, 2012).
2. PEW Charitable Trusts and Global Fishing Watch (GFW) are working together with NOAA of the USA using satellite night light detection (VIIRS) and AIS to identify and track fishing vessel and carrier movement throughout the globe. Further, GFW has been recognized for its work with governments for tracking fishing vessel activities, including Indonesia and Peru for the inclusion of real-time VMS data to supplement their AIS; Japan Fisheries Research and Education Agency (FRA) for possible IUU fishing; and Canada for general tracking. GFW has also worked with PEW and ICCAT to establish longer-term profiles of fish carriers using AIS and observer reports. These are just a few of the benefits for RFMOs that link with new technologies and civil societies and private sector companies providing analysis of the growing volume of data now available from these technologies.

3. The FAO Regional Secretariats’ Network (RSN) is a network of the Executives of the 51 Regional Fisheries Organizations, 31 being regional fisheries bodies (RFBs) with advisory mandates only and 20 Regional Fisheries Management Organizations (RFMOs) whose Members have given them the authority to implement mandatory management measures agreed by its Members. This Network meets officially on the side of the FAO Committee on Fisheries (COFI) every two years, consequently its direct assistance to an individual RFMO or groups of RFMOs has neither been fully investigated, nor mandated, nor utilized, but has considerable potential for the future.

4. The current United Nations exercise under UNGA Resolution 72/249 to establish an international legally binding instrument (ILBI) to address biological diversity beyond national jurisdictions (BBNJ) has gathered momentum in some quarters based on the idea that ‘RFMOs are ineffective, not committed and do not have the mandates to address biodiversity.’ In essence, the functionality and effectiveness of RFMOs are under the microscope. This exercise may well change the mandate and authority of existing RFMOs if, as some UN Members are suggesting, that the BBNJ exercise close the high seas to fishing and have the implementation of the Instrument fall under the exclusive management authority of a central body, and not through the RFMOs.5

5. There is a lack of knowledge and acceptance in the UN BBNJ delegations of the evolution of the RFMOs over the last several years and the efforts made by RFMOs to address ecosystem management and biodiversity conservation issues. This knowledge gap is partially due to a lack of fisheries representation on the UN delegations. Second, and also important is the fact that very few of the five Tuna RFMOs that currently cover 90% of the ABNJ and the eight Deep-Sea RFMOs (including CCAMLR) that cover 77% of the ABNJ are attending the UN BBNJ exercise to enhance the knowledge of unknowing UN Members as to what we are doing.

The claim that RFMOs are not taking action regarding biodiversity is untrue,

HOWEVER

it is true that there is no existing mechanism to coordinate the actions from all users of the ABNJ spaces, especially those who are likely to interact with each other, e.g., the prospection and use of marine genetic resources (e.g. for pharmaceutical uses), seabed mining, shipping, deep-sea fisheries, etc. (Ref. FAO comments).

Further, the author is not aware of any example where RFMOs with overlapping jurisdictions actively cooperate and coordinate their operations to address common issues. The RSN is in place, and there are also existing MOUs between RFMOs, however the effective implementation of these MOUs is not known.

6. There have been expressions of confidence that IUU fishing has decreased and is fully eliminated within some RFMOs. This is usually based on the claims of no IUU reports being received by the Commission, coupled with the belief that all registered vessels have been brought under control by their Members and the enforcement efforts of the Commission. It is believed that such thoughts that IUU fishing is under control in the North Pacific are countered by the evidence to the contrary as noted below.

7. Evidence to counter the idea that IUU is under control in the North Pacific Ocean is partially countered by the 27 vessels of no nationality that have been placed on the NPFC IUU Vessel list in its second two years of operations. It is noteworthy that some of these IUU vessels had duplicate names and details, but neither of the vessels had been registered and the photographs showed different types of fishing vessels, e.g., one being a trawler and the second a stick-held lift net type of vessel. In seven special cases where photographs indicated that both vessels were conducting IUU activities, the vessels were of differing types and also had different gear types, and further it was found that both vessels were fraudulently using the names and details of a legally registered vessel. The Member thus had to recall its registered vessels and following investigation of its activities, had to assist the owners to re-register the vessels under new names. Consequently, any vessel continuing to use the former names of these seven vessels can

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5 UNGA Res. 72/249 states that the new BBNJ Instrument is not to undermine existing legal instruments of frameworks.
be considered IUU fishing. These examples do not support the idea that IUU fishing is under control in the North Pacific Ocean.

Another clear example of IUU fishing in the western NPFC Convention Area, overlapping with WCPFC, was highlighted at an FAO side event of the 33rd session of COFI in 2018 on the global concerns regarding transshipment at sea. Prior to the side event, PEW and GFW presented the representatives of NPFC and WCPFC with a list of 35 fish carrier vessels that had, according to 2016 AIS tracking records had encounters6 with fishing vessels in the North Pacific Ocean. On checking vessel registrations neither NPFC nor WCPFC could find these fish carriers on their vessel registrations for that year. If we hypothesize on this information a slight bit and assume that these 35 fish carriers were transshipping fish products in the Convention Area of NPFC or WCPFC, then they were IUU fishing vessels and the fish they caught was illegal and had found its way into the legal fish food market chain. Further, if each of these 35 carriers conducted one full trip in 2016 and for expediency sake, collected 10,000 mt of fish or fish product, that equates to 350,000 mt of an unknown, IUU fish product going into the market in 2016. In comparison, the NPFC Members reported a transshipment total for 2016 of approximately 220,000 mt and that included none of the transshipments from these 35 vessels. NPFC reports that 13 of these 35 carrier vessels are now on the NPFC Vessel Register in 2018.

I leave you to hypothesize if IUU fishing is well under control in the North Pacific Ocean or if perhaps there is a need for greater efforts by NPFC to get its MCS/Compliance scheme fully operational? And further, it is suggested that there is an even more timely need for cooperation, collaboration and coordination for compliance operations amongst the RFMOs with overlapping jurisdictions in the North Pacific Ocean to enable them to collectively address IUU fishing and address ecosystem management and biodiversity conservation issues, or we run the risk of these tasks being assigned to another centralized ocean sector management body under the UN BBNJ international legally binding instrument.

Note: All opinions and statements in this article are those of the author and do not necessarily represent the position of the NPFC or its Members.

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6 An ‘encounter’ is where AIS tracks that show two or more vessels remaining within 500 m of each other for a period of more than 2–3 hours. An ‘encounter’ is not proof of any transshipment, however, it does provide an indicator worthy of further investigation of the activity of the two vessels and examination of their logbooks if possible.
Introduction

The night view of the port always attracted painters. Since the 17th century, Claude Lorraine, then Claude Joseph Vernet, Alessandro Grevenbroeck, Jacob Hackert, Johan Christian Dahl, Johan Barthold Jongkind, Ansdell Smythe, and even masterpiece-creator Edouard Manet, frequently painted different European sea port scenes under the moonlight. Despite a night-time world usually dominated by silence and tranquility, we see lots of activities on these canvases. Many people go about their business in the dead of night. Most of them are fishermen, while others deliver by small boats and unload goods and commodities from merchant vessels. Now, nobody could say how legal those night operations were in those early times. Nevertheless, it seems that the depicted scenes, to some degree, persisted until the beginning of the current century.

The binding FAO Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (“Port State Measures Agreement”, PSMA) entered into force on June 5, 2016. Nevertheless, the process of agreement development began at FAO as early as 2002. A voluntary instrument was developed to facilitate the implementation of the 2001 FAO International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (POA-IUU) as an initial step to introduce port State measures. FAO experts started to discuss elements that could compose comprehensive port protection from IUU fishing products delivery. First, there was the view that several regional memoranda of understanding on port State measures would be concluded in the world’s hot spots for IUU fishing.

In 2003, the FAO Committee on Fisheries (COFI) recommended to continue technical consultations and reviews on port State measures. The consultation would address substantive issues relating to the role of the port State in combating IUU fishing as well as principles and guidelines for the establishment of regional memoranda. The governments of Japan, Norway, Sweden and the United States of America, through the FAO FishCode Programme, contributed financially to the preparatory activities leading to the development and publication of the 2005 FAO Model Scheme on Port State Measures (FAO 2007). In 2005, COFI endorsed the report and recommendations of the 2004 Technical Consultation and agreed that follow-up work should be undertaken.
In 2006, calls were made to States in the UN system to “take all necessary measures ... including the prohibition of vessels from accessing their ports followed by a report to the flag State concerned, when there is clear evidence that they are or have been engaged in or have supported illegal, unreported and unregulated fishing, or when they refuse to give information either on the origin of the catch or on the authorization under which the catch has been made” (UNGA Resolution 61/105). In the same resolution, UN General Assembly encouraged to initiate, as soon as possible, a process to develop a legally binding agreement that was addressed to the States as to the relevant regional fisheries management organizations (RFMOs).

The FAO approved the Port State Measures Agreement at its Thirty-sixth Session through Resolution No. 12/2009 dated November 22, 2009. The same day, ten countries including the United States signed the PSMA, and thirteen other countries including Canada and the Russian Federation signed within one year. Norway first ratified the agreement on July 20, 2011 while Myanmar was the first State, which acceded the PSMA on November 22, 2010. The European Union, as an FAO member organisation, approved the PSMA on July 7, 2011. So, the long journey went of the PSMA acceptance by the world community with growing understanding on joint responsibility for marine living resources conservation and the consequent need to combat IUU fishing practices. As of December 2018, the Port State Measures Agreement has 57 Parties, including the European Union.

In May 2017, at the First Meeting of the PSMA Parties, the Port State Measures Agreement was named a major achievement in the global effort to combat IUU fishing. The Parties to the PSMA are now working together towards its effective implementation, including by encouraging non-Parties to adhere to the agreement. RFMOs also undertake efforts to promote the PSMA among their contracting parties and relevant non-members. Several RFMOs have adopted port State measures into their own conservation and management practices.

The NPAFC processes related to the PSMA

Since the beginning, the NPAFC explored opportunities to combat IUU fishing by preventing the illegal trafficking of fisheries products. The Certificate of Origin Program for Pacific Salmon was one from the first proposals to have a major Commission’s enforcement-related program. Implementation of this program should enable verification of the provenance of fish entering the market. At the same time, no evidence occurred that illegally caught salmon from the Convention Area were sold on the World fish market after reviewing a situation with Pacific salmon trade and inquiring into information on import and export of salmon products. In 1995, Parties agreed
that it was not necessary at that point to spend financial and human resources for further development of the Certificate of Origin Program. However, there was a mutual understanding that the issue could be raised again on the Commission’s future agenda.

The Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean took effect the same year the 1993 FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (Compliance Agreement) was approved. This coincidence entrusted special responsibilities to NPAFC for promoting conservation of fishery stocks, in particular of anadromous fish, and fighting IUU fishing. At the 1995 NPAFC Annual Meeting, Canada proposed that the Compliance Agreement could serve as a mechanism to obligate non-parties to the Convention to support and cooperate with its conservation objectives and principles. The Committee on Enforcement (ENFO) recommended that the Parties should encourage States or entities not a party to the convention to deposit their instrument of acceptance with the FAO Director-General as soon as possible. This recommendation was also repeated in three subsequent years (1996–1998), and four of five NPAFC member countries accepted the FAO Compliance Agreement in 1994–2003. Perhaps, now is an appropriate time to resuscitate this defunct subject.

From 1998–2001, the NPAFC Committee on Enforcement (ENFO) undertook efforts to perform a market analysis. That was a time when the patrol assets of the NPAFC member counties observed up to eleven IUU driftnet vessels and apprehended up to four of them annually. In 2000, Canada reported on concerns as to the origins of canned salmon imported from Korea and China. Later, it was ascertained that the fish had been caught in waters under national jurisdiction and then shipped overseas for processing. Nevertheless, the United States requested information on any market analysis frameworks on models that the Parties may be using. Unfortunately, no suitable framework was proposed.

Since 2000, the NPAFC practiced holding the interim Enforcement Evaluation and Coordination Meeting (EECM, initially Planning and Coordination Meeting, EPCM) that facilitates a dialogue between the Parties on relevant enforcement matters including combating IUU fishing. At the 2006 EECM, the United States tabled a document on the FAO IUU Model Scheme (NPAFC Doc. 935, Rev. 1, Appendix 4). Referring to the 1995 Code of Conduct for Responsible Fisheries (hereafter CCRF) and the 2001 International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (hereafter IPOA-IUU), the US Party proposed to use presented guidance as a starting point for discussion to apply this scheme in the NPAFC.

There were some doubts expressed by Parties at the 2006 EECM: whether a level of decision making in the NPAFC is enough to discuss the implementation of the port State measures adoption in the member countries. For example, Russia listed four different authorities dealing with fisheries and fishing vessel monitoring but do not participate in the NPAFC processes. Meanwhile, the Russian Federation still was not a member of FAO at the time of EECM in late February–early March (the Russian Federation officially joined FAO on April 13, 2016).
Other doubts were that the port State control implementation could constrain on some relevant domestic laws in member countries. At the same time, doubts had been expressed about port State measures relevance to the NPAFC case due to the Commission’s specificity: while other RFMOs have active fishing in their areas of responsibility, the Commission prohibits any directed fishing for anadromous stocks within in the Convention Area. Meeting participants pointed to difficulties related to the lack of a mechanism to exchange information about fishing vessels going to port. At that time, the Integrated Information System (IIS) developments were still not complete. Discussion on the Certificate of Origin program occurred again in search for evidence of illegally caught salmon delivered into port. In the course of the discussion, little by little, doubts were replaced by practical questions: What types of port State schemes will be more effective at apprehending IUU vessels and prosecuting? Which agencies within each member country are responsible for inspecting fishing vessels in their ports and whether they have a connection to NPAFC activities? The Canadian Party informed that domestic legislation was recently amended to enable Canada to adopt a model of the port State scheme on the west coast. Standard operating procedure for fishing enforcement inspectors was developed based on the FAO guidelines. All adopted measures and procedures will be reviewed to determine whether they fit with rules of multinational conventions to which Canada is a party.

Based on this approach, a productive idea was formulated to explore an experience of the port State scheme as well as other schemes implementation in the partner RFMOs including ICCAT, NAFO, IATTC, CCALMR and others. Russia reported about information exchange with Japan and Korea concerning landings from Russian fishing vessels in foreign ports. This communication might become a first step towards developing an information exchange tool in the frame of scheme under consideration. It was a suggestion to the Parties to review each part of the model and to find out, what already exists in each country and what challenges there will be for implementation of the scheme. At the end of the meeting, discussions resulted in an overview that summarized main approaches within the port State scheme: a set of questions should be developed to ask a vessel entering port and set of actions based on the answers to the questions; inspection procedures should be created; and results of inspection shall be communicated to the captain of the vessel as well as to the flag State of the vessel.

At the 2006 Annual Meeting, the NPAFC member countries recognized that Port State Control Measures are an important tool to combat IUU fishing. Parties unanimously agreed to implement the port State control measures of the FAO scheme where consistent with national laws. For this purpose, Parties also agreed to promote port State control measures with other agencies not present at the Annual Meeting but with authorities for port State control.

From 2007–2009, ENFO paid attention to numerous new issues including cooperation with the North Pacific Coast Guard Forum, other RFMOs including a new North Pacific organisation under formation (NPFC since July 2015), and non-member States, IIS development, functioning, and access, approaches to create a NPAFC IUU
vessel register (resulted in creation of the Vessel of Interest list), recovery of abandoned driftnets, etc., and PSMA was placed a little in the background. In the EECM 2007 report (NPAFC Doc. 1014), there is only a mentioning that Lisa Ragone of the United States presented the Port State Control Measures from US perspective. Unfortunately, no copy of the presentation was added to the NPAFC archive. At the 2007 Annual Meeting, then NPAFC President Mr. Guy Beaupre encouraged Parties to discuss the port State measures at the ENFO meeting but participants limited their reporting by the reiteration of 2006 statements and doubts.

The NPAFC performance review gave a new impetus to the PSMA considerations by the Commission. According to the performance review work plan, the Review Panel submitted the final report and list of recommendations to the 2010 NPAFC Annual Meeting. Among others, the Review Panel expressed its concern over the lack of a standardized institutional mechanism for ongoing collection and review of trade data from which the Commission can ascertain levels of illegal trafficking of anadromous fish. A Certificate of Origin Program was not highly recommended due to fact that IUU driftnet fishing in the Convention Area appears to have been significantly curtailed. Nevertheless, the Review Panel called on the ENFO to conduct a comprehensive study of a possible Certificate of Origin Program, particularly with a view to assessing its cost/benefit as against at-sea enforcement operations, in order to ensure the Parties are complying with their obligations under the Convention and recommended that the Parties shall be encouraged to become parties to the Port State Measures Agreement and that ENFO analyse its applicability to the NPAFC context and provide recommendations to the Commission thereon.

At the 2011 EECM, ENFO agreed that the recommendations on encouragement the Parties to become parties to the should be prioritized. It was decided that the Parties will report on their progress in accession to the agreement at the 2012 NPAFC Annual Meeting, and ENFO will report on the PSMA applicability to the NPAFC context and develop necessary recommendations on its implementation one year later. The Commission adopted this decision in November 2011 at the 19th Annual Meeting.

Gradually, all NPAFC member countries recognized the significance and acknowledged the effectiveness of the PSMA to the NPAFC context. Growing attention was paid to the PSMA issues in the ENFO meetings’ agenda from 2012–2015. If only “no further developments” was recorded in the ENFO report on this agenda item in 2012, detailed explanation on the Parties’ domestic processes to adopt their national legislation related to PSMA is provided in 2014–2015 reports. The ENFO Terms of Reference amended in July 2015, after revisions recommended by the Review Panel, included references to port State measures in two items related to information exchange. Finally, in 2016, the decision was made that the PSMA remain on the agenda until such time as all NPAFC Parties have ratified the Port State Measures Agreement, and the Secretariat was tasked to collect and summarize information on the PSMA implementation in the member countries. Now, after almost two years since the first NPAFC member country ratified the PSMA, there is enough information collected for a preliminary summary of the agreement implementation approaches and results.

In March 2012, ENFO held the Workshop on Procedures of Interception and Seizure of Vessels of Interest on the High Seas on the Jeju Island, Republic of Korea. Korea, as the host country, presented a talk on the Case Study on Korea’s Port State Measures taken against IUU vessels in the NPAFC. One of the primary objectives of the presentation was to recommend the basic components and enforcement framework which need to be considered in domestic port State measures with an international minimum standard proposed by the FAO Model Scheme.

Korea imported about 70% of fish and seafood to satisfy the population’s food needs (1.4 million metric tonnes (mt) from over 100 countries worldwide in 2016). Considering crab import, the country ranked as one of the leading three global importers in 2016. Korean seaports are secure from harsh weather conditions, located close to major Asian seafood markets and are accessible to fishing vessels from the most productive fishing grounds in the western North Pacific Ocean. It is therefore not surprising that an intensive struggle against IUU fishing products delivery was launched.
Korea developed and submitted to FAO its first National Plan of Action to Prevent, Deter and Eliminate IUU Fishing (NPOA-IUU) in February 2005. In 2007, the Republic of Korea legislated the Distant Water Fisheries Development Act (DWFDA) and amended it in 2015 to strengthen distant water fisheries management, curb IUU fishing, and improve traceability of catches and fisheries products imported to the domestic seafood market. According to Article 7 of DWFDA, the Minister of Ocean and Fisheries may restrict mooring of a ship or its entry into and departure from a port in several cases, including listing of the ship on the IUU vessel list by an international fisheries organization or a costal state and if there is sufficient evidence to suspect that any ship is involved in IUU activities. Article 14 (Port State Control Inspections) authorizes inspectors to investigate delivered seafood products and to document presumed IUU fishing activities. Correspondent enforcement regulation and inspection procedures were established in accordance with the DWFDA.

In the presentation, implementation of the port State measures was illustrated by the case of Cambodian-flagged F/V Arvid and Panamanian-flagged reefer Bellatrix which visited the Korean port of Busan in May 2010. The port inspection revealed that F/V Arvid was typically designed for fishing by driftnets and possessed no fishing permission, fishing gear or fish products onboard. Fresh paint on the bow of the hull concealed the vessel name recently changed from Seisho Maru No. 8 (from January 2006 to March 2010, according to the Maritime Connector database). Soon after inspection, F/V Arvid had fled from the port and its track had been lost. Photos, video record, and copies of documents found on board were sent to the NPAFC Parties and the Secretariat. The Commission sent a letter to the Government of Cambodia with a call to take all possible preventative measures and to ensure that Cambodian vessels are not involved in unlawful driftnet fishing in the Convention Area. The government of Cambodia responded that the F/V Arvid has been cancelled from the International Ship Registry of Cambodia.

Twenty-eight tons of illegally caught salmon were revealed aboard the Panamanian-flagged reefer Bellatrix. After the investigation, the salmon products were confiscated in accordance with Korean domestic law. As it was found from salmon tissue analyses, there were chum and sockeye salmon originating from the Kamchatka Peninsula coasts and, most likely, the salmon were illegally caught in the NPAFC Convention Area. As well as in the F/V Arvid case, Korean officials issued documents requesting Panama take preventative measures to ensure that Panamanian-flagged carrier vessels do not engage in illegal activities. It was remarkable that the reefer Bellatrix was, first and last, a fish carrier apprehended for the support of transshipment of unlawfully obtained catches in the NPAFC Convention Area. In December 2010, Korean officials inspected the reefer Bellatrix (now under name of Esteban) in Busan Port. No salmon product on board of reefer was found at that time. Unlike many other vessels apprehended for violations of the NPAFC Convention, the Esteban/Bellatrix reefer still sails in the North Pacific Ocean under the new name.

The Korean NPOA-IUU plan was reviewed and adopted by the Ministry of Oceans and Fisheries in August 2014. At the third review of the NPOA, Korea has incorporated the lessons learned from the past and addressed the concerns expressed by the international community. The third revision of the NPOA contains, among others, strengthening the level of sanctions against IUU fishers; mandatory installation of Vessel Monitoring Systems on all Korean fishing vessels operating in distant waters; enhancing Monitoring, Control and Surveillance (MCS) through the port state inspection scheme with broader application and coverage; rebuilding the internal/
external governance for the fight against IUU fishing; and strengthening the cooperation with coastal developing states.

After the new Korean NPOA-IUU plan revision was adopted, all vessels seeking to enter Korean ports carrying fish caught in waters outside Korea’s jurisdiction are required to submit a prior notification. Detailed information on the vessel and fish/fisheries products on board should be provided to the Korean National Fishery Products Quality Management Service. The inspection authorities examine received information and check if the vessel has engaged in IUU fishing before determining the approval or denial of port entry. In this process, all relevant information—fishing authorizations, transshipment certificates, VMS records, logbooks, fishing gears, equipment, documents, and fish/fisheries products on board—could be examined. If IUU allegation on a foreign fishing vessel is confirmed as a result of the examination or through other means, the vessel is not allowed to enter or land their consignments in a Korean port. The flag State of the pertinent vessel and relevant RFMOs will be informed on results of an inspection.

If a Korean vessel is detected for IUU activities, the vessel will be detained in port for legal proceedings in accordance with national laws. In 2016, the voluntary vessel buyback programme in Korea was revised and became obligatory for certain government designated vessels. The compulsory scheme enhances effectiveness and introduces special vessel types which are likely to cause overfishing and subjects vessels demonstrating a history of IUU fishing to the programme as of 2017. Korea’s national legislation was also amended to allow for stricter control over nationals who engage in IUU fishing outside State jurisdiction, including having an ownership or managing a foreign vessel engaged in IUU fishing; employment as the master or crew member of a foreign vessel engaged in IUU fishing; or knowingly importing IUU fish or fisheries products from other States.

Earlier in 2014, the Korean NPOA-IUU plan implementation was tested by the NPAFC States’ request to conduct a port inspection on two suspicious vessels, Sovereign and Stellar, which visited Busan port in June (see NPAFC Doc. 1605). There was neither fish nor fishing gear on board of both vessels when they were inspected. However, both of the masters were not trustworthy and behaved in an uncooperative manner during the inspection. In winter 2014, after a two-hour pursuit, a Russian Coast Guard cutter inspected and apprehended Stellar for fishing crab in the Russian EEZ without a valid permit. In accordance with Russian domestic laws, the master of the vessel was fined. Nevertheless, the vessel was renamed to Severus in July 2017 and continues sailing in the North Pacific Ocean under the ownership of the same Belize shipping company.
Recently, the Organisation for Economic Co-operation and Development (OECD) published a report on the progress achieved in implementing internationally recognised best policies and practices against IUU fishing since 2005 (Hutniczak et al. 2018). In this report, the progress is evaluated based on six OECD indicators including responsibilities of flag State, coastal State, port State and market State, enforcement and international cooperation. Korea’s performance is evaluated higher than 75% on all indicators with two other States from 31 under consideration only while performance reached 100% on the port State measures implementation.

The United States deposited the instrument of the Port State Measures Agreement on February 26, 2016 while the PSMA provisions became effective on June 5, 2016. In practice, the process of preparation to the PSMA ratification has never ceased since the United States signed the agreement in 2009. After receiving consent from the US Senate, domestic implementing legislation was developed, in particular, the IUU Fishing Enforcement Act that provides more powers to NOAA officers to conduct thorough inspections and deny entry to suspected IUU vessels at US ports.

The United States occupies leading positions among the world’s top seafood consumers despite consumption growth slowing in recent years (FAO 2018). More than 91% of seafood consumed in the USA is imported; mostly from developing countries (Swartz et al. 2010). This is partly due to efforts to clean up the domestic seafood market. It was shocking news that between 20% and 32% of wild-caught seafood or $1.3–2.1 billion in US imports are IUU fishing products (Pramod et al. 2014). Despite the validity of the methodology used to make such estimates was criticized for some inaccuracies and crude generalizations, a society of responsible seafood consumers cannot disregard this alarming message.

On June 17, 2014, the US President Obama released a Presidential Memorandum entitled “Establishing a Comprehensive Framework to Combat Illegal, Unreported and Unregulated Fishing and Seafood Fraud”. The Memorandum expressed deep concern over the threat that IUU-fishing continues to pose to the economic and environmental sustainability of fisheries and fish stocks, both in the United States and around the world. It established the Presidential Task Force, co-chaired by the US Departments of State and Commerce and made up of a broad range of other US federal agencies. Fifteen recommendations for implementation of a comprehensive framework to combat IUU fishing and seafood fraud were prepared by the Presidential Task Force including the development of instruments of law, especially in the area of internationally agreed trade-related measures. The first recommendation of the Task Force report published in the Federal Register on December 18, 2014 was working with Congress to pass legislation for the Port State Measures Agreement and direct the Secretary of State to promote entry into force and full implementation of the PSMA.

Until then, US fisheries possessed basic approaches and tools for combating IUU fishing conducted by non-US flagged fleets under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). MSA requires that flag States comply with their duties as regulated in article 94 of the United Nations Convention on the Law of the Sea (UNCLOS), i.e., take measures to ensure that vessels flying their flag do not violate sustainable management measures adopted by various regional fisheries management organizations. In practice, foreign governments that are found to have vessels engaged in IUU fishing are identified in a biennial report to the Congress. Listing in this report has legal consequences for such countries and their fishing fleets. If no sufficient action is taken after the NOAA Fisheries consultations with correspondent authorities of these newly identified countries, prohibitions on the import into the United States of certain fisheries products and the denial of port privileges for fishing vessels of that flag may be levied.

Importantly, the measures to be taken in order to deter IUU fishing are not limited to those of flag States. Adopted IUU Fishing Enforcement Act established a mechanism of US Departments and federal agencies coordination in accordance with PSMA measures to prevent illegally caught fish from entering the US ports and domestic seafood market. The bill requires that the Commerce Secretary is authorized to designate and publicize ports of entry for foreign vessels, persons, private entities or governments seeking entry to a port under US jurisdiction.
These vessels and entities should submit, prior to arriving in a port, the information as stipulated by the Port States Measures Agreement including details of intended port call, details of previous port call and transshipment at sea, if any, with authorization proof, comprehensive characteristics of vessel and fishing gears, information on shipowner, vessel's and master's fishing authorizations, and detailed information on catch and seafood products on board, their origin, and intention to offload in port.

Based on submitted information, the Commerce Secretary has rights to authorize or deny port entry and communicate this decision to the foreign vessel or its representative. A vessel may be denied entry for the following reasons: if it is listed as an IUU vessel; the Secretary has reasonable grounds to believe that vessel has engaged in IUU fishing or fishing related activities; or the Secretary has reasonable grounds to believe that the vessel has violated this Act by another means. In addition, a notice of denial of port entry decision must be sent to the flag State of the vessel and, as appropriate, to relevant RFMO. Port entry can be permitted to a vessel for inspection, enforcement, or scrapping, and as an exception, if it is essential for the safety or health of the crew or safety of the ship. If the vessel entered the port without authorization and/or is a listed IUU vessel, the use of the port for landing, transshipment, packing or processing of fish, refueling, resupplying, performing maintenance, or the use of dry dock facilities shall be denied.

The bill orders the Commerce Secretary and the US Coast Guard to conduct vessel inspections in US ports. Authorized inspectors have rights to make arrests, board, search or inspect vessels including facilities and records, and seize fishing gear. Based on inspection results, any foreign vessel including its fishing gear, furniture, appurtenances, stores, cargo, and any delivered IUU fishing products or their fair market value shall be subject to forfeiture under MSA. Despite no IUU fishing vessel was arrested in a US port since the PSMA provisions became effective, this bill gives a powerful legal instrument that can be applied when it will be needed.

Along with the PSMA ratification, the United States strengthens enforcement mechanisms to stop IUU fishing by establishing of the Seafood Import Monitoring Program (SIMP). The SIMP stipulates permitting, data reporting and recordkeeping requirements for thirteen imported fish species and group of species as well as derived seafood products: abalone, Atlantic cod, Pacific cod, Atlantic blue crab, red king crab, dolphinfish, grouper, red snapper, sea cucumber, shrimp, sharks, swordfish, and tunas (albacore, bigeye, skipjack, bluefin and yellowfin tuna), identified as vulnerable to IUU fishing and/or seafood fraud. Mandatory compliance for eleven of the species covered under SIMP began on January 1, 2018, while shrimp and abalone compliance requirements became effective on December 31, 2018. Pacific salmon species were initially considered but removed from the list of species vulnerable to IUU fishing. Likely, such decision confirms the previous expert conclusion that illegally caught salmon is rare on the World’s seafood market.

In 2018, NOAA Fisheries announced a proposed rule to establish a voluntary Commerce Trusted Trader Program for US importers, which will encourage seafood traders to provide data required in the SIMP framework. Implementation of this program will facilitate market access for trusted traders and give them some advantages that may be resulted in less expense and lowering of consumer prices as well. However, both traders and customers understand that it will not be another flooding of cheap seafood into the US domestic market as still 10–15 years ago. Sustainable seafood market and, even more important, fishery stocks condition require and demand certain sacrifices but promise long-term socio-economic benefits.

Back in 2006, Japan noted that national authorities will not issue permits for port calls of the vessels that are suspected of illegal fishing with reasonable evidence provided and this would contribute to the deterrence of IUU fishing toward the overall goal of the NPAFC. The national legislature, Japanese Diet approved acceding the PSMA ten years later, on May 10, 2017. In accordance with the provisions of this Agreement, PSMA entered into force in respect of Japan on June 18, the 30th day after the date of the deposit of the instrument of accession with the FAO Director-General on May 19, 2017.

Japan came to the PSMA ratification on their way to implementation of Sustainable Development Goals (SDG), in which Japan is striving to be one of the global leaders. Following the SDG adoption at the 2015 UN Summit, Japan established the SDGs Promotion Headquarters to ensure a whole-of-government approach to implementing the goals in a comprehensive and effective manner. Following the predetermined course, the Prime Minister Shinzo Abe proclaimed that Japan will prioritize the SDGs as a main pillar of the national strategy for creating nation’s future at the fifth meeting of the SDGs Promotion Headquarters on June 15, 2018. Goal 14 of the SDGs focuses on “conserving and sustainably using the oceans, seas and marine resources” that addresses the problem of the worsening condition of global fish stocks. Japan, the fifth largest marine capture producer and the third largest destination for fish imports in the World, is an essential player in moving the world toward a future of sustainable fisheries. All this was an additional impetus for Japan to ratify and join the PSMA in an expedited manner, in about one year after the agreement entered into force in June 2016.
Japan gradually took measures and actions to tackle IUU fishing by strengthening international cooperation in this field. The Japanese initiative was to establish an RFMO in the North Western Pacific Ocean to regulate bottom trawl fishing through the development of interim measures for the conservation of vulnerable marine ecosystems, which led to the North Pacific Fisheries Commission (NPFC) establishment in 2015. In 2012, the European Union and Japan signed a joint statement on fighting IUU fishing. In April 2016, G7 Foreign Ministers released a statement on maritime security during the G7 meeting in Hiroshima, which included their support for the implementation of measures and regulations to prevent IUU fishing.

Japan promoted accedence to PSMA for many states of the Central and South Pacific region by supporting financially the activities of the Southeast Asian Fisheries Development Center (SEAFDEC). SEAFDEC organized the Experts Meeting on Regional Cooperation to Support the Implementation of Port State Measures in Southeast Asian Region in Bangkok, Thailand from February 2—4 2016, other expert consultation meetings, workshops, and training courses. At the SEAFDEC Regional PSM Implementation Workshop in February 2018, the US NOAA Fisheries delivered an invited presentation with comprehensive recommendations on port State measures operational implications, boarding and inspection procedures, pre-inspection training and planning, documents to review and subjects to examine, necessary measuring and calculations, identifying violations and collection of evidence. Japan and the United States continue holding a joint training programme to help Pacific
island nations crack down on IUU fishing within their EEZs. The last three-week training courses for officials from 12 nations was held in Japan in late November–December 2018.

In December 2017, Japan proposed to establish the Port State Measures Working Group in WCPFC. After consideration, the WCPFC agreed to a Conservation and Management Measure on Port State Minimum Standards with the stated purpose being “to establish processes and procedures for CMMs to request that port inspections be undertaken on fishing vessels suspected of engaging in IUU fishing or fishing related activities in support of IUU fishing.”

Japan and Peru support the Global Fishing Watch (GFW), an international non-profit organization with the goal of “advancing sustainability of the oceans through increased transparency.” The GFW’s tracking of automatic identification system (AIS) messages from ocean-going boats is now being used to fight illegal transshipment inside and near the Japanese EEZ (Loew 2018). GFW recently signed a multilateral agreement on collaboration with the Japan Fisheries Research and Education Agency (FRA) and some Australian entities to investigate IUU fishing and strengthen transparency and governance of fisheries within the southeastern Pacific region. A concentration of bright lights on the night-time map compiled by GWF can show not only IUU fishing hot spots but main routes of transshipment vessels to the “ports of convenience” for landing seafood products from IUU fishing. This is of high importance since the number of IUU fishing boats seem to be growing in waters around the Japanese EEZ together with the stock abundance of several commercially important pelagic fish stocks.

However, even in the last years, Japan is criticized that a large portion of imported seafood on their domestic market is a product of non-sustainable fisheries. In 2009, up to 38% of seafood consumed in Japan was imported from other countries, rising to about 40% in 2015 (about 2,500 mt in weight). From this amount, 24–36% by weight of seafood could be sourced from illegal and unreported catches (Pramod et al. 2017). It was pointed in the cited article that the absence of reliable traceability systems and enforcement capacity, countries in the developing world often certify and export products exported to Japan without adequate provenance. Not all experts completely agree with this study. Nevertheless, in the OECD report mentioned above, the market State responsibilities by Japan is evaluated at 70%, less than for other five indicators (Hutniczak et al. 2018). As the Japan Times recently stated in editorials, the government should introduce more powerful steps to crack down on IUU fishing and port State measures should be supplemented by the seafood traceability program.

In Canada, it also takes a long time to develop a domestic implementing legislation after signing the PSMA in November 2010. Bill S-3 to amend the Coastal Fisheries Protection Act (CFPA) was passed by the Senate on December 9, 2013, by the House of Commons on May 28, 2015, and became law as the Port State Measures Agreement Implementation Act on June 18, 2015. As it is stated in the preamble, the purpose of this enactment is “to implement the Port State Measures Agreement, to prohibit the importation of fish caught and marine plants harvested in the course of illegal, unreported and unregulated fishing and to clarify certain powers in respect of the administration and enforcement” of CFPA. At the 2016 NPAFC Annual Meeting, Canada reported on the CFPA
amendment and ongoing drafting process of regulations that was completed in June 2016. The PSMA ratification is expected in early 2019.

Canada is an active player on the World’s seafood market. In 2016–2017, Canada exported 597,500–640,000 mt of fish and seafood, mostly lobster, crab, shrimp, and Atlantic salmon of total value about 6.6–6.9 billion dollars. At the same time, 530,882–534,000 mt, mainly shrimp, salmon, and tuna of total value about 3.8–3.9 billion dollars were imported. Sometimes, Canada also receives a portion of criticism from the Oceana Canada for weak market State measures that could not prevent seafood fraud, particularly mislabelling, and stop a flow of products coming to customers from illegal and unreported sources. At the same time, many economic reviews acknowledge Canada’s leadership in combating IUU fishing.

Despite the instrument of PSMA ratification still was not deposited, Canada has already developed a robust port state control regime for foreign fishing vessels. In 2005, Canada adopted NPOA-IUU, which stipulates that the Canadian Port Access Policy remains a “closed ports” policy whereby Canadian ports are generally closed, and access is a privilege that may only be granted by the Canadian government. In line with this policy, a foreign fishing vessel may apply for a licence for entering the Canadian EEZ and a variety of activities in a Canadian port. Three of the criteria specified in the policy to support the decision-making are: the vessel is flagged to a country Canada regards as having fulfilled its flag State duties in controlling the activities of its fleet and ensuring compliance with relevant conservation and management measures and relevant international fisheries treaty obligations; the vessel is flagged to a country that adheres to international fisheries instruments, notably UN Fish Stocks Agreement, the FAO Compliance Agreement, the Code of Conduct for Responsible Fisheries, and the IPOA-IUU; and the Minister of Fisheries and Oceans is satisfied that the vessel applying for a licence has not engaged in IUU fishing as per the criteria and timeframes developed by the National Port Access Committee. The policy will be consistent with Canada’s international obligations including those in the international trade field.

It was set in the NPOA-IUU that Canada promotes adoption of harmonized protocols for conducting port inspections to strengthen port State controls in RFMOs, of which it is a member. Separate NPOA-IUU section describes the port State measures in Canada’s vision. First, any foreign fishing vessel or vessel engaged in fishing-related activities (e.g., carrier, vessel repair ship, supplier) seeking EEZ and port access in Canada are required to provide a notice of entry into port, a copy of authorization to fish, and details of the fishing trip and quantities of fish on board at least 30 days in advance to intended entering to Canadian fisheries waters and port call. The three-page application includes information on the flag State of the vessel, its name, nationality, and identification details; qualifications of the master/fishing master; types of fishing gear; catch on board, including the origin of catch, species, form, and quantity; and other information required by relevant RFMOs/international agreements.

If the vessel intends to land or transship fish in Canadian ports, then a port inspection will be carried out. However, if no fish is to be landed or transshipped, then access may be provided for the purposes of refuelling and re-supply without inspection. Where there are reasonable grounds for suspecting IUU fishing, Canada reserves the right to prohibit landings and transshipments from the IUU vessel in port; immediately report the matter to relevant authorities in the flag State and to RFMO, as appropriate.

In comparison with earlier versions, the CFPA and Coastal Fisheries Protection Regulations (CFPR) have been amended to include a broader definition of “fish” and “fishing vessel”. Previously, some rare occasions like carrying fish by a container vessel were not covered by the existing legislation. Inspection and enforcement powers of fishery protection officers were expanded to investigate any place and vessel’s compartment, where illegally harvested fish might be stored or hidden, including containers, warehouses, and other areas. Import prohibitions on fish and seafood products from IUU sources was strengthened. The amended revision also set clearer authorities for information sharing among federal departments and agencies as well as with other States and international fisheries organizations.

According to policy statements of the Fisheries and Oceans Canada (DFO), Canada is stepping up its efforts to combat IUU fishing on the high seas by building stronger...
international partnerships with other governments, technology providers and law enforcement. For the NPAFC enforcement, Canada provides highly important satellite information of fishery vessel distribution and fishing hot spots. Canadian Operation Driftnet is a valuable component of the NPAFC enforcement activities against high-seas driftnet fishing. In September 2018, Canada declared its support for the work of GFW. A promising attempt to deter IUU fishing by stopping to provide insurance coverage to IUU vessels and their catch was also proposed by a Canadian researcher from the University of British Columbia (Miller et al. 2016). In the OECD report mentioned above, Canada’s performance is also evaluated higher than 75% on all indicators with the highest possible rank (100%) in relation to the international cooperation and flag State responsibilities (Hutniczak et al. 2018). As it is mentioned in the report, despite Canada still is not a party to the Port State Measures Agreement, “equivalent measures, i.e., measures with the same goal, introduced to domestic law towards ratifying the PSMA”. It seems we don’t have long to wait until Canada ratifies the PSMA.

The Russian Federation signed the FAO Port State Measures Agreement on April 29, 2010. At the 2009 NPAFC Annual Meeting, the Russian Party explained that the national authorities are currently reviewing Russian domestic laws to address the IUU fishing issues. The Russian Coast Guard has rights, under domestic legislation, to board and inspect stateless vessels. If the vessel’s nationality is known, Russia cannot prosecute it but can hand over custody of the suspected vessel to its flag State. If the vessel is stateless/flagless, Russia can escort the vessel to a Russian port for further investigation. Stricter enforcement measures were necessary to advance combating the IUU fishing in the Russian EEZ.

From 2011–2013, Russia exported 1,672–1,978 thousand mt and imported 917–1,014 thousand mt of fish and other fishery products annually. Frozen headed and gutted fish predominated (88.5–90.7%) among exported fishery commodities with 52–55% presented by walleye pollock and about half of the export being directed to China. From 2014–2017, the environment for trade significantly changed for political reasons in a changing world. While Russian export of fish and other fishery products averaged on almost the same level (1,890 thousand mt) with gradual growth in 2016–2017, import of fishery commodities decreased to 512–888, 640 thousand mt on average. This circumstance can impact priorities in Russia’s legislative work.

A decisive step in combating illegal seafood trafficking was made with the government decision of 2008 to oblige fishing vessels to deliver all fishery catches to Russian ports for their legalization under the State control. These Government Decrees amended in 2010 and 2013 made Russian marine ports a place of ceaseless struggle with “fishing piracy” as Russian media often named IUU fishing. Correspondingly, the port State measures have immediately assumed a greater degree of importance.

In 2013, in accordance with the federal program “Development of the Fisheries Industry”, Russian NPOA-IUU was prepared and approved by the Government Decree of December 25, 2013 No. 2534-p. Among other things, the plan provides for strengthening control over the fisheries commodity chain, international cooperation in combating IUU fishing, establishing a traceability system for seafood and seafood products tracking from the point of production to its eventual consumption. Plan implementation includes developing of operational and preventative measures in order to combat and curb IUU fishing, enabling stricter measures, as administrative
fines and as criminal sanctions, to violators of provisions of conservation legislation. Separate items are devoted to launching the electronic fishery logbook usage by commercial fishers and electronic signature by masters of fishing vessels.

In 2015, the Russian Government adopted the list of actions for the implementation of NPOA-IUU until 2020. The listed measures are aimed at strengthening of flag State measures and monitoring of the Russian fishing fleet activities; tightening international cooperation in the prevention, criminal prosecution and sanctions against the IUU fishing; facilitating the processes of issuing and obtaining fishing permit, improvement of quality of statistical information on the fishing industry functioning, and modernizing a traceability system for fish and fishery products exported from Russia as well as imported into it. As a result, the number of violations of environmental protection legislation should decrease by 37.9% until 2020 while a seafood traceability system will cover 89% of exported/imported volume.

Russia closely cooperates with FAO, and the FAO Liaison Office with the Russian Federation advises and assists in the development and implementation of FAO policies. At the 2018 annual FAO webinar in Moscow, the Port State Measures Agreement implementation was discussed by FAO’s Senior Fisheries Officer Matthew Camilleri and officials of the Russian Ministry of Agriculture responsible for fisheries matters. Russia informed FAO that a traceability monitoring system for fish and fishery products works satisfactorily with the major focus on crab and crab products export. An increase of sanctions and penalties for IUU fishing is under the constant attention of the State. While the port State measures are no panacea for comprehensive defeating of IUU fishing, it is a very important tool in combating it, and the Russian Federation is just a step away from the PSMA ratification.

Partner Organisations’ Practices

In preparation of this article, the Secretariat conducted a brief survey on the port State measures implementation in partner RFMOs with a technical compliance function. The most comprehensive reply was received from the Northwestern Atlantic Fisheries Organization (NAFO), which is a recognized leader in gradual upgrading of the MCS measures and in the performance evaluation process (second performance review was completed by NAFO in 2018). Nine of twelve NAFO members, including Denmark in respect of Greenland and the Faroe Islands and European Union, are also Parties to the PSMA.

Since December 2005, NAFO prohibited non-contracting party IUU-listed vessels from landing and transshipping fish products and receiving port services in designated ports (von Kistowski et al. 2010). One year later, NAFO decided to require denial of port entry to non-contracting party IUU-listed vessels. Currently, the Port State Control measures are outlined in Chapter VII of the NAFO Conservation and Enforcement Measures (NCEM) and apply to landings or transshipments in ports of Contracting Parties listed on the NAFO website by fishing vessels flying the flag of another Contracting Party. The provisions apply to landing or transshipment of fish caught in the NAFO Regulatory Area, or fish products originating from such fish, that have not been previously landed or offloaded at a port. The port State Contacting party shall carry out inspections of at least 15% of all landings or transshipments during each reporting year. As for some fish species, e.g., Greenland halibut, authorised vessels may only land Greenland halibut catch in ports designated by NAFO Contracting Parties and, without exceptions, none in non-Contracting Parties ports. Duties of the flag State Contracting Party are also outlined in the NCEM. Procedures related to infringements, if any, are comprehensively described in Chapter VI of the NCEM as well as other enforcement measures pertaining to at-sea inspection and surveillance protocol.

The NAFO IUU vessel list contains IMO numbers for all vessels, which is crucial in identifying vessels and tracking their movements. Currently, as of October 2018, it contains seven IUU vessels. Information on vessels listed as IUU by other RFMOs is also provided. Last years, the NAFO Secretariat has not received any information from a member port State regarding a denial of entry for IUU vessels. In the first years after the Port State Control measures implementation, independent researchers estimated that 49 port visits of the NAFO IUU-listed fishing vessels were made in four ports of the NAFO Contracting Parties. Of these 49 port visits, 38 were considered violations or potential violations and eight were considered non-violations; three port visits were followed by port State actions (von Kistowski et al. 2010). It is fair to point out in this connection that the NAFO Secretariat considers these independent estimates are exaggerated.

Should there be a new sighting or inspection of a suspected IUU vessel in the NAFO regulatory area, including the port inspection, the port State will report it to the Secretariat and the suspected vessel will be placed on the Provisional IUU Vessel List, according to the NCEM. The Standing Committee on International Control examines and discusses the provisional list and makes recommendations to the Commission whether to include the vessel in the official IUU List. The official IUU vessel list is available to the public while the provisional list is available only to the Contracting Parties. Currently, NAFO has no a provisional IUU vessel list due to non-sighting of suspected vessels.
The Inter-American Tropical Tuna Commission (IATTC) has not yet adopted a resolution to implement port State measures. Despite the recognition of the FAO Model Scheme, it has not been possible to reach a consensus among the currently 21 contracting parties on the proposals that have been tabled, year after year, the last one in August 2018. At the same time, some measures were independently implemented. Since June 18, 2004, the landing and transshipment of fish products from non-contracting party IUU vessels has been prohibited. About one year later, the landing and transshipment of fish products from contracting party IUU vessels was also prohibited. Despite the IATTC implements the IUU-vessel listing procedure since June 2005, it does not require the denial of port entry to IUU-listed vessels.

The number of IATTC members that are Parties to the PSMA has increased significantly in 2016–2017 and reached nine members: Costa Rica, European Union, France, Japan, Korea, Panama, Peru, USA, and Vanuatu. Two of five cooperating non-members (Chile and Indonesia) also ratified the PSMA in 2012 and 2016, respectively. Since the PSMA resolution is still not adopted, the IATTC Secretariat does not receive information from port States as a result of port inspections or regarding the denial of access to port. The only information that is collected and shared between members relates to potential IUU activities identified at sea.

Only five of the 111 vessels on IATTC IUU vessel list were recorded with an IMO number. This makes the list less effective for identification of IUU-listed vessels. However, independent researchers recorded 26 visits from five IATTC IUU-listed vessels to four of the contracting party ports from 2005–2009 (von Kistowski et al. 2010). Of those, 25 visits were considered violations or potential violations of the IATTC conservation and management measures, and one was considered a non-violation.

According to the IATTC procedures, if the port State member will report that there is reasonable evidence for believing that a foreign fishing vessel has engaged in, or supported, IUU fishing activities after the port inspection, such report would be treated like all information regarding compliance and possible infractions. First, it would be shared only between members and posted on a website with restricted access, since it must be reviewed by the IATTC compliance committee to be confirmed as infractions.

Notwithstanding, the North Pacific Fisheries Commission (NPFC) was established relatively recently and started to develop its regulatory mechanisms very actively. To date, four of seven NPFC members have ratified or acceded the PSMA—Japan, Korea, the United States, and Vanuatu. Since the beginning, NPFC gives priority to the establishment of conservation and management measures (CMMs) and MCS measures. In three and a half years, NPFC adopted 19 CMMs, ten of which are currently amended or superseded. Nine CMMs are active including measures on such basic issues as requirements for vessel registration, the establishment of an IUU vessel list, interim transshipment procedures, and high seas boarding and inspection procedures. NPFC still did not discuss the port State measures scheme and/or its implementation. However, the NPFC considers this is one of the urgent areas to tackle in the near future. There are no doubts that the PSMA will appear on the NPFC agenda soon.

The North East Atlantic Fisheries Commission (NEAFC) also adopted CMMs, which prohibit the landing and transshipment of products and the provision of port services to IUU-listed vessels since January 2004 and deny entering ports for IUU-listed vessels of non-Contracting Parties since May 2007. Among five NEAFC members, only one has not ratified the PSMA while three of six cooperating non-members (Bahamas, New Zealand, and Panama Indonesia) also ratified/acceded the PSMA from 2014–2016.

For almost a decade, the NEAFC Port State Control system has been successfully applied to all landings of frozen fish products by foreign vessels. In July 2015, the system was expanded to apply measures to delivering fresh fish and their products. The flag State of the landing vessel is used to certify that it is authorised to fish and has the quota available before the landing is allowed. It has also helped flag States ensure that their vessels are not landing catches without having them properly registered and counted against any applicable quotas. Each Contracting Party shall carry out inspections of at least
5% of landings or transshipments of fresh fish and at least 7.5% of frozen fish in its ports during each reporting year.

In independent research (von Kistowski et al. 2010), 117 port visits by IUU-listed fishing vessels are recorded in six NEAFC Contracting Parties, including the European Union with 14 of its member States from 2005–2009. Of the 117 port visits, 81 were considered violations or potential violations of the NEAFC CMMs and 16 were considered non-violations. Twenty port visits were followed by port State actions.

Concluding Remarks

It has been more than two and a half years since PSMA entered into force. States who are parties to the Port State Measures Agreement developed inner port State measures frameworks and procedures and started implementing them, sometimes well before the PSMA ratification. However, it is impossible to find in the media any mention of port State measures implementation. There are neither stories about suspected IUU fishing vessels being denied entry into port, nor statistics of applications, inspections, positive or negative decisions. One can say that routine day-to-day work is being done that does not require public attention and concern. At the same time, combating IUU fishing and lack of transparency are not compatible. The lack of knowledge and awareness among officials and the public always helps IUU fishers. If we are seriously going to deter IUU fishing activities by port State control, several immediate actions are necessary including exchange by day-to-day news, summaries, and reviews on the PSMA implementation, good and bad experience sharing, consultations and development of advanced recommendations.

The IUU-listing looks to be a necessary step to implement port State measures. The NPAFC should expeditiously continue last year’s discussions on a definition of IUU fishing vessels and transformation of the Vessels of Interest listing to the NPAFC IUU-listing. Despite no agreement being reached between the NPAFC Parties, nobody could explain whether the IUU fishing definition provided in Paragraph 3 of the IPOA-IUU does not suite the anadromous fish case. If there is no progress in the discussion, we will find ourselves left outside the process of combating IUU fishing in the North Pacific Ocean.

At the FAO webinar in Moscow mentioned above, the FAO officer listed factors that impede the PSMA implementation, including lack of knowledge and impact assessment of IUU fishing and benefits from port State measures implementation; lack of political goodwill and weak management structure; complicated and lengthy internal processes related to compliance with international agreements; inadequate operational capacity of port authorities for inspections and implementation of port state measures; weak legislative framework for the implementation of law enforcement and judicial measures; alertness for financial implications; pre-determination that national and regional mechanisms to combat IUU fishing work satisfactory; and concerns about potential losses for port services.

After preparation of this brief review, we can add at least one more item—non-synchronous development of tools that should be combined together as a way to of prevent, deter and eliminate IUU fishing. Port State measures are a dependent mechanism. To make the PSMA implementation successful, the distant water fishing nations should join and implement other treaties developed and supported by UN FAO: flag State responsibilities under the UN Convention on the Law of the Sea to regulate domestically flagged fishing vessels in the areas beyond their national jurisdiction and in foreign exclusive economic zones, market States responsibilities to create economic disincentives for IUU fishing and using market tools to detect illegal seafood moving along the supply chain, coastal States obligations to regulate vessels in the domestic exclusive economic zone (Hutniczak et al. 2018). Bilateral and multilateral agreements under RFMOs’ umbrellas can provide with opportunities to assess and increase the capacity of monitoring, control and surveillance (MCS) schemes, strengthening inter-agency cooperation, exchange best policies and practices against IUU fishing. Close cooperation in measures implementation is even more important than the established schemes themselves.

Acknowledgements

We thank our colleagues, NPFC Executive Secretary Dr. Dae-Yeon Moon, NAFO Senior Fisheries Commission Coordinator Dr. Ricardo Federizono, and IATTC Senior Policy Advisor Dr. Jean-François Pulvenis, who provided insight and expertise that greatly assisted the preparation of this review, although they may not agree with all of the interpretations/conclusions of this paper.
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CP-140 Aurora of the Royal Canadian Air Force and Canadian Coast Guard vessel going on a patrol. Photo credit: RCAF/DND
IYS Implementation Progress in 2018 and its Focal Year of 2019

By Mark Saunders, IYS Director
North Pacific Region

Happy International Year of the Salmon! It seems a little surreal that we are actually here at the focal year of the IYS. It has been just over six years since Dr. Dick Beamish submitted his 2012 NPAFC document proposing an International Year of the Salmon to gain support for field and analytical research related to understanding the mechanisms affecting productivity in the high seas and the limitations in our ability to forecast and effectively manage Pacific salmon. After hundreds of hours of meetings within the NPAFC and with our partners, we have succeeded in defining and launching a five-year IYS initiative that remarkably will begin with a survey of the Gulf of Alaska in February of 2019 and will culminate in 2022.

I would like to share some of the IYS highlights from 2018 and consider what is ahead in 2019. Before I go any further, however, I have to acknowledge the commitment and creativity of the IYS team, including our leadership and Secretariat Staff. I want to particularly acknowledge the contribution of Madeline Young, who helped shape the IYS over the past two years, and I wish her well in her new position with DFO’s salmon management team.

The IYS Working Group and the North Pacific Steering Committee have provided excellent direction and support. I have worked particularly closely with Doug Mecum, Carmel Lowe, Vladimir Radchenko, and Suam Kim who have provided strong executive direction that enabled us to negotiate the challenges we faced throughout the year. Dr. Shigehiko Urawa has been tireless in supporting the IYS and its link to the NPAFC Science plan. All the Secretariat staff have embraced the challenge of the IYS and have helped immeasurably. I would like to single out Jennifer Chang for her skill and dedication in administering the IYS.

Vision While not splashy, one of the key achievements was the development of a strategic implementation plan laying out the logic of the IYS. The NPAFC US Commissioner, Joe Mentor Jr. hosted a productive session in Seattle to set this in motion. The IYS Vision “to ensure salmon and people are resilient in a rapidly changing world” is to be achieved over five years through a series of workshops/symposia and high-impact projects focused on five research outcomes and one outreach outcome that will set the conditions for resilience. This approach is proving to be compelling in discussions with potential partners within government, NGO’s or the private sector.

Opening Events The opening event in Vancouver was one of the most rewarding and nerve-wracking events that I have been part of. In partnership with the Pacific Salmon Foundation (PSF), we went quite a way out of the box when hosting a media event in Vancouver in October. Madeline Young, our new Coordinator Stephanie Taylor, and Jennifer Chang worked as a team with experts from the PSF, DFO, and contracted companies to pull off an

Former IYS Coordinator, Madeline Young. Photo credit: NPAFC Secretariat
extraordinary event that has sparked considerable interest in the Pacific across all sectors. Speakers included the Honourable Jonathan Wilkinson, the Minister of Fisheries, Oceans and the Canadian Coast Guard, British Columbia Premier John Horgan, Chief Bob Chamberlain and representatives from Korea, Japan, and the United States consulates, respectively.

President Suam Kim was an excellent ambassador for NPAFC and the IYS, attending the opening event in Vancouver, the Russian opening of the IYS that was held as part of the Second Global Fishery Forum in St. Petersburg on September 15th, and the opening event in Scotland on October 26th. I had the pleasure of attending the event in Scotland with Dr. Kim and we were ably hosted by Dr. Emma Hatfield, the NASCO Executive Secretary, NASCO President Jóhannes Hansen, and NASCO Deputy Secretary Sarah Robinson. We had a remarkable tour of salmon restoration sites in the Scottish Highlands as well as excellent meetings with the Scottish Minister and federal Science staff at the Marine Fisheries—Freshwater Fish Laboratory, in Pitlochry Scotland. I should no longer be surprised but I was struck by the similar science and policy issues that are being dealt with by each agency we encounter. It was excellent to see the NASCO office in Edinburgh. We also met with Board members of the Atlantic Salmon Trust and had some very fruitful discussion of potential research collaboration with the United Kingdom and NGO’s more broadly.

The Republic of Korea’s IYS announcement was made on October 20, 2018, during the Yangyang Salmon Festival in Yanagyang, Gangwon Province, the Republic of Korea. In the lead-up to the openings, Dr. Vladimir Radchenko and Dr. Emma Hatfield introduced the IYS to the Regional Fishery Body Secretariats’ Network (RSN) held during the FAO’s COFI meeting in August in Rome.
Workshops/Symposia

Not surprisingly, this was a very busy year as we held workshops and symposia to develop priorities and plans for high-impact projects to address IYS outcomes, as well as further our understanding associated with these outcomes. In addition, IYS posters were presented at numerous conferences/meetings to raise awareness of the IYS. Some of the workshops included:

- **IYS Local Symposium on Sustainable Management of Chum Salmon in Changing Environments**, Tokyo, Japan (March 2018)

- The First NPAFC-IYS Workshop on *Pacific Salmon Production in a Changing Climate* was held in Khabarovsk, Russia (May 2018) and it was very successful with 60 participants in attendance.

- **Toward Effective Coupling of the Science of a Changing Climate with Salmon and People**, Santa Barbara, USA (June 2018). This scoping workshop was co-convened with our partner, the National Center for Ecosystem Analysis and Synthesis (NCEAS) and brought together salmon ecologists and climatologists from both the Atlantic and the Pacific basins.

- **IYS Special Session at the 2018 Long-Term Marine Ecosystem Research International Symposium**, Busan, Republic of Korea (December 2018). Dr. Radchenko and I were invited to attend this symposium. After we introduced the IYS and NPAFC high seas research, we held very productive meetings with Korean academic professors and students that may lead to collaborative ecosystem research with Korea as part of the IYS.

IYS Meetings

In 2018 we had over 80 meetings with partners or potential partners. Partnerships crossing cultures and great distances unquestionably take time to develop. Our relationship with NASCO and Atlantic partners grew very positively in 2018, particularly after face-to-face meetings of the two Presidents and our IYS Coordinating Committee and its technical team.

Website and Social Media Presence

As a latecomer to the world of social media, I have greatly appreciated the know-how and enthusiasm that our young staff bring to establishing our IYS net presence. Without their savvy, we will fail in reaching the public. Madeline did a fantastic job of leading our website development with the website developer MyLoudSpeaker and our collaboration with NASCO. Our Facebook page is customized for the North Pacific and our Twitter feed is used to push people to our website. I encourage you to have a look at the site and make sure your projects and activities are posted. I am constantly impressed by the articles that we are able to post. It will be interesting to hear how useful the sites are to members from non-English speaking countries.
The IYS Focal Year—2019

The New Year truly brings a turning of the page for the IYS as we move headlong from planning into implementation. It seemed until the opening event in October that there was a chance the IYS would not occur. But here we are. It is happening!!

The last two weeks of January are jam-packed with meetings of our Working Group & North Pacific Steering Committee in Vancouver, BC. After those two meetings are 3 days of workshops on IYS Salmon Status and Trends and International Salmon Data Laboratory (ISDL). The goal of these foundational planning workshops is to review the data requirements for understanding status and trends of salmon in both the Pacific and Atlantic basins, and to consider projects to address issues of data availability in relation to effectively reporting the status of salmon and assessing the factors that are driving trends.

It is particularly exciting that on February 14th/15th the Russian Research Vessel Professor Kaganovsky will arrive in Vancouver BC to load and depart for the Gulf of Alaska, to conduct what we expect to be ground-breaking research into the mechanisms driving salmon productivity in the Northeast Pacific Ocean. Scientists from all five countries will participate in this expedition that has been funded by a group of private individuals, corporate organizations, NGOs and government funders.

The NPAFC will hold its annual meeting in Portland, OR, USA and will host its Second NPAFC-IYS Workshop on Salmon Ocean Ecology in a Changing Climate on May 18–20, 2019. Convened jointly with the Salmon Ocean Ecology Meeting it will provide an opportunity for researchers to present studies and findings on all five IYS research themes, but there will be emphasis on three topics—the current status of salmon and their environments, salmon in a changing ocean conditions, and new technologies/integrated information systems for salmon research and management. Portland is a vibrant community that strongly identifies with salmon and we look forward to celebrating the focal year of the IYS with this lively city.

Later in the year, we will convene planning workshops related to the IYS outcomes, in particular, identifying projects related to new technologies such as eDNA and microchemistry, as well as the Human Dimension. We also look forward to having Pacific representatives attend symposia and workshops planned in the Atlantic. NASCO’s annual meeting is being held in Tromso, Norway in June with a special symposium on the Management of Atlantic Salmon in a Changing Climate. Again, please visit the website https://yearofthesalmon.org to see all of the activities from festivals to symposia planned across the salmosphere.

I feel particularly privileged in having the opportunity to meet with peoples across the hemisphere these past several years to promote and develop the IYS. Across all the countries that I have visited and the interests that I have met with, I am convinced that the timing of the IYS as it has been developed could not be better. In the years since Dick Beamish initially proposed the IYS, the need for collaboration has only grown, as the uncertainty in our socio-ecological systems has grown dramatically as well. We have a significant challenge and an even bigger opportunity in front of us to use the “call to action” that was envisioned in the 2016 proposal. Together, we will capitalize on the positive responses that we have received through the opening events to secure resources, either private or public, and continue our work implementing the IYS.
INTERNATIONAL YEAR OF THE SALMON

IYS Photo Challenge in the North Pacific

To help celebrate the launch of the International Year of the Salmon (IYS), NPAFC held the IYS Photo Challenge in the North Pacific from September 1 to October 31, 2018. On November 14, 2018, the NPAFC announced the winner of the Photo Challenge—Fernando Lessa, a resident of North Vancouver, British Columbia, Canada.

The IYS Photo Challenge was put on by the North Pacific Anadromous Fish Commission to stimulate public interest in the IYS and to celebrate what salmon mean to citizens of NPAFC’s member countries. The topic of the Photo Challenge was “Salmon and people in a changing world” and participants were also encouraged to incorporate any of the six themes of IYS: status of salmon, salmon in a changing salmosphere, new frontiers, human dimension, information systems, and outreach and communication. Many outstanding submissions were received, making it very difficult to determine a winner. The judges agreed that Mr. Lessa’s photo “Releasing some Chinook fry in Surrey!” was the best representation of the challenge theme.

Fernando Lessa (1984, Brazilian) is an outdoor storyteller. With a degree in Biology and a Masters in Photography, Fernando has collaborated with many clients in the search for unique images, and more recently as a writer, publishing two articles on the National Geographic Brazil website. Fernando has been a certified diver since 2004 and a fly fisherman for his whole life. He began his career as a photographic assistant in 2007, before becoming a full-time outdoor photographer in 2013. With extensive experience in the field, Fernando has worked in a variety of areas, from the untouched Amazon forest to tropical and temperate rainforests in South and North America. In Canada, Fernando has run the Urban Salmon Project since 2016 and collaborates with brands, conservancies and governmental agencies dedicated to the protect the environment. The Urban Salmon Project is proud to have PATAGONIA and The Rivers Institute as official partners.
NPAFC Technical Report No. 11

The First NPAFC-IYS Workshop on Pacific Salmon Production in a Changing Climate

Technical Editors: Jeongseok Park and Stephanie Taylor

Organizing Committee: Alexander Bugaev, Ed Farley, Jr., Jim Irvine, Ju Kyoung Kim, Denis Kotsyuk, Svetlana Naydenko, Mark Saunders, Shigehiko Urawa, and Jeongseok Park

Proceedings of the first NPAFC-IYS Workshop on Pacific Salmon Production in a Changing Climate, May 26–27, 2018, Khabarovsk, Russia. Full PDF extended abstracts are available online.

Topic 1: Status of Pacific Salmon and Steelhead Trout

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Iliamna Lake Watershed, Bristol Bay, Alaska August 3, 2015—Unique to Iliamna Lake, these island beach spawning sockeye salmon align in the wind driven current, waiting for appropriate spawning conditions. Photo credit: Jason Ching
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Mark Saunders
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In a Rapidly Changing World, Are Mixed-stock Fisheries the Best Option?

By Stephanie Taylor
2018 NPAFC Intern

Changing climate and ocean conditions are contributing to an increasingly uncertain future for Pacific salmon. Impacts of a changing world are slowly appearing as some Pacific salmon stocks have markedly decreased. As the variability in eastern North Pacific salmon stocks increases, perhaps it is time to re-evaluate fishing methods. Commercial salmon fisheries often target multiple stocks at once and an incidental catch is common and may be harmful.

Throughout the North Pacific Ocean, there are seven species of anadromous fish (salmon and steelhead) and countless different stocks. These fish originate from rivers throughout the Pacific Rim. The vast majority come from the five member countries of the NPAFC—Canada, Japan, the Republic of Korea, the Russian Federation, and the United States. As can be expected from the variety of species, stocks, and natal environments, the status of Pacific salmon varies greatly throughout this region (Irvine et al. 2018; Klovach et al. 2018; NPAFC 2018; Saito and Miyakoshi 2018).

In the eastern North Pacific, population health of Pacific salmon varies highly from species to species and stock to stock (Figure 1). Some are doing quite well, while others are on the brink of extinction. There have been widespread declines in Chinook returns which suggest that large-scale environmental processes are responsible, as opposed to local factors (Irvine et al. 2018). Since the late 1990s/ early 2000s, Chinook in Alaska have decreased in abundance. This trend has been mirrored in British Columbia, Washington, and Oregon (Irvine et al. 2018). In November 2018, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determined that eight Chinook populations are endangered; four are threatened; two are data deficient; one is considered special concern of the 16 populations studied (COSEWIC 2018a). The report concluded that many populations of Chinook in Canada were at risk of disappearing altogether. Sockeye salmon, on the other hand, have a much more variable status in the eastern North Pacific (Irvine et al. 2018). Sockeye populations further north, in the Bering Sea and northern Alaska are typically doing better than their southern counterparts.

While coho salmon are traditionally difficult to assess as they return late in the season throughout the eastern

Figure 1. Eastern North Pacific Ocean and surrounding territories. Alaska, British Columbia, Washington (WA) and Oregon (OR) are all labelled (Irvine et al. 2018).
North Pacific and do not congregate in large groups, recent reports indicate that while escapement goals are generally met in Alaska, returning coho salmon are getting smaller and smaller in size (Irvine et al. 2018). In British Columbia, the status of coho is mirroring that of sockeye, with northern stocks generally remaining healthy and southern stocks showing more variability. Interior Fraser River coho are currently the weakest stock in British Columbia, and the marine survival of coho smolts released from British Columbia hatcheries into the Salish Sea has declined over the past 30 years (Irvine et al. 2018).

The status of pink salmon in the eastern North Pacific is highly dependent on the, with the odd-year returns typically being larger than the even-year returns. In Alaska, odd-year pinks have been providing very large harvests while meeting or surpassing escapement goals whereas even-year pinks have been declining (Irvine et al. 2018). A mid-season update in 2018 on commercial salmon fisheries in Alaska saw a 31% decline in salmon catches from the previous year, mainly due to very poor pink salmon returns in Gulf of Alaska Rivers (ADF&G 2018). In British Columbia, the odd-year returning pinks are generally stable or in some cases increasing, and the even-year returning pinks have also been stable, but some stocks are declining (Irvine et al. 2018).

Throughout their range in the eastern North Pacific, chum salmon are generally doing well. In Alaska and Washington, the numbers of chum salmon remain high. In British Columbia, chum stocks in the northern parts of the province tend to be doing slightly worse than their counterparts in the southern areas of the province (Irvine et al. 2018). Steelhead throughout the eastern North Pacific are generally doing poorly. Throughout Washington, Oregon, and northern California steelhead stocks are classified as threatened (NMFS 2016a, 2016b, 2016c, 2016d, 2016e, 2016f). In southern California, steelhead are classified as endangered (NMFS 2016g, 2016h). In British Columbia, many steelhead stocks have remained in a low marine survival regime since the 1990s (Ministry of Forest, Lands, and Natural Resource Operations 2016). The Thompson River and Chilcotin populations of steelhead are classified as endangered and received an emergency assessment by COSEWIC in 2018 (COSEWIC 2018b). The assessment recommended they be listed under Canada’s Species At Risk Act immediately, as they are currently at risk of disappearing in the next five years. In Alaska, steelhead are generally healthy with only a few specific populations of concern to fisheries managers (ADF&G n.d.a).

Similar trends have been observed in the western North Pacific. In this region, abundances are determined via commercial catch statistics, which are dominated by pink and chum salmon (NPAFC 2018). In Japan, the chum salmon catch has decreased significantly since 2010 (Saito and Miyakoshi 2018). Pink salmon catches in Japan have also decreased abruptly, starting in 2011, but improved slightly in 2016 (Saito and Miyakoshi 2018). In the Republic of Korea, only chum salmon are fished commercially (NPAFC 2018). The chum salmon catch in 2017 was 182.2 metric tons, down from 256.5 metric tons in 2016 (NPAFC 2018). Chum catch in the Republic of Korea has been decreasing since 2015 with 488.0 metric tons (NPAFC 2018).

Figure 2. Kamchatka region of Russia. Areas with reported catch of Oncorhynchus species are identified (Lepskaya et al. 2018).
In Russia, all Pacific salmon stocks were at high levels, but slightly below the average levels from 2011–2016 (Klovach et al. 2018). Stocks of pink salmon in the Kamchatka region of Russia have increased since 2015 and pink salmon in the Amur and Primor’e regions are exceeding the levels of 20th century stocks (Figures 2 and 3). The pink salmon in the Sakhalin region, however, have seen an abrupt decrease in abundance since 2015 (Figure 4) (Klovach et al. 2018). Coho catch in 2017 in Russia was less than 60% of the catches in 2014 and 2015, and the catch of Far East Chinook has decreased by more than 200% from 2016 to 2017. Cherry salmon has been closed to commercial fisheries for many years due to low abundance (Klovach et al. 2018). Chum and sockeye catch in Russia are currently at high levels (Klovach et al. 2018).

As illustrated above, the status of Pacific salmon varies significantly from species to species and from stock to stock, especially in the eastern North Pacific. In the North Pacific, many commercial fisheries occur in areas where multiple stocks are mixed together (Satterthwaite et al. 2015; Kemp 2018). These fisheries are referred to as mixed-stock fisheries. Often these fisheries target areas where there is a mix of highly abundant stocks and smaller, weaker stocks (Routledge 2001; Satterthwaite et al. 2015). To protect the weaker stocks while still maximizing the overall harvest opportunities, managers typically employ a ‘weak stock management’ scheme in mixed-stock fisheries. This is meant to ensure that the conservation goals for all stocks are met (Satterthwaite et al. 2015). Weak stock management typically uses a combination of selective fishing methods, restricted openings of mixed-stock fisheries to specific times and areas, and established catch quotas to achieve management and conservation goals (Satterthwaite et al. 2015).

While these methods can be successful, they are not without challenges. The Fraser River in British Columbia is an excellent case study of mixed-stock management (Figure 5). Traditionally, the Fraser River sockeye fisheries are one of the most lucrative Pacific Salmon fisheries in Canada. There are 44 genetically distinct populations of Sockeye salmon (Routledge 2001; Kemp 2018). These populations are only distinguishable through genetic analyses. Many of the stocks in the Fraser River are highly abundant; however, there are also many smaller sockeye populations which co-migrate with the healthy stocks (Routledge 2001). Many of these weaker stocks are unable to sustain the same level of fishing as the stronger ones. Furthermore, some stocks in the Fraser River are considered critically endangered or threatened, leading to severe constraints on the harvest of the larger stocks in order to protect the weaker stocks (Routledge 2001; Satterthwaite et al. 2015). This is a common occurrence in all mixed-stock fisheries.

Terminal fisheries are an alternative to mixed-stock fisheries and have the potential to maximize harvest of strong stocks while also protecting weak stocks. In North America, Indigenous peoples have traditionally used terminal fisheries, and often still do (Schnute and Sibert 1983; Ebbin 2002). These fisheries occur in bays or inlets at the mouth of the salmon’s natal rivers and streams (Figure 6) (Schnute and Sibert 1983; Routledge 2001). While terminal fisheries have been used for centuries, they are not widely adopted in commercial fisheries of North America today. Some managers believe that terminal fisheries are the solution to conservation issues. Terminal fisheries ensure that weaker, critical stocks are relieved of fishing pressures while simultaneously allowing a robust harvest of the stronger, healthier stocks (Schnute and Sibert 1983; Ebbin 2002). In areas such as the Fraser River, where many different stocks intermingle, terminal fisheries offer the ability to harvest healthy stocks without putting weak stocks at risk (DFO 2011b; Kemp 2018).
In weak stock management regimes, strong stocks are often under harvested and weak stocks are at a higher risk of being overharvested (DFO 2011; Kemp 2018). Proponents of terminal fisheries argue that they negate this harvesting issue (Schnute and Sibert 1983). Unfortunately, it can be difficult to determine the appropriate catch quota in terminal fisheries. A quota is dependent on the number of salmon that have returned to spawn, but data on spawners can take days or weeks to become available. Since Pacific salmon die after spawning, the maximum economic yield is obtained by harvesting throughout the spawning period, to harvest both early and late spawners (Schnute and Sibert 1983). Due to the delay in obtaining information on salmon returns, it often arrives too late to be useful to fisheries managers. To combat this, managers set up test fisheries to gather data around the run-timing of the stocks (Schnute and Sibert 1983; DFO 2017; PSC n.d.). Test fisheries provide preliminary estimates of the run sizes to aid in setting catch quotas. In test fisheries, fishermen are contracted to catch fish in certain areas. Their results are compared to historical data to predict the returns for the year and set catch quotas. Another method of forecasting salmon returns is the use of counting fences (DFO 2018). Counting fences are temporary traps in which all fish pass through and are counted, providing estimates of salmon returns. These often occur as part of fish passages around down-river obstructions such as dams (FAO 1980).

Figure 5. Fraser River in British Columbia, Canada. The status of each designatable unit (stock) is indicated (Grant and MacDonald 2018).

Another drawback to terminal fisheries is their economic viability. A bioeconomic model of mixed-stock and terminal fisheries found that the economic incentive will always lie with the mixed-stock fisheries (Routledge 2001). Mixed-stock fisheries have a higher catch per unit effort (CPUE) than terminal fisheries, which leads to high economic yields. The economic yields of mixed-stock fisheries in the bioeconomic model were high enough to provide incentives to disregard the conservation of weaker stocks (Routledge 2001). However, while economic incentives play a large role in fisheries, conservation of stocks is also important and cannot be disregarded. Maintaining the genetic diversity of the many Pacific salmon stocks is essential for the resilience of salmon in a changing environment (Routledge 2001; DFO 2011). Routledge’s (2001) bioeconomic model shows that the short-term economic benefits are higher in mixed-stock fisheries, but the model does not account for the devaluation of the fishery as the weaker populations are depleted to provide benefits. Although, fisheries are highly unlikely to ever be managed in this manner. The at times high restrictions on mixed-stock fisheries reduce the harvest of these fisheries and their economic yields. The long-term economic benefits likely lie with terminal fisheries because they safeguard populations for the future and can increase the harvest of healthy populations over that of mixed-stock fisheries.

Another factor regarding the economics of terminal fisheries is that the salmon products are often seen as less desirable. As the salmon are close to the end of their life when harvested, consumers often feel that the quality of the salmon caught in the terminal area is not as good as that of salmon caught in mixed stock ocean fisheries, often yielding a lower unit price (Mark Saunders, pers. comm. 2018). Additionally, shifting entirely from mixed-stock fisheries to terminal fisheries in the eastern North Pacific is not feasible. While it would boost inland economies, many of which are First Nations communities which rely heavily on fisheries, it would mean removing livelihoods from coastal communities (DFO 2011). A balance between the two will need to be struck by allocating part of the commercial quota to terminal fisheries (Ebbin 2002; DFO 2011).

One such balance was seen in the states of the Pacific Northwest. In Washington, three legal decisions have led to the creation of the North of Falcon process, which mimics the process of the Pacific Fishery Management Council (PFMC), the federal management authority in this region (Ebbin 2002; WDF&W 2019a). The PFMC manages groundfish fisheries and salmon fishing in the Pacific Ocean, while the North of Falcon process manages inland, or terminal fisheries (WDF&W 2019b). Both bring together various stakeholders from state and First Nations governments, commercial and recreational fisheries, and
other interested parties. The North of Falcon meetings occur at the same time as the PFMC meetings (WDF&W 2019a). Members of the North of Falcon process meet several times before each fishing season to develop a region-wide fisheries management plan, by consensus (Ebbin 2002). Members also develop the technical reports that provide the basis for all management decisions. The goal of the North of Falcon process is to develop a region-wide management plan to divide the runs of Pacific salmon between mixed-stock and terminal fisheries, tribal and non-tribal fisheries, and commercial and recreational fisheries (Ebbin 2002). Often smaller groups break out to negotiate sharing arrangements on a smaller scale. The agreements reached are done outside of the federal PFMC process, but some agreements are attached to the PFMC fishing plan as Memoranda of Understanding (Ebbin 2002). Issues arise especially in situations where hatchery fish are released in bays and river mouths as opposed to upriver. When hatchery fish are released upriver, near spawning locations, they imprint on this area and behave like wild fish. However, when they are released in bays and river mouths, they do not imprint on spawning locations and often stray. When they stray and interbreed with other populations, it can have unintended consequences.

In some areas, concern has arisen over the impacts of interbreeding between hatchery-reared salmon (from production hatcheries) and wild salmon (FishBio 2017). This can decrease the genetic diversity of salmon stocks and reduce their ability to adapt to changing conditions (Routledge 2001; Araki et al. 2008; Christie et al. 2014). In California, the expected stray rate of hatchery fish is approximately one to ten percent, depending on the species; in part because of evolving practices that led to some hatchery salmon being released directly into estuaries. This prevents the salmon from imprinting on a natal river and increases the likelihood of straying (Williamson and May 2005; FishBio 2016). Alaska also uses hatcheries to increase the abundance of Pacific salmon and improve the commercial fisheries, but the rate of straying is much lower than that of California (Heard 2010; Vercessi 2013; Fish Bio 2017). Hatchery programs in Alaska are designed to protect wild stocks by decreasing the influence and interactions of hatchery fish and wild fish (Heard 2010; FishBio 2017). Alaska uses terminal fisheries to reduce the straying of hatchery fish and interbreeding of hatchery fish with wild fish as it can decrease genetic diversity of Pacific salmon.
wild fish; straying of wild fish is not of concern as it often increases genetic diversity and fitness (Vercessi 2013; FishBio 2017; ADFG n.d. b). One of the most effective tools for minimizing the influence of hatchery fish on wild stocks has been the development of terminal hatchery fisheries.

Recreational terminal fisheries are in small bays or coves where the hatchery fish have been held, allowing them to imprint on the location of release (ADFG n.d. b; FishBio 2017). These bays and coves are in rivers and streams that do not connect to wild salmon spawning grounds, which are located further upstream (Heard 2010; Vercessi 2013). When the hatchery fish return to spawn, they do so in areas free of wild salmon. This provides robust terminal fisheries in the area, while still protecting the genetic diversity of wild populations, thus balancing the dual goals of fishery enhancement and wild stock protection.

Terminal fisheries are being considered in California as an opportunity to provide more salmon in areas that have seen large decreases, while still protecting wild populations (FishBio 2017). This could also be used in other areas of the North Pacific where concerns about the interbreeding of hatchery and wild fish are prevalent.

Terminal fisheries are an interesting notion that deserves further investigation. They do provide marked benefits over mixed-stock fisheries in a time in which Pacific salmon are facing an uncertain future: they harvest only healthy stocks, thus conserving weaker stocks and the overall genetic diversity of Pacific salmon. They can also provide opportunities for continued hatchery production while simultaneously protecting wild stocks, an issue that is quite important in the eastern North Pacific. However, terminal fisheries are not without their drawbacks. The highest economic yield still lies within the mixed-stock fisheries. A shift to terminal fisheries in the eastern North Pacific also draws profits away from coastal communities and to inland communities, a shift that needs to be managed carefully.

While terminal fisheries may not be the solution, they are certainly worth considering, in North America especially. Public attention has been drawn to salmon along the west coast of North America as more and more members of the southern resident orca population are starving. Chinook salmon, which are doing quite poorly are their key food source. After the loss of the killer whale, J50 (a.k.a. Scarlet) and the incredible display of mourning for her calf from J35 (a.k.a. Tahlequah), the need to safeguard salmon populations is essential, and the implementation of terminal fisheries in the eastern North Pacific becomes an option that may allow commercial fisheries to continue while protecting weaker stocks, such as the Chinook for rebuilding.

References


Adult male sockeye salmon bonding with some younger salmon (Aniak River, AK, Aug 2017). Photo credit: Dave Cannon
Accepting Applications for the 2019 NPAFC Internship Program  
**APPLICATION DEADLINE: March 14, 2019**

The North Pacific Anadromous Fish Commission (NPAFC) invites citizens from its member countries (Canada, Japan, the Republic of Korea, the Russian Federation, and the USA) to apply for the NPAFC Internship Program. One intern will be accepted upon approval of the Commission. The intern will work at the NPAFC Secretariat office in Vancouver, BC, Canada.

The intern will gain experience and knowledge in operations of the NPAFC and will have the opportunity to test his/her interest in international governmental organizations, fisheries management, salmon biology & ecology, and fisheries enforcement. The intern will work under the supervision of the Executive Director and/or his designates. In general, the intern will assist in a variety of tasks, including:

- plan, develop, and complete an individual project in enforcement, science, communication, fisheries management, or administration;
- prepare information for and provide support to special projects including the International Year of the Salmon (IYS) initiative;
- assist in organizing and editing various NPAFC publications;
- coordinate international cooperative programs and assist Secretariat activities; and
- assist with other work delegated by the Executive Director and/or his designates.

**Internship period:** Up to a maximum of 6 (six) months, with the start date to be negotiated. Start date must occur between the period of July-December 2019. The intern is expected to perform his/her tasks at the Secretariat office on a daily basis, Monday–Friday, 7.5 hours per day.

**Qualifications:** Applicants must be a citizen of an NPAFC member country, have a university degree, the ability to read, write, and speak English, the ability to use computers and the Internet, and demonstrated personal initiative. Applicants must currently be a part of the government or academic sector, a recent graduate, or currently enrolled in school for an advanced degree.

**Financial support:** NPAFC will provide a stipend of CDN $2,500 per month. Travel costs for the intern to and from his/her place of residence and the location of the Secretariat will be at the intern’s own expense or by home country support. Travel expenses associated with the intern’s work in the Secretariat will be covered by NPAFC. The intern’s medical insurance and benefits are not covered by the NPAFC Internship Program.

**Applications:** Completed applications must include all of the following:

- A cover letter describing the applicant’s interests and qualifications
- Resume showing academic and/or work experience
- Three professional letters of reference
- Personal Data Page of passport as citizenship proof

Email the completed application to secretariat@npafc.org by March 14, 2019. The selected intern will be notified in early June of 2019.

**For complete information:** Go to www.npafc.org and contact the NPAFC Secretariat for questions at secretariat@npafc.org.

**APPLICATION DEADLINE: March 14, 2019**
Jeff Guyon worked as the Genetics Program Manager at the Auke Bay Laboratories (NOAA Fisheries) in Juneau, Alaska, where he and his colleagues investigated the genetics of salmon and other fish species in the North Pacific. He received his PhD from the University of Notre Dame on the topic of chromatin remodeling with work conducted in laboratories at both Notre Dame and Massachusetts General Hospital/Harvard Medical School. Afterwards, Jeff completed a post-doctoral fellowship at Children’s Hospital Boston/ Harvard Medical School developing a zebrafish model of muscular dystrophy. In 2007, he moved to Alaska working first with the Alaska Department of Fish and Game (ADF&G) and then, in mid-2008, with NOAA Fisheries as part of the Alaska Fisheries Science Center. In 2008, Jeff joined the NPAFC as a member of the Working Group on Stock Identification (WGSI), and from 2011 to 2018, he served as its Chairperson. In January of 2019, Jeff accepted a new position within NOAA as the Branch Chief for the Key Species and Bioinformatics Branch for the National Centers for Coastal Ocean Science (NCCOS/NOAA) located in Charleston, South Carolina.

2018 was the final year for Dr. Jeff Guyon to chair the CSRS Working Group on Stock Identification (WGSI). The Secretariat had an interview with him in an email format to let him leave his message for the NPAFC people. It has been so great working with him over ten years in the NPAFC. We all wish him another successful position in Charleston, South Carolina—NPAFC Secretariat.

1. How long have you served as Chairperson of the Working Group on Stock Identification (WGSI), and what are some of the most important achievements of the WGSI during your leadership?

I have been part of the Working Group on Stock Identification since 2008 and served its Chairperson since 2011. During that time, the reliance on the use of DNA for stock identification grew and the Ad Hoc Working Group on Stock Identification became a full working group in 2011. Over the years, it’s been an honor to work with everyone in the sharing of information and samples to help support the management of salmon, explore migratory routes, and support the mission of the North Pacific Anadromous Fish Commission through both annual meetings and international symposia. One of the most recent accomplishments of the working group included the development of updated protocols for the collection of genetic samples. You can see the updated protocols on pages 46–49.

2. Among many fond memories of the NPAFC, what are some of your most unforgettable memories so far and why?

It has been a great honor to be part of the North Pacific Anadromous Fish Commission for many years and I still remember my first annual meeting in Seattle during November of 2008. During that time, I have had the opportunity to participate in annual meetings in all member countries twice. The many friendships and collaborations established during those times will be with me forever, and I thank everyone for all their hospitality and kindness.

3. From your perspective, what do you expect will be the most difficult challenge that the WGSI will be facing in the next five or ten years, and how might this be resolved?

It is becoming increasingly cost-effective to collect large amounts of DNA sequence information. The analysis of these data sets will require technical expertise from a large variety of disciplines including fisheries biologists, geneticists, mathematicians, statisticians, and ocean scientists. Continued collaborations fostered through interactions at NPAFC annual meetings and workshops such as the upcoming “Second NPAFC-IYS Workshop on Salmon Ocean Ecology in a Changing Climate” in Portland, OR, USA, offer a great opportunity to work with scientific experts and leaders to further our understanding of salmon using genetic techniques.
4. Would you introduce Dr. Chris Kondzela who has replaced you on the Working Group on Stock Identification? And what advice and message would you give her?

Chris has been a member of the National Marine Fisheries Service’s Auke Bay Laboratories (part of the Alaska Fisheries Science Center) since 1984. Chris leads the chum salmon projects and her results identified the stocks of chum salmon intercepted as bycatch in some of Alaska’s groundfish trawl fisheries. She is an expert geneticist and received her PhD in Fisheries working with Dr. Tony Gharrett at the University of Alaska investigating salmon recolonization following glacial retreat. She is currently the acting Genetics Program Manager at Auke Bay Laboratories.

5. Would you tell us more about your new position in Charleston, South Carolina? And what messages would you like to leave the NPAFC people?

While we don’t have many Pacific salmon in South Carolina, I recently accepted a new position with the National Centers for Coastal Ocean Science (NCCOS) in the city of Charleston! Like the National Marine Fisheries Service, NCCOS is part of the United States’ National Oceanic and Atmospheric Administration (NOAA). Our laboratory is located at Fort Johnson in Charleston, South Carolina and I serve as the Branch Chief for the Key Species and Bioinformatics Branch where we work on corals, marine mammals, ecological reserves, and mathematics on projects throughout the United States. As in Alaska, we have such great people here and I am looking forward to working with everyone. Charleston in a great city and I hope you might get a chance to visit if you are visiting on our east coast. Thank you everyone and I’ll miss you all!
Updated Instructions for Sampling Salmon Tissues for DNA Stock Identification

General Information

Genetic analysis is one of most reliable methods to estimate the population origins of salmon caught in the ocean. As of February 2017, species range-wide genetic baselines are available for chum, sockeye and Chinook salmon. Regional genetic baselines are available for pink and coho salmon, and steelhead will be available in the near future. Genetic analyses begin with tissue sample collection. This guide describes preferred and alternate methods using three approaches to collect samples from fresh or frozen salmon for DNA extraction.

How to Preserve DNA

In order to preserve DNA, the enzymes that break down the DNA must be inactivated. These enzymes need water to function, so it is very important to sequester water from the sample.

Preferred Tissues

1. **Axillary**: Cut one axillary process from each salmon (Figs. 1, 2, and 3).
2. **Fin**: Cut a piece of the fin (approximately 2 cm x 2 cm) from each salmon (Figs. 4 and 5).

Methods for Preserving Tissue

Below is a schematic of three approaches for preserving tissue, each one showing the preferred and alternate methods. Following this schematic are detailed descriptions for each method.

Freeze—Preferred: Individual samples in labeled vials
1. Put individual tissue into a plastic vial labeled with a sample number (Fig. 1).
2. Seal the vial with a screw cap (Fig. 2).
3. Place whole group of samples in a plastic bag labeled with sample information (i.e., species name, date, location of collection, and any specific information for each fish; Fig. 3).
4. Store the samples in freezer at -20°C or lower (Fig. 4).

Freeze—Alternate: Multiple samples in plastic food wrap and paper label
1. Put individual tissue onto a piece paper.
2. Write a label on a piece of paper (Fig. 1).
3. Place paper with tissue onto a piece of plastic food wrap (Fig. 1).
4. Roll the tissue and paper, in the plastic food wrap, one complete revolution (Fig. 2).
5. Repeat steps 1, 2, 3, and 4 with remaining axillaries (Figs. 3 and 4).
6. Place whole group of samples in a plastic bag labeled with sample information (i.e., species name, date, location of collection, and any specific information for each fish; Fig. 5).
7. Store the samples in freezer at -20°C or lower (Fig. 6).

Alcohol—Preferred: Individual samples in labeled vials with ethanol
1. Put individual tissue into a plastic vial labeled with a sample number (Fig. 1).
2. Fill vial with ethanol (Fig. 2).
3. Seal the vial with a screw cap (Fig. 3).
4. Place whole group of samples in a plastic bag labeled with sample information (i.e., species name, date, and location of collection, and any specific information for each fish; Fig. 4).
5. Store the samples at room temperature.
Alcohol—Alternate: Multiple samples in high proof alcohol bottle (Example: vodka)
1. Put axillaries into a bottle of high proof alcohol (example: vodka) (Figs. 1 and 2).
2. Put cap back on bottle (Fig. 3).
3. Label bottle with sample information (i.e. species name, date, and location of collection; Fig. 4).
4. Store the samples at room temperature.

Dry—Preferred: Attached to blotter paper in airtight case with desiccant packs
1. Put individual tissue into a numbered square on the blotter paper sampling grid (Fig. 1).
2. Staple the tissue sample to the paper.
3. Sprinkle non-iodized salt over tissues (Fig. 2).
4. Write sample information at the top of each card (i.e., species name, date, and location of collection, and any specific information for each fish).
5. Place samples in airtight cases, with samples facing desiccant pack (Fig. 3 and 4).
6. Seal container tightly (Fig. 5).
7. Store at room temperature.

Dry—Alternate: Attached to regular paper and laid on vent in cabin to dry
1. Place tissue on piece of paper (Fig. 1).
2. Write sample number below sample (Fig. 2)
3. Pour non-iodized salt over tissues (Fig. 3).
4. Attach tissue to a piece of paper using tape or staple (Figs. 4 and 5).
5. Put paper on warm vent (<50°C) until completely dry (Fig. 6).
6. Write collection information on the paper (i.e., species name, date, location of collection, and any specific information for each fish).
7. Once dry, store group of samples and collection information in dry area (e.g., cabin, plastic bag, airtight box).
Points of Contact for Sample Analysis

Considerable expertise is required to analyze samples for the stock identification of salmon. Please make contact with one of following working group members for specific DNA analysis. The sampling instructions in Japanese, Korean, and Russian will be available on our website soon.

Canada
Terry Beacham
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Japan
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NPAFC International High Seas Tagging Project

Project Overview

High seas salmon tagging has been conducted from the 1950s to the present by placing disk tags (Photo 1) on salmon and steelhead during research cruises in the North Pacific Ocean, Gulf of Alaska, and Bering Sea. These studies have been used to investigate ocean distribution, migration, and growth of salmon at sea. Reporting salmon and steelhead tag recoveries is important because it provides direct evidence of the distribution and ocean habitat of salmon, which can be affected by climatic changes, and helps to conserve salmon stocks in North Pacific ecosystems. Some disk-tagged fish also carry an electronic tag (Photo 2). Recoveries of undamaged electronic tags provide detailed information on the individual salmon’s behaviour by recording the fish’s swimming depth and other information about the fish’s habitat. Disk tags and electronic tags are easy to see because they are placed outside the fish’s body, near the dorsal fin (Photo 3). Please return high seas salmon and steelhead tags.

Reward for Tag Recovery

Every member of the public who returns a NPAFC High Seas Tag is eligible for the cash prize draw. There will be a total of three prizes:

1st Prize CDN$500
2nd Prize CDN$300
3rd Prize CDN$200

The draw will take place at the Plenary Session of the 29th NPAFC Annual Meeting (May 2021). Only non-fishery agency personnel are eligible for entry into the draw. Each draw entry must include the name and mailing address of the person who returned the high seas tag to a national contact (see list to the right) from June 1, 2018 to December 31, 2020.

What to do if you catch a tagged fish

1. Collect tag (if tag can not be collected, then record tag number and description (disk or electronic))
2. Record recovery location, date, species, gear, sex, length, and weight
3. Collect scales for age determination and growth analysis
4. Send tags with your name, phone number, and email to one of addresses below to get release information about the fish and a reward.

Tag return poster for details in English, Japanese, Korean, and Russian will be available soon on the NPAFC website (www.npafc.org).

Please Return Tags!

Please send tag and other information to one of national contacts:

Canada
John Holmes
Pacific Biological Station
3190 Hammond Bay Road Nanaimo, BC, V9T 6N7 Canada
Tel: +250-756-7145
E-mail: John.Holmes@dfo-mpo.gc.ca

Japan
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Photo 1. Disk tags
Photo 2. Electronic tags
Photo 3. Tags placed near the dorsal fin
Salmon Teriyaki Rice Bowl

By Nathan Bendriem
2018 NPAFC Intern

Enjoy this delicious and filling meal, including a homemade teriyaki sauce! It’s a perfect way to end a day of surfing the cold waters of the Pacific or to share with friends on a rainy weekend. The splendor of this dish is that it can be customized with different vegetables to match your tastes. Here, I used wild-caught sockeye salmon but your favorite Pacific salmon will go very well with the sweetness of the teriyaki sauce.

Ingredients:

**Bowl:**
- 2 sockeye salmon fillets (5oz each)
- 1 cup cooked rice
- ¼ cup edamame, shelled
- 1 carrot, grated
- 1 tsp sesame seeds
- ¼ cup bean sprouts
- 1 sheet nori cut into thin slices

**Teriyaki Sauce:**
- 2 tbsp soy sauce
- 2 tbsp sake
- 1 ½ tsp honey
- 1 ½ tsp water
- 2 tbsp mirin
- 1 tsp cornstarch
Method

1. To begin, preheat the oven to 400°F. Prepare a baking sheet with aluminum foil and set aside.
2. Combine soy sauce, mirin, sake, and honey in a small pan over medium heat.
3. While the mixture is heating, whisk together in a small bowl the cornstarch and water. Add cornstarch mixture to soy sauce mixture and bring to a boil.
4. Reduce heat and continue to stir frequently until teriyaki reaches your desired thickness, about 2–3 minutes.
5. To prepare the salmon, place the fillets skin side down on the aluminum foil. Drizzle and brush the teriyaki sauce, while reserving some additional sauce for the rice bowl.
6. Place the salmon in the oven and cook for 12–15 minutes, until pink. Allow to cool for a few minutes and remove the fillet from the skin.
7. To assemble the bowl, start with a layer of warm cooked rice. Top the rice with edamame, shredded carrots, nori strips, and bean sprouts. Add the salmon fillet, and drizzle with remaining teriyaki sauce. Garnish with sesame seeds if desired.
8. Bon Appetit!
NEW OFFICER AND REPRESENTATIVES

New NPAFC Vice President, the US Representative and Point of Contact for the NPAFC

Doug Mecum has served as Deputy Regional Administrator for NOAA Fisheries Alaska Region since September 2005. Before that, he was Director of the Division of Commercial Fisheries for the Alaska Department of Fish and Game. Doug started his career as a fisheries biologist for the Wyoming Game and Fish Department, but he moved to Alaska in 1981 to pursue his graduate education. In 1983 he began work with the Alaska Department of Fish and Game where he has served in various positions culminating as Director of the Division of Commercial Fisheries. Doug has also served on many fisheries-related commissions and committees, including the North Pacific Fisheries Management Council, North Pacific Research Board, Pacific Salmon Commission, North Pacific Anadromous Fish Commission, Pacific States Marine Fisheries Commission, the Exxon Valdez Oil Spill Trustee Council, and the Marine Stewardship Council. The University of Wyoming graduated Doug with Honors and a Bachelor’s degree in wildlife conservation and management emphasizing fisheries. He later earned a Master’s degree in fisheries science from the University of Alaska Fairbanks. Doug resides in Juneau with his wife Barbara, daughter Brianne, and son Bryce. He was appointed the NPAFC Vice President, the US Representative and Point of Contact for the NPAFC on November 15, 2018.

New Representative of Japan

Yoshie Nakatani is Director, Fishery Division, Economic Affairs Bureau, the Ministry of Foreign Affairs of Japan (MOFA) and has been appointed as a Japanese Representative to the North Pacific Anadromous Fish Commission (NPAFC) as of November 1, 2018. Yoshie has extensive experience in foreign policy, public diplomacy, and development from the MOFA where she started her career in 1983. She had a career as the Head of the OECD Tokyo Centre from 2009 to 2013, and she represents the OECD in international meetings and conferences and actively promotes the organization’s mission “Better Policies for Better lives” to key stakeholders in Japan. In recent years, Yoshie served as Director of Asia-Europe Cooperation Division of European Affairs Bureau. As the alternate senior official, she contributed to elaborate Chair’s Statement of ASEM leaders meeting in October 2018 in cooperation with like-minded members. In abroad she served as Deputy Chief of Mission of Japan in Paraguay and Counselor of Japanese Embassy in Mexico. She has been active to promote and support Japanese companies’ presence in those countries and to visualize the presence of Nikkei Paraguayan women. She has been one of the Japanese female leaders who work globally. She has been invited by many universities to give lectures on global leadership and has attended meetings and conferences organized by several entities such as the World Economic Forum—Japan and the Economist magazine. Yoshie holds a Diploma in International Relations from the Diplomatic School (Escuela Diplomatica) attached to the Ministry of Foreign Affairs in Spain and a BA in Spanish Philology and International Relations from the Tokyo University of Foreign Studies (Japan). She is fluent in English and Spanish.

New Representative of Canada

Gerald Kristianson was trained as a political scientist, earning his doctorate after studies at the University of British Columbia and the Australian National University. A life-long recreational angler, following his retirement from a professional career as an academic, diplomat, and management consultant, Gerald became closely involved in the political issues surrounding the management of North Pacific fisheries. He is Chairman of Canada’s Sport Fishing Advisory Board and a Director of the Sport Fishing Institute of British Columbia. He was one of Canada’s representatives on the Pacific Salmon Commission from 1998 to 2013. From 1997 to 2011, Gerald was a Representative of Canada for the NPAFC serving twice as the Chairperson of the Committee on Finance and Administration (2001 and 2010–2011). He was re-appointed a Canadian Representative for the NPAFC as of June 29, 2018.
UPCOMING EVENTS

Committee on Enforcement Joint Patrol Schedule Meeting (JPSM)

Dates: March 18–21, 2019
Venue: Email Meeting

ENFO Workshop

Dates: May 12, 2019
Venue: The Embassy Suite by Hilton Portland Downtown, Portland, OR, USA

NPAFC 27th Annual Meeting

Dates: May 13–17, 2019
Venue: The Embassy Suite by Hilton Portland Downtown, Portland, OR, USA

The Second NPAFC-IYS Workshop on Salmon Ocean Ecology in a Changing Climate

Dates: May 18–20, 2019
Venue: The Embassy Suite by Hilton Portland Downtown, Portland, OR, USA

NPAFC Technical Report 11

Includes extended abstracts of oral and poster presentations at the first NPAFC-IYS Workshop in May 2018. It is now available online.

NPAFC Technical Report 12

Report of the proceedings for the IYS Workshop toward effective coupling of the science of a changing climate with salmon and people took place in June 27–29, 2018, Santa Barbara, CA, USA will be announced when available online.

Portland Skyline with Mount Hood in the background. Location of the NPAFC 27th Annual Meeting. Photo Credit: Amateria1121 [CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0)], from Wikimedia Commons

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Visit the NPAFC website: www.npafc.org for more information on events, publications, scientific documents, and salmon catch statistics.

The Commission encourages submission of ideas, articles, and images on NPAFC-related activities for publication in the newsletter.

ISSN 1028-0227 | Issued in February 2019
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