



NEWSLETTER OF THE NORTH PACIFIC ANADROMOUS FISH COMMISSION

ENFORCEMENT EVALUATION AND COORDINATION MEETING  
 &  
 ENFORCEMENT WORKSHOP  
 February 23-24, 2009

**The Enforcement Evaluation and Coordination Meeting (EECM)** was held on February 23-24, 2009 at Fukuoka Messe Convention Center in Fukuoka, Kyushu, Japan. V. Fedorenko, Executive Director of the NPAFC, opened the meeting. R. Martinolich, Chairman of the Committee on Enforcement (ENFO) presided at the meeting. Mr. K. Oishi, Director of Kyushu Coordination Office of Fisheries Agency of Japan welcomed the group.

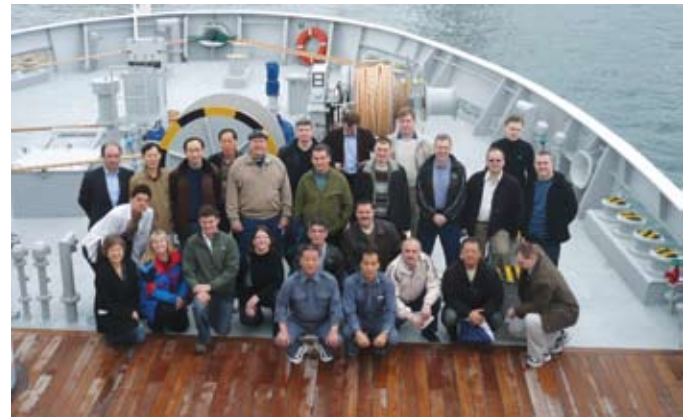
H. Imai of Japan presented scientific information on salmon migration in the vertical water column in the North Pacific. This information was obtained from archival tagging work done by *Wakatake maru*. Salmon migration patterns were shown with changes in the vertical temperature distribution and swimming depth during the homing migration from the Bering Sea to the coast of Hokkaido, Japan.

K. Fox of USA provided a threat assessment for 2009 with the potential for illegal squid driftnet fishing activities being high and salmon low.

The member countries provided updated information on their 2008 patrol activities and their patrol plans for 2009. A detailed coordinated patrol schedule was developed in an attempt to maximize patrol coverage of the Convention Area as effectively and efficiently as possible.

In 2008 the members conducted extensive ship and aerial patrols in the Convention Area and 11 high-seas drift net vessels were sighted. Two were apprehended and United States Coast Guard (USCG) conducted an international right of approach on another two vessels which are believed to be Indonesian registered.

Two Chinese registered vessels that were apprehended were turned over to the Chinese Coast Guard. One was fined 50,000 RMB (approximately \$7,300.00 US) and the second vessel was fined 99,000 RMB (approximately \$14,500.00 US). This vessel was seized and scrapped. All nets were confiscated and destroyed,



EECM Participants on a Japanese patrol vessel *Toko maru*  
 Photo by NPAFC Secretariat

and the fish were confiscated and sold at auction.

The United States noted difficulties caused by the Indonesian Government taking so long to respond to the US inquiries with respect to a possible Indonesian registered vessel sighted as a potential driftnet vessel in 2008. The United States is negotiating an MOU with the Indonesian Government to resolve this situation. It was also noted that at the time of the incident Indonesia did not have domestic law prohibiting driftnet fisheries.

The chairman reported that at the last Western Central Pacific Fisheries Commission (WCPFC) meeting, the United States introduced a draft Conservation Management Measure (CMM) which was adopted by WCPFC prohibiting the use of large scale driftnets on the high seas in the WCPFC Convention Area. The WCPFC and NPAFC convention areas overlap and this measure may provide another means of dealing with fishing vessels which are flagged to countries which are not members of NPAFC but are subject to the WCPFC boarding and inspection guidelines.

The Chairman also advised the members at the meeting that the Secretariat of WCPFC was tasked to begin establishing a cooperative framework with the NPAFC for the exchange information on North Pacific large-scale driftnet fishing activities.

*continue...see EECM page 3*

INSIDE THIS ISSUE (AUGUST 2009)

Enforcement Evaluation and Coordination Meeting and Enforcement Workshop .....	1
Research Planning and Coordinating Meeting .....	2
Long-Term Research and Monitoring Plan Meeting .....	3
Canada's Research on the Marine Biology of Pacific Salmon .....	4-5
The Year of Salmon in Russia .....	6-7
News from the Secretariat .....	8

An electronic edition is available at the NPAFC website: [www.npafc.org](http://www.npafc.org)

# RPCM

## RESEARCH PLANNING AND COORDINATING MEETING

April 21-23, 2009



RPCM Participants  
Photo by NPAFC Secretariat

The NPAFC Committee on Scientific Research and Statistics (CSRS) held its annual Research Planning and Coordinating Meeting (RPCM) at Sakhalin Convention Center and SakhNIRO in Yuzhno-Sakhalinsk, Russia, from April 21-23, 2009. The group including 27 participants from five member countries was welcomed to the beautiful city of Yuzho-Sakhlinsk by S. Karepkin, Vice Governor of the Sakhalin Region, and A. Kletchenko, Deputy Director of the Territorial Department of the Federal Agency of Fisheries.

The primary purpose of the RPCM is to discuss the 2009 national research plans and cruise activities, and to review the exchange of biological samples, data, and personnel, and the activities of sub-committee and working groups after the last Annual Meeting.

The Parties presented 2009 national research and cruise plans. Canada provided three cruise plans in summer, fall and winter to collect biological information on Pacific salmon and their ecological communities. Japan will conduct three research cruises in the North Pacific Ocean, Bering Sea and Chukchi Sea. Russia described three research cruise plans for Pacific salmon marine life period studies in the salmon wintering area, during their migrations. The United States presented cruise plans for Southeast Alaska coastal monitoring (SECM) in the northern region from late May to late August and in the southern region in late June and late July. The NOAA ship *Oscar Dyson* will be also used to collect biological information on ecologically important fish species in the eastern Bering Sea during the fall.

The Science Sub-Committee reported the progress of the Long-term Research and Monitoring Plan (LRMP). The LRMP Steering Committee members plan to meet in Shioyama, Japan in mid June 2009 to review and finalize the report. It was agreed on a process to review the results of the current 2006-2010 NPAFC Science Plan by the next RPCM in spring 2010 and begin to draft the next 5-year Science Plan.

The Working Group on Stock Assessment had a one day meeting at SakhNIRO on April 21. The group agreed that the salmon status report will be completed on time for the next Annual Meeting in

Niigata, Japan. Assembling these data by the end of May should also satisfy the request by PICES to provide catch data.

The Working Group on Salmon Marking discussed via email the status of the NPAFC otolith mark database, marking plans for brood year 2009 salmon, and the success of designating thermal mark patterns for specific countries.

The *ad hoc* Working Group on Stock Identification (WGSII) updated country reports of current genetic population studies through correspondence.

The BASIS Working Group discussed the BASIS Phase II Plan and BASIS Symposium Proceedings. The BASIS Phase II plan summarized proposed research by Parties in the Bering Sea during 2009 to 2013. BASIS will address the following four key questions: (1) How will climate change and climate cycles affect anadromous stocks, ecologically related species, and the Bering Sea ecosystems? (2) What are the key climatic factors affecting cyclical changes in the Bering Sea food production and pelagic fish communities? (3) How will climate change and climate cycles impact the available salmon habitat in the Bering Sea? (4) How will climate change and climate cycles affect Pacific salmon carrying capacity within the Bering Sea? As proceedings of 2008 BASIS Symposium held in Seattle, a total of 35 manuscripts were submitted for consideration to be published in the NPAFC Bulletin No. 5.

The Working Group on Salmon Tagging had discussed by email communication on the tagging plans in 2009, format for tagging database, and other items. The Secretariat noted that 1,000 disc tags are stocked for future tagging experiments.

The 2009 RPCM was supported by SakhNIRO staff, and was a very productive meeting. The Parties look forward for the 17th Annual Meeting, be held in Niigata, Japan on November 2-6, 2009.

*Yukimasa Ishida*  
CSRS Chairperson



SAKHINCENTER, the complex including the Sakhalin Convention Center  
Photo by NPAFC Secretariat



RPCM at the Sakhalin Convention Center  
Photo by NPAFC Secretariat

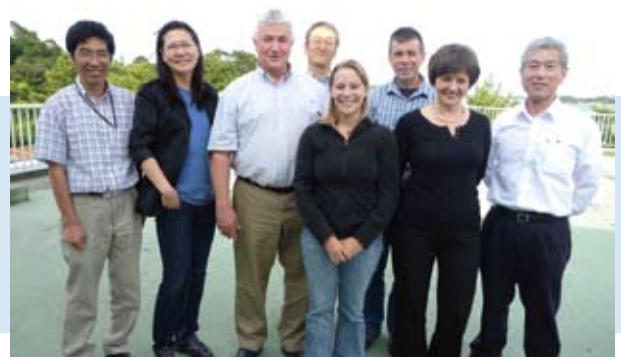


Laboratory tour at SakhNIRO hosted by V. Radchenko (right)  
Photo by NPAFC Secretariat

# LRMP

## LONG-TERM RESEARCH AND MONITORING PLAN

June 18-20, 2009



LRMP Panel Members  
Photo by NPAFC Secretariat

The third meeting of the North Pacific Anadromous Fish Commission (NPAFC) Long-term Research and Monitoring Plan (LRMP) committee took place on June 18-20, 2009 at the Tohoku National Fisheries Research Institute in Shiogama, Japan. Participants from Canada (D. Beamish and K. Lange), Japan (Y. Ishida and T. Nagasawa), Korea (S. Kang), Russia (O. Temnykh), the United States (E. Farley, Jr.) and NPAFC Secretariat (S. Urawa) met to approve the final drafts of the LRMP and the synthesis of current knowledge. This project was funded by the Gordon and Betty Moore Foundation, the Bering Sea Fisherman's Association and the North Pacific Research Board. Organizational support was provided by the NPAFC.

Three major documents including a LRMP, a synthesis of current knowledge and a bibliography will be created as a result of this project. Development of these documents began with the first meeting on April 7-9, 2008 in Sokcho, Korea where over 30 experts from all member countries met to give presentations and discussed their ideas on what long-term research and monitoring of Pacific salmon is needed to ensure the sustainability of commercial and recreational fisheries around the world. After this meeting, D. Beamish, B. Riddell and K. Lange traveled to Vladivostok, Russia to meet with V. Shuntov, one of the most knowledgeable and influential Pacific salmon scientists in the world. From the ideas compiled at

*continued...from EECM page 1*

At the conclusion of the EECM an Enforcement workshop for operational personnel commenced. Each country presented information with respect to their patrol activities. Canada presented information on the use of the new commercial Synthetic Aperture Radar (SAR) satellite and how it can be used to more efficiently task our air patrols. Through the use of this satellite the central and eastern portion of the Convention Area can be monitored more effectively. Korea provided information with respect to the patrols they have conducted in the WCPFC Convention Area and, Japan provided a very informative summary of their patrol activities since 2003. Twenty of the twenty nine driftnet vessels sighted by Japan since 2003 were tuna long liners, five were stern trawlers and four were squid anglers. Russia presented their vision on joint enforcement operations in the Convention Area. The US explained how they develop and deliver their patrols starting with planning and securing the assets to boarding and inspection procedures.

On February 25, 2009 the EECM participants were on a field trip visiting the Fish Market and patrol vessel *Toko maru*. All the participants enjoyed the warm hospitality of the Japanese hosts.

**Robert Martinolich**  
ENFO Chairperson

the meetings in Korea and Russia, we created the first drafts of the monitoring plan and the synthesis of knowledge which were presented to a smaller panel at the second meeting on September 29 – October 2, 2008 in Nanaimo, Canada. Participants were asked to provide comments to this draft and subsequently a final draft was created for approval at the third and final meeting. A bibliography containing over 350 papers relating to the impacts of climate and climate change on Pacific salmon was also produced and will be available from the NPAFC.

The monitoring plan is a remarkable example of international agreement and cooperation between all five salmon producing countries. It outlines the current research being performed by all member countries on all species and life history stages of Pacific salmon and emphasises the need for simultaneous international surveys, particularly in the winter months. This is the first step towards a new program known as the International Year of the Salmon which could take place as early as 2011.

As a new biologist, this project has been an enlightening experience that has allowed me to gain a holistic view of Pacific salmon production and utilization throughout the North Pacific. The trips to Korea and Russia in April 2008 and to Japan in June 2009 have granted me an appreciation of the extent of both fisheries and aquaculture practices around the world. I had the opportunity to experience different cultures and try some of the best and worst tasting foods that have ever touched my tongue.

**Krista Lange**  
Pacific Biological Station, DFO, Canada



Krista tasting a sea squirt  
during the field trip in  
Shizugawa, Japan.

Photos by NPAFC Secretariat

# Canada's Research on the Marine Biology of Pacific Salmon. I. Offshore Areas



**Marine survival of Pacific salmon** can no longer be treated as a black box or as a constant in stock assessment models in order to adequately manage salmon fisheries. Moreover, mitigation efforts that are underway to rebuild depressed salmon stocks might be confounded or even compromised by changing and unfavourable ocean conditions, indicating that the variability in the marine environment needs to be taken into consideration to accurately assess the success of these activities. As such, Canada currently maintains two research programs on the marine biology of Pacific salmon to understand the processes regulating their production in the marine environment, the interactions between wild and hatchery-reared salmon, as well as the impacts of ocean conditions and climate change on marine ecosystems and salmon resources: an offshore program conducted off the west coast of British Columbia and Southeast Alaska, and an inshore program conducted in the Strait of Georgia and Puget Sound (Fig. 1).

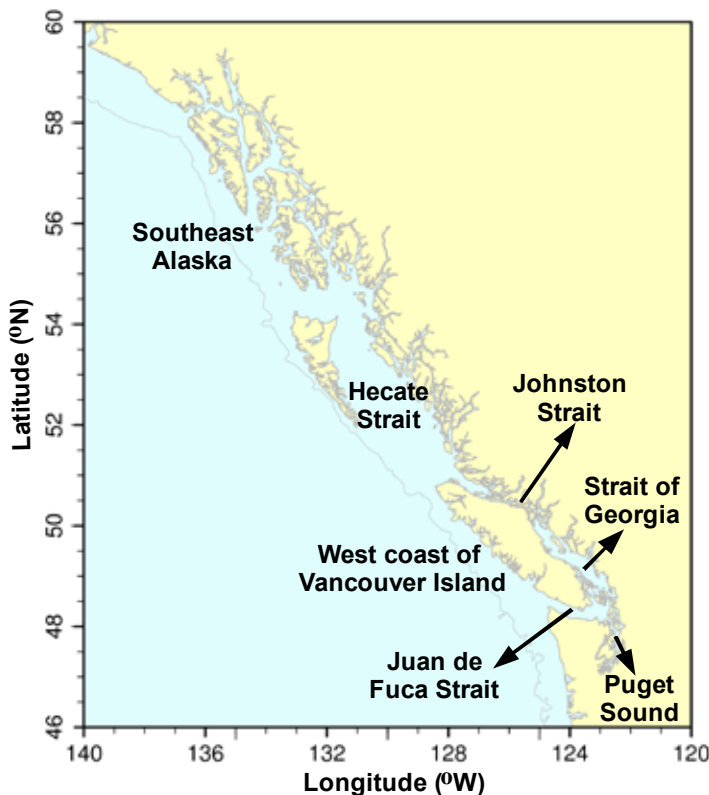
The Canadian Program on High Seas Salmon was initiated in the mid-1950's as part of a commitment to the newly created International North Pacific Fisheries Commission to study the biology of Pacific salmon in the North Pacific Ocean. Of particular interest at the time were questions pertaining to the feeding habits, distribution, and migration of maturing salmon. This research program was active until 1970, and then re-launched in the early 1990s. The revived program then focused on the factors limiting

salmon distribution in the North Pacific Ocean such as ocean temperatures, and the impacts of climate change on Pacific salmon distribution and production.

The focus of the Canadian Program on High Seas Salmon shifted in the mid-1990s from mature to juvenile salmon, as early marine mortality had been identified in previous studies as a critical period that could drive the production of Pacific salmon. It was thus felt that a better understanding of the recruitment dynamics of Pacific salmon could be achieved by studying the factors limiting the marine survival of juvenile salmon. Research surveys conducted onboard the CCGS *W.E. Ricker* revealed early on that, on the west coast of North America, juvenile salmon were for the most part restricted to the continental shelf up to the Aleutian Islands during summer and fall, suggesting that they migrated to the open waters of the Gulf of Alaska and the Bering Sea late in the fall or during winter. As a result, offshore research surveys conducted by Canada are currently primarily limited to the coastal and shelf waters of British Columbia and Southeast Alaska (Figure 1), where mortality is expected to be substantial and highly variable.

Three surveys are typically conducted each year onboard the CCGS *W.E. Ricker* or chartered vessels under the Canadian Program on High Seas Salmon to collect juvenile salmon and associated fish community, water samples for nutrient and phytoplankton analyses, zooplankton, and oceanographic data: 1) a summer (June-July) survey to assess the ocean conditions experienced by juvenile salmon during the growing season, 2) a fall (October-November) survey to determine the growth rates of resident stocks, and 3) a winter (February-March) survey to measure energy and lipid depletion during winter and the significance of overwinter mortality. Changes in the distribution and stock composition determined from DNA analyses, combined with coded-wire tag recoveries, are used to infer region- and stock-specific migration behaviour and routes.

Results obtained from over a decade of observations on the coasts of British Columbia and Southeast Alaska indicate that, with the exception of the Columbia River-Snake River system, juvenile Chinook salmon remain within 100-200 km of their natal rivers during their first year at sea irrespective of their freshwater history and adult run timing, suggesting that they are affected primarily by local conditions in the marine environment. Columbia River Chinook salmon exhibit a diversity of migration behaviour, including southern migrants, slow and fast northern migrants, as well as long-term residents. In contrast to Chinook salmon, juvenile sockeye salmon generally exhibit a rapid northward migration along the continental shelf, with some fish exceeding 40 km/d or reaching nearly 4 body lengths per second during every second of the day for a period of two months! However, stock-specific differences are also apparent in juvenile sockeye salmon, even within a large watershed such as the Fraser River. In particular,



**Fig. 1.** Marine areas surveyed by Canada for juvenile Pacific salmon.

Marc Trudel is a research scientist and the Head of the High Seas Salmon Program at Pacific Biological Station, Nanaimo.



Harrison River, a tributary of the Fraser River, is home to a unique life-history type of sockeye salmon that migrates to sea immediately after emerging from gravel instead of rearing in a nearby nursery lake. These fish rear in the Strait of Georgia for several months before migrating onto the continental shelf. Unlike other Fraser River stocks that leave the Strait of Georgia via the northern route (Johnston Strait), juvenile Harrison River sockeye salmon take the southern route through Juan de Fuca Strait (Fig. 1). By describing stock-specific migration routes used by juvenile Pacific salmon on the continental shelf, this research can aid in the identification of the appropriate spatial and temporal scales that are required for assessing the processes regulating salmon production in the marine environment.

Because larger fish generally sustain higher marine survival, either due to their ability to escape gape-limited predators or to survive starvation during winter, considerable effort is devoted by this program to study the effects of ocean conditions on juvenile salmon growth. A diversity of approaches are used to assess juvenile salmon growth in the marine environment, including stock-specific changes in size-frequency distribution over time, analysis of otolith microstructure, measurements of growth hormones, and gene expression. To date, this research shows that, despite ocean conditions appear to be more favourable to growth off southern British Columbia, juvenile salmon grow faster off Southeast Alaska. The poorer growth and condition of salmon in southern British Columbia is related to a calorie-deficient diet rather than to lower ocean productivity or to higher temperatures. This research also shows that the interannual variability in juvenile salmon growth is primarily driven by changes in zooplankton community composition and fat content: off the west coast of Vancouver Island, summer

growth is faster when lipid-rich northern copepods dominate the zooplankton community. Since copepods generally constitute a small fraction of juvenile salmon diet in this area, these results may simply reflect profound changes that occur at the base of the food chain with respect to lipid dynamics and quality rather than a direct effect of copepods on juvenile salmon growth.

In addition to studying the marine biology of Pacific salmon, the Canadian Program on High Seas Salmon recently started to develop simple forecasting models for the marine survival of Pacific salmon 1-2 years prior to the return of adult salmon to their natal river. As with growth, marine survival is strongly correlated to zooplankton community composition and indicators of food web quality (Fig. 2). These models may also be used by managers to partition the effects associated with changes in freshwater events such as freshwater restoration from those solely due to changing ocean conditions and climate. Thus, research and monitoring studies conducted by Canada in the ocean environment off the British Columbia coast has the potential to provide guidance for establishing harvest strategies and conservation measures for the sustainable use of Pacific salmon, as well as assess the success of mitigation measures in the face of a changing ocean.

### Future Challenges

In the marine environment, most salmon mortality is thought to occur during two critical periods: an early predation-based mortality that occurs within the first few weeks to months following ocean entry and a starvation-based mortality that occurs following their first winter at sea. Yet relatively little is known about salmon predators in the marine environment. Similarly, little is known about the magnitude and variability of the mortality that occurs during these two critical periods, and how they will respond to climate change. Future work will need to examine the source of early marine mortality, especially in the nearshore environment. Assessing the importance of overwinter mortality in offshore areas of the North Pacific Ocean will be a major challenge due to the vastness of the area that needs to be covered to collect these fish, the mixing of stocks originating from different regions and continents, and the harsh conditions that prevail during winter time. Studies on the winter ecology of Pacific salmon will require an integrated international effort, and will best be achieved under the auspices of the North Pacific Anadromous Fish Commission.

Marc Trudel  
Pacific Biological Station, DFO, Canada

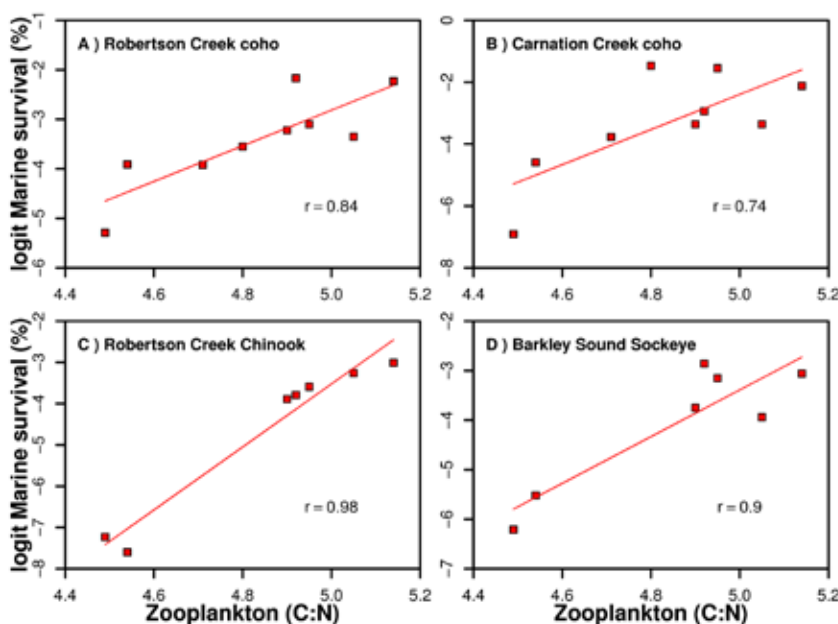


Fig. 2. Relationship between marine survival of west coast of Vancouver Island salmon and the carbon to nitrogen ratio (C:N) in zooplankton smaller than 1.7 mm. The C:N ratio is an indicator of lipid contents in aquatic ecosystems.

# The Year of Salmon in Russia

It has been over 20 years since the beginning of Pacific salmon marine life period wide study in the Far-Eastern seas of Russia and adjacent waters of the North Pacific Ocean. Today the Pacific Scientific Research Fisheries Center (TINRO-Center) is the leading Russian institute in these investigations. In 1990s under Dr. V.P. Shuntov's guidance TINRO-Center scientists have developed the methods of trawl surveys for the assessment of salmon abundance during their migrations. The quantitative evaluation of juvenile and adult salmon is important for fishing forecasts and stock management.

The year 2009 can be called the Year of Salmon in Russia. That is not only because the highest returns of salmon are expected to the Russian rivers. Despite the economical problems TINRO-Center has planned and partly fulfilled the plan of extensive investigations on Pacific salmon throughout the Far East Exclusive Economic Zone (EEZ) and adjacent waters of the North Pacific Ocean. This grand plan is based on results of trawl surveys, provided in 2008. Last autumn the abundance of juvenile pink salmon in the western Bering Sea was 1.3 billion individuals, which was twice as high as the maximum pink salmon amount estimated in the past. The total abundance of juvenile pink salmon in the Okhotsk Sea was also estimated at about 1 billion individuals higher.

Pink salmon, a mass salmon species prevalent in the Far East, provides the success of salmon fishing seasons. Thus the amazingly high amount of juvenile pink salmon requires an observation over this unusually abundant year class to be held

during the subsequent stages of its life cycle. In 2009 the wintering conditions and overall biological surveys were held in the Sub-Arctic Pacific, owing to the prospective mass summer pink salmon approach. These are very important researches, because this matter is straightly connected to the issue of epipelagic carrying capacity for salmon during the less favorable seasons – winter and early spring.

The survey was conducted by the R/V "TINRO" from February 10 to March 9, 2009 in the central part of Sub-Arctic Pacific, where the East Kamchatka and American pink salmon stocks are known to cohabit (Fig. 1). The abundance of pink salmon (and other salmon) in region "B" (the eastern North Pacific Ocean) have turned out unusually low compared to the previous autumn survey data. We consider the majority of salmon was unexpectedly distributed northwards and eastwards from the survey area.

In the western part of Sub-Arctic Pacific we managed to outline the main concentrations of Okhotsk Sea pink salmon stocks. Its amount was considerably higher than in the region "B". A comparison of 2007 year class abundance in autumn 2008 and spring 2009 estimated that the mortality of pink salmon during winter season might be less than 30%.

Winter salmon is widely spread not only over the near-surface layer (0-30 m), but is also abundant on the depths up to 120 m. Despite the lower plankton concentration in central and western parts of Sub-Arctic Pacific compared to the summer

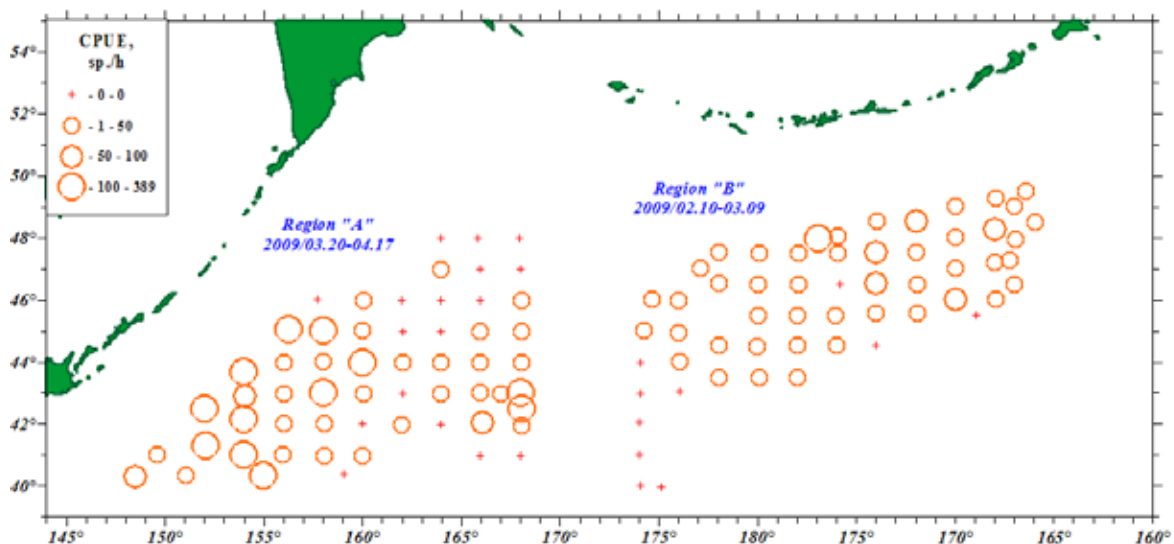


Fig. 1. Spatial distribution of pink salmon in the North Pacific Ocean during winter 2009.



*Dr. O. Temnykh, Head of Laboratory of Applied Biocenology (TINRO-Center)*

period, the salmon feeding activity (especially of the 20-40 cm fish) was high. Thus we can claim that those winter salmon was not underfed. An extremely high concentration of lantern fish and small squids (exceeding salmon biomass), which were available for salmon food is the additional confirmation of this fact. Salmon predators were not abundant in the catches. We consider these facts kept the high survival rate of salmon during the winter period.

The results of summer surveys have proved this conclusion. In June and July 2009 two TINRO-Center research vessels registered the threshold abundance of pink salmon in the North Pacific waters near Kuril Islands and Kamchatka Peninsula, and in the western Bering Sea (Fig. 2). The abundance of Okhotsk Sea pink salmon stocks was 1.5 times as high as in 2007 which was known as a salmon-rich year. In the western Bering Sea the amount of pink salmon was 5 times as high as in 2007.

The quantity of other salmon species (except masu, coho and Chinook salmon) is also high in Russian Far East EEZ. It shows that one can hope there will not be any significant decreasing of this species abundance for at least several years.

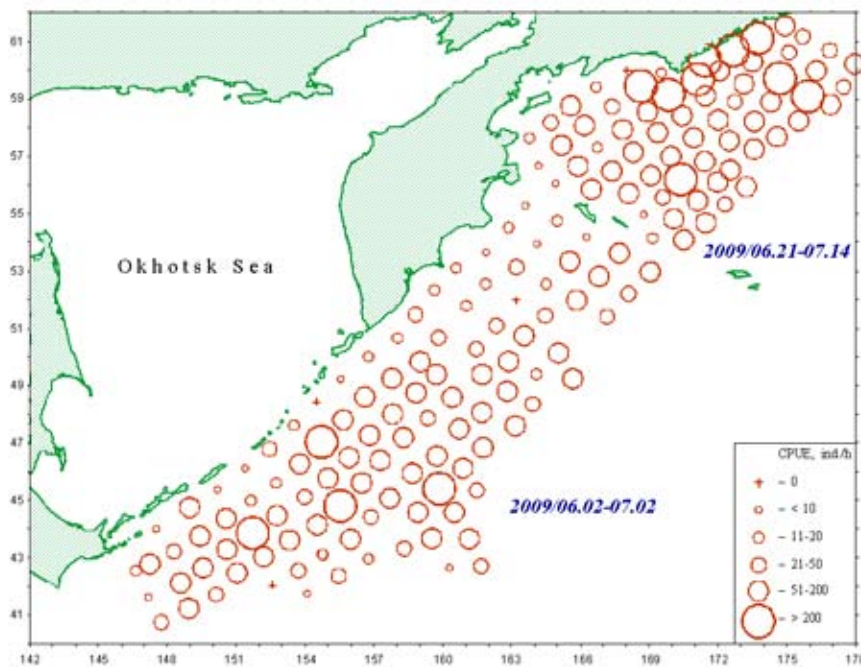
By present time the complex surveys of the salmon approaching Russian coasts have entered the final stage. Their results will become a basis for effective control of fishing activities. We expect that this year Russian fishermen will be able to get the highest catch of salmon ever.



*Dr. I. Glebov (the head of many expeditions in the Bering Sea) on the board of R/V "TINRO"*



*Dr. V.P. Shuntov, the head of the salmon research program, is analyzing salmon information collected by research vessels.*



**Fig. 2.** Spatial distribution of pink salmon in the western Bering Sea and western Sub-Arctic Pacific in summer 2009.

It is remarkable that the most important Russian salmon marine life period study program, developed and managed by Dr. Shuntov, has been accomplished by the 50 years date of his work in TINRO-Center. Let's wish him further creative success and realization of his most daring plans.

*Olga Temnykh  
TINRO-Center, Russia*

## UPCOMING EVENTS

### NPAFC 17<sup>th</sup> Annual Meeting

Toki Messe Niigata Convention Center  
Niigata, Japan: November 2-6, 2009



Toki Messe, Niigata

## PUBLICATION



**NPAFC Annual Report 2008** include results of the Commission's major activities such as Annual Meeting, symposium, workshop and other NPAFC events is now available on CD-ROM and online.

**NPAFC Bulletin No. 5**, the proceedings of the NPAFC International Symposium on "The Bering-Aleutian Salmon International Surveys (BASIS): Climate Change, Production Trends and Carrying Capacity of Pacific Salmon in the Bering Sea and Adjacent Waters" held in Seattle, WA, U.S.A., November 23-25, 2008, is scheduled for print by December 2009.

## RECIPE FROM OUR PEOPLE

### UNITED STATES

*John and I like to spend our summers in Seattle, Washington, fishing for salmon in Puget Sound. Salmon fishing is not always good, but when it is we sometimes catch more fish than we can eat fresh. We fillet and freeze those fish for later use. In winter and spring it's fun to smoke some of these fish to share with friends and neighbors. We use a commercially available electric food smoker (Bradley Smoker) to make a "hot" (cooked) smoked salmon.*



*John and Katherine Myers  
Seattle, WA, U.S.A.*

### Hot Smoked Salmon

1. Trim and rinse fillets in cold water (*do not remove the skin*)
2. Cut fillets into chunks or strips
3. Make a brine and cure fish overnight: (*Mix all ingredients well; then, submerge fish in the brine, and refrigerate overnight (12 -24 hrs)*)

4 liters of water;	4 bay leaves;
1½ cups of pickling salt;	½ tablespoon of cloves;
1½ cup brown sugar;	1 stick cinnamon;
1 cup unsulfured dark molasses;	1 teaspoon whole allspice
4. Remove fish from brine and rinse well
5. Place pieces skin side down on greased racks (about 1 hr)
6. Use alder or fruit wood chips
7. Smoke for 2 hours at a low temperature 40-60°C (100-120°F) (blot off excess moisture)
8. Smoke at a higher temperature for the next several hours 70°C (140°F)
9. If you can control the temperature on your fish smoker finish at 80°C (175°F) for 1 hour or in your oven

Visit [www.npafc.org/new/recipes](http://www.npafc.org/new/recipes) for details.



## NPAFC REPRESENTATIVES

### CANADA

**Guy Beaupré**  
Fisheries and Oceans Canada  
**Gerry Kristianson**  
Sport Fishing Institute

### JAPAN

**Yutaka Aoki**  
Ministry of Foreign Affairs  
**Koji Imamura**  
National Federation of Medium Trawlers  
**Daishiro Nagahata**  
Fisheries Agency of Japan

### REPUBLIC OF KOREA

**Sukyung Kang**  
National Fisheries Research and Development Institute  
**Suam Kim**  
Pukyong National University  
**Ki Baik Seong**  
National Fisheries Research and Development Institute

### RUSSIA

**Mikhail Glubokovsky**  
Federal Agency of Fisheries  
**Sergey Maksimov**  
Federal Agency of Fisheries  
**Sergey Podolyan**  
Federal Agency of Fisheries

### UNITED STATES

**James Balsiger**  
NOAA/NMFS  
**Roland Maw**  
United Cook Inlet Drift Association  
**Gary Smith**  
Smith & Stark

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

## PUBLISHED BY

NPAFC Secretariat  
Suite 502, 889 West Pender Street  
Vancouver, B.C., V6C 3B2 CANADA  
Tel: 604-775-5550  
Fax: 604-775-5577  
Website: <http://www.npafc.org>  
E-mail: [secretariat@npafc.org](mailto:secretariat@npafc.org)  
Vladimir Fedorenko: [vladf@npafc.org](mailto:vladf@npafc.org)  
Shigehiko Urawa: [urawa@npafc.org](mailto:urawa@npafc.org)  
Wakako Morris: [wmorris@npafc.org](mailto:wmorris@npafc.org)  
Denise McGrann-Pavlovic: [denisem@npafc.org](mailto:denisem@npafc.org)

ISSN 1028-0227  
Issued in August 2009  
© The North Pacific Anadromous Fish Commission

The Commission invites you to submit articles and photos or slides on NPAFC related activities for publication in the newsletter.

 Printed on recycled paper in Canada.