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**Trawl Survey Plans for Pacific Salmon Marine Life Period Studies in the Far  
Eastern Seas in 2010 by Russia**

by

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# **Trawl Survey Plans for Pacific Salmon Marine Life Period Studies in the Far Eastern Seas in 2010 by Russia**

## **ABSTRACT**

The document summarizes trawl survey plans for Pacific salmon marine life period studies in the Far Eastern Seas in 2010 by Russia (TINRO-Centre). The outline of materials, methods, surveys timing and theoretical background are provided.

## **INTRODUCTION**

Pacific salmon marine life period studies are planned in accordance with “Strategic plan for Far Eastern basin-scale Pacific salmon research program for 2006–2010 period” (NPAFC Doc 1122). Surveys plan for Pacific salmon research is a logical continuation of previous studies. It is based on proven methods and approaches for assessment of salmon abundance, biological condition, spatial distribution patterns, size and age composition and others (NPAFC Doc 645, 682, 901, 985 and others).

In last years the abundance of many Russian salmon stocks (especially some stocks of pink salmon) increased. In 2009, the total catch of Pacific salmon by Russia was the highest and reached 542 th. ton. In this year salmon abundance is expected to be lower. Continuation of salmon studies in main areas of their habitat let us to estimate the dynamic of their distribution, abundance, body size and other features and improve our knowledge of salmon ecology.

In 2010 TINRO-Centre will continue monitoring of the state of Bering Sea, Okhotsk Sea, Subarctic front of North Pacific and Pacific waters off Kuril and Comander Islands ecosystems. The studies on salmon distribution, food selectivity, dependence of salmon feeding on biomass and composition of plankton and nekton communities, changes of biological condition of fishes during the foraging, salmon spatial differentiation, structure of stocks contributing to the mixture and the influence of abiotic environment upon the salmon quantitative allocation and migrations are planned. One of the goals of these studies is the estimation of Pacific salmon survival/mortality at the different stages of marine life period. It can be possible due to conducting of the series of expeditions (including surveys in autumn 2009), which are planned (1) to the North Pacific waters (Subarctic front) in winter-spring period (wintering period), (2) to the Pacific waters off Kuril Islands in summer (period of anadromous migrations of different salmon stocks) and (3) to the Bering and Okhotsk Seas

in autumn (period of catadromous migrations).

## **METHODOLOGY OF STUDIES**

All surveys will be conducted by TINRO-Centre' vessels using uniform methods and approaches. Trawlings are carried out by the standard midwater trawl, model RT/TM 80/376 m fished with four 120 m bridles. Heavy orbicular midwater trawl doors, each one of 6 sq.m, are used. Depending on towing speed the vertical spread of the trawl is 32-42 m and horizontal spread is 30-34 m. At each station the net is towed for 1 hour. The net is towed at about 4.5-5.0 kts with the headrope located at the surface (fixed layer - 0 m), particularly at night. The length of warps is 250-310 m.

Each trawling is accompanied (before or after) by the collection of plankton samples. Samples for fish and squid diet studies are taken from the catch of every trawling and these samples undergo on-board processing. The processing of all samples is carried out by means of express methods of analysis that were developed by TINRO-Center. Intensification of research on caloric content of food items and their isotope composition will provide further insights into understanding of Pacific salmon biological environment. Pacific salmon tagging activities will be continued if workload permits.

Hydrological studies are conducted during the whole period of the survey by means of hydrological probe Neil-Brown or by ICTD. The data is recorded for the fixed layer 0-1000 meters and for the areas with the depth less than 1000 meters – down to the bottom.

## **I. CRUISE PLAN FOR PACIFIC SALMON MARINE PERIOD OF LIFE RESEARCH IN THE SALMON WINTERING AREA**

### **SURVEYS OBJECTIVES AND TASKS**

Pacific salmon studies in the wintering area (Subarctic front of North Pacific) were planned and realized in accordance with comprehensive ecosystem research plans of Russia by R/V TINRO. The major purpose of these studies is the determination of environment conditions and state of Pacific salmon during the less favorable period of their marine life cycle. In 2010 the studies on salmon distribution, salmon food selectivity, dependence of salmon feeding on biomass and composition of plankton and nekton communities, changes of biological condition of salmon during winter, salmon spatial differentiation, structure of stocks contributing to the mixture and the influence of abiotic environment upon the salmon quantitative allocation and migrations are planned.

The major objectives of the survey are: 1) determination of the current state of Pacific salmon

in the pelagic ecosystems of the Pacific waters; 2) elucidation of Pacific salmon position and role in the trophic structure of the epipelagic zone; 3) evaluation of pelagic ecosystems status, as well as oceanic and overall ecological conditions in the Pacific waters in winter-spring of 2010, 4) estimation of salmon mortality during fall-winter period.

Achievement of these objectives will be accomplished through the fulfillment of the following tasks:

1) carrying out of trawl survey of epipelagic zone in the western area of the Subarctic front for estimation of Pacific salmon and other nekton species abundance and biomass. Assessment of their biological condition and spatial distribution patterns, size and age composition of stocks and their mixtures. Sampling for feeding studies.

2) carrying out of plankton survey of epipelagic zone for collection of data on plankton communities composition and structure, salmon and mass nekton species feeding environment; description and development of nektonic communities trophic structure models.

3) carrying out of hydrological survey for evaluation of climate-oceanic conditions.

4) carrying out of acoustic survey for estimation of Pacific salmon abundance, biomass and vertical distribution.

### **LOCATIONS AND PERIOD OF SURVEYS**

The cruise of research vessel "TINRO" began in port of Vladivostok in February 15. In February-March, R/V "TINRO" conducted studies in the western area of the North Pacific waters (Figure 1). Two daily stations including trawlings, fish diet analysis, plankton samplings and hydrological studies in each 40-m layer down to 300 m are planned.

### **PARTICIPATING SCIENTISTS**

Scientific field party will include 17 persons: 7 ichthyologists, 4 hydrobiologists, 4 hydrologists and 2 acousticians (preliminary).

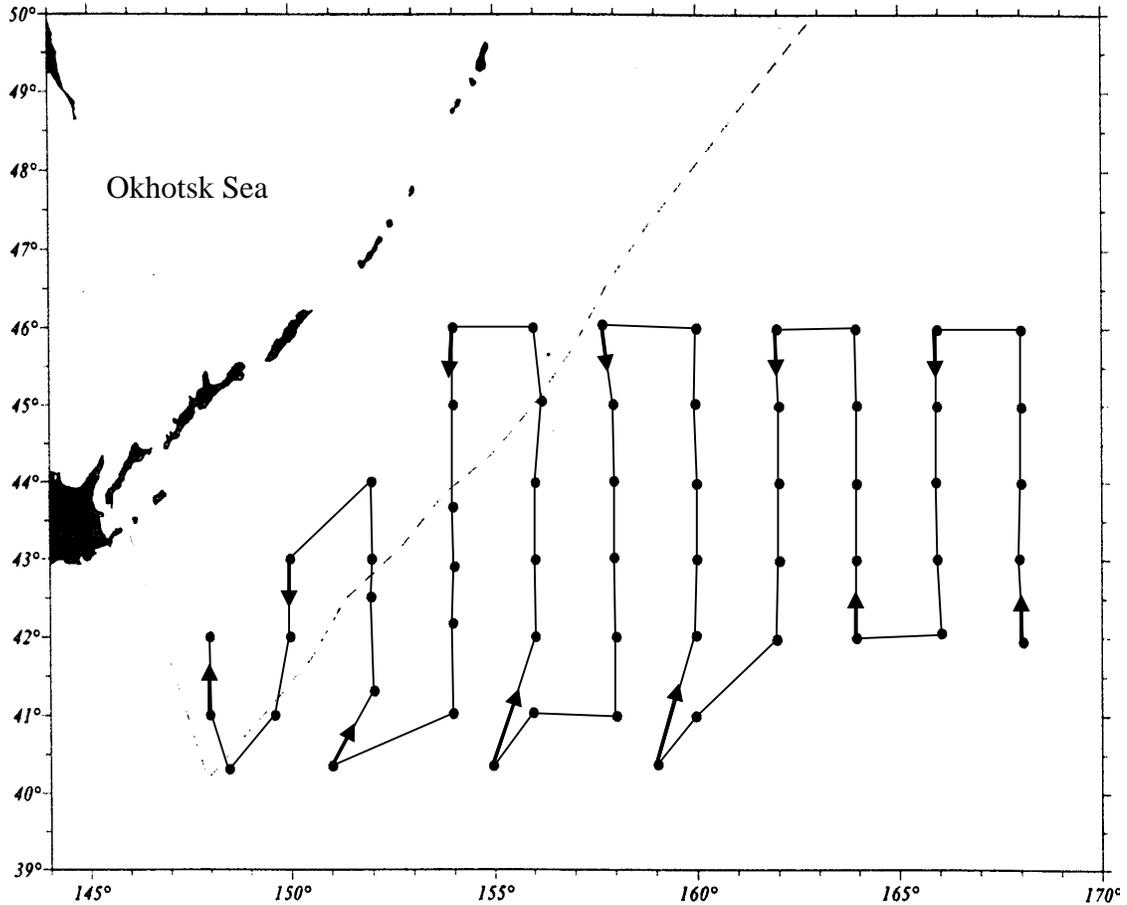


Figure 1. Station locations to be sampled by the comprehensive survey of pelagic community in the western Subarctic front during February-March, 2010 according to TINRO-Center plan.

## II. CRUISE PLAN FOR PACIFIC SALMON MARINE PERIOD OF LIFE RESEARCH DURING THEIR ANADROMOUS MIGRATIONS

### SURVEYS OBJECTIVES AND TASKS

Studies during Pacific salmon anadromous migrations were planned in the Pacific waters off Kuril Islands. The major purpose of these studies is the estimation of anadromous Pacific salmon abundance and biomass for short-term forecasting of their returns and possible catch. The studies on salmon distribution, salmon food selectivity, dependence of salmon feeding on biomass and composition of plankton and nekton communities, changes of biological condition of salmon during the anadromous migrations and foraging, salmon spatial differentiation, structure of stocks

contributing to the mixture and the influence of abiotic environment upon the salmon quantitative allocation and migrations are planned.

Achievement of these objectives will be accomplished through the fulfillment of the following tasks:

1) carrying out of trawl survey of epipelagic zone in the Pacific waters off Kuril Islands for estimation of mature and immature Pacific salmon and other nekton species abundance and biomass. Assessment of their biological condition and spatial distribution patterns, size and age composition of stocks and their mixtures. Sampling for feeding studies.

2) carrying out of plankton survey of epipelagic zone for collection of data on plankton communities composition and structure, salmon and mass nekton species feeding environment; description and development of nektonic communities trophic structure models.

3) carrying out of hydrological survey for evaluation of climate-oceanic conditions of the Pacific waters off Kuril Islands in 2010.

Only one research vessel, Professor Kaganovsky, are planned to study Pacific salmon anadromous migrations.

### **LOCATIONS AND PERIOD OF SURVEY**

The salmon studies of research vessel "Professor Kaganovsky" begin in June 1. In June 1 – July 3 (provisional date), R/V "Professor Kaganovsky" will conduct studies in Pacific waters off Kuril Islands (Figure 2).

### **PARTICIPATING SCIENTISTS**

Scientific field party will include 13 persons: 7 ichthyologists, 3 hydrobiologists, 3 hydrologists (preliminary).

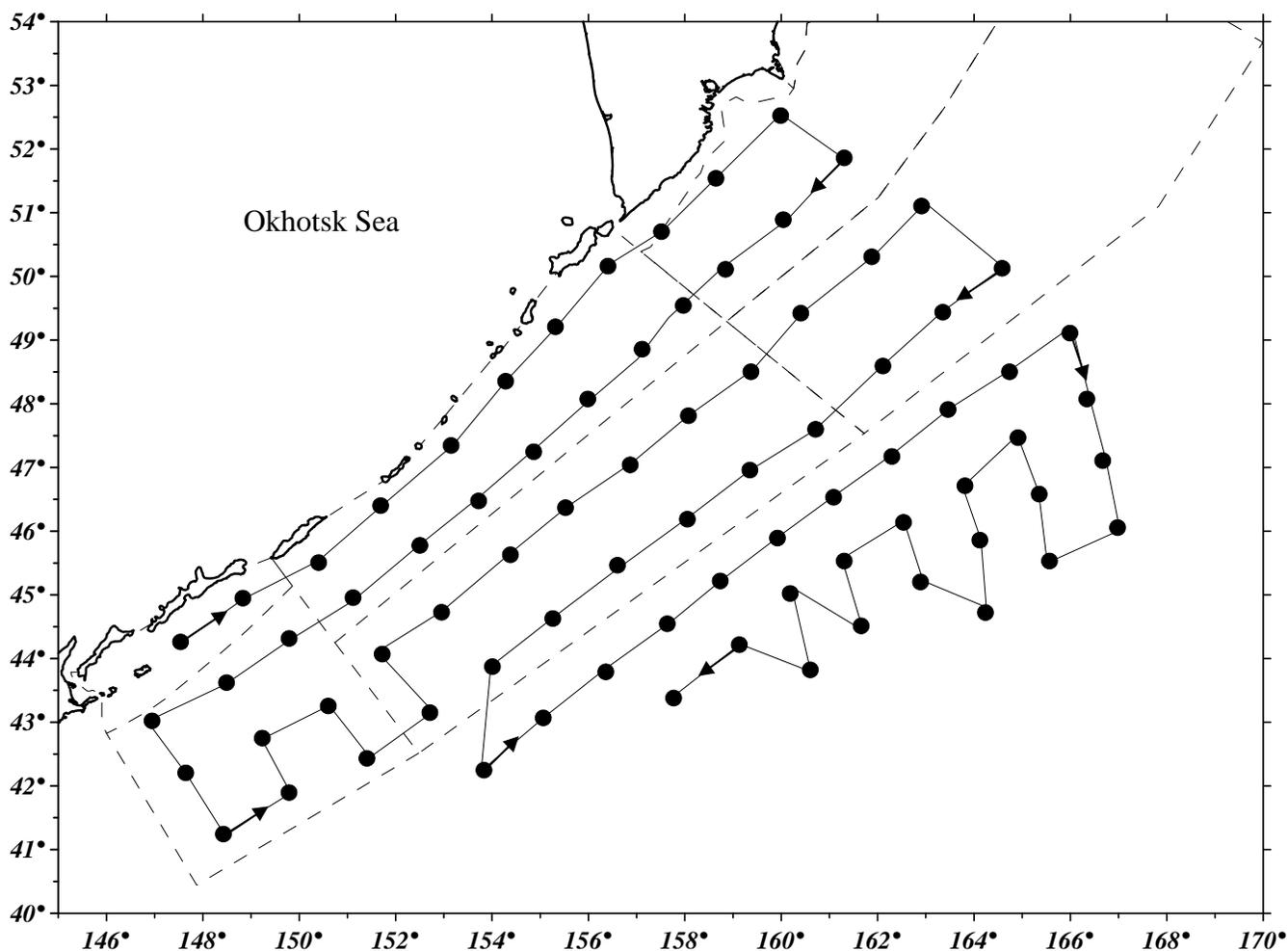


Figure 2. Station locations to be sampled by the standard comprehensive survey of the upper epipelagic layer of the Pacific waters off Kuril Islands by RV «Professor Kaganovsky» according to TINRO-Center plan for June-July, 2010.

### III. CRUISE PLAN FOR PACIFIC SALMON MARINE PERIOD OF LIFE RESEARCH DURING THEIR CATADROMOUS MIGRATIONS

#### SURVEYS OBJECTIVES AND TASKS

Studies during Pacific salmon catadromous migrations were planned in the Bering and Okhotsk Seas. The major purpose of these studies is the estimation of catadromous Pacific salmon abundance and biomass for forecasting of their returns and possible catch in the next years. The studies on salmon distribution, salmon food selectivity, dependence of salmon feeding on biomass and composition of plankton and nekton communities, changes of biological condition of salmon during the catadromous migrations and foraging, salmon spatial differentiation, structure of stocks

contributing to the mixture and the influence of abiotic environment upon the salmon quantitative allocation and migrations are planned.

Achievement of these objectives will be accomplished through the fulfillment of the following tasks:

1) carrying out of trawl survey of epipelagic zone in the western Bering Sea and southern Okhotsk Sea for estimation of juvenile and immature Pacific salmon and other nekton species abundance and biomass. Assessment of their biological condition and spatial distribution patterns, size and age composition of stocks and their mixtures. Sampling for feeding studies.

2) carrying out of plankton survey of epipelagic zone for collection of data on plankton communities composition and structure, salmon and mass nekton species feeding environment; description and development of nektonic communities trophic structure models.

3) carrying out of hydrological survey for evaluation of climate-oceanic conditions of the western Bering Sea and southern Okhotsk Sea in 2010.

Studies of Pacific salmon during their catadromous migrations will be conducted by R/V Professor Kaganovsky.

### **LOCATIONS AND PERIOD OF SURVEY**

The first phase of R/V Professor Kaganovsky' cruise (provisional dates – September 18-October 19, 2010) will be devoted to the catadromous migrations of Pacific salmon in the western Bering Sea (Figure 3). The second phase (provisional dates – October 22-November 20, 2010) are planned to study the catadromous migrations of Pacific salmon in the southern Okhotsk Sea (Figure 3).

### **PARTICIPATING SCIENTISTS**

Scientific field party will include 13 persons: 7 ichthyologists, 3 hydrobiologists, 3 hydrologists (preliminary).

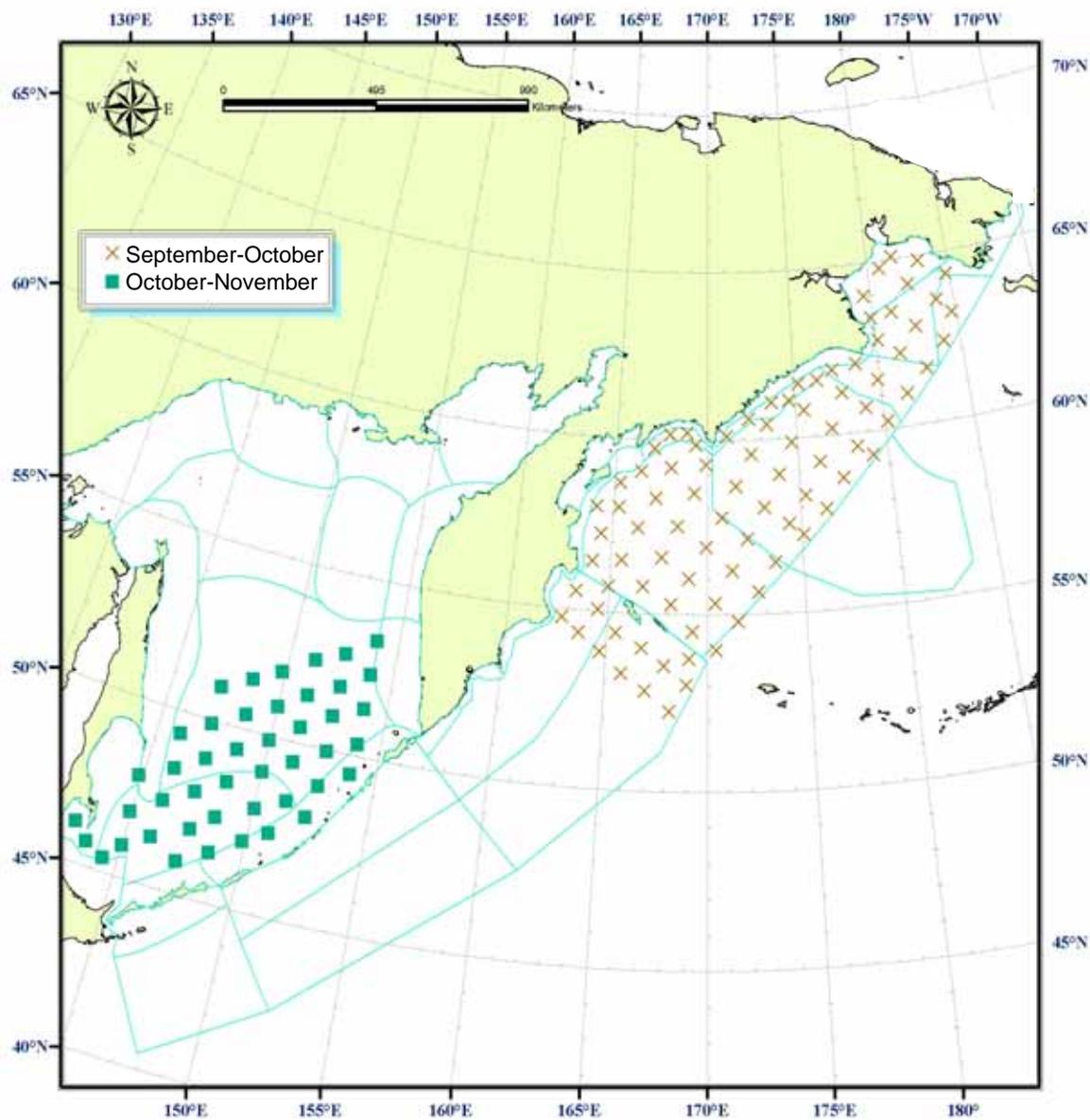


Figure 3. Station locations to be sampled by the standard comprehensive survey of the upper epipelagic layer of the western Bering Sea (provisional dates – September 18-October 19, 2010) and southern Okhotsk Sea (October 22-November 20, 2010) by RV “Professor Kaganovsky”.