NPAFC
Doc. 943
Rev. _____

Trawl Survey Plans for Pacific Salmon Marine Life Period Studies in the Far Eastern Seas in 2006 by Russia

Submitted to the

NORTH PACIFIC ANADROMOUS FISH COMMISSION

by

Russia

April 2006

THIS PAPER MAY BE CITED IN THE FOLLOWING MANNER:
Trawl Survey Plans for Pacific Salmon Marine Life Period Studies in the Far Eastern Seas in 2006 by Russia. (NPAFC Doc. 943) 11 p. Submitted by Russia.

I. CRUISE PLAN OF R/V TINRO FOR PACIFIC SALMON MARINE PERIOD OF LIFE RESEARCH IN THE BERING SEA AND NORTH PACIFIC WATERS OFF KURIL ISLANDS IN 2006 BY TINRO-CENTER

SURVEYS OBJECTIVES AND TASKS

The fulfillment of trawl survey in 2006 on Pacific salmon abundance and ecology in the Bering Sea and adjacent North Pacific waters is planned in accordance with comprehensive ecosystem Russian research plans. The major purpose of these studies is the detection and interpretation of environmental variation and density-dependence mechanisms that influence salmon carrying capacity in the North Pacific waters and Bering Sea and their relevance for conservation and rational exploitation of salmon stocks. In 2006 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.

The major objectives of the survey are: 1) determination of the current state of Pacific salmon in the pelagic ecosystems of the Pacific waters of Kuril Islands and western Bering Sea; 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 of Kuril Islands and western Bering sea in summer-autumn of 2006.

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 whole areas of the Pacific waters of Kuril Islands and western Bering Sea for estimation of Pacific salmon and other nekton species abundance and biomass. Assessment of their abundance, biological condition and spatial distribution patterns, size and age composition of stocks and their mixtures.

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 of Kuril Islands and western Bering Sea in 2006.

LOCATIONS AND PERIOD OF SURVEY

The cruise of research vessel "TINRO" is planned to begin in port of Vladivostok in June (provisional dates: June 15, 2006). The first part of the expedition will be devoted to the comprehensive epipelagic survey of the Pacific waters of Kuril Islands (Fig. 1). After fulfillment of the first part of the expedition the second part (approximately August 1) will be devoted to the epipelagic survey of the Bering Sea within the Russian economic zone (Fig. 2). The research vessel returns to Vladivostok in mid-October (provisional).

METHODOLOGY OF STUDIES

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.

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.

PARTICIPATING SCIENTISTS

Scientific field party will include 15 persons: 7 ichthyologists, 3 hydrobiologists, 3 hydrologists. The participation in the survey of two scientists from NPAFC member country may be preliminarily arranged in accordance with the project of BASIS program.

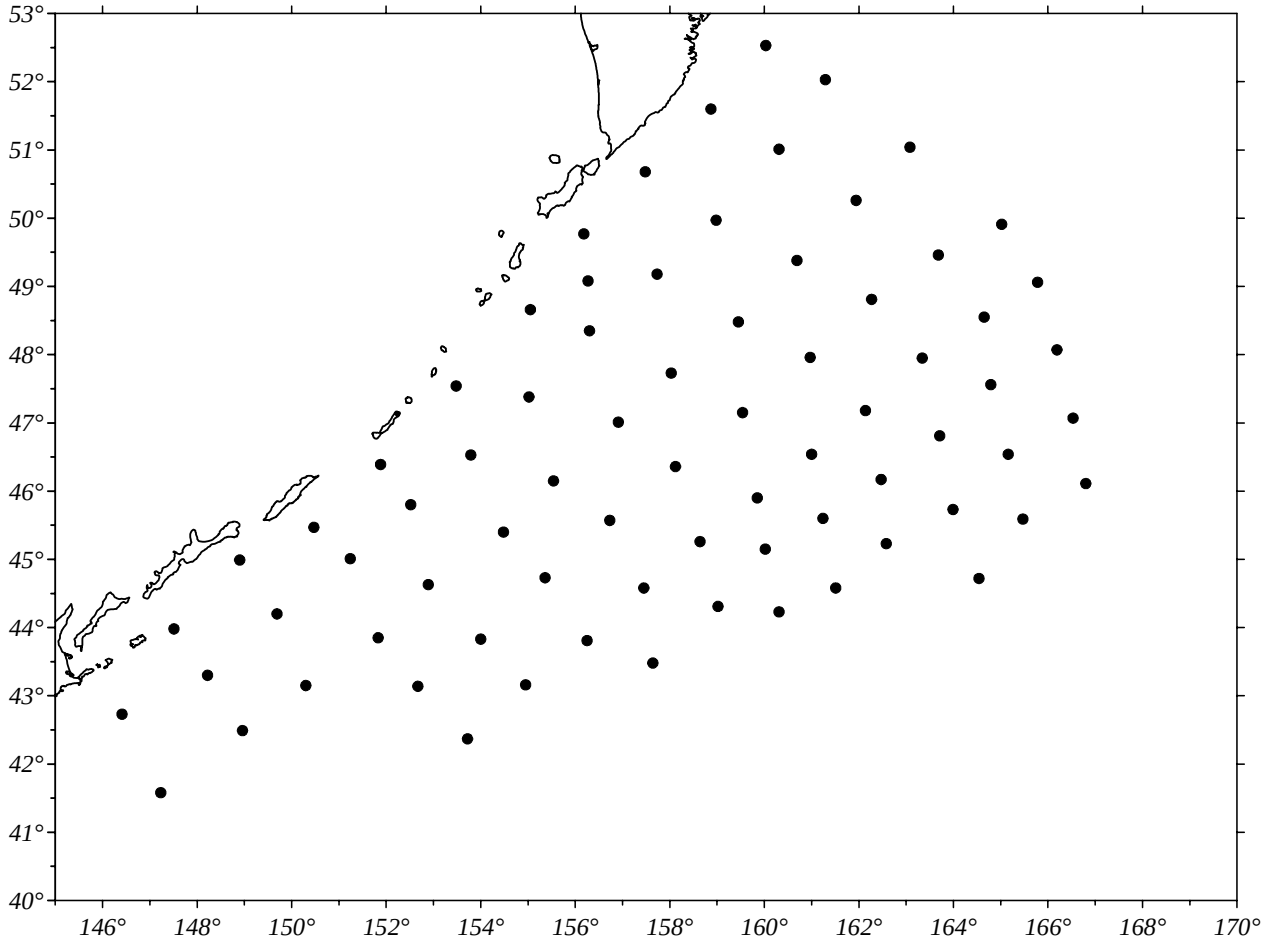

Fig. 1. Station locations to be sampled by the standard comprehensive survey of the upper epipelagic layer of the Pacific waters of Kuril Islands according to TINRO-Center plan for June-July of 2006.

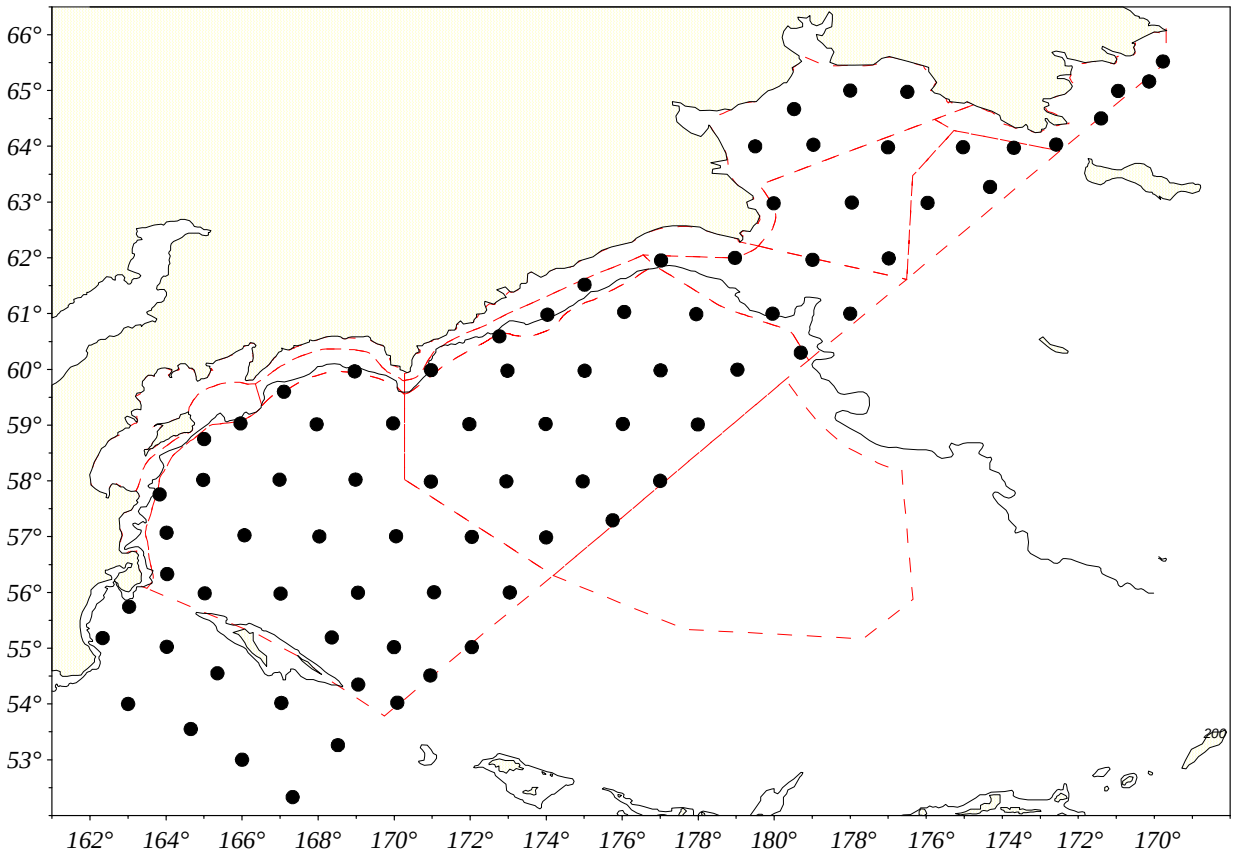

Fig. 2. Station locations to be sampled by the standard comprehensive survey of the upper epipelagic layer of the western Bering Sea according to TINRO-Center plan for August-September of 2006

.

II. CRUISE PLAN OF R/V KAGANOVSKY FOR PACIFIC SALMON MARINE PERIOD OF LIFE RESEARCH IN THE OKHOTSK SEA IN 2006 BY TINRO-CENTER

SURVEYS OBJECTIVES AND TASKS

The conduction of trawl survey in 2006 on salmon abundance and ecology in the Okhotsk Sea is planned in the baseline of the comprehensive ecosystem research of the Far Eastern Seas and North Pacific ecosystems status monitoring. The major purpose is to conduct standard ecosystem upper epipelagic trawl survey in order to study juvenile Pacific salmon abundance, distribution, food selectivity, composition of plankton and nekton communities, changes of biological condition of salmon during the catadromous migrations, salmon spatial differentiation, structure of stocks contributing to the mixture and the influence of abiotic environment upon the salmon quantitative allocation and migrations.

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 whole areas of the southern Okhotsk Sea for estimation of juvenile Pacific salmon and other nekton species abundance and biomass. Assessment of their abundance, 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 southern Okhotsk Sea in 2006.

LOCATIONS AND PERIOD OF SURVEY

The cruise of research vessel "Kaganovsky" is planned conduct its survey in the southern Okhotsk Sea in October-November of 2006.

METHODOLOGY OF STUDIES

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.

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.

PARTICIPATING SCIENTISTS

Scientific field party will include 15 persons: 7 ichthyologists, 3 hydrobiologists, 3 hydrologists.

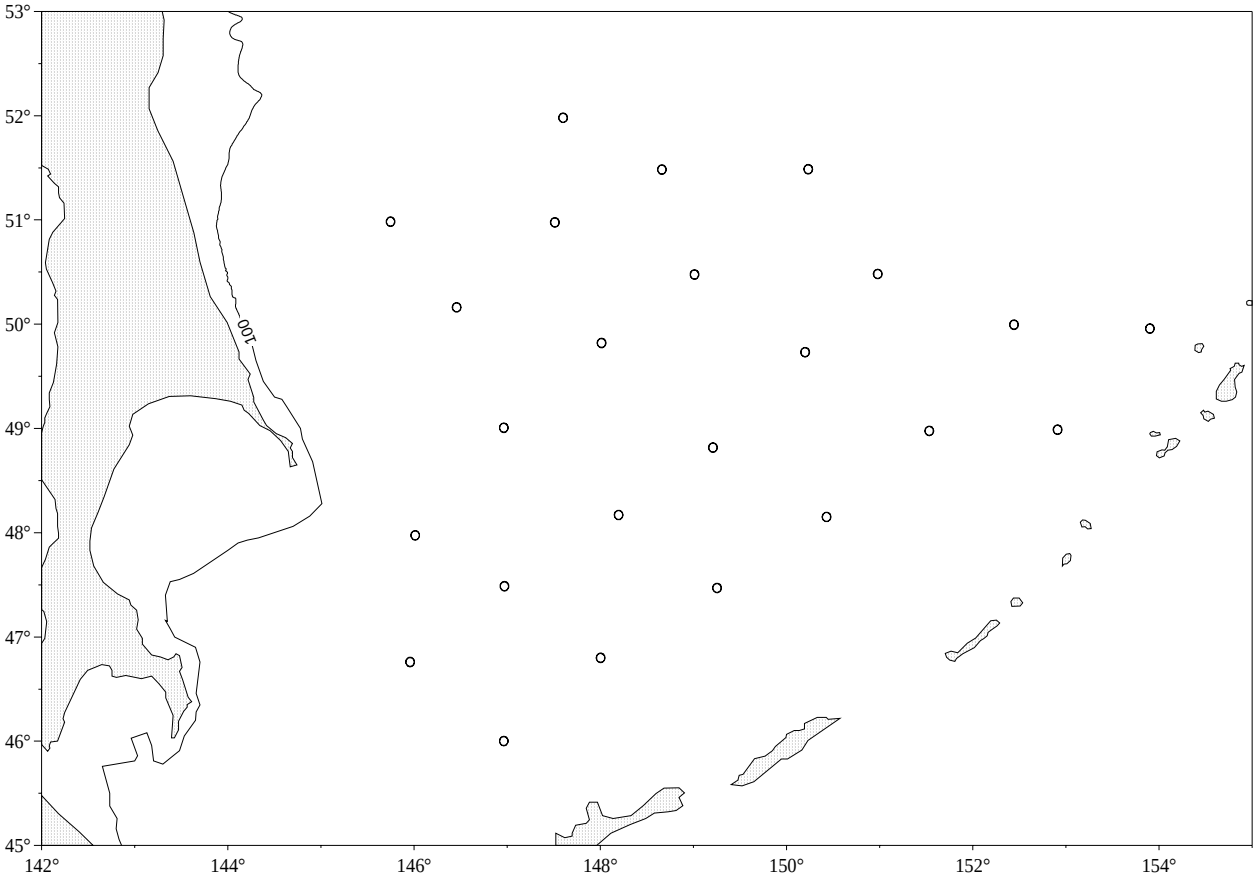

Fig. 3. Station locations to be sampled by the standard comprehensive survey of the upper epipelagic layer of the southern Okhotsk Sea of Kuril Islands according to TINRO-Center plan for October-November of 2006.

III. CRUISE PLAN OF R/V "DMITRY PESKOV" FOR PACIFIC SALMON EARLY MARINE LIFE RESEARCH IN THE OKHOTSK SEA IN 2006 BY SAKHNIRO

SURVEYS OBJECTIVES AND TASKS

In the Sakhalin-Kuril region, the pink salmon and chum salmon form a basis of the Pacific salmon stocks. In the productive years, the total numbers of juveniles of these species (from natural reproduction and release from the hatcheries) reach 0.8-1.0 billions fish. However, the spawners return (catch and escapement) usually comprises not more than 3-4% from the juvenile salmon abundance. Entire remaining numbers of fishes perish during the sea life cycle, which indicates significance of this phase in the formation of the number of year classes. It was revealed in 1970s-1990s that pink salmon and chum salmon juveniles do not stay during any long time not only in the river

estuaries and lagoons, but also in the inshore shelf adjacent to them. Juveniles move away from the coast to the outer shelf water area already during the first days and weeks after entry into the marine environment, where they dwell under the conditions of the open sea. However, its further fate remains unclear before occurrence in the autumnal aggregations in the southern Okhotsk Sea. During June-July of 2002-2005, SakhNIRO conducted the trawl surveys of Pacific salmon juveniles in the shelf and continental slope zones off the eastern Sakhalin and southern Kuril Islands on the r/v "Dmitry Peskov". Pelagic cable trawl 54.4/192 m was used. In spite of the expectations, aggregations of juvenile salmon were not found in 2002-2003. Catches per unit effort (CPUE) were insignificant and did not correspond to abundance of juveniles migrated from the rivers of this region. For the first time, notable aggregations of pink salmon and chum salmon fry occurred into the Aniva Bay, and so in the shelf and continental slope zones of southeastern Sakhalin during July of 2004. It was revealed that Pacific salmon juveniles demonstrated prolonged residence in the inshore shelf zone along the southern Sakhalin coast before the migration in the offshore sea. Pink salmon could not be revealed beyond this inshore zone before the end of June. During July of 2005, trawl survey was repeated in the Aniva Bay and the results of 2004 were confirmed. In 2006, SakhNIRO plans the continuation of study on Pacific salmon juveniles distribution, biology, environmental conditions influencing the year-class abundance formation during the stage of offshore migrations from the Sakhalin Island coast. The study objectives are as following:

1. Definition of migration timetable of young salmon from the coast.
2. Estimation of distribution and numbers of juvenile Pacific salmon.
3. Estimation of the biological parameters of the captured juvenile Pacific salmon by the regions and periods of observation.

LOCATIONS AND PERIOD OF SURVEY

Surveys will be conducted in the southwestern Okhotsk Sea in the limits of Aniva Bay, coastal waters of southeastern Sakhalin, and Terpenia Bay. They will be conducted from the beginning of July to early August of 2006, that must cover a period from juvenile salmon enter the sea environment until their migration into the offshore southern Okhotsk Sea.

METHODOLOGY OF STUDIES

Trawl survey will be carried out from the SakhNIRO r/v "Dmitry Peskov" (STR-420) along the previously developed pattern of trawling stations from the 30-meters depth far to the continental slope limits. Trawling stations will cover inner, middle, and outer part of the sea shelf. Trawl hauls will be carried out by the standard midwater trawl, model RT/TM 54.4/192 m with the small mesh (9 mm) insert in the trawl codend. Upper epipelagic layer from 0 to 30 m will be swept during the trawl hauls. It is planned to conduct up to 150 trawl hauls during the research cruise.

Trawl catches of fishes will be investigated by species, CPUE will be calculated (in weight and quantitative units), and size and weight parameters of fish will be measured. Trawl survey will be accompanied by hydrological survey using the CTD-probe. In the places of juvenile Pacific salmon aggregations oceanographic research will be carried out using the Juday plankton net. Juvenile salmon and associated fish species will be fixed with 4% formalin for feeding studies.

PARTICIPATING SCIENTISTS

Scientific field party will include 7 persons: 4 ichthyologists, 1 biological oceanographer, and 2 physical oceanographers.

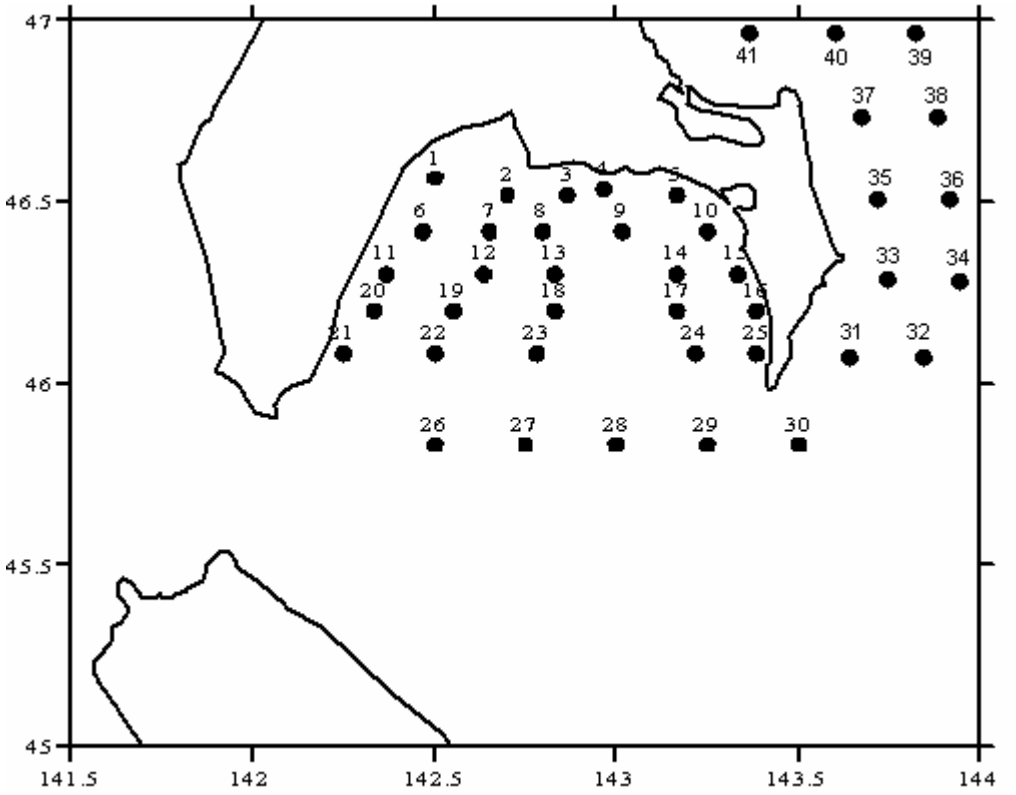

Fig. 4. Station locations to be sampled by the standard trawl survey of the upper epipelagic layer of the southwestern Okhotsk Sea according to SakhNIRO plan for July-August of 2006.

IV. CRUISE PLANS FOR PACIFIC SALMON EARLY MARINE LIFE PERIOD RESEARCH IN THE OKHOTSK AND BERING SEAS IN 2006 BY KAMCHATNIRO

SURVEYS OBJECTIVES AND TASKS

Coastal and offshore life history of juvenile salmon in some selected areas (western Bering Sea, eastern, northern and southern Okhotsk Sea) will be studied. Environmental, feeding, and food competition data will be collected in the main coastal areas off Kamchatka, and in the northern Okhotsk Sea during spring-summer-fall season. Seasonal distribution, abundance, migration, population characteristics, and survival of juvenile salmon will be surveyed by means of various approaches. Stocks abundance, habitat conditions, feeding and trophic interactions of salmon juveniles and others species will be studied. Primary production and salmon food resources in different salmon habitats (coastal and offshore waters) will be estimated. A comparison between salmon and other pelagic fishes of the consumption rates of plankton and micronekton animals will help to estimate the place of salmon in the trophic structure of pelagic ecosystems. Pacific salmon juveniles' distribution, migration, abundance, and biological data will be analyzed retrospectively from 1981. These data will be used for estimation abundance of pink, chum and sockeye salmon in 2005 brood and latter.

LOCATIONS AND PERIOD OF SURVEY

Several (approximately - 2-3) small-scale short-term surveys will be conducted in the southeastern Okhotsk Sea within the Russian territorial waters between May 15 and August 31, 2006.

Assessment of juvenile salmon abundance during their migration to Okhotsk and Bering Seas will be carried out by means of STR-503 – type vessels operating by specially designed midwater trawls during September 1-October 31, 2006. Station locations are shown in Fig. 5.

METHODOLOGY OF STUDIES

During the May 15- August 31, 2006 trawl survey will be carried out from the KamchatNIRO MRTK-type vessels. Trawl hauls will be carried out by the specially designed midwater trawl.

During the September 1-October 31, 2006 assessment of juvenile salmon abundance during their migration to Okhotsk and Bering Seas will be carried out by means of STR-503 – type vessels operating by specially designed midwater trawls.

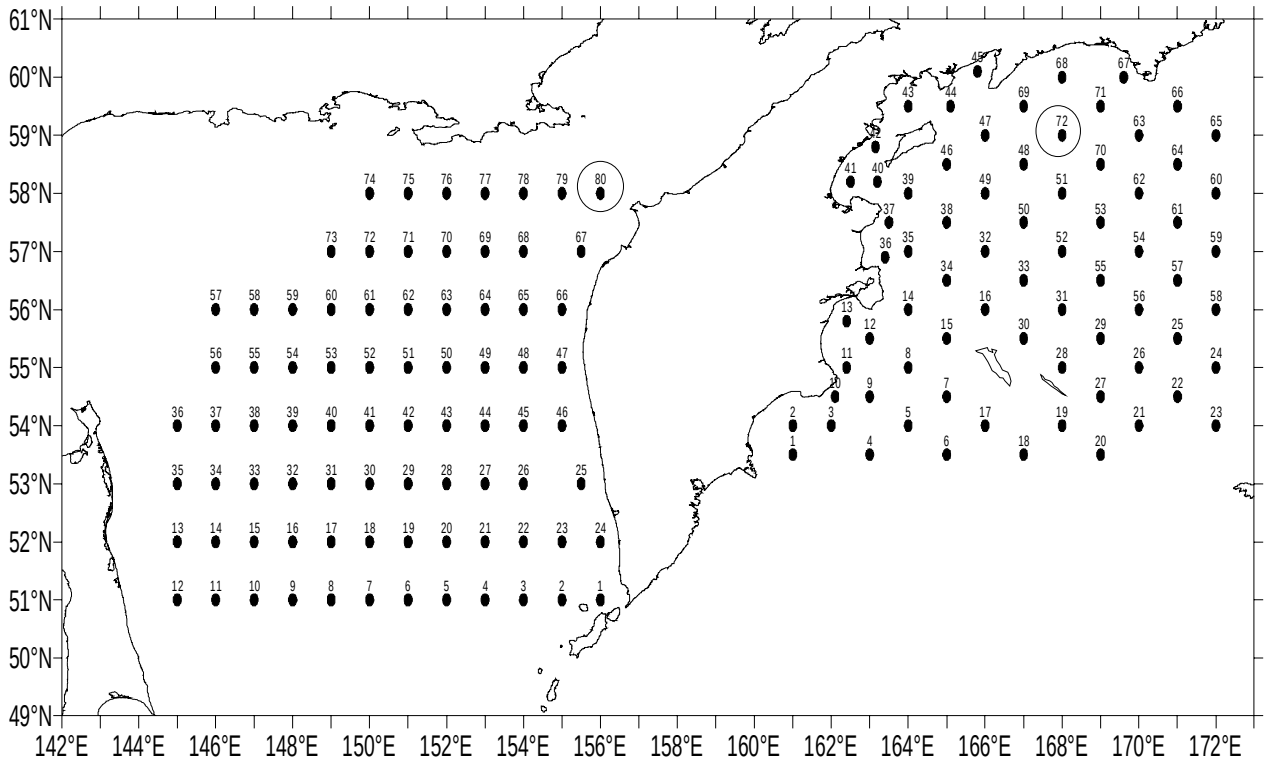

Fig. 5. Station locations to be sampled by the standard trawl survey of the upper epipelagic layer for the assessment of juvenile salmon abundance during their migration to Okhotsk and Bering Seas.