Towards the Russian Cruise Plan for Pacific Salmon Marine Period of Life Research in the Bering Sea in July-October 2003

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by
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BRIEF DESCRIPTION OF SURVEY

The results of the Russian survey at the summer-autumn period of 2002, as a part of the international BASIS program, have confirmed the previous data on changes in the structure and composition of the upper epipelagic ecosystems of the Bering Sea in the late 1990-ies (including the significant decrease of walleye pollock and some other species abundance). As the result of these changes, the dominance of mesopelagic migrants (Myctophidae species), which were previously intensively consumed by walleye pollock, in the pelagic layer of the deep-water areas took place. The increase of salmon percentage in the fish community biomass took place as well.

The abundance of Pacific salmon (chum, sockeye and chinook) that are foraging in the Bering Sea has grown considerably since 1980-ies. Also, the abundance of juvenile Atka mackerel in the deep-water areas of the western Bering Sea was very high in the autumn period of 2002. Despite of the increase of salmon and juvenile Atka mackerel abundance, the biomass of zooplankton (mostly crustaceans) in the western Bering Sea remains steadily high. The are no any notable changes in the salmon diet, except for the higher percentage of nekton species in it (Myctophidae species and juvenile Atka mackerel).

At the same time the information on the state of the eastern Bering Sea ecosystem (including plankton and nekton components of ecosystem) indicates that situation is unstable and there is a possibility of these signs of crisis to spread into the western Bering Sea. This dictates the necessity of the further international monitoring and coordination in ecosystem status and dynamics studies in the whole areas of the Bering Sea, major components of ecosystem, including Pacific salmon.

The conduction of trawl survey in 2003 on salmon abundance and ecology in the Bering 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 of these studies is the detection and interpretation of environmental variation and density-dependence mechanisms that influence salmon carrying capacity in the Bering Sea and their relevance for conservation and rational exploitation of salmon stocks. In 2003 the studies on salmon vertical distribution, salmon 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.

SURVEY OBJECTIVES AND TASKS

The major objectives of the survey are: 1) determination of the current state of Pacific salmon in the pelagic ecosystems of the Bering sea; 2) elucidation of Pacific salmon position and role in the trophic structure of the Bering sea epipelagic zone; 3) evaluation pelagic ecosystems status, as well as oceanic and overall ecological conditions in the western Bering Sea in summer-autumn of 2003.

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 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. 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 western Bering Sea in 2003;

4) - collection of genetic samples for the subsequent laboratory analysis.

5) - carrying out of daily stations for the elucidation of salmon vertical distribution;

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 – July 31). The first part of the expedition will be devoted to the comprehensive epipelagic survey of the Bering Sea within the Russian economic zone (Figure). After fulfillment of the first part of the expedition the second part will be devoted to the walleye pollock studies and Chukotka Sea small-scale trawl survey. At the final part of the survey (approximately September 1 – October 15) the second comprehensive epipelagic survey of the Bering Sea within the Russian economic zone (Figure). During the second decade of September, upon the agreement with the Japanese side, the conduction of trawl calibration experiment with R/V Kayo-maru is planned (duration - 4-6 days). The research vessel returns to Vladivostok in November (approximately).

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.

During the trawl calibration experiment 4 to 6 trawlings are conducted each day (duration of trawling – 1 hour). During the first day the trawlings are conducted with the headrope located at the surface (fixed layer - 0 m). During the second day the headrope of the trawl is adjusted to the depth of 30, during the third day - 60 meters.

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: 6 ichthyologists, 3 hydrobiologists, 3 hydrologists and 1 geneticist. The participation in the survey of two scientists from NPAFC member country may be preliminarily arranged.

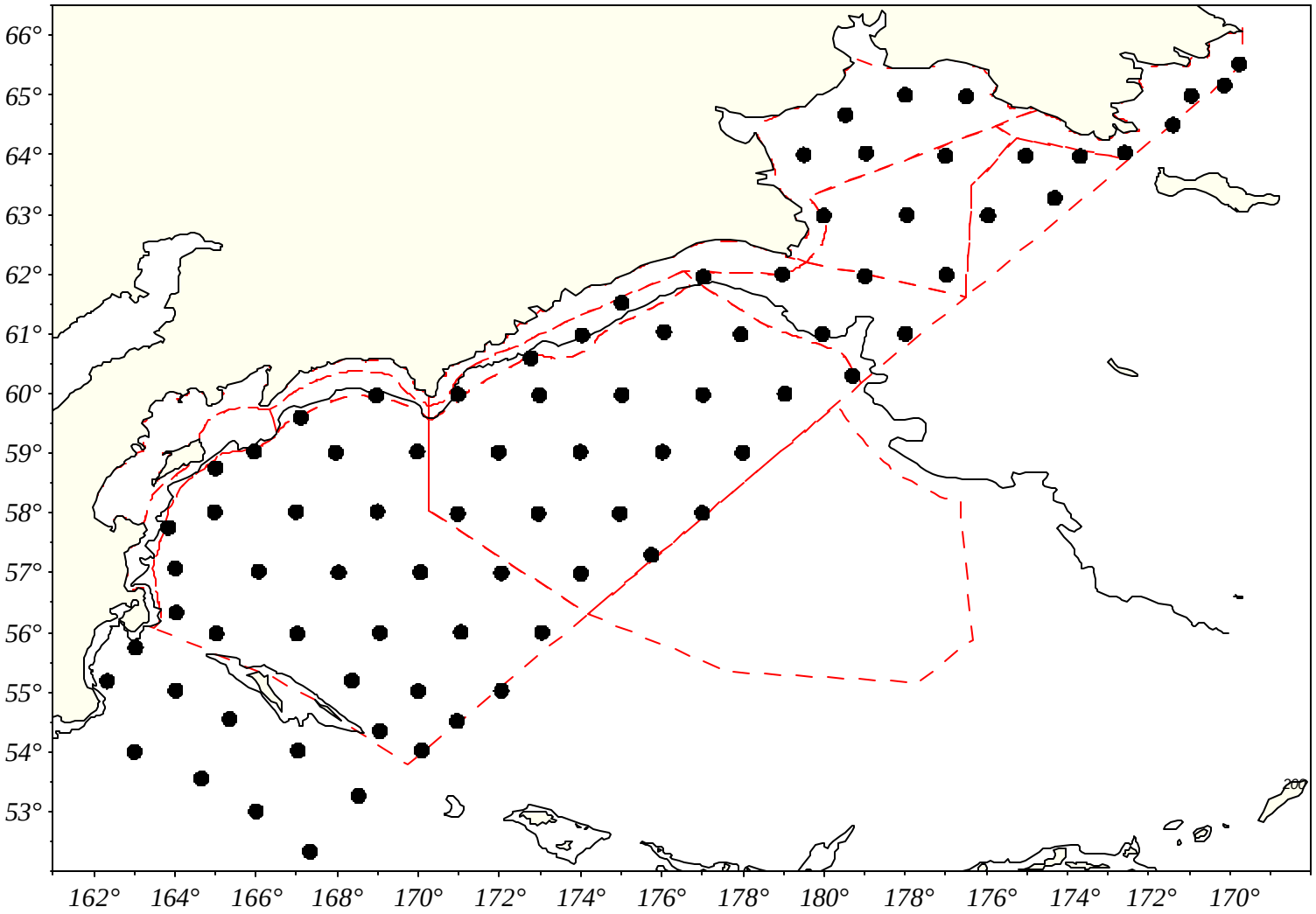

Figure. Station locations to be sampled by the standard comprehensive survey of the upper epipelagic layer of the western Bering Sea according to TINRO-Centre plan for 2003.