INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

Serial No. 734
(D. c. 4)

Document No.16

ANNUAL MEETING - MAY/JUNE 1960

Tagging of Commercial Fish in the Soviet Union

A Review by Aslanova, VNIRO, U.S.S.R.[1)]

Tagging of commercial fish is considered in the Soviet Union to be of great scientific and practical importance, especially in connection with the development of the extremely important marine fisheries.

Tagging is practiced in almost every water of this country, as well as in the open sea (Figure 1).

Tagging of fish is included in programs of expeditions, observation stations, and special boats, as a separate part.

Methods of tagging are now being improved, more efficient tags and ways of using them being worked out.

Large-scale tagging of a new species or use of a new type of tag is usually preceded by experimental tagging of a number of fish of the same or a similar species in aquarium or under natural conditions.

The first attempts to tag fish in this country date back to a remote past. It is known from literature that as far back as 1794 a tagged pike was found in a pond in the vicinity of Moscow, and in 1872 a tagged sturgeon was caught in the Volga river. Extensive and regular tagging of commercial fish was started in the beginning of this century, with mass tagging of acipenceridae, salmonidae, and other species of fish.

Mass tagging of groundfish was initiated in the late twenties in the Barents Sea, where about 32,000 fish, mostly cod, were tagged in the course of five years (M.S. Idelson, 1933). Large scale tagging of commercial salt water fish has been practiced ever since in various areas. About 400,000 groundfish and almost 40,000 herring were tagged in the Barents Sea, White Sea and North Atlantic. More than 100,000 herring, cod, flatfish and other fish were tagged in the Far East. More than 80,000 horse mackerel, mullet, pike-perch, bream, flatfish and acipenceridae were tagged in the Azov Sea and Black Sea. More than 130,000 acipenceridae, carp, bream, vobla and other species - in the Caspian Sea and Aral Sea. Around 30,000 cod, carp, flatfish and other species - in the Baltic Sea.

Extensive tagging of fish in rivers, lakes and reservoirs was started in recent years. Approximately 250,000 fish, mostly bream, carp, pike-perch, acipenceridae, and salmonidae, and their young, were tagged in the Volga, Don, Kura and Dnieper rivers, and in rivers of the Far East, and North, Siberia, etc.

The purpose of the tagging was the study of the spawning, feeding, and wintering migrations of commercial fish, as well as their seasonal and local distribution. Besides, tagging helped to determine

1) This document No.16 is to be considered as Appendix IX to Annual Meeting, 1959, Document No.39: North Atlantic Fish Marking Symposium, Observations from Submissions on Tagging Publicity Methods. The posters, etc., forwarded with the MS. are not reproduced, but filed in the Secretariat, as was the case with similar posters for Document No.39. They are now available for inspection in the office. - Executive Secretary.

the intensity of fishing operations, the fishing capacity factor of the gear used, the commercial return factor of artificially reared fish, as well as methods of establishing the age of fish and their rate of growth.

The results of a large scale tagging of cod in the Barents Sea proved that there existed two relatively independent stocks of immature cod: one feeding in the southern part of the Barents Sea, and another in the Bear-Spitsbergen area. Only after spawning, the mature cod migrate from the southern part of the Barents Sea to the Bear-Spitsbergen area, or vice versa. Tagging also permitted the thorough study of the time and routes of migrations of cod and haddock to their feeding, spawning and wintering grounds.

N.A.Maslov has, based on mass tagging, established that eastward migration of cod begins in April-May and ends in the main in the middle of June. In the second half of June cod reach the slope of Gusinaya Bank and the eastern part of the Murmansk coast. In July they appear on the northern and southern slopes of Gusinaya Bank, in the shallow waters of Novaya Zemlya, and north-east of Kolguev Island. In September-October cod reach the extreme limits of their habitat, i.e. the coastal area of Novaya Zemlya in the north-east, and Vaigach Island in the south-east. (Figure 2).

Late in September or early in October cod begin to retreat from Novaya Zemlya south-westward. Mature cod come every year to Lofoten for spawning (Figure 3). Cod tagged in Motovsky Bay on April 22, 1939, were caught again near Lofoten on February 15, 1940. These cod came for the first spawning to Motovsky Bay, and for the next spawning to Lofoten. Tagging revealed that in winter cod migrated from the area of Central Elevation to Lofoten, North Cape, and other areas in the western part of the Barents Sea, which was also mentioned by Dr. G.C.Trout in his capital work (G.C.Trout, 1957).

Spawning migrations of cod proceed at a higher speed than their feeding migrations (N.A.Maslov, 1944).

Tagging practice contributed considerably to the study of migration routes of herring in the Norwegian and Greenland seas. The research conducted by Yu. Yu. Marti and A.P.Wilson revealed that Atlantic-Scandinavian herring migrate annually for feeding to the western coast of Spitsbergen and Yan Mayen, and to Iceland. Herring which feed in these areas in summer migrate for spawning to the south-west coast of Norway (Figure 4).

The results of tagging herring in the seas of the Far East proved to be quite interesting. They revealed that the Sakhalin-Hokkaido herring make up one stock. By tagging of pre-spawning herring in the south-eastern part of Tartar Strait it was established that herring ascend for spawning the streams of the southern part of the west coast of Sakhalin in April, and that in May or early June spent specimens migrate to the south-west part of the Sea of Okhotsk, to the Japanese Coast (Figure 5).

Extensive tagging experiments were conducted in the Caspian Sea by G.A.Karavaev (1939). They contributed considerably to our knowledge of migrations and local distribution of commercial fish stocks in this basin.

Tagging in the Black Sea revealed that horse mackerel migrate in spring from the coast of the Caucasus to the Crimean coast, and from the coast of Bulgaria to the Odessa coastal area. Mullet tagged in spring in the Crimean coastal area were caught in November-December near the Bulgarian Coast, and in January-February in the southern part of Bosphorus and in the north-eastern part of the Sea of Marmora (Figure 6). Thus it was established that the ranges of migration of the mullet were quite vast. Mullet migrate for wintering outside the Black Sea and, apparently, they do not form local stocks bound to the coastal

areas of Crimea or Caucasus.

Tagging in the White Sea revealed that the resources of White Sea cod were scanty. With no great intensity of fishing operations the return of tagged fish was quite high (more than 30%). (M.A.Sonina, 1937).

Tagging experiments also produced quite valuable information about fishing capacity of beach seines in the Volga and Ob rivers, which permitted the computation of the fishing capacity factors for such seines (V.G.Andreev, 1949; B.G.Iogansen, 1952).

Moreover, as a result of tagging very interesting data were obtained for determining the speed of migrations of various fish. Thus, it was established that Barents Sea cod moved at a speed of 12 miles per day, Black Sea bonito at a speed of up to 18 miles, horse mackerel up to 14 miles, mullet up to 16 miles per day, while the average speed of movement of Atlantic herring was about 7 miles per day. This important information helps fishing fleets to follow the movements of concentrations of fish.

Experience has shown that there are no generally recognised standards of tagging applicable to all the species of fish. Therefore a variety of types of tags and methods of fixing are still used. Types of tags and methods of tagging are being constantly improved in conformity with the objects and conditions of tagging and its purpose. The main types of tags in this country, used for a number of years, are: for cod, haddock, flatfish, vobla, carp, etc. - staple-shaped metal tags; for herring, horse mackerel, mullet, bonito, etc. - suspended cellulose strip-shaped tags. In the last two years, tags made of cellulose and polyethylene tube (ampule type) and of polyethylene film (envelope type), and cardboard tags covered with cellulose lacquer for tagging young fish, were used. (See samples).

Tags are made in experimental workshops of the All-Union Research Institute of Marine Fisheries and Oceanography (VNIRO) in Moscow.

Young acipenceridae artificially reared are marked in the Soviet Union with radioactive isotopes (tracers) for studying the speed when descending into the sea, their distribution and survival rate.

Soviet physiologists, Professor G.S.Karzinkin and his disciples, mark fish with radioactive isotope of phosphorus (P^{32}), which assimilates easily and despite its short half-life (14.3 days) can be detected even in $2\frac{1}{2}$-3 months.

The most efficient way of marking artificially reared young acipenceridae on a mass scale is to give them radioactive tracers with food during the rearing, in particular, with enchytreids (Enchytraeus albidus) seasoned on a radioactive substratum. (I.A.Shekhanova, 1959).

Tracers can be detected by an instrument recording radioactive emanation of live fry, of fry fixed in 4% formalin, or of fry dried without fixing.

Success of tagging experiments depends not only upon the methods, types of tags, and ways of attaching, but also upon organisational work and proper advertising. In order to enhance public interest in returning tags, the purpose and results of tagging experiments are being advertised through press, placards (attached to the MS), lectures and public discussions. People returning tags must also supply information about the place where the fish was caught, its length and attach otoliths or scales required for age-determination. Senders of tags receive rewards and are informed of the time and place of tagging the fish.

The main tasks of our tagging program for the future are:

1. To extend tagging experiments with the purpose of evaluating the existing resources of fish and the extent of their use by fisheries, as well as for estimating the efficiency of artificial rearing.

2. To improve the existing methods of tagging commercial fish and to find the most efficient types of tags and methods of attaching.

3. To extend advertising of tagging experiments through press, placards, lectures and public discussions in order to ensure maximum return of tags.

References

1. Andreev, V. G., 1949. Increase of fishing capacity of beach seines used in rivers. "Rybnoe Khozyaistvo" ("Fisheries") No.1.
2. Wilson, A.P., 1956. Tagging of the Kandalaksha and Atlantic-Scandinavian herring. "Rybnoe Khozyaistvo" ("Fisheries") No.7.
3. Derzhavin, N.A., 1922. Sevryuga. Biol. essay. Trans. of the Baku Ichthyol. Lab., v.1.
4. Druzhinin, A.D., 1959. Migration of herring in Sakhalin waters according to the data of tagging experiments conducted in 1956-1958. "Rybnoe Khozyaistvo" ("Fisheries") No.9.
5. Idelson, M.S., 1933. Tagging of fish in the Barents Sea in 1930-1932. "Karelo-Murmansk territory", Nos.7-8.
6. Iogansen, B.G., 1952. Results of studying the quantities of anadromous coregoninae and intensity of fishing operations in the middle reaches of the Ob river. Trans. of the Tomsky State University, v. 119.
7. Karavaev, G.A., 1939. Migration of vobla in the North Caspian (as established by tagging data). Trans. of the All-Union Res. Inst. of Mar. Fisheries and Oceanography (VNIRO), v. X.
8. Karavaev, G.A., 1958. Instructions for tagging fish.
9. Karzinkin, G.S.; Soldatova, I.V.; Shekhanova, I.A., 1959. Results of mass tagging of "non-standard" young of sturgeon with radioactive phosphorus. "Migrations of Animals", collected articles, No.1.
10. Sonina, M.A., 1957. The White Sea Cod. "Data of Complex Studies of the White Sea", collected articles, v.1.
11. Konstantinov, K.G., 1957. Results of tagging groundfish in the Barents Sea, in 1946-1955. Trans. of the Polar Res. Inst. of Marine Fisheries and Oceanography, No.10.
12. Marti, Yu. Yu., 1956. Main stages of the life cycle of the Atlantic-Scandinavian herring. Trans. of the Polar Res. Inst. of Marine Fisheries and Oceanography, No.9.
13. Tikhy, M.I., 1931. Tagging of salmonidae in the mouth of the Svir river. Trans. of the Leningrad Res. Inst. of Ichthyology, v. XII.
14. Maslov, N.A., 1944. The Barents Sea commercial groundfish. Trans. of the Polar Res. Inst. of Marine Fisheries and Oceanography, No.8.
15. Soldatov, V.K., 1914. Scientific and commercial investigations in the Far East. Materials for studying Russian Fisheries, v.III, No.12.
16. Shekhanova, I.A., 1959. Study of phosphorus exchange in cyprinidae and acipenceridae young by the use of radioactive phosphorus.
17. Trout, G.C., 1957. The Bear Island Cod: Migrations and Movements Fish. Fishery inv. ser. XXI, No.6.

--ooOoo--

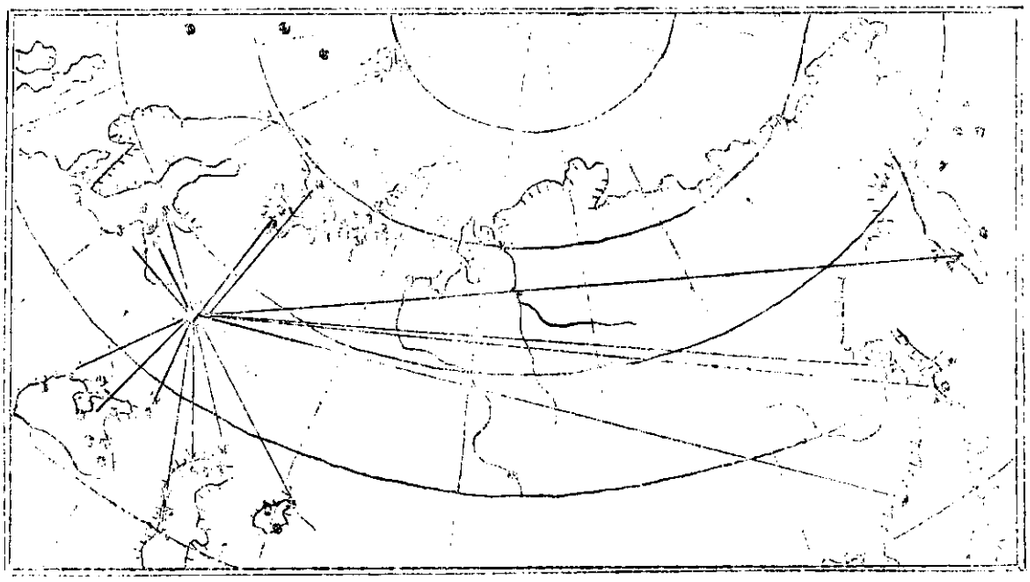

Figure 1 - Areas of tagging experiments in the Soviet Union
o areas of tagging
—— information about results of tagging experiments

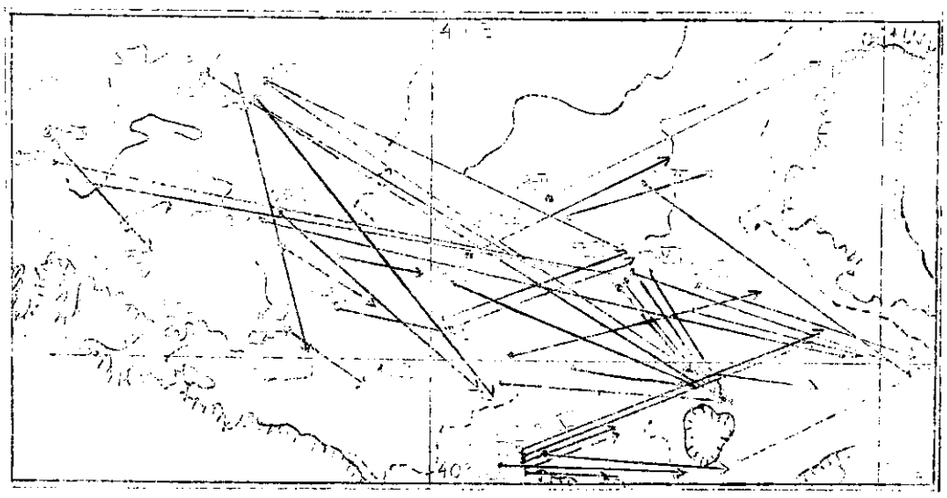

Figure 2 - Some of the routes of eastwards migrations of tagged cod in the open sea.
o areas of tagging
migration routes

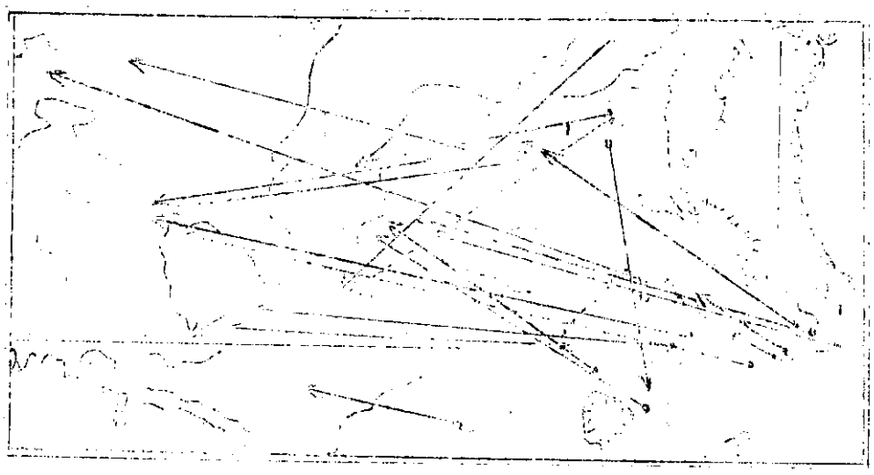

Figure 3 - Some of the routes of westward migrations of tagged cod in the open sea
areas of tagging
migration routes

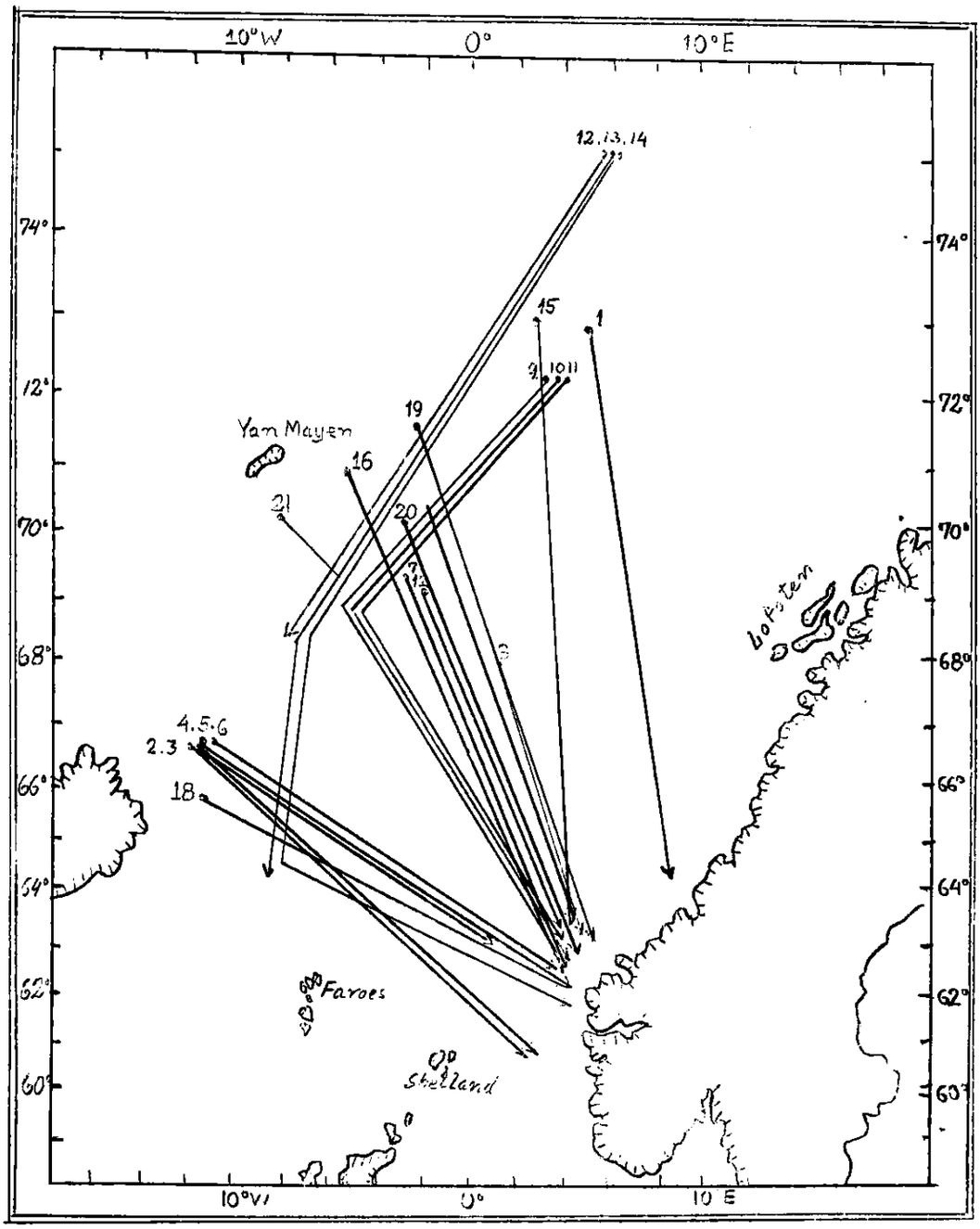

Figure 4 - Migration routes of the Atlantic-Scandinavian herring based on tagging experiments.
● areas of tagging
⟵ migration routes

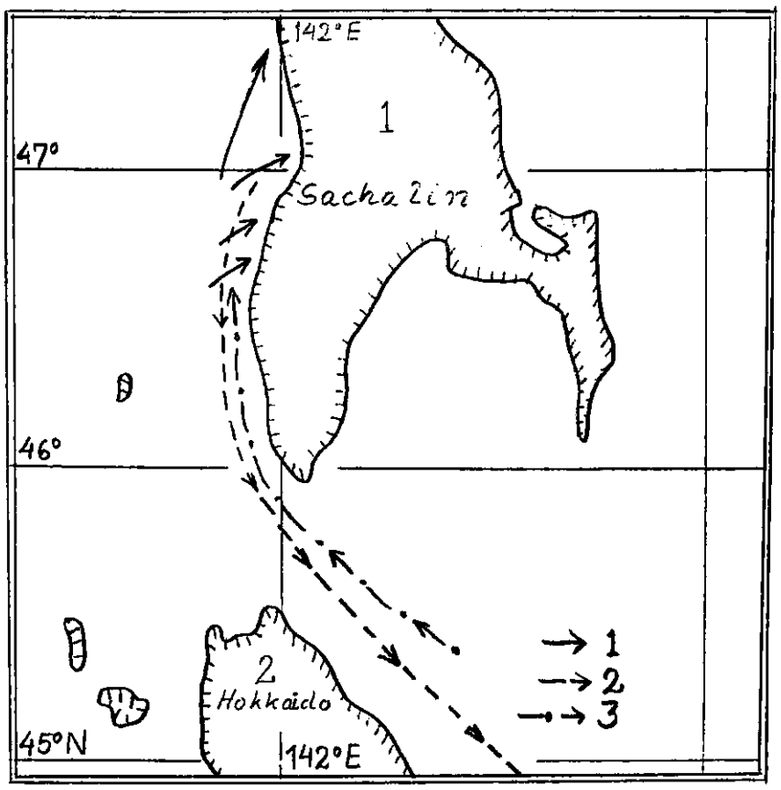

Figure 5 - Migrations of the Sakhalin-Hokkaido stock of old herring as established by the results of tagging, in 1956-58
1. Routes of spawning migrations of herring.
2. Migration routes of spent herring.
3. Routes of migration of herring to Tartar Strait.
1. Sakhalin 2. Hokkaido

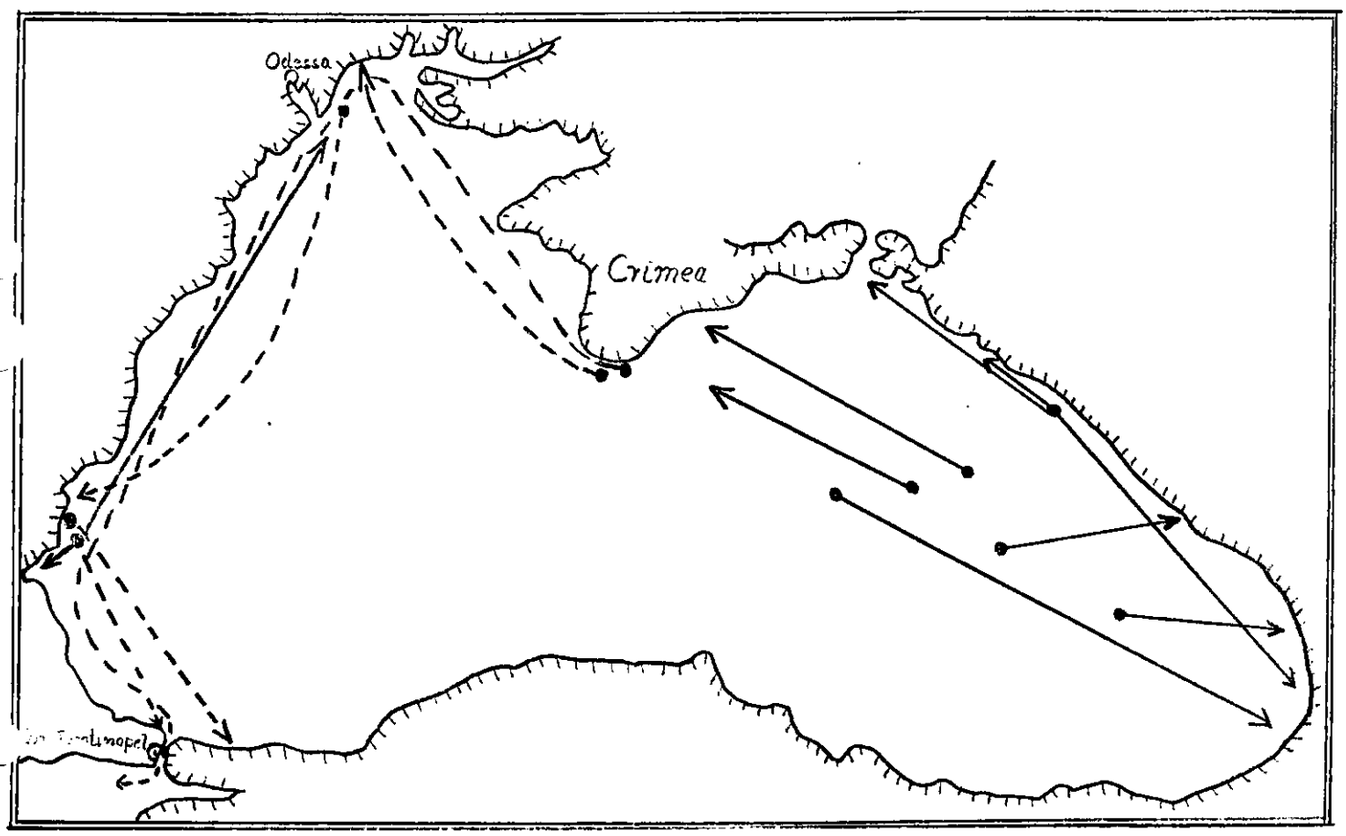

Figure 6 - Migration routes of horse mackerel
• areas of tagging
←--- migration routes of horse mackerel
←—— migration routes of mullet