

Ministry of the Environment
Erimo Area Kuril Harbor Seal Management Project Implementation
Plan, FY 2024

March 2024

Hokkaido Regional Environment Office

Contents

| | |
|--|----|
| Background | 1 |
| FY 2022 Project Implementation Results and Assessment..... | 2 |
| 1. Damage Prevention Measures..... | 3 |
| 2. Population Management | 8 |
| 3. Monitoring | 14 |
| 4. Survey of the Damage Done to the Fishing Industry | 16 |
| 5. Public Awareness | 18 |
| FY 2024 Project Implementation Plan | 20 |
| 1. Damage Prevention Measures..... | 20 |
| 2. Population Management..... | 20 |
| 3. Monitoring | 23 |

Background

The Ministry of the Environment establishes an “Erimo Area Kuril Harbor Seal Management Project Implementation Plan” (hereafter the “Implementation Plan”) every fiscal year. This is to ensure the appropriate implications of the project in accordance with the “Erimo Area Kuril Harbor Seal Specified Rare Wildlife Management Plan (hereafter the “Management Plan”) (Phase II)”, which was established in March 2021.

The goal of the Management Plan is to establish procedures for population management, damage prevention and similar objectives to promote present and future coexistence between Kuril harbor seals and the local community in the Erimo area, including the coastal fishing industry. The Ministry of the Environment will develop these procedures in partnership with various organizations, including the Hokkaido Government, Erimo Town, fishing industry associations, members of the fishing industry, local residents, related organizations, and universities and research institutions. To accomplish these goals, the FY 2024 Implementation Plan shall be defined as outlined below, taking into account the results of the projects implemented from 2016 to 2023.

FY 2022 Project Implementation Results and Assessment

The details of the FY 2023 Erimo Area Kuril Harbor Seal Management Project are as follows.

Table 1: FY 2023 Erimo Area Kuril Harbor Seal Management Project Implementation Details

| Item | Activities | Implementing Agencies |
|-----------------------|--|---|
| Damage Prevention | Installation of exclusion grids on fixed nets (spring, autumn) | Ministry of the Environment, members of the fishing industry |
| Population Management | Spring Capture: Capture in fixed nets, trial of pocket nets, capture by gill nets | Ministry of the Environment, members of the fishing industry |
| | Autumn Capture: Capture in fixed nets | Ministry of the Environment, members of the fishing industry |
| Monitoring | Home range survey | Ministry of the Environment, Marine Wildlife Center of Japan |
| | Questionnaire survey on salmon damage (Autumn) | Ministry of the Environment, Marine Wildlife Center of Japan, members of the fishing industry |
| | Boarding survey of salmon damage (Spring, Autumn) | Ministry of the Environment |
| | Ecological survey of captured and bycatch seals (gender, measurements, age and stomach contents) | Ministry of the Environment, Marine Wildlife Center of Japan |
| | Counting of haul out individuals 【drone (UAV) , visual observation】 | Ministry of the Environment, Marine Wildlife Center of Japan, Kuril Harbour Seal Research Group (Obihiro University of Agriculture and Veterinary Medicine) |
| | Automated haul out counting system | Ministry of the Environment, Rakuno Gakuen University (Associate Professor Ogawa) |
| | Assessment of Kuril Harbor Seal Population | Ministry of the Environment, Tokyo University of Marine Science and Technology (Professor Kitakado) |
| Public awareness | Posting of council Documents on the website (including English) | Ministry of the Environment |
| | Watching tours | Erimo Town Tourism Association Inc. |
| | School Outreach lesson in Erimo town | Ministry of the Environment, Erimo town board of education, and school |
| | Transfer of Kuril Harbor Seals | Ministry of the Environment, Zoos and aquariums, etc. |
| other | reference and collect information 【Damage prevention, infectious diseases etc.】 | Ministry of the Environment, Each committee member |

1 . Damage Prevention Measures

The following initiatives were implemented to mitigate damage to the fishing industry.

(1) Improvement of fishing nets (damage preventing net)

To reduce damage to salmon set nets caused by Kuril harbor seals (hereafter the “seals”) and block their entrance into bag nets, the Ministry of the Environment installed damage prevention net (hereafter the “rope grids”) at the tunnel entrances to the bag nets. These installations were made in trap nets particularly susceptible to severe damage in the Cape Erimo area during the trap net fishing seasons in spring and autumn. And the effectiveness of these measures was verified (Fig. 1 and 2) .

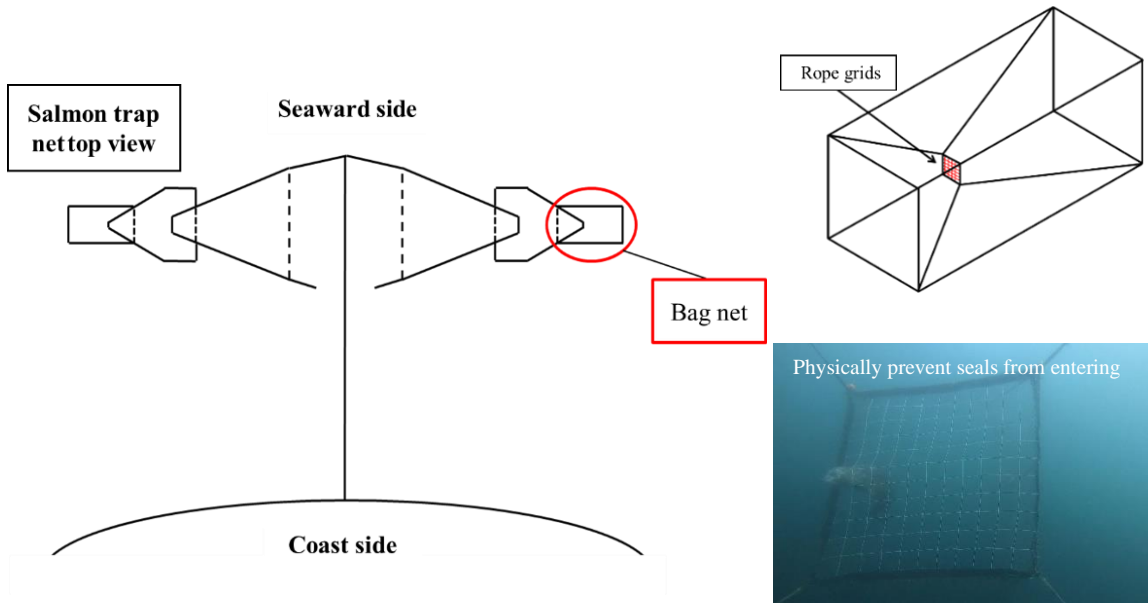


Fig. 1. Installation positions of Rope grids

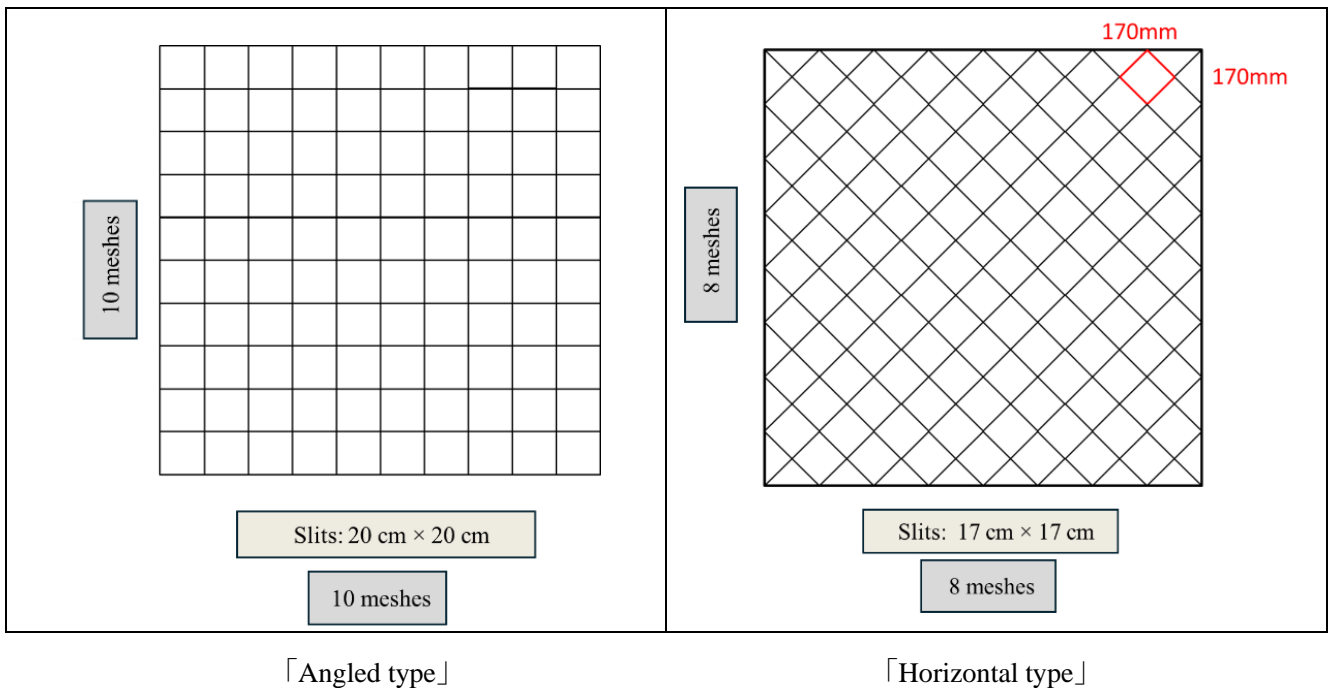


Fig. 2. Specification of Rope grids

<Effect verification of the rope grids>

① Spring fishing season (Toyo sector)

A rope grid was attached to one salmon set net in the Toyo sector (West side of Cape Erimo). The slit of the rope grids was 20 cm × 20 cm horizontal type (Dyneema, white).

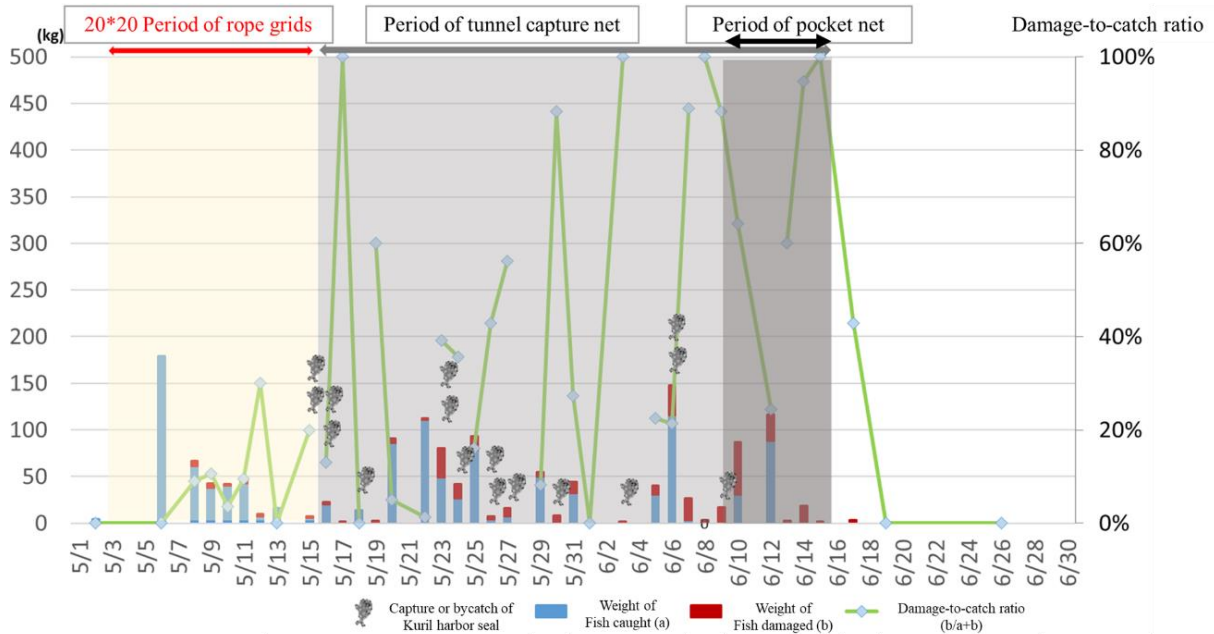


Fig. 3. Total catch size and damage-to-catch ratio of Salmon and Trout (Toyo sector land side)

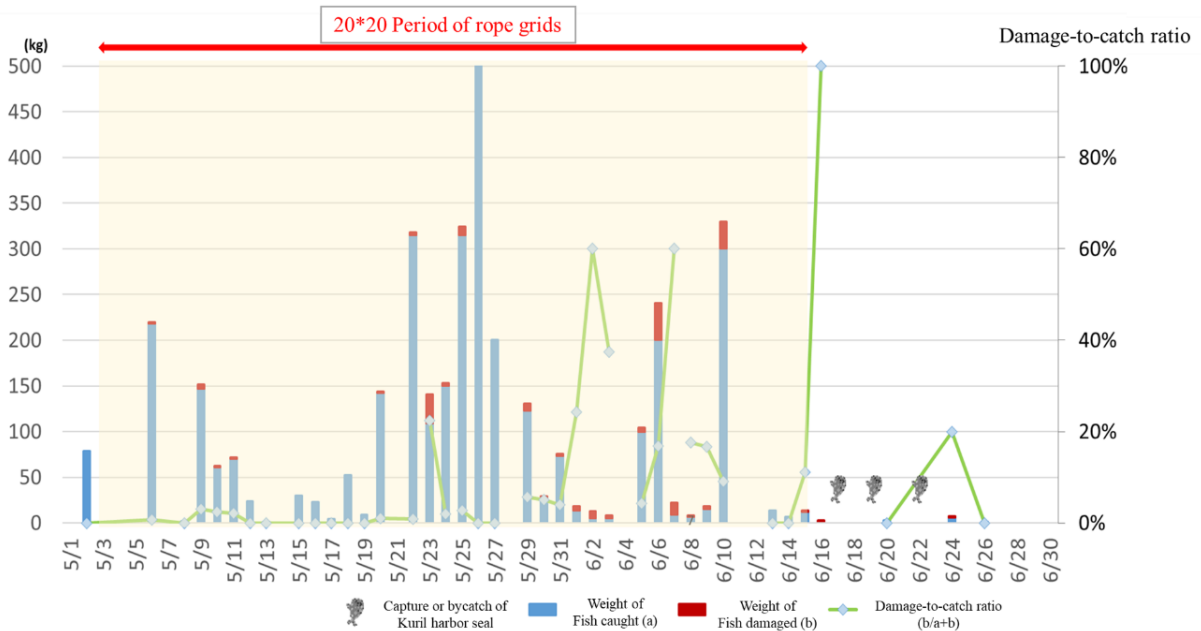


Fig. 4. Total catch size and damage-to-catch ratio of Salmon and Trout (Toyo sector seaward side)

② Autumn fishing season (Cape Erimo sector, Shoya sector)

A rope grid (Dyneema, white) was attached to four salmon set net in the Cape Erimo and Shoya sectors. The dimensions of the rope grid slits and the installation period were tailored to each fishing area. Due to the damage, three of the four rope grids were repeatedly attached and removed. This report focuses on one salmon set net in the Cape Erimo sector, where the rope grid was continuously attached throughout the fishing season.

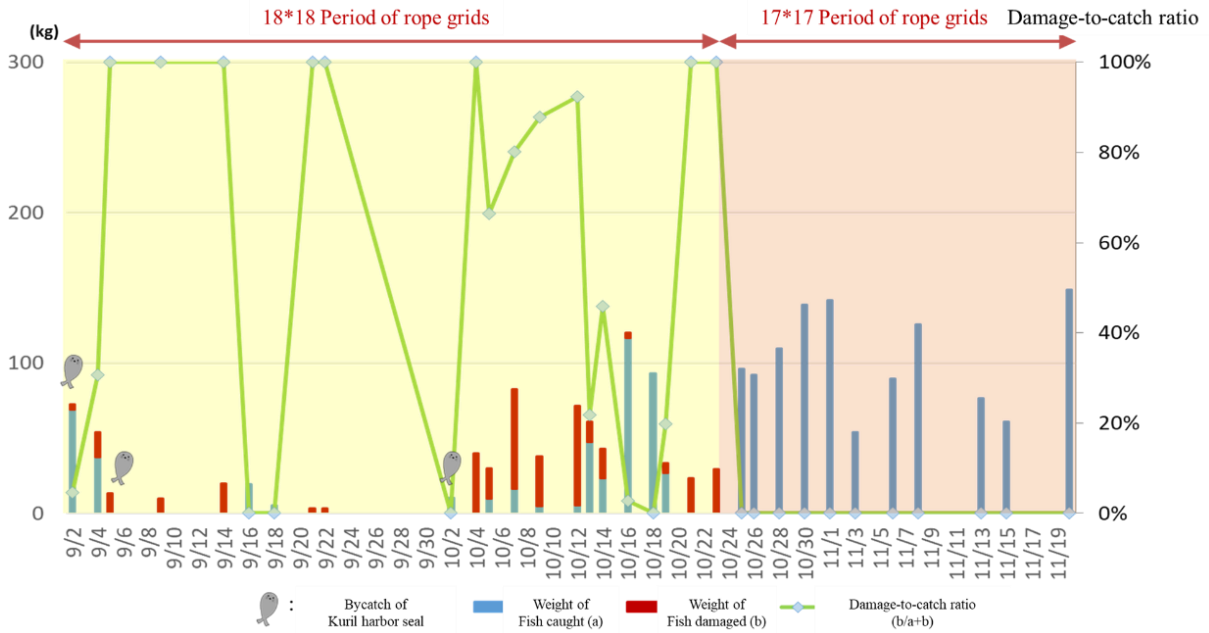


Fig. 5. Total catch size and damage-to-catch ratio of Salmon and Trout (Cape Erimo sector, net: southern land side)

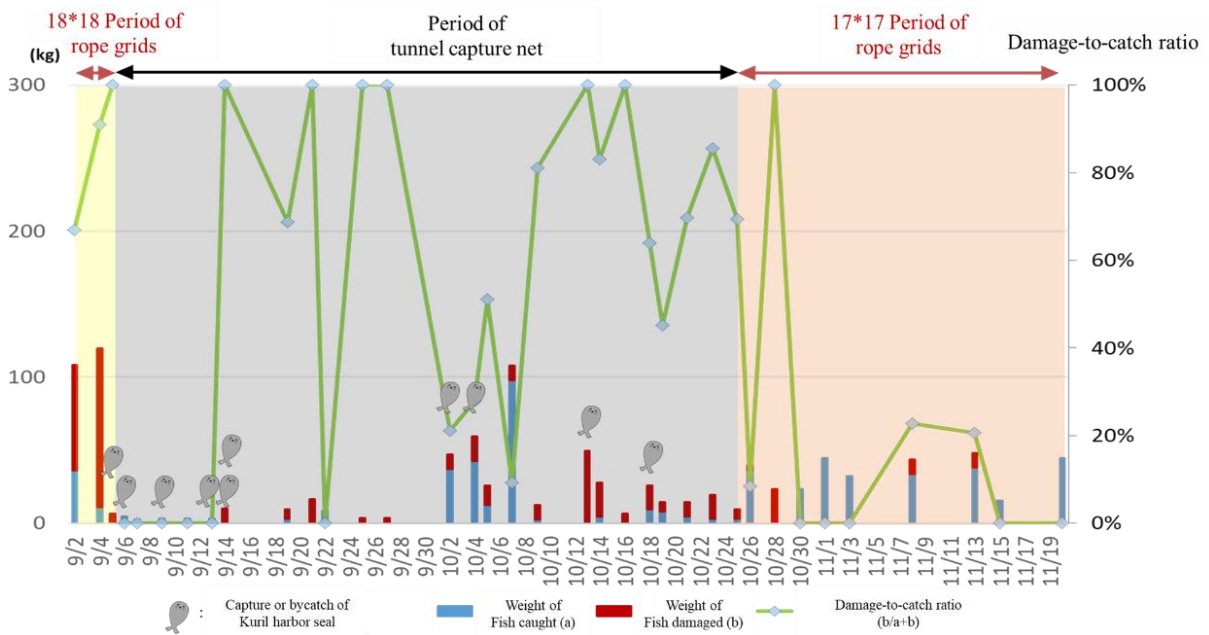


Fig. 6. Total catch size and damage-to-catch ratio of Salmon and Trout (Cape Erimo sector, net: northern land side)

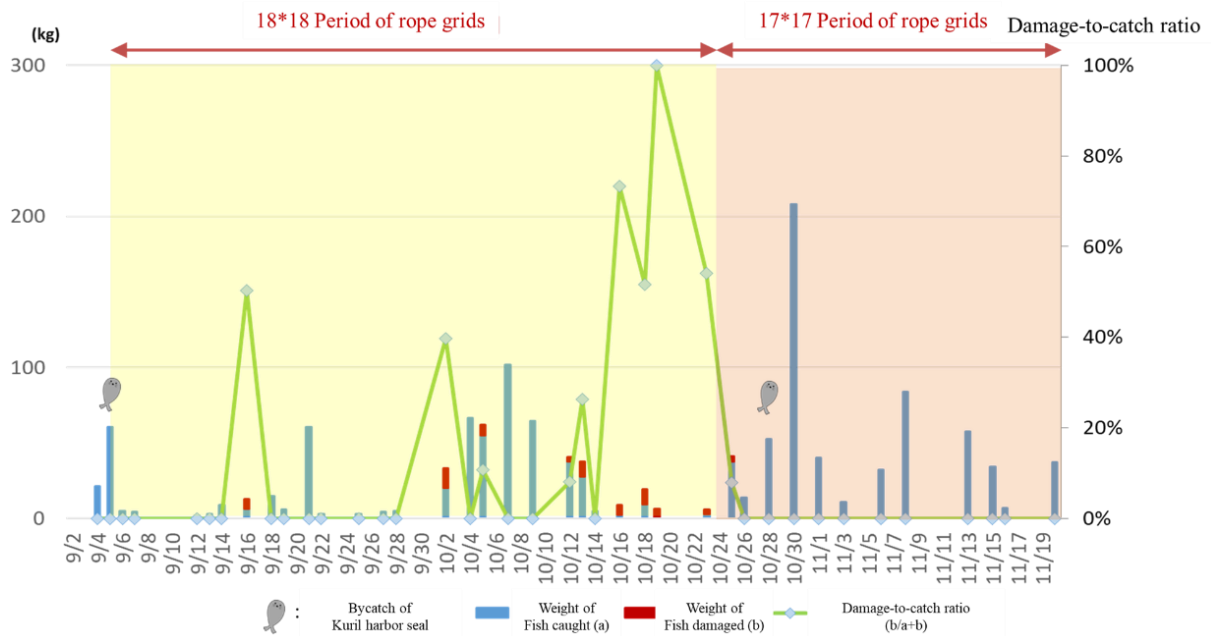


Fig. 7. Total catch size and damage-to-catch ratio of Salmon and Trout (Cape Erimo sector, net: southern seaward side)

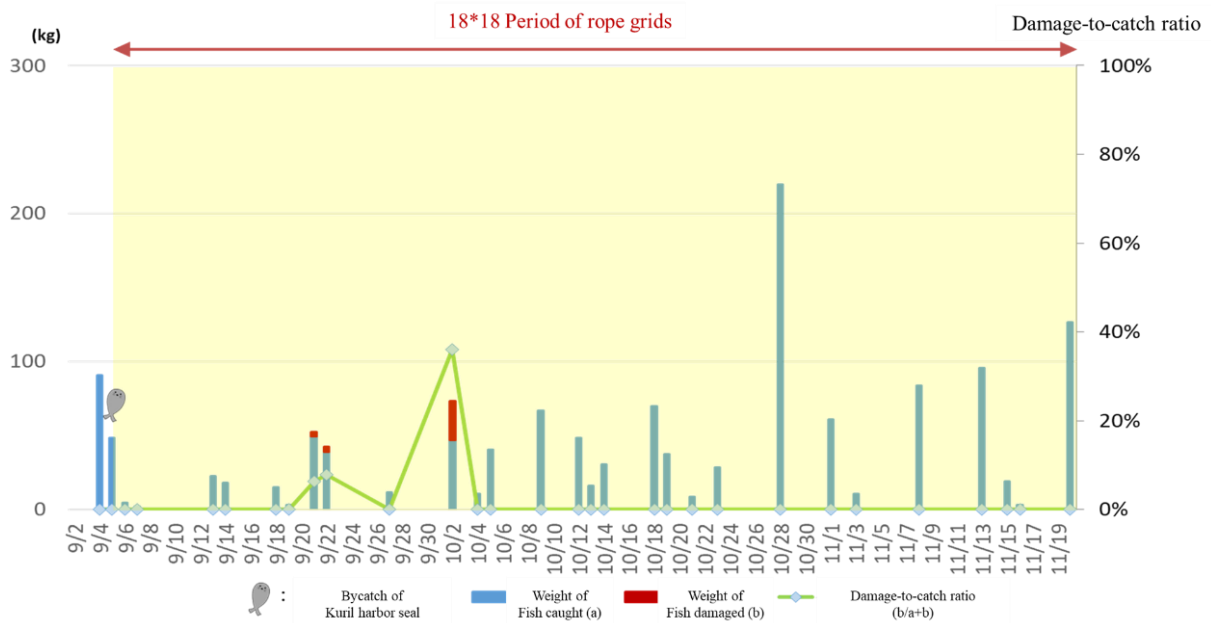


Fig. 8. Total catch size and damage-to-catch ratio of Salmon and Trout (Cape Erimo sector, net: northern seaward side)

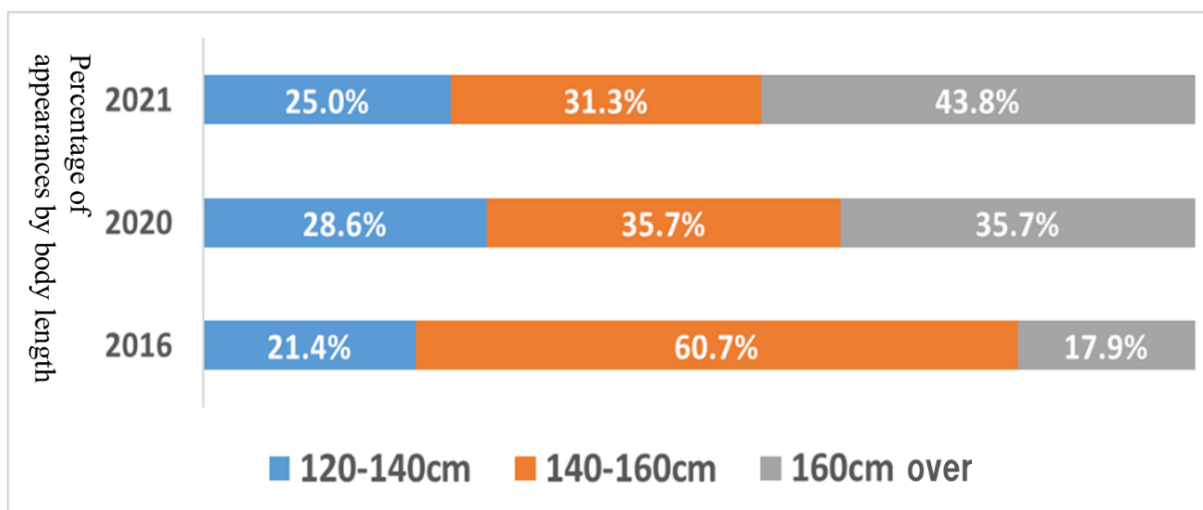
(2) Assessment of damage control measures

- The rope grid effectively prevents seals from entering and is considered effective in reducing fishing damage. Additionally, it provides peace of mind by ensuring that seals will not enter the nets.
- In trap net fishing, which relies on fish behaviors, there is concern that fish may avoid the rope grid and turn back. Rope grids are not intended for permanent use; rather, they should be used flexibly, allowing fishermen to attach and remove them as needed.
- Recently, damage to fishing nets caused by seals had been noticeable. However, during the fall fishing season in 2023, there was almost no damage. This may be due to the seals either not entering the bag nets or learning to escape without breaking through. These results are likely attributed to the repair of weak points in the fishing nets through partial replacements since 2021. Additionally, sunfish and seaweed were found to block the rope grids, preventing both seals and fish from entering. This blockage required time-consuming removal efforts. To improve efficiency, a zipper was added to the rope grid, replacing the previously hand-sewn attachment, thereby making it easier to attach and remove.

(ref.) Analysis of seal behavior using underwater cameras in No.9 salmon set net



- • There is a possibility that the number of appearances has decreased due to capture.
- It is possible that the seals learned that entry to salmon set net was not possible due to the grid net being attached.



- • Small individuals (120-140 cm) make up about 20-30% of the total.
- The appearance of medium-sized individuals decreases, and the large individuals increases.

※The number of individual seals that repeatedly visit the same fishing grounds is decreasing. However, the number of individuals visiting for the first time is increasing.

2. Population Management

The Ministry of the Environment captured seals using salmon set nets, gillnets, as part of population management efforts aimed at mitigating damage to the fishing industry and maintaining a sustainable Kuril harbor seal population. Efforts were made to capture seals alive whenever possible. Research data necessary for developing future measures was collected. Two of the captured seals with EM transmitter tags to monitor their behavioral zones before being released. Other captured seals were euthanized by a veterinarian.

(1) Capture using salmon set nets

① Spring fishing season (Toyo sector)

The effectiveness of rope grids was verified in one set net in the Toyo sector (West side of Cape Erimo), To capture Kuril harbor seals, capture nets were installed for a total of 27 days between May 16th and June 15th, and pocket nets were installed for a total of 7 days between June 9th and June 15th.

The capture net, which had undergone three improvements since last year (I to III below), successfully captured a seal the next day after it was installed, indicating positive results. Although, underwater cameras revealed other seals were entering and exiting the net, waiting for the current to open the funnel before escaping. Continued improvements to prevent the seals from escaping, such as adjusting the method of fixing the weights attached to the funnel, resulted in the capture of 14 seals.

<Improvements to the capture net>

- I The funnel length was changed from 150cm to 210cm to more attract seals.
- II To prevent the funnel's exit from opening in the sea, the suspension was changed from one point to two points.
- III Changed the shape of the funnel to a cylinder with the same width from entrance to exit.

(2022 : the opening is narrowed from the entrance to the exit, 2023 : not narrowed)

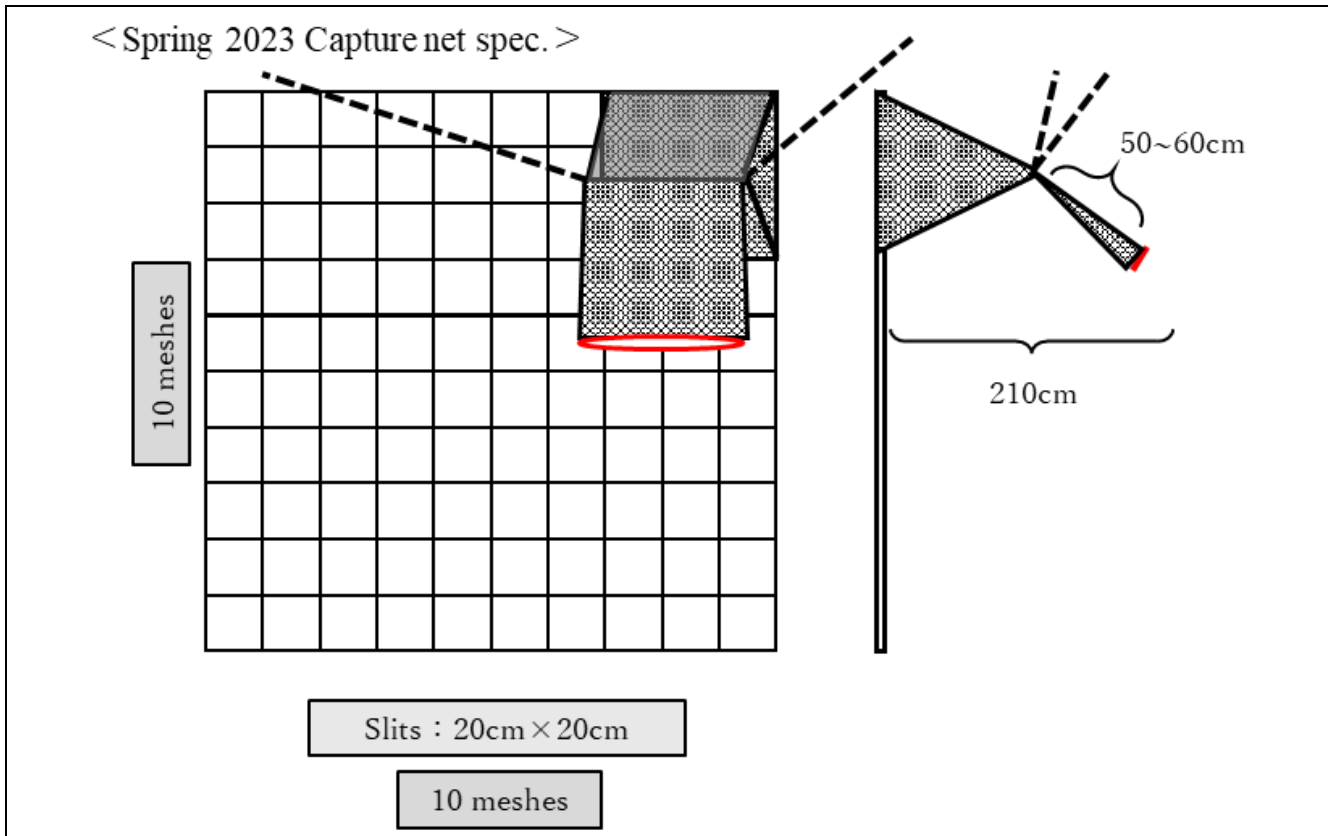
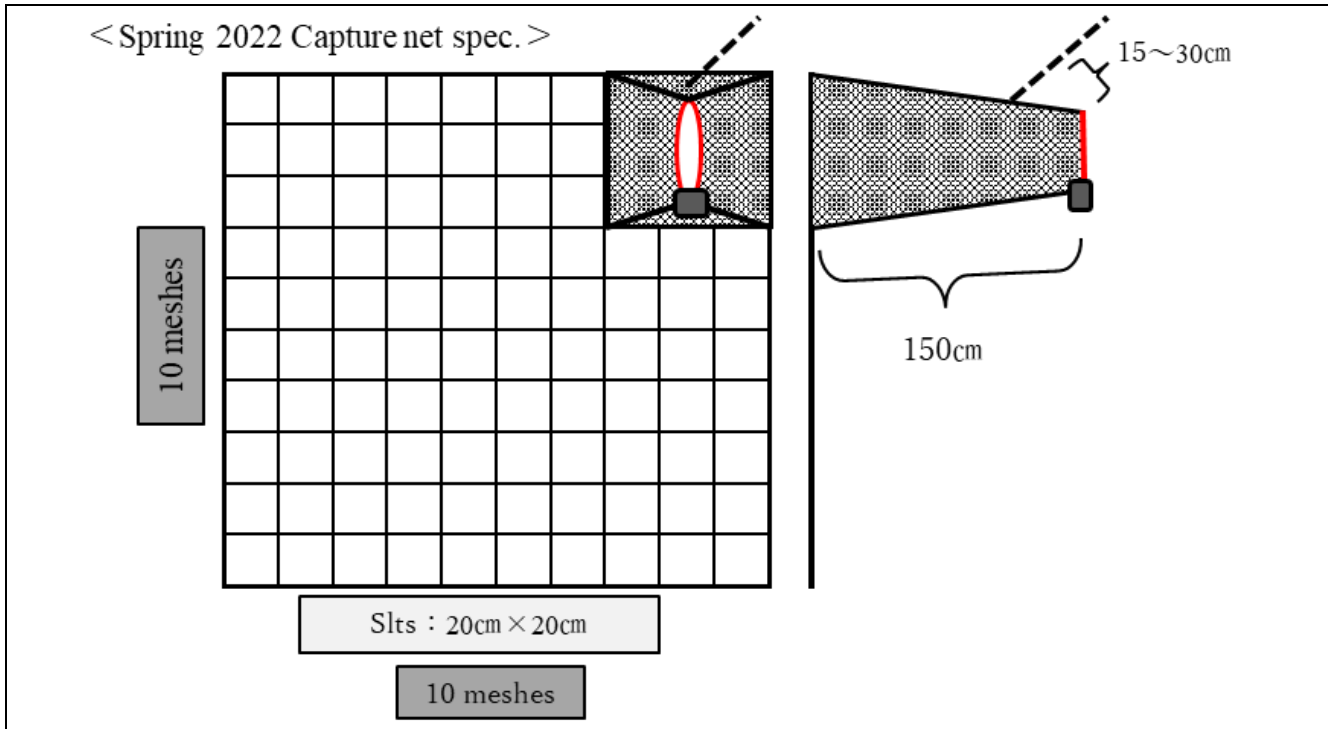


Fig. 9. Shape of the capture net

The pocket nets were set in the same position as in 2022, taking into consideration the current and the ease of haul up for fishermen. The pocket net itself was fixed with ropes to prevent it from twisting, and floats were attached to allow the seals caught in the net to breathe. Attaching the pocket net took several days due to weather and sea conditions. After the pocket nets were attached, damage decreased, and no seals approached the salmon set nets. The pocket net was only used for a short time because it became difficult to haul up the net when it got tangled in jellyfish or seaweed. As a result, no seals were caught in the pocket nets.

| | 2021 | 2022 | 2023 |
|---------------|--------------------------|-------------|-------------|
| Slts | 121mm | 60mm | 60mm |
| Sewing method | Special node (unknotted) | Russell | Russell |
| Length | 300cm | 300cm | 300cm |
| Entrance | 60cm × 60cm | 60cm × 60cm | 60cm × 60cm |
| Exit | 20cm × 20cm | 20cm × 20cm | 30cm × 30cm |

【For 2024】

- The method of tension should be devised so that the net itself does not twist.
- Attach floats and Improve the tube wider so that seals in pocket nets do not have difficulty breathing.

Rope for fixing the bag net

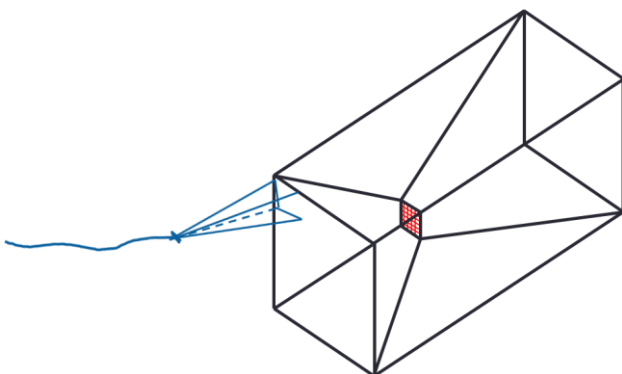
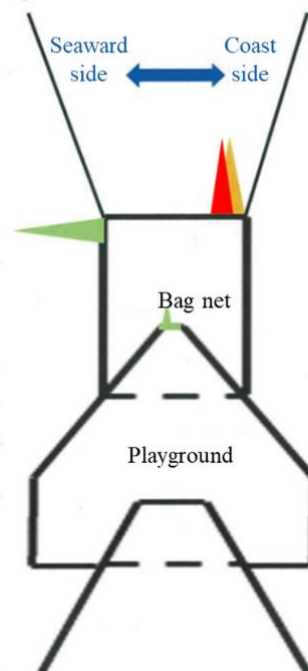


Fig. 10. Pocket net structure and installation period

② Autumn fishing season (Cape Erimo sector)

Captures were conducted in three salmon set nets in the Cape Erimo sector. At the start of the fishing season, capture was planned to be conducted in one salmon set net (set net A, conducted every year) in the Cape Erimo sector. However, the number of seals caught was low as of mid-September, and it was predicted that this year's goal would not be reached: set net B - 2021: 5 seals, 2022: 28 seals, Set net C - 2021: 16 seals, 2022: 26 seals.

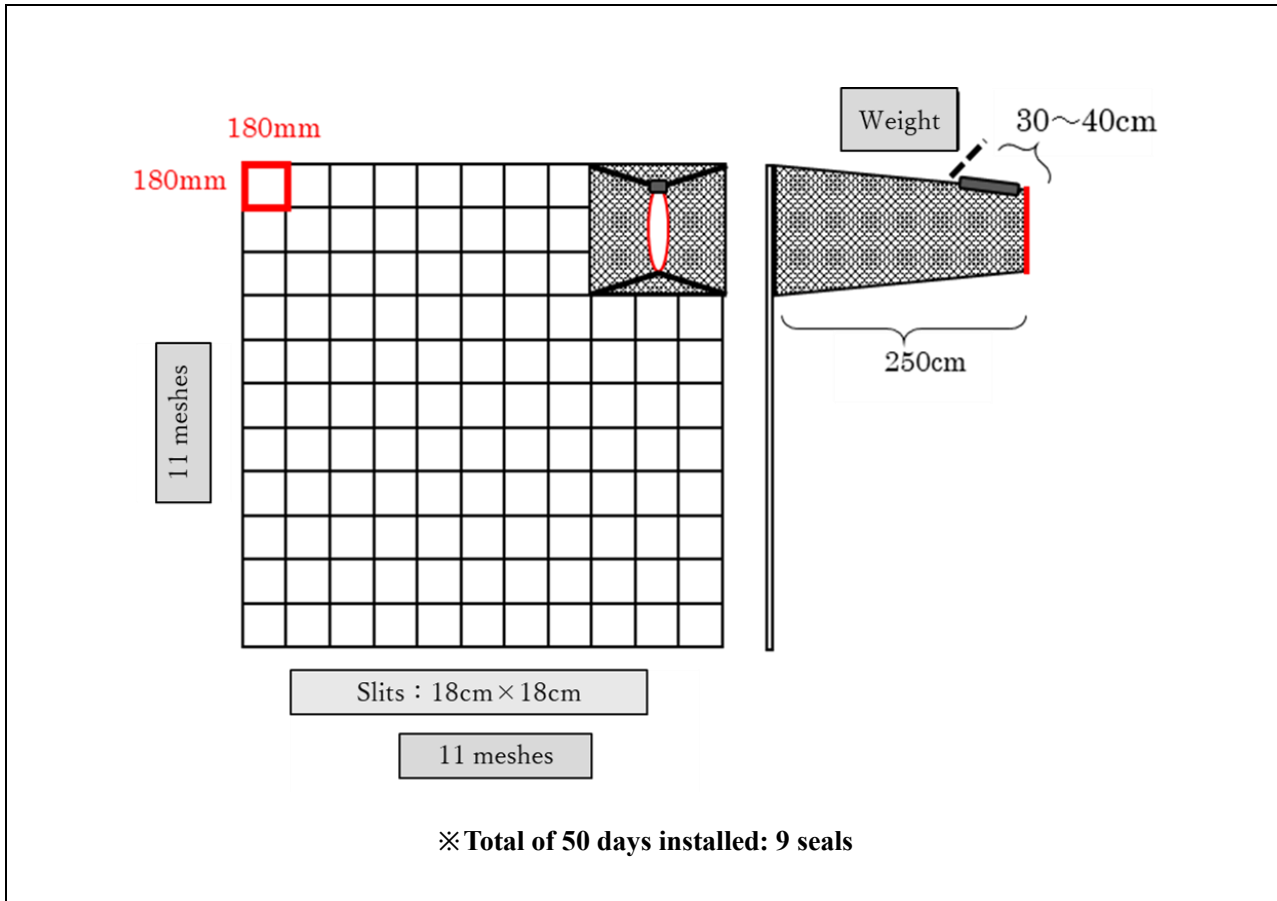


Fig. 11. The capture net used in salmon set net A
(entrance to funnel: 3 vertical holes × 3 horizontal holes)
Adjust the hanging point of the funnel so that the funnel exits bends in the sea.

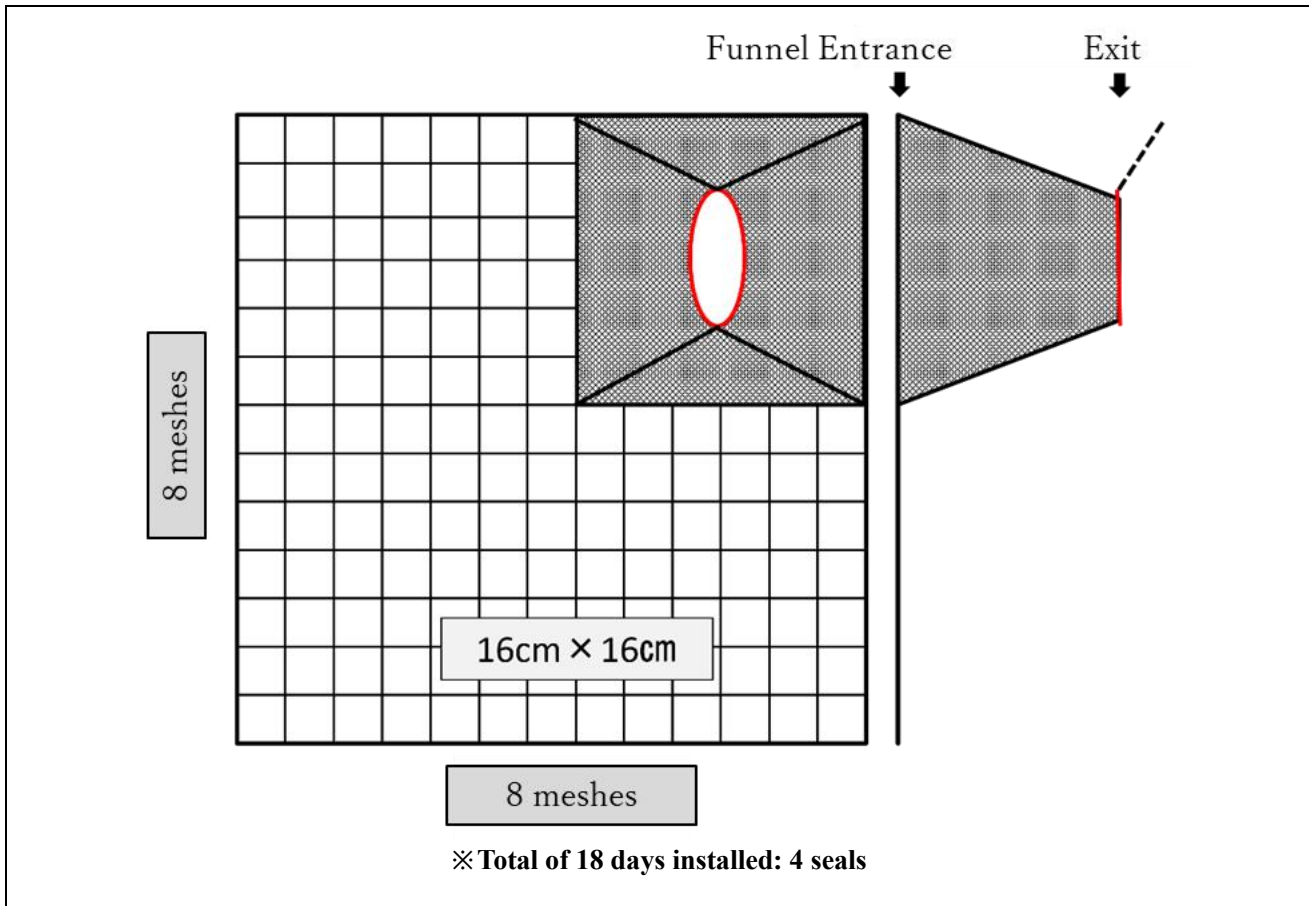


Fig. 11. The capture net used in salmon set net B
(entrance to funnel: 5 vertical holes × 5 horizontal holes)

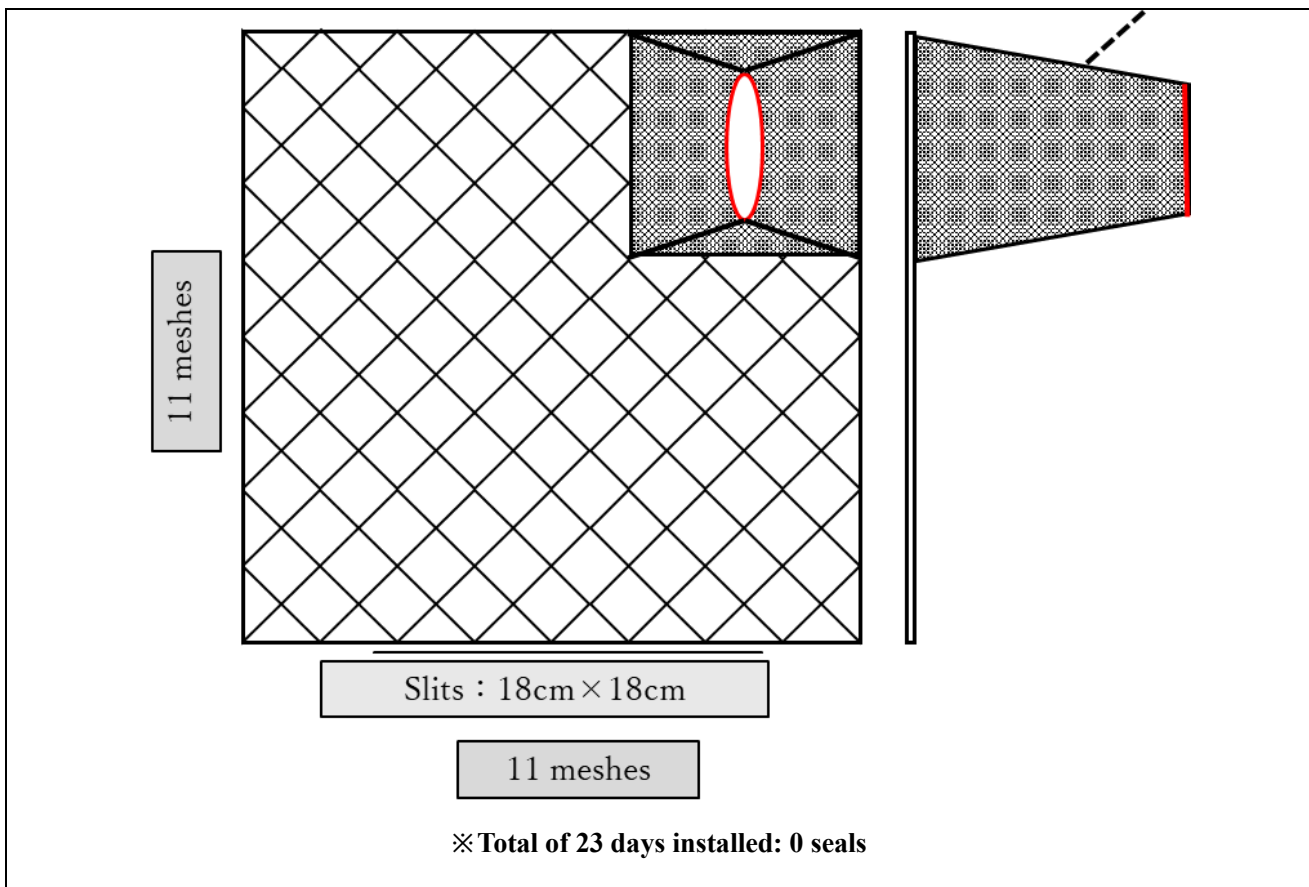


Fig. 13. The capture net used in salmon set net C
(entrance to funnel: 5 vertical holes × 5 horizontal holes)

(2) Capture results

A total of 43 seals were captured, 27 in salmon set nets and 16 in gill nets. Targeting harvest number 55 seals in 2023 minus 43 seals actually captured, for a total of 12 seals, will be carried over to capture in 2024.

➤ Capture of salmon set nets

| | Number | Age composition and sex |
|--------|---------------------------|---|
| Spring | 14 (Male:4, Female:10) | Pup: Male0 Female0 Subadult: Male1 Female2 Adult: Male3 Female8 |
| Autumn | 13 (Male:4, Female:9) | Pup: Male1 Female6 Subadult: Male2 Female3 Adult: Male1 Female0 |
| Total | 27 (Male:8, Female:19) | Pup: Male1 Female6 Subadult: Male3 Female5 Adult: Male4 Female8 |

➤ Capture of gill nets

Capture was carried out twice, on June 15th and 19th, near the Cape Erimo reef.

| Date | Number | Age composition and sex |
|-------|-------------------------|---|
| 6/15 | 11 (Male6, Female5) | Pup: Male4 Female5 Subadult: Male2 Female0 |
| 6/19 | 5 (Male4, Female1) | Pup: Male4 Female1 |
| Total | 16 (Male10, Female6) | Pup: Male8 Female6 Subadult: Male2 Female0 |

(3) Bycatch results

This year, 69 seals were recovered as bycatch.

| Date | Number | Age composition and sex |
|--------|--------------------------|--|
| Spring | 7 (Male2, Female5) | Pup: Male2 Female3 Subadult: Male0 Female0 Adult: Male0 Female0 |
| Autumn | 62 (Male22, Female40) | Pup: Male15 Female33 Subadult: Male7 Female7 Adult: Male0 Female0 |
| Total | 69 (Male24, Female45) | Pup : Male17 Female36 Subadult: Male7 Female9 Adult: Male0 Female0 |

(4) Assessment of population management

The result of the capture was 43 seals, which is falling short of the guideline for the number of seals to be captured of 55.

In the spring, females approached the salmon set nets after giving birth, and the capture proceeded as expected. Although, due to bad weather, the installation of the pocket net was delayed, resulting in no seals being caught. Despite this, the pocket net itself has been able to capture several adults since 2021. As a result, the pocket nets have been well received by fishermen, and they will continue to be used in the future, choosing the best time to install them.

Due to poor catches in the autumn fishing season, the number of fishing days was reduced, and no seals were seen

approaching the salmon set nets. In addition, seals were rarely seen on the underwater camera, so it was not possible to determine what improvements should be made to the capture nets.

The reason for the small number of captured seals is that pups are caught as bycatch before learning the structure of the salmon set net, whereas subadults and adults are able to learn the structure of the salmon set net thoroughly. Some seals maintained a certain distance in front of the capture nets. This behavior indicated that the seals understood that they would be in danger if they went any further. Another possible reason is that poor catches resulted in seals approaching the salmon set nets less frequently, where there is little food.

There were many bycatches in the Shono sector, which was not the case last year. As a result, it is possible that the movements of the seals are changing or that there are good feeding grounds.

3. Monitoring

(1) Population size and structure

- Largest number monitoring

The population survey using a drone (UAV) involved taking still images for ortho mosaics and video recording that could be conducted quickly when bad weather was forecast. The largest haul-out population of Kuril harbor seals on reefs is shown in Fig. 14.

【Visual observation data】

<1983~2010>

Survey report of one week during molting season (Kobayashi et al. 2014)

<1983~2023>

Results of Kuril Harbour Seal Research Group, Obihiro University of Agriculture and Veterinary Medicine (unpublished data)

<2011~2019>

Results of Tokyo University of Agriculture Long-Term Census – July through November (Kobayashi, unpublished data)

【UAV data】

<2017~2023>

Census results centered on low tide time (Ministry of the Environment)

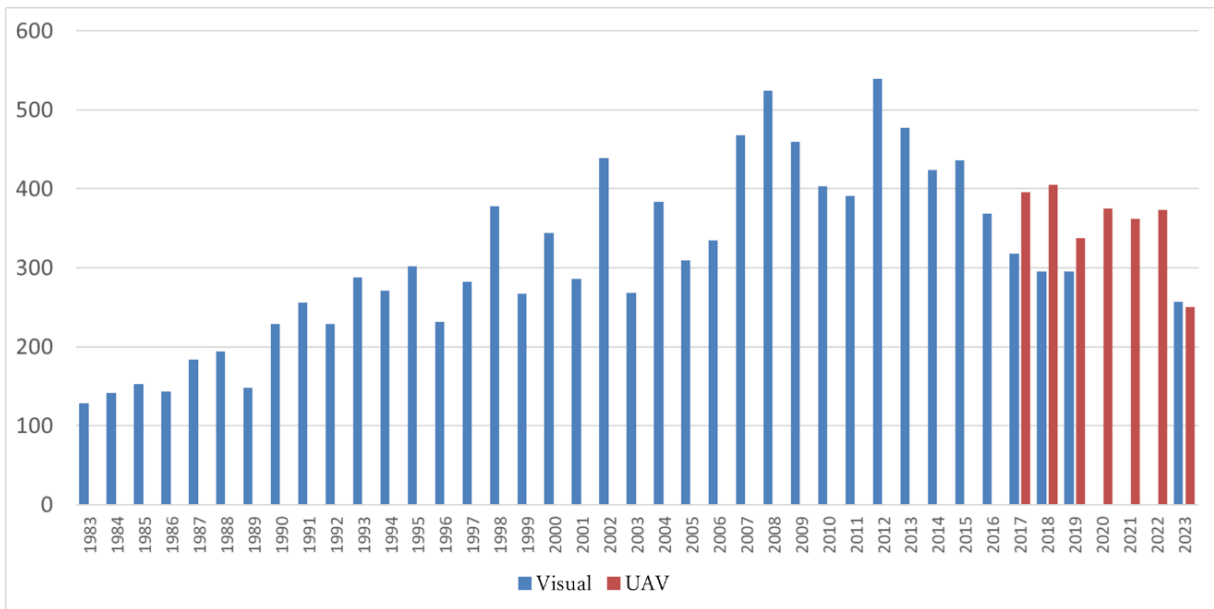


Fig. 14. Largest number of Kuril harbor seals ashore on reefs at Cape Erimo

※The largest number of Kuril harbor seals ashore on reefs, it seems that it has been on a downward trend since 2012. However, the results of wildlife census vary greatly from year to year, and it is necessary to consider changes in survey frequency and accuracy (Survey subject is not constant), landing frequency and detection rate due to capture (Implemented from 2016). Therefore, it is considered that the increase and decrease in the maximum landing population and the increase and decrease in the number of individuals in this graph do not always match.

※UAV's have the advantage of being able to find hard-to-see individuals hidden in reefs, but they also have the disadvantage of not being able to fly in bad weather, such as under strong winds or in the rain. At Cape Erimo, drones are often unable to fly due to bad weather, so monitoring will continue to be carried out both visually and using drones.

(2) Home range survey

This year, the plan was to release two seals that were reserved during the autumn fishing season, each over one year old and weighing over 70 kg, attached with satellite transmitters. However, they were unable to obtain any seals at age class suitable for release, and so the home range analysis was not possible.

(3) Development and verification of automated haul out counting system

The number of haul out Kuril harbor seals can be automatically detected with over 90% accuracy by using drone images taken under favorable conditions. The system is currently in the stage where the automated detection results will be manually reviewed and corrected. These will undergo trial operation and fine-tuning in 2024 and implement from 2025.

4. Survey of the Damage Done to the Fishing Industry

(1) Survey of damage done to the fishing industry of trap net in autumn

An understanding of the damage done to the fishing industry was gained through the analysis of questionnaires completed by autumn salmon trap net fishermen in the Erimo area (representing a total of 21 nets) which recorded the number of fish damaged on each fishing day. The most recent rate of damage was 1.9% in 2021 and 2.4% in 2022 (Fig15).

Of the total catch in the Erimo area, salmon catches have been declining trend since 2018 (2,752.7 t), with the catch in 2023 being the lowest ever (130.9 t) (Table 2). Along with the significant decrease in catches, the number of damaged fish continues to decrease.

Table 2. Number of fish caught (t) in the Erimo area autumn salmon set net fishery

| | Total | Salmon | Yellowtail | Other |
|-------|---------|---------|------------|-------|
| 2023年 | 880.9 | 130.9 | 500.1 | 249.9 |
| 2022年 | 952.1 | 478.8 | 387.9 | 85.4 |
| 2021年 | 2,189.9 | 713.1 | 890.7 | 586.1 |
| 2020年 | 2,504.8 | 1,228.6 | 993.3 | 282.9 |
| 2019年 | 1,714.6 | 1,469.0 | 222.5 | 23.1 |
| 2018年 | 2,879.1 | 2,752.7 | 72.6 | 53.9 |
| 2017年 | 1,070.2 | 972.3 | 72.7 | 25.2 |

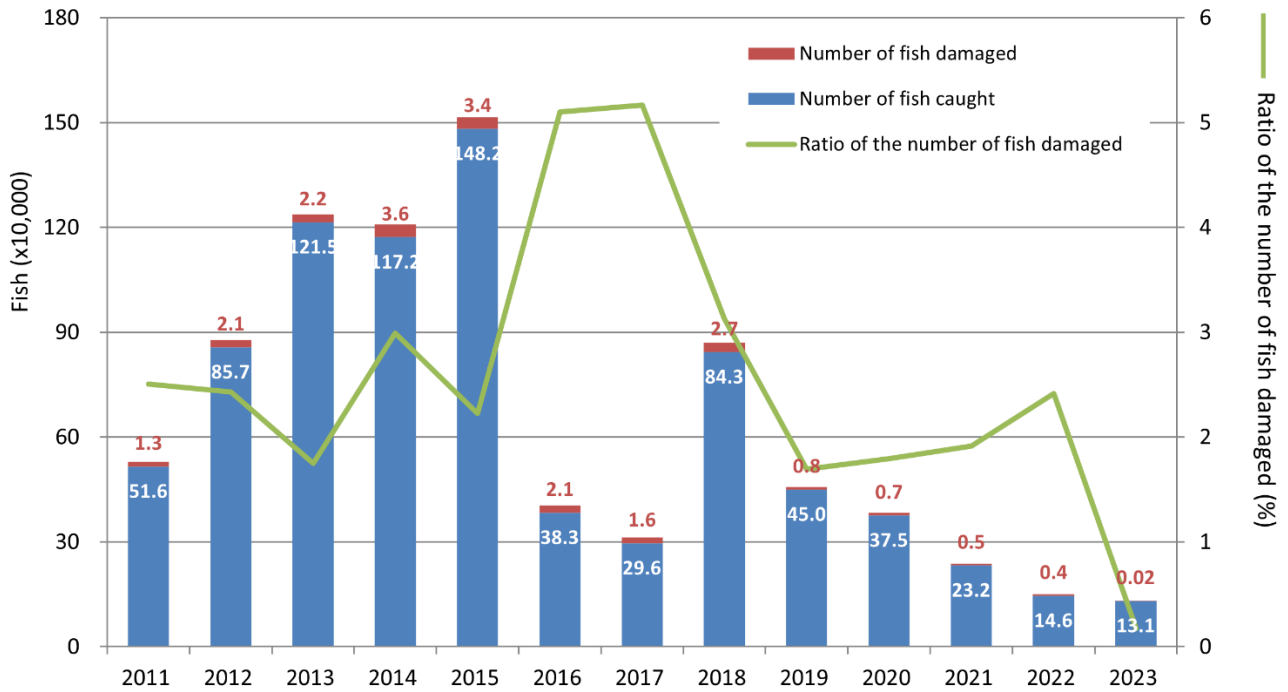


Fig. 15. Changes in damage done to the fishing industry of trap net in autumn across the Erimo area.

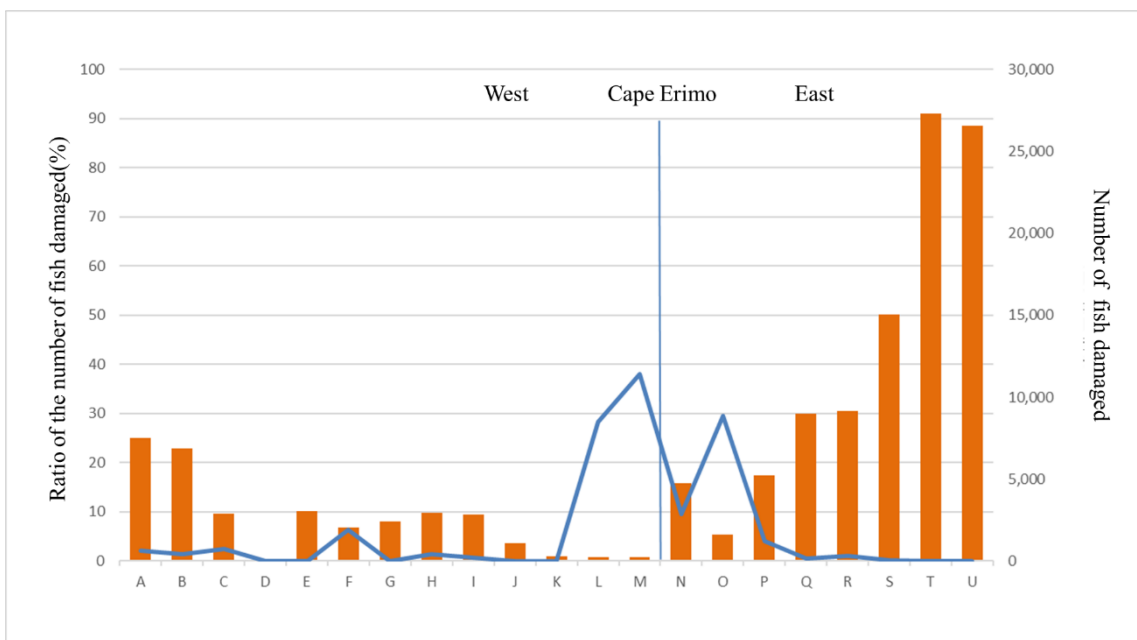


Fig16. Changes in damage to salmon in autumn salmon set net fisheries (by set net)

(2) Assessment of the damage done to the fishing industry

Regarding the catch, the record poor catch that has continued since 2016. The percentage of affected fish has increased since 2020. However, existing studies suggest a negative correlation between catch and the percentage of affected fish. Further studies on the damage should be continued and a long-term assessment should be made.

5. Public Awareness

(1) Communicating information both inside and outside the Erimo area, and public awareness

- The Ministry of the Environment attempted to use the fat from dissected seals as food for the polar bears at Maruyama Zoo. When the young male was given seal meat and fat on his forelimbs, he ate but reacted to the stimuli by sneezing or shaking his head. The older female polar bear ran away as soon as she smelled the oil. According to the animal care staff, it may be necessary to trim off the fat and feed only the meat to help the bears get used to it. They will continue to explore how to use the seal fat and meat from next year onwards.
- We traveled to Erimo Elementary School to give classes, explaining the ecology of the Kuril harbor seal and its relationship to the fishing industry. However, there was no response to the request for fiscal year 2023. Since there are specific seasons suitable for observing seals, we will provide information on these as well in the future.

(2) Transferring seals to aquariums and zoos

To make effective use of individuals captured in living organisms and to disseminate information about this project, we will respond to requests for transfer to zoos and aquariums. In 2023, we provided information to facilities planning to introduce new individuals, and also notified other facilities about transfers.

Table 3. Kuril harbor seals transferred to date

| | Institution | Number of individuals transferred |
|---------------------------|---|--|
| 2016 | Noboribetsu Marine Park Nixe (Noboribetsu City, Hokkaido) | 1 (1 female juvenile) |
| | New Yashima Aquarium (Takamatsu City, Kagawa) | 4 (3 female juveniles and 1 male juvenile) |
| | Ueno Zoological Gardens (Taito City, Tokyo) | 1 (1 female juvenile) |
| | Kamogawa Seaworld (Kamogawa City, Chiba) | 1 (1 male juvenile) |
| | Yokohama Hakkeijima Sea Paradise (Yokohama City, Kanagawa) | 3 (3 female juveniles) |
| 2017 | Yokohama Hakkeijima Sea Paradise (Yokohama City, Kanagawa) | 2 (1 female juvenile and 1 male juvenile) |
| Total transferred to date | | 12 (9 female and 3 male juveniles) |

*Additionally, a weakened individual (1 male juvenile) that washed ashore in Erimo Town in 2016 was transferred to Ouchiya Zoo (Taiki Town, Mie Prefecture) in November 2017.

(3) Assessment of public awareness

- Regarding the use of the animals after dissection, we verified their feasibility as food for polar bears will continue to accumulate results and explore better ways to utilize them.
- It is expected to take some time to reserve the seals and transfer them. It is essential to determine in advance how many seals can be kept at Erimo and for how long, and to resolve any issues with the receiving side's storage space and structure. Therefore, while continuing to disseminate information in preparation for the transfer, we will confirm the response procedures and aim to realize the transfer within a few years.

FY 2024 Project Implementation Plan

1 . Damage Prevention Measures

Based on results of the various damage prevention measures implemented to date, the following initiatives will be undertaken to establish new and improved methods for mitigating damage to the fishing industry.

Furthermore, these methods will be implemented in collaboration with researchers and other related parties, and with adequate consideration of opinions from local fishermen; in addition to presenting the results of experimentation to the community at reporting and conference meetings, etc., advice and suggestions will be gathered for more effective damage prevention efforts, etc., and these will be reflected in the Implementation Plan for the following fiscal year.

(1) Improvement of fishing nets

- Promote further improvement of trap nets through methods (e.g., installation of rope grids, pocket nets) that are expected to reduce fishery damage and improve capture efficiency. Regarding improvements to nets, During the salmon trap net fishing seasons in spring and autumn, the effectiveness of these damage-preventing trap nets will be verified, particularly in areas of severe damage in the Cape Erimo area.

(2) Gathering information on damage management

- We will gather additional examples of measures to prevent fishery damage caused by marine mammals, including methods such as chasing away, learning seals, and repellent devices. This will help in developing comprehensive strategies to mitigate fishery damage.

2 . Population Management

The following initiatives will be implemented in order to perform population management aimed at both mitigating damage to the fishing industry and maintaining a sustainable Kuril harbor seal population level.

- (1) Because damage prevention alone is not enough to prevent increases in the scope of damage, Kuril harbor seals will be captured in cooperation with members of the fishing industry, with the aim of mitigating damage to the fishing industry (preventing increases in the scope of the damage, reducing the severe damage to salmon trap nets, etc.), while also preserving the sustainability of the seal population. Furthermore, research has clarified that juvenile seals, which are susceptible to bycatch, but particular sub-adults and adults cause damage to salmon trap nets, the following methods will be employed toward establishing techniques to capture subadult and adult individuals preferentially.

- In salmon trap nets where damage is particularly severe, seals will be captured using trap nets which may be capable of preferentially capturing individuals that come into or near to the trap nets.
- Depending on the population management situation, individuals in the Cape Erimo area will be captured, as a supplementary measure, using gillnets (nets will be raised immediately after any Kuril harbor seal is caught) primarily.
- In order to be able to preferentially capture damage-causing individuals, methods for distinguishing individuals that persistently attack salmon trap nets will be considered.

- More effective yet still feasible capture methods will be considered through exchanging ideas with members of the fishing industry, other experts, and so on.
- In recent years, when installing fishing nets with capture nets and damage preventing nets, direct damage to the fishing nets by Kuril harbor seals has begun to be seen, and in response to this, fishing nets aimed at reducing damage when installing capture nets.

(2) The number of individuals to be captured will be determined based on the following considerations.

<Current habitat situation>

In recent years, the largest number of Kuril harbor seals hauling out at a single time in the Erimo area has increased from 400 individuals to approximately 600 individuals. The estimated population size, taken from the largest number of individuals haul out at a single time corrected using the haul out ratio and discovery rate, is approximately 800 individuals. From the 1,000 individuals at the start of the plan (as of 2015), we have now nearly achieved 80% of guidelines for the number of seals. Further, the average population growth rate over the past 30 years has been 5% (Matsuda et al. 2015).

- Examination will be conducted based on the number of individuals captured over the course of eight years from 2016 to 2023 and the number of individuals to be captured will be determined based on the findings.
- The following will be considered when determining the number of individuals to be captured: mitigating damage to the fishing industry, while also guaranteeing population sustainability so that the Kuril harbor seal does not once again become threatened and keeping the probability of extinction within 100 years to under 10%, all with continuing management beyond 2024 as a necessary condition.
- Kuril harbor seal population is highly occlusive at Erimo, and that there are a number of uncertain elements in the estimates of population size, population structure and ecology, it is necessary to sufficiently account for the safe sustainability of the population.
- The number of individuals to be captured must be adjusted flexibly in consideration of the number of bycaught individuals and imbalances in sex and age among captured individuals (for example, in cases when a high number of adult females, who strongly influence population trends, have been captured, or in cases when the number of juvenile bycatch deaths has decreased).

<Determining the number of individuals to be captured>

- In the current resource management simulation, which takes the number of bycaught individuals, infectious disease outbreaks and the like into account, the probability of extinction within the next 100 years is nearly 0% if the population in 2024—when Phase II of the Management Plan ends—is managed at a level that is 80% of the population at the time the Management Plan was established (March 2016), and if this level is maintained from 2024 onward (Kitakado 2019). Therefore, the Ministry of the Environment has determined, through an estimation of population dynamics taking the population growth rate and other factors into account, that 50 seals are to be captured annually during Phase II of the Management Plan. In the event that the number of individuals captured in a single year is too low or too high, we will listen to the opinions of the Scientific Committee and adjustments will be made in the number of individuals to be captured in the following year.
- Approximately 62 seals (excluding released and bycaught individuals) are to be captured in 2024. This number was calculated by adding to the annual 50 seals a shortfall of 12 from the 55 which had been estimated for 2023.
- When the number of catches reaches, which is a guideline, individuals attached to the salmon trap net are

confirmed, and if there is concern about fishery damage, the salmon trap net will continue to be caught from the viewpoint of reducing fishery damage. However, the maximum number of individuals is 20% of the total number of catches.

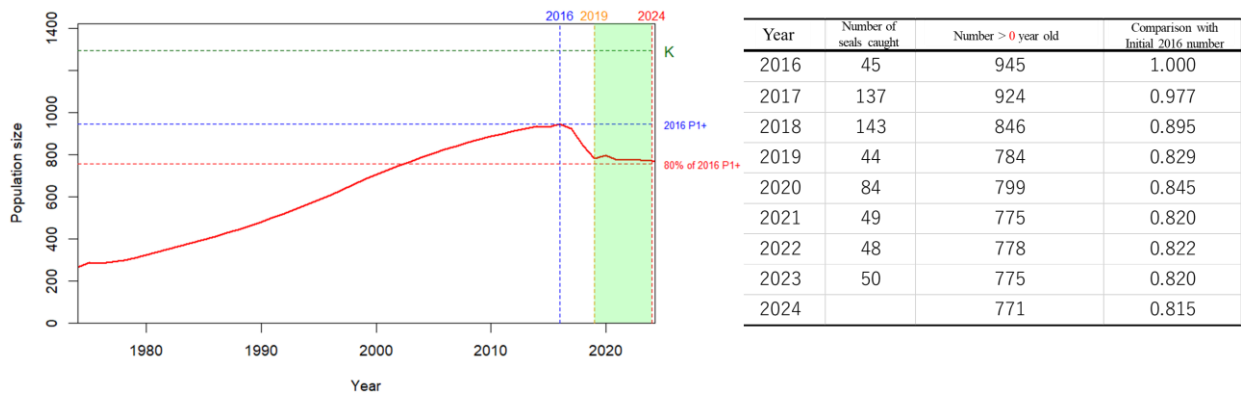


Fig. 17. Results of the reassessment of the number of individuals caught

*Population dynamics were predicted when 50 individuals were captured over the next year, taking into account the 2022 capture record.

<Adjustments and changes to the number of individuals to be captured, etc., and procedures for determining the number in future years>

- The number of individuals to be captured in 2025 and beyond will be set based on "Erimo Area Kuril Harbor Seal Specified Rare Wildlife Management Plan (Phase III)," which is currently under consideration.
 - The maximum number of individuals to be captured each year will be reexamined after hearing the opinion of the Science Committee.
 - From a viewpoint of adaptive management, the information necessary for reexamining the plan will be gathered, a sustainability assessment will be performed, and a new Implementation Plan with the number of individuals to be captured will be established every year.
- (3) The following other considerations will be made regarding population management.
- In the event that sudden changes in population conditions due to an unforeseen circumstance, such as an epidemic outbreak, are discovered in the population, the number of individuals to be captured may be flexibly reassessed even during a year in which capture is being conducted.
 - To the fullest extent possible, the Ministry of the Environment will effectively put captured individuals to practical use, including use for research in order to gather data which will facilitate appropriate population management, and strategically raising individuals and transferring them to zoos and aquariums for educational and other purposes. Moreover, in cases when captured individuals are to be euthanized, a method will be employed which limits their suffering to the greatest extent possible.

3. Monitoring

Surveys covering the following items will be conducted in order to appropriately manage the Kuril harbor seals by verifying project implementation effectiveness and reflecting feedback about the population's situation into the Management Plan. Moreover, as a part of adaptive management, survey items may be added as necessity dictates.

Further, in order to examine project assessment and future management plans, the Ministry of the Environment will examine necessary surveys and assessment methods, through a monitoring working group, etc.

(1) Population size and structure

- Accurate haul-out numbers will be surveyed by performing counts of the number of individuals hauling out using visual observation from on land and images captured by drone or other unmanned aerial vehicles (UAVs). The detection rate will be calculated from the counts obtained by UAV and visual observation, and attempts will be made to improve the accuracy of these measurements.
- Regarding the timing of the UAV survey, if the survey conditions are met, it will be conducted regardless of the season.
- Images captured by UAV will be analyzed (measurements of body length, girth, etc.) and all efforts will be made to ascertain the structure of the population.

(2) Survey of the Fishery damage and of the effectiveness of damage prevention

- In addition to requesting members of the fishing industry to record the damage situation (number of fish damaged, number of individuals bycaught) on each fishing day, information from shipboard surveys, etc. will be gathered, and the degree and extent of the damage will be ascertained. Multiple indices will be used in the assessment of the damage situation, including the damage-to-catch ratio, total catch size, total catch value, and others.
- Surveys will be conducted on the stomach contents of bycaught and captured individuals to clarify the general situation of salmon predation by seals.
- In trap nets where population management and damage control measures are being implemented, underwater cameras will be installed to survey the behavior of Kuril harbor seals and the status of salmon entering the nets.

(3) Population trends

- Ecological data which is necessary to ascertain population trends (body length, body weight, age, sex, blubber thickness, breeding conditions, etc.) will be obtained from bycaught and captured individuals.
- Specimens necessary for the analysis of infectious diseases, the population's genetic diversity and the like will be collected.

(4) Habitat

- The Ministry of the Environment will gain the cooperation of members of the fishing industry and consider how to build a system for collecting and analyzing information which is necessary to gain a complete understanding of coastal ecosystems, including fish fauna as the seal's food sources.

(5) Assessment of sustainability

- Population dynamics will be assessed based on quantitative analysis of monitoring results.

Literature cited

- Kitakado, T. 2019. FY 2018 Research Commissioned by the Ministry of the Environment “Estimation of Population Dynamics of the Erimo Kuril Harbor Seal Population” Report: 7-13.
- Kobayashi Y, T. Kariya, J. Chishima, K. Fujii, K. Wada, S. Baba, T. Ito, T. Nakaoka, M. Kawashima, S. Saito, N. Aoki, S. Hayama, Y. Osa, H. Osada, A. Niizuma, M. Suzuki, Y. Uekane, K. Hayashi, M. Kobayashi, N. Ohtaishi. and Y. Sakurai. 2014. Population trends of the Kuril harbour seal *Phoca vitulina stejnegeri* from 1974 to 2010 in southeastern Hokkaido, Japan. *Endangered Species Research* 24 (1): 61-72.
- Matsuda, H., O. Yamamura, T. Kitakado, Y. Kobayashi, M. Kobayashi, K. Hattori, and H. Kato. 2015. Beyond dichotomy in the protection and management of marine mammals in Japan. *THERYA* 6 (2): 283-296