Socio-ecological traits of the interactions between Steller sea lions and small-scale fisheries in Hokkaido coastal waters

Fleur E. C. Brochut[1], Yumi Kobayashi[2], Mina Jimbo[3], and Orio Yamamura[1]
[1]*Faculty of Fisheries Sciences, Hokkaido University*
[2]*Faculty of Agriculture, Hokkaido University*
[3]*Central Fisheries Research Institute, Hokkaido Research Organization*

After the breeding season, Steller sea lions (SSL, *Eumetopias jubatus*) migrate from the Russian Pacific coasts to spend the winter feeding in Hokkaido coastal waters, where the seasonal sea ice cover remains low (Burkanov and Loughlin 2005). Since the 1990s, the SSL population began to recover after an acute decline in the 1970s and 1980s. Because of plummeting fish stocks around Hokkaido there has been an increase in the levels of competition for marine resources between SSLs and coastal fisheries (Wada 1998, Matsuda et al. 2015). These antagonistic interactions are harmful for both the pinnipeds and fishermen livelihood posing a severe threat to SSL conservation and causing damage to catch and fishing gear, respectively. In Japan, mitigation strategies to curb these issues include SSL population control and reinforced fishing gear. However, population control has often been criticized because of its obscureness in objective and effect (Bowen and Lidgard, 2013). Moreover, the specific characteristics and magnitude of this conflicting interaction in Hokkaido are not well understood, especially when it comes to the human dimension. By including the human dimension in this study, we hope to clarify how the different aspects of this conflict (socio-economic, damage, etc.), as well as the implemented mitigation solutions are impacting fishermen's livelihood. This will help finding more adequate mitigation strategies that can be compatible with fishermen needs and SSL conservation. Therefore, the goal of this research was to investigate the human dimension of SSL – coastal fisheries interactions in Hokkaido.

We focused on two distinct human groups with contrasted perspectives: fishermen and the general public. With fishermen, we conducted interviews in fishing villages located along the coasts of the Sea of Japan and the Sea of Okhotsk, from March to June 2023. Specifically, we inquired about the fishermen's (1) perception of these interactions (level of damage caused and impacts on their livelihood), (2) attitude toward SSLs, and (3) opinion about the different mitigation methods. With the general public, we conducted questionnaire survey in urban Hokkaido area from October 2022 to January 2023. We inquired about people's knowledge on marine mammals and SSL in particular, and opinions on mitigation methods.

A total of 193 usable questionnaires were collected. The preliminary results showed that the general public has a decent knowledge (mean correct answers = 70%) on marine mammals including SSLs. The people's opinion about population control varied greatly but tended to be unfavorable (disagree = 43.7%). This suggests a possible conflict between public and fishermen interests. Besides, 14 interviews with fishermen were conducted in 10 fishing villages. The answers collected from fishermen about the perception of interaction and their attitude toward SSLs seemed to vary according to location. Only half of the respondents were favorable to population control. Most of them were open to the development of non-lethal methods. Interestingly, when considering threat to fisheries, SSLs damage was low in fishermen's mind. These unexpected results suggest that mitigating the conflict between fisheries and SSLs is more complex than damage prevention. Understanding the human dimension and taking into account all stakeholders interests including the general public and fishermen is indispensable to establish a mitigation solution that is acceptable to all, thus potentially leading to co-existence with wildlife.

Further ongoing analyses aim at examining whether socio-demographic, knowledge, and ecological factors (such as fish availability) have an influence on the attitude and perception of SSL-fisheries interactions in both fishermen and the general public.

References

Bowen, W.D. and D. Lidgard, Marine mammal culling programs: review of effects on predator and prey populations. Mammal Review 43, 207-220, 2013.

Burkanov, V.N. and T.R. Loughlin, Distribution and Abundance of Steller Sea Lions, *Eumetopias jubatus*, on the Asian Coast, 1720's–2005, 2005.

Matsuda, H., O. Yamamura, T. Kitakado, Y. Kobayashi, M. Kobayashi, K. Hattori, and H. Kato, Beyond dichotomy in the protection and management of marine mammals in Japan, THERYA, 6 (2), 283-296, 2015.

Wada, K., Steller sea lions: Present status of studies of migratory ecology, and conflict between fisheries and conservation in Japan, Biospher Conservation, 1 (1), 1-6, 1998.