Final report to:

Rufford Small Grant 2009

Conservation of killer whales (Orcinus orca) in the Russian Far East: protecting food resources and promoting environmental stewardship

Olga A. Filatova

MOSCOW STATE UNIVERSITY
named after M.V.Lomonosov

December 2009

Acknowledgments

We would like to thank the Rufford Small Grants Foundation for their great support and assistance in putting together this conservation project.

We are also grateful to many people who helped us during the realization of the project:

- lighthouse keeper at Karaginsky Island Anatoly Belokopytov;
- captains and crew of the ships “Rys’” and “PTR076”
- director of the Commander Reserve Nikolay Pavlov and the Reserve employees Sergei Zagrebelny, Vladimir Chikunov, Vladimir Golytsyn, Sergey Fomon, Roman Fomichev;
- employee of the Komandorsky Fishery Service (Rybvod) Eduard Baldin;
- villager of Nikolskoye Valery Lisovsky;
- head of Komandorsky branch of NIRO A.P. Semerinov and NIRO employee Eduard Chekalsky.

Abstract

In recent years fish stocks have declined in the Russian Far East because of mass poaching and overfishing. During the last field season some of our orcas showed signs of food shortage. In frames of the current project we studied orca feeding behaviour in several regions of Kamchatka to estimate the impact of fish shortage on their survival. Our study showed pronounced differences in foraging effort in killer whales between the regions with intensive fishery (Avacha Gulf and Karaginsky Gulf) and marine protected area (Commander Islands). In the regions with intensive fishery killer whales spent more time (and hence more energy) on foraging, and some animals showed signs of malnutrition. In Commander Islands the lowest percent of foraging activity was observed, and no killer whales in bad physical condition were found. Increasing foraging effort in Avacha Gulf in 2005-2009 probably indicates the continuing overfishing in the area. Our results give a scientific evidence of fishery influence on the foraging success and welfare of killer whales in the waters of Russian Far East.

Project leader: Olga A. Filatova

Address: Department of Vertebrate Zoology, Faculty of Biology, Moscow State University, Vorobiovy gory, 1/12, Moscow 119992, Russia

telephone +7-903-236-64-74

e-mail alazor@rambler.ru

website www.russianorca.com

Conservation Issue: Main objective of our project is to prevent the depletion of food resources of the orcas of Kamchatka. My colleagues and I have studied orcas at Kamchatka since 2000. Our work was partially funded by First and Second Rufford Small Grants and helped determine their status and prevent live-captures for oceanariums. However, another danger threatens the orcas now. During the last field season some of our orcas showed signs of food shortage. Some of the whales were anomalously thin, and the dorsal fin of one male collapsed. They also practiced “deep-diving foraging” which was rarely used before; hence they had probably switched to an alternate prey. It is well known that in recent years fish stocks have declined in the Russian Far East because of mass poaching. In the Avacha Gulf poachers have exhausted the important spawning areas of Atka mackerel. The numbers of salmon are also declining in Kamchatka waters. Several years ago orcas began to depredate halibut from longlines, suggesting they are not getting enough food. We studied orca feeding behaviour in

several regions of Kamchatka to estimate the impact of fish shortage on their survival. We also spread knowledge about orcas among local people to convince them of the need to preserve orcas and their environment.

Through our project we determined whether orcas in three regions of Kamchatka have adequate food supplies. Realization of our project provided us with reliable information about the welfare of orcas in these regions, which gives us a scientific basis to suggest the measures for the recovery of their prey species. Orcas are the top predators, and therefore serve as indicators of the whole ecosystem health. If they are not getting enough food, it is obvious that urgent actions to restore fish stocks are necessary. It is well known that fish stocks are being depleted, but it is difficult to convince officials and local people of the need to reduce fishing pressure until the depletion is severe and ecosystems have already suffered severe damage. Orcas are a better at attracting public attention than fish, and thin orcas provide powerful illustration of exhaustion of ocean resources. Our activities will attract public attention to the problem of starving orcas and promote concern about the condition of fish stocks.

Objectives:

- to obtain photographs of killer whales from three regions of Kamchatka (South-eastern Kamchatka; Commander Islands; Eastern Koryakia);
- to estimate the state of animals (normal or thin) by these photos;
- to observe killer whale's hunting behaviour in three regions of Kamchatka (South-eastern Kamchatka; Commander Islands; Eastern Koryakia);
- to compare killer whale's hunting behaviour across South-eastern Kamchatka, Commander Islands and Eastern Koryakia;
- to inform the public about the exhaustion of ocean resources, which leads to food shortage in killer whales;

Challenge:

Our challenge is:

- to estimate the state and behavioural budget of killer whales from three regions of Kamchatka: two intensive fishery areas (South-eastern Kamchatka; Eastern Koryakia) and one marine protected area (Commander Islands).
- to estimate the real impact of fisheries on killer whale's welfare and food availability;
- to turn the public opinion against the permanent overfishing.

Results:

Field work

Our study took place in June-September 2009 in the following regions: South-eastern Kamchatka (Avacha Gulf); Commander Islands (Beringa Island); Eastern Koryakia (Karaginsky Gulf) (fig. 1). We went to the sea in the inflatable boat with outboard motor and searched for killer whale groups to make photos and observe their behaviour. After killer whales were encountered the boat approached different groups of killer whales, followed each group in a distance of 20-50 m for about 10 – 20 min to take picture of each whale in the encounter. The photographs of the left side of individual whales were taken to show the details of dorsal fin and saddle patch, which allowed to distinguish individual whales using the technique of photo identification. The data recorded during the work with a group included the date, time, duration of the work with group, location of the group, number of animals in the group, group composition and type of activity for the group. During the work we noted all changes in the type of activity, which allowed calculating the behavioural budget of the group. If the group started foraging, we described the foraging event and recorded diving patterns of individual animals to compare hunting behaviour across study sites.

Fig.1. Map of Kamchatka and adjacent area. Study regions are shown in red.

Eastern Koryakia

In the area of Eastern Koryakia (Karaginsky Gulf) we have obtained a total of 1187 photos and more than ten hours of behavioural observations. No animals with visible ribs were detected, but some animals were in rather bad condition as indicated by the shape of the area around the blowhole. At least two adult animals (one male and one "other") had a substantial depression behind the blowhole (fig. 2). This depression appears in thin animals, which suffer from malnutrition. Killer whales were foraging more than a half (51.4%) of the total observation time.

South-eastern Kamchatka

In the area of South-eastern Kamchatka (Avacha Gulf) we have obtained a total of 8553 photos and more than 48 hours of behavioural observations. No thin animals with visible ribs or depression behind the blowhole were detected. Killer whales were foraging 37.6% of the total observation time.

Fig. 2. Adult male killer whales: a) with signs of malnutrition - depression behind the blowhole (red arrow) – Karaginsky Gulf 2009; b) in good physical condition – Commander Islands 2009.

Commander Islands

In the Commander Islands we have obtained 5337 photos and about 32 hours of behavioural observations. No thin animals with visible ribs or depression behind the blowhole were detected. Killer whales were foraging only 8.3% of the total observation time.

Comparison of behavioural budgets

We have compared the percent of foraging in the behavioural budgets across three study sites in 2009 and with our previous observations in Avacha Gulf in 2005-2008.

The lowest percent of foraging was found in Commander Islands area (8.3%), the highest percent of foraging – in Karaginsky Gulf area (51.4%). In Avacha Gulf percent of foraging varied in different years from 10.1% to 48.2% (medium 30.2%).

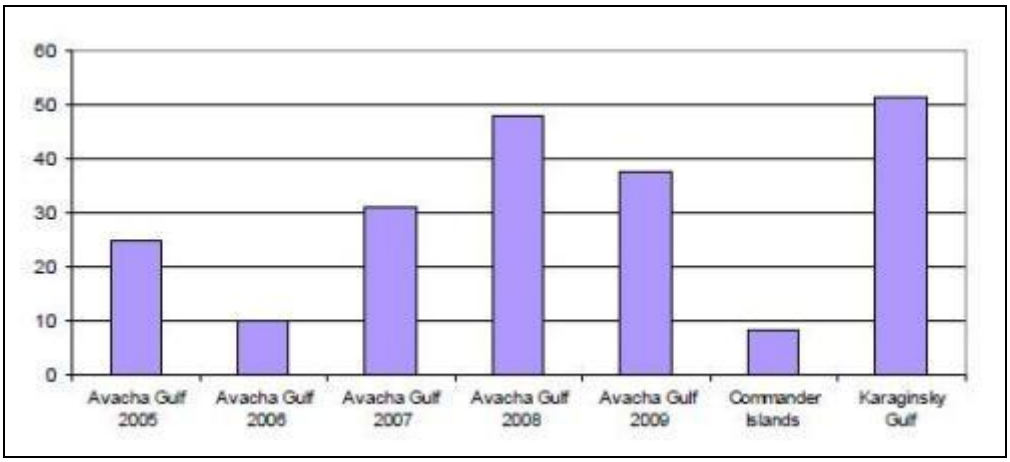

Fig. 3. Percent of foraging in the behavioural budget of killer whales in different years in Avacha Gulf and in Commander and Karaginsky regions.

Discussion

Avacha Gulf and Karaginsky Gulf are the regions of intensive fishery, and fish stocks are considerably depleted there. On the contrary, waters around Commander Islands include 30 miles of marine protected area, so they remain relatively unexploited. Our study showed pronounced differences in behavioural budget of killer whales in these regions.

The highest percent of foraging (51.4%) was found in Karaginsky Gulf area. Also, we found the signs of malnutrition in some animals encountered in that area. Karaginsky Gulf area suffer not only from the coastal fishery, but also on the offshore salmon driftnet fishery (fig. 4). Consequently, Karaginsky Gulf fish stocks are probably even more depleted than in Avacha Gulf. On the other hand, the bad condition and the intensive foraging effort of killer whales may be partly caused by the seasonal differences: in Karaginsky Gulf we have worked in June-July, and in Avacha Gulf – in July-September, so in Karaginsky Gulf in early summer killer whales were probably fattening after the winter season. But still, the intensive fishery must play a role here: the run of the largest salmon species – Chinook salmon (*Oncorhynchus tshawytscha*) starts in May, and of Sockeye salmon (*Oncorhynchus nerka*) – in June. Both species are among the favourite killer whale prey, and the whales could quickly recover after winter if these fish stocks were abundant. However, because of intensive driftnet fishery and coastal poaching these salmon species doesn't occur in numbers sufficient for killer whale foraging.

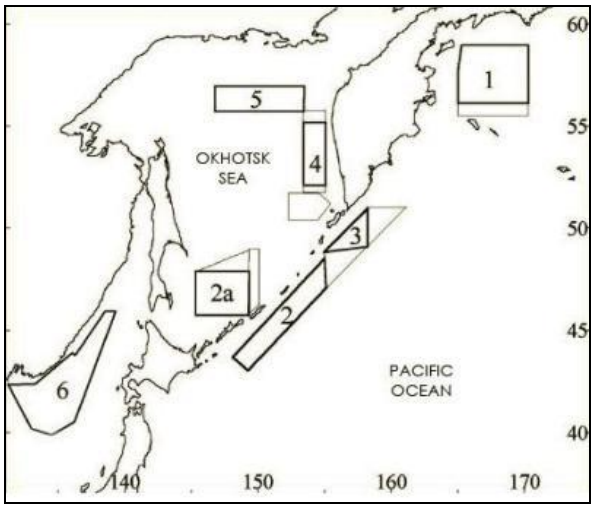

Fig. 4. Zones of driftnet fishery in the Russian Far East

In Avacha Gulf the situation was slightly better than in Karaginsky Gulf. We have found no killer whales in bad physical condition, and percent of foraging was 37.6%. Comparison with the previous year's showed a general increase in foraging ratio (fig. 3). However, in 2008 foraging ratio was higher than in 2009 (fig. 3), and several animals in very bad physical condition (with visible ribs, collapsed dorsal fin) were observed. By natural reasons, in Kamchatka 2009 year was very rich in salmon, which have probably caused better condition of animals, than in 2008. But in general the ratio of foraging has increased in the last years, which can be caused by the depletion of fish stocks.

Thirty miles area around Commander Islands is a part of Commander Reserve, and fishery activities are prohibited there, so the fish stocks remain relatively unexploited in that area. Our research showed the lowest percent of foraging activity (8.3%) in the waters around Commander Islands comparing to the other areas. No killer whales in bad physical conditions were observed.

Conclusions

Our study showed pronounced differences in foraging effort in killer whales between the regions with intensive fishery (Avacha Gulf and Karaginsky Gulf) and marine protected area (Commander Islands). In the regions with intensive fishery killer whales spent more time (and hence more energy) on foraging, and some animals showed signs of malnutrition. In Commander Islands the lowest percent of foraging activity was observed, and no killer whales in bad physical condition were found. Increasing foraging effort in Avacha Gulf in 2005-2009 probably indicates the continuing overfishing in the area. Our results give a scientific evidence of fishery influence on the foraging success and welfare of killer whales in the waters of Russian Far East.

Communicatory and popularization activities

During our field season we had many contacts with local people, fishermen and tourists from Russia and other countries. We talked with them about the problem of overfishing and other environmental problems. Many fishermen in the intensive fishery areas are aware of the problem of fish depletion and suffer from it because they are not able to catch enough fish. In Karaginsky Gulf, we had a discussion with local fishermen on the small seiner. They told us that cod and Pollock stocks are severely depleted in the area. The substantial part of their catch consisted of flatfish.

In October 2009 I have participated in TV program "Podrobnosti" ("Details") on the local TV in Petropavlovsk-Kamchatsky. I was speaking about our research and the problems that killer whales face because of anthropogenic influence on the marine environment. I have specially mentioned the problem of overfishing which leads to the depletion of fish stocks.

We have prepared the scientific paper which describes behaviour and area usage in killer whales of Avacha Gulf. In this paper, we showed that because of overfishing of Atka mackerel the feeding regions of killer whales have shifted southwards. The paper is now in press in "Zoologichesky zhurnal" (Russian "Journal of Zoology").

Conference participation

18th Biennial Conference on the Biology of Marine Mammals, Quebec City, Québec, Canada, 12-16 October 2009 (Poster).

Conference “Behaviour and behavioural ecology in mammals”, Chernogolovka,, Russia, November 9-14, 2009 (Talk, workshop).

Other communicatory and popularization activities

We established contacts with local people in the study areas. We told them about the problems of marine mammal conservation and other environmental problems of Kamchatka. It was surprising that many local people understand the importance of these problems, and possible risk to the nature from which they highly depend. Unfortunately, people in Russia are used to be passive, and they do nothing to solve these problems. We hope that our conservational project will become the “precedent” and encourage other Russian people to take an action.

Publications

O.A. Filatova, I.D. Fedutin, T.V. Ivkovich, M.M. Nagaylik, A.M. Burdin and E. Hoyt. 2009. The function of multi-pod aggregations of fish-eating killer whales (*Orcinus orca*) in Kamchatka, Far East Russia. Journal of Ethology, 27 (3):333-341.

O.A. Filatova, I.D. Fedutin, M.M. Nagaylik, A.M. Burdin and E. Hoyt. 2009. Usage of monophonic and biphonic calls by free-ranging resident killer whales (*Orcinus orca*) in Kamchatka, Russian Far East. Acta ethologica, 12 (1): 37-44.

Ivkovich T.V., Filatova O.A., Burdin A.M., Sato H., Hoyt E. in press. The social organization of resident-type killer whales (*Orcinus orca*) in Avacha Gulf, Northwest Pacific, as revealed through association patterns and acoustic similarity. Mammalian Biology. doi:10.1016/j.mambio.2009.03.006.

A. Burdin, O. Filatova, E. Hoyt. 2009. Marine mammals of Russia. Kirov. ISBN: 978-5-88186-850-5.

Web-site

We continue to put on our web-site http://www.russianorca.com/indexeng.htm information about killer whales in the wild and their problems, as well as about other marine mammals and their problems, e.g. whaling. We have a good feedback on our forum, and we hope that our activity will contribute to the rise of concern of Russian web-users towards marine mammals.

Financial report

Because of the unpredictable changes in airplane ticket prices some budget lines differ from those in the requested budget. In general, we spent less money for the travel expenses. However, we had some problems with the engine in Avacha Gulf which made us to use two-stroke engine instead of four-stroke, which caused unexpected increase of fuel consumption. So, we used the "Contingency" money and the money saved from the travel expenses to cover this difference.

№	**Budget lines and spends**	**Requested, £**	**Expend, £**
1	Salary	0	0
2	Equipment	320	320
3	Consumables and stationery	185	185
	- *Digital tapes for sound recording*	*75*	*75*
	- *Digital tapes for video recording*	*50*	*50*
	- *Batteries*	*60*	*50*
4	Travel expenses	6925	6592
	- *Airplane tickets to Moscow – Petropavlovsk-Kamchatsky-Moscow for 4 people*	*1755*	*1144*
	- *Airplane tickets St Petersburg-Petropavlovsk-Kamchatsky-St Petersburg for 1 person*	*570*	*511*
	- *Airplane tickets Petropavlovsk-Kamchatsky-Nikol'skoye (Commander Islands)- Petropavlovsk-Kamchatsky for 5 people*	*1338*	*1810*
	- *Rent of a lorry Nikol'skoye (Commander Islands)-Podutesnaya- Nikol'skoye*	*98*	*109*
	- *Airplane tickets Petropavlovsk-Kamchatsky-Ossora (Eastern Koryakia)-Petropavlovsk-Kamchatsky for 5 people*	*2413*	*1702*
	- *Freight (950kg) – 2 return trips (Nikol'skoye, Ossora)*	*751*	*1316*
6	Field expenses	2991	3424
	- *Camp supplies (gas, food)*	*1754*	*1754*
	- *Fuel and motor oil*	*1237*	*1670*
7	Contingency	100	0
	Total budget	**10521**	**10521**

Appendix: photographs from the field

Transportation of our field equipment from the cargo ship to the field camp (photo M.Nagaylik)

Field work near Karaginsky Island: Olga Filatova, Ivan Fedutin, Evgenya Lazareva (photo M.Nagaylik)

Mikhail Nagaylik with Native (Koryak) people in the lighthouse village at Karaginsky Island (photo I. Fedutin)

Evgenya Lazareva is talking with the captain of cargo ship “PTR0076” about the problem of overfishing in Kamchatka waters (photo M.Nagaylik)

Our field camp in Avacha Gulf (photo A. Goskov)

Looking for killer whales (photo A. Goskov)

Working with killer whales (photo A. Goskov)

Killer whales in the waters of Bering Island (photo E. Lazareva)

Most killer whales in the waters of Bering Island were in good physical condition (photo E. Lazareva)

Documenting the behaviour of killer whales (photo A. Goskov)