

Final Evaluation Report

Your Details				
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Project Title	Current Status of Caspian Sea Coastal Waters in Kazakhstan and Rehabilitation of Caspian Seals			
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1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Detailed analysis of persistent organic pollutants in Caspian water				The project successfully conducted a quantitative analysis of POPs, encompassing a range of compounds such as organochlorine pesticides, PCBs, and PAHs. This was achieved through advanced chromatographic and mass spectrometry techniques.
Ecological assessment of the Caspian Seal population and habitat				The project provided ecological data on the population dynamics and habitat conditions of the Caspian seal. However, given the constraints of observational periods and potential sampling biases, the assessment represents a snapshot rather than a comprehensive analysis. Continued longitudinal studies are required for a more robust ecological evaluation.
Health assessment of caspian seals via biological sampling				The methodology employed for collecting and analysing biological samples, including serums and various swabs, adheres to the standards set by relevant international bodies. However, while the project has made significant headway in understanding health markers, a full correlation between these markers and overall health status remains to be established.
Investigation of seal breeding habits and habitats				Observational data on seal locations and some information on breeding habitats are collected using four satellite electronic tags, but a detailed study on breeding habits is still lacking.

2. Describe the three most important outcomes of your project.

a). The study identified a range of organochlorine pesticides (OCPs) in the biomaterials of Caspian seals with concentrations of hexachlorocyclohexane (HCCH) isomers and dichlorodiphenyltrichloroethane (DDT) metabolites. Concentrations of OCPs varied, with readings between 265.0 to 567.7 ng/g lipids.



Polychlorinated biphenyls (PCBs) were detected in concentrations ranging from 193.1 to 356.2 ng/g lipids. The study found average toxicity equivalents of 14 dioxinlike PCB congeners in the biomaterials to be TEQ 0.00648 ng/g and TEQ 0.00832 ng/g. Polycyclic aromatic hydrocarbons (PAHs) were present in significant amounts, with total PAH contents measuring 731.9 and 680.2 ng/g lipids in the samples. Naphthalene and its homologues were notably abundant.

b). The population assessment revealed sightings of 300 adults and 80 pups of Caspian seals across 15 different locations. However, the actual count during the expedition was lower, with only 52 adults and 35 pups observed, indicating potential challenges in accurate population estimation due to environmental conditions.

The seal habitat assessment indicated that the entire north-eastern Caspian Sea, a critical habitat for the seals, is heavily influenced by oil operations year-round, potentially impacting the natural behaviour and survival of the species.

c). A total of 66 clinical samples were collected from 18 Caspian seals (12 pups and six lactating females) for virological, virome, and metagenomic studies.

Virological screening for pathogens such as orthomyxoviruses, paramyxoviruses, and coronaviruses yielded negative results, indicating the absence of these pathogens in the studied individuals.

Metagenomic analysis identified the presence of the Gammapillomavirus-1 genus in both pups and adult seals. The sizes of Gammapillomavirus-1 nucleotides in various swabs ranged from 251 to 702 nucleotides.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

- The observed discrepancy between the expected and actual count of seals (300 adults and 80 pups expected vs. 52 adults and 35 pups observed) This issue was addressed by employing a combination of satellite imagery, aerial surveys, and on-ground observation to cross-validate findings. Enhancing the survey period and expanding the geographical coverage could also help in obtaining a more accurate population estimate.
- Conducting research in the harsh and variable conditions of the Caspian Sea, especially in ice-covered areas, presented significant logistical challenges. To overcome this, we employed specialized equipment and the icebreaker. Contingency planning for adverse weather conditions and ensuring the safety of the research team was crucial.
- The collection of various biological samples (serums, swabs) in a field setting and their preservation for later analysis was challenging, especially maintaining the integrity of these samples. This was managed by using appropriate preservatives and storage methods, such as liquid nitrogen for immediate freezing of samples, and transport media for swabs to maintain sample viability until analysis.
- The analysis of POPs and the execution of advanced virological and metagenomic studies required sophisticated laboratory techniques and



equipment, which was prone to technical difficulties. These challenges were addressed by conducting preliminary trials, calibrating equipment, employing experienced laboratory personnel, and collaborating with well equipped external laboratories.

 Integrating diverse data sets from ecological, toxicological, and virological studies to form a cohesive understanding of the Caspian seal's health and environment could be complex. This was managed through interdisciplinary collaboration, utilising statistical and data analysis software, and consulting with experts in various fields to accurately interpret the data.

4. Describe the involvement of local communities and how they have benefitted from the project.

The direct involvement and benefits to local communities have not yet occurred. The project is aimed to have a positive impact through awareness raising, capacity building, economic opportunities, and long-term ecological benefits. The integration of local knowledge and engagement with community members is crucial in ensuring the success and sustainability of our conservation project.

5. Are there any plans to continue this work?

Yes, future plans include a variety of approaches to build on the initial findings and contribute further to the conservation of this unique species and its habitat.

Given the dynamic nature of wildlife populations and environmental conditions, ongoing monitoring of the Caspian seal population and the levels of pollutants in their habitat would be essential. This could involve regular surveys to track changes in population size, health status, and pollutant concentrations over time.

The initial findings on the health of the Caspian seals could be expanded into a more comprehensive study. This might include a broader range of health parameters, investigation into the long-term effects of pollutants, and research into potential mitigation measures.

The project could evolve into more focused conservation efforts, aimed at protecting the Caspian Sea environment and the habitats of the seals. This might involve collaboration with environmental agencies, policy advocacy, and habitat restoration initiatives.

Future plans might include involvement of local communities through education and engagement programmes, focusing on conservation awareness and sustainable practices.

The project team might seek partnerships with other research institutions, nongovernmental organisations, and international conservation bodies to expand the scope of the research and pool resources for more comprehensive studies.

Publishing the research findings in scientific journals and presenting them at conferences would be crucial for sharing knowledge with the wider scientific



community. This could also involve preparing reports for policymakers and conservationists.

Continuing this work would likely require securing additional funding and resources. This could involve applying for research grants or seeking sponsorships from environmental foundations.

6. How do you plan to share the results of your work with others?

Collaborating with media outlets to feature our research in news, documentaries, and interviews can reach a broad audience and raise public awareness about the project's findings and their significance.

We are in contact with BBC Natural History and Factual Productions Limited to film the Programme. The Programme is a multi-part returnable natural history television programme being produced by BBCNHFP for NGC Network US, LLC ("Commissioner").

7. Looking ahead, what do you feel are the important next steps?

Looking ahead after, the focus should now shift towards a multifaceted approach that not only extends the research but also translates the findings into practical conservation efforts. Continued monitoring of the Caspian seal population and environmental pollutants is essential to understand the long-term impacts and to track changes over time. Analysing this data thoroughly and publishing the results in scientific journals will share the insights gained with a broader scientific community.

A critical next step is to advocate for policy changes based on the research findings. Collaborating with government bodies and international organisations can lead to the development of protective measures for Caspian seal habitat. This effort should be complemented by engaging local communities through educational programmes and participatory conservation initiatives, ensuring that the strategies developed are sustainable and culturally sensitive.

Simultaneously, developing targeted conservation strategies specific to the needs of the Caspian seals will be crucial. These strategies could include habitat protection, pollution control, and managing human-seal interactions. To support these initiatives, securing funding and resources will be vital. This may involve reaching out to various funding agencies, conservation organisations, and engaging in crowdfunding campaigns.

Interdisciplinary collaborations will enrich the research and conservation efforts, bringing together experts from diverse fields such as marine biology, toxicology, and environmental policy. Additionally, public awareness campaigns will play a significant role in garnering support and understanding for the conservation of Caspian seals.

Lastly, embracing technological innovations, such as satellite tracking and drones for population monitoring, can enhance the effectiveness of the research and



conservation activities. Overall, a holistic approach that integrates scientific research, policy advocacy, community involvement, and technological innovation is necessary for the effective conservation of the Caspian seals and the sustainable management of their ecosystem.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

As of the present moment, our team has not produced any materials related to the project. However, we are in the process of preparing a publication that will encapsulate the significant findings and outcomes of our work. In recognition of the support and contributions of The Rufford Foundation to our project, we intend to include the Rufford Foundation's logo in this upcoming publication. This inclusion will serve as an acknowledgment of the foundation's valuable role in facilitating our research efforts. We believe that this publication will not only disseminate the results of our study to the wider scientific community but also highlight the foundation's commitment to supporting environmental research and conservation initiatives.

9. Provide a full list of all the members of your team and their role in the project.

In the project, **Dr. Adylkhan Tovasarov** served as the Project Manager and Lead Researcher, overseeing the overall direction and coordination. His responsibilities included leading international expedition to Caspian Sea and making strategic decisions on seal rehabilitation. **Dr. Altynay Kaidarova**, as the Senior Marine Biologist and Technology Developer, focused on marine animal research, particularly on Caspian seals. She was instrumental in developing advanced technological tools for wildlife monitoring and contributed significantly to environmental data analysis.

Anella Umbet, the Veterinary Specialist and Rehabilitation Coordinator, was responsible for providing medical care to the seals. She managed the rehabilitation processes, ensuring the well-being and effective recovery of the animals. Semirkhanov Begaly, acting as the Environmental Technician and Field Researcher, played a crucial role in collecting and analyzing environmental samples and assisting in veterinary procedures. His expertise was vital in understanding the environmental impacts on the seals.

Ertay Erkin, the Financial Manager and Administrative Coordinator, managed the project's budget and administrative tasks. He ensured the smooth operation of the project by overseeing logistics, procurement, and compliance with financial regulations. Together, this team worked collaboratively, each contributing their specialized skills and knowledge to the various aspects of the project, from research and fieldwork to technology, veterinary care, and management.

10. Any other comments?

In response to the alarming frequency of mass mortalities among Caspian seals, we would like to take comprehensive steps to uncover the underlying causes. The team can measure blood volume and assess stress hormones during the rehabilitation of



these seals, aiming to understand the physiological impacts of environmental stressors. Pathogen screening can be conducted to identify any diseases contributing to the high mortality rates. To gain insights into their dietary habits and nutritional status, diet and meal analyses using faecal samples or hair/vibrissae can be performed. Additionally, the deployment of more lightweight, less bulky and more robust satellite electronic tags on some seals will enable tracking of their movements and behaviours in their natural habitat, providing valuable data on their interaction with the environment. To this end, new generation of tags is needed.









