CaspEco project

Seal Special Protected Network (SSPA)

Final Report

University of Leeds

May 2011

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1. Background

Creation of a network of Seal Special Protected Areas (SSPAs) for the Caspian seal throughout the Caspian is a major expected output of the CaspEco project COMPONENT 1.

The Caspian seal, *Phoca caspica*, is the only marine mammal in the Caspian and is an endemic species. The seal was a relatively small-bodied and numerous species, with a total estimated population in 1900 of about 1.5 million animals giving birth to 300–400 thousand pups annually (Härkönen et al., in preparation). The population has declined by more than 90% over the past century to a maximum of about 100 thousand animals giving birth to about 21,000 pups in 2005 (Härkönen et al. 2008; in preparation). This pattern of this decline has been reconstructed using hunting records, and been mainly due to unsustainable hunting, both before and during the Soviet era. Although hunting has declined during the past 15 years, quotas continue to be issued, mainly to the Russian Federation and Kazakhstan, by the region's Aquatic Bioresources Commission, and thus hunting, mainly of pups, continues even though the species is almost commercially extinct. In addition, other factors may be exacerbating the decline and inhibiting population recovery. These factors include fisheries by-catch, poaching, habitat destruction, pollution and disease. In addition, profound changes to the ecosystem resulting from anthropogenic introduction of alien species and over-harvesting of sturgeon and bony fish may mean that the potential for population recovery of the Caspian seal may be limited (Härkönen et al. in preparation).

All of these factors contributing to the species decline, with the probable exception of recent disease outbreaks, are anthropogenic, and should therefore be reversible by adopting conservation measures which involve changes in human attitudes and activities. In October 2008, the IUCN status of the Caspian seal was changed from 'vulnerable' to 'endangered'. It has not, as yet, been added to the red list of any Caspian littoral State, although there are plans to do so in Kazakhstan and Turkmenistan.

The Caspian seal species consists of a single transboundary population, migrating freely throughout the Caspian. Conservation of this species is therefore the joint responsibility of the five Caspian littoral States. Since the cause of the catastrophic population decline (excessive hunting) is clear, the required conservation action (stopping hunting) is equally clear (Thompson, 2009). Solutions to the other, ongoing threats faced by the seal population will require a combination of conservation measures, as outlined in the Caspian Seal Conservation Action Plan (CSCAP; March 2007). This was designed to implement Article 14 of the 2003 Tehran Convention with respect to Caspian seals, and was agreed by all 5 littoral States in 2007, although none of the measures have, as yet, been implemented. The present SSPA plan is based on the CSCAP recommendation and, if successfully developed, will represent the first stage of CSCAP implementation.

2. The potential contribution of SSPAs to the conservation of Caspian seals and the Caspian marine ecosystem

Before attempting to establish pilot SSPAs – which will be both expensive and logistically difficult –it is necessary to examine what may reasonably be expected from SSPAs and how, if they are to be established, they may best be tailored to meet the priority conservation requirements of both the Caspian seal and the Caspian ecosystem.

2.1 Why do we need protected areas for seals?

If the Caspian were a pristine environment, free from human impact, SSPAs would not be necessary. However, human activities now impinge upon seals and their habitat at every stage in their life cycle and everywhere in the Caspian. Protected areas are therefore needed to create a buffer zone between seals and their critical habitat and human activities. Establishment of protected areas is not a substitute for legal species protection against deliberate killing, disturbance and habitat destruction. Legal protection for the Caspian seal should be implemented under national law in all five Caspian countries. This protection would have the potential to be stronger if and when the Caspian seal is added to the red book of each country. However, establishment of protected areas can protect seals from incidental or unintended consequences of human activities in certain areas by regulating or relocating such activities.

There is considerable precedent for the establishment of seal reserves in sea areas bordered by several littoral States between whom there is agreement on seal conservation under an international convention. Under the Action Plan for the implementation of the HELCOM Project on seals (Anon, 2001), protected areas for seals have been established in the Baltic littoral states of Denmark (10 reserve areas), Estonia (20 reserves), Sweden (23 reserves), the Kattegat (12 reserves), Finland and the Åland islands (10 reserves) (Anon, 2001). In the Wadden Sea, under the Wadden Sea Agreement (Convention of Migratory Species, CMS) seal reserves have been established in the Netherlands (20 reserves), a national park in Lower Saxony, a national park in Schleswig-Holstein, a national park in Hamburg and 3 seal reserves in Denmark (Farke, 1996). Each of these reserves implements specific regulations in relation to recreational boats, landing and fishing. In Estonia, for example, fishing gear dangerous to seals may not be used within 2km of the reserve area.

2.2 What are the pre-requisites for selecting an area or site as an SSPA?

An SSPA can be a useful conservation tool where spatial components of threats can be defined (Reeves, 2000). Where this is not possible, species protection law is the more effective tool. However, a protected area must have specific goals and a management plan to achieve those goals. Nevertheless, a protected area will still be ineffective unless a director is empowered to implement it, i.e. the director has the necessary legal authority, financial resources and staff (Reeves, 2000).

2.3 How can Caspian SSPAs benefit the ecosystem?

The Caspian seal may be seen as an ‘indicator’ or ‘focal’ species, whose protection aids in protecting the more complex ecosystem of which the seal is a top predator. The Caspian seal is a ‘flagship’ species, i.e. a charismatic ‘ambassador’ for the Caspian, and it is also to some extent an ‘umbrella’ species, since the protection of seal habitat may also protect that of sturgeon, fish and other species, and it is a ‘condition indicator species’, since the health of the seal reflects the ecosystem health and levels of pollutants within the Caspian system (Hooker and Gerber, 2004). For example, creating a

no-fishing zone in an area surrounding a seal haul-out site, or in an area known to be used by seals for foraging may benefit fish stocks by allowing fish to spawn and replenish depleted stocks. Furthermore, enabling the seal to fulfil its historic top predator role, may result in restoring some balance to the food web.

2.4 How can an SSPA network overcome the difficulties of a mobile marine mammal in an ecosystem comprising mobile component habitats?

The Caspian seal is a highly mobile species, which ranges across the whole of the Caspian basin. Individuals may inhabit different areas of the Caspian at different season of the year and at different stages in their lives. Foraging areas may vary according to season or ephemeral effects, and even haul-out sites may appear and disappear with fluctuating sea levels, storms etc. Protected areas may benefit seal conservation where they improve seal health and survival at critical stages in their life cycle. For SSPAs to be effective, therefore, the areas in which these critical stages take place need to be identified on an ongoing basis.

One approach is to locate seal aggregations through surveys (i.e. by satellite imaging) and establish temporary 'management zones within which, for example, fishing gear must be removed from the water and vessel traffic either slowed or re-routed' (Reeves, 2000). This approach would be appropriate for Caspian seal breeding colonies, for example, since the precise location of these within the winter ice-field varies annually according to patterns of ice formation and even on a daily basis according to ice movement. An example of legal provision of this kind already exists in the Kazakh EcoCode for seal concentrations on the ice to be located and icebreaking vessels servicing the oil industry to be re-routed to avoid them.

A similar approach could be applied under the SSPA network to protect haul-out aggregations of moulting seals and foraging aggregations of weaned pups in late March and April, following the ice melt.

All seals older than one year gather in very dense aggregations at terrestrial sites for several weeks to undergo their annual hair moult. At present it appears that most of the adult breeding population of up to about 40,000 seals gathers at only three locations in the north Caspian during the month of April – these are Komsomolets Bay and Kenderli Bay in Kazakhstan and Mala Zhemchuzniya in Russia. Breeding seals are extremely vulnerable during this period, with depleted energy reserves following the breeding season and feeding little, if at all, during the moult. A top priority of an SSPA network should be to protect the breeding population during the spring moult at these three sites – *or at any alternative sites used during this period.* The exact location of the moulting sites being used can be determined by helicopter surveys of the coastline and islands as soon as the ice melts. The same helicopter survey may be able to detect aggregations of weaned pups, either hauled out or in the waters of the north Caspian.

SSPA measures, which must include exclusion and removal of all fishing gear and fishing or poaching vessels, and any potentially damaging industrial or construction activity, should be enforced for those few weeks in early spring. The areas should include haul-out areas used by moulting seals and also by weaned pups, an area of water (eg 1km) around these haul-out areas) and migration corridors used by moulting seals to leave the moulting sites in late April and early May. Migration corridors and juvenile foraging areas can be identified from satellite telemetry studies (currently ongoing by the University of Leeds team, Kazakh Institutes and Agip KCO). A similar approach in Lake Saimaa – of banning fishing after the ice melt from areas surrounding many of the endangered Saimaa seal (*Pusa hispida saimensis*) pupping sites – has successfully reduced weaned pup mortality

by 10%. The protected area is currently being increased in order to improve pup survival still further (T. Sïpïla, pers. comm.).

The importance of protecting the habitat in the north Caspian for the adult breeding population of seals during the moult and also for weaned pups is one principal reason why Kazakhstan was selected to develop plans for the first pilot SSPA during the short life of the CaspEco project. Because the seal is a transboundary species which gathers in the north-east Caspian for the critical annual breeding and moulting periods, Kazakhstan is taking the lead in planning the first pilot SSPA on behalf of all five Caspian countries, who are expected to participate in the continuing stages of the SSPA network development.

3. Initial meeting to launch the CaspEco SSPA project

At the end of 2009 a concept document (Appendix A) was prepared by the University of Leeds team and distributed to all relevant authorities and stakeholders in all five littoral states. Authorities and stakeholders in each country were requested to collaborate to select candidate SSPAs in their territory, either from the list of 17 sites listed in the concept document or from other information. Countries were then to develop a proposal with cost estimates for implementing the SSPA(s) in their territory. The cost estimate was to include scientific monitoring, equipment, personnel, training (in-country or abroad) and 'Seal Centre' office space.

This concept document was presented at a dedicated CaspEco project regional meeting for SSPA project participants was held in Astana, Kazakhstan on March 15–16 2010 (Meeting minutes are attached in Appendix B). Each country representative made a presentation on its proposed participation in the project, summarised as follows.

3.1 Azerbaijan. Seal hunting in Azerbaijan ended in 1950. A national park (The Apsheron National Park) was created in 2005. This park includes an important site for Caspian seals at Shakhova Kosa and surrounding waters (400ha). The only conservation measure specifically for seals has been to prevent tourist access to this site. In the Ministry's view there is no need to increase the protected area for seals. They believe SSPAs should include bans on certain activities, eg those relating to the oil industry.

3.2 IR Iran. Three coastal areas of Iran (Gomishan, Miankaleh and Gorgan Bay) are suggested as potential SSPAs. Other possible areas already in protected areas are the Lisar protected area and the Boujagh national park area. Since all these areas already have protected area status, it would not be an administrative problem to make these into SSPAs. However, there are potential difficulties in establishing protective measures for seals in Iran, since fisheries authorities view them as competitors, and there is currently no cooperation between them and the Department of the Environment for this project. They would like to find a solution which enables seals, fisheries and ecotourism to co-exist in every habitat. They would want minimal fishing activity in some areas, more in others, and increased work with fishermen. They are considering coastal waters up to about 20km offshore and could define these areas on a map. However, there is inadequate data at the moment on seal habitat use and distribution in Iranian waters.

3.3 Kazakhstan. The Kazakh Institute of Fisheries and other research organisations have been collaborating with the international Ecotox, Darwin and CISS teams since 2000 in carrying out research and monitoring of the seal population. This work includes the number of pups born every year on the winter ice-field (in both Russian and Kazakh sectors), migration corridors, foraging areas and genetic diversity. Some of this work has already contributed to the change in the IUCN red-book status of the Caspian seal to 'endangered'. There is a state programme 2011-15 planned for seal protection.

The Institute of Fisheries considers that SSPAs should not be created in areas of severely polluted with rubbish, including discarded fishing nets. They reported an attempt in 2009 to clear the seabed of rubbish in an area of geological survey, and found 150 dead seals in one tiny area.

National Park zones exist already for protecting foraging areas of sturgeon and from the development of navigation routes. The 'Akzhayik' State Nature Reserve, announced in February 2009, includes the Ural river delta and adjacent coastline, including the Peshnoi peninsula and SW island– a known seal haul-out site. However, this area is threatened by intense illegal fishing activities. The Ural River Park Project (URRP) which is being spearheaded by ENI (the parent company of Agip KCO) as part of the UNESCO-MAB biosphere programme also includes this coastal area. The URRP received ministerial approval in September 2009 and a steering committee has been established.

3.4 Russian Federation. The issue of the declining conservation status of the Caspian seal has been recognised by the Russian Marine Mammal Council, which is now considering whether it should be added to the endangered species list of Russia. At present the Caspian seal is a 'commercial species' in Russian law and therefore a legitimate target of commercial hunting, and the question of a potential moratorium is still unresolved. The Marine Mammal Council is not always involved in the setting of hunting quotas, which is regulated by Government ministries. There has been no progress in combating poaching of sturgeon, which results in seal by-catch. They recognise that islands have become increasingly important habitat for seals because of persecution along the mainland coastal zone. The island of Mala Zemchuzniya is considered to be priority seal habitat, although its existence is vulnerable to hydrodynamic changes. This island was designated as a 'national monument' in 2002 and s now part of the Astrakhan National Park, but the ANP does not have the resources to monitor the island and there have been no improvements to management. This could be strengthened under the SSPA project. There are plans (to be completed in 2010) to enlarge the Dagestan NP to include Tyuleni Island, used by seals historically, but not used by seals at the present time.

Fishing exclusion zones have been created in the Russian sector of the Caspian, and these could also create protected areas for seals, but these zones so far exist on paper only and have not yet been implemented. Regional sanctuaries would not have the resources to manage such areas, although they could play an important role in developing them.

3.5 Turkmenistan. A start was made in conjunction with the 2006–09 Darwin project in developing some knowledge on current habitat use and range of the Caspian seal in Turkmenistan. Four main areas of seal assembly have been identified, but only two of these are in the National State Khazar reserve. The Khazar reserve was created primarily to protect birds, but consideration is now being given to consider protection for seals also. The important seal haul-out on the southern part of

Ogurchinsky Island, where pup births have been recorded, lies outside the Khazar reserve boundaries. Seal numbers in Turkmenistan appear to be low relative to numbers recorded by visiting Russian scientists in the early 1980s. They consider that the Caspian seal is in danger of extinction in Turkmenistan and preparations were made several years ago to include it in the red book of Turkmenistan – this is expected to happen during the forthcoming red book revision.

The Khazar reserve staff are planning to pay fishermen for by-catch information and records of sightings on shore.

4. Terms of Reference for each Country to develop SSPA plans

At the end of the meeting on March 15–16 2010, the following 'roadmap' for the SSPA project was proposed by the CaspEco coordination team, as follows.

1. The minutes of this meeting will be produced (by the University of Leeds team) as an outcome of this meeting
2. The University of Leeds team will prepare TORs for each country for 3 months (starting in May, or as soon as practicable) to collate all historical and current information on seal status for their country and develop a national report which will lead towards the development of one or more SSPAs in each country to form a coherent pan-Caspian network.
3. CaspEco will send a letter to NFPs of IR Iran, Turkmenistan, Azerbaijan and Russian Federation requesting the establishment of a working group consisting of two government representatives and one Darwin scientist.
4. A detailed SSPA proposal will be developed (by the University of Leeds and the Kazakh Government) for Komsomolets bay, the Kulali archipelago and Kinderli bay, using the SSPA concept document as background.
5. A report on the outcome of these activities, with proposals arising, will be presented at the Steering Committee meeting on September 13.

1. The minutes of the meeting were prepared by the University of Leeds team and submitted to the CaspEco team on April 12 2010.

2. The TORs for the working group of each country were prepared by the University of Leeds and submitted to the CaspEco team on April 21 2010.

3. The letters to the NFPs of each country requesting the establishment of the working group (to include one scientist from the Darwin project and two government representatives) were sent by the CaspEco team along with the TORs for each country (see no. 4 below).

4. The TOR for the Kazakh government with regard to preparing the Kazakhstan National Report on seals and SSPA proposals was submitted to the CaspEco team (along with the TORs for the other countries) on April 21 2010. The national report for Kazakhstan and the proposals for potential SSPA sites in Kazakhstan were prepared by the University of Leeds and the Kazakh Government nominated representative and submitted to the CaspEco team on November 28 2010 (Appendix 3). In addition, a document recommending the inclusion of the Caspian seal in the red book of Kazakhstan is currently being finalised (Appendix 4).

5. The University Leeds made a progress report to the Steering Committee meeting in Almaty on September 14 2010. The following recommendations for discussion were made by the Steering Committee:

- The SC appreciates the initiatives by the PMCU and representatives of the CISS, Leeds University UK and calls upon the members of the working group on seals to expedite collaborative Caspian-wide seal surveys as stipulated in their contracts.

- The SC recommends the Caspian states to include the Concept Plan on SSPA into the SCAP and NCAP and including a seal data base into the Caspian Information Centre.

- The SC tasks the PMCU to provide technical assistance to help conduct the preparatory recommendation work and surveys required for the establishment by the Government of Kazakhstan of a coastal protected area for seal conservation along Kazakhstan's Caspian coastline.

5. The Country National Reports

The Country national reports were received by the CaspEco team on February 2nd 2011 (Azerbaijan), March 3rd (Turkmenistan and Russian Federation) and May 9th (IR Iran).

The country report for the Russian Federation unfortunately did not follow the Caspeco team recommendation to involve a Darwin project scientist. The report author was unable, without the Darwin project involvement, to provide any data on the seal population in Russian territory, since his Institute (Kaspnirkh) does not have any data. The present final report to Caspeco has therefore included the available data from CISS (University of Leeds) fixed-wing and helicopter surveys of Caspian seals in Russian territory. These data include the transect surveys for breeding seals and pups on the ice field in February since 2008 as part of the CISS annual survey of the entire north Caspian ice-field conducted in conjunction with Agip KCO, and also the spring and autumn helicopter surveys documenting the numbers, locations and grouping of seals on Mala Zhemchuzniya between 2008–11 (Table 1). Also, the Rf report author was also unaware of the Darwin project study of seal poaching and by-catch in illegal sturgeon nets (Dmitrieva et al. in preparation), merely stating that poaching is greatly reduced due to the activities of the Marine Inspectorate and that seals caught in poaching nets are 'not registered'.

The paradox must be pointed out that the Russian Federation national report, while unable to provide any data at all on the status of the Caspian seal in Russian territory, nevertheless advocates the continued status of the Caspian seal as a 'harvested species' in Russia and the continued hunting of the seal at the present time. Kaspnirkh Institute personnel also take part in regular mass slaughter of seals on Mala Zhemchuzniya Island, despite the Island's State reserve status. The University of Leeds concludes that Kaspnirkh Insitute personnel at present, due to the absence of collaboration with other national, regional and international partners, were not well placed to prepare the national report on behalf of the Russian Federation.

The country reports from Turkmenistan and Azerbaijan were able to confirm information on current seal haul-out site distribution obtained over the past ten years in association with the international Ecotox (2000–02) and UK Darwin (2006–10) projects. In addition, the Azerbaijan report was able to summarise historical data on annual mortality rates on the Apsheron peninsula since 1971. The report for Kazakhstan includes a summary of more comprehensive data on the size and density distribution of the breeding population on the winter ice-field (from annual surveys since 2005), and numbers and seasonal distribution along the Kazakh coast. Reference is also made to recent satellite telemetry data (obtained by the University of Leeds team in association with Agip KCO), which indicate the location of seal migration corridors and foraging areas. These data will be made available to the Kazakh government for the detailed planning of SSPAs.

The report received from IR. Iran did not provide any data on Caspian seals in Iran, but suggested that interaction with fisheries would be the principal threat to seals in the vicinity of the Iranian coast. The report acknowledged the work of the late Dr Hormoz Asadi and his team in the Ecotox and Darwin projects, and suggested that the seal awareness work amongst fishing

communities begun by Dr Asadi's team should continue.

5.1 Protection for seals within existing state reserve areas

The information on seal haul-out distribution within existing wildlife protected areas in Turkmenistan, Azerbaijan, Russian Federation and Kazakhstan are given in Table 1. It is clear that thus far no state protected reserve area anywhere in the Caspian thus far protects seals effectively from disturbance, hunting or poaching, or from fishing in adjacent waters.

One important and apparently long-standing seal moulting and haul-out site – Shakhova Kosa – in Azerbaijan has been abandoned by seals since it became a state nature reserve in 2005. Recent observations suggesting that state reserve status has resulted in poachers operating with apparent impunity and the Darwin scientist has experienced difficulty in obtaining permission to survey the site. Seal numbers at Osushnoy Island in Turkmenistan appear to have declined in recent years, while the Darwin project partners (University of Leeds) have not been permitted to visit the island in order to collaborate in addressing the problems. As mentioned above, mass slaughter of seals by state institute employees has occurred regularly on the Russian state protected island of Mala Zhemchuzniya.

If the proposed SSPA network is to provide effective protection at key sites for Caspian seals under the auspices of a regional and international programme, it is evident that there will need to be more openness and transparency in protected area management than at present. Otherwise the SSPA network will be nothing more than a paper exercise.

5.2 Seal sites recommended as pilot SSPAs

The seal sites recommended as pilot SSPAs are listed in Table 2, together with a summary of information available on these sites. The few suggestions made in the national reports for implementing protection measures for these SSPAs are also included in Table 2.

The common theme running through all the reports is that any SSPAs must prevent poaching and setting of fishing nets which result in seals becoming entangled. The Azerbaijan report requested guidelines for developing seal-safe fishing nets and making their use mandatory. However it must be recognised that much of the seal by-catch occurs in large-mesh nets (>100mm) set for sturgeon, and most of this fishing is illegal and therefore not amenable to government rules for seal-safe nets. Educational work among local fishing communities, even with illegal fishermen, can help to change attitudes towards seals and fishing methods, as has been shown by the Darwin project partners in IR Iran, led by the late Hormoz Asadi. Unfortunately, Dr Asadi's successors in the seal conservation project in Iran have not been involved in the Caspeco SSPA consultation process in Iran.

6. **Essential considerations for establishment of SSPAs**

6.1 Seal by-catch in fisheries and the development of seal-safe nets

The first step to developing seal-safe fisheries in the Caspian is a description of the types of fishing which are lethal to Caspian seals at present. The types and intensity of fishing are not

uniform throughout the Caspian, and therefore different parts of the region may require local solutions.

An interview study with fishermen in the north Caspian in 2009 (Dmitrieva et al. in preparation) found that most by-catch and illegal hunting was reported between the peak breeding season in February (when pups may be caught on the ice) and the end of April (when seals disperse from moulting sites). By-catch was reported from all coastal areas of the north Caspian, but was particularly high in relation to fishing effort in Dagestan and the 'Kulali' area of the Kazakhstan coast (from the Mangyshlak peninsula to Komsomolets Bay, including the Kulali archipelago). Substantial illegal hunting also occurred in the 'Kulali' area. Some seal entanglement in small mesh (30–90 mm) gill nets was reported (13% of records), but the highest proportion relative to fishing effort (91%) was recorded from nets illegally set for sturgeon, which have 110–125 mm mesh, extend from the sea surface to the seabed and are set in groups of nets which total 1–4 km in length from each boat. These nets are set in coastal waters up to 30m depth, and target beluga sturgeon in particular. Beluga sturgeon and seals both forage on benthic prey such as gobies and shrimps, and thus both sturgeon and seals are vulnerable to being caught in these nets. Thus seals foraging or migrating in shallow waters of the north Caspian and along coastal corridors or around island shelves are most vulnerable to by-catch. With > 1km of nets from many boats extending from the sea surface to the seabed, it may be very difficult for seals to avoid entanglement.

The national report for Azerbaijan similarly states that seals may be entangled both in gill nets and sturgeon nets around the islands of the Apsheron peninsula. The photographs illustrating one entangled carcass in the report appears to show a large-mesh (sturgeon) net. A total of 62 fisheries-related deaths along the Iranian coast examined between Autumn 2000 and summer 2001. Of these, 42 (68%) were either shot or killed with a hammer by fishermen when they were entrapped encircling nets set in shallow water for kutum and mullet, 14 (22%) were harpooned by kilka (sprat) fishermen and 6 (10%) were entangled in large-mesh nets (10–35 cm) nets set for sturgeon (Eybatov et al. 2002). In Iran this problem was tackled by a series of workshops in 2006–08 held by Darwin project scientists with fishermen's cooperatives along the northern Iranian coast which resulted in agreements by both legal and illegal fishermen not to deliberately kill seals (Asadi and Shamimi, 2006). Data from stranded carcasses since 2006 suggest a similar range of lethal interactions with fisheries, although the numbers of seals are much lower than before (Ayasheri et al. 2009). This could be due to a combination of factors, including reduced legal and illegal fishing (IR Iran national report), lower numbers of seals in Iranian inshore waters and some success of the awareness workshop and agreement programmes.

It is evident that nets set for sturgeon are the type of net most lethal to seals, by virtue of their large mesh which can easily entrap the head or flipper of a seal and then entangle it, and both the length and depth of the net. Seals may also be entangled in smaller-mesh gillnets, though

this appears to occur less regularly than in sturgeon nets[1]. However, it should be noted that the critically endangered vaquita (*Phocoena sinus*), a porpoise about the same size as the Caspan seal, is often (particularly juveniles) entangled in nets with mesh as small as 75 mm. Caspian seals are also caught and killed in ghost (discarded) nets. Nets that may be relatively seal-safe should therefore have small mesh (<90mm), not extend from the surface to the sea bed, and should be not more than a few tens of metres in length (so that seals may negotiate around them).

However, since many nets are set illegally, the most realistic way to solve this problem will be to work with fishermen in coastal communities (as in Iran) and create incentives or subsidies for fishermen to change their fishing practices and establishment of alternative artisanal livelihoods. However, when fishermen in the Gulf of California were compensated by the Mexican government for not fishing in a refuge created for the vaquita porpoise, the fishermen used the money to buy new boats and motors (Culik, 2010). The government then forbade any kind of fishing operation in the reserve area – a policy which requires active patrolling and enforcement. Since many of the illegal fishermen in the north Caspian are armed, confrontation by patrol boats is beset with difficulties. Disincentives should also be developed, i.e. closing down the legal and illegal sealskin processing factories in Dagestan and making illegal the sale of sturgeon and seal products in local markets in all Caspian littoral states.

It seems likely that a combination of incentives, alternative artisanal livelihoods (possibly including ecotourism), disincentives and law enforcement will be necessary to create effective SSPAs. Such a combination was envisaged for the URRP, although this has yet to be developed.

6.2 Wardening and patrolling of SSPAs

Each SPA will require an adequate number of full-time, part-time and voluntary wardens. These should be based in local communities, have adequate education and training, and have appropriate vessels, vehicles etc. State-employed wardens should have sufficient authority and cooperative links with police, coastal protection agencies etc. At least some wardens should be recruited from local coastal communities. Their duties should include:

- ✓ Ensure implementation of seal protection measures within their SSPA
- ✓ Maintain contact with local authorities and coastal community groups
- ✓ Help to foster the development of environmentally friendly artisanal livelihoods and attitudes within local community
- ✓ Maintain close links with Caspian Seal Centre (CSC) or other coordinating body and research personnel
- ✓ Carry out monitoring within SSPA as agreed with CSC and report annually
- ✓ Disseminate information to public

Cross-border and transboundary cooperation in SSPA wardening should be established.

[1] It should be noted that the highly endangered vaquita porpoise (*Phocoena sinus*), a marine mammal about the same size as the Caspian seal, *is vulnerable to entanglement in nets with a large range of mesh sizes, including those presently used in fishing for the following species in the northern Gulf: sharks (15 cm), chano and curvina (10-11 cm), mackerel and sierra (8.5 cm), and shrimp (~7 cm)* (Vidal 1995; cited in the North American Conservation Action Plan)

6.3 Obtaining knowledge of seal migration routes and times

The most effective way of determining seal migration corridors to be protected during the spring and autumn and foraging areas throughout the year is by satellite telemetry. This work is already in progress[2] with seals tagged in Kazakhstan, and is already yielding information about potential SSPAs which have been proposed. In April 2011, 33 adult seals were tagged in Komsomolets bay, just as they were finishing their moult and before they dispersed. The migration routes of all of these seals is now yielding information about patterns of dispersal to foraging areas and corridors used.

Of the areas proposed for SSPAs (Table 2), seals have already (at the time of writing, May 07 2011) visited the sea areas around SW island and Peshnoi peninsula in Kazakhstan, Mala Zhemchuzniya in Russia and Ogurchinsky Island in Turkmenistan. Thus far none of the 33 have visited the proposed areas around Tyuleni Island in Russia, Kenderli in Kazakhstan, the Tyuleni islands at the Kara Bogaz Gol in Turkmenistan, Osushnoy Island in Turkmenbashi Bay, or the Apsheron peninsula. Seals have passed by the Tyuleni Islands (Kulali archipelago) but have not spent time there or entered into the archipegalo area. Seals have, however, spent time in the shallow sea around the eastern part of the Volga delta, close to the coast in southern Dagestan between Izbarbash and Derbenskiy, and in northern Azerbaijan near Siazan. These data will inform the process of identifying areas where resources should be put into protection from poachers and fishing nets in the spring. In the Autumn of 2008, 2009 and 2010 a total of 34 seals were tagged on Rybachi Island and at Kenderli in Kazakhstan. As these seals moved between the Mangyshlak Peninsula and the ice sheet during the winter, a migration corridor was identified along the Mangistau coast, and distinct foraging areas were identified. These data will inform the process of identifying particular areas to be protected in the autumn and early winter.

Seals present at haul-out sites in Turkmenistan and Azerbaijan in the early spring (March and the first 2-3 weeks of April) are seals moulting at those sites – they are not part of a spring migration. This migration occurs after the moult. Therefore seals that appear in Azerbaijan and Turkmenistan from late April into May are probably migrating from moulting sites elsewhere. Records of large numbers of seals at Ogurchinsky and the Apsheron peninsula islands in April indicate that seals moult at these sites in some years, but records are too sparse to state that they do not moult at these sites in others recent years (Table 2). The absence of tagged seals at the Apsheron peninsula during the spring migration does not mean there are no seals at the Apsheron peninsula sites in late April/early May – those sites may be occupied by seals which moulted there in March-April.

The spring 2011 telemetry data are also showing that many seals are spending time in the middle of the Caspian, foraging in deep waters, in contrast to the seals tagged in Kenderli in the autumn, which stayed mostly close to the coast. This will inform the SSPA network coordinators where seal foraging hot spots are, and where they may come into conflict with commercial boats.

[2] The CISS (University of Leeds) team together with Agip KCO, The Institute of Hydrobiology and Ecology, the Institute of Virology and Microbiology and the Institute of Fisheries.

Other tagging sites are recommended to provide a more complete picture of Caspian seal migration and foraging patterns:

- Mala Zhemchuzniya at the end of the spring moult
- Apsheron Peninsula at the end of the spring moult
- Ogurchinsky Island during the spring moult and in the autumn

It is recommended that the SSPA coordination unit (the 'Seal Centre') will coordinate efforts to continue with the satellite telemetry programme on behalf of the SSPA network. Oil companies working in these areas may be approached to help with funding the programme, as Agip KCO has already done in 2008–11.

6.4 The establishment of a Caspian Seal Centre and database

The concept of a Caspian Seal Centre originated from the CEP and formed a component of the Caspian Seal Conservation Action Plan (2007). The Seal Centre was to be developed within the Caspeco project as part of the SSPA network plan. The Seal Centre might involve an actual building or office space, or might be an internet centre. In either case, it should involve a Caspian Seal Conservation Action Plan Coordinator. At present, this role is fulfilled by the CISS (University of Leeds team) and is therefore best served as an internet centre. A region-based coordinating role might eventually be established through the Caspian Environment Programme (CEP). There is currently a separate website dedicated to Caspian seal conservation (www.caspianseal.org) which could eventually serve the purpose of holding the Caspian seal database, which would include all data relevant to Caspian seal conservation biology. This includes all research and monitoring data relating to the establishment, maintenance and assessment of the SSPA network. The database should also be linked to the CEP website. Nevertheless, a Caspian Seal Conservation Network consisting of international and regional scientists working on the Caspian seal was established in 2006 and adopted under the CSCAP in 2007. The Caspian Seal centre should provide a central communication focus and coordinating centre for the CSCN.

At present there is almost no recent data on Caspian seals other than the outcome of the international programmes (Ecotox, Darwin, CISS) and even the independent monitoring of live seals by regional scientists under the auspices of the Darwin project has been quite sparse. The Russian national report unfortunately continues to promote old population survey estimates from the Soviet era and sea distribution maps for none of which there are any supporting or reliable data. The systematic monitoring of seal carcasses along a 10km stretch of the Apsheron peninsula since the early seventies, which is still being continued by Dr Tariel Eybatov, is an exception to the poor regional record of seal monitoring, provides an excellent methodological standard[3], and is not outdated (as claimed by the Russian federation national report). These data, dating from 1971 to the present, should be included in the database, and mortality

[3] Nevertheless, a systematic method for recording evidence of entanglement in different types of net as cause of death would make this dataset even more valuable.

monitoring from other areas (some data on mortality and by-catch have been collected from IR Iran by Dr Hormoz Asadi and his successors) in the past and future may add to this database. If the conservation plan, including the SSPA is to save the Caspian seal, monitoring methods must move towards modern and systematic methodology, transparency of data and access to key sites for international scientists working with and training regional scientists. Mortality and by-catch monitoring around the Caspian should be coordinated by the Seal centre.

All of the national reports have pointed to a lack of expertise in seal biology in their littoral institutes. For this reason, continued collaboration in the immediate future with the international CISS team will be essential for the seal conservation measures, including the SSPA network, to be effective.

6.5 TOR for initial SSPA development in Kazakhstan

The University of Leeds is currently preparing a TOR for a consultant in Kazakhstan to develop plans for the first pilot SSPA(s) in Kazakhstan, which should include some more detailed proposals including specific aims, implementation proposals and resources required. The purpose of the pilot SSPAs will be to assess pilot implementation in areas which are of paramount importance to the species and where there is currently maximum knowledge of numbers of seals, migration corridors and foraging areas.

8. Conclusions

It seems that at present there is general agreement among the four national report submissions that the conservation status of seals in their sea and coastal sector could benefit from the special protected areas for seals. The reports from Russia, Azerbaijan and Turkmenistan referred to seal haul-out areas within existing state reserves, and both Russia and Azerbaijan suggested that other sites might be included in existing state reserves and protection measures strengthened. However, monitoring data on live seals was sparse in Azerbaijan and Turkmenistan and non-existent in Russia, and there were no specific initiatives suggested in any of the reports. Russian policy at present is to continue hunting of seals, which is contrary to the aims and objectives of the agreed Caspian Seal Conservation Action Plan (CSCAP). Owing to this disarray and lack of impetus in embarking on an SSPA scheme in these countries, the Caspeco team made a decision to continue with the proposal to establish pilot SSPAs in Kazakhstan within the life of the present project.

Kazakhstan has the benefit of hosting the majority of the breeding population in most recent winters by far the largest spring moulting assembly in the Caspian, and high numbers of seals in late autumn as the seals gather in areas adjacent to the forming ice field. In addition, SSPA plans in Kazakhstan have the benefit of a database which includes the results of 7 years' aerial survey of the seal breeding grounds, 3 years' helicopter survey of haul-out sites and four seasons' satellite tracking to determine migration corridors and foraging patterns.

The proposal is for the Caspeco team to develop Terms of Reference for a Kazakh team to develop specific plans for an SSPA pilot scheme with clear management objectives and means

and strategies for achieving them. These plans would be developed during the Caspeco project period in consultation with the University of Leeds team of international specialists. In addition, a 'seal centre' coordination unit will be established. If this scheme can be successfully initiated in Kazakhstan, the aim would be for the pilot scheme to be extended gradually to other Caspian countries, possibly starting with Azerbaijan.

Table 1. Caspian seal sites within existing protected areas

	Within existing protected area	Perceived problems	Existing measures benefiting seals	Additional protection measures proposed under SSPA
Russian Federation				
Mala Zhemchuzniya	Astrakhan NP, *M. Zhem* island is 'national monument'	• This is the only haul-out site identified as being currently used by Caspian seals in Russian waters • Poaching and by-catch by fishermen, especially sturgeon poachers, throughout the Russian sea area • Annual mass slaughter of seals on *M. Zhem* by Kaspnirkh and associates, classed as official and legal 'scientific' hunt.	✓ Fishing prohibited within protected sea area adjacent to *M. Zhem* island. ✓ April-Nov annually Russian waters cleared of discarded fishing nets ✓ April-Nov border guard vessel patrols M. Zhem island ✓ April-Nov border guard helicopter patrols sea area; poachers photographed and arrested	✓ A fine for poaching seals suggested at 2,500 RUR per seal
Kazakhstan				
Southwest Island	'Akzhaik' NP and URRP	• Formerly haul-out site for several hundred seals, but few live seals recorded since 2007 • Island probably subject to poaching, owing to relative ease of access from Peshnoi • Island surrounded by area of intense illegal fishing	✓ SW Island and surrounding seal habitat in the Ural delta and Penshoi areas should benefit from protective measures under the URRP plan	✓ The proposed SSPA pilot I Kazakhstan should work with the 'Akzhaik' and URRP management to ensure the seal SSPA measures are incorporated into the management plan.
Turkmenistan				
Osushnoy Island	Khazar State Reserve	• Formerly haul-out site where up to 200 seals recorded, but decline since 2006 with	✓ Economic activities, including fishing, prohibited	

		numbers <30 recorded • Seals on Island may be subject to disturbance or poaching by fishermen; also may be illegal fishing nets surrounding island		
Azerbaijan				
Samur Yalama	National Park	• Seal satellite tagged in April 2011 recorded close to this coast in late April. No other information		
Apsheron (created in 2005)	National Park			
	Shakhova Kosa	• 2000–2005 up to 300-400 seals; no live seals since 2005. • Seals on Island may be subject to disturbance and poaching by armed fishermen in small motor boats, also hunters with dogs • Seals in waters surrounding Apsheron peninsula by-caught in illegal sturgeon nets	✓ Tourists prohibited	✓ Proposal to have motor boat patrols, especially during the spring and autumn migration period, to control seal netting and poaching ✓ Consider identifying seal-safe fishing nets, making the use of these obligatory and making the use of other nets a criminal offence
Shirvan	National Park	• Small numbers of seals (29-32) recorded Oct-Nov 2006 & 07. No other information		No proposals other than cooperation with IR Iran in monitoring seals migrating between Iran and southern Azerbaijan
Hirkan	National Park	• 16 seals recorded in Dec 2009. No other information		
IR Iran				
Miankaleh	Biosphere reserve and international	• No information on seals • Period of sturgeon catch mid-Nov to late May up to 6 miles from shore in 10m	Since 1990s Iran Fishery Organisation (IFO) paying money to fishermen start alternative livelihood in order to reduce gill net (mesh 35mm) fishery for bony fish, in which juvenile sturgeon and	• No specific proposals for protected area • Suggestion for seal rehabilitation centre in Boujagh. (Univ. Leeds team

	wetland	water depth, using 140–180mm mesh nets	sometimes seals were by-caught.	do not support this)[4]
Gomishan	Wildlife refuge and international wetland			
Boujagh	International wetland and National Park			

Table 2. Caspian seal sites considered by Caspian littoral state national reports for pilot SSPAs

(National report proposals in black type. Supplementary information and proposals from CISS (University of Leeds) in blue type).

	site	**Available information**	**Consideration for development as SSPA**
Russian Federation	Mala Zhemchuzniya Island	High density seal aggregations recorded by CISS (University of Leeds) helicopter surveys during spring moult (7,400 in April 2009 and ~2,000 in April 2011) and high numbers also in autumn (500 in November 2008 and 600 in November 2009).	• The measures stated by the national report as being already in place at M. Zhem. Island and in adjacent sea areas could be the basis for M. Zhem becoming an SSPA within the network. • An additional essential measure, however, is the prohibiting of any 'scientific' or commercial seal hunting on the island. • Space on the island for moulting seals in the spring or autumn haul-out seems not to be a limiting factor at present and therefore the creation of artificial sandbars (as suggested in the national report) would not be appropriate at the present time. • Systematic monitoring of seal numbers on M. Zhem should be carried out by taking comprehensive photographs during helicopter surveys (as in the CISS surveys). A survey boat to transport observers (as suggested by the national report) would not be appropriate for this purpose, since in the past such vessels have been used to transport Kaspnirkh personnel to carry out

[4] University of Leeds do not support the rehabilitation centre set up in Iran by SSRC. The reasons are (1) rehabilitation centres world-wide are primarily for orphaned and post-weaning pups, while occasional seals stranding on the Iranian shore are usually older than this, and therefore there is no need envisaged for a permanent rehabilitation centre in the south Caspian. (2) SSRC personnel have insufficient knowledge of Caspian seal biology to know when to intervene with stranded seals, and therefore healthy seals may be taken in captivity unnecessarily, contrary to their welfare (4) SSRC (L. T'Hart) have refused to engage or cooperate with the Caspian Seal project, and therefore their motives are unclear.

			mass slaughter of seals on the island. All steps should be taken through the SSPA network to ensure that this does not reoccur.
	Tyuleni Island	Historical anecdotes of seal haul-out in 17th and 18th centuries. CISS (Univ. Leeds) helicopter surveys on Nov 05 2008 and April 10 2009 found zero seals, although sandy beach areas available. Ongoing satellite tracking of seal spring migration routes by satellite telemetry in April-May 2011 find no tagged adult seals in sea area near Tyuleni island.	• Rf report states seals use area as part of spring migration route, but no supporting data provided. • Rf report suggested construction of sandbars to attract seals. However, Univ Leeds considers further investigation needed as to why seals may avoid this sea area before restoration project involving sandbar construction would be recommended.
Kazakhstan	Komsomolets Bay	High density seal aggregations, mainly adults, only during spring moult, recorded in 2008, 2009 and 2011 CISS helicopter surveys. >25,000 seals, mainly adults, recorded on April 13 2009 in 3 main aggregations on 22 islands, including 7,000 seals on 11 small islands near mouth of bay. Only site at mouth of bay occupied – by many thousand seals on April 09 2011. Site use depends on fluctuating water levels permitting access. Telemetry studies in April-May 2011 are yielding data on migration routes as seals leave Komsomolets Bay in late April and early May.	• More than half of the total Caspian seal breeding adults currently haul out to moult in Komsomolets Bay in late March –April and then disperse to foraging grounds throughout the Caspian. • It is essential that these moulting haul-out sites should be a target for an SSPA pilot project. The precise locations of these moulting aggregations are identified in early April each year and measures taken to exclude fishing vessels and gear from these areas, sea access routes and known dispersal routes. • The integrity of Komsomolets Bay for seals (and birds) may be threatened by oil and gas industry development. EIA for O&G developments must include potential impacts on the habitat for birds and seals and the SSPA development must keep abreast of O&G developments in the area and ensure they are compatible with SSPA aims.
	Kenderli Bay	High density seal aggregations, all ages, recorded in November 2009 and 2010 CISS helicopter surveys. Used by smaller numbers in spring and autumn.	• The integrity of seal habitat in Kenderli Bay is currently threatened by an imminent large-scale coastal resort development. The local authorities have been advised about the need to preserve the habitat value of the Bay, but it is not yet clear what steps are planned to achieve this. • Only net fishing proven to be seal-safe should be permitted in Kenderli Bay.
	Ural delta (SW Island, Peshnoi).	Historically area for seal haul-out and foraging, especially in spring and autumn. By-catch in water and persecution on land make this area less frequented by seals than historically, but	• Put measures in place to prevent seal disturbance and persecution on SW Island and Pehsnoi peninsula and develop measures to ensure that illegal fishing is curtailed and that legal

		restoration considered possible with good reserve management.	fishing uses seal-safe nets. • Develop regulated eco-tourism, including seal-watching, under auspices of URRP
	Tyuleni Islands (the Kulali archipelago)	Only one site in the Kulali archipelago is known to be occupied by seals in recent years; this is a sandbar (M. Rybachi) lying to the south of Rybachi Island, here up to about 60 seals, mainly juveniles and some adult females, were located during CISS helicopter surveys in November 2007 and 2008, and 200 seals in November 2009. However, in Nov 2010 the sandbar was found to have been largely washed away by wave action. Satellite tracking of five juveniles and two adult females from M. Rybachi in Nov 2008 found that 2 juveniles signals were lost almost immediately between Rybachi and Kulali Islands, the juveniles probably caught in fishing nets. Ongoing satellite tracking of 33 adults of their migration routes from Komsomolets Bay in late Aril/early May 2011 indicated that the seals were avoiding the Kulali island archipelago.	• The Kulali archipelago was recommended as a pilot SSPA by the Kz authorities, on the basis of its historical reputation as seal habitat (for which there appears to be little pushed documentation). • The reasons for the avoidance of the Kulali archipelago in recent years are not known, but may relate to disturbance and illegal set fishing nets. • We would recommend that the reasons for seal avoidance of this area be investigated before any plans for including the Kulali archipelago in the pilot SSPA project should be developed further. However, restoration of the Kulali archipelago for seals by creating and enforcing a no-fishing zone around it would be a worthwhile project for the future.
Turkmenistan	Tyuleni Islands (Kara Bogaz Gol)	Sporadic counts 2007–10 indicate maximum number of 350 in July 2007 and 150 in April 2009; numbers 0–30 at other counts.	• Fishing ban in adjacent waters suggested (note – these islands are adjacent to a small dedicated fishing community, the leader of which carries out the seal counts. Therefore an effective ban on fishing seems unlikely. Univ Leeds suggests instead seal-safe fishing methods. • Counting every 10 days, i.e. 3x per month suggested
	Osushnoy Island	Sporadic counts 2000–10 indicate maximum numbers of 70 in April 2001, 200 in June 2001, 100 both in April and October 2006 and 0–28 at other counts.	• Fishing ban in adjacent waters suggested (note that this island and adjacent waters are part of Khazar State Reserve) • Counting every 10 days, i.e. 3x per month suggested
	Ogurchinsky island (southern spit)	Sporadic counts 2000–10 indicate maximum numbers of 1,550 and 2400 in March (moulting season) 2000 and 2002 respectively, and 250–500 in April (moulting season) 2006–08. Numbers 100–350 in May–June 2001 & 2007–08. 0–60 seals at other times. Ogurchinsky is historically a terrestrial pupping site, with ~50 pups recorded in winter 1983–84 and 3 live pups (and	• Ogurchinsky is the only non-ice location where pupping may occur at the present time. As such, Ogurchinsky is of considerable scientific interest. We recommend collaboration with international scientific team to document annual breeding success on Ogurchinsky. • The southern tip of Ogurchinsky island is not part of the Khazar

		4 pups killed) in winter 2002. No information on pupping since 2002.	reserve and is a 'free zone' for human activity, including fishing. Disturbance to seals (including hunting) probably occurs. • Include the southern spit of Ogurchinsky island into the Khazar Reserve is recommended; this could permit some options for establishing a protected area for seals. • Counting once a month suggested. (note – Univ Leeds recommends that Ogurchinsky count should be done by helicopter).
Azerbaijan	Shakhova Kosa	Used by up to about 400 seals during spring moult, autumn migration and also at other times of year. Abrupt cessation of use after 2005, coinciding with formation of National Park, attributed to armed fishermen in motorized boats, hunting and poaching.	• Include islands between Pirahalli (Artem) and Zhilhov in Apsheron National Park. • Establish system of patrol boats to ensure safe corridor for seals especially during spring and autumn migrations and to prevent poaching • Develop seal-safe fishing nets and make their use mandatory • Develop system of cooperation with other four littoral states in monitoring seals, developing database and coordinating SSPA network • Establish link with oil companies to facilitate helicopter surveys, boat monitoring and satellite telemetry
	Zhilhov island	Up to 1997 at least several tens of seals all year round. During spring moult small groups in 2008 and 2010, several hundred in 2009. During autumn migration a few tens noted in 2007 and 2009. Seals by-catch at Zhilhov in Dec 2007.	
	Islands between Pirahalli (Artem) and Zhilhov Islands	Single seals and small groups of up to 6 seals Sep-Dec 07 and April-Aug 08. 60 seals in Oct 08. 5-20 seals on each island in April 09, c. 300 Dec 09.	
I.R. Iran	Miankaleh and Gomishan	No seal information in national report, although seals have been observed in Miankaleh since 2006 by bird counting team in winter (Ayasheri et al., 2009)	No specific proposals other than to continue the awareness work initiated by the late Dr Hormoz Asadi and continued by the Plan for the Land team since 2008.
	Boujagh	No seal information in national report	Plans in national report to promote seal rehabilitation centre at Boujagh not supported by University of Leeds (see note to Table 1).

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