Status of Scientific Research on Spotted Seal in RO Korea

GYUNG SOO PARK (朴慶洙)
Department of Marine Biotechnology
Anyang University
Ganghwa County, Incheon, ROK

Seals visited 10 years ago
海豹10年前访问过
Presenter is not a seal expert
Status of scientific research on spotted seal in RO Korea

1. Introduction of main research and education organizations of marine mammals in RO Korea: CRI and KOEM

2. Existing major researches and education programs before 2019

3. Major researches in 2019 by CRI, NIFS of MOF
   - Population survey in Backryeong Is and Garolim Bay (boat /land based & drone survey)
   - By-catches and rescues (including migration study)
   - International joint researches

4. Summary and Suggestions
   - Introduction of seal studies and educations in RO Korea
   - Habitat connectivity between MPAs
World distribution of Spotted Seal

Three populations of spotted seal in the far east Asia
- **Bering Sea population**: about 100,000 in the Kamchatka, in Russia and in Alaska
- **East Sea of Korea (Sea of Japan) and Sea of Okhotsk population**: about 100,000
- **Yellow Sea and Bohai Sea population**: 3,300 in the Yellow Sea: Smaller population of 300 grey spotted seals living in waters off Baekryeong

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**BREEDING AREAS**

A. Liaodong Bay  
B. Peter the Great Bay  
C. Tatar Strait  
D. SW Sea of Okhotsk  
E. NE Sea of Okhotsk  
F. Karaginsky Bay  
G. Gulf of Anadyr  
H. E. Bering Sea
World distribution of Spotted Seal

Ocean winds influence seal pup migration
by American Geophysical Union

Many northern fur seal pups die on their initial migration from the Bering Sea to...

Scientists have confirmed what native Alaskans have observed for centuries - maritime winds influence the travel patterns of northern fur seal pups. New research presented at the Ocean Sciences Meeting here today shows strong winds can potentially displace seal pups by hundreds of kilometers during their first winter migration.

This map shows where tagged seal pups went in 2005 and 2015. These illustrate the contrasts between years, in addition to showing where the pups go in general. These are portions of the pup tracks in November-December, just after they’ve left their birth islands. The tracks are overlaid on an 1895 chart that depicts the North Pacific Ocean and the understanding at that time of where northern fur seals traveled on their migration.
Marine Mammal Studies and Educations in ROK

Cetacean Research Institutes (CRI): Whales & Pinniped
National Institute of Fisheries Science (NIFS)
Ministry of Ocean and Fisheries (MOF)
Marine Mammal Studies and Educations in KOEM, ROK

 Restoration of Marine Ecosystem

KOEM leads the restoration and improvement of the functions of the marine ecosystem.

Systematic Management of the Ecosystem
KOEM is promoting systematic mudflat restoration projects in line with the increased social demand for restoration of damaged mudflats. KOEM has prepared a foundation for promoting customized restoration projects in the future by discovering and establishing restoration plans for mudflats as candidate sites for such restoration projects.
Marine Mammal Studies and Educations in KOEM, ROK
Marine Mammal Studies and Educations in KOEM, ROK
Marine Mammal Studies and Educations in KOEM, ROK

Rescue and treatment practice of whale
Marine Mammal Studies and Educations in KOEM, ROK
Marine Mammal Studies and Educations in KOEM, ROK

summer camp for middle and high school student in Backryeong Is, 2017
Existing major researches and education programs before 2019

International Symposium on Preservation of Spotted Seal in Backryeong Island held at the Songdo Bridge Hotel in Incheon on February 10, 2010 with experts from South Korea, China, Russia and Japan, organized by CRI, MOF
Existing major researches and education programs before 2019

The island-style man-made shelter;
- Upper exposed area of 350m², length of 20m × 17.5m
- Constructed during April to November 2018
- 1.8 million USD
Existing major researches and education programs before 2019

Three Spotted Seals, which were also visited 10 years ago, came again in Backryeong Is, 2018.

Sited from press release from MOF in January 2019
Existing major researches and education programs before 2019

Existing major researches and education programs before 2019

Rescued in May 25, 2013 and released in Ulsan on June 25, 2013

DPRK
North Korea

East Sea

YONHAP NEWS

YSLME MPA NETWORKING WORKSHOP
14-16 January 2019 • Dalian, Liaoning, PR China
Existing major researches and education programs before 2019

The Ministry of Ocean and Fisheries designated the Garolim Bay area (91.237㎢) in Chungcheongnam-do, Korea, on July 28, 2016 as a high biodiversity and productivity, and clean tidal flat.
Existing major researches and education programs before 2019

Expanding the value to the nation gives us an aggregate value of **31.5 billion won per year**. The results of measuring the conservation value provide decision-makers with data indispensable to devising a conservation and management policy. **31.5 million USD/year**
Existing major researches and education programs before 2019

2011년도 한국해양과학기술협회 공동학술대회
6월 2일(목) ~ 3일(금) 부산 BEXCO

서식지 보호 조치를 통한 백령도 접박이물범 보전 방안
육근형, 손규희(한국해양수산개발원)

How to protect *Phoca largha* (spotted seal) around Baekryong Island through habitat protection
K.H. Yook, K.H. Son (Korea Maritime Institute)

pISSN 1598-298X
http://dx.doi.org/10.17555/ksvc.2014.08.31.4.322

Dermatitis Caused by *Candida albicans*
in a Captive Spotted Seal (*Phoca largha*)

Kyung-Yeon Eo and Oh-Deog Kwon

Seoul Zoo, Gwacheon 427-702, Korea
*College of Veterinary Medicine, Kyungpook National University, Daegu 702-701, Korea

(Accepted: August 11, 2014)
Spotted Seal Survey Sites in ROK 2019

Objectives
Habitats and migration
Identification of threats
Management plans
Methods
Land and boat based telescope survey
Drone survey
Real-time survey by monitoring camera
### Number of seals observed at 5 sites of Backryeong Is (Boat based obs in 2019)

<table>
<thead>
<tr>
<th>Dates</th>
<th>Artificial rest area</th>
<th>Hani Beach</th>
<th>Seal Rock</th>
<th>Yeonbong Rock</th>
<th>Dumujin</th>
<th>Total</th>
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<td>26</td>
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Number of seals observed at 5 sites of Backryeong Is (Boat based obs in 2019)
Number of seals observed in Backryeong Is (Boat based obs in 2006-2011)
Number of seals observed in Backryeong Is (Boat based obs in 2016-2019)
Number of seals observed at 5 sites of Backryeong Is (Drone survey in 2019)

<table>
<thead>
<tr>
<th>Dates</th>
<th>Survey sites (Backryeong Is)</th>
<th>Total</th>
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<td></td>
<td>Artificial rest area</td>
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<tr>
<td>10/31</td>
<td>0</td>
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</tbody>
</table>
Comparison of survey results btw drone and boat based observations

Boated based observation

Drone observation

Number of individuals

Time

4/24 6/20 7/18 8/20 9/19 10/29 10/30 10/31

YSLME MPA NETWORKING WORKSHOP
14-16 January 2019 • Dalian, Liaoning, PR China
## Real-time observations

<table>
<thead>
<tr>
<th>Dates (2019)</th>
<th>Number of individuals</th>
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<td>Mar 02</td>
<td>17</td>
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<td>Apr 22</td>
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<tr>
<td>May 03</td>
<td>69</td>
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<tr>
<td>Jun 02</td>
<td>68</td>
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<tr>
<td>Jul 08</td>
<td>77</td>
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<tr>
<td>Aug 19</td>
<td>82</td>
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<tr>
<td>Sep 20</td>
<td>92</td>
</tr>
<tr>
<td>Oct 02</td>
<td>102</td>
</tr>
<tr>
<td>Nov 02</td>
<td>96</td>
</tr>
<tr>
<td>Dec 02</td>
<td>0</td>
</tr>
</tbody>
</table>
Effects of Artificial Shelter

Aug 09, 2019 : First observation (by Ms. Park)
Aug 21, 2019 : Eight individuals observed
Sep 17, 2019 : One observed
Effects of Artificial Shelter
Spotted Seal Studies in Garolim Bay ROK (2019)
## Spotted Seal Studies in Garolim Bay ROK (2019)

<table>
<thead>
<tr>
<th>Dates</th>
<th>Tide</th>
<th>Number of individuals</th>
</tr>
</thead>
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<tr>
<td>Jul 11</td>
<td>05:08/17:47</td>
<td>7</td>
</tr>
<tr>
<td>Jul 12</td>
<td>06:29/18:56</td>
<td>8</td>
</tr>
<tr>
<td>Jull 13</td>
<td>07:49/20:00</td>
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</tr>
<tr>
<td>Aug 07</td>
<td>02:43/15:12</td>
<td>3</td>
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<tr>
<td>Aug 08</td>
<td>03:33/16:00</td>
<td>5</td>
</tr>
<tr>
<td>Aug 09</td>
<td>04:35/17:02</td>
<td>0</td>
</tr>
</tbody>
</table>
Spotted Seal Studies in Garolim Bay ROK (2019)

July Observation

August Observation
# By-catches and stranding statistics of Spotted Seal in ROK 2019

<table>
<thead>
<tr>
<th>Dates</th>
<th>Life stages</th>
<th>Locations</th>
<th>References</th>
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</thead>
<tbody>
<tr>
<td>2019.05.05</td>
<td>immature</td>
<td>Goseong, Ganwon</td>
<td>stranding</td>
</tr>
<tr>
<td>2019.05.17</td>
<td>immature</td>
<td>Pohang, Gyung Buk</td>
<td>drifting</td>
</tr>
<tr>
<td>2019.05.24</td>
<td>immature</td>
<td>Hwaseong, Gunggi</td>
<td>Drifting</td>
</tr>
<tr>
<td>2019.05.28</td>
<td>immature</td>
<td>Taean, Chungnam</td>
<td>By-catch</td>
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<tr>
<td>2019.06.01</td>
<td>immature</td>
<td>Junggu, Incheon</td>
<td>Stranding</td>
</tr>
<tr>
<td>2019.06.01</td>
<td>adult</td>
<td>Gyung Ju, Gyung Buk</td>
<td>Drifting</td>
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<tr>
<td>2019.06.12</td>
<td>Immature</td>
<td>Samchuck, Gangwon</td>
<td>By-catch</td>
</tr>
<tr>
<td>2019.06.25</td>
<td>Immature</td>
<td>Samchuck, Gangwon</td>
<td>Stranding</td>
</tr>
<tr>
<td>2019.10.08</td>
<td>Immature</td>
<td>Gyung Ju, Gyung Buk</td>
<td>Stranding</td>
</tr>
<tr>
<td>2019.10.08</td>
<td>Immature</td>
<td>Backryeong, Incheon</td>
<td>Drifting</td>
</tr>
<tr>
<td>2019.10.15</td>
<td>adult</td>
<td>Backryeong, Incheon</td>
<td>stranding</td>
</tr>
</tbody>
</table>
Rescue of Spotted Seal

Seal trapped in cooling water intake of power plant in Gyung Ju, Gyung Buk on October 8, 2019
Rescue of Spotted Seal
Rescue of Spotted Seal

Released on Oct 22, 2019 after taking blood sample and attaching tracking device
Rescue of Spotted Seal

First satellite signal on Oct 24, 2019 and terminated on Nov 15, 2019
International joint research on spotted seal and other marine mammals

May, 2017: released 3 spotted seals in Posyet, Russia
Oct, 2018: released 2 seals in Tyuleniy Island, Russia
May, 2019: released 5 spotted seals in Verkhovskie, Russia
still have signals from 3 individuals out of 5 released
International joint research on spotted seal and other marine mammals

Rescue trap designed with Russian scientists
Suggestions

23 potential priority areas (PPA) in YS: connectivity between key habitats?

Degree of connectivity = degree of economic growth
Degree of habitat connectivity = degree of ecosystem stability and biodiversity
Suggestions

Coastal habitat Connectivity in ROK

- tidal flat and estuary
- archipelago
- climates change
- east sea
- marine mammals
Suggestions

Li et al., 2010, Preliminary genetic status of the spotted seal Phoca largha in Liaodong Bay (China) based on microsatellite and mitochondrial DNA analyses. Trends in Evolutionary Biology 2010; volume 2:6

Spotted seal distribution (light blue) and breeding sites (numbered dark blue areas)
Suggestions

Both F-statistics and the haplotypic network indicate a clear differentiation between the Liaodong Bay and Japanese populations separated by a fixed mutation. The observed low genetic diversity in mtDNA and the intermediate levels of nuclear microsatellite diversity, combined with the potential genetic isolation, suggest that the Liaodong Bay population might be at risk.

Median-joining network among mitochondrial *Phoca largha* haplotypes of Liaodong Bay (green) and Japan (yellow)
Save the spotted seal - At risk in the Bohai Sea

By uo Lingren | October 4, 2010, Monday | PRINT EDITION

A herd of spotted seals relaxes in their winter home: the Shuangtaizi River estuary in Panjin, Liaoning Province. Competition with fishermen for food is the major threat faced by the seals.

FEW people think of China as the home of seals, but Liaoning and Shandong provinces are the winter home of endangered spotted seals, the only seal that breeds in Chinese waters. Zuo Lingren tells the story.