

# Animals

The *Baekdudaegan* forms the core of mountains in the Korean Peninsula, their continuous ranges reach out to the seas on three sides of the peninsula forming the main streams such as Hangang, Nakdonggang, Geumgang, and Seomjinjang. Residential areas in cities and villages, and productive agricultural land and estuaries possess unique fauna. The Korean Demilitarized Zone (DMZ), subalpine zone and islands play an important role as middle stopover sites for migratory animals. In Korea, approximately 100,000 species of living organisms are estimated to inhabit the land, and 42,756 species among them have been identified and recorded. Among the recorded species, 25,453 species, which constitute 59.5% of the total, belong to the Kingdom Animalia including 1,936 species of vertebrates, 102 species of tunicates, and 23,415 species of invertebrates.

Although Korea seems to be a peninsula that is part of Northeast Asia, the peninsula is ecologically isolated from the continent by the high mountain terrain of Baekdusan and two large rivers. The Amnokgang in the northwest and the Dumangang in the northeast act as barriers that

limit movement of wild animals to Korea from China and Russia. Consequently, freshwater fish and insects in the Korean Peninsula have more endemic species than other taxa. Endemic species are those that are native to a particular geographic area and are not naturally found anywhere else in the world. Out of the 100,000 species that may live in Korea, approximately 10% is presumed to be endemic. In terms of higher animals, 4 species of birds, 4 species of mammals, 5 species of amphibians, one reptile species, and 59 species of fishes are known to be endemic to Korea.

In the case of marine organisms, there are approximately 32 species per 1,000 km<sup>2</sup> of territorial water and Exclusive Economic Zone (EEZ), which is the highest diversity in the world, and that of coastal wetlands is found to be 717 species. Endemic animal species inhabiting South Korea account for 6.95% of indigenous animal species and include 76 species of vertebrates, one tunicate species, and 1,691 species of invertebrates.

There are 35,569 Globally Endangered Species (Class I, II), including 5,659 animal species, of

which 31 are prohibited from being used as food, 479 are protected from capture, 12 are permitted to be captured for artificial insemination, and 568 are approved for export and import. In the case of marine life, 77 species, of which 70 species are animals inhabiting marine or coastal environments, which are classified as marine animals under protection, domestic endemic species, and/or species that are highly valued academically and economically are subject to protection. Of 45 endangered animal species, 4 species are migratory marine animals and 41 species are marine mammals.

Decrease in the number of predators of higher trophic levels led to an increase of small and medium sized mammals, which have been damaging crops and cultivated areas. Some domesticated animals released into the wild have been affecting the faunal ecosystem.

Of 18 species determined to cause bioturbation, 6 species are animals. Of 24 species of potential adverse ecological effects 7 species are animals.

There are 17 wild animal species that cause harm to the environment, one naturalized animal, and

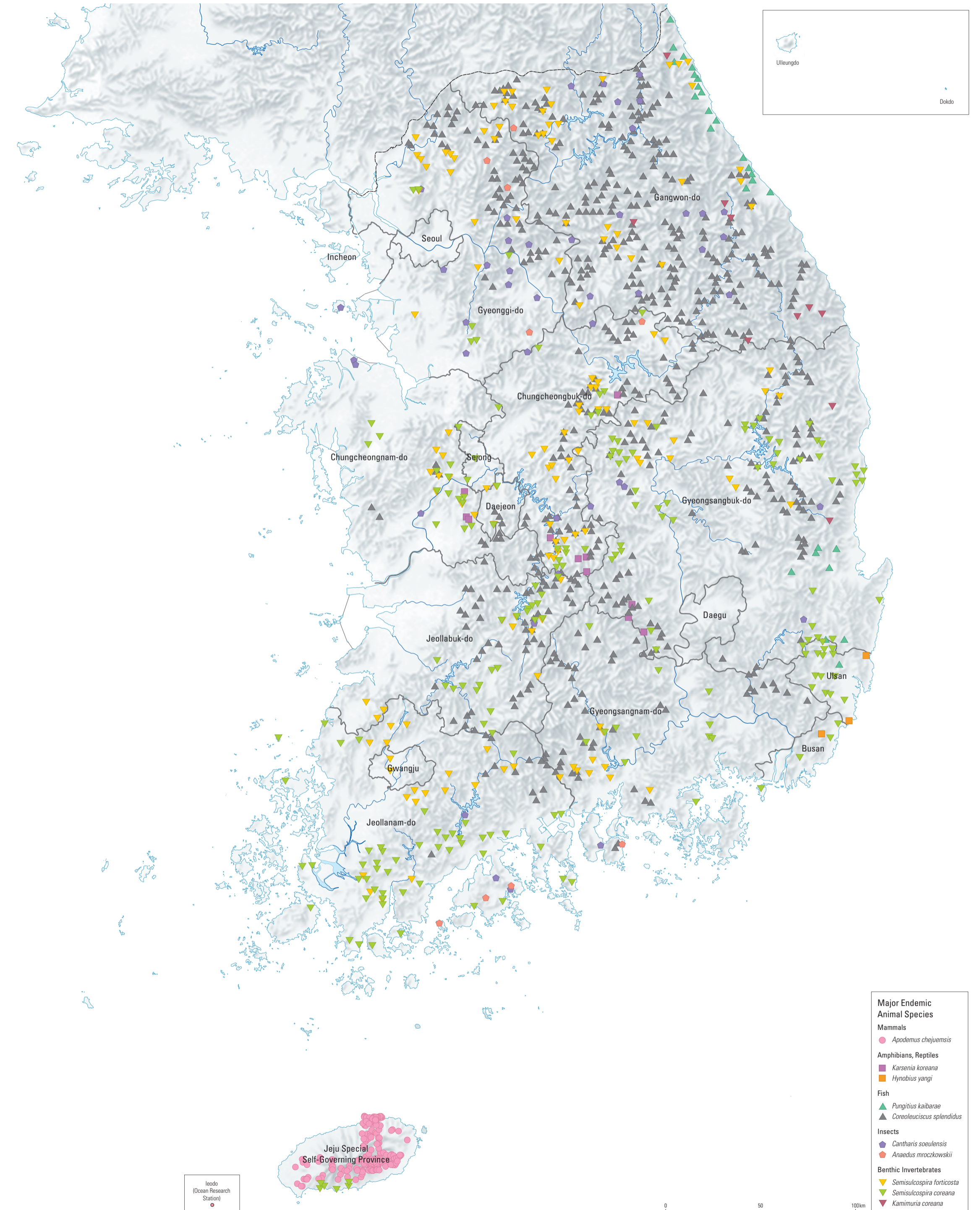
16 animal species under lawful hunting. Of 15 marine species that cause harm to the environment, 8 species are animals.

Conservation projects for endangered wild animal species have been designed to target the Asiatic black bear (*Ursus thibetanus ussuricus*), Korean goral (*Naemorhedus caudatus*), Korean fox (*Vulpes vulpes peculiosa*), Oriental stork (*Ciconia boyciana*), crested ibis (*Nipponia nippon*), sea horse (*Hippocampus coronatus*), green turtle (*Chelonia mydas*), and several other species. Twenty-four Ex-Situ Conservation Institutes have been established for conservation projects for endangered species and their habitat restoration. In addition, there are 8 medical care and rescue centers for protected marine animal species.

The factors that threaten the wildlife species are poaching and trafficking (600 – 800 cases per annum), roadway mortality (5,700 cases per annum), whaling (2,633 cases per annum as of 2012), and predation due to the extinction of predators that control the populations of animals such as wild boar (*Sus scrofa*) and water deer (*Hydropotes inermis*).

## Endemic Animal Species

Distribution of Major Endemic Animal Species



Number of Animal Species

Category	Number of Species		Proportion of Species (%)	
	Number of Species	Proportion of Species (%)	Number of Species	Proportion of Species (%)
Chordates	Mammals	125	6.1	
	Birds	522	25.6	
	Reptiles	32	1.6	
	Amphibians	22	1.1	
	Fish	1,235	60.6	
Tunicates	102	5.0		
Invertebrates	23,415	54.7		

Ministry of Environment, Ministry of Maritime Affairs and Fisheries (2016)

Number of Protected Animal Species

Taxon	Endangered Wild Animal Species		Protected Marine Animal Species	
	Number of Species	Percentage	Number of Species	Percentage
Mammals	20	8.1	15	20.7
Birds	61	24.8	-	-
Reptiles	4	1.6	4	5.2
Amphibians	3	1.2	-	-
Fish	25	10.2	2	6.5
Invertebrates	53	21.6	24	40.2

Ministry of Environment, Ministry of Maritime Affairs and Fisheries (2016)

Number of Animal Species Under Key Management

Category	Number of Species Under Overseas Transfer Approval		Number of Wild Species Under Poaching Prohibition	
	Number of Species Under Overseas Transfer Approval	Number of Wild Species Under Poaching Prohibition	Number of Species Under Overseas Transfer Approval	Number of Wild Species Under Poaching Prohibition
Vertebrates	Mammals	0	57	
	Birds	0	396	
	Reptiles	1	16	
	Amphibians	0	16	
Invertebrates	Fish	68	0	
	Insects	1,017	0	
	Arachnids	251	0	
	Molluscs	226	0	
Other	355	0		

Ministry of Environment, Ministry of Maritime Affairs and Fisheries (2016)

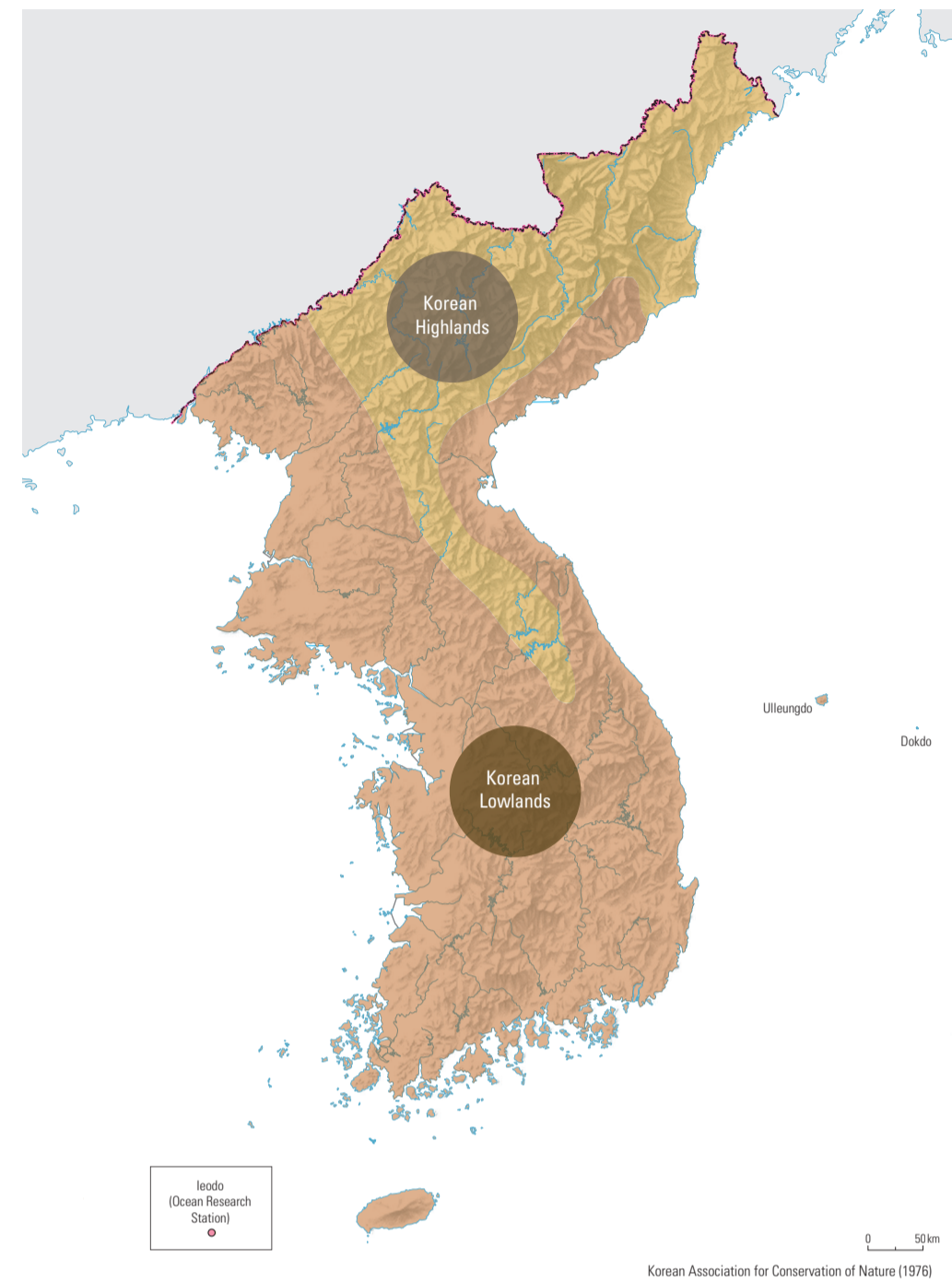
**Major Endemic Animal Species**

- Mammals**
  - Apodemus chjujuensis
- Amphibians, Reptiles**
  - Karsenia koreana
  - Hynobius yangii
- Fish**
  - Pungitius kibarae
  - Coreoleuciscus splendidus
- Insects**
  - Camptaris soeulensis
  - Anaedus mroczkowskii
- Benthic Invertebrates**
  - Semistulosipgia forticosta
  - Semistulosipgia corana
  - Kammuria corana

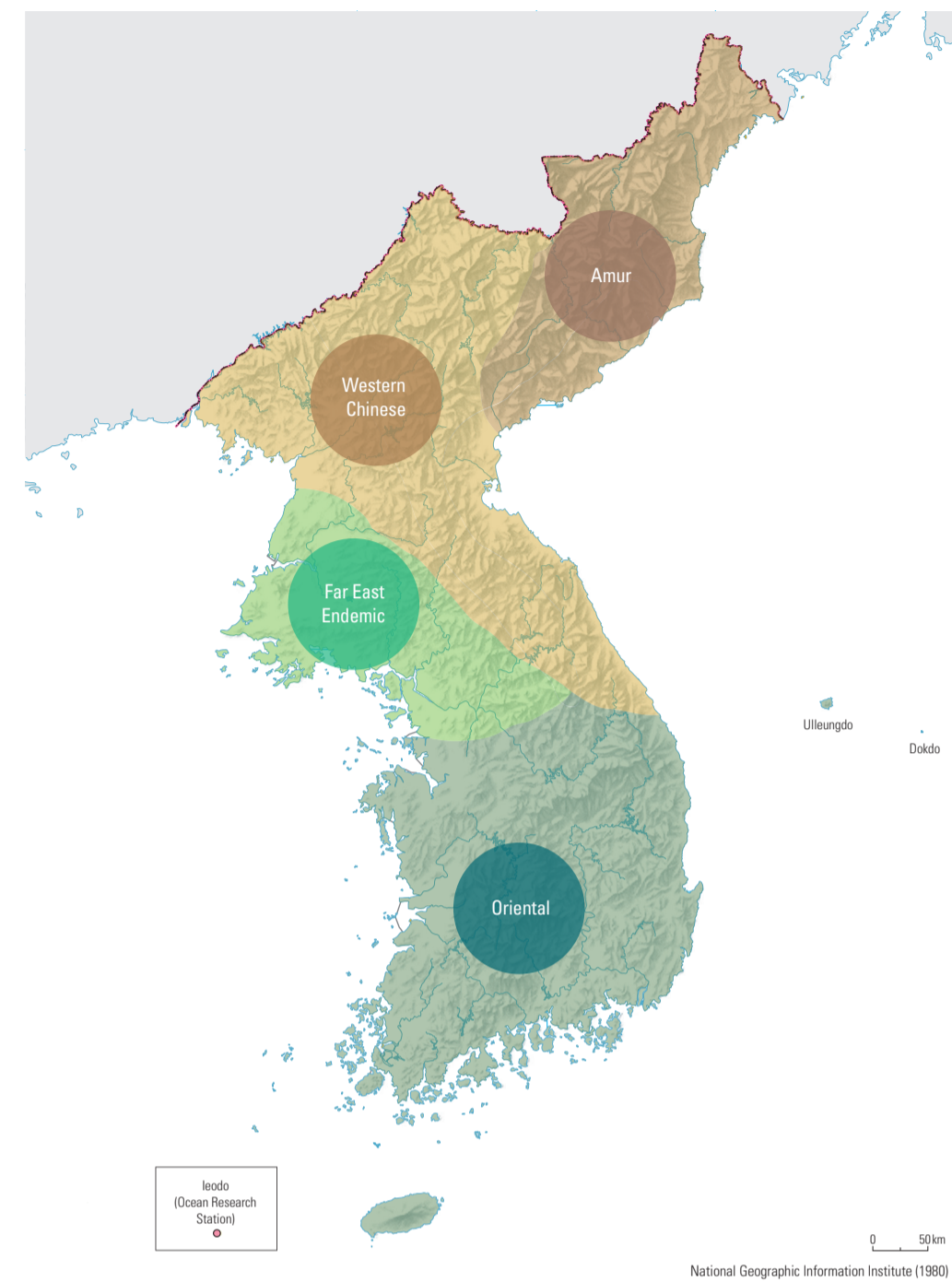
Ministry of Environment, National Institute of Ecology (2016)

Zoogeographical Regions

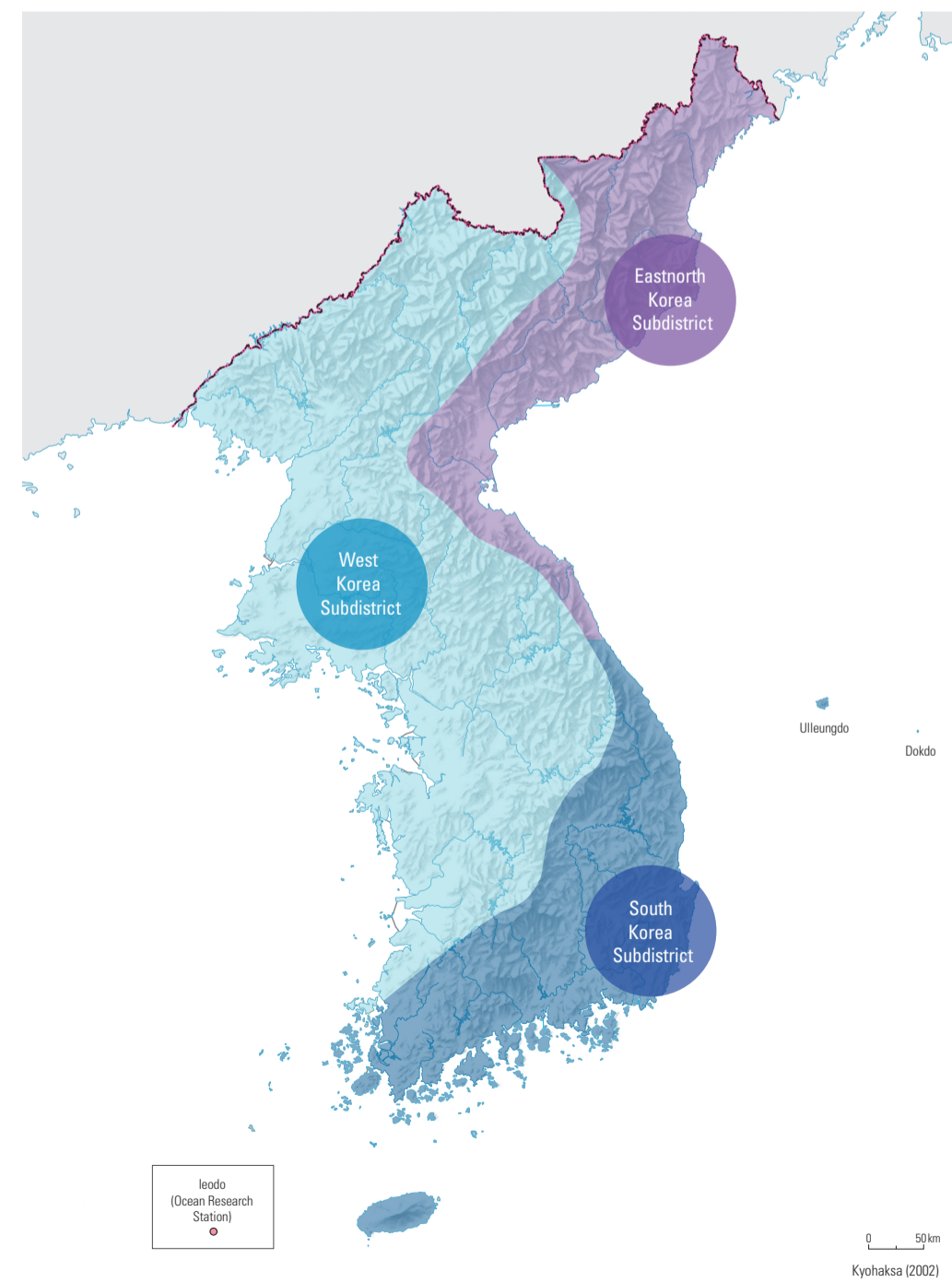
Distributional Regions of Mammals and Birds



Zoogeographical Region of Butterflies



Distributional Regions of Freshwater Fish in the Korean Peninsula



Geographical distribution of animals is determined by habitat conditions in which landform, climate, hydrology, and vegetation are reflected. The Korean Peninsula is subdivided into the Korean Highlands (*Hanguk goji sogu*) and Korean Lowlands (*Hanguk jeoji sogu*) in relation to distributions of mammal and bird species, and vegetation zones. In the Korean Highlands, the natural environment and landscapes are similar to those of the Ussuri region in Russia and the northeastern region of China. Mammals such as *Crocidura lasiura*, *Ochotona hyperborea*, *Vespertilio murinus*, *Martes zibellina*, *Mustela nivalis mosanensis*, and *Cervus nippon hortulorum* inhabit the Korean Highlands. Also, it is home to many bird species such as *Lyrurus tetrix*, *Emberiza jankowskii*, *Picoides tridactylus*, *Surnia ulula*, *Dendrocopos minor*, and *Jynx torquilla*.

The Korean Lowlands include the western, central, and southern part of Korea where temperate forests and warm-temperate forests develop. Since there are less mountainous areas but more cultivated lands, animals that are typically found in piedmont-plains inhabit the areas. Mammalian species such as *Myotis formosus*, *Hydropotes inermis*, *Lasiopodomys mandarinus*, and *Sus scrofa* are found in the Korean Lowlands. Bird species such as *Columba janthina*, *Microscelis amaurotis*, and *Zosterops japonicus* are also found.

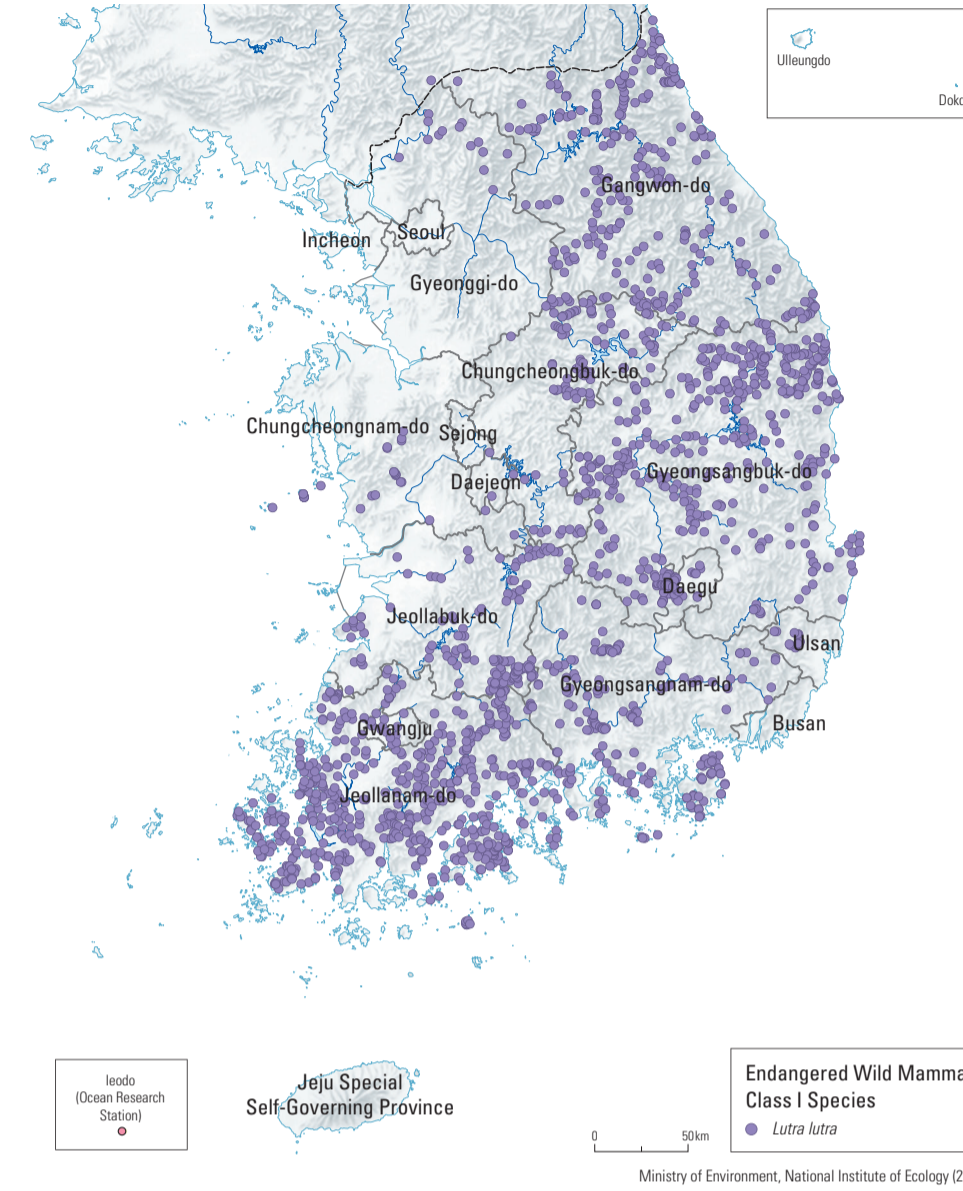
Zoogeographic region of butterflies is subdivided into four, based on their distribution and composition (the ratio between the Palearctic species and the Oriental species). *Oeneis urda*, *Clossiana angarensis*, *Euphydryas ichnea*, and *Albulina op-*

*tilete* are representative for the Palearctic species which were advanced south from the Amur region in Siberia. Species such as *Seokia pratti*, *Nymphalis io*, and *Aporia hippia* that flew across the western China, Mongolia, and the southern Manchuria, and crossed the Amnokgang are typical of southern Chinese strains. *Mimathyma schrenckii*, *Nymphalis antiopa*, and *Aldania thisbe* are the Far East endemic species. Species migrated from Kyushu, Tsushima, and Ryukyu such as *Junonia almana*, *Parantica sita*, *Eurema hecabe*, and *Atrophaneura alcinous* are the Oriental species.

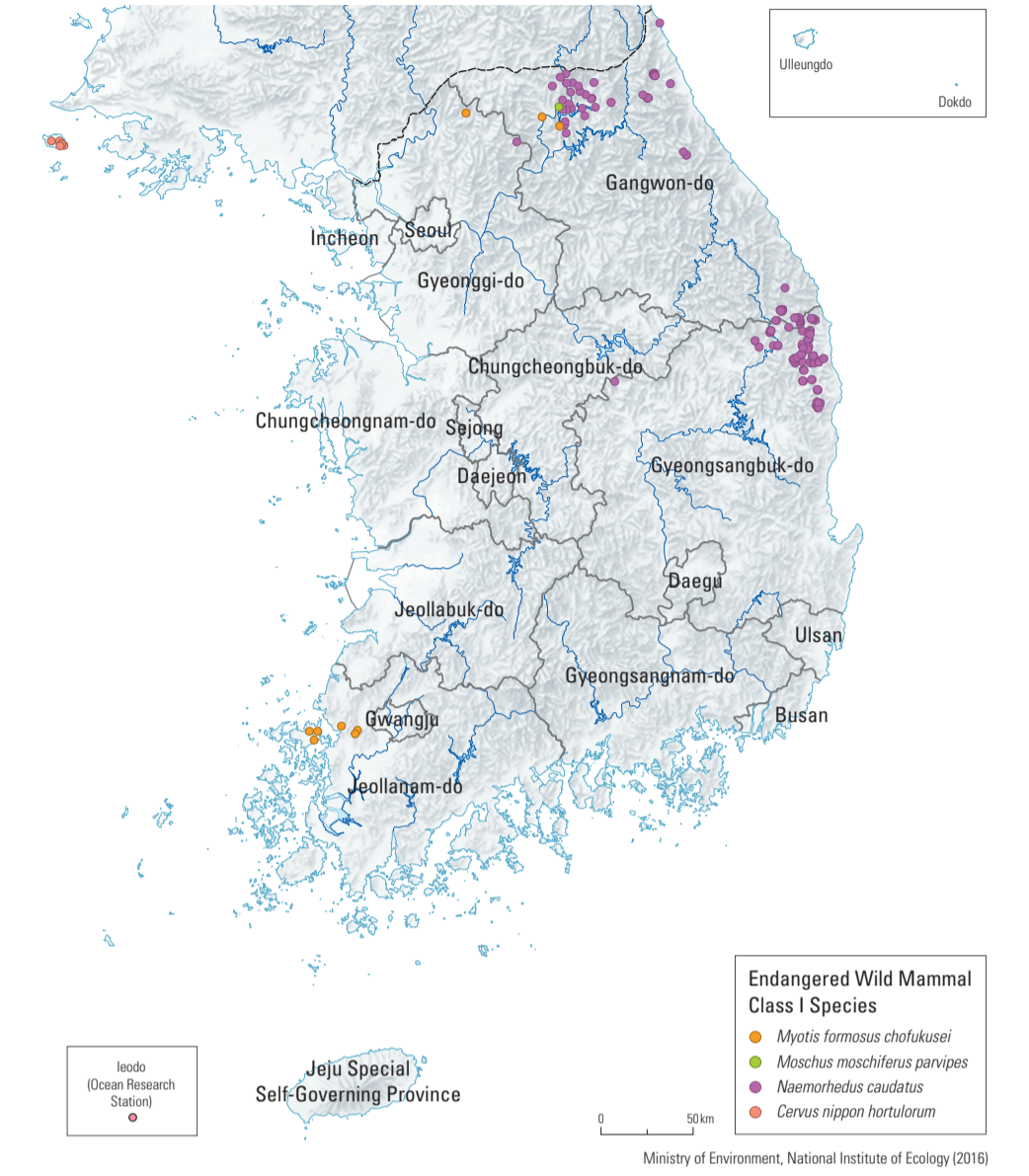
Zoogeographical distribution of freshwater fish species is classified into the Eastnorth Korea Subdistrict, the South Korea Subdistrict, and the West Korea Subdistrict. Freshwater species such as *Rhynchocypris semotilus*, and *Cobitis pacifica* are endemic to the Eastnorth Korea Subdistrict. The Palearctic species such as *Gobio cynocephalus*, *Phoxinus phoxinus*, and *Orthrias toni* that are believed to have originated from the Amur river in the past are also found. *Microphysogobio koreensis*, *Iksookimia longicorpa*, and *Nivaella multifasciata* are found in the South Korea Subdistrict. Palearctic species such as *Rhynchocypris oxycephalus* and *Lefua costata*, and species in common with Japan such as *Oryzias latipes* and *Coreoperca kawamebari* are also found in South Korea Subdistrict. Not only endemic species such as *Hemibarbus mylodon*, *Pseudopungtungia nigra*, *Moroco kumgangensis*, and *Gobiobotia brevivirba*, but also Palearctic species such as *Ladislavia taczanowskii* and *Phoxinus phoxinus* are found in the West Korea Subdistrict.

Wild Mammals

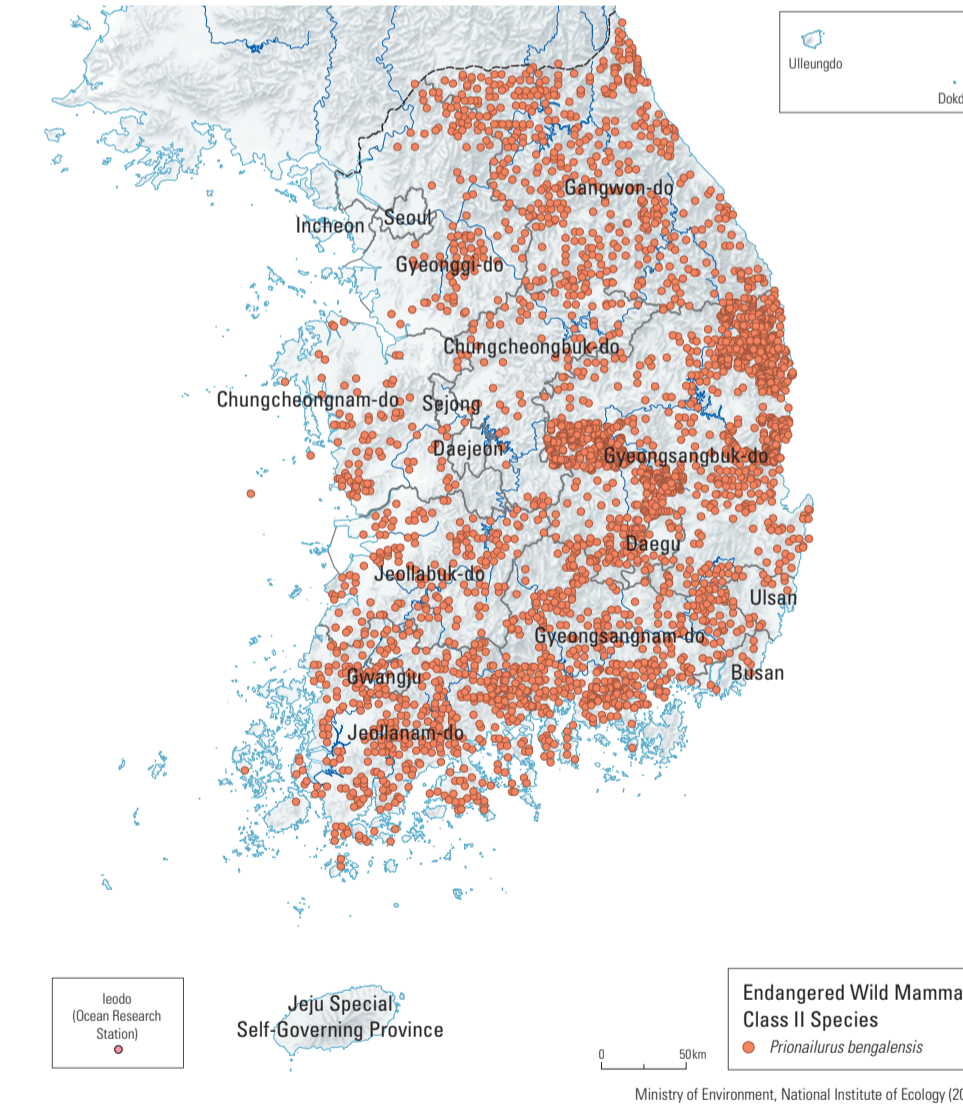
Distribution of Endangered Wild Mammal Class I Species (1)



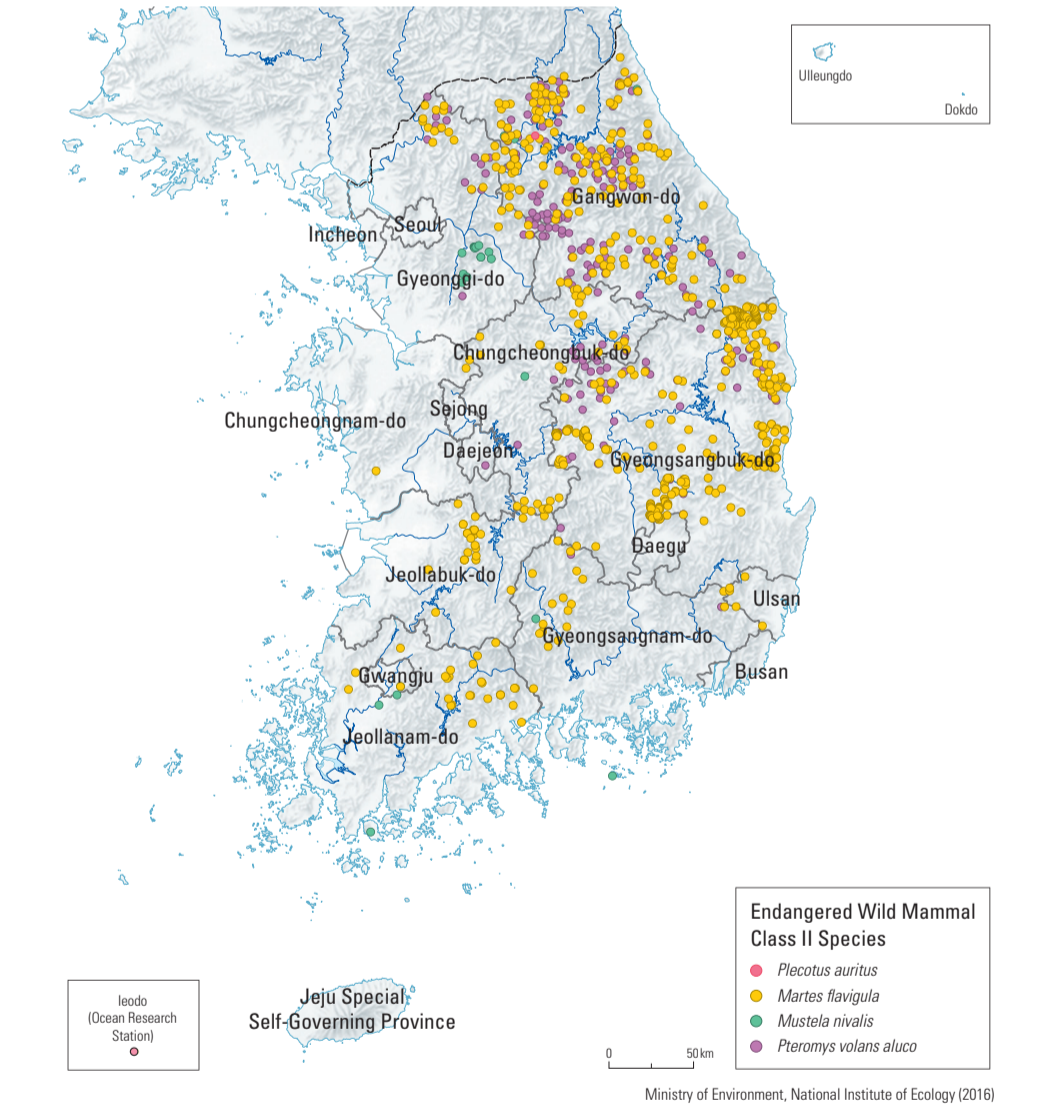
Distribution of Endangered Wild Mammal Class I Species (2)



Distribution of Endangered Wild Mammal Class II Species (1)



Distribution of Endangered Wild Mammal Class II Species (2)



Among the 125 species of mammals inhabiting the land and marine waters of South Korea (including 7 orders and 84 species of land mammals and 2 orders and 41 species of marine mammals), 20 species are designated as endangered (11 under Class I and 9 under Class II) by the Ministry of Environment. Class I species, including the Asiatic black bear (*Ursus thibetanus ussuricus*), Hodgson's bat (*Myotis formosus chofukusei*), Siberian musk deer (*Moschus moschiferus parvipes*), Korean goral (*Naemorhedus caudatus*), and European otter (*Lutra lutra*), and Class II species,

including the yellow-throated marten (*Martes flavigula*), least weasel (*Mustela nivalis*), leopard cat (*Prionailurus bengalensis*), Ussuri tube-nosed bat (*Murina ussuriensis*), brown long-eared bat (*Plecotus auritus*), and Siberian flying squirrel (*Pteromys volans aluco*), are evenly distributed from the high elevations to the lowlands and nearby shorelines of South Korea.

The Asiatic black bear mostly inhabits the Jirisan area; the Siberian musk deer inhabits the regions of Gangwon-do; and the yellow-throated marten, leopard cat, Siberian flying squirrel, least

weasel, and European otter are evenly distributed nationwide. The Hodgson's bat mostly inhabits the regions of Chungcheong-do, Jeolla-do and Gyeongsangbuk-do; the brown long-eared bat inhabits the Gangwon-do region and north woodlands; and the Ussuri tube-nosed bat mostly inhabits the regions of Gangwon-do, Chungcheong-do, Gyeonggi-do, and Gyeongsangbuk-do.

Of 41 species of marine mammal inhabiting the South Korean waters, 15 species, including the humpback whale (*Megaptera novaeangliae*) and California sea lion (*Zalophus californianus*), have

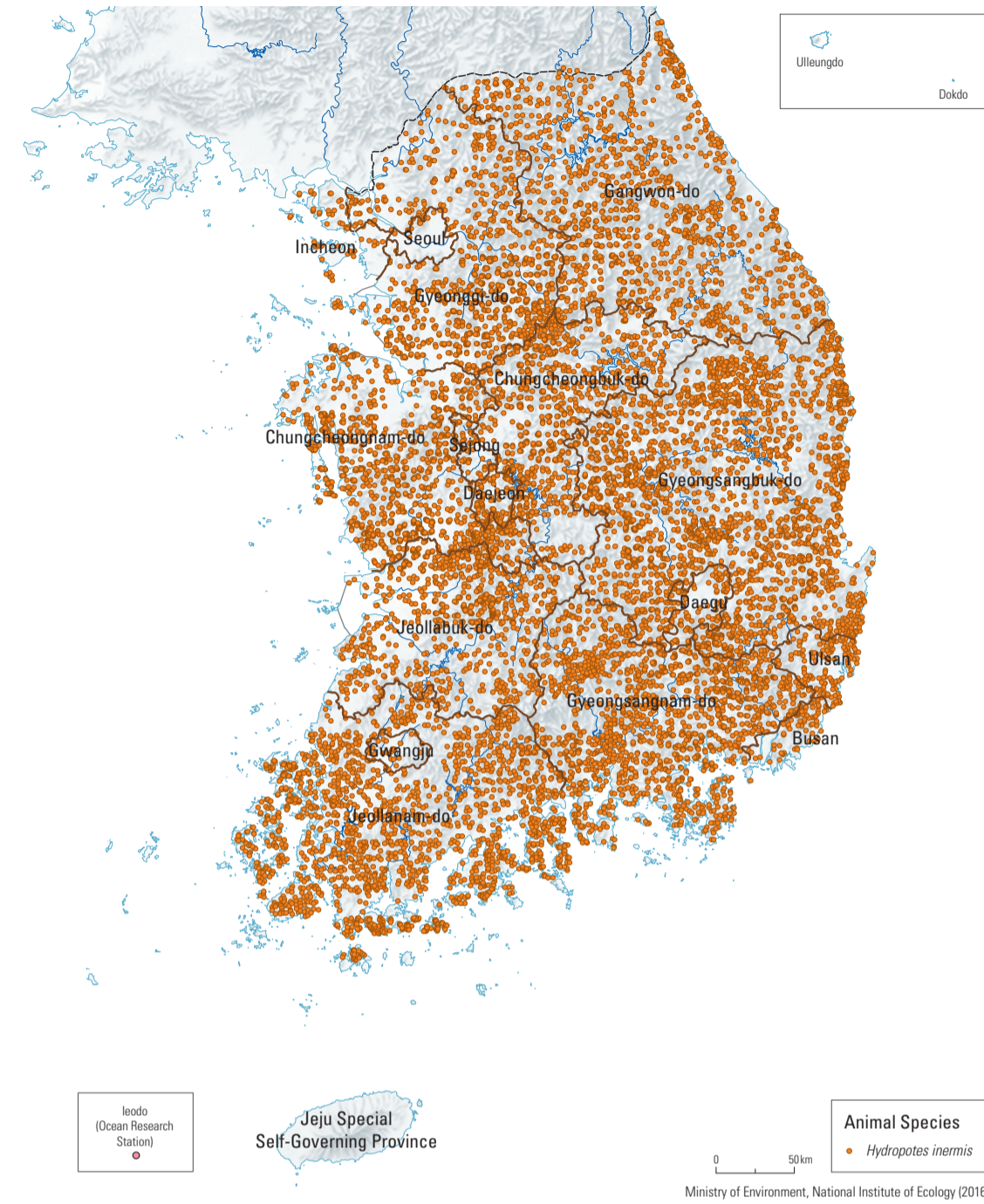
been designated as protected species by the Ministry of Maritime Affairs and Fisheries.

Endangered Wild Species Class I and II

Endangered Wild Species refers to animals that are recognized to be at risk of extinction due to natural or artificial factors. Class I species are those currently at risk of extinction, while Class II species are animals that may become endangered in the near future if threat factors are not removed. As of 2016, 163 wild species have been designated as endangered species in Korea.

Representative Wild Mammals

Domestic Distribution of Water Deer (*Hydropotes inermis*)



Global Distribution of Water Deer (*Hydropotes inermis*)

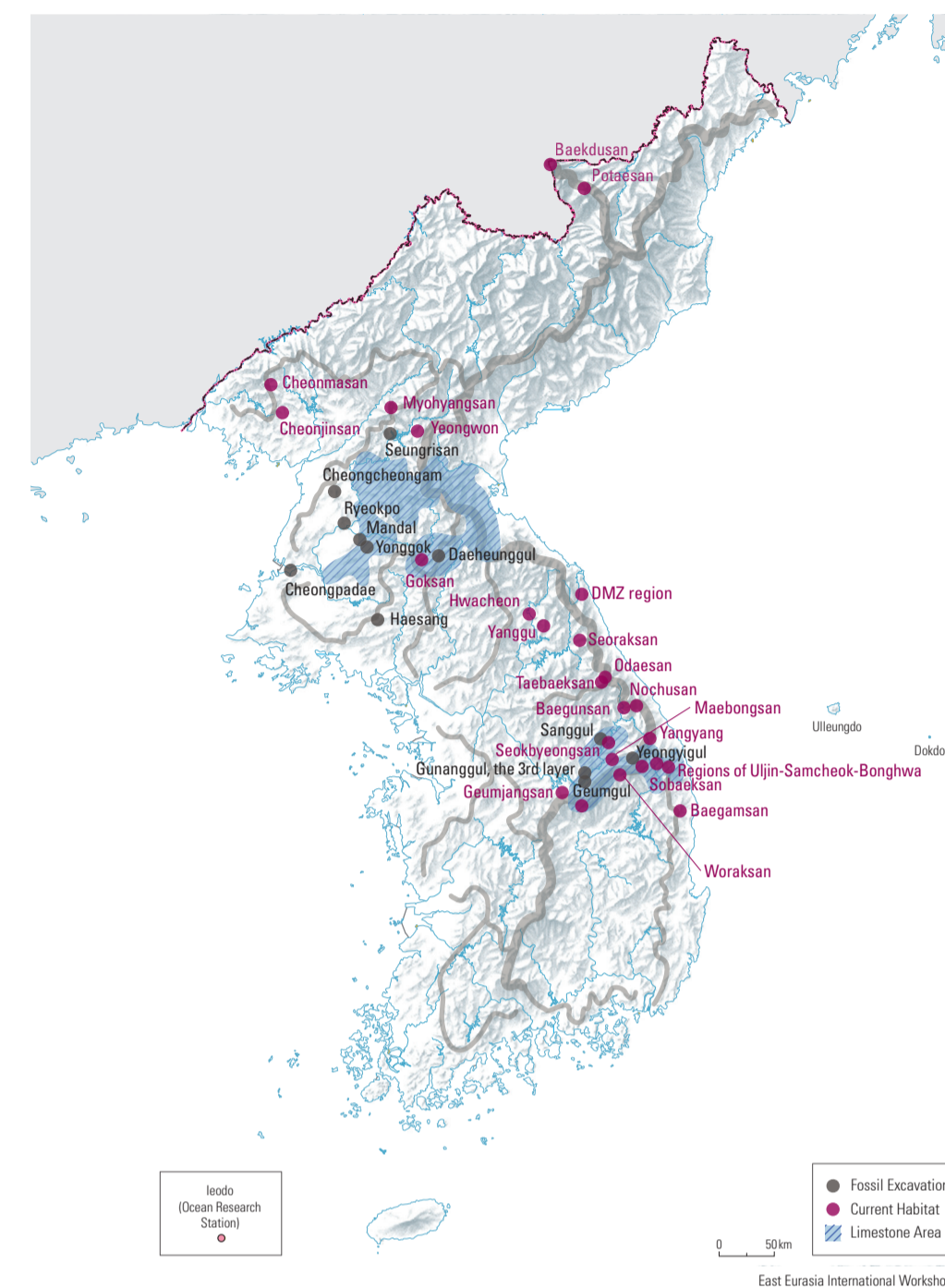


Globally, the water deer (*Hydropotes inermis*) only inhabits certain regions of South Korea and China, so that it is classified into a different subspecies. Despite its lack of antlers, it has canine teeth used to confront other males or to mark out its territory. Water deer molt during the spring and autumn, mate from December to January, and give birth to 2 – 6 young around early June. They are cautious, and mostly active at night around lowland forests of 300 – 400 m elevation and cultivated fields.



Water Deer (Sihwaho, Ansan-si)

Spatio-Temporal Distribution Change of Korean Goral (*Naemorhedus caudatus*)



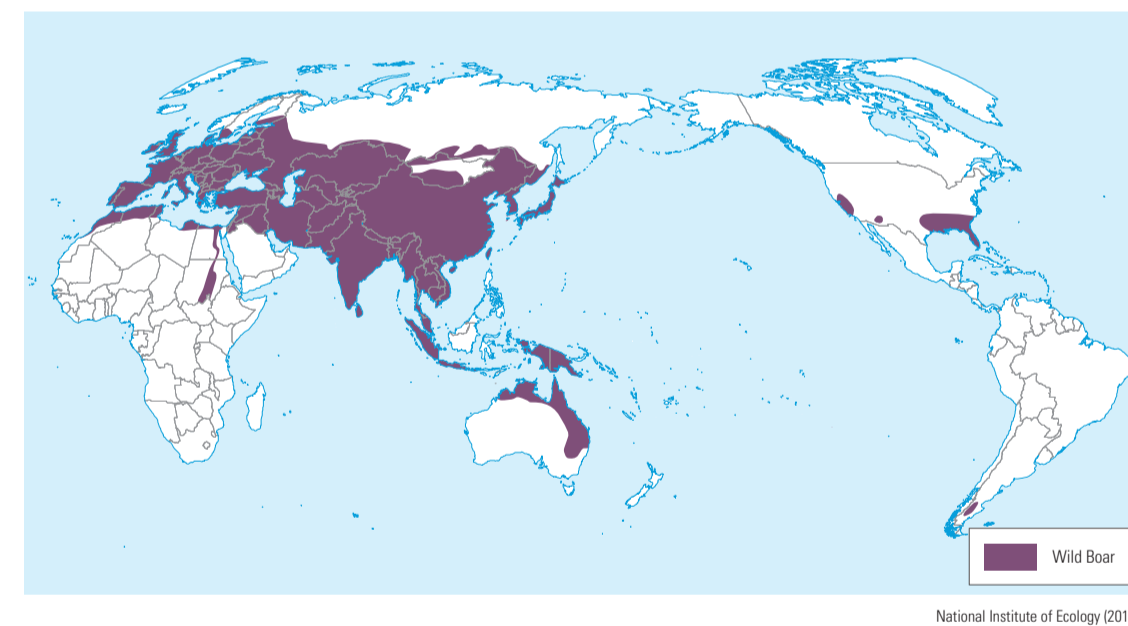
The Korean goral (*Naemorhedus caudatus*) is a species of wild goat found in the mountains of eastern and northern Asia, including Russia, China, and Korea. This species has been listed as endangered in South Korea with an estimated population less than 250, and has been designated as the Natural Monument No. 217. It inhabits rocky and steep mountains along Nangnimsanmaek and Taebaek-samaek, and a few are also found around the Baekdusan area and in the Korean Demilitarized Zone. Korean gorals have been on the Earth for 2 million years and are called “living fossils.” Since the oldest Korean goral fossil that is estimated to be 210

thousand year-old (mid-Pleistocene) was excavated in Pyeongyang-si (Ryeokpo), more fossils have been unearthed in 7 places in North Korea (Ryonggok, Daeheunggul, Cheongcheongam, Mandal, Seungrisan, Haesang Cave, and Cheongpdae) and 4 places in South Korea (Geumgul and Gunnggul in Danyang-gun, Chungcheongbuk-do, Sanggul in Pyeongchang-gun, Gangwon-do, and Yeonigul in Yeongwol-gun, Gangwon-do). Most were found in flat lowlands of the northwestern and central regions of the Korean Peninsula. This distribution pattern may indicate that, unlike today, the Korean goral inhabited both high and lowlands in the past.

Excavation Sites of Korean Goral Fossils

Excavation site	Excavation Site	Latitude	Longitude	Elevation (m)
Seungrisan	Seungrisan, Deokcheon-si, Pyeongannam-do	39° 47' 59.0"N	126° 18' 59.0"E	17.5
Ryeokpo	Ryongsanri, Daehyeon-dong, Ryeokpoguyek, Pyeongyang-si	39° 04' 29.1"N	125° 50' 37.1"E	6.5
Cheongcheongam	Barangol, Sangwon-eup, Sangwon-gun, Pyeongyang-si	38° 59' 05.0"N	125° 44' 00.0"E	-
Mandal	Mandal-ri, Seungho-guyek, Pyeongyang-si	38° 56' 30.0"N	126° 01' 30.6"E	14
Yonggok	Ryonggok-ri, Sangwon-gun, Pyeongyang-si	38° 53' 19.8"N	126° 05' 30.4"E	100
Daeheunggul	Cheongpdae, Hwangju-eup, Hwangju-gun, Hwanghaebuk-do	38° 49' 00.0"N	126° 49' 59.0"E	100
Cheongpdae	Cheongpdae, Hwangju-eup, Hwangju-gun, Hwanghaebuk-do	38° 41' 00.0"N	125° 16' 58.0"E	8
Haesang	Hvegol, Haesang-ri, Pyeongsan-gun, Hwanghae-do	38° 17' 23.9"N	126° 12' 20.6"E	-
Sanggul	Gihwa-ri, Mitan-myeon, Pyeongchang-gun, Gangwon-do	37° 18' 37.0"N	128° 31' 39.0"E	300
Yeonigul	Gurae-ri, Sangdong-eup, Yeongwol-gun, Gangwon-do	37° 08' 53.0"N	128° 50' 58.0"E	740
Gunnggul	Yeocheon-ri, Gagok-myeon, Danyang-gun, Chungcheongbuk-do	37° 01' 44.0"N	128° 21' 57.0"E	321
Geumgul	Dodam-ri, Danyang-eup, Danyang-gun, Chungcheongbuk-do	36° 59' 46.6"N	128° 21' 26.6"E	135

Global Distribution of Wild Boar (*Sus scrofa*)



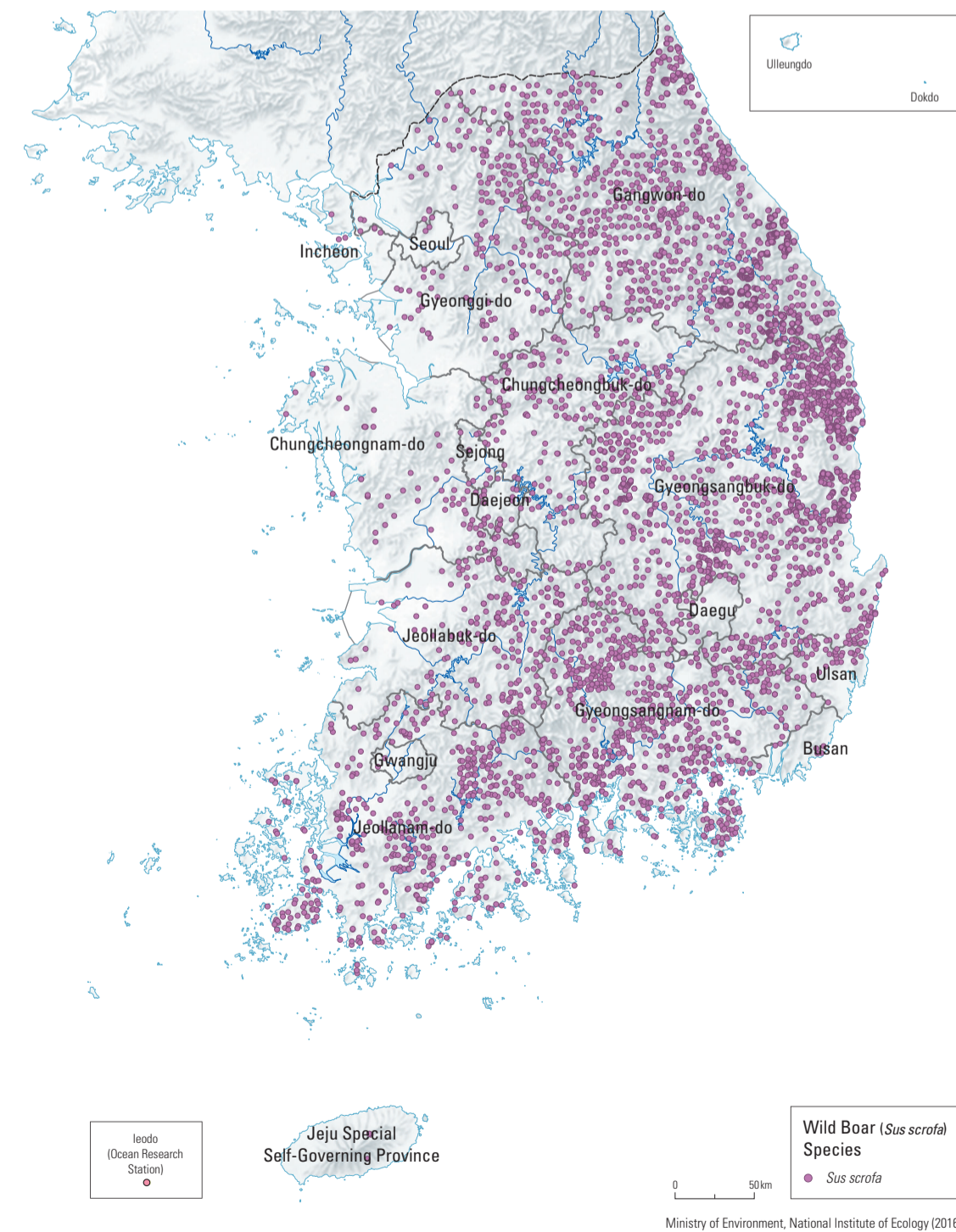
The wild boar (*Sus scrofa*) had been distributed throughout South Korea except in Jeju-do; however, the species has been naturalized in Jeju-do recently. With a high fertility rate and ability to adapt to its environment, the species exhibits a trend of increasing population. The wild boar is mostly nocturnal and able to cross kilometers of river or sea in some cases. The wild boar can generally be described as having a large head, short neck, small eyes, and relatively big ears. More specifically, its head is long, conical-shaped, and its neck is short and thick. It has triangle-shaped earflaps that point upwards, and its eyes are very small, while its legs are short and thick. Bristles cover its body, with fur resembling a mane on top. Its coat consists of brown color fur that fades with age. Two canine teeth protrude at the bridge of the nose. The disappearance of large predato-

ry animals such as tigers and leopards in Korea led to a constant increase in the population of the wild boar, the species has been encroaching on farmlands, causing damage. The Ministry of Environment has designated the wild boar as a harmful wild animal and has been controlling its population size.

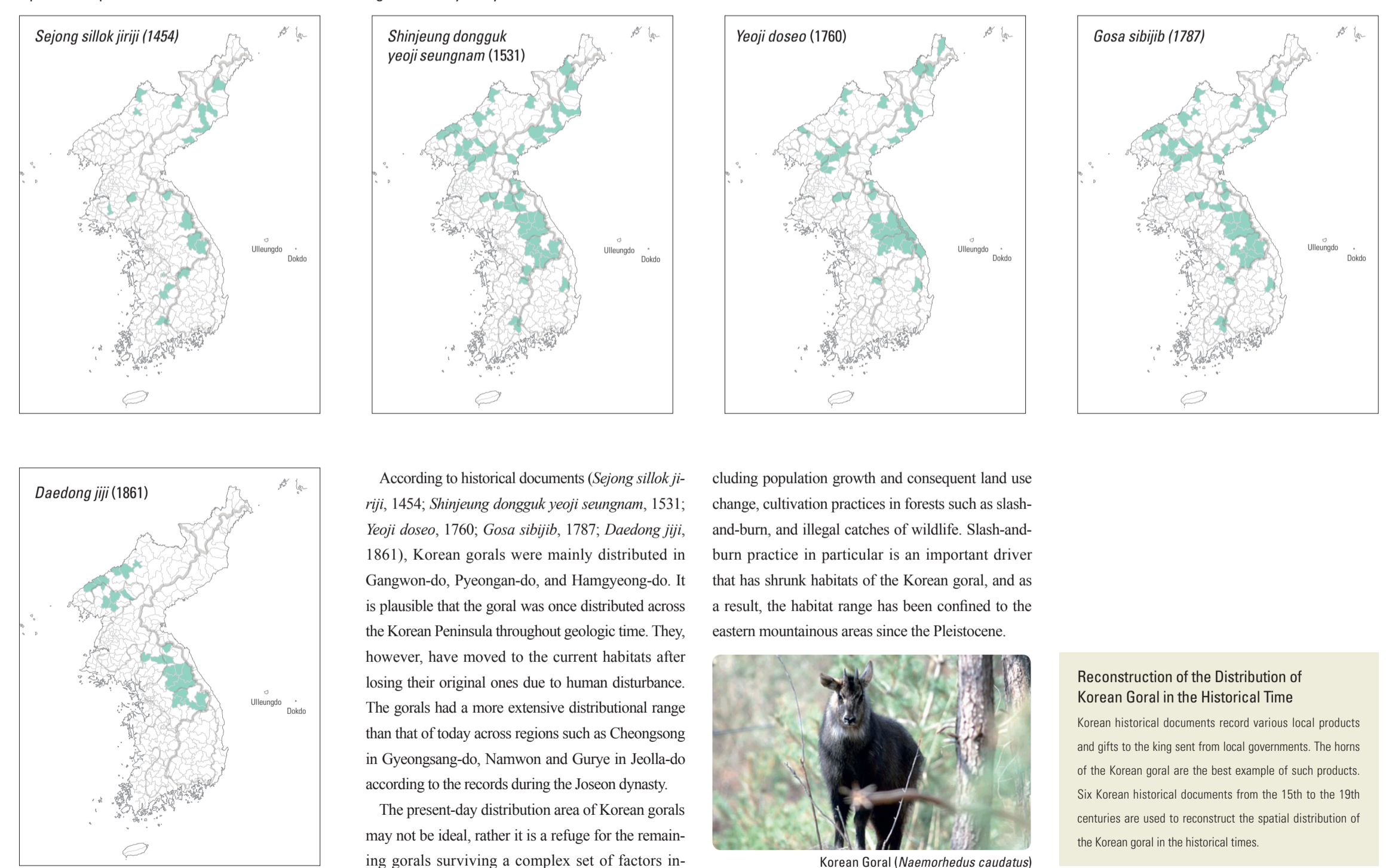


Wild Boar (Civilian Control Line Area, Goseong-gun)

Domestic Distribution of Wild Boar (*Sus scrofa*)



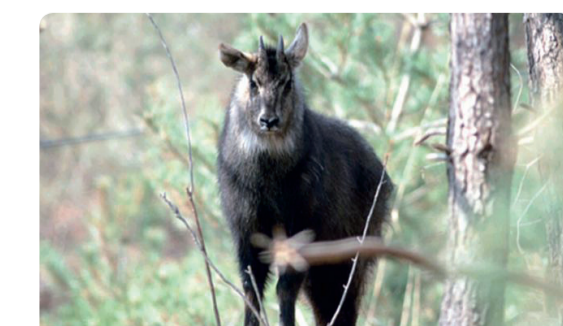
Spatio-Temporal Distribution of Korean Goral During Joseon Dynasty



According to historical documents (*Sejong sillok jiriji*, 1454; *Shinjeung dongguk yeoji seungnam*, 1531; *Yeoji doseo*, 1760; *Gosa sibijib*, 1787; *Daedong jiji*, 1861), Korean gorals were mainly distributed in Gangwon-do, Pyeongan-do, and Hamgyeong-do. It is plausible that the goral was once distributed across the Korean Peninsula throughout geologic time. They, however, have moved to the current habitats after losing their original ones due to human disturbance. The gorals had a more extensive distributional range than that of today across regions such as Cheongsong in Gyeongsang-do, Namwon and Gurye in Jeolla-do according to the records during the Joseon dynasty.

The present-day distribution area of Korean gorals may not be ideal, rather it is a refuge for the remaining gorals surviving a complex set of factors in-

cluding population growth and consequent land use change, cultivation practices in forests such as slash-and-burn, and illegal catches of wildlife. Slash-and-burn practice in particular is an important driver that has shrunk habitats of the Korean goral, and as a result, the habitat range has been confined to the eastern mountainous areas since the Pleistocene.



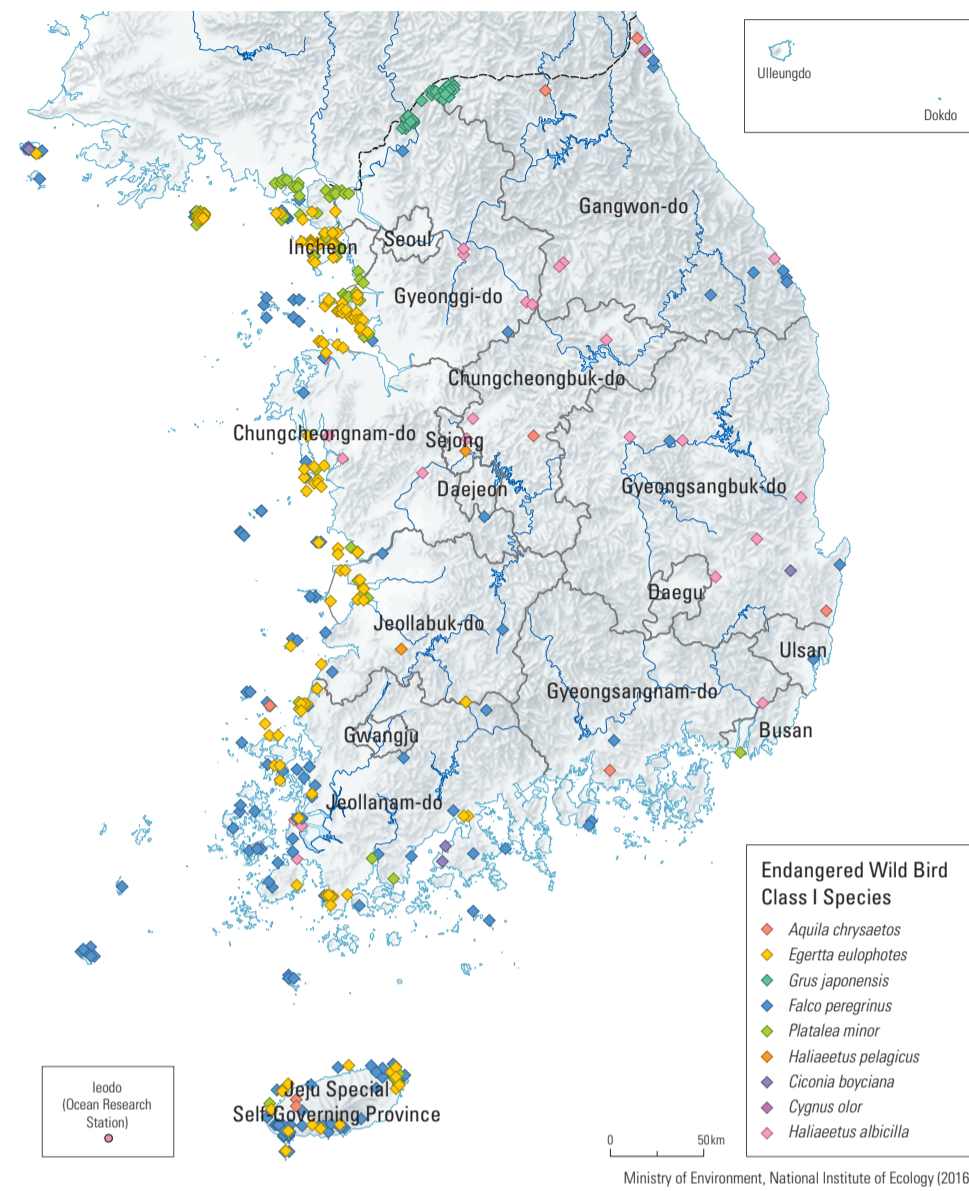
Korean Goral (*Naemorhedus caudatus*)

Reconstruction of the Distribution of Korean Goral in the Historical Time

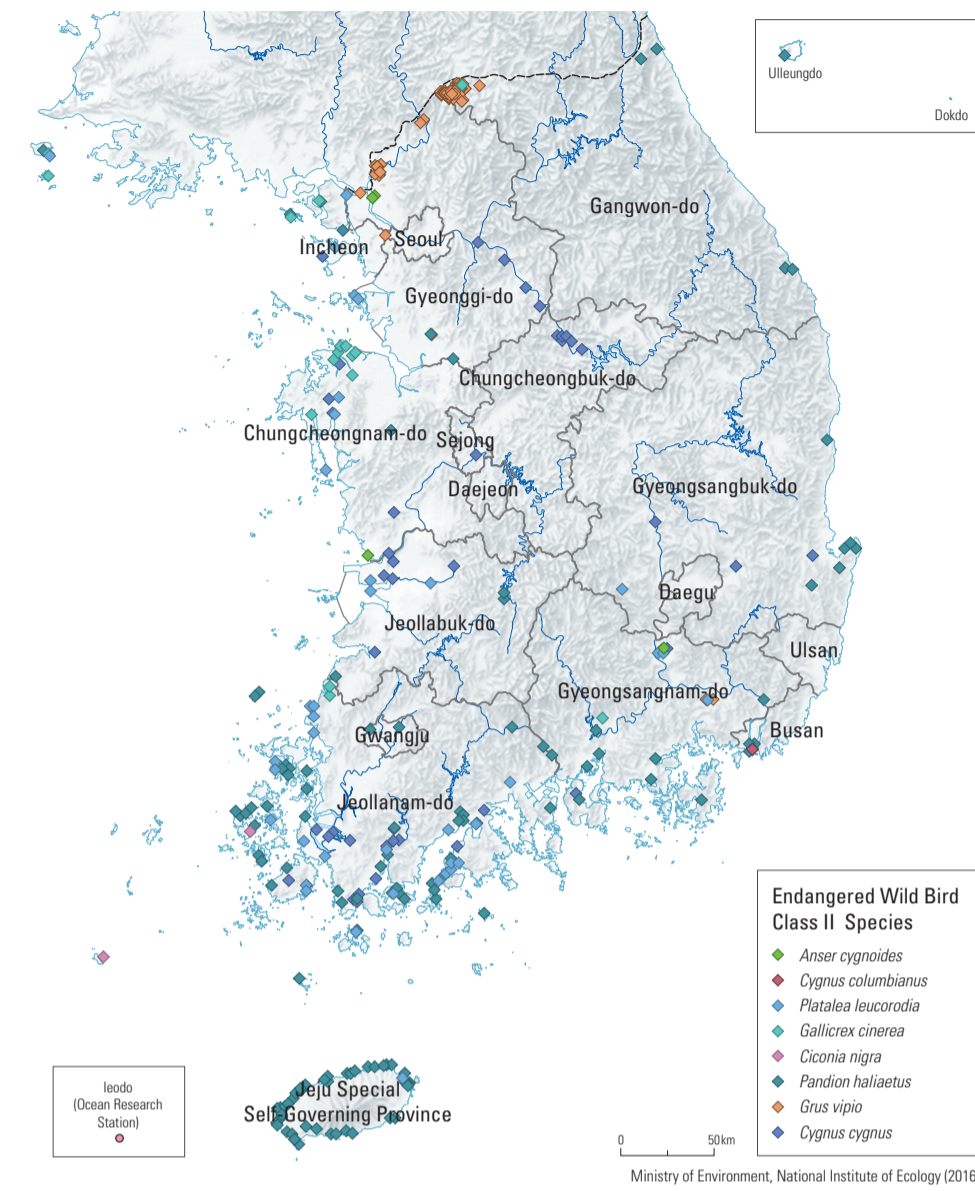
Korean historical documents record various local products and gifts to the king sent from local governments. The horns of the Korean goral are the best example of such products. Six Korean historical documents from the 15th to the 19th centuries are used to reconstruct the spatial distribution of the Korean goral in the historical times.

Wild Birds

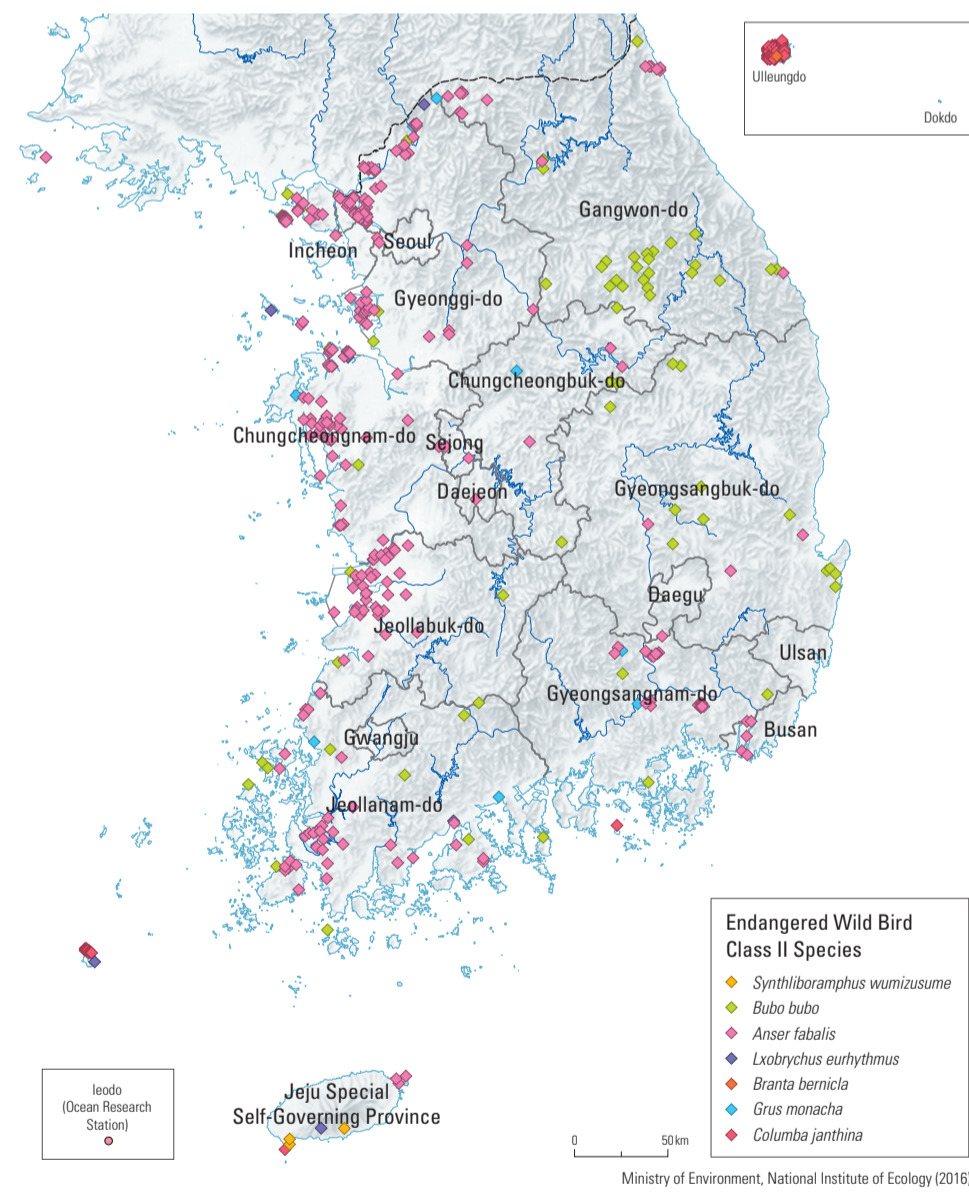
Distribution of Endangered Wild Bird Class I Species



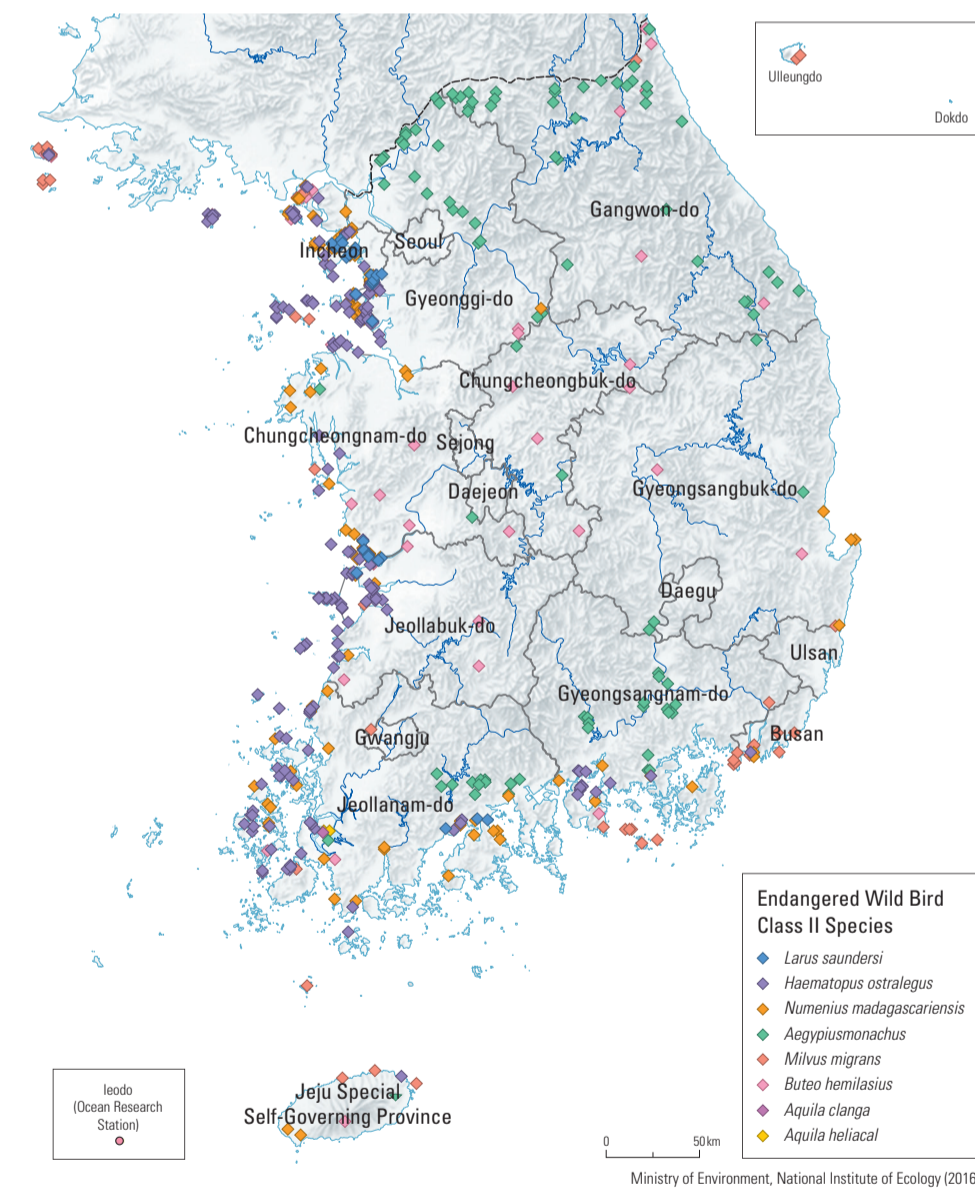
Distribution of Endangered Wild Bird Class II Species (1)



Distribution of Endangered Wild Bird Class II Species (2)

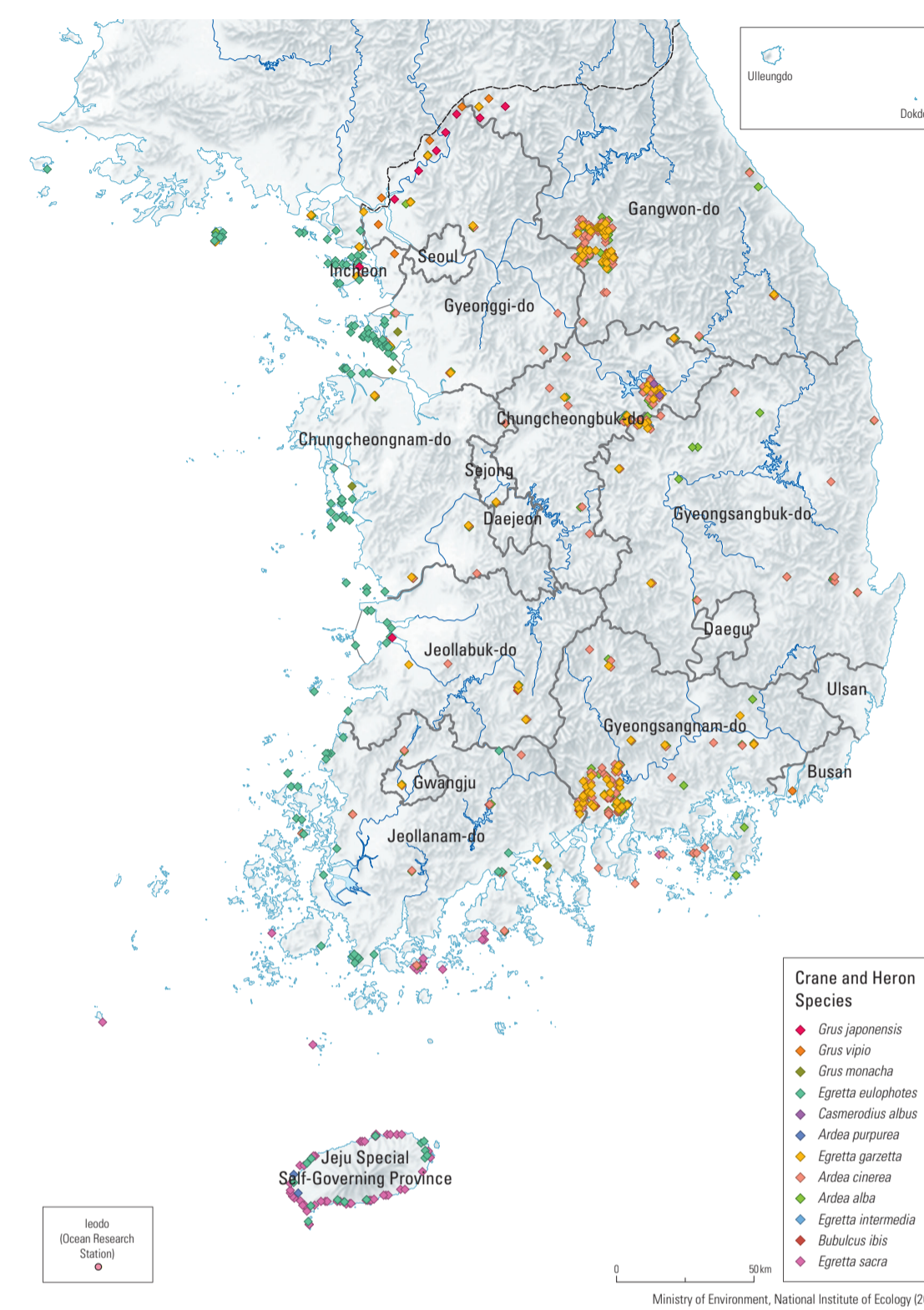


Distribution of Endangered Wild Bird Class II Species (3)

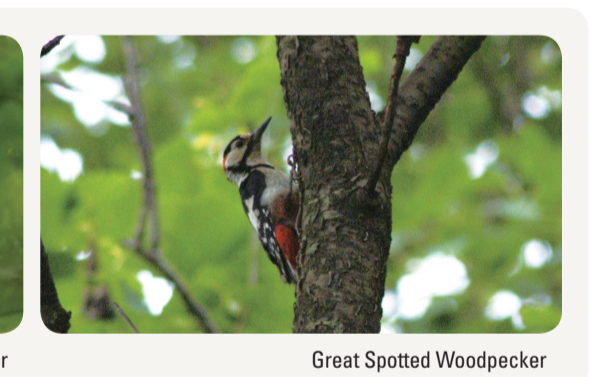
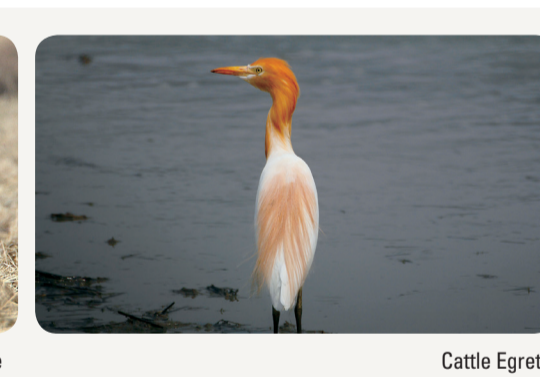
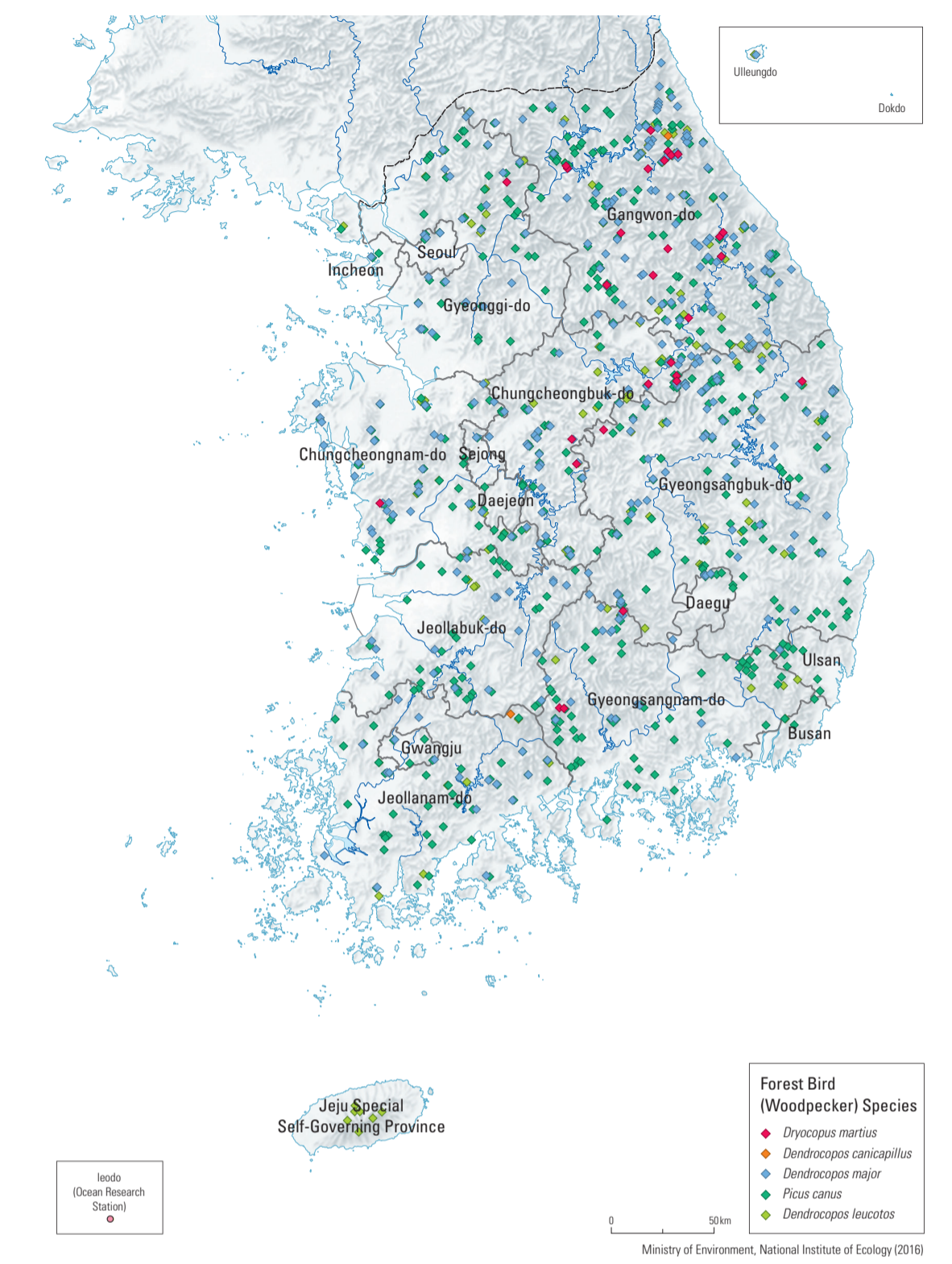


Representative Wild Birds

Distribution of Crane and Heron Species



Distribution of Forest Bird (Woodpecker) Species



Among the 522 bird species that have been identified in Korea, 61 species have been designated as Endangered Wild Species (12 species of Class I, 49 species of Class II) by the Ministry of Environment. The mute swan (*Cygnus olor*), Oriental stork (*Ciconia boyciana*), black-faced spoonbill (*Platalea minor*), Chinese egret (*Egretta eulophotes*), peregrine falcon (*Falco peregrinus*), white-tailed eagle (*Haliaeetus albicilla*), Steller's

sea eagle (*Haliaeetus pelagicus*), golden eagle (*Aquila chrysaetos*), red-crowned crane (*Grus japonensis*), spotted greenshank (*Tringa guttifer*), spoon-billed sandpiper (*Eurynorhynchus pygmaeus*), and white-bellied woodpecker (*Dryocopus javensis*) belong to Endangered Wild Species Class I. The Endangered Wild Species Class II of birds include the swan goose (*Anser cygnoides*) and bean goose (*Anser fabalis*), inhabiting wet-

lands and riparian areas; the Eurasian oystercatcher (*Haematopus ostralegus*), Far Eastern curlew (*Numenius madagascariensis*), and Japanese murrelet (*Synthliboramphus wumizusume*), observed on tidal flats or at sea; the Japanese wood pigeon (*Columba janthina*) and Styan's grasshopper warbler (*Locustella pleskei*), living in island habitats; the Chinese sparrowhawk (*Accipiter soloensis*), hen harrier (*Circus cyaneus*), Eurasian eagle-owl

(*Bubo bubo*), northern goshawk (*Accipiter gentilis*), black woodpecker (*Dryocopus martius*), and fairy pitta (*Pitta nympha*), living in grasslands or forested areas; and the black kite (*Milvus migrans*), upland buzzard (*Buteo hemilasius*), and cinereous vulture (*Aegypius monachus*), living on open terrain. Of the 47 bird species that have been designated as Korean Natural Monuments, 46 are wild birds.

Belonging to the order Gruiformes, cranes are large in size with long legs and necks. Globally, cranes belong to 4 genera and 15 species. In regions of North-east Asia, several species reproduce here including the red-crowned crane (*Grus japonensis*), white-naped crane (*Grus vipio*), hooded crane (*Grus monacha*), and demoiselle crane (*Anthropoides virgo*), while the Eurasian crane (*Grus grus*) and Siberian crane (*Grus leucogeranus*) can be observed during migratory and wintering seasons.

Cranes inhabit wetlands or grasslands. The wintering season in South Korea spans from October to March, during which the flock migrates south from its summer habitat. Cranes display diurnal behaviors, differentiating sleeping grounds and feeding territories in wintering areas in South Korea, and mostly feed on plant bulbs and fallen grains and invertebrates in cultivated fields.

Seven species of cranes inhabit South Korea, including the red-crowned crane, white-naped crane,

hooded crane, Eurasian crane, sandhill crane (*Crus canadensis*), Siberian crane, and demoiselle crane. The red-crowned crane, white-naped crane, and hooded crane mostly winter in South Korea. The hooded crane inhabits South Korea only temporarily as a migratory stopover; however, the population of hooded cranes has been increasing recently. Of the cranes inhabiting South Korea, the red-crowned crane and Siberian crane are globally endangered species. In particular, the red-crowned crane is protected and designated as both, an Endangered Wild Species Class I and a Korean Natural Monument. With very few recorded observations in South Korea, the Siberian crane is not protected under the law but is classified as Endangered on the IUCN Redlist.

Of 62 species of herons around the globe, 18 species inhabit South Korea. The nine major species are the black-crowned night heron (*Nycticorax nycticorax*), Chinese pond heron (*Ardea cinerea*), great egret (*Ardea alba*), intermediate egret (*Egretta*

*intermedia*), little egret (*Egretta garzetta*), Chinese pond heron (*Ardeola bacchus*), cattle egret (*Bubulcus ibis*), Pacific reef egret (*Egretta sacra*), and Chinese egret (*Egretta eulophotes*), which breed in flocks around low hilly forests near villages or in the woodlands of uninhabited islands. The Chinese little bittern (*Ixobrychus sinensis*) and Schrenk's bittern (*Ixobrychus eurhythmus*) breed in single pairs in emerging plant communities, while the green-backed heron (*Butorides striatus*) breeds in single pairs in woodlands. Records from 2009 indicate sightings of Japanese night heron (*Gorsachius gorsachii*) breeding in Jeju-do and Gubongsan of Busan.

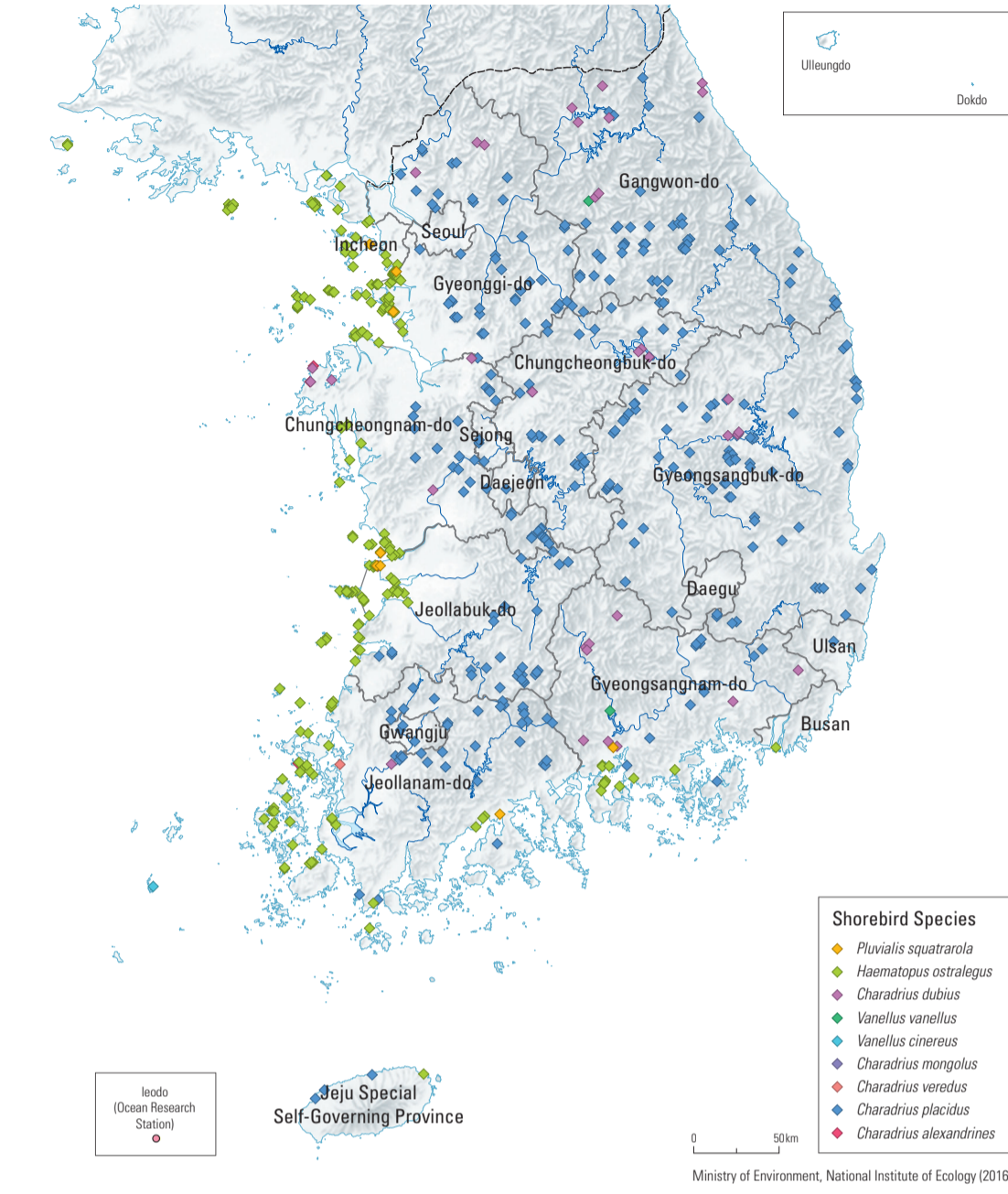
While rarely spotted, the spring and autumn migratory seasons are the time of year to occasionally see the cinnamon bittern (*Ixobrychus cinnamomeus*), black bittern (*Butorides flavicollis*), and purple heron (*Ardea purpurea*), while the striated bittern (*Botaurus stellaris*) is rarely spotted during the winter season. Single individuals of the Malayan night heron species

(*Gorsachius melanolophus*) are on record as having been rescued in Gunsan-si in 2006.

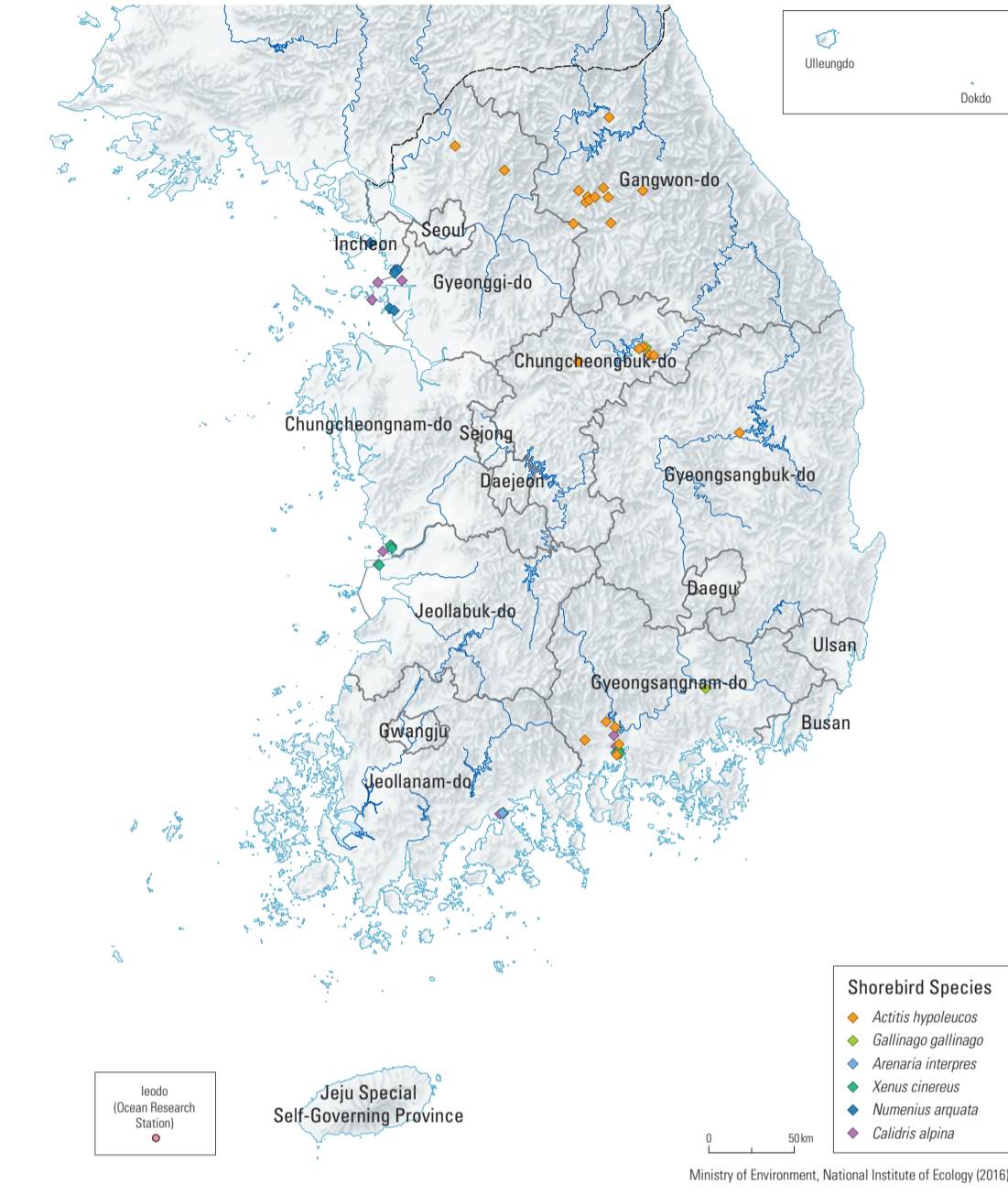
Forest birds consist of 244 species that reproduce in, winter at, or temporarily inhabit the forest region. Forest birds can be categorized into species displaying strong forest habitat preference (residing and feeding in forests), intermediate forest habitat preference (either residing or feeding in forests), and weak preference (migrating through forests). Of forest birds, 188 species belong to the group displaying strong preferences, 46 belong to the group of intermediate preferences, and 10 belong to the weak preferences group.

As a long-term ecological study, the Forest Bird Density Survey has been continuing since 2003 around the areas of Gwangneung, Gyeongju, Geumsan, and Jeju-do. Since 2015, the study has expanded to the regions of Baekdudaegan, including nests in forests, rivers, farmlands, and the settlements of Jirisan, Odaesan, Taebaeksan, Sobaksan, and Deogyusan.

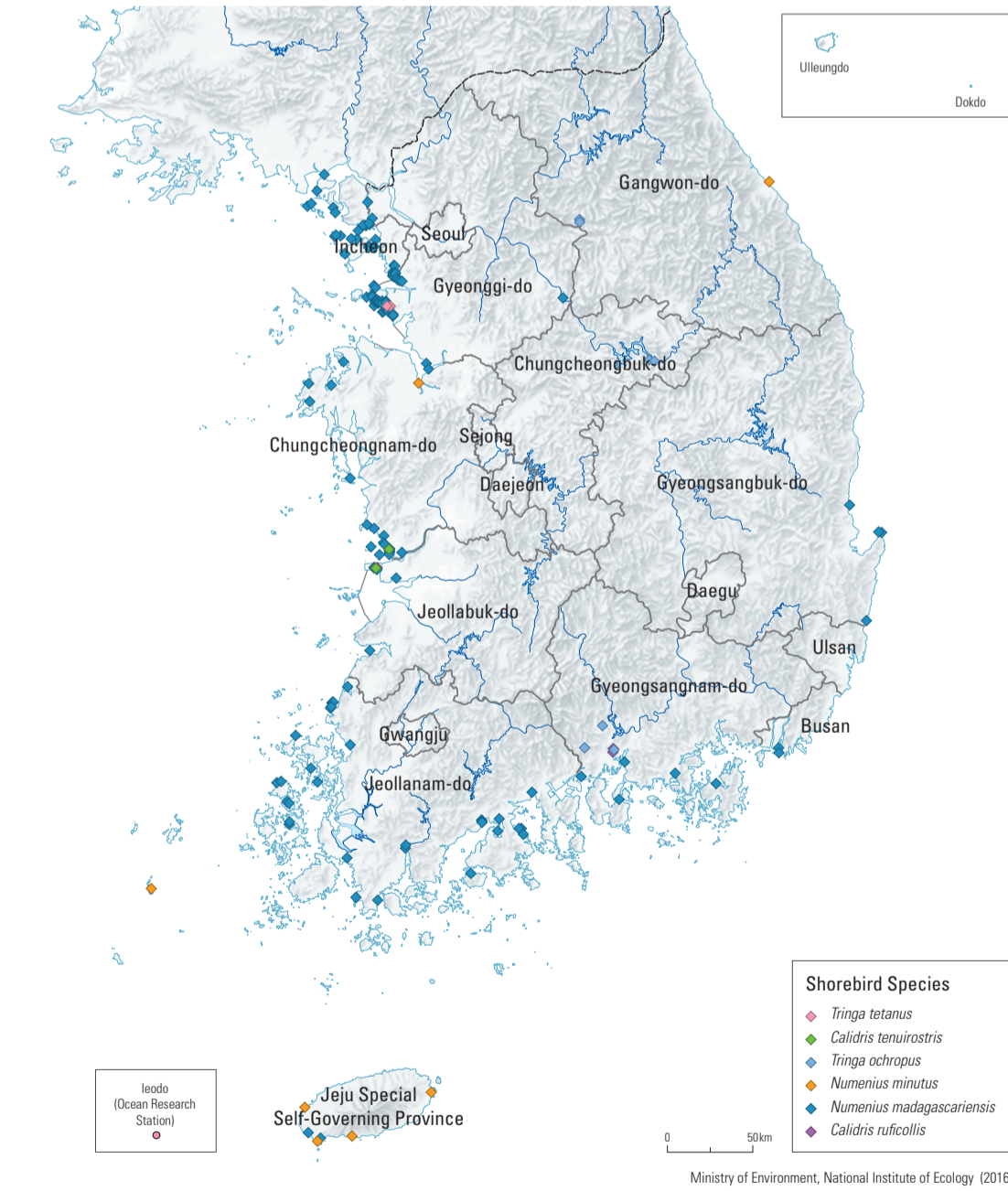
Distribution of Shorebird Species (1)



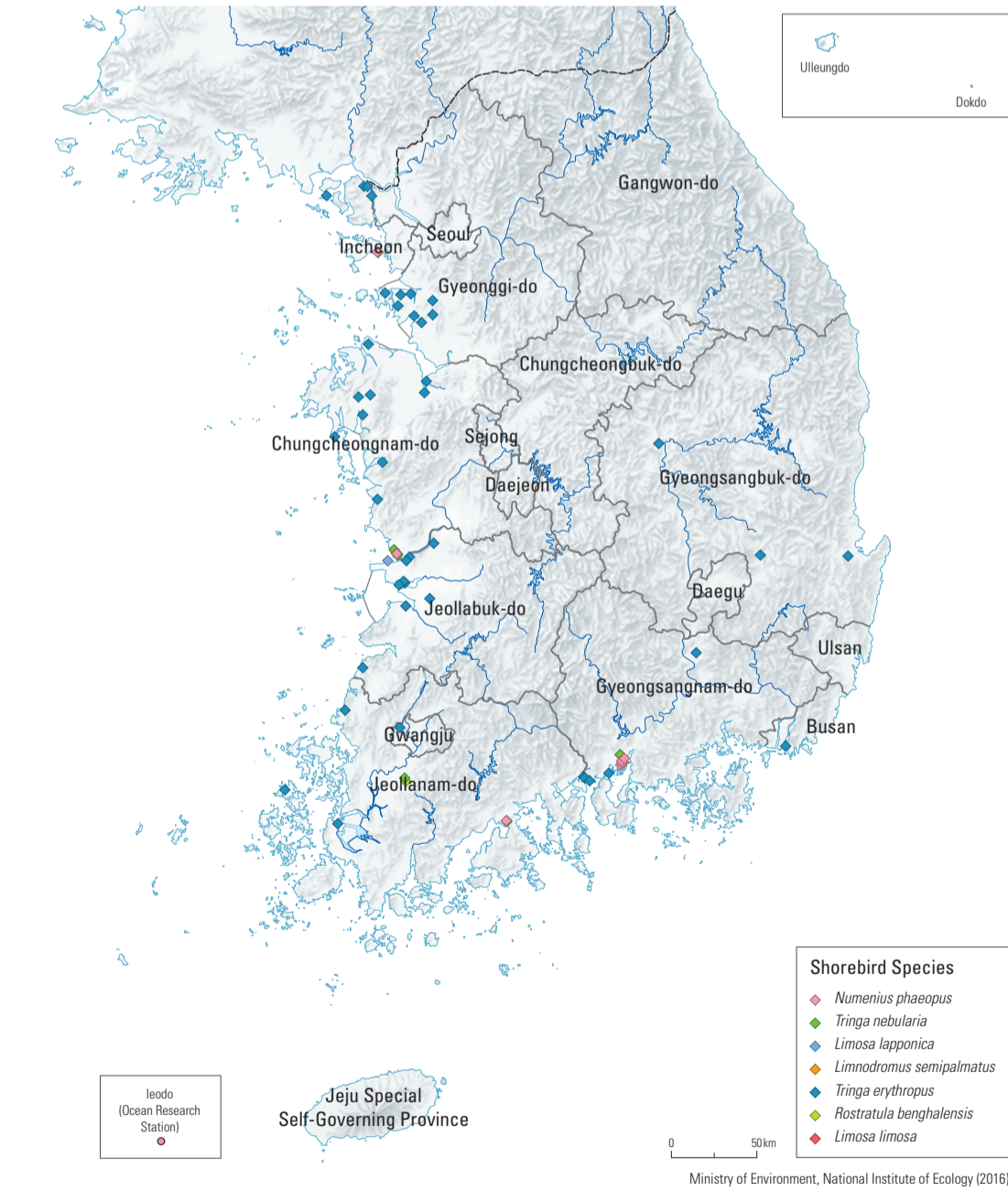
Distribution of Shorebird Species (2)



Distribution of Shorebird Species (3)



Distribution of Shorebird Species (4)



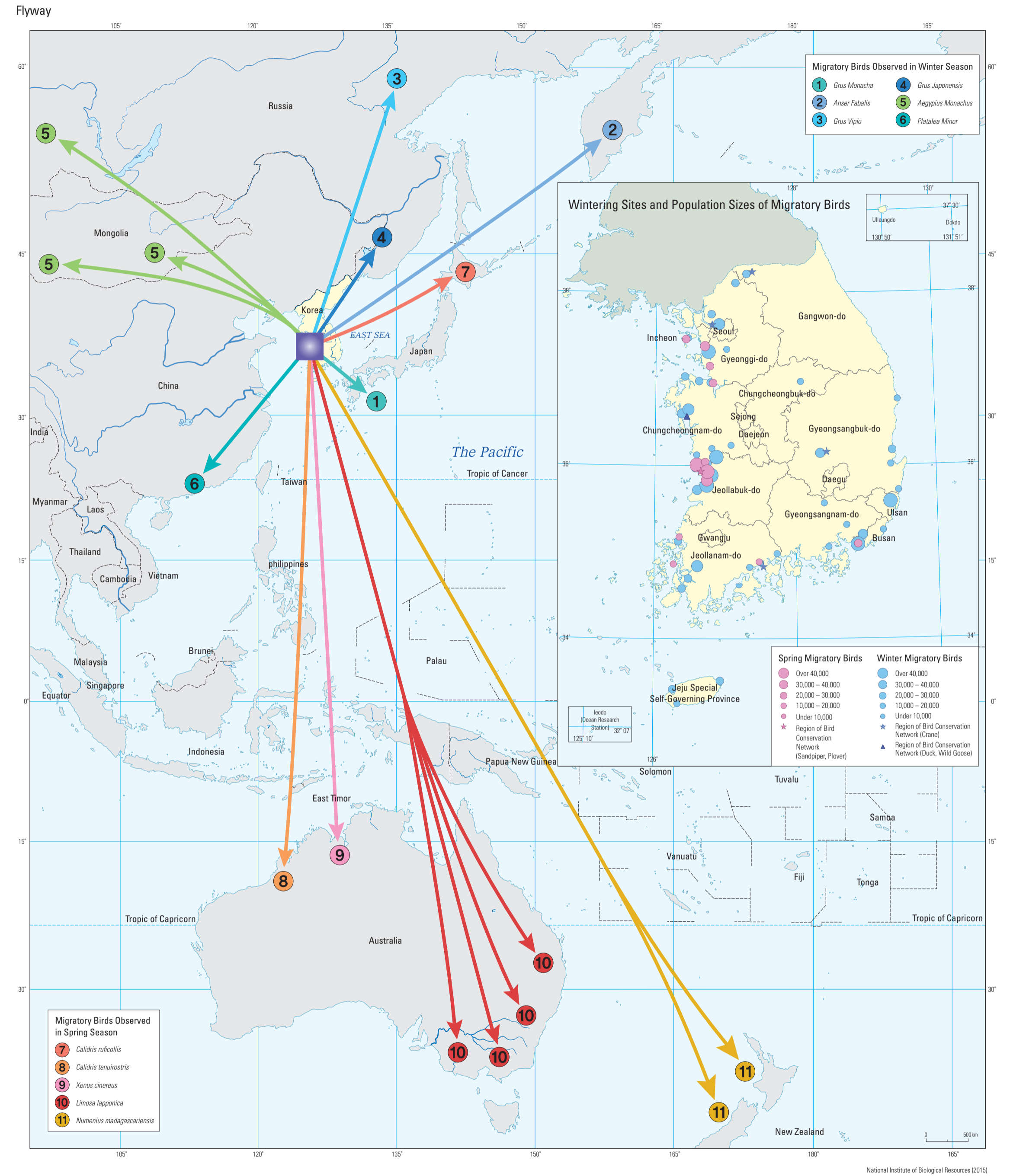
Bird species with various beak types and long legs inhabiting wetlands are called shorebirds or waders. Of the 216 bird species recorded globally as shorebirds, 70.8% of species belong to the

sandpiper or plover family. A total of 63 species and 7 families of sandpipers and plovers have been recorded in South Korea, including the families such as Recurvirostridae, Charadriidae, Rostratulidae, Jacanidae, Scolopacidae, Glareolidae, and Haematopodidae belonging to the order, Charadriiformes. Sandpipers and plovers follow the East Asia-Australia

Flyway (EAAF) for breeding and wintering, and use regions of South Korea as a stopover area.

Many migratory birds that are internationally endangered visit and use the Korean Peninsula as over-wintering sites, breeding sites, and stop-over sites. Especially, shore birds that spend winter in

Flyway of Major Migratory Birds

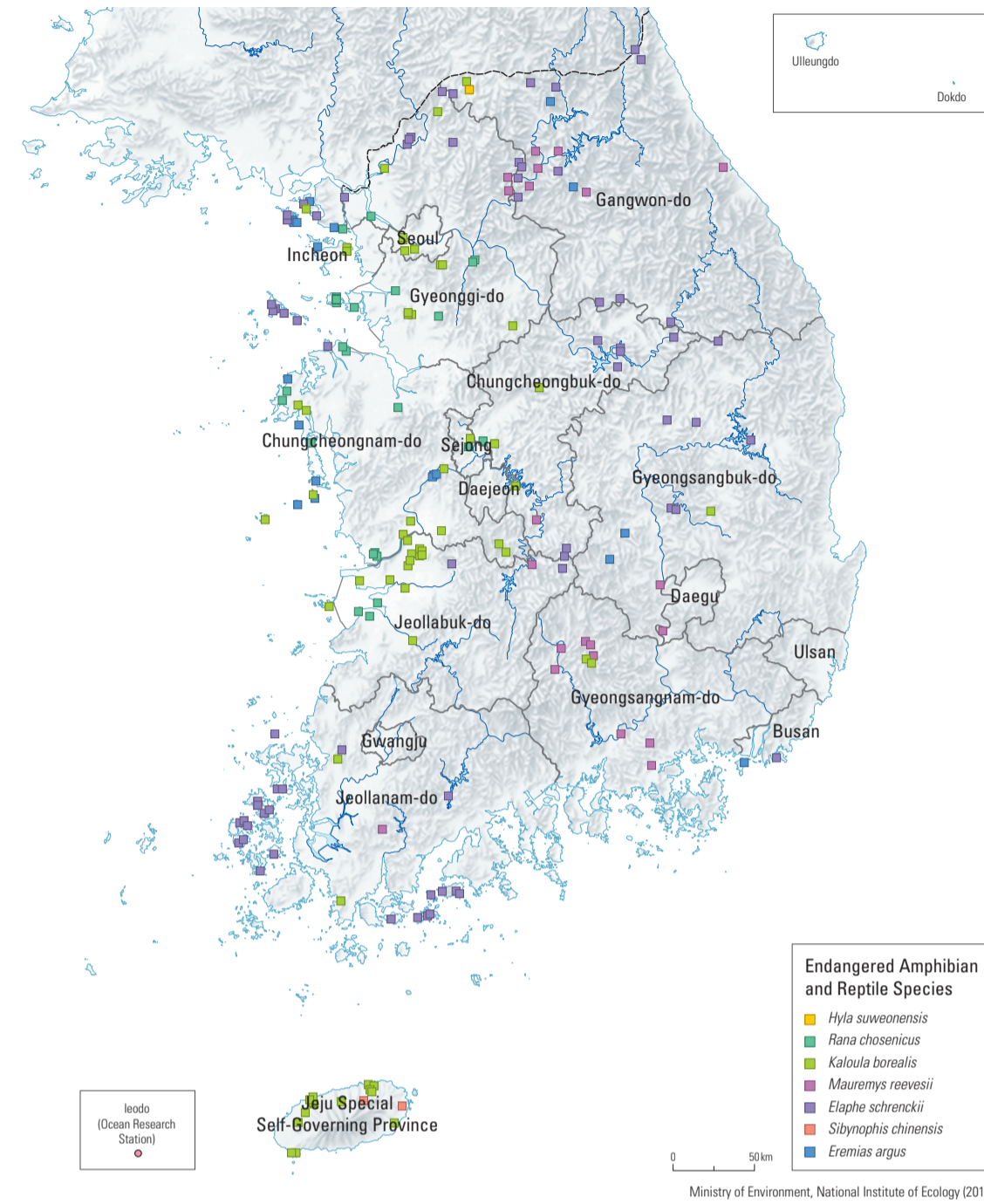


Australia and New Zealand and then migrate to Siberia for breeding stop to feed in the tidal flats of the west coast of Korea during spring and autumn. Sandpipers and plovers visiting South Korea follow the East Asia-Australia Flyway (EAAF), one of the 9 major flight paths used by migratory waterfowls in the annual bird migration for breeding and wintering. It has been reported that 35 species

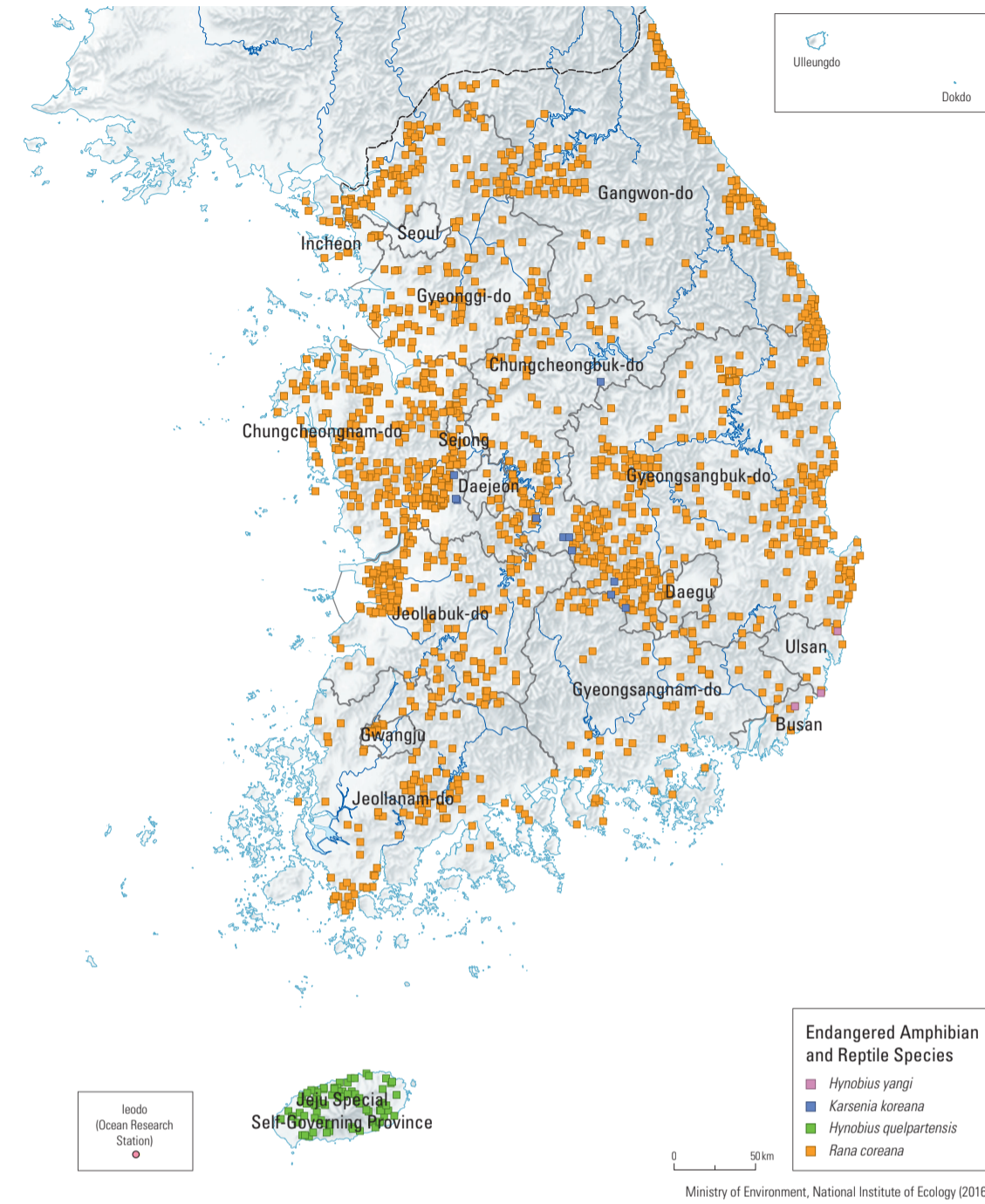
of globally endangered waterfowl, 13 species of near-threatened waterfowl, and 50 million birds belonging to more than 250 population units travel along the EAAF.

Amphibians and Reptiles

Distribution of Endangered Amphibian and Reptile Species (1)



Distribution of Endangered Amphibian and Reptile Species (2)



**Gori Salamander**  
(*Hynobius yangi*)

Inhabits certain regions of Gyeongsangnam-do, distributed around woodlands and cultivated lands. Its full length is 7 – 12 cm, while its length from mouth to cloacal cavity is 4 – 6 cm. Mostly nocturnal, it feeds on earthworms, arachnids, aquatic insects, and insects such as ants, beetles, and crickets. Lifespan of 10 – 11 years.



**Korean Crevice Salamander**  
(*Karsenia koreana*)

Inhabits the woodlands of Chungcheong-do, Jeollabuk-do, Gyeongsangnam-do, and Gangwon-do. Mostly found under fallen leaves or old trees and under stones around valleys or streams that are dense with large trees. Its full length is 6 – 10 cm, while its length from mouth to cloacal cavity is 3 – 5 cm.



**Jeju Salamander**  
(*Hynobius queipartensis*)

Inhabits parts of Jeju do and the west and south coasts of Korea. Distributed around agricultural waterways in cultivated lands and woodlands, and regions surrounding pools and woodlands. Its full length is 9 – 14 cm, while its length from mouth to cloacal cavity is 5 – 7 cm. Feeds on earthworms, arachnids, aquatic insects, and insects such as ants, beetles, and crickets. Lifespan of 9 – 10 years.



**Korean Brown Frog**  
(*Rana coreana*)

Distributed throughout South Korea, excluding Jeju do. Inhabits rice fields, agricultural waterways, wetlands, pools surrounding plains and grasslands, and nearby woodlands. The smallest among other brown frogs, its length from mouth to cloacal cavity is 3.5 – 5.0 cm.



**Korean Ratsnake**  
(*Elaphe schrenckii*)

Inhabits regions throughout South Korea, except Jeju do. Distributed mostly in woodlands, cultivated lands, and villages along coasts and islands. Frequently exhibits camouflage coloring, depending on individuals. Scales at the central part of the torso are generally in 23 rows. All of the 23 rows except 3 – 5 rows from the outer edges contain mastodon bones.



**Black-Headed Snake**  
(*Sibynophis chinensis*)

Known to be distributed only in the grasslands of Jeju do. It is the smallest and thinnest snake in South Korea. Displays physical characteristics similar to the Asian keelback (*Amphiesma vibakari ruthveni*), but with a wide black pattern from the crown to the nape. Mostly feeds on small reptiles and small snakes such as the Wolter lizard (*Takydromus wolteri*).



**Mongolian Racerunner**  
(*Eremias argus*)

Distributed throughout South Korea, except Jeju do. Inhabits grasslands near rivers, coastal areas near beaches, grassy areas of sand dunes, and nearby tombs or bare ground in grasslands. Compared to other lacer-tids, it has a similar tail and body length but larger head size. The number of pairs of femoral pores in the scales of the groin is usually 11.



**Reeve's Pond Turtle**  
(*Mauremys reevesii*)

Inhabits rivers, farmland, reservoirs, waterways, and rice fields throughout South Korea, excluding Jeju do. It has a pattern of multiple green stripes running from behind each eye to the neck. Omnivorous, it feeds on insects, gastropods, crustaceans, fish, and aquatic plants. Lays 4 – 15 eggs during the months of June and July in burrows in grasslands near rivers.

There are 32 species of reptiles and 22 species of amphibians inhabiting South Korea. Among these species, the Ministry of Environment designated the black-headed snake (*Sibynophis chinensis*) and Suwon treefrog (*Hyla suweonensis*) as

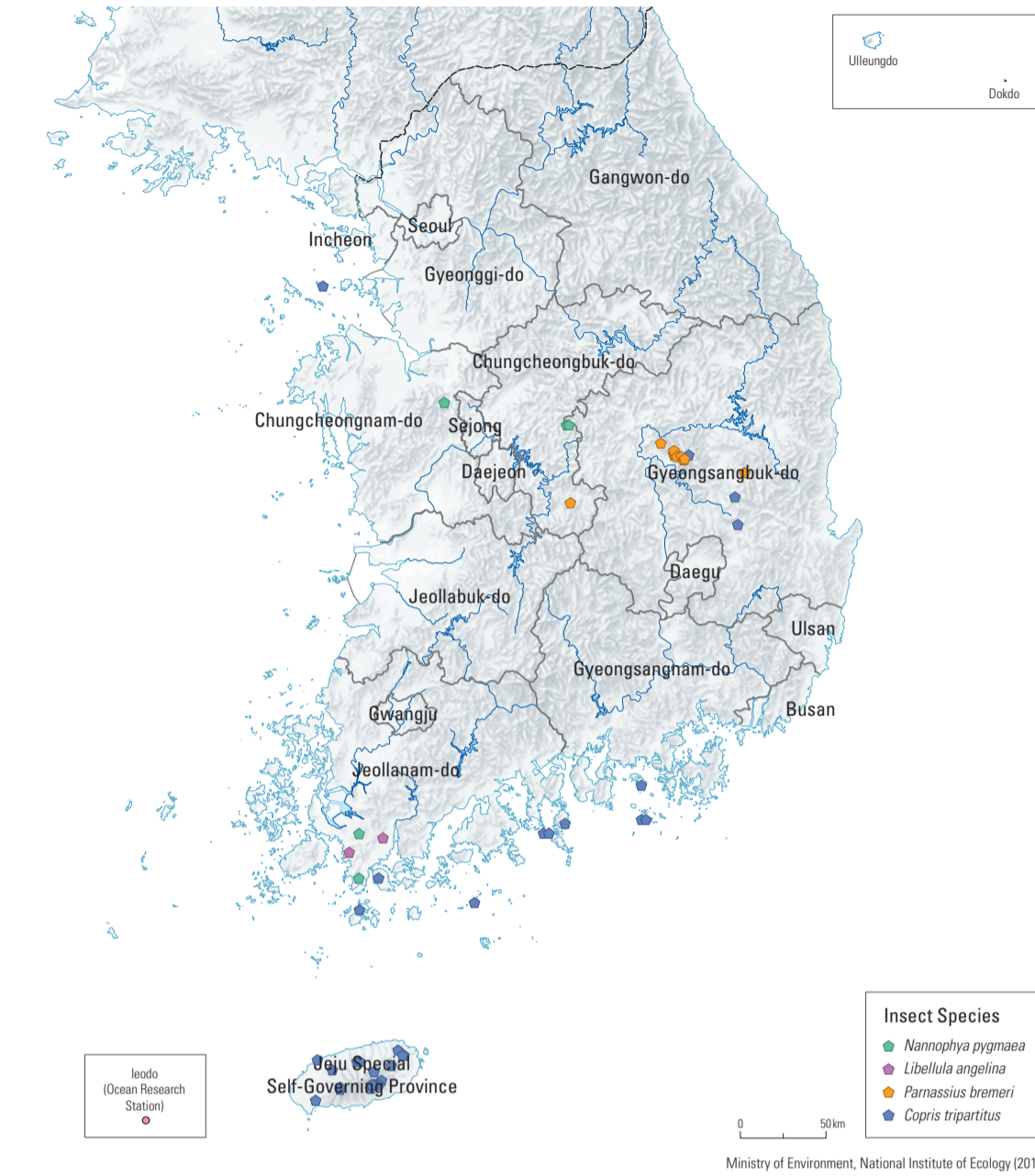
Endangered Wild Species Class I. The rat snake (*Elaphe schrenckii*), Korea golden frog (*Rana chosonensis*), reeve's pond turtle (*Mauremys reevesii*), Narrow-mouthed frog (*Kaloula borealis*), and Mongolian racerunner (*Eremias argus*) are

designated as Endangered Wild Species Class II. Six species, including the Gori salamander (*Hynobius yangi*), Korean crevice salamander (*Karsenia koreana*), Suwon treefrog, Jeju salamander (*Hynobius queipartensis*), Korean brown

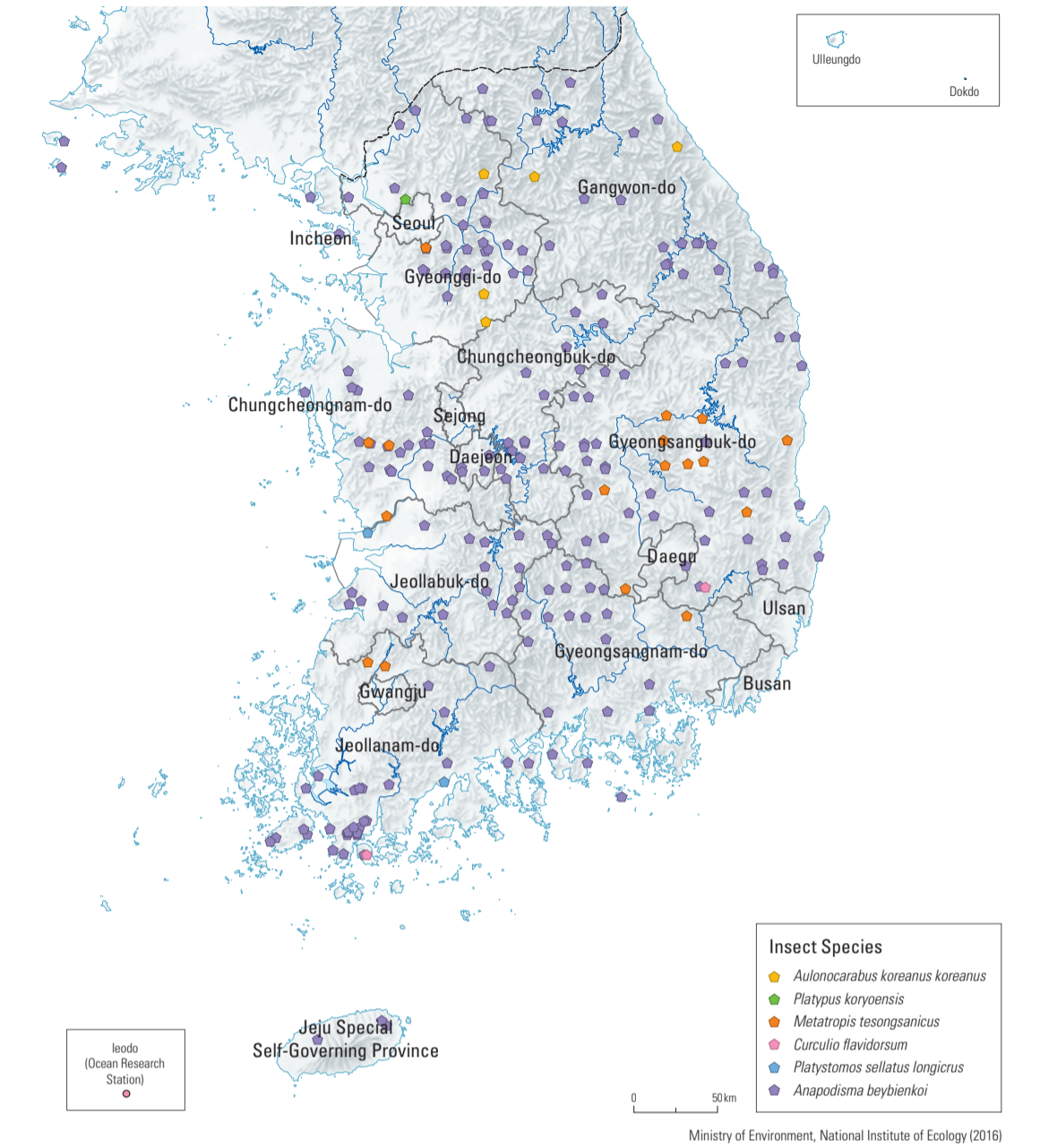
frog (*Rana coreana*), and Korean golden frog (*Rana chosonensis*) are known to be endemic to South Korea.

Insects

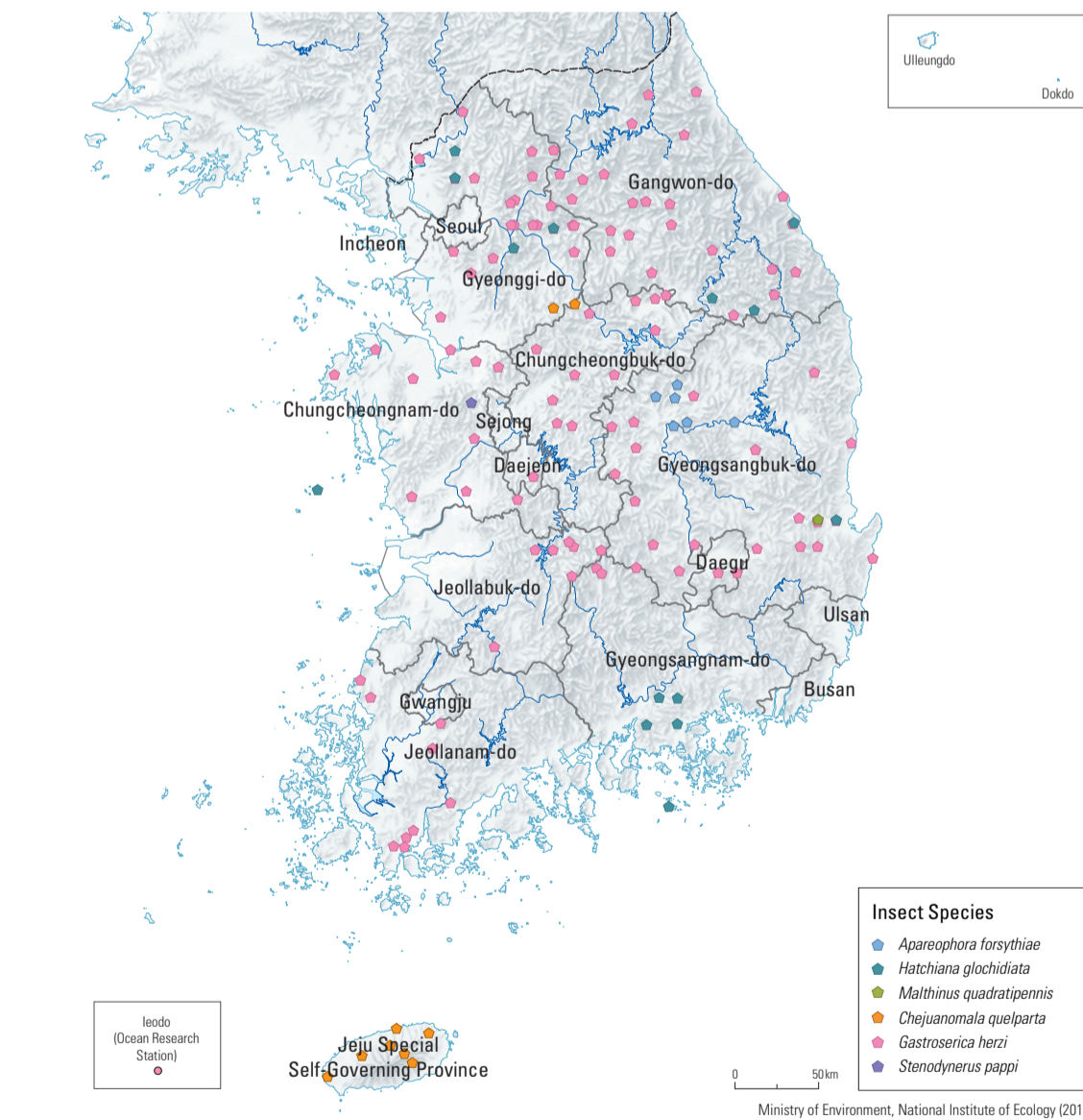
Distribution of Major Insect Species (1)



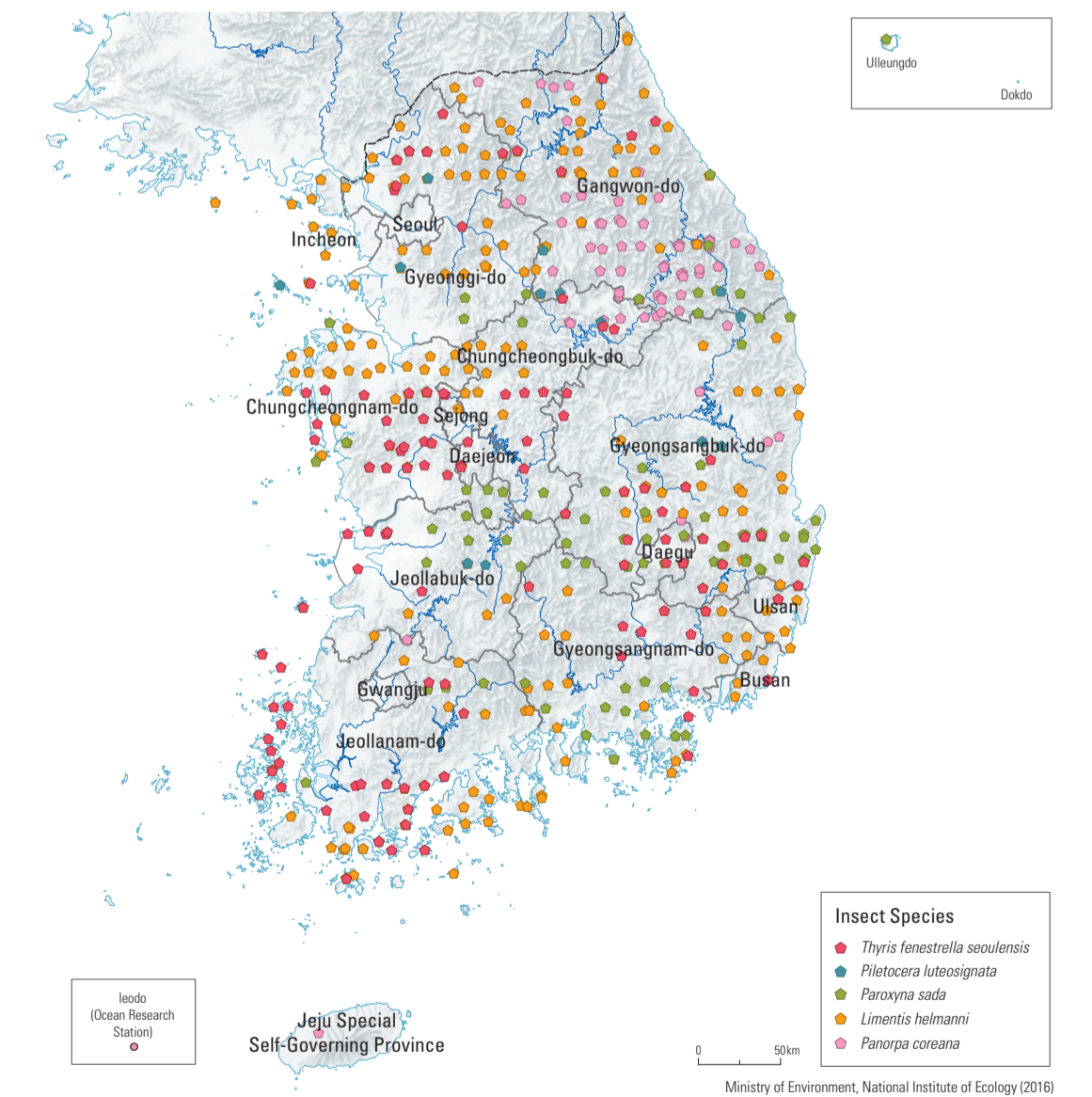
Distribution of Major Insect Species (2)



Distribution of Major Insect Species (3)



Distribution of Major Insect Species (4)



491 families, 4,658 genera, and 11,853 species of insects have been recorded in Korea, but scientists now estimate that these figures only take up 20% of the more than 50,000 insect species that inhabit the country. Of the species that have been recorded, species of Coleoptera and Lepidoptera order are the most abundant, comprising 26% and

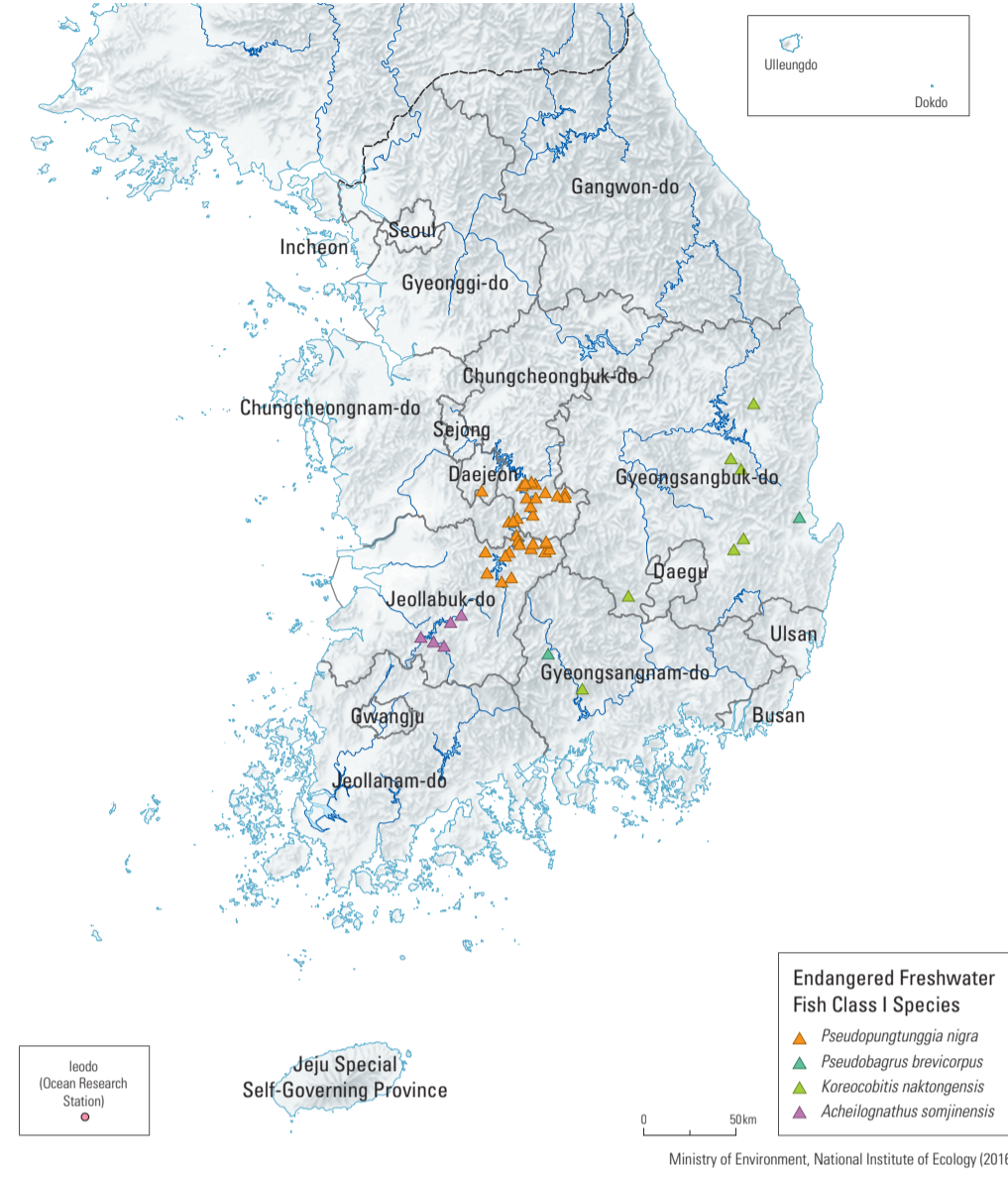
25%, respectively, followed by Hymenoptera and Hemiptera. Through systematic researches that have been carried out, 596 species of the Hemiptera order have been recorded to inhabit Korea. Among these species, 75% come from the Palearctic region, 20% from the Oriental region, and only the remaining 5% are endemic species of

Korea. 264 species of butterflies currently inhabit Korea, with over 80% from the Palearctic region and only 20% from the Oriental region. The Ministry of Environment has designated 22 insect species as Endangered Wild Species, with 4 species, including *Hipparchia autonoe*, the black-veined white (*Aporia crataegi*), *Polyphylla*

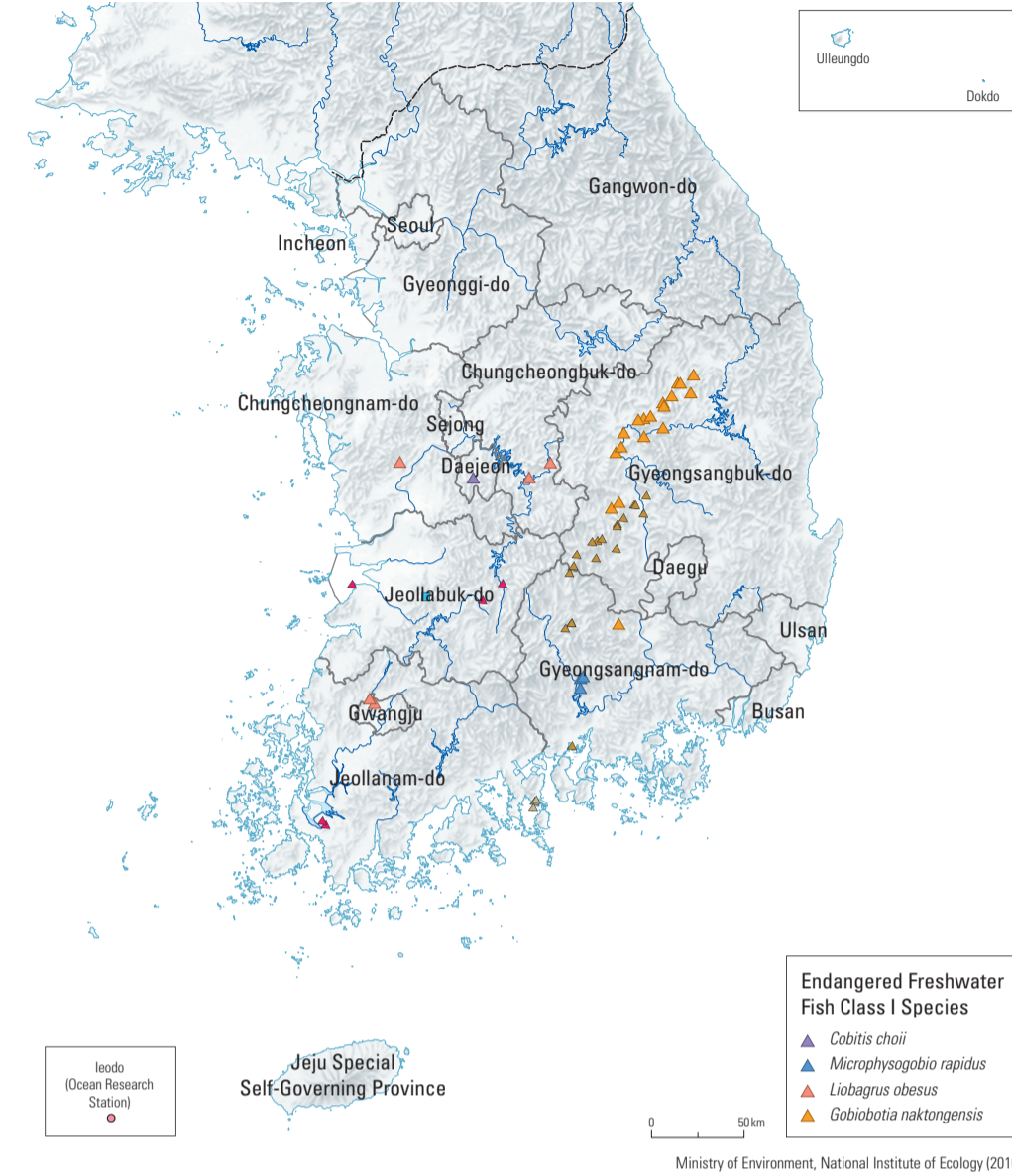
*laticollis manchurica*, and *Callipogon relictus*, under Class I, and 18 species, including the scarlet dwarf (*Nannophya pygmaea*), Bekko Tombo (*Libellula Angelina*), dung beetle (*Copris tripartitus*), and *Parnassius bremeri*, under Class II.

Freshwater Fish and Benthic Macroinvertebrate Species

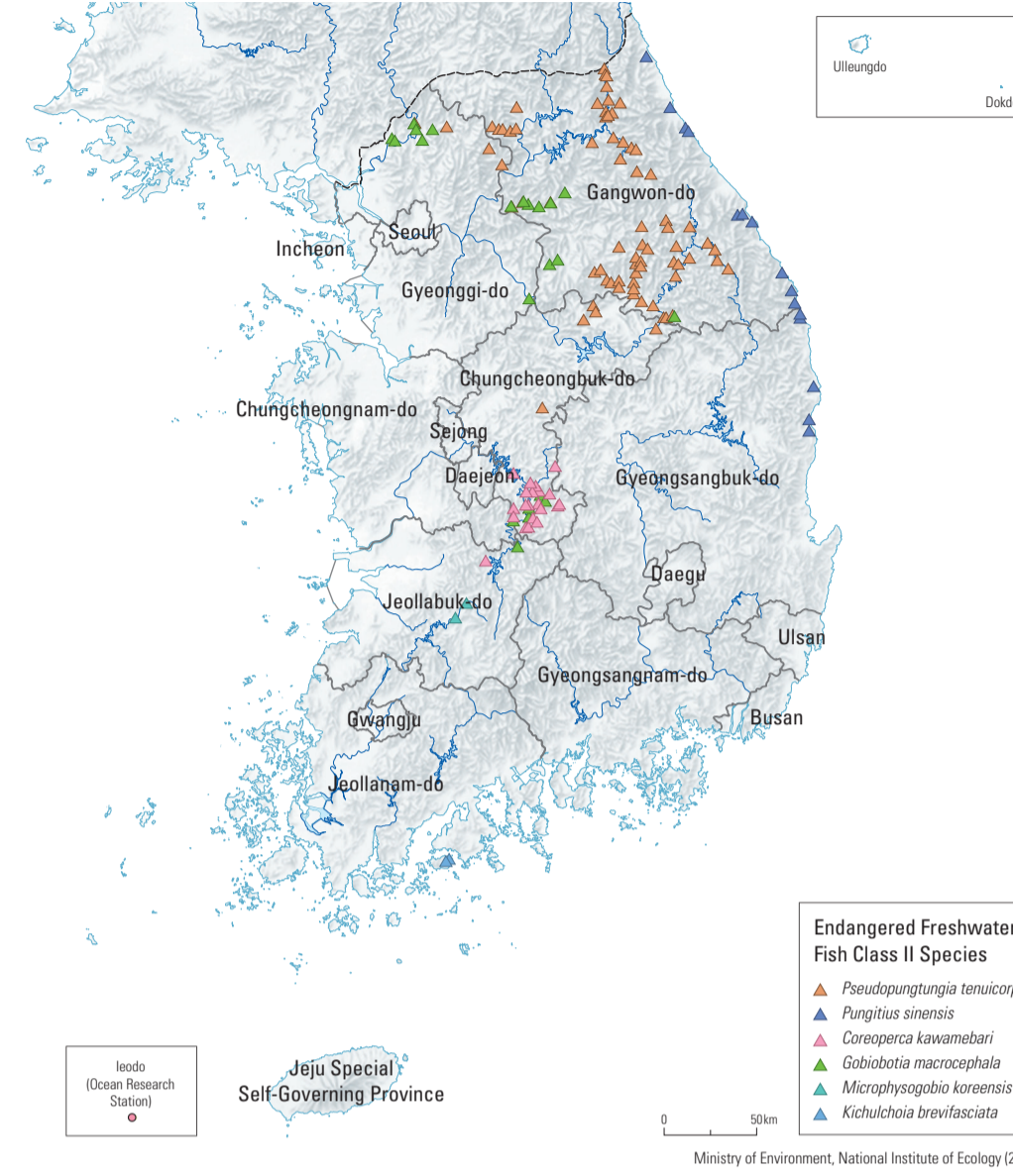
Distribution of Endangered Freshwater Fish Class I Species (1)



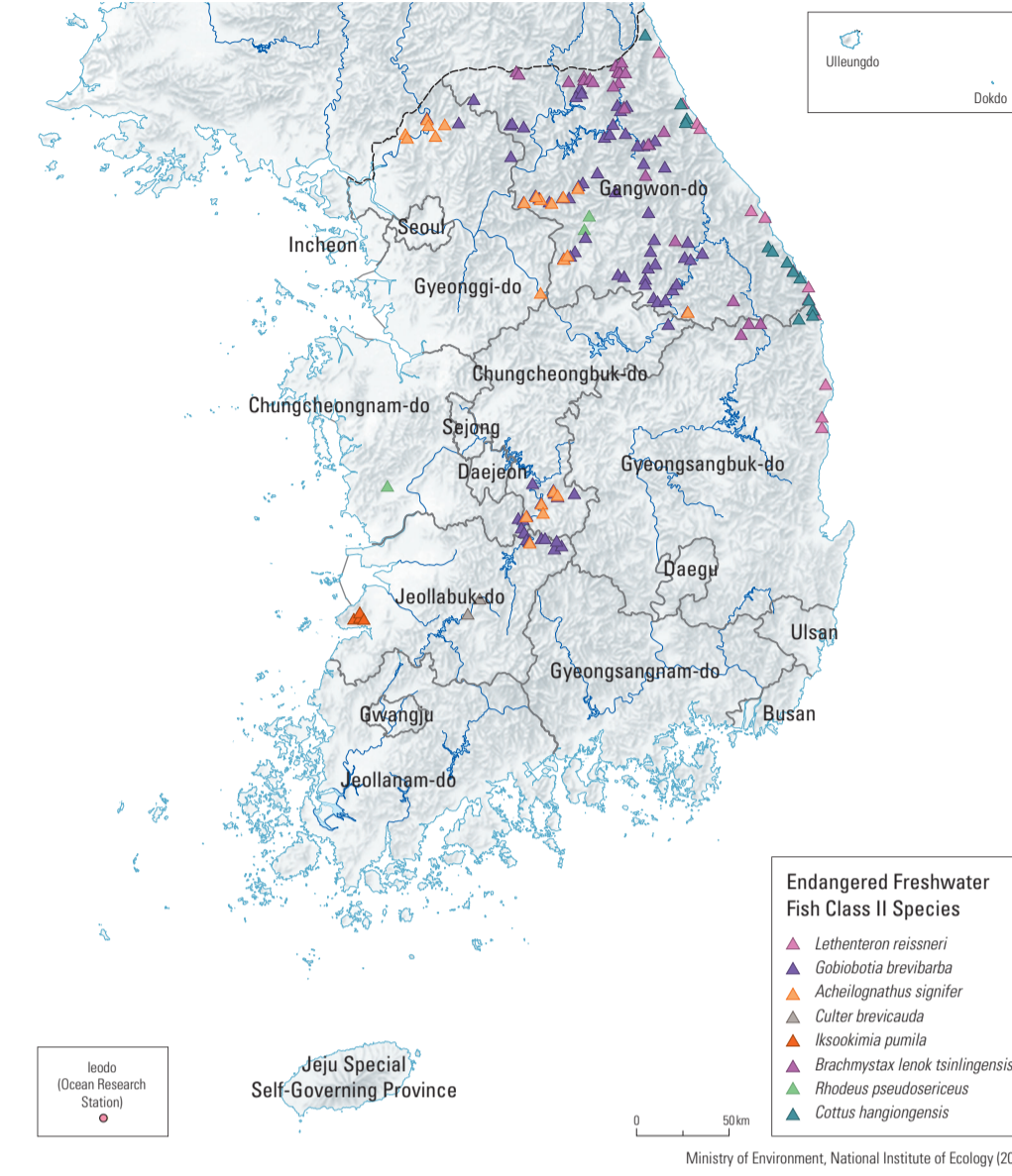
Distribution of Endangered Freshwater Fish Class I Species (2)



Distribution of Endangered Freshwater Fish Class II Species (1)



Distribution of Endangered Freshwater Fish Class II Species (2)



**Black Shiner**  
(*Pseudopungtungia nigra*)

Inhabits midstream and upstream areas of rivers with pebble and large stone beds, laying eggs in the breeding places of *Coreoperca herzi*. Endemic to South Korea, distributed in the mid- and upstream areas of the Geumgang, Mangyeong-gang, and Ungcheoncheon.



**Korean Stumpy Bullhead**  
(*Pseudobagrus brevicarpus*)

Nocturnal; inhabits downstream pools with high water clarity and pebble or large stone beds. Endemic to South Korea, displaying limited distribution in the waters of certain parts of the Nakdonggang; designated as Korean Natural Monument Number 455.



**Miho Spine Loach**  
(*Cobitis choi*)

Inhabits slow-flowing, shallow water with sand beds. Species endemic to South Korea designated as Korean Natural Monument Number 454. Distributed in certain parts of the Geumgang basin.



**Nakdong Nose Loach**  
(*Koreocobitis naktongensis*)

Inhabits mid- and upstream areas of fast-flowing rivers with pebble or large stone beds. Endemic to South Korea, distributed in limited areas of the Nakdonggang basin.



**Gobiobotia naktongensis**

Inhabits midstream river beds in areas with rapids and pebbles or large stones. Endemic to South Korea, distributed in the Nakdonggang, Hangang, Geumgang, and Imjingang.



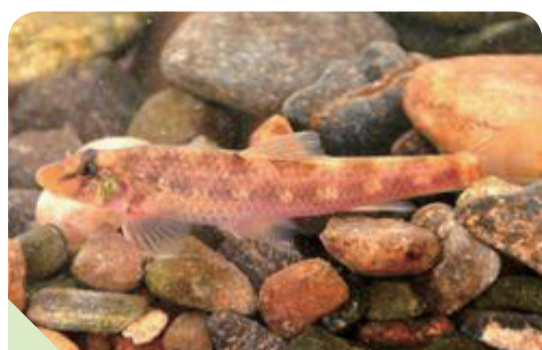
**Japanese Aucha Perch**  
(*Coreoperca kawamebari*)

Inhabits the mid- and upstream areas of slow-flowing rivers with abundant aquatic plants, large stone, sand, and pebble beds. Distributed only in the Tamjingang watershed.



**Puan Spine Loach**  
(*Iksookimia pumila*)

Inhabits the beds of clear, slow-flowing streams with abundant rocks, pebbles, and sand. Endemic to South Korea, distributed only around the Baekcheon in Buan-gun, Jeollabuk-do.



**Gobiobotia brevisbarba**  
(*Brachymystax lenok*)

Inhabits the mid- and upstream areas of clear, fast-flowing rivers with pebble and large stone beds. Endemic to South Korea, distributed in the Hangang, Imjingang, and Geumgang.

Record shows a total of 17 orders, 39 families, and 220 species of freshwater fish inhabiting South Korea. Among them, 9 species have been designated as Class I Endangered Wild Species by the Ministry of Environment, including the black shiner (*Pseudopungtungia nigra*), Korean stumpy

bullhead (*Pseudobagrus brevicarpus*), donko (*Odontobutis obscura*), Miho spine loach (*Cobitis choi*), Nakdong nose loach (*Koreocobitis naktongensis*), *Microphysogobio rapidus*, *Acheilognathus somjinensis*, bullhead torrent catfish (*Liobagrus obesus*), and *Gobiobotia naktongensis*.

Sixteen species are designated as Class II Endangered Wild Species, including the slender shiner (*Pseudopungtungia tenuicarpa*), Amur stickleback (*Pungtius sinensis*), Japanese aucha perch (*Coreoperca kawamebari*), *Gobiobotia macrocephala*, Far Eastern brook lamprey (*Le-*

*thenteron reissneri*), *Gobiobotia brevisbarba*, *Acheilognathus signifer*, *Culter brevicauda*, *Rhynchocypris semotilus*, Puan spine loach (*Iksookimia pumila*), and lenok (*Brachymystax lenok tsinlingensis*).

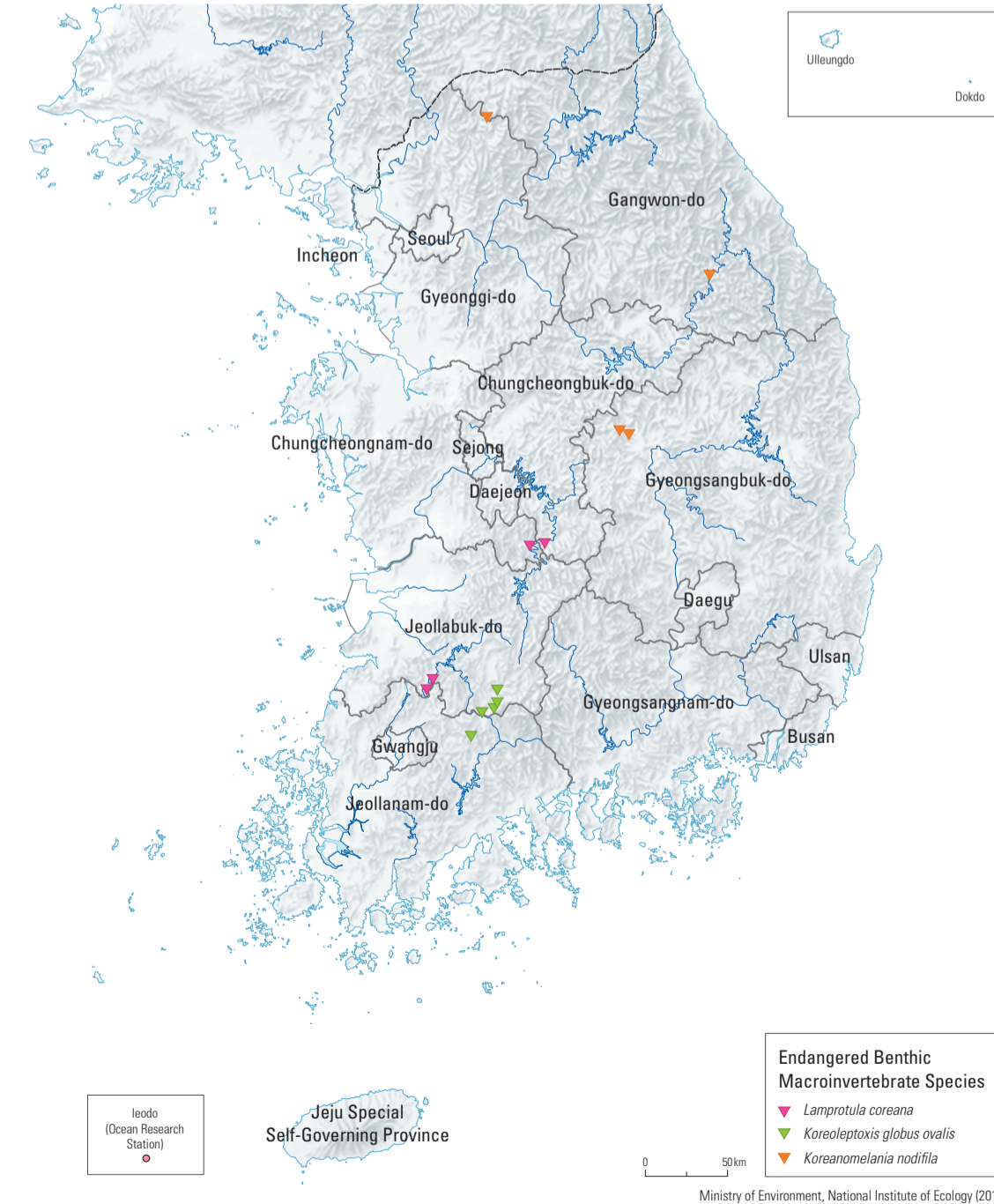
Korean endemic freshwater species have adapted to diverse types of habitats attributable to geological changes and geographical features of the Korean Peninsula. There are 63 freshwater fish species endemic

to South Korea, accounting for 28% of the total freshwater fish species, including the *Rhodeus uyekii*, *Acheilognathus majusculus*, *Sarcocheilichthys variegatus wakiyae*, spotted-barbel gudgeon (*Squalidus multimaculatus*), spotted

barbel (*Hemibarbus mylodon*), *Zacco koreanus*, *Iksookimia longicarpa*, *Iksookimia hugovolfeldi*, *Iksookimia pacifica*, black bullhead (*Pseudobagrus koreanus*), slender catfish (*Silurus microdorsalis*), *Pungtius kaibar-*

*ae*, *Odontobutis platycephala*, and Korean perch (*Coreoperca herzi*).

Distribution of Endangered Benthic Macroinvertebrate Species



**Lamprotula coreana**

Distributed in certain parts of the Geumgang and Boseonggang. A population decrease led to its protection and designation as a Class I Endangered Wild Species by the Ministry of Environment. Granular projections are scattered on its thick shell. Inhabits pebble and sand stream beds in the mid- and upstream areas of rivers with abundant water flow.



**Koreanomelania nodifila**

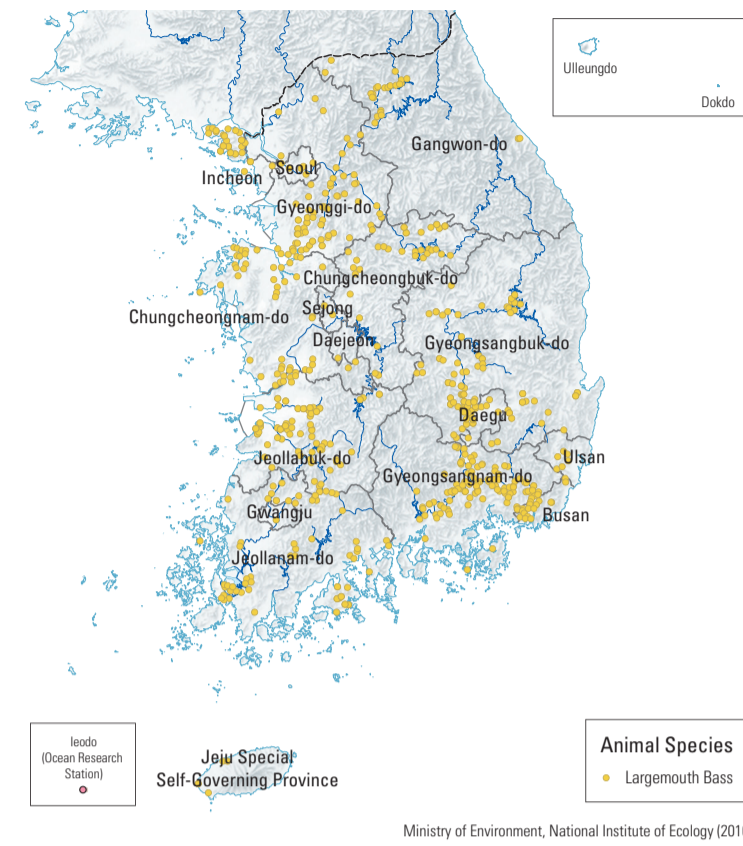
Species endemic to South Korea. Distributed around central regions such as Gangwon-do and Chungcheongbuk-do. Population decrease led to its designation as an Endangered Class II Wild Species by the Ministry of Environment. Thick, moniform spiral lines can be observed on its shell. Inhabits the shallows of plains, streams, rivers and others with fast and abundant water flow in the lotic water zone.

Benthic macroinvertebrates are invertebrates that are visible to the naked eye, such as those belonging to Phylum Platyhelminthes, Nematomorpha, Mollusca, Annelida, and Arthropoda. Arthropoda is the most abundant in species with over 70% of the benthic macroinvertebrate species. Among Arthropoda, aquatic insects such as the mayfly and dragonfly are most abundant in number and population.

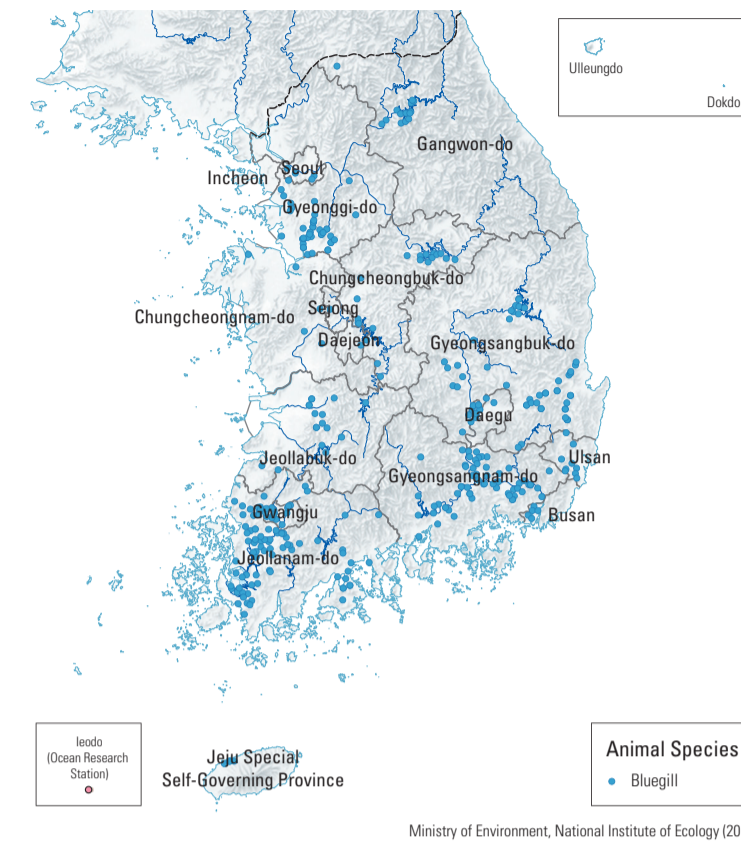
Benthic macroinvertebrates designated as Class I Endangered Wild Species include the cockscomb pearl mussel (*Cristaria plicata*), *Charonia lanpas*, *Pseudohelice quadrata*, and *Lamprotula coreana*, while 31 species are designated as Class II, including *Chasmagnathus convexus*, *Dendronephthya stuenzoni*, the orange cup coral (*Tabas-traea coccinea*), and *Clithon retropictus*.

Invasive Alien Animal Species

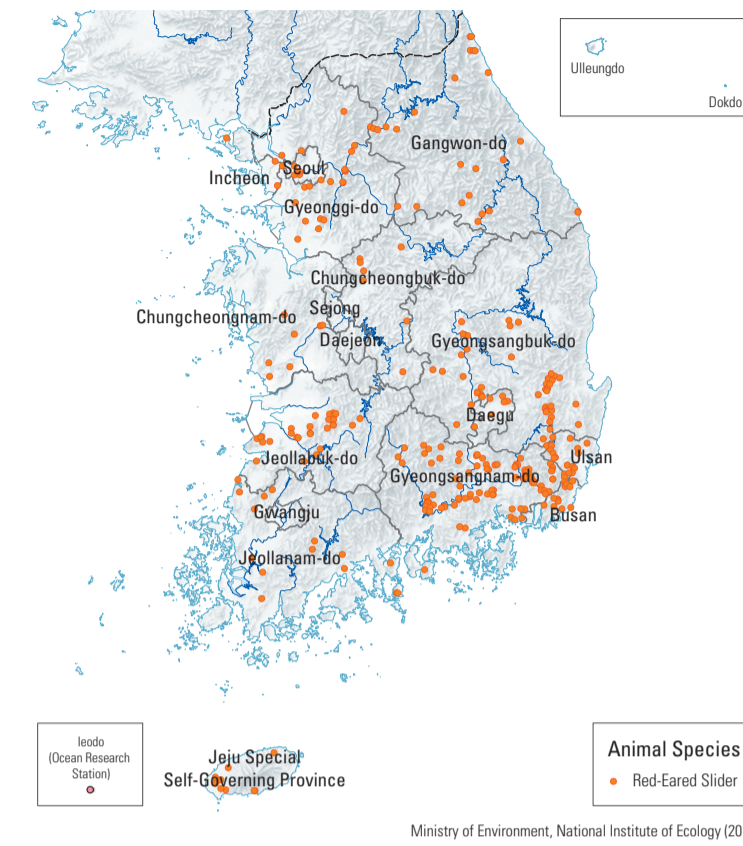
Distribution of Largemouth Bass (*Mikropterus salmoides*)



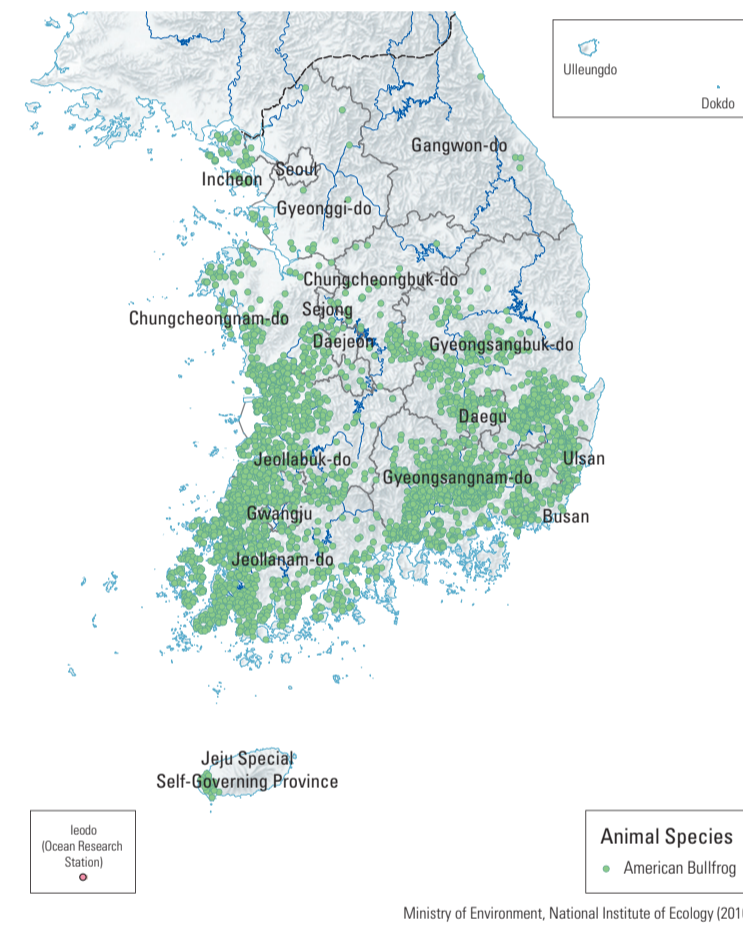
Distribution of Bluegill (*Lepomis macrochirus*)



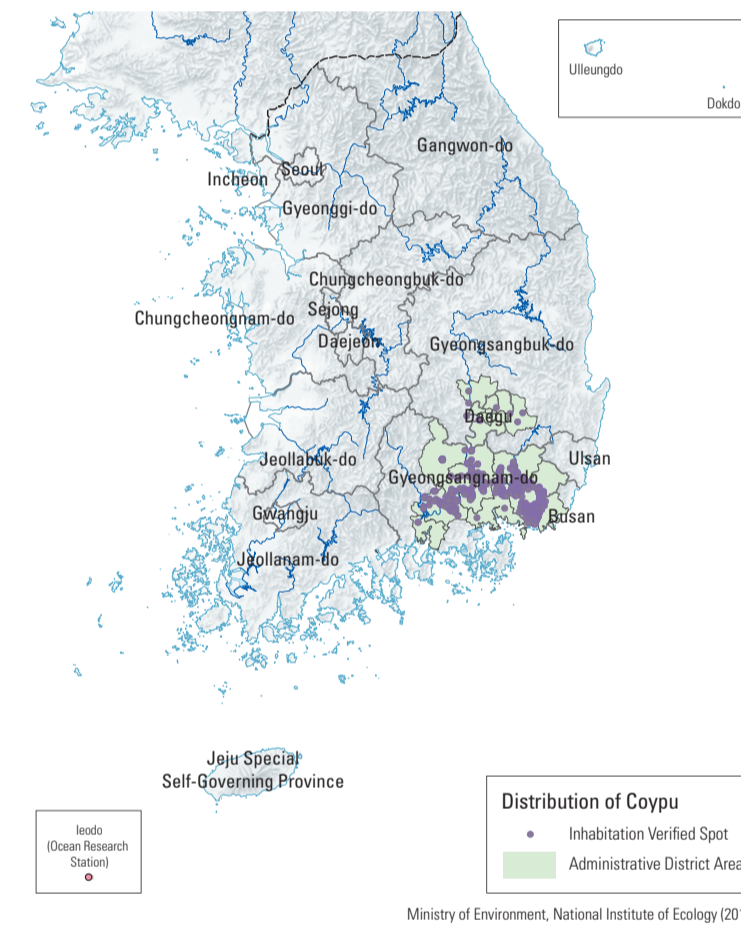
Distribution of Red-Eared Slider (*Trachemys scripta elegans*)



Distribution of American Bullfrog (*Lithobates catesbeianus*)



Distribution of Coypu (*Myocastor coypus*)



Largemouth Bass (*Mikropterus salmoides*)

Native to North America, the species was introduced to South Korea in 1973 as a freshwater resource. Repeated release into large reservoirs for such purpose caused the species to become widespread in rivers and water bodies throughout the country.



Bluegill (*Lepomis macrochirus*)

Native to North America, the species was introduced to South Korea in 1969 as a freshwater resource. Release into large reservoirs led to the wide dispersal of the species throughout rivers and streams.



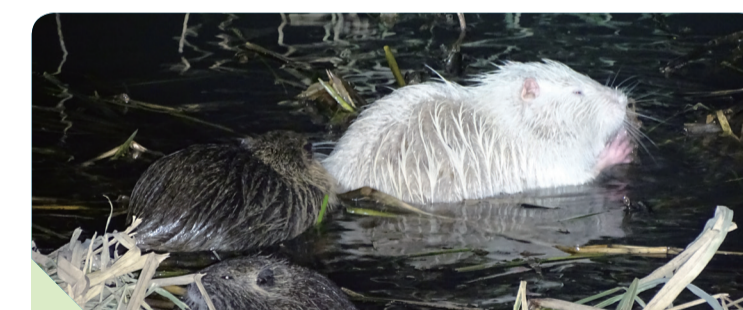
Red-Eared Slider (*Trachemys scripta elegans*)

Native to the Mississippi River basin in the United States. Imported into South Korea as a pet turtle in the late 1970s. Its large body size and difficulties with disposal of its waste led to the abandonment or deliberate release of the species during religious rituals, which led to its wide dispersal.



American Bullfrog (*Lithobates catesbeianus*)

Native to southern parts of the United States. Large numbers were bred in farms after its introduction into South Korea as a food source in 1971, which led to a wide dispersal throughout Korea's natural ecosystem. In Europe, Asia, and North America, poor control led to the escape of the species from breeding establishments into the surrounding ecosystems, and it is therefore considered an invasive species in many countries, including Japan.



Coypu (*Myocastor coypus*)

Introduced to South Korea in July 1985 from France to improve food self-sufficiency and to acquire animal fur. Failure of the species to adapt to a new environment and the lack of technology in breeding establishments caused the death of the initial 100. In 1987, 60 more from Bulgaria were introduced as breeders. Successful breeding led to the full-scale supply of the species. Currently, it greatly threatens Korea's native ecosystem due to typical invasive species characteristics such as rapid breeding and destructive feeding habits.

As global economic growth has influenced the increase in international interactions through activities such as travel and trade, there has been an escalation in the export and import of species valuable to the agriculture and fishing industries,

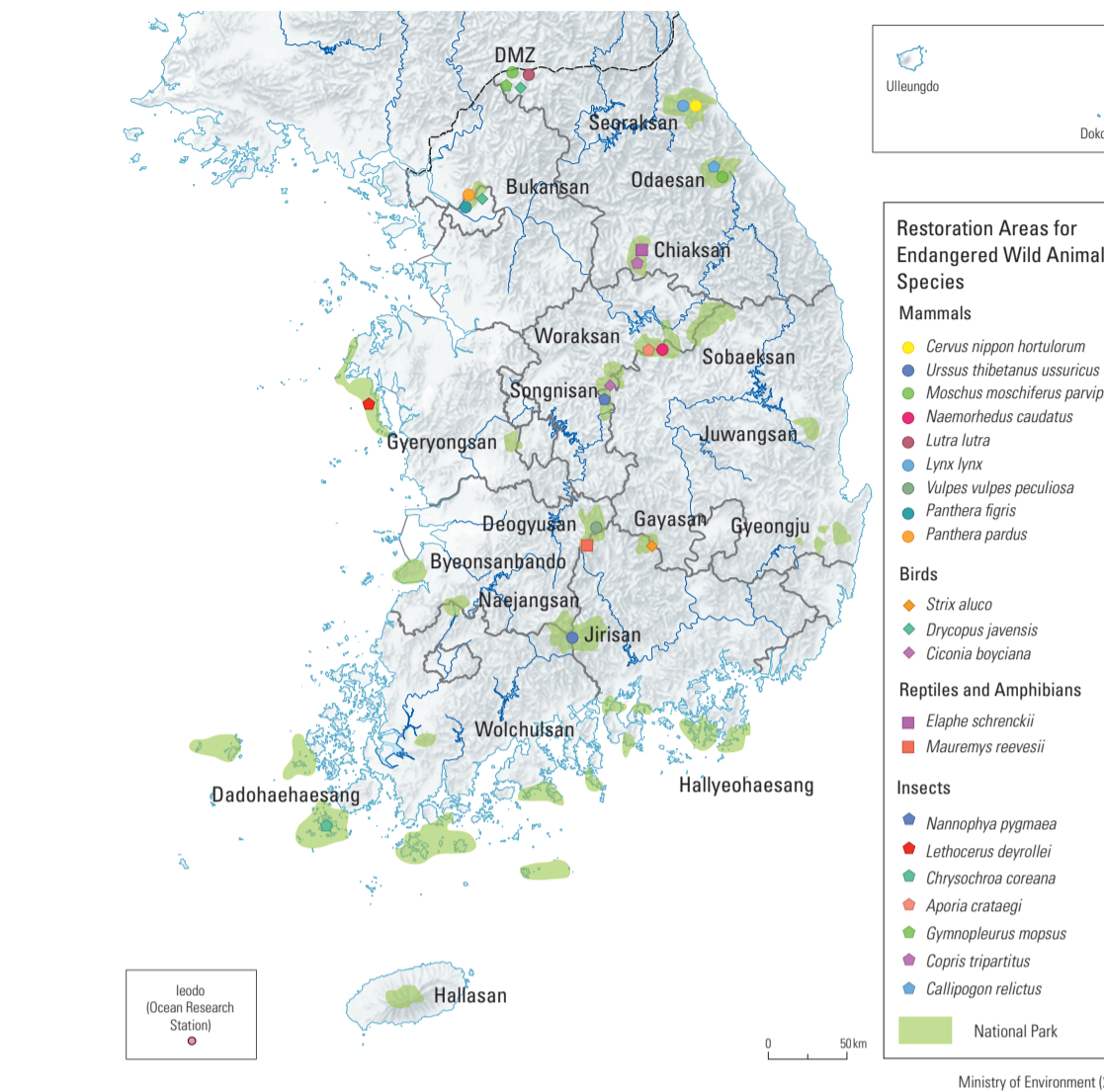
pets, and ornamental alien species. In 2013, a total of 1,718 alien species, including 1,384 animal species and 334 plant species, were imported into South Korea, which is an increase by approximately 50% compared to 2011; thus, the import

of alien species into South Korea is increasing. In addition, the appearance of species with the potential for ecological disturbance has been increasing, following incidents such as an outbreak of alien invasive species caused by changes in

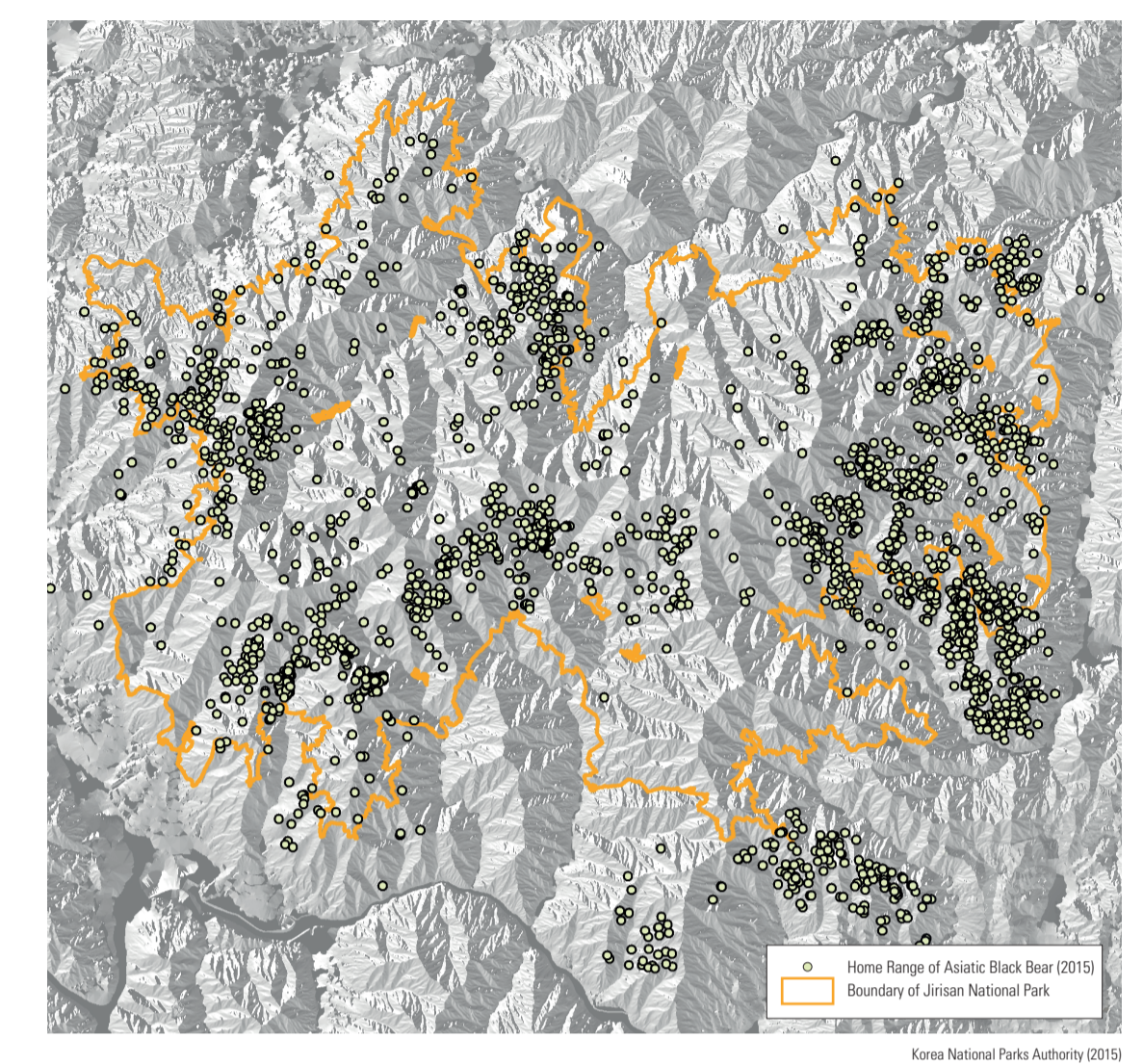
the environment, including climate change. The invasive alien species that have adapted to Korea are exacerbating disturbances on the ecosystem through their characteristics of rapid proliferation and thriving feeding ability.

Restoration Project for Endangered Wild Species and Animal Species around the Demilitarized Zone (DMZ)

Restoration Areas for Endangered Wild Animal Species



Home Range of Asiatic Black Bear (2015)



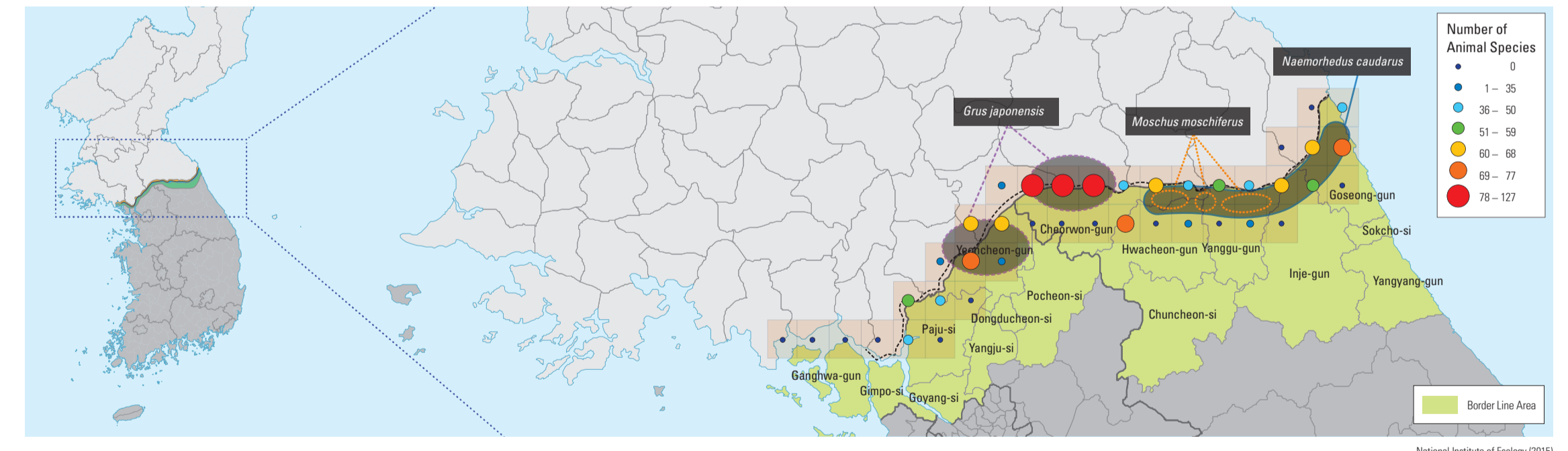
Recovery refers to the process where an endangered species is recovered to its original state and is provided ensured means for long-term survival in the wild. Korea is currently pursuing recovery efforts for endangered animals and plants such as the Asiatic black bear (*Ursus tibetanus*), musk deer (*Moschus moschiferus*), Oriental white stork (*Ciconia boyciana*), black shiner (*Pseudopungtungia nigra*), bull-head torrent catfish, (*Liobagrus obesus*), and wind orchid (*Neofinetia falcate*). Recovery plans for many of these endangered species are being constructed and carried out. In the case of the Asiatic black bear and the Oriental white stork, species restoration projects

have been approved and are currently being conducted by Jirisan and the Eco-institute for Oriental Stork of Korea National University of Education. Also, recovery plans for other endangered species have been suggested and launched. The Asiatic black bear once occupied virtually all mountainous areas stretching across major mountains such as Seoraksan, Odaesan, and Jirisan. However, reckless human activities such as habitat destruction and overhunting brought about a sharp decline in its population. In 1982, the bear was classified as the National Monument to be protected from further endangerment. Korea's first measure for the recovery of this species

began in 2004 when 6 Asiatic black bears were translocated from Russia to Korea's Jirisan National Park. In 2005, 8 bears from North Korea and 6 bears from Russia were further released into the area. As of 2016, there are a total of 44 bears living in Jirisan National Park. In September of 2015, a 3-year old bear was captured in the park, proving that the species has succeeded in natural propagation. The Oriental white stork is listed as an Endangered Species by the IUCN as it only has a remaining population size of 5,000 in the Amur River basin of Russia. Recovery efforts for the stork have been in place for over 20 years, initiat-

ed in 1996 when two juvenile white storks from Russia and two male storks from Germany were delivered to Korea. In April of 2002, the species succeeded in breeding for the first time in an artificial environment. The Eco-institute for Oriental Stork is currently raising 95 storks, while 74 individuals inhabit the Yesan Oriental Stork Park. The storks at the recovery institute are in the process of undergoing survival training in order to be released into the wild. In the near future, the birds will be translocated to its original habitat where they will complete their training before finally being released.

Distribution of Animal Species around the DMZ



The DMZ (Demilitarized Zone) region attracts the world's attention for its well-conserved natural ecosystem due to strict prohibition of civilian activities. This region has high biological diversity of mammals and birds, along with high habitat density of endangered species and the Natural Monument species such as the Asian black bear (*Ursus tibetanus*), the Siberi-

an musk deer (*Moschus moschiferus*), Korean goral (*Naemorhedus caudatus*), and the Eurasian otter (*Lutra lutra*). In addition, streams and wetlands are well developed around the DMZ region, displaying diverse and abundant species of fish. The western region of the DMZ is inhabited by wetland birds such as the white-naped crane (*Grus vipio*) and black-faced spoonbill (*Platalea minor*).

The central region of the DMZ is a wide plain which provides wintering areas for the red-crowned crane (*Grus japonensis*). The eastern mountainous region is inhabited by the Siberian musk deer (*Moschus moschiferus*) and Korean goral (*Naemorhedus caudatus*). The red-crowned crane visits Cheorwon-gun of Gangwon-do, Paju-si, Ganghwa-gun, and Yeoncheon-gun of Gyeonggi-do for wintering. The Siberian musk deer and Korean goral inhabit the eastern rocky mountainous region of the DMZ. The Siberian musk deer is especially low in population, inhabiting only the regions of Hwacheon-gun and Yanggu-gun.