**MARINE BIRDS**

Marine birds are important components of North Pacific ecosystems. At least 137 sea bird species inhabit the North Pacific, with total abundance estimated to exceed 200 million birds. They are widely distributed across the North Pacific, and include many species which breed in the South Pacific but migrate to the North Pacific to feed in summer. Sizes of individual birds range from 20 to over 8,000 g. The number of species varies by region. The fewest number of species (24) occurs in the Eastern Sub-Arctic, whereas the largest number is in the Kuroshio/Oyashio Current region (61 species). In general, the western Pacific has a higher species richness than the eastern North Pacific but the difference is only about 10%. Birds of larger body mass (>1000 g) predominate in the Bering Sea and California Current regions (murres, puffins and shearwaters). Most of these species forage in the upper water column for small fish or macrozooplankton. Small marine bird species (<125 g) predominate in the Eastern and Western Sub-Arctic gyres, and in the central North Pacific Transition Zone (storm petrels). These smaller birds forage at the water’s surface, consuming mainly neuston and micronekton. Numbers of species in each region are:

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of marine bird species</th>
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<tr>
<td>Eastern Bering Sea shelf</td>
<td>37</td>
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<tr>
<td>Gulf of Alaska</td>
<td>24-30</td>
</tr>
<tr>
<td>Coastal Gulf of Alaska</td>
<td>38</td>
</tr>
<tr>
<td>California Current North</td>
<td>52</td>
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<tr>
<td>California Current South</td>
<td>49</td>
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<tr>
<td>Western sub-arctic gyre</td>
<td>31</td>
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<tr>
<td>Sea of Okhotsk</td>
<td>42</td>
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<tr>
<td>Central Transition Zone</td>
<td>35-40</td>
</tr>
<tr>
<td>Kuroshio/Oyashio</td>
<td>54-61</td>
</tr>
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<td>East China Sea</td>
<td>25-36</td>
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Comparison of populations of dominant marine bird between the western and eastern North Pacific are:

<table>
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<tr>
<th>Western N. Pacific</th>
<th>Albacore 4</th>
<th>Fulmars &amp; Shearwaters 4</th>
<th>Storm-Petrels 4</th>
<th>Gulls &amp; Allies 4</th>
<th>Phalaropes 4</th>
<th>Alcids 4</th>
<th>Total</th>
<th>Surface Area</th>
</tr>
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<tbody>
<tr>
<td>Western Subarctic</td>
<td>1,160,000</td>
<td>4,490,000</td>
<td>7,220,000</td>
<td>1,064,000</td>
<td>87,000</td>
<td>145,000</td>
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<td>120,000</td>
<td>2,400</td>
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<tr>
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<td>1,546,000</td>
<td>30,093,000</td>
<td>38,828,000</td>
<td>1,238,000</td>
<td>207,000</td>
<td>147,000</td>
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<td>3.25</td>
<td>4.55</td>
<td>0.15</td>
<td>0.02</td>
<td>0.02</td>
<td>8.16</td>
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<table>
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<th>Eastern N. Pacific</th>
<th>Albacore 4</th>
<th>Fulmars &amp; Shearwaters 4</th>
<th>Storm-Petrels 4</th>
<th>Gulls &amp; Allies 4</th>
<th>Phalaropes 4</th>
<th>Alcids 4</th>
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<th>Surface Area</th>
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<td>4,100,000</td>
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Estimates of species abundances in summer (June – August) by region are provided in the table below:

**BSC** - Bering Sea Continental Shelf  
**BSP** - Bering Sea Pelagic/Russia/Aleutian Islands  
**ASK** - Gulf of Alaska  
**CAN** - California Current North  
**ESA** - Eastern Subarctic  
**WSA** - Western Subarctic  
**KM/KL** - Kamchatka and Kurile Islands

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<thead>
<tr>
<th>Species</th>
<th>BSC</th>
<th>BSP</th>
<th>ASK</th>
<th>CAN</th>
<th>ESA</th>
<th>WSA</th>
<th>KM/KL</th>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>+</td>
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<td>9000</td>
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<tr>
<td>Cook's Petrel</td>
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<tr>
<td>Cormorant</td>
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<td>Bonin Petrel</td>
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<tr>
<td>Streaked Shearwater</td>
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<tr>
<td>Band-rumped Storm-Petrel</td>
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<tr>
<td>Swinhoe's Storm-Petrel</td>
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<tr>
<td>Temminck's Cormorant</td>
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<td>Black-tailed Gull</td>
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<td>Little Gull</td>
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<tr>
<td>Japanese Murrelet</td>
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The intertidal areas and coastal wetlands of the Yellow Sea support more than 2,000,000 shore birds during their northward migration; about 40% of the all migratory shorebirds in the East Asian-Australasian Flyway.\(^1\) A total of 36 shorebird species have so far been found to occur in internationally important numbers at one or more sites in the Yellow Sea, representing 60% of the migratory shorebird species occurring in the Flyway. Two of the species are classified as globally threatened, the Spotted Greenshank *Tringa guttifer* and Spoon-billed Sandpiper *Eurynorhynchus pygmeus*, whilst two are near-threatened, the Eastern Curlew *Numenius madagascariensis* and Asian Dowitcher *Limnodromus semipalmatus*. While the South Korean coastline has been well surveyed, only about one-third of the Chinese coasts has been surveyed and little is known from the North Korea.

A total of 160 species and about 634,773 individuals of water birds were reported to overwinter on the Korean coast in 2001-2002. Dominant species were geese, mallards (*Anas platyrhynchos*), and ducks (*A. poecilorhyncha, A. formosa*). Migratory birds that use Korean coasts as stopover sites consisted of 305,887 individuals in 25 species during the spring and of 269,317 individuals in 33 species during the autumn in 2002.\(^1\) Dominant species were lapwings (*Vanellus vanellus*), plovers (*Charadrius dubius*), and sandpipers (*Tringa hypoleucos*). More species of migratory birds stop over at Heuksando Islands (remotely located in the southern Yellow Sea) during spring and autumn. The number of species was 112 while the number of individuals was 3,448 in 2002.

Time series of the number of overwintering birds during 1993-2002 showed no particular trends, although they were different depending on locations (Figure 1). In the Keum River estuary (located at ~36°N latitude), for example, the total number is largely determined by a couple of dominant species, such as *Anas formosa*. There was no particular trend in the time series of the number of spring-autumn migratory birds (Figure 1, lower panel).
**FIGURE 1** UPPER PANEL: THE NUMBER OF OVERWINTERING BIRDS IN THE KEUM RIVER ESTUARY (KOREAN YELLOW SEA COAST). LOWER PANEL: THE NUMBER OF BIRDS THAT STOPPED OVER AT THE ASAN RECLAMATION AREA DURING THEIR MIGRATION IN SPRING AND FALL.  

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