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Cranes of the World: Hooded Crane (*Grus monachus*)

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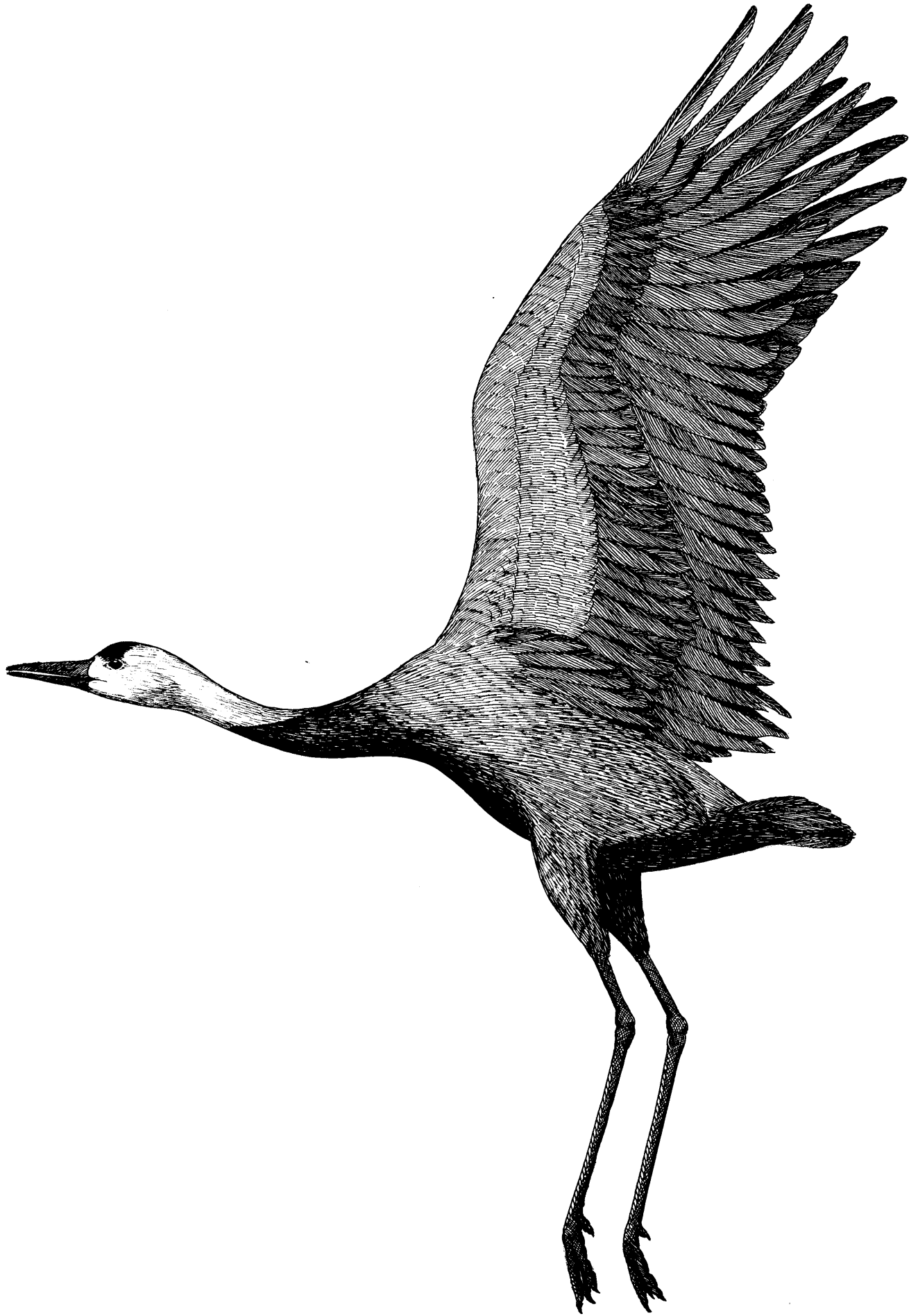
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Hooded Crane

Grus monachus Temminck 1835

Other Vernacular Names. None in general English use; Huan-has (Chinese); Grue-moine (French); Mönchskranich (German); Nabe-zuru (Japanese); Chernyi zhuravl (Russian); Grulla capachina (Spanish).

Range. Breeding range not well known, but currently known to breed only in a few isolated areas of the USSR, including the Ussuri River and the lower Amur, in the basin of the middle reaches of the Vilyuy, and in the Olekma-Chara uplands. Breeding probably also occurs in the upper Nizhnaya Tunguska River and its tributary the Nyepa, along the Chona River, in the lower Amur along the In and Mukhen rivers, in the basin of the Evur River and Lake Evonon, in the upper part of the Gorin River, and in central Sakhalin. Possibly also breeds in northwestern Manchuria (Hai-la-erh) and the middle Sungari. Migratory, wintering in Korea (irregularly) and Japan (Kyushu and Honshu, Kagoshima and Yamaguchi prefectures, and formerly Hokkaido). Also winters in unknown numbers in the lower Yangtze Valley of China (Cheng, 1981), and has been seen rarely in India.

Subspecies. None recognized.

Measurements. Wing (chord), males 479-525 mm (average of 7, 506 mm); females 453-560 mm (average of 9, 487.9 mm). Exposed culmen, males 99-107 mm (average of 7, 103.7 mm); females 89-101 mm (average of 9, 95.4 mm). Tarsus, males 194-222 mm (average of 7, 209.3 mm); females 199-223 mm (average of 9, 208.8 mm). Eggs, average 91.25 × 58.97 mm (86.0-97.4 × 55.7-59.7 mm) (Walkinshaw, 1973).

Weights. Seven adult males at the International Crane Foundation averaged 3,930 grams (range 3,284-4,870 grams), and four adult females averaged 3,540 grams (range 3,397-3,737 grams). Two breeding-grounds females weighed 3,110 and 3,550 grams (Andreev, 1974). The estimated egg weight is 173

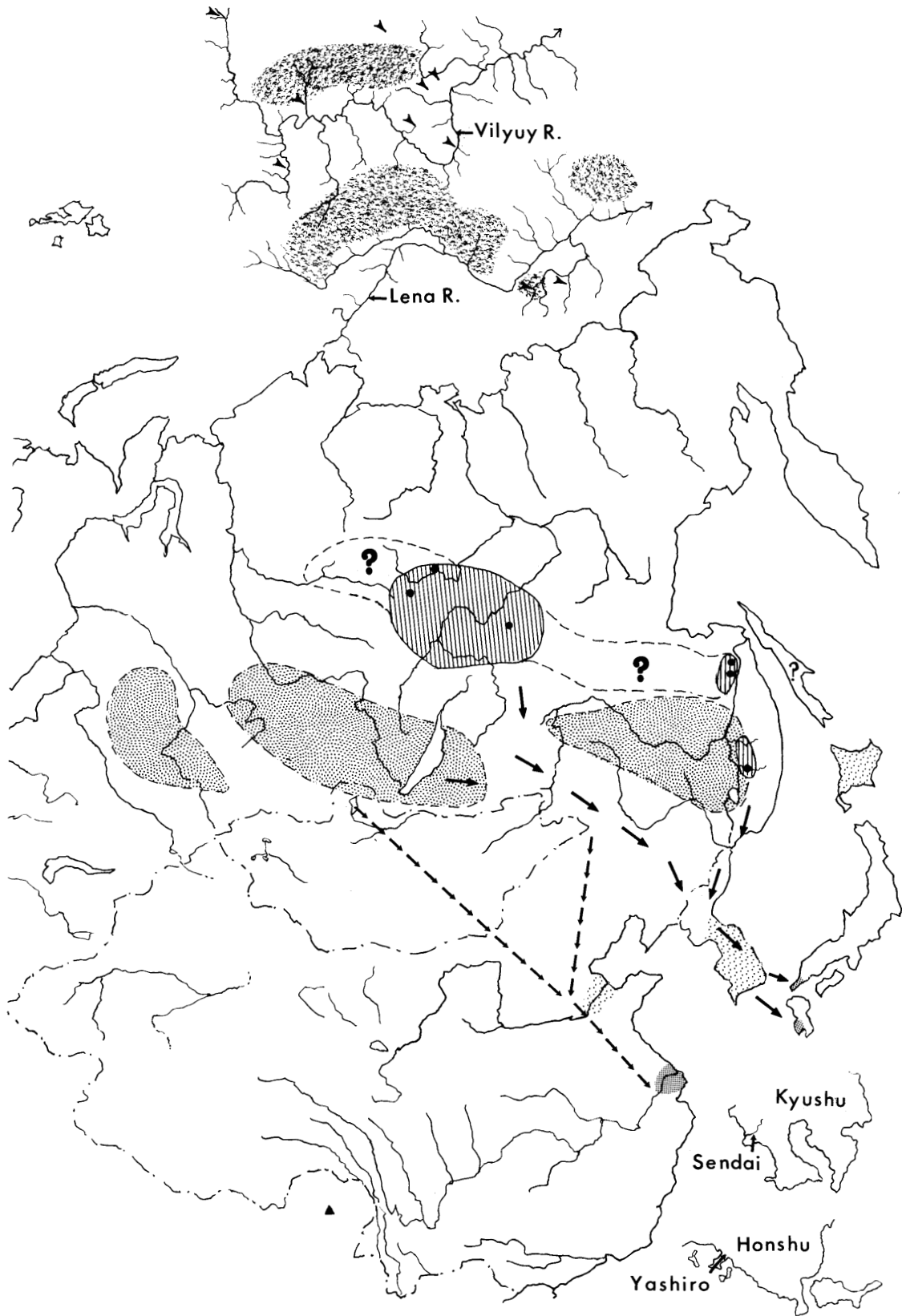
grams, but four fresh eggs averaged 149.6 grams (Christine Sheppard, pers. comm.).

Description

Adults of both sexes are alike, with the forepart of the crown unfeathered, red, and covered with black hairlike bristles. The upper eyelid is also bare and is horn-colored. The rest of the head and neck are white, sometimes tinged with gray. The white extends down the neck, about halfway down the front side and almost to the shoulders posteriorly, sometimes abruptly changing to the blackish gray of the back and breast. The body is otherwise slaty gray, with some brownish or grayish tinge above and with the feathers tipped with grayish. The primaries, secondaries, tail, and tail coverts are black, and the inner secondaries are elongated, pointed, and drooping. The iris is hazel yellow to orange brown, usually with yellowish present, the bill is yellowish horn, and the legs and toes are nearly black.

Juveniles have the crown covered with black and white feathers during their first year, and exhibit some brownish or grayish wash on their feathers, especially on the head and neck.

Downy chicks are rusty ochre, darker on the shoulders and back, and noticeably lighter on the belly and the rump. Each down feather is lighter at its tip; the basal third is dark brown with a cinnamon tinge, while the tips of the feathers have a golden tinge. The beak is yellow at the base, gradually shading to light flesh color, and getting darker only at the very tip. The eyelids are yellow, and the iris is dark cinnamon. The toes, tarsus, and bare portions of the tibia are initially yellow, but by the time the chick is 24 hours old they have taken on a brownish tone. The beak begins to darken by the end of the third day (Pukinskii and Ilynskii, 1977).



Breeding (hatched) and wintering (dark shading) ranges of the hooded crane. Areas of nonbreeding summer occurrence are indicated by coarse stippling, and prior wintering areas are shown by light stippling. Arrows indicate known (large arrows) or probable (small arrows) migratory routes, and inked circles indicate breeding records. The small triangle indicates an extralimital winter record. Upper inset indicates summer occurrences in Vilyuy and Lena basins, and distribution of bog forest habitats (overlay). Lower inset shows locations of major wintering vicinities on Kyushu and Honshu islands, Japan.

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Identification

In the field, this is the only crane that has a medium-gray body color that contrasts with the pure white neck and head, with a small reddish "hood" provided by the bare crown skin. In flight, the birds appear uniformly dark above and below on the body and wings. The call is relatively high-pitched, but is very similar to that of the common Eurasian crane.

In the hand, the distinctive white neck and head but otherwise gray body serve to identify this species immediately. Apart from the absence of black on the neck and head, the hooded crane is very similar in general color to the Eurasian crane. As in the Eurasian crane, the trachea is coiled within the keel of the sternum. The hooded crane is generally a darker tone of gray on the body than is the Eurasian crane, and has smaller but overlapping body measurements. Wild hybrids between these species sometimes occur.

DISTRIBUTION AND HABITATS

Historical Range

The breeding range of this rare species has only begun to be identified in the past few decades. Dementiev and Gladkov (1968) considered the breeding area to be "unclarified," since at the time of their writing only a single hooded crane nest had ever been reported, and this was found about 40 kilometers west of Kainsk (Kuibyshev) in 1908 or 1909. This record was later found to be erroneous, as was the record of an egg obtained in the vicinity of Tomsk and wrongly identified as that of a hooded crane. Indeed, it was not until 140 years after the species was initially described that the first nest of the hooded crane was found, in 1974. As a result, almost nothing can be said about the historical breeding range with any degree of certainty. Certainly, many of the earlier summer records of birds in the vicinity of Tomsk, Minusinsk, and the Lake Baikal region generally believed to be nesting birds were obviously only those of nonbreeders summering in these areas (Neufeldt, 1977).

It was not until Vorbiev (1963) discovered a nesting area in larch-peat bogs of southwestern Yakutia that the actual nesting grounds of this species began to become apparent, and it is now clear that their major nesting habitats are the wide, mossy taiga bogs, interspersed with stunted larch trees and bushes, of that area. For example, Vorobiev provided an account of a man who observed a family of hooded cranes in August of 1961, at the mouth of the Nezhnyeye Dzhegye (above the mouth of the Tyana River), and quoted several other accounts of paired birds seen in the general area of the Olekmo-

Charskoye uplands during the 1950s. Later nesting was verified in the Bekin River area by Pukinskii and Ilyinskii (1977).

Current Breeding Range

It is now apparent that the hooded crane nests over much of the southern part of the Yakut Autonomous Republic, generally between Lake Baikal and the Amur River, in the Amur Region of Khabavorsk Territory, and in the Maritime Territory. Its patchy distribution is a reflection of the discontinuous occurrence of its favored breeding habitat, namely raised mossy bogs in central and southern taiga country where stunted trees, especially larches, occur.

Studies by Andreev (1974) in the Vilyuy Basin have confirmed the fact that hooded cranes nest regularly over this rather broad area. From the Vilyuy's tributary river the Appaiya and the town of Kuomaryka (approximately 117° east longitude) the range extends to the north as far as the middle reaches of the Posporin River (about 60° north latitude), and the upper reaches of the Morkoka River. Andreev reported that old hunters had regularly met cranes with fledged young in the area of Annar (along the Kukuhungda River, a tributary to the Oylenck River), and also nesting in the lower Vilyuy in the vicinity of Kobyayski. Andreev judged the breeding range in this area to be at least 3,000 square kilometers, associated with thin, middle-aged taiga on basaltic landscapes. Within this area, nesting habitats are marshy forests with peat areas and wetter open-water bogs with cottongrass and sedges. Nesting in the Vilyuy Basin has been confirmed on the River Chona (near Tuai Khaya), in the bases of the Akhtaranda and Syuldyukar rivers, and near the village of Vilyuchan. In the last-named area mixed pairs of hooded and Eurasian cranes have been observed (Neufeldt, 1981a). The lower reaches of the Vilyuy, as in the vicinity of Yakutsk, where adult specimens have been collected in May, is perhaps also a nesting area, but so far this remains unproven. In the Vilyuy Basin the Eurasian crane is somewhat separated ecologically from the hooded crane, with the former preferring wide, flat valleys with reed and sedge meadows and drier areas with birches, while the hooded prefers mossy hammocks or damp moors in boggy larch forests, at altitudes of 500 to 700 meters. In the Bikin River valley the birds nest at similar altitudes of 200 to 600 meters.

The second area of hooded crane nesting to have been discovered recently is in the Bikin River area of the Ussuri Basin, in Maritime Territory. This breeding area was discovered by Yuri Pukinskii in 1974, near the settlement of Barkhatnoya. The habitat in that region is a depressed mossy swamp, enclosed by hills, and with floodplain woods along one edge. Most of the swamp is covered by scattered and stunted larches (*Larix dahurica*)

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and in some places there is an undergrowth of birch (*Betula fructiosa*). The most recent observations in this area (in 1980) suggest that about 50 pairs may summer in this area presently, of which about two-thirds apparently nest. The population density there is about a pair per 20 to 25 square kilometers (USSR Crane Working Group Information Bulletin No 2, 1981). Areas of probable breeding in the lower Ussuri River include some 6,000 square kilometers of area, from the Nizhni Pereval to the Ulunga, where 14 to 16 nesting pairs were recorded in the early 1970s. At lower population densities the birds might reach the middle parts of the Khor Ri River (a Ussuri tributary), and its lower reaches near Sukpai Village. They also occur during the breeding season northeast of Birobidzhan city, at the mouth of the Simmi River, close to Evoron Lake, in the Evur River basin, in the In River basin, and along the Mukhen and Gorin rivers (Neufeldt, 1981a). Lone birds, pairs, and small groups have been observed in late spring in the In River basin of the Jewish Autonomous Republic (Yevreysk A.O) in typical peat bogs among larch and shrub habitats, and distraction displays have been observed as well, strongly suggesting nesting there. Birds performing distraction behavior have also been observed along the Mukhen River, a tributary to the Neptu, which flows into the Amur River below Khabavorsk (Neufeldt and Wunderlich, 1978).

Besides these areas, the Vilyuy Basin and the adjoining Olekmo-Charskoye uplands, and the Bikin area of the Ussuri Basin, there are but few definite records of breeding. In 1980 nesting was found to occur along the Uda River and at Lake Bolon, and in the mossy larch bogs at Lake Udy, in the lower Amur Valley, Khabavorsk Territory (USSR Crane Working Group Information Bulletin No. 2, 1981). Beyond that, it is possible that the birds are nesting in the upper reaches of the lower Tunguska River, in the upper Zeya River, and in the upper parts of the Selemdsha and its tributary river, the Nora, since the same kinds of habitat are to be found in these regions (Neufeldt and Wunderlich, 1978). Similar habitat occurs on Sakhalin Island, and elsewhere in eastern Siberia.

Additionally, there are a considerable number of areas where nonbreeding birds gather, both in wooded steppes and in open steppe habitats. Of these, two are especially important. The first consists of open, swampy lowlands in forest-steppes and steppes of southern, middle, and western Siberia, westward to Barabinsk steppe, in the Ob Basin. The second important area is the treeless steppes of southern Transbaikalia (Dauria), including the Torei Lakes and Borzya Lakes. This area seems to have been the most important concentration area of hooded cranes in the past, from June to August. At various times as many as hundreds of birds have been seen there in earlier times, but recent increased agri-

cultural activities, livestock grazing, and hunting have caused a reduction of use. At the present, most hooded cranes occurring on these summering grounds are in small groups, often in company with Eurasian cranes (Neufeldt, 1981a).

Apart from these areas, there may be a very limited amount of breeding in China, in the lower Sungari River area of extreme northeastern China in the middle Amur basin and in the Hai-lao-erh area of northwestern Manchuria, near the Soviet and Mongolian borders (Cheng, 1973). There is no definite evidence of nesting in Sakhalin, and Cheng (1981) reported that there are no recent reports of Chinese nesting for this species.

Thus, it is clear that virtually the entire breeding population of this species is confined to the USSR, and is not confined to any single critical area. In general, its nesting habitats are relatively remote and in areas having little human influence, except perhaps for lumbering. Such activities may increase the nesting habitat by making it more open, and thus the total nesting range may be increasing rather than declining.

Habitat Requirements and Densities

Studies by Yuri Pukinskii in the Maritime Territory provide the best information about breeding habitats. Nesting there occurs in wet, swampy areas dominated by heathers such as Labrador tea (*Ledum palustre*), and leatherleaf (*Chamaedaphne calyculata*), as well as bog whortleberry (*Vaccinium uliginosum*) and cranberry (*Oxycoccus quadripetalus*). In some areas iris (*Iris laevigata*, *I. kaempferi*) grow, as do various sedges (*Carex* spp.), reeds (*Phragmites*), buckbean (*Menyanthes trifoliata*), and cottongrass (*Eriophorum vaginatum*). The ground cover is mostly of mosses (*Sphagnum*, *Polytrichum*, *Aulacomnium*). In the nesting marsh that was studied there was no open water except for two brooklets and a pond area of about 10×100 meters. Under the moss cover, there was also water, which oozed up to the surface along animal trails. On one side of this boggy area larch growth was present, and much of the bog was covered by scattered, low-growing larches.

In the Vilyuysk Basin, where breeding was reported by Andreev (1974), the breeding habitats appear to be very similar bogs that either lack open water or have open stretches, and are covered on their banks by cottongrass and various sedges. Nesting occurs in boggy, burned-out patches of habitat near the higher marshes of the drier or "tumara" type. Wetter marshes of the "eeii" type are apparently used for brood-rearing. In early fall, as the young are fledging, the birds use meadows with grassy areas along the small taiga rivers.

Nesting densities appear to be extremely low. In the Bikin River area, covering about 6,000 square kilometers, only about 7 to 12 percent of the land represents

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possible nesting habitat, in which 14 to 16 nesting pairs were recorded (Neufeldt, 1981a). This would represent a breeding density of about a pair per 25 to 50 square kilometers of suitable habitat. The local distribution of the birds seems to be closely associated with the distribution of bogs of the type described earlier. On one section of the Bikin River (between Verkhnyeye Oerevalo to Ulunga) there are 6 or 7 bogs, and a pair of hooded cranes was reported associated with each. These mossy bogs probably provide only limited visual and acoustic separation from other pairs of hooded cranes and may set territorial limits according to the size limits of the bogs. Pukinskii and Ilyinskii (1977) stated that the nesting territory may be 4 to 6 square kilometers, or even ten times larger, depending on the size of the bog occupied by the pair.

Nonbreeding Range and Habitats

As mentioned above, some of the steppes and wooded steppes of central Asia that were once believed to be breeding habitats are actually only summering habitats of nonbreeding birds. One such area, in the upper Ob Basin, stretches from Verkhny Uimon Village on the Altai northward to the Ket River, and from Bateni Village along the Yenisei River in Tuva to the edges of the steppe marshes in the basin of Tes-Khen River and Tere-Khol Lake. This area is used by both nomadic hooded cranes and Eurasian cranes, mainly from May to July, but sometimes into September or even October (Neufeldt, 1981a).

The other summering area, the Daurian steppes, is still used to a limited extent by hooded cranes in summer, and extends southward into neighboring regions of eastern Mongolia and China (Neufeldt, 1981a).

The wintering area of the hooded crane is now apparently almost entirely limited to Japan; current wintering in eastern China is not well documented but is believed to take place in the lower Yangtze Valley (Cheng, 1981). There is no convincing evidence that the species ever wintered in significant numbers in Assam or Manipur.

Fortunately, the hooded crane's status in Japan has been well documented, and this provides an excellent opportunity to monitor the species' overall status (table 31). Two major wintering areas occur in Japan, at Arasaki, Kagoshima Prefecture, and in Yashiro in Yamaguchi Prefecture. The population at Yashiro has been reported on by Kawamura (1981) and Koga (1981), and that at Arasaki by Nishida (1981). Only a relatively few hooded cranes winter at Yashiro, generally less than 100, while sometimes as many as 3,000 have been reported at Arasaki (Sendai City). The birds forage in grain fields, and at Yashiro have been found to feed mainly on rice from late October to early December, and

later on wheat and barley. Roosting is done in shallow water paddies associated with rice culture. Some of the major roost locations are at Yashiro (Kumage Town), Nakasu (Tokuyama City), and Nakayama (Shuto Town). Feeding is done in areas ranging from 2 to 26 hectares, which usually are located near their roosts, and which typically are harvested rice paddies, where the birds forage on waste rice. Some of the Yashiro roosts are known to have been used annually since 1960, and the number of birds using them has varied from only a few to as many as nearly 50 (Kawamura, 1981). At Izumi almost all the cranes, more than 1,000, roost in a single location, but hooded cranes and white-naped cranes remain separated (Nishida, 1981).

FOODS AND FORAGING BEHAVIOR

Foods of Adults

Very little is known of the foods of adults on the breeding grounds. Andreev (1974) reported that the birds eat large quantities of mountain cranberries and especially bog bilberries. In a stomach that he examined he found seven mosquito larvae (*Platytipula*), and large numbers of threadlike aquatic plants. Local residents told him that the birds capture and eat hynobiids, which they obtain by digging in the mossy bogs. Besides insects, some frogs (*Rana cruenta*) and salamanders (*Hynobius keyserlingi*) may also be consumed in summer, but apparently plant food predominates even during the breeding season (Neufeldt and Wunderlich, 1978; Pukinskii and Ilyinskii, 1977).

Foods on the wintering areas consist of cultivated grains such as rice, wheat, and barley, particularly rice (Nishida, 1981). Mixed samples of crane droppings from hooded and white-naped cranes exhibited a high occurrence of rice hulls in them, with smaller amounts of wheat or barley husks, and very small quantities of other seeds, grass fragments, shell fragments, and insects. There is no indication that animal materials play a significant role in the diets of these birds, at least during winter months.

Foods of Young

Nothing specific has been written on this subject.

MIGRATIONS AND MOVEMENTS

Seasonal Movements

The migratory movements of this species have been discussed by Neufeldt (1981a), who believes that the Yakutia birds of the Vilyuy Basin migrate over the

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northern part of the Irkutskaya Oblast and Transbaikalia in a generally southwestern direction, where they merge with local summer resident birds and those migrating almost directly east out of the summering area in eastern Siberia. This route crosses over the Torei lakes, where flocks of 80 to 100 birds are still encountered. Then the birds fly through northeastern Mongolia and Barga, cut through Inner Mongolia (Dalai-Nur and Kalgan), Hopei (Hebei) Province of China, over Korea, and cross especially the Tsushima Straits to reach their wintering areas in southern Japan. It is possible that some of the birds of the Siberian population, together with cranes from unknown nesting areas north of Amurland, pass over the Zeya Basin and farther south through the middle Amur plains, where they join migrants from the lower Amur Basin.

The migration through the Maritime Territory is less obvious, but evidently passes southward along the Ussuri River valley past Lake Khanka, and south into Korea. However, apparently only small migrations take place in southern Maritime Territory, and probably many of the birds breeding in the Bikin area and north on the lower Amur fly up the Sungari River basin over Liaoning Province of northeastern China, and then southward to China or Japan.

At least in earlier years there was moderate migration of birds during both spring and fall over Hopei (Hebei) Province of northeastern China (Hemmingsen and Guildal, 1968; Cheng, 1981), during which most of the migrant birds coming out of western Siberia on their way south to wintering areas of the lower Yangtze River, where it has long been believed that the species occurred. Yet, there is no specific information on the numbers of birds now wintering there, although Cheng reported (1981) that spring and fall migrations still occur along the lower Wu Yu-erh River near Qiqihar in Heilongjiang Province.

In earlier years, substantial numbers of hooded cranes remained in Korea over the winter, arriving in late November or early December and departing in March. However, since the Korean War very few have been observed, so the birds must now largely overfly Korea on their way to Japan and back. In the Yashiro area, the cranes usually arrive in late October (range of 10 years, October 23 to November 7), and leave in March (latest dates range from 28 February to 16 March over 9 years) (Nishida, 1981). Kawamura (1981) reported that the birds begin leaving in spring when the maximum daily temperatures exceed 10° C, typically departing on the morning of a nice day when the atmospheric pressure is high. Sometimes the birds all depart during a single day, while at other times several days may be required.

The hooded cranes arrive on their breeding areas of the lower Amur at about the beginning of April, and in the Vilyuy Basin they were reported by Andreev (1974) to

arrive at about the beginning of May, with the largest flocks (up to 26 birds) seen on May 19. However, eggs have been reported there as early as mid-May. The movement out of that area begins in mid-August, according to Andreev.

Daily Movements

On the wintering areas, the daily activities of the hooded cranes appear to be very much like those of other species. They forage during daylight hours, and begin returning to the roost at dusk. They often leave their feeding grounds before dark, land at a point near their roost and remain there until almost dark, and then fly into the roost. Or, they may remain in the feeding area until dark, and then fly directly to the roost. In either case, it is as dark as 0-50 luxes when they fly into their roosting areas. After landing, they drink, utter unison calls, or walk around a bit before settling in for the night. While roosting they maintain moderate distances between one another, probably to avoid wing contact should they have to take flight rapidly.

Studies by Nishida (1981) indicate that cranes are very sensitive to light intensity, and that light between 0 and 20 luxes tends to stimulate movement to and away from the roost at dusk and dawn.

Observations by Kawamura (1975) indicate that the roosts tend to be located from 0.75 to 10.2 kilometers from feeding areas, and the majority (15 of 19) studied were in wet paddies. The roosts ranged in area from 40 to 1,250 square meters, and in water depth from 1.0 to 7.5 centimeters, with 5.0 centimeters representing an ideal water depth. Mud depth ranged from 4.5 to 10.5 centimeters.

Interspecific Interactions

Very little is known of the possible predators of this species on the breeding grounds, but it is moderately large and probably safe from most if not all avian predators. In the Bikin River breeding area, both the pied harrier (*Circus melanoleucus*) and the crested honey buzzard (*Pernis ptilorhynchus*) occur regularly, and black storks (*Ciconia nigra*) also occur. Some of these species might represent threats to eggs or young birds. The Manchurian wapiti (*Cervus elaphus*) also is common, and indeed nests of hooded cranes are often placed at intersections of paths made by these large animals, which might well trample nests. It seems likely, however, as with the sandhill cranes, that the adult cranes are able to chase those ungulates away from their nesting territories.

As noted earlier, Eurasian cranes nest in some of the same areas as do hooded cranes, as for example the Vilyuy Basin. Although the two species tend to be ecologically separated, they often associate during migration, and mixed pairing has been observed on the

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breeding area. Thus, in 1865 a pair in which the male was a Eurasian crane and the female a hooded crane was observed during May (Andreev, 1974), which was the same combination as a mixed pair observed at Izumi, Japan, during seven winters (1968-1975). During this period the birds had seven hybrid offspring (Nishida, 1981).

BREEDING BIOLOGY

Age of Maturity and Time of Breeding

Hooded cranes have so far been bred in captivity only once (Katz, 1979), and no information is available on age of maturity under captive conditions. Presumably maturity is not attained before the third year, and possibly requires longer than that.

There are extremely few records of eggs in the wild. Eggs have been found on the Bikin River in the latter part of May; these proved to be well incubated, suggesting that incubation may have started in late April. In the Vilyuy Basin a hunter reported seeing eggs about the middle of May, and both downy young and large flightless young in late June. Flightless young have also been seen there as late as the end of July. All of this would suggest that most egg-laying probably occurs in late April and early May, and hatching probably occurs about the beginning of June.

Pair Formation and Courtship

The best descriptions of social behavior in the hooded crane come from Archibald (1975, 1976), who described the unison call behavior. He placed the species in the group also containing the Eurasian, whooping, and Japanese cranes, but noted that unlike these other three species the hooded crane does not usually lower its wrists during high intensity threat posturing. The female usually utters a long call and a short call for every male call. Male calls tend to be disyllabic. During the unison call the tertial feathers are raised to form a conspicuous plume in both sexes, and the head and neck are variably extended upward and backward.

In its posturing and calls the hooded crane closely resembles the Eurasian crane, and as noted earlier mixed pairing has been observed under wild conditions. Likewise, the two species often associate on migration.

Although dancing behavior and behavior associated with copulation have not been described in detail, at least the dancing behavior does not seem to differ significantly from that of other *Grus* species. Katz (1979) observed two pairs and two additional females of hooded cranes in captivity during 1977, and reported that sexual displays of the species included the unison

call, the contact call, dancing, copulatory behavior, and nesting behavior. Males consistently performed more breeding displays than did females, and one of the extra females participated in unison calls and precopulatory behavior with a male Eurasian crane in the same pen.

Territoriality and Early Nesting Behavior

The observations of Pukinskii and Ilyinskii (1977) are essentially the only ones available on early nesting behavior of these birds. In spring, when it is still easy to see across the nesting marsh, it is still difficult to observe hooded cranes, for the birds are surprisingly well camouflaged. The slate-gray body color and the white head and neck blend well among the branches of birch and larch, and after the trees and undergrowth have leafed out the cranes are impossible to see more than about 50 meters away. The birds nest on those parts of the marsh that are nearly devoid of trees or brush, but otherwise they prefer to keep to the birch thickets.

It is probable that the birds return to the same territory and may even nest in the same site year after year, for Pukinskii and Ilyinskii found fragments of old eggshells in one active nest, and in a second nest remnants judged to be three years old were also found.

Not a single nest of the four that were located was placed on hummocks of cottongrass and sedges, which were abundant in the bog. Instead they were all placed in paths or path intersections of Manchurian wapitis, or on those areas where the natural ground cover had been flattened or suppressed. Perhaps the hummocky areas are not sufficiently stable for nest sites. Most nest bases are dense heaps of damp sphagnum moss, with chunks of peat and sedge rhizomes added. The upper part of the nest is made of the stalks and leaves of sedges, along with sedge rhizomes, some branches of birch, and occasionally also larch branches. The cup of the nest is lined with sedges. Since all of the materials are gathered in the immediate vicinity, a small moat develops around the nest. One nest was about 20 centimeters high, with a basal diameter of 75×80 centimeters and a platform of 40×45 centimeters.

Egg-laying and Incubation

Nothing is known of the egg-laying behavior of this species in the wild, but it is probably identical to that of the Eurasian crane. The few available records would suggest that two eggs constitute the normal clutch. The clutches of hooded cranes are very similar to those of the Eurasian crane, averaging about 93×54 mm in the case of those found in the Bikin River area.

While incubating, the birds are remarkably secretive and quiet, calling only for a short time at dawn and again at dusk. When disturbed on the nest, they would

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sometimes fly for about 500 meters, or about twice the distance typical of Eurasian cranes. Normally, however, they tried to leave the nest without being observed, by skulking away through the bushes while keeping close to the ground. They also returned silently and stealthily, according to Pukinskii and Ilyinskii (1977).

Various observers have reported seeing distraction behavior in hooded cranes, which is typical of birds leading newly hatched young or of birds frightened from their nest.

Pukinskii and Ilyinskii (1977) found that the female did the majority of the incubation, with the male taking over for brief periods of 40 minutes to an hour during the morning and evening hours. The role of the male increased considerably during the week prior to hatching, when he spent almost as much time on the nest as did the female during the daylight hours. The female continued to incubate at night, however.

These authors reported that hatching in the nest they observed required about 24 hours, with the shell of the first egg pipping one morning, the chick completing hatching that night, and the second egg hatching in the same manner a day later. In the nest where they were making regular observations the first chick hatched on the night of 20-21 May.

Hatching and Postbreeding Biology

Pukinskii and Ilyinskii (1977) reported that a newly hatched chick weighed 93.5 grams shortly after hatching, while the second chick in the clutch weighed 85 grams. At the age of only a day or two the chicks were producing two special sound signals. One of them, first observed when the chick was still in the shell, is a vibratory, ringing peeping indicating distress. The other is a possible location call, and is a louder, clear, rhythmically repeated peep. The second call is present until the chick is a year old, and is the major means of communication used by young birds, according to these authors.

By three days after hatching the older chick was making expeditions away from the nest, up to as far as 20 meters. There the father would brood the chick, while the mother brooded the chick that was still in the nest. By the fifth day the chicks were moving along animal trails 250 meters from the nest, and on the seventh day the two chicks moved in company with their parents about 2 kilometers to a small peaty lake at the opposite end of the nesting bog. Thereafter the family remained in this bog, feeding throughout its 6 square-kilometer area, until at least mid-August.

Very little information is available on the molting patterns of hooded cranes in the wild. Andreev (1974) reported that he observed extensive body molt occurring in a crane that he collected in early June, but that the flight and tail feathers had not yet been molted.

Apparently after hatching has occurred, the parents move their young to damp bogs of the "eeii" type, which have areas of open water and bankside vegetation of cottongrass and sedges. Later, the well-grown fledglings move to meadows with grassy knolls along the small taiga rivers. Migration out of the area begins in mid-August, probably not long after the young have fledged. At least in captivity, about 75 days are required for fledging (Michael Putnam, pers. comm.).

Pukinskii and Ilyinskii (1977) reported that they found an abundance of fallen contour feathers in the nesting area during the latter part of the breeding season, especially in July. However, they did not find any tail feathers or wing feathers that would indicate the timing of a flightless period. Most of the feathers were found on the relatively open parts of the bog that were used by the birds after hatching.

From mid-August until the end of September the hooded cranes depart from their breeding areas in the Maritime Territory, leaving in small groups. They typically rise in spirals up to about 300 meters and, selecting a course, fly out in echelon formation over the peaks.

RECRUITMENT RATES, POPULATION STATUS, AND CONSERVATION

Only a few data are available on recruitment rates. Jahn (1942) observed a 13 percent incidence of juveniles in Yashiro, during February of 1939, which compares very closely to a 13.5 percent juvenile incidence among more than 3,000 birds counted by Nishida (1981). Nishida also noted that 48 percent of the families he observed in 1966-67 were leading two young, which represents a surprisingly high incidence of successful "twinning"; by comparison, Jahn did not observe any pairs with more than a single offspring.

Counts in Japan would indicate that the world population of hooded cranes was approaching 3,000 birds in the late 1970s, and they clearly have shown a consistent increase from earlier decades (see table 31). The widely dispersed nesting areas of the species, and their fairly remote locations help to provide further security for the birds. Indeed, the cranes may be increasing in both abundance and breeding range because of protection in both the USSR and Japan and because of the feeding program that has developed in Japan. Limited timbering in some parts of the breeding range causes little if any damage to the habitat, and perhaps even improves it to some degree by making it more open. Flint (1978a) suggested that additional attention and protection for the birds be provided in the Bikin River area, the Vilyuy Basin, and the Olekmo-Charskoye uplands as well as in the summer aggregation areas on the Torei Lakes.

HOODED CRANE

EVOLUTIONARY RELATIONSHIPS

Archibald (1976) included the hooded crane in a species group that also contained the Eurasian, whooping, and Japanese cranes, although he noted that the hooded crane was behaviorally distinct in its lack of wrist-lowering during high-intensity threat. Wood

(1979) found that anatomically the hooded crane is similar to the sandhill crane in external characteristics, but not consistently so otherwise. I believe that the Eurasian crane is perhaps the hooded crane's nearest living relative, in part because of the occasional occurrence of wild hybrids between these two species, but also because of general behavioral similarities.