

The importance of Northeastern Mongolia for migrating Pacific Golden Plovers 2005

Short report



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1. Summary (English and Mongolian)

The Mongol-Daguur Strictly Protected Area is an important area for numerous breeding and migrating birds, including the Pacific Golden Plover (*Pluvialis fulva*). During migration to the breeding grounds in the high arctic of Russia and Alaska, significant numbers of Pacific Golden Plover migrate through this area in the North-East of Mongolia.

Financed by the Royal Netherlands Embassy and with help of the Foundation Working Group International Waterbird & Wetland Research (WIWO), a Dutch-Mongolian expedition was set up. During a 16 day period, Pacific Golden Plovers on migration were counted, caught and measured, to gain a better understanding of their behaviour and of the importance of this area for this wader species.

In a 16 day period from 15 May to 30 May 2005, 323 Pacific Golden Plovers were caught. Among the 294 birds released were 174 males (of which 12 were 2nd year birds) and 116 females (of which 8 were 2nd year birds). During the catching period, the proportion of males decreased from 60% to 30%. Counts of migrating birds during our stay in the area showed three peaks of around 2.000 or more individuals. This pattern was likely closely related to (high) wind patterns. We observed an estimated 5.9- 7.5% (12.500 birds) of the world population of Pacific Golden Plover (166.000 –213.000 birds; Johnson 2003)

The body mass of the Pacific Golden Plovers caught ranged from 100 to 139 g on the first catching day to between 152 g and 182 g on the last catching day. Over the whole catching period this corresponded to an average daily mass increase of 2.8 g. Males and females showed very similar patterns in mass change (fig. 2). A similar mass increase (3.1 g/day) was found in the dissected birds. Measurements showed that this mass increase is the result of both storage of fat and an increase of total fat-free dry-mass, with individuals reaching fat stores of up to 40g.

A radio receiver was used to try and track Pacific Golden Plovers that were supplied with a radio transmitter by O.W. Johnson on the Marian Islands. However, no individuals were recorded in our study area. However, even if individuals from the Marian Islands would

migrate through the Mongol-Daguur area, the chance of tracking them would be very small, due to the numbers, vastness of the area and the limited range of the receiver.

Although the wind conditions made catching difficult, we were very successful in getting good data on numbers, sex-ratio, mass change and physiology of this migratory species during stop-over in the Mongol-Daguur area. The mass increase clearly indicates that this area is an important stopover site for the Pacific Golden Plovers on spring migration, with males migrating earlier than females in order to acquire territories on the breeding grounds.

Based on the results of our study, we can conclude that the Mongol-Daguur Strictly Protected Area is an important stopover site for migrating Pacific Golden Plovers using the area to refuel. We suggest further studies to be done to get more detailed information on numbers, individual length of stay and other population characteristics. We encourage further collaboration with the National University of Mongolia, because local knowledge proved indispensable to the success of this project.

Хураангуй

Монгол Дагуурын дархан цаазат газар нь Азийн сүвээцагаан (*Pluvialis fulva*) зэрэг нүүдлийн болоод өндөглөдөг шувуудын хувьд чухал нутаг билээ. Үржлийн нутаг болох ОХУ, Аляска хүрэх нүүдлийн замдаа дээрх зүйл шувууд нэн олон тоотойгоор Монголын дорнод бүс нутгаар дайран өнгөрдөг юм.

Дани- Монголын хамтарсан Азийн сүвээцагааны судалгааны ажил Royal Netherlands Embassy байгууллагын санхүүгийн дэмжлэг, Foundation Working Group International Waterbird & Wetland Research (WIWO) байгууллагын тусламжтайгаар хэрэгжив. Нийт 16 хоногийн хугацаанд нүүдлийн үедээ дайран өнгөрч буй Азийн сүвээцагаан шувууны зан төрхийг судлах, бусад зүйл эргийн шувуудын хувьд энэ нутгийн ач холбогдлыг тогтоохын тулд бид шувуудыг тоолж, барин биеийн хэмжилтийг хийлээ.

2005 оны 5-р сарын 15-аас 5-р сарын 30 хүртэл 16 хоногт нийт 323 бодгаль Азийн сүвээцагаан шувууг барив. Эдгээрээс 174 нь эр (12 нь хоёр настай), харин 116 нь эм

(8 нь хоёр настай) шувууд байлаа. Шувуу барих хугацаанд эр бодгалийн эзлэх хувь 30%-аас 60% хүртэл буурав. Хоёр мянга, түүнээс олон бодгалиас тогтсон нийт гурван том сүрэг бидний тооллогын талбайгаар дайрч өнгөрсөн нь салхины хурд, чиглэлээс хамаарсан байх талтай. Бидний тооллогоор энэ бүс нутгаар Азийн сүвээцагааны дэлхийн популяцийн 5.9- 7.5% (12.500 бодгаль) нь дайрч өнгөрөв (дэлхийн популяци 166.000 –213.000 бодгаль; Johnson 2003)

Азийн сүвээцагааны биеийн жин нүүдлийн эхний хоногуудад 100-139 грамм, харин сүүлчийн өдрүүдэд 152-182 граммаар хэлбэлзэнэ. Энэ үзүүлэлтийг барилт хийсэн нийт хугацаагаар тооцвол биеийн жин нь дунджаар нэг хоногт 2.8 граммаар өсдөг нь эр, эм шувуудад ижил ажиглагдав (fig. 2). Иймэрхүү биеийн жингийн өсөлт (3.1 грамм/хоног) тусгаарлан хэмжсэн шувуудын хувьд ч илрэв. Биеийн жингийн өсөлт нь шувууны биед өөх хуримтлагдах, биеийн хуурай жингийн нийт чөлөөт-өөхний хэмжээ ихсэх явц (бодгалийн өөхний хуримтлал 40 грамм)-ын үр дүн болно.

Азийн сүвээцагааны нүүдлийн замыг тандан тогтоох зорилгоор Мариан арлуудын судлаач О.В.Жонсоны өгсөн радио долгион дамжуулагч багажийг ашигласан ч судалгааны талбайд радио дамжуулагчтай шувуу олдсонгүй. Гэхдээ Мариан арлуудаас гарсан шувууд Монгол Дагуураар дайран өнгөрдөг байлаа ч тэдгээрийг радио долгион дамжуулагчийн тусламжтай илрүүлэх боломж бага нь шувуудын тоо толгой харьцангуй цөөн, нүүдэл өргөн уудам нутгийг хамардаг, мөн радио долгион хүлээн авагчийн долгион хүлээн авах зай хязгаарагдмал байдагтай шууд холбоотой.

Хаврын хавсарга шуурга шувууг барихад сөрөг нөлөө үзүүлж байсан ч Монгол Дагуурын дархан цаазат газарт энэ зүйл шувууны тоо толгой, хүйсийн харьцаа, биеийн жингийн өөрчлөлт, физиологийн зарим үзүүлэлтийг амжилттай судлан тогтоолоо. Биеийн жингийн өсөлтийн үзүүлэлт нь энэ бүс Азийн сүвээцагааны хувьд хаврын нүүдлийн үедээ дайрч өнгөрдөг чухал нутаг төдийгүй үржлийн нутгаа олох, тодорхойлоход онцгой үүрэгтэй эр бодгалиуд эмээсээ түрүүлж нүүдэллэн ирдэг болохыг харуулж байна.

Энэхүү судалгааны үр дүнгүүдэд тулгуурлан Монгол Дагуурын дархан цаазат газар бол Азийн сүвээцагаан шувууны нүүдлийн үедээ дайран өнгөрч, хүчээ сэлбэх чухал нутаг мөн гэж дүгнэж байна. Цаашид энэ чиглэлийн судалгааг үргэлжлүүлэн, тэдгээрийн тоо толгой, тухайлсан бодгалийн хүчээ сэлгэх хугацааг тогтоох зэрэг популяцийн бусад үзүүлэлтийг нарийвчлан судлах шаардлагатай гэсэн саналыг дэвшүүлж байгаа бөгөөд судалгааны ажлыг амжилттай гүйцэтгэхэд хамтарсан Монгол улсын их сургуультай цаашид хамтран ажиллахыг бүрэн дэмжиж байгаа юм.

2. Introduction

In the spring of 2005, we, a Dutch-Mongolian team, went on an expedition to investigate the importance of the North-Eastern Mongolian grasslands for migrating Pacific Golden Plovers. The Mongol-Daguur area lies within the Dornod, a province in the north-east of Mongolia, and is dominated by grasslands (fig. 1). These vast grasslands are grazed by numerous herds of cows, sheep, goats, camels and horses. Since 1992 the north of the province, characterised by a number of lakes and the Ulz river, embedded in the gently sloping hills, has been protected. The Mongol-Daguur Strictly Protected Area (28000 ha, around 49°45'N, 115°30'E) is part of the Dauria International Protected Area, which also includes the Daursky Biosphere Nature Reserve (Russia) and the Dalai-Nuur reserve (China). This international reserve was established in 1994, and is especially renowned for the great numbers of migratory waders and waterfowl, and the six crane species present during the breeding season and during spring and autumn migration. A number of these species are listed under the IUCN "Globally Endangered" category.



Figure 1. Map of Mongolia, showing the Dornod province in the northeast. The Mongol-Daguur Strictly Protected Area is found north of Choibalsan.

Among the many species of shorebirds utilising this area, is the Pacific Golden Plover (*Pluvialis fulva*). This bird is known to winter across a wide geographic range, extending

from East-Africa to as far east as the Hawaiian archipelago (referentie). It breeds on the High Arctic tundra from the Taimyr Penninsula (Russia) in the west, to Alaska (United States) in the east. During both spring and autumn migration, a substantial part of the worlds' population passes through the Mongol-Daguur area. Up until now, the importance of this site in terms of numbers of Pacific Golden Plovers and their refuelling opportunities was not very clear due to lack of detailed field investigations.

The Dutch part of the team, previously involved in research on both the American Golden Plover (*P. dominica*) and the Eurasian Golden Plover (*P. apricaria*), became interested in this particular migration site by reports of both German and American researchers (Johsnon, 2003, Ketzenberg & Leyer unpubl. report). To extend the knowledge on the migration of the Pacific Golden Plovers, as well as to investigate the importance of the Mongol-Daguur area for this species during migration, an expedition to this site was necessary. Since American researchers equipped a number of Pacific Golden Plovers with radio transmitters on wintering sites in the Pacific Ocean early 2005, it was especially interesting to try to track these marked birds on their migration through the Mongol-Daguur area.

The Foundation Working Group International Waterbird & Wetland Research (WIWO) managed to get funding with the Royal Netherlands Embassy in Beijing. With help of Dr Sudev Gombobaatar, a professor at the National University of Mongolia and in cooperation with the Faculty of Biology, National University of Mongolia, Mongolian Ornithological Society and the Mongol-Daguur Strictly Protected Area, the WIWO expedition to the Mongol-Daguur area was organised.

During a 16 day period, from 15 May to 31 May 2005, Pacific Golden Plovers were observed and caught for detailed investigations. These catches and observations yielded valuable information on numbers, mass change, and physiology of this migratory species during stop-over in the Mongol-Daguur area.

In this report, an overview of the findings of the expedition are presented. Furthermore, we intend to publish our results in one or more international, scientific journals.

3. Organisation

This project was financed by the Royal Netherlands Embassy, through the KNIP-programme of the Agriculture, Nature and Food Quality Department. When the Foundation Working Group International Waterbird & Wetland Research (WIWO) informed the Royal Netherlands Embassy on this expedition, it recognised the value of such an expedition, and encouraged us to have two Mongolian students to join. This would indeed appear to be a good opportunity to familiarize Mongolian participants with ecological research and facilitate cultural exchanges.

Jutta Leyrer and Ute Bradter, who had previously been involved in crane and waterfowl monitoring in North Eastern Mongolia, helped us get in touch with Dr. Sundev Gombobaatar of the National University of Mongolia. The latter, director of the Mongolian Ornithological Society and professor of the National University of Mongolia, supported us by supplying the permits necessary to enter the research area and to perform the research. Furthermore he organised transport, food supplies and cooking equipment. As such, in cooperation with the Mongolian National University, Mongolian Ornithological Society and the office of the Mongol-Daguur Strictly Protected Area, an expedition to the Mongol-Daguur area was organised.

The team consisted of two Dutch researchers (Joop Jukema and Jeroen Reneerkens) and one Dutch (Jan Wijmenga) and two Mongolian students (S. Tserenadmid and B. Gantulga). We were further supported by B. Delgermaa, who acted as a guide and translator, and two drivers (B. Batnyamsuren and N. Enkhjargal).

Based on data from previous surveys, showing that the Pacific Golden Plovers were present mainly in the second half of May (Ketzenberg & Leyrer, unpubl. report) and that birds start arriving at the breeding grounds from the first week of June onwards (Tulp & Schekkerman 2001), the expedition was planned to start at the 10th of May and to last until the 4th of June, including travel.

Besides the nine days needed for organisation and travelling within Mongolia, 16 days were spent in the Mongol-Daguur area. During this period, time was mainly spent catching and counting of Pacific Golden Plovers.

The drivers and their durable cars handled the trip along the tracks through the vast grasslands very well. Photo by JJW.

4. Itinerary

The Dutch part of the expedition departed from Amsterdam on the 10th of May 2005. Upon arrival the next day in Ulaanbaatar, in the early morning, we were welcomed by Dr. Sundev Gombobaatar, of the National University of Mongolia and B.Batnyamsuren, one of the two drivers. We spent some time at the University, where we met the dean of the Biology faculty, Prof. M.Tsogbadrakh. The collaboration between the National University of Mongolia and the WIWO team was discussed, as well as some general rules of conduct. Gombobaatar, who had prepared a lot in advance, helped us with the last preparations and introduced the Mongolian counterparts, S.Tserenadmid and B.Gantulga. The next day, we met the other driver, N.Enkhjargal, and purchased food supplies and other materials. At about noon, the seven of us left for Choibalsan.

When we arrived in Choibalsan two days later, we met our guide, B.Delgermaa. In the building of the Office Mongol-Daguur Strictly Protected Area she informed us of the locations and status of the protected areas and the activities of the office. The following day we took in additional food supplies and left for Khukh Nuur, a lake located in the south of the protected area. We arrived there in the evening.

The next morning, the 15th of May, we started catching immediately after seeing some flocks of Pacific Golden Plovers. Although not yet familiar with the catching method, the Mongolian counterparts were very keen in helping to get the wilsternet prepared. When the net was installed the waiting started. Would this age-old method succeed here in Mongolia? Within an hour or so it proved to be very effective: The first catch had been made! As more catches followed, close to 50 Pacific Golden Plovers were caught that day. The high number of birds caught gave the Mongolian counterparts plenty of opportunity to inspect the birds and to learn which measurements to take and how to take them.

In the late afternoon, for the first time, we were confronted with severe winds, causing problems with our tents. We tried to create some shelter by using the cars and the windscreen that is used with the wilsternet. Since it was still stormy the following day, we

left for Ereentsav, a village at the Russian border. After B. Delgermaa had got us a permit for entering the area, we met with the local ranger to ask him about the Pacific Golden Plovers. After this informative meeting, concerning arrival dates and good catching locations, we continued for Huh Nuut Nuur, a large lake extending into Russia and reported to be a good site for Pacific Golden Plovers. Because we saw only a single Pacific Golden Plover there, we decided that catching would not yield, and we continued to yet another lake, further west. Here we witnessed the drivers slay a sheep according to the Mongolian traditions. The intestines are considered to be the best part and are consumed first. The dry and windy climate enables storage of meat in the open air. As such, the rest of the sheep was stored on the rack on top of one of the cars, and provided food for another five days. Therefore, two sheep provided enough meat for the whole field trip. The cooking was usually done by the Mongolian counterparts, allowing the team to continue catching throughout the day.

As no Pacific Golden Plovers were seen at this site either, we headed back to the first site, Khukh Nuur. There, good numbers of birds were caught between the 21st and 24th of May. Once again driven away by severe storm, we then headed for Galuut Nuur, a lake with surroundings that seemed to provide a perfect habitat for Pacific Golden Plovers. From the 26th to the 30th of May onward, good numbers of Pacific Golden Plovers were caught at that location.

The 31st of May the team left for Choibalsan, where the guide was dropped off. The next day the remaining team members continued to Ulaanbaatar, where we arrived on the afternoon of the 2nd of June. One more day was spent in the capital to finish up business and to organise a cargo transport for the catching material. In the early morning of the 4th of June, the Dutch team members left for Amsterdam, where they arrived at midnight.

5. Description of the Area, Species and Methods

5.1 Study area

The Mongol-Daguur area mainly consists of vast grasslands, in a rolling, hilly landscape. Scattered across are a number of lakes and the Ulz river (fig. 2). These water sources are of great importance for the several species of breeding birds, but for thousands of migratory birds as well. Among these, the shorebirds, waterfowl and cranes are the most important. Although very little is known about exact migration routes and schemes of birds on this branch of the East Asian-Australian Flyway, it is assumed that the Mongol-Daguur area is an important refuelling site for many species. This assumption follows observations of thousands of birds, of numerous species, stopping over at these wetlands (e.g. see Goroshko, unpubl. data, Ketzenberg & Leyer unpubl. report).

Spread over the grasslands the traditional gers are found. An estimated 60 families with 230 persons live in the 28000 ha Mongol-Daguur Strictly Protected Area (REF). The semi-nomadic families herd their cattle on the grasslands, keeping the vegetation short year-round. This grazing of the vegetation creates an ideal habitat for the Pacific Golden Plover, which forages on ground-dwelling insects and larvae by eye-sight.

The numerous lakes and the Ulz river provide good feeding and roosting opportunities for the many migratory bird species passing by. Throughout the area, one can see that it has once been a marine environment. Especially at the shores of the lakes this is clearly visible. The constant evaporation during the dry season creates white salt crusts. Many saline plant species grow along these shores.

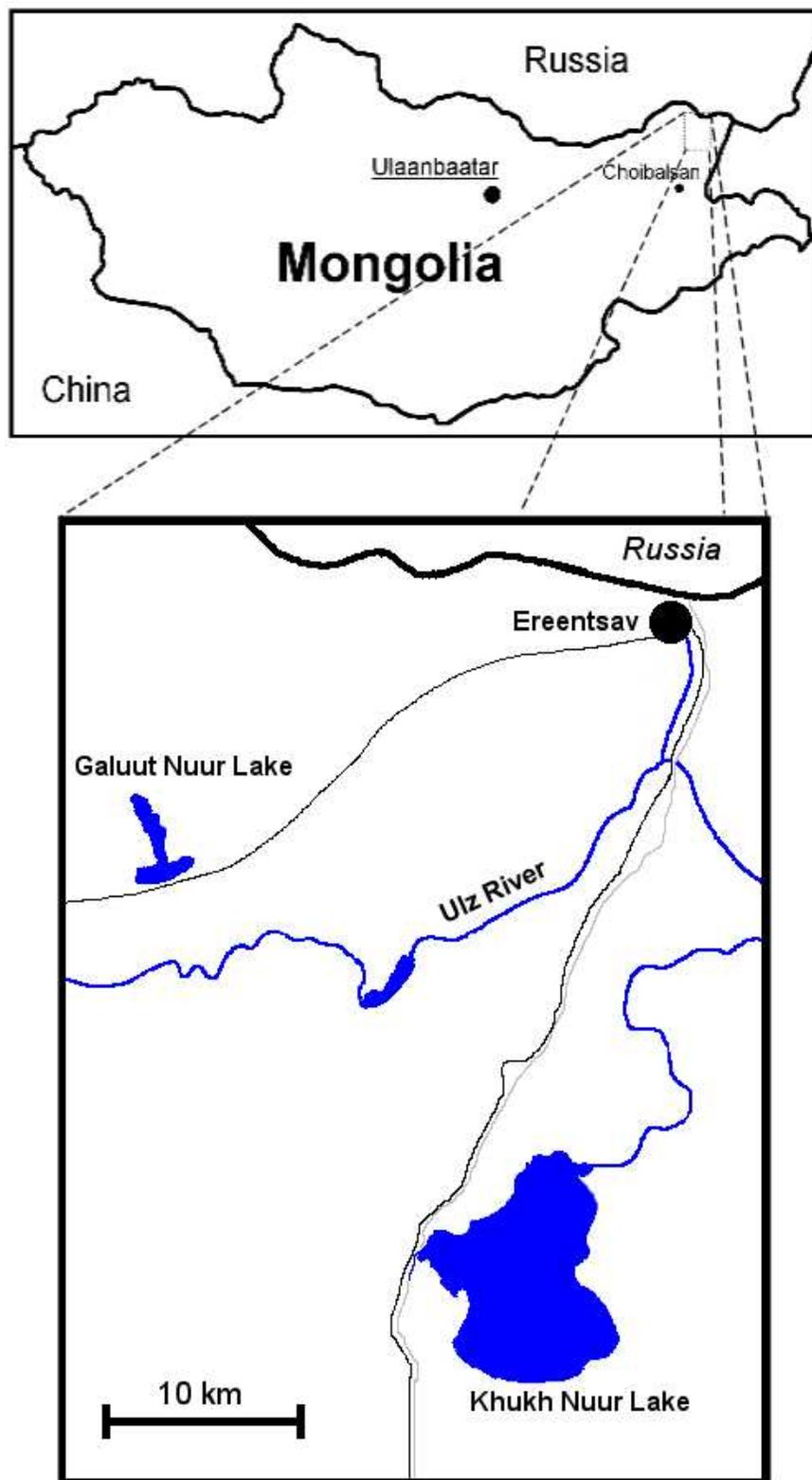


Figure 2. The study area located in the Mongol-Daguur Strictly Protected Area. Most Pacific Golden Plovers were seen at Khukh Nuur and Galuut Nuur Lake, the two locations where all birds were caught.

5.2 Climate and Weather

During the stay, weather conditions varied from somewhat cloudy while driving to the site, to very sunny weather, with day temperatures ranging between 20 and 25° C. During the night, temperatures would drop to just a few degrees above zero.

In general there was hardly any wind during the night. At about 9:00 AM the wind usually started to increase in force. The team was not able to catch until there was a constant wind (in both direction and speed), given that the catching method relied heavily on the wind (see section 4.4). Although the wind was usually northerly, it was quite variable in both direction and speed. Sometimes it went from absolutely calm to heavy storm (10 on the Beaufort scale) within a few minutes. Catching was impossible on a number of days because of continuous storm conditions.

In contrast, the team was not hindered by rain. This area is generally quite dry during this period. As such, there was only one morning with a few hours of rain. Conversations with locals revealed a generally impression on their part that conditions have been getting drier every year for the last decade or so. Local herders told us that they are concerned by this decline in rainfall, since food supplies for the cattle (the grassland vegetation) have also declined. This change in precipitation will also affect lakes and the Ulz river and subsequently all the animals, both domestic and wild, that rely on it. In fact, a number of smaller lakes were completely dry.

5.3 Study Species

The Pacific Golden Plover (*Pluvialis fulva*) is known to winter from East-Africa throughout South-Asia and Oceania up to islands as far east as Hawaii in the Pacific Ocean. The breeding range extends from the Taimyr Peninsula (Russia) in the west, to Alaska (USA) in the east (reference). During both spring- and autumn migration, a substantial part of the world population passes through the Mongol-Daguur area. During a four year period, from

1993 to 1996, the first water bird surveys were done in the area. These counts estimated 50.000 Pacific Golden Plovers passing through this area (Goroshko, unpubl. data). Given an estimated world population size of 166.000 – 216.000 (Johnson, 2003), this seems to be a very important refuelling site for the plovers. However, up until now, the importance of this site in terms of numbers of Pacific Golden Plovers and their refuelling opportunities was not very clear.

Ketzenberg & Leyrer (unpubl. report) found relatively high numbers, about 4.000, during only one of their surveys between 24 and 27 May 2000. Earlier on, and after that survey, hardly any Pacific Golden Plovers were observed by the German-Mongolian team. A census of the Royal Society for the Protection of Birds (RSPB) and the Mongolian Ornithological Society in the spring of 2004 recorded only 536 Pacific Golden Plovers, the majority of which were observed on a single day, 14 May 2004 (Badley *et al.*, 2005).

The challenge was to find out how many Pacific Golden Plovers pass through during spring migration and whether they just pass by, or use the area to refuel. This assessment could be done by counting migrating and foraging flocks and by taking measurements of birds caught. Especially the development of the body mass of the birds during their stay, would inform us of the significance of the area as a refuelling site. The onward migration of the Pacific Golden Plover from the Mongol-Daguur area to the breeding grounds of Northern Siberia covers another two-thousand kilometres, and requires either a number of subsequent stops, or a significant build up of fat and protein reserves in the Mongol-Daguur area to complete their journey to the breeding grounds.

Pacific Golden Plovers, the female (left) is more dull coloured compared to the bright coloured male on the right. Photos by JR.

5.4 Catching Method

Birds were caught using a 'wilsternet'. This wind-assisted net is traditionally used in the meadows in the northern part of the Netherlands to catch Eurasian Golden Plovers (*P.*

apricaria; see Jukema *et al.*, 2001). 'Wilsterflappen' (i.e. catching using a wilsternet) therefore seemed to be a suitable method for catching this closely related species in a similar landscape. Moreover, JJ is very experienced in catching with a wilsternet, as he caught many Eurasian Golden Plovers throughout the course of his research on this species. On a few occasions, even Pacific Golden Plovers have been caught by wilsterflappers in The Netherlands (Jukema *et al.* 2001).

The catchers wait behind a hide at about 30 metres distance from the net, with a pulling line attached to it. Besides dummy birds and a whistle to imitate the bird calls, a speaker setup playing recorded calls of the Pacific Golden Plover was used to attract the birds. Magnus Robb allowed us to use recordings that had been made in the Sound Approach program. When attracted birds approach the dummy birds, and are about to land (always with headwind), the net gets pulled over, its speed partly generated by the tail wind. After removal of the birds from the net, the net is re-installed and the catchers head back to the hide to continue catching and to handle the birds. With strong winds an elastic cord is used as a brake, to avoid caught birds to hit the ground with too high speed. A more elaborate description of this catching method and anecdotes on catches of Pacific Golden Plovers in the Netherlands can be found in Jukema *et al.* (2001)

A successful catch. Photo by JR.

5.5 Data Collection

Most time was spent catching and handling birds. Each bird was supplied with a Dutch metal ring, after which sex and age was determined by plumage characteristics. Biometrics, such as wing length and body mass were taken, as well as a small blood-, feather- and preen wax sample. The latter data may, in the future, yield interesting information on population structure and wax usage.

During the day passing plovers were monitored and assigned to be either locally foraging or migrating flocks. Behaviour of migrating flocks, such as flock size, bearing (direction of movement) and approximate height of each flock was recorded.

In early 2005, O.W.Johnson (Montana State University) equipped 34 Pacific Golden Plovers on the Marian Islands (East of the Philippines in the Pacific Ocean) with a transmitter to gain knowledge on the migration routes and timing of these birds. This enabled us to find out whether these wintering birds migrate through the Mongol-Daguur Area en route to the breeding grounds. Therefore, whenever we saw birds passing or foraging, we checked for signals with a portable receiver.

Casualties were dissected within two days. Internal organs were collected and the length of digestive tract was measured. Deposited body fat was collected and weighed.

During the field period, the Mongolian counterparts were eager to learn about the methods used in this type of ecological research. They thoroughly studied the methods and put their new knowledge into practice by helping with the catching and by measuring and dissecting birds themselves.

Joop Jukema handling a bird, while Jeroen Reneerkens counts passing birds from behind the windscreen. Photo by JJW.

6. Results

6.1 Catches and Numbers

During the period in the field area, from the 15 May through 30 May 2005, 323 Pacific Golden Plovers were caught. Of the 294 birds released were 174 males (of which 12 were 2nd year birds) and 116 females (of which 8 were 2nd year birds). There were 4 adult birds of which we were unable to determine sex based on plumage characteristics.

After the first day, when good numbers (47) were caught, five days passed without catching any birds. This was due to severe winds, starting in the evening of the 15th, and the subsequent absence of birds. From the 21st until the 24th of May, high numbers were caught, with a peak catch of 87 birds on the 23rd. Once again stormy weather kept us from catching for a number of days. However, between the 26th and 30th of May, good numbers of Pacific Golden Plovers were caught once more (fig. 3).

During the same period, we made attempts to count every flock passing by or seen foraging, and assigned it to be either a migrating flock, or a locally foraging flock (fig. 3). These data suggest that there are three peaks in migration. However, this pattern is probably mainly driven by the winds and the behaviour of the birds. We do not know if the birds actually leave the area during the storms, or that they are just hiding at particular (roosting) sites that we had not discovered in the vast area.

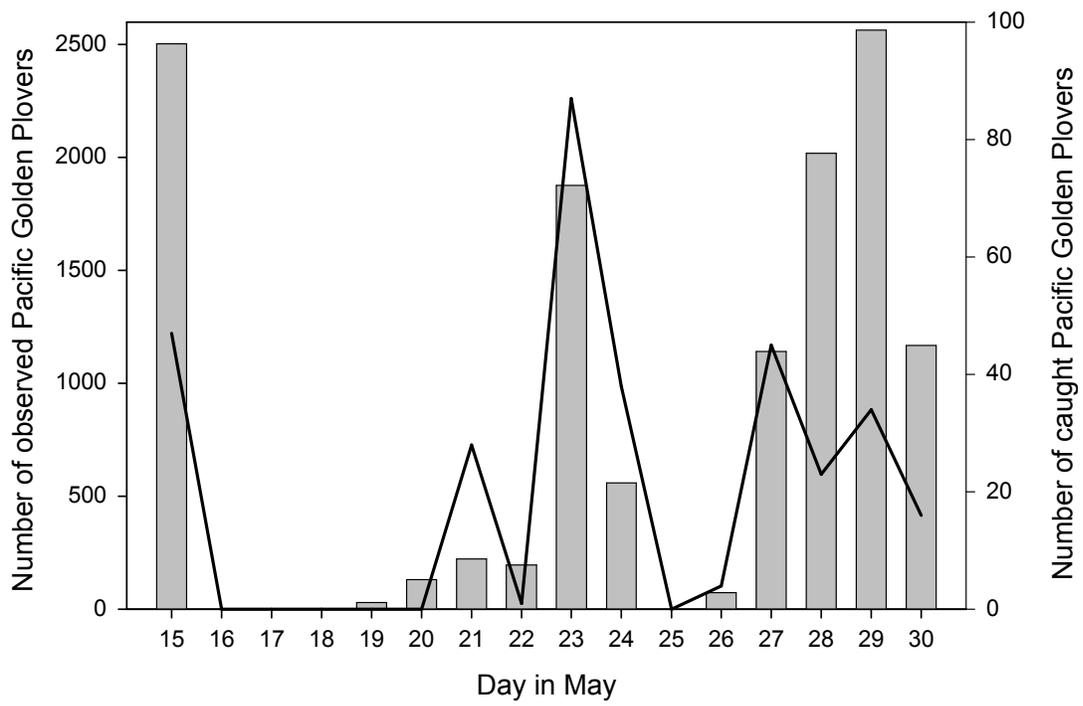


Figure 3. Numbers of Pacific Golden Plovers seen migrating (bars) and caught (line) during spring migration 2005 in the Mongol-Daguur area, Mongolia.

6.2 Body Mass and Sex-ratio

The body mass of the Pacific Golden Plovers caught on the 15 May 2005 ranged from 100 to 139 g, whereas on the last catching day, 30 May 2005, the body mass ranged from 152 g up to 182 g. Over the whole catching period this corresponds to an average daily mass increase of 2.8 g. Males and females show very similar patterns in mass change (fig. 4). During the catching period, the proportion of males decreased from 60% to 30% (fig. 5).

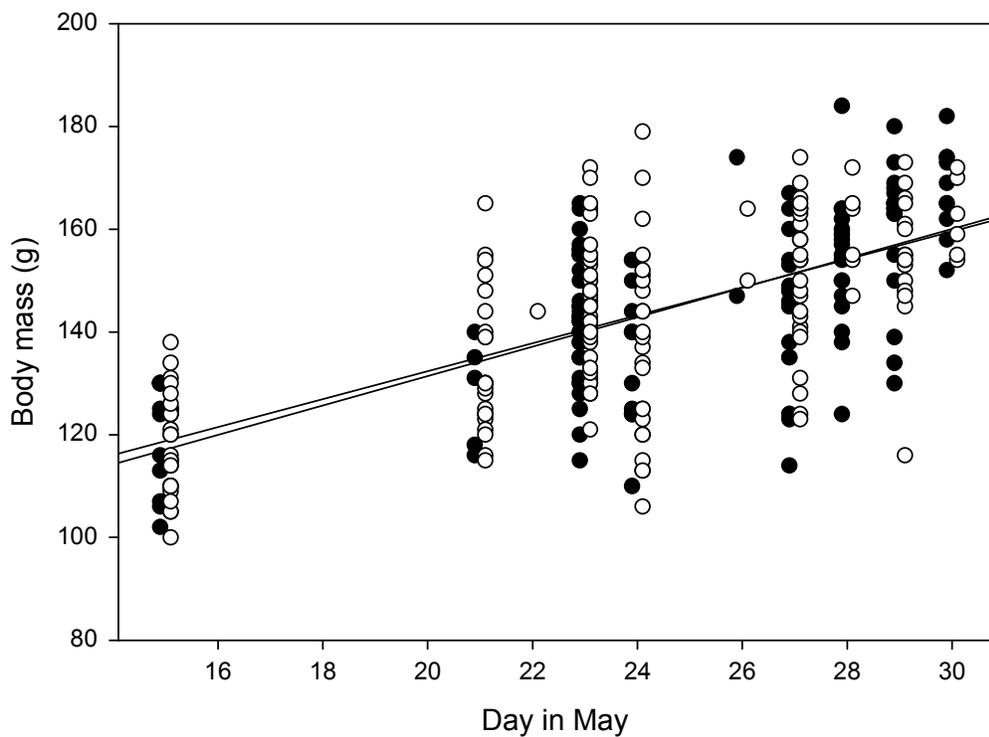


Figure 4. Body mass (g) of Pacific Golden Plovers caught and released during spring migration 2005 in the Mongol-Daguur area, Mongolia. The black dots represent the females; slope of the linear regression is 2.8 g/day. The white dots represent the males; slope of the linear regression is 2.7 g/day. The dots of the two sexes are slightly separated for graphical clarity.

6.3 Transmitters

During the field period, groups of Plovers were checked for transmitters using a hand-held receiver. However, no signals were received. Given the small number of individuals supplied with transmitters, we cannot conclude that the transmitted birds do not migrate through this area, since the chance of receiving a signal from a bird if it would pass by is very small.

6.4 Dissection of casualties

Despite the use of a braking system to reduce the speed of the net in case of heavy winds, we had 29 casualties. The average body mass of these casualties was lower compared to the other birds. This is probably due to the fact that casualties were not always measured directly after catching. The warm and dry weather may then have caused a significant loss of body water due to evaporation. Although this difference in body mass could also be induced by biased sampling (i.e. a specific group of birds having a higher chance on getting killed), this seems unlikely, as casualties are usually birds that had too much speed when they hit the net. These birds usually tried to catch up with the flock that is being caught. Moreover, we find a similar pattern of body mass change, with an average increase of 3.1 g per day. Such a pattern would probably not be found when the casualties would consist of physically compromised individuals. As all fat was removed and measured, we could find out if this mass change was due to either storage of fat, or to an increase of total fat-free dry-mass. Our results show that both components contribute to the mass increase, with birds reaching fat stores of up to 40g.

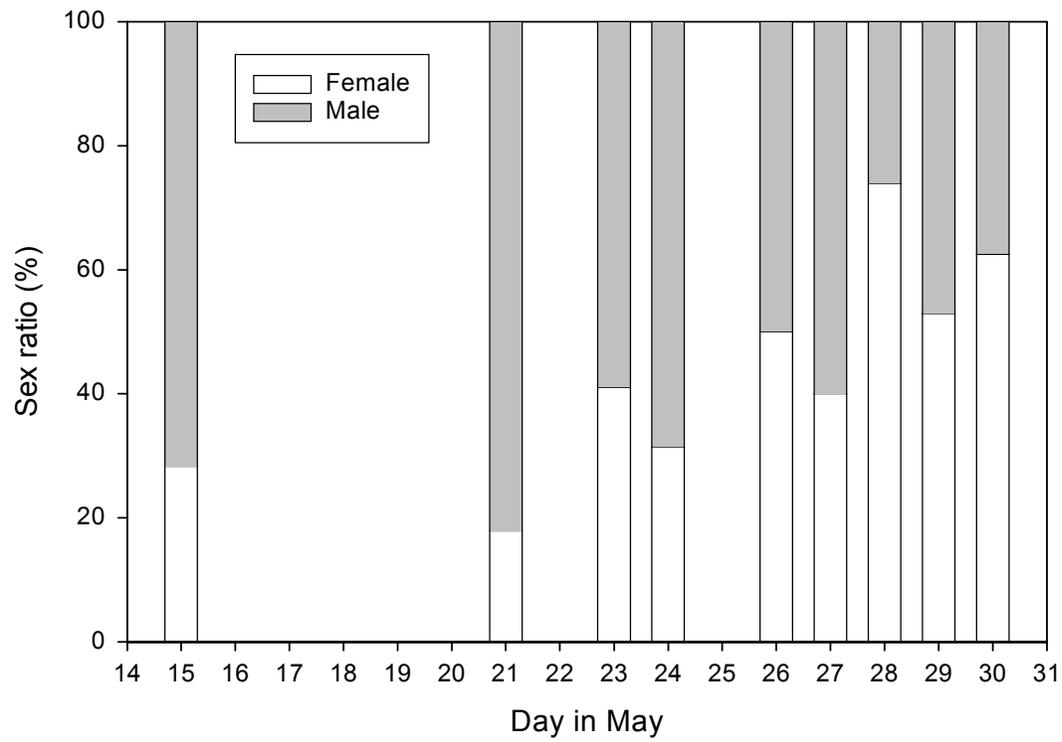


Figure 5. Sex-ratio of Pacific Golden Plovers in the catches during spring migration 2005 in the Mongol-Daguur area, Mongolia. The bars represent the percentage of males (grey) and females (white) caught each day in May.

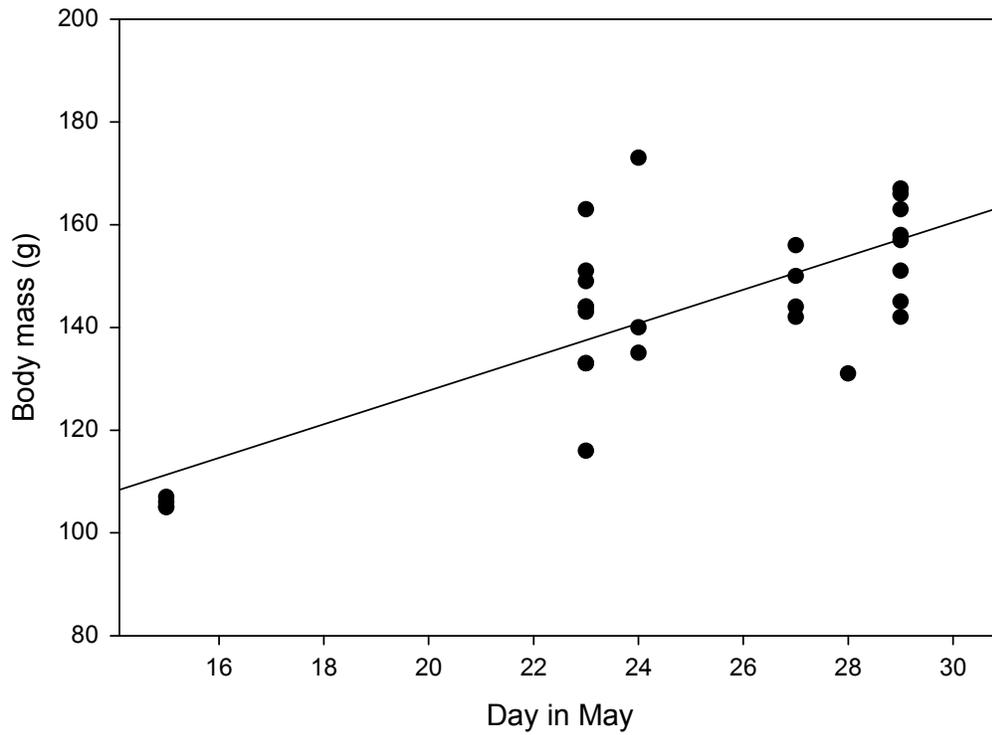


Figure 4. Body mass (g) of Pacific Golden Plover casualties during spring migration 2005 in the Mongol-Daguur area, Mongolia. Both males and females are shown, slope of the linear regression is 3.3g/day.

7. Discussion

7.1 Catching

During a 16 day period, a substantial number of Pacific Golden Plovers were caught. Despite the troubles with the wind, the catching with a wilsternet proved to be very effective. When the wind conditions were favourable, passing birds were very often lured to the net easily with both sound and dummy birds. Moreover, we felt that catching using mist nets would not have resulted in many birds being caught, if any at all, as there was no knowledge on the whereabouts of the birds, nor on their activity at night time (e.g. sleeping or foraging). Additionally, wind speed at most nights would have been too high for a proper use of mist nets. Local people told us that it was an exceptional windy spring. If wind conditions had been more favourable, we could have caught even more birds with the wilsternet. Not only did the wind affect the numbers of birds caught, but probably also the number of birds seen. It seemed as if all the Pacific Golden Plovers just disappeared from the area during and days after these storms. However, we cannot tell whether the birds actually (permanently or temporarily) leave the area after such winds, or that they just stay low for the duration of the storm, making it hard to find them.

7.2 Counts and sex-ratio

Although the vastness of the area and time constraints due to handling caught birds prevented us from performing systematic counts, the counts we were able to perform nonetheless give an indication of the number of Pacific Golden Plovers migrating through the area. Not surprisingly, the daily number of birds caught closely followed the number of birds observed migrating. Throughout the field period substantial numbers of Pacific Golden Plovers were seen, with several days of over a thousand birds. On two days the numbers of Pacific Golden Plovers even reached 2.500. Assuming no double counts, we observed 5.9-7.5% (12.500 birds) of the world population of Pacific Golden Plover (166.000 –213.000 birds; Johnson 2003) in the second half of May 2005.

During the catching period the population structure shifts from mainly males in mid May, to mainly females at the end of May. This suggests that males migrate earlier than females, perhaps to acquire the best territories on the breeding grounds. This would correspond with the finding of Klima & Johnson (2005), who found that male Pacific Golden Plovers arrive over a week earlier on the snow covered breeding grounds than the females.

7.3 Mass change and importance of the area for refuelling

During the catching period, the body mass of Pacific Golden Plovers increased significantly over time with 2.8g/d on average. A similar pattern was found in the casualties. The dissection revealed that in both males and females fat-free components (proteins) and fat contributed to equally this body mass increase, which is indicative of a preparation of a long-distance migration (e.g. Piersma, 1998).

Since we saw (and caught) birds from the first day in the Mongol-Daguur area, up to the last day, we do not know the exact duration of the migration period of spring 2005. However, the measured small body masses and fat reserves of the first birds that we caught, and the fact that Pacific Golden Plovers are known to arrive at the breeding grounds from the first week of June onwards (Tulp & Schekkerman, 2001), suggests that we were at least close to covering the whole migration period. Actual proof of birds utilising the Mongol-Daguur area for substantial refuelling, instead of just resting and drinking is still lacking, since we have no repeated measures of individual birds. It could be that heavier birds arrive later in the area, which would generate the same pattern of mass increase throughout the study as if birds increased in body mass during their stay. However, this is not very likely and moreover, we found the casualties to have been foraging before capture. Their stomach contents revealed a diet of mainly beetles and larvae.

7.4 Importance of future research and Conservation

The Mongol-Daguur area is relatively remote area, which has been subject to relatively few studies. However, those studies that have been done, clearly show that the area is used by numerous species of migratory bird species, as well as breeding species.

If we want to have more accurate estimates of the number of Pacific Golden Plovers using the area, as well as information on how they use the area, further systematic research efforts should be made. Simultaneous counts throughout the area, perhaps accompanied by a continued catching program, would yield a more reliable estimate of the number of birds stopping over at the Mongol-Daguur area within a number of years. Considering the difficulties of observing birds (especially their legs in the relatively high vegetation), we think that it would not be worthwhile to supply Pacific Golden Plovers with colour-rings. A better option would perhaps be using transmitters. We did not receive any of the birds that Johnson supplied with a transmitter, either due to the small number applied with transmitters or to the fact that those birds take a different route. However, by applying transmitters to birds within the Mongol-Daguur area, a clearer picture of behaviour could be drawn by monitoring their movements throughout their stay.

Although the number of Mongolian Gazelle (*Procapra gutturosa*) has dramatically declined, the grazing pressure has greatly increased by means of roaming cattle. This actually seems to be beneficial to the Pacific Golden Plover, which prefers to forage on such grasslands. However, in times of a global decline in shorebird numbers (reference), it is very important to further assess and protect areas like these and to research the effects of human induced manipulation and other factors like climate, especially in terms of rainfall, on the value of these sites to shorebirds.

7.6 Collaboration with the National University of Mongolia and Mongolian Ornithological Society

Planning and organising work efficiently in a remote area like the Mongol-Daguur would not have been possible without the help of our Mongolian colleagues. The help and support by

the National University of Mongolia and Mongolian Ornithological Society was indispensable, not only locating and accessing the remote field sites, but also in obtaining local scientific permits. Apart from greatly facilitating the expedition, the collaboration between the Dutch and Mongolian researchers was also fruitful in terms of transferring local Dutch skills and knowledge regarding shorebird research to the Mongolian counterparts. We would like to encourage future researchers to continue on the same route, allowing students the opportunity to experience being part of an international research team, and to take advantage of the opportunities the nature reserves and the National University of Mongolia provide.

8. Conclusion

Altogether, our results strongly indicate that significant numbers of the Pacific Golden Plovers use this site to refuel, before they continue for their breeding grounds. Individuals reaching fat reserves of around 40g and additional protein stores, should be able to make a big leap to, or at least close to their breeding grounds. Therefore the Mongol-Daguur area seems to be a very important refuelling site for the Pacific Golden Plover.

To get a more complete picture of this beautiful gold coloured migrant and its dependency on the Mongol-Daguur area, more extensive surveys and additional behavioural observations should be done in the future. Ideally, this should be done by at least two teams, so that better data can be gathered by counting, catching, tracking, and sampling on multiple locations at the same time in this vast area in North-East Mongolia. More detailed information about the wintering grounds of the birds passing through Mongolia could be obtained by performing stable isotope or trace element analyses on feather samples.

On expeditions such as these, knowledge of methods, techniques and study species, as well as knowledge of the local terrain, language and culture is vital. Therefore, the collaboration between the Dutch and the Mongolian counterparts proved to be very successful. As for the future, a better understanding of this system through collaboration of scientists in different parts of the world would be very useful in conserving the Mongol-Daguur area, and one of its main users: the Pacific Golden Plover.

The gold coloured spots on the back coverts from a male Pacific Golden Plover. Photo by JR.

9. Acknowledgements

First of all we would like to thank the Foundation Working Group International Waterbird & Wetland Research for enabling this expedition. Leo Bruinzeel encouraged us to organise this expedition. His colleagues from WIWO, Bernd de Bruijn and Frank Willems, managed to obtain funds within a very short time. They found the Royal Netherlands Embassy in Beijing, China, prepared to fund our expedition. By funding us they did not only enable a successful expedition, they also stimulated Mongolian research by giving two Mongolian students the chance to go with us and learn about migratory shorebirds.

Simon Busuttil (RSPB) and Axel Braunlich kindly provided us with information that was very useful for the preparation of our expedition. Jutta Leyrer's and Ute Bradter's contacts and experience with the area gave us a head start with organising the expedition. One of their contacts, Dr. Sundeв Gombobaatar, ornithologist and professor at the National University of Mongolia, did a great job by arranging logistics and the necessary documents, as well as organising transport. Prof. M. Tsogbadrakh, Dean of the Faculty of Biology, recognised the importance of the collaboration with the National University of Mongolia and gave us some valuable advice before we took off to the field site.

B. Batnyamsuren and N. Enkhjargal both proved to be very skilled drivers and good company. They were always glad to help wherever they could. Besides helping us in communicating with the Mongolians, B. Delgermaa, of the Mongolian Ornithological Society and the Office Mongol-Daguur Strictly Protected Area, Mongolia also managed to deal with issues concerning permits and some other difficulties.

Piet Vlas allowed us to use his steel wentjes, part of the wilsternet, which were very useful in the rocky soil. Another part of the wilsternet, the loarmstokken were fabricated by Albert Anne Mulder. The two component construction made transport a lot easier. Piet Terpstra's plastic luring birds performed as a real life flock of plovers on the grasslands. Magnus Robb provided us with sound recordings of the Pacific Golden Plover, recorded for the 'Sound Approach' program. Playing these recordings appeared to be very effective in attracting

Pacific Golden Plovers. Douwe van der Zee lent us his sound installation, to play the recordings. Jos Hooijmeijer, assistant at the University of Groningen, supplied us with the sampling materials.

Back in the Netherlands, Theunis Piersma, Head of the Animal Ecology Group of the University of Groningen and Royal Netherlands Institute for Sea Research (NIOZ), The Netherlands, helped us with some additional analyses. Finally, without Gerrit Jukema, we might not have even been able to go on this expedition. We are very thankful to all these people. All of them contributed in making this expedition a huge success.

Tserennadmid and Gantulga observing birds. Photo by JJW.

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Missed Oleg Goroshko's unpub. Data??????????

Spectators at a horse race. Photo by JJW.

Appendix 1: List of species seen during the 2005 expedition

Great Cormorant	<i>Phalacrocorax carbo</i>
Whooper Swan	<i>Cygnus cygnus</i>
Swan Goose	<i>Anser cygnoides</i>
Ruddy Shelduck	<i>Tadorna ferruginea</i>
Common Shelduck	<i>Tadorna tadorna</i>
Northern Pintail	<i>Anas acuta</i>
Northern Shoveler	<i>Anas clypeata</i>
Cinereous Vulture	<i>Aegypius monachus</i>
Black Kite	<i>Milvus migrans</i>
Eastern Marsh Harrier	<i>Circus spilonotus</i>
Pied Harrier	<i>Circus melanoleucos</i>
Upland Buzzard	<i>Buteo hemilasius</i>
Steppe Eagle	<i>Aquila nipalensis</i>
Golden Eagle	<i>Aquila chrysaetos</i>
Amur Falcon	<i>Falco amurensis</i>
Saker Falcon	<i>Falco cherrug</i>
Demoiselle Crane	<i>Anthropoides virgo</i>
Northern Lapwing	<i>Vanellus vanellus</i>
Pacific Golden Plover	<i>Pluvialis fulva</i>
Oriental Plover	<i>Charadrius veredus</i>
Common Snipe	<i>Gallinago gallinago</i>
Asian Dowitcher	<i>Limnodromus semipalmatus</i>
Black-tailed Godwit	<i>Limosa limosa</i>
Whimbrel	<i>Numenius phaeopus</i>
Marsh Sandpiper	<i>Tringa stagnatilis</i>
Wood Sandpiper	<i>Tringa glareola</i>
Ruff	<i>Philomachus pugnax</i>
Red-necked Stint	<i>Calidris ruficollis</i>
Temminck's Stint	<i>Calidris temminckii</i>
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>
Curlew Sandpiper	<i>Calidris ferruginea</i>
Common Black-headed Gull	<i>Larus ridibundus</i>
Mongolian Gull	<i>Larus mongolicus</i>
Gull-billed Tern	<i>Gelochelidon nilotica</i>
Common Tern	<i>Sterna hirundo</i>
White-winged tern	<i>Chlidonias leucopterus</i>
Black Tern	<i>Chlidonias niger</i>
Rock Dove	<i>Columba livia</i>
Pacific Swift	<i>Apus pacificus</i>
Needle-tailed Swift	<i>Hirundapus caudacutus</i>
Hoopoe	<i>Upupa epops</i>
Skylark	<i>Alauda arvensis</i>
Mongolian Lark	<i>Melanocorypha mongolica</i>

Shore Lark	<i>Eremophila alpestris</i>
Short-toed Lark sp.	<i>Calandrella sp.</i>
Sand Martin	<i>Riparia riparia</i>
Barn Swallow	<i>Hirundo rustica</i>
Yellow Wagtail	<i>Motacilla flava</i>
Citrine Wagtail	<i>Motacilla citreola</i>
Grey Wagtail	<i>Motacilla cinerea</i>
White Wagtail	<i>Motacilla alba</i>
Olive-backed Pipit	<i>Anthus hodgsoni</i>
Red-throated Pipit	<i>Anthus cervinus</i>
Arctic Warbler	<i>Phylloscopus borealis</i>
Yellow-browed Warbler	<i>Phylloscopus inornatus</i>
Pallas' Leaf Warbler	<i>Phylloscopus proregulus</i>
Daurian Redstart	<i>Phoenicurus aureus</i>
White's Thrush	<i>Zoothera dauma</i>
Naumann's Thrush	<i>Turdus naumanni</i>
Siberian Blue Robin	<i>Luscinia cyane</i>
Northern Wheatear	<i>Oenanthe oenanthe</i>
Isabelline Wheatear	<i>Oenanthe isabellina</i>
Great Reed Warbler	<i>Acrocephalus arundinaceus</i>
Asian Brown Flycatcher	<i>Muscicapa dauurica</i>
Red-breasted Flycatcher	<i>Ficedula parva</i>
Pine Bunting	<i>Emberiza leucocephala</i>
Yellow-breasted Bunting	<i>Emberiza aureola</i>
Chestnut Bunting	<i>Emberiza rutila</i>
Yellow-browed Bunting	<i>Emberiza chrysophrys</i>
Little Bunting	<i>Emberiza pusilla</i>
Reed Bunting	<i>Emberiza schoeniclus</i>
Scarlet Rosefinch	<i>Carpodacus erythrinus</i>
Brown Shrike	<i>Lanius cristatus</i>
Chough	<i>Phyrrocorax phyrrocorax</i>
Daurian Jackdaw	<i>Corvus dauuricus</i>
Rook	<i>Corvus frugilegus</i>
Raven	<i>Corvus corax</i>
Lapland Bunting	<i>Calcarius lapponicus</i>

Appendix 2: Total number of Pacific Golden Plovers seen migrating and number near the net

<u>Date</u>	<u>Number</u>	<u>Near net</u>
May-15	2455	48
May-19	30	0
May-20	132	0
May-21	129	94
May-22	168	28
May-23	1762	114
May-24	308	251
May-26	44	29
May-27	622	519
May-28	1621	398
May-29	2354	211
May-30	1054	114
<u>Total</u>	<u>10679</u>	<u>1806</u>

