WADER STATION

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Our wader ringing station catches most birds in walk-in traps and in mist-nets, but also uses cannon nets and rocket nets when they are suitable. Different catching methods are adopted for the traps and the nets, but the mist-nets can be used in tandem with walk-in traps, particularly after dusk when waders seldom enter the traps.

Trapping success depends on a range of external factors, so the number of birds caught in walk-in traps or mist-nets should not be used to determine migration dynamics or to monitor population numbers. For these purposes daily counts of waders resting and foraging around the station are recommended.

DIFFERENT CATCHING TECHNIQUES

Walk-in traps catch certain species and age classes more effectively than others. They are also less effective for long-legged species, though certain designs work well in catching large waders. Waders such as *Charadriidae* that forage by sight are not as easy to catch as tactile feeders, so the species of birds caught in the walk-in traps does not reflect the range of species observed in counts. Juveniles are also more likely to be trapped than adults. Similar biases are encountered when mist-nets or cannon-nets are used at the ringing station.

Walk-in traps

Walk-in traps are convenient and safer for waders than mist-nets, and their successful use is mostly independent of the weather, except conditions influencing the water level. These traps can also be used to catch Wagtails, Pipits, Rallids and dabbling ducks. Walk-in traps are also effective in different habitats, such as on sandy seashore; in small, shallow muddy bays; and on sewage farms and wet meadows. They differ in shape, dimension, placement of the

capture chamber, the type of entrance and the material used for their construction, wire netting or thick fish net. Different types are described in the book by Bub (1971). Based on the Kuling Waterbird Research Group's experience, we recommend two types of walk-in traps (Fig. 1). The first has the capture chamber located at one side and is considered the safest for the trapped birds, limiting mortality and injury. The second sites the capture chamber in the middle. This type has been used in Poland and other European countries since the sixties. Both traps are lightweight and can be carried by one person. They are made of wire frames and are covered in thick fishnet, with strands no less than 1 mm thick and a mesh of 18-19 mm. Fishnet is less durable than galvanised wire, but the wire causes more injuries and damages the plumage of trapped waders, particularly Snipes, which butt their heads against the roof while fluttering inside the trap. Frames are connected with pieces of wire, but other material such as plastic cable ties can be used. Welding is strongest.

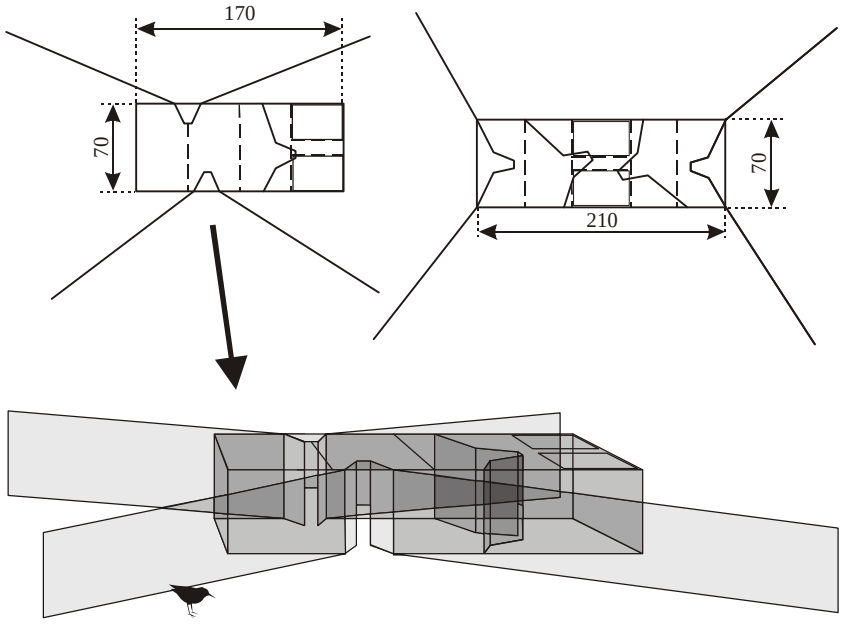

Fig. 1. Walk-in traps for waders. Measurements in centimetres.

Both models may be built so they can be folded. Less wire is needed for the traps that cannot be folded, but this model is less convenient to store and transport. It is easier and quicker to fit a new frame to the folded version when wire or netting break than to move the whole trap from the catching site for repair. The best frames are made of stainless or zinc-plated wire, which last longer, especially in marine habitats. Unprotected 5mm wire rusts away after 3-4 years of use.

The traps should not be built more than 40 cm high. This size trap will catch a wide range of species up to the size of an Oystercatcher. Traps 50 cm or higher seem to frighten off smaller waders, but are effective for larger species.

The shape of the entrance funnel determines the traps' success (Fig. 2). In our opinion a funnel-shaped entrance of sufficient depth works better than a curved-wall type and fewer trapped waders escape. Funnels should not be lined up directly in front of each other (see Fig. 1), which would lead the bird to a potential exit, and birds easily escape from traps with that design.

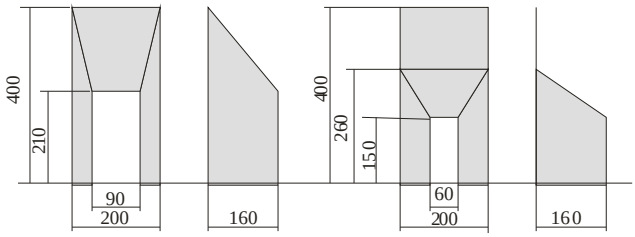

Fig. 2. Funnels for walk-in traps. Measurements in millimetres.

An important feature of these traps is the fence that directs foraging birds to the funnel. Fences that are fixed to the traps allow the whole assembly to be moved easier and faster. Spare lose fences make traps more versatile (Fig. 3). The fence is the part most susceptible to damage, particularly in marine habitats, so it is always useful to keep spares at the ringing station.

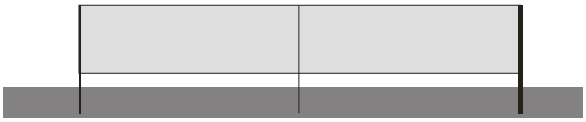
Fig. 3. Guide fence for walk-in traps.

Another type of walk-in trap, the so-called tent-like type, is also effective and has the advantage that it can be folded and carried in a pocket. These traps are made of fishnet and cord, and are frequently set along the edges of small pools. But the tent-like trap is more difficult to set up and is less convenient where it must be moved (Fig. 4). They are best suited to locations with a stable water level.

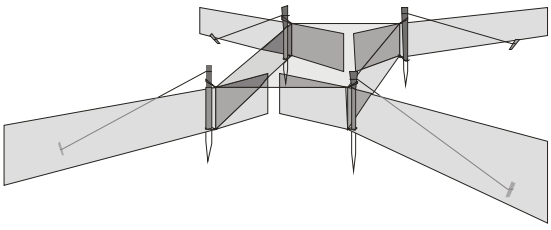
Fig. 4. Soft netting ("tent-like") walk-in trap.

Mist-nets for catching waders

(written by Christer Persson)

The standard 30mm mesh, three-shelf, 110d/2-ply, 9m or 12m long wader net will catch most species of waders, ducks and terns. The net must be double tethered, with a knot securing the netting to the shelf strands about every 50cm. Longer nets are seldom practical in wet surroundings and tend to sag whenever the atmospheric humidity changes. Poles should preferably be of aluminium and painted black.

The nets should be set up with maximum tension and so high above any water that about 10% of all birds fly below the lowest shelf. These nets do cut and damage struggling birds, which should not be left in them for long or when a wind stronger than about 18 km/h is blowing. Larger species, such as Whimbrel, Curlew, Oystercatcher and even the Godwits, soon become entangled and may have to be cut free with scissors. Try to cut only one or two strands, creating a hole through which the bird is freed. The welfare of the birds must come first and there is no excuse for sloppy technique that harms the waders. Wader nets are easy to repair. Use polyester sewing-thread, not cotton, if you don't have the correct netting material.

The background is an essential factor to consider when mist-netting, particularly when the nets are set in the open. When waders or small ducks such as Teal are targeted in marshland, a useful background can be obtained simply by cutting out small clearings of at most 25m x 25m in reedbeds. Arrange the nets against the background of the reeds, such as four nets on four poles in a square. The birds are forced to enter the clearing from above, which helps to make the nets blend in enough with the background to continue mist-netting in daylight, particularly at a spot with blackish mud or soil. Banks of seaweed can serve the same purpose. Dunlin descending in the early morning can be caught with wader nets set up in this fashion for 3 to 4 hours after daybreak.

Two other methods can be tried even with a poor background that leaves the nets visibly exposed. Try setting nets over driftlines where seaweed piles up, or exploit dense concentrations of birds caused by congregations of prey or by high water levels. The odds are against substantial catches in the daytime, but these techniques are ten to a hundred times more productive in darkness, and particularly if the trapper uses a tape lure or better yet several tapes playing the calls of different species.

Nets are set up on the windy flats of Southern Scania in Sweden where sand and water are the only features as far as the eye can see, There is no background at all, but waders are

caught successfully thanks to tape lures. Best catches are achieved by playing the calls loud and setting the nets correctly for the conditions. Nets must be moved when the water level changes. When waders are caught alongside the waterline one single-shelf net is set perpendicular to the shoreline, or nets may be used in tandem, with one set across the waterline and one in the water. Other permutations seldom catch birds. But when waders approach a mound of seaweed from the water a row of nets parallel to the waterline with a tape recorder attached to each pole is often the best arrangement.

In recent years this technique has also been used productively with Common, Arctic, Little and – in particular – Sandwich Terns. Moonlight is no great disadvantage if the site hosts many birds, but the volume of the calls is crucial; if possible, the sound should carry for about a kilometre. Use rechargeable Ni-Cd batteries for recorders and lights, or solder leak-proof 9V or 12V lead-acid cells to the battery sockets.

Wader transport and storage devices

Do not use bags to carry waders, particularly the larger species such as Bar-tailed Godwit, Whimbrel and Greenshank, which are sensitive to being confined. Use containers such as wicker baskets or plastic laundry baskets about 50-80cm long, 30-40cm wide and 40cm high. The walls must allow plenty of airflow, the floor must be hard and the roof must be covered with waterproof material to prevent the birds from getting wet in rainy weather. The flooring must be cleaned regularly, so it is handy if it can be removed. Containers can be made with a metal frame covered by fabric and the removable floor from plywood or plastic. Birds are removed through a fastened entrance that must be large enough to remove even the largest species without hindrance. The transport boxes should not allow birds to stick their bills or toes through holes.

Avoid shaking the birds when transporting them, so it is better to hold the container firmly than to hang it from your shoulder. Different species may be carried together, but ensure the containers are not overcrowded and give the birds ample free space in the container.

The waders may be stored at the ringing station in the same containers in which they were transported. The station should however have at least one large storage container to keep unexpectedly large catches and have at least 5 to 6 carrying containers.

Ringing tools

Waders are usually marked with stainless steel rings and suitable pliers must be available to close all sizes of rings that are likely to be used at the station. The holes in ringing pliers are slightly elliptical (Fig. 5) to flatten the rings slightly when they are closed. Pliers should open and close easily and be able to close the ring properly in only two moves: the first squeeze closes the ring except for a small gap, then turn the ring 90° and with the second squeeze close the remaining gap and give the ring the right shape.

Measurements are taken with callipers and a stopped ruler. We recommend callipers with a digital or clock face rather than a vernier face.

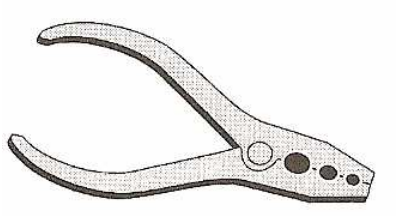

Fig. 5. Pliers for closing steel rings.

ARRANGEMENT OF THE CATCHING AREA

The pattern chosen for setting the traps will be determined by the habitat in which they are used, most importantly the presence of a clear boundary between water and land. Traps should be set only where birds forage, for resting places are no good as catching sites. On the shore of a pond, a lake or the open sea traps should be set slightly inland of the water. The fences are used to direct birds to the entrance and to prevent them from passing the trap on the water side. Where the shore is sufficiently wide, setting a second trap or additional fences on the landward side will improve the catching efficiency (Fig. 6). But where there is no clear border between the water and more-or-less dry land, such as on mudflats or wet meadows, traps that are not linked to each other will not be very effective. In these cases a line of several traps with extra long fences will give the best results. A V-shape arrangement on the banks of a pond or a line of fences linking traps on mudflats, with the fence placed next to the traps' entrances (Fig. 6), is often a productive arrangement.

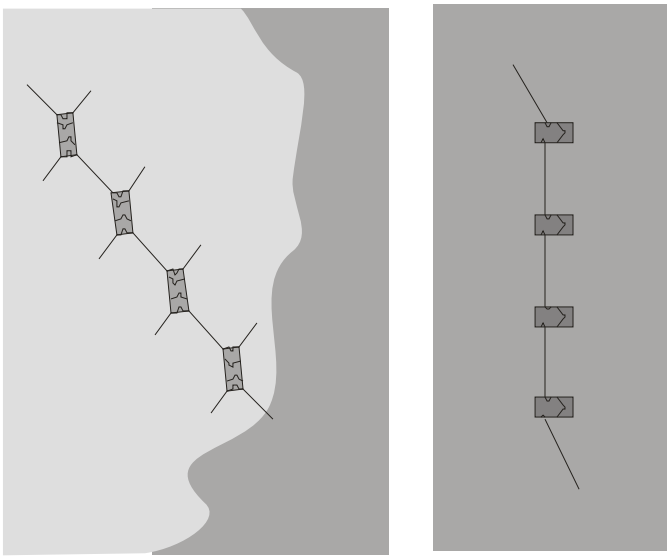

Fig. 6. Arrangement of walk-in traps at the catching area (dark grey– shallow water or mud).

It is important for the safety of trapped birds to ensure that the capture chamber is placed on a dry area. Sand or cut grass may be piled in the capture chamber to keep the birds dry even when the traps are set on mud or on a wet meadow. Lightweight walk-in traps may be set on beds of floating seaweed, but take care that they don't settle in the water over a few hours. Where they do sink ringers can place wooden poles under the trap along or perpendicular to its longer walls.

MAINTENANCE OF THE TRAPS

Traps can soon become caked with mud or vegetation. Dirty traps are less effective and should be cleaned of vegetation and mud that gets caught in the netting of their walls. This is a laborious task that can take as much as an hour, when it would be better to remove the fouled trap from the catching area for cleaning. If many traps are fouled it is advisable to curtail the catching session and use all the staff of the ringing point to clean them. This will disturb the rhythm of inspecting the traps and reduce the catch in the short term, but in the long run it can't be avoided since birds avoid traps that are caked with vegetation or mud.

The team inspecting the traps should always carry pieces of wire or cord for small repairs. They should always carefully examine the traps for damage to the netting. Even a single broken mesh may allow small trapped birds such as stints and wagtails to escape, particularly holes in the corners of the capture chamber. A single broken mesh may be quickly repaired in place, but extensive damage requires the whole trap to be replaced on the next round of inspections.

The damaged trap should be taken to the camp and repaired away from the catching site. The inspection team should take care to ensure that the flaps covering the holes through which birds are taken out are properly closed and that the capture chambers are dry.

Where the water level changes rapidly, such as alongside rivers or in the marine environment, traps must be moved before the rising water floods them. The number of staff required at a site should be calculated with this need in mind and the number of traps they service will also be determined by this requirement. Traps must constantly be moved, cleaned and repaired, particularly in marine environments, so 2-3 people should be assigned to each round of inspections to allow these tasks to be undertaken quickly and efficiently.

The water level at the area where the traps are set should be continually monitored. Do not wait for a scheduled inspection to move the traps if the water starts rising suddenly. Set up a marked pole, visible from the camp, so that the water level can be easily gauged. Ringing stations on riverbanks or in marine areas should tune in to radio weather reports that give water levels or to weather forecasts for fishermen. Meteorological sites on the web are also useful for ringing staff to foretell large changes in the water level. If the water level is expected to rise overnight, try to move the traps before they flood.

CONTROL OF THE TRAPS

Try to arrange the traps so they do not have to be passed more than once on inspections to avoid disturbing the birds unnecessarily. Another tip is to avoid setting traps too densely, which would discourage birds from feeding at that area of the beach or bank.

Walk-in traps should be inspected every two hours. The first visit should be made 1 to 2 hours after dawn, the last no later than one hour after dusk. An inspection round should not take longer than 30 to 40 minutes, except when traps must be moved or cleaned. But breaks between inspections should never extend beyond 2 to 2.5 hours.

Waders will enter walk-in traps by day and night. In some areas, particularly in late autumn in Central Europe, waders often feed throughout the night, even on overcast and dark nights. Trapping under these circumstances is often more rewarding than in daylight, so ringers should always check if waders are feeding at night. The traps must still be checked every two hours.

Standard set of measurements and scores

The **total head length** (Fig. 7) is measured with callipers. The easiest way is to use the wider part of the jaw for this task. The bird's bill is held close to its tip. The caliper's inner jaw is placed at the tip of the bill and kept in place with the thumb and the second finger (Fig. 8). The outer jaw is then pressed against the most exposed part of the occipital bone. Slight movements of this jaw will help in finding the right position. The axis of the bird's head should be parallel to the calliper and it is important this angle is maintained while taking the measurement. Use only sufficient pressure on the calliper to just press the contour feathers to the skull and never curve the tip of the bill. Be careful not to block the nostrils of short-billed species. When learning to take this measurement first find the most exposed part of the occiput with the one jaw and then open the other jaw carefully while keeping the first fixed to the occiput. Determine the correct length by moving the second jaw back to the tip of the bill. This procedure allows the proper pressure on the callipers to be attained easily.

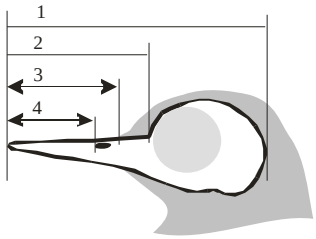

Fig. 7. Measurements of the head. 1 – total head length, 2 – bill length to the skull, 3 – bill length to the feathers, 4 – bill length to the nostrils (nalospi).

The most frequent errors:

1. Underestimating the head length

a) from exerting too much pressure on the callipers , which changes the shape of the bill at the tip

b) by maintaining the wrong angle between the calliper and the long axis of the bird's head

c) by using the wrong contact point between the calliper and the occiput

2. Overestimating the head length

a) from not holding the calliper close to the occiput

b) by placing the calliper's jaw on the muscles of the upper part of the nape

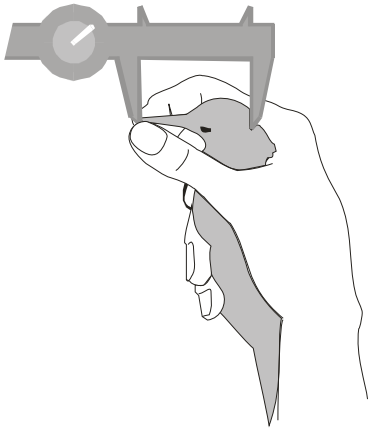

Fig. 8. Technique for measuring head length.

The **bill length** is also measured with callipers. The bill should be held the same way as when measuring the head length, but the tip of the bill is placed at the tip of the calliper's jaw, not the wide part. Then find the most distant point of the bill with the tip of the outer jaw (Fig. 9). Keep in mind that part of the bill's sheath is very elastic in some species, so be careful to take the measurement in its natural position and avoid over-tightening the calliper.

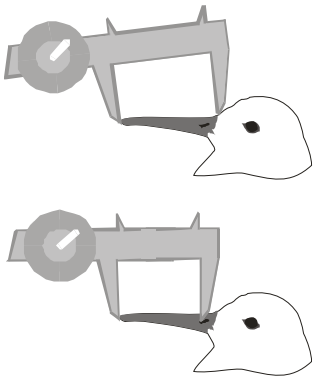

Fig. 9. Technique for measuring bill length to feathers (above) and to nostrils (below).

The most frequent errors:

1. Underestimating the bill's length

a) by closing the calliper too tightly on the bill , which will change the shape of the tip

b) by holding the calliper at the wrong angle to the long axis of the bird's bill and not holding the bill's tip at the end of the calliper's inner jaw

c) by placing the calliper's jaw on the wrong section of the edge of the bill's sheath or by stretching the sheath with the calliper's jaw towards the bill tip

2. Overestimating the bill's length

a) by placing the calliper on the wrong point at the edge of the bill's sheath

b) by stretching the bill's sheath towards the head with the tip of the calliper's jaw

This measurement is difficult to take accurately in species where the border between the horny and the feathered parts of the bill is poorly demarcated, such as most species in the genus *Tringa*. In these species the distance from bill tip to the nostrils can be measured (nalospi - see Fig. 7 and page 12) instead of bill length or the measurement can be left out. There is a strong correlation between the bill length and the total head length, and in most cases an analysis of both these parameters in individuals whose bills have finished growing gives similar results.

Wing length – A stop at the zero end of the ruler will help when measuring waders' wings, which are usually longer and stiffer than passerines' wings. The folded wing should be held parallel to the body on the ruler. The carpal joint is placed on the ruler's stop. Use the thumb of the same hand to press the wing firmly against the ruler. Use the thumb of the left hand to straighten the primaries to their maximum length by pressing down the curved wing while applying slight lateral pressure towards the bird's body at the level of the primary coverts. The third and fourth fingers of the left hand control the folding and straightening of the wing (Fig. 11).

The most frequent errors:

1. Underestimating the wing's length

a) by not pressing the wing fully against the ruler

b) by not fully straightening the primaries

2. Overestimating the wing's length

a) by not holding the carpal joint firmly against the ruler's stop

b) by not fully bending the carpal joint

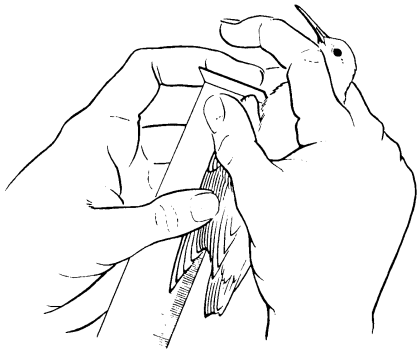

Fig. 11. Technique for measuring the wing's length.

Length of tarsus + toe (without claw) is measured using a ruler with a stop. The tibiotarsus (tibia) is pressed against the stop and the tarsometatarsus (tarsus) to the surface of the ruler. Push the tibia to the stop with the fingers of the right hand and straighten the tarsus and the longest toe along the ruler's surface with the fingers of the left hand (Fig. 12). Both parts of the leg should be pressed against the ruler so that the correct angle between them is maintained. Ensure that the whole toe is held against the ruler. Do not include the claw when reading the value.

The most frequent errors:

1. Underestimating the length of the tarsus + toe

a) by maintaining too small an angle (acute angle) between tibia and the tarsus

b) by not pressing the toe firmly against the ruler

2. Overestimating the tarsus + toe length

a) by maintaining too large an angle (obtuse angle) between the tibia and the tarsus

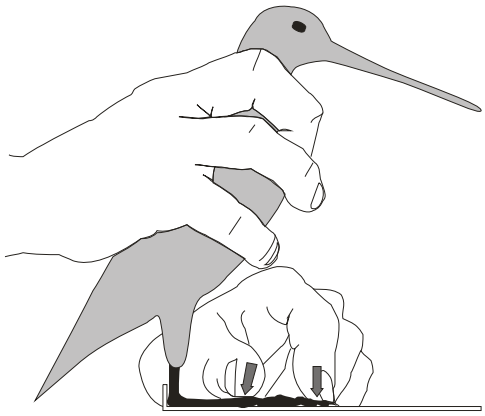

Fig. 12. Technique for measuring the length of the tarsus and toe.

Additional measurements and scores

Tarsus-length is measured with callipers from the notch on the back of the intertarsal joint to the end of the tarsus bone. The toes should be bent about 90° to the tarsus.

Nalospi, the distance between the tip of the bill and the proximal edge of the nostrils, is measured with callipers (Fig. 7). This measurement is recommended for species in which the border between the horny bill sheath and the feathers on the head is poorly demarcated. It is strongly correlated with the head length. Some difficulties might occur while holding the calliper against the proximal edge of the nostril. The bill's sheath is more supple at this point and is easily deformed. When the bird has narrow nostrils it might be difficult to find the right place to hold the calliper.

Wear categories of primaries and secondaries - the timing and pattern for the moult of flight feathers helps in the ageing of waders and also in recognising different populations, which have different moult schedules. The categories of wear described by Prater et al. (1977) are widely used (Fig. 13). A magnifying glass is helpful when distinguishing among these categories.

When taking notes in the field numbers from 0 (fresh feather) to 3 (very worn feather) could be attributed to subsequent wear categories and it is convenient to use a similar notation to the one used in the moult index of primaries.

Example: $3^3\ 4^2\ 2^1\ 1^0$

- three outermost primaries - very worn (3)
- next four primaries – worn (2)
- next two primaries – slightly worn (1)
- the innermost primary – fresh (0)

Note that the sum of exponents must be equal to the number of primaries or secondaries (10 in case of waders).

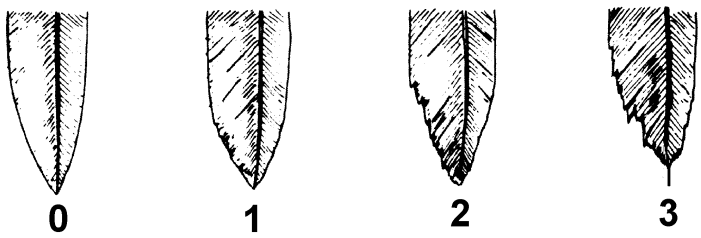

Fig. 13. Wear categories of flight feathers.

Features relating to the **plumage colours**.

Colours of the plumage can help to distinguish different populations of waders. For example, in the Bar-tailed Godwit and the Whimbrel a relationship has been established between the colour pattern of the underwing scapulars and the breeding area. A similar key has been devised for Dunlin that notes the extent of white reaching the shaft on inner primaries and the presence of median wing coverts of the adult-buff type. Devising a scale to note these types of features starts with a description of the range of variation in a feature and goes on to define a succession of criteria, allowing a distinction to be determined between each category.

LABORATORY WORKING ROUTINE

The routines and rules at a wader ringing station are similar to those at a passerine station, but ringers should note the differences in trapping methods and the slightly different set of measurements that are taken.

Species that suffer most from confinement should be ringed first, i.e. Godwits, Curlews, Whimbrels, Greenshanks and Spotted Redshanks. Any passerines that were trapped, such as wagtails, should be ringed next.

After ringing, the age and if possible the sex of the bird should be noted together with the ring number. This usually requires the wing to be opened, and so the moult score and other details of the wing may be taken at the same time, such as features related to the colour of feathers. The wing length can be measured at the same time. With the ruler in hand, the next measurement taken should be the tarsus+toe length. After that the callipers are used to measure total head length, bill length and any other measurements (nalospi, tarsus). Finally, the bird is weighed.

The best way to reduce the time birds are kept is to work with a team of 3 to 4 people while ringing. One person takes birds out of the basket and fixes the ring, another takes all the measurements, a third weighs the bird and releases it. The fourth person writes the notes, or if short staffed the third person takes notes while not weighing birds.

Waders released in daylight will fly away by themselves. Larger species may be carefully thrown in the air, taking care there are no obstructions such as bushes or telephone lines in their way. At night birds being released from the ringing station should be given time to adapt to the darkness before being set free. This recovery period lasts longer than in the daytime and therefore the person weighing birds cannot also release them. Birds should never be allowed to walk from ringing station. Uninjured birds that cannot fly away are best taken back to the feeding area where they were caught and released there. Most of these immobilised birds will take a short while to recover and then fly away.

WADER COUNTS

When waders are being counted, adult and juvenile birds should be noted separately if possible. This data helps to determine the breeding success of a species and the migration dynamics of both age categories can be established. In contrast, the age structure obtained by catching waders in walk-in traps will be biased since adult birds are less likely to enter the traps. Furthermore, the phenology of adults differs from that of juvenile birds. In most species adults migrate much earlier than juveniles and the trapping efficiency might also change over the season as water levels and foraging conditions change. Observers should realise that we do not know how many of the same individuals may have been counted on a previous day when birds are tallied every day. The age structure monitored in any season also partly depends on the length of the birds' stopover in the study area and the duration of the stay will likely differ between adult and juveniles.

Counts should be done only by people who can identify all species in the field and estimate the size of flocks. The best time for counting is around noon, when few birds walk into the traps and most are resting, which also makes counting easier. Remember to add the number of birds caught in the traps to the overall count. Many wader species tend to favour one particular type of habitat, so for example Curlew Sandpipers and Bar-tailed Godwits are seldom found in a wet meadow, and Sanderling and Turnstone almost always feed on sandy beaches. Therefore the area where birds are counted should include all the local habitats. A strict definition of the limits of the census area is also important. The area should preferably provide natural demarcations: a meadow or a muddy bay should not be divided. The area should not be so large that walking around it and counting the birds would take more than 1 to 1.5 hours.

Ringers who do counts should start immediately after all the birds from the last inspection round have been processed, so that birds brought from the next inspection will not have to be held until the ringer returns. A light telescope is very helpful in counts. Some genera, such as snipes, are very shy and spotting all the individuals in the vegetation is practically impossible even with a telescope. Therefore places where snipes congregate should be traversed in a zigzag pattern, with the observer trying to flush all individuals in the area.