WALTER
wadden sea
LONG-TERM ECOSYSTEM RESEARCH

Gedegen, innovatieve en verbindende monitoring van het waddengebied

SHOREBIRD RECRUITMENT IN THE DUTCH WADDEN SEA

A PILOT STUDY FOCUSING ON THE USE OF CITIZEN SCIENCE IN SHOREBIRD RECRUITMENT MEASUREMENTS OF BIRD SPECIES IN THE DUTCH WADDEN SEA

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SHOREBIRD RECRUITMENT

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1 CASE STUDY: SHOREBIRD RECRUITMENT

The Wadden Sea is acknowledged as one of the most important tidal wetland areas in the world (Roomen et al, 2005). Existing of the world's largest continuous belt of tidal mudflats and protected by a barrier of sandy islands against strong currents and waves, this area contains a unique composition of nutrients due to a massive input of freshwater from five estuaries. Therefore, the area is used as a nursery for many species of fish and is an important foraging area for birds (Reise et al, 2010). For migrating birds, this area is crucial during their migration southwards over the East Atlantic flyway; a large geographical area stretching from North-eastern Canada in the west and Central Siberia in the east all the way south to South-Africa (Boere & Stroud, 2006; Roomen et al, 2005). The Wadden Sea is one of the first areas in which the migrating birds from the west and the east come together to strengthen, rest and store fat reserves for the rest of their journey south; each year about 12 million waterbirds visit the Wadden Sea during their migration (Kam et al, 1999).

Since the early 1960's, countings of waterbirds have been executed in the Wadden Sea, but not as frequent enough to define it as monitoring. Around the mid 1970's, the countings of waterbirds became more systematic and the data could be utilized as monitoring data. Nowadays, the Wadden Sea has been divided in several subareas which are monitored about every month (Roomen et al, 2005). Most of the monitoring is done by scientists, but many hobbyists, or potential Citizen Scientists (Hochachka et al., 2012), collect data about birds every day and submit their findings in online databases. Therefore, these volunteering participants can be integrated in new research projects. A potential research subject is to examine the juvenile recruitment rate of specific groups of shorebirds. The aim of this report is to establish an overview of the differences between adult and juvenile plumages of 54 species of shorebird in the Dutch part of the Wadden Sea.

Figure 1-1: Multiple species of shorebird on the coastline of one of the Wadden Islands (TELMAR, 2014).

2 MATERIALS AND METHODS

2.1 Species selection and literature

This report mainly focuses on bird species found in the coastal zone of the Netherlands; more importantly, the selected bird species have a certain relationship to the Dutch Wadden Sea. Therefore, the selection of species is based upon the examined species in the following report:

Jeugd, H. Van Der, Ens, B. J., Versluijs, M., Schekkerman, H., Roodbergen, M., Hallmann, C., & Coehoorn, P. (2014). Geïntegreerde monitoring van vogels van de Nederlandse Waddenzee (p. 261).

This report examines the possibility of using "integrated population monitoring" as a method to examine and predict the trends of bird populations in the Wadden Sea. In total, 54 species have been selected which have been used in this report as well.

The plumage and moult descriptions of every species, examined in this report, is based on three main literature resources:

- Volumes 1, 2, 3, and 4 (consecutive 1977, 1980, 1983, 1985) of *Cramp, S. et al, Handbook of the birds of Europe, the Middle East and North Africa: the birds of the western Palearctic*.

- Volumes 1, 2, 3 and 5 (consecutive 1992, 1994, 1996 and 1999) of *Del Hoyo, J., A. Elliot, and J. Sargatal. "Handbook of the Birds of the World.*

- *Svensson, L., Grant, P. J., & Mullarney, K. (2009). Collins bird guide. HarperCollins.*

2.2 Figure preparation

The "juvenile plumage and moult phases" diagrams and the figures showing the differences between juveniles and adults (non-breeding) have all been completely designed by making use of Microsoft Office PowerPoint 2013. Both figure types have been established by using the following literature resources:

Jeugd, H. Van Der, Ens, B. J., Versluijs, M., Schekkerman, H., Roodbergen, M., Hallmann, C., & Coehoorn, P. (2014). Geïntegreerde monitoring van vogels van de Nederlandse Waddenzee (p. 261).

Cramp, S. (1977). Handbook of the birds of Europe, the Middle East, and North Africa: the birds of the western Palearctic. Vol. 1, Ostrich to ducks. Oxford University Press.

Cramp, S. (1980). Handbook of the birds of Europe, the Middle East, and North Africa: the birds of the Western Palearctic. Vol. 2, Hawks to bustards. Oxford University Press.

Cramp, S., Simmons, K. L. E., Brooks, D. C., Collar, N. J., Dunn, E., Gillmor, R., ... & Wilson, M. G. (1983). Handbook of the birds of Europe, the Middle East and North Africa. The birds of the Western Palearctic: 3. Waders to gulls.

Cramp, S. (1985). Handbook of the birds of Europe, the Middle East, and North Africa: the birds of the western Palearctic. Vol. 4, Terns to woodpeckers. Oxford University Press.

Glossary

Downy young – As long as a young is not able to fly.

Juvenile – Fledged young wearing its first full plumage.

Immature – Post-juvenile phase; not yet fully acquired adult plumage.

Non-breeding – The plumage mostly worn during winter.

Breeding – The plumage mostly worn during the breeding season.

Calendar year – The period between the 1st of January and the 31st of December.

3 RESULTS

3.1 Result overview, interpretation and guide

To interpret the results and the associated figures, this short introduction should guide you through the result chapters. For every examined species, a “juvenile plumage and moult phases” diagram has been established to provide us with an overview of the first calendar years of a specific species containing every plumage and moult phase it goes through.

Figure 3-1 shows an example of such a diagram: the legend (1) should provide you with enough information about the associated colours in the diagram. The ‘breeding season’ ( ) is defined as the period of which birds are really nesting and ends when most of the eggs hatched. The ‘moult stop’ ( ) is the period of which some species arrest their moult and mostly resume in early spring. The ‘number WS’ ( ) indicates the number of present individuals in a certain period in the Dutch Wadden Sea; the average amount of present numbers (3) is shown on the left of the diagram. On the right, the calendar years (2) indicate when a certain moult and/or plumage phase occurs.

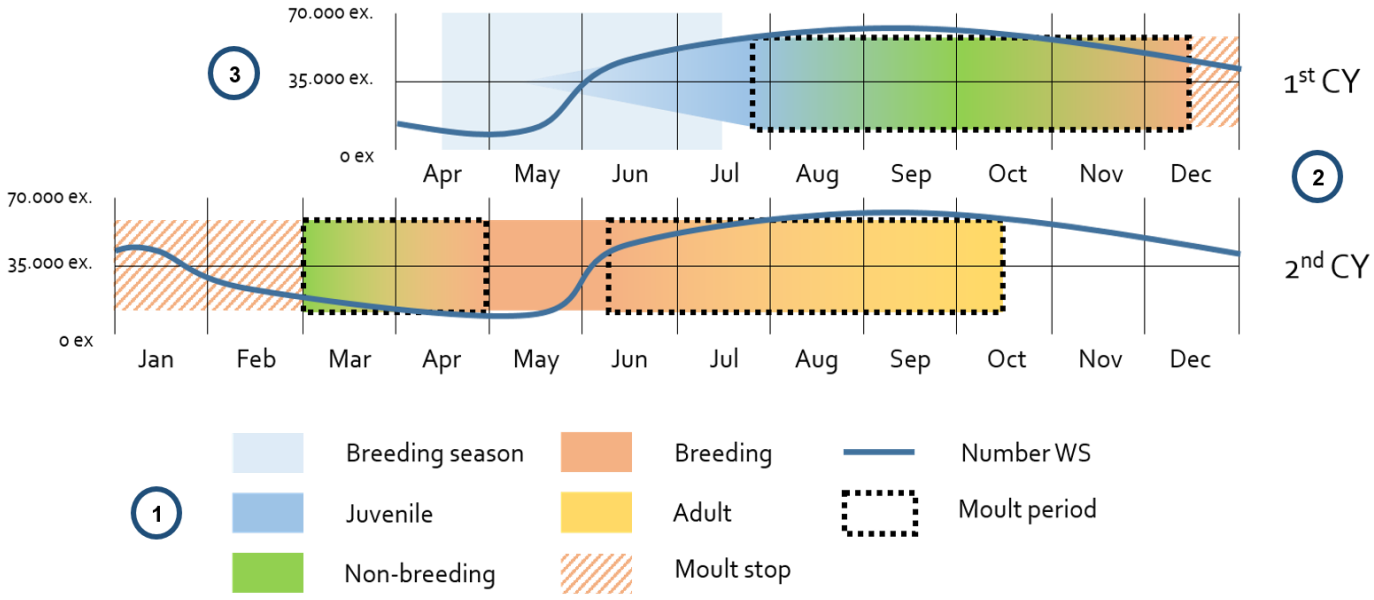

Figure 3-1: An example of a “juvenile plumage and moult phases” diagram (Common Shelduck (*Tadorna tadorna*))

For some species, the difference between juvenile and adult (non-breeding) is very little and mostly indistinguishable in the field, from a distance or even on photographic material. In this case, the species is provided with a diagram showing the apparent differences known from literature. Figure 3-2 shows the example of the Eurasian Wigeon (*Anas penelope*). The legend (1) should provide you with information about differences and semi-differences between juveniles and adults (non-breeding).

Different from adult (▬) means that the associated parts of the plumage are completely different from adults, while semi-differences (▨) are differences in the plumage which are relatively different, but still show similarities to adults (non-breeding). The gender symbol (2) indicates whether a certain plumage part is different among genders.

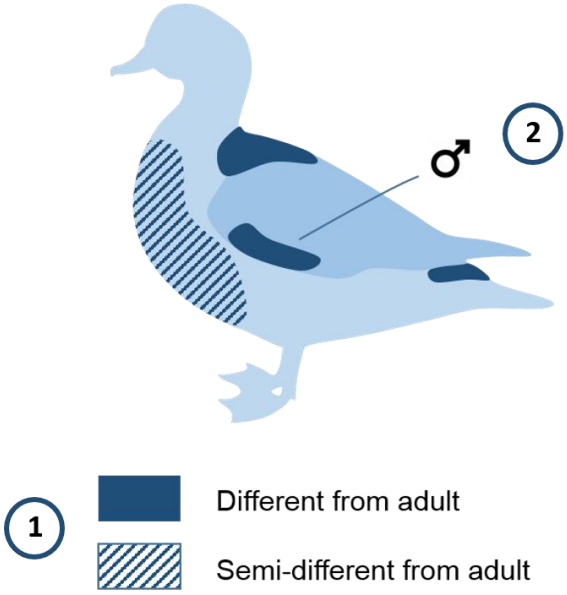

Figure 3-2: An example of a diagram showing the apparent differences of species which are difficult to distinguish from adults (non-breeding), in this case the Eurasian Wigeon (*Anas penelope*).

To give an overview on all the examined shorebird species and their associated recommendations, table 3-2 has been established to provide us with potential species which could be the main focus in new monitoring projects performed by Citizen Scientists. The total numbers (T) have been established by looking at three main parameters: "distinguishability" (D), "seasonality" (S) and "frequency" (F). "Distinguishability" is more important compared to the other parameters and has therefore been taken primarily into account. Table 3-1 shows the top 8 potential species which should be easiest to conduct a monitoring project on, performed by Citizen Scientists.

Table 3-1: The top 8 of potential species which should be easiest to conduct a monitoring project on, performed by Citizen Scientists. The summed up scores of the parameters "distinguishability" (D), "seasonality" (S) and "frequency" (F) together indicate the total score (T).

#	Species	D	S	F	T
1	Great Cormorant	12	2	8	22
2	Common Shelduck	12	2	8	22
3	Eurasian Oystercatcher	12	2	8	22
4	Bar-tailed Godwit	12	2	8	22
5	Common Redshank	12	2	8	22
6	Black-headed Gull	12	2	8	22
7	Mew Gull	12	2	8	22
8	European Herring Gull	12	2	8	22

Table 3-2: Summary of all 54 examined shorebird species showing the difficulty of performing a monitoring project by the parameters 'distinguishability' (D), 'seasonality' (S) and 'frequency' (F) of which 'distinguishability' is more important than the other parameters. The total number (T) indicates whether the species has (relative) potential to become subject of a monitoring project, performed by Citizen Scientists.

#	Species	D	S	F	T
1	Great-crested Grebe	12	2	4	18
2	Great Cormorant	12	2	8	22
3	Little Egret	6	1	2	9
4	Eurasian Spoonbill	9	1	3	13
5	Tundra Swan	12	1	2	15
6	Tundra Bean Goose	9	1	6	16
7	Greylag Goose	9	2	8	19
8	Barnacle Goose	9	1	8	18
9	Brent Goose	12	1	8	21
10	Common Shelduck	12	2	8	22
11	Eurasian Wigeon	3	1	8	12
12	Gadwall	3	2	4	9
13	Common Teal	3	2	8	13
14	Mallard	3	2	8	13
15	Northern Pintail	3	1	8	12
16	Northern Shoveler	3	1	6	10
17	Greater Scaup	9	1	8	18
18	Common Eider	6	2	8	16
19	Common Golden-eye	9	2	6	17
20	Red-breasted Merganser	3	1	6	10
21	Goosander	9	1	2	12
22	Western Marsh-harrier	6	1	4	11
23	Hen Harrier	3	1	2	6
24	Peregrine Falcon	9	1	2	12
25	Eurasian Oystercatcher	12	2	8	22
26	Pied Avocet	9	1	8	18
27	Common Ringed Plover	3	1	6	10
28	Kentish Plover	3	1	2	6
29	Eurasian Golden Plover	3	1	8	12

#	Species	D	S	F	T
30	Grey Plover	6	1	8	15
31	Northern Lapwing	9	2	8	19
32	Red Knot	9	1	8	18
33	Sanderling	12	1	8	21
34	Curlew Sandpiper	6	1	6	13
35	Dunlin	9	2	8	19
36	Black-tailed Godwit	12	1	4	17
37	Bar-tailed Godwit	12	2	8	22
38	Whimbrel	3	1	4	8
39	Eurasian Curlew	6	2	8	16
40	Spotted Redshank	12	1	6	19
41	Common Redshank	12	2	8	22
42	Common Greenshank	9	1	6	16
43	Ruddy Turnstone	9	2	6	17
44	Black-headed Gull	12	2	8	22
45	Mew Gull	12	2	8	22
46	Lesser Black-backed Gull	12	1	8	21
47	European Herring Gull	12	2	8	22
48	Great Black-backed Gull	12	1	6	19
49	Sandwich Tern	12	1	6	19
50	Common Tern	12	1	8	21
51	Arctic Tern	12	1	4	17
52	Little Tern	12	1	4	17
53	Black Tern	12	1	2	15
54	Short-eared Owl	3	2	2	7

3.2 Great Crested Grebe (*Podiceps cristatus*)

Plumages

Juvenile. Black and white stripes on sides of neck and head are obvious (3-3); mostly retained until late autumn. Paler bill and orange iris. Immature in late autumn and winter still retains vague black and white pattern on neck and head (3-4). Bill turns pinkish in colour.

Sub adult breeding. Very similar to adult breeding plumage, but plumes incomplete or lacking. Some even retain downy feathers on scapulars.

Figure 3-3: Downy young (Jul) © L. Buckx

Figure 3-4: Juvenile plumage (Nov) © A. van Ouden

Figure 3-5: Adult non-breeding (Feb) © P. van den Hoek

Moults

Post-juvenile. Most of juvenile moult occurs between January and about mid-April. Before, juvenile head and neck start to fade in late autumn of first CY.

1st Post-breeding. Same as adult post breeding; from mid-August until beginning of November. Complete moult to adult non-breeding.

Movements

Mostly migratory, but some individuals present all year round. Between July and August, many individuals move to moult areas and start migrating south; joined by birds from north-eastern breeding areas in September. Part also moves to open ocean.

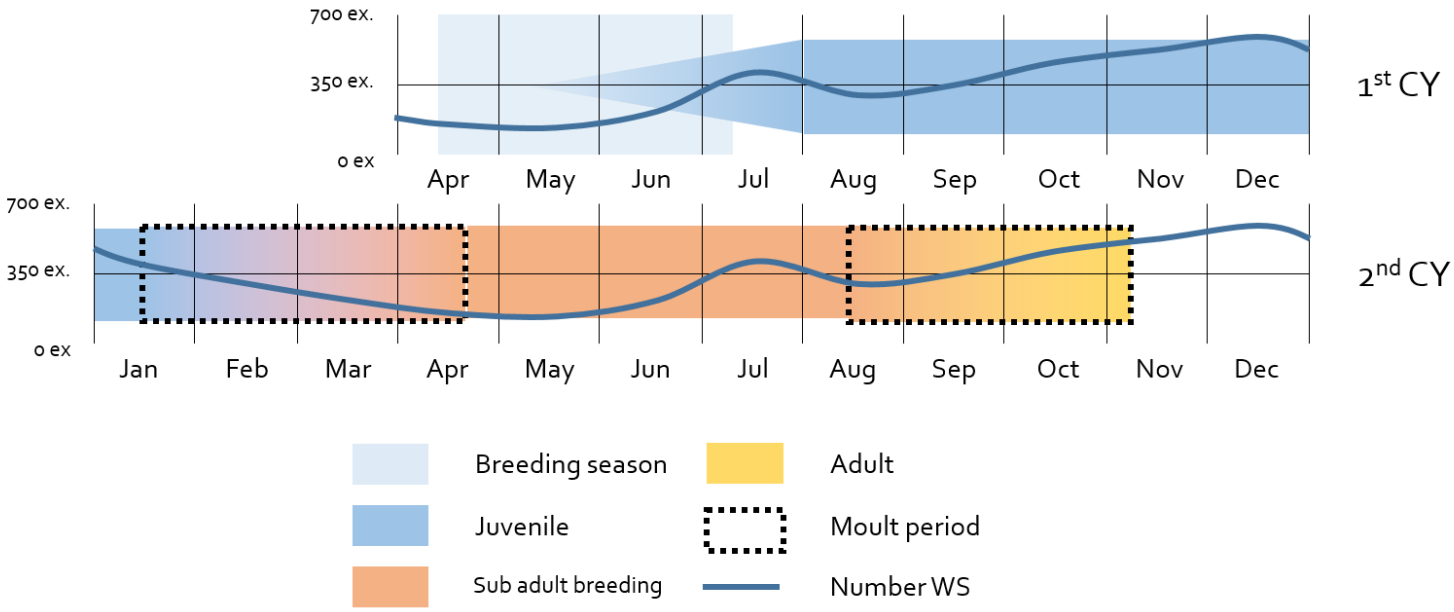

Figure 3-6: Juvenile plumage and moult phases of the Great-crested Grebe (© Bas Engels)

Recommendation

Juveniles are easily distinguished from adults during the first calendar year by head markings. Present all year round, but move to moult areas on open waters or ocean; numbers are relatively low in the Wadden Sea. Telescope and/or binocular countings could be performed during late summer in July or in mid-winter between November and December on open waters or near-shore areas.

3.3 Great Cormorant (*Phalacrocorax carbo*)

Plumages

Juvenile. Most upperparts brown-black in colour (3-7). Neck, throat and chest light brown to buff and pale chin; breast and belly white, but very variable.

Immature 1st winter. Similar to juvenile, but more contrast between white chin and dark head and neck. Breast and belly often brighter white.

Immature 1st spring/summer. Like immature 1st winter, but white parts start to darken (3-8).

Immature 2nd winter. Like adult non-breeding, but upperparts lack blue gloss of adult; belly and breast light mottled.

Moults

Post-juvenile. From August until December. Most of head, neck, mantle, belly and breast.

Immature 2nd CY. Complete body moult from February until December of which wing and tail from July on.

Subsequent moults. Indistinguishable from adults in the field.

Figure 3-7: Juvenile plumage (Aug) © L. Nagelkerke

Figure 3-8: Juvenile plumage 2KJ (Jan) © J. de Jong

Figure 3-9: Adult non-breeding (Nov) © O. & J. Balm

Movements

In the Netherlands, most adults stay during winter, but juveniles tend to disperse from June/July onwards over land accompanied by other juveniles from other countries. Reassembles in January and February in breeding colonies.

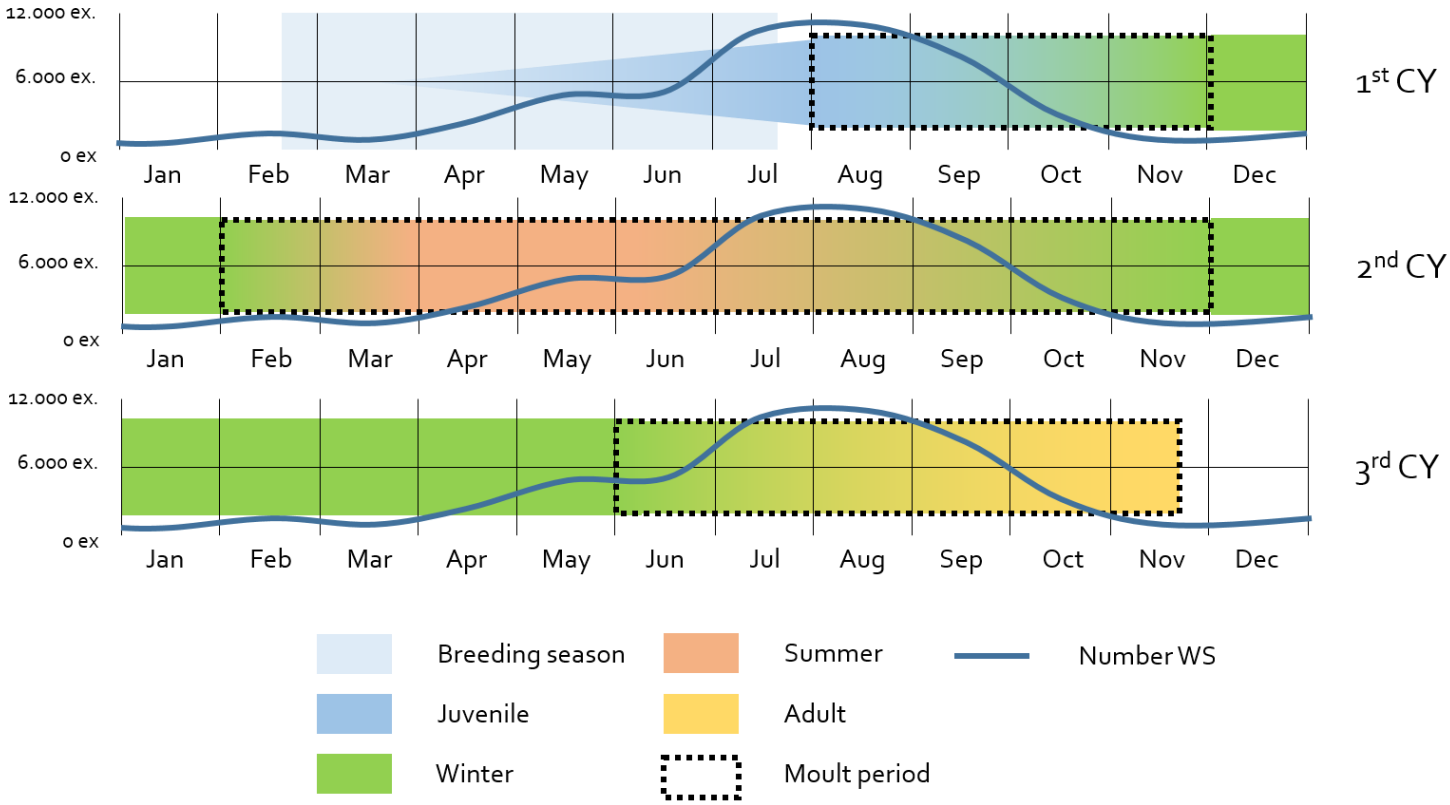

Figure 3-10: Juvenile plumage and moult phases of the Great Cormorant (© Bas Engels)

Recommendation

Juveniles are easily distinguished from adults by white underparts. Present all year round, but accompanied by others between July and August; numbers relatively high in the Wadden Sea. Telescope and/or binocular countings could be performed between July and September in colonies, harbours or beaches.

3.4 Little Egret (*Egretta garzetta*)

Plumages

Juvenile. Very similar to adult, but lacks ornamental feathers on head like adult. Bill brownish and legs black to green.

Immature. Very similar to adult and difficult to distinguish, but chest feathers slightly elongated. Bill and legs as adult (3-11).

Figure 3-11: Immature plumage (Oct) © B. Rijksen

Moults

Post-juvenile. Juveniles start moulting after leaving breeding grounds between August and December. Wings and tail retained during this moult.

Post-immature. Complete moult like adult post-breeding, but earlier; some start in early spring around March, but majority in June.

Figure 3-12: Adult non-breeding (Jan) © J. Schwiebbe

Movements

Between July and September, juveniles tend to migrate and disperse randomly. Adults migrate between August and early September.

Recommendation

Juveniles are fairly difficult to distinguish from adults; only small details are different but hard to distinguish. Mostly present during summer and autumn in small numbers in the Wadden Sea. Telescope countings could be performed during low tide in intertidal areas near ditches or trenches between August and September.

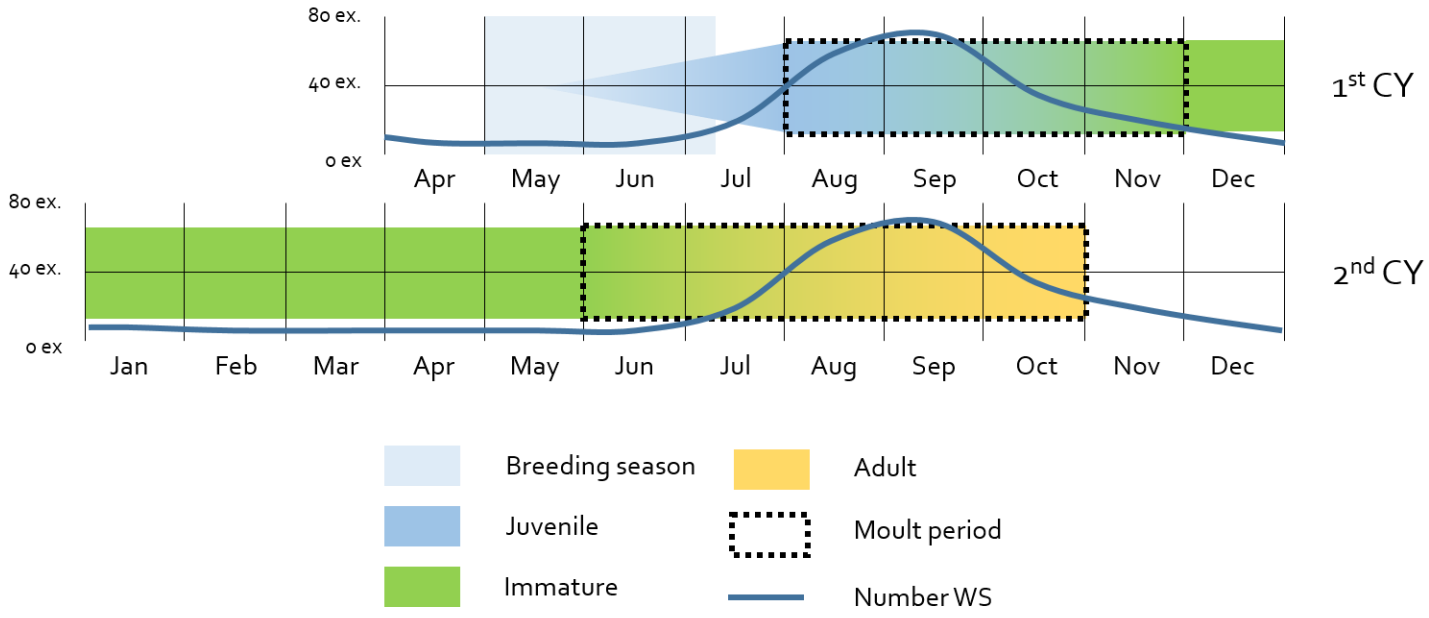

Figure 3-13: Juvenile plumage and moult phases of the Little Egret (© Bas Engels)

3.5 Eurasian Spoonbill (*Platalea leucorodia*)

Plumages

Juvenile. Like adult non-breeding, but tips of flight feathers dark brown to black (3-14). Bill pink and legs pink to dark brown.

Immature winter. Very variable per juvenile; advanced individuals still retain dark tips on flight feathers. Retarded juveniles still like juvenile. Bill and legs slowly turn dark.

Immature summer. Still very variable between juveniles; advanced juveniles like adult breeding, but still retain some black tips on flight feathers. Some birds have small crest and/or yellow patch on base of the neck. Bill and legs as adult.

Figure 3-14: Juvenile plumage (Sep) © M. Slot

Figure 3-15: Adult non-breeding (Sep) © A. Meijer

Moults

Post-juvenile. Complete moult from December until the end of May. Timing of moult depends on age; some individuals already start moulting in October.

Movements

Between August and September, individuals start migrating southwards along the Atlantic coastline. Juveniles tend to disperse over short distances already in July. Between March and April, birds start to return to their breeding colonies.

Recommendation

Juveniles are fairly easy to distinguish from adults; especially the black wingtips and bill colour are notable. Mostly present between June and October in fairly common numbers on the Wadden Islands. Telescope countings could be performed during low tide in intertidal areas or in colonies around August.

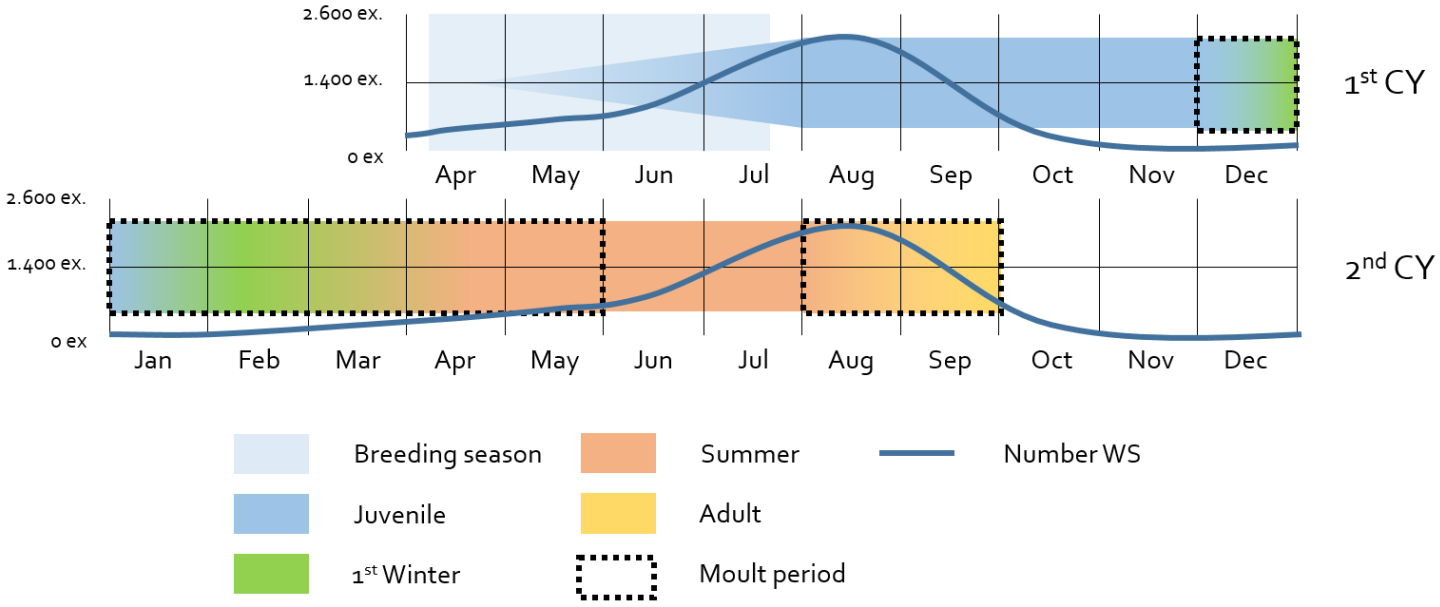

Figure 3-16: Juvenile plumage and moult phases of the Eurasian Spoonbill (© Bas Engels)

3.6 Tundra Swan (*Cygnus columbianus*)

Plumages

Juvenile. Head and neck pale brown to grey of which crown is slightly darker (3-17). Upperparts, sides and flanks are mainly white with grey tips. Bill pink and black; yellow patch already vaguely visible.

Figure 3-17: Juvenile plumage (Nov) © P. v. Meerendonk

Immature. Like juvenile, but crown and nape lighter; rest of neck like juvenile. White feathers start to appear on body and remaining feathers are worn off.

Moults

Post-juvenile. Between October and January, crown, nape and head followed by neck, mantle, scapulars, flanks, chest and sides between January and March.

Figure 3-18: Adult non-breeding (Nov) © C. v.d Sanden

Post-immature. Between June and late August, all remaining juvenile feathers moulted to adult non-breeding. Some individuals retain some juvenile feathers until next moult.

Movements

Starts migrating from breeding grounds in September, but peak numbers in the Netherlands can be found in December. Around the end of March, the majority of birds are leaving towards breeding grounds in the north.

Recommendation

Juveniles are easily distinguished from adults by grey appearance. Mostly present in late autumn and winter in the Wadden Sea; numbers are low and mostly present on Texel. Telescope and/or binocular countings could be performed on pastures or fields within dyked areas between December and January.

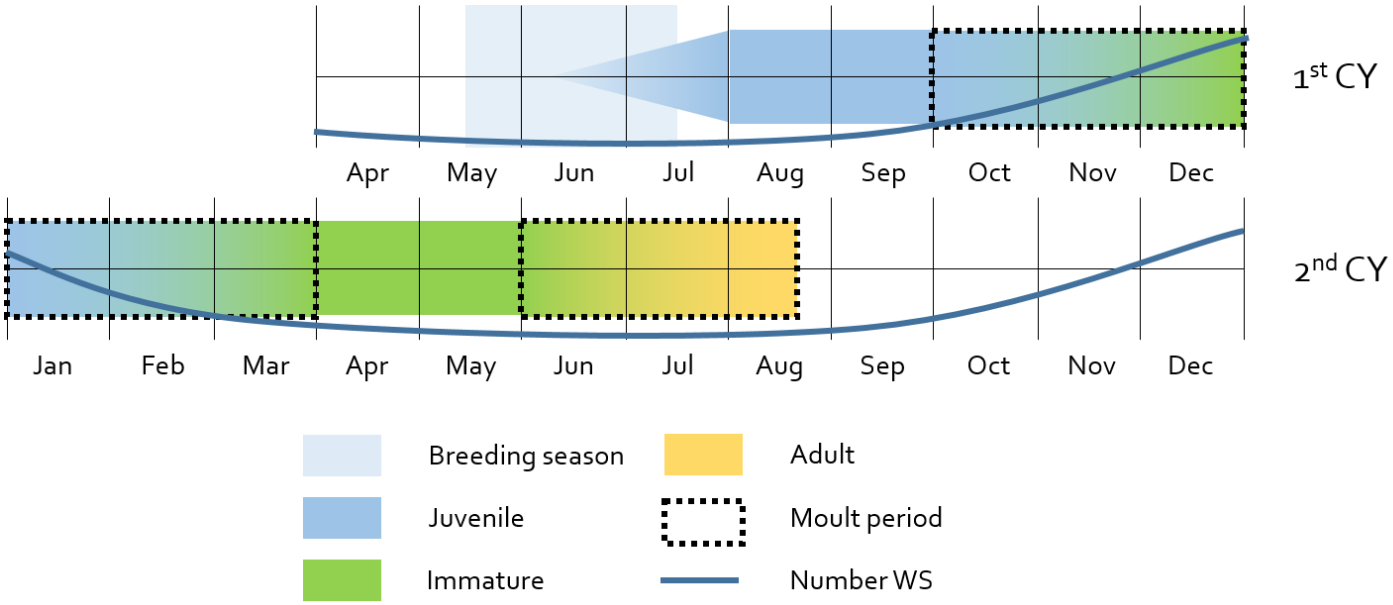

Figure 3-19: Juvenile plumage and moult phases of the Tundra Swan (© Bas Engels)

3.7 Tundra Bean Goose (*Anser fabalis serrirostris*)

Plumages

Juvenile. Similar to adult, but upperparts browner. Sides of body paler with less contrasting edges; compared to adult, body looks darker and more scaled (3-20). Orange of bill and feet duller or grey.

Figure 3-20: Juvenile plumage (Oct) © F. Visscher

Moults

Post-juvenile. Moult starts in about October and continues partially until at least April. First, head and neck are moulted, followed by scapulars, flanks and chest in mid-winter. Some individuals already completely moulted in late January, but majority done in March.

Movements

Departs from breeding grounds in early September, reaching the Netherlands in October with a peak in December. Return to breeding grounds in rapid migration around February and March.

Figure 3-21: Adult non-breeding (Jan) © D. Hiemstra

Recommendation

Juveniles are fairly easy to distinguish from adult by scaled pattern on their back. Mostly present between October and February in the Wadden Sea; numbers are relatively low and primarily present on Texel or coastal areas of Groningen and Friesland. Telescope countings could be performed on pastures or farm fields around December in early juvenile moult stage.

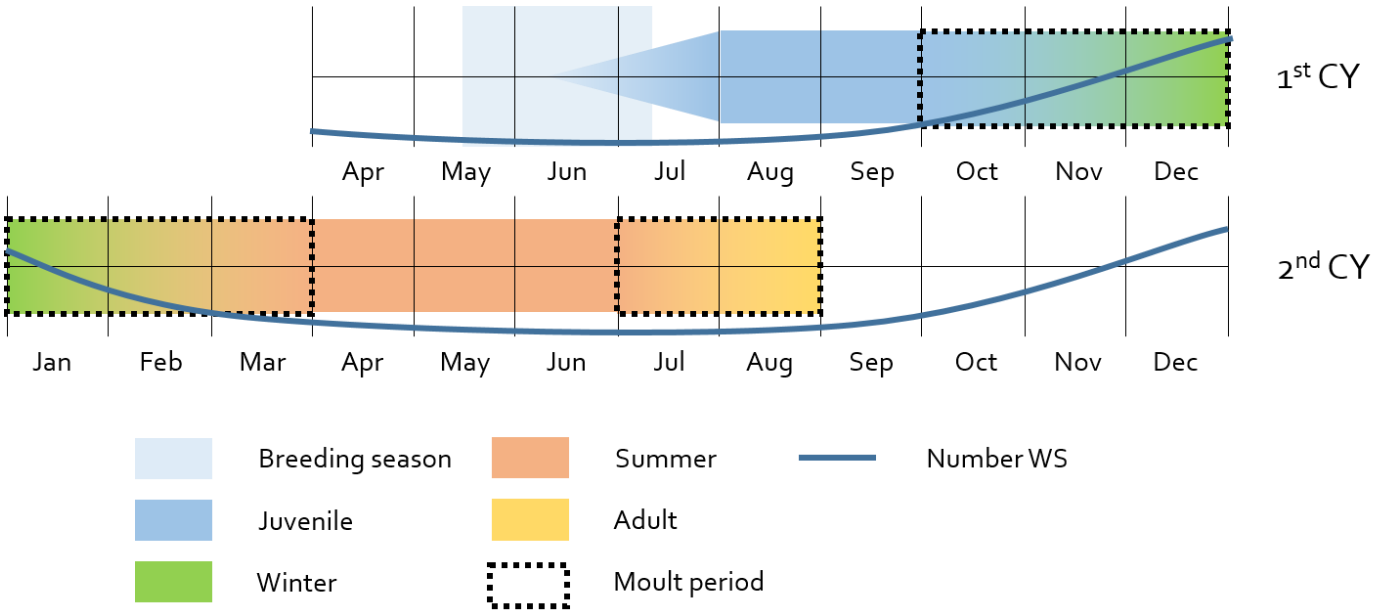

Figure 3-22: Juvenile plumage and moult phases of the Tundra Bean Goose (© Bas Engels)

3.8 Greylag Goose (*Anser anser*)

Plumages

Juvenile. Similar to adult, but feather edges on upperparts and sides more buff coloured which causes a scaled effect (3-23). Breast grey to brown with darker streaks or blotches. Bill and legs tinged grey.

Figure 3-23: Juvenile plumage (Oct) © F. Köhler

Moults

Post-juvenile. Between September and November, mantle, breast, scapulars, belly, back, rump, tail and median coverts moulted. Most juveniles almost complete by late October. Others retain some juvenile feathers until January or even later.

Figure 3-24: Adult breeding (Mar) © T. Hak

Movements

Start migrating south to southwest by late September and have a rapid migration through the Netherlands between October and November. Part of population uses the Wadden Sea as wintering area.

Recommendation

Juveniles are fairly easy to distinguish from adult by scaled pattern on their back. Present all year round, but majority of numbers between August and February in the Wadden Sea; numbers high and spread all over the area on agricultural fields and intertidal areas. Telescope countings could be performed on pastures or agricultural fields around September in early juvenile moult stage.

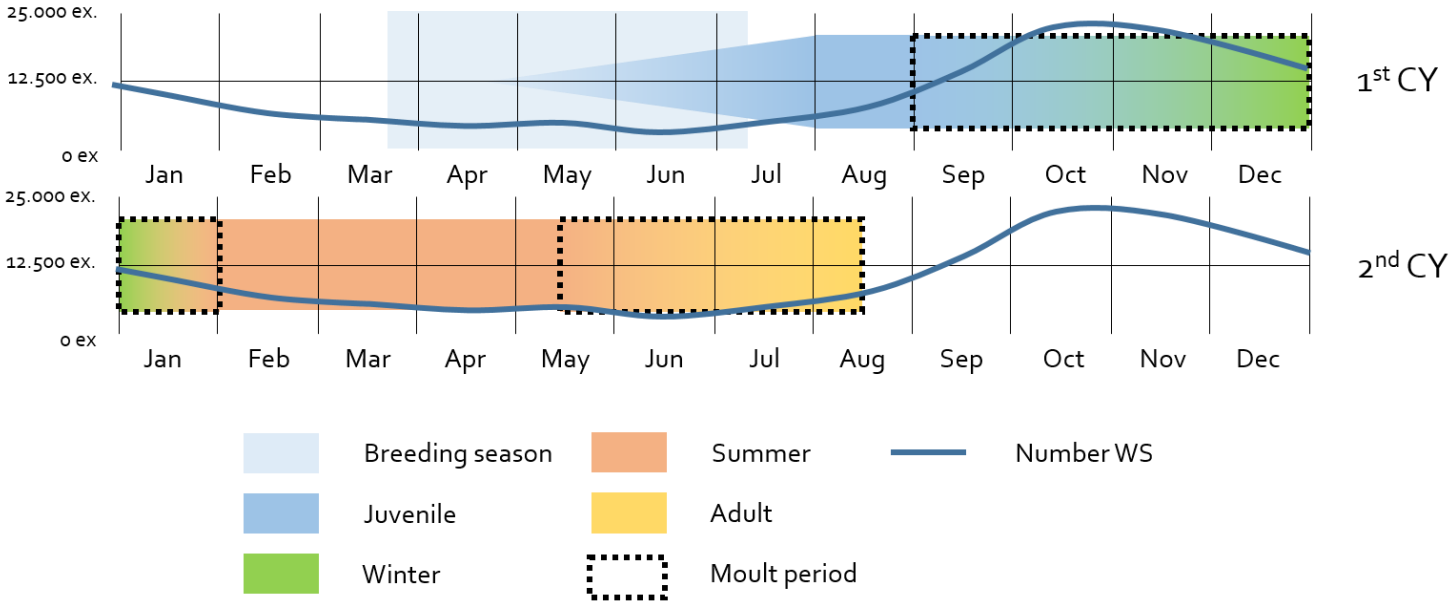

Figure 3-25: Juvenile plumage and moult phases of the Greylag Goose (© Bas Engels)

3.9 Barnacle Goose (*Branta leucopsis*)

Plumages

Juvenile. Very similar to adult, but white parts on head greyer. Black on chest, neck and mantle duller and tinged brown. Scapulars and wing coverts grey-brown and gradually becoming darker towards tips. Pattern on the side of its body vague or scaled.

Figure 3-26: Post-juvenile (Dec) © P. v.d Heijden

Moults

Post-juvenile. Starts from about October with head, neck, mantle and chest, followed by flanks, scapulars and tail between November and January (3-26). Other juvenile feathers retained until spring.

Figure 3-27: Adult non-breeding (Dec) © D. Hiemstra

Movements

Departs from breeding grounds between the end of August and early September and most arrive in October and November with another peak in January in the Netherlands. During their migration back to the breeding grounds in late March, many move to the Wadden Sea area and stay until late April.

Recommendation

Juveniles are fairly easy to distinguish from adult by browner upperparts and scaled flanks. Mainly present between October and May in the Wadden Sea; numbers are high and can be found primarily on the coast of Groningen and Friesland and the eastern Wadden islands. Telescope countings could be performed on pastures and agricultural fields between October and November during juvenile stage and early post-juvenile moult.

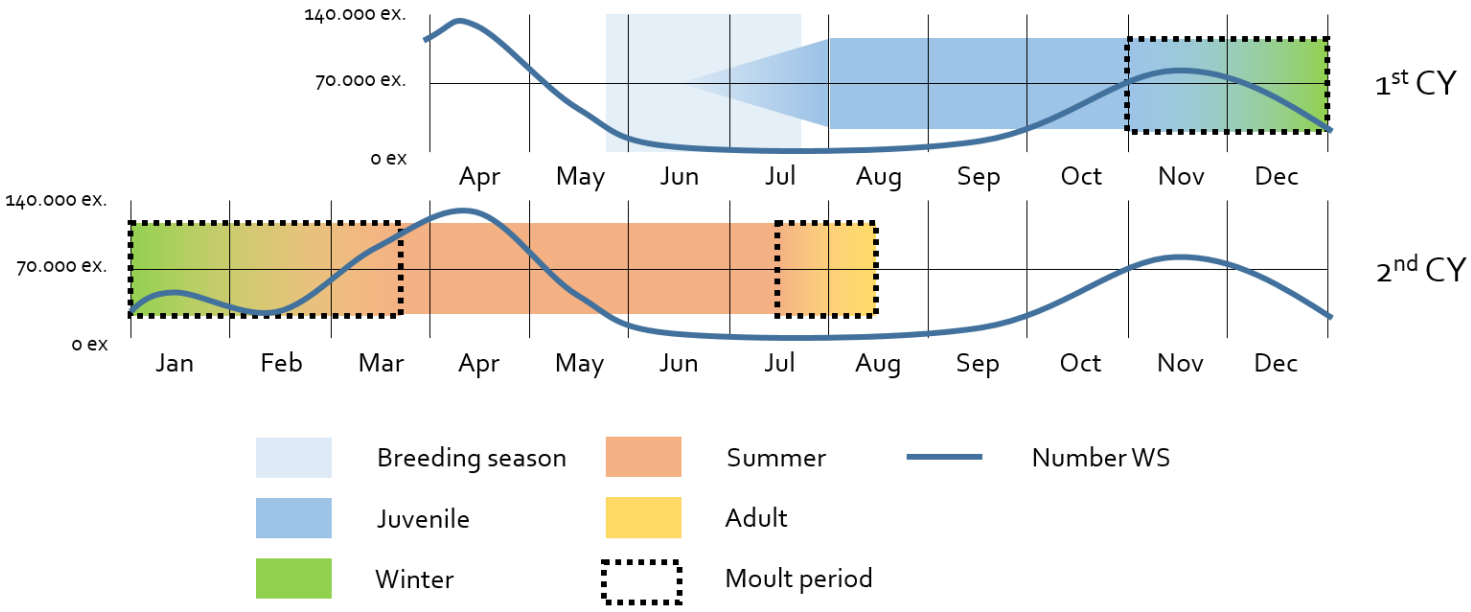

Figure 3-28: Juvenile plumage and moult phases of the Barnacle Goose (© Bas Engels)

3.10 Brent Goose (*Branta bernicla*)

Plumages

Juvenile. Like adult, but colours on head, neck, chest, upper breast and mantle dull brown to black without white markings. Edges of scapulars and coverts white which cause a scaled effect (3-29). Feathers on sides of body and flanks lack contrasting white edges.

Figure 3-29: Juvenile plumage (Oct) © R. Wielinga

Moults

Post-juvenile. Starts in October with head, neck, mantle and chest, followed by flanks, scapulars and tail between November and January. Other juvenile feathers retained until spring.

Movements

Starts migrating between mid-August and early September and arrives in the Netherlands in October and abundant until February. During their migration back, large gatherings in the Wadden Sea between March and May.

Figure 3-30: Adult non-breeding (Oct) © H. Stoel

Recommendation

Juveniles are easily distinguished from adults by white markings on upperparts. Primarily present between October and May in the Wadden Sea; numbers are high and can be found all over the area. Telescope and/or binocular countings could be performed during low tide on intertidal areas or on pastures and agricultural fields within dyked area around October and November during early stages of post-juvenile moult.

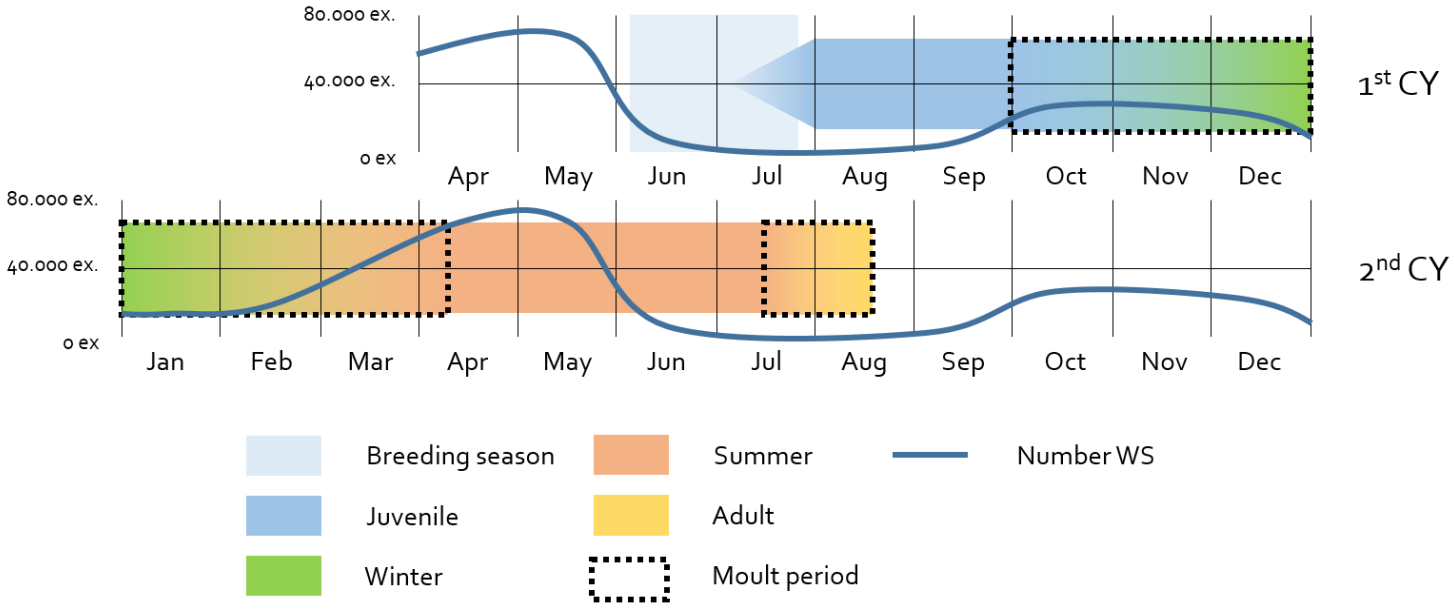

Figure 3-31: Juvenile plumage and moult phases of the Brent Goose (© Bas Engels)

3.11 Common Shelduck (*Tadorna tadorna*)

Plumages

Juvenile. Crown, sides of head, neck and back sooty-black. Forehead, cheeks, chin, throat and foreneck white. Mantle and scapular feathers grey to dark grey and edged buff. Chest-band and dark stripe on belly absent (3-32). White trailing edge on back-wing. Bill and legs pale pink.

Figure 3-32: Juvenile plumage (Aug) © J. de Wit

1st Non-breeding. Like adult non-breeding, but still juvenile wing and tail retained. Some juvenile body feathers still retained as well. Bill slowly turns red.

Figure 3-33: Adult breeding (Jan) © M. van Antwerpen

1st Breeding. Like adult breeding plumage, but white edge on back-wings and some grey-tinged upper wing coverts still juvenile. Both black streak and brown band show white mottling.

Moults

Post-juvenile. Starts soon after fledging between late July and early October. Head, breast, belly, chest, flanks, scapulars and mantle but soon replaced with 1st breeding plumage.

1st Pre-breeding. From late September on, 1st breeding feathers start to appear. Before moult stop in mid-winter, head, mantle, scapulars and underparts in 1st breeding; other body feathers moult after moult-stop between March and April.

1st Post-breeding. Like adult post-breeding; between early June and mid-October.

Movements

Migration start in June when juveniles start moving towards German Wadden Sea, followed by the adults in July. When completely moulted, they return to their breeding areas in late October, but sometimes until December. Recent studies show that these moulting locations shift from Germany to the Netherlands (Kleefstra et al, 2011).

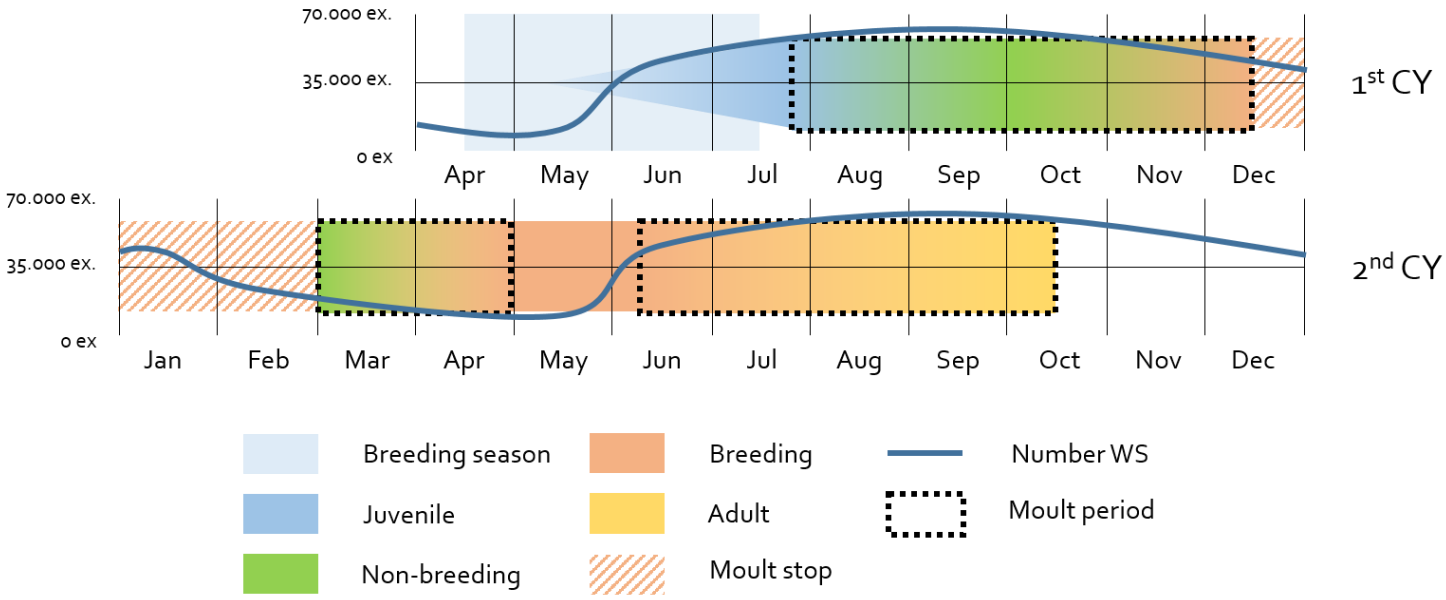

Figure 3-34: Juvenile plumage and moult phases of the Common Shelduck (© Bas Engels)

Recommendation

Juveniles are easily distinguished from adults by primarily white and brown body feathers. Present all year round, but peak numbers between July and November in the Wadden Sea; numbers are high and spread all over the area. Telescope and/or binocular countings could be performed during low tide on intertidal areas between July and August when still juvenile or during early stages of post-juvenile moult. Also possible later in season around October, but by then similar to adult ♀.

3.12 Eurasian Wigeon (*Mareca penelope*)

Plumages

Juvenile ♂. Like adult ♀ non-breeding, but mantle dark grey to black; back and rump dull dark grey; feathers on underparts pale grey with marginal white stripe and buff tips; white feathers on belly sometimes mottled grey. White patch of adult male lacking on its wing (3-35). Swimming or resting adults often don't show white patch either, so dark feathers on shoulders decisive (Hulscher, 2006).

Juvenile ♀. Like juvenile ♂, but ground colour of the head slightly paler; cannot be distinguished from adult ♀ in the field (Hulscher, 2006).

1st Breeding ♂. Like adult ♂ breeding, but back and rump still contains juvenile plumage. Most have chest variable barred or speckled black. Grey to black shoulder parts retained and still lacks white patch on its wing (Hulscher, 2006).

1st Breeding ♀. Many juvenile feathers still retained; at least rump and back, but often also head, scapulars, flanks and chest; cannot be distinguished from adult ♀ in the field (Hulscher, 2006).

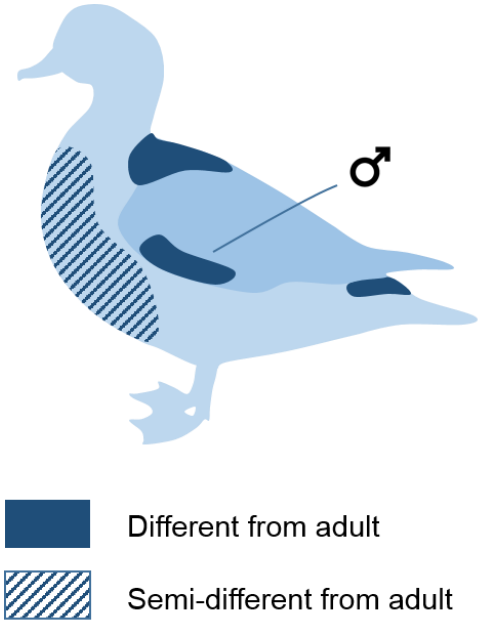

Figure 3-35: Diagram showing different and semi-different parts of the juvenile plumage of Eurasian Wigeon compared with adult ♀ non-breeding (© Bas Engels)

Moults

Post-juvenile ♂. Between September and October; starting with head, flanks, scapulars, chest and breast until October.

Post-juvenile ♀. Between the end of September and October; same feathers as male, but more strongly developed.

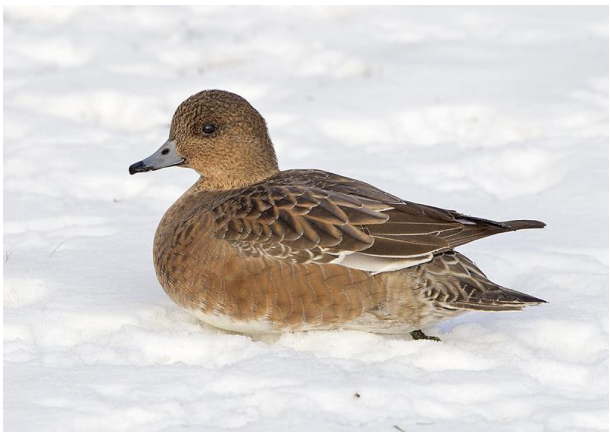

Figure 3-36: Adult ♀ non-breeding (Jan) © R. van Rossum

1st Pre-breeding ♂. Most of 1st non-breeding plumage already replaced by breeding before December, starting in October. Last body feathers moulted in March and April after moult-stop.

1st Pre-breeding ♀. Most feathers replaced by breeding from late October and most of breeding plumage in December. Remaining body feathers moulted between March and May after moult-stop.

Movements

Eurasian Wigeon starts migrating from breeding grounds in large flocks from August and arrive on winter quarters between October and November. Start migrating back to breeding grounds around January.

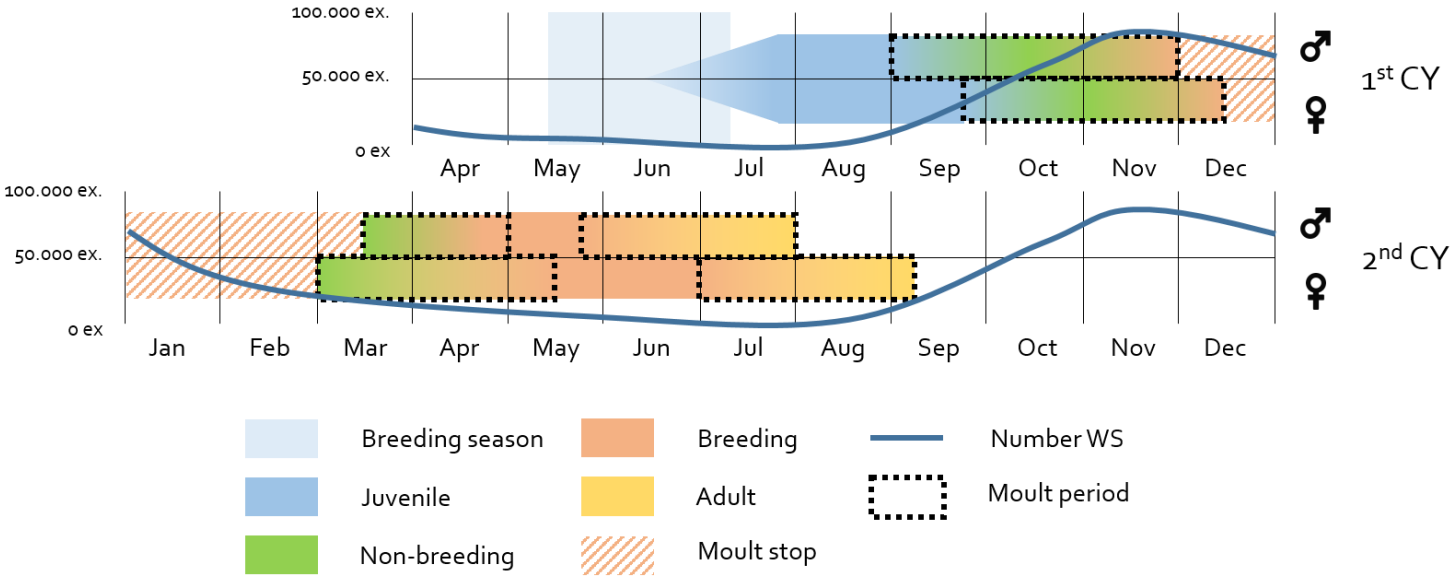

Figure 3-37: Juvenile plumage and moult phases of the Eurasian Wigeon (© Bas Engels)

Recommendation

Almost indistinguishable from adults in the field due to high similarity with adult ♀ non-breeding. Primarily present between September and February in the Wadden Sea; numbers are high and can be found all over the area in mostly saline environments. If experienced, telescope countings could be performed during low tide on intertidal areas between September and October when still juvenile or in early stages of post-juvenile moult.

3.13 Gadwall (*Mareca strepera*)

Plumages

Juvenile ♂. Black crown; upperparts dull black with pale buff, V-shaped markings on mantle, scapulars, sides of the body and tail coverts (3-38). Amount of chestnut and black markings on its body variable, but always less than adult ♂ and ♀.

Juvenile ♀. Like juvenile ♂, but less markings on mantle, scapulars and sides of the breast.

1st Breeding ♂ and ♀. Like adult ♂ and ♀ plumage, but still juvenile wing retained. Also some sparse juvenile feathers on its body.

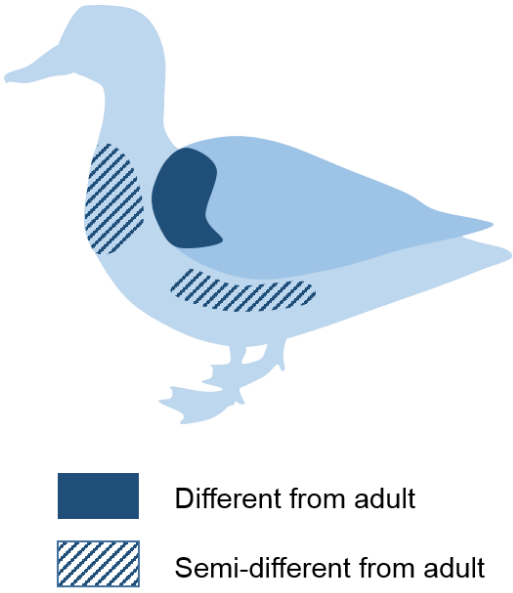

Figure 3-38: Diagram showing different and semi-different parts of the juvenile plumage of Gadwall compared with adult ♀ non-breeding (© Bas Engels)

Moults

Post-juvenile ♂ and ♀. Between August and October, moult of head, flanks, chest, sides of mantle and scapulars. ♀♀ one month later.

1st Pre-breeding ♂. Breeding plumage starts appearing in September with tail and underparts first. Most of juvenile and 1st non-breeding feathers moulted before December.

1st Pre-breeding ♀. Like juvenile pre-breeding ♂, but retains tail feathers and tertials during winter and are moulted between March and April in 2nd calendar year.

Figure 3-39: Adult ♀ non-breeding (Oct) © W. Koch

Movements

Partially migratory and resident. Those breeding in the Netherlands are believed to be residents. Breeders northeast of the Netherlands primarily winter in the Netherlands and Britain and arrive from August on. Start migrating back to breeding areas between March and April.

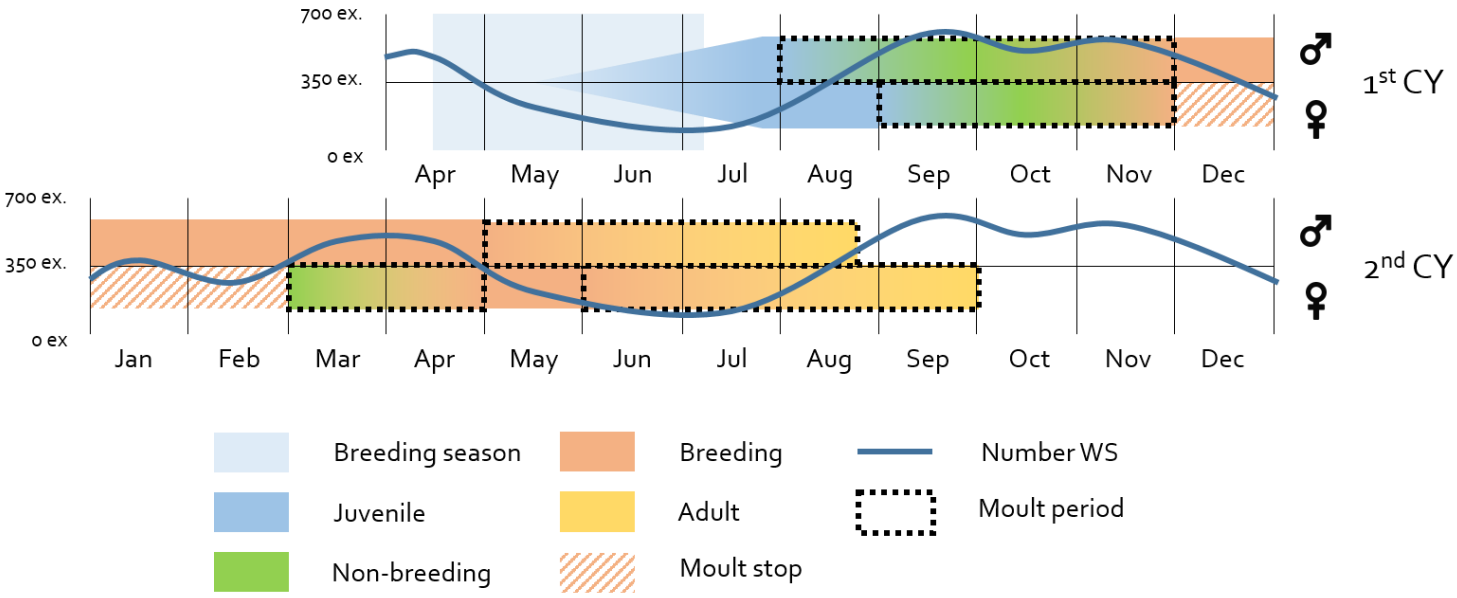

Figure 3-40: Juvenile plumage and moult phases of the Gadwall (© Bas Engels)

Recommendation

Juveniles are very difficult to distinguish from adult ♀ non-breeding or even adult ♂ eclipse. Present all year round, but major peaks between August and December and between February and May in the Wadden Sea; numbers are relatively low and can be found in freshwater areas on the Wadden islands. If experienced, telescope countings could be performed during low tide on intertidal areas with freshwater outputs and on open freshwater areas around August when still juvenile or early stages of post-juvenile moult.

3.14 Common Teal (*Anas crecca*)

Plumages

Juvenile. Like adult ♂ non-breeding and adult ♀ breeding but underparts with dusky streaks and spots instead of scaled pattern (3-41). Most of the upperparts darker in colour compared with adult.

1st Breeding. Like adult ♂ and ♀ plumage, but still retains juvenile feathers on tail and upperparts. Wings still as juvenile.

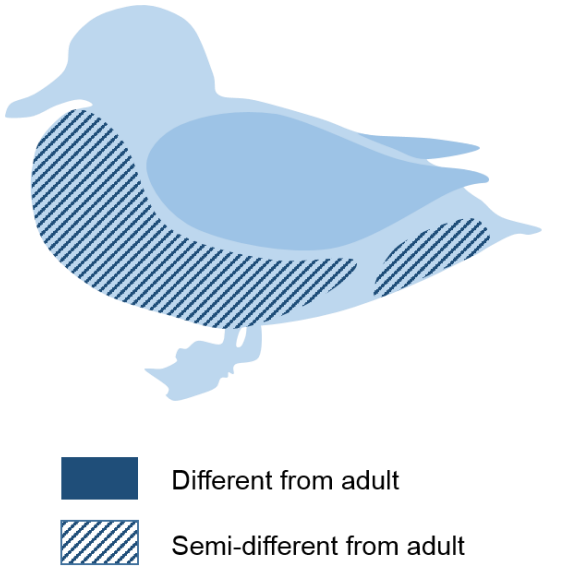

Figure 3-41: Diagram showing different and semi-different parts of the juvenile plumage of Common Teal compared with adult ♀ non-breeding (© Bas Engels)

Moults

Post-juvenile. Between August and September, most of body feathers moulted into non-breeding.

1st Pre-breeding ♂. Most of first breeding plumage obtained between September and November. Most of body feathers in full breeding before December.

1st Pre-breeding ♀. Most of body feathers moulted between September and December. Remaining body feathers moulted after moult-stop between February and March in 2nd calendar year.

Figure 3-42: Adult ♀ non-breeding (Sep) © G. Welgraven

Movements

Most of the population migratory, but some small populations resident. Most of breeding individuals between north Russia and north Germany winter in the Netherlands and Britain between and start migrating between October and November. Return to breeding grounds between March and April until May.

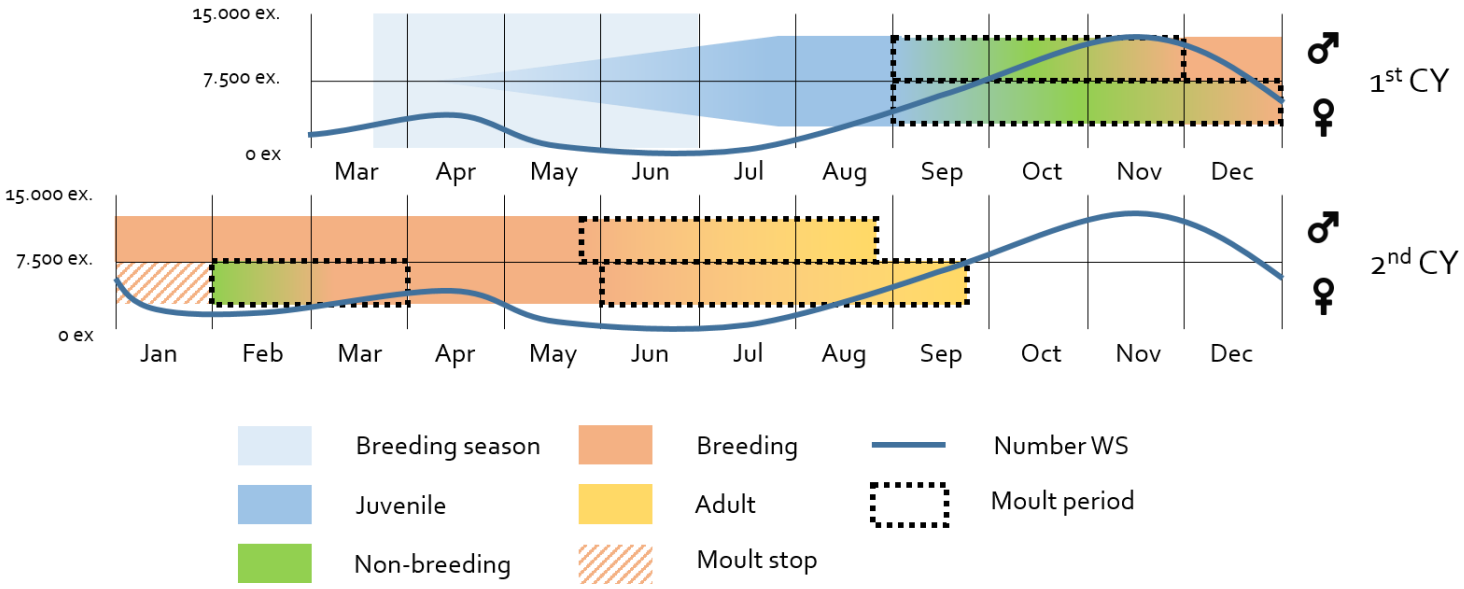

Figure 3-43: Juvenile plumage and moult phases of the Common Teal (© Bas Engels)

Recommendation

Juveniles are very difficult to distinguish from adult ♀ non-breeding and only differs in small details. Present all year round, but majority between August and December; numbers are relatively high and can be found on primarily freshwater within dyked areas or on saltmarshes all over the Wadden Sea. If experienced, telescope countings could be performed on freshwater areas around September during the early stages of post-juvenile moult.

3.15 Mallard (*Anas platyrhynchos*)

Plumages

Juvenile. Very similar to adult ♀, but underparts are lighter in colour (3-44). Feathers on flanks with pale buff or off-white margins with dark streaks at the tips. Wing coverts tinged brown with buff grey margins.

1st Breeding ♂. Very much like adult ♂ breeding, but juvenile wing and some body feathers retained.

1st Breeding ♀. Like adult ♀ breeding, but juvenile wing, back and rump retained. Sometimes only distinguishable from adult by pale buff edges on wing coverts.

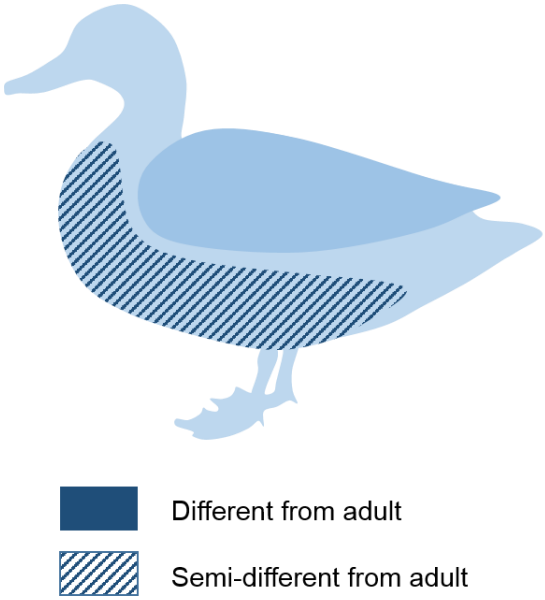

Figure 3-44: Diagram showing different and semi-different parts of the juvenile plumage of Mallard compared with adult ♀ non-breeding (© Bas Engels)

Moults

Post-juvenile. Between July and September, some juvenile feathers moulted to 1st non-breeding, but many retained until 1st pre-breeding moult. Mainly on chest, sides of the body, flanks, scapulars and part of mantle moulted.

1st Pre-breeding. From September on, both sexes moult into 1st breeding plumage with moult stop in mid-winter. Some parts of belly, rump and back retained until spring in 2nd calendar year.

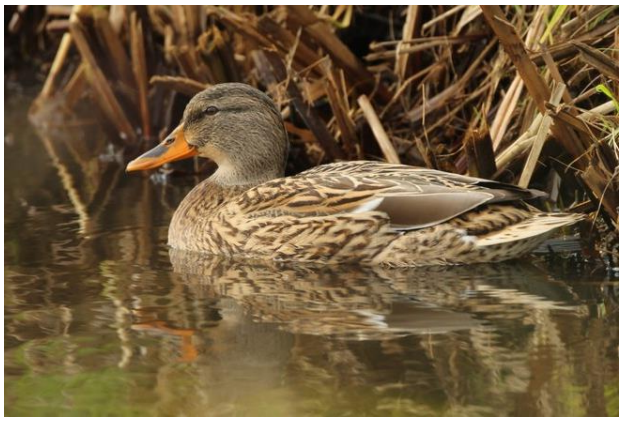

Figure 3-45: Adult ♀ non-breeding (Nov) © G. v.d. Velden

Movements

Breeding population in the Netherlands mostly sedentary. From mid-July on, juveniles tend to spread out in all directions followed by the adults in August; birds from north-west Russia to north Germany start migrating towards winter quarters between Netherlands and France.

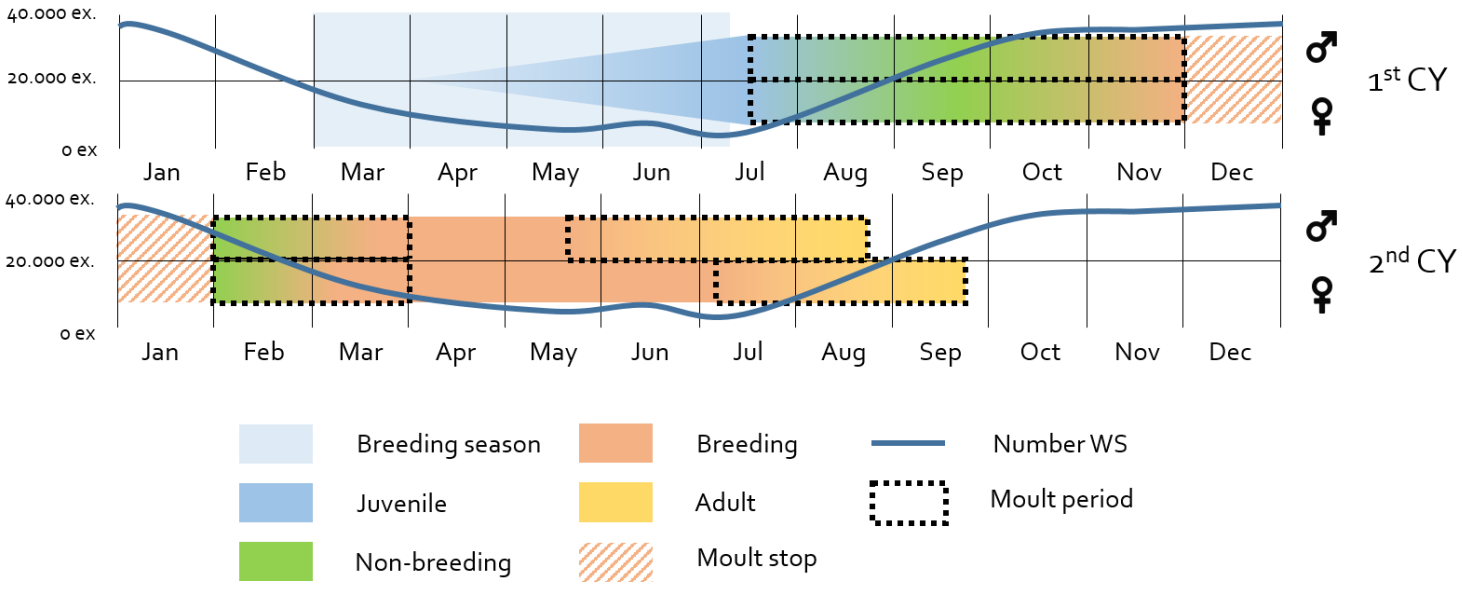

Figure 3-46: Juvenile plumage and moult phases of the Mallard (© Bas Engels)

Recommendation

Juveniles are very difficult to distinguish from adult ♀ non-breeding and even adult ♂ eclipse. Present all year round, but majority between September and March; numbers are high and can be found around saltmarshes all over the Wadden Sea. If experienced, telescope countings could be performed on saltmarshes around August in the early stages of post-juvenile moult.

3.16 Northern Pintail (*Anas acuta*)

Plumages

Juvenile. Like adult ♀ breeding, but pattern on whole body more messy streaked and mottled compared to frequent pattern on adult ♀ body (3-47). Head darker and neck off-white. Juvenile ♀ recognized by unstreaked mantle.

1st Breeding ♂. Similar to adult ♂ breeding, but some parts of back, rump and underparts as juvenile retained. Wing still in full juvenile plumage.

1st Breeding ♀. Very similar to adult ♀ breeding, but wing and some body feathers still juvenile.

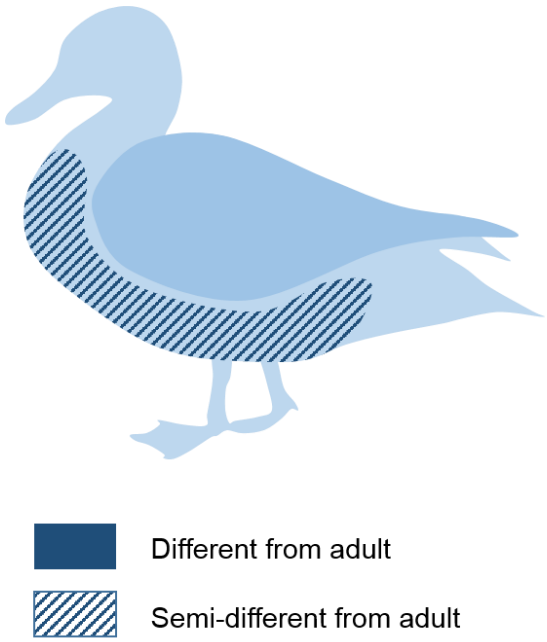

Figure 3-47: Diagram showing different and semi-different parts of the juvenile plumage of Northern Pintail compared with adult ♀ non-breeding (© Bas Engels)

Moults

Post-juvenile. Very similar to Mallard, but generally later. Between July and September, some juvenile feathers moulted to 1st non-breeding, but many retained until 1st pre-breeding moult. Mainly on chest, sides of the body, flanks, scapulars and part of mantle moulted.

1st Pre-breeding. Very similar to Mallard, but generally later. From September on, both sexes moult into 1st breeding plumage with moult stop in mid-winter. Some parts of belly, rump and back retained until spring in 2nd calendar year.

Figure 3-48: Adult ♀ non-breeding (Sep) © R. Floor

Movements

Mainly migratory species. Breeding birds between north Russia and Baltic States migrate to winter quarters in the Netherlands and Britain, starting in mid-August to early September and arrive mid-September to October. Start migrating back to breeding grounds between February and March.

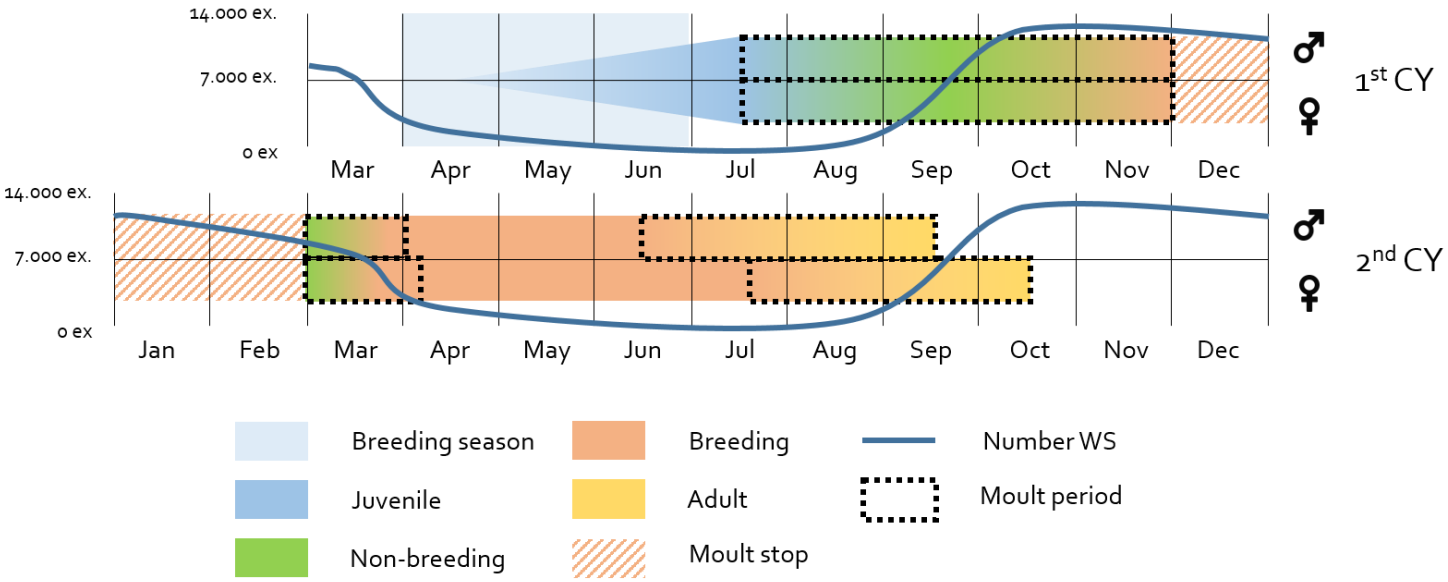

Figure 3-49: Juvenile plumage and moult phases of the Northern Pintail (© Bas Engels)

Recommendation

Juveniles are very difficult to distinguish from adult ♀ non-breeding and even adult ♂ eclipse. Primarily present between September and March; numbers are relatively high and can be found all over the Wadden Sea. If experienced, telescope countings could be performed during low tide on intertidal areas and saltmarshes around September and October during post-juvenile stages of moult.

3.17 Northern Shoveler (*Spatula clypeata*)

Plumages

Juvenile. Similar to adult ♀, but generally darker on head (3-50), neck and upperparts and lighter on underparts. Very narrow buff edges on wing-coverts. Small dark spots on belly and undertail. In autumn, the iris of the ♂ changes from grey-brown to yellow.

1st Breeding. Very similar to adult breeding; probably only distinguishable by retained juvenile wings. Some black dots on belly retained in ♂♂, but generally all juvenile feathers moulted.

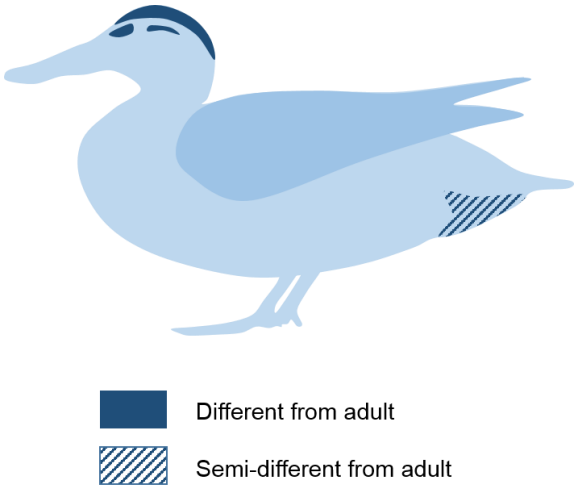

Figure 3-50: Diagram showing different and semi-different parts of the juvenile plumage of Northern Shoveler compared with adult ♀ non-breeding (© Bas Engels)

Moults

Post-juvenile ♂. Between August and September, most of body feathers moulted into non-breeding, but tail, back and rump retain juvenile until next moult.

Post-juvenile ♀. Generally one month later than ♂ and retain non-breeding plumage until February in their 2nd calendar year.

Figure 3-51: Adult ♀ non-breeding (Sep) © A. Vriens

1st Pre-breeding ♂. Between September and October, non-breeding plumage is moulted into 1st breeding, starting with belly and vent; followed by head, chest, flanks, outer mantle, scapulars and breast. Most of body in 1st breeding by December, but some breast, tail, rump and back feathers retained until spring in 2nd calendar year.

1st Pre-breeding ♀. Between February and April, remaining juvenile and 1st non-breeding feathers moulted into 1st breeding plumage.

Movements

Between September and October, major passage of breeding birds from north Russia through Western Europe to wintering grounds in the Netherlands, Britain and Ireland. Migration back to breeding grounds start in February from tropical Africa and major passage through the Netherlands around March.

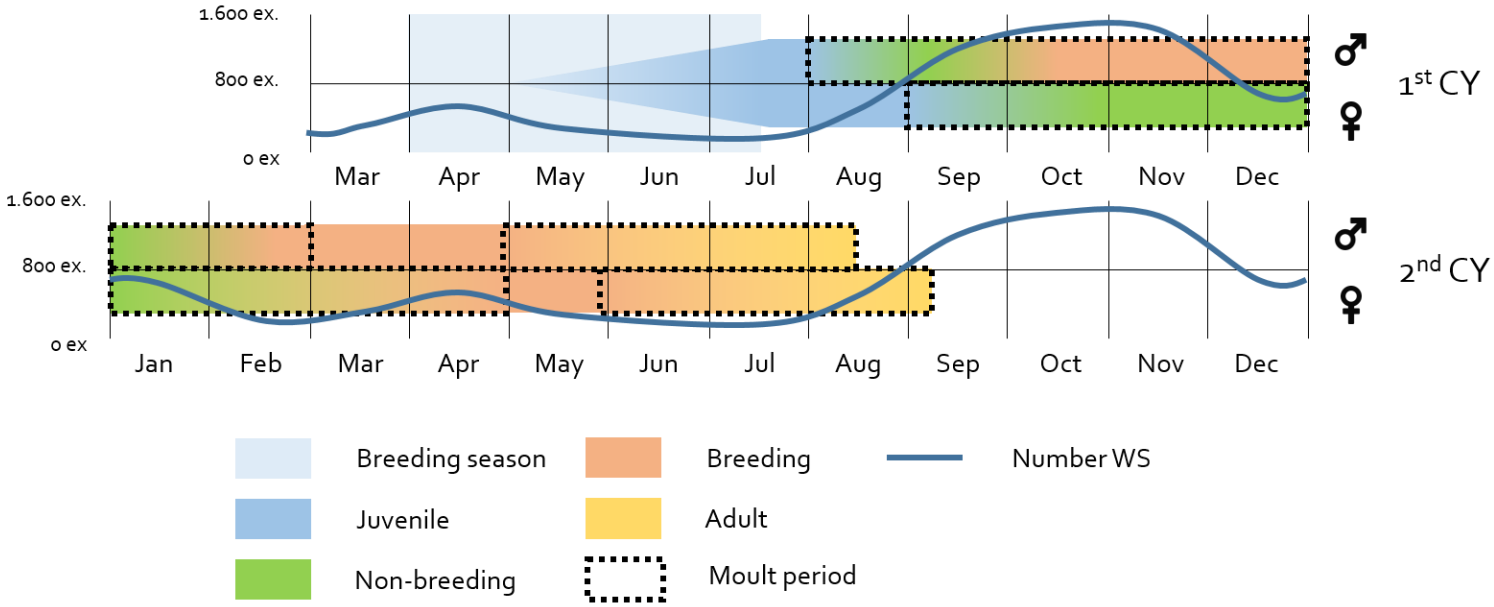

Figure 3-52: Juvenile plumage and moult phases of the Northern Shoveler (© Bas Engels)

Recommendation

Juveniles are very difficult to distinguish from adult ♀ non-breeding. Present all year round, but primarily between August and December; numbers are relatively low and can be found primarily near the continental shore in the Wadden Sea. If experienced, telescope countings could be performed on open freshwater areas around August and September when still in juvenile or post-juvenile moult.

3.18 Greater Scaup (*Aythya marila*)

Plumages

Juvenile. Similar to adult ♀ breeding, but head and neck dark grey to brown; lighter patch on lores and chin. Upperparts dark brown to grey in colour; underparts lighter brown.

Figure 3-53: 1st Breeding ♂ (Jan) © M. Jonker

1st and 2nd Non-breeding. Starts in September on head; other body feathers in October. Usually before winter in non-breeding plumage, but juvenile tail, wing and most underparts retained juvenile. Only one moult during first calendar year. ♀♀ (3-54) do not attain 1st breeding plumage, but moult straight into 2nd non-breeding during spring of 2nd calendar year.

Figure 3-54: 1st Non-breeding ♀ (Dec) © W. van Yperen

1st Breeding ♂. Unlike ♀, ♂ moults from October on into 1st breeding plumage with most of body feathers done before winter (3-53), but wing and some other feathers retained juvenile until summer in 2nd calendar year.

Moults

Post-juvenile. Between August and November, most of juvenile plumage, except for most of body and tail, is moulted into 1st non-breeding. ♀♀ moult directly from 1st non-breeding to 2nd non-breeding during spring of 2nd calendar year.

Figure 3-55: Adult non-breeding ♀ (Jan) © H. Moorslag

1st Pre-breeding ♂. Between October and late December, juvenile and 1st non-breeding feathers moulted into breeding plumage, starting with head, followed by mantle and scapulars. Most in full breeding plumage before winter, but some tail feathers retained until spring.

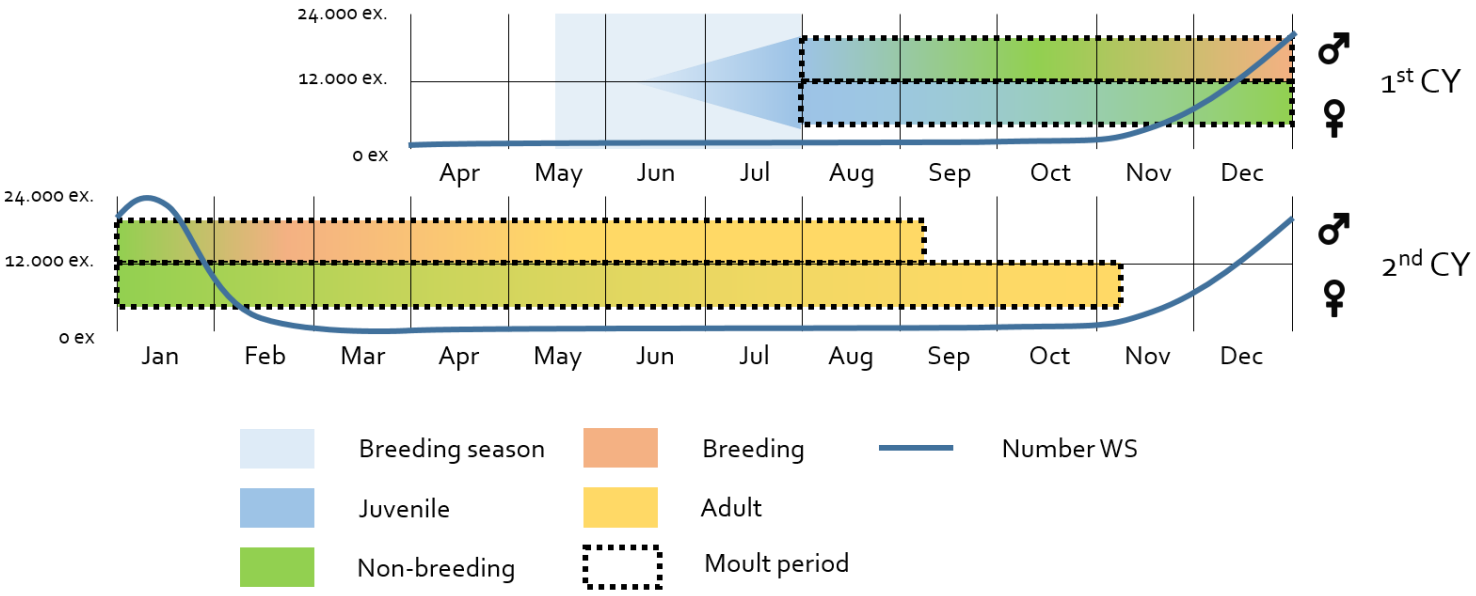

Figure 3-56: Juvenile plumage and moult phases of the Greater Scaup (© Bas Engels)

Movements

Between late October and November, breeding birds from Baltic States and Iceland meet on the North Sea and concentrate in the Dutch Wadden Sea and Ijsselmeer. Return to breeding grounds starts in February.

Recommendation

Juveniles are fairly easy to distinguish from adult, but often not present in the Netherlands; 1st breeding ♂♂ and 1st non-breeding ♀♀ are still fairly easy to distinguish by retaining juvenile feathers. Primarily present between December and January; numbers are high on the Ijsselmeer, but low on the Wadden Sea. Only during severe winters, these numbers move to the Wadden Sea. Telescope countings could be performed on near shore areas in December and January during pre-breeding or non-breeding moult; sexes must be examined separately in which stage of moult they currently are.

3.19 Common Eider (*Somateria mollissima*)

Plumages

Juvenile. Very similar to adult ♀, but differs in not having distinct bars on upperparts of the body. Underparts narrowly streaked with pale bars. Usually no white tips on upper wing-coverts. Indistinct white streak over eye (3-57). ♀♀ very hard to distinguish after first juvenile moult.

Figure 3-57: Juvenile plumage (Oct) © K. Das

1st Breeding ♂. Highly variable plumage. Generally, white feathers appear on chest, mantle, shoulders, back and flanks. Some white, black and green feathers appear on head as well. All black feathers with brown tinge. Most of wing, back, rump, most of underparts and tail retained juvenile until summer 2nd calendar year.

Figure 3-58: Adult non-breeding ♀ (Dec) © J.K. Bossenbroek

2nd Non-breeding ♂. Distinguishable from adult due to retaining juvenile and 1st breeding feathers. Wing still retained as juvenile.

Subsequent plumages. Almost indistinguishable from adults in the field.

Moults

Post-juvenile. Between September and October, head, neck, some upperparts, sides and flanks attain 1st non-breeding; remaining juvenile plumage retained until summer of 2nd calendar year.

1st Post-breeding ♂. Like adult post-breeding from mid-June to late-August, but still some juvenile and 1st breeding plumage retained.

Subsequent moults. Like adult.

Movements

Partially migratory and dispersive. Most breeding birds from the Netherlands stay and moult during winter. Between September and November, breeding birds from Scandinavia migrate to the Netherlands and mix with the Dutch breeders. Around late February, most migrating birds start to migrate back to their breeding grounds.

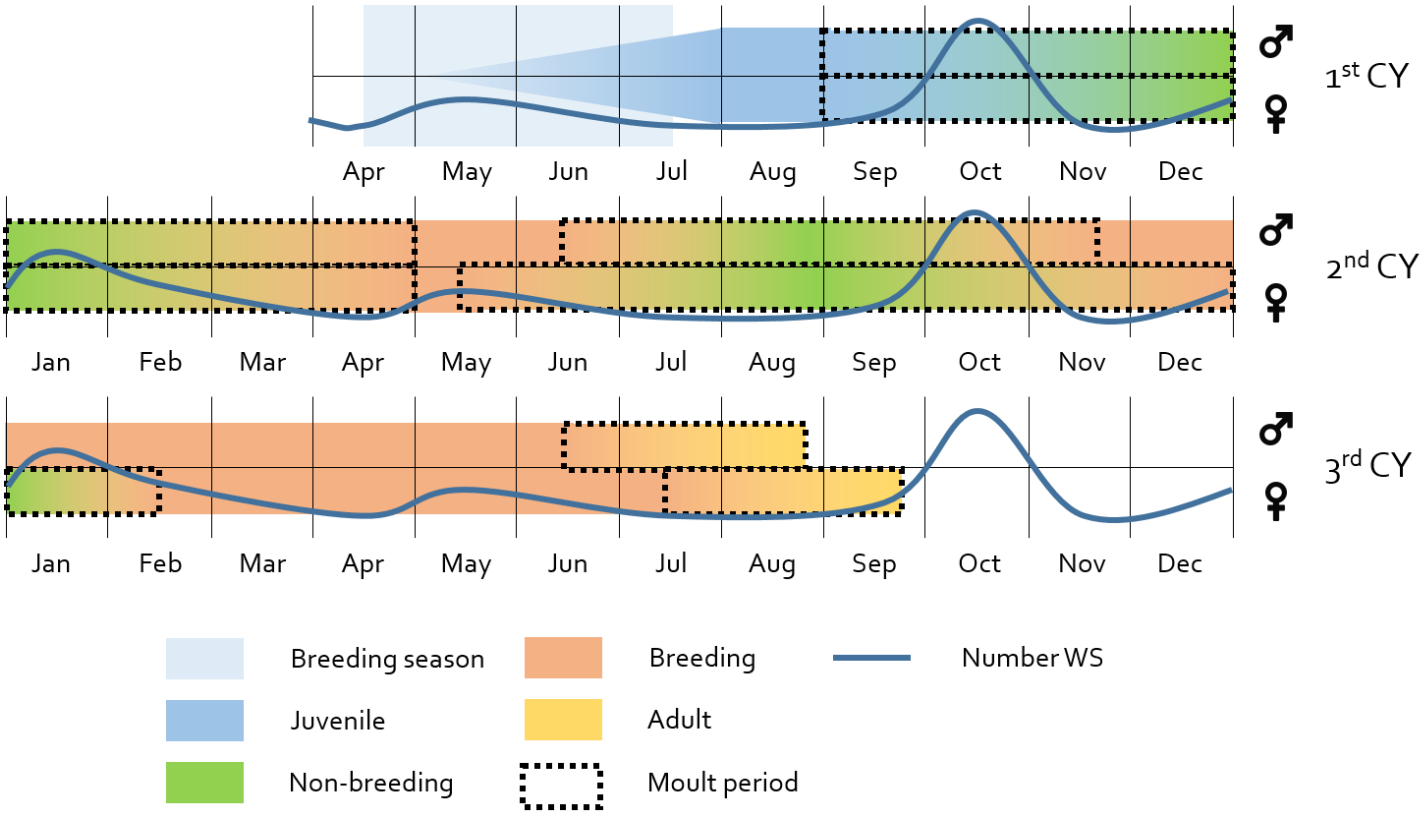

Figure 3-59: Juvenile plumage and moult phases of the Common Eider (© Bas Engels)

Recommendation

Juveniles can be fairly difficult to distinguish from adult ♀ non-breeding and adult ♂ eclipse. Present all year round, but primarily around October and January; numbers are relatively high and spread all over the Wadden Sea. If experienced, telescope countings could be performed in near shore areas or on beaches when resting around October during their post-juvenile moult.

3.20 Common Goldeneye (*Bucephala clangula*)

Plumages

Juvenile. Very similar to adult ♀, but differs in having a duller, grey brown head (3-60). Lacks white collar of adult ♀ and eclipse ♂. Juvenile ♂ differs from juvenile ♀ by having more white tips on wing coverts, while juvenile ♀ has darker grey to brown coverts. Yellow patch on bill of adult ♀ lacks in juvenile ♀. Iris dark.

Figure 3-60: Juvenile plumage (Dec) © H. Cuper

1st Non-breeding. Like adult non-breeding, but belly, vent, tail and back still retained juvenile.

1st Breeding. Like adult breeding, but still juvenile wing, underparts, back and tail retained. ♀♀ often retain more juvenile feathers than ♂♂.

Figure 3-61: Adult non-breeding ♀ (Nov) © P. Cools

2nd Non-breeding ♂. Like adult ♂ non-breeding, but some breeding plumage retained.

Subsequent plumages. Almost indistinguishable from adults in the field.

Moults

Post-juvenile. Most juveniles in 1st non-breeding before mid-winter, starting in early autumn around September. Most of head, mantle, chest and flanks moulted before November and chest before December.

1st Pre-breeding ♂. Starting from December with variable parts of plumage moulted; most of acquired 1st non-breeding and juvenile retained.

Subsequent moults. Like adults, but sometimes prolonged.

Movements

Migratory species. Autumn migration starts about late August with peaking numbers in the North Sea in about November and December. In the Netherlands, breeding birds between northern Russia and Germany winter in Denmark, the Netherlands, Britain and Ireland. Most individuals have left winter quarters in the end of March.

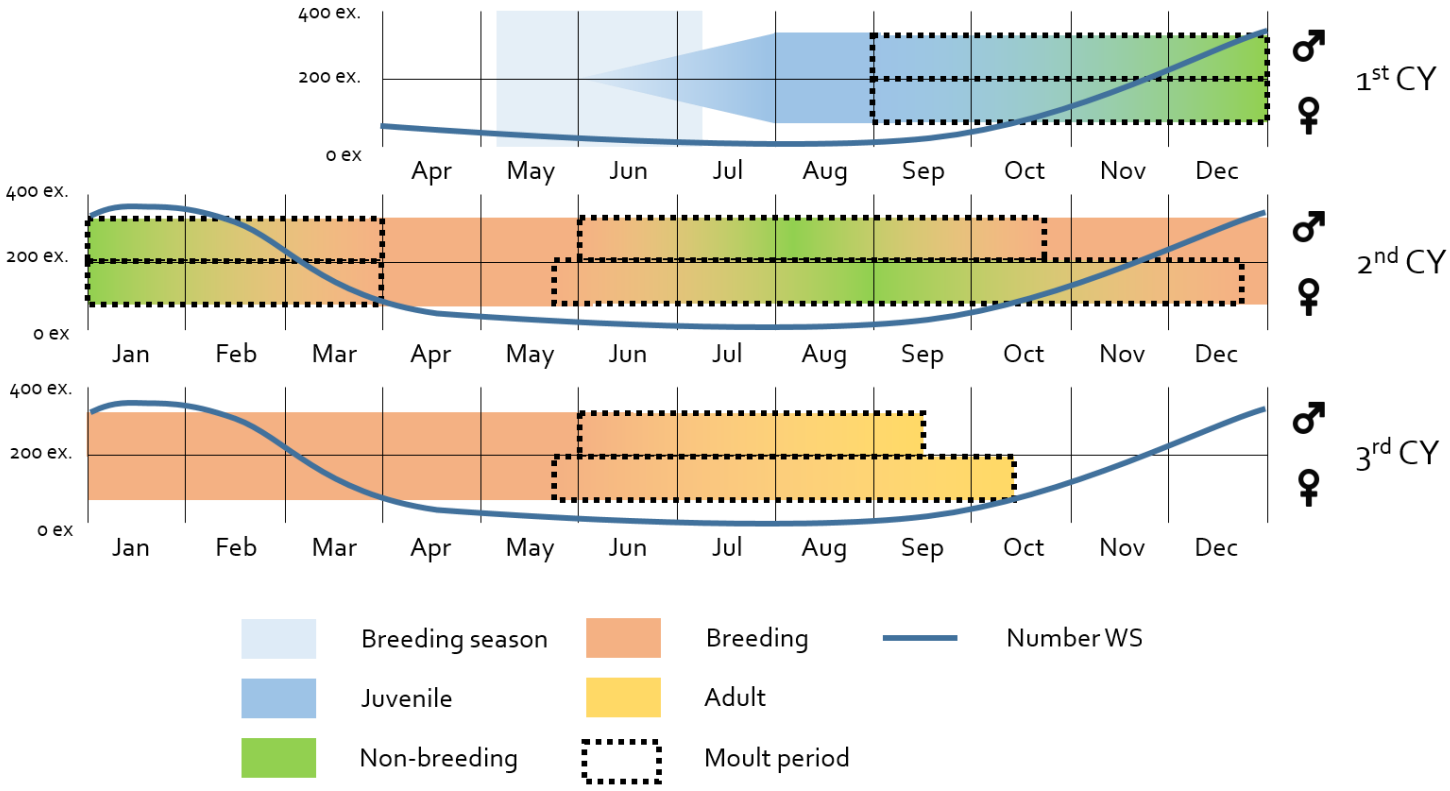

Figure 3-62: Juvenile plumage and moult phases of the Common Golden-eye (© Bas Engels)

Recommendation

Juveniles are fairly easy to distinguish from adult ♀ non-breeding by browner upperparts, lacking yellow patch on bill and dark iris. Primarily present between November and March; numbers are low and can primarily be found on the Ijsselmeer or during severe winters on the Wadden Sea. Telescope countings could be performed in near shore areas in November and December while still in post-juvenile moult.

3.21 Red-breasted Merganser (*Mergus serrator*)

Plumages

Juvenile. Very similar to adult ♀ non-breeding, but sides of the head paler buff-brown. Lacks black face of adult. Bill is duller red in colour and crest shorter (3-63).

1st Breeding ♂. Like adult ♂ breeding, but head tinged brown, lacks white collar and less white on wings.

2nd Non-breeding ♂. Like adult ♂ non-breeding, but some acquired juvenile breeding plumage still retained.

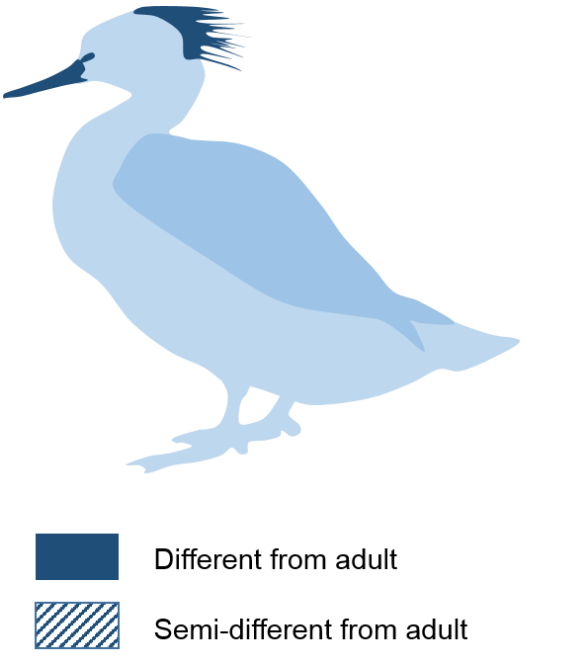

Figure 3-63: Diagram showing different and semi-different parts of the juvenile plumage of Red-breasted Merganser compared with adult ♀ non-breeding (© Bas Engels)

Moults

Post-juvenile. Juvenile plumage moulted into 1st non-breeding from October and mostly done before mid-winter; head, neck, flanks and scapulars. ♀♀ often slower than ♂♂.

1st Pre-breeding. Starts about December in ♂ with head, body, tail and tertials but most of non-breeding and juvenile plumages retained. ♀♀ often start in about January.

Movements

Mostly migratory; breeding birds between northern Russia and Poland migrate to winter quarters in Germany, the Netherlands and Britain, starting in early September and arrives around October. Starts migrating back to breeding grounds in about February.

Figure 3-64: Adult non-breeding ♀ (Jan) © M. Kolkman

Recommendation

Juveniles are difficult to distinguish from adult ♀ non-breeding due to small details on bill and crest. Primarily present between October and April; numbers are low and can be found on open water in the Wadden Sea. If experienced, telescope countings could be performed in near shore areas around October and November during their post-juvenile moult.

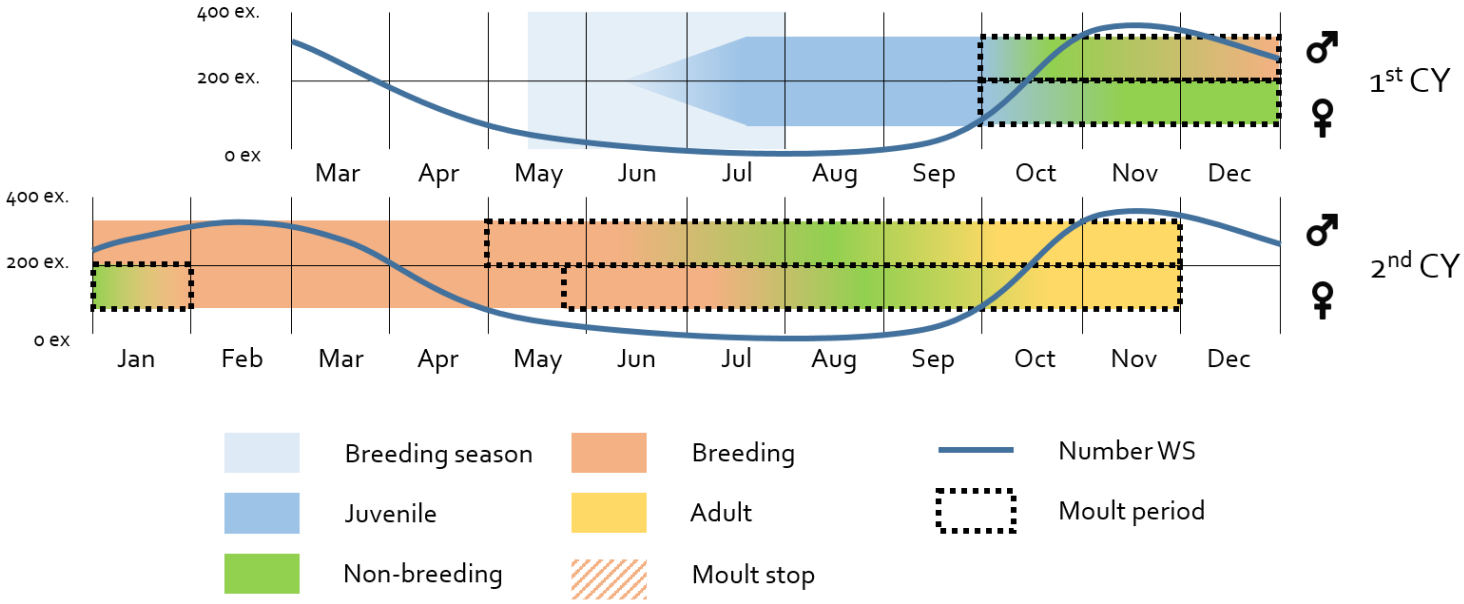

Figure 3-65: Juvenile plumage and moult phases of the Red-breasted Merganser (© Bas Engels)

3.22 Goosander (*Mergus merganser*)

Plumages

Juvenile. Very similar to adult ♀ non-breeding, but head duller buff-brown to olive-grey. Crest shorter and less dense. Light streak from upper mandible to eye (3-66). Yellow iris and yellow-brown bill. Lacks contrasting collar of adult.

1st Breeding ♂. Like adult ♂ breeding, but mixed with retained juvenile feathers on most of head and body. Attained semi-circular collar.

2nd Non-breeding ♂. Like adult ♂ non-breeding, but still some acquired 1st breeding feathers and juvenile wing retained.

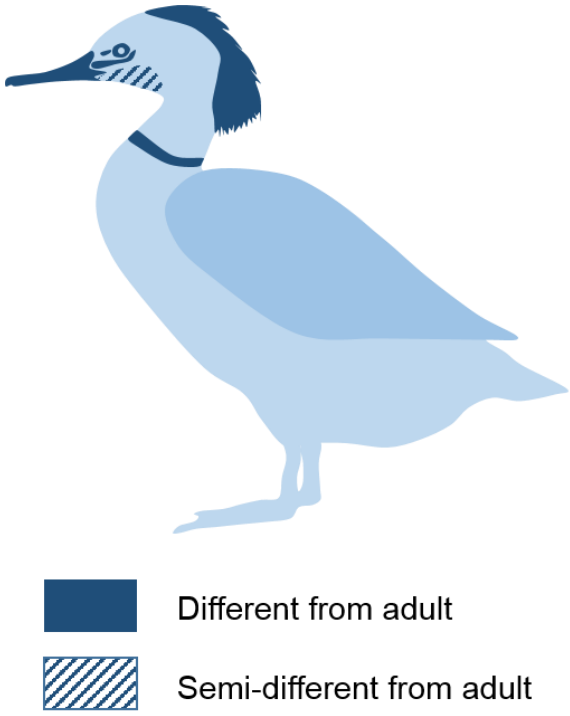

Figure 3-66: Diagram showing different and semi-different parts of the juvenile plumage of Goosander compared with adult ♀ non-breeding (© Bas Engels)

Moults

Post-juvenile. Starting in September with head, body, tail and tertials, but quickly moulted into 1st breeding from November on.

1st Pre-breeding. Between November and April, 1st breeding plumage is attained with moult stop in mid-winter; most of body and head feathers moulted before mid-winter, but tertials retained until spring.

Movements

Breeding birds between northern Russia and Baltic States migrate to winter quarters between western Baltic States and the Netherlands; starting in October with most arriving from about December. Starts migrating back to breeding grounds in early March.

Figure 3-67: Adult non-breeding ♀ (Feb) © W. Veldhuis

Recommendation

Juveniles are fairly easy to distinguish from adult ♀ non-breeding, but not present in the Netherlands. Most juveniles already in 1st breeding moult when arriving in December. Present between December and March in the Wadden sea; numbers are low and can be found on the Ijsselmeer. If experienced, telescope countings could be performed in near shore areas in December during their 1st breeding moult.

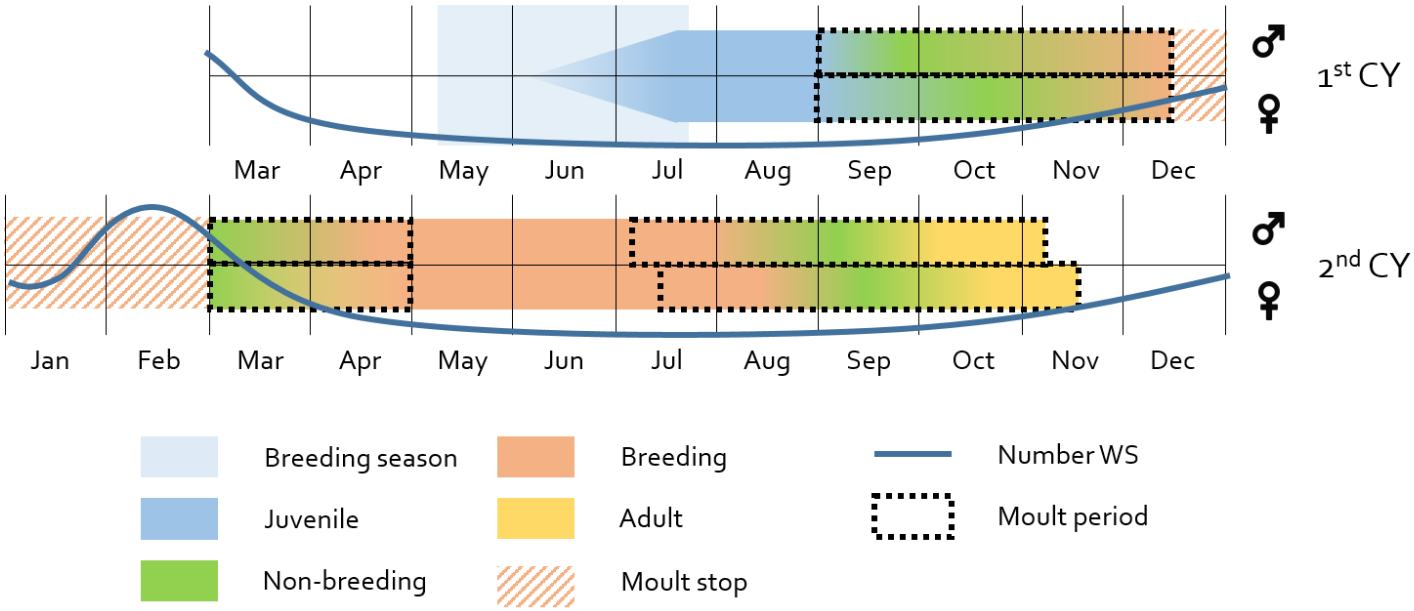

Figure 3-68: Juvenile plumage and moult phases of the Goosander (© Bas Engels)

3.23 Western Marsh-harrier (*Circus aeruginosus*)

Plumages

Juvenile. Similar to adult ♀, but yellow forehead less streaked black-brown and more contrasting than adult ♀ (3-69). Most body feathers darker brown in colour and has a golden-yellow streak in front on upper wing-coverts.

Subsequent plumages. Almost indistinguishable from adults in the field.

Figure 3-69: Juvenile plumage (Aug) © T. Hak

Moults

Post-juvenile. Starts moulting around December and attains almost full adult plumage in around November in the 2nd calendar year.

Subsequent moults. Like adult moult.

Figure 3-70: Adult ♀ (Apr) © J. Schwiebbe

Movements

In the Netherlands, some birds stay during winter, but most individuals migrate to winter quarters in Mediterranean, Asia and Africa. Around early March to April, most individuals return to breeding grounds in Western Europe. Juveniles tend to disperse around early August.

Recommendation

Juveniles are fairly difficult to distinguish from adult ♀ in the field; most adult ♀ as dark as juvenile. Primarily present between March and September; numbers are low and can be found on primarily the Wadden islands. If experienced, telescope and/or binocular countings could be performed in especially dune areas in July and August while still in juvenile plumage.

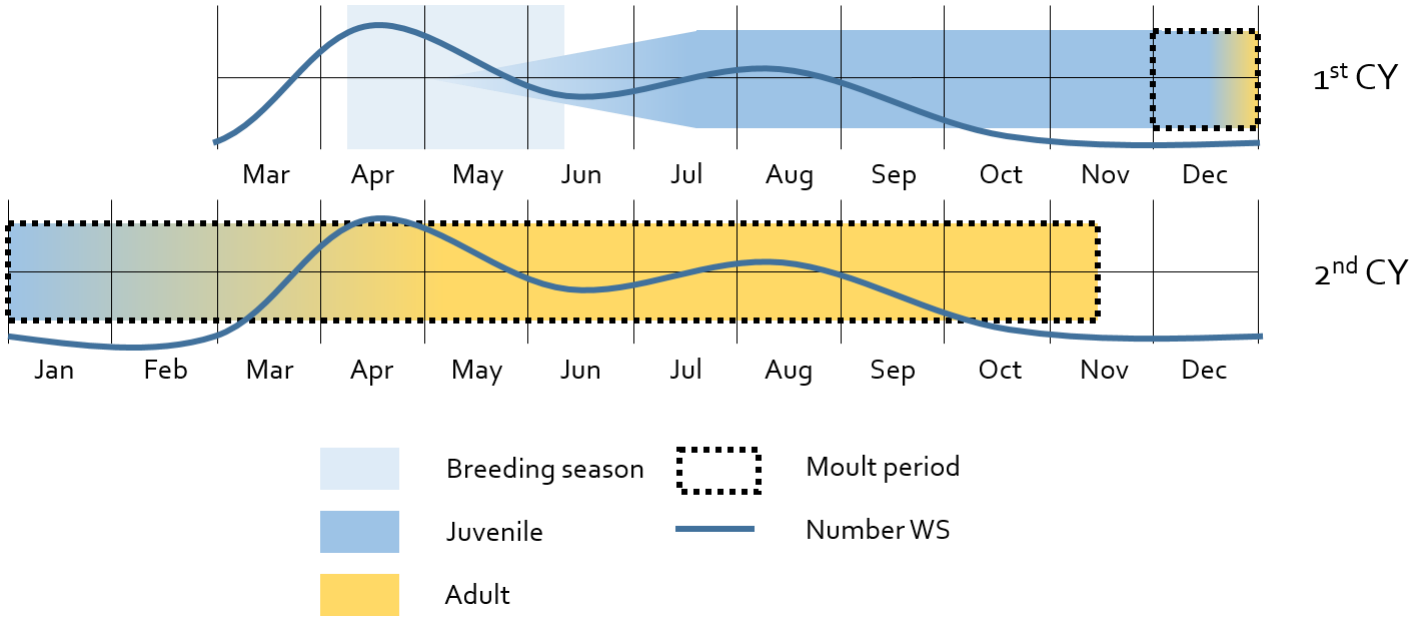

Figure 3-71: Juvenile plumage and moult phases of the Western Marsh-harrier (© Bas Engels)

3.24 Hen Harrier (*Circus cyaneus*)

Plumages

Juvenile. Very similar to adult ♀ and not always distinguishable with certainty. Warmer, yellow-brown and less streaked underparts compared with adult ♀ (3-72).

Subsequent plumages. Almost indistinguishable from adults in the field.

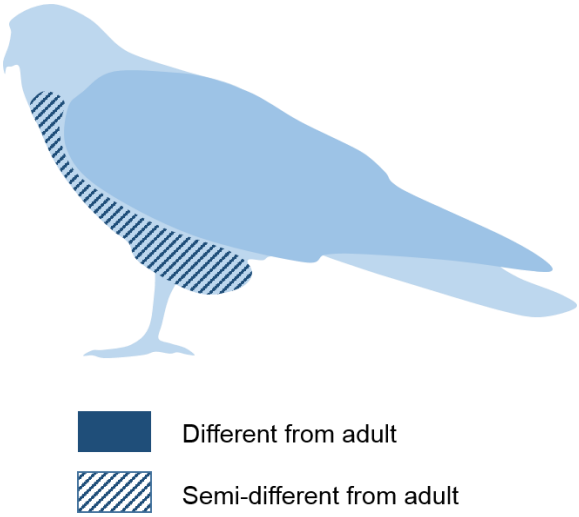

Figure 3-72: Diagram showing different and semi-different parts of the juvenile plumage of Hen Harrier compared with adult ♀ (© Bas Engels)

Moults

Post-juvenile. Starts moulting around December and attains almost full adult plumage in around September in 2nd calendar year.

Subsequent moults. Like adult moult.

Movements

Breeding birds from the Netherlands mostly resident, while breeding birds north and north-eastern Europe start migrating south, southwest in late August and peak around October and migrate back to breeding grounds around April.

Figure 3-73: Adult ♀ (Oct) © R. van Rossum

Recommendation

Very difficult and almost indistinguishable from adult ♀ in the field. Mostly present around April and between September and November; numbers are low and can be found on primarily the Wadden islands. If experienced, telescope and/or binocular countings could be performed in especially dune areas in September and October while still in juvenile plumage.

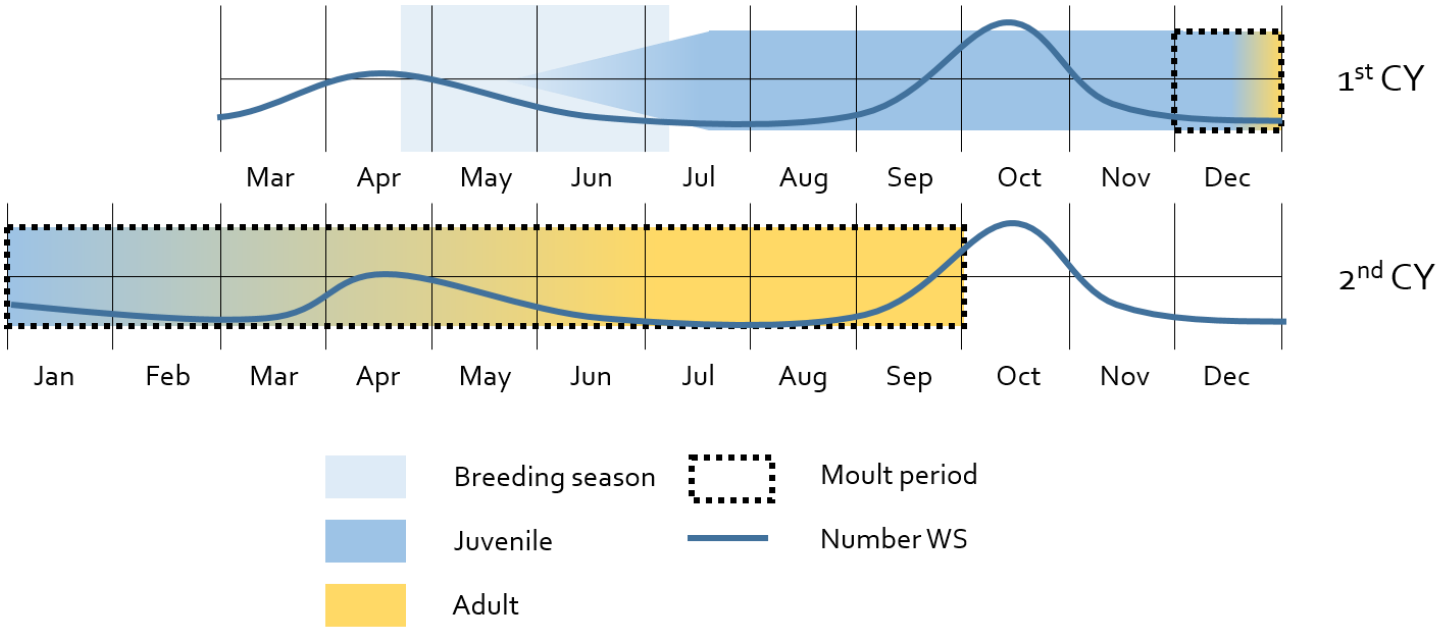

Figure 3-74: Juvenile plumage and moult phases of the Hen Harrier (© Bas Engels)

3.25 Peregrine Falcon (*Falco peregrinus*)

Plumages

Juvenile. Most body feathers dark brown in colour; wing-coverts with buff edges. Best characteristic feature is streaked chest and belly instead of banded like adult (3-75).

Figure 3-75: Juvenile (Aug) © R. Schoemaker

Moults

Post-juvenile. Starts moulting in March of 2nd calendar year; some half moulted in April while others retain juvenile plumage until December.

Movements

Most breeding individuals resident in the Netherlands. Juveniles tend to wander extensively in autumn and winter between August and November. Return to breeding areas between March and early May.

Figure 3-76: Adult (May) © F. Visscher

Recommendation

Juveniles are fairly easy to distinguish from adult by browner upperparts and streaked chest. Present all year round, but primarily between September and April in the Wadden Sea; numbers are very low and can be found on intertidal areas near high tide wader roosts. Telescope and/or binocular countings could be performed in October and November when still in juvenile plumage.

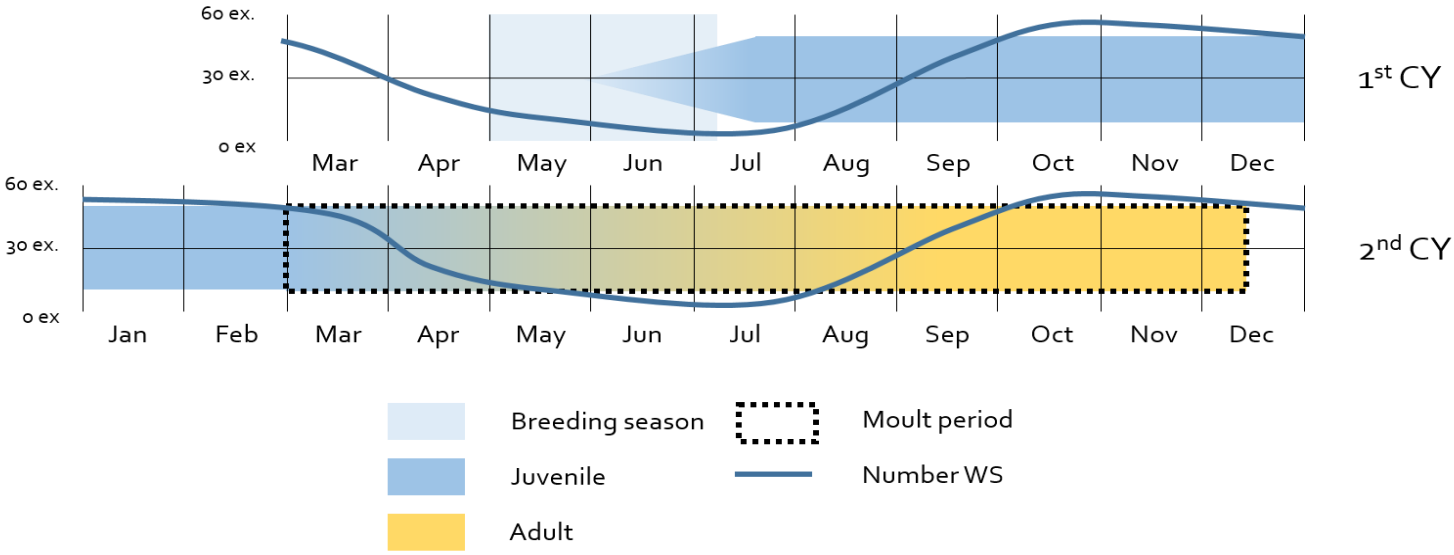

Figure 3-77: Juvenile plumage and moult phases of the Peregrine Falcon (© Bas Engels)

3.26 Eurasian Oystercatcher (*Haematopus ostralegus*)

Plumages

Juvenile. Similar to adult non-breeding, but differs in having tinged brown upperparts instead of deep black (3-78). Bill dull orange to yellow at the base and dark horn towards the end; brown iris without clear eye-ring; feet pale grey.

Figure 3-78: Juvenile plumage (Aug) © G. Visser

1st Non-breeding. Very similar to adult non-breeding, but can be distinguished by browner upperparts, retained juvenile wing and tail and overall very worn plumage (3-79). White collar develops gradually during 1st autumn; by December, collar mostly like adult, but a bit wider. Bill becomes dull red, but still retains some juvenile dark on the tip; feet dark grey to pink.

Figure 3-79: 1st Non-breeding (Mar) © R. Floor

1st Breeding. Juveniles are easily distinguished from adults by having a white collar. Some juvenile wing feathers still retained.

Subsequent plumages. Almost indistinguishable from adults in the field.

Figure 3-80: Adult non-breeding (Nov) © A. Vriens

Moults

Post-juvenile. Between August and September until December, most body feathers and some tail and wing feathers moulted into 1st non-breeding plumage.

1st Pre-breeding. Between January and May of 2nd calendar year, some body, wing and tail feathers moulted into 1st breeding plumage.

1st Post-breeding. Starts in the end of May or June by moulting complete plumage; always earlier compare to adult post-breeding moult.

Subsequent moults. Like adult moults; adult breeding acquired in spring of 3rd calendar year.

Movements

Breeding birds from the Netherlands moult and winter mainly in the Wadden Sea. Most immatures dispersive and winter along the coast between the Netherlands and Portugal. Breeding birds from northern Russia and Scandinavia migrate to winter quarters around the North Sea, but primarily the Wadden Sea, and arrive around late July; peak lies around August and September. Return to breeding grounds about late January to April. Immatures tend to stay in winter quarters where they moult.

Recommendation

Depending on season; juveniles are easily distinguished from adults in their 1st summer while having a white collar and fairly easily distinguished in autumn by dull upperparts and black tip on the bill. Present all year round in the Wadden Sea; numbers are high and can primarily be found on intertidal areas, but also on pastures and agricultural fields. Telescope and/or binocular countings could be performed in July and August while still in juvenile plumage or early stages of post-juvenile moult or in 1st summer around May while in 1st breeding plumage.

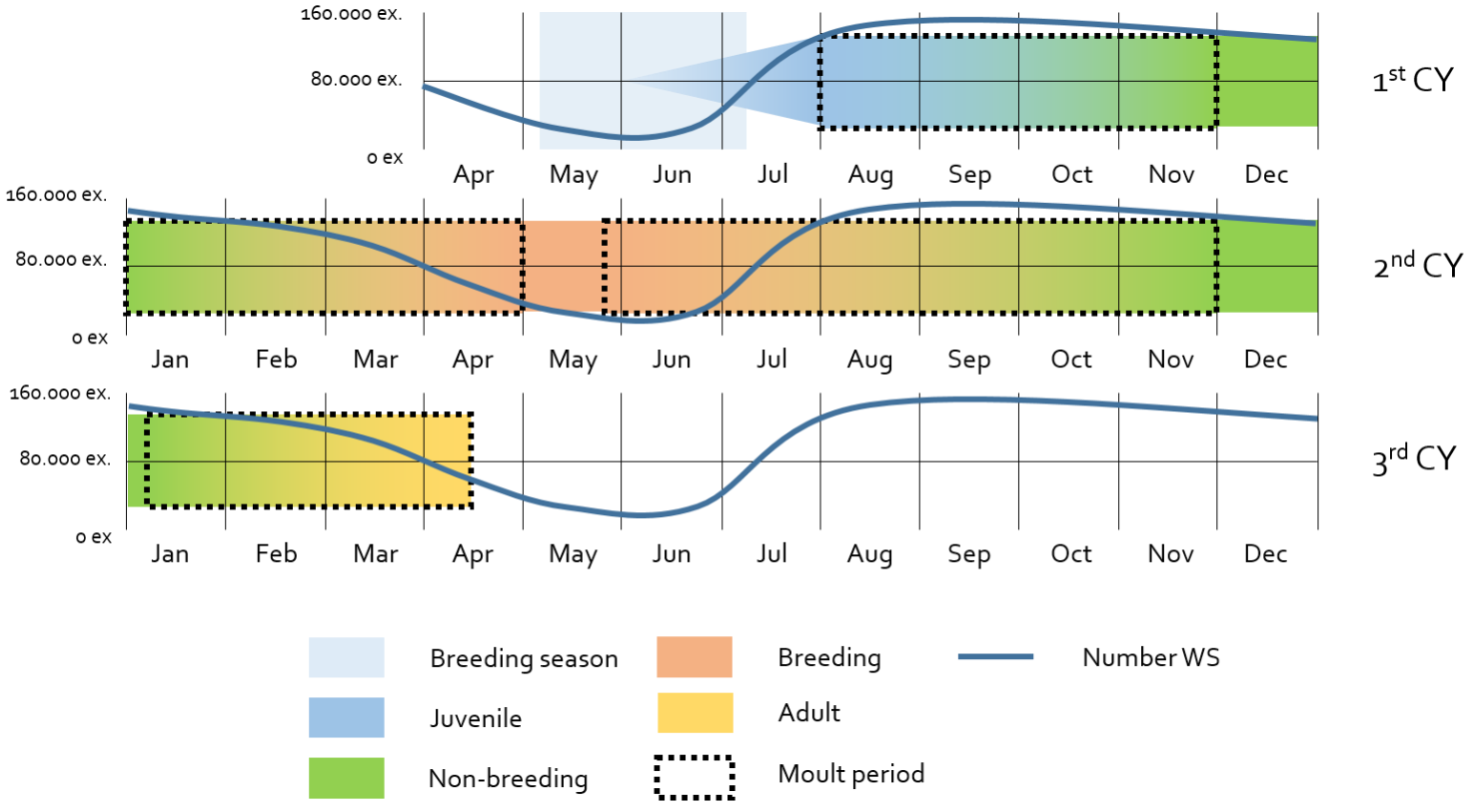

Figure 3-81: Juvenile plumage and moult phases of the Eurasian Oystercatcher (© Bas Engels)

3.27 Pied Avocet (*Recurvirostra avosetta*)

Plumages

Juvenile. Like adult, but black parts of adult are brownish in juvenile plumage (3-82). Feet slate grey.

Figure 3-82: Juvenile plumage (Sep) © G. Visser

1st Non-breeding. Similar to adult non-breeding, but more white visible on forehead instead of completely black. Scapulars fringed white. Juvenile wings and some juvenile coverts, tertials and tail feathers retained.

1st Breeding. Similar to adult breeding, but still juvenile wing retained.

Figure 3-83: Adult non-breeding (Oct) © F. Hoorn

Moults

Post-juvenile. Starts about halfway July with head, neck, mantle, scapulars and wing coverts followed by tail, back, rump and tertials.

1st Pre-breeding. Similar to adult pre-breeding; between February and March. Most of juvenile plumage retained.

1st Post-breeding. Similar to adult post-breeding, but starts a little earlier in June with body and wing.

Movements

Depending on winter, Dutch breeding birds winter or migrate southwards. Most birds move to the Dutch Delta region to moult between mid-July and September; joined by breeding birds from Scandinavia and Germany. From about October, most birds start migrating southwards to winter quarters. Juveniles tend to move southwards before adults are done moulting. Return back to their breeding grounds around late February but arrive in the Netherlands around March and April.

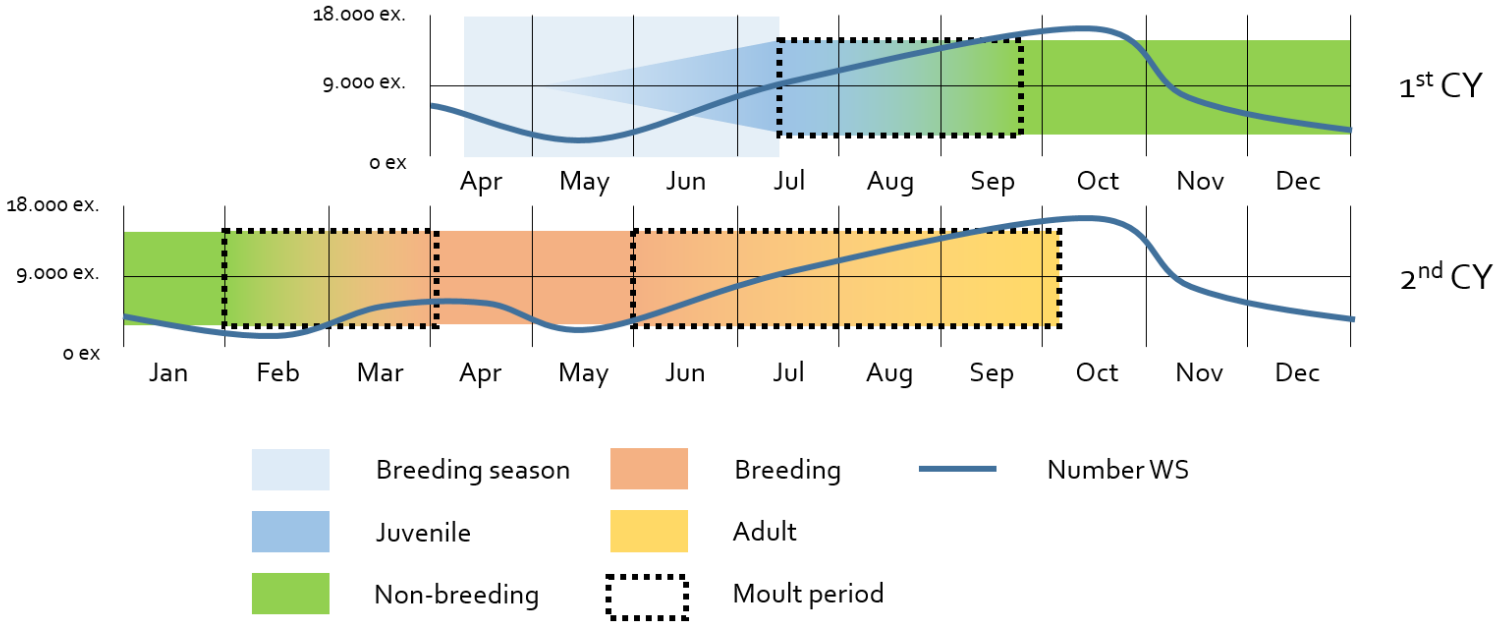

Figure 3-84: Juvenile plumage and moult phases of the Pied Avocet (© Bas Engels)

Recommendation

Juveniles are fairly easy to distinguish from adult non-breeding by their brown tinged upperparts. Present all year round, but primarily between June and October; numbers are fairly high and can be found spread all over the Wadden Sea. Telescope and/or binocular countings could be performed during low tide on intertidal areas or in smaller water habitats within dyked area in July and August during their post-juvenile moult.

3.28 Common Ringed Plover (*Charadrius hiaticula*)

Plumages

Juvenile. Very similar to adult non-breeding, but crown and upperparts olive to dark brown. Chest band brown; paler in the centre or even interrupted. Fringes on upperparts light (3-85). Feet yellow to dull orange.

Figure 3-85: Juvenile plumage (Sep) © F. Visscher

1st Non-breeding. Very similar to adult non-breeding and only distinguishable by some retained juvenile feathers. After this plumage, indistinguishable from adults.

Moults

Post-juvenile. Starting to moult in August with body, tail, tertials and some wing coverts. Remaining feathers moulted until January or until spring of 2nd calendar year.

Figure 3-86: Adult non-breeding (Dec) © E. Roeland

Subsequent moults. Like adult moult, but juvenile indistinguishable from adult in 2nd calendar year.

Movements

Mainly migratory species. Breeding birds from North Sea coastal areas migrate to winter quarters south of the English Channel around September. Start to return to breeding grounds mainly between March and May.

Recommendation

Juveniles are very difficult to distinguish from adult non-breeding and indistinguishable in the field early during moult process; most juveniles in 1st non-breeding plumage from November on. Mostly present between April and October; numbers are fairly high and can be found all over the Wadden Sea. If experienced, telescope countings could be performed during low tide on intertidal areas in August and September during their post-breeding moult.

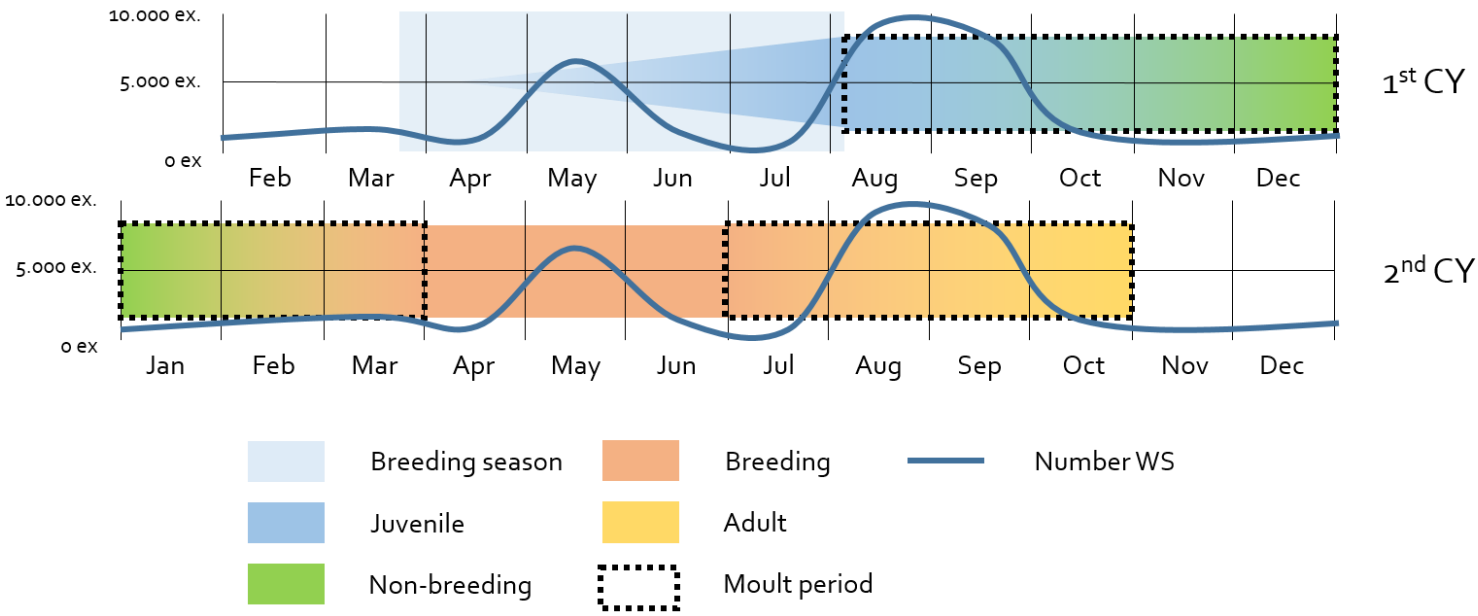

Figure 3-87: Juvenile plumage and moult phases of the Common Ringed Plover (© Bas Engels)

3.29 Kentish Plover (*Charadrius alexandrinus*)

Plumages

Juvenile. Very similar to adult ♀ non-breeding, but fringes on upperparts are rufous to light in colour (3-88). Head and chest patches paler.

Figure 3-88: Juvenile plumage (Jan) © P. Cools

1st Non-breeding. Like adult non-breeding, but juvenile flight feathers, back, rump, tail and variable wing coverts retained. By midwinter, most juvenile feathers worn and undistinguishable from adult.

1st Breeding. Like adult breeding, but still juvenile flight feathers and wing coverts retained. ♂♂ lack cinnamon crown and nape and black parts on adult ♂ head brownish in colour.

Figure 3-89: Adult non-breeding (Aug) © P. Meininger

Moults

Post-juvenile. Already around late June, juveniles start moulting to 1st non-breeding; head, mantle, scapulars and underparts before late September and remainder of body, wing coverts and tail before December.

1st Pre-breeding. Like adult pre-breeding, but slightly later; starting mid-November until the beginning of March.

Movements

Dispersal from breeding grounds starts around late June when moving towards moulting areas like the Wadden Sea. Start migrating south towards winter quarters in September. Breeding birds mainly arrive in the Netherlands around the end of March and April.

Recommendation

Juveniles are very difficult to distinguish from adult ♀ non-breeding; with some experience, distinguishable from adults in 1st summer by incomplete head markings. Present between April and September; very low numbers can be found in intertidal areas in the Wadden Sea. If experienced, telescope countings could be performed during low tide on intertidal areas in July during their post-juvenile moult.

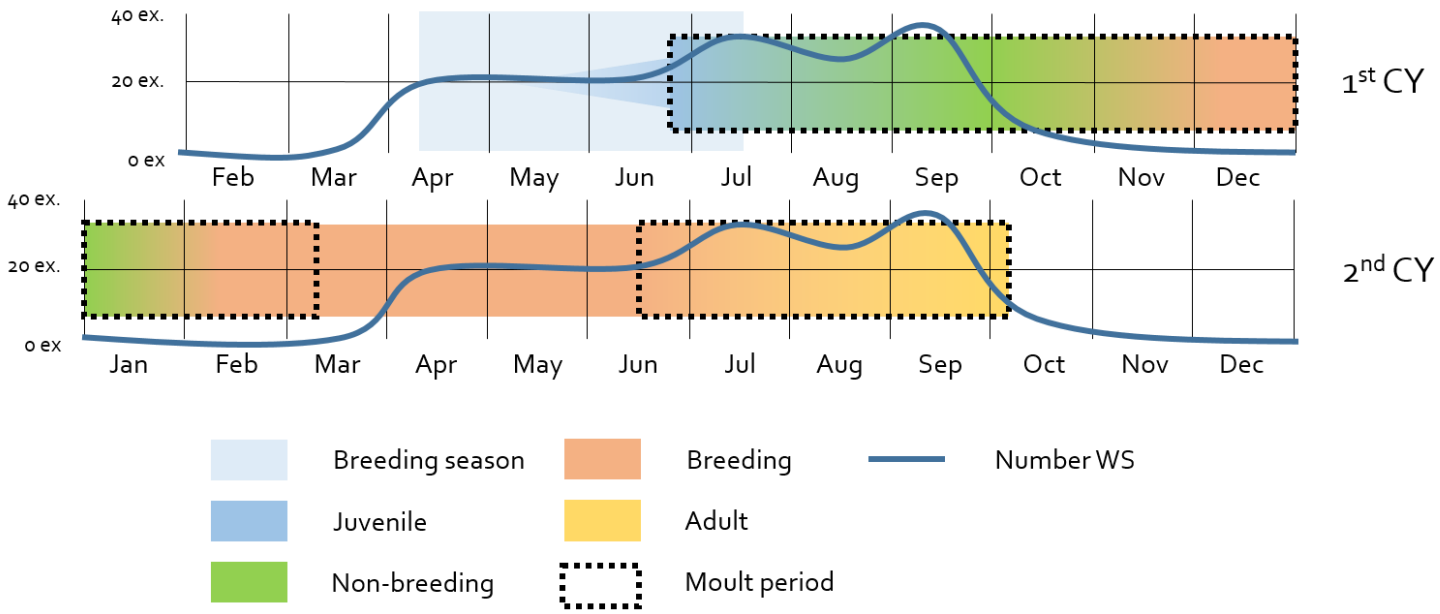

Figure 3-90: Juvenile plumage and moult phases of the Kentish Plover (© Bas Engels)

3.30 Eurasian Golden Plover (*Charadrius apricaria*)

Plumages

Juvenile. Like adult non-breeding, but distinguishable by small details. Underparts appear barred yellow and grey on chest, breast and flanks; barred grey and white on belly and vent (3-91). Pattern on upperparts more evenly distributed.

Figure 3-91: Juvenile plumage (Sep) © A. Vriens

1st Non-breeding. Similar to adult non-breeding, but juvenile back, rump, tail, tertials and wing retained. Contrasting heavily worn juvenile plumage with fresh non-breeding.

1st Breeding. Similar to adult breeding and moult of 1st non-breeding plumage; still juvenile back, rump, tail, tertials and wing retained.

Figure 3-92: Adult non-breeding (Nov) © R. v. Rossum

Moults

Post-juvenile. Between late August and late October, juvenile plumage moulted to 1st non-breeding; starting with body and head.

Subsequent moults. Like adult moult, but juvenile pre-breeding starts slightly later than adult pre-breeding.

Movements

Adults start migrating between late July and late August to moult and winter quarters in northern Europe; juveniles do the same but later between October and November. Around mid-February, migration back to breeding grounds with a peak around March and April in the Netherlands.

Recommendation

Juveniles are very difficult to distinguish from adult non-breeding and only distinguishable by small details. Mainly present between July and January; numbers are high and can be found all over the Wadden Sea. If experienced, telescope countings could be performed during low tide on intertidal areas or on pastures and agricultural fields in August, while still in juvenile plumage, or September in early post-breeding moult.

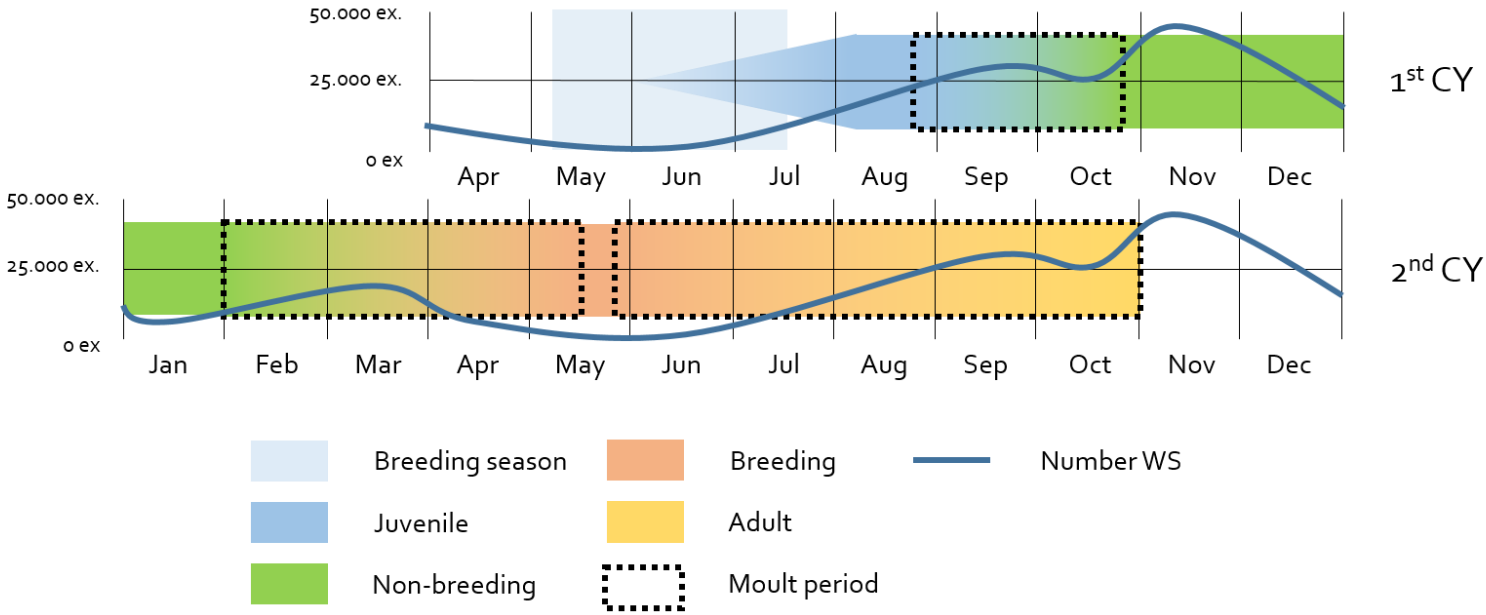

Figure 3-93: Juvenile plumage and moult phases of the Eurasian Golden Plover (© Bas Engels)

3.31 Grey Plover (*Charadrius squatarola*)

Plumages

Juvenile. Grey and black upperparts with frequent yellow-brown spots and serrated featheredges. Underparts lighter yellow-brown with grey streaks on chest and belly. Black armpits noticed easily during flight (3-94).

Figure 3-94: Juvenile plumage (Sep) © P. Hilgeman

1st Non-breeding. Like adult ♀ non-breeding in spring of 2nd calendar year, but still retains fringed yellowish feathers on crown. Also wing coverts, tail, rump and tertials retained juvenile. Usually no breeding plumage attained during 2nd calendar year.

Figure 3-95: Adult non-breeding (Dec) © P. Cools

Moults

Post-juvenile. Between November and January, most of crown, mantle and scapulars moulted into 1st non-breeding. Some nape, tail, wing coverts, tertials, scapulars and sides of breast retained juvenile until spring.

1st Post-breeding. No breeding plumage attained during 2nd calendar year. Starts moulting around March with head, tail and the remainder of juvenile wing until October.

Movements

Starts migrating from breeding grounds in northern Russia to winter quarters around August, peaking in the Dutch Wadden Sea around September. Juveniles tend to migrate about five to six weeks later than adults. From February onwards, birds start to migrate back to breeding grounds, passing through the Netherlands between April and the beginning of June.

Recommendations

Juveniles are fairly difficult to distinguish from adult non-breeding by black armpits and yellowish upperparts. Mainly present during winter months but peak around April and May and between July and December; numbers are high and can be found all over the Wadden Sea. If experienced, telescope countings could be performed during low tide on intertidal areas between August and October when still in juvenile plumage.

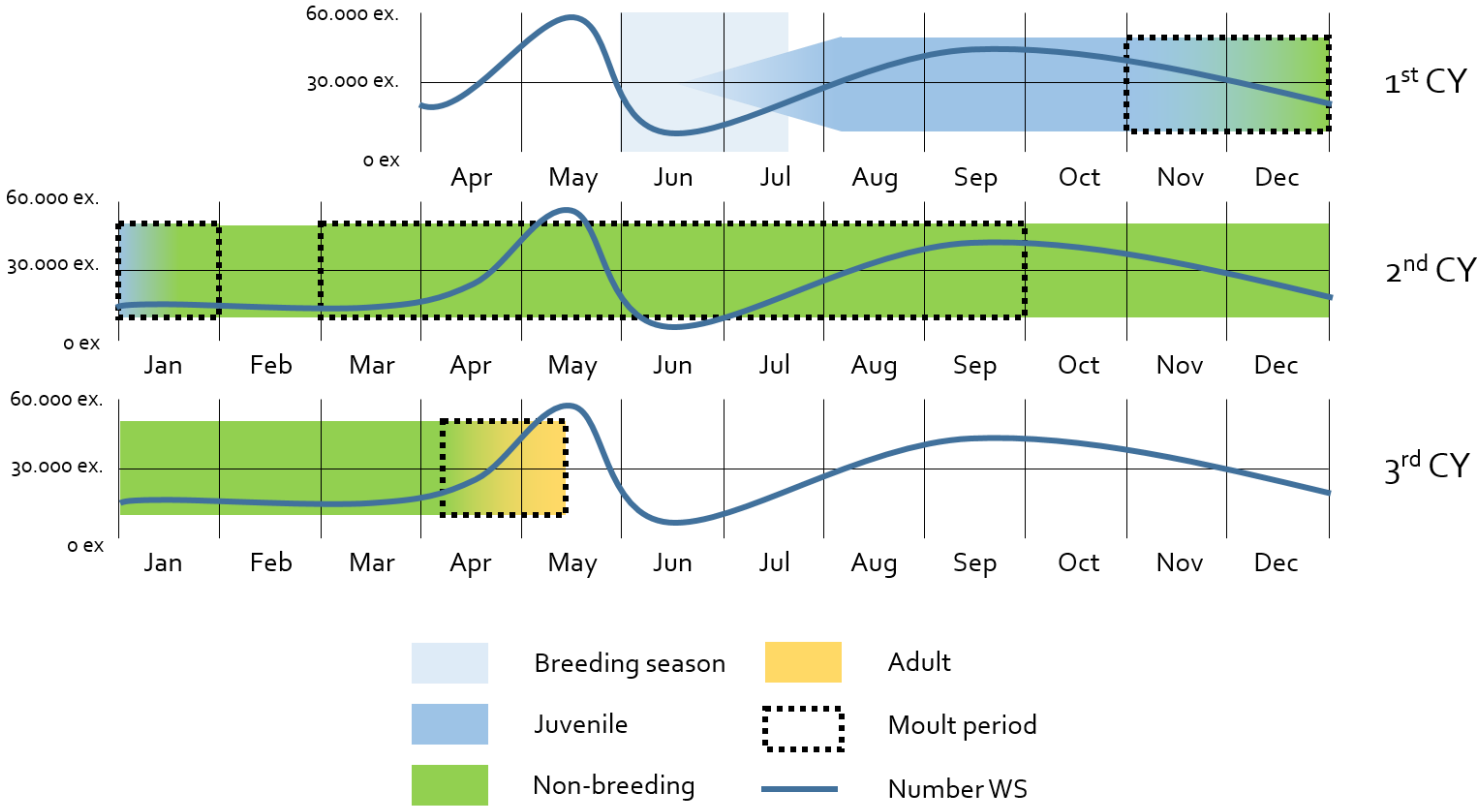

Figure 3-96: Juvenile plumage and moult phases of the Grey Plover (© Bas Engels)

3.32 Northern Lapwing (*Vanellus vanellus*)

Plumages

Juvenile. Similar to adult ♀ non-breeding, but feathers on crown duller brown with pale edges and a very short crest (3-97). Upperparts dull green and tinged brown with buff edges. Dark pattern on sides of the head not well developed as adult.

Figure 3-97: Juvenile plumage (Sep) © K. Bakker

1st Non-breeding. Like adult non-breeding, but best distinguished by narrower and browner breast-shield and buff edges on scapulars and wing coverts.

1st Breeding. Like adult ♂ and ♀ breeding, but wing coverts duller in colour. Almost indistinguishable from adults in the field.

Figure 3-98: Adult non-breeding (Sep) © H. de Rooij

Moults

Post-juvenile. Between July and December, most body feathers, wing coverts and tail moulted into 1st non-breeding plumage.

Subsequent moults. Like adult moult, but 1st post-breeding in 2nd calendar year earlier than adult. Juveniles indistinguishable after 1st pre-breeding moult.

Movements

Between late May and June, first post-breeding dispersal from breeding grounds begins. Many breeding birds from eastern countries, northern Russia and Scandinavia migrate to western, coastal countries. After slow dispersal of adults, juveniles and remaining adults migrate southwards through the Netherlands between October and December. Some Dutch birds are resident and only migrate southwards during cold winters. Migration back to breeding grounds starts about March.

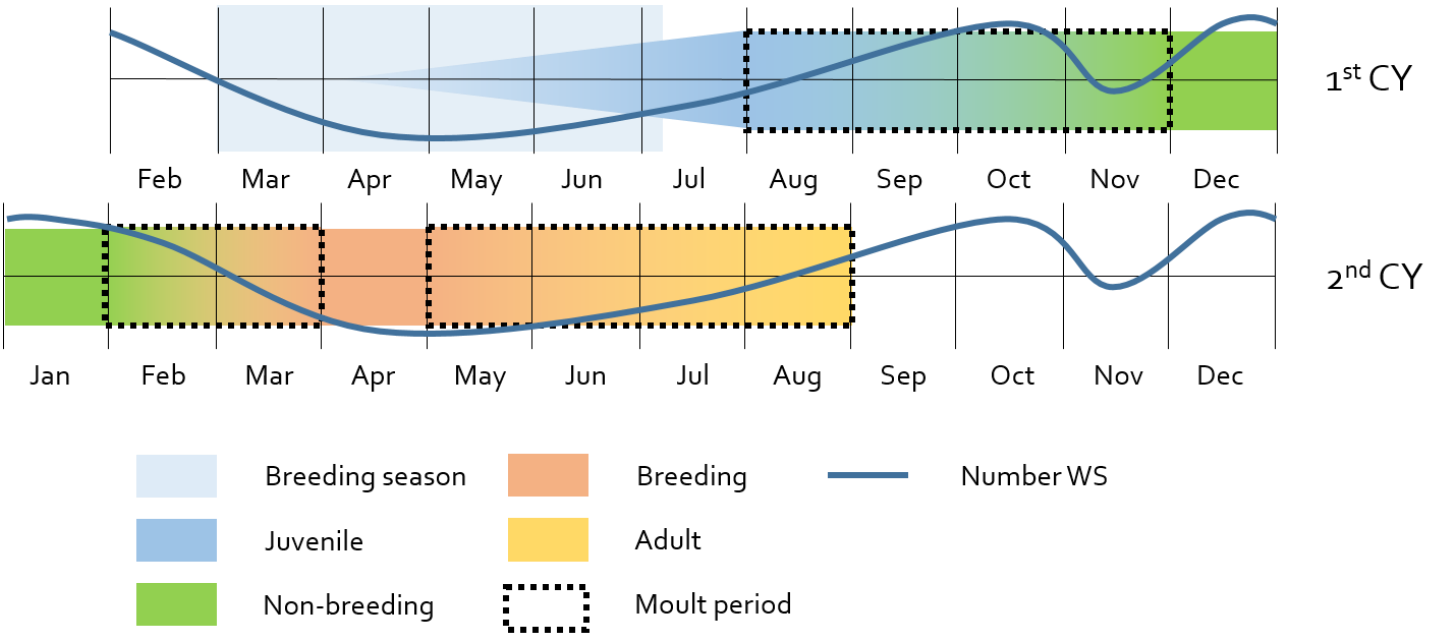

Figure 3-99 Juvenile plumage and moult phases of the Northern Lapwing (© Bas Engels)

Recommendation

Juveniles are fairly easy to distinguish from adult non-breeding by short crest and undeveloped head markings. Present all year round but peaks between September and October and around December; numbers are high and can be found all over the Wadden Sea. Telescope countings could be performed during low tide on intertidal areas or on pastures and agricultural fields in August and September while in early post-breeding moult.

3.33 Red Knot (*Calidris canutus*)

Plumages

Juvenile. Very similar to adult non-breeding plumage, especially from a distance, but differs in having grey upperparts tinged orange-yellow with darker edges (3-100). Forehead, lores and crown black to speckled buff. Very distinct eyebrow. Breast and belly mottled and barred grey.

Figure 3-100: Juvenile plumage (Sep) © F. Hustings

1st Non-breeding. Like adult non-breeding, but most of back, rump, tail, wing coverts and tertials retained juvenile.

1st Breeding. Most of 1st non-breeding plumage retained during the 1st pre-breeding moult and just a couple of breeding feathers attained.

Figure 3-101: Adult non-breeding (Nov) © P. v.d Meer

Moults

Post-juvenile. Starts about early September to late October until December with head, body, tail, some tertials and wing coverts.

1st Pre-breeding. Between April and June, very variable amount of plumage is moulted into 1st breeding plumage; some individuals moult just a couple of feathers, others same like adult. Most of the time involves throat, chest, breast, head, mantle scapulars, tertials, belly and wing coverts.

Subsequent moults. Like adult moult, but most of the time some juvenile feathers retained.

Movements

Migratory species. Between August and September, birds from the Nearctic population migrate from breeding grounds in Canada and Greenland towards winter quarters in southern North Sea and France. Between late July and August, adults will arrive while juveniles tend to come in one month later around September. Migration back to breeding grounds rapid around March and April in the Wadden Sea.

The Siberian population is slightly later than the Nearctic population, leaving in the end of August from their breeding grounds in northern Russia and arrive around September in the Netherlands; one month later for juveniles. The Siberian population migrates rapidly along coast of Western Europe towards breeding grounds in Africa. Migration back starts about April in Africa and moves through Wadden Sea around May.

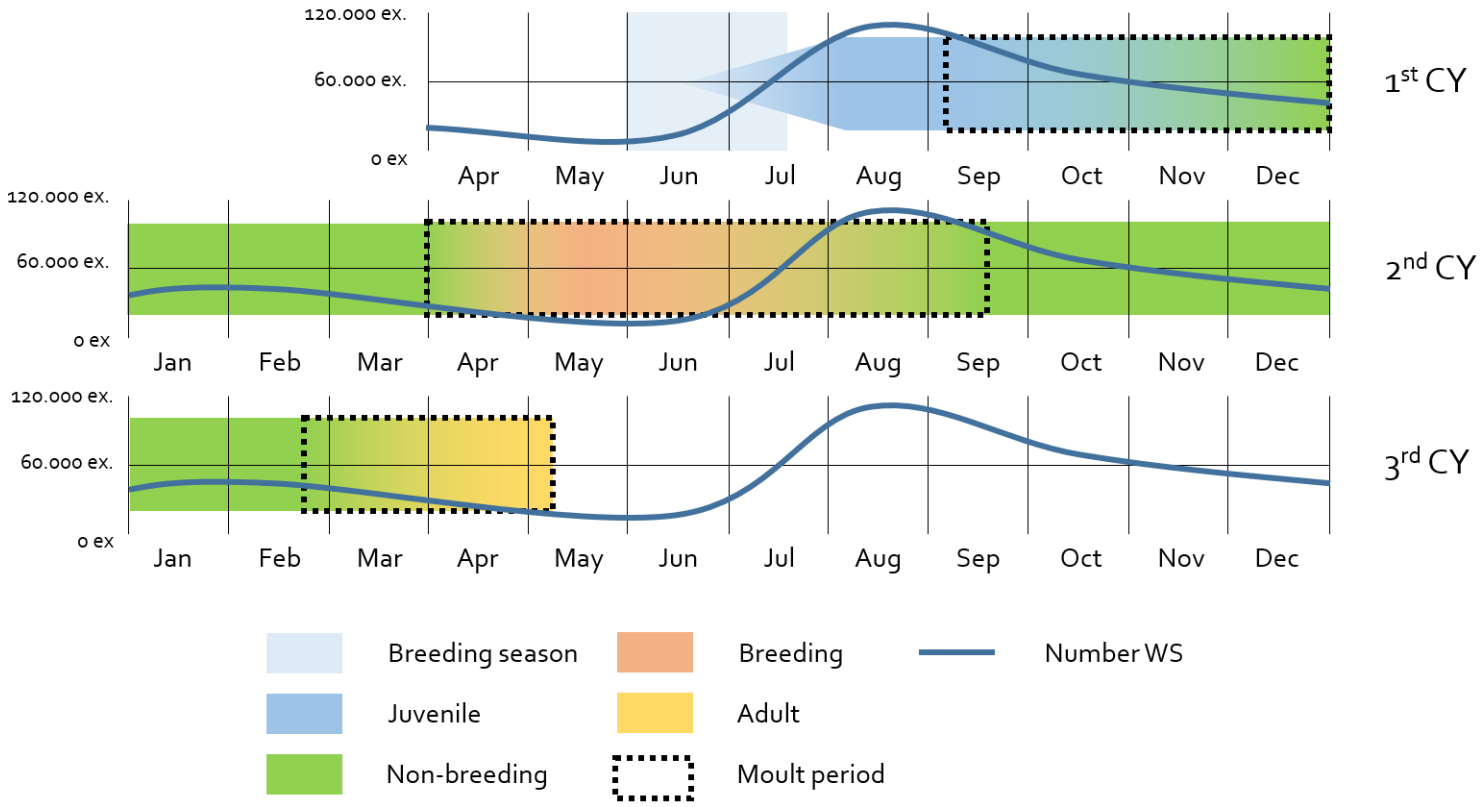

Figure 3-102 Juvenile plumage and moult phases of the Red Knot (© Bas Engels)

Recommendation

Juveniles are fairy difficult to distinguish from adult non-breeding on distance, but in close range, fairly easy to recognize by scaled pattern on upperparts. Present all year round, but primarily between July and March; numbers are high and can be found all over the Wadden Sea. On distance in intertidal areas, experienced counters could perform telescope countings during low tide around August on highest number peak and still in juvenile plumage.

3.34 Sanderling (*Calidris alba*)

Plumages

Juvenile. Crown black and buff streaked; black spot just in front of the eyes; hindneck, sides of the neck and mantle pale grey with faint dark grey streaks; lower mantle, scapulars and tertials black with grey centres (3-103).

Figure 3-103: Juvenile plumage (Aug) © L. Steen

1st Non-breeding. Similar to adult non-breeding, but juvenile tertials, back, rump, tail and wing retained. Most juvenile feathers visible until around July of 2nd calendar year.

Figure 3-104: Adult non-breeding (Oct) © J. Bosch

1st Breeding. Highly variable moult; some birds retain juvenile back, rump and wing coverts but others moult completely like adult, but always retain some juvenile feathers.

Moults

Post-juvenile. From mid-September until early October, mantle, scapulars and sides of chest moulted into 1st non-breeding; appearing non-breeding by early October until mid-November.

1st Pre-breeding. Between May and June, highly variable amount of plumage moulted into 1st breeding, but mostly retain a lot of juvenile and non-breeding plumage during this phase.

Movements

From late July, breeding birds from two populations arrive in the Dutch Wadden Sea and also migrate further to other winter quarters in Western Europe and Africa; juveniles tend to migrate one month later than adults. It is not yet known how the two populations exactly migrate. Between February and March and during a second peak around May, birds migrate back to their breeding grounds.

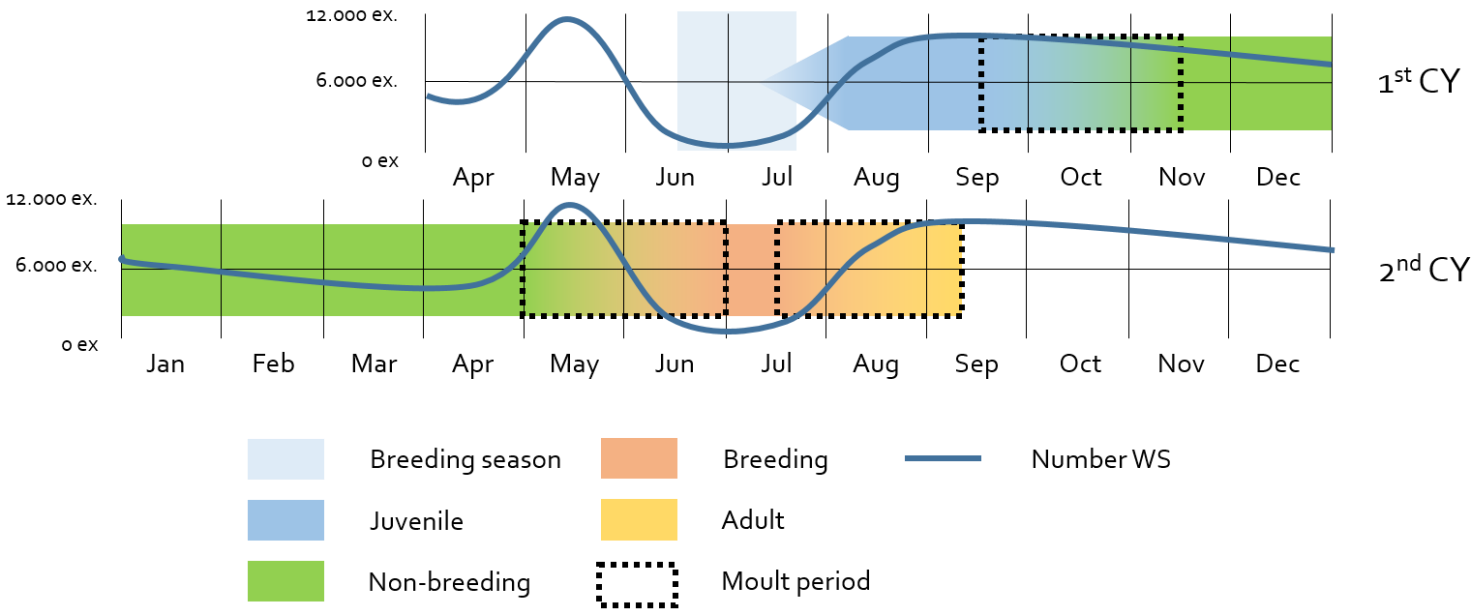

Figure 3-105 Juvenile plumage and moult phases of the Sanderling (© Bas Engels)

Recommendation

Juveniles are easy to distinguish from adult non-breeding by darker upperparts and head. Present most of the year, but primarily between August and May; numbers are fairly high and can be found all over the Wadden Sea. Telescope countings could be performed during low tide on intertidal areas or on beaches when foraging near the splash zone during August and September while still in juvenile plumage or in early post-juvenile moult.

3.35 Curlew Sandpiper (*Calidris ferruginea*)

Plumages

Juvenile. Forehead, nape and crown streak brown to black, showing a clear supercilium; hindneck and sides of neck streaked grey; mantle, scapulars and tertials dull black with buff fringes; white chin; throat and chest cinnamon to buff with grey streaks and remainder of underparts white to buff. Wing coverts as adult breeding (3-106).

Figure 3-106: Juvenile plumage (Sep) © A. Dijkstra

1st Non-breeding. Like adult non-breeding, but still juvenile back, rump, tail, tertials and wings retained.

1st Breeding. Only some individuals attain 1st breeding plumage, which is mainly like adult breeding, but many juvenile feathers retained. Most of the 2nd calendar year birds moult from 1st to 2nd non-breeding plumage.

Moults

Post-juvenile. Moult does not start prior to arrival in winter quarters around September or October. Same feathers moulted as adult post-breeding. Between November and December, most of 1st non-breeding plumage attained; continues in spring of 2nd calendar year with remaining juvenile plumage.

1st Post-breeding. Starting in late July until early September and completed between October until December; complete plumage moulted.

Movements

Migratory species. Adult breeding birds from the high Russian arctic reach the Netherlands mainly in July; juveniles tend to arrive around August and September. Migration is rapid. Returns back to breeding grounds between late April and May; juveniles remain in winter quarters during the summer.

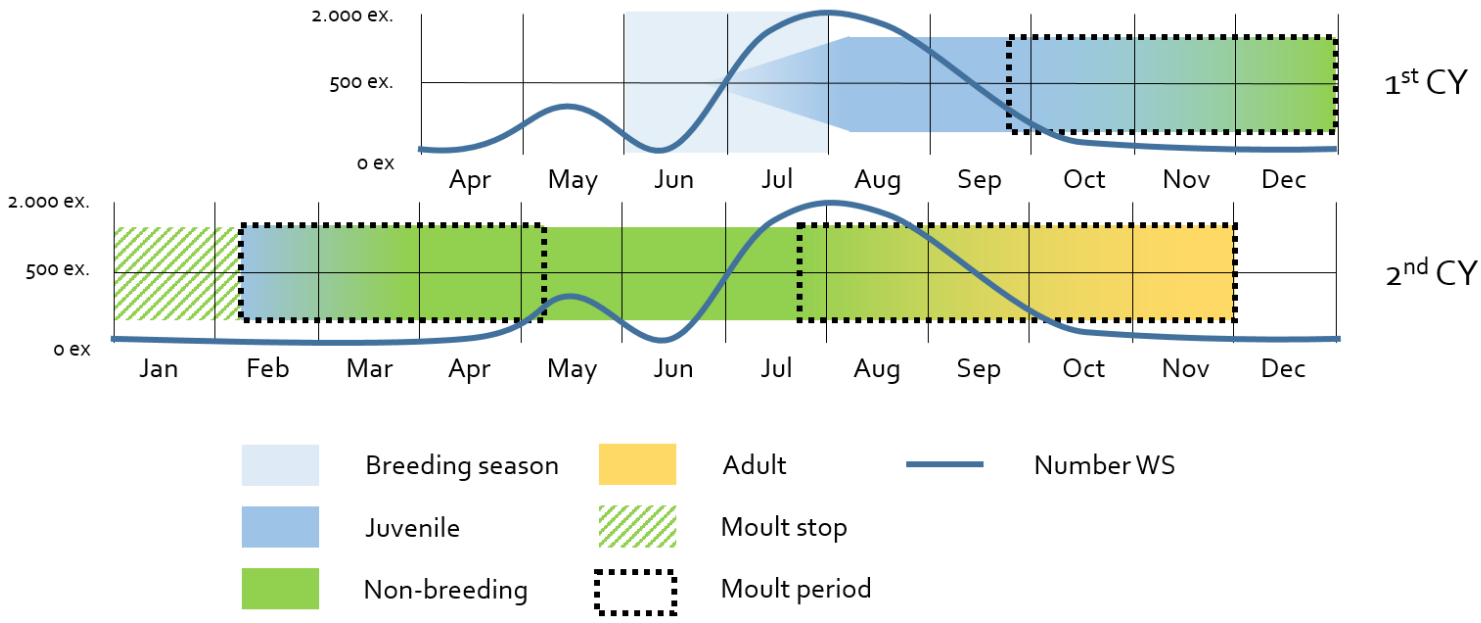

Figure 3-107 Juvenile plumage and moult phases of the Curlew Sandpiper (© Bas Engels)

Recommendation

Juveniles are fairly difficult to distinguish from adult non-breeding due to most adults moulting into non-breeding plumage when present in the Netherlands. Primarily present between June and October; numbers are fairly low and can be found all over the Wadden Sea. If experienced, telescope countings could be performed during low tide on intertidal areas in August and September while juveniles migrate through the Wadden Sea and still wear their juvenile plumage.

3.36 Dunlin (*Calidris alpina*)

Plumages

Juvenile. Shows some similarities with adult breeding plumage. Crown streaked black; sides of the head and neck streaked grey; mantle and scapulars black with white edges; white chin; chest and sides of breast buff with grey streaks; remainder of underparts white with variable amount of black spots (3-108).

Figure 3-108: Juvenile plumage (Sep) © A. de Jong

1st Non-breeding. Like adult breeding plumage, but juvenile back, rump, tail, tertials and wing coverts retained.

1st Breeding. Variable amount of plumage moulted. Most birds retain 1st non-breeding plumage during summer, but some 1st breeding feathers are attained. Juvenile back, rump, tertials, tail and wing coverts retained.

Figure 3-109: Adult post-breeding (Feb) © G. Visser

Moults

Post-juvenile. Primary moult between late August and to October, but some birds still moulting in December; same feathers moulted as adult pre-breeding, most of head, body and tail feathers.

1st Pre-breeding. Similar to adult pre-breeding in timing and moult; between the end of March until the end of May, but many juveniles moult wing coverts as well. Occasionally, many 1st non-breeding feathers retained.

1st Post-breeding. Similar to adult post-breeding, but starts already in the beginning of June.

Movements

Migratory species. Between July and mid-August, adult breeding birds from northern Russia arrive in the Netherlands where they will moult, stay and/or migrate further to southern countries; juveniles tend to arrive between early August and October. Between March and May, the return passage occurs towards the breeding grounds.

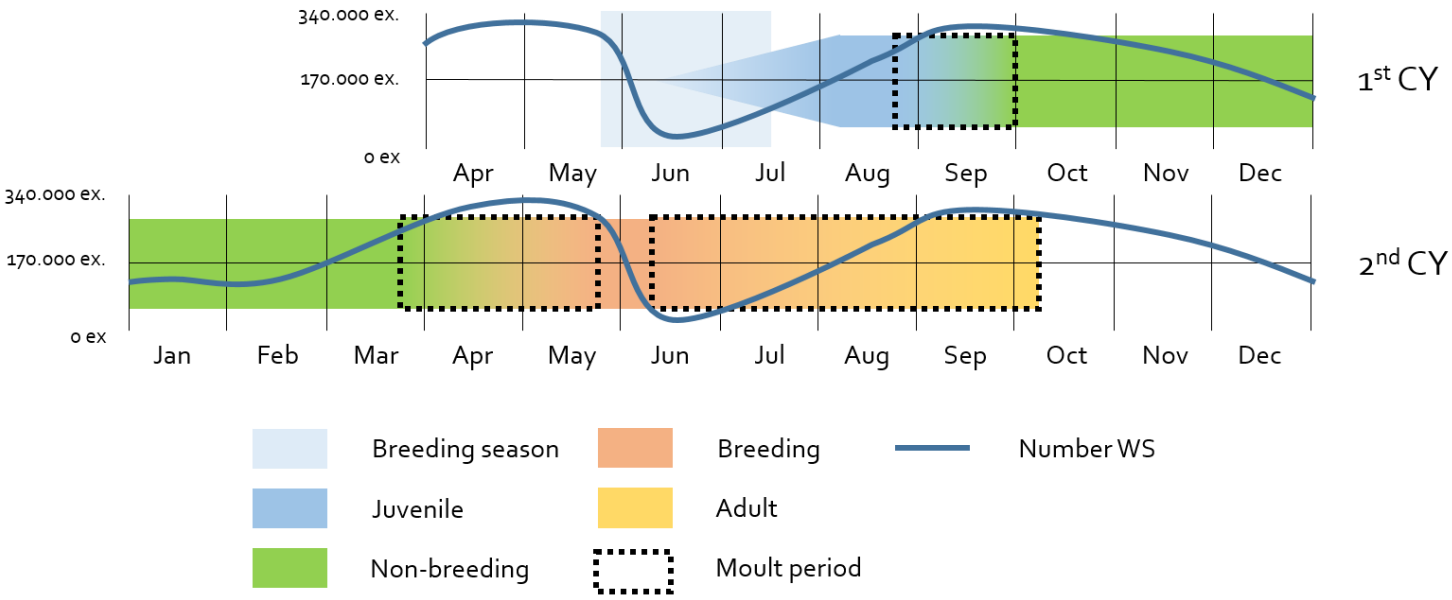

Figure 3-110 Juvenile plumage and moult phases of the Dunlin (© Bas Engels)

Recommendation

Juveniles are fairly easy to distinguish from adult by their more buff-coloured plumage and white V-shaped pattern on their back. Present all year round except around June during breeding season; numbers are high around April, May and September and can be found all over the Wadden Sea. Telescope countings could be performed during low tide on intertidal areas in August, when still in juvenile plumage, or in September, during early post-breeding moult.

3.37 Black-tailed Godwit (*Limosa limosa*)

Plumages

Juvenile. Black crown; upper mantle dark grey to black on lower mantle and scapulars with narrow cinnamon fringes; short, light supercilium and bordered below by black streak; sides of the breast cinnamon to buff (3-111).

Figure 3-111: Juvenile plumage (Jul) © C. Struijk

1st Non-breeding. Similar to adult non-breeding, but juvenile back, rump, tail, tertials and wings retained.

1st Breeding. Highly variable amount of juvenile and 1st non-breeding plumage retained. Tail, tertials, many wing coverts and flight feathers juvenile. Remaining feathers either like adult breeding or non-breeding feathers retained throughout 2nd calendar year.

Figure 3-112: Adult non-breeding (Oct) © C. Rosmalen

Moults

Post-juvenile. Between August and November, head, neck, mantle, scapulars, tertials, underparts and some wing coverts moulted into 1st non-breeding. Most individuals attained full non-breeding plumage in September.

1st Pre-breeding. Between March and June, some individuals attain some 1st breeding plumage around April, but most individuals attain 1st non-breeding plumage.

1st Post-breeding. Starts about one month earlier than adult post-breeding around March.

Movements

Migratory species. Around late June, birds depart from breeding grounds and migrates through coastal Western Europe between mid-July and September; adults tend to migrate earlier than juveniles. During this period, Dutch breeding birds mix with breeding birds from eastern countries. Migration back to breeding grounds starts around late February with peaks in Western Europe between March and April. Between late June and mid-August, breeding birds from Iceland mix with breeding birds from western and eastern Europe on the coast of western Europe. Return migration occurs between late-February and mid-March.

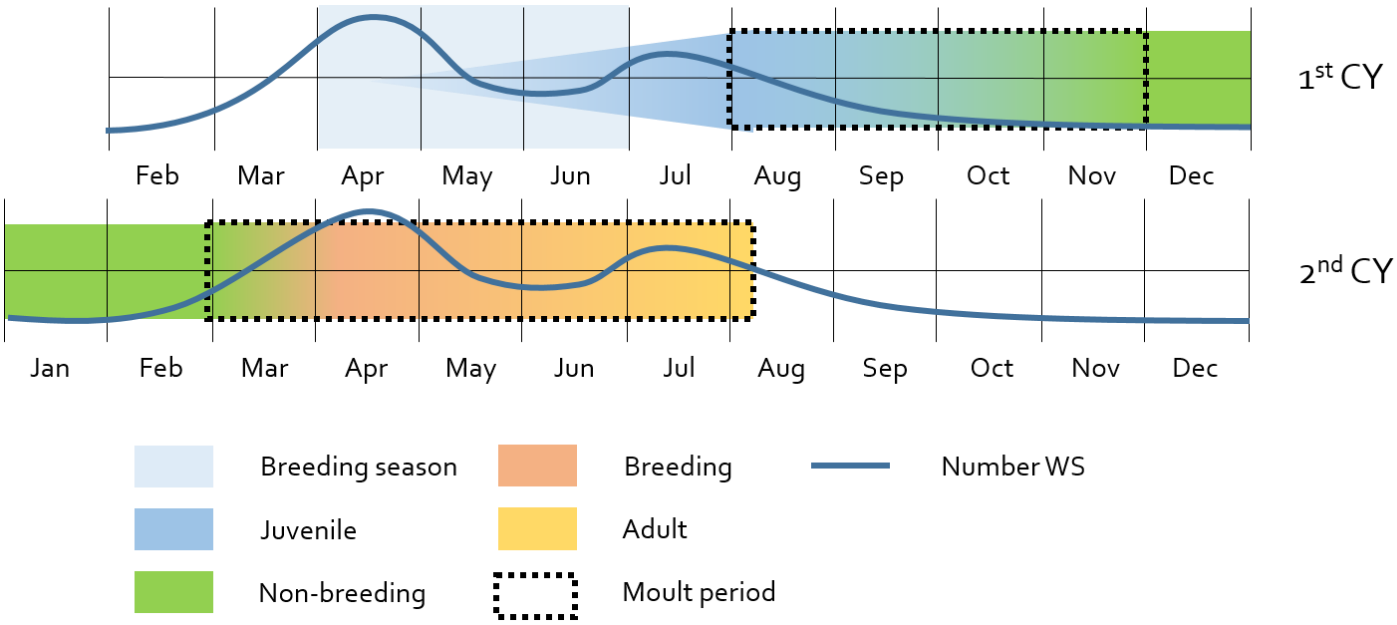

Figure 3-113 Juvenile plumage and moult phases of the Black-tailed Godwit (© Bas Engels)

Recommendation

Juveniles are easy to distinguish from adult non-breeding by light fringes on upperparts. Primarily present between March and September; numbers are fairly low and can be found primarily on pastures within dyked areas in the Wadden Sea. Telescope countings could be performed during low tide on intertidal areas in July when still in juvenile plumage.

3.38 Bar-tailed Godwit (*Limosa lapponica*)

Plumages

Juvenile. Similar to adult non-breeding plumage, but differs in having a dark streaked crown; dark mantle, scapulars and tertials with buff notches; supercilium more prominent; neck, chest and sides of breast are tinged buff in fresh plumage (3-114).

Figure 3-114: Juvenile plumage (Sep) © F. Klootwijk

1st Non-breeding. Like adult non-breeding, but tail, tertials and many upper-wing coverts retained juvenile. Juvenile feathers are contrasting with the fresh 1st non-breeding feathers.

Figure 3-115: Adult non-breeding (Apr) © M. Verbeek

1st Breeding. Both sexes very similar to adult ♂ and ♀ breeding plumage, but differs in having many non-breeding feathers retained.

Moults

Post-juvenile. From mid-September until February. Head, neck, most of the underparts, mantle and most to all of the scapulars.

1st Pre-breeding. From April until May. Head, neck, mantle, part of the scapulars and some feathers on the chest, breast and flanks. Some individuals directly moult from 1st non-breeding to 2nd non-breeding.

1st Post-breeding. Starts in May/July until August/October. Complete moult from breeding to non-breeding.

Movements

The presence of Bar-tailed Godwit in the Dutch Wadden Sea has two peaks: between April and May and July and September. Both subspecies, *L. l. lapponica* and *L. l. taymyrensis*, migrate through the Wadden Sea, but only the 'European' subspecies *L. l. lapponica* uses this area as its wintering grounds.

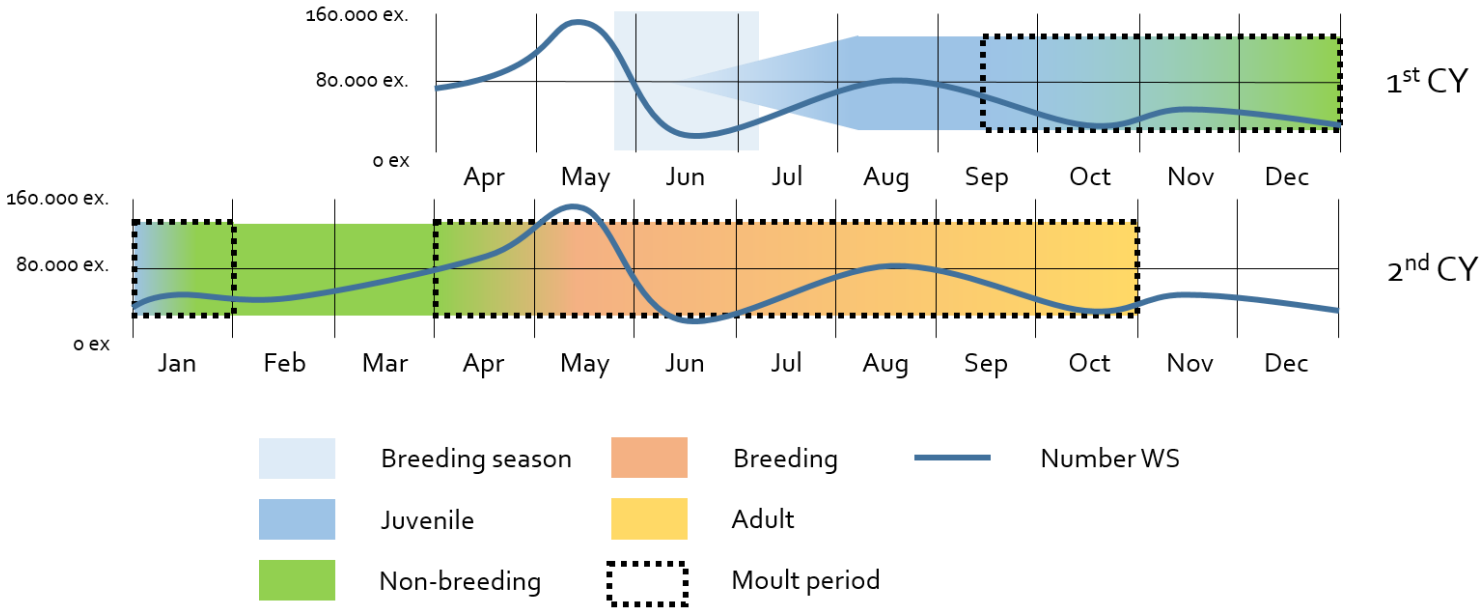

Figure 3-116 Juvenile plumage and moult phases of the Bar-tailed Godwit (© Bas Engels)

Recommendation

Juveniles are easy to distinguish from adult non-breeding by their more buff-coloured plumage and pattern on their upperparts. Mostly present all year round, but primarily between February and May and between July and September; numbers are high and can be found all over the Wadden Sea. Telescope countings could be performed during low tide on intertidal areas around August when still in juvenile plumage.

3.39 Whimbrel (*Numenius phaeopus*)

Plumages

Juvenile. Very similar to adult, but forehead, crown and nape darker brown to black; foreneck and chest with rounder streaks; upperparts more contrasting than adult; wing coverts darker compared to adult (3-117).

Subsequent plumages. Like adult plumages; indistinguishable from adults in the field after post-juvenile moult.

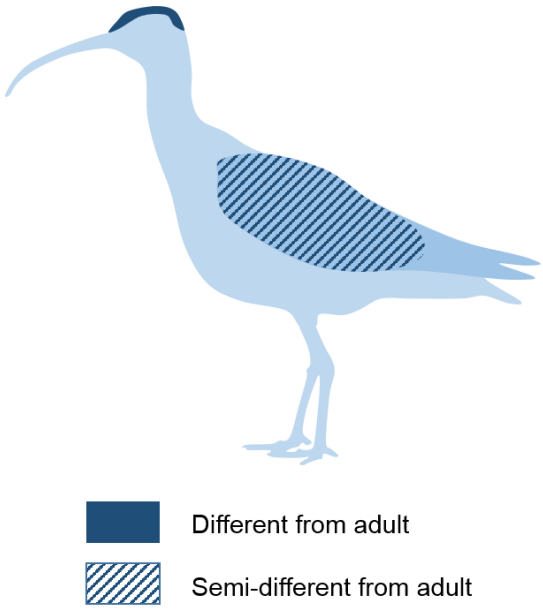

Figure 3-117: Diagram showing different and semi-different parts of the juvenile plumage of the Whimbrel compared with adult non-breeding (© Bas Engels)

Moults

Post-juvenile. Usually starts around November in winter quarters, but sometimes already in October; head, mantle, scapulars, neck, breast, chest and tail moulted into 1st non-breeding plumage.

Subsequent moults. Like adult moult, but indistinguishable from adults in the field after post-juvenile moult.

Movements

Migratory species. Starts migrating from breeding ground beginning of July and peaking in numbers around August. Departure from winter quarters starts around March and main passage through Europe around the end of April and the beginning of May.

Figure 3-118: Adult non-breeding (Aug) © T. Verhulst

Recommendation

Juveniles are very difficult to distinguish from adult non-breeding. Present between July and September; numbers are fairly low and can primarily be found near the continental shore of the Wadden Sea. If experienced, telescope countings could be performed on dykes or pastures in July and August when still in juvenile plumage.

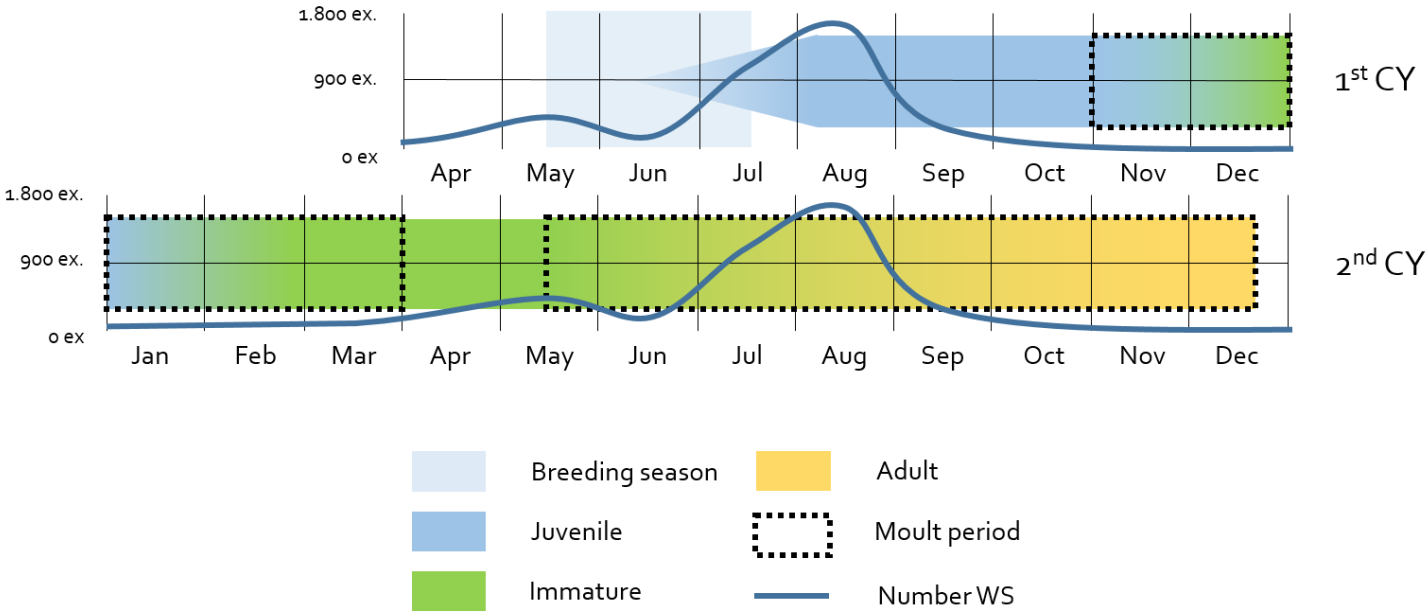

Figure 3-119 Juvenile plumage and moult phases of the Whimbrel (© Bas Engels)

3.40 Eurasian Curlew (*Numenius arquata*)

Plumages

Juvenile. Very similar to adult, but can be distinguished by less rufous fringes of head, neck, mantle, scapulars, tail, chest and breast. Flanks with narrower and less numerous bars and arrowheads. Bill slightly smaller compared to adult (3-120).

Figure 3-120: Juvenile plumage (Sep) © M. Slot

1st Non-breeding. Very similar to adult non-breeding, but many juvenile feathers retained during winter and only moulted during spring of 2nd calendar year.

Subsequent plumages. Like adult plumages; indistinguishable from adults in the field.

Figure 3-121: Adult non-breeding (Jan) © M. Slot

Moults

Post-juvenile. Mainly between mid-September and late November with no active moult during winter. Starts with moulting crown, mantle and scapulars and in full moult around October. By mid-winter most of juvenile plumage replaced by 1st non-breeding. In spring, moult of remaining tertials, tail, rump and wing coverts.

1st Pre-breeding. Like adult pre-breeding, but restricted to head, sides of chest, mantle and scapulars. Most of juvenile and 1st non-breeding plumage retained.

Subsequent moults. Like adult moults, but often starts earlier.

Movements

Departure from breeding grounds between northern Russia and east from the Netherlands towards moulting and winter quarters starts around late June and arrive in the Netherlands around July and August. Juveniles tend to arrive later around mid to late September. Between February and March, adults start to migrate back to breeding grounds. Most of juveniles tend to stay at winter quarters during the summer.

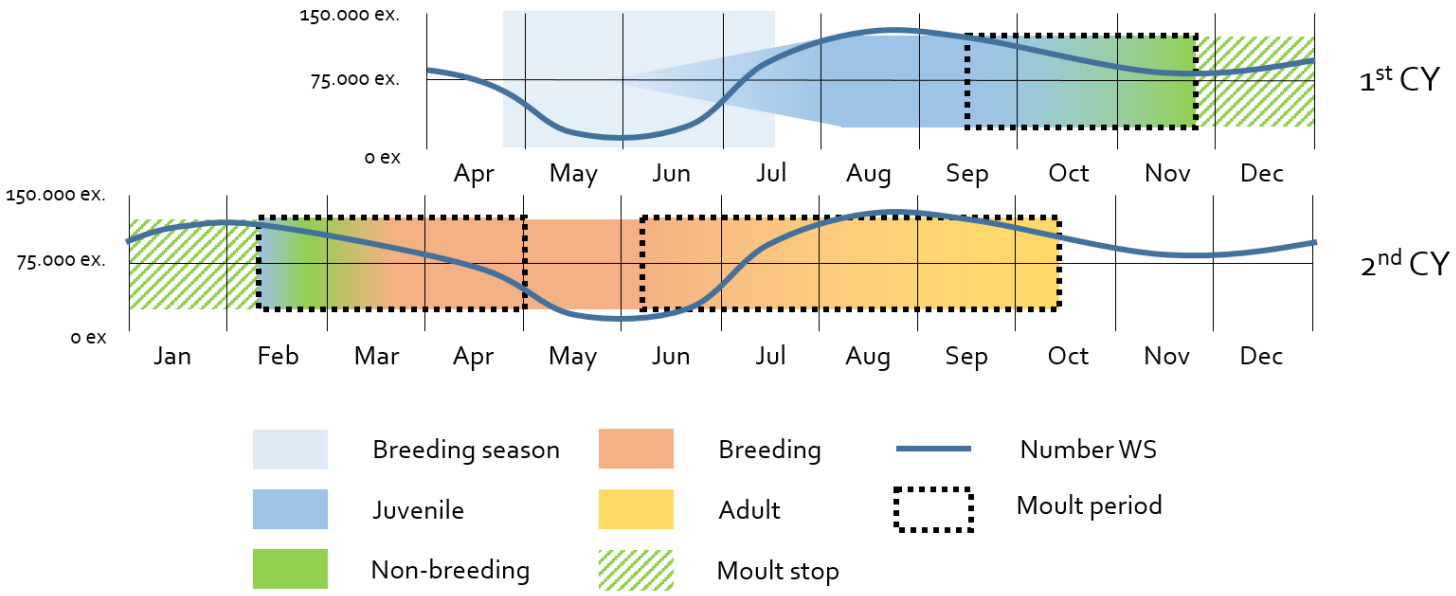

Figure 3-122 Juvenile plumage and moult phases of the Eurasian Curlew (© Bas Engels)

Recommendation

Juveniles are fairly difficult to distinguish from adult non-breeding and only differs by small details on breast and upperpart feathers. Present all year round; numbers are high and can be found all over the Wadden Sea. If experienced, telescope countings could be performed during low tide on intertidal areas between July and August when still in juvenile plumage and numbers are high.

3.41 Spotted Redshank (*Tringa erythropus*)

Plumages

Juvenile. Upperparts like adult breeding, but differs in being more dull black to brown with greyish centres. Underparts white and heavily barred darker grey. Head dull black with narrow off-white fringes. Cheeks and neck streaked and spotted with white and dark grey to brown patches; chin white; all underparts from chin to tail white to pale cream, barred dark grey. Legs like adult non-breeding (3-123).

Figure 3-123: Juvenile plumage (Aug) © J.P. Oudwater

1st Non-breeding. Like adult non-breeding, but many parts of juvenile plumage retained. 1st non-breeding mostly acquired before mid-winter.

1st Breeding. Similar to adult breeding, but flight feathers, wing coverts, tertials and tail still retained juvenile or 1st non-breeding.

Figure 3-124: Adult non-breeding (Feb) © F. Visscher

Moults

Post-juvenile. About early and mid-September, moult start with mantle and scapulars followed by chest, breast, neck and early. From early October, most of plumage appears 1st non-breeding. Limited amount of plumage moulted during winter and continued during March and April.

1st Pre-breeding. Between April and mid-May, some juvenile and 1st non-breeding feathers replaced by 1st breeding feathers, but much of old plumage retained.

Subsequent moults. Like adult moults.

Movements

Migratory species. Around mid-June, ♀♀ arrive in the Dutch Wadden Sea, while ♂♂ and juveniles tend to arrive one month later around late July and August after which they migrate further towards winter quarters. Between April and May, birds start to return to their breeding grounds.

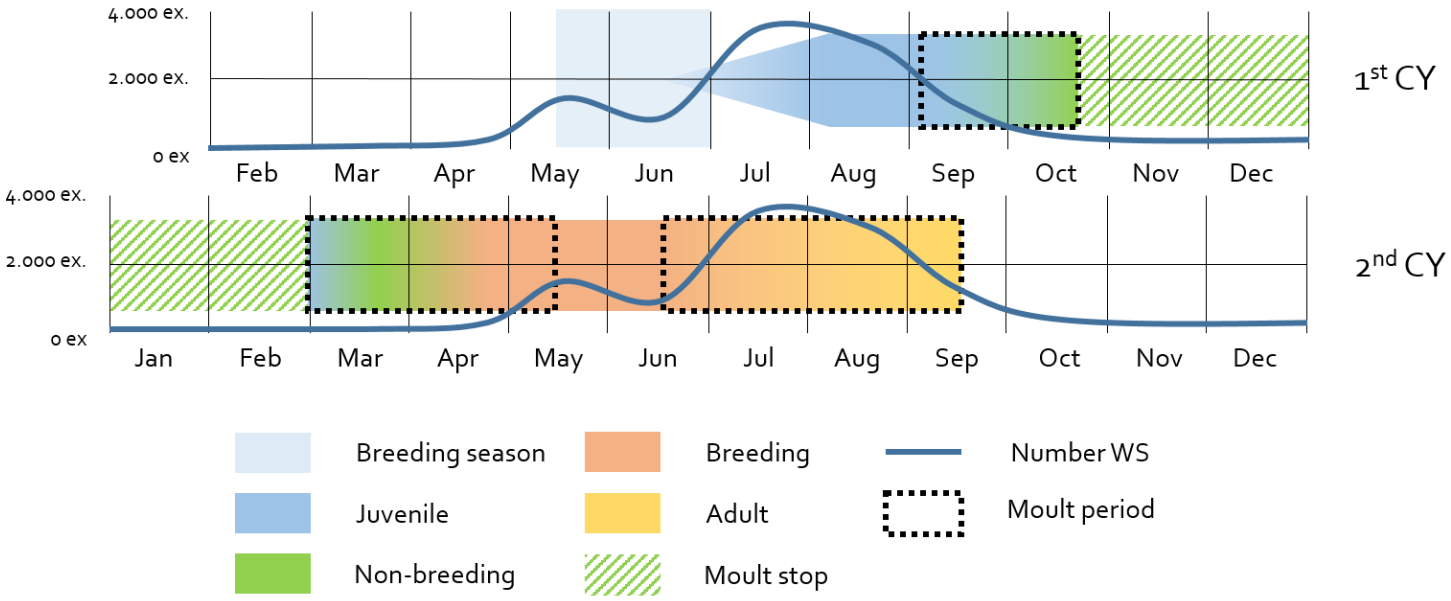

Figure 3-125 Juvenile plumage and moult phases of the Spotted Redshank (© Bas Engels)

Recommendation

Juveniles are easy to distinguish from adult non-breeding by their dull black to brown upperparts. Primarily present between May and September; numbers are fairly high and can be found primarily near the continental shore of the Wadden Sea. Telescope countings could be performed during low tide on intertidal areas around August when still in juvenile plumage and present in the Wadden Sea.

3.42 Common Redshank (*Tringa totanus*)

Plumages

Juvenile. Similar to dark adult breeding plumage, but feathers on upperparts with primarily buff edges or cinnamon-buff spots along the edges. Underparts with darker spots and streaks on the breast and belly white with grey spots. Legs orange to yellow and bill dull reddish to brown (3-126).

Figure 3-126: Juvenile plumage (Jul) © F. Visscher

1st Non-breeding. As adult non-breeding, but juvenile wing coverts, tertials and tail retained.

Subsequent plumages. Like adult plumages; indistinguishable from adults in the field.

Figure 3-127: Adult non-breeding (Dec) © M. Kolkman

Moults

Post-juvenile. Between August and January, most of juvenile body, scapulars, tail, tertials and wing coverts moulted into 1st non-breeding.

Subsequent moults. Like adult moults, but may involve fewer feathers.

Movements

Migratory and resident. Between early July and August, Icelandic breeders reach the Dutch Wadden Sea and mix with the Dutch and continental breeding birds. This population mainly return to breeding grounds around March and April.

Between July and September, breeding birds from Northern Russia and Baltic States arrive in the Netherlands and mix with the Dutch and Icelandic breeders. Around February, these birds migrate back to their breeding grounds.

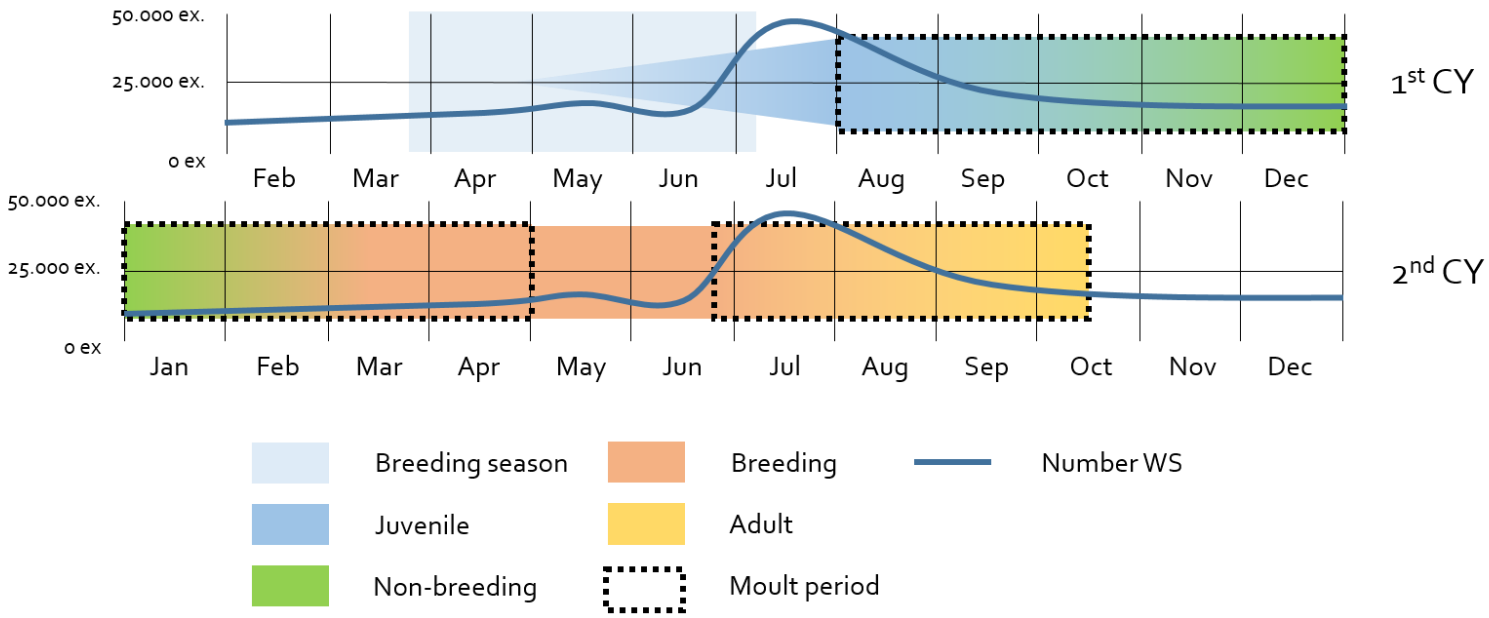

Figure 3-128 Juvenile plumage and moult phases of the Common Redshank (© Bas Engels)

Recommendation

Juveniles are easy to distinguish from adult non-breeding by their browner upperparts and markings. Present all year round, but peaks around July and August; numbers are high and can be found all over the Wadden Sea. Telescope countings could be performed during low tide on intertidal areas around July when still in juvenile plumage and numbers of juveniles are highest.

3.43 Common Greenshank (*Tringa nebularia*)

Plumages

Juvenile. Like adult non-breeding, but upperparts darker brown to grey with buff fringes. Chin white; foreneck and chest slightly marked with black dots; sides of the chest barred grey. Upperparts show a more streaked instead of scaled pattern (3-129).

Figure 3-129: Juvenile plumage (Aug) © O. Zijlstra

1st Non-breeding. Like adult non-breeding, but juvenile back, rump, tail and wing-coverts retained.

Subsequent plumages. Very variable; some attain breeding plumage while others moult into 2nd non-breeding.

Figure 3-130: Adult non-breeding (Sep) © F. Visscher

Moults

Post-juvenile. Between late August and late September, most of mantle, scapulars, head, neck and underparts moulted into 1st non-breeding. Remainder of juvenile feathers replaced mostly before November or after winter in February and March.

1st Pre-breeding. Very variable, but mostly between April and May; some birds do not attain breeding plumage at all.

1st Post-breeding. Starting around May and done moulting from August onwards; way ahead of adults.

Movements

Migratory species. Adults migrate through the Wadden Sea towards winter quarters in western Africa around July; ♀♀ leave breeding grounds already in late June. Juveniles tend to migrate one month later in August. Starts migrating back to breeding grounds in March and quickly pass through the Wadden Sea around April and May.

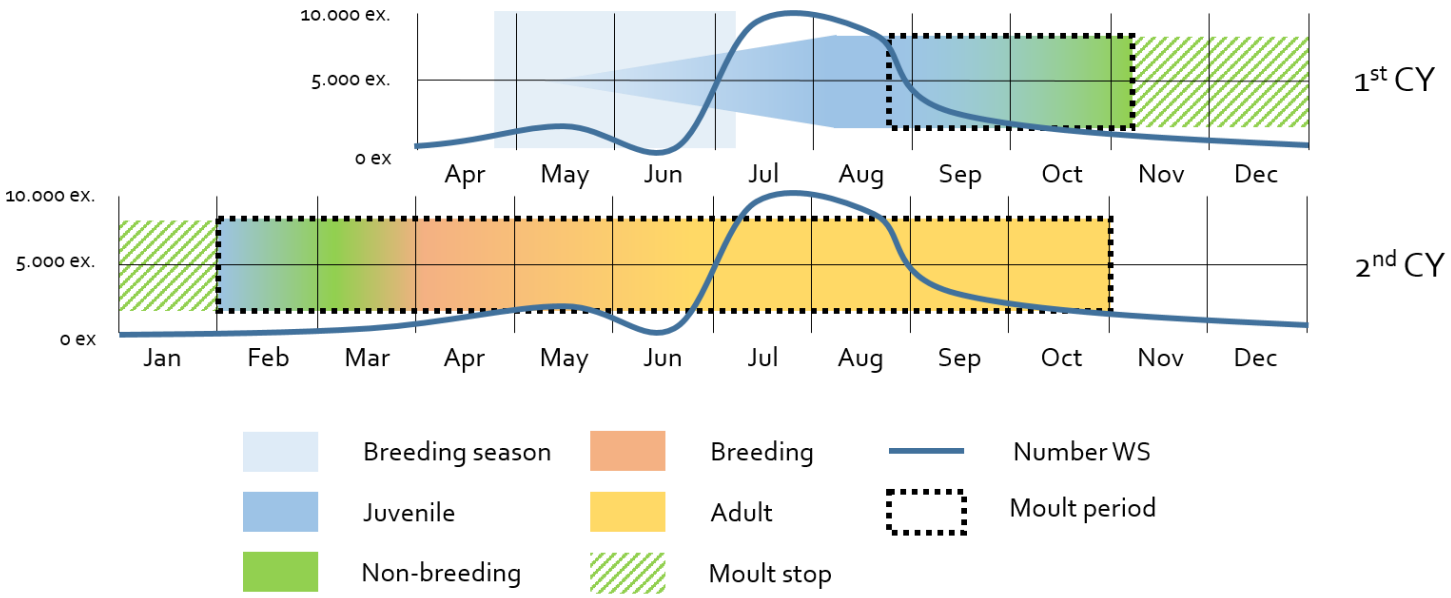

Figure 3-131 Juvenile plumage and moult phases of the Common Greenshank (© Bas Engels)

Recommendation

Juveniles are fairly easy to distinguish from adult non-breeding by the streaked pattern on their upperparts. Primarily present between June and September; numbers are fairly high and can be found all over the Wadden Sea. Telescope countings could be performed during low tide on intertidal areas in August when still in juvenile plumage and numbers of juveniles are highest.

3.44 Ruddy Turnstone (*Arenaria interpres*)

Plumages

Juvenile. Similar to adult non-breeding, but differs in having a scaled pattern of buff fringes on its upperparts (3-132); some adults show this scaled pattern too, but not as even distributed as juvenile. Band from upper mantle down to breast speckled instead of complete black.

Figure 3-132: Juvenile plumage (Aug) © F. Visscher

1st Non-breeding. Like adult non-breeding, but juvenile tail, tertials and wing-coverts retained.

1st Breeding. Highly variable plumage. Some retained many juvenile feathers which are heavily worn, others show a contrasting fresh breeding plumage and worn juvenile feathers.

Figure 3-133: Adult non-breeding (Dec) © H. Cuper

Moults

Post-juvenile. Between late September and November, most of head, neck, mantle, scapulars, underparts and tertials moulted into 1st non-breeding.

1st Pre-breeding. Between April and early June, later than adults, most of head, neck, mantle, chest and scapulars moulted into 1st breeding.

Subsequent moults: like adult moult, but highly variable in timing and location.

Movements

Adult breeding birds from Canada and Greenland arrive in winter quarters in Western Europe around late July, while juveniles arrive one month later in August. Return back to breeding grounds in April and May. Juveniles tend to stay in winter quarters.

Adult breeding birds from Western Russia pass through the Netherlands towards winter quarters in Western Africa in July and August, followed by the juveniles in September. Around April and May, birds start migrating back towards breeding grounds. Juveniles tend to stay in winter quarters.

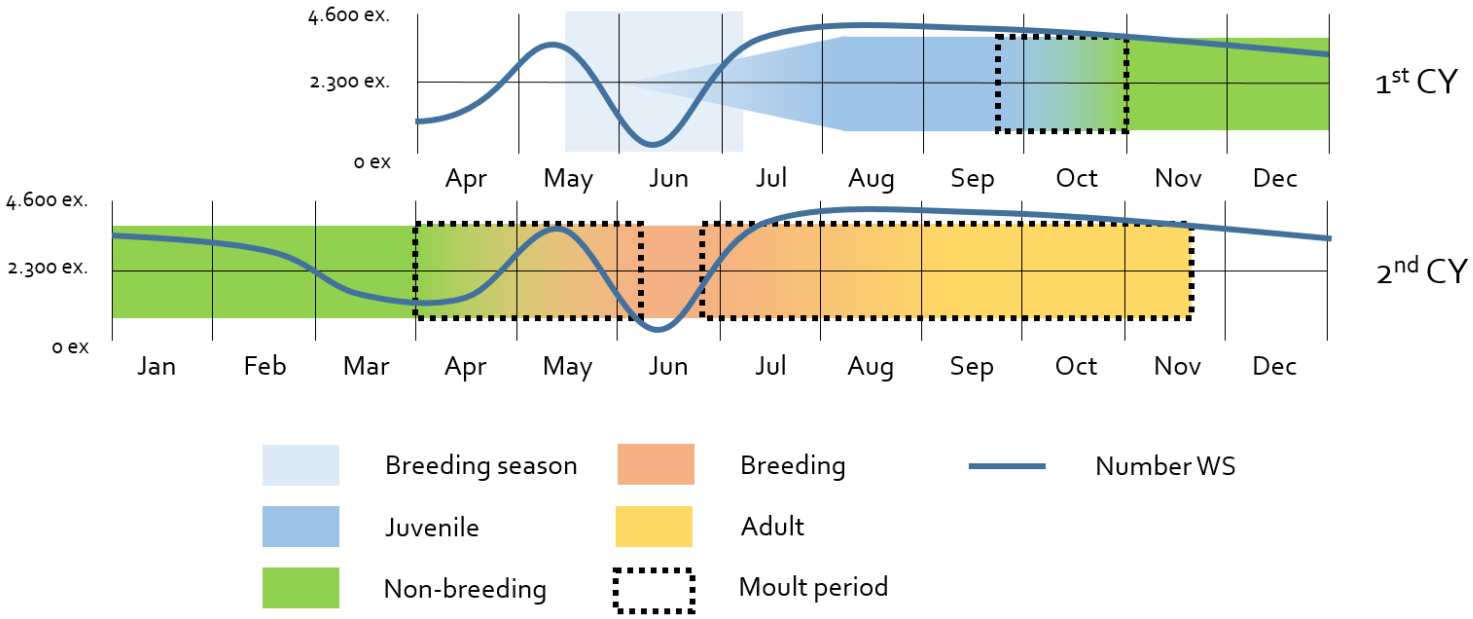

Figure 3-134 Juvenile plumage and moult phases of the Ruddy Turnstone (© Bas Engels)

Recommendation

Juveniles are fairly easy to distinguish from adult non-breeding by their buff-scaled upperparts; adults are in post-breeding moult when arriving in the Netherlands while juveniles are still in juvenile plumage. Present all year round, except around June; numbers are fairly high and can be found all over the Wadden Sea. Telescope countings could be performed during low tide on intertidal areas or in harbours, water barriers or dykes between July and September while still in juvenile plumage.

3.45 Black-headed Gull (*Chroicocephalus ridibundus*)

Plumages

Juvenile. Very different from adult non-breeding; all upperparts with dark, brown and reddish colours (3-135). Very dark mantle and scapulars with light buff fringes; underparts white with buff patches of sides of breast; bill and legs dull yellow to pink.

Figure 3-135: Juvenile plumage (Jul) © H. Niekus

1st Non-breeding. Like adult non-breeding, but juvenile scapulars, wing and tail retained (3-136).

1st Breeding. Like 1st non-breeding, but sometimes dark cap with variable white patches present. Juvenile tail and wing retained.

Figure 3-136: 1st Non-breeding (Dec) © M. van Kleinwee

Subsequent plumages: similar to adult, but only distinguishable by small details.

Moults

Post-juvenile. Between July and December, most of head, body and sometimes some wing-coverts moulted into 1st non-breeding.

1st Pre-breeding. Between January and May, most of head, body, some wing-coverts and some tail feathers moulted into 1st breeding.

Figure 3-137: Adult non-breeding (Nov) © K. Bakker

1st Post-breeding. As adult post-breeding, but 3 to 4 weeks earlier until the end of August. Complete plumage moulted into 2nd non-breeding.

Movements

Around mid-June, mostly in July, Dutch juveniles tend to disperse predominantly towards the coast and move southwards to winter in France, Iberia and Western Africa. Return to breeding grounds in spring. Breeding birds from Scandinavia and Baltic States migrate from late-June on towards winter quarters in Western Europe and mostly arrive around late-July.

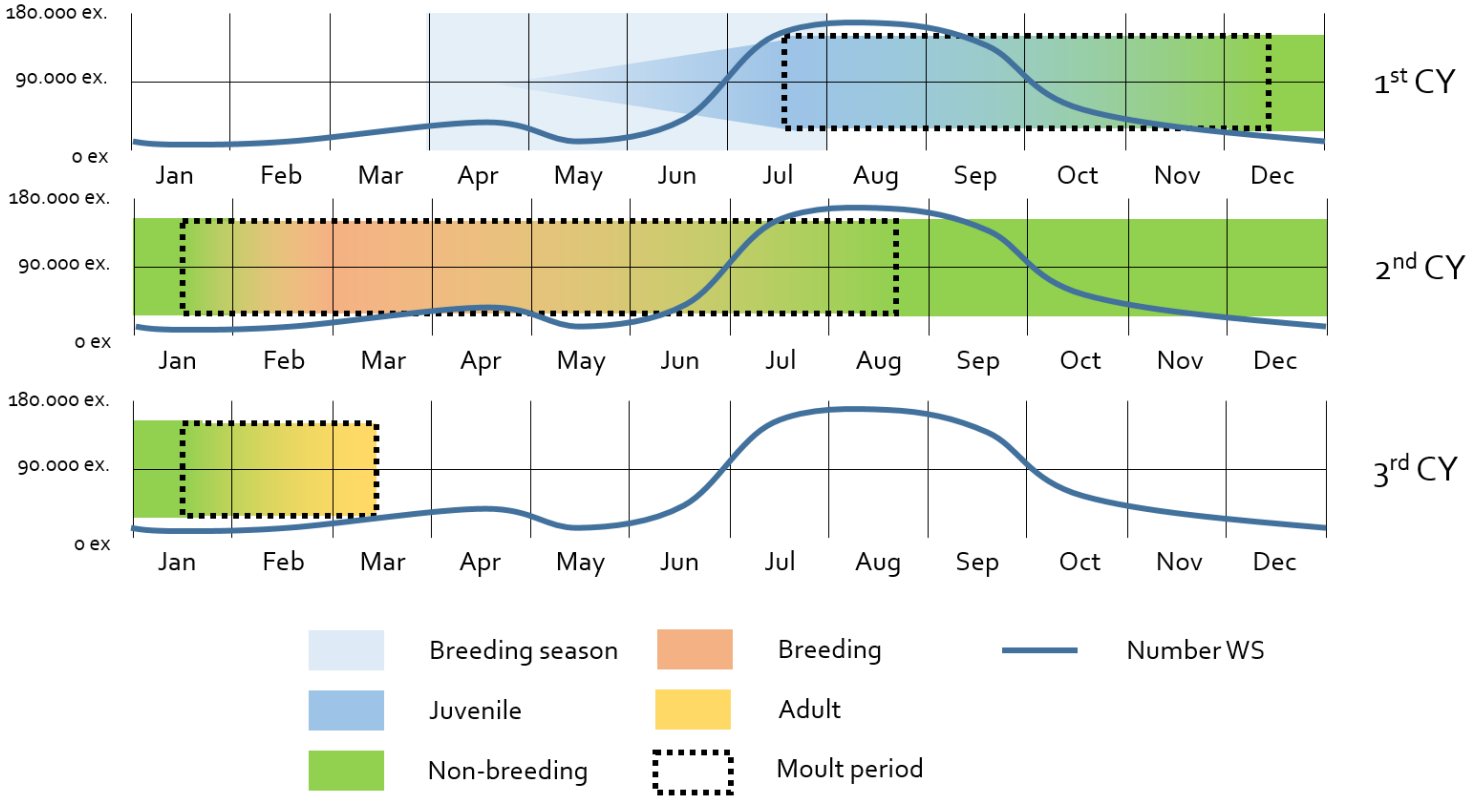

Figure 3-138 Juvenile plumage and moult phases of the Black-headed Gull (© Bas Engels)

Recommendation

Juveniles are easy to distinguish from adult non-breeding during their juvenile and 1st non-breeding plumage due to their brown upperparts. Present all year round, but peaks in the Wadden Sea between June and October; numbers are high and can be found all over the area. Telescope or binocular countings could be performed during low tide on intertidal areas, on agricultural fields or around human structures in harbours and dykes between July and September when still in juvenile plumage or in early post-juvenile moult and numbers are highest or later between October and January in 1st non-breeding, but numbers are much lower.

3.46 Mew Gull (*Larus canus*)

Plumages

Juvenile. Very different from adult non-breeding; all upperparts with dark and brown colours with buff fringes (3-139). Head grey-brown and streaked white; mantle and scapulars brown with dark centres and buff edges; underparts white and mottled brown; tail with broad black-brown band; bill pink with black tip.

Figure 3-139: Juvenile plumage (Aug) © R. Portielje

1st Non-breeding. Like adult non-breeding, but hindneck more extensively streaked, flanks spotted and barred (3-140); some upperpart feathers still juvenile. Complete juvenile wing and tail retained. Bill still with black tip.

Figure 3-140: 1st Non-breeding (Sep) © F. Visscher

1st Breeding. Like 1st non-breeding, but head, neck and underparts whiter and overall fewer juvenile feathers (3-141).

Figure 3-141: 1st Breeding (May) © F. Klootwijk

2nd Non-breeding. Similar to adult non-breeding, but streaking of head and neck more extensive and sometimes extended towards flanks. Upper wing with more black markings towards tips. Black tip of bill turned into black band.

2nd Breeding. Like adult breeding, but still 2nd non-breeding wing and tail retained.

Figure 3-142: Adult non-breeding (Nov) © R. van Rossum

Moults

Post-juvenile. Between August and October, most of head, much of underparts some to all mantle, scapulars, back and rump moulted into 1st non-breeding.

1st Pre-breeding. Between April and May, most of head, underparts, mantle and rump moulted into 1st breeding.

Subsequent moults: like adult, but mostly 3 to 4 weeks earlier.

Movements

Breeding birds from north-western Europe arrive around August and September in winter quarters in the Dutch Wadden Sea, but juveniles tend to disperse already around early July. Most breeding birds return around March, but juveniles tend to stay in winter quarters.

Recommendation

Juveniles are easy to distinguish from adults in several moult and plumage stages due to their brown feathers. Present all year round, but peaks between July and October; numbers are high and can be found all over the Wadden Sea. Telescope or binocular countings could be performed during low tide on intertidal areas or near human structures, like harbours or dykes, between July and August when still in juvenile plumage or early post-juvenile moult or in February during the return passage when in 1st non-breeding plumage.

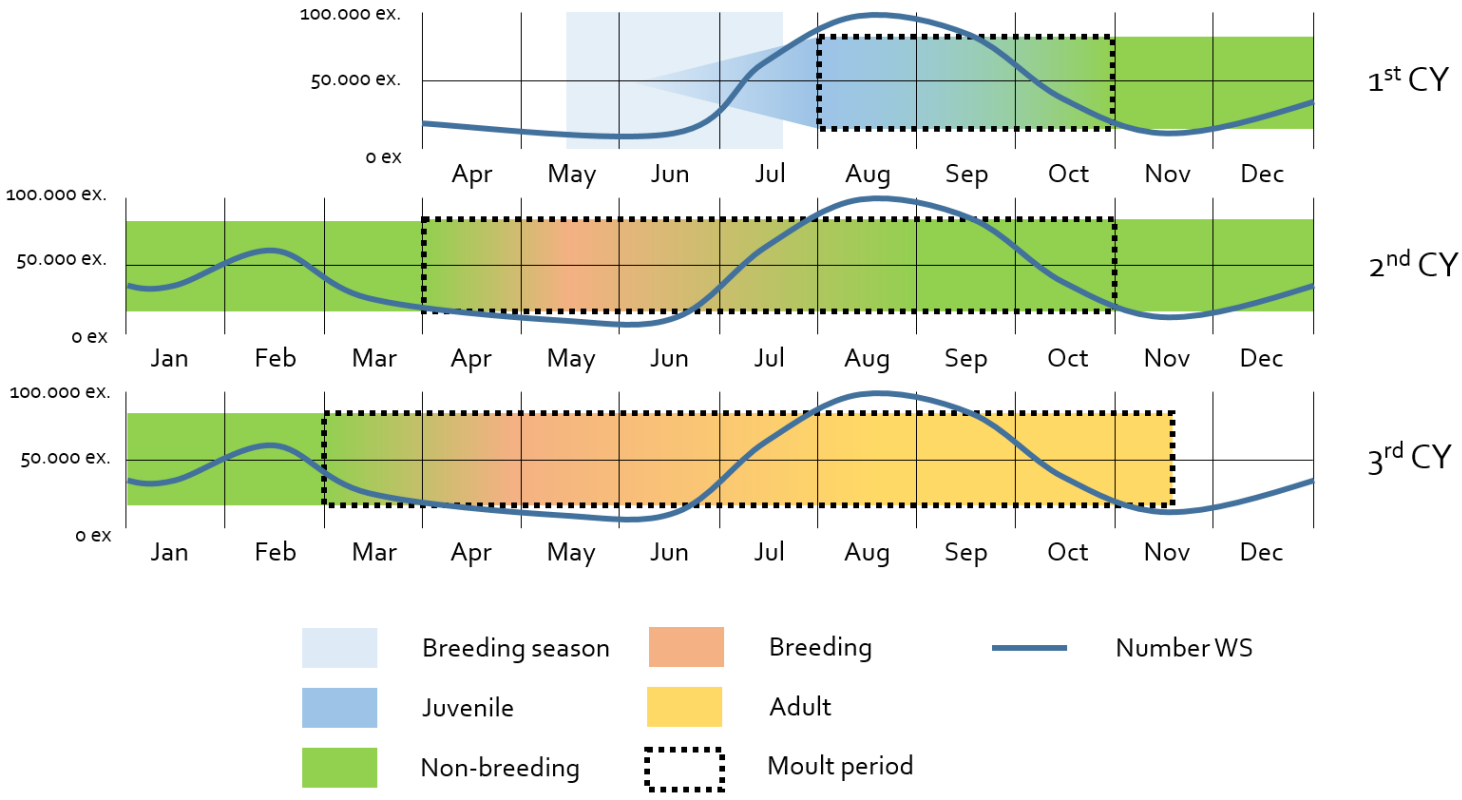

Figure 3-143 Juvenile plumage and moult phases of the Mew Gull (© Bas Engels)

3.47 Lesser Black-backed Gull (*Larus fuscus*)

Plumages

Juvenile. Very different from adult (non-) breeding; overall dark brown and grey in colour and completely dark bill (3-144). Streaking of head and neck coarser and less contrasting upperparts compared with other large gull juveniles.

1st Non-breeding. Like juvenile, but more white on head, neck and underparts (3-145). Also wing appears more contrasting brown to white.

1st Breeding. Like 1st non-breeding, but head, underparts and rump whiter in colour.

2nd Non-breeding. Getting more similar to adult non-breeding, but still brown feathers retained on head, neck, underparts, upperparts and wings (3-146). Bill slowly turning pink, but still mainly black. Legs sometimes tinged yellow.

2nd Breeding. Like 2nd non-breeding, but upperparts more grey and remaining feathers whiter. Legs dull yellow.

3rd Non-breeding. Like adult non-breeding, but hindneck usually shows more brown (3-147). Mantle, scapulars and wing-coverts tinged brown; breast, flanks and under wing-coverts with variable amount of brown markings, sometimes none.

Subsequent plumages: very similar to adult (non-) breeding, but sometimes still tinged brown.

Figure 3-144: Juvenile plumage (Sep) © T. Smulders

Figure 3-145: 1st Non-breeding (Feb) © R. Altenburg

Figure 3-146: 2nd Non-breeding (Oct) © R. Altenburg

Figure 3-147: 3rf Non-breeding (Sep) © M. van Kleinwee

Moults

Post-juvenile. Between September and November, most of head, underparts, mantle, back, rump and some scapulars moult into 1st non-breeding.

1st Pre-breeding. Between January and April, most of head, underparts, some mantle feathers and rump moult into 1st breeding.

Figure 3-148: Adult non-breeding (Nov) © G. Visser

Subsequent moults: like adult moults, but mostly a bit earlier.

Movements

Around the second half of July, juveniles tend to disperse from their colonies and most of the population moves southwards around September to winter around the Mediterranean or Western Africa. Around March and April, birds start to return towards breeding grounds.

Recommendation

Juveniles are easy to distinguish from adult non-breeding in several stages of juvenile moult due to dark appearance. Present most of the year, but mostly absent in winter; numbers are high and can be found all over the Wadden Sea. Telescope and/or binocular countings could be performed in intertidal areas and around human structures like harbours, dykes and around ferries between July and September when still in juvenile plumage or in early post-juvenile moult.

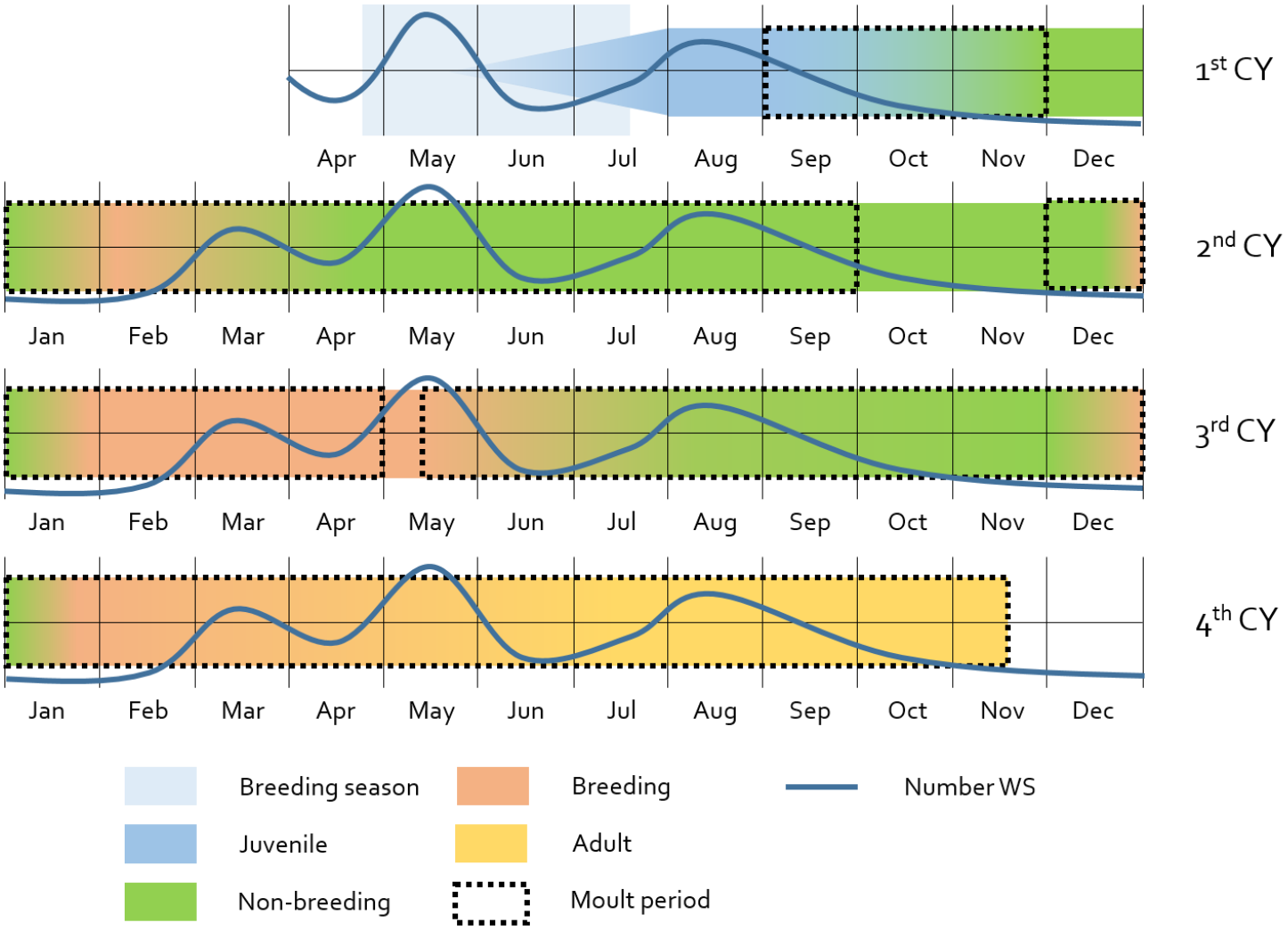

Figure 3-149 Juvenile plumage and moult phases of the Lesser Black-backed Gull (© Bas Engels)

3.48 European Herring Gull (*Larus argentatus*)

Plumages

Juvenile. Very different from adult (non-) breeding; overall dark grey in colour and dark bill (3-150). Compared with *Larus fuscus* and *L. marinus*, juvenile lighter in colour.

Figure 3-150: Juvenile plumage (Sep) © R. Vogels

1st Non-breeding. Like juvenile, but feathers on head, neck and underparts whiter (3-151); especially mantle different from juvenile.

1st Breeding. Like 1st non-breeding, but head and neck much whiter; sometimes underparts almost as white as adult.

Figure 3-151: 1st Non-breeding (Mar) © T. Bakker

2nd Non-breeding. Like 1st non-breeding, but head and neck much whiter and less streaked (3-152); mantle starts showing grey in colour; underparts like 1st non-breeding, but also much whiter and less streaked.

2nd Breeding. Getting similar to adult breeding, especially head, neck, underparts and rump, but tail and wing still retained as 2nd non-breeding.

Figure 3-152: 2nd Non-breeding (Nov) © O.J. Goreng

3rd Non-breeding. Like adult non-breeding, but head, neck and breast still heavily streaked (3-154).

Subsequent plumages: like adult, but sometimes only distinguishable from small details.

Moults

Post-juvenile. Between August and November, most of head, underparts, mantle, scapulars, back and rump moulted into 1st non-breeding.

1st Pre-breeding. Between January and April, most of head, underparts, mantle and rump moulted into 1st breeding.

Subsequent moults: like adult moults, but much earlier.

Figure 3-153: 3rd Non-breeding (Nov) © M. Los

Figure 3-154: Adult non-breeding (Dec) © J. Zorgdrager

Movements

Mostly resident or disperse in the Netherlands. From late July on, juveniles tend to disperse from their breeding grounds and move towards coast or human structures. Breeding birds from Baltic States and Russia migrate to winter quarters around the North Sea around September and October. Around March, birds start to return to breeding grounds.

Recommendation

Juveniles are easy to distinguish from adult (non-) breeding during several stages of juvenile moult by their brown appearance. Present all year round, but peak around February and August; numbers are high and can be found all over the Wadden Sea. Telescope and/or binocular countings could be performed in intertidal areas, agricultural fields or near human structures, like harbours, dykes and near ferries between July and September when still in juvenile plumage or in early post-juvenile moult.

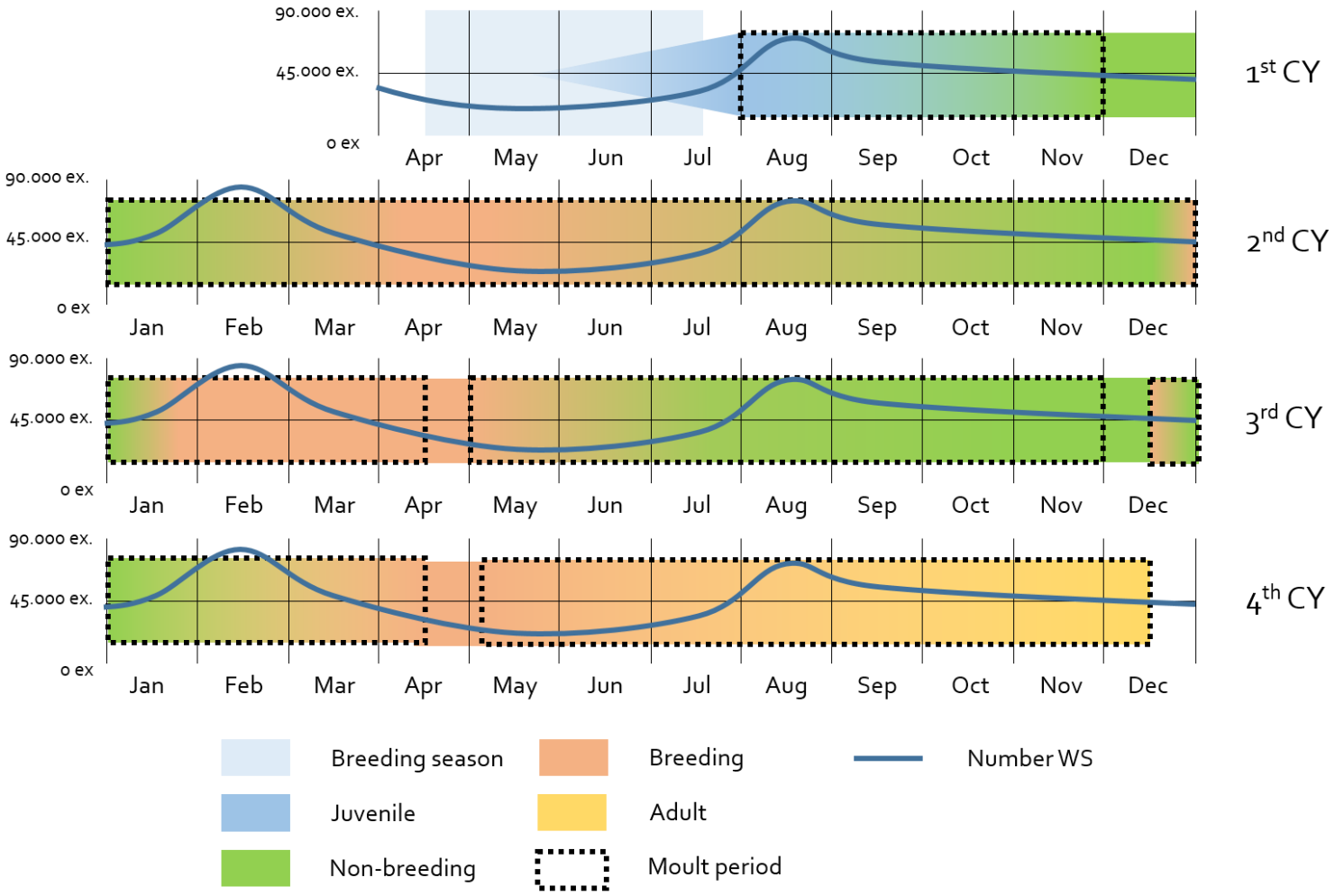

Figure 3-155 Juvenile plumage and moult phases of the European Herring Gull (© Bas Engels)

3.49 Great Black-backed Gull (*Larus marinus*)

Plumages

Juvenile. Very different from adult (non-) breeding; overall very contrasting white, brown and black (3-156). Bill black and heavy. Compared with *Larus fuscus* and *L. argentatus* juveniles, very contrasting upperparts and larger in size.

Figure 3-156: Juvenile plumage (Sep) © R. van Rossum

1st Non-breeding. Similar to juvenile, but head, mantle and scapulars whiter in colour (3-157).

1st Breeding. Like 1st non-breeding, but head, neck and underparts whiter.

Figure 3-157: 1st Non-breeding (Jan) © R. Bos

2nd Non-breeding. Similar to 1st non-breeding, but head and neck whiter and less streaked (3-158); mantle and scapulars greyer and less prominent markings; underparts less spotted and barred; bill turning pinkish.

2nd Breeding. Like 2nd non-breeding, but head and underparts less streaked; mantle and scapulars getting more blackish in colour.

3rd Non-breeding. Like adult non-breeding, but back of the head with markings (3-159); mantle, scapulars and back as adult, but tinged brown; underparts white with a few brown markings; wings still more or less juvenile; bill almost pink.

Figure 3-158: 2nd Non-breeding (Sep) © O.J. Goreng

Subsequent plumages: like adult plumages, but sometimes with retained juvenile markings.

Moults

Post-juvenile. Between August and November, most of head, mantle, scapulars, back, rump and underparts moulted into 1st non-breeding.

1st Pre-breeding. Between January and April, most of head and body moult into 1st breeding.

Subsequent moults: like adult moults, but much earlier.

Figure 3-159: 3rd Non-breeding (Nov) © A. Vriens

Figure 3-160: Adult non-breeding (Oct) © M. Los

Movements

Juveniles tend to disperse around July, while adults mostly migrate southwards between September and November; most winter around North Sea area. Starts to return around January and February towards breeding areas.

Recommendation

Juveniles are easy to distinguish from adult (non-) breeding during several stages of juvenile moult due to their brown-grey appearance. Present most of the year, except around April and May during breeding season; numbers are fairly high and can be found all over the Wadden Sea. Telescope and/or binocular countings could be performed in intertidal areas or near human structures, such as harbours and dykes between July and September in early post-juvenile moult.

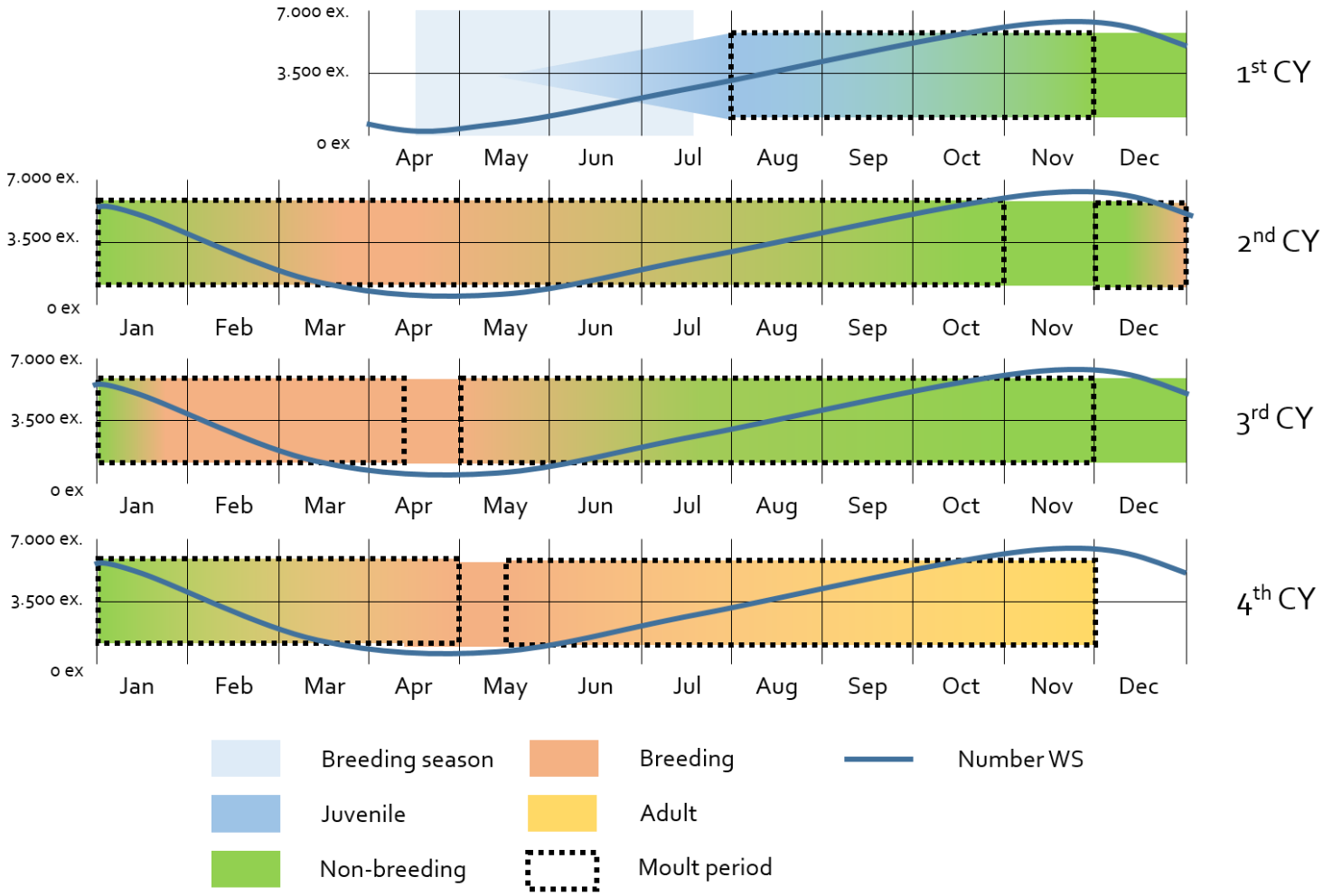

Figure 3-161 Juvenile plumage and moult phases of the Great Black-backed Gull (© Bas Engels)

3.50 Sandwich Tern (*Sterna sandvicensis*)

Plumages

Juvenile. Very different from adult non-breeding. Most of head black; mantle, scapulars, tertials and back grey with sub terminal black-brown arcs (3-162); underparts white; relatively short bill lack yellow tip.

Figure 3-162: Juvenile plumage (Jul) © R. Visscher

1st Non-breeding. Like adult non-breeding, but juvenile wing and tail retained. Yellow tip slowly develops. No breeding plumage attained in 2nd calendar year.

1st Breeding. In spring of 3rd calendar year, partial breeding plumage attained, but still some juvenile feathers on head retained.

Figure 3-163: Post-juvenile (Aug) © W. Koch

Moults

Post-juvenile. Between late-August and mid-September, most of juvenile plumage moulted into 1st non-breeding, but flight feathers, some coverts and tail done moulting around January (3-164).

1st Post-breeding. No breeding plumage attained during 2nd calendar year; direct moult from 1st to 2nd non-breeding during summer.

Subsequent moults: like adult moults, but pre-breeding in 3rd calendar year earlier.

Figure 3-164: Adult non-breeding (Sep) © F. Visscher

Movements

Completely migratory throughout the western Palearctic. Around late June, juvenile birds leave breeding grounds and start to disperse. In July and August, adults and juveniles migrate southwards towards winter quarters in western Africa. Juveniles stay during most of 2nd calendar year in these areas. Adults arrive at their breeding grounds around April.

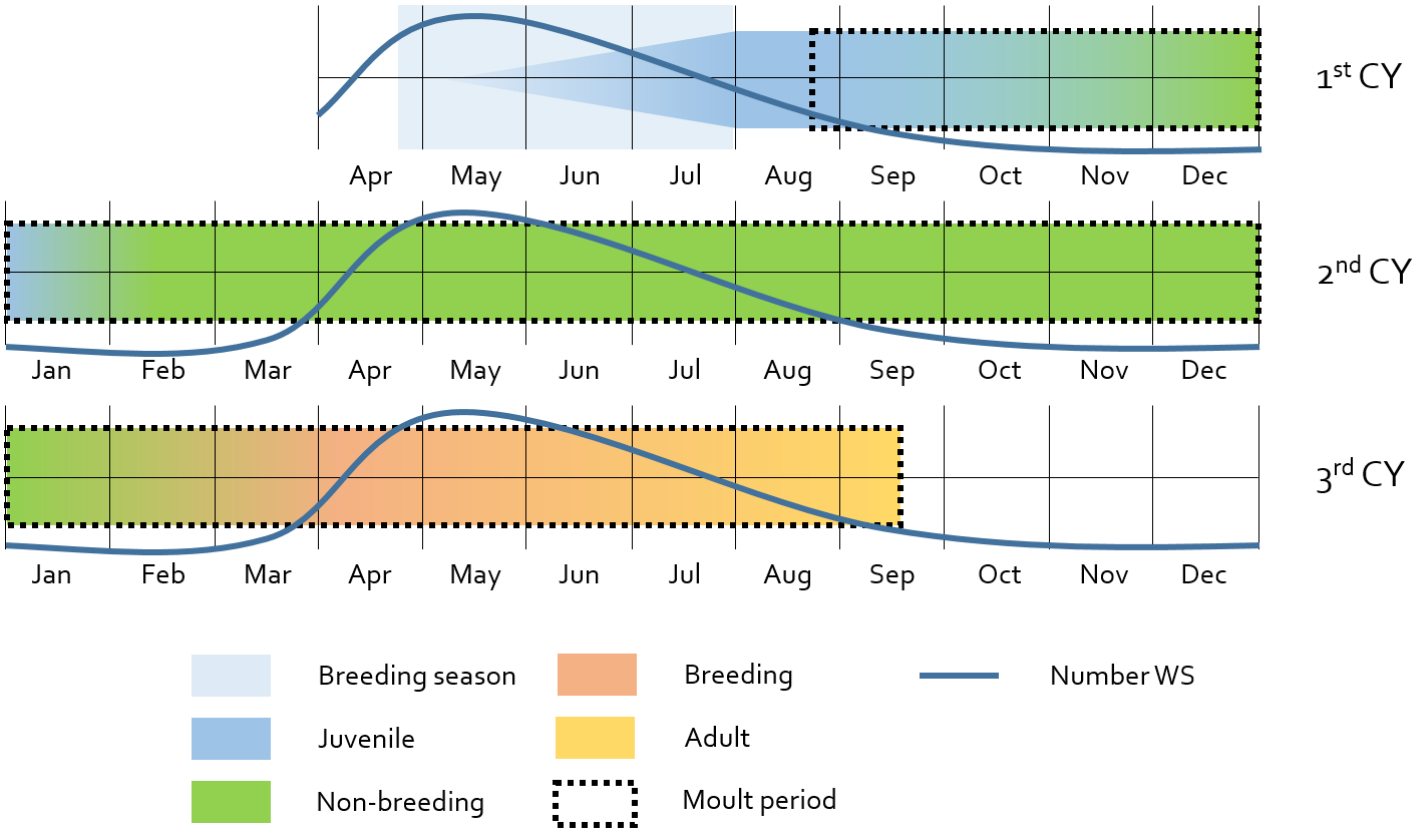

Figure 3-165 Juvenile plumage and moult phases of the Sandwich Tern (© Bas Engels)

Recommendation

Juveniles are easy to distinguish from adult non-breeding by their brown scaled upperparts, but moults early to 1st non-breeding which are harder to distinguish from a distance. Mostly present between April and August; numbers are relatively high and can primarily be found on the Wadden islands. Telescope and/or binocular countings could be performed in breeding colonies in July and August when still in juvenile plumage.

3.51 Common Tern (*Sterna hirundo*)

Plumages

Juvenile. Colour of crown and neck variable; streaked black, pale buff, grey-buff or warm-buff. Rest of the head white (3-166). Upperparts mainly buff or rufous-brown with grey and darker brown fringes; wing-coverts grey; underparts white; distinct black bar on upper wing coverts; bill pale yellow-orange with black tip; feet pink-orange.

Figure 3-166: Juvenile plumage (Jul) © B. de Bruijn

1st Non-breeding. Like adult non-breeding and especially distinguishable by different moult cycles. Some feathers in upperparts with characteristic dark crescents; especially on mantle and scapulars. Juvenile wing retained. Bill becoming more black, but still pale-orange base retained. No breeding plumage attained in 2nd calendar year.

Figure 3-167: Post-juvenile (Sep) © R. Wielinga

1st Breeding. In spring of 3rd calendar year, partial breeding plumage attained, but still some juvenile feathers on head retained. In summer, juveniles very variable; some like 2nd calendar year non-breeding, others like adult breeding.

Moults

Post-juvenile. Around November and December, start complete body moult until March-June of 3rd calendar year. No breeding plumage attained in 2nd calendar year (3-168).

Figure 3-168: Adult non-breeding (Sep) © F. Visscher

1st Pre-breeding. Between February and June of 3rd calendar year, partial breeding plumage attained on head, underparts and some upperparts.

Subsequent moults: like adult moults.

Movements

Migratory species. Starts migrating southwards late August and mostly gone by October in the Netherlands. Migrate towards winter quarters in Western Africa. Most juveniles tend to stay in these winter quarters during their 2nd calendar year. Start appearing in the Netherlands again around the end of March.

Recommendation

Juveniles are easy to distinguish from adult non-breeding early in the season by their brown scaled upperparts, but moults early to 1st non-breeding which is harder to distinguish. Mostly present between April and August; numbers are relatively high and can be found all over the Wadden Sea. Telescope and/or binocular countings could be performed in colonies in August when still in juvenile plumage.

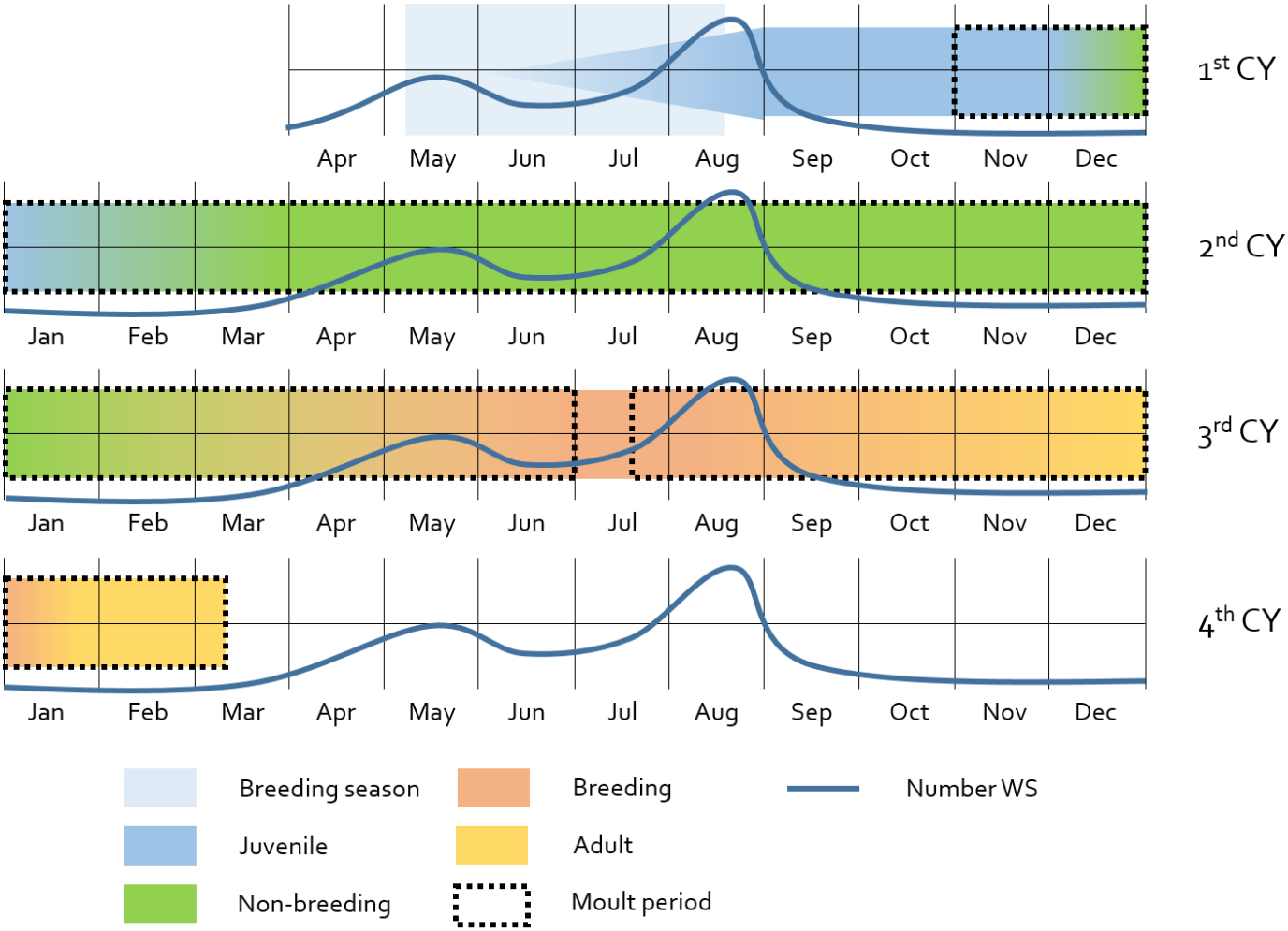

Figure 3-169 Juvenile plumage and moult phases of the Common Tern (© Bas Engels)

3.52 Arctic Tern (*Sterna paradisaea*)

Plumages

Juvenile. Very similar to the Common Tern plumages and moults; crown and nape black; mantle, scapulars and tertials grey with dusky grey to black fringes (3-170); distinct bar on wing-coverts grey; underparts white; bill pink or orange with black tip; feet orange to pink.

Figure 3-170: Juvenile plumage (Oct) © E. Kerssens

1st Non-breeding. Like adult non-breeding and indistinguishable from adult by January; some juvenile feathers retained on wing and other upperparts; bill mostly black.

Subsequent plumages: like adult plumage, but sometimes some juvenile feathers on upperparts retained until 3rd calendar year. No breeding plumage in 2nd calendar year attained.

Moults

Post-juvenile. Complete moult mostly between late October and February; some wing feathers until May. No breeding plumage attained in 2nd calendar year.

Subsequent moults: like adult moults, but 1st pre-breeding in 2nd winter starts later.

Movements

Migratory species. Around September, both juveniles and adults start migrating southwards to winter quarters spread over a large geographical range. Around April, birds start to appear again on breeding grounds.

Recommendation

Juveniles are easy to distinguish from adult non-breeding early in the season while having brown scaled upperparts; indistinguishable in January in 1st non-breeding plumage. Adult non-breeding plumages rarely seen in the Netherlands. Mainly present between April and August; numbers are fairly low and can be found on several places spread across the Wadden Sea. Telescope countings could be performed in breeding colonies in July and August when still in juvenile plumage.

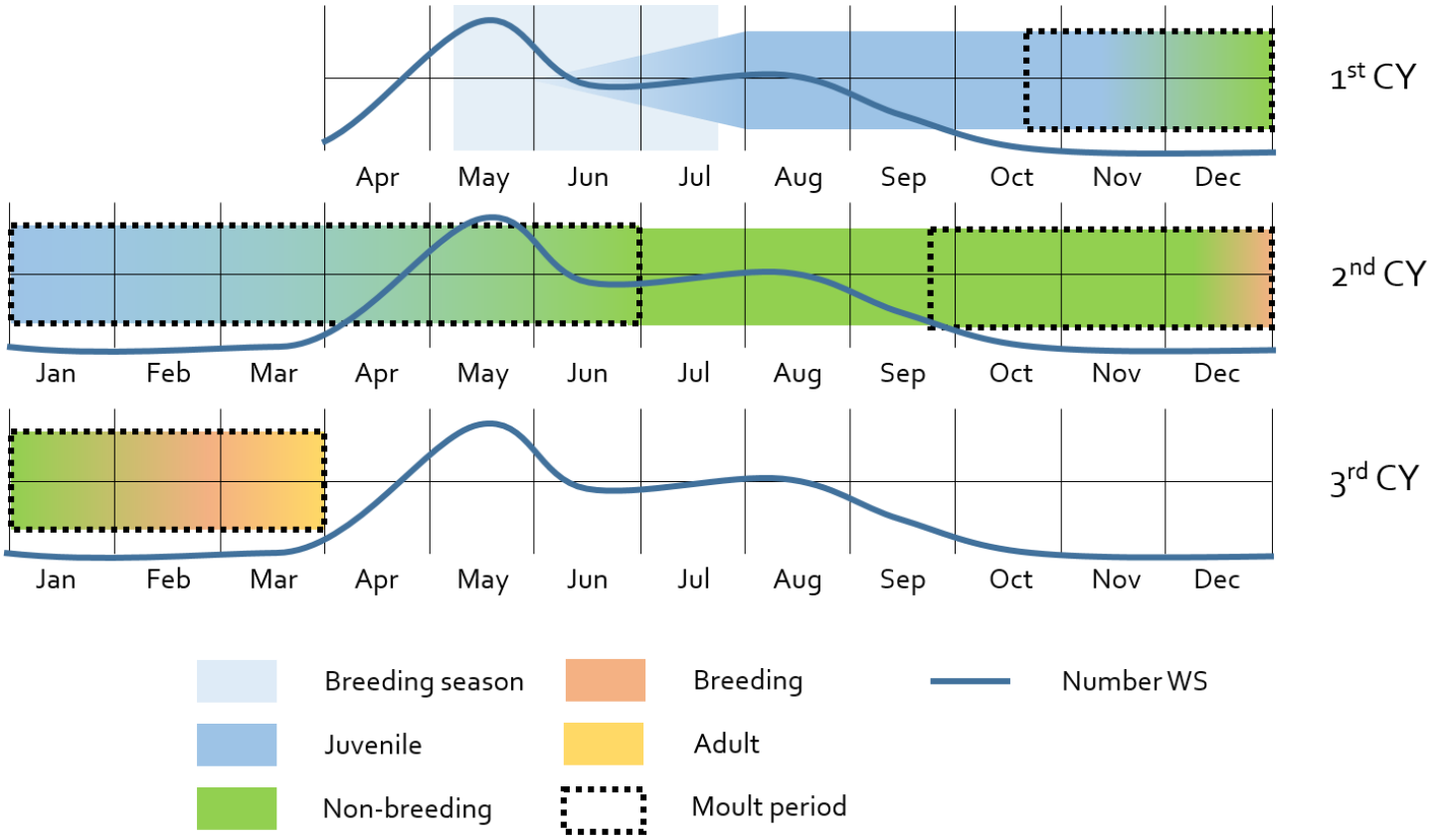

Figure 3-171 Juvenile plumage and moult phases of the Arctic Tern (© Bas Engels)

3.53 Little Tern (*Sterna albifrons*)

Plumages

Juvenile. Like other tern juveniles; crown and hindneck black and streaked brown to black (3-172); rest of the head white; mantle, scapulars and tertials pale buff to grey with dark brown to black fringes; wing-coverts grey with dark tips; underparts white; bill dark brown to black; feet yellow-brown.

Figure 3-172: Juvenile plumage (Aug) © R. van Rossum

1st Non-breeding. Similar to adult non-breeding and hard to distinguish when moulting last juvenile feathers in October and November. Some juvenile wing-coverts retained.

Figure 3-173: Adult non-breeding (Aug) © R. Rotscheid

1st Breeding. In spring of 3rd calendar year, most of 1st breeding plumage attained; some white non-breeding feathers on head visible.

Moults

Post-juvenile. Between early August and early November, most of mantle, scapulars, head, tertials, remainder of upperparts, some wing-coverts and underparts moulted into 1st non-breeding; all wing and tail feathers done by mid-May in 2nd calendar year.

1st Post-breeding. Most juveniles moult 1st non-breeding directly in 2nd non-breeding; starting from July and done by December.

1st Pre-breeding. Between late February and April in 3rd calendar year, most of head, body, wing and tail moulted into 1st breeding; some non-breeding feathers on head retained.

Movements

Around late July, most of families start to disperse from breeding grounds and migrate towards winter quarters in Mediterranean and Western Africa; mostly gone by September. Juveniles tend to stay during their 1st summer in winter quarters. Return migration starts around March and arrives on breeding grounds in April.

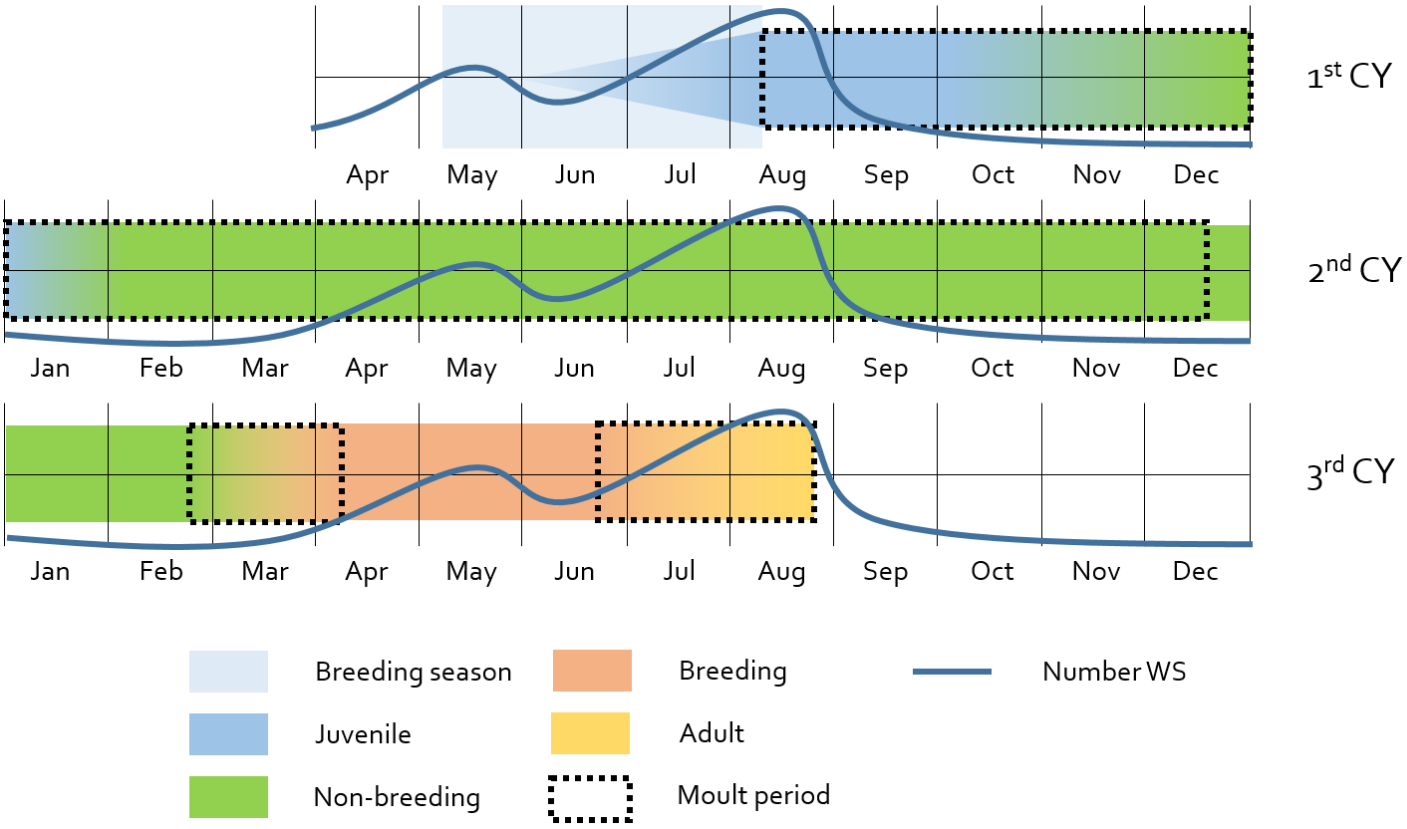

Figure 3-174 Juvenile plumage and moult phases of the Little Tern (© Bas Engels)

Recommendation

Juveniles are easily distinguished from adult non-breeding by their scaled upperparts, but after juvenile moult mostly indistinguishable. Mainly present between April and August; numbers are relatively low and can mostly be found on the Wadden islands. Telescope countings could be performed in colonies around July and August when still in juvenile plumage.

3.54 Black Tern (*Chlidonias niger*)

Plumages

Juvenile. Crown and nape black; rest of the head white (3-175); mantle, scapulars and tertials grey to dull black with black to dark brown and buff fringes; wing-coverts grey with buff fringes; dull black bar on upper wing-coverts; underparts white with black patches on sides of chest; bill black; feet pink-brown.

Figure 3-175: Juvenile plumage (Aug) © H. Steenbergen

1st Non-breeding. Similar to adult non-breeding and mostly indistinguishable from adults after loss of juvenile feathers in January. Some juvenile wing-coverts and scapulars retained. No breeding plumage attained in 2nd calendar year.

Figure 3-176: Adult non-breeding (Aug) © H. Langerijs

1st Breeding. In spring of 3rd calendar year, most juvenile attain 1st breeding plumage; non-breeding feathers retained on head, neck and chest.

Moults

Post-juvenile. Starting around October with complete moult; most of head, mantle and scapulars. By early March, most of 1st non-breeding attained, except for some tail and wing feathers. Complete by August of 2nd calendar year.

1st Pre-breeding. Same as adult pre-breeding; starting late November and mostly done by early April; some non-breeding feathers retained on head.

Movements

Around June, adults start to disperse from breeding grounds and move southwards towards breeding grounds in tropical Africa; juveniles tend to migrate one months later. In the Netherlands, peak migration between July and August. Juveniles tend to stay in winter quarters during 1st summer. Adults return to breeding grounds in late March and arrive in the Netherlands around June.

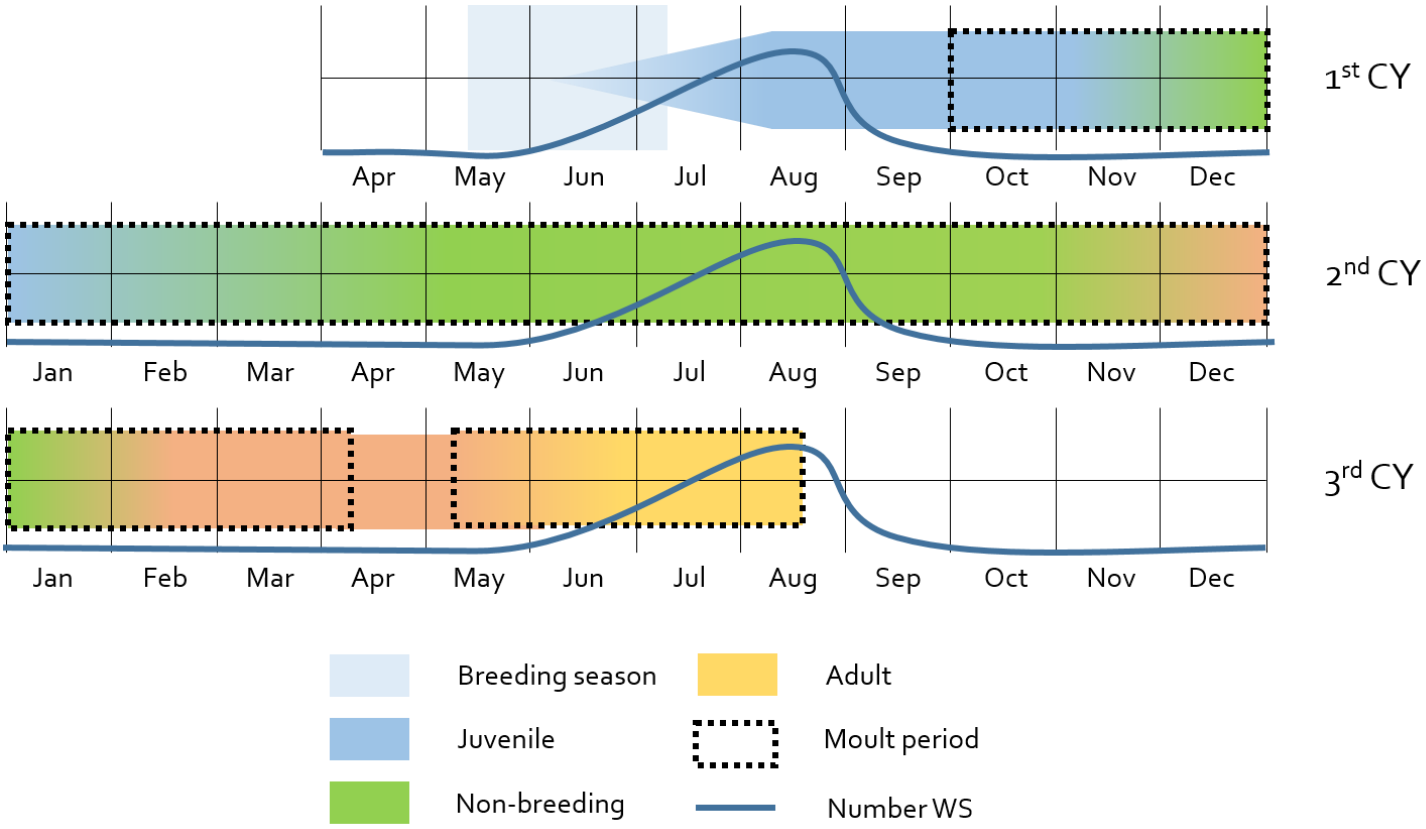

Figure 3-177 Juvenile plumage and moult phases of the Black Tern (© Bas Engels)

Recommendation

Juveniles are easily distinguished from adult non-breeding by their brown scaled upperparts, but after juvenile moult mostly indistinguishable. Mainly present between June and August; numbers are low in the Wadden Sea but relatively high in the Ijsselmeer area. Telescope countings could be performed during on the dykes near the Ijsselmeer area around August when still in juvenile plumage.

3.55 Short-eared Owl (*Asio flammeus*)

Plumages

Juvenile. Some downy plumage on mantle, scapulars and upper wing-coverts long and dense; rest of the body fluffy; upperparts and wing-coverts dark (grey) brown with buff tips; facial disc brownish-black (3-178); underparts and legs buff.

Immature. Similar to adult, but juvenile flight feathers, tertials, wing-coverts and tail retained.

Figure 3-178: Juvenile plumage (Aug) © M. van Antwerpen

Moults

Post-juvenile. Most juveniles appear as adult in August; after about a month, plumage partially moulted, starting with head, body and wing-coverts; crown, hindneck, sides of chest, flanks and legs moulted last.

Figure 3-179: Adult (Oct) © C. Struijk

Movements

Partially migratory species; tends to disperse from breeding grounds to areas with high food sources. Some migrate towards Mediterranean and even across the Sahara. Mostly observed around September and October when juveniles are very dispersive.

Recommendation

Juveniles are difficult to distinguish from adults and mostly differ in having a darker facial disk. Present all year round, but mostly seen between September and November; numbers are low and can be found on several locations in the Wadden Sea. If experienced, telescope countings could be performed near salt marshes around September and October during post-juvenile moult.

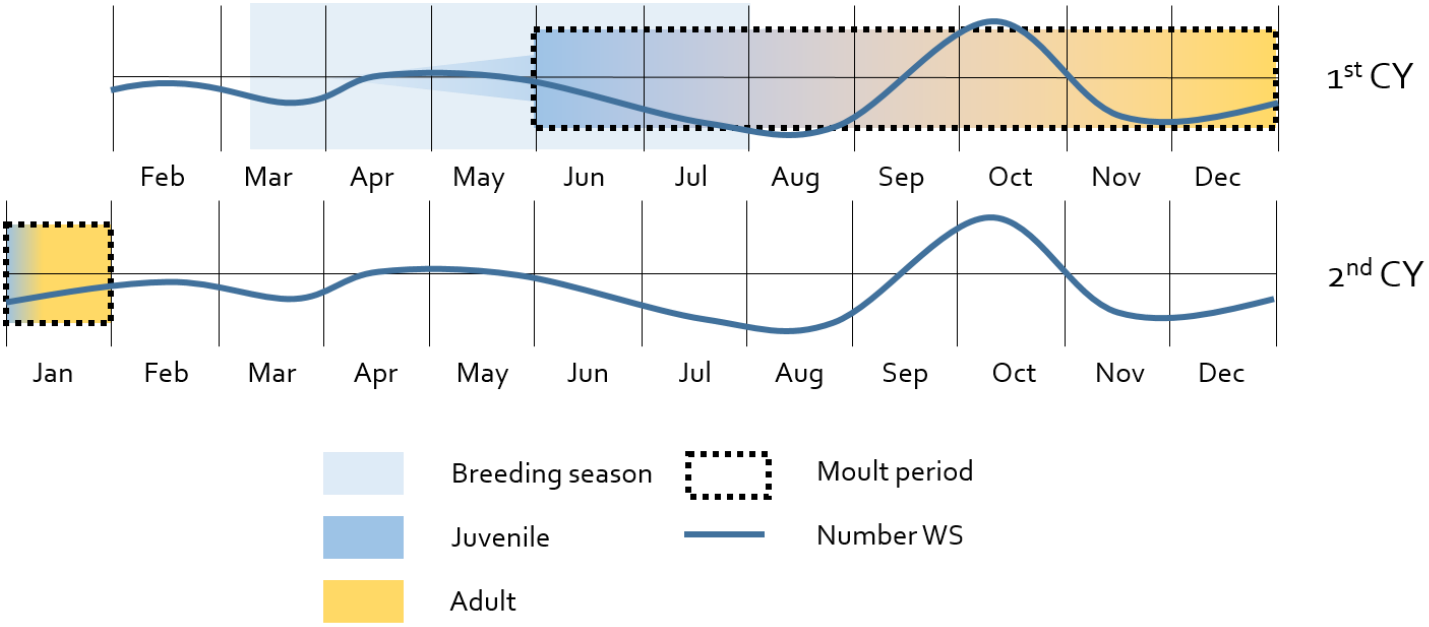

Figure 3-180 Juvenile plumage and moult phases of the Short-eared Owl (© Bas Engels)

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4.2 Figures

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