HEN HARRIER

AGEING AND SEXING

ZEISS EDITION ON FIELD ORNITHOLOGY, VOL. 1

GEROLD
DOBLER

ZEISS

Editor‘s foreword

DEAR READERS,
in co-operation with Zeiss we have produced this special edition on field ornithology about the ageing and sexing of Hen Harriers, which we are attaching free of charge to our readers, as a sign of gratitude for their long-term loyalty.

It doesn´t often happen that new findings in bird identification accomplish substantial corrections of existing doctrines and fill existing gaps in the knowledge. The most recent identification literature boasts a very high quality level compared to the texts available half a century ago. At that time we had to identify a garden warbler mainly by its song, because there were only poor drawings in the books available at that time, and which, for example, did not really make clear the differences from a Marsh warbler. Today, we are blessed by the choice between a whole series of fine identification books that include several good illustrations per species.

Against this background, it is astonishing that the results presented here have been able to uncover inadequacies and errors in almost all recent literature on bird identification. Certainly the identification of ring-tailed Harriers has always been a difficult subject which challenged even experienced ornithologists. For many years the focus was on identification between species, whereas the separation of ring-tailed Hen Harriers remained a „hot potato“, touched by very few, and not comprehensively studied by anyone. Never before have the field-marks of adult females been compared to those of juvenile males and juvenile females in such a detailed way.

The progress made here displays a parallel with the further development of optical observation devices, which has also taken place over the last 50 years. The image quality of an old Nickel spotting scope of those times and that of the recent Zeiss Harpia spotting scope are poles apart. What we have previously experienced in astronomy and microscopy on a regular basis has now also been transferred to ornithology: an example how recent optical developments have seamlessly facilitated the gathering of new and essential ornithological knowledge, established by scientific methods and corroborated by photographic evidence.

Walter Schulz, Chief Editor Vögel-Magazine

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COVER
Hen Harrier. Juvenile female. Göppingen, January 2019. Gerold Dobler

Hen Harrier (Circus cyaneus): Ageing and Sexing

GEROLD DOBLER

Identification of "ringtail" Harriers has always been a challenge and a major topic in birding. Understandably, identification to species was prioritized for many years, whereas sexing and ageing of ringtails was scarcely addressed, primarily because of the lack of knowledge. In fact even today we have only a rudimentary knowledge of the differences between juvenile male, juvenile female and adult female Hen Harriers. Forsman 1999 and 2016 recommends eye colour as a good character but notes that it is "surprisingly difficult to see in the field". The relevant characteristics have not been worked out comprehensively, leaving considerable ambiguity in separating ring-tailed Hen Harriers. Even today´s photos on current birding websites like Ornitho misidentify adult females, young males and young females. All recent Field Guides only roughly cover the differences between adult females and juveniles, leaving sex differences amongst juveniles completely unconsidered. Vinicombe et al. 2014 show a 'juvenile female' entirely missing the essential and diagnostic dark malar spot. Jiguet & Audevard 2017 explain the differences between a juvenile and a female hen harrier as being merely variations in juvenile female plumage. Clark & Davies 2018 present a photo of a Hen Harrier misidentified as adult female and which in fact is a juvenile male. The same mistake also happened in Hume et al. 2019.

The main reason for the lack of knowledge that led to this situation is first of all the fact that differences bet-

Fig. 1: Adult female. Note the typical details of greater coverts and axillaries, broad black terminal band of secondaries and dotted under-tail coverts (Riedlingen 2/2020 GD).

ween juvenile males and juvenile females are almost impossible to detect from a distance, and still challenging when observed from close up. There is definitely some overlap in most of the features, and the differences are subtle, demanding visual skills and birdwatching experience at an advanced level. Einstein 2000 mentioned that during studies undertaken since 1957, and his intensified census work between 1975 and 1991 on Hen Harriers at "Federsee" (30 miles north of the Lake of Constance in Germany), males in transitional plumage had never been recorded. Yet "Federsee" hosts one of the biggest hen harrier roost concentrations in Europe, with up to 170 birds in the winter 2019/2020, and represents one of the most prominent birdwatching hotspots in southern Germany, from where birders report their harrier observations quite frequently.

Early in this project progress was slow because although I had good quality instruments neither the binoculars or the telescopes had wide enough fields of view to allow observation of the harriers as they flew across it without panning. I found that panning was unsatisfactory as it does not deliver an image steady enough to enable examination of the necessary details. Undoubtedly other observers have had similar difficulties. The situation changed when Zeiss started to develop the new wide-angle SF binoculars and a completely new ultra-wide-angle telescope, the Harpia. With the field tests of the first prototypes of the Zeiss Harpia, and later, the prototypes of the new SF 32 wide-angle binoculars at Federsee and its surroundings from 2016 through 2019, I no longer had any excuses for slow progress, as they provided the necessary wide fields of view and optical quality.

METHOD

Originally initiated by my personal Hen Harrier observations over the last 40 years seeming to not correspond to the drawings and descriptions in field guides, my studies were enhanced when Zeiss launched a series of new high quality and innovative wide-angle optical instruments. To briefly explain, I used the Zeiss Harpia wide-angle scope models 22-65 x 85 and 23-70 x 95 alongside the Zeiss wide-angle SF 32 binoculars. Their large fields of view not only allow a prolonged and more comfortable study-period of flying birds, especially of birds flying across the field of view, to verify different features, but also enable the observer to determine size and body-proportion differences through side by side comparison, when birds get close to each other.

All the results of this study, both photographic and text, are based on intense periods of observation of more than 500 different individual Hen Harriers over a 6 year period (2015 through 2020) mainly in Germany, Austria and Hungary, and a few in Great Britain and France. During the years 2019 (January-April and October-December) and 2020 (January-March) more than 100 Hen Harriers have been photographed and examined in southern Germany. Additional photographs of different origin have also been considered. This study confines itself to some of the most important identification features relevant in the field to achieve a high level of accuracy but without claiming total comprehensiveness. The variance between individuals is significant, and there is quite some overlap between most of the features, demanding substantial familiarity with these features which I have worked hard to impart by the comprehensive photographic documentation within this paper.

I would like to thank Dominique Gest and especially Prof. Dr. Matthias Helm for their great support in preparing the photographic documentation for this paper. I am sincerely grateful to Richard Porter for his great support in preparing this paper including the professional discussions on defining the terms. Many thanks to Otto for reviewing the manuscript and the many fruitful discussions on optics and birding. I would like to further thank Roger Riddington and Paul French for reading the manuscript and their constructive comments.

RESULTS

Shape and Structure

Male Hen Harriers are smaller than females and there is no overlap in body length, wing length, or body weight (Glutz v. Blotzheim et al. 1971, Cramp & Simmons 1980). The same facts apply to the Northern Harrier (Circus hudsonius) in North America (Dunne 2017

As the wing-beat rate of males is higher than females they appear more agile and less heavy than females in flight. The wings of males are narrower at base and hand (the spreading primaries at the wingtips), for direct comparison see Fig. 2, and in combination with their faster wingbeats they appear more elegant and tern-like. It is no coincidence that males are more intensive bird hunters than their heavier sisters and therefore juvenile males are sometimes confused with Goshawks or Sparrowhawks when glimpsed flying fast along hedges and fields.

Juvenile male wings are relatively narrow (Fig. 5, 8, 18), their body is short and compact, whereas juvenile females appear longer overall partly caused by a slightly longer

neck and a smaller protruding and more pointed head (Fig. 6, 9, 10). In flight they sometimes resemble the silhouette of a female Goshawk, whereas juvenile males appear short-necked as well as having a larger-looking and more rounded head (Fig. 8, 11, 15) than juvenile females. Even more broad-necked and also having an owl-like appearance are the heads of adult females (Fig. 7, 28, 53), especially those more than 2 years old. By this time they have also developed a powerful body (Fig. 20, 41) as well. However in some older females this owl-like and broad-necked appearance seems reduced to some extent (Fig. 49).

Summing up we can say that brown Hen Harriers with a heavy body, broad and rounded wings and rather big heads are typically adult females (Fig. 7, 34). Small- and slim-headed long-necked birds with less rounded, more pointed wings, are juvenile females (Fig. 6, 10, 17) and narrow-winged, short-necked birds with large, rounded-looking heads are usually young males (Fig. 5, 8, 11, 18). It must be emphasised that significant experience is needed to recognise these differences in the field.

Eye Colour

The eye colour of juvenile males during their first winter from October onwards, varies from pale grey to bright yellow, although the normal range is from greyish-yellow to lemon yellow. In most juvenile females eye colour appears dark (predominantly brown), although there is a considerable number of juvenile females showing a pale grey (Fig. 6) or even yellow (Fig. 16, 22, 24, 43, 45) iris. There is a significant overlap in this feature to be considered when ageing and sexing Hen Harriers. The iris colour of males older than one year is principally yellow (Fig. 38, 39). 2nd Winter females mainly show a brown-coloured iris although a considerable number have developed an amber-coloured or even yellow iris by then. Single individuals seem to maintain an amber-coloured iris at least over some years. For example, an adult female returned to its winter territory over at least 3 consecutive years at Federsee without noticeably changing its amber-coloured iris at all. Nonetheless we have to mention that some adult females with at least 3 winters behind them still show a dark brown-coloured eye (Fig. 13, 19).

According to these findings ageing and sexing of Hen Harriers in the field based on eye-colour alone is not reliable enough.

Facial Pattern

Facial patterns comprise several components that together provide a high degree of reliability for ageing and sexing Hen Harriers.

Juvenile females are characterized by a striking contrast between the whitish supercilium and sub-eye spot, set against the dark crown and face-surround (Fig. 3). The dark face-surround is brownish to grey-brown, but can appear almost black in some individuals (Fig. 35). It forms a unit between the typical dark malar-spot below the base of the beak, and the similarly dark ear-spot connected by a slightly paler but still darkish, narrower, bridge in between. Note that the sharp-edged border between white and dark, combined with the edged 'hooky' shape of the dark face-surround, often leaves a kind of 'diabolic' face pattern in juvenile females, especially when viewed from the side (Fig. 26, 50).

The white sub-eye spot in juvenile females shows a roughly triangular shape in most individuals, causing the middle part of the dark face-surround to narrow and slightly lighten in that section, creating the already mentioned narrower and slightly paler bridge between the malar-spot and ear-spot, leaving the 'hooky' shape of the dark face-surround (Fig. 3, 6, 22, 26). Under normal light conditions the darkened malar-spot and ear-spot are recognisable in the field (Fig. 3, 43, 55), although the contrast sometimes significantly fades under extreme glaring light conditions (Fig. 9).

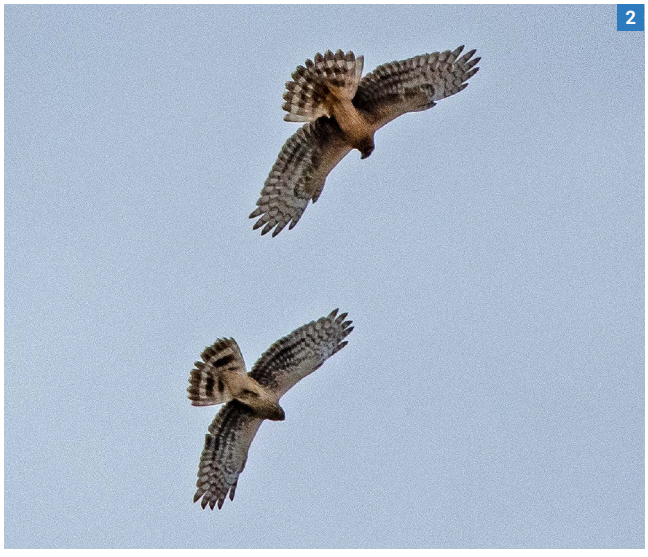

Fig. 2: Intraspecific Interactions frequently allow side by side comparison: Juvenile Female chasing juvenile male carrying prey. Note smaller size, narrower wing and pale belly of male. Relatively small pointed head of the female compares to a big rounded head of male (Memmingen 12/2019 GD).

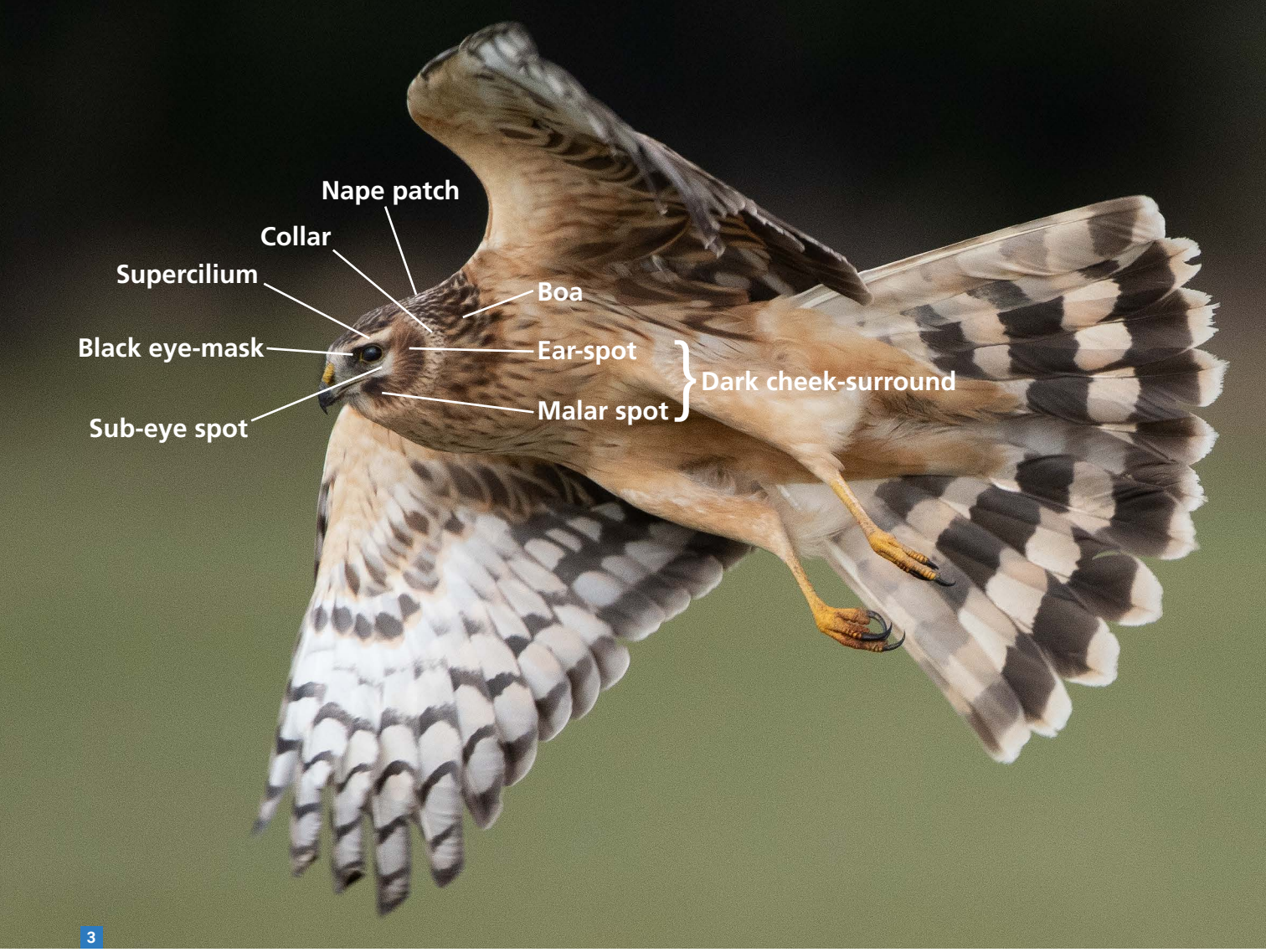

Fig. 3: Topography. Juvenile female. Nictitating membrane extended (Riedlingen 2/2020 GD).

Juvenile males show less contrast in face pattern. The malar-spot is not recognisable in most individuals, either because it doesn´t stand out against the uniformly coloured face-surround (Fig. 8, 18, 27, 33), or it doesn´t exist at all (Fig. 11, 32). Although some show visible but rather indistinct malar-spots and ear-spots (Fig. 23, 47) the percentage of those with well-marked ear- and malar-spots similar to juvenile females is very small. Males also develop a kind of hooked shape of the dark face-surround, especially towards the second half of the winter, but the malar-spot is transformed to a narrow, colourless stripe, peaking towards the base of the beak (Fig. 15, 18).

Some males show a quite dark face-surround (Fig. 33, 44) but the colouration is uniform and the pale sub-eye spot is smaller and more rounded than triangular, forming a dark face-surround of constant width which creates the "friendly" looking rounded face pattern (Abb. 27, 33, 54) of juvenile males. In combination with the black eye-surround (Fig. 3) the face pattern of some males resembles that of a Short-eared owl (Fig. 33). The inner black eye-surround, on average, is more prominent in juvenile males (Fig. 44) than in juvenile females (Fig. 6, 30). Adult females frequently show reduced black eye-surrounds (Fig. 7, 41, 49, 53). Apart from a few exceptions, juvenile males can be identified by a far less contrasting face pattern of a more rounded instead of edged shape, and therefore look quite similar to adult females. Juvenile females without a protruding malar-spot are rare (Fig. 25) but can still be identified by their edged structure of the dark face-surround.

The crown of juvenile females is brown or (dark)brownish-grey (Fig. 29, 35) with some fine, short pale streaking. Juvenile males on average show stronger pale streaking (Fig. 15) but not as much as adult females (Fig. 7) although the variation is considerable: Fig. 34 shows a female in at least its fourth winter with a nearly uniform brownish-black crown and face-surround.

The typical raptor nape patches are prominent in juveniles, most notably in juvenile females (Fig. 24, 25, 35). The vast majority of adult females have reduced nape

Fig. 4: 2. Winter female shows decreasing face contrast, amber-coloured iris, spotted under-tail coverts but greater coverts without dots on under-wing (Ehingen 2/2020 GD).

Fig. 5: Juvenile male. Whitish belly shows fine stripes. Weak face contrast but prominent collar. Pale dots on orange brown axillaries (Federsee 3/2020 GD).

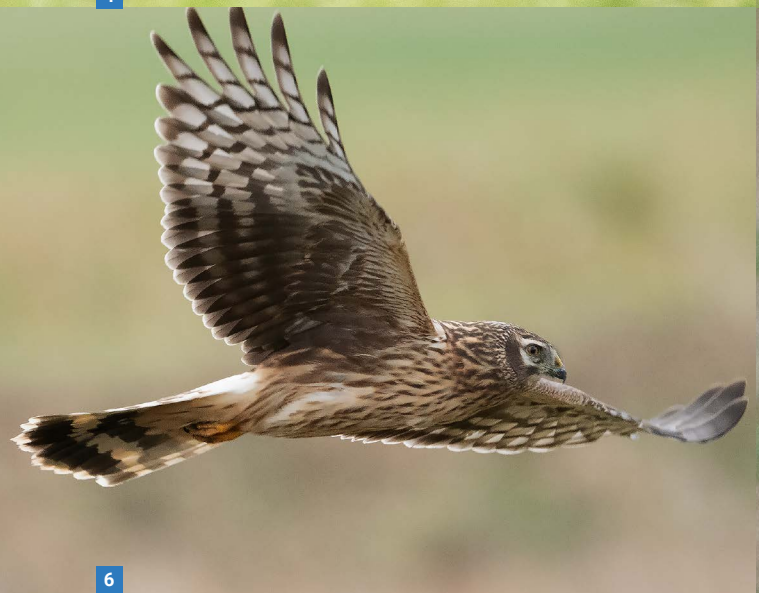

Fig. 6: Juvenile female. Pointed head showing strong cornered dark eye-surround. Note the pale grey iris (Göppingen 1/2019 GD).

Fig. 7: 3. Winter+ female shows typical owl-like face pattern, broad wings with typical half-round dots on greater coverts, dots and ragged barring along the flanks (Biberach 3/2019 GD).

patches Fig. 7), although some 2nd winter females can still show signs of them.

The face pattern of adult females varies substantially, but all of them have reduced protruding malar-spots and ear-spots (Abb. 37, 49) as they get older. The obvious contrast and edged shape of the dark face-surround of juvenile plumage is substantially reduced, especially in birds in their third winter and older. Some 2nd winter birds still show an intermediate pattern (Fig. 4) whereas others lose contrast quite considerably (Fig. 51). While the dark face-surround gradually brightens and becomes less distinct in most, it is preserved in some individuals, but the step from the bright eye frame to the dark face-surround is soft and the differentiation of the malar-spot and ear-spot field is usually lost (Fig. 34). As a result, the dark face-surround appears more uniformly coloured and assumes a less angled and rounded shape of largely constant width, often resulting in an owl-like face expression similar to juvenile males. The high variability of the dark face-surround in adult females not only affects its shape, but also its colouration, from very dark brown or grey-black (Fig. 34) to pale light or rust-brown (Fig. 49). At close distance we can see the dark face-surround is lightened by fine and long pale stripes (Fig. 1, 7). The same principle applies to juvenile males (Fig. 15).

The shape and brightness of the collar varies greatly and is on average the most noticeable in some juvenile females (Fig. 17, 24, 26, 30, 45). In a few juvenile females

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Fig. 8: Juvenile male in evening light. Relatively large round head and narrow wings. Dark face-surround of constant width and colour distribution. Primaries are uniformly and distinctly barred. Noticeable pale sparsely streaked belly (Federsee 2/2018 Matthias Helm).

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Fig. 9: Juvenile female of rusty type in intense light. Note the cloudy pattern on lower belly and under-tail coverts. Dark terminal secondary band of constant width (Federsee 12/2019 Matthias Helm).

it can be so pronounced that the bird is misidentified as Pallid Harrier by inexperienced birdwatchers. In adult females the collar is significantly reduced (Fig. 1, 13, 49) and disappears in some older specimens (Fig. 19, 20, 28, 34) almost completely. Unlike adult females, juvenile males show a broad and distinct collar, helping to distinguish between the two.

Underside of Body

Juvenile females are distinguished by an often bland and featureless underbody with a dirty white but usually light beige to rusty, basic colouration, which often becomes a little brighter towards the rear. Behind the densely streaked boa, juvenile females show some widely-spaced dark, narrow streaking towards the rear, and these get thinner and longer in the under-tail coverts, where they narrow finally to very fine shaft streaks, hardly noticeable even from close distance (Fig. 3, 17, 26, 55). On the flanks underneath the axillaries the stripes are usually stronger (Fig. 14, 16, 29, 45, 55) and in rare cases we already see hints of ragged barring typical for adult females (Fig. 16, 30, 43). Juvenile females occasionally show a cloudy-looking plumage structure resembling a Savi´s or River Warbler alongside the flanks as well as on the under-tail coverts (Fig. 9). Anyhow the variety of basic colour types of juvenile females reaches from very bright specimens with hardly recognizable stripes on the underside behind the boa (Fig. 17) via those with strong streaking on a relatively dark underside (Fig. 22) to dark beige or rusty coloured (Fig. 16) individuals. In any case, the body pattern behind the boa of juvenile females therefore appears fundamentally featureless to the observer.

Young males average a brighter underside than females, with a light-beige to whitish basic colouration and relatively short, but stronger brown to black-brown streaks resembling adult females to some extent. In some, however, a rust-beige colouration occurs, which looks very similar to that of some young females especially from a distance, but the lighter ground colour of the belly breaks through in most of those cases (Fig. 8). The boa is either narrow or broad, in the latter case often appearing greyish because of the mix between blackish to greyish-brown short streaks on a pale background. This results in a

Fig. 10: Juvenile female: Small pointed head showing strong face contrast. Longish body showing broad boa, whitish underneath with long dark streaks and obvious stripes on under-tail coverts. Dark terminal band of secondaries marginally narrows towards body in this individual. (Federsee 1/2020 GD).

Fig. 11: Juvenile male: Large head and compact body. Weak face contrast and missing malar spot. White underneath showing fine stripes along belly and broader streaks on under-tail coverts. Dark terminal band of secondaries shows constant width (Federsee 1/2020 GD).

visible contrast to the following whitish and only sparsely striped belly area. Many individuals are also characterised by an orange tint originating from the rear part of the flanks covering the under-tail coverts (Fig. 5, 31, 44). Overall, this again resembles the pattern of the adult female. In these, the short-streaks of boa and breast are brownish to blackish, while the spots on the flanks down to the under-tail coverts often show a rusty-coloured, rarely grey-brown colouration and thus indicate a distant similarity to many young males. Therefore, young males often appear more varied, more "colourful" (Fig. 31, 32), and in almost all cases brighter underneath (Fig. 5, 8), compared to the featureless looking juvenile females. While young females' basic colouration ranges from (dirty)white (Fig. 17) through an often beige tone (Fig. 3, 45, 55) to rusty (Fig. 16), young males show a significantly more whitish and only occasionally beige basic tone, which doesn´t tend towards rusty like juvenile females, but more towards orange tones and tints. In rare cases, the entire whitish underside of juvenile males can be tinted in orange, so much that the whole underneath of the bird appears orange to the distant observer. However, bright young males with consistently white colouration (Fig. 21, 40) are more common. Even more common are those appearing grey on the breast (resulting from a blackish streaked boa on a pale background), whitish and sparsely striped along the belly, but with broader stripes or dots on often orange-tinted under-tail coverts, jointly causing a more contrasty underside (Fig. 5, 18, 31) than that of juvenile females. Occasionally we record very bright-coloured juvenile individuals of both sexes, appearing white after the narrow dark boa and with hardly any perceptible streaking towards the under-tail coverts (even paler than Fig. 17).

Adult females - especially from 3rd winter onwards - are characterized by light beige to predominantly white basic coloration, which is brighter compared to their juvenile plumage. As a result, the short reddish-brown, brown, greyish or blackish streaks and spots, stand out more clearly than in young birds. On the flanks along the bases of the wings, characteristic elements of ragged barring appear in almost all adult females (Fig. 1).

The axillaries of adult females (Fig. 1, 46) and juvenile males are usually reddish-brown to orange-brown

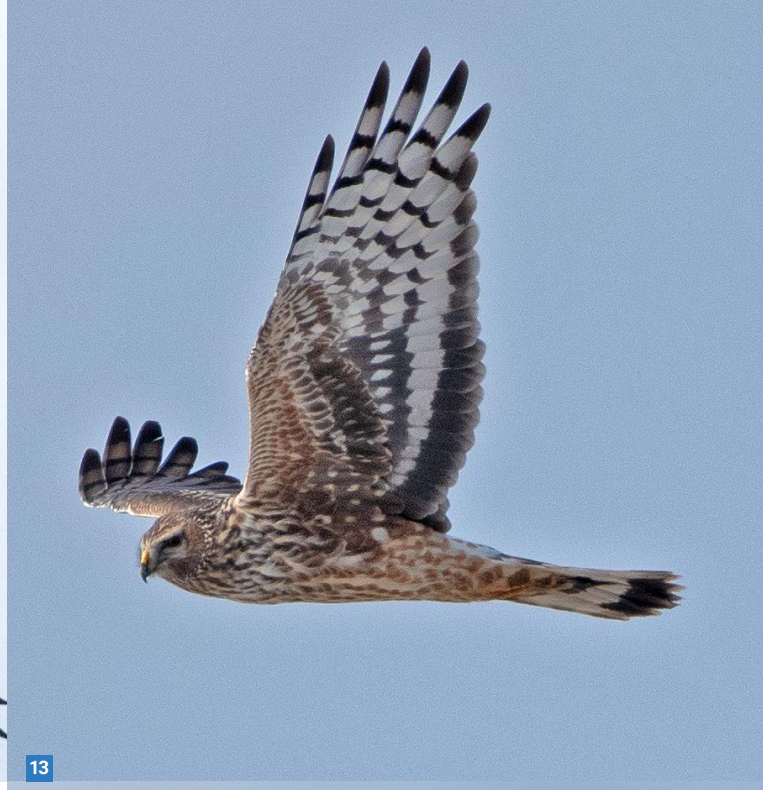

Fig. 12: First adult plumaged female showing pale eyes, dotted under-tail coverts and pale spotted greater coverts. Retained inner secondaries of juvenile plumage form a paler and narrower terminal band in that section (12/2019 Bad Buchau GD).

Fig. 13: 3. Winter+ female showing dark eye. Heavily marked underbody. Club-like spots on under-tail coverts and incomplete barring along flanks (Riedlingen 1/2020 GD).

Fig. 14: Juvenile female. Pale bands of secondaries reduced. Contrasting dark boa and unmarked greyish-brown axillaries (Federsee 1/2020 Matthias Helm).

(Fig. 31, 32), less often grey-brown (Fig. 21) with whitish spots. The orange tint is often only recognizable in direct light, especially when the birds turn sideways in hunting flight (Fig. 31, 32). Apart from the rust-coloured individuals (Fig. 16) juvenile females show either sparsely spotted or unspotted brown to grey axillaries (Fig. 30).

Underwing

The dark narrow bands across the hand often show an incomplete pattern in many juvenile males (Fig. 23) whereas young females tend to show a more regular and complete barring, but there is some substantial overlap (Fig. 8), giving this characteristic a limited reliability under field conditions.

More reliable, especially under changing light conditions are the differences in the pattern of the secondaries. Juvenile females show a dark grey-brown or bleached light grey-brown coloured terminal band across the secondaries. However, they usually moult their secondaries until the beginning of the 2nd winter, thereafter showing the much wider black terminal band characteristic for

Fig. 15: Juvenile male: Dark face-surround shows pale narrow steaks. Note the relatively large and rounded head (3/2020 Ehingen GD).

adult females. For simplification, we call this band black, because it appears black in the field, although it is actually very dark grey.

We have to consider that breeding females in their second calendar year sometimes interrupt moult in favour of parental care and breeding success (Fig. 36) retaining remiges during that period. Such individuals may retain at least some of their remiges into the 2nd winter and a few individuals even into 2nd spring. The black terminal band on the secondaries of adult plumage is much wider and darker than the comparatively lighter, dark brownish-grey terminal band of juvenile females (for comparison see Fig. 12). This black terminal band widens continuously towards the body and stands out in contrast to the bright pale band in front of it, making it easy to recognise from usual observation distances. This bright sub-terminal band reaches the body, while the second pale band in front of it does not, because it is increasingly covered by axillaries and greater coverts as it nears the body. In the vast majority of cases this band does not form a continuous pale band but appears as a line of bright dots instead (Fig. 7, 13, 34). A related pattern occurs in young females (Fig. 30) but also males (Fig. 31) occasionally. Only few adult females show a largely uninterrupted light band (Fig. 28), as it is typical for juvenile males, in those normally reaching further down to the body.

The majority of adult females possess a dark terminal band along the 5 inner primaries (P1-5), which is both lighter and narrower than the secondary terminal band, generating a more (Fig. 1, 19, 20, 34, 42) or less (Fig. 7, 28, 46) well-pronounced step at the borderline between arm and hand. Only a few birds are characterized by a primary terminal band as dark as the secondary terminal band (Fig. 41) and the step between hand and arm is not present due to a continuous crossover (Fig. 37, 41). For females in adult plumage we can propose the basic rule that the width of the inner primary terminal band (e.g. P1) is significantly narrower than the middle area of the secondary terminal band (e.g. S6).

Juveniles don´t feature the described continuously broadening black secondary terminal band characteristic of adult females, but if the pale secondary bands stand out clearly and contrasty, without much narrowing towards the body and therefore appear almost parallel, (Fig. 5, 18, 40) then we have a pretty strong indicator for a juvenile male. In juvenile females the pale secondary bands narrow continuously between primaries and body (Fig. 10, 17, 26) and also often darken so much that the light banding virtually disappears close to the body (Fig. 26, 55). Individuals with extremely dark secondaries leaving only slight remains of the pale bands are not really rare (Fig. 14).

Unfortunately, this characteristic also shows an overlap in the field, whereby the two bright secondary bands of dark males narrow quite strongly and darken towards the body without reaching it (Fig. 44). On the other hand we see fairly bleached juvenile females in spring, whose pale secondary bands narrow relatively little, and darken only insignificantly towards the body. In a few cases, this might be so well-developed that these birds are practically indistinguishable from the typical pattern of juvenile males – especially at a greater distance.

Fig. 16: Juvenile female of rusty type. Note the yellow eye, very strong face contrast but narrow and indistinct collar (Riedlingen 2/2020 GD).

Fig. 17: Juvenile female. Pale whitish underneath. Note the characteristic details on greater coverts (Riedlingen 2/2020 GD).

In clear contrast to adult females, the dark secondary terminal band of juvenile males (Fig. 5, 8, 11, 18) does not significantly widen towards the body, but sometimes becomes almost black (Fig. 11). The black terminal band of females, from first adult plumage onwards, widens continuously from the hand towards the body (Fig. 46). However, 2nd winter females in incomplete first adult plumage could cause some confusion with juvenile birds if only this feature is considered.

The greater secondary coverts of juvenile females are brownish with a beige margin and lack any pale spots (Fig. 55). Adult females, usually from the 2nd winter, but certainly from the 3rd at the latest, have pale spotted or half-spotted greater secondary coverts (for detailed pattern see fig. 1, 28).

Usually the marginal underwing coverts of juvenile Hen harriers are plain beige (Fig. 16-18, 21), while those of adult females, apart from some pale specimens (Fig. 20), usually show fine dark stripes on a light background (Fig. 7, 34, 46).

Under-tail Coverts

The under-tail coverts of juvenile females are coloured from white to pale beige to rusty-coloured with very fine, sometimes barely visible, dark shaft-streaks (Fig. 3, 55), and with a more or less cloudy marbling (Fig. 9), resembling a Savi´s warbler. Slightly wider shaft streaks in juvenile females are rare (Fig. 10). Fine long shaft-streaks, that are very typical for young females, are very rare in males, because they usually show broader darkish streaks or spots compared to the sparsely and thinly striped belly. A significant number have spots (Fig. 27) almost identical to those of adult females. The stripes, spots or shaft-streaks are often lined up in a row on the sides of the under-tail coverts in juvenile males

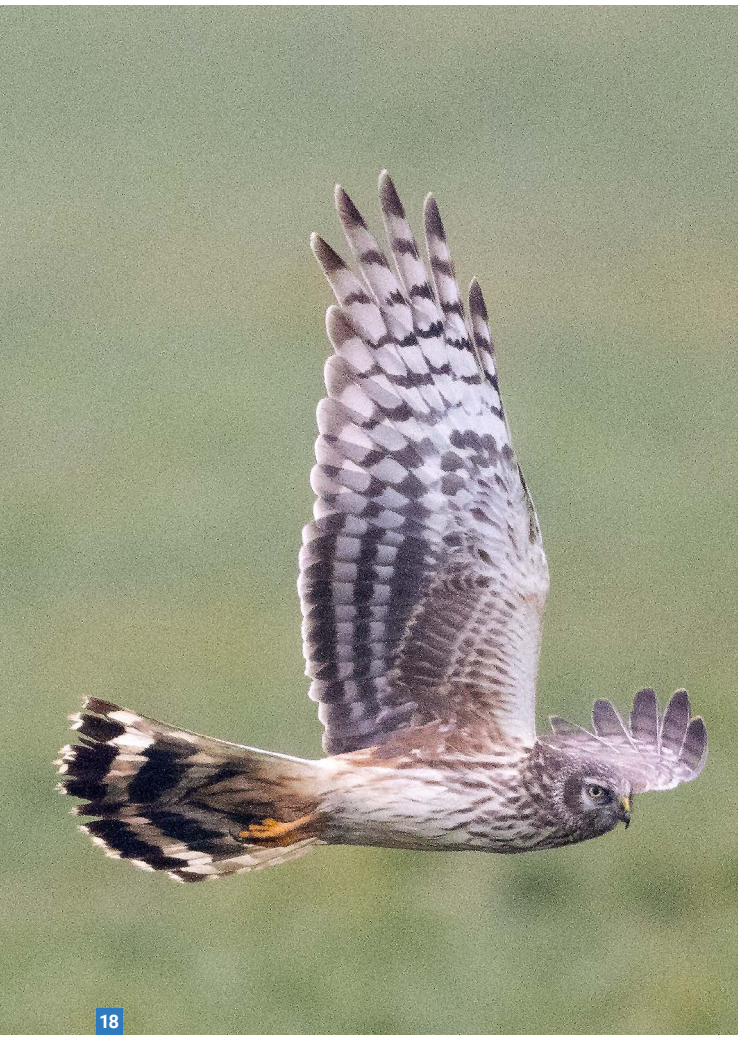

Fig. 18: Juvenile male. Narrow wings and sparsely striped belly contrasting with more broadly-marked under-tail coverts (Riedlingen 12/2019 GD).

(Fig. 31, 40, 44), juvenile females (Fig. 3, 30, 45) and adult females (Fig. 1, 46). While the basic colour in juvenile females varies from white to pale beige (Fig. 30) to light rusty (Fig. 9, 16), young males show, apart from white and beige, often a tendency to an orange tint, which often runs from the hind flanks to the under-tail coverts (e.g. Fig. 31, 44). Especially pale males (Fig. 40) with an almost pure white underside, occasionally develop fine dark streaks, which are almost as thin as those of young females. Interestingly 2nd winter females show at least partially spotted under-tail coverts (Fig. 4), while their face pattern still largely resembles that of juvenile females and some of their remiges may not yet have been moulted into first adult plumage, as already mentioned above. For adult females, whitish under-tail coverts with distinct rusty-brown to grey spots are diagnostic (Fig. 1).

Upper-tail

Forsman (2016) and Clark (1999) mention a greyish cast on the upper-tail of juvenile males, which is present in some adult females as well. In fact not all of the juvenile males develop this greyish cast and some show it so slightly that it is almost impossible to detect especially under difficult light conditions, making it often impossible to recognise in the field.

Upper Wing

The colouration of the upper wing is variable and young birds are not fundamentally darker than adult females, as is so often stated in the current literature. Adult females vary from light grey-brown (Fig. 49) to (very) dark grey-brown (Fig. 34, 48) almost as much as juvenile males and females, although the latter may tend to brown a little more. The secondary banding pattern of the underwing, described above, is also represented on the upper wing basically the same way. The frequently mentioned "more prominent and more rufous panel above on inner wing" by different field guides as a field mark for juveniles is misleading. First of all the variation of the panel is very high in juveniles of both sexes, and still considerable in adult females. Males (Fig. 47) seem to tend a bit more towards rufous in average than juvenile females, although they show both rufous and whitish panels at least as pale as those of adult females. Juvenile females show a high variation in the size of the panel from very small and barely visible to quite large, but many of their panels are at least as pale (Fig. 24) as those of adult females (Fig. 48, 49).

With few exceptions, pale spots on the greater secondary coverts form a more (Fig. 49, 53) or less (Fig. 48) continuous spotted line along the wing of adult females. Most juvenile males show a similar pattern, although not as obvious and usually less complete (Fig. 47), while juvenile females normally show a just few single spots (Fig. 50) or none of them at all. Young females with extensively dotted greater secondary coverts have been observed but are relatively rare. So there is a small tendency for this feature but also a considerable overlap with the more frequently seen limited spotting.

Based on the observations made during extensive fieldwork preparing for this study, I must advise that "pale tips to greater upper-wing coverts" as mentioned in several books, can no longer be recommended as a field mark for juvenile Hen Harriers (Fig. 50, 47) because this feature is also present in older females (Fig. 48, 49) and therefore misleading in the field (compare Fig. 52 with 53 and 54).

According to my observations so far, identification based on a combination of several of the presented characteristics can provide a fairly reliable result.

Brief Field-guide for Ringtail Identification

For 95% of the flying ringtails you see, you will only need the following:

1. Broad and rounded wing shows clearly contrasting broad black terminal band on the secondaries broadening towards body, face pattern lacking in contrast, without prominent collar, pale but having dark spots underneath, with ragged barring on flanks and spotted under-tail coverts: **Adult female 2nd winter and older.**

Birds without clearly contrasting broad black terminal band on the secondaries:

2. Highly contrasting face pattern with typically dark ear-spot and dark malar-spot, distinct collar, uniformly patterned underneath with finely striped under-tail coverts, pale bands of secondaries narrow and darker towards body: **Juvenile Female 1st winter.**
3. Round-looking face with distinct collar, poorly-contrasting pattern lacking pronounced dark malar-spot, and yellowish iris, giving an owl-like face expression. Contrasting pattern underneath with pale and sparsely striped belly, almost parallel barring on secondaries and broad-striped or even spotted under-tail coverts: **Juvenile 1st winter male.**

Moult

Juvenile male Hen harriers start moulting at the end of the year of their birth. On a regular basis we see birds with partially grown grey tail feathers in December and fully grown tail feathers from January onwards (Fig. 31, 33). Some single grey body feathers are often already present from January onwards. During the entire study period, juvenile males in transitional plumage were encountered on a regular basis during the winter months, particularly towards spring. Unfortunately I cannot contribute to the question to what extent females follow the same strategy or not, but breeding 1-year-old females can interrupt their moult at least to some extent and retain juvenile remiges during the summer months (Fig. 36) in favour of parental care and breeding success. At least some of these birds also retain juvenile remiges during the following winter into the 2nd spring, but I cannot comment on the further development after their arrival in the breeding area. In males, single remiges are retained sometimes into the 3rd calendar year, but not any further.

Adult females have sometimes not completed their annual moult when they reach their winter quarters during October or November, probably due to intensive reproductive activity during the summer months. Incompletely moulted primaries (Fig. 37) can then potentially lead to confusion with Pallid Harrier or Montagu´s Harrier by inexperienced observers.

Males in adult plumage

Since the facial pattern of Hen harriers is described here in detail for the first time, I would like to briefly explain the situation of males in 2nd winter plumage. Although they already wear the unmistakeable grey-white-black adult plumage, they can be told from older individuals by the dark „saddle“ formed by dark brownish-grey feathers on the back and shoulder. From not too far away we can further recognise remnants of the facial pattern of the juvenile plumage (Fig. 39): The white supercilium as well as the white sub-eye spot surrounding the dark eye-mask are still shining through the grey adult face, and the pale collar is still standing out as a very narrow spot line. Small rusty-coloured to grey-brown spots on crown and neck sometimes with remnants of the large nape patches are characteristic of the plumage of 2nd winter, as well as small spots on the chest, flanks and belly. Occasionally there are some retained bleached-out remiges, mostly secondaries rather than primaries. The further development of older individuals is different, but during the 3rd winter some birds still show remnants of the dark saddle as well as some facial features before these successively vanish in the grey adult plumage during the next years (Fig. 38).

Fig. 19: Adult female showing dark eye (brown iris). Note pale dotted orange-brown axillaries and club-like spots on under-tail coverts (Laupheim 1/2019 GD).

Fig. 20: Pale 3. Winter+ female showing massive body, weak face contrast, prominent boa but extremely reduced collar. In the case of very pale individuals, the banding elements on the flanks may be missing (Federsee 12/2018 Matthias Helm).

Fig. 21: Juvenile male showing exceptional face contrast, but lacking malar spot. White underneath with sparsely striped belly, but considerable striping on under-tail coverts (Federsee 12/2018 Matthias Helm).

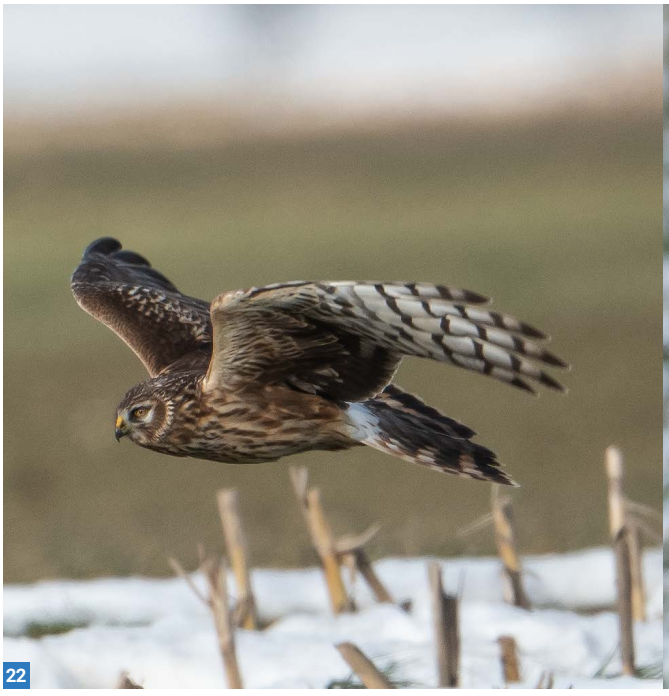

Fig. 22: Juvenile female: Strong streaks underneath, typical edged face pattern and a yellow iris. (Memmingen 1/2019 GD).

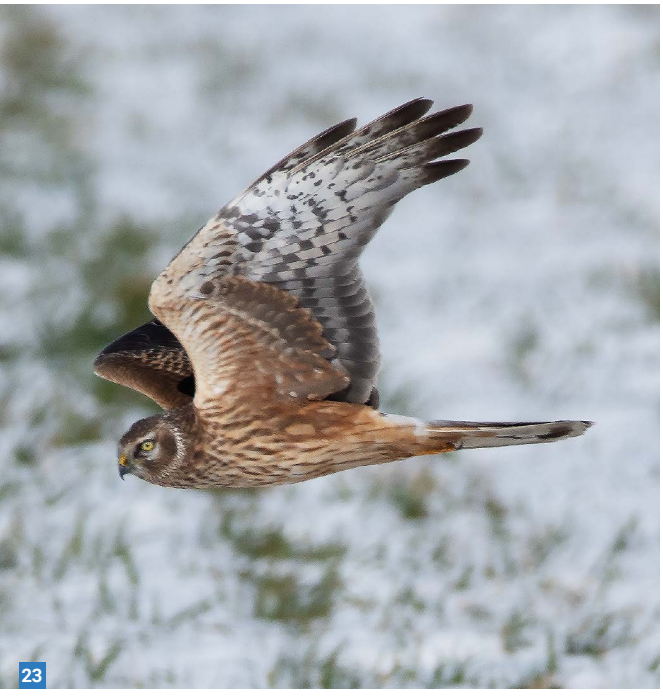

Fig. 23: Juvenile male showing well-marked dark ear- and malar spot, with round head shape and typically rounded face pattern (Riedlingen 1/2020 GD).

Fig. 24: Juvenile female. Pale individual with white underneath, white-spotted panel on the upper wing and yellow iris (Riedlingen 2/2020 GD).

Fig. 25: A few juvenile females show reduced dark malar spots, but most of them can still be identified by their typically edged dark face-surround (Riedlingen 2/2020 GD).

DISCUSSION

Until now, any attempts at ageing and sexing of Hen Harriers has had to rely on Forsman (2008 and 2016) and Clark (1999, 2018). However, these really good texts revealed some smaller gaps of knowledge:

– The drawings of the underwings of juvenile males and females in Clark (1999) are not perfect, and only give a general impression of the reality.
– A holistic review and illustration of the juvenile male underbody was not provided.
– The black terminal band in relation to the previous pale band on the pictured adult female underwing is by far too narrow, obviously due to the widespread confusion between adult female and juvenile male mentioned in the introduction, which obviously also affects the images in Ferguson-Lees & Christie 2016: The underwing of the „adult female" drawing is more similar to that of a juvenile male, rather than that of an adult female.

Several identification field guides seem to have mixed the characteristics of juvenile males with those of adult females and sometimes even juvenile females, due to the lack of knowledge in the past. In some cases, descriptions of misidentified juvenile females were improperly attributed to juvenile males (cf. Gensbol 1997, Svensson et al. 1999, Vinicombe et al. 2014, Khil 2019). The underbody of juvenile birds was often described as „ochre-coloured, yellowish-brown or reddish-yellow" which indeed applies to the majority of juvenile females, but not to the majority of juvenile males (Fig. 5, 11, 15, 21, 27, 40). Likewise, the contrasting dark face-surround ascribed to all juveniles (Lontkowski 1995), can only apply to juvenile females, not to the majority of juvenile males, and as I have shown, spots on the under-tail coverts are not limited to adult females.

Contributing to the problem was the partly incorrect description of the eye colour. According to Clark 1999 and 2018, juvenile males have pale grey to grey-brown eyes becoming yellow by the spring, while juvenile females have chocolate brown eyes becoming clear yellow by 4 to 6 years. Referring to Ferguson-Lees & Christie 2005, eyes of both sexes are brown to 3–4 years. Of all the authors, Forsman (1999, 2016) gets closest to reality, as he describes the irises of young females as brown to dark brown, and those of young males from September of the first calendar year onwards, as yellow. The latter is correct, the former not strictly so, because the proportion of juvenile females with yellow irises is simply too large to be considered outside the normal variation. Although the yellow iris colour of some juvenile females tends towards a darker yellow than that of juvenile males, there are some mostly bright females showing a bright lemon-yellow iris, which cannot be differentiated in the field from that of a juvenile male. According to my results, the eye colour of female Hen Harriers is subject to high variability, while the yellow iris colour of young males during 1st winter is an important and reliable field mark for those.

As a matter of course a field guide has to prioritise illustrating birds that are representative of the vast majority of the population before showing abnormal or exceptional specimens.

A key result of this study is the fact that brown Hen harriers in the field must be identified by a combination of several characteristics, as most of them show varying degrees of overlap. Apart from body size, which is difficult to confirm in the field, the broad blackish terminal band along the secondaries of adult females is a reliable field mark for them, apart from those retaining juvenile secondaries. I have seen only one adult female so far missing these features, instead showing extremely dark secondaries without any visible terminal band. These were probably retained juvenile secondaries of a bird similar to Fig. 14, but this is speculation. Abnormal birds do occur, but I estimate that their proportion is well below one percent. However, reliable ageing and sexing of Hen Harriers requires proper observation conditions or good photo documentations, and often some helping of luck, as Hen Harriers are basically shy and avoid humans, as are many other bird species. That being said, it makes no sense to try to build identification criteria based on poor or incomplete photographic documentation.

The other result of this study is the surprising and intriguing similarity between young males and adult females, which has led to widespread errors in field guides and quite some disturbance on internet data platforms. While fledglings of both sexes don´t seem to differ that much (Forsman 1999, 2016), males obviously develop characteristics before and during first winter, making them look very much like adult females, before they start moulting into first adult plumage partly in winter but mainly during summer of their 2nd calendar year. This begs the question about a biological explanation of this curiosity.

Fig. 26: Juvenile female. Relatively small headed with contrasting edged „diabolic" face pattern. Unspotted brown axillaries (Federsee 4/2019 GD).

Fig. 27: Juvenile male. Round owl-like face pattern with greyish-brown face-surround. Note dark spots on under-tail coverts (Memmingen 1/2019 GD).

Fig. 28: 3. Winter+ female showing greyish owl-like face pattern and greatly reduced collar. Note incomplete banding along flanks and pale spotted rusty brown axillaries (Memmingen 1/2019 GD).

Fig. 29: Juvenile female: Uniformly coloured underneath, contrasting edged face pattern, stronger streaking along flanks (Memmingen 11/2020 GD).

Fig. 30: Juvenile female showing typical uniformly coloured and streaked underside. Note the unspotted greater coverts surrounded by beige (Riedlingen 2/2020 GD).

Fig. 31: Juvenile males often show a varied underside. Note the 3 fully grown tail feathers of first adult plumage (Federseeried 3/2020 GD).

Fig. 32: Juvenile male in hunting action: Pale-dotted orange-brown axillaries, whitish belly and orange cast on under-tail coverts (Ehingen 3/2020 GD).


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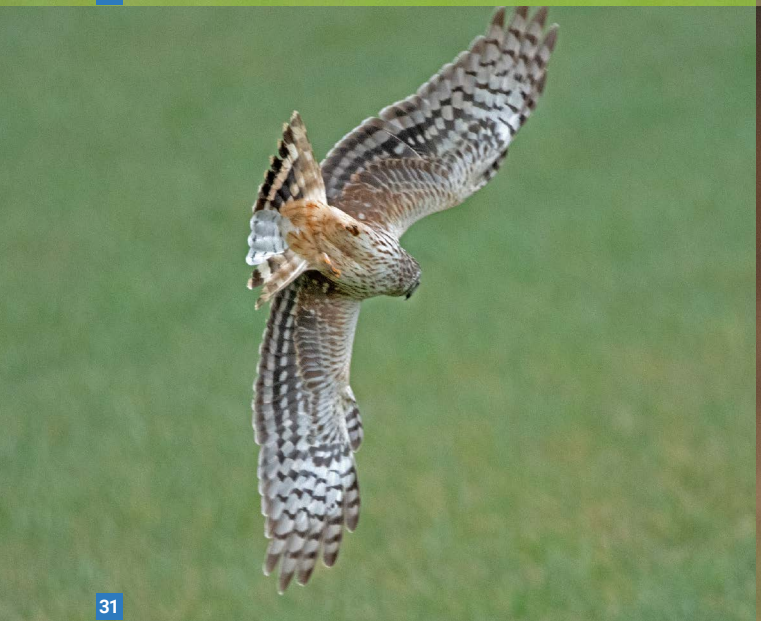
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Fig. 33: The yellow iris combined with a black eye-surround resembles a short-eared owl. This male was recorded on the 23rd of December 2019 with five of its first adult plumage tail feathers already grown to 2/3 of their full size (Riedlingen 2/2020 GD).

Fig. 34: Dark 3. Winter+ female showing distinct dark greyish brown face-surround. Heavily marked underneath with incomplete banding along flanks (Memmingen 11/2019 GD).

Fig. 35: Juvenile female. Obvious nape patches. Note the triangular white sub-eye spot in relation to the edged dark face-surround (Riedlingen 2/2020 GD).

Fig. 36: 2. CY female breeding successfully. The moult of remiges has obviously been stopped in favour of maternal care (France 6/2008 Dominique Gest).

Fig. 37: Moulting 3. Winter+ female. Note broad wings and widely reduced face-surround, contrasting spots on under-tail coverts (Memmingen 11/2019 GD).

Fig. 38: 4. CY+ adult male Hen Harrier. The juvenile face-pattern disappears successively with age and older males don´t even show remnants of the collar. Brownish spots on crown and neck are completely reduced (Anton Luhr).

Fig. 39: 2nd winter male. Birds in first adult plumage show remains of juvenile plumage: brownish flecks on crown and nape, as well as irregular dark flecks on breast, belly and flanks. Facial features of juveniles like sub-eye spot, dark eye-surround and rests of collar can still be recognised (Bad Buchau 1/2020 GD).

Fig. 40: Juvenile male. Note the constant width of the dark terminal band on secondaries, the almost parallel bands in front and the slightly broader stripes on under-tail coverts in successive order. The dark malar spot is missing but a distinctive collar is visible (Federsee 12/2019 GD).

Fig. 41: 3. winter+ female with extraordinary dark and wide terminal band on inner primaries. Face pattern lacking contrast, bull-necked, robust body, broad wings and incomplete barring along flanks (Memmingen 1/2020 GD).

Fig. 42: 2. Winter female. Intermediate face contrast. Dark malar spot still prominent while dark ear spot is reduced. Eyes are amber-coloured, collar starts to fade (Federseeried 2/2020 GD).

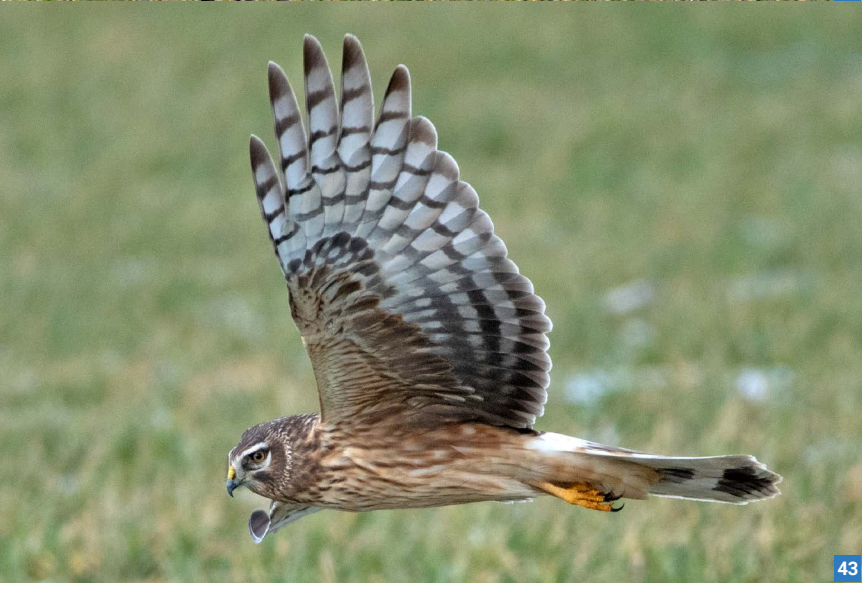
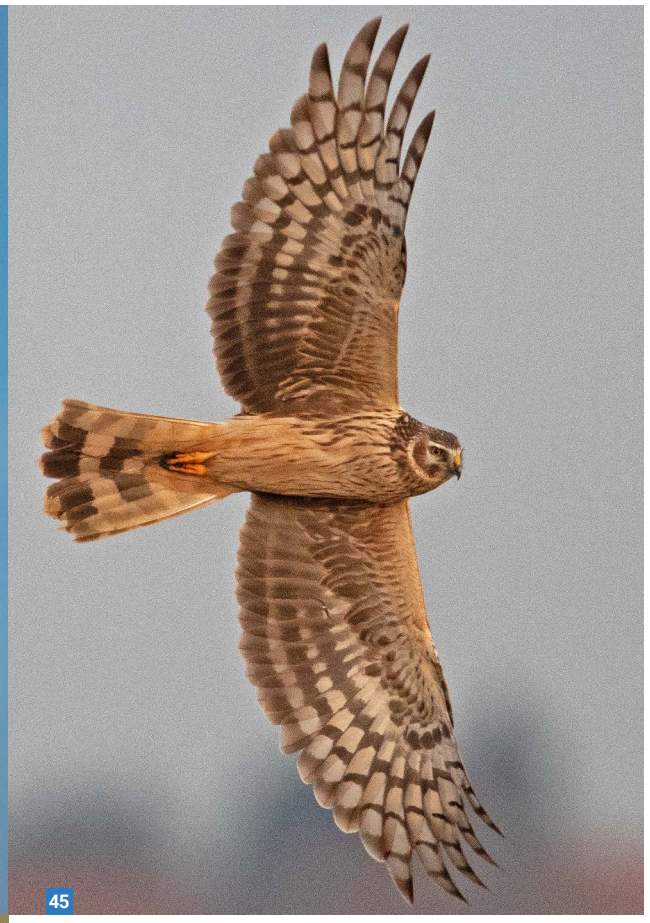


Fig. 43: Juvenile female. Dark terminal band of secondaries widens towards body in this individual. Note typical face pattern but yellow iris (Riedlingen 2/2020 GD).



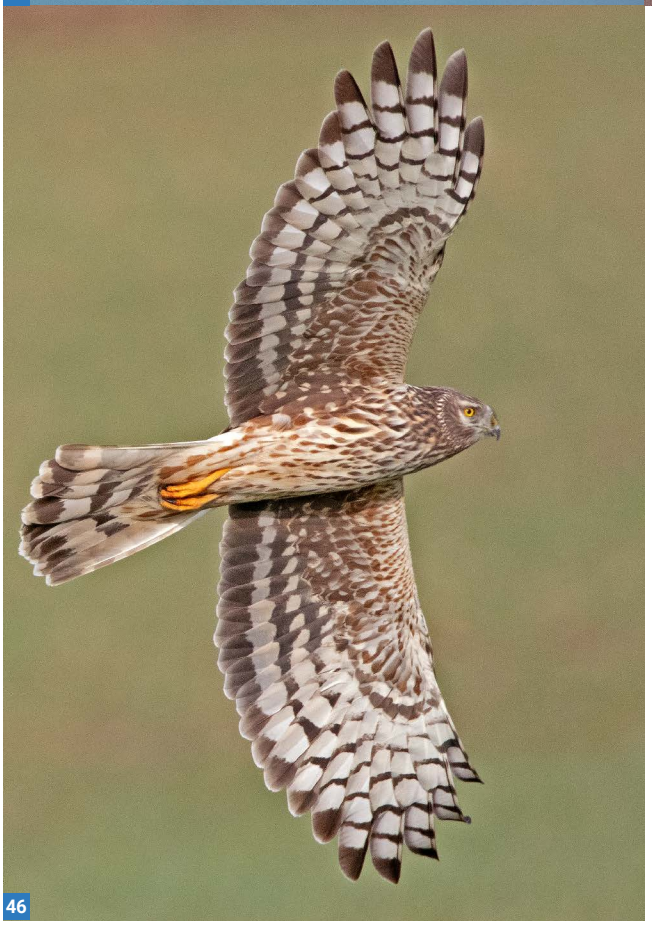


Fig. 44: Juvenile male. Round head shows unvaried dark face-surround of constant width and rounded white sub-eye spot. Belly still pale in this dark individual. Orange hue on hind-flanks and dark spotted under-tail coverts (Memmingen 12/2019 GD).

Fig. 45: Juvenile female with uniformly coloured underbody behind the pronounced collar and narrow clear-cut boa. Brown unspotted axillaries and beige surrounded unspotted greater coverts. Small head compared to body. Note the yellow iris (Bad Buchau 2/2020 GD).

Fig. 46: Adult female showing typical broad and rounded wings, spotted under-tail coverts and pale dots on rusty brown axillaries. Dark malar spot is still recognisable but ear spot faded. Dark secondary terminal band widening towards body. Eyes are yellow (Ehingen 3/2020 GD).

Fig. 47: Juvenile male showing typical pale spots on several greater secondary coverts forming a short spot-line on upper wing (Federsee 10/2019 GD).

Fig. 48: 3. Winter+ female. Unusually indistinct spots but obvious pale tips to greater secondary coverts (Memmingen 12/2019 GD).

Fig. 49: 3. Winter+ female showing typical pale spots as well as pale tips to greater secondary coverts (Federseeried 2/2020 GD).

Fig. 50: Juvenile female. Greater secondary coverts show only single pale dots. Note the diabolic face expression caused by hooked dark face-surround (Memmingen 2/2019 GD).

Fig. 51: 2. Winter female. Massive body, small head showing reduced face contrast, amber-coloured iris, indistinct but visible spot line on greater coverts (Ehingen 11/2019 GD).

Fig. 52: Juvenile female. Contrasty face pattern with prominent malar spot and obvious pale collar. Greater coverts without pale spots (Riedlingen 2/2020 GD).

Fig. 53: Adult female. Heavy body. Owl-like face showing faded face-surround. Greater coverts show pale spot-line. (Ehingen 3/2020 GD).

Fig. 54: Juvenile male. Large rounded head and low face contrast. Greater coverts with pale spots. White underneath shows orange cast on hind-flanks (Ehingen 2/2020 GD).

SUMMARY

The ageing and sexing of Hen Harriers has rarely been studied in detail, and this has resulted in errors reported in the published literature. Nonetheless juveniles of both sexes can be reliably separated between each other, as well as from adult females in the field, using a combination of several features.

Facial pattern, colouration and the pattern of the underparts, including the under-tail coverts, as well as the pattern of secondaries and greater coverts, have been found to be useful field-marks, although there is some overlap in most of the features. Juvenile males share many more similarities in plumage with adult females than with juvenile females. As for adult females, juvenile males show a less contrasting face pattern and a more contrasting, and varied underbody than juvenile females.

The striking resemblance between juvenile males and adult females has caused widespread confusion as well as mistakes in current field guides over a long period of time and this also raises the fundamental question of a biological background for this phenomenon.

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Fig. 55: Juvenile female. Dark eye like most. Contrasty face pattern with distinct dark face-surround and dark ear spot as well as malar spot. Note the characteristic pattern of the greater coverts and the very fine shaft streaks on under-tail coverts (Riedlingen 2/2020 GD).

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