

# A REVIEW OF THE LITERATURE OF THE EIDER DUCKS

(D.I. GILLESPIE, 1968?)

CANADIAN WILDLIFE SERVICE, UNPUBLISHED REPORT



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## Names (1)

1. Mitiek, Mitivik, Male only amaulik
2. Sea duck, Moyac, Ducks and Drakes, Eskimo Duck and Metik
3. borealis = Greenland eider  
dresseri = American eider, Laying duck, Shoreyer,  
Eskimo duck, Morgac (Indian)
4. Sea-duck, sea-ducks and drakes, ducks and drakes, Big sea-duck, canvasback, black and white coot, Eskimo duck, Isle-of-Shoals duck, laying duck, looby, metik, moyac, moyak, passing birds, pied wamp, sea-coot, shoal duck, shoreyer, squaw duck, squaw duck, wamp. Somateria from Greek somatos meaning the body and erion, meaning wool, down; mollissima, Latin meaning very soft; borealis meaning northern; dresseri, in honour of Henry E. Dresser (1838-1915) celebrated English ornithologist, who published "Birds of Europe" in 9 volumes 1871-81.
5. Le Moyac, l'Eider, Le Moyac du Nord
6. Pokaond (bag-duck) in Iceland
7. Genus: Somateria Leach, 1819. Eiders  
Type: Anas mollissima  
Synonyms: Polystricta Eyton, 1836, Eniconetta Gray, 1840; Lampronetta Brandt, 1847; Arctonetta Gray, 1855; Erionetta Coues, 1884.

## Common Eider

Somateria mollissima L.  
Anas mollissima Linnaeus, Syst. Nat. Ed. X, 1, p.124.  
1758, Gotland Island.  
Synonym: Anas acutberti Pallas, Zoographia Rosso-Asiatica, II, p. 235, 1811.  
Russian Names: Gaga (F) gagan (M), gagka, gagka (onomatopoeic names for eiders) allied to Saam name havda and Finnish hagka (origin of name probably to be sought in nuptial calls of male).  
Obyknove nnaya gaga (common eider) immatures and molters are here and there incorrectly termed turpan (scoters).

1. Macpherson, Andrew H. and Ian A. McLaren 1959
2. Lewis, Harrison F. 1926
3. Townsend, Charles W. and Glover, M. Allen 1907
4. Kortright, Francis H. 1942
5. Taverner, P.A. 1949
6. Gudmundsson, Finnur 1932
7. Dement'ev, G.P. et al. 1952

Names (1)

8. L'Eider common. S.m. dresseri Sharpe occupies the S.E. Atlantic part of Canada n. to the Hamilton Inlet area of Labrador. S.m. borealis (Brehm) breeds from Hamilton Inlet northward and westward in the Arctic to Somerset, Cornwallis and Southampton Islands. S.m. sendentaria Snyder breeds and winters on Hudson and James Bays. (s. Bonaparte breeds from Bathurst Inlet and Victoria Island westward (apparently separated from the ranges of the eastern races by a hiatus)).

9. Family: Anatidae  
Subfamily: Anatinae  
Tribe: Somateriini  
(proposed by Delacour & Mayr)

Delacour & Mayr used for their classification the pattern of the scales on the tarsus; the plumage pattern in adults and in downy young, the presence or absence of a double moult, the posture and general body proportions, the structure of the trachea and synnx, and the behaviour particularly courtship display.

10. Black and white Sea Duck (Mass.) Canvasback (Maine, Mass.) Ducks and Drakes (Maine) Greenland Bird (Mass.) Isle-of-Shoal Duck (Maine, N.W., Mass., Conn.) Mongrel (Mass.) Pied Wamp (All N.E. States) Ruff Duck (Mass.) Sea Coot (Conn.) Sea Duck (All) Sea Duck and Drake (All) Shoal Duck (Mass.) Shoal Island Duck (Maine) Squam Duck (Maine) Wamp (Mass., Conn., R.I.).
11. In the paper 'The Family Anatidae' Delacour and E. Mayr included the eiders with the Sea Ducks tribe Mergini. They now think (1959) like the Pochards the eiders are an offshoot of the Anatinior Dabbling Ducks adapted to a special mostly marine diving life. Eiders and Pochards have evidently evolved separately and along different lines as they show no very close relationship to one another.
12. adult male Meramashee Island Whitejackets; west side of Placentia Bay canvasbacks north shore squaw ducks FF is brown duck. decoys called tollers.
8. Godfrey, W. Earl 1966
9. Thomson, Sir A. Landsborough 1964
10. McAttee, W.L 1955
11. Delacour, Jean 1959
12. Local Newfoundland Names Gillespie

## Winter Plumages of Male

### Male in 1st winter plumage

Until early spring (April) mantle brown like juvenile plumage. Before 1st eclipse molt to some extent displays white feathering characteristic of adults on nape, malars, neck, mantle and humerals. Anterior part of breast acquires white or pale rosy cream colour. There are marked variations in the extent of white.

### Male in 2nd winter plumage

Mantle and humerals edged with black. Middle and rear back usually cinnamon black. Sides of rump more or less white.

### Male in 3rd winter plumage

Back same as in 2nd winter

### Adult male winter plumage (nuptial plumage)

Nape and postmalar region with emerald green tinge against white background. Humerals, upper back, two spots on either side of rump and wing coverts white.

Birds of the Soviet Union Volume IV

G.P. Dement'ev and N.A. Gladkov, editors.

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## Topography (1)

1. Forehead - the anterior part of the upper or dorsal head extending up and back from the bill to an imaginary line joining the anterior corners of the eyes. It is composed of an anterior (forward) and a posterior (rear) part.

Crown - the remainder of the upper part of the head, the posterior part. The occiput or hind head is the sloping portion of the crown.

Superciliary line - below the lateral boundary of the forehead and crown.

Auriculars - a group of feathers around the auricular region (around the ear opening).

Temporal region - between the auriculars and the orbital region.

The lore - the area between the eyelid and the base of the upper part of the bill.

Malar region - the side of the head from the base of the lower part of the bill to the angle of the jaw (also cheek).

The chin - the anterior part of the ventral side of the head - the feathered area in the lower part of the bill.

The gular region - the posterior part of the ventral side of the head - a continuation of the chin to an imaginary line drawn between the angles of the jaw.

The neck - extends from the posterior part of the crown to the trunk.

The nape - the upper or dorsal part of the neck.

The jugulum - the lower or ventral part of the neck.

The throat - includes the gular region of the head and the jugulum of the neck.

The side of the neck - extends between the nape and the jugulum from the posterior borders of the auricular and malar regions to the trunk.

The back - the anterior two-thirds of the area between the base of the neck and the base of the tail.

## Topography (1)

### 1. Cont'd.

The rump - the posterior one-third.

The breast - the rounded portion of the underparts beginning at the lower border of the jugulum.

The abdomen - the flatter portion ending in an imaginary line drawn across the anus or vent.

The sides - the upward curves of the breast and abdomen.

The flanks - the parts that lie between the posterior half of the abdomen and the rump.

The scapulars - a group of prominent feathers arising from the shoulder and adjoining portion of the upper surface of the brachium (the portion of the wing between the trunk and the elbow). They slightly overlap the tertiaries.

### 2. The back - the area on the upper surface of the body between the neck, rump and wings.

The breast - the area on the under surface of the body between the chest or upper breast and the belly or abdomen.

The cheek - the area on the side of the head, below the eye, above the chin and throat, extending from the forehead to include the ear region. May be divided into lores, cheek and ear region.

The chest - the upper breast; the area between the base of foreneck and the breast.

The chin - the area on the underside of the head at the base of lower mandible.

The crown - the top part of the head between the forehead and the back of the head or occiput.

The forehead - the area between the base of the upper mandible of the bill and the top of head or crown.

The fore-neck - the front part of the neck, between the throat and the chest.

The hind-neck - the middle of the neck behind.

The malar region - the cheek region.

The nape - the upper parts of the hind-neck just below the base of the skull.

Nuchal - relating to the nucha or nape.

### 2. Kortright, Francis H. 1942

## Topography (2)

### 2. Cont'd

Occiput - the back of the head.

The rump - the lower portion of the back, lying just forward of the base of the tail.

The side - the area on each side of the body between the armpit and flank and the back and breast.

The throat - the area on the underside of the head between the chin and foreneck.

Underparts - those parts of the body below a line drawn along either side from the corner of the mouth to the side of the tail.

### 3. Occiput = back of head

Nape = upper hind-neck adj. nuchal

Pileum = forehead + crown + occiput

Malar = part below the lower mandible

Mentum = chin

Interscapular region = upper back

Uropygium = lower back and rump

Mantle (pallium) = the back, scapulars and wing coverts

### 3. Thomson, Sir A. Landsborough 1964

## Plumages and Molt (1)

1. In the juvenal plumage the sexes are much alike. The young male wears this plumage through the fall and resembles that of the young female but not that of the adult female. The young begins to differentiate sometimes as early as October but more often not until December. He acquires a few black feathers in the flanks and scapulars and a few white feathers on the lower neck or chest. These two colours increase in purity and extent by a practically continuous molt throughout the winter and spring (with considerable individual variation). The tail is molted during the winter, the time varying with different birds, and some white feathers appear in the scapulars and rump in early spring or before that. By April many young males have the throat, neck and chest almost wholly white, the back almost wholly black and white and the head nearly all black above but the wings and underparts are still wholly immature. At this stage the sea-green patch over and behind the ear coverts is often completely developed or intermixed with black and brown feathers of the first stage. In July and August the summer molt begins - this is a complete molt involving a double molt of much of the contour plumage and producing a first-eclipse plumage. The feathers of the whole head and neck are shed and replaced in a few days with a plumage resembling but somewhat darker than that of the juvenile, eye-stripe dull white with blackish markings; crown, upper parts of cheeks and back of head and neck black; rest of cheeks grey-brown; mantle and scapulars blackish-brown. During the fall the first-eclipse plumage is replaced by the second winter plumage which is not completed until November. The second winter plumage resembles the adult plumage in a general way but it can easily be recognized by its imperfections. The centre of the crown is mottled with greyish-brown; the green areas on the head are paler and more restricted; the white of the back is broken by scattering dusky feathers; the lesser wing coverts are brownish and the greater wing coverts are edged with dusky, both of which are pure white in adults; the curving tertials are less developed and edged with dusky instead of being pure white; and the underparts, which are clear, deep black in adults, are now dull, brownish black, with the anterior border broken and mottled. This plumage is worn without much change until the second eclipse plumage appears the next summer. This is less complete than the adult eclipse plumage and can be distinguished from the 1st eclipse by the wings. The fall molt out of this plumage produces the adult winter plumage, characterized by the pure white back, wing coverts, and curved tertials. The young bird thus becomes adult at an age of 28 or 30 months. A few birds otherwise adult retain signs of immaturity during their third winter, chiefly in the form of dusky-edged feathers in the cream-coloured breast.



## Plumages and Molt (1)

### 1. Cont'd

The adult male has one complete molt each year, reaching its climax in August; the plumage of the head and neck is all molted twice to produce and replace the eclipse plumage, that of the breast and back partially twice and the rest of the plumage only once. The bright colours of the head and neck are completely replaced by blacks and browns in mottled effect, a complete molt of these parts beginning in July; the white back is screened by a new growth of grayish-white feathers broadly tipped with dusky; and the breast is completely concealed by new feathers, subterminally barred with the black and tipped with brown. In the fall the winter plumage is reproduced by a complete new growth of feathers on the head and neck; the plumage on the back and breast is restored partly by molt and partly by wearing away of the dark tips.

The female in the juvenal plumage has a smaller eye stripe, paler upperparts and darker upper breast. This plumage lasts through much of the winter. By March most birds have acquired a semi-adult plumage. In this the dull-brown feathers, with narrow sandy-brown edges, of the juvenal plumage have been replaced by dusky or dusky barred feathers, with broad edges or deeper and richer browns, of the adult plumage. These birds can still be distinguished from adults by their juvenal wings, which still retain the old worn, dusky secondaries, tertials, and long-tipped secondaries and secondary coverts of adults are lacking, the belly plumage also remains largely immature. At the next summer molt, which is complete, a second winter plumage is assumed, which is nearly adult; but the white tips of the secondaries and secondary coverts are smaller and narrower; and the birds are usually more heavily barred above and more uniformly dark brown below. At the next molt, when a little over 2 years old, the fully adult plumage is acquired.

According to Audubon the sterile females molt at the same time as males but females with broods do not molt until fully two weeks later. In the first half of July on the southern part of the eastern coast of Labrador males were molting. In the latter part of July and early August, in the Mingan region, only a few showed traces of their nuptial plumage.

2. On August 14 about 20 (probably drakes) were found in a flightless condition near the Neta Islands. On August 9-12 one molting male was seen.

## Plumages and Molt (2)

3. *borealis* differs from *dresseri* except the sea-green of hindhead on *borealis* does not extend as far forward under the black cap towards the bill. The membranous processes on the sides of the bill are much narrower terminating posteriorly in sharp points instead of in broad rounded ones. The feathered portion on the sides of the upper mandible do not extend as far towards the nostrils. A black V on the throat is often found on *borealis*.

The females of both subspecies are identical except for differences in bill-processes.

The moult into the eclipse takes place in July and August and the moult out of eclipse during November and December.

Adult males winter plumage: Head. Forehead region around eye and crown, iridescent glossy black, crown divided along middle by white streak originating in hindhead; cheek, chin, throat and neck white; hindhead sea-green, this colour extending forward narrowly under black cap almost to bill (in *dresseri*); (in *borealis* this line of colour does not extend as far forward); narrow indistinct line of white down side of head; eye brown; bill variable from grey to green, in spring orange-yellow; nail almost white fused with bill and forming entire of tip of upper mandible; bill-processes - from each side of the base of the bill a leathery process extends well up into the forehead and terminates in a broad rounded tip (in *dresseri* while in *borealis* it is much narrower, ends in a sharp, pointed tip) these processes are divided by a thin line of feathering on culmen; feathering of head at lores extends forward on upper mandible to below hind end of nostril and is sharp-pointed terminally (on *borealis* it doesn't extend as far towards nostril). Body. Back and scapulars, white to creamy white; chest, white, tinged with pale creamy brown; rump black, with white patches on flanks; breast, belly and sides, black; feet yellow or green, webs dusky. Tail and its coverts black. Wings Lesser and middle coverts white dusky along forward edge of wing; greater coverts black in some cases with white tips, or occasionally with central feathers white or mottled white and greyish; primaries, black; outer secondaries black; inner secondaries white and sickle-shaped; tertials white; lining grey and white axillars, white.

Eclipse Plumage. In *dresseri* it commences in June and reaches its climax in late July or August. The bright colours of the head and neck are replaced by blacks and browns, feathers of the back are greyish, tipped with dusky and the chest becomes barred with black and brown. The full-plumage wing is renewed.

## Plumages and Molt (2)

### 3. Cont'd

Autumn plumage. In the early stages scatterings of new, white feathers may be seen on head, neck, back and scapulars; the chest also shows a few white feathers of winter plumage among brown-and-black barred ones of the eclipse. Later the black and white head pattern of the winter plumage becomes recognizable and a few sea-green feathers appear on the hind head, though they are still mixed with a number of old brownish eclipse-feathers; the back, scapulars and chest are mostly white with a few, old brown feathers. The molt usually continues until late December. Throughout this moult the fall-plumaged wing distinguishes the fully adult male from young males.

Adult females. Head and neck brown finely streaked with black, darker on crown; bill, duller and greener than that of male in winter; nail bone yellow; bill-processes same as those of male but narrower posteriorly; eye dark brown. Body, Back and scapular feathers brownish black, broadly tipped barred and mottled with rusty brown and buff; chest and sides, feathers brownish-buff barred with blackish and tipped with greyish-buff; breast and belly dusky brown; feet greyish-yellow, webs dusky; tail greyish-brown; upper and under coverts like the back; wings lesser and middle coverts like the back; greater coverts greyish-brown, tipped with white, primaries brownish-black; outer secondaries brownish-black tipped with white; inner secondaries and tertials rusty-brown on outer web, brownish-black on inner web; lining brownish-grey and white; axillars whitish.

Juvenile. In the first autumn the sexes are much alike but do not resemble the adult female. The plumage is dull brown, with narrow sandy-brown edges to the feathers. The young male has a larger eye-stripe, darker upperparts and paler chest than the young female. During the late autumn the young male differentiates by acquiring some black feathers in sides and scapulars and some white feathers in chest. This moult continues during the winter and by April many young males have the throat, neck and chest almost wholly white, the sea-green patch around the ear region is either completely developed or mixed with black and brown feathers; the wing and underparts are still immature.

During July and August of the second summer the first eclipse moult takes place. This is a complete double body-moult and the first winter plumage is replaced by another which is similar but darker. During the second autumn a moult towards adult plumage continues and usually by November the plumage resembles that of the adult but the young male can still be recognized by certain imperfections: the crown is mottled with greyish or brown; the white back shows a sprinkling of dusky feathers; the breast black in the adult is dull brownish-black, mottled and broken where it meets the white of the forebreast and chest. This plumage is worn until the second eclipse

## Plumages and Molt (3)

### 3. Cont'd

moult takes place; further progress towards full dress is made and after a 3rd eclipse moult the plumage is fully adult.

The young female retains the immature plumage during the 1st winter but by March most of the birds have acquired a semi-adult plumage but can be distinguished from the adult by immature wing and the breast plumage. After the first summer moult the 2nd winter plumage is assumed which is almost adult but the young birds are more heavily barred above and the breast is more mottled but lighter than in the adult. After the 2nd summer moult when a little over two years old the fully adult plumage is assumed.

4. There seems to be large moulting concentrations of the species off the shores of Prince Edward Island.

5. In W. Morman there have been mass appearances of molting male eiders in January-February while complete moulting did not take place before December. The adults were the first to begin acquiring their mature plumage and were then followed by the juveniles which changed into their 1st prenuptial attire.

6. Molts twice yearly, after nuptial season completely or almost so and before beginning of season partially (wings untouched). Males aggregated into parties and roam off from nesting area to molt when females begin to incubate. On eastern Murman as early as mid-June - 1st blotchy males appear by June 22-24 become flightless by August. At Estonian coast males begin to molt in mid-June. On Novaya Zemlya some males already appear in molted condition by June 24. Molt begins at feathering of trunk, without involving lower breast, belly and back which molts somewhat later together with wings and tail. Last phases of post-nuptial molt coincides with beginning of subsequent molt. Sometimes feathering of lower breast and belly remains unreplaced until beginning of autumn molt, so that only one molt occurs annually. Termination of fall moulting in males usually in August in adult females from August to September with replacement preceeding on head, neck upperside of body, appear breast and crissum, with wings, tail and remainder of body molting later. Prenuptial molt occurs in males from August to December in females from December to March.

4. Boyer, George F. 1966

5. Belopol'ski, L.O. 1957

6. Dement'ev, G.P. et al. 1952

## Plumages and Molt (3)

### 6. Cont'd

1st molt of juveniles extremely protracted beginning in September and concluding only in April, but remaining far from complete with various individuals molting to different degrees. This replaces most but not always all mantle feathers, back, upper-tail, and ~~crissum~~ feathers, sometimes breast and belly feathers and sometimes all, but at other times only central pair of retrices. Subsequent molt of immatures proceeds more or less simultaneously with adults. Molting flocks remain at sea, generally in quiet coves near shallows or under water, reefs but far away from shore.

White Sea and Murman nesters voyage to Terskii Coast of White Sea around region of Tetriho-Polonga encampments and perhaps somewhat further west. Novaya Zemlya drakes may molt at Kolguev Island but bands also occur on Kara Sea.

Juvenile. Generally resembles adult female but upper parts darker with narrower feather edging. In males internal secondaries darker, more markedly curved than in females; secondaries and large wing coverts with indistinct white or cinnamon tips. Juvenile females feathering on back and rear more frequently possess broad brown end bands.

Female in 1st winter plumage. resembles adult females in plumage worn after complete summer molt but differs in darker crown and dark ashy cinnamon nape. Mantle, humerals and flanks sepia with narrower brownish edging than in adults. Back as in 1st plumage. Upper tail coverts light brown - black with other subterminal bands; feathers on both sides of rump as in adults. Malars and sides of neck cinnamon brown markedly more striated with dark cinnamon bands than in adults. Chin and throat ashy white with narrow dark cinnamon bands, rest of feathering of underparts as in adults.

Female after 1st full molt. coloured like adults in same plumage but differ in wing colours (as in juveniles) and persistence of individual feathers of juvenal plumage on trunk.

Female in 2nd winter plumage. differentiable from adults only by narrower white tips on secondaries and large wing coverts. In all subsequent plumages indistinguishable from adults.

Adult female in nuptial plumage. uniformly brown cinnamon darker above. Top of head blackish with numerous small longitudinal vermiculations, malars and throat light but also with black streaks. Other parts black-brown with reddish edging on feathers, with similar scale-like pattern also occurring on flanks and almost entire underparts except lower breast which is uniformly dark brown. Wings and tails of similar colours secondaries and large

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Plumages and Molt (4)

6. Cont'd

feathers with gray-cinnamon tips. White internal secondaries and coverts with cinnamon tips, some internal large coverts and median coverts with cinnamon dots.

Male after 3rd complete molt. Now indistinguishable from adults.

Adult male in nuptial plumage. Forehead, crown and upper half of sides of head black; from nape anteriorly over eyes extend narrow white bands. Nape and postmalar area with emerald-green tinge against white ground. Rest of head, humerals, upper back, two spots one either side of rump and wing coverts white. Crop and forebreast also white, but with delicate pinkish-cream tinge. Rest of underparts, rear back and upper tail black. Primaries black-brown, secondaries black, internal secondaries curved and white. Rectrices black-brown. Upper mandible black, over proximal half green-olive, nail pink; feet olive; irides black-brown.

Adult male in summer plumage. Entire head, neck, mantle, breast dingy brown with narrow black bars. Over eyes run black and white streaks. Crop and forebreast white, sometimes pinkish, with black tips on feathers. Rest of underparts black; white elongated feathers on either side of rump absent.

7. The molting areas are along the Tersky Coast of the White Sea (the area of the Terino and Pulon'ga camps).

Prenuptial molts occur in males from August to December; in females from September to March. The eclipse in females takes place from mid-June to end of August. Males begin to gather early in June - in Kandalaksha Bay, they gather between June 1-10 then depart between June 12-15. From the Kandalaksha Bay they move mainly along the Karelian coast. They gather in the southern part of the Severny Archipelago near the Golovin, Dokocheikha, Lemnishny, Sedlovatyeludy. Later the flocks concentrate at Afanaska Island and the Lambing Anisimov and Oleniy Islands to the Turly promontory, along the Terskiy Coast to the neck of the White Sea. Between August 20-25 near Chavan'ga and Chapoma and by Sosnovka and Ponoy large flocks were noted at a distance of one to two Km. from the shore. They were unable to fly. On September 2, the 1st two males were seen to fly. Males begin to appear from the end of June near the Tersk and Saami Coasts. Especially large accumulations of males are found in the neck of the White Sea. After the molt males appear in Kandalaksha Bay between the end of August and mid-September.

7. Gerasimova, T.D. and Z.M. Baranova 1960

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Plumages and Molt (4).

6. Cont'd

coverts with white tips, forming bands delineating usual site of speculum. Bill greenish-olive, darker than in male, feet olive.

Adult female in summer plumage (after complete molt). Above particularly on head, markedly darker than in spring. Crown cinnamon-brown, nape ashy-cinnamon. Upperparts and breast lighter and more narrowly edged than in common plumage. Malars and sides of neck with thick blackish-cinnamon bands. Flanks dark ashy-cinnamon, crissum lighter, with browner tips and dark cinnamon subterminal spots.

Male in 1st winter plumage. Forehead and nape tobacco-cinnamon with black, more or less distinct longitudinal streaks. Lower crown and nape black with bluish gloss, hind neck cinnamon-black. Through eye extends light brown or whitish stripe; rest of sides of head and neck cinnamon-black. Throat anterior neck and humerals blackish-cinnamon. Rest of body retains juvenal feathering. In spring of 1st year of life even before complete molt, male to some extent displays white feathering characteristic of adults on nape, malars, neck, mantle and humerals. Anterior part of breast acquires white or pale rosy-cream colour. Tail as in adults; underparts retain colour of first plumage. Plumage described above displays marked variations in extent of white.

Male after 1st summer molt. Differs from adult in same plumage in retention of juvenal feather colours of wing feathers characteristic of juveniles.

Male in second winter plumage. Generally similar to adults but feathers of head and neck edged with dark and yellow-brown edging; mantle and humerals partially edged with black. Middle and rear back usually cinnamon-black, sides of rump more or less white with some addition of white feathers. Sides of crissum with large white patches, some feathers with blackish tips. Rest of feathering as in adults, but some feathers of throat, foreneck and upper breast narrowly banded with black. Some secondaries tipped in white and sometimes with white markings, but never with so much white as in adults; internal of these narrower than in adults, only slightly curved, with external vane or both vanes white. Median wing coverts white with blackish-cinnamon edging and spots; large coverts with white tips; some small coverts with white specks. For rest wings as in adults. Amount of white on wing highly variable.

Male after 2nd full molt. Differs from adults and yearlings in same plumage in feathering of wings. Internal secondaries blackish-cinnamon with some white markings, median coverts with blackish tips, small coverts pale cinnamon.

Male in 3rd winter plumage. Generally like adults, but back as in two-year old males. Middle of rump with some white

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Plumages and Molt (5)

7. Cont'd

On the Murman Coast maximum numbers of males are noted by the end of May. In June their numbers decline and by the end of July only individual birds may be encountered. In the second half of August or the beginning of September molted males reappear.

8. By late May and early June the old males have already strayed into the flocks and have abandoned the nesting areas for the purpose of moulting. There is no data re: migrations of old males for moulting or places where they moult.

9. Along the Terskii Coast of the White Sea is where the eider drakes from the Eastern Murman and the Kandalaksha Gulf (and possibly the Onega one as well) of the White Sea congregate for moulting. Moulting sites on the northwestern part of Vaigach Island, along the Terskii Coast between Tetrino Village and Pyalitsa Village.

10. At entrance of Natasquam 2 males shot found very much advanced in the moult June 23, 1833. No doubt exists in my mind that male birds are much in advance of females in their moults. This is very slow&indeed is not complete until late in the winter after which the brilliancy of the bills and the richness of the colouring of the legs and feet only improve as they depart from the south to the north.

8. Aumees, L.E. 1966

9. Karpovich, V.N. and V.D. Kokhanov 1966

10. Audubon, M.R. 1897



## Weights and Measurements

1. 4 lb., 3 oz. adult female crippled (mollissima) (Frobisher Bay July 13, 1953).

4 lb., 8 oz. subadult male (mollissima) (Frobisher Bay July 20, 1953).

2. Average summer weight (22) males 2217.8 range 1384-2800 gram  
(32) females 1914.6 range 1192-2895 gram  
male eiders differ from females by as much as 13.7%.

The difference between the maximum and minimum weight in male eiders is 51.9% and in females 58.8%. The greatest deviations in the average summer weights of males and females appear in birds with distinctive sexual dimorphism (the eider). Before or at the beginning of breeding all birds are considerably fatter than immediately after wintering or at the peak of breeding.

spring - summer fluctuations males 12% - females 31%

females fast during incubation - males during mating season

3. Weight of two (2) one day-old birds at Kent's Island, June 20, 1932 - 73.5 and 77.0 grams.

4. Brooding females were weighed at the end phase of their brooding in the Soderskar area in 1960-1964. The average weight was  $1592 \pm 1398$  (482 females) (weighed to the nearest 50 g) extremes 1200-2150.

5. Eight (8) males collected between May 21 and July 2 ranged between 1775 and 2100 gms with mean 1871 gms. Twelve (12) females collected between June 23 and July 20 range 1475 to 2100 with mean 1756 gms.

Culmen 25 males 46.0 - 53.9  $\bar{x}$  50.50

Length of frontal process 26 males 15.2 - 21.8  $\bar{x}$  19.41

Width of frontal process (exposed width) 27 males 5.0 - 8.4  $\bar{x}$  6.40

Wing chord 25 males 263 - 296  $\bar{x}$  278

Culmen 30 females 44.0 - 57.5  $\bar{x}$  47.90

Length of frontal process 31 females 13.7 - 20.1  $\bar{x}$  16.93

Width of frontal process (exposed width) 31 females 3.7 - 6.0  $\bar{x}$  4.81

Wing chord 31 females 251 - 280  $\bar{x}$  267.7

1. Sutton, G.M. and D.F. Parmelee 1955

2. Belopol'skii, L.O. 1957

3. Gross, A.O. 1938

4. Grenquist, Pekka 1965

5. Macpherson, Andrew and Ian A. McLaren 1959

## Weights and Measurements

6. James Bay - wing chord 287 (272-305 mm) culmen 49.8 (47-52) length of lateral bill process 21.8 (19-24) width of bill process 6.5 (5-7.8).

7. 8 females collected in Peter Force Sound August 4, 1950 weighted 1.84, 1.68, 1.53, 1.47, 1.45, 1.39, 1.30 and 1.22 kgms.  $\bar{x}$  1.485 kgms.

8. male collected June 19 wt. 2548 gms; wing 307 mm; bill 63 mm; tarsus 45 mm. Female collected June 28 no wt. wing 270 and 273 mm; bill 52 mm; tarsus 55 mm.

9. length of wing of males 269-328 females 258-295 mm. tarsometatarsus of males 45-55 females 45-53. Weight males (adult) in spring before breeding period 2250-2600 g. adult females 2365-2895 gms. During breeding season drakes lose 200-300 gm. but females about 1000 gms. Immature males at end of May and early June about 2250 (2075-2485 gm.) White Sea. Weight of female before end of sitting 1555-9637 gms. eastern Murman. Murman birds in summer adult males 2218 gms (1384-2800) adult females 1915 gms. (1192-2895) in summer, in May 2370, June 2081, July 1629, August 1928 gms.

borealis to 2300 gms in June.

10. dresseri adult male wing 262-291 (274) tail 82.5-102 (92.4) exposed culmen 52-58.5 (56.4) tarsus 49-56 (53.4). Adult female wing 250-293 (271.5).

6. Manning, T.H. and D.F. Coates 1952
7. Wynne-Edwards, V.C. 1952
8. Hohn, E. Otto 1968
9. Dement'ev, G.P. et al. 1952
10. Godfrey, W. Earl 1966

# Nesting Range and Breeding Areas (1)

1. bred from western side of Penobscot Bay east to Machias Bay. By 1904 it (dresseri) was reduced to a small number breeding in Jericho Bay and on Old Man's Island.
2. In an inspection of the seabird colonies of the Maine Coast in 1931 eiders were breeding on Old Man's Island, White Ledge, West Penobscot Egg Rock, Mouse Island, Robinson's Rock and Calderwood Island.
3. In an inventory from Isle of Shoals near the Maine-New Hampshire boundary to the most northeastern sections of the Maine coast nests were found on 31 islands (1941-43). Nesting range extends from Mark Island in Casco Bay. The nesting population in 1941-43 exceeded 2000 pairs compared to 2 known pairs in 1907. By the summer of 1943 there were a thousand pairs nesting on Kent Island.

## breeding localities on the Maine Coast 1941-43

Old Man's I.	44°37'	67°14'	
Double Shot I.	44°36'	67°16'	
Green I.	44°34'	67°27'	
Ballast I.	44°34'	67°33'	
Shabby I.	44°10'	68°34'	
Great Spoon I.	44°03'	68°34'	
Little Spoon I.	44°03'	68°34.4'	
Green Ledge	44°18'	68°50'	
Barred I.	44°16'	68°50'	(1943 - 13 nests)
Colt Head I.	44°16'	68°51'	
Horse Head I.	44°15'	68°51'	
Grass Ledge	44°13'	68°51'	(1933-94 nests;1941-89;1943-123)
Compass I.	44°13'	68°52'	(1943 - 40 nests)
Sloop I.	44°12'	68°49'	
Spoon Ledge	44°12'	68°50'	
Mouse I.	44°12'	68°57'	
Grass Ledge	44°12'	68°48'	
Oak I.	44°12'	68°49'	
Burnt I.	44°11'	68°49'	
Goose I.	44°11'	68°57'	
East Goose Rock	44°11'	68°59'	
Dagger I.	44°11'	68°48'	
Downfall I.	44°11'	68°49'	(1943-46 nests)
Sheep I.	44°11'	68°49'	
Robinson's Rock	44°10'	68°59'	
Widow's I.	44°08'	68°50'	
Otter I.	44°01'	68°48'	
No Man's Land I.	44°53'	68°52'	
Fisherman's I.	44°02'	69°02'	
Otter I.	44°01'	69°04'	
Mark I.	43°42'	69°54'	

1. Dutcher, Wm. 1904
2. Norton and Allen 1931
3. Gross, A.O. 1944

Nesting Range and Breeding Areas (1)

4. a dozen pairs of eiders breed on Three Islands (a group of which Kent I. is a member) in 1908.

5. the Colony on Kent Island (Three Islands) had increased to 300 pairs by 1937.

6. Ile Blanche (4752 6941) or North Reef or Hare Island showed 4,014 and 3,966 eider nests in 1965 and 1966 - an island of 20 acres.

7. the nesting population in Iceland has been determined to be 250,000 pairs, while the total population counting juveniles must be near 1 million birds.

8. Koksoak R. nesting 5832N.

9. Akpatok I. breeding.

10. Button Is. Hudson Strait breeding.

11. Flaherty I., Belcher Is. nesting.

12. Charles I. Hudson St. one egg?

13. Islands off Aulatsivik, breeding 5945N (S. m. borealis)

4. Brownson, W.H. 1908
5. Gross, A.O. 1938
6. Reed, A. and J-Guy Cousineau 1967
7. Pettingill, O.S. Jr. 1959
8. Phillips, John C. 1926
9. Davis, D.H.S. 1932
10. Gross, Alfred A. 1935
11. Twomey, Arthur C. 1942
12. Eifrig, C. Wm. G. 1905
13. Hantzsch, Bernhard 1908

Nesting Range and Breeding Areas (2)

14. Island off Hopedale breeding; Koksoak R. (1883 Turner) eggs, Whale R. eggs (1883) MacKays I. in Whale R. Eider Island between Wolstenholme Island and Saunders Island, Greenland June 23 and 25, 1914 just commenced nesting. Dalrymple Rock, Lyttleton Island, McGarys Rock, the small islets in the bay south of Cape Hatherton, Sunderland Islands, Haklayt, and the Cary Islands are all frequented by large numbers of nesting eiders (Greenland).
  15. Hopedale, Cape Chidley, Boudain Harbour, Eclipse Harbour, Button Is. Grenfell Tickle, Louse Harbour, Port Manvers Run, Tornavik West and Red Is. nesting.
  16. mouth of Whale River nesting (S. dresseri).
  17. Kikkertavak Island (1920) 2 empty nests (July 12), Louse Bay (1920); July 19, 5 eggs, 1 nest and several broods. Metik Islands (1905) 3-4000 eggs collected fide Dr. W.T. Grenfell. Islands in the Kasigiaksiovik R. (a stream emptying into Leaf Bay) nests fide Hildebrand and Dunbar 1947. Islands near the entrance of Hopes Advance Bay nests 1947, False River downy young 1947. Gyr Falcon Islands nest 1947.
  18. Eider Islands off Cape Hopes Advance nesting 1897.
  19. Greenly I., Strait of Belle Isle 1861 nesting (S. m. ).
  20. Mingan Is. Quebec. nesting 1862.
  21. Mingan Is. and Islands below Eskimo Pt. Quebec 1881 nesting.
  22. St. Augustin, Que. breeding.
  23. Saguenay to Blanc Sablon nesting 1900.
  24. Gannet Is. Mason's I. nesting 1948.
  25. Ayler Sound, Yankee Harbour, Nazaire Harbour, Quebec nesting 1924.
  26. St. Mary's Is. Que. breeding 1935.
- 
14. Bent, A.C. 1925
  15. Gross, Alfred O. 1937
  16. Macoun, John 1900
  17. Todd, W.E. Clyde 1963
  18. Low, Albert P. 1899
  19. Bryant, Henry 1861
  20. Verrill, A.E. 1862
  21. Couper, Wm. 1881
  22. Stearns, W.A. 1884
  23. De Puyjalon, H. 1900
  24. Orr, Virginia 1948
  25. Lewis, H.F. 1925
  26. Johnson, R.A. 1935

Nesting Range and Breeding Areas (2)

27. Carrousel I., Birch I., Cliff I., Washikuti R. Falls, Que. nesting 1952.
28. Musguaro and Eskimo Pt. Que. nesting 1887.
29. Mingan Is. Que. breeding 1887.
30. same as 29.
31. Mingan Is. Que. breeding 1904.
32. Eskimo Is., Que. nesting.
33. St. Mary's Is. Wapitagan, Que. nesting 1929.
34. off Gore I., Que. breeding 1891.
35. Mingan Is., Que. 1894 breeding.
36. American Harbour (Natashguan) Que. nesting 1833. Partridge Bay, Que. nesting 1833.
37. Mingan Is. breeding 1909.
38. Iles Corneilles, Que. nesting 1910.
39. Derby Bay, Que. nesting 1917.
40. Bay Johan Beetz, Que. nesting 1918, island off Watshishu, Que. breeding 1918, island off Romaine R., Que. nesting 1918, La Petite Rigolet, Que. breeding 1918.
41. St. Mary's Ile. Que. breeding 1933.
42. Romaine adult with nest plus eggs collected 1915 C.H. Young. Etamamu River 2 downy young collected 1938 A. Nelles. Anchor Island, Ste. Genevieve Isle Hunting Island, islands off Natashguan and islands at the mouth of Kegashka River eggs collected 1928, islands off Washikuti R. 1928, Old Bluff and nearby Islands 1928 nesting, Perroquet Islands 1928 nesting plus broods.

27. Gabrielson, J.N. 1952
28. Frazar, M.A. 1887
29. Palmer, Wm. 1890
30. Lucas, F.A. 1891
31. Schmitt, J. 1904
32. Townsend, C.W. 1910
33. Cleaves, H.H. 1929
34. Packard, A.S. 1891

35. Stearns, W.A. 1894
36. Audubon, M.R. 1897
37. Comeau, N.A. 1909
38. Townsend, C.W. 1910
39. Townsend, C.W. 1917
40. Townsend, C.W. 1918
41. Bailey, A.M. 1933
42. Todd, W.E. Clyde 1963

Nesting Range and Breeding Areas (3)

43. Island off Fort George River nesting 1900 (sedentaria?)  
Richmond Gulf Islands nest fide spread borough 1896.
44. Great Whale River, Quebec nesting fide Low 1906.
45. Belcher Is. breeding 1918.
46. Flaherty I. Belcher Is. nesting 1942.
47. Gasket Shoal, Solomons Temole I., Grey Goose I., Bear I.,  
breeding 1952.
48. Elsie I. egg 1926. Island in Moar Bay, Tukavak Island  
(Cruickshank Hill), Kogalvk River mouth eggs collected. Reef  
Bay colony fide Snyder small island north of Cape Anderson 1930  
nest. Island near Magnet Point 1930 nest. Island near mouth  
of Mosquito Bay nest 1930, Island of Smith Island 1930 nest,  
island off Long Point 1860 fide Drexler eggs. Paint Hills Island  
1860 eggs fide Drexler, a point north of the Comb Islands egg 1860  
fide Drexler. Aquatuk Bay 1960 eggs fide Drexler. Walrus Island  
female and eggs 1912, island in Moar Bay nest 1914. Scoter Island  
n.e. of Struttons nests 1942, islands in Richmond Gulf old nest  
1926, small islands east of Nicholson Island nests 1915 fide  
O.J. Murie. Rocky point south of Cotter Island nest 1915 fide  
Murie, some small islands north of Kikkerteluk R. 1915 nests fide  
Murie, island south of Hopewell Sound nests fide Murie 1915, near  
Taylor I. 1915 nest fide Murie, Curran Island 1915 nest fide Murie.
49. Small island east of Gushie Point 1938 nest, small islands  
along the west shore of Tukavak Island 1938 nest. On the shoals  
near the south end of Wetalltok Bay nests 1938.
50. Kandalaksha Bay - Malyi Lomnishnii Island 1952, 9.4 nests/hectare,  
Dokucheikha Island 7.4 nests, Kurichka Island 6.5 nests, Voronii  
Island 1 nest, Anisimov Island, Kurichov Island, Gul'makha Island,  
Poperechnyeludy, Sem'Ostrovov (7 Islands), Veshnyak Island, Novaya  
Zemlya, Ainov Islands, Irin'in Island 1.2 nests/hectare, Bol'shoi  
Litskii Island, Medvezhii Island, Spitzbergen, Lomnishnyi, Lodeynii  
I., Anisimov I., Kharlov Island (East Murman) Malyi Zelentsy I.,  
Voronka I., Devichyaluda, B. Litskiy I., Afanaska I., Zelenets I.,  
Ryazhkov, Gul'makh, Devich'ya, Sedlovataya.
51. St. Brendans nest 1945, Islands off St. Peter's Bay, Labrador  
nest and eggs 1943, Dementre I., Hare Bay nest and egg 1943, Spring  
I., Hare Bay nest and eggs 1943, Hare Island, St. John's Bay May  
nest 1944. Whale I. St. John's Bay nest and eggs 1944, James I.
- |  |  |
|--|--|
| 43. Macoun, J. 1900                    | 48. Todd, W.E. Clyde 1963                      |
| 44. Eifrig, C.W.G. 1906                | 49. Twomey, A.C. 1942                          |
| 45. Flaherty, R.J. 1918                | 50. Gerasimova, T.D. and<br>Z.M. Baranoya 1960 |
| 46. Twomey, A.C. 1942                  | 51. Peters, Harold S. 1945                     |
| 47. Manning, T.H. and D.F. Coates 1952 |  |

Nesting Range and Breeding Areas (3)

51. Cont'd

St. John's Bay nest and eggs 1944, Fox I., St. John's Bay nesting 1944. Petrel I., St. Peter's Bay, Labrador nests 1944, Westernmost I., St. Peter's Bay nest 1944, Gull Rocks St. Lewis Bay, Labrador nest and eggs 1944, Otter Bay, Labrador nests 1944, S. Penguin I., Cape Freels nesting 1945. from his notes "Between Barachois Bay and Connoire Bay Aug 1, 1938 eiders nest on several rocky islets off coast several females with young unable to fly. La Poile Bay Aug. 2, 1938 group of small islets east of La Poile Bay where eiders nest.

52. Saunders Isle July 25 - 142 individuals seen most in family groups. Some young appeared to be only a few days old. Eggs were reported to be found July 1. Numerous small flocks (27 individuals) were seen at the head of Foulke Fjord (Etah) accompanied by a few day-old ducklings. At Port Leopold a hen was flushed from her nest which contained 4 eggs on August 1 and 2 females examined from a flock of 8 had ovaries well developed. A hen with 25 small ducklings was seen in Hell Gate in heavy pack-ice on August 6. Several nests with eggs were reported to have been found on Olsen Island at the entrance to the fjord.

Saundes I. second largest island in the entrance to Wolstenholme Fjord, northwest Greenland Foulke f. N.W. Greenland where Etah is located omits northshore about 78°20'N lat. Port Leopold - off Prince Regent Inlet northeastern Somerset Island. Hell Gate Strait separating Simmons Peninsula from eastern North Kent Island 89°40'W. Olsen I., at mouth of Goose Fjord S.W. Ellesmore I., 88°35'W.

53. Halfway I., Labrador several nest and eggs 1952, Gannet I., several nests and eggs 1952. Small island off Double I., Labrador fine nesting population 1953; Nunarsuk I., Labrador eggs 1953.

54. Found eggs on outer islands near Kikkertaksoak 1918.

55. Egg Metic I. (fide Lenz) 1916 Red Islands eggs 1927, Sandy Island near Ford's Harbour eggs 1928, Nanuktok I. eggs 1928.

52. Duvall, A.J. and C.O. Handley

53. Tuck, L. 1953 Field Notes, Unpublished, written.

54. Wheeler, E.P. 1930

55. Austin, O.L. Jr. 1932



29

#### Nesting Range and Breeding Areas (4)

56. Its nests have been found in the Barents Sea region along the entire Norwegian-Murman Coast on the entire western coast of Novaya Zemlya (from Vaigach Island to C. Zhelanie), on Franz Josef Land, Spitsbergen, and Bear Island. It never nests on Kolguev Island and on the Kanin-Penchora Coast (east of Cape Kanin). It is common in the White Sea (on the Tersk and western coast, including the Onega Bay), on the Scandinavian coast, the Baltic Sea, in Iceland, the British Isles, Greenland and on the American coast (from Grant Land to Nova Scotia. The nesting range of the common eider does not reach the Kara Sea. The greatest concentration of eider nests seen is in the Seven Islands region (about 1000 nests) and on the Ainovy Islands (about 500 nests) where they are protected by the Seven Island sanctuary. In Novaya Zemlya the largest number is found in the following regions: Kara Strait (near settlements of Rusanov, Savichikha and others), the Malye Karmakuly-Gribovaya Inlet and at the Inlets of Matyushikha and Krefovaya. Two subspecies nest within the limits of the Barents Sea *S. m. mollissima* L. and *S. m. borealis* Brehm. The former are found in the southern and eastern parts of the area and the latter in Spitsbergen, on Bear Island and probably on Franz Josef Land.

57. The most abundant breeding bird, probably, of the coastal region, nesting in large numbers on islands on the sea and in lakes, on rocky hillsides and even on cliffs at least as far north as Cape Queen (from just east of 73°00'W).

Two lone females were observed on June 19 at nesting sites on Okolli Island. On August 4 two nests were found one containing four eggs and the other five ducklings.

58. It is probably the common breeding eider on the Hudson Bay Coast north of latitude 56° (*S. m. borealis*). Bigelow says it is abundant north of Hamilton Inlet on the east coast. At Nain, Mr. Schmitt told us that eiders breed during the latter part of June and early July.

*S. dresseri* common summer resident along the south coast and south of Hamilton Inlet on the east coast and of Richmond Gulf on the west coast (Macoun 1900).

59. Along Foxe Channel it is less numerous than along the southern shore of Foxe Peninsula. It gradually decreases in numbers from King Charles Cape northward to Cape Dorchester. In the Bowman Bay region a small breeding colony was located on July 24, 1929 - some of the eggs were hatched on that date. Along the north coast of Foxe Peninsula west of Bowman Bay it is more common. Eskimos reported great numbers of nests on the Middle Savage Island and in a group of islands west of Big Island. The islands from Middle Savage to Lower Savage Islands are productive nesting sites. Natives report that large nesting colonies occur in and about Frobisher Bay and in Cumberland Sound.

56. Belopol'skii, L.O. 1957

57. Macpherson, Andrew H. and Ian A. McLaren 1959

58. Townsend, Charles W. and Glover M. Allen 1907

59. Soper, J. Dewey 1946

# Nesting Range and Breeding Areas (4)

60. Gasket Shoal, James Bay 200 nests in 1949 the greatest concentration on the north shore.

61. Brewster Point 1 nest with 5 eggs August 6, 1937.

62. Baffin Island - West Foxe Islands 64°17'N;75° . Tunitjuak Island, Ooglukjuak Island, Coatesworth Island, Innuk Island; Russell Island, Dune Island, Luke Island, Blades Island, S. Island, (Andrew Gordon Bay), Alareak Island, Sakkiak Island, 1955&1956) nests & eggs found.

63. Flat Island, Mouse Island, Goose Island, East Goose Rock and Robinson Rock, Penobsot Bay, Maine nesting 1964-1965.

64. On Kent Island the largest of a group of three Islands located about six miles to the southeast of Grand Manan there exists one of the greatest known concentrations of breeding American eiders.

65. The Common Eider has never been recorded on or near the Fosheim Peninsula, west-central Ellesmore Island so far as known.

66. The common eider is not known to breed on St. Pierre et Miquelon.

60. Manning, T.H. and D.F. Coates 1952

61. Wynne-Edwards, V.C. 1952

62. Cooch, F.G. 1965

63. Choates, Jerry S. 1967

64. Paynter, Jr., Raymond A. 1951

65. Parmalee, David F. and S.D. MacDonald 1960

66. Cameron, Austin W. 1967

Nesting Range and Breeding Areas (5)

67. Eider duck nesting during gull-cormorant control program 1940 in Maine.

Island	Date	Nest With Egg							Nest With Young	$\bar{x}$ clutch
		2	3	4	5	6	0			
Fisherman's I.	5/20	1	5	7	6					3.93 (19ne
	6/2	6	6	5	6	1	2	1		3.07 (28 "
Colt Head I.	5/20									
	6/3	4 nests with eggs								
Spoon Ledge	5/20				1					
Metinic Green I.	5/21	1	3	2	3	1				4.0 (10 ne
Old Man's I.	6/1	6	6	1	5	1	1			3.25(20 "
Green I.	6/2				1	1				
Hay Ledge	6/2	eider duck egg found in gulls nest								

68. The breeding eider of this part of the coast of eastern Labrador is dresseri but the winter birds are undoubtedly the northern species since Battle Harbour is at the extreme northern limit of the breeding range of dresseri.

69. near Chesterfield settlement 2 eggs June 17; Sachpik Island 2 eggs June 19; Promise Island 3 eggs June 28, 5 eggs June 25, 5 eggs July 8. Rockhouse Island 7 eggs July 13.

70. The breeding places (in Iceland) of which there are appr. 300 scattered along the coast of the country. Most of the breeding places are on the west coast others are on the north and east coasts; the south coast on the other hand, where there are no islands or other suitable places, is only very scantily settled.

71. Common eider - coasts of Iceland and most of Scotland. Sporadically breeds in northern Ireland, inhabits Shetlands; Hebrides and Orkneys, breeds in northern part of Jutland Peninsula and nearby islands throughout Scandinavian coasts on both Norwegian and Baltic shores; in Finland to Helsinki area. Within Soviet Union common on Estonian islands (Sarema, Khiume etc.) and here and there breeds on Latvian coasts. Common on Murman coast and particularly abounding on Ainovy Islands, Sem Ostrovov (Seven Islands

- 67. Gross, Alfred O. 1948
- 68. Cooke, Wells W. 1916
- 69. Hohn, E. Otto 1968
- 70. Gudmundsson, Finnur 1932
- 71. Dement'ev, G.P. et al. 1952

## Nesting Range and Breeding Areas (5)

### 71. Cont'd

group etc. almost as common on White Sea coast at Kandalaksha Bay but rarer at Onega Bay, remaining there chiefly at large and small islands further east on coast absent and perhaps occurs as breeder only in northern part of Kanin Peninsula. Easternmost breeding areas on west coasts of both Novaya Zemlya and Vaigach. Encountered in Yenisei Gulf but probably as straggler, as is also true of Leningrad occurrences.

Greenland Eider (*S. m. borealis*) Nest range Banks Island, northeastern Victoria Island, southern Parry Island, Prince of Wales Island west coast of Baffin Island, Boothia and Mellville peninsulas, northern Hudson Bay, Labrador south to mouth of Hamilton R. coast of Greenland to northern parts of Robeson Channel and traverse from there to Petermann Peak; Jan Mayen, islands of Franz Josef Land.

72. Solovetskie Islands 95% of eider nests destroyed by man in 1924. Ordt (1954) describes increased nesting on West-Frisian Islands (Netherlands) from 16 nests in 1928 to 2000 in 1954. Kumerlove (1955) describes eider colony in Amrum Island, the North Sea. 1952 density on Malyi Lomnishnii Island  $\bar{x}$  9.4 nests/hectare Dokucheikha Island, 7.4/hectare Kurichka Island 6.5/hectare Voronii Island 1/hectare. Gul'makha Island, Poperechnye ludy island, Devich'i ludy, Veshnyak Island, Irin'in Island. Veshnyak Island, Bol'shoi Litskii Island, Voronka luda, Ryanzhkov Island, Medvezhii Island. White Sea - Kurichok, Dokocheikha, Lomnishny Lodeynii, Anisimov. According to K.N. Blagosklonov (1960 in 1940 there were only 300 eider nests on the islands of Kandalaksha Bay. In 1945 they were made a sanctuary. Over the Saverny (northern) Archipelago 1945, 548 nests were recorded. In 1946 their numbers decreased. From 1948 to 1953 the number of nests increased from 626 to 2376. By 1956 the maximum (2825 nests) was reached. In the spring of that year 8200 adults were recorded on the water 3000 males, 3000 females and 1900 single birds. In 1957 the number of nests dropped to 805 and in 1959 - 684. In the spring of 1957 the number of males decreased by 11.5% compared with 1956 and in 1958 by 48.4%. The number of unpaired females dropped from 1900 in 1957 to 950 in 1958.

73. Resident on all coasts of Scotland and isles except from Caithness to Rattray Head (Aberdeenshire) and somewhat local both thence S to Coquet Island (Northumberland) with historic and important colony on Farne Islands and in SW Scotland; has bred Walney Island (Lancashire); in Ireland appears to be extending its range from Donegal.

72. Gerasimova, T.D. and Z.M. Baranova 1960.

73. Fitter, R.S.R. 1954.

## Nesting Range and Breeding Areas (6)

74. Holarctic Breeds from Iceland, Spitsbergen, Novaya Zemlya, south to the British Isles, Denmark, France, and the Baltics, also northern Siberia; and in North America from the Arctic south coastally to Kodiak Island and Maine. Breeds locally and commonly on the coastal islands and shores of Yukon, Banks Island, Victoria Island (Simpson Bay, Walker Bay, Finlayson Islands) Jenny Lind Island and the coasts of Mackenzie (east at least to Bathurst Inlet) and from middle Ellesmere Island, Devon Island (Croker Bay) Somerset Island (Port Leopold), Cornwallis Island (Resolute Bay), Baffin Island, Southampton Island, Hudson and James Bays, Hudson Strait (east of Cape Weggs), Ungava Bay, Labrador, Newfoundland, north shore of the Gulf of St. Lawrence, lower St. Lawrence River (Riviere Ouelle, Gaspé Peninsula, Ile aux Coudres) and the Maritime Provinces (breeding on P.E.I. not established).

75. The Eider breeds along the whole coast of Greenland (are pan-Arctic) with the exception of the extreme north.

76. Hoogerheide puts the present population at 11,000 old and 2,000 to 3,000 young, one-year old ducks. In the past few years however a good many birds appear to have joined the colony from the north. Let us therefore assume that the year-round population is 16,000 birds the centre of which lies to the south of Vlie land.

77. A large breeding colony at the Sands of Forvie National Nature Reserve, Aberdeenshire.

78. The Vaikas State Preserve situated off Vil'sand Island (western part of Saaremaa Island) is the foremost of the Baltic Preserves (established in 1910) and a major nesting area of the Common Eider in the Soviet Sector of the Baltic Sea. Work done on 30 small islets in the vicinity of Vil'sand. During the period 1964-1965 the number of breeding females exceeded 2,000, an increase over previous years attributed to continuous protection.

79. In the Kandalaksha Gulf there are 860 islands of which 130 are protected. About 85% of the Kandalaksha eider population nest in these islands of the Preserve.

80. In 1963 the number of nesting females in the Kandalaksha Gulf of the White Sea totalled 2,300 (85% of them on the Preserve) 1,500-2,500 in the Onega Gulf in 1960, about 1,100 in the islands of the Murman in 1960 (85% in the Preserve) and about 1,000 in the area of Vaigach Island in 1960.

Nesting areas: the Murmansk Oblast; near the villages of Gridino & Kalgalaksha in the Karelian ASSR, the northern part of the Onega skerries, the northwestern part of Vaigach Island; the Zubouskii Islands (Murmansk Oblast) islands in the vicinity of Shchueretskoye village (Karelian ASSR) the areas of the nesting grounds in the Por'ya Gulf.

- 74. Godfrey, W. Earl 1966
- 75. Salomonsen, Finn 1951
- 76. Verwey, J. 1966

- 77. Milne, H. 1969
- 78. Aumees, L.E. 1966
- 79. Bianki, V.V. and N.S. Boiko 1966
- 80. Karpovich, V.N. and V.D.

## Nesting Range and Breeding Areas (6)

81. In northeastern North America (New England and Cape Cod) between 1890 and the present time the eider population in the nesting grounds has increased several tens of times while the size of the wintering population is, approximately speaking, as much as 100 times greater (Hebaud 1960; Hill 1965). In Iceland the eider numbers during the period 1805 to 1914 increased by 150 times (Hantsch 1905; Timmerman 1938, 1949). Latterly the eider population in Iceland has not displayed a large increase.

During recent decades a very large increase has been observed in the eider population in the territorial waters of Great Britain (Travener 1959, 1963; Milne 1965). Both the nesting and the wintering components of the eider in Britain as well as the neighbouring country of Holland have been increasing constantly since 1945. The eider began nesting in the Netherland Islands at the beginning of this century (about the year 1906) and by 1940 its numbers had increased. During the second World War heavy losses were inflicted on the eider colonies in Holland and Norway (by collecting eggs and shooting of adult birds) in consequence the eider population was again reduced.

In the Federal Republic of Germany the eider first began nesting in the East Frisian Islands in the late 18th century and in 1820 there were already about 100 pairs nesting there (Kumerloeve, 1956). Even today these Islands are very important nesting grounds of this species although its numbers in former times were subject to substantial fluctuations on account of human interference. Today almost all of the eider nesting grounds in the Federal Republic of Germany have been declared wildlife reservations.

The eider of the North Sea Region (Great Britain, Norway, Holland and the Federal Republic of Germany) is almost a sedentary bird, undertaking only negligible migrations. It is considered that the large increase in the number of eiders in this region occurred as a result of the growth of the local populations and not through immigration from without. Other than during the nesting season the Dutch eider may be encountered in the terrestrial waters of southern England as also may apart of the Scottish eider (to a lesser extent than the Dutch ones) migrating there. The Norwegian eider remain to winter not far from their nesting ground. The Icelandic eiders are completely sedentary.

During the 20th century the Baltic eider populations have undergone a large increase. In Estonia during the years prior to the establishment of the Vaikass Preserve (in 1910) only several dozen pairs of eiders were able to nest in the coastal waters of Saaremaa Island on account of the shooting of them and the collection of eggs. The Vaikass Preserve instituted the regular protection of the eider nesting grounds as a result of which there was a rapid increase in their numbers. In 1938-40 in the vicinity of the Vaikass Islands alone, up to 1,000 pairs

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## Nesting Range and Breeding Areas (7)

### 81. Cont'd

of eiders were nesting. During the 2 Great Wars protection was discontinued and the colonies were again exploited by poachers. After protection was restored following the war the eider population rapidly began to establish itself and at the present time there are more than 2,000 pairs in the broad environs of the Vaikass Preserve. At the same time on the islets of the Estonian Inland sea of Vyainameri the eider population fluctuates to the extent of 500 pairs. The protection of its nesting grounds there leaves much to be desired.

Of very great significance is the increase in the eider population in the skerries of Finland and Sweden during recent decades. The numerous studies of Finnish authors (Bergman 1939, 1951, Grenquist 1938, 1952, 1959, 1961, 1965, V. Hartman 1945, Hilden 1964, Merikallio 1955, 1958, Paavolainen 1957) confirms the gradual settlement of the eider in the Gulf of Finland and Bothnia, beginning in the years 1920-1930. During the period 1935-1945 a fall in the numbers occurred (epidemics and the consequences of wartime) although starting in 1947 there has been a new more rapid settlement. Based on the data of Bergman and Merikallio, the total number of eider nesting in Finland in 1951 was estimated as more than 10,000 pairs in 1957 as 25,000 pairs (2/3 of them on the small skerries of the open sea) and presently as 50,000 pairs. Grenquist (1969) has furnished data indicating that the eider population in the Gulf of Finland during the years 1950-1962 tripled.

Similar data are also available for Sweden although for the most part they relate only to separate Archipelagos. For example, in the Zedermanland skerries of the Baltic Sea (southwestwards of Stockholm) (Olsson, 1951, Jonsell, 1959) the number of nesting eiders increased between 1895 and 1913 but fell sharply during both of the wars. Since 1945 a new increase in the numbers was observed. The settling of eiders throughout the Swedish Islands of the Baltic Sea during the last 20 years is a general phenomenon wherever they are protected. The same thing has occurred in Denmark (Paludan, 1962) and Norway, particularly in the southern parts of the country (Lund written communication of 1966).

The reason for the increase in all the above regions is due to the protection of the eider on the part of man.

The eider is most extensively protected in Iceland where appropriate laws and government edicts have been in existence for more than a century.

The nesting eiders of Denmark, the Federal Republic of Germany, Holland, Great Britain, Norway and Iceland are entirely or almost entirely sedentary birds.

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## Nesting Range and Breeding Areas (7)

82. The bulk of the eider in Estonia nest on the islands of the west coast of Saaremaa. In the nesting grounds on Moonzund (Vyainameri) no less than 500 pairs of eiders are nesting there amongst which almost 150 pairs have settled the islands of the Matsaluski State Preserve. The eider nests on almost all the small sea islets.

82. Onno, S. Kh. 1966



# Chronology of Nesting (1)

1. Halfway I., Labrador	July 14/52	53°42'N
Gannet I., Labrador	July 17/52	53°57'N
Small I., off Double I., Labrador	July 20/52	54°52'N
Nunaksuk I., Labrador.	Aug. 10/53	
2. Islands in St. Peter's Bay, Labrador	June 30/43	52°04'N
Demetre I., Hare Bay	July 3/43	51°14'N
Spring I., Hare Bay	July 3/43	51°14'N
Whale I., St. John's Bay	July 28/44	50°53'N
James I., St. John's Bay	July 29/44	50°55'N
Gull Rocks, St. Lewis Bay, Labrador	Aug. 9/44	52°19'N
St. Brendan's	July 11/45	48°48'N
3. Ile Blanche, St. Lawrence R.	June 9/64	47°52'N
4. Mackay's Ile, Koksoak R.	June 17/1883	58°32'N
Mouth of Whale R.	June 17/1883	58°24'N
Islands near Hopedale, Labrador	July 22/1912	55°28'N
Eider I., Greenland between	June 23/1914	
Wolstenholme I., and Saunders I.		
Sutherland I., Greenland	Aug. 16/1912	
5. Kegashka R., Que. N. Shore	June 22/1922	50°12'N
6. Outer islands at Kikkertaksoak	June 22/1918	56°10'N
7. Metic Is. (just layed)	June 16/1916	59°56'N
Red Islands (just hatching)	July 22/1927	56°31'N
Sandy Island near Ford's Harb.	Aug. 9/1928	56°31'N
Nanuktok	July 23/1928	55°24'N

1. Tuck, L.M. 1953
2. Peters, H.S. 1945
3. Reed, A. and J.-Guy Cousineau 1967
4. Bent, A.C. 1925
5. Lewis, H.F. 1922
6. Wheeler, E.P. 1930
7. Austin, O.L. Jr. 1932

# Chronology of Nesting (1)

8. Louse Bay	July 19/1920	59°20'N
Kasigiaksiovik R. (empties into Leaf Bay from the south)	July 9/1947	58°54'N
Hopes Advance Bay	July 14/1947	59°22'N
Eider Islands (off Hopes Advance Islands near Natashguan)	Aug. 10/1897	61°05'N
Old Bluff nearby Islands	May 28/1928	50°11'N
Perroguet Islands	June 13-16/28	50°26'N
Small Island north of Cape Anderson	June 21/28	51°28'N
Island near Magnetic Point	July 27/30	60°04'N
Island north of Mosquito Bay (hatching)	July 27/30	60°24'N
Island off Smith Island	July 30/30	60°45'N
Island in Moor Bay	Aug. 1/30	60°45'N
North end of Aguatak Bay	July 13/14	52°48'N
Scoter Island	July 22/14	53°35'N
Small island east of Nicholson I.	June 14/42	52°10'N
South of Cotter Island	June 22/1915	57°15'N
Small islands north of Kikkerteluk R.	June 24/15	57°46'N
Mainland below south end of Hopewell Sound	June 25/15	58°01'N
Island south of Hopewell Sound	June 30/15	58°09'N
Near Taylor Island	July 1/15	58°09'N
Curran Island	July 8/15	56°45'N
Small island on the west shore of Tukarak I.	July 9/15	56°32'N
South end of Wetalltok Bay	June 17/38	56°16'N
	July 2/38	

9. May flights in 1966 (18th - 22nd) were probably too late as subsequent ground checks indicated a substantial number of females were already nesting, especially from Penobscot Bay westward. 1967 was a retarded spring and nesting was barely started even in western Maine (May 6-11). Coverage was from west to east to allow for differences in breeding chronology (i.e. birds in the east breed later).

## 10. 1st nests Kandalaksha Bay

May 15, 1940	May 9, 1949	May 6, 1950
May 23, 1952	May 20, 1953	May 13, 1954
May 23, 1955	May 25, 1956	May 18, 1957
May 29, 1958		

On Ainov Island May 10, 1949, May 9, 1950  
On Sem'Ostrovov  
May 30, 1929, May 21, 1933, May 29, 1935  
May 25-27, 1937, June 4-5, 1938, June 2, 1939,  
May 24, 1940, May 30, 1947, May 24, 1948  
May 25, 1949, May 12, 1950, May 15, 1953  
May 10, 1954, May 16, 1956, May 15, 1957  
June 11, 1958  
On Novaya Zemlya June 6, 1948, June 14, 1949, June 5, 1950  
Average period of laying 1st egg in the eastern Murman May 25.

- 8. Todd, W.E.C. 1963
- 9. Mendall, Howard L. 1968
- 10. Gerasimova, T.D. and Z.M. Baranova 1960

Chronology of Nesting (2)

11. American Harbour June 18, 1833 many nests of eiders were seen, some eggs hatching, 2 females had 12 ducklings, flocks of 30-40 males were leaving without females. Ducklings collected were about a week old.

Partridge Bay, June 20, 1823 nest 100 yds from water 5 eggs. So abundant were the birds on the islands of Partridge Bay that a boatload of their eggs might have been collected if they were fresh.

Small harbour north of Little Macatine, July 21, 1883 a hundred eider ducks and their broods.

In the Gulf of St. Lawrence most eiders make their nests in June, though some nest in May and some in early July.

12. Along the southern coast of Foxe Peninsula, Baffin Island they nest on various islands in late June and early July. On July 2, 1929, nests with 3-5 eggs were found in Bowman's Bay.

13. Brewster Point, Baffin Island, August 6, 1937 1 nest - 5 eggs, on the north shore of Frobisher Bay.

14. First egg Kent Island 1937-May 4, 1938-May 9, 1939-May 12, 1940-May 6, 1941-May 7, 1942-May 8, 1943-May 10, 1944-May 7, 1945-May 12, 1946-May 6.

15. On May 9, 1932 nesting had just started and 3 nests were found - one contained 3 eggs the others 1.

16. Old Man Island 44°37'N;67°14'W four nests, 3-4 eggs each July 24-25, 1931. July 6, 1943 1 nest 3 eggs, 4 nests 4 eggs, 3 nests 5 eggs, 1 nest empty.

Grass Ledge 44°13'N;68°51'W June 7, 1933, 94 nests found 72 contained 1-6 eggs and one contained 4 young. Young had left 14 nests. May 30, 1941, 45 nests with 1-8 eggs. June 8, 1941, 89 nests of which 62 contained 1-8 eggs. Young had left 19 nests. June 10, 1942, eggs in 7 nests had just hatched or were in the process of hatching. 86 nests with 1-7 eggs, 27 empty. June 3, 1943, 123 nests, 115 contained 1-6 eggs, 1 nothing. Young had left 1 nest.

Compass Island 44°13'N;68°52'W. June 8, 1941, 5 nests with 2-5 eggs, June 10, 1942 2 nests with 4 eggs, 2 nests with 5 eggs. Young had left 3 nests. June 3, 1943, 40 nests, 13 with 2-5 eggs, 1 with 4 young. Young have left 3 nests.

Downfall Island 44°11'N;68°49'W. June 8, 1941, 7 nests with 1-7 eggs, 1 nest with young, 1 nest empty. June 10, 1942, 23 nests with 1-7 eggs, 3 with young. June 3, 1943, 37 nests with 1-7 eggs, 1 with young, 1 empty.

Barred and Colt Head Islands 44°16'N;68°50'W. June 9, 1942, 9 nests, 3 with 3 eggs, 2 with 4 and 4 with 5. June 3, 1943, 13 nests, 1 with 3, five had 4, five had five, 1 had 6 and 1 had 7.

11. Lewis, Harrison F. 1926  
12. Soper, J. Dewey 1946  
13. Wynne-Edwards, V.C. 1952

14. Paynter, Jr. Raymond A. 1955  
15. Gross, Alfred O. 1938  
16. Gross, Alfred O. 1944

# Chronology of Nesting (2)

## 16. Cont'd

Fisherman's Island 44°02'N;69°02'W. June 8, 1941, 1 nest with 4 eggs, 1 nest with 1 egg and 4 freshly hatched young.

June 1, 1943, 7 nests, 1 with 2, 1 with 3, 1 with 4, 4 with 5.

No Man's Land 43°53'N;68°52'W. June 8, 1942, 4 nests, two with 4, 2 with 5. June 11, 1943, 15 nests, 12 with 3-5, 1 with freshly hatched young and 1 egg.

Mark Island 43°42'N;69°54'W. June 14, 1943, 1 nest with 4.

17. In the islands of the Kandalaksha Sanctuary eiders begin to nest in the beginning of May and it is at its peak in the last half of the month.

18. Two lone females were observed on 19 June, 1955 at nesting sites on Okolli Island (Foxe Peninsula, Baffin Island) eggs were seen on 25 June, 1955. Downies were first observed on 28 July, 1955. Two nests were found 4 August, 1955 - one with 4 eggs, the other 5 ducklings.

19. On July 9, 1949 several eggs were pipped and a few were hatched on Gasket Shoal, James Bay. By July 12 nearly all eggs were hatched.

20. In 1955 nesting began on June 19, reached its peak on June 27 and 75% were initiated in the 1st half of the 24-day nesting period. In 1956 it began on June 23, peaked on July 1 and 70% were initiated in the 1st half.

21. nest near Chesterfield Inlet	2 eggs	June 17
" Sachpik Island	2 eggs	June 19
" Promise Island	3 eggs	June 28
" "	5 eggs	June 25
" "	5 eggs	July 8
" Rockhouse Island	7 eggs	July 13
" Islet N.E. of Out Island		July 19

22. Egg laying on Franz Josef Land (borealis) in second half of June. 1st nest with 4 eggs found on June 21.

17. Kalachkova, V.C.

18. Macpherson, Andrew H. and Ian A. McLaren 1959

19. Manning, T.H. and D.F. Coates

20. Cooch, F.G. 1965

21. Hohn, E. Otto 1968

22. Dement'ev, G.P. et al. 1952

Activity Cycle Cape Dorset Eiders from Cooch 1965

Arrival, Pairing, Courtship	early May to July (10)
Peak Pairing	June 1-5
Nest Seeking	early June
Nest Reconditioning	June 15-20
Nest Initiation	June 19-July 16
First Egg	June 19-23
Males Desert Females	July 5-14
Incubation	June (19) - Aug (16)
Hatching	July 19-Aug 16
Peak Hatching	July 27
Departure of broods from nesting area	Aug 5
Maturation of Flight Feathers	Sept 27 to Oct 22
1st Arrival at Fogo	Oct 15
Mass Arrival at Fogo	Nov 15
1st Arrival at St. John's	Dec 1
Mass Arrival at St. John's	Dec 15
Winter Along Coast of Avalon	Dec 1 to Mar 31
Movement North to Nesting Grounds	Mar 24 to early May

# Cycle of Eiders in the Barents Sea

1.

First appearance Franz Josef Land	April 10, 1931
Mean first appearance	April 3, (10 day period)
Early mass arrival	May 29, 1896
Mean mass arrival	May 3, (10 day period)

Pre-nesting period (interval between appearance of 1st individual and the laying of the 1st egg) 60 days.

Sex activity (based on size and weight of testicles and ovaries) in the E. Murman population begins in the 2nd and sometimes the 1st ten-day period of May, reaches its peak at the end of May - 1st half of June and terminates at the end of June.

Mean 1st egg-laying periods E. Murman May 25 range May 9-June 1  
1st egg-laying period W. Murman May 10, 1949, May 8, 1950.

Duration of egg-laying period W. Murman May 4 to June 23, 1949 - 51 day

Brooding period (from the laying of the last egg to the hatching of the nestling) 25 days range 23-27.

Mean date of appearance of 1st nesting E. Murman June 24 (range June 8-30). Date of 1st nestling appearance W. Murman June 12, 1949, June 5, 1950.

Age when thermo-regulation sets in 2-7 hours.

Mean date of descent to water of nestling E. Murman June 25 (June 9-July 1).

Date of descent to water W. Murman -1st 10-day period of June	
" " " " " Franz Josef Land - 2nd 10-day period of July	
" " " " " Novaya Zemlya - end of July	

Gazetteer (1)

Hudson Bay  
n Flaherty I. largest island in Belcher group (55°45'N to 56°36'N)  
n Richmond Gulf 56°09'N  
b Belcher Islands 55°30'-56°58'N; 78°38'-80°10'W  
b Bear Islands 55°08'N  
e Elsie Island 58°51'N; 78°57'W  
en Tukarak Island, the large eastern island of the Belcher group  
n Reef Bay 59°40'N  
n Cape Anderson 60°04'N  
n Magnet Point 60°24'N  
n Mosquito Bay 60°45'N  
n Smith Island 78°44'W-78°14'W; 60°45'N  
e Long Point 52°45'N  
e Paint Hills Islands 52°57'N; 78°57'W  
n Nicholson Island 57°15'N  
n Cotter Island 57°46'N  
n Kikkerteluk River 58°01'N  
n Hopewell Sound 58°38'N-58°09'N  
n Taylor Island 56°45'N  
n Curran Island 56°32'N  
n Gushie Point 56°27'N; 78°55'W  
n Wetalltok Bay, a deep bay in the eastern part of Flaherty I.  
e Kogluk River 59°40'N  
end Chesterfield Inlet 63°20'N; 90°42'W

James Bay  
n Fort George River 53°50'N; 79°00'W  
bn Gasket Shoal 52°27'N; 80°25'W  
b Solomon's Temple Island 52°49'N; 79°08'W  
b Grey Goose Island 53°55'N; 79°55'W  
e Comb (Hills) Islands 53°17'N  
en Aquatuk Bay 53°35'-42'N  
n Scoter Island 52°10'N; 78°57'W  
Strutton Islands 52°06'N; 79°00'W  
e Walrus Island 52°56'N (the largest of the Paint Hills Islands)  
en Moar Bay 52°48'N

Quebec North Shore  
nb Mingan I. 64°08'W (the westernmost island in the Mingan chain),  
n Eskimo Point 63°36'W at Havre St. Pierre  
b St. Augustin 51°14'N; 58°39'W  
Saguenay 48°15'N; 69°55'W  
n Blanc Sablon 51°25'N; 57°08'W  
n Aylmer Sound 50°33'N; 59°23'W  
n Yankee Harbour 59°47'N on Galibois Island (59°47'W)  
n Nazaire Harbour 50°17'N; 59°48'W  
b St. Mary's Islands 50°20'N; 59°37'W  
n Carrousel Island 50°05'N; 66°23'W  
n Birch Islands (two islands in the Mingan group lying off Mingan  
n Cliff Island 59°42'W (the Westernmost of the St. Mary's group)  
n Washikuti River Falls 60°52'W

n = nests found e = eggs b = breeding d = downy young

Gazetteer (1)

Quebec North Shore

n	Musguaro	61°05'W
n	Eskimo Island	57°43'W
n	Wapitagun	50°12'N;60°01'W
b	Gore Island	50°37'N;59°11'W (also called Kanty Island)
ne	American Harbour	61°48'W (also known as Natashguan)
n	Partridge Bay, forty miles west of Natashguan	
n	Iles Corneilles	62°53'W
n	Derby Bay	50°25'N;59°49'W
n	Bay Johan Beetz	50°18'N;62°49'W
b	Watshishu	62°43'W
n	Romaine River	54°33'N;63°47'W
b	La Petite Rigolet	
ne	Romaine	50°13'N;60°40'W (now called Gethsemani)
d	Etamamu River	60°11'W
e	Anchor Island	63°06'W
e	Ste. Genevieve Island	63°04'W (easternmost of Mingan group)
e	Hunting Island	63°10'W
e	Kegashka River	61°23'W
n	Old Bluff Island	50°26'N;60°13'W
nd	Perroquet Islands	50°13'N;64°12'W
n	Greenly Island	57°11'W
n	Ile Blanche	47°52'N;69°41'W (North Reef or Harel)

Ungava Bay

ne	Koksoak River	58°32'N
	Akpatok Island	60°05'N;68°00'W
ne	Whale River	67°38'W
n	Kasigiaksiovik River	58°54'N;69°03'W
n	Hopes Advance Bay	69°40'W
d	False River, an inlet a few miles east of the Koksoak River	
n	Gyr Falcon Islands	59°05'N;68°55'W
n	Eider Islands	60°52'N (south of Cape Hopes Advance)
	Kasigiaksiovik River	58°54'N;69°03'W

Hudson Strait and Arctic Islands

bn	Button Islands	60°30'N;65°20'W
n?	Charles Island	62°40'N;74°20'W
ne	Port Leopold	74°00'N;90°30'W
d	Hell Gate	77°00'N;90°00'W
n?e?	Olsen Island	76°45'N;88°35'W
	Foxe Channel	64°50'N;78°00'W
	King Charles Cape	64°20'N;77°00'W
	Cape Dorchester	65°20'N;77°20'W
e	Bowman Bay	65°20'N;73°30'W
n?	Middle Savage Islands	62°00'N;68°00'W
ne	Brewsters Point (north shore of Frobisher Bay)	
ne	West Foxe Island	64°17'N;75°45'W
n?	Big Island	62°30'N;70°30'W
	Cape Dorset	64°10'N;76°40'W
n?	Big Island	62°30'N;70°30'W



# Gazetteer (2)

## Greenland

de?n	Saunders Island	76°45'N;70°00'W
d	Foulke Fjord	78°45'N;73°00'W

## Labrador (east) Coast

b	Aulatsivik	59°45'N (North Aulatsivik)
nb	Hopedale	55°27'N;60°13'W
n	Cape Chidley	60°23'N
n	Bowdain Harbour	60°20'N
n	Eclipse Harbour	59°52'N;64°08'W
n	Grenfell Tickle	60°20'N (McLellan Strait)
nde	Louse Harbour	59°20'N;63°42'W
n	Port Manvers Run	56°57'N;61°20'W (between mainland and South Aulatsivik I.)
n	Turnavik West	55°17'N;59°21'W
ne	Red Islands	55°13'N (west of Cape Aillik)
n	Kikkertavak Island	56°22'N;61°40'W
e	Metik Islands	58°54'N-59°00'N;63°50'W-64°01'W
ne	Gannet Islands	53°57'N;56°35'W
n	Mason Island	54°13'N;56°50'W
ne	St. Peter's Bay Islands	52°03'N;55°44'W
ne	Gull Rocks, St. Lewis Bay	52°19'N;53°48'W
n	Otter Bay	52°58'N;55°52'W
ne	Halfway Island	53°43'N;56°12'W
n	Double Island	54°54'N;58°19'W
e	Nunarsuk	56°03'N;60°27'W
e	Kikkertaksoak Island	56°10'N;60°43'W (Sprackling's I.)
e	Sandy Island	56°27'N
e	Ford Harbour	56°27'N (at east end of Paul Island)
e	Nanuktok	55°24'N;59°39'W

## Newfoundland

n	St. Brendan's	48°48'N;53°40'W
ne	Demetre Island	
ne	Spring Island	51°10'N;55°50'W
ne	Whale Island	50°49'N;57°08'W
ne	James Island	50°52'N;57°10'W
	Fox Island	50°52'N;57°07'W
	South Penguin Isle	49°23'N;53°47'W
d	Barachois Bay-Connoire Bay	47°36'N;57°14'N;57°14'W-57°55'W
	La Poile Bay	47°42'N;58°20'W
	Hare I.	50°45'N;57°09'W

## Nova Scotia

nb	Three Islands (includes Kent's I.)	44°35'N;67°05'W
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## Breeding Populations (1)

1. An almost unbroken growth of the nesting population in Finland has taken place since 1950 until 54/55. Soderskar and Klavskar are the best eider areas in Finland. The coefficients of increase compared with 1950 are Soderskar 1963-3.1 1964-3.6 and Vlarskar 1963-3.7 1964-4.4. Other eider colonies are at Valassaaret (.4 and .6 compared to 1951) and Trollo (.6 and .6 compared to 1951). In all areas except Vallassaaret there has been a strong increase with an extension of the distribution areas towards the mainland. The expansion has taken place since the last war (1939-1945) and is considered quite new. The increase in the salinity of the Baltic Sea is considered a factor promoting the movement of eiders nearer the southwest archipelago. The decrease of the Valassaaret population in the 1950's and the Trollo population in 1958 and 1960 was probably due to the movement of the eiders to islands with ice-free shore waters.

2. Nesting eiders (*S. m. dresseri*) along the Maine coast have apparently doubled their numbers at least 4 times in the past 25 years and have extended their range southward. Following an alltime low in 1907 the eider staged a comeback by 1915 a trend that has continued to the present. In 1943 it was estimated that the Maine breeding population was probably more than 2000 pairs (Gross(1944)) and breeding on 31 known islands and probably 14 more. By 1967 the minimum breeding population was estimated to be 18,000 pairs and they were breeding on 75 islands with about 1/4 of the coast still to be examined.

3. In 1932 there were 178 nests on Kent Island 1,937 more than 300, 1948 an estimated 750 nests. The island is only 150 acres.

4. In June 1932 there were only 178 occupied nests on Kent Island.

5. In the Kandalaksha Sanctuary the numbers of eiders increased from 548 in 1945 to 3000 in 1957.

6. The ratio of increase 1962:1950 in the south archipelago was 3.0. The hard winters of 1940-42 and irregular conditions during the war thoroughly reduced the bird populations. Following the termination of the war and with the gradual return of normal conditions regarding hunting and bird preservation the populations were able to recover during the late 1940's and 1949 was reckoned as a fairly good bird year. The bird protection arrangements in Finland and Scandinavia also prevented the hard winter from being disastrous for the breeding population in 1947.

1. Grenquist, Pekka 1965
2. Mendell, Howard L. 1968
3. Paynter, Jr. Raymond A. 1951
4. Gross, Alfred O. 1938
5. Kulachkova, V.G.
6. Grenquist, Pekka 1966

## Breeding Populations (1)

7. The number of reproductive females in all Iceland was approximately 230,000.

8. On Krestovatik Island (Novaya Zemlya) over 400 nests appear yearly on area of 300 m<sup>2</sup>.

borealis at Spitsbergen, Greenland and Labrador nest in hordes. On Franz Josef Land common but not abundant

9. In Hvalfjordur fiord Iceland the breeding population of eiders is no more than 500 pairs.

10. In the period 1961-63 a regular census showed an increase in the Sands of Forvie National Nature Reserve, Aberdeenshire population from a total number of about 3000 birds to about 5000 in the period 1964-67 - the whole increase occurring in one large step following the breeding season of 1963. Breeding females showed a similar pattern of increase in 1965. The conclusion drawn is that any increases in our breeding eider colonies are most probably a direct result of their own breeding output and are not a result of immigration from unknown sources.

In Europe a general upward trend in population size and an extension of breeding range of *Somateria mollissima mollissima* has been observed in Scandinavia, the Netherlands, Denmark and Britain during the past 20 years. The source of such increases appears to remain very much a choice between immigration from, as yet, uncertain breeding colonies or a direct result of each breeding unit producing a surplus of young.

11. Following protection breeding population of islets in vicinity of western part of Saaremaa have steadily increased until 1964-1965 when the area supported +2000 breeding females.

12. The largest change in the number of nests occurred on the Northern Archipelago of the Kandalaksha Preserve in the crest of the Kandalaksha Gulf. The Preserve was set up between 1932 and 1939. About 500 nests were recorded just after the last war (1945). The increase in the next ten years as a result of increased protection was about 240 nests per year or about 6 times the 1945 level. This increase resulted despite a large scale invasion of helminths among the ducklings in the 4th year. Following the 10 yr increase a marked decrease (31% of the nests) occurred over 2 years resulting in a reduction of 52.5% from their maximum number in 1956. Subsequently, after rising to a total of 1600 in 1959 the number of nests during the ensuing 6 years increased by a total of 11% that is by an annual figure of less than 2%.

- 7. Gudmundsson, Finnur 1932
- 8. Dement'ev, G.P. et al. 1952
- 9. Ingolfsson, Agnar
- 10. Milne, H. 1969
- 11. Aumees, L.E. 1966
- 12. Bianki, V. V. 1966

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## Breeding Populations (2)

### 12. Cont'd

On the Islands of the Murman an increase in the number of eider nests occurred during the space of only 4 years both in the Sem (seven) Islands and on the Bol'shoi Ainov Islands. The average increase amounted to about 120% in the Sem Islands and more than 140% on Bol'shoi Ainov. In absolute figures the increases appear as follows: in the Sem Islands from 600 to 1126 nests and on Bol'shoi Ainov Island from 200 to 576 nests. The period of decline in the numbers was absent in the Ainov Islands but was felt in the Sem Islands where the number of nests diminished by 34% during the three-year period 1957-1959.

Almost no increase was noted either on Velikii Island or the Kem'skerries in the number of eider nests up to 1964 inclusive. However the number of females breeding here displays annual fluctuations with a slight tendency towards an increase. It is probable that the small area of the local nesting grounds of the eider, encircled as they are by environs devastated by poachers is not conducive to an increase in the populations.

13. Estonia 3,000 pairs; Finland 50,000 pairs (G. Bergman, P. Grenquist); Sweden in excess of 50,000 pairs (G. Bergman); Latvia, Lithuania and Poland - none; German Democratic Republic - none (H. Schildmacher); Denmark, 3,000 pairs (F. Salomonsen, K. Paludan); Federal Republic of Germany up to 300 pairs (W. Meise, 1957, F. Goethe); Holland 5500 pairs (C. Swennen) Great Britain, in excess of 40,000 pairs (Atkinson-Willes, 1963; H. Milne); Norway 103,000 pairs (Hj. Mik. Lund); and Iceland 230,000 pairs (Gudmundsson, 1932; Timmermann 1938-1949).

14. In the Matsaluski State Preserve (Estonia) the density of nests is on the average one nest per hectare although on some of the islands up to 10 nests per hectare have been counted. The number of nesting pairs on the individual islands fluctuates to a greater extent than that of other goose-like birds. When a fox shows up on an island the eider will migrate during that or the following year to neighbouring islands where there are no foxes.

In the Matsaluski Preserve there were 78 pairs nesting in 1958(1st yr of protection), 86 in 1959, 112 in 1960, 132 in 1961, about 150 in 1962. Later the numbers declined - because of predators, especially foxes and during 1962-63 a large number of dead ducklings were found - cause unknown.

13. Kumari, E.V. 1966

14. Onno, S. Kh. 1966

## Breeding Populations (2)

15. The most valuable and promising, from the economic standpoint, populations of breeding eiders in the U.S.S.R. and the Barents Sea and White Sea population (race *mollissima*) and of lesser importance the Franz Josef Land population (race *borealis*).

The distribution of the nesting colonies of eider in the Barents and White Sea is closely connected with the hydrological regime and biological productivity of the sea waters, and with the geomorphology of the coasts. The actual and especially the potential sizes of the colonies are directly proportional to the indices of the biomass of the benthos on the littoral and sublittoral and also to the numbers of isolated islands and nesting sites of the birds and their area.

In the Soviet north, the nesting area of the Greenland eider is actually delimited by the Barents Sea (in the Kara Sea the birds only nest on the northeastern part of Novaya Zemlya) and the western part of the White Sea. The largest concentrations of eider in the nesting area have become adapted in decreasing order of numbers to the area of the Kara Gates (especially to the southern part of Novaya Zemlya), the central part of the west coast and the extreme north of Novaya Zemlya, the Kandalaksha and Onega Gulfs of the White Sea and the Murman coast. According to approximate estimates by the beginning of 1950 the total number of eider nests in the Barents and White Seas amounted to about 50,000 including about 25,000 on Novaya Zemlya.

As is also the case with other members of the Arctic biocoenoses especially in the northern part of their range the eider are subject to episodic partial or complete non-nesting seasons (during ice-bound years).

## Breeding Population Ratios (1)

1. Aerial counts Ad males 3922 Females 4075 Imm males 351  
(May 6-11, 1967) 1 male! 1.0 females Imm males = 4.2 of all birds  
on the assumption that the immature females were in the same ratio  
as immature males the immature content of the breeding birds observed  
was 8.4% or 3,153.

2. The sex ratio in common eiders is 1:1 at the beginning of  
breeding (1005 males:937 females).

3. Males predominated among the 1st arrivals. On May 15, 1955  
the ratio was 4.8 males:1 female. On June 1, 1955 the ratio was  
balanced 1:1. On May 13, 1956 the ratio was 4.9:1 and on June 5,  
1956 it was 1:1.

4. Pairing off at winter quarters or on journey to eideries.  
Flocks of late April and May contain distinct pairs, but males  
still predominate. Usual sex ratio in mating period 1:1. borealis  
arrives at nesting quarters paired off.

5. On May 11, 1950 on B. Ainov Islands the ratio was 175 females  
to 179 males. Commonly the sex ratio is 1.1 to 1.0.

Young eiders come into established breeding areas at a later  
date than adults. They keep close to shore in small flocks. They do  
not display a spring excitement. In 1935 in Kandalaksha Bay 1300  
adult birds and from 200-250 young birds were seen. In the summers  
of 1950-52 young males comprised from 0.5 to 2.75% of the adults.

Young females stay at the islands all summer, sometimes trying  
to brood foreign clutches and joining broods when they descend to  
water.

In May 1958 in the area of Seven Islands, 1460 adult males  
were noted and 95 young males. Perhaps the main bulk of young  
birds keep individually far away from nesting grounds.

1. Mendall, Howard L. 1968
2. Belopol'skii, L.O. 1957
3. Cooch, F.G. 1965
4. Dement'ev, G.P. et al. 1952
5. Gerasimova, T.D. and Z.M. Baranova 1960

## Arrival and Departure Dates (1)

1. The American eider many of which winter along the New England coast arrive at Kent's I. during April. 1st in 1937 was April 7.

The northern eider which winters off Kent I. leave for the north before the American arrives. The American eider remains at Kent Island until they evidently migrate en masse.

The wintering population of northern eiders arrive in the latter part of October.

2. At Franz Josef Land early arrival 10 April, 1931, mean April 3rd, mass arrival early 29 May, 1896, mean May 3rd. Prenesting period (appearance of 1st individuals and the laying of the 1st egg) - 60 days in Franz Josef Land.

3. In Kandalaksha Bay the earliest arrival was April 18, 1940 and the latest was the 2nd half of May, 1935. 12 year average is 20th April. There is a relationship between time of arrival and the date at which the bay becomes free of ice. 1st birds appear several days after the appearance of large openings - ceases when bay becomes free of ice. Commonly drakes come first.

4. The eider does not settle down to nest before the ice surrounding its nesting island has disappeared (Bergman, 1939).

5. In 1954 not seen until 19 May when there were pairs and small groups at the open tide rips among the islands of Korok Inlet. In 1955 the first were two groups of two males on 10 May. On 30 May about 250 mostly paired seen on the strait between Tenetuke Island and Sungasuk Peninsula.

6. Cartwright at Cape Charles notes on March 7, 1771 two pairs March 23rd a flock looking for water.

7. In the vicinity of Foxe Peninsula the eider remains until October.

8. Males predominated among the first arrivals and it wasn't until June 1, 1955 and June 5, 1956 that sex ratios approached 1:1. On May 13, 1956 three flocks were seen and on May 13, 1955 two flocks were seen. They are reported to winter in the eastern Hudson Strait near Port Burwell (P.A.C. Nichols of the Hudson's Bay Company - 1922-23). Migration appears to be west through Hudson Strait to Cape Dorset and perhaps north from Flaherty Island, James Bay and Roes Welcome Sound, Southampton Island where they are suspected to be wintering. Many early migrants arrive at Cape Dorset in sex-segregated flocks. Large flocks of females are never abundant. Pairing may take place before

1. Gross, A.O. 1938
2. Belopol'skii, L.O. 1957
3. Gerasimova, T.D. and Z.M. Baranova 1960
4. Grenquist, Pekka 1965
5. Macpherson, Andrew H. and Ian A. McLaren 1959
6. Townsend, Charles, W. and Glover M. Allen 1907
7. Soper, J. Dewey 1946
8. Cooch, F.G. 1965

Arrival and Departure Dates (1)

8. Cont'd

arrival at Cape Dorset. Local Eskimos say that nearly all eiders leave the area by freeze-up although some are seen in mid-November among the loose ice. Apparently there is no massive autumn migration but a gradual withdrawal along routes followed in spring migration. Males and subadult males and females appear to leave first.

9. Arrival at Kent Island 1937- Apr 7, 1938- Apr 5, 1939- Apr 7, 1940- Mar 31, 1941- Mar 28, 1942- Mar 7, 1943- Mar 11, 1944- Feb 26, 1945- Mar 2, 1946- Mar 15, 1947- ?, 1948- Apr 7.

10. Winter resident along Greenland coast (fide Ekblau) probably 1st to appear usually about April 20. The numbers frequenting open places gradually increases until the last week of May when immigration begins in earnest and continues until mid-June. The females come later than the males but the last females come with the last males. As soon as egg-laying is over by mid-summer the adult males desert their mates and begin to move away from the breeding grounds. Immature males of the previous year keep by themselves all summer in large flocks and do not even now mingle with adult males. They spend the summer well out at sea near the drift ice. The fall migration is very irregular. Many birds spend the winter not far from their breeding grounds. Early dates of arrival: Battle Harbour May 1, Cumberland Sound April 30, Etah northern Greenland April 20, Wellington Channel lat. 76°N May 17, Cape Sabine lat. 79°N May 28, Thank God Harbour Lat. 81°N June 4.

dresseri males move two or three weeks or a month before the females to their northern breeding areas. In the latter part of May and early June they were found abundant on the southern coast of the Labrador Peninsula. Northward movement of dresseri begins in March and early April. Leaves Massachusetts about April 20. Arrives in Massachusetts, Essex County, Sept. 20, Cohasset Sept. 18 - usual arrival early in November.

11. The common eiders appear in the islands of the Kandalaksha Sanctuary between April 15 and April 20.

12. Seen off flow edge at Chesterfield Inlet May 30, 1967 migration continued until early June. 1st seen on ponds on June 11, 1950.

13. At the end of April the birds begin to arrive in larger groups in the vicinity of the breeding places.

- 9. Paynter, Jr. Raymond A. 1951
- 10. Bent, A.C. 1925
- 11. Kulachkova, V.G.
- 12. Hohn, E. Otto 1968
- 13. Gudmundsson, Finnur 1932



## Arrival and Departure Dates (2)

14. In March collects in large numbers at bays of eastern Murman. Between April 18 and May 11 yearly passages proceed to neck of White Sea. Small bands of 8-15 journey south one after another, coursing over leads or edge of ice. Novaya Zemlya birds return from winter in west in April. 1st flocks are predominately males. From Kandalaksha Bay departs only on formation of ice in November. borealis arrival at Spitsbergen in early June. Departs from Franz Josef Land according to ice conditions, on September 22 already rare at end of month encountered only as lone individuals.

15. The earliest arrival in Kandalaksha Bay was April 18, 1940 whereas the latest was the 2nd half of May, 1935. Twelve years of data indicate average arrival 20th April. There is a relationship between arrival and the date the bay becomes clear of ice. 1st birds appear several days after the appearance of 1st open leads. Mass arrival coincides with large openings in the bay and ceases when the bay becomes free of ice. Commonly drakes come first. In the Kandalaksha Bay eiders stay for about 7 months.

(See nesting range (8))

In 1938 617 nests were recorded on Seven Islands in 1940 - 1614 nests. On B. Litsky Islands in 1938 there were 167 nests and in 1939 - 502 nests. On M. Litsky Island in 1938 - 9 nests in 1939 - 70 nests.

16. Usually arrive in the vicinity of Vil'sand Island in late March and early April.

17. Depending on the distribution during the nesting period and on the positioning of the wintering sites, the number of eiders in flight in the basin of the Baltic Sea is greatest in its western part near the coast of Sweden and Denmark. They are encountered in flight in especially large numbers in the Kal'marzund, the strait between the mainland part of Sweden and Eland Island. According to Edberg's findings (1960-61) in some years up to 300,000 individuals (in 1959) have been encountered here flying in a southerly direction and up to 186,000 individuals (in 1960) flying in a northerly direction. Quite large numbers are encountered in flight in the fall near the Fal'sterbu ornithological station (in southern Sweden) and near Ottenby (at the southern extremity of Eland Island). Between 1949 and 1960 the number of individuals observed in flight fluctuated between 5167 and 59,174. The number observed tended to increase from year to year. Between June 1 and October 31 in the vicinity of the

- 14. Dement'ev, G.P. et al. 1952
- 15. Gerasimova, T.D. and Z.M. Baranova 1960
- 16. Aumees, L.E. 1966
- 17. Iygii, A.J. 1966

17. Cont'd

Ottenbyu (Eland Island) ornithological station up to 23,000 individuals were sighted. In 1950 - 7227, 1952 - 3260, 1953 - 7240, 1954 - 18,000, 1955 - 21,800, 1956 - 23,000.

At the end of May the migration of adult males in a southerly direction is already beginning off the coast of Sweden. This continues throughout June. At the end of July a new increase in the number of flying individuals begins which reaches a culmination in the middle of August when the flight begins to places of shedding off flight feathers. According to Paavolainen's data (1957) in the eastern part of the Gulf of Finland the adult males separate from the females in the second half of May and congregate in flocks which fly away in a westerly direction during the second half of July. In Estonia the adult males assemble in moulting flocks within Moonzund (in flocks of up to 60) likewise during the period from late May to early June and wander around Moonzund in the vicinity of the islands or in the open sea.

The true autumn flight of the eider off the coast of Sweden begins in late August or early September. At this time the eider also leave their birthplaces in the eastern part of the Gulf of Finland.

The culmination of the autumn flight in the Kal'marzund is observed during the second half of September (34,000 seen Sept. 16-20, 1957) or in October (93,000 seen Oct. 12-21). Near Fal'sterbu the culmination of the autumn flight is observed in October. In Estonia the culmination of the autumn flight occurs during the second 10 days of October.

In the eastern part of the Gulf of Finland the departure of the main mass is already underway during the second half of September.

The principal wintering areas of the Baltic eider are the territorial waters of Denmark. The majority of eiders banded in Sweden, Finland and Estonia are encountered in the winter-time in Denmark.

There is very few data on the autumn flight of the eider in the Baltic Sea. It is known that in the Kal'marzund in some years eiders are encountered flying in a northerly direction in numbers exceeding 186,000 individuals. In 1958 the culmination of their autumn flight here was observed between April 15 and 24 when 86,000 individuals were seen. Near Fal'sterbu no more than 3224 individuals were encountered between April 1 and May 15.

In southwestern Finland the average arrival date is April 10 with a range of March 17 to May 8.

The eider arrives at the Vaikass Preserve in Estonia no later than March. In 1959 the first individuals were seen on March 21 (a very early spring) in 1960 on March 31 (normal spring) and in 1961 on March 11 (an unusually mild winter). Near the city of Tallin on the Gulf of Finland the first eider were spotted in 1938 on March 23 and in 1939 on March 14.

# Arrival and Departure Dates (3)

## 17. Cont'd

The eider has been encountered regularly in fresh water lakes in Finland. During recent decades young eiders have been appearing with increasing frequency at wintering sites in Switzerland (Hauri, 1961) and in other inland waterbasins of Europe.

18. Site of late summer and fall congregations near Zhizhagin Island and the northern part of the Onega Peninsula near the Solovetskii Islands.

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## Mating (1)

1. First mating activity on Kent's I. in 1937 - April 26, all took place on water. The eider is polygamous a male bird copulated with 3 females on May 12, 1937. Number of females is greatly in excess of number of males. The male deserts the female after breeding.
2. Following a mating period in the water pairs come ashore in mid-May to select nesting sites.
3. The sex ratio at the Murman is commonly 1.1 to 1.0. Soon after arrival the mating begins. A female leaves the flock accompanied by 2 or 3 males, other males may join until the female is accompanied by 6-14 males. The males fight until the female flies away with one of them.
4. In the eider population in East Murman sex activity begins judging by the size and weight of the testicles and ovaries in the second and sometimes the first 10-day period of May, reaches its peak at the end of May - first half of June and terminates at the end of June.

Eiders begin breeding at the age of 2 years when 1½ years old males acquire their full plumage and a number of young males and females gather near the breeding ground. Young eiders though physiologically not yet ready for reproduction (because of under developed ovaries and testicles) show an awakened breeding instinct. The male birds persecute the females and sometimes start fighting; the females occupy the nests of other adult birds or sit next to them, behave aggressively towards the nestlings; later they join the brood. The main mass of the flock occupying the breeding ground before the nesting period consist of physically mature and normally reproducing birds which form the first group. The second group is composed of potentially mature birds which will not breed that season. The third group includes subadults, appearing either singly or in very small parties. The fourth group contains senile birds.

5. During the last week of May males begin to call Ah-hoo. There is little fighting among males. Most of the courtship is carried on while swimming. A single female is often accompanied by two or three males. As the season progresses the intensity and frequency of their calls increases. Males rear up in the water exposing their black belly and at times flap their wings; give a restrained head "toss" with the bill pointing vertically upward. During moments of more intense display the head is jerked backwards rigidly from the vertical position, then returned to the normal position. Vocalization occurs as part of the visible display. The Ah-hoo is uttered while the bill of the male is in a vertical position or when it is brought forward from the more extreme head toss. When courtship reaches a high intensity the male emits a "doo" or "k'dou" sound while the bill is pointed directly downward and held tightly to its breast. Mating occurs shortly afterwards. When the female accompanied by

1. Gross, A.O. 1938
2. Pettingill, Olin, Sewall, Jr. 1959
3. Gerasimova, T.D. and Z.M. Baranova 1960
4. Belopol'skii, L.O. 1957
5. Cooch, F.G. 1965

## Mating (1)

### 5. Cont'd

one male swims quietly away. Copulation occurs soon after. The female stretches her head and neck forward lying low in the water in a straight line. The male becomes excited swims in a circle around her, repeatedly raises himself in the water exposing his belly and flapping his wings. Finally he swims behind the female who lies flat in the water, mounts and copulates. They then wash themselves rocking in a forward and aft motion. They then preen before returning to the flock.

6. First mating Kent Island 1937 - April 26, 1938 - April 16, 1939 - April 17, 1948 - April 19, 1941 - April 17, 1942 - April 28.

7. Some females probably breed during their second spring, but probably most of them do not do so until they are nearly 3 years old. The mating season in Greenland is usually at its peak by mid-June (fide Ekblau). In years of heavy snow when the islets are covered until late the season is retarded. Immature males during the breeding season do not associate with the adults but keep aloof and usually solitary. Not until the full adult plumage of the male is assumed does he enter into contest for the female.

8. On May 31, 1915 near the Nastapoka River eiders were mating.

9. Pairing and copulation takes place in March in most cases probably in the second half of the month. During mating they are seen in large and small flocks frequently several hundred everywhere along the coast where, in the shallow water near shore, they dive eagerly for food.... Copulation takes place exclusively on the water, most frequently between March 20 and the beginning of the month of April. A female followed by a male bird moves away from the other birds. She then stretches head and neck forward, so that her body, lying flat on the surface of the water, forms a straight line. The drake now swims very excitedly around the duck and repeatedly raises himself in the water, flapping his wings. He then alights on the female and copulation takes place.

On June 2, 1931 at the breeding island near Baer in Hrutatjordour a Stellers drake was paired with a female eider which was brooding 4 fresh eggs. On May 29, 1931 a velvet duck was paired with a female eider on the breeding island of Engey, in front of the harbour of Reykjavik. The nest contained 3 eggs.

10. Puberty at age of 2 or closer to 3 years. Complete nuptial plumage appears on male only during 28-30 months of life. Together with ordinary pairs, 2-3 females may cluster around one male or conversely 2-3 males around 1 female.

6. Paynter, Jr. Raymond S. 1951

7. Bent, A.C. 1925

8. Todd, W.E. Clyde 1963

9. Gudmundsson, Finnur 1932

10. Dement'ev, G.P. et al. 1952

## Mating (2)

11. Soon after arrival mating begins. A female leaves the flock accompanied by 2 or 3 males. The drakes overpass one another. More males are attracted by their cries and soon the female is surrounded by 6-14 males. All of them cry loudly and drag away one another by feathers. The fighting continues until the female flies away with one male. The rest of the males return to the flock.

If we consider that eiders begin brooding in their third year and the principal part of the nesting population is composed of birds between 3 and 8 years old (in Kandalaksha Bay).....

12. The males remain until the first half of June on the islands on which the females are hatching. They then assemble in flocks which feed among the shoals located far from the shore and islands and rest on the small reefs and islets. In the sector being observed the moulting males frequently join up with large mergansers undergoing moulting.

- 11. Gerasimova, T.D. and Z.M. Baranova 1960
- 12. Onno, S.Kr. 1966

## Nesting Site and Nests (1)

1. small, low, rocky islands with very little grass and a few mosses, nests on the ground, in the grass or moss, or in hollows between the rocks frequently nest on cliffs on the coast of Greenland, nest on islands in freshwater, (e.g. 18 miles up Koksoak River) the nest is profusely lined, around, under and sometimes over the eggs with a thick bed of soft fluffy down, densely matted. Colour is drab, light drab or drab gray with poorly defined lighter centers and light tips mixed with the occasional bit of pure white down dusky belly feathers and barred breast feathers.

eiders prefer to nest in communities but do nest singly. off south coast of Labrador found 20-30 nests in space of an acre. nest is generally close to saltwater, have been found 100 yards from water. nesting site may be open to the sky in a depression among the rocks or more often partially or wholly concealed among and under spruce, alder, and laurel bushes or in the grass and rushes.

nest may contain seaweeds, mosses, sticks and grasses, down comes from female only, female makes nest, female can make at least 2 nests if the first is destroyed the down is rarely clean as it contains bits of moss, twigs and grasses.

the amount of vegetable material in the nest depends upon the particular situation of the nest. the nests are often several inches high resting on a mound formed from the decayed mass of material used for previous years' nests. in some situations the nest consists of a slight depression cleared of vegetation with the eggs deposited on the ground and covered with down.

2. nest sites low, rocky barren islands with a preference for those which are more or less covered with grass and low scrubby juniper. nests are always placed on the ground often in a tuft of grass or beneath the spreading bows of juniper. the grassy crevices between flat strata and the soft beds of moss at the foot of over-shadowing rocks are also favourite situations. nests are rarely found absolutely in the open. may be under stumps behind large pieces of driftwood, under small junipers and overhanging dwarf spruces. the nest is of rather bulky construction formed of mosses, lichens, dried grasses and seaweed loosely matted together and the whole fabric sunk as deeply as possible in the ground. the nests are frequently several hundred feet from the water.

3. nesting islands vary in size from one acre to more than 3,000 acres. nesting densities vary from less than one nest per acre to about 500 per acre.

1. Bent, A.C. 1925
2. Coues, Elliott 1861
3. Reed, Austin and J.-Guy Cousineau 1967

## Nesting Site and Nests (1)

4. in addition to down and feathers other materials such as dry cranberry, willow twigs, cloudberry leaves, stalks of cereals, alder scrubs, lichens, crushed mollusk shells and stones are used. new nests built on clean ground are the least littered. the old nests are surrounded by an accumulated debris in the form of a ring (elevated ring) which has gradually developed in different ways; after 2-3 nesting seasons some of the accumulated organic material begins to decay and forms a layer of humus, the ring becomes overgrown by various plants. the plant encircled ring protects both the nest and the eider from the wind and in some cases also from the sight of predators. there are four basic types of nest sites - underneath tussocks and overhanging rocks and among the tufted drooping grass and brushwood; between shingle stones and shrubs but open at the top and occasionally at the sides, attached to a single shingle rock, cliff, shrub etc, the open nest lie on level surfaces of the insular tundra region or on the slopes of the islands. Females choose the nesting site shortly before egg-laying and builds the nest during egg-laying.

5. the female makes a shallow excavation in the soft peaty soil. in this cavity devoid of all nesting material the first egg may be laid but more often grasses, bits of turf and debris are added. The nesting eider seems to take no precaution to conceal the first eggs but as the set is completed and after the onset of incubation she carefully covers the eggs with the nesting material, chiefly down. Along the coast of Labrador the down is present at the time the first eggs are deposited, eiders nest in the seclusion of woods so thick that little light filters to the forest floor. nests were found among the tangled masses of fallen dead spruce, in the rank growth of grasses and iris and a few are in very exposed places entirely devoid of vegetation among boulders. nest in interspecific communities - with herring gull. lay eggs in herring gull nest (3 nests). gull hatched egg, eiders used herring gull nests to which they added down. nest is usually round and fairly uniform in size, outside diameters ranged from 230 mm to 340 mm, inside diameter 160 to 240 and depth 60 to 85 mm.

nesting tenacity of females demonstrated by 3 females banded which returned to the same nesting site on three successive years. the female selects the nesting site and builds the nest.

4. Belopol'skii, L.O. 1957
5. Gross, A.O. 1938



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## Nesting Site and Nests (2)

### 8. Cont'd

be related to location of nest. On open tundra they are thicker than in protected situations. On Novaya Zemlya an "accumulative bar" was noted around old nests - organic material had accumulated and had become overgrown with plants. These bars are not found on the Murman or the islands of the White Sea, probably because nests are not reused to the same degree. On the islands of Novaya Zemlya which are devoid of vegetation, shells are put over the bottom of the cradle. The eider usually uses the material that is available at the site for the construction of the nest. The female plucks the down from the lower portion of her breast and from almost all the abdomen area. This is the area of the brood patch 190-200 sq. cm. The brood patch remains for almost all the brooding period. The barbs of the down from the brood patch are longer and more numerous than that from other parts of the body and therefore have a greater cohesive quality. The down used in a nest is not the same as that can be plucked out of a killed bird. The average amount of down in a nest on Seven Islands was from 17-19 grams. From nests of Kandalaksha Bay it was 20-21 grams. The female lines her nests 2 or 3 times with down. While building the nest she adds only the amount of down that remains in the area of the brood patch. While sitting on the eggs after she had plucked out most of the down she adds a very little amount. The average amount she produces is 20 grams occasionally 28-35 grams. Frequently nests are lined not only by adult females but by young birds. Immature females frequently occupy deserted nests, start to line them and brood the foreign eggs. The female begins to pluck out her down after the third egg is laid. The normal amount of down (20 grams) predominates in nests of 4-5 eggs. At the beginning of brooding the down is clean but becomes dirty with vegetable admixtures later. On forested islands the down after 15-20 days of brooding is 48.9 - 59.8% impurity while on treeless islands it is 21.3%. The average weight of the raw down on forested islands is 100 grams and 70.2 grams on treeless islands. The further north the nesting locality is the scarcer the vegetation and the cleaner the down.

9. On a half-acre island in Penobscot Bay in 1967 there were 150 eider nests.

10. Onset of nesting is announced by the increased number of birds using the nests and pairs flying low over the islands. These scouting forays are made at on the incoming tide whereas at low tide they are feeding. The male always accompanies the female on the scouting foray. The males are silent but the females croak or moan, throughout the flight. The pair fly low over the land, the female in the lead slightly. Desirable areas are circled many times. At the end of the search flight they land on the water near the potential area. The female leaves the water followed by the more timorous male. In 1955 92% of the females selected sites that had been used in previous years and in 1956 87%. Final preparation

9. Mendall, Howard L. 1968  
10. Cooch, F.G. 1965

## Nesting Site and Nests (2)

6. the female scrapes a shallow hole and then lines it with grasses and any other material picked up near the periphery. she does not begin adding much down until the eggs are laid and incubation is underway. Down-preening - wedging the bill-tip into the breast or belly plumage, withdrawing a few downy feathers and shaking them loose or rubbing them off against the nest - goes on intermittently for several days until the nest lining is sufficiently built up with down.

7. Nests are sometimes as close as two feet from each other. Some of the nests were built on fresh scrapes, most were in old nest depressions.

8. In the beginning of May eiders begin to ascend onto the islands in pairs or in small flocks searching for nesting sites. In the White Sea snow may be still on the ground when they begin their search. In Kandalaksha Bay the earliest appearance on the islands is between May 1 and 6. First nest records there are May 6, 1950 - May 29, 1958. On the Ainov Islands in 1949, first nest record - May 10 and in 1950 - May 9. On Sem'Ostrovov (Seven Islands) - May 10, 1954 - June 11, 1958. On Novaya Zemlya in 1948, June 6, 1949 - June 14, 1950 - June 4. Time of nesting depends on climatic conditions. In the White Sea onset of nesting depends on when the sea becomes free of ice. Nests appear on the southern island of the archipelago 10 days earlier than on the northern island because of the earlier release of the littoral of the southern islands. Snowcover affects beginning of nesting. In 1949 snow stayed until mid-June in Eastern Murman, the average temperature was +2°C. In 1950 the spring was mild. In 1949 nest appeared May 25 and in 1950 May 12. On Ainov Islands first nest appear on open sections of the tundra where the snow is quickly blown off and the earth dries rapidly while in bush, over tussocks, in high grasses where the eiders nest principally the snow melts slowly and nests are established later. On Khavlov Island (the Eastern Murman) in the northern and eastern parts snow stays later and nest appear later than in the southern part. On Kuvshin, Bol'shoi and Malyi Zelentsy Islands snow doesn't affect onset of nesting. On treeless islands nesting begins later although they are free of ice earlier perhaps because of cold spring winds. Female rakes the litter one day the next she comes back tramples down the cradle, rakes in the needles, dried branches and leaves. The next time she reappeared (2 days later) the first egg was laid. On Novaya Zemlya eiders commonly occupy old nests using them for many years in succession. On the Murman of the White Sea they occupy old nests less frequently. Nesting tenacity was demonstrated in 1957 on Devichya luda where a female was caught that was ringed there in 1953. The average diameter of nests is 220-225 mm height of cradle, 110 mm and thickness of walls 55 mm. Thickness of walls seems to be related to

6. Tinbergen, Niko 1958

7. Pettingill, O.S. 1959

8. Gerasimova, T.D. and Z.M. Baranova 1960

## Nesting Site and Nests (3)

### 10. Cont'd

of the nesting site is not normally made during the first inspection tour. No eggs are laid except late in the season. No eggs are laid when new nests are constructed. The male leads the female back to water after the inspection. They often preen and wash in the lakes before returning to the sea. Scouting of prospective sites takes place normally 2-3 days before the first egg is laid. On selecting an old nest site the female churns up the material with her bill to allow air circulation and let the material dry out. Nests showing this churned up state were first noted on June 15, 1955 and June 20, 1956. New nests are usually constructed on the same day as the first egg is laid. 90% of the nests were located in rock shelters only, 10% were seen in flat, open, grassy areas. Most eiders in the Cape Dorset area selected sites surrounded by rocks or under an overhang or preferably both. Favoured sites provided that shelter or concealment is available are along ridges facing south and southwest and are well drained. 40% nested within 100 feet of water and at least 10% more than 900 feet.

The deposition of down varies in different nests as egg laying progresses. Some nests receive their first nesting down with the deposition of the first egg, in others no down is deposited until the clutch is complete. The median date of nest commencement was 8 days after the first nest was begun. Nesting density West Foxe Islands 2.5/acre in 1955 range 1.2/acre - 7.0.

11. Nesting densities on Moose Island was 3.8 per 1,000 sq. ft. (166/acre) in 1965 and 8.9/1,000 sq. ft. (389/acre) on East Goose Rock in 1964. The nest initiation period in 1964 was week of April 29 to June 24 and in 1965 week of April 29 to week of July 1. The peak was the week of May 20 in 1964 and 1965.

12. On Kent Island most of the eiders nest on the southern end where there are few living trees. However numerous nests are also found on the northern end under thick stands of spruce and occasional fully exposed on the rocky shore or in marshes. Most nests are built under fallen dead spruce or in raspberry and gooseberry. There is little leaf cover until well after the first of June. Nests with incomplete clutches are seldom filled with down and the eggs remain rather exposed.

13. During the first part of May the first females, always followed by their males, walk up from the sea to the breeding place to choose the nesting site. Only during the incoming tide do they now visit their breeding colony, all this time they never fly from the sea to the breeding place, nor from there back to the water, all distances are covered by the birds running. As soon as the egg laying starts the behaviour of the ducks changes, they now fly between the breeding place and the sea. After choosing the nest-basin, it is cleared if necessary of the loose material which has accumulated during the winter and shapes it anew. Then begins the

- 11. Choates, Larry S. 1967
- 12. Paynter, Jr. Raymond A. 1951
- 13. Gudmundsson, Finnur 1932

# Nesting Site and Nests (3) 13. Cont'd

gathering and moulding of material for the bottom of the nest. According to my observations all this is done by the female alone, even though the male is present he does not take part in the nest building. The nest-basin is always lined with 2 layers, an outer and an inner one. The outer layer usually consists of mosses last year's material made up of various gramineae and a few other plants that grow nearby. The inner layer consists of the well known down. It is usually of considerable thickness. The down is of a light-gray to brown-gray colour and has a light coloured centre. The shedding of the down and the lining of the nest begins with incubation after the second or third egg is laid. Only when the down is removed by human beings during the incubation period will the birds "pluck" their down in order to provide a substitute. But the latter consists for the greater part of the small feathers growing on the belly and the upper leg, these are not down feathers in the true sense.

## Measurements of 43 nests (1931) at Videy

Width of nest (with down rim)	26 cm (20-31 cm)
Width of nest-basin	17 cm (14-26 cm)
Depth of nest-basin	6.8 cm (5-12 cm)

14. In Kandalaksha Bay most of the nests are on wooded islands. In 1957, 1860 nests were on wooded islands and 165 on treeless islands. In 1958 it was 1139 and 204. Spruce growth are the best stations for eiders in Kandalaksha Bay. Their branches descend to the earth forming a canopy under which a nest is almost inconspicuous. Over islands covered with spruce the densest distribution of nests are found. With the most uniform distribution. Over treeless islands eider nests are confined to the coastal strip protected by driftwood, stones, wildrye and grasses. Over Devich'i ludy 63% of all nests are in driftwood and on Poperechnye ludy 65% were among stones. Over Sem'Ostrovov eiders use for nesting deep niches and crevices in rocks, depressions and pits between turf hillocks.

Over Veshnyak Island 71.3% of the nests were protected by stones and only 3.3% were in grasses. On the Ainov Islands high (up to 1.5 m) hillocks, bushes of willow and relatively early vegetation serves as excellent protection for nests. On the islands of the Murman Coast it is very important whether nests are protected from the strong northern winds - most nests are concentrated on the southern part of the islands. On the northern shores most nests are located on the southern side of stones that protect them from the wind. In 1949 in Kandalaksha Bay 683 (75.13%) nests found were protected and in the Sem Ostrovov Sanctuary 918 (76.3% of 1215 located) were found in sheltered places. On the Novaya Zemlya the basic shelter for eider nests are stones. Eiders avoid dead and deep niches where cold air becomes stagnant and nest on dry open slopes. On

## Nesting Site and Nests (4)

### 14. Cont'd

Novaya Zemlya they tend to nest in dense groups to practically form a colony. Sometimes nests are poorly located below the maximum tidal line and are lost. The distribution of nests also depends upon the unevenness of thawing and the release of the littoral from ice. On islands which become ice-free at a late date as Irin'in Island the density is low (1.2/hectare) despite an abundance of favourable nesting sites and good food. The distribution of nests also depends on the food capacity of the littoral and on the accessibility of food. On Sem Ostrovov for example the north shores are steep, the rough seas do not allow eiders to feed. On Voronii Islands nests are concentrated on the southeastern end where the littoral is richest and the seas calmest.

On the average the diameter of the nest is from 220 to 225 mm. The height of the cradle is 110 mm. The thickness of the walls is 55 mm. There was no essential difference in nests found in different places. However the wall thickness was less in Kandalaksha Bay (an area sheltered from winds) than it was on the Murman especially in the area of Sem Ostrovov. Nests located on a lake shore or over sections of an open tundra have thicker walls than those located in sheltered situations.

An "accumulative bar" organic material built up over the years is characteristic around the cradle of nests located on Novaya Zemlya. It sometimes serves as a protection against winds. It is not found in the Murman or the islands of the White Sea.

Usually the eiders line its nest with vegetable waste and down. On Novaya Zemlya where vegetation is absent the eider puts shells over the bottom of the cradle. Usually materials that are on the spot are used in nest construction. Therefore nests built on the fern tundra are built of fern leaves whereas spruce needles are found in nests located in forested areas and nests on the seashore contain algae.

Nests are lined with down plucked by the female from the lower portion of her breast and almost all of the abdomen area. The brood patch reaches 190 - 200 sq. cm. Only at the end of the nesting period new fluff begins to appear.

The fluff from the area of the brood patch has a large number of woved barbs (from 60-80 barbs) of the first order having a large number of barbs of the second order. The latter are longer (2.5 - 4.2 mm) than barbs in fluff from other parts of the body. This allows the down to link together in a compact mass which has considerable thermal insulating capacity. The down from other part of the body has a smaller number of barbs of the first order (28 to 30). Barbs of the second order are shorter (1-2 mm). The average amount of down in a nest at Sem Ostrovov was 17-19 grams. In

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## Nesting Sites and Nests (4)

### 14. Cont'd

Kandalaksha Bay the average was 20-21 grams.

The female lines her nest 2 or 3 times. While building the nest she adds only that amount of down which remains in the brooding patch. While sitting on eggs she adds a very little amount. The average production of a female is 20 grams rarely 28-35 gms. It is often that in insulating a nest there participated not only adult females but also young birds. The female begins to pluck out down after the 3rd egg is laid. In nests of 2 eggs there is no down or its amount is quite little.

At the beginning of brooding the down is quite clean but becomes dirty with an admixture of vegetable matter as incubation advances. Impurity is higher on forested islands after 15-20 days of brooding (48.9-57.8%) than on treeless islands (21.3%). After the brood hatches the impurity increases to 81.5% and 76%. The average weight of the raw down on a forested island is about 100 grams vs 70.2 grams on a treeless island. In areas of richer vegetation (the southern and western parts) the impurity is high but in the north in the area of scarcer vegetation it is lower.

15. Social; always on ground on sand, shingle, rocky ledges or moorland near the sea, either with or without cover. Nest made of grass and similar local materials (exceptionally of freak materials such as wood shavings) usually well lined with down (pale grey-brown paler in middle and at tips) and characteristic feathers (brown barred black). Eggs covered with down when bird absent.

16. The locations of the eider nests are very diverse. Whenever possible the majority of the nests are located among juniper stands or in wild currant bushes. Furthermore, the nests are usually located in shrubbery in order that the female may quickly and freely run from the nest when danger threatens. A certain proportion of the nests are situated on the open shore and at low water level, some of them are even found to be on the sea bed. Very often the eider nests are located either between or alongside stones.

The nests located in open places especially on the coastal ridges of fucus algae form small colonies consisting of 3 to 5 nests. The distance between the nests in these colonies amounts to several meters.

15. Fitter, R.S.R. 1954

16. Onno, S. Kh. 1966

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Nesting Site and Nests (5)

17. Many nests of the eider duck were seen at the edge of the woods placed under the rampart boughs of the fir trees which in this latitude (American Hrb.) grow only a few inches above the ground. The nests were scooped a few inches deep in the mossy, rotten substance that forms here what must be called earth, the eggs are deposited on a bed of down and covered with the same material. Six eggs was the greatest number found in a nest. The nests found on the grassy islands are fashioned in the same manner and generally placed at a large tussock of grass.

## Nesting Tenacity

1. Of 284 females ringed on their nests 1957-63, 177 or 62% were caught on their nests in 1958-1964, of these 167 or 94% were found nesting on the same island, 120 were recovered twice, 40 three times, 6 four times, 1 five times, on the same island.
2. Of 26 females banded with coloured bands in 1955, 23 or 88.5% returned to the same nesting site and two were found nesting in close proximity. 18 of the 23 nested within 50 feet of their 1955 site and 2 within 200 feet. Minor shifts were attributed to snow drifts covering former sites.
3. If the female previously nested on the breeding site, the old nest-basin is after re-occupied. Thus I have repeatedly ascertained that females which were easily recognizable because of external characteristics (eg. partial albinism, lameness, etc.) laid in the same nest for several successive years.
4. On Novaya Zemlya eiders commonly occupy old nests. On Murman and White Sea they occupy old nests less frequently. In 1950 over B. Ainov Island only 22 or 5.8% of 358 nests marked in 1949 were used. Some birds show strong nesting tenacity. On April 15, 1957 on Devichya luda a female was caught where she was ringed in April 13, 1953. On June 9, 1958 a female was caught on the same nest where she was ringed in 1956.

1. Grenquist, Pekka 1965
2. Cooch, F.G. 1965
3. Gudmundsson, Finnur 1932
4. Gerasimova, T.D. and Z.M. Baranova 1960



Eggs (1)

1. One brood per season clutch ordinarily 4-6 eggs large clutches (up to 19 eggs) have been found, eggs of 3 subspecies, *mollissima*, *dresseri* and *V-nigra* same shape size and colour. shape - from ovate to elliptical. shell is smooth with a slight gloss which increases with incubation. colour varies from olive to deep olive-buff, the eggs are often mottled or clouded with darker shades of green, olive, or buffy-olive, through which the ground colour sometimes shows in washed out spots. average size 75.4 X 50.4 mm (76 eggs) (*borealis*) range 83 X 53, 67.8 X 47 and 73.2 X 46 mm (*borealis*) average size 76 X 50.7 mm (59 eggs) (*dresseri*) range 83.5 X 54.8, 65 X 44.5 and 66.4 and 66.4 X 41.5 (*dresseri*) The summer of 1914 was late in Greenland and nesting had hardly begun on June 20.

2. between 2 and 7 eggs are laid the average being 5.

3. eider eggs are a weak pale-green colour. the number of eggs in the clutches varies greatly the average number of eggs per clutch varied noticeably from year to year, from 3.13 to 4.28 on Seven Islands. clutch size variation was explained by rate of predation differences in feeding and climatic conditions is reflected in the number of eggs per clutch from region to region. abnormal clutch sizes may be due to twin nests where two females lay their eggs in the same nest or where one female abandons the nest and it is taken over by another female who adds her eggs to the first. An examination of ovaries revealed a high percentage of successive clutch laying. eggs are variable in shape although most of them are ellipsoidally elongated with their length in relation to the maximum width being 1.45 to 1.65. average date for onset of egg laying 25 May. Onset of egg laying is dependent on the presence of high-calorie food which assures prebreeding fat and accelerates breeding, the average weight of 8 fresh eggs 105.2 grams; average weight of 9 pipped eggs 90.7 grams; ranges 99-111.3 and 83.5 - 94.8. presence of warm and cold streams, the forming of waterholes in the ice cover; air temperature is not a leading factor nor is light.

duration of egg laying - 5 to 8 days for a clutch of 4-6 eggs. It is dependent upon the exploitation of the nest (predation) and the conditions at the nesting site (weather). The weak pale-green colour is probably caused by attachment to the nest of the brooding bird which also covers the egg with down when it leaves the nest.

The number of eider eggs can only be more or less constant in specific regions where the feeding and climatic conditions are about the same from year to year. Here, fluctuations in the average number of recorded eggs in the nest are determined exclusively by local factors (predatory factors or fowling) but the size of the clutch remains the same. The quantity of torn follicles in the ovaries of eiders generally exceeds the number of eggs laid in the nest.

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Eggs (1)

3. Cont'd

There are less eggs in the clutches of Seven Islands and Novaya Zemlya than on Ainovy Islands and especially the Kandalasksha Islands. On the Kandalasksha Islands and in West Murman the greatest % contained 5 eggs (sometimes 6 on Kandalasksha) while in East Murman and Novaya Zemlya the average was 4 (occasionally 5). The largest number was found in the White Sea area (5.15) and in W. Murman (4.32) and the lowest in E. Murman (3.86) and on Novaya Zemlya (3.52). Onset of egg laying, over a period of years, varied by 23 days. Early spring generally resulted in early onset.

The laying of the first eggs at Seven Islands began on 6 June, 1947, 1948 and 5 June 1949. In the Matochkin Shar Strait hatching of the first egg occurred 2 August, 1903., laying must have started at the end of June. On Franz Josef Land it was 16 June, 1931, S.W. Spitsbergen end of May or early June. On Bear Island, probably no earlier than the beginning of June.

The light factor does exercise a certain influence on the onset of gonad development but it does not determine the beginning of the egg laying. There is a relationship between the appearance of open water areas and the beginning of egg laying. There has also been shown a relationship between feeding (the presence of high calorie foods) and breeding. Bird fertility increases in years of favourable feeding conditions.

Duration of the egg laying period - the timespan between the laying of the first egg and of the last egg. The eider takes from 5 to 8 days for the laying of 4 to 6 eggs. The laying of second clutches was due in part to poaching and to predation and resulted in an extended egg laying period with two or sometimes three peaks. In 1949 the egg laying period on the Ainovy Islands (from age analysis of embryo and nestlings) was from 4 May to 23 June (51 days).

4. Mean clutch size  $3.56 \pm .10$  (134 dresser nests) range 1 to 8 eggs. 39 nests produced young - mean clutch  $3.56 \pm .18$ . 95 nests didn't produce young  $3.57 \pm .12$ . Kent Island believes dresser seldom lays a second clutch if the first is destroyed since males desert shores of island in mid-June, probably no difference between clutch size of early and late nesters hatching (of 39 nests) was spread over 54 days, probably no difference between clutch size in early and late nesters at least for dresser (see 6). 39 nests produced 123 young or 3.15/nest. of the 134 nests studied 95 didn't produce young and the total (134) produced an average of 0.9/nest. losses were entirely through predation. Herring gulls were the biggest predator although crows and ravens could also contribute to the loss. the predation rate is probably higher because of the study. the cause or causes determining clutch-size are still unknown. no significant difference between clutch-size or different years, between nests that produce young or not or between early

Eggs (2)

4. Cont'd

nests and late nests. Clutch size isn't related to survival rate. There is a geographical trend of increasing clutch size from south to north.

5. average number in 100 nests of complete sets - 4.4 eggs (1932) Kent I. (dresseri) 1933 mean  $3.25 \pm .10$  (nests complete and incomplete clutches) colour was light vetiver green ranging from tea-green-watergreen to vetiver green. the eggs are free of markings except for the nest stains and calcareous deposits. the number of eggs in a set known to be complete ranged from 2-7. the average number of eggs from 133 nests found on islands in Penobscot Bay, Maine in 1933, clutch complete - incomplete - 3.2. The average number of eggs per set in about 150 nests along the coast of Labrador was 4.5. mean measurements of 45 eggs (calculated from Gross' data)  $78.6 \times 53.5$ , number of eggs laid / female based on 3 banded females suggest as females become older they lay larger clutches. there is a considerable decrease in egg weight as incubation proceeds - average of 2 sets of 5 eggs, 116.9 grams to 109.8 and 99.3 to 95.4 the total loss in weight during incubation is about 14% of the weight. Weight range of 45 eggs 94.2 to 125.4 grams.
  6. European eider in Spitsbergen lay between 4-6 eggs at first laying and 3-4 eggs at repeat layings.
  7. S. m. mollissima normally lays 4-6 eggs in Britain. Theoretically a shorter laying period would reduce the chances of predation. with reduced clutch size the chances would be smaller.
  8. Clutch size normally 6-7 eggs in Spitsbergen.
  9. Mean clutch size of 1131 nests (1934-1938 on Quebec northshore)  $4.04 \pm .03$  eggs (clutches complete and incomplete).
  10. Average size of 4 eggs collected on an island off Frobisher Bay was  $76.0 \times 48.0$  mm.
  11. Average size of 70 eggs from Baffin Island  $75.7 \times 49.9$  mm
  12. The majority of the nests contained 3 or 4 eggs rarely 5 (as the Icelanders are allowed to harvest eggs from nests in excess of 4).
  13. Eider eggs taken by the farmer cannot be sold.
5. Gross, A.O. 1938
  6. Koenig, A. and O. LeRoi 1911
  7. Lack, D. 1947
  8. Jourdain, F.C.R. 1922
  9. Lewis, G.F. 1939
  10. Sutton, G.M. and D.F. Parmalee 1955
  11. Phillips, J.C. 1926
  12. Pettingill, O.S. Jr. 1959
  13. Munro, D.A. 1961

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Eggs (2)

14. The female usually lays eggs at intervals of 24 hours, sometimes it is on 8-12 hours or 36-40 hours. The interval between the 3rd, 4th and 5th egg is usually longer. Laying takes place early in the morning or during daylight hours, rarely at night. A full set of eggs is usually 4-6. Rarely 2-3 or 7-8 eggs. From region to region clutch size varies. Kandalaksha Bay 5-6 average 5.42 eggs. Ainov Islands 4-5 averaged 4.7, Seven Islands 4 average 3.8. Novaya Zemlya 3-4 average 3.52. In regions of milder climate Kandalaksha Bay and Ainov Isles the clutch size is greater than in colder climatic regions, Seven Isles and Novaya Zemlya, probably because a female is able to heat a smaller clutch. Clutch size is also related to seasonal weather. Clutches of 5-6 predominated in mild years 1950 and 1951 (average 5.49 and 4.87) in Kandalaksha Bay, while in a cold late spring in 1952 the average was 3.89 with clutches of 4 predominating. On Seven Islands in the extremely cold spring of 1958 the average number was 3.28.

Egg length ranged from 69-89 mm width 43.5-60.5 mean 77-78 X 50-51 mm. Weight varied from 69-134 grams. Eggs are large on islands of the White Sea (Kandalaksha Bay) than on islands of the Barents Sea (Ainov Isles, Seven Isles, Novaya Zemlya). Differences in weight and size occur in the same nest. Repeat clutches are produced by females whose lose their first clutch. Traces of 3 clutch production have been noted in ovaries. Once brooding has begun and eggs are removed no replacement occurs.

15. Clutch size in the Soderskar area 1953-63  $\bar{x}$  of all egg clutches observed = 4.44. Following the hard winter of 1955/56 the clutch size was significantly smaller (4.24) and so was it in 1961 (4.12). In 1953, 54, 57 and 60 they were significantly higher. The decrease in the clutch size of 1956 is attributed to a weakening of the vitality of the females as a result of the lack of nourishment during the severe winter, or to the changing of the age composition of the population or to disturbances caused during delayed reproduction. Addled eggs as a % of the eggs in clutches where brooding was completed = 2.3. In the years 1954, 1956 and 1958 the average was significantly higher than the mean of the period 1953-63. Average number of embryos found dead in eggs shown as % of eggs in clutches where brooding was complete = 0.8. Nest losses to the hooded crow during the period 1953-59 in the Soderskar area were 300 nests (10% of 3,000 examined). Only one pair of hooded crows nested in the area and did most of the damage in the first half of June. Decreased clutch size, increased addled eggs, increase young found dead in the egg as well as increased destroyed and abandoned nests and eggs occurred in 1956 following a severe winter but this was not so following the severe winter of 1962/63.

14. Gerasimova, T.D. and Z.M. Baranova 1960

15. Grenquist, Pekka 1965

Eggs (3)

16. June 25, 1955 3 nests eggs 2,1,0  
June 28, 1955 6 nests eggs 2,2,2  
July 1, 1955 7 nests eggs 1,3,2,1  
July 15, 1955 8 nests eggs 6,1,1  
August 4, 1955 1 nest eggs 4; 1 nest 5 ducklings

17. The earliest dates given by Cartwright in Sandwich Bay is June 3, 1778.

18. The female lays the first egg after selecting the nest site and preparing it. Normally she deposits 1 egg per day until the clutch is completed but during inclement weather egg laying virtually ceases. Tidal rythm has a marked influence on nest initiation. Their dotty movements are seemingly co-ordinated with the ebb and flow of the sea. Throughout the egg laying period most females visit their nests only at high tide. The males continue to accompany the females on every trip to land and sit or stand a few feet from the nest. The birds fly instead of walking to the nest during the egg laying period.

After egg laying the males and females return to the water where the females wash themselves. The length of time spent during laying varies. Generally it increases each day until she spends all her time at the nest. Few females were observed sitting on nests with only 1 egg. Before incubation commences the pair spend much time sleeping on communal loafing areas. Frequent flushing of the birds resulted in the exposure of the eggs to predators and heavier than normal loss.

Location	Reference	Clutch Size									
		1	2	3	4	5	6	7	8	9	10
Iceland	Gudmundsson (1932)	6	14	7	15						
Payne Bay, Que.	Edwards (1957)	4	13	31	19	6					
North Shore	Lewis (1939)	27	79	215	405	337	55	6	6	-	1
St. Lawrence											
Green Isl., Que.	Lemieux (1954)	2	37	114	254	248	57	19	3		
Lower Razades, Que.	Lemieux (1954)	1	21	38	48	35	15	8	6	1	1
Cape Dorset	Cooch (1955,1956)	48	211	520	669	118	24	8			

$\bar{x}$ Clutch	No. of Nests	Total Eggs
2.74	42	115
3.13	73	229
4.04	1,131	4,565
4.32	734	3,173
4.24	174	737
3.44	1,598	5,496

16. Macpherson, Andrew H. and Ian A. McLaren 1959  
17. Townsend, Charles W. and Glover M. Allen 1907  
18. Cooch, F.G. 1965

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Eggs (3)

18. Cont'd

Dividing the nesting season into a 24 day initiation period clutch size in both years was higher in the first 12 day period than in the last. (3.96 - 2.31 and 4.06 - 3.21). The first 12 day period probably doesn't include as many rene-  
sting data. In 1955 predation and nest desertion apparently caused many birds to rene-  
st. In 1956 not to the same degree. A negative correlation between date of nest initiation and clutch size was found to exist. Clutch size varied from island to island. The smaller clutch size might be attributed to different environmental conditions viz. snow and later in-  
itiation of nesting. More than 75% in 1955 and 70% in 1956 of the nests were initiated in the first 12 day period. By July 5, 1955 and July 14, 1956 the only males in constant association with females were in pairs attempting to rene-  
st. Eiders have a comparatively long nest initiation period, a maritime habit, an apparent excess of males over females and a temporary pair bond. Evidence of rene-  
sting was obtained from banded (colour bands) birds. Of 12 nests used in a rene-  
sting experiment 11 of them were used again. If the down was removed the female built a new nest consisting of more contour feathers than was found in early nests. The egg laying period lasted for 29 days in 1955 and 25 days in 1956.

19. Clutch size 1964 less than 4 eggs 129 nests nest  
success 53%, 1965 less than 4 eggs 107 nests nest  
" 50%, 1964 four or more eggs 190 nests nest  
success 67%, 1965 " " " " 159 " "  
" 66%.

20. As soon as nest building is completed the birds begin laying. First eggs are found in the 2nd week of May, the main laying period however falls in the last half (of May). By mid-May nests containing more than 4 eggs are very seldom found. The time of egg laying in this season particularly depends on the prevailing weather conditions; if cold weather sets in, laying is usually delayed; but the difference is rarely more than a week. If the eggs of a complete clutch are taken away, the female always starts laying again for a second or even a third time.

The normal clutch size consist of 6 to 7 eggs. Clutches of less than 5 eggs are a rarity; 5,8,9 and even 10 eggs to a clutch are comparatively frequent; 11,12 and 13 eggs to a clutch must be considered an exception; it is likely that in the cases of the latter kind 2 or more female birds may have laid their eggs in the same nest.

19. Choate, Jerry S. 1967

20. Gudmundsson, Finnur 1932

Eggs (4)

22. Cont'd

In the White Sea onset of nesting depends on the time when the sea becomes free of ice. Nests appear on the southern islands of the archipelago 10 days earlier than on the northern islands because of an earlier release of the littoral of the southern islands from ice. In 1949 first nests appeared on the islands of the southern part of the Northern Archipelago (Kurichok, Dokosheikha and Lomnishnyi) on May 9-10 and May 14-17 on islands in the northern part (Lodeynii and Anisimov I.). Nesting begins somewhat later on treeless islands than on treed islands.

Most often the female lays eggs with intervals of about 24 hours. Sometimes the period is shortened to 8-12 hours or sometimes prolonged to 36-40 hours. Usually the laying interval between the 3rd, 4th and 5th egg is longer. Laying occurs early in the morning or by day rarely by night.

A full clutch contains, commonly, 4-6 eggs. Sometimes 2-3 or 7-8. In most cases nests with a smaller number of eggs belong to repeat layings. In Kandalaksha Bay nests of 5-6 eggs predominate average 5.42. On Western Murman (Ainov Islands) 45 predominate average is 4.67. On Eastern Murman (Sem Ostrovov) 4 eggs predominate average is 3.8. On Novaya Zemlya 3-4 predominate average 3.52. In regions of milder climates (Kandalaksha Bay, Ainov Islands) the number of eggs is greater than on Sem Ostrovov and Novaya Zemlya.

Individual years show variations in egg numbers. Unfavourable weather conditions appear to result in reduced clutch size. In 1950 and 1951 in Kandalaksha Bay the spring was mild and the summer warm. Clutches of 5-6 eggs predominated, the average was 5.49 and 4.87 respectively. The spring of 1952 was late and the summer cold. The average clutch size was 3.89, clutches with 4 predominated.

The egg varies in length from 69 to 89 mm, the width 43.5-60.5 mm. The average was 77.78 X 50.51 mm. The weight varies from 69 - 134 grams. Difference in size can be seen in individual nests.

Repeat laying occurs if for some reason the first clutch is lost. Up to 3 clutches may be laid.

In 1940 on the Seven Islands the average number of eggs per nest = 3.96 with increased protection (from predators) it rose 4.3 in 1941.

70  
Eggs (4)

20. Cont'd

Measurements of eggs (188 eggs)

$\bar{x}$  76.2 mm X 52.0 mm

Range 86.2 X 50.9 (78.0 X 54.0) to 69.5 X 47.6 (70.5 X 47.0)

Full Weight (53 eggs)

$\bar{x}$  102.95 g max 121.50 g min 82.00 g.

Weight of shells (40 eggs)

$\bar{x}$  8.165 g max 9.923 g min 6.571 g.

21. Ordinary size of full clutch in Kandalaksha Bay 5.6 often 7, on eastern Murman (Sem Ostrovov) 4, sometimes 6, on Novaya Zemlya 3-4 (to 6) on Ainovy Island 4, on Estonian Islands 5-6. in Denmark (Ertsholmene I.) 5 (4-6). Clutch size probably depends on age of bird and climatic conditions. Young females produce fewer eggs. The same is true of years with late spring.

If eggs are aborted for any reason at start of nesting season female frequently produces replacement clutch. Examination of ovaries shows from 4-6 to 13-15 scars indicating some females may produce eggs twice or even three times yearly. Removal of part of eggs from nest causes no increase in clutch size. Clutches of 11-13 or even 19 eggs are known but these undoubtedly belong to several females inhabiting one nest. Sometimes lays individual eggs in nests of other birds i.e. scoters and long-nosed red-breasted mergansers (Estonia), long-nosed mergansers, and lesser black-backed gulls (Ertsholmene I.), silver (herring) gulls (eastern Murman).

Eggs very large, of regular ovate form with greenish-gray colour - sizes 69-93 X 47-53.3 average 77.9 X 51.3, weight 86.7 - 127 g, av. 109.1 g. (eastern Murman). Female lays one egg daily but interval between eggs may decline to 12-15 hours.

borealis - clutch size in Franz Josef Land 4-6 Greenland 4 (3-5) occasionally 6-8. Egg size 69.9 - 81.6 X 47.2 - 52.6, average 75.4 X 50.7 mm.

22. Nesting depends on climatic conditions (air temperature, the time when the snow cover disappears, when open leads appear etc.). Earliest eggs appear in the first half of May in the southern and western part of the region (Kandalaksha Bay) where average summer temperatures are not over plus 15°C. In the second half of May eider nests appear on the Eastern Murman (the average summer temperature is plus 10°C. In the north and far east (Medvezhii Island, Spitzbergen, Novaya Zemlya) nesting begins in the middle of June or by the end of the month.

21. Dement'ev, G.P. et al. 1952

22. Gerasimova, T.D. and Z.M. Boranova 1960



Eggs (5)

23. 4-5; elliptical, green, usually tinted olive or grey, or buff, often with stain spots.

24. Laying begins around April 20 and reaches a peak at the end of April and the first 10 days of May. Additional laying may continue up to the end of May and even during the first 10 days of June. First layings consist of 5 eggs the later ones of 4 eggs.

25. On the Matsaluski State Preserve (Estonia) the first eider egg was April 22, 1961. On the average the first egg appears on May 2. In 1/2 of the nests that were found egg laying had begun prior to May 16. The egg laying period of the eider is protracted - new-laid eggs can be found over a two-month period.

The average size of the eider laying (including second clutches) was 4.83 (8 years data extremes 4.56 to 5.00). The number of additional layings is usually large and the number of eggs in them smaller than in the normal layings. But even among the normal layings the early layings are larger than the late ones.

The size of the egg is  $77.24 \pm 0.095$  mm X  $51.50 \pm 0.05$  mm (h = 730). The lengths of the eggs range from 67.8 to 94.9 mm and their widths from 47.5 to 60.5 mm.

- 23. Fitter, R.S.R. 1954
- 24. Aumees, L.E. 1966
- 25. Onno, S. Kh. 1966

Location	Reference	CLUTCH SIZE											$\bar{x}$	No. Nests	Total Eggs
		1	2	3	4	5	6	7	8	9	10				
Iceland	Gudmundsson 1932	6	14	7	15								2.74	42	115
Payne Bay, Que.	Edwards 1957	4	13	31	19	6							3.13	73	229
Quebec N. Shore	Lewis 1939	27	79	215	405	337	55	6	6	1			4.04	1131	4565
Green I., Que.	Lemieux 1954	2	37	114	254	248	57	19	3				4.32	734	3173
Lower Razades, Que.	Lemieux 1954	1	21	38	48	35	15	8	6	1	1		4.24	174	737
Cape Dorset	Cooch 1955, 1956	48	211	520	669	118	24	8					3.44	1598	5496
Notre Dame Bay, Nfld.	Gillespie 1969		1		12	13	4						4.63	30	139
Hare Bay, Nfld.	Gillespie 1969	2		5	9	7	1						3.92	24	94
St. Peter's Bay, Lab.	Gillespie 1969	1	6	15	9	5							3.49	51	159
Kent Isle	Paynter 1951												3.56	134	477
Kent Isle	Gross 1938												4.4	100	440
Penobscot, Maine	Gross 1938												3.2	133	426
Fox Peninsula, Baffin I.	Macpherson and Mc Laren 1959	5	5	1	1	1							2.23	13	29

## Incubation or Brooding Period(1)

1. 25-26, 27-28, 28, 28-30 days.  
average brooding period 25 days varying from 23 to 27 days.  
The number of eggs in the clutch influences duration, the smaller the number the shorter the time because of better heat distribution. 24 days for a clutch of 3-4 eggs, 26 days for a clutch of 6. Brooding generally begins after the 4th egg is laid. The period from the egg laying until the egg shell is pecked open = clutches of 3 - 23, 22, 24 days average 24.4 days, clutches of 4 eggs 23 days; 5 eggs 24, 25, 24-25 and 24 (24.4 days); 6 eggs 25 and 25-26 (26.3), average 24 days range 22-26 all clutches. Time of nestling to get out after breaking egg average 22.6 hours range 12 to 42 hours. Fresh eggs require 24 days to hatch in an incubator. Brooding continuity of the eider is high - seldom do the females leave the nest. The part of the male eider in the reproduction process is confined to mating alone as is frequent in many ducks with specific dimorphic characters. Brooding period = the duration of natural incubation from the beginning of brooding until the hatching of nestlings. Yu. M. Kaftanovskii (1951) established the brooding period as 34-36 days (1937-39) from the laying of the first egg to the hatching of the nestlings. Flint (1954) noted that females left their nests for a short period each day (White Sea).

In the northern latitudes the brooding continuity is so great that complete starvation is its immediate consequence. The intestines of a brooding female excised on 13 July 1940 (at the very end of brooding) weighed 27.7 grams. The stomach of a bird shot on 1 August, after the brooding period, weighed 95 grams. The duration of the brooding period depends on continuity of brooding, temperature, humidity, clutch size.

The temperature of the upper surface of the eggs is more or less constant throughout the brooding period (35-39°C) and approaches the body temperature of the bird (39-41°C). The temperature of the lower part of the egg when regularly and constantly warmed is slightly lower (34-35°C). In some cases dampness enters the eider nest and temperature may drop to 28-30°C. This probably delays hatching. Eider eggs react most favourably to a drastic increase in the range of temperatures between the upper and lower part of the egg. The minimum loss of heat was observed in the nests of eiders (0.5°C per 10 minutes). The eider sometimes (though not frequently) gets off her eggs, turns them over and then resumes brooding. The eggs of the eider show a smaller loss of weight than the eggs of the cormorant (during incubation) 16.6 grams average loss or 16.3% of weight.

The hatching period of the nestlings of a population (when the clutches consist of several eggs) is considerably shorter than the egg laying period (if the brooding begins with the laying of the last egg). This shortening is due to the birds taking several days to lay a complete clutch while the hatching of the chicks is almost simultaneous and is completed in 24-36 hours. From the

## Eggs (1)

### 1. Cont'd

hatching of the first nestling (8 June) until the appearance of the last ones (10 July) the time span is 32 days. While from the moment of laying of the first egg (8 May) until the appearance of the last egg (15 June) the time span is 38 days.

2. The period of incubation is 28 days and is performed only by the female. The first hatch is soon after July 1 in Greenland with most hatched out by July 15-20. On Sutherland Island as late as August 16, 1912.

3. The incubation period for the American eider is 28 days. Based on observations of 1 nest with 5 eggs last egg (5th) laid June 8-July 4 four of the eggs were cracked. 3 young emerged from the eggs on July 5. The female incubates the eggs (no males remain in the vicinity of the nest). The brooding female leaves the nest each morning for 2-3 hours and flies to feeding places.

4. The incubation period is 28 days. After about the first 10 days of incubation the male leaves the female, previous to this they remain close to the female. First hatch takes place by the first of July sometimes earlier. Females leave nests during incubation and go to ponds for a drink and loafing.

5. Nesting females do not eat during incubation.

6. Female begins to brood after last egg is laid  $\therefore$  the development of all the eggs begins at the same time. However females were observed to begin brooding on incomplete clutches during years of cold spells. Period of incubation varies from area to area. In areas of more severe climate the period is shorter probably due to more compact brooding. During the first few days of brooding the female does not sit tight but flees at any reason for alarm. When leaving the nest she defecates over the eggs. Towards the end of incubation she sits tight. During cold weather the female sits close to the eggs but in warm weather she sits up over them. During the first few days of brooding the female's mate may sit by her. In the White Sea area the female leaves its nest 2-3 times a day for 1.5-2.5 hours - this occurs in the early days of incubation. She goes to the sea where she may swim a considerable distance from the nest. At mid-incubation she may leave for 1-1½ hours and near the end not at all. It was shown that the female regularly leaves the nest to feed for 1.5-6 hours at low tide (Flint (1954)). This occurred throughout incubation. In an area of more severe climate (e.g. Barents Sea) and where nests are less sheltered the female sits more tightly on the nest. On Seven Islands eiders don't eat at all,

2. Bent, A.C. 1925
3. Gross, A.O. 1938
4. Pettingill, O.S. 1959
5. Tinbergen, N. 1958
6. Gerasimova, T.D. and Z.M. Baranova 1960

76  
Eggs (2)

6. Cont'd

when brooding. In the first few days of brooding there is a slight loss of weight and between the 10th and 20th day with increased embryo growth the loss is great. Total loss of weight during incubation is 8 to 14 grams. (Did a detailed study on embryonic development). Temperature and moisture affect embryonal development. The eggs lie on the down of the cradle and therefore temperature variation from top to bottom is not great 33-39°C at top to 30-34°C at bottom. If moisture gets in the nest the temperature difference increases and embryonal development may be slowed down. If the difference reaches 15° The embryo does. Egg loss varies from area to area and year to year from 12 to 34%. Predation is the major factor in egg loss. Rarely nests are lost through flooding. Loss of eggs increases sharply with the appearance of man and increase nest desertion by females. Predation losses are lower when the females aren't disturbed. In Kandalaksha Bay and on Ainov Islands hatching occurs during the first half of June and on Seven Islands by the end of June. There is considerable variation. The time of mass hatching is later in the north and east than that of the south and west. Hatching (from first pecks inside the egg shell to final emergence) takes two 24-hour periods. Within a nest the interval between first and last pecking of egg is 2-6 hours and between first and last emergence is up to 18 hours.

7. First hatching dates '54 - 30/5, 55 - 3/6, 56 - 8/6, 57 - 31/5, 58 - 4/6, 60 - 2/6, 62 - 29/5, 63 - 4/6 in Soderskar. First common hatching dates 54 - 4/6, 55 - 7/6, 57 - 3/6, 59 - 31/5, 60 - 8/6, 61 - 29/5, 62 - 1/6, 63 - 11/6. It seems that following mild winters and early melting of the ice only 3-4 days would lapse between the first and the common hatching dates but after hard winters one week. Following the hard winters of 1939/40 - 1941/42 there were noticeably fewer eiders both in Sweden and Denmark and the egg-laying occurred in many places 2 - 4 weeks later than usual during the summer of 1942.

8. Downies were first observed in 1955 on 28 July when a brood of 5 was seen at one of the lakes at the head of Tellik Bay and another of 4 in the Strait near Tenetuke Island.

9. Gasket Shoal, James Bay, 1949. Several eggs pipped July 9 and a few had hatched. By July 12 nearly all eggs had hatched.

7. Grenquist, Pekka 1965

8. Macpherson, Andrew H. and Ian A. McLaren 1959

9. Manning, T.H. and D.F. Coates

# Eggs (2)

10. The onset of incubation varies from individual to individual. A few females remain on the nest almost continuously after the first egg has been laid. Most females begin to incubate after the deposition of the 3rd egg. During the first week of incubation the female makes short visits to ponds where she bathes and drinks. Apparently they consumed little or no food during incubation. If ponds are not available the female gets water from plants. When the female begins sitting continuously she doesn't flush readily but sits tight and when flushed flies only a short distance from the nest uttering a harsh grating croak. Displacement behaviour occurs if water is nearby. A female suddenly frightened from her nest leaves a trail of watery, greenish or blackish ill smelling excreta behind. Length of incubation is thought to be 28-30 days. The male during the early part of incubation only joins the female when she leaves the nest to go to water. If the nest is destroyed more than a few days after the onset of incubation it is doubtful whether successful re-nesting can occur. In 1955 the first brood hatched on July 19, 31 days after the discovery of the first egg and the last eggs hatched on August 13. The 1955 nesting season was .. 57 days. In 1956 it was 55 days, starting on June 23 with the last hatch on August 16. The time required for the clutch to hatch varied depending on clutch size especially if there was inconsistent laying; stage of clutch completion when the female begins to incubate; inclement weather delaying duckling emergence from the shell. Midpoint of incubation, from the median number of eggs, was 14 days after the commencement of incubation.

11. The eider does not incubate until a full clutch is laid. When disturbed during incubation the female flies off and spends some time in the water before returning.

12. In the islands of the Kandalaksha Sanctuary broods begin to appear in the first days of June and between June 20 and June 30 mass hatching occurs.

13. First young seen July 18, 1967 at Chesterfield Inlet.

14. Following pairing and copulation the pair stick closely together until the end of the incubation period. The incubation period lasts from 28 to 30 days. Incubation commences after the second or third egg has been laid. From the very beginning the females sit closely. During the whole incubation period the duck does not partake of any food. The stomachs of brooding females examined were always empty except for sand and small pebbles. Throughout the incubation period the females their nests every day for a short period to drink and bathe. I have

10. Cooch, F.G. 1965
11. Paynter, Jr. Raymond A. 1951
12. Kulachkova, V.G. 1960
13. Hohn, E. Otto 1968
14. Gudmundsson, Finnur 1932

# Eggs (3)

## 14. Cont'd

never seen the eider duck drink sea water (The birds always look for fresh water for drinking purposes). If the brooding female is scared off the nest the clutch is frequently sprayed with an extremely watery excrement. This could represent a protective measure against predatory animals or it could be merely a reflex action. The males do not participate in the brooding activity and always sit during the brooding period near their brooding females or stay very close to the nest. They leave more frequently to make short excursions out onto the sea. They too seem to partake of only very little nourishment during this time.

Males are more timorous toward human beings. The male leaves the breeding place to moult toward the end of the incubation period and as the first ducklings hatch. On June 8, 1931 the first ducklings had hatched and a considerable proportion of the males had left.

First eggs remain almost unincubated with attentive sitting beginning only after 4th egg. Female almost never leaves nest after conclusion of clutch, towards end of incubation sitting so attentively that she may sometimes be picked up and probably retraining entirely from food at such times, subsists chiefly on fat deposits. Weights during incubation consequently drop by some 39% with intestine becoming so shrunken and folded as almost to occlude lumen. By plucking down from belly and lower breast female clears brood patch of about 200 cm which begins to regrow feathers only after incubation. Incubation period (eastern Murman) 24-27 days with last 0.5 - 2 days occupied by process of pipping by duckling.

borealis - some reports say male doesn't immediately abandon incubating female but remain close to nest for some time. Hatching begins in late July. First ducklings found on July 19-22 but mass hatching continues some years until August 7 (Franz Josef Land).

15. The female begins brooding after the last egg has been laid. Therefore the development of all eggs in a clutch begins at the same time. In periods of cold weather eiders have been seen to begin incubation on incomplete clutches but never in warm periods. The length of brooding is different in different areas. In regions of more severe climate it is somewhat shorter and seems associated with more compact brooding.

In the first days of brooding the female flushed readily and pours excrement over the eggs. By the end of brooding she sits tight. The brooding female turns the eggs 20-24 times in a 24 hour period. When performing this she slightly gets up and turns herself over the nest. In cold weather she sits on the eggs very tightly whereas in warm weather she gets up over the eggs. The male may be seen sitting beside her during the first

79  
Eggs (3)

15. Cont'd

days of brooding.

In the White Sea the female leaves the nest 2-3 times a day for 1½ to 2½ hours each day during the beginning of brooding. In the Barents Sea with more severe climatic conditions the female sits more tightly on the nest. On the Ainov Island the female leaves the nest 1 or 2 times a day for 40-60 minutes and in the last week of incubation it doesn't leave at all. On the Seven Islands females do not eat at all when brooding.

In the first days of brooding eggs slightly lose in weight. Between the 18th and 20th day there is increased growth of the embryo and the weight of the egg drops rapidly. During incubation the total weight loss is 8 to 14 grams.

The temperature of the upper surface of the egg ranges from 33°C to 39°C. The lower 30°C to 34°C. If moisture gets inside the nest the temperature of the lower surface may drop to 28°C. This delays embryonic development and if the difference between upper and lower surfaces reaches 15°C the embryo dies.

The down has good insulation qualities. At an air temperature of 15-17°C for each 10 minute period there is a 5°C loss of heat.

16. Incubation by duck only, 27-28 days. Eggs or young may be found in nests from May to early July.

17. The annual cycle of body weight and crude fat content in breeding females shows that these birds are in very poor condition immediately after incubation. The seasonal distribution of female mortality is in agreement with these observations since 48% of the annual deaths occurs during June and July.

18. The duration of hatching averaged 26 days (fluctuating between 24 and 28 days) according to data for 6 nests. In half of the nests which were found the chicks had hatched prior to 14 June on the average. The earliest hatching was recorded on May 22, 1961. The chicks from the late layings hatched during the second half of July.

16. Fitter, R.S.R. 1954

17. Milne, H.

18. Onno, S. Kh. 1966



## Young Birds and Post Nesting (1)

1. Females and brood remain in the vicinity of Kent's I., usually 2 or more females combine broods and by late July and early August it is not uncommon to see groups of up to 15 families in all age classes together. Females show a maternalistic behaviour to their own young and young of other females. Young can dive almost immediately and search for food in this manner. One day old chicks on Kent I. June 20, 1932.

2. Nestlings are dry 5-10 hours after hatching but still inert and slow moving. After 16-20 hours they move more. The more regulation is established between the 2nd and 7th hour. Broods leave the nests and descend to water 24-30 hours after the last bird is hatched. If the weather is cold or rainy the brood may stay in the nest up to 72 hours. Descent takes place during daylight hours most frequently between 1200-1600 hours. Some broods have to be moved 500-600 meters to water. Most broods descend directly to the sea but some of them spend a few days on freshwater lakes. During the first few days the females keep the young close to the shore in calm inlets and bays. At the age of 7-10 days they can move considerable distances. Food distribution determines brood distribution and distances up to 25 kilometers may be traversed. Large accumulations of young birds occur in favourable areas. From the end of July to mid-August females and broods move towards the sea along the Tersk shore. Along the Murman coast after being raised in calm inlets and bays where the littoral fauna is rich the young birds begin to migrate to wintering places in September. The average daily weight gain for the first 15-20 days is 10-15 grams. Development increases more rapidly after the 13th day at about 20-30 grams/day. At about 80-90 day young birds = adult weight. Wing length is slow and maturity is achieved at 70-75 days. Nestlings from repeat clutches are usually smaller and growth is slower - 3 month old nestlings from repeat clutches weigh 1250 grams compared to 1800 grams of first clutch nestlings. Mortality from exposure to cold occurs more frequently in young of repeat clutches.

3. The young of eiders were found to be the most coldhandy of 9 species of ducks studied. Young eiders 2-7 hours old in temperatures of 5-10°C are capable of maintaining their temperature. The mean number of ducklings surviving until the 3rd of August in Valassaaret in proportion to the hatched young for 3 years 1958, 1960 and 1962 was 25.6% (198 broods). It varied from 71.6% to 3.4% - (sample size in different years might be a factor).

4. The average data for the first nestlings to descend to the water on Seven Islands (eastern Murman) was June 25 for 10 years of observations with a range of June 9 to July 1. The average dates of appearance of first nestlings in W. Murman was June 9,

1. Gross, A.O. 1938
2. Gerasimova, T.D. and Z.M. Baranova 1960
3. Grenquist, Pekka 1965
4. Belopol'skii, L.O. 1957

Young Birds and Post Nesting (1)

4. Cont'd

Bear Island beginning of July, S.W. Spitsbergen end of June, Novaya Zemlya mid-July, Franz Josef Land July 2. The eider (which produces fairly large broods) has well-developed nestlings that are covered with down and are so developed that after remaining in the nest for 12-24 hours they take to the water and never return. The eider which is a relatively large bird (average weight 2071 grams) has nestlings with a relative weight of 3.3%.

5. The young leave the nest when about 36 hours old and immediately follow the female to water (fide Turner). In Northern Greenland (fide Ekblau) eggs hatch soon after July 1 and most are hatched by July 15-20. On Sutherland Island on August 16, 1912 a clutch was hatching.

6. The young hatch out during a period which varies from early in July to mid-August. Eggs were just hatching on the Red Islands July 22, 1927 and July 23, 1928. Young of the year were on the wing in Machelan Strait, August 19, 1927. Less than a week old birds were seen at Tikkerasuk on August 26, 1926. On Nanuktok several broods were just hatched July 23, 1928.

7. On July 3, 1948 a downy young was collected at False River. On July 15, 1948 one brood was observed at the Gyr Falcon Islands. Etamamu River June 19, 1938 two downy young. June 21-22 Perroquet Island broods on water. July 27, 1930 one brood of 4 ducklings on a small island north of Cape Anderson. July 28, 1930 small island near Magnetic Point a brood of 3 young about 1/3 grown. July 30, 1930 island north of Mosquito Bay 3 newly hatched young still in nest. August 5, 1912 a brood of 6 off Walrus Island.

8. July 7, 1952 downies Gannet Islands  
August 10, 1952 one downy Nunarsuk Island  
August 12, 1953 three downies about 1 week old near one of Turnavik Isles.

9. July 2, 1943 3 broods of downies Brent I., Hare Bay  
July 29, 1944 saw a brood of young 1/3 grown Twin Is., St. John's  
August 7, 1944 3 or 4 broods St. Peter's Bay  
August 9, 1944 1 egg pipped Gull Rocks, St. Lewis Bay  
August 12, 1944 1 downy young collected St. Michael's Bay, Lab.  
August 12, 1944 1 brood young Otter Bay, Lab.  
August 16, 1944 3 females with broods Rocky Bay, Lab.  
August 17, 1944 5 broods between Long Is., and Cartwright, Lab.

5. Bent, A.C. 1925
6. Austin, Jr. Oliver Luther 1932
7. Todd, W.E. Clyde 1963
8. Tuck, Leslie M. 1953
9. Peters, Harold S.

## Young Birds and Post Nesting (2)

10. In 1955 the first brood appeared July 19, 31 days after the discovery of the first egg. The last egg hatched August 13. Thus the 1955 nesting season lasted 57 days. In 1956 the nesting season started on June 23 and the last egg hatched August 16. The nesting season was  $\therefore$  55 days. When the brood is dry it is led to the water by the female. The ducklings are led to shallow tidal pools or preferably freshwater lakes. A major withdrawal of females with broods from West Foxe Islands occurred on August 5, 1956. Apparently the ducklings do not require food during the first 48 hours after hatching. Nourishment is provided by the remnant of the yolk sac, which is gradually resorbed and finally disappears when the duckling is 72 hours old. They feed a little during the 3rd day after hatching. Apparently the first food consists mainly of mosquito larvae (*Culicidae* sp.). Ducklings can swim easily upon first contact with water but their diving ability increases with age. After they leave the ponds their food consists of fish lice (*Argulus* sp.). Brood snaring is common. Class I broods were found close to the mainland while the older ducklings were found farther away. The first flying young was seen on September 10, 1955. Most young reach the flying stage by October 7.

11. During four consecutive years the first young birds were hatched between June 5 to June 8. Most of the young ducks hatched during the period from June 15 to June 20. At first the ducklings are very weak and wet. After the emergence of the last duckling (a few hours after) they are led to the sea by the female.

12. Duckling appear in late June or early July. Weight at hatching about 69 grams (56.5 - 85). Ducklings hatch more or less simultaneously and spend 1-2 days in nest after which female leads brood to water. Nestlings mostly attain sea forthwith but occasionally must spend long periods in interior waters. At Sem Ostrovov first ducklings noted on June 25 (June 9 - July 2). From very first day ducklings swim adeptly and dive into raging tidal belt. Broods of even highly varied ages frequently combine often being joined by juveniles and bachelor males to form extremely large and variegated flocks. 2-month old nestlings attain almost adult sizes whereupon broods disperse and juveniles turn to independent living.

13. First young eiders appear first half of June in Kandalaksha Bay and on Ainov Islands, end of June on Sem Ostrovov. Hatching time varies considerably. In Kandalaksha Bay the earliest broods seen were June 2 and 3 and on Ainov Island it was June 5 on Seven Islands it was June 13. Similarly to mass laying the time of mass appearance of nestlings in the north and east falls on later dates than those for the more southern and western regions.

Hatching takes about two 24-hour periods (from the moment the first pecks appear inside the shell until the nestling frees itself from the shell). The interval between the hatching of individuals

10. Cooch, F.G. 1965

11. Gudmundsson, Finnur 1932

12. Dement'ev, G.P. et al. 1952

13. Gerasimova, T.D. and Z.M. Baranova 1960

## Young Birds and Post Nesting (2)

### 13. Cont'd

in a nest ranges to 18 hours. 5-10 hours after hatching they are dry, but still inert and slow moving. After 16-20 hours nestlings move about. A brood leaves the nest and descends to water 24-30 hours after the last nestling is hatched. In cold or rainy weather they may remain in the nest up to 72 hours.

The descent to water is during daylight hours. Most frequently between 1200-1600. Most broods descend directly to the sea but some may spend a few days on a freshwater lake. In the first few days they stay close to the shore in calm inlets and bays. At 7-10 days they can move a considerable distance in searching for food.

In Kandalaksha Bay large accumulations of young birds may be found along the Karelia shore, in Kapsha, Zhemchuzhnaya, Nishcheskaya Bays and along the Kola shore, the respective locations are the Luven'ga settlement, Cape Vonyuchiy, Por'ya Bay. Beginning from the end of July to the middle of August broods all over Kandalaksha Bay move towards the sea. On the Murman Coast when young birds reach adult size in September the flocks gradually begin migrating to their wintering range.

Nestlings on the average are smaller on the Murman Coast as compared with those in the White Sea. The average daily gain in weight in the first 15-20 days is 10-15 grams. Beginning the 13th day development proceeds more rapidly and daily gains reach 20-30 grams.

At about 80-90 days young birds are as heavy as adults.

Wings grow slowly averaging 5-6 cm in 5 days. On the 45th day there is a speed-up in the growth of wings, and the wings achieve their full growth by the 70 or 75th day.

Nestlings hatched from repeat (2nd) clutches are generally smaller and their growth progresses more slowly. 2-month old nestlings of a 2nd clutch weigh only 1250 grams whereas first clutch nestlings are practically adult weight 1800 grams. Early cold spells result in higher mortality in 2nd clutch nestlings than in 1st clutch nestlings.

14. The survival of chicks is extremely variable between years. The many factors affecting survival are not necessarily the same in different years but they include air temperature, wind speed, rainfall, food abundance, food availability, predation by gulls, condition of breeding females, condition of chicks at hatching. Crèche behaviour of eider females and chicks is usually regarded as a means of increasing the protection afforded the chicks against attacks by predators. Observations on marked individuals, however, suggest the hypothesis that the system has more survival value for adult females than for chicks, by allowing them to leave

Young Birds and Post Nesting (3)

14. Cont'd

their chicks in the care of other birds while they join the main feeding flock and replace the body reserves consumed during incubation.

Survival of young to fledging is very low (less than 5% in most years) but in occasional years when environmental factors are favourable a very high chick survival results and the population increases in corresponding steps. In long-lived slow-breeding species such as eiders it seems that it is advantageous to the young. The ultimate factor controlling population size in such a system is thought to be the food supplies.

15. Chicks hatch in late May and early June. The greater part of the broods leave the nesting grounds and settle in the shallow area of the open sea.

16. In 1965 along the shores of the Northern Archipelago of the Kandalaksha Preserve and in a radius of 20 km of it it was found 8600 eggs were hid in 1760 nests. Of these 2200 were destroyed chiefly by the Common Grey Crow and to a lesser extent by the Herring Gull and other predators. Of 6400 hatched chicks about 3900 died chiefly from the invasion of helminths and 400 healthy chicks were destroyed principally by Herring Gulls. In August about 2100 chicks were on hand. During the later periods there were almost no losses of grown fledglings through the activity of predators. A certain number of them are taken by poachers.. it can be assumed that in 1965 no more than 2000 of the young reached the flying stage that is about 23% of the number of eggs laid.

15. Aumees, L.E. 1966

16. Biankii, V.V. and N.S. Boiko

## Sexually Immature Birds

1. Young eiders come into an established region at a later date than adults. They do not display a spring excitement. In 1935 M.E. Legantsev recorded in Kandalaksha Bay 1300 adult birds and from 200-250 youngsters. In the summers of 1950-52 the recording of young males in the same bay showed that they composed from 0.5% to 2.75% of the adults.

In the Murman coast young females occur often. In 1949 on Ainov Island 15 females were shot, 5 of them were young. Young females keep at the islands all summer sometimes they try to brood foreign clutches and after the youngsters have descended to the water they join the broods. There were only individual cases where young males were found on the Murman coast in the summer and such cases do not occur each year. In May 1958 in that area of the Seven Islands there were recorded 1460 adult males and only 95 young ones. Young male birds were encountered individually or in small groups amongst mixed flocks sometimes even among adult males. By the end of June & the beginning of July after old males had disappeared also young birds are not found. Perhaps the main bulk of young birds which are sexually immature continue to keep individually far away from nesting grounds.

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## Food (1)

1. sea-urchins, small crustaceans, snails, other molluscs none of the stomachs examined contained either vegetable material or fish.

2. In the White Sea and on the Murman eiders feed by diving or by collecting it on the littoral. Crustaceans and other marine invertebrates are often obtained by simply dipping their heads in the water. Eiders feed in the sub-littoral on Novaya Zemlya but the littoral fauna is poor due to moving tides and ice. Adults feed mainly in the lower and middle layers of the littoral in tidewater. Broods usually keep to the lower horizons or to the upper horizons in tide. Almost all animals in the littoral and sub-littoral serve as food.. the nature of the littoral and the specific composition of its fauna determines the food composition. The eider food of the White Sea is rich in assortment containing 25 animals - the Barents Sea is poorer. Eastern Murman 15 animal species, West Murman 10 species and Novaya Zemlya only 5. Mollusks compose 87% of White Sea eider food, 94% on the Ainov Islands, 60% on Seven Islands, 76% on Novaya Zemlya. Sea mussels are especially important - 36% of food in White Sea, 54% in Ainov Island and 61% on Seven Islands. Littorina are in second order of importance. Algae and land plants are only a small part of their food but may be important as a source of vitamins and stimulants. The White Sea and Murman food is similar - *Mytilus edulis* and *Littorina* sp. are the major species. On Novaya Zemlya no littoral forms were found in stomachs probably because severe climatic conditions and heavy ice hinders the development of littoral fauna. Sub-littoral forms *Hysaraneus* *Mesidothea* *entomon* predominate. Sea mussels are represented there by small forms generally in small numbers. In the White Sea seasonal changes in food consumption are obvious. Just prior to nesting April - early May they feed in the sub-littoral as the littoral is covered with ice.. the food of this period is characterized by sub-littoral forms. Bivalvia = 86% Gastropod = 12%. Sea mussels = 51% with sub-littoral mussels 42%. Littoral animals = 28%.

During the nesting period (late May-June) littoral forms predominate. Bivalvia = 58%, of which 50% = mussels. Gastropoda = 23%, *Littorina* = 23%. Fish equal up to 19% (probably due to a mass arrival of the stickleback). Sub-littoral forms only comprise 14%. Part of the change to the littoral forms is due to the increased abundance of littoral forms partially due to migration of some species e.g. *Littorina litorea* from the upper sub-littoral to the littoral.

In the nestling period (July-September) sublittoral forms represent 58% of the bulk. Bivalvia = 50%, Gastropoda = 39%, Sea mussels comprise only 15%. *Cardium ciliatum* (18%) and *Myatuncata* (11%) are important. *Littorina* (a Gastropod) is important (29%). No land plants or fish were present. Heavy gales and storms plus

1. Gross, A.O. 1938

2. Gerasimova, T.D. and Z.M. Baranova 1960

## Food (1)

## 2. Cont'd

fear of shore predators may influence the eiders to feed in the sub-littoral in the fall.

On the Murman coast seasonal changes are less pronounced. Before nesting mollusks made up 75% with *Balanus balanoides* in 50% of the stomachs. Crowberries occurred in 15% of the stomachs in May. Sea mussels continue to predominate (86%) during the nesting period with *Littorina* increasing their share to 69%. Crowberries increased to 34%. During the nestling period sub-littoral mollusks (*Cyprina islandica*, *Margarita*, *Buccinum* sp) increased to 38%. Among crustaceans *Gammarus* = 17%. Almost no plants were found.

Many investigators state that brooding females do not feed. Some that they feed in the vicinity of the nest. Workers in the White Sea say breeding females continue to feed but less frequently. On the Murman coast females while brooding take very small amounts of food. Land plants, mainly Crowberries (42%) served as the principal food. Severe climatic conditions of the Barents Sea force the females to sit closely on the nests - during brooding females eat small amounts of plant material and in the last few days nothing.

In the Kandalaksha Bay of the White Sea food of young differs from adults. Gastropoda comprise 38% by weight of all food of nestlings followed by tunicates 23%. *Bivalvia* predominate in adults. Algae comprise 9% of the food of nestlings.

On the Murman coast Gastropoda predominate in nestling food (52%) with *Gammarus* (25%). Sea mussels predominate adult food (55%).

In the White Sea and Barents Sea nestlings under 15 days old feed on small *Littorina* which compose 81% of all foods in Kandalaksha Bay and 44% on the Murman coast. Large sea mussels can't be broken away by small nestlings and make up only a small amount of their food 10% in the White Sea and 15% in the Barents Sea. Swiftly moving *Gammarus* escape small nestlings. *Gammarus* began to appear in nestlings 10-12 days old. Sea mussels increase in nestlings 15 days and older.

Young eiders do not eat much in their first few days. By their 5th day they are more voracious. Crustaceans are digested in 50-60 minutes and mollusks in 90-120 minutes by nestlings. Adults eat 3-4 times a day nestlings 7-8 times. Adult eiders eat sea mussels ranging from 8-25 mm long, primarily and only occasionally larger or smaller specimens. Nestlings up to their 12th day feed almost exclusively on *Littorina* 1-4 mm long .. there is selection not only to composition but to size. It was calculated that a population of 5000 adults will consume during one season 11.7 tons of sea mussels and 77.6 tons of *Littorina*.



Food (2)

3. Stomach of 1 female collected in Peter Force Sound August 4, 1950 remains of the polychaete *Aphrodite* sp. the gastropods *Littorina rudis* and ? *Buccinum* sp. and the amphipod *Caprella* sp.

4. Eiders obtain their food almost wholly by diving to moderate depths and it appears that almost any kind of marine animal life of the appropriate size is acceptable and easily digested by the birds powerful gizzards. Most of the food seems to be found on or about the sunken ledges or submerged reefs of the rocky shores. They feed mainly at low tide (Bent, 1925). They freely use their wings in their underwater movements (Phillips, 1925-26). The northern eider is predominately a mollusk feeder. Blue and horse mussels (*Mytilidae*), limpet shells (*Acmaea*) top shells (*Margarites*, undetermined bivalves, remains of a crab and a trace of marine algae were found in one stomach of borealis examined. In 10 stomachs the blue mussel (*Mytilus edulis*) and other *Mytilidae* constituted 39.65% by volume. There were also soft shelled clams (*Mya*). *Astarte* shells, other pelecypods, Whelks (*Buccinum*) other gastropods, Amphipods (10.65%) fishes, *Echioderus* sea urchin (*Strongylocentrotus drobachiensis*) and starfish (*Asteroidea*).

The American eider is also predominately an animal feeder with a noticeable preponderance of mollusks in its food. In the aggregate many species of plants and animals were consumed yet the individual birds made most of their meal on one or at least a few specific items. An average of 5.4 species a meal was taken. Gravel was found in considerable quantity averaging 14.10% of the total stomach content. In 96 stomachs examined the Blue mussel and horse mussels made up 66.76% by volume. *Cyprina islandica* was present, the Arctic rock borer (*Saxicava arctica*) and other pelecypods, the Oyster drill (*Urosalpinx cinereus*) and other gastropods. Crabs made up 5.61%, sea urchins and the *Echinoidea* 4.42%, insects 2.20%.

5. The eider belongs to the diver group. Its main food are the mollusks and crustaceans that inhabit the littoral zone and the upper sublittoral belts. The considerable admixture of vegetable fragments, more often in females, is caused by the fact that the females like the males during the mating season, do not eat anything except some green portions of plants e.g. the leaves of *Empetrum nigrum*.

The abundance of mussels *Balanus* and other littoral invertebrates on islets and cliffs at the exit of gulfs and inlets, sheltered by promontories or islands from the sea surf, provide a good feeding ground for the eider. The creation of these grounds depends on many factors: a well defined high salt content in the water, ice-free conditions, sufficient O content in the water. In some areas (Novaya Zemlya) the littoral is devoid of life because of the mechanical grinding of the ice.

3. Wynne-Edwards, V.C. 1952
4. Cottam, Clarence 1939
5. Belopol'skii, L.O. 1957

## Food (2)

### 5. Cont'd

Vegetable particles enter the stomachs of eiders through accidental swallowing of nest materials. It is also possible that the swallowed parts of green plants act as vitamins or play a "mechanical" role (e.g. *Empetrum nigrum*) in the de-worming of eiders.

In 168 stomachs collected among eiders of the Barent Sea 51.2% showed mollusks 23.2% crustaceans, 20.8% plants, 1.2% insects and also present were fish, Bryozoa, Hydrozoa, Echinoderms and birds. Bryozoa were accidentally eaten. The eider was observed to be eating eggs of other species, an unusual behaviour. In a few isolated cases berries and vegetable matter were found in eider nestlings. Mechanical additions, stones and sand are seldom found in eiders. The eider belongs to the polyphage group - a specialized polyphage.

The eider, which settled on the seashore, could not adapt itself to feeding on pelagic foods in the open sea and lived on food obtained in the narrow coastal belt of the littoral and sub-littoral belt. Such narrow food specialization prevented the eider from learning to obtain its food from the sea (as do auks and cormorants) while it also lost the habit of finding it on land. The eider's food consists of only 2% of land foods (berries and insects), 1% of pelagic foods (only for the young) and 97% of benthonic-coastal foods obtained exclusively by diving. An eider will not eat *Mytilus edulis* until the islet (on which they are found) is submerged by the approaching tide.

The basic foods of eiders are mollusks and crustaceans. However the proportions of these basic food eaten differ in different regions of the Barents Sea. *Mytilus edulis* constitutes 84.1% of the eider food eaten in E. Murman but in Novaya Zemlya its importance decreased with increased use of *Pecten*, *Acmaea*, *Buccinum* and *Saxicava artica*. In West Murman the mussel *Littorina* is greatly used as food. The fauna of West Murman is abundant compared to East Murman and other regions of the Barent Sea. Mollusks constituted 94.7%, 67.7% and 77.3% of the diet (by rel. occurrence) in 37 stomachs from West Murman, 88 stomachs from East Murman and 12 stomachs from Novaya Zemlya respectively. Crustaceans were 3.5%, 25.9% and 22.6%.

There is almost no change in the relative occurrences of the basic food groups. The food of the Seven Islands population consisted from May to June of 66.2% mollusks and 29.2% crustaceans from July to August 63.5% mollusks and 28.8% crustaceans. Nevertheless their food composition, with regards to species changes noticeably during summer - not caused by any change in the food conditions of the littoral zone but by the transition from large-sized foods to smaller ones during the feeding period of the young.

Even a highly specialized bird as the eider can be diverted (through domestic) to a diet of concentrated vegetable

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Food (3)

5. Cont'd

(grain) foods and dry fish. The young birds possess much greater ecological adaptability than do adults. A highly specialized feeder such as the eider can be converted into almost an omnivorous duck.

The diet of the female eider differs noticeably from that of the males since the females which escort their broods during the second part of the summer change to the small-sized foods more suitable to the young. During May-June 24 male stomach = 70.0% mollusk and 30% crustaceans, while 13 female stomachs = 69.2% and 30.8% crustaceans. Large and medium *Mytilus* constituted 67.5% and 53.8% respectively. During July-August 17 female stomachs showed 66.7% mollusks, 33.3% crustaceans but large and medium. *Mytilus* had dropped to 33.3%.

The maximum content recorded at the crop of an adult eider weighed 72 grams and consisted exclusively of *Mytilus edulis*. (The eider eats 4 times a day). The daily diet of an eider could therefore be 300 grams.

6. The food of the eider duck apparently consists mainly of molluscs e.g. small sea mussels *Mytilus edulis* and snails *Litorina*. They apparently contain enough water to satisfy their requirements

7. Eastern Murman chiefly mollusks including mussels (*Mytilus edulis* encountered in stomachs with frequency of 70.3%) and litorines (*Litorina* sp. 24.3%) less often, other crustaceans, seastars and marine hedgehogs or sea urchins. In spring frequently feeds on wintering crowberries and green parts of plants. From late June chief food of juveniles and accompanying females consist of litorine mollusks collected in coastal shallows, amphipods, and crowberries ripening at this time. In Onega Bay, White Sea as in Murman but many litorines, amphipods, and polychete worms (*Nereis*). In Kandalaksha Bay mollusks (mussels and litorines) in 100% of stomachs, fucoid algae in 37.5% and crowberries in 25%. Both adults and nestlings procure food by diving generally to depth of 2-4 m. Well-filled stomachs contain about 76 grams of food. Eiders feed four times daily (at high and low tides).. daily ration must equal 300 grams.

*borealis* - Stomachs at Spitsbergen filled exclusively with mollusks (*Mya*, *Neptunia*, *Bela*) Ducklings chiefly consume fish (*Cottidae* or cods; Greenland and Labrador).

8. In the White Sea and on Murman they get their food by diving or by collecting it on the littoral. They catch crustaceans and marine invertebrates sometimes simply by putting their heads under water. On Novaya Zemlya where the littoral fauna is poor because of moving tides and ice they feed on the sub-littoral. Adults

6. Gudmundsson, Finnur 1932

7. Dement'ev, G.P. et al. 1952

8. Gerasimova, T.D. and Z.M. Baranova 1960

Food (3)

8. Cont'd

feed mainly in the lower and middle layers of the littoral in tide water while brood usually keep to the lower horizons or to the upper horizons in tide. Almost all animals of the littoral and sublittoral serve as food.

In the White Sea the fauna is rich in variety and more than 25 animals are available. In the Barents Sea food is more restricted. On the Eastern Murman there are only 15 animals available, Western Murman about 10 and on Novaya Zemlya only 5.

Mollusks are pre-eminent as food. In the White Sea they comprise 85% of the food, on the Ainov Islands 94% on Seven Islands 60% and on Novaya Zemlya 75.5%. Sea mussels comprise 36% of the White Sea food, 54% on Ainov Islands, and 61% on Seven Islands. Second place was Littorina. Crustaceans comprised 35.6% on the Eastern Murman and 22.5% on Novaya Zemlya. Algae and land plants comprised only a small part of the food.

On Novaya Zemlya no littoral forms were found in stomachs - even sea mussels were taken from the sub-littoral.

Seasonal changes in food - In the White Sea prior to nesting (April to early May) the littoral is ice covered and the birds feed in openings in the sub-littoral. Only 28.4% consisted of littoral forms.

Littoral forms predominate during the nesting period (end May - June). Bivalvia comprise 57.7% of this. With the mass arrival of the stickleback fish comprise 18.6%. Some sub-littoral forms migrate to the littoral at this time and serve as food.

In the nestling period (July-September) 58.3% of the White Sea food is sub-littoral. Mollusks predominate. It is believed that at this time the eiders feed offshore because of predators, gales and storms.

9. An adult eider weighs roughly 2500 grams and according to Swenhen's research consumes some 475 grams of fresh cockle meat or 330 grams of fresh mussel meat a day. i.e. one-fifth to one-seventh of its own weight. Expressed numerically the eiders daily consumption amounts to about 250 two year-old cockles (approximately 32 mm in length) or 150 half grown mussels (2-4 cm.).

10. The glaucous gull (*L. hypoboreus*) and the Great Black-backed Gull (*L. marinus*) associate with the eider in Hualfjordur, southwestern Iceland and rob them of their food. A gull usually sits quietly among them until one of them surfaces after a dive with something in its bill. The gull then immediately rises and flies straight at the surfacing duck which diving frantically usually lets go of its food item. The gull then dives into the sea after

9. Verwey, J. 1966

10. Ingolfsson, Agnar

Food (4)

10. Cont'd

the rapidly sinking object. The habit of robbing eiders is more prevalent with glaucous and herring gulls than among black-backed or Iceland gulls. The gulls clearly defend the raft of eiders against all other adult glaucous gulls. This behaviour appears to be confined to sexually mature gulls.

## Predators (1)

1. In Kandalaksha Bay - the sea-gull, herring gull, arctic skua, gray crow, raven, white-tailed eagle and fox. On Novaya Zemlya the glaucous gull and the polar fox. On the Murman coast sea gull (*Larus marinus* L.) destroy nests and take nestlings. On Ainov in 1949 12% were destroyed by sea gulls and herring gulls in 1950 29% were destroyed. On B. Litsky Islands 5% of nests were destroyed by gulls in 1959. *Larus argentatus* Pontopp. also destroy eider nests and attack nestlings. In periods of abundance of other foods e.g. fish, eider eggs and nestling play a smaller role in the food of gulls. During the time of an epizootic the herring gull devour weak nestlings. Arctic skuas where they nest in the same area as the eiders inflict large losses on the nests. On the Murman coast the arctic skua is the principal predator. On Novaya Zemlya the glaucous gull destroy eggs and attack broods. On Seven Islands the raven feed on nestlings. In Kandalaksha Bay the grey crow is a predator of eggs. The white-tailed eagle (*Haliaeetus albicilla* L.) nests on Kandalaksha Bay and hunt adult eiders and broods. On Novaya Zemlya the white own preys on adult eiders (take females from nests) destroy nests and kill broods. Ice connects many of the islands of the White Sea in winter and the fox may gain access to them over it. If on a nesting island they reach havoc.

2. The hooded crow (*Corvus cornix*) is a robber of eggs, while the great black-backed gull (*Larus marinus*) destroys the young. The herring gull (*Larus argentatus*) also feeds on eggs, while the lesser black-backed gull (*Larus fuscus*) and the common gull (*Larus canus*) have been recorded feeding on young.

3. The raven (*Corvus corax*), the herring gull (*Larus argentatus smithsonianus*) and the parasitic jaeger (*Stercorarius parasiticus*) used the area as a hunting area. The egg loss by parasitic jaegers may be slight. Predation losses in 1955 were comparable to losses in 1956 (142 eggs to 129) but on the basis of eggs laid the 1955 losses were 50% higher. The predation loss in 1955 may have been the maximum toll. The average total daily loss was the same in 1955 and 1956 5.9 eggs/day. Predation accounted for 5.1/day in 1956 and 4.9/day in 1955. Weather and egg availability are factors in egg loss. In 1958 seven peaks accounting for 74% of the total loss coincided with periods of inclement weather. In 1956 a season of better weather there were 6 peaks and only one coincided with bad weather. The 6 peaks in 1956 were 70% predation loss. There was little relationship between total number of eggs available on the area and the number of eggs available for predation. i.e. as incubation begins there are fewer eggs available for predation as the female sits tight but there are more total eggs on the area. Apparently weather influences greatly the number of nests and eggs deserted. Preflight mortality may be caused by gulls, jaegers, ravens, Arctic fox, red fox, possibly seals and short-tailed weasels. Greatest loss to gulls was in 1st week after hatching. At least 25% of all eggs and ducklings were lost to predators in 1955 and 15% in 1956.

1. Gerasimova, T.D. and Z.M. Baranova 1960
2. Grenquist, Pekka 1965
3. Cooch, F.G. 1965

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Predators (1)

4. Gulls, the great black-backed gull (*Larus marinus*) and the herring gull (*Larus argentatus*) were the major predators. It was found that there was greater nest loss in the latter part of the season compared to the early period. Partial predation (loss of only part of the clutch) was recorded in 13% of the nests in 1964 and 9% in 1965. It occurred only after incubation started. Black-backed gulls probably preyed more heavily on eider nests than did herring gulls. There was an apparent relationship between all gull:eider ratios and nesting success although the chief predator (the black-backed gull) made up only a 1/4 of the gull population. Blond observations indicated that gulls return to the island much sooner than do eiders after human disturbance, probably increasing nest loss. Nest desertion was not apparently increased by human disturbance.

5. The loss of eggs at Kent Island is caused, almost exclusively, by herring gulls although crows and ravens may cause some losses. The presence of humans may increase predation losses.

6. The black-backed gull is a frequent marauder of young eiders.

7. The great black-backed gulls are notorious nest robbers and destroyers of young eiders.

8. Sea eagles often attack them along the coast of Norway. The great black-backed gull will harass and eventually kill a weakened eider. In the Orkneys and Shetlands a few young birds fall prey to both lesser and great black-backed gulls. In Unst the great skua kills young eiders while in Iceland they are eaten by Richardson's skua, sea eagles and Iceland falcons. In Russia (on islands) Labrador and Greenland Arctic foxes prey on old birds (and eggs) on the nest and young. Polar bears kill young eiders and eat eggs. The harp seal is suspected in West Greenland of catching eiders on the water. A small whale Orca gladiator may also kill a few. In north-east Greenland the glaucous gull is a major predator.

9. Arctic foxes, polar bears, skuas, falcons, sharks, seals, ravens, and black-backed and glaucous gulls all prey on eiders, their young and eggs.

10. Large sculpin grabbed one of the downies and pulled it under water.

11. Of 1702 pairs of eiders nesting on a total surface area of 110 hectares 60 female eiders were taken from their nest by sea eagles during the summer of 1930. There is a possibility that the population was already weakened by an infection of *P. boschadis* that occurred the previous year.

4. Choate, Jerry S. 1967

5. Paynter, Jr. Raymond A. 1951

6. Gross, Alfred O. 1938

7. Bent, A.C. 1925

8. Millais, John Guille 1913

9. Kortright, Francis H. 1942

10. Tuck, Leslie M. 1953

11. Grenquist, Pekka 1948

Predators (2)

12. The island of Rømø off the southwestern coast of Denmark was invaded by foxes when a road was built between it and the mainland. The former thriving eider colony on Rømø disappeared. Goran Bergman informed him that the losses of young eiders may vary from 25% to 95% in the Helsinki-Porkkala area the 95% loss was attributed to the very cold sea water.

13. Predation by black-backed gulls and skuas on eggs on the Ainovy Islands produced an extended egg laying period (because of repeated clutches).

14. The polar fox (*Canis lagopus*) hunts adult birds all year round and in the summer also takes young ones. Icelanders believe eider ducks fall prey to seals.

The black-backed gull, the glaucous gull, the parasitic skua, the great skua, the common raven, the Icelandic hunting falcon and the sea-eagle are predators. The black-backed gull takes eggs as well as young and occasionally attacks full grown ducks. The parasitic skua take eggs. The great skua and the glaucous gull have similar habits to the black-backed gull but they do not cause serious damage as they are not too common in Iceland. The common raven is an egg robber. The Icelandic hunting falcon is the only bird which seriously endangers adult ducks. The sea-eagle fed most consistently on eider ducks but today it is scarce in Iceland.

15. In different places in different years egg loss varies from 12-34%. On the Ainov Island in 1950 nest loss was 34.5%. With improved protection it dropped to 12.4% in 1951. Predators destroyed from 11.4-20% of the clutches in Kandalaksha Bay. The crow was the major predator. Desertion by brooding females resulted in not more than 3.6%. Occasionally nests are lost by flooding. The sea-eagle is another predator. Clutches are more susceptible to predators early in brooding when the female flushes readily and stays away from the nest longer. In 1955 37 nests in Onezhskaya guba (bay) produced 169 eggs, 12 eggs (7.1% didn't hatch). The average theoretical brood was 4.25 reaching water.

Sea-gulls and herring gulls pursue nestlings on the Murman Coast. Herring gulls and crows do so on the White Sea (particularly when the young are descending to the water). A high surf may drive the young into cliffs killing them.

On the Eastern Murman the average brood size is from 2.14 to 3.89 when the brood is not over 10 days in age. Commonly brood of 2-3 predominated. Considering the average size of broods just hatched is 3.94 the loss before 10 days of age is 12%. Mass epizootics in 1949, 56, 57 and 58 in the White Sea produced losses of 10.5%. In 1952 in Onega Bay 23.8% of all hatched birds perished before the 10th day.

12. Errington, Paul L. 1961

13. Belopol'skii, L.O. 1957

14. ... 1970





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Predators (2)

16. During the nesting period the chief enemies of the eider are the common grey crow (*Corvus cornix*), the great black-backed gull (*Larus marinus*), the herring gull (*Larus argentatus*) and the common gull (*Larus canus*). The Vaikas Preserve combats them by limiting their numbers in all the inlets.

17. Predators (mentioned by Aumees) are of secondary importance as a limiting factor although they may have a substantial influence in some sections of the preserve.

18. The common grey crow inflicts heavy damage on the eider nests. On some of the islands the crow destroys up to 85% of the nests. The average number of nests annually destroyed by it on the wooded islands of the Northern Archipelago during an 18-year period is 16.1% (8.5 - 25.0%). The crow also attacks the eider nestlings left behind when the brood takes to water. On the Preserve it is necessary to reduce the numbers of both nesting and sexually immature crows arriving to feed. The number of herring gulls must be reduced by one-third to one-half chiefly on account of those individuals which specialize in eating the nestlings and eggs of the eiders.

19. Under the conditions existing in the Kandalaksha Preserve the great black-backed gull and the herring gull do definite harm, the extent of which varies in the different sections of the Preserve and does not remain constant over the years. The factors that determine the degree of predation are: the numbers of the gulls and bird victims and the ratio between them; the presence or absence of a mass supply of food for the gulls; the ecological conditions of the particular season; the presence and size of the population of gulls specializing in the plundering of individuals; and also the degree of feeding specialization of the gull population as a whole for specific types of food in particular for eggs and chicks. In all cases the herring gull is less harmful than the great black-backed gull.

At the present time the large gulls are doing the greatest amount of harm in the Ainov Islands where their density is very high. In the last seven years their numbers have increased from 1370 in 1958 to 8700 in 1965. Included are the great black-backed gulls who have increased from 700 to 4200. In 1965 the gull density was 44.2 per hectare with great black-backed gulls = 21.3 per hectare. The main food of gulls is fish. When lacking they switch to littoral invertebrates which are not abundant on Ainov Islands. Although both species feed on eider eggs the great black-backed gull, as a rule, is the only one to attack fledglings alighting on the sea. Wholesale destruction of nests seems to be dependent upon 2 factors: a lack of fish foods and a delay in the development of vegetation. During a 10-year period the loss of nests by gulls amounted to 12.5% on the average with a maximum of 49% in 1964. In some

16. Aumees, L.E. 1966

17. Bianki, V.V. 1966

18. Bianki, V.V. and N.S. Boiko 1966

19. Karpovich, V.N. and I.B. Tartarinkova 1966

# Predators (3)

## 19. Cont'd

years the great black-backed gull devour a minimum of 10-20% of the eiders alighting on the sea. In the Sem'Islands the large gulls vary between 6-12 per hectare and therefore inflict less damage on the eiders. On the average with a density of gulls between 10 and 34 birds per hectare 11.9% of the eider nests are destroyed.

Great black-backed gulls on Sem'Islands less frequently attack young eiders compared to the Ainov Islands. A permissible density of large gulls would be not more than 6-10 per hectare and the great black-backed gull should not exceed more than 10-15%.

20. In the Matsaluskaa State Preserve (Estonia) the losses of eider layings are very great. The worst enemies are the fox, racoon, dog and the common grey crow as well as the raven on some of the islands. The nests situated in shrubbery are destroyed to a much greater extent than those located along the open shore. Eider nests located on small islets are destroyed by the great black-backed gull and sometimes by the common grey crow. Outside the Preserve fishermen sometimes collect eider eggs. The activities of tourists and amateur fishermen often frighten the ducks from the nest. Wherever the islands are occupied by humans the losses of eider nests are increased markedly.

A large number of the nests are destroyed during the hatching period (up to 70%) and only 30% during the egg-laying period. The comparatively small losses of the latter is the short laying season (the laying is small and the female lays one egg almost daily). The eider abandon their nests quite frequently and not only those containing new-laid eggs but also those that are being incubated. The number of abandoned nests was larger during the initial years of observations. Evidently a proportion of the females had become accustomed to humans over the years and were not abandoning their nests so readily.

## Eiderdown Industry (1)

1. One of Iceland's largest eider farms supports 5,000 nests, a small farm has 1,500 nests. 60 nests produce about one kilo (2.2 pounds) of down. Icelanders recognize 2 kinds of down - grasdunn - from nests in grassy places (the cleanest) and thangdunn - from nests on seaweed. Down is collected 3 times - twice in the early stages of incubation when only a small portion is taken and after the broods have left the nest. The lowland is dredged to improve drainage and sheep and cattle which are allowed to graze in the non-breeding season are fenced out. Scarecrows, and guns are used to discourage predation.

2. The sites of the colonies are privately owned, so also by Icelandic law and tradition are the ducks when they are on the breeding grounds. Stringent governmental regulations prohibit shooting of eiders at any time. Eiderdown is collected twice each season, at the mid-point of the incubation and after the young have left the nest. Artificial nest scrapes and shelters are built by the farmers. Predator control of black-backed gulls and ravens is by poisoned baits (strychnine) injected into hens (domestic) eggs, after the eiderdown is collected it is dried in the sun then bagged and stored. The down is cleaned of grasses, twigs, excreta and sprayed with DDT to rid it of parasites. The old method of cleaning down (by a sieve process) produces 2-3 kilograms/man/day. Today they use a machine developed by Baldwin Johsson. It cleans a kilogram of down in an hour.

3. In 1920 the total amount of eiderdown produced in Iceland was 7,467 pounds, of which 5,610 were exported. Price ranged from \$3-5 per pound. Most of the eiderdown is collected from the nest soon after the duck begins to sit. A second collection should be made after the female and ducklings have left the nest. This should be done as soon as they leave otherwise the down loses its elasticity. The average yield per nest is about 1 ounce. It is best to collect down on a bright sunny day when it is dry and warm. Down that has been soiled by the excrements cannot be cleaned or used. Down taken from dead eiders loses its elasticity and is of poor quality.

4. Eiderdown can be collected twice during each nesting season. The best quality down is taken midway through the incubation period when the maximum amount of down is present and it has not been in the nest long enough to become matted and soiled by rain and fecal material. A second down collection can be made after all the eggs have hatched. It is inferior because of the bits of shell, fecal matter and contour feathers it contains. At the 1st collection some down must be left to protect the eggs.

1. Pettingill, O.S. Jr. 1959

2. Munro, D.A. 1961

3. Lewis, Harrison F. 1926

4. Cooch, F.G. 1965

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## Eiderdown Industry (1)

### 4. Cont'd

To reduce soiling by excretion tests showed that if the collector wore a dark parka as opposed to a light one and approached the nest slowly there was less chance of soiling. A study of the nesting curve that the best time to begin down collection was 25 days after the laying of the 1st egg. At that time 95% of the females had been incubating for at least 9 days. The down must be collected when it is dry. In 1955, 5,765 grams were collected from 272 nests ( $\bar{x}$  21.2 grams). In 1956, 784 nests produced 22,719.5 grams ( $\bar{x}$  28.9 grams). In Iceland 34.1 grams/nest is collected in 2 collections. Collection procedures were: 1. remove eggs and place on ground 2. remove the inner layer next to the eggs 3. loosen up the outer layer replace eggs and cover them 4. place collected down in small paper bags. Contaminated nest yielded an average of 17.5 grams of dirty down. Uncontaminated nests yield 34.1 grams of cleaner down. The later the date of nest initiation the more frequently the nests are contaminated. Nest contamination reduced down collection by 13.8%. Nests of late initiation have smaller clutches and yield less than the average weight of down. Nests with smaller clutches were more frequently contaminated. Contamination appears to decrease when the eiders become more accustomed to human activity. One-half ( $\frac{1}{2}$ ) pound of down sells for \$4.00. On small island dark clothing was not as effective as on large ones as the birds didn't have time to watch the collector approach.

5. The total yield of cleaned eiderdown in the whole of Iceland during the years 1914-1929 amounted to an average of 3,848 kg. annually. The maximum, 4,355 kg, was reached in 1916. The minimum, 3,238 kg. in 1919. One duck yields 16-17 g. of down per year. The yield of the largest duck breeding place in Iceland amounts to approximately 200 kg of cleaned down annually. This would mean there are 12,000 pairs breeding there.

6. Down removed from nest itself possesses quite different commercial qualities than that plucked directly from breasts of eider. The down grows on the lower breast and belly and differs from down elsewhere on body in having more abundant curly barbs and barbules at 1st and 2nd order and somewhat greater length, so that these downs intertwine tenaciously to form elastic mass. Average amount of down provided by each nest totals 17-19 g in eastern Murman, 18-20 g at Kandalaksha and 14.5-16.5 in Iceland.

In 1930 at Novaya Zemlya 452 kg. were prepared.

5. Gudmundsson, Finnur 1932

6. Dement'ev, G.P. et al. 1952

Eiderdown Industry (2)

7. Beginning from 1940 (in the hunter's co-operatives of Novaya Zemlya) definite nesting ground sections of the eider were assigned there to those collectives which did the protection and gathered the down. Already in 1944 the southern island of Novaya Zemlya showed an increased income owing to the collection of down.

8. Provision has never been made for using commercially the down on Saaremaa Island. At the present time the number of eiders are too small (2,000 nests) for this purpose. This question could only be raised in earnest in the event of our being able to increase the numbers by at least 10 fold.

9. In the Kandalaksha Preserve the main enemies of the eiders are the Fox, Common Grey Crow, Raven, Great Black-backed Gull, Herring Gull, Short-tailed Skua, and White-tailed Eagle. The fox (Vulpes vulpes) freely visits the islands via the ice for 6 months of the year. In the spring some of them do not succeed in leaving the islands and remain to live there. To control them they have used traps and poison (barium fluoracetate). The Common Grey Crow (Corvus cornix) nests both on the mainland and on the islands of the Gulf. In the last 20 years it has begun to nest on the Murman Peninsula more successfully on the Sem' Islands and less so on the Ainov Islands. It does the greatest amount of harm in the islands of the Kandalaksha Gulf. To control the crow they shoot (adults) them near the nests, destroy the nests, and shoot the young in the vicinity of the nests. In 1965 they attempted to control them by means of poisons and soporific substances. Barium fluoracetate was used as the poison. The large gulls (Larus marinus, Larus argentatus) to great harm. The Great Black-backed Gull is numerous on the Murman and the Herring Gull on the Murman and in the Kandalaksha Gulf. They plunder the nests and attack the eider broods. Their behaviour appears related to the relative availability to other sources of food. To control them they collect the eggs, use traps and shoot them. The short-tailed skua (Stercorarius parasiticus), Raven (Corvus corax) and the White-tailed Eagle (Haliaeetus albicilla) are not numerous in the Preserves...inflict very little damage.

10. On the islands of the White Sea and the Murman Sea and on Novaya Zemlya the eiderdown industry has existed for a long time. At the beginning of the 20th century the export of down amounted to 12-14 tons a year (Formozov, 1930). At the present time the collection of down (several tens of kilograms of raw material annually) is carried out only in the Kandalaksha Preserve.

7. Gerasimova, T.D. and Z.M. Baranova. 1960

8. Aumees, L.E. 1966

9. Boiko, N.S. 1966

10. Karpovich, V.N. and V.D. Kokhanov 1966

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## Eiderdown Industry (2)

11. Currently it is only in Iceland and Norway that the common eider are sufficiently numerous to justify talking about arranging for the production and collection of their down.

In Iceland the production of eider down has been in progress for a very long time and exporting of the down on a smaller scale began in the 18th century. One eider brood yields from 16 to 17 grams of clean down during a nesting season (Gudmundsson, 1932). An eider colony yields up to 50 kilograms and the largest colony as much as 400-500 kilograms of down annually (Hantsch, 1905). The export of down from Iceland during the year amounts to between 3.5 and 4.5 tons. In Norway (according to written communications received from Hj. M.K. Lund) the collection of eider-down has been practiced for more than a thousand years. About 1900 the annual production amounted to about 1.7 tons of clean down. At the present time the figure is much lower. One of the main Norwegian suppliers has recently been exporting about 200 kg annually.

In the remaining countries Finland, Sweden, Denmark, the Federal Republic of Germany and Holland the collection of down is not undertaken. Although it was formerly practiced it is prohibited. In Britain it is proposed to carry out an experimental collection of down in one colony with the aim of clarifying its productivity.

12. Formerly, Russia was the main supplier of eiderdown for the world market (the total annual volume of "live" nesting down evidently exceeded 10 tons). By 1930-50 the procured volume of eiderdown had fallen markedly although even then it reached two tons annually.

11. Kumari, E.V. 1966

12. Uspenskii, S.M. 1966

Harvest (1)

1. Danish kill by hunting 1959-60 equals 109,092 eiders with bulk of kill being located on Danish counties bordering Kattegat at entrance to Baltic Sea. In Finland the kill is about 3,000 (males only), while in Sweden it is about 5,500. The Danes hunt eiders from speedboats (Tuck, pers. comm.). In Denmark the season is from October 1 to February 28 with special seasons in some areas in certain years. All Danish sportsmen must, when the annual renewal of the shooting license is due, supply a list of all game killed by him during the preceeding year. The annual Danish bag has been 50/51 - 22,800, 51/52 - 55,200, 52/53 - 52,400, 53/54 - 76,500, 54/55 - 70,400, 55/56 - 70,300, 56/57 - 49,500, 57/58 - 76,700, 58/59 - 80,700, 59/60 - 86,400, since 54/55 the figures were corrected to 91,200 (70,400), 93,100 (70,300), 93,100 (70,300), 60,900 (49,500), 92,800 (76,700), 96,500 (80,700), 109,100 (86,400).

The winters of 53/54, 54/55 and 55/56 were hard, the remaining three were mild. The mean annual mortality among adult eiders about 20%. No decrease in the population can be traced despite the large annual kill - in fact there has been an increase. The minimum calculated wintering population passing through Danish waters (allowing a 15% hunting kill and a bag of 90,000) is 600,000. The Finnish breeding population is estimated to be 30,000 pairs. The Swedish breeding population is estimated to be somewhat more.

2. Ducks of the census area migrate far from centres inhabited by man along the border of the open sea and do not become the catch of the hunter, because in Finland open-sea shooting is not practiced. The greatest number of ringed birds in the census area were recovered in Denmark - 109 or 20% (all species not just eiders). Eiders have been protected in Denmark as a result of hard ice winters (fide Strandgaard) 1951-56 from 1/2 to 28/2; 1956-1963 - 1/9 to 30/9; 1964 - 1/9 to 24/9, and in other local areas for varying periods. There was a crash in the Danish kill of eiders (and dabblers and diving ducks) in 1956-57. The crash was followed by an increase. The bag-figures in the severe winters of 53/54-55/56, 57/58 and 59/60 are higher than those of the mild winters 52/53, 56/57, 58/59 and 60/61. The ice-winter force ducks to move to the Danish waters in greater numbers than usual.

3. At West Bay on January 31, 1913, after the simultaneous discharge of six guns, 140 eiders were picked up and many more were lost.

4. Norway exerts the lightest hunting pressure on waterfowl of any of the Scandinavian countries though the dense nesting concentrations of eiders in Norway's Atlantic and Arctic archipelagoes are exploited for down and to some extent for eggs. The recent

1. Paludan, Af Knud 1962
2. Grenquist, Pekka 1965
3. Cooke, Wells, W. 1916
4. Errington, Paul L. 1961



Harvest (1)

4. Cont'd

abolition of spring shooting in Sweden is credited with a fivefold increase of the eider population in adjacent Finland (though he is not sure how well a cause-and-effect relationship could be demonstrated). There are no bag limits in Sweden.

5. The Eider was previously ruthlessly persecuted; the birds were shot throughout the year, even when sitting and the eggs were collected many times each year. The result was a most dangerous decline in numbers in a period from about 1820 AD to 1924. In the latter year the breeding Eiders were protected by law throughout Greenland and the egg-collecting was limited to early spring. Eiders shot in winter (and non-breeding birds in summer) total about 150,000 birds a year (King Eiders included). According to ringing 30-40% of Eiders ringed as ducklings are shot but only about 10% of these ringed as adult birds (in flightless condition or caught in nets in winter). This will make a total average of about 20% of the population, a figure probably not so high as to threaten the population.

6. As noted by V.E. Flint (1955) in 1945 hunters took on the coast of Onega Bay 30 eiders for a gun and in 1951 a hunter killed an average of 8 to 10 females and males to a gun. An average of 150 killed eiders fall to any coastal village. Sailors from fisher boats also often kill brooding birds. Inhabitants of the Murman Coast state that in each populated point poachers kill in winter and autumn several hundred of birds. In the Motovo Bay eiders are shot the year round. In 1945 wrote E.E. Flint in the area of the Kond Islands 800 eider eggs per hunter. In recent years each fisherman has gathered not over 20 to 30 eggs in spring.

7. Total eider kill 1968 - 125,000 birds

Total license sales - 125,000, of which about 10,000 are eider hunters. Total waterfowl kill - 750,000-775,000, consisting of 400,000 mallards, 125,000 eiders, 150,000 dabblers other than mallards, 100,000 other diving ducks, 10,000 geese. Population of Denmark equals 5,000,000 people area 18,000 square miles, 4,000 miles of coast. Season - October 1-February 28. No bag possession limit. Shooting from boats with speeds up to 10 knots allowed. Hunters go offshore up to 10-15 miles to hunt. Sweden's kill about 20,000, Finland about 10,000. About 700,000 eiders winter off Denmark.

Kill ratio equals 75% birds. 5 year 5%-1.5, 5%-2.5, 15%-3.5 and older. Most of kill made in October and November. Pairing begins early in April. Boat used for hunting Kayak type (for two people) with light motor. Decoys not used and are considered of no value. A good hunter shoots 2-3,000 eiders in a year, an average hunter 200. Sale of shotgun shells - 30 to 40 million a year. Eiders can be sold. Some people make a good living from sale of eiders. Three major breeding areas in Denmark - 2 colonies of 3-4,000 birds, one of 1,000. Sex ratio of adult birds killed 55 males:45 females; one year it was 57 males:43 females.

5. Salomonsen, Finn 1951

6. Gerasimova, T.D. and Z.M. Baranova 1960

7. Joensen, Anders (pers. comm.) 1969.

Harvest (2)

8. The eider is protected the year round in Estonia where hunting for it is prohibited and the nesting grounds are protected.

9. The decisive factor controlling eider duck nesting in the Preserve is man, who engages in collecting the eggs outside the Preserve and hunts the adult birds.

10. The eider is most extensively protected in Iceland where appropriate laws and government edicts have been in existence for more than a century. The eider is also protected the year round in Estonia, Norway, Holland, the Federal Republic of Germany, and Britain. The nesting grounds of the eider are protected by the State throughout the Baltic, North Sea and North Atlantic and a large portion of them is situated in preserves and wildlife reservations.

The eider is regarded as a game bird in a few countries (Paludan, 1962); in Finland (open season September 1-February 29 - bag up to 3,000 per year), Sweden (September 1-December 31 - up to 5,500 per year), Denmark (September 1-February 28 - between 23,000 and 110,000 per year). The vast majority of birds shot by Danes are nesting birds from Sweden and Finland.

Visual observations and band returns have established that the eider of the northern Baltic region (the Gulf of Bothnia and Finland as well as those of Estonia) are migratory birds wintering in the southwestern part of the Baltic Sea and in the Danish Straits.

8. Aumees, L.E. 1966  
9. Bianki, V.V. 1966  
10. Kumari, E.V. 1966

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## Disease (1)

1. After the hard winter of 1946/47 a widespread incidence of disease was discovered in eiders in the east waters of Borholm Island. The causative organism was apparently the acanthocephalid worm - Polymorphus boschadis. It was estimated that 300-400 eiders died most of which were young of the same summer. The disease situation of 1955/56 was similar to that of 1946/47 and followed a similar winter: a mild early winter followed by a strong and late winter which were extremely cold. Between 1956 and 1959 a similar epizootic was found in eiders on Vlieland Island, off the coast of Holland. The first infected birds were found at the end of August, 1956. The disease apparently reached its climax at the end of August the following year. Of 12,000 eiders wintering in the Waddenzee area 15% were severely infected and 100 died in a few weeks. Similarly, in September and October, 1956 and February and March, 1957 a score of dead and 100's of infected eiders were found along the shores of Maine and Massachusetts in U.S.A. During hard winters the birds crowd together more than usually in such suitable feeding grounds as are free from ice. In Finland, it was found during the early summer of 1942, following the hard winters of 1939/40-1941/42 acanthocephalid eggs were found in great quantity within individuals of Gammarus taken from the shallow shore-zone. The Acanthocephalid epidemic hit the Finnish eiders in the 1930's, 1940's, 1950's and 1960's. There was a noticeably high mortality rate in the spring and summer months of 1931, 1935-37, 1948, 1957, and 1959 in the southwest and southern archipelagos. They caused death not only among the downy young but also the old birds, especially the females. The disease lasted with reduced severity continuing to strike adult birds even some years later. In the late 1930's the eider populations had decreased by about 1/3 from its previous maximum numbers in the southwest archipelago. The outbreaks took place in areas where the birds were massed together either in unusually overcrowded wintering grounds, especially in hard ice winters or in nesting areas with high densities. In 1947 the outbreak in young paralleled an increase in the Gammarus crustaceans (which serve as intermediate hosts of Acanthocephalids).

2. There was a mass mortality of young eiders in Kandalaska Bay, White Sea 65°30'N; 33° E in 1949 between June 22 and July 7, 321 birds died from the infection (of Paramonostomum alveatum) and as many as 50,000 worms were found in a single bird. Eider chicks less than 2 weeks old fed in tidal pools on hydrobias (Hydrobia alvae) which carried from 10 to 25 cysts of the parasite. Birds older than 2 weeks fed in Fucus and Mussel beds where the hydrobias was rare or absent and survived.

3. During the months of September and October, 1956 numerous eider ducks were found dead near Matinicus Island on the Maine coast. In Massachusetts dead and dying ducks were reported by state game officials in the Chatham to Nantasket area during February, 1957. On March 2, 1957, 12 dead and 200 weakened eiders were found in the vicinity of Chatham. On March 4, 1957 dead and dying ducks were noted in the Plymouth-Duxbury area. A

1. Grenquist, Pekka 1965
2. Stunkard, Horace W. 1967
3. Clark, Gordon M., David O'Meara and James W. Van Weelden 1950

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## Diseases (1)

### 3. Cont'd

biopsy revealed heavy infections of *Polymorphus botulus*. They had harboured 154, 62, 49, 86, 38 and 235 worms - 3 eiders taken in Maine had 610, 206, 196.

4. In 1949 an epizootic began among the young eiders found about the islands of the Kandalaska Sanctuary. From 1949 to 1957, 162 dead young eiders were found. The rate of mortality varied from year to year. The causative organism was found to be a trematode *Paramonostomum alveatum*. The intermediate host(s) of this parasite was found to be *Hydrobia alvae*, *Littorina radis* and *L. obtusata*. The cysts of the parasite were found on the shells of the intermediate hosts. Nestings not older than 10 days predominated in the dead or dying birds. No perished adults were found. The young on swimming to land die in convulsions in 20-30 minutes. They bend their heads far back and most of them were found lying on their backs. Most of the dead were found on treeless islands. The earliest date dead nestlings were found was June 21, 1957 and the latest July 10, 1955. The loss stopped between July 7 and 30. In years of higher mortality the epizootic lasted for shorter periods than in years of lower mortality. Differences in mortality rate, duration of the epizootic, the dates of its onset, peak and termination were related to the date of the beginning of the epizootic, spring weather conditions and temperature conditions. Beside *P. alveatum*, it was found that *Spelotrema pygmaeum*, *Hymenolepis microsomae* caused mortality. The rediae and cecariae of *P. alveatum* develop in hydrobias. After leaving the mollusk they encyst on the shell of the mollusk or the shell of other species. In Kandalaksha Bay 55.0% of the adults were infested and 92.7% of the nestlings. All perished nestlings lacked hypodermic and internal accumulations of fat. Water temperatures determine the mass appearance of the cercariae of *P. alveatum* and their encystment on shells of mollusks. It occurred between June 21 and July 27 each year. Major mortality occurred when the mass hatching of eiders co-incided or was just preceeded by encystment.

5. *Polymorphus boschadis*, the thorn-headed worm (an Acanthocephalid) destroyed a third of the eider population of the southern coast of Finland in the early thirties.

6. There is an almost complete dehelminization toward the end of the brooding period.

4. Kulachkova, V.G. 1960
5. Lampio, Teppo 1946
6. Belopol'skii, L.O. 1957

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## Diseases (2)

7. V.G. Kulachkova (1958) found in the eider 35 species of parasitic worms.

Eiders get the trematodes mainly via mollusks *Littorina* sp. and *Hydrobia* alvae; *Gammarus* sp. and other crustaceans give to them the tapeworms. The intermediate hosts of the horny-headed worms and the round worms have not been found yet. Ten species of trematodes are common to the eider of Kandalaksha Bay and of the Murman. *Hymenolepis setigera* of the tapeworms and *Amidostomus anseris* of the round worms frequently occur in the eiders of eastern Murman but are completely absent from the eiders of Kandalaksha Bay. Trematodes *Gymnophallus bursicola*, *Paramonostomum alveatum*, *Renicolla mollissima*, *Psilostomum brovicolle* are the most common parasites of eiders in Kandalaksha Bay but are never found in eastern Murman. V.G. Kulachkova (1958) suggests this may be explained by the faunal differences of the intermediate hosts in the White and Barents Sea as well as by the difference in wintering places for eider populations. He considers *Spelotrema pygmaeum*, *Hymenolepis microsome* and *Protilicollis botulus* as the most pathogenic for eiders in the Kandalaksha Bay and Murman.

Along the Murman coast the following species of trematodes occur most often:

*Gymnophallus somateriae* - 52% in test adults, 8.4% nestlings

*Spelotrema pygmaeum* - 76% adults-91.7% nestlings

*Hymenolepis microsome* - 52% in adults - 25% nestlings.

Thorny-headed worms - 82% of eiders.

In Kandalaksha Bay there is a medium and the most intensive infestation with *S. pygmaeum* and *Protilicollis botulus* several times higher than along Murman (100% adults - 91.7% nestlings). On this coast parasitic worms do not produce an immediate mass death but nestlings which become weak are often eaten by predators. *S. pygmaeum*, *Hymenolepis microsome*, *H. diorchis*, and *Paramonostomum alveatum* cause nestling mortality in Kandalaksha Bay, but are absent from the Barent Sea.

Ectoparasitic fauna is relatively poor. Three species of bird lice and two species of fleas. Infestation intensity with bird lice was 91% adults and 24.7% nestlings. V.G. Kulachkova (1958) found 17 species of mites and three of fleas in nests. Because of heavy infestation of nests female eider avoid reuse of nests.

An epizootic of *Paramonostomum alveatum* produced 300 dead nestlings in 1949 in Kandalaksha Bay. This was 10% of the nestlings.

7. Gerasimova, T.D. and Z.M. Baranova 1960

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Diseases (2)

In 1957 the numbers dropped markedly because of another epizootic of *P. alveatum*. It started in 1953 and continued until 1958. Particularly bad years for losses were in 1953, 1956 and 1957.

8. Of indirect significance are the character of the spring and the temperature of the water and air in June and July. When the water in the "baths" of the littoral heats during ebb-tide to 23 to 25 C the encystment of pathogenic helminths occurs in the small molluscs which serve as food for the downy nestlings. In those years when the heating of the water takes place earlier than or simultaneously with the mass descent of the eider broods to the sea substantial destruction of the nestlings is observed.

The epizootic focus is located on the Northern Archipelago of the Preserve. The most pathogenic species according to V.G. Kulachkova (1960) are *Paramonostomum alveatum* and *Spelotrema pygmaeum*. On the shores of the Northern Archipelago between 11 and 405 carcasses of nestlings were found during a season.

## Wintering Areas (1)

1. Near Ivigtut they wintered in the fjord in 1886.
2. Their winter resorts extend from Greenland to Maine wherever they can find open water and food. A few eiders stay all through the four months winter in the open waters of Smith Sound. They find sufficient food in the upswelling of the tidal currents about the Gary Islands (fide Ekblaw). Winter rarely to Massachusetts. Dresseri winters south to Nantucket and in rare cases to Delaware and Virginia. Eighty-seven (87) were shot in December 1859 near the Salvages, off Rockport on the end of Cape Ann. On March 18, 1875 a flock was seen between Muskeget and Nantucket Islands. In March 1894 there was a flock seen near Muskeget and Cape Poge, Martha's Vinyard and near Woods Hole.
3. During the winter months great rafts largely consisting of borealis frequent the waters off the southern end of Kent's Island. By the end of March they begin to move north to Labrador and the Arctic Islands.
4. Common in the waters surrounding the Archipelago during the late fall, winter and early spring. On January 12, 1961 a flock estimated at 900 was seen in the Rade de Miquelon.
5. The main wintering region of the eider ducks is on the ice limits of the Bering Sea.
6. Coasts of British Isles, France, Germany, Denmark, southern Iceland and Scandinavia. Winters in Barents Sea (Murman Coast) in greatest numbers at Pechenga Bay, less in Motovskii Bay and least on Teriberka and Sem Ostrovov. Winters in low numbers on Southern Island of Novaya Zemlya and in White Sea, where ice free leads remain. (West Murman coast warmed by the Gulf Stream) from east Murman coast (Sem Ostrovov) most fly to western Murman and northern Norway in fall. Return movements begin as early as mid-January.
7. In Kandalaksha Bay departure begins in mid-July or early August. Complete departure depends on time of freeze-up. Mass migration is underway by the end of September and by the middle of October relatively few are left. The departure goes along the continent. They fly 2-5 metres above the water, sometimes making small stops. Part of them winter in small openings in Kandalaksha Bay.

Eiders winter on the Murman Coast. Their numbers increase in September with birds coming in from the east. They winter in the Shirokaya Bay, Vayatka Bay, by the Gavrilovsky Islands in Teriberka Bay. During gales they may ascend the Voronya River 3-4 kilometres. They winter in Teriberka Bay.

- |                                   |                                |
|-----------------------------------|--------------------------------|
| 1. Hagerup, Andreas, Thomsen 1891 | 5. Isakov, Yu A.               |
| 2. Bent, A.C. 1925                | 6. Dement'ev, G.P. et al. 1952 |
| 3. Gross, Alfred O. 1938          | 7. Gerasimova, T.D. and        |
| 4. Cameron, Austin W. 1967        | Z.M. Baranova 1960             |

## Oil Pollution (1)

1. In February, 1952 off the Massachusetts coast oil spilled from two tankers in a stormy sea, caused a considerable loss of eider ducks. (They) estimated the 1952 wintering population dropped from 500,000 to 150,000 in 1953.

2. Although mortality (from oil) along the Newfoundland coast of seabirds as a result of pollution is continuous, it is most serious in winter when eider ducks concentrate inshore and murres offshore. Next to murres the eider ducks suffer most heavily. Since the ducks concentrate closer to shore than do murres they are not affected continuously but they die by the thousands when gales drive viscous masses of oil to the beaches. In recent years, far more murres - and possibly eider ducks - have been killed annually off the coast of Newfoundland by oil than have been utilized for food.

3. In 1956 as a result of oil dumping 7,500 birds were destroyed of which eiders comprised about 80%. This occurred off the coast of Nantucket.

1. Burnett, F.L. and Snyder, D.E. 1954
2. Tuck, L.M. 1960
3. Dennis, J.V. 1959



Ice Conditions Newfoundland (1)

Tuck to Livingstone (letter) March 31, 1961. Ice all around south shore.

Peters, June 18, 1943. Left Englee pushed northward through ice, arrived at Great Islet Harbour. June 19, 1943, Maiden Arm, Hare Bay. Ice bound same June 20, 21.

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## Spring Migration (1)

1. The date of the eider's arrival in spring depends somewhat on the season, whether or not there is much open water. The flights keep on for over a month lasting until the end of June (at Battle Harbour). As late as July 12, 1926 mixed flocks of males and females were going north past Battle Harbour.

Perret records the 1st eiders on Ailik on April 15, 1899 and states they remained through the winter at Killinek in 1905-1906. One was killed at Ailikon November 14, 1899. Wheeler notes they were passing northward along the edge of the ice south of Nain on May 26, 1928 and probably had for some days.

2. A flock not less than 400 was seen at Rigolet March 14, 1913. The 1st northward migrants were noted at Battle Harbour May 1, 1913 and on May 23 they passed in the thousands in companies of a hundred or more.

3. Not common at Annanactook till the latter days of May (in Cumberland Sound). Eskimos reported them on the floe edge near Niantilic early in May. Kumlien saw a few on an iceberg near the Middlejuacktwack Island on the 30th of April.

4. Early dates of arrival: Battle Harbour, May 1, Cumberland Sound, April 30, northern Greenland Etah, April 20, Wellington Channel at 76 May 17, Cape Sabine lat. 79 May 28, Thank God Harbor lat. 81 June 4.

Dresseri's spring migration occurs on the New England coast in the latter part of March or early April. The birds have been wintering south to Nantucket and in rare cases to Delaware and Virginia. In the latter part of May and early June, they were abundant on the southern coast of the Labrador Peninsula. On June 3, 1909 along the shores of Eskimo Island they were actively courting. Usual date of departure from Massachusetts is about April 20. Unusually late dates are Milford, Conn. May 29, Massachusetts May 18.

5. Eiders in pairs near Carrousel Island May 18, 1917. Cape Charles April 26, 1771 (fide Cartwright) thousands flying north.

6. Arrive mid-May at Cape Dorset, Sex ratios 1:1, June 1, 1955 and June 5, 1956.

7. Arrive Kent's Island April 7, 1937 (dresseri). borealis arrives to winter latter part of October.

1. Austin, Jr. Oliver Luther 1932
2. Cooke, Wells Woodbridge 1916
3. Kumlien, Ludwig 1879
4. Bent, A.C. 1925
5. Todd, W.E. Clyde 1963
6. Cooch, F.G. 1965
7. Gross, Alfred O. 1938

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Spring Migration (1)

8. Observations made in the top part of Kandalaksha Bay. The observation point was located in the southern part of the Sanctuary archipelago on the SE shore of Bol'shoi Lomnishnyi Island. The common eider was the most numerous flat-billed bird seen (9,218 individuals). The first flock consisting of 9 birds was noted on April 25th and after that date we recorded daily flights of eiders. In the beginning of the observations the ducks flying to the north as a rule returned to the south since the bay was clad in ice. Probably south of the Severnyi Archipelago openings were forming in the ice and eiders coming from the south were gathering there. By May 1st the numbers of eiders returning to the south was considerably reduced, this was effected by the formation of an opening (80 m by 40 m) from the direction of Devichya luda. However, many flocks still continued returning to the south. The number of birds on that opening gradually increased till May 15 as follows: May 2 - 40, May 4 - 100, May 6 - 300, May 7-8 - 400, May 10-11 - 600-650, May 14-15 - 700-750.

At the same time the total amount of eiders continued to increase in the region of the Northern Archipelago. A sharp increase in numbers took place during the first five days of May, i.e. when openings were formed nearby the island. In other words the arrival of eiders to the Kandalaksha sea cliffs is timed to the mass appearance of openings there.

As a rule eiders arrived in flocks 10 to 60 birds strong, not so frequently there were 80 to 100 birds in a flock. Sometimes we saw single females and males. Most of the flocks came at a height of 0.5 to 2.5 metres from the ice surface. Eiders came in larger numbers during early hours and least of all in evening hours along the routes. We did not follow the bulk of arriving birds since most probably they came in the night time. So on May 11 at 11 pm a flock of 50 birds strong flew to the north. Eiders were active mostly in early hours during low tides without wind. When winds were strong ducks went to the shore or went to inlets sheltered from winds. In the night hours pairs of eiders rested either on the water or on floating ice. Birds which did not form pairs were more active: the males chased the females cried and fought one another. The sex ratio was two males to one female.

Mid-April - beginning of May - searching openings in ice often returned south.

May 1 - May 10 - Gather in openings.

May 20 - on - spread over islands as ice gradually disappeared.

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## Fall Migration (1)

1. In the fall of 1912 the eider duck shooting began on September 20 near Battle Harbour but birds were scarce. By October 24, 1912, the gunning season hadn't reached its height.

2. A few eiders stay all through the four months of winter in the open waters of Smith Sound (fide Ekblau). Late date of departure Thank God Harbor, November 4, Etah, November 1. Cumberland Sound, November 17.

Dresseri arrives on the New England coast late in November and early December. Early dates of arrival Massachusetts: Essex County, September 20, Cohasset, September 18.

3. Autumn migration from the Cape Dorset area is gradual. Some birds remain in the area throughout the winter. Eskimos said that nearly all eiders leave the area by freeze-up, although some are seen in mid-November. The males and subadults of both sexes appear to leave first followed by the adult females with broods.

4. Remain at Kent's Island until mid-October. October 14, 1936 only three eiders (dresseri) there whereas two days earlier there were 250. They evidently migrate en masse.

5. Mass flights occurred 28 and 29 of September, and 14 October. It was the most numerous Anseri Lormes (total 4,032 individuals). They were recorded almost daily during the observation period. The observation site was on the Brevnushka luda in the vicinity of Devichya luda in Kandalaksha Bay.

1. Cooke, Wells Woodbridge 1916
2. Bent, A.C. 1925
3. Cooch, F.G. 1965
4. Gross, Alfred O. 1938
5. Kurochkin, E.N. and N.N. Skokova 1960

## Currents (1)

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The West Greenland Current is formed by the combination of the East Greenland Current and the Irminger Current near Cape Farewell. The East Greenland Current never flows directly across from Cape Farewell to Newfoundland. The tempering effect of the Irminger Current which is a recurving branch of the Atlantic Current of the Gulf Stream system makes the West Greenland Current relatively warm and salty. The West Greenland Current flows northward along the West Greenland coast steadily losing volume through low-velocity westward branching as water is fed into the anticyclonic circulatory system of the Labrador Sea. Just south of Davis Strait Ridge a major westward branching occurs, the remainder of the West Greenland Current continuing across Davis Strait Ridge into Baffin Bay where it feeds the eastern edge of another anticyclonic circulatory system.

The Labrador Current is formed by the junction of that portion of the Baffin Land Current which flows southward across Davis Strait Ridge along the Baffin Land side with the branch of the West Greenland Current which curves westward just south of this ridge. The resulting Labrador Current flows southward along the Labrador Coast with its axis over and paralleling the continental slope. The frigid (Baffin Land) component, by which the Labrador Current is best known is on the coastal side of the axis; and the warmer (West Greenland) component is on the offshore side of the axis. The Labrador Current retains these characteristics with remarkably little change all the way to the Tail of the Grand Banks. Arctic water and a few bergs enter the troughlike Strait of Belle Isle on the Labrador side and more or less conforming to the bottom configuration the current discharges on the Newfoundland side but the extent of the Arctic intrusion into the Gulf of St. Lawrence is largely controlled by tides, winds, and by some metric pressures. The major portion of the Labrador Current continues southward along the east coast of Newfoundland and completely floods the northeast part of the Grand Banks. Here it divides; one branch sets southwestward along the Avalon Peninsula; another and usually major branch continues southward down the east side of the Grand Banks this being the portion of the Labrador Current that bears the ice farthest south.

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Historical (1)

1. Jacques Cartier (1534) collected eider duck eggs from Greenly Island (in Straits of Belle Isle).

2. As far back as the seventh century Kutberg, a priest in Saxony, was known as the protector of the eider. In later years the eider was called the duck of St. Kutberg. In the records of Durham Cathedral there are statements that for the picture representing that duck on the iconostasis of the cathedral in Newcastle twelve pence were paid. Those statements are dated as far back as 1417-1418 (Demme, 1946).

1. Bakeless, Katherine and John Bakeless 1957  
2. Gerasimova, T.D. and Z.M. Baranova 1964

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## Management (1)

1. The birds as well as their eggs are protected throughout the year. Only the owner of a breeding place has the right to gather a limited number of eggs for use in his own household.

2. In 1702 a law was passed in Iceland prohibiting hunting of the bird. The violence of the law was punished by imprisonment. In 1784 Olaf Stefenson who was Governor of Iceland published an instruction for the conservation of the species. In 1787 a decree was published providing rewards for a better management of the cultivation of this species. In order to attract the eider the Icelanders built special artificial nests, arranged around them stuffed males put into nests old egg shells.

In the middle of the last century in Norway the protection of this species was arranged.

In 1880 England passed a law to protect wild birds.

In 1891 hunting the eider was prohibited in the United States.

Protective measures carried out in 1947-1953 on West Frisian Islands helped to increase numbers from 16 nests in 1928 to 2000 in 1953 (Ordt, 1954).

Monks of the Solovetski convent protected the species, they even tried to rear young birds (Nekrasov, 1925). On the Ainov Islands monks of Trifon-Pechenga convent carried out a primitive culture of this species. During the nesting period two monks used to live on the islands to protect the birds. From 50 birds in 1887 their numbers increased to 2060 in 1913. In 1909 the convent sold three puds of pure down and obtained 200 rubles for that (Pinegin, 1909).

In order to stop that predatory business since 1931 hunting the species has been prohibited. In 1935 in Kandalaksha Bay of the White Sea a sanctuary was established. It was opened at the Karelo-Finnish branch of the Academy of Sciences of the U.S.S.R. and in 1939 it was reorganized under the name Kandalaksha State Sanctuary. In 1938 on the Murman coast the preserve "Sem" Ostrovov (Seven Island) was organized. In 1952 both preserves were united under the name Kandalaksha Sanctuary.

It was proved that if only protective measures are carried out the numbers of eiders can be increased considerably.

Also during the time when the species does not nest the protection is poor. When the hunting season begins (for the regions of the White Sea and the Murman) hunters kill the eiders in large amounts since they are in masses and easily killed. Molting birds are shot along the Tersk Coast in the area of Chavan'ga-Chapoma.

1. Gudmundsson, Finnur 1932
2. Gerasimova, T.D. and Z.M. Baranova 1960

Mortality (1)

1. The low yield of eider down in 1919 (3238 kg) was explained, in part, by the severe winter of 1918-19 during which thousands of eiders perished. Especially severe winters when the ice-masses are driven against the shore by sea currents and violent gales from the north in the fjords and bays with pack ice. The eider ducks become completely locked in and perish miserably from lack of food. This occurred during the winter of 1917-18. At that time eider ducks could be gathered dead or half-dead in large numbers on the ice.



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## References

- Bent, Arthur Cleveland, 1925. Life histories of North American wild fowl, order anseres (part). U.S. Nat. Mus. Bull. 130, Washington, 1925. 8 Vol. Pp. x, 376, pls. LX.
- Coues, Elliott, 1861. Notes on the ornithology of Labrador. Proc. Acad. Nat. Sci. Phila, Vol. XIII, August, 1861. Pp. 215-257.
- Belopol'skii, L.O., 1957. Ecology of sea colony birds of the Barents Sea. Izdatel'styo Akademii Nauk SSSR, Moskva-Leningrad, 1957. (Published for the National Science Foundation, Washington, D.C. and the Smithsonian Institute by the Israel Program for Scientific Translations).
- Paynter, Raymond A., Jr., 1951. Clutch-size and egg mortality of Kent Island eiders. Ecology 32(3): 497-507.
- Gross, A.O., 1938. Eider ducks of Kent's Island. Auk 55: 387-400.
- Koenig, A., and O. Le Roi, 1911. Avifauna Spitsbergensis. Pp. 294. Bonn.
- Lack, D., 1947. The significance of clutch-size. Ibis, 1947: 302-352.
- Jourdain, F.C.R., 1922. The birds of Spitsbergen and Bear Island. Ibis, 1922: 159-179.
- Lewis, G.F., 1939. Size of sets of eggs of the American eider. J. Wildl. Mgmt. 3: 70-73.
- Reed, A. and J. Guy Cousineau, 1967. Epidemics involving the common eider (Somateria mollissima) at Ile Blanche, Quebec.
- Sutton, G.M. and D.F. Parmelee, 1955. On certain anatids of Frobisher Bay, Baffin Island. J. Arctic Inst. N. Am. 8(3): 139-147.

Phillips, John C., 1926. A natural history of the ducks.  
London. Vol. 4. Pp. lx - 489.

Dutcher, William, 1904. Report of the A.O.U. Committee  
on the protection of North American birds for the  
year 1903. Auk 21: 97-208.

Norton, A.H. and R.P. Allen, 1931. List of eider nesting  
sites. Unpublished report to Nat. Audubon Soc.

Gross, A.O., 1944. The present status of the American  
eider on the Maine coast. Wilson Bull. 56(1): 15-26.

Brownson, W.H., 1908. A visit to Grand Manan Island. J.  
Maine Ornith. Soc. 10: 72-77.

Pettingill, O.S., Jr., 1959. Puffins and eiders in Iceland.  
Maine Field Nat. 15(3): 58-71.

Tinbergen, Niko, 1958. Curious naturalists. Country Life  
Limited. London.

Munro, D.A., 1961. The eider farms of Iceland. Can. Geogr.  
J., August, 1961: 3-7.

Davis, D.H.S., 1932. The animal communities of Akpatok  
Island. In Clutterbuck, H.M. Akpatok Island (Hudson  
Strait): the Oxford University Exploration Club's Ex-  
pedition, 1931. Appendix 2. Geogr. J. 80, September,  
1932: 211-233.

Gross, Alfred A., 1935. To the strange "Buttons". Nat. Hist.  
36, September, 1935: 133-148.

Twomey, Arthur C., 1942. Needle to the North. Houghton  
Mifflin Company, 1942. Pp. viii - 360.

Eifrig, Charles William Gustave, 1905. Ornithological results  
of the Canadian "Neptune" expedition to Hudson Bay and  
Northward, 1903-1904. Auk 22(3): 233-241.

Hantzsch, Bernhard, 1908. Beitrag zur Kenntnis der fur  
Ornithologie 56, 1908, April: 177-202 and July, 308-392  
(Review in Auk 45, 1928: 450-466).

Gross, Alfred O., 1937. Birds of the Boudoin-MacMillan Arctic Expedition, 1934. Auk 54(1): 12-42.

Macoun, John, 1900. Catalogue of Canadian birds. Part 1. Geographical Survey of Canada, Ottawa, 1900, pp. vii - 218.

Todd, W.E. Clyde, 1963. Birds of the Labrador Peninsula and adjacent areas. University of Toronto Press.

Low, Albert P., 1899. Report on an exploration of part of the south shore of Hudson Strait and of Ungava Bay. Geological Survey of Canada, Annual report for 1898 (n.s.), 11, pp. L147.

Bryant, Henry, 1861. Remarks on some of the birds that breed in the Gulf of St. Lawrence. Proc. Boston Soc. Nat. Hist, 8, May, 1861: 65-75. (Reprinted Zoologist 19, 1861: 7742-7753.

Verrill, Addison E., 1862. Catalogue of the birds observed at Anticosti and vicinity. Proc. Boston Soc. Nat. Hist, September 1862: 137-143.

Couper, William, 1881. Rare birds in Canada. Can. Sportsman and Naturalist 1, Sept. 15, 1881: 68.

Stearns, Winfred A., 1884. Stearn's natural history of Labrador. Forest and Stream 22, April 17, 1884: 223-224.

De Puyjalon, H., 1900. Histoire Naturelle a l' usage de Chasseurs Canadiens et des Eleveurs d' animaux a Fourrure. Quebec, 1900. Pp. iv - 428.

Orr, Virginia, 1948. Notes on birds of Sandwich Bay and Vicinity, Newfoundland Labrador. Auk 65(2): 220-225.

Lewis, Harrison F., 1925. Notes on birds of the Labrador Peninsula in 1924. Auk 42(2): 278-281.

Johnson, Robert A., 1935. A new method of banding sea ducks. Bird-Banding 6(1): 32.

Gabrielson, Ira N., 1952. Notes on the birds of the north shore of the Gulf of St. Lawrence. Can. Field Nat. 66, March-April, 1952: 44-59.

Frazar, M. Abbott, 1887. An ornithologist's summer in Labrador. Ornithologist and Oologist 12, January, 1887: 1-3; February, 17-20; March, 33-35.

Palmer, William, 1890. Notes on the birds observed during the cruise of the United States Fish Commission Schooner Grampus in the summer of 1887. Proc. U.S. Nat. Mus. 13, 1890: 249-265.

Lucas, Frederick A., 1891. Explorations in Newfoundland and Labrador in 1887. Made in connection with the cruise of the Fish Commission Schooner Grampus. Rep. U.S. Nat. Mus. for 1888-1889, 1891: 709-728.

Schmitt, Joseph, 1904. Monographie de l'Ile d' Anticosti (Gulfe Saint-Laurent). Paris, 1904. Pp. vi - 367.

Townsend, Charles W., 1910. The courtship of gold-eye and eider ducks. Auk 27(2): 177-181.

Cleaves, Howard H., 1929. In the land of the eider. Nature Magazine 13, February, 1929: 77-83.

Packard, Alpheus Spring, 1891. The Labrador Coast: a journal of two summer cruises to that region. New York, 1891. Pp. 6 - 513.

Stearns, Winfred A., 1894. Bird egging "Down Along". Museum 1, December, 1894: 50-53.

Audubon, Maria R., 1897. Audubon and his journals. New York 1, 1897. Pp. xiv - 532.

Comeau, Napoleon A., 1909. Life and sport on the north shore of the lower St. Lawrence and Gulf. Quebec, 1909. Pp. 440.

Townsend, Charles W., 1910. A Labrador spring. Boston, 1910. Pp. xi - 262. (review in Auk 28, 1911: 129-130)

- Townsend, Charles W., 1917. In Audubon's Labrador. Auk 34(2): 133-146.
- Townsend, Charles W., 1918. In Audubon's Labrador. Boston and New York, 1918. Pp. xii - 316, appendix, 319-337.
- Bailey, Alfred M., 1933. Along Audubon's Labrador Trail. Nat. Hist. 33(6): 638-646.
- Eifrig, Charles William Gustave, 1906. Notes on some northern birds. Auk 23(3): 313-318.
- Flaherty, Robert J., 1918. The Belcher Islands of Hudson Bay: their discovery and exploration. Geogr. Re. 5, June, 1918: 433-458.
- Manning, Thomas H. and D.F. Coates, 1952. Notes on the birds of some James Bay Islands. Nat. Mus. Can. Bull. 126, 1952: 195-197.
- Gerasimova, T.D. and Z.M. Baranova, 1960. Ecology of common eider (*Somateria Mollissima* L.) in the Kandalaksha sanctuary. Proc. Kandalaksha Sanctuary, 1960. Issue III (Translation).
- Peters, Harold S., 1945. Ornithological investigations in Newfoundland 1942-1943-1944-1945. Fish & Wildlife Service, U.S. Dept. of the Interior, Charleston, S.C., 1945. Unpublished - typed.
- Duvall, Allen J. and Charles O. Handley, Jr., 1948. Special report, second wildlife reconnaissance of the Eastern Canadian Arctic. U.S. Fish and Wildlife and Smithsonian Institution, Washington, D.C. Pp. 168. Typed.
- Tuck, Leslie M., 1953. Field notes 1952-53. Unpublished handwritten.
- Lewis, Harrison F., 1922. Notes on some Labrador birds. Auk 39: 507-516.
- Wheeler, Everett Pepperrell, 1930. Journey about Nain. Geogr. Re 20(3): 454-468.

Paludan, Af Knud, 1962. Ederfuglene I de Danske farvande, Danske Vildtundersøgelser Hefte 10. (Eider-ducks (Somateria mollissima) in Danish waters with English summary).

Grenquist, Pekka, 1965. Changes in abundance of some duck and sea-bird populations off the coast of Finland 1949-1963. Riistatieteellisia Julkaisuja.

Mendall, Howard L., 1968. An inventory of Maine's breeding eider ducks. Maine Co-operative Wildlife Research Unit (presented at N.E. Fish and Wild. Conf, Bedford, New Hampshire, January 17, 1968).

Macpherson, Andrew H. and Ian A. McLaren, 1959. Notes on the birds of Southern Foxe Peninsula, Baffin Island, Northwest Territories. Can. Field Nat. 73(2): 63-81.

Townsend, Charles W. and Glover M. Allen, 1907. Birds of Labrador. Proc. Boston Soc. Nat. Hist. 33(7): 277-428.

Lewis, Harrison F., 1926. Producing Eiderdown. Canadian National Parks Branch, Dept. of Interior.

Soper, J. Dewey, 1946. Ornithological results of the Baffin Island expeditions of 1928-1929 and 1930-1931 together with more recent records. Auk 63: 1-24; 223-239; and 418-427.

Manning, T.H. and D.F. Coates, 1952. Notes on the birds of some James Bay Islands. From Bulletin No. 126, Annual Report of the Nat. Mus. for the Fiscal Year 1950-1951.

Wynne-Edwards, V.C., 1952. Zoology of the Baird expedition (1950). I. The birds observed in Central and South-east Baffin Island. Auk 69: 353-391.

Cooch, F.G., 1965. The breeding biology and management of the northern eider (Somateria mollissima borealis) in the Cape Dorset area Northwest Territories. C.W.S. Management Bulletin, Series 2, No. 10.

Choate, Jerry S., 1967. Factors influencing nesting success of eiders in Penobscot Bay, Maine. J. Wildl. Mgmt. 31(4): 769-777.

Stunkard, Horace W., 1967. Studies on the trematode genus Paramonostomum Lüne, 1909. (Digenea: not ocotylidae) Biol. Bull. 132(1): 133-145.

Clark, Gordon M., David O'Meara and Jame W. Van Weelden, 1950. Anepizootic among eider ducks involving an Acanthocephalid worm. J. Wildl. Mgmt. 22(2): 204-205.

Millais, John Guille, 1913. British diving ducks. London, New York.

Hagerup, Andreas Thomsen, 1891. The birds of Greenland. Translated from the Danish by Frimann B. Arnglimson. Edited by Montaque Chamberlain. Boston.

Cottam, Clarence, 1939. Food habits of North American diving ducks. U.S. Dept. of Agriculture. Tech. Bull. No. 643. Pp. 140.

Kulachkova, V.G., 1960. Loss of youngsters of common eider and the causes. Proc. Kandalaksha Game Reserve. Issue 3. Chief editor, N.N. Kartashev.

Kortright, Francis H., 1942. The ducks, geese and swans of North America. The Stackpole Company.

Cooke, Wells, Woodbridge, 1916. Labrador bird notes. Auk 33(2): 162-167.

Kumlien, Ludwig, 1879. Contributions to the natural history of Arctic America. U.S. Nat. Mus. Bull. 15.

Taverner, P.A., 1949. Birds of Canada. The Mission Book Company.

Parmelee, David F. and S.D. MacDonald, 1960. The birds of west-central Ellesmere Island and adjacent areas. Canada Dept. of Northern Affairs and Natural Resources. Nat. Mus. Can. Bull. 169.

Cameron, Austin W., 1967. Birds of the St. Pierre et Miquelon Archipelago. Naturaliste Canadien 94(4): 389-420.

Gross, Alfred O., 1948. The herring gull - cormorant control project 1948. State of Maine, Sea and Shore Fisheries Department, Augusta, Maine. U.S. Dept. of the Interior, Fish and Wildlife Service. Mimeo. 11 pp.

Boyer, George F., 1966. Birds of the Nova Scotia - New Brunswick border region. C.W.S. Occasional Papers, No. 8. Newfoundland Historic Resources Branch, Department of Northern Affairs and National Resources.

Isakov, Yu A., Geography of resources of waterfowl in the U.S.S.R. and measures for their protection and proper exploitation. Institute of Geography, U.S.S.R. Acad. of Sci.

Grenquist, Pekka, 1966. A summary of changes in abundance of Finnish duck and sea-bird populations in four southern archipelago areas 1950-1962 and some causes influencing them. Riistatieteellisia Julkaisuja (Finnish Game Res.) No. 28.

Lampio, Teppo, 1946. Game diseases in Finland. Suomen Riista 1: 141-142.

Grenquist, Pekka, 1948. Ett program for sjofagelviltforskning i skargarden. Suomen Riista 3: 67-97.

Errington, Paul L., 1961. An American visitor's impressions of Scandinavian waterfowl problems. J. Wildl. Mgmt. 25(2): 109-130.

Cooch, F.G., 1954. Eider duck survey, Eastern Arctic. Typed, 19 pp.

Burnett, F.L. and D.E. Snyder, 1954. Blue crab as a starvation food of oiled American eiders. Auk 71: 315-316.

Tuck, L.M., 1960. The murre: their distribution, populations and biology, a study of the genus Uria. C.W.S. Ottawa.

Dennis, J.V., 1959. Oil pollution survey of the U.S. Atlantic coast with special reference to southeast Florida coast conditions. Am. Petrol. Inst. Washington.



Hohn, E. Otto, 1968. The birds of the Chesterfield Inlet, District of Keewatin, N.W.T. Canada. Can. Field. Nat. 82(4), 244-262.

Bakeless, Katherine and John Bakeless, 1957. Explorers of the New World. G. Dell & Sons Ltd. York House, Portugal Street, London WE 2.

Gudmundsson, Finnur, 1932. Observations made on Icelandic eider ducks (*Somateria m. mollissima*) Beitrage zur Fortpflanzungsbiologie der Vogel (Contributions to the Propagation Biology of Birds) May/June, 1932. No. 3/4.

Dement'ev, G.P., N.A. Gladkov, Yu.A. Isakov, N.N. Kartashev, S.V. Kirikov, A.V. Mikheev, and E.S. Ptushenko, 1952. Birds of the Soviet Union (Ptitsy Sovetskogo Soyuza). Vol. IV. G.P. Dement'ev and N.A. Gladkov, editors. Gosudarstvennoe Izdatel'stvo "Sovetskaya Nauka" Moskva 1952.

Pettingill, Jr., Olin Sewall, 1939. A laboratory and field manual of ornithology. Burgess Publishing Company.

Fitter, R.S.R., 1954. The pocket guide to nests and eggs. Collins St. James Place, London.

Godfrey, W. Earl, 1966. The birds of Canada. Queen's Printer, Ottawa.

Thomson, Sir A. Landsborough, 1964. A new dictionary of birds. Thomas Nelson and Sons Ltd.

McAttee, W.L., 1955. Folknames of New England birds. Bull. Massachusetts Audubon Soc. Vol. XXXIX, No. 8. November.

Salomonsen, Finn, 1951. A report on an address given by Dr. Salomonsen on "The Status of Wildfowl in Greenland". Ibis 93 (1951): 330-331.

Verwey, J., 1966. The Waddenzee and its riches. A Plea for the Wadden Sea. Herengracht 540, Amsterdam (Netherlands).

- Iygi, A.I., 1966. Migration of eider in the Baltic Sea. Contribution to the conference on the study, protection and reproduction of the common eider (Saaremaa Island, May, 1966). Acad. of Sci. of the Estonia SSR Institute of Zoology and Botany. Tartu. Pp. 11-15.
- Karpovich, V.N. and V.D. Kokhanov, 1966. Number and seasonal distribution of the common eider in the European North of the RSFSR and the measures necessary for its protection. Contribution to the conference on the study, protection and reproduction of the common eider (Saaremaa Island, May, 1966). Acad. of Sci. of the Estonia SSR Institute of Zoology and Botany. Tartu. Pp. 16-18.
- Karpovich, V.N. and I.B. Tatarikhova, 1966. Population dynamics of the great black-backed and herring gulls on the islands of the Murman and their influence on the effectiveness of the breeding activities of the common eider. Contribution to the conference on the study, protection and reproduction of the common eider (Saaremaa Island, May, 1966). Acad. of Sci. of the Estonia SSR Institute of Zoology and Botany. Tartu. Pp. 18-22.
- Kumari, E.V., 1966. The status of the common eider stocks in the Baltic and North Seas and in the North Atlantic. Contribution to the conference on the study, protection and reproduction of the common eider (Saaremaa Island, May, 1966). Acad. of Sci. of the Estonia SSR Institute of Zoology and Botany. Tartu. Pp. 22-27.
- Onno, S. Kh., 1966. The ecology of the nesting eider in Moonzund (Estonia). Contribution to the conference on the study, protection and reproduction of the common eider (Saaremaa Island, May, 1966). Acad. of Sci. of the Estonia SSR Institute of Zoology and Botany. Tartu. Pp. 27-33.
- Uspenskii, S.M., 1966. The eider in the northern seas of the SSSR (Distribution numbers and the problems of rehabilitation and rational use of resources). Contribution to the conference on the study, protection and reproduction of the common eider (Saaremaa Island, May, 1966). Acad. of Sci. of the Estonia SSR Institute of Zoology and Botany. Tartu.

Kokhanov, V.D. and N.N. Skokova, 1960. Observing the spring migration of 1958 in the Kandalaksha Sea Cliffs. Proc. of the Kandalaksha Sanctuary Issue 3. Chief editor, N.N. Kartashev.

Kurochkin, E.N. and N.N. Skokova, 1960. Migration in the Kandalaksha Sea Cliffs in the autumn of 1958. Proc. of the Kandalaksha Sanctuary Issue 3. Chief editor, N.N. Kartashev.

Ingolfsson, Agnar. Behaviour of gulls robbing eiders. Bird Study 16: 45-52.

Milne, H. Eider biology. British Ornithologists' Union. Ibis 111: 278.

Delacour, Jean, 1959. The waterfowl of the world. Vol. 3. Country Life Ltd. London.

Aumees, L.E., 1966. The common eider on the sea islands comprising the western part of Saaremaa Island. Contribution to the conference on the study, protection and reproduction of the common eider (Saaremaa Island, May, 1966). Acad. of Sci. of the Estonia SSR Institute of Zoology and Botany. Tartu. Pp. 1-4.

Bianki, V.V., 1966. Long-term changes in the number of eider nests in the Kandalaksha Preserve and the reasons for these. (See Aumees, L.E.) Contribution to the conference on the study, protection and reproduction of the common eider (Saaremaa Island, May 1966). Acad. of Sci. of the Estonia SSR Institute of Zoology and Botany. Tartu. Pp. 5-7.

Bianki, V.V. and N.S. Boiko, 1966. The breeding effectiveness of the common eider in the Kandalaksha Gulf. Contributions to the Conference on the study, protection and reproduction of the Common Eider (Saaremaa Island, May 1966). Acad. of Sci. of the Estonia SSR Institute of Zoology and Botany. Tartu. Pp. 7-9.

Boiko, N.S., 1966. Measures of combatting terrestrial and feathered predators - saboteurs of eider broods. Contribution to the conference on the study, protection and reproduction of the common eider (Saaremaa Island, May, 1966). Acad. of Sci. of the Estonia SSR Institute of Zoology and Botany. Tartu. Pp. 9-11.