

= Crested auklet =

The crested auklet (*Aethia cristatella*) is a small seabird of the family Alcidae , distributed throughout the northern Pacific and the Bering Sea . The species feeds by diving in deep waters , eating krill and a variety of small marine animals . It nests in dense colonies of up to 1 million individuals in the Bering Sea and the Sea of Okhotsk . It often breeds in mixed @-@ species colonies with the least auklet , a smaller congener .

The species is known for its sexual ornaments , found in both males and females . These include colorful plumage with a forehead crest , a striking scent recalling citrus fruit , and a loud trumpet call , all of which appear to have evolved through sexual selection . The total population is around 6 million , almost half in North America . It is in general considered to be of least concern , though the Alaskan population faces additional threats from predation and oil spills .

= Taxonomy =

The crested auklet was first identified in 1769 by the German zoologist Peter Simon Pallas , who named it *Aethia cristatella* . The genus *Aethia* includes four auklet species . There are no subspecies of crested auklet . The family Alcidae consists of many species of shorebirds including other auklets (not in the genus *Aethia*) , puffins , razorbills , guillemots , and murre .

= Description =

The crested auklet can measure 18 ? 27 cm (7 @.@ 1 ? 10 @.@ 6 in) in length , 34 ? 50 cm (13 ? 20 in) in wingspan and weigh 195 ? 330 g (6 @.@ 9 ? 11 @.@ 6 oz) . They have a reddish @-@ orange and yellow tipped bill , yellowish white irises , and white auricular plumes from their eyes to their ears . Their bodies , wings , and tails are primarily dark sooty grey , while their legs and feet are grey and claws black . The males and females are very similar , although the females have slightly smaller and less curved bills , additionally slightly smaller crests .

Crested auklets are known for their forehead crests , which is made of black forward @-@ curving feathers . These forehead crests are highly variable , and can have between two and twenty three narrow forward curving feathers . The average auklet has 12 crest feathers , which are of variable length , between 8 @.@ 1 and 58 @.@ 5 millimetres . Auklets have auricular plumes and a bright orange bill with curved accessory plates . Like forehead crests , these features vary widely within auklet populations .

The crested auklet is recognized primarily by two characteristics during the breeding season . The first is its crest , a group of bristle feathers located on top of its head above its eyes . The second is a social odor that the auklets produce during the breeding season , described as smelling like tangerines . This odor originates from tiny wick feathers , located in a small patch of skin between the shoulder blades . In winter plumage , their bills are smaller and dull yellow . They lack accessory plates and their crest and auricular plumes are reduced .

Juveniles are similar to winter adults , but without auricular and crest plumes . Their bills are smaller , and colored a dull brownish yellow . Juveniles take 33 days to reach adult size .

= Habitat and distribution =

Crested auklets are found throughout the northern Pacific Ocean and Bering Sea . They are particularly prevalent during the non @-@ breeding winter months along the Aleutian Islands , Kuril Islands and the Russian island of Sakhalin . They travel to breeding locations on the islands and shorelines of the Sea of Okhotsk and the Bering Sea during the late spring and summer . Their habitats consist of slopes , boulder fields , lava flows , and sea cliffs . They are often found with other auklet species such as the least auklet . On a daily basis , crested auklets circle 500 meters above the sea and the breeding colonies . This circling is triggered by disturbances and predators posing a threat .

= = Behavior and ecology = =

= = = Diet = = =

Crested auklets primarily forage in deep waters , however sometimes in areas closer to the shore , but always in large flocks . Little is known about the winter diets , however , it is suggested that they feed on a variety of marine invertebrates . Crested auklets are planktivores . Their diet consists mainly of krill , but they are also known to eat copepods , pteropods (such as *Limacina*) , amphipods and larval fishes . Crested auklets dive from the surface of the water to catch their food . This behavior has been described as underwater " flight " .

= = = Breeding and parental care = = =

The crested auklet breeding season begins mid @-@ May and ends mid @-@ August . Their nesting sites are within the rocky crevices of North Pacific coast . They breed in dense colonies of up to one million birds . Because of this , nesting sites are in close proximity , with as little as 0 @. @ 3 meters between nests . Even so , there is a high degree of territoriality , and adults show a high degree of site fidelity within a year . Because mating occurs at sea and males have no copulatory organ , males must hover over females for a successful mating . Mate choice is mutual , but females do have final choice on breeding partner .

Crested auklets are highly social during the breeding season , before pair formation , and after pair formation . Within a breeding year , however , crested auklets are monogamous , with only 10 % of the population having extra @-@ pair copulations . Partners continue to self @-@ advertise to other birds when they are not incubating . While some of this advertising behavior can be linked to extra @-@ pair mating , it is suggested that continuation of the behavior allows birds to find pairs for the next breeding season . Only 45 @. @ 5 % of birds remain with the same partner in the subsequent breeding season .

Both sexes invest highly in parental care ; parents share equally in incubating the single egg and raising the chick . Since both sexes are ornamented , crested auklets align with Robert Trivers 's parental investment theory , which predicts that with biparental care , mutual choosiness will arise .

= = = Sexual selection = = =

Crested auklets are unique in their use of optical , vocal , and olfactory signals in mating . Their communicative behavior is more complex and diversified than that of closely related species . There are three general evolutionary mechanisms proposed to address the origin of the elaborate display traits of crested auklets , and of showy mating signals by males in general :

Runaway selection : Fisher ? s theory of runaway sexual selection explains flamboyant traits in males as resulting from a genetic linkage between ornamental traits and a mating preference for such ornaments . Under this model , mating preferences could be spread by arbitrary or even deleterious traits that carry no benefits to fitness , besides sexual selection .

The good genes hypothesis : The second mechanism is the good genes or handicap processes , where mating preference focuses on ornamental traits that reflect the health or viability of the individual expressing them . These good genes convey genetic benefits to the offspring . Amotz Zahavi proposed the handicap hypothesis , where he suggests that individuals ? ornamental traits are indicators of good fitness , because they reflect the individual ? s success in spite of these traits as handicaps .

Sensory exploitation : The third proposed mechanism is sexual selection for sensory exploitation , which results in mating preferences that arise due to natural selection for inherent sensory biases . Mutations occur that result in a display trait which exploits the pre @-@ existing sensory bias .

== Ornamentation ==

=== Visual ornaments ===

Asserted dominance , with regards to claimed display area , has been correlated with crest length in both males and females . The existence of these showy monomorphic traits is indicative of intense sexual selection for both sexes . Large @-@ crested adults of both sexes receive higher levels of sexual interest and displays from the opposite sex compared to those with smaller crests . Crested auklets with larger crests are more likely to obtain mates and to form pair bonds earlier .

Based on divorce rate and mortality , more than half of individuals find a new mate each year . Female crest length is the primary factor of male mate switching between years .

While there is variation in displays across populations , crested auklet crests and plume ornaments are consistent in expression within an individual over time . Furthermore , there is little sexual dimorphism or evidence of condition dependence . From studies , it seems to be a survival @-@ neutral ornament . Some studies , however , offer up a functional purpose for these ornaments . One study suggests a link between habitat complexity and facial feathering , where tactile facial elongation helps individuals navigate complex underground crevices . The high density of crested auklet nesting sites can be expected to impose selective pressures on sensory mechanisms .

=== Vocal ornaments ===

Crested auklets have a wide variety of single and complex calls . Billing is " defined as pair courtship with mutual cackling vocal display . " It is a crucial part of successful pair formation and becomes harmonious once male and female partners are well acquainted . Trumpet calls are one of the most common advertising calls . The call represents a complex but stereotyped vocal sequence that is linked with a specific visual display . Between individuals , the calls differ in duration and frequency . Calls are primarily performed in males , but can also be seen in females . The call is particularly strong in widowed females . These calls stay stable from year to year , and individuals ' specific calls are associated with the maintenance of long @-@ term social bonds between pair mates and between neighbors . This suggests that trumpet calls can be used for both short @-@ term and long @-@ term individual recognition . Recognition of neighboring individuals ' calls is advantageous because it minimizes energy expenditure on aggressive displays , and prevents conflict between neighbors and trusted individuals (the " dear enemy phenomenon ") .

=== Olfactory ornaments ===

Crested auklets have a distinctive citrus @-@ like plumage odor . The scent is released when there is ruffling of feathers on the nape and upper back of the individual from threat , trumpeting , or billing displays . The cloud of scent released encourages the ruff sniff display . A ruff sniff display is when birds fully insert their half open , bill into the others ' plumage . This display occurs in the absence of obvious aggression and is important for pair formation . For both sexes , a strong odor attracts more individuals , which then do a ruff sniff display .

Odor secretions increase during the breeding season , highlighting its association with courtship and mate selection . The scent may also act as an ectoparasite repellent . This scent is also found in whiskered auklet .

== Conservation status ==

According to the International Union for Conservation of Nature , crested auklets are of least concern . The global population is estimated to be six million individuals , while the North American population is estimated at 2 @.@ 9 million birds . However , an accurate assessment of the number of birds is difficult , since those on the surface of the colony and in the nearby sea form only a small

proportion of the variable and poorly understood population .

There is greater concern for the Alaskan population . There has been high predation by rats which have escaped from fishing vessels in the harbor . The auklets ' main predators are gulls , Arctic fox and common ravens . They have also been reported in the stomachs of halibut caught on St. Lawrence Island . Oil spills and collisions with light sources pose additional risks . In Alaska , there is some subsistence hunting of the species .

= = = Books = = =

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= = = Websites = = =

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