

= Alpine chough =

The Alpine chough / ˈtʃʊf / , or yellow @-@ billed chough , ( *Pyrrhocorax graculus* ) is a bird in the crow family , one of only two species in the genus *Pyrrhocorax* . Its two subspecies breed in high mountains from Spain eastwards through southern Europe and North Africa to Central Asia and Nepal , and it may nest at a higher altitude than any other bird . The eggs have adaptations to the thin atmosphere that improve oxygen take @-@ up and reduce water loss .

This bird has glossy black plumage , a yellow beak , red legs , and distinctive calls . It has a buoyant acrobatic flight with widely spread flight feathers . The Alpine chough pairs for life and displays fidelity to its breeding site , which is usually a cave or crevice in a cliff face . It builds a lined stick nest and lays three to five brown @-@ blotched whitish eggs . It feeds , usually in flocks , on short grazed grassland , taking mainly invertebrate prey in summer and fruit in winter ; it will readily approach tourist sites to find supplementary food .

Although it is subject to predation and parasitism , and changes in agricultural practices have caused local population declines , this widespread and abundant species is not threatened globally . Climate change may present a long @-@ term threat , by shifting the necessary Alpine habitat to higher altitudes .

= = Taxonomy = =

The Alpine chough was first described as *Corvus graculus* by Linnaeus in the *Systema Naturae* in 1766 . It was moved to its current genus , *Pyrrhocorax* , by English ornithologist Marmaduke Tunstall in his 1771 *Ornithologia Britannica* , along with the only other member of the genus , the red @-@ billed chough , *P. pyrrhocorax* . The closest relatives of the choughs were formerly thought to be the typical crows , *Corvus* , especially the jackdaws in the subgenus *Coloeus* , but DNA and cytochrome b analysis shows that the genus *Pyrrhocorax* , along with the ratchet @-@ tailed treepie ( genus *Temnurus* ) , diverged early from the rest of the *Corvidae* .

The genus name is derived from Greek ????? ( *purrhos* ) , " flame @-@ coloured " , and ????? ( *korax* ) , " raven " . The species epithet *graculus* is Latin for a jackdaw . The current binomial name of the Alpine chough was formerly sometimes applied to the red @-@ billed chough . The English word " chough " was originally an alternative onomatopoeic name for the jackdaw , *Corvus monedula* , based on its call . The red @-@ billed chough , formerly particularly common in Cornwall and known initially as the " Cornish chough " , eventually became just " chough " , the name transferring from one genus to another .

The Alpine chough has two extant subspecies .

*P. g. graculus* , the nominate subspecies in Europe , north Africa , Turkey , the Caucasus and northern Iran .

*P. g. digitatus* , described by the German naturalists Wilhelm Hemprich and Christian Gottfried Ehrenberg as *P. alpinus* var. *digitatus* in 1833 , is larger and has stronger feet than the nominate race . It breeds in the rest of the depicted Asian range , mainly in the Himalayas .

Moravian palaeontologist Ferdinand Stoliczka separated the Himalayan population as a third subspecies , *P. g. forsythi* , but this has not been widely accepted and is usually treated as synonymous with *digitatus* . A Pleistocene form from Europe was similar to the extant subspecies , and is sometimes categorised as *P. g. vetus* .

The Australian white @-@ winged chough , *Corcorax melanorhamphos* , despite its similar bill shape and black plumage , is only distantly related to the true choughs .

= = Description = =

The adult of the nominate subspecies of the Alpine chough has glossy black plumage , a short yellow bill , dark brown irises , and red legs . It is slightly smaller than red @-@ billed chough , at 37 ? 39 centimetres ( 14 @. 6 ? 15 @. 3 in ) length with a 12 ? 14 cm ( 4 @. 7 ? 5 @. 5 in ) tail and a 75 ? 85 cm ( 30 ? 33 in ) wingspan , but has a proportionally longer tail and shorter wings .

than its relative . It has a similar buoyant and easy flight . The sexes are identical in appearance although the male averages slightly larger than the female . The juvenile is duller than the adult with a dull yellow bill and brownish legs . The Alpine chough is unlikely to be confused with any other species ; although the jackdaw and red @-@ billed chough share its range , the jackdaw is smaller and has unglossed grey plumage , and the red @-@ billed chough has a long red bill .

The subspecies *P. g. digitatus* averages slightly larger than the nominate form , weighing 191 ? 244 grams ( 6 @. @ 8 ? 8 @. @ 7 oz ) against 188 ? 252 g ( 6 @. @ 7 ? 9 @. @ 0 oz ) for *P. g. graculus* , and it has stronger feet . This is in accordance with Bergmann 's rule , which predicts that the largest birds should be found higher elevations or in colder and more arid regions . The extremities of the body , the bill and tarsus , were longer in warmer areas , in line with Allen 's rule . Temperature seemed to be the most important cause of body variation in the Alpine chough .

The flight of the Alpine chough is swift and acrobatic with loose deep wing beats . Its high manoeuvrability is accomplished by fanning the tail , folding its wings , and soaring in the updraughts at cliff faces . Even in flight , it can be distinguished from the red @-@ billed chough by its less rectangular wings , and longer , less square @-@ ended tail .

The rippling preep and whistled sweeeooo calls of the Alpine chough are quite different from the more typically crow @-@ like chee @-@ ow vocalisations of the jackdaw and the red @-@ billed chough . It also has a rolling churr alarm call , and a variety of quiet warbles and squeaks given by resting or feeding birds . In a study of chough calls throughout the Palearctic region it was found that call frequencies in the Alpine chough showed an inverse relationship between body size and frequency , being higher @-@ pitched in smaller @-@ bodied populations .

= = Distribution and habitat = =

The Alpine Chough breeds in mountains from Spain eastwards through southern Europe and the Alps across Central Asia and the Himalayas to western China . There are also populations in Morocco , Corsica and Crete . It is a non @-@ migratory resident throughout its range , although Moroccan birds have established a small colony near Málaga in southern Spain , and wanderers have reached Czechoslovakia , Gibraltar , Hungary and Cyprus .

This is a high @-@ altitude species normally breeding between 1 @, @ 260 ? 2 @, @ 880 metres ( 4 @, @ 130 ? 9 @, @ 450 ft ) in Europe , 2 @, @ 880 ? 3 @, @ 900 m ( 9 @, @ 450 ? 12 @, @ 800 ft ) in Morocco , and 3 @, @ 500 ? 5 @, @ 000 m ( 11 @, @ 500 ? 16 @, @ 400 ft ) in the Himalayas . It has nested at 6 @, @ 500 m ( 21 @, @ 300 ft ) , higher than any other bird species , even surpassing the Red @-@ billed chough which has a diet less well adapted to the highest altitudes . It has been observed following mountaineers ascending Mount Everest at an altitude of 8 @, @ 200 m ( 26 @, @ 900 ft ) . It usually nests in cavities and fissures on inaccessible rock faces , although locally it will use holes between rocks in fields , and forages in open habitats such as alpine meadows and scree slopes to the tree line or lower , and in winter will often congregate around human settlements , ski resorts , hotels and other tourist facilities . Its penchant for waiting by hotel windows for food is popular with tourists , but less so with hotel owners .

= = Behaviour and ecology = =

= = = Breeding = = =

The Alpine chough is socially monogamous , showing high partner fidelity in summer and winter and from year to year . Nesting typically starts in early May , and is non @-@ colonial , although in suitable habitat several pairs may nest in close proximity . The bulky nests are composed of roots , sticks and plant stems lined with grass , fine twiglets or hair , and may be constructed on ledges , in a cave or similar fissure in a cliff face , or in an abandoned building . The clutch is 3 ? 5 glossy whitish eggs , averaging 33 @. @ 9 by 24 @. @ 9 millimetres ( 1 @. @ 33 in x 0 @. @ 98 in ) in size , which are tinged with buff , cream or light @-@ green and marked with small brown blotches ; they

are incubated by the female for 14 ? 21 days before hatching . The chicks hatch with a dense covering of natal down , in contrast to those of the red @-@ billed chough which are almost naked , and fledge in a further 29 ? 31 days from hatching . The young birds are fed by both parents , and may also be fed by other adults when they have fledged and joined the flock . Breeding is possible in the high mountains because chough eggs have relatively fewer pores than those of lowland species , and lose less water by evaporation at low atmospheric pressure . The embryos of bird species that breed at high altitude also have haemoglobin with a genetically determined high affinity for oxygen .

In the western Italian Alps , the Alpine chough nests in a greater variety of sites than red @-@ billed chough , using natural cliffs , pot @-@ holes and abandoned buildings , whereas the red @-@ billed uses only natural cliffs ( although it nests in old buildings elsewhere ) . The Alpine chough lays its eggs about one month later than its relative , although breeding success and reproductive behaviour are similar . The similarities between the two species presumably arose because of the same strong environmental constraints on breeding behaviour .

A study of three different European populations showed a mean clutch size of 3 @.@ 6 eggs , producing 2 @.@ 6 chicks , of which 1 @.@ 9 fledged . Adult survival rate varied from 83 to 92 % , with no significant difference detected between males and females . Survival of first @-@ year birds was , at 77 % , lower than that of adults . The availability or otherwise of human food supplied from tourist activities did not affect breeding success .

= = = Feeding = = =

In the summer , the Alpine chough feeds mainly on invertebrates collected from pasture , such as beetles ( *Selatosomus aeneus* and *Otiorhynchus morio* have been recorded from pellets ) , snails , grasshoppers , caterpillars and fly larvae . The diet in autumn , winter and early spring becomes mainly fruit , including berries such as the European Hackberry ( *Celtis australis* ) and Sea @-@ buckthorn ( *Hippophae rhamnoides* ) , rose hips , and domesticated crops such as apples , grapes and pears where available . It has been observed eating flowers of *Crocus vernus albiflorus* , including the pistils , perhaps as a source of carotenoids . The chough will readily supplement its winter diet with food provided by tourist activities in mountain regions , including ski resorts , refuse dumps and picnic areas . Where additional food is available , winter flocks are larger and contain a high proportion of immature birds . The young birds principally frequent the sites with the greatest food availability , such as refuse dumps . Both chough species will hide food in cracks and fissures , concealing the cache with a few pebbles .

This bird always forages in groups , which are larger in winter than summer , and have constant composition in each season . Where food resources are restricted , adults dominate young birds , and males outrank females . Foraging areas change altitudinally through the year , depending on climatic factors , food availability and food quality . During the breeding season , birds remain above the tree line , although they may use food provided by tourists at refuges and picnic areas .

Movement to lower levels begins after the first snowfalls , and feeding by day is mainly in or near valley bottoms when the snow cover deepens , although the birds return to the mountains to roost . In March and April the choughs frequent villages at valley tops or forage in snow @-@ free patches prior to their return to the high meadows . Feeding trips may cover 20 km ( 12 mi ) distance and 1 @, @ 600 m ( 5 @, @ 200 ft ) in altitude . In the Alps , the development of skiing above 3 @, @ 000 m ( 9 @, @ 800 ft ) has enabled more birds to remain at high levels in winter .

Where their ranges overlap , the two chough species may feed together in the summer , although there is only limited competition for food . An Italian study showed that the vegetable part of the winter diet for the red @-@ billed chough was almost exclusively *Gagea* bulbs dug from the ground , whilst the Alpine chough took berries and hips . In June , red @-@ billed choughs fed mainly on caterpillars whereas Alpine choughs ate crane fly pupae . Later in the summer , the Alpine chough consumed large numbers of grasshoppers , while the red @-@ billed chough added crane fly pupae , fly larvae and beetles to its diet . In the eastern Himalayas in November , Alpine choughs occur mainly in juniper forests where they feed on juniper berries , differing ecologically from the red @-@

billed choughs in the same region and at the same time of year , which feed by digging in the soil of terraced pastures of villages .

= = = Natural threats = = =

Predators of the choughs include the peregrine falcon , golden eagle and Eurasian eagle owl , while the common raven will take nestlings . Alpine choughs have been observed diving at a Tibetan red fox . It seems likely that this " mobbing " behaviour may be play activity to give practice for when genuine defensive measures may be needed to protect eggs or young .

The Alpine chough is a host of the widespread bird flea *Ceratophyllus vagabunda* , two specialist chough fleas *Frontopsylla frontalis* and *F. laetus* , a cestode *Choanotaenia pirinica* , and various species of chewing lice in the genera *Brueelia* , *Menacanthus* and *Philopterus* .

= = Status = =

The Alpine chough has an extensive though sometimes fragmented range , estimated at 1 ? 10 million square kilometres ( 0 @. @ 4 ? 3 @. @ 8 million sq mi ) , and a large population , including an estimated 260 @, @ 000 to 620 @, @ 000 individuals in Europe . The Corsican population has been estimated to comprise about 2 @, @ 500 birds . Over its range as a whole , the species is not believed to approach the thresholds for the global population decline criteria of the IUCN Red List ( i.e. , declining more than 30 % in ten years or three generations ) , and is therefore evaluated as Least Concern .

At the greatest extent of the last glacial period around 18 @, @ 000 years ago , southern Europe was characterised by cold open habitats , and the Alpine chough was found as far as south as southern Italy , well outside its current range . Some of these peripheral prehistoric populations persisted until recently , only to disappear within the last couple of centuries . In the Polish Tatra Mountains , where a population had survived since the glacial period , it was not found as a breeding bird after the 19th century . In Bulgaria , the number of breeding sites fell from 77 between 1950 and 1981 to just 14 in the 1996 to 2006 period , and the number of pairs in the remaining colonies were much smaller . The decline was thought to be due to the loss of former open grasslands which had reverted to scrubby vegetation once extensive cattle grazing ceased . Foraging habitat can also be lost to human activities such as the construction of ski resorts and other tourist development on former alpine meadows . Populations of choughs are stable or increasing in areas where traditional pastoral or other low intensity agriculture persists , but are declining or have become locally extinct where intensive farming methods have been introduced , such as Brittany , England , south @- @ west Portugal and mainland Scotland .

Choughs can be locally threatened by the accumulation of pesticides and heavy metals in the mountain soils , heavy rain , shooting and other human disturbances , but a longer @- @ term threat comes from global warming , which would cause the species ' preferred Alpine climate zone to shift to higher , more restricted areas , or locally to disappear entirely . Fossils of both chough species were found in the mountains of the Canary Islands . The local extinction of the Alpine chough and the reduced range of red @- @ billed chough in the islands may have been due to climate change or human activity .