IDENTIFICATION GUIDE

Great Cormorant Subspecies in the UK

Phalacrocorax carbo carbo vs *Phalacrocorax carbo sinensis*

Great Cormorant (Phalacrocorax carbo) in the classic wing-drying pose at an inland water. Photograph: Ken Billington / Wikimedia Commons (CC BY-SA 3.0).

A comprehensive field guide for fishery managers, anglers, and wildlife recorders. Understanding which subspecies is present at your site strengthens licence applications and contributes to national population monitoring.

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1. Introduction

The Great Cormorant (Phalacrocorax carbo) is one of the most widespread and recognisable waterbirds in the UK. What many fishery managers, anglers, and even experienced birdwatchers do not realise is that two distinct subspecies occur in British waters, and distinguishing between them has significant implications for wildlife management, licence applications, and conservation policy.

The nominate form, ***Phalacrocorax carbo carbo*** (the Atlantic or “British” cormorant), has been part of our native coastal fauna for centuries. The continental form, ***Phalacrocorax carbo sinensis*** (the Continental or Eurasian cormorant), first established inland breeding colonies in England in 1981 and has since expanded dramatically across inland waters.

This guide provides the identification knowledge needed to differentiate between these subspecies in the field, explains why the distinction matters for fishery management and A06 licence applications, and outlines how Hydroscape’s monitoring tools capture subspecies-relevant data automatically.

2. Taxonomic Background

The Great Cormorant was formally described by Carl Linnaeus in 1758. Six subspecies are currently recognised worldwide. In the UK and wider European context, two are relevant:

Feature	P. c. carbo (Atlantic)	P. c. sinensis (Continental)
Common Names	Atlantic Cormorant, British Cormorant, Nominate form	Continental Cormorant, Eurasian Cormorant, Tree-nesting Cormorant
Type Locality	North Atlantic Ocean (restricted by Hartert, 1920)	China (Staunton, 1796)
Core Range	NW European coasts, Faroe Islands, Iceland, Greenland, NE North America	Central and Southern Europe, across Asia to China and Japan
UK Status	Native breeding resident, primarily coastal	Established inland breeder since 1981, expanding
Preferred Habitat	Rocky coasts, sea cliffs, offshore islands	Inland lakes, reservoirs, rivers, gravel pits, tree-nesting colonies
Average Size	Larger: males average ~10% bigger in linear measurements	Smaller: lighter build, sometimes confused with European Shag
Average Weight	Males: 2.6–3.7 kg (heaviest populations)	Males: 2.28 kg average (Germany); females: 1.94 kg average

Hybridisation between the two subspecies is well documented, particularly at mixed inland colonies such as Abberton Reservoir in Essex. Genetic studies have confirmed that gene flow occurs more commonly from sinensis into carbo populations than vice versa.

3. Key Identification Features

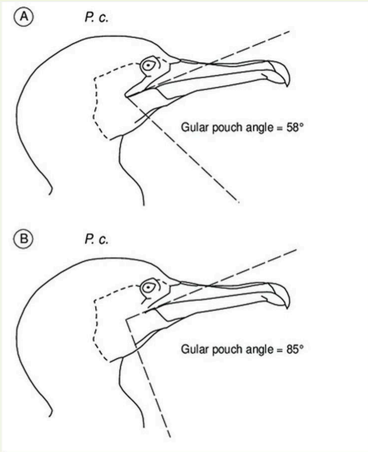
3.1 The Gular Pouch Angle — The Only Reliable Character

Modern ornithological research has established that the shape of the gular pouch (the area of bare yellow-orange skin at the base of the lower mandible) is the single most reliable character for subspecies identification. Older field guides suggesting differences in plumage, head colour, or overall size are now considered unreliable due to extensive overlap and individual variation.

*Close-up head profile of a Great Cormorant showing the gular pouch — the yellow-orange bare skin area at the base of the bill. The angle at which the rear edge of this patch meets the gape line is the key diagnostic feature. On this bird, the rear edge drops near-vertically, suggesting **P. c. sinensis**. Photograph: Pexels (free licence).*

How to measure: The gular pouch angle is measured between the gape line (the line of the mouth across the facial skin below the eye) and the rear edge of the gular pouch. The bird must be viewed in full profile with its bill held approximately horizontally for an accurate assessment.

Measurement	P. c. carbo	P. c. sinensis
Gular Pouch Angle (GPA)	Less than 65° (acute angle)	Greater than 73° (obtuse angle)
Visual Description	Rear edge of bare skin slopes BACK towards bill tip; pointed gular patch	Rear edge drops VERTICALLY from gape; square gular patch
Overlap Zone	66–72° — cannot be reliably assigned to either subspecies	(approx. 10% of birds fall in this range)
Full Range	38° (Greenland) to 72°	66° to 111° (China)



Gular pouch angle comparison. *(A) P. c. carbo* showing an acute angle of 58° — the rear edge of the bare skin slopes back towards the bill tip, creating a pointed gular patch. *(B) P. c. sinensis* showing an obtuse angle of 85° — the rear edge drops near-vertically, creating a square gular patch. **Birds with angles of 66–72° cannot be reliably assigned to either subspecies.**

Diagram: Grøndahl & Johnsen (2024), Ornis Norvegica 47: 25–40. Reproduced under academic fair use for educational purposes.

3.2 Supplementary Characters

When the gular pouch angle falls in the overlap zone (66–72°) or cannot be assessed clearly, supplementary measurements can assist:

Character	P. c. carbo	P. c. sinensis
Bill Depth (minimum)	Generally deeper/heavier	Generally shallower/finer
Bill Length	Longer on average	Shorter on average
Overall Structure	Heavier, more robust build	Lighter, more “dainty”; can appear Shag-like
Facial Skin Impression	More dark on lores; less “beady-eyed”	Often shows “beady-eyed” effect; cleaner face

3.3 Unreliable Characters (Common Misconceptions)

The following features are commonly cited in older literature but are NOT reliable for subspecies identification:

- White head plumes in breeding season — varies with age and individual; extensive overlap between subspecies
- Overall body size — significant overlap; a large female carbo and small male sinensis may be indistinguishable by size alone
- Plumage sheen colour — both can show bronze, green, or purple tones depending on angle and light
- Nesting habitat alone — carbo is increasingly found at inland tree-nesting colonies, particularly older established ones

4. UK Population Context

4.1 Historical Background

Until 1981, the Great Cormorant was almost exclusively a coastal breeder in the UK, with the entire breeding population belonging to the nominate carbo subspecies. The first inland tree-nesting colony was established at Abberton Reservoir, Essex, in 1981, founded by Continental sinensis birds originating primarily from the Netherlands and Denmark.

4.2 The Inland Expansion

The inland breeding population grew rapidly after 1981. By 2005, breeding had been recorded at 80 inland sites with at least 2,096 pairs. By 2012, this had reached 89 sites with approximately 2,362 pairs. New colonies continue to be established, particularly expanding into south-western England.

A Pan-European census of breeding cormorants in 2006 estimated approximately 284,500 breeding pairs across Europe, comprising roughly 52,143 pairs of carbo and 232,311 pairs of sinensis — demonstrating that sinensis outnumbers carbo by approximately 4.5:1 across Europe.

Population Metric	P. c. carbo	P. c. sinensis
European Breeding Pairs (2006)	~52,143	~232,311
UK Coastal Breeding (historical)	~1,154 pairs (1969–70)	Not present
UK Inland Breeding (2012)	Increasing at sinensis colonies	~2,362 pairs at 48 sites
Total European Population	Part of ~1.2 million wintering	Majority of ~1.2 million wintering
Annual Fish Consumption (Europe)	Part of estimated 274,000 tonnes/year	Majority of estimated 274,000 tonnes/year

4.3 Mixed Colonies and Hybridisation

As sinensis colonies became established inland, nominate carbo birds from coastal colonies in Wales and England began joining them. Genetic studies at colonies like Abberton Reservoir have confirmed that both subspecies now live sympatrically (side by side) and hybridise. Offspring of these mixed pairings show intermediate gular pouch angles (66–72°) and cannot be reliably assigned to either subspecies.

Gene flow appears to be asymmetric — more commonly from sinensis into carbo than vice versa. This has implications for the long-term genetic identity of the Atlantic subspecies.

5. Seasonal Patterns and Behaviour

Season	P. c. carbo Behaviour	P. c. sinensis Behaviour
Spring (Mar–May)	Breeds at coastal cliff colonies. Some now join inland sinensis colonies.	Breeds at inland tree-nesting colonies. Colony establishment continues.

Summer (Jun–Aug)	Fledged young disperse along coast. Moult begins late summer.	Fledged young disperse widely. Post-breeding movements to fisheries.
Autumn (Sep–Nov)	Some dispersal from coastal colonies. Winter roosts forming.	Continental birds arrive from Netherlands, Denmark, Baltic. Numbers peak.
Winter (Dec–Feb)	Present at coastal roosts. Some move to estuaries.	Maximum numbers at inland fisheries. Major conflict period. Continental migrants augment resident population.

5.1 Feeding Behaviour Differences

Research on the winter diet of cormorants at inland fishery sites (over 1,400 birds studied) has revealed dietary differences between the subspecies. The largest birds (male carbo) tend to consume fewer but larger fish, while the smallest birds (female sinensis) take more numerous but smaller prey items.

Male carbo are more likely to forage at fisheries where larger prey is available, such as put-and-take trout fisheries. This has implications for the type and scale of predation damage experienced at different fishery types.

Each cormorant consumes an average of 500g of fish daily. When raising chicks, this can rise to 1.1–1.9 kg per day per adult. A chick requires an average of 386g per day in its first 30 days, peaking at 632g per day during fastest growth.

6. Practical Field Identification

6.1 When to Look

The best time to assess gular pouch angle is when birds are loafing at roost sites, standing with heads in profile. Early morning and late afternoon roost gatherings offer the best opportunities. Breeding season (March–June) provides the clearest facial skin coloration.

6.2 What You Need

- Binoculars (8x42 or 10x42 recommended) or spotting scope for distant birds
- Camera with zoom lens — photographs allow post-visit analysis of gular angle
- Patience — birds spend much time preening or sleeping with bills tucked, obscuring the gular patch
- The Hydroscape app — upload photographs for AI-assisted species verification via Hydro-Vision AI™

6.3 The Quick Field Method (No Protractor Required)

You do not need to measure angles precisely in the field. Use this simple visual test:

1. Imagine the bird is holding its bill perfectly horizontal
2. Look at the rear edge of the bare facial skin (the gular patch)
3. Drop an imaginary vertical line from the gape (corner of the mouth)
4. On sinensis, the rear edge drops nearly vertically — giving a square patch. On carbo, the rear edge slopes back towards the bill tip — giving a pointed patch.

Cormorant roost at dusk, North Lanarkshire — 51 birds recorded. Large gatherings like this at inland waters are characteristic of ***P. c. sinensis*** populations. This image was captured through the Hydroscape sighting platform and verified by Hydro-Vision AI™ (AI count: 35).

Cormorants roosting on a fallen tree, Bath & North East Somerset — 30 birds recorded. A typical inland fishery scene. Birds perched in profile like this provide the best opportunity to assess gular pouch angle for subspecies identification. Verified by Hydro-Vision AI™ (AI count: 8).

6.4 Common Pitfalls

- Bill angle effect: sinensis birds often hold their bills pointed upwards, making the gular angle appear more acute than it actually is. Wait for a level-bill profile.
- Distance: At long range, the precise gular patch shape is very difficult to confirm. Photograph for later analysis.
- Hybrids: Approximately 10% of birds in mixed colonies show intermediate characters and cannot be assigned to either subspecies with certainty.
- Juvenile birds: Subspecies identification is more difficult in juveniles. The gular patch is less developed and facial skin colour less distinct.

7. Relevance to A06 Licence Applications

Natural England's assessment of A06 licence applications considers the broader population context of the cormorant population at and around your site. Demonstrating an understanding of subspecies composition strengthens your application in several ways:

5. Population Context: Knowing whether your site's cormorants are predominantly sinensis (inland specialists) or carbo (coastal birds exploiting inland resources) informs the population-level argument. The sinensis population has grown dramatically and is not conservation-limited in the same way as some carbo populations.
6. Seasonal Analysis: Continental sinensis birds migrating from the Netherlands, Denmark, and the Baltic augment the resident UK population each autumn. Documenting this seasonal influx demonstrates that winter predation pressure is partly driven by non-resident birds.
7. Predation Evidence: Research shows dietary differences between the subspecies. Male carbo tend to target larger prey at trout fisheries, while sinensis take higher volumes of smaller fish at coarse fisheries. This distinction can strengthen the "serious damage" argument.
8. The Three Tests: Natural England applies three tests to A06 applications. Subspecies data contributes to the "satisfactory alternative" test and the "population-level impact" test.

8. How Hydroscape Captures Subspecies Data

Hydroscape's ecosystem of monitoring tools captures subspecies-relevant data automatically, building the evidence base your licence application needs:

- Hydro-Vision AI™ analyses uploaded photographs using Gemini 3.1 Pro to verify species, assess count accuracy, and evaluate evidence quality. Subspecies indicators visible in photographs are flagged automatically.
- GPS-precise sighting records with timestamps allow seasonal pattern analysis — distinguishing resident birds from continental migrants.
- The Hydro-Vericount™ spatial clustering algorithm provides defensible Minimum Confirmed Population figures across 5km radius zones.
- The A06 Licence Builder generates branded, structured applications with all required sections pre-populated from your sighting data, deterrent logs, and financial impact records.
- The 3D Biodiversity Explorer visualises your sighting data as extruded columns on a terrain map, revealing spatial and temporal patterns that strengthen the evidence narrative.

9. Quick Reference Card

Cut out or photograph this page for use in the field.

	CARBO (Atlantic)	SINENSIS (Continental)
Gular Pouch Angle	< 65° (pointed, slopes back)	> 73° (square, drops vertically)
Build	Heavy, robust	Lighter, can look Shag-like
Typical Habitat	Coast, cliffs, rocky islands	Inland lakes, rivers, reservoirs
Nesting	Cliff ledges (increasingly also trees)	Trees, usually in colonies
UK Winter Peak	Resident coastal populations	Boosted by continental migrants Oct–Mar
Feeding Preference	Fewer, larger fish	More numerous, smaller fish
Overlap Zone (66–72°)	~10% of birds — hybrids or intermediate. Cannot be reliably assigned.	

10. Key References

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Field sighting images (North Lanarkshire roost, Bath & NE Somerset lineup): Hydroscape-Group Ltd. Captured via the Hydroscape sighting platform, AI-verified by Hydro-Vision AI™. March 2026.

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