

Order PELECANIFORMES

Medium-sized to very large aquatic birds of marine and inland waters. Worldwide distribution. Six families all breeding in our region. Feed mainly on aquatic animals including fish, arthropods and molluscs. Take-off from water aided by hopping or kicking with both feet together, in synchrony with wing-beat. Totipalmate (four toes connected by three webs). Hind toe rather long and turned inwards. Claws of feet curved and strong to aid in clambering up cliffs and trees. Body-down evenly distributed on both pteryxae and apteria. Contour-feathers without after shaft, except slightly developed in Fregatidae. Pair of oil glands rather large and external opening tufted. Upper mandible has complex rhamphotheca of three or four plates. Pair of salt-glands or nasal glands recessed into underside of frontal bone (not upper side as in other saltwater birds) (Schmidt-Nielson 1959; Siegel-Causey 1990). Salt-glands drain via ducts under rhamphotheca at tip of upper mandible. Moist throat-lining used for evaporative cooling aided by rapid gular-flutter of hyoid bones. Tongue rudimentary, but somewhat larger in Phaethontidae. Throat, oesophagus and stomach united in a distensible gullet. Undigested food remains are regurgitated. Only fluids pass pyloric sphincter.

Sexually dimorphic plumage only in Anhingidae and Fregatidae. Selection of nest-site and initiation of pair-formation by male, but in Pelecanidae female first leads several males in a male-selection (or persistence) chase as in ducks. Nest built by female with material brought to nest-site mainly by male. Copulation normally on nest-site. Both sexes take turns guarding nest-site, incubating eggs, and brooding and feeding chicks. Eggs unicoloured with chalky finish except for Phaethontidae. Webbed feet used to warm eggs. Chicks hatch naked (except in Phaethontidae) and blind. Later fully covered with down for several weeks. Newly hatched chicks take fluid food from tip of parental bill. Older chicks take partly digested food from parental gullet, except in Phaethontidae, in which parent inserts bill into gullet of chick. Chicks become independent usually within a few weeks after fledging and at fledging in gannets *Sula* spp. At nesting colonies severe loss of eggs and chicks may result from human disturbance, parents being forced off nests, so that eggs and chicks become cold or overheat or are taken by predators.

Anatomical and behavioural similarities suggest close phylogenetic affinities between Pelecaniformes and Ciconiiformes, which could perhaps be united. Cottam (1957) found skeletal characters that suggest that the Shoe-billed Stork *Balaeniceps rex*, only member of the African family Balaenicipitidae, ought to be in Pelecaniformes rather than Ciconiiformes. Linnaeus (1758) included all pelecaniform birds known to him, except those in *Phaethon*, in the genus *Pelecanus*, from which Brisson (1760) removed the genera *Sula*, *Anhinga*, *Phalacrocorax* and *Fregata*. Subsequently these genera became the bases of six families in the order Pelecaniformes, formerly known as the Steganopodes. Over the last 200 years there has been debate about whether *Phaethon* and even *Fregata* ought to be included, and whether *Anhinga* ought to be in the same family as *Phalacrocorax*. There is ample behavioural (van Tets 1965), osteological and palaeontological (Olson 1985) evidence to demonstrate that there are six distinct extant families in the Pelecaniformes.

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Family PHALACROCORACIDAE cormorants and shags

Medium-sized to large aquatic birds of marine and freshwater habitats. Worldwide, 30–40 species, depending on recognition of forms as full species or subspecies. Many isolated insular forms are sensibly regarded as full species. Here we recognize 19 species occurring in our region; after Peters, placed in a single genus *Phalacrocorax*. However, latest arrangements (Siegel-Causey 1988; G.F. van Tets) are more elaborate and divide the family into two sub-families: Phalacrocoracinae (cormorants) with two genera (*Phalacrocorax* or macrocormorants and *Microcarbo* or microcormorants) and Leucocarbininae (shags) with three genera (*Stictocarbo* or cliff-shags, *Nannopterum* or island-shags and *Leucocarbo* or trek-shags). The genus *Phalacrocorax* has two sub-genera: *Phalacrocorax* (s.s.) of two species, *carbo* occurring in our region, and *Hypoleucos* of five species, *varius* and *sulcirostris* occurring in our region. *Stictocarbo* has seven species, *punctatus* and *featherstoni* forming a superspecies in our region. *Nannopterum* has 15 or more species, 12 of which belong to our region; their distribution and association in superspecies is most easily shown on Fig. 1. *Leucocarbo* has six species but only *fuscescens* occurs in our region. Long broad head with patterns of tuft-like crests, which are the origin of the term 'shag'; rather long serpentine neck; broad elongate body; wings broad at base, less broad in outer part, with 11 primaries (p8 and 9 longest) and 17–23 secondaries, diastataxic; stiff wedge-shaped tail, short in shags and long in cormorants, 12–14 feathers. Bill, sub-conical, strong, medium-long, hooked, laterally compressed, without serration; nostrils closed. Gular skin, bare, varying in extent and colour in different species. Tarsus, thick; long toes with outermost longest, totalpalmate; middle toe, pectinate. Tibia, feathered. Oil-gland, feathered. Plumage, black, often with metallic sheen, or black above and white below. Sexes similar with some seasonal changes, mostly affecting crests and facial colours. Juveniles recognizable by colour-patterns of plumage; attain adult plumage when 1–4 years old.

Stance upright; gait waddling, legs being set far back towards tail; cormorants, but not shags, able to perch in trees, on wire and similar thin perches. Swim well, body low in water and even partly submerged, tail flat on water; on surface use feet alternately but under water use both feet together in unison. Plumage is permeable under water and sheds air so that buoyancy is reduced; out of water, plumage repels the water, traps air and increases thermal insulation. Thus, swimming in cold water limited to less than 30 min, otherwise hypothermia sets in. Some species reduce buoyancy further by swallowing pebbles (van Tets 1968, 1976). Indigestible matter regurgitated as pellet about once a day with repetitive *gock-gock-gock...* sound that attracts gulls *Larus* spp for scavenging. In some species, distinctive posture held with wings spread on either side of body during loafing when out of water; thought to be mainly for drying wings but plumage is thoroughly waterproof and oil gland often used when preening. Some hours each day may be spent flying between colonies or roosts and feeding areas. Flight powerful with alternating periods of wing-beats and gliding as in gannets; adopt V-formation in travelling flight. Where colonies far from feeding areas, females leave to feed in mornings, males in afternoon. Much of day spent loafing and so plenty of time for courtship rituals, which take up a major part of activities all year in some species. Feed mostly on fish, caught by surface-diving or pursuit-swimming; sometimes co-operatively and often in dense flocks. Migratory and dispersive; movements probably usually by day. However, island shags seem to be entirely sedentary.

Pair-bond monogamous, maintained mostly or entirely at nest-site. Male selects site and advertises for mate; once accepted, female builds nest with material brought by male. Copulation takes place on nest. Advertising displays by male specially well developed. Movements by both sexes associated with ritualized take-off, landing and locomotion postures and include Pre- and Post-take-off postures, Kink-throating, Circle-flying, Hopping with Pre- and Post-hop postures, and Penguin-walking, which is particularly noticeable in females in search of mate and in males seeking nesting material. Allopreening and entwining of necks occur, probably to maintain pair-bond. Calls are mostly unspecialized; males generally give a variety of croaks, grunts, and groans, whereas females hiss or are relatively silent; calling usually confined to breeding colonies. Bathing in groups may be spectacular and has been misidentified as display (van Tets 1965). Comfort-behaviour consists of gular fluttering to dissipate heat; direct head-scratching; true yawning and jaw-stretching.

Typically breed colonially. Defend small nest-territory. Nests often densely packed and associated with other species such as herons, ibises and spoonbills. Season extended but least so in temperate latitudes. Nests on ground, on cliffs and in trees; used from year to year; built of any available plant material, seaweed and debris to form substantial heap but sometimes nothing more than a scrape in the ground. Tend to continue building during incubation and nestling periods. Eggs, elongate oval, pale blue or green with white chalky coating. Clutch-size, usually 2–4 (1–7 extremes); single-brooded but replacements laid after loss. Incubation by both sexes in approximately equal shares; change-overs at least once or twice a day. Incubation starts with first egg; eggs incubated on feet. Incubation period, 27–31 days. Eggshells removed from nest. Hatching asynchronous. Young

altricial, nidicolous; hatched naked but develop a single coat of dense white, brown or black down. Cared for by both parents; brooded continuously while small; fed by incomplete regurgitation; in cormorants, but not in shags, adults may bring water to young in hot weather. Nestling period, c. 70 days at most but usually 48–53 days. Young attended and fed by both parents for 2–3 months or more after fledging.

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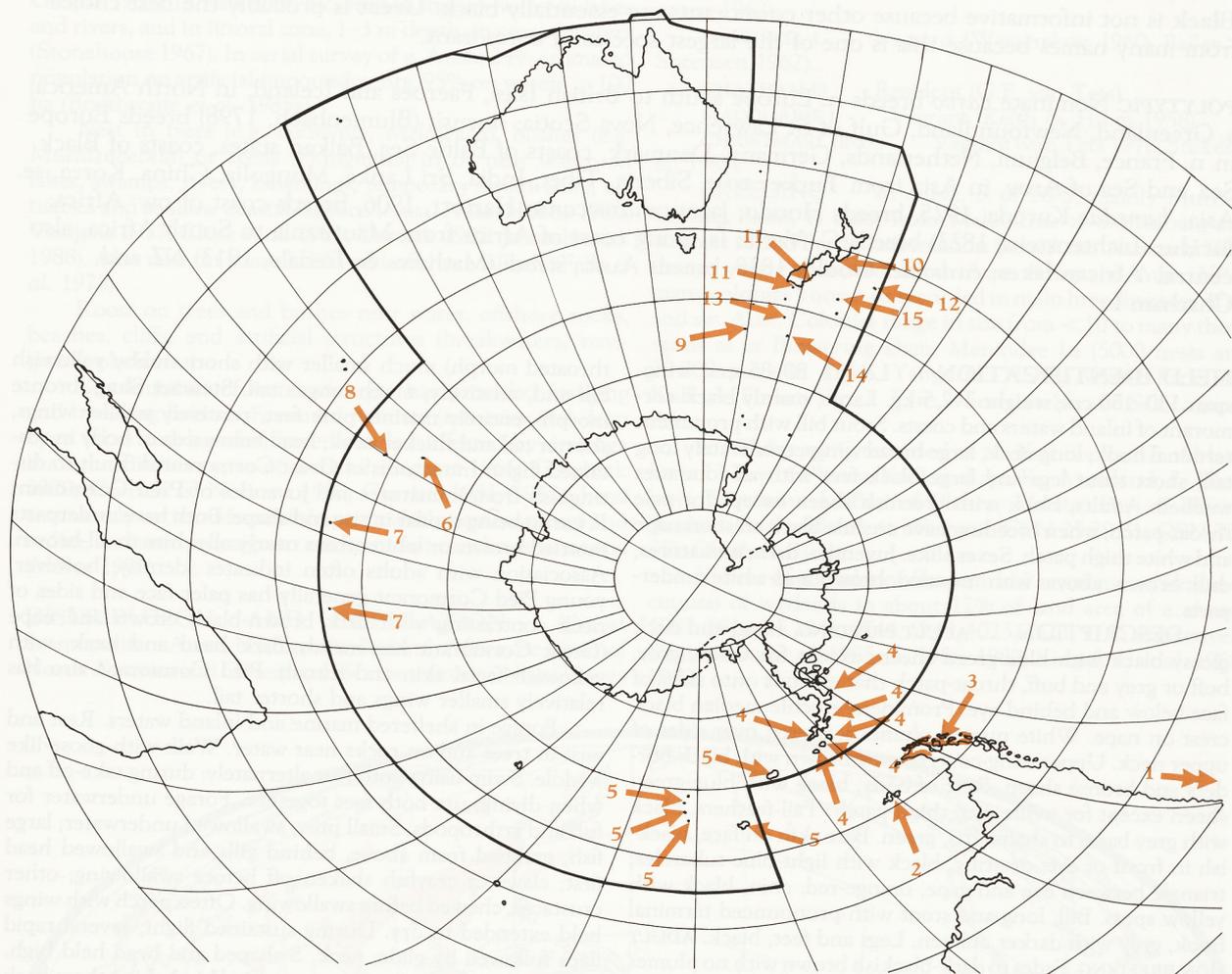


Fig. 1. Distribution of island forms of *Phalacrocorax*.

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|----|-------------------------------|----|------------------|
| 1 | <i>harrisi</i> (Galapagos Is) | 12 | <i>onslowi</i> |
| 2 | <i>albiventer</i> | 13 | <i>colensoi</i> |
| 3 | <i>atriceps</i> | 14 | <i>campbelli</i> |
| 4 | <i>bransfieldensis</i> | 15 | <i>ranfurlyi</i> |
| 5 | <i>georgianus</i> | | |
| 6 | <i>nivalis</i> | | |
| 7 | <i>melanogenis</i> | | |
| 8 | <i>verrucosus</i> | | |
| 9 | <i>purpurascens</i> | | |
| 10 | <i>carunculatus</i> | | |
| 11 | <i>chalconotus</i> | | |

Phalacrocorax featherstoni Buller, 1873, *Ibis* (3) 3: 90 — Chatham Islands.

Named specifically in honour of Dr I.E. Featherston (1813–76), Superintendent of the Province of Wellington and Agent-General in Great Britain for New Zealand.

MONOTYPIC

FIELD IDENTIFICATION Length c. 63 cm; weight c. 1 kg. Small slender marine shag with long sinuous neck, slim body, long slender wings and short stubby tail, appearing like a darker and slightly stockier Spotted Shag *P. punctatus*. Bill, slender and long with small terminal hook. Found only on and round Chatham Is where unlikely to be confused with other species. Sexes alike; differences in seasonal plumage. Juveniles separable.

DESCRIPTION **ADULT BREEDING.** Head, hindneck and upper foreneck, blue-black. Prominent long black crests on forehead and nape curl forward. Long white filoplumes dense on hindneck, scattered elsewhere on head and neck. Mantle, scapulars and upper wing-coverts, dark olive-brown, glossed with green; each feather has black terminal spot. Back, rump, flanks and upper tail-coverts, glossy blue-black. Tail, black with pale-grey bases to shafts. Lower foreneck, breast and upper abdomen, smooth medium-grey. Lower abdomen, under tail-coverts and underwing, blue black. Bill, long and very slender, blackish with light-brown tip and cream-coloured bar at base of lower mandible. Facial skin in front of, round and below eye, bright grass-green; gular pouch, black with lines of blue-green warts; mouth-lining, blackish brown. Iris, dark red-brown. Legs and feet, orange. **ADULT NON-BREEDING.** Crests small and plumes absent; gular pouch, grass green. **JUVENILE, IMMATURE.** Overall, dark blackish-brown with greenish tinge on head, neck and upperparts; breast and upper abdomen, paler brown. Bill, grey-brown with dark culmen. Facial skin, legs and feet, yellow, becoming more orange with age. Iris, greyish brown.

SIMILAR SPECIES Pitt Shag distinguished by small size, slender build and greyish plumage from **Great Cormorant** *P. carbo* and **Chatham Shag** *P. onslowi*, also recorded from Chatham Is. Differ from **Spotted Shag** in generally darker plumage and especially in absence of white stripe down side of head and neck in breeding plumage. Juveniles resemble immature **Little Black Cormorants** *P. sulcirostris* in small size,

slender bill and blackish brown plumage, but look for yellow-brown feet (black in Little Black Cormorant) and shorter tail of Pitt Shag.

Mainly forage far out to sea, especially over reefs and foul ground but also inshore. Rest and nest on narrow ledges of steep cliffs. Walk with fairly rapid high-stepping gait, the upright body leaning slightly forward. Swim using feet alternately; during take-off and when diving uses both feet in unison. Forage underwater for fish and a few invertebrates. Flight rapid; head and neck stretched forward. Fly, feed, rest and nest in small groups. At nest-site, male uses a number of calls including grunts, gargles and ticks; females silent.

HABITAT Marine; restricted to Chatham Is and surrounding waters. Feed far out at sea or close inshore in bays and inlets (G.F. van Tets); dive in kelp beds in coastal waters (Fleming 1939). Nest on rocky shores and headlands and ledges and alcoves in vertical cliff-faces; breeding distribution determined by availability of suitable sites (Fleming 1939).

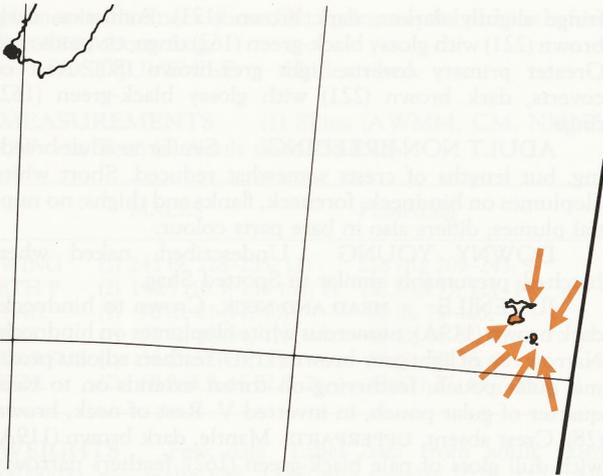
DISTRIBUTION AND POPULATION NZ endemic. Found only in Chatham Is Grp. Said to forage far out to sea but distances not specified. Breed Chatham, Pitt, Mangere, Little Mangere and South East Is, Star Keys, Pyramid Rock and Rabbit I. (Fleming 1939; CSN 28–30).

Total population estimated at less than 1000 (Robertson & Bell 1984). Small population of concern but no direct threats to survival.

MOVEMENTS Sedentary, no records away from Chatham Is.

FOOD No information.

SOCIAL ORGANIZATION Virtually unknown. Groups of adults and juveniles forage inshore (Fleming 1939);



structure of groups not known.

BONDS No information.

BREEDING DISPERSION Colonial; on cliffs and rock ledges. Territorial, defending nest-site only though males may leave nest-site to chase conspecifics (G.F. van Tets).

ROOSTING No information. Nests deserted after breeding (Fleming 1939).

SOCIAL BEHAVIOUR

Limited observations (before laying) by G.F. van Tets at Matarakau Pt. Displays obvious; similar to those of Spotted Shag. Tail raised above horizontal near nest-site.

AGONISTIC BEHAVIOUR As for Spotted Shag. Male sometimes leaves nest-site to chase away intruding conspecifics.

SEXUAL BEHAVIOUR **ADVERTISING.** Males advertise with Wing-waving, Swing-pointing and Bowing displays, all of which differ only slightly from those of Spotted Shag. All performed silently. During **Wing-waving** (Fig. 1),

head held so that closed bill pointed upwards, on back or beside shoulder away from cliff face; wings waved upwards and outwards about 4 times/s. During **Swing-pointing** (Figs 2a,b), head swung back and forth in an upward-directed arc of less than 90° and not to base of tail, nor as far forward as ground in front of bird. During **Bowing** (Fig. 3) head brought forwards; ends with part-open bill touching ground in vertical- or forward-sloping position. **RECOGNITION.** Similar to Spotted Shag but Gaping not seen; this might occur later in breeding sequence; displays consist of **Darting** (Fig. 4 a,b), **Pointing** and **Sky-upright** (Fig. 5), all performed silently. Sky-upright differs from that of Spotted Shag in that it is performed with axis of body varying from horizontal to partly upright. **OTHER DISPLAYS AT SITE.** At departure, **Pre-take-off Posture** like Spotted Shag but feathers of upper hindneck raised and throat bulged more, displaying lines of iridescent blue-green warts with yellow-green margins on black background; throat and base of neck pulsate. Males sometimes make soft ticking sound, females silent. On arrival at site, **Kink-throating** as in Spotted Shag with head flattened laterally and bill wide open. **Post-landing Posture** similar to Spotted Shag, but feathers of upper hind-neck raised and closed bill raised above horizontal. Males make monosyllabic call; females silent. **Hop** resembles that of cormorants; differs from Spotted Shags and other shag species in that **Pre-hop Posture** the same as Pre-flight Posture; during Hop, males call softly; females silent.

VOICE

Little known; no studies. Limited observations (made before laying) by G.F. van Tets at Matarakau Pt, Sept. 1974. No reports of calls at sea; occasional loud calls given at breeding colonies and roost sites. Males have a range of grunting, gargling and ticking sounds; females silent. No information on individual differences or geographical variation. No non-vocal sounds reported.

ADULT MALE Threat Call: loud, gargling calls rendered *ooo-argh*, *eh-argh-argh* or repeated *argh-argh-argh* . . . **Pre-take-off/Pre-hop Call:** soft repeated ticking *t-t-t* . . . ; during **Hop** ticking call has slurred end, *t-t-t* . . . **Kink-**

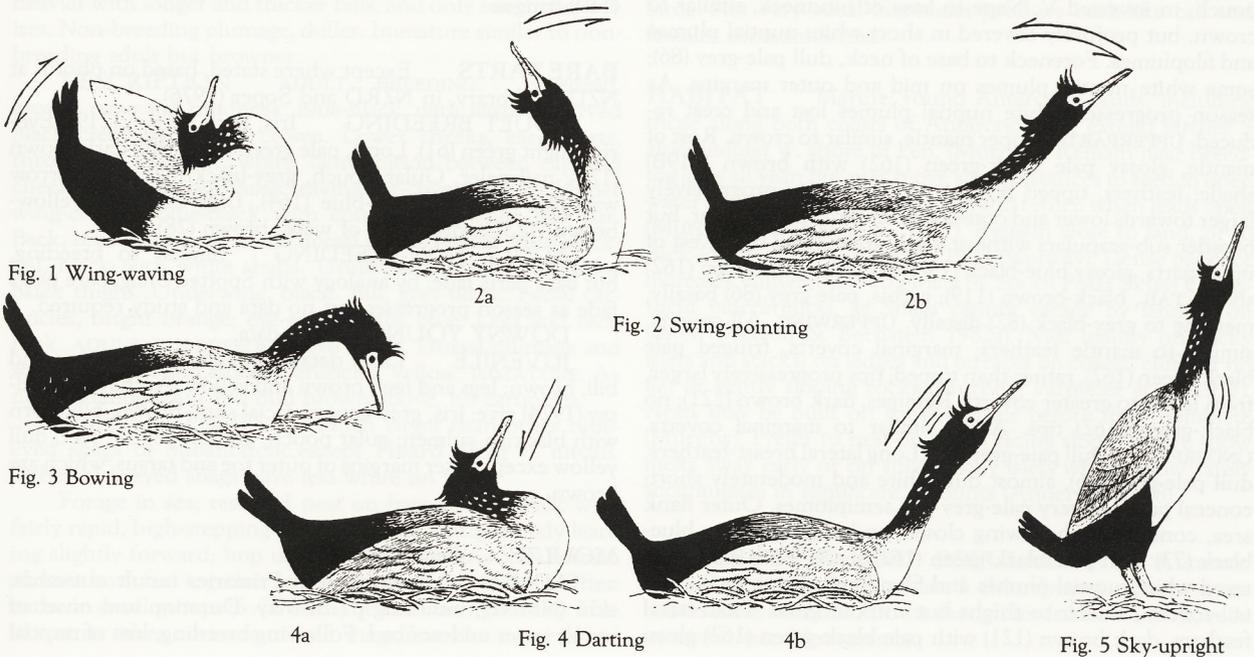


Fig. 1 Wing-waving

2a

2b

Fig. 2 Swing-pointing

Fig. 3 Bowing

4a

Fig. 4 Darting

4b

Fig. 5 Sky-upright

throating Call: loud repeated *ergh-ergh-ergh* . . . or *ergh-oh-ergh-oh-ergh-oh* . . . ; similar to call of Spotted Shag. **Post-landing Call:** single *oh* sound.

YOUNG No information.

BREEDING Not known except cursorily from remarks by Fleming (1939) and observations of G.F. van Tets, presumably because nests are generally inaccessible. Information supplied by G.F. van Tets. Nests colonially on cliffs and headlands of Chatham Is Grp.

SEASON Said to be Aug.-Dec.; laying starts in Aug. and all chicks fledged by Dec. (Fleming 1939); chick hatching 27 Dec. (CSN 30). Juveniles still being fed by adults, late Jan. (CSN 29).

SITE On ledges, in niches and crevices of steep sea-cliffs.

NEST, MATERIALS Small, well-built. Made of ice-plant *Disphyma australe*, grass and other plants. Old nests refurbished. Male selects site; female builds with material brought by male; building continues during incubation and nestling periods.

EGGS Elliptical ovoid; mat, rough texture; pale blue with white chalky coating.

MEASUREMENTS: 58.1 (2.57; 55.2-61.4; 8) x 34.8 (1.51; 32.5-36.8; A.J.D. Tennyson); 58 (56-61; 10) x 35 (33-38; Schönwetter 1967).

CLUTCH-SIZE Modal size probably three (G.F. van Tets).

No further information on laying, incubation, nestling period, growth of young and so on but probably similar in these matters to Spotted Shag.

PLUMAGES

ADULT BREEDING Age of first breeding unknown. **HEAD AND NECK.** Crown, sides of head, throat and foreneck, glossy blue-black (90) with slight black-green (162) shade. Crest, 22-34 mm long, on forehead; another crest, 28-48 mm in length, on hindcrown. Bare gular pouch on chin; feathering on throat extends on to basal quarter of gular pouch, in inverted V. Nape to base of hindneck, similar to crown, but profusely covered in short white nuptial plumes and filoplumes. Foreneck to base of neck, dull pale-grey (86); some white nuptial plumes on mid and outer margins. As season progresses, white nuptial plumes lost and crest reduced. **UPPERPARTS.** Upper mantle, similar to crown. Rest of mantle, glossy pale black-green (162) with brown (119B) shade; feathers, tipped black-green (162); tips progressively larger towards lower and outer margins. Scapulars similar, but broader sub-scapulars without black-green (162) tips. Rest of upperparts, glossy blue-black (73) with pale black-green (162) shade. **TAIL,** black-brown (119); rachis, pale grey (86) basally, merging to grey-black (82) distally. **UPPERWING.** All coverts, similar to mantle feathers; marginal coverts, fringed pale black-green (162), rather than tipped; tips progressively larger, from lesser to greater coverts. Remiges, dark brown (221); no black-green (162) tips. Alula, similar to marginal coverts. **UNDERPARTS.** Dull pale-grey (86). Long lateral breast-feathers, dull pale-grey (86), almost dull white and moderately short; conceal patch of very pale-grey (86) semiplumes. Outer flank area, concealed when wing closed, and thighs, glossy blue-black (73) with pale black-green (162) shade; both with scattered white nuptial plumes and filoplumes. Vent and under tail-coverts, similar to thighs but without gloss. Tibio-tarsal feathers, dark brown (121) with pale black-green (162) gloss;

fringe slightly darker, dark brown (121). Axillaries, dark brown (221) with glossy black-green (162) tinge. **UNDERWING.** Greater primary coverts, light grey-brown (80). Rest of coverts, dark brown (221) with glossy black-green (162) tinge.

ADULT NON-BREEDING Similar to adult breeding, but lengths of crests somewhat reduced. Short white filoplumes on hindneck, foreneck, flanks and thighs; no nuptial plumes; differs also in bare parts colour.

DOWNY YOUNG Undescribed; naked when hatched; presumably similar to Spotted Shag.

JUVENILE HEAD AND NECK. Crown to hindneck, dark brown (119A); numerous white filoplumes on hindneck. Narrow rim of light grey-brown (119D) feathers adjoins proximal gular pouch; feathering on throat extends on to basal quarter of gular pouch, in inverted V. Rest of neck, brown (28). Crest absent. **UPPERPARTS.** Mantle, dark brown (119A) with dull gloss of pale black-green (162); feathers narrowly tipped black brown (119); in some lights, tips appear black-green (162); tips progressively larger towards lower and outer margins. Scapulars similar; broader sub-scapulars lack black-brown (119) tips. Rest of upperparts, similar to adult, but mixed with dark brown (121). **TAIL,** black-brown (119); calamus, pale grey (86), merging to grey-black (82) distally. **UPPERWING.** All coverts, similar to mantle feathers; marginal coverts fringed pale black-green (162), rather than tipped; tips progressively larger from lesser towards greater coverts. Remiges, dark brown (221); black-green (162) tips entirely absent. Alula, similar to marginal coverts. **UNDERPARTS,** dull dark-brown (119A). Lateral breast-feathers not conspicuous, short, and similar to outer mantle feathers; concealed beneath these, patch of very pale-grey (86) semiplumes. Outer flanks, concealed when wing closed, dark brown (119A). Thighs and under tail-coverts, a mixture of dark brown (121) and dull glossy blue-black (73). Tibio-tarsal feathers, dark brown (121), slightly tipped black-brown (119). Axillaries, dark brown (221). **UNDERWING.** Greater primary coverts and greater coverts, light glossy grey-brown (80). Rest of coverts, dark brown (119A) with narrow open pennaceous black-brown (119) fringes.

BARE PARTS Except where stated, based on photos at NZDOC library, in NZRD and Soper (1976).

ADULT BREEDING Iris, dark brown (219). Eye-ring, light green (61). Loes, pale green (161). Bill, dark brown (121); nail paler. Gular pouch, grey-black (82) with narrow wart-like lines of green-blue (164). Legs and feet, yellow-brown (123C); distal tips of webs, brown (28).

ADULT NON-BREEDING Similar to breeding, but bare parts fade; by analogy with Spotted Shag, bare parts fade as season progresses but no data and study required.

DOWNY YOUNG No data.

JUVENILE Label details on skin (NMNZ): Iris and bill, brown; legs and feet, brown and yellow. Archey & Lindsay (1924) give: iris, grey-brown; facial skin, brown; bill, horn with blackish culmen; gular pouch, greyish yellow; feet, dull yellow except outer margins of outer toe and tarsus, which are brown.

MOULTS Few data.

ADULT Staffelmäuser. Primaries moult outwards; skin (NMNZ), moulting p7 in May. Duration and onset of moult series undescribed. Following breeding, loss of nuptial

plumes on hindneck about Oct.; gains nuptial plumes before breeding, about Aug.

POST-JUVENILE Undescribed.

MEASUREMENTS (1) Skins (AWMM, CM, NMNZ; G.F. van Tets) (2) Adult skins (NMNZ).

	MALES	FEMALES
WING	(1) 243 (9; 228-255; 12)	228 (10; 209-243; 9)
8TH P	(2) 146.5 (10.5; 136 157; 2)	132.6 (8.33; 121-140; 3)
TAIL	(1) 90 (6; 81-97; 13)	90 (8; 75-103; 9)
BILL	(1) 52 (2; 48-54; 12)	49 (2; 44-51; 9)
TARSUS	(1) 56 (2; 52-61; 13)	55 (2; 52-58; 9)
TOE	(2) 68.9 (3.9; 65 72.8; 2)	63.5 (1.27; 61.7-64.5; 3)

WEIGHTS Few data. Label data from adult skins (NMNZ): two males 645, 1325; two females 1078, 1127. No data on seasonal changes of weight.

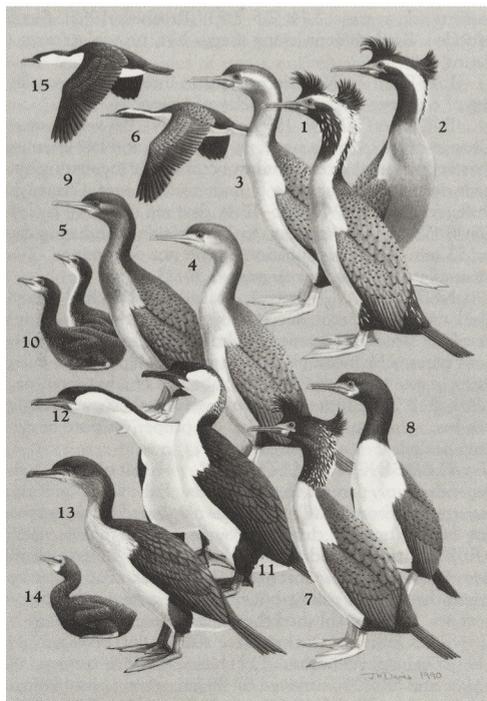
STRUCTURE Wing, broad. Eleven primaries: p8 usually longest, p10 7-13 mm shorter, p9 0-2, p7 2-8, p6 19-26, p5 25-35, p4 39-45, p3 47-56, p2 55-63, p1 64-75, p11 minute. P10 emarginated on inner web; p9 and p8 slight on outer and inner webs. Sixteen secondaries, six of tertial form. Tail, wedge-shaped; 12 rectrices; stiff at base; t1 longest, t6 33-47 mm shorter. Bill, long and slender, nail with small hook at tip. At gape, horny bill flange. Tarsus, short. Feet, totipalmate. Claw of middle toe, serrated. Outer toe, longest c. 142% of middle, inner c. 71%, hind c. 43%.

GEOGRAPHICAL VARIATION Has been regarded as subspecies of Spotted Shag (Peters).

RMO

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Spotted Shag *Phalacrocorax punctatus*

- 1. Adult breeding, courtship
- 2. Adult breeding, subspecies *oliveri*
- 3. Immature
- 4. Juvenile
- 5. Downy young
- 6. Adult

Pitt Shag *Phalacrocorax featherstoni*

- 7. Adult breeding
- 8. Adult non-breeding
- 9. Juvenile
- 10. Downy young

Black-faced Shag *Phalacrocorax fuscescens*

- 11. Adult breeding
- 12. Adult non-breeding
- 13. Juvenile
- 14. Downy young
- 15. Adult

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