# Order GRUIFORMES

Diverse assemblage of small to very large wading and terrestrial birds. Morphologically diverse, with few unifying characters within the Order. Anatomical details are summarized by Sibley & Ahlquist (1990). Possibly polyphyletic, though DNA comparisons indicate that the Order is monophyletic, composed of highly divergent groups that are more closely related to one another than to members of any other order (Sibley & Ahlquist 1990). The boundaries of the Order and relationships with other Orders and between families in this Order are uncertain (Sibley 1960; Sibley & Ahlquist 1972, 1990; Cracraft 1973; G.F. van Tets).

Peters, Wetmore (1960) and Storer (1971) recognized 12 families: Eurypygidae (monotypic Sun-bittern of tropical America); Otididae (bustards); Gruidae (cranes); Heliornithidae (finfoots of tropical Old and New World; three monotypic species); Aramidae (monotypic Limpkin of tropical and subtropical America); Psophiidae (trumpeters of tropical America; three species in single genus); Cariamidae (seriemas of central S. America; two monotypic genera); Rhynochetidae (monotypic Kagu of New Caledonia); Rallidae (crakes and rails); Mesitornithidae (mesites of Madagascar; three species in two genera); Pedionomidae (monotypic Plains-wanderer of Aust.); and Turnicidae (button-quails).

The Plains-wanderer is now recognized as being a charadriiform on evidence of morphology (Olson & Steadman 1981) and DNA–DNA hybridization (Sibley *et al.* 1988). Sibley *et al.* (1988) and Sibley & Ahlquist (1990) placed the Turnicidae in a separate Order, the Turniciformes *incertae sedis* (which we follow here; q.v.) and included Aramidae within the Heliornithidae but otherwise retained a similar arrangement of families. The Mesitornithidae, Rhynocetidae and Otididae have also been regarded as separate Orders.

Only Gruidae, Rallidae and Otididae occur in our region; other families are not considered further here.

## REFERENCES

Cracraft, J. 1973. *Bull. Am. Mus. nat. Hist.* 151.
Farner, D.S., *et al.* (Eds) 1971. *Avian Biology. 1.* Academic Press, New York.
Olson, S.L., & D.W. Steadman. 1981. *Smithson. Contrib. Zool.* 337: 1–25.
Sibley, C.G. 1960. *Ibis* 102: 215–29.
—, & J.E. Ahlquist. 1972. *Bull. Peabody Mus. nat. Hist.* 39: 1–276.
—, — 1990. *Phylogeny and Classification of Birds.* Yale Univ. Press, New Haven.
—, *et al.* 1988. *Auk* 105: 409–23.
Storer, R.W. 1971. Pp 1–18 **In:** Farner *et al.* 1971.
Wetmore, A. 1960. *Smithson. misc. Coll.* 139.

# Family **RALLIDAE rails, crakes and gallinules**

A group of small to medium-sized (12–65 cm long), generally slender, terrestrial birds, usually of wetlands, often very secretive and skulking. Almost cosmopolitan, not occurring in polar regions and waterless deserts. In our region, 17 breeding species in 11 genera, five accidentals (one doubtful) and three extinct. Relation to other Gruiformes not fully resolved; skeletal morphology suggests close alliance to Psophiidae (trumpeters) and Heliornithidae (sungrebes) (Cracraft 1973); Aramidae, Eurypygidae and Cariamidae of S. America, and Rhynochetidae of New Caledonia and the extinct Aptornithidae of NZ also closely related; some or all of these families could be included as sub-families in Rallidae (G.F. van Tets). DNA–DNA hybridization evidence shows Rallidae form a distinct cluster separate from cranes and their allies (Sibley & Ahlquist 1990). Olson (1973b) recognized two sub-families: the monotypic Himantornithinae and the Rallinae, with Himantornithinae intermediate between Rallinae and Psophiidae. The Jacanidae (Charadriiformes; q.v.) may be derived as aquatic specialists from *Gallinula*-like stock and more appropriately placed within the Rallidae (G.F. van Tets).

Arrangements within the Rallidae have varied: Peters recognized 52 genera; Thomson (1964), 45; Olson (1973b), 35; Ripley (1977) 17; BWP, 32–39; Campbell & Lack (1985), 18; and Sibley & Ahlquist (1990) 34 (142 species). Rallidae vary anatomically in relation to diet and habitat. Olson (1973b) suggested they evolved from terrestrial to aquatic but admits evolution may have occurred several times. For practical purposes, broad division often made into (1) rails, crakes and wood-rails, most of which are terrestrial (in HANZAB region: *Rallina*, *Gallirallus*, *Dryolimnas*, *Porzana*, *Eulabeornis*, *Crex*); and (2) coots and gallinules (including swamphens, native-hens and waterhens), which tend to be more aquatic (in HANZAB region: *Amaurornis*, *Gallinula*, *Porphyrio*, *Fulica*, *Gallicrex*). The affinities of the genera and, in brackets, the number of volant and flightless species recorded in HANZAB region given below. *Rallina* (2, 0): one species occurring Aust. and New Guinea and another vagrant to Aust.; close relatives are *Canirallus* and *Sarothrura* of Africa, *Mentocrex* of Madagascar and *Rallicula* of New Guinea (Olson 1973b). *Gallirallus* (1, 4): widespread in Indo-Pacific region; one or more species of volant *Gallirallus* are thought to be ancestral to several insular species in the sw. Pacific, including *lafresnayanus* of New Caledonia and *sylvestris* of Lord Howe I. (Olson 1973b; Fullagar & Disney 1981; Schodde & de Naurois 1982; Diamond 1991). *Dryolimnas* (1, 0): one species (*pectoralis*) occurring Aust. and Auckland Is; closely related to *Gallirallus* and *Rallus*; *pectoralis* often placed in *Rallus*. *Amaurornis* (1, 0): one species occurring Aust., New Guinea, Philippines and Moluccas. *Porzana* (5, 0): worldwide, with four species native to our region and one vagrant; we follow Mees (1982) by including *Poliolimnas* in *Porzana*; Olson (1973b) thought *Porzana* may have evolved from *Amaurornis*. *Eulabeornis* (1, 0) endemic to n. Aust. and Aru Is, and according to Olson (1973b), an allopatric close relative of *Habroptila* (1, 1) of Wallacea and New Guinea. *Crex* (1, 0) breeds in Eurasia and migrates S, mainly to Africa; vagrant to Aust. and, doubtfully, to NZ. *Gallicrex* (1, 0): vagrant from se. Asia to Christmas I. (Ind.); may also have derived from *Amaurornis*. *Gallinula* (2, 1) worldwide distribution, with three species in our area; also an *Amaurornis* derivative; sub-genus *Tribonyx* is endemic to Aust. with a fossil record going back to Pliocene (Olson 1975); differ from *Gallinula* in broad bill, long tail and short toes. *Porphyrio* (2, 2) appears to be a *Gallinula* derivative, with sub-genus *Porphyrula* intermediate in shape and plumage between *Gallinula* and nominate *Porphyrio* of Africa, Asia and Aust.; the sub-genus *Notornis* of Lord Howe I. and NZ consists of obvious derivatives of the nominate, but are terrestrial with an exceptionally deep bill and short toes. *Fulica* (1, 0): worldwide distribution, with one species in our region, and two flightless extinct species in NZ; probably derived from *Gallinula*-like stock (Olson 1973b).

Bodies, short, often laterally compressed for ease of movement in dense vegetation. Neck, short or moderately long; 14–15 cervical vertebrae. Males, often slightly larger than females. Wings, short, broad, rounded; in volant species, flight appears low, weak and generally not sustained though some species capable of long-distance movements, occurring on or colonizing oceanic islands (e.g. Purple Gallinule *Porphyrio martinica*, Watercock *Gallicrex cinerea* in HANZAB region). Some island species are flightless, yet many others migrate or disperse over long distances. In HANZAB region, all species have 11 primaries (p11 minute) and 10–12 secondaries; in Family, 10–20 secondaries, smaller species have ten and some flightless species have fewer primaries (BWP); diastataxic. Short sharp curved claw on alula. Tail, short, square to rounded, soft; often raised or flicked up to signal colours of under tail-coverts; normally 12 (6–16) rectrices. Bill varies: often rather slender, straight and slightly longer than head, and in some species, slightly decurved; or quite short and laterally compressed (crakes, most gallinules, coots); or massive and laterally compressed (some species of *Porphyrio*). Gallinules and coots have smooth, plate-like horny frontal shield (continuous with ramphotheca) on forehead. Nostrils usually in large depression (not in *Porphyrio*), pervious and perforate in some species. Sense of smell said to be well developed (Ripley 1977). Legs, well developed, usually strong, long to quite short, often laterally compressed. Toes, long and slender but may be rather short and heavy; hind toe, large, slightly raised. In most gallinules (not native-hens *Gallinula*, Takahe *Porphyrio mantelli* and White Gallinule *P. alba*) and some crakes, toes greatly elongated and legs modified for walking on floating vegetation; in coots, toes have enlarged lateral lobes to aid swimming, and pelvis and legs modified for diving. All species can swim; dive easily and can sink, using wings under water if necessary. Many species climb easily among thick vegetation; downy young of some (and

possibly adults) use wing-claw to assist climbing. Oil-gland bi-lobed, feathered in most species. Caeca, long. Syrinx, simple; tracho-bronchial. Feathers, fairly loose and soft, frayed and even hair-like in some; small after-feather usual.

Plumage, generally sombre browns, chestnut, black, or greys; iridescent purplish-blue and green in *Porphyrio*. Barring on flanks common. Vent and under tail-coverts may contrast with rest of plumage. Upperparts, spotted, barred, streaked, or plain. Bare parts often brightly coloured and forehead shield conspicuous. Sexes usually similar or nearly so (except in *Sarothrura* and *Gallicrex*). Pre-breeding moults restricted or absent, with no seasonal changes in appearance (except in *Gallicrex*) but colours of bare parts change in some species, coinciding with moults. Post-breeding moult, complete. Remiges may be moulted irregularly, or simultaneously, with consequent flightless period. Post-juvenile moult partial; can be followed by partial pre-alternate moult or by complete second pre-basic. Young, downy, and unlike other precocial birds, black (sometimes iridescent) or dark brown, which may be an adaptation for hiding in dense vegetation; evidently a derived condition (Olson 1973b). In some species, downy young have brightly coloured bills or skin on head or both, which may function for signalling (Fjeldså 1977). Downy young of *Gallinula*, *Porphyrio* and *Fulica* also have white or yellow terminal bristles on down. Post-natal development slower than in some other precocial birds, such as Galliformes and Turniciformes, with initial emphasis on development of legs and feet and not wings; flight-feathers develop last. Juveniles generally similar to but duller than adults.

Numerous flightless forms; incidence of flightlessness perhaps greater than in any other group except ratites and penguins. Flightlessness has evolved many times within the Rallidae, often and repeatedly on islands without predators and probably independently each time; appears to evolve rapidly and so probably of little phylogenetic significance above the level of species (Olson 1973a). Selection reduces flight-muscle and pectoral girdle, possibly through neoteny (Olson 1973a); usually corresponding increase in development of leg muscles. Frequency of flightlessness suggests that rails are predisposed to it; they are certainly pre-adapted for coping with some of the restrictions it imposes: many volant species are behaviourally flightless, e.g. avoiding predators by running away; many are temporarily flightless during wing-moult (a feature shared with several other groups containing flightless forms), when secretive and elusive; and post-natal development of flight is slow. In many species, populations of insular flightless species exterminated by introduced predators (e.g. Chatham Island Rail *Gallirallus modestus*, Dieffenbach's Rail *Gallirallus dieffenbachi*). Subfossils from our region have been reviewed (Olson 1977) and include flightless and often large species of coot, waterhen, rail and wood-rail and the distinctive snipe-rail *Capellirallus*. For discussion of biogeography of *Gallirallus* see Olson (1973b), Fullagar *et al.* (1982), Schodde & de Naurois (1982), and Diamond (1991).

Most inhabit all sorts of terrestrial, estuarine and littoral wetlands, from sea-level to mountain highlands. Some genera found in lowland and montane forests; others in wet grasslands; still others, e.g. Takahe *Porphyrio mantelli*, *Crex*, tussock grasslands, hay-fields and similar places, not necessarily with wet areas. Some species migratory; many dispersive; others apparently sedentary. Patterns of movements in HANZAB region generally not known, perhaps because they appear to take place at night and perhaps because the birds are so secretive and silent when not breeding that absences may be more supposed than real. Gallinules and coots appear to be more sedentary than crakes and rails, though at least the Black-tailed Native-hen *Gallinula ventralis* is notably irruptive, in response to floods and droughts of inland Aust.

Omnivorous, or in some species mostly vegetarian. Species with long thin bills probe for invertebrates in soft ground and litter. Eat all sorts of plants and submerged vegetation, insects, molluscs, crustaceans, eggs and young of other birds, small fish and carrion. Some gallinules graze, e.g. Tasmanian Native-hen *Gallinula mortierii* and coots. Only *Fulica* dives for food; they and *Gallinula* will up-end. Often wash food in water.

Mostly solitary or in small groups, though densities can be very high in some wetlands; *Gallinula* (e.g. Black-tailed Native-hen *Gallinula ventralis*) and *Fulica* form large flocks, especially in winter; after onset of inland droughts, irruptions may involve thousands of birds. Roost solitarily except in species that flock; generally at night on ground in cover; occasionally in bushes and trees. Some species nocturnal or crepuscular. Most species nest solitarily; some strongly territorial, advertising territories with loud persistent calling and chasing of intruders. Dense vegetation and apparently secretive habits make it hard to study social organization and behaviour in most species. Agonistic and sexual behaviour often conspicuous with wing-spreading, tail-flicking, fighting with use of bill and feet and other ritualized features of display. Pair-bond usually monogamous and only for one season but may be sustained. Polygyny known in captivity and suspected in wild, e.g. in *C. crex*; polyandry occurs in Tasmanian Native-hen *Gallinula mortierii* and possibly Weka *Gallirallus australis*. Co-operative breeding in some gallinules, e.g. Dusky Moorhen *Gallinula tenebrosa*. Pair-formation and courtship little known except in some gallinules and coots, in which a variety of chasing, bowing, nibbling, mock-preening and feeding, and courtship feeding takes place; no elaborate ceremonies at time of nest-relief. Copulation and other activities take place out of water or on specially built platforms. Most species very vocal, with screams, trills, whistles, booms, rattles, trumpets, grunts or barks; can be ventriloquial; mostly silent when not breeding but social species have loud rallying cries. Stand at rest (sometimes on one leg) in hunched posture with head sunk on shoulders, or lie down; sleep with head on back and bill among feathers. Bathe in shallow water, alternately ducking head in water and flipping water over back or by beating half-open wings in water; coots may bathe while swimming. Leave water to oil and preen after bathing. Sun themselves after preening. Allopreening common. Scratch head directly. Some species (e.g. *Porphyrio porphyrio*, *P. alba*, *P. mantelli*) recorded manipulating and grasping food in foot or holding down large items with feet.

Breed seasonally and protractedly. Nest fairly deep and cup-shaped; in some rails, domed; in wetlands, often with ramps up to nests. In thick vegetation, often near or on surface of water but some species nest high in trees; use old nests of other birds or nest on ground far from water; materials from any available plants; built by both sexes. Horned Coot *F. cornuta* of S. America builds islands of small stones. Some build nests that float or are attached to aquatic vegetation; nests on water may be built up rapidly if water-level rises. Non-functional nests often found in gallinules and *Gallinula*, which also build nursery nests after young hatch. Eggs, blunt oval; smooth and fairly glossy; dull white to tan ground-colour, blotched and spotted red-brown to black; unspotted in *Rallina*. Clutch-size, 5–10 (1–18) but dump-laying or laying by more than one female in same nest may complicate estimation of size of clutch laid by an individual. Usually one or two broods and replacement layings up to three times. Lay at intervals of 24 or 48 h. Incubation usually by both sexes but in some by female alone or with only small share by male. Incubation period, 14–24 days per egg; start of incubation varies from first to last egg and so hatching synchronic or asynchronic. Egg-shells left in nest or removed. Generally have two large lateral and one small median brood-patches. Young hatch in down, precocial, nidifugous; at first fed bill to bill, becoming self-feeding within few days or not until 8 weeks old. Normally tended by both parents and, in a few species, offspring of previous broods may help to feed young, e.g. *Gallinula*, occasionally *Porphyrio*. Fledging period, 30–60 days (20–70) and then independent except in co-operative breeders. First breeding usually when 1 year old or less.

**REFERENCES**

Campbell, B., & E. Lack. 1985. *A Dictionary of Birds*. Poyser, Calton.
Cracraft, J. 1973. *Bull. Am. Mus. nat. Hist.* 151.
Diamond, J. 1991. *Auk* 108: 461–70.
Fjeldså, J. 1977. *Guide to the Young of European Precocial Birds*. Skarv. Nature Publs, Strandgården, Tisvildileje.
Fullagar, P.J., *et al.* 1982. *Emu* 82: 131-6.
Mees, G.F. 1982. *Zool. Verh., Leiden* 191.
Olson, S.L. 1973a. *Smithson. Contr. Zool.* 152.
—— 1973b. *Wilson Bull.* 85: 381–416.
—— 1977. Pp 339–73 **In:** Ripley 1977.
Ripley, S.D. 1977. *Rails of the World*. Feheley, Toronto.
Schodde, R., & R. de Naurois. 1982. *Notornis* 29: 131–42.
Sibley, C.G., & J.E. Ahlquist. 1990. *Phylogeny and Classification of Birds*. Yale Univ. Press, New Haven.
Thomson, A.L. (Ed.) 1964. *A New Dictionary of Birds*. Nelson, Lond.

## *Porzana fluminea* Australian Crake

COLOUR PLATE FACING PAGE 553

*Porzana fluminea* Gould, 1843, *Proc. zool. Soc. Lond.* (1842): 139 — New South Wales.

*Fluminea* is Latin for 'frequenting rivers', which is hardly definitive.

OTHER ENGLISH NAMES Spotted, Australian Spotted or Water Crake.

**Spotted** is the traditional name for *P. porzana* of Europe and so not appropriate for a different species in Aust.; being endemic to the continent, it is conveniently named **Australian**.

MONOTYPIC

**FIELD IDENTIFICATION** Length 19–23 cm; wingspan 27–33 cm; weight: male 65 g, female 55 g. Medium to small crake, with short stout bill and long tail; slightly larger than Baillon's *Porzana pusilla* and Spotless *P. tabuensis* Crakes; slightly smaller, with stumpier bill and longer tail than Lewin's Rail *Dryolimnas pectoralis*. Slight seasonal variation in size and colour of spot at base of bill. Juvenile separable.

**Description Adult male** Forehead, supercilium, face and throat, dark grey, usually finely streaked or mottled with white on ear-coverts and with upper half of lores tinged brownish. Crown, nape and hindneck, brownish olive, heavily streaked black and white. Rest of upperparts and inner wing-coverts, brownish olive, heavily streaked black and profusely spotted white; tertials and hindmost upper scapulars, thinly edged white; primary coverts and upperside of remiges, dark brown, with thin white leading-edge to outermost primary (sometimes visible in flight). Underparts, dark grey, finely spotted white at sides of foreneck and breast, strongly barred black and white on flanks, axillaries and sides of belly and with fine untidy white barring on central belly, thighs and vent; under tail-coverts, white, showing as conspicuous white triangle from behind. Underside of remiges and greater coverts, ashy grey, with white tips and barring on greater secondary coverts; rest of lining, barred black and white, grading to white leading-edge of innerwing. Bill, light green or olive-yellow, often tinged yellower at base and with dusky patch midway along culmen; base of culmen, usually bright red and swollen; can be orange-red and less swollen or brownish yellow and unswollen (perhaps varying seasonally). Iris, bright red. Legs and feet, green to olive-yellow. **Adult female** Differs from male by: upperparts slightly duller olive; forehead, face, chin, throat, foreneck and breast, much paler uniform grey, without dusky area on lores and chin; distinct brown stripe across upper lores; more white spotting on sides of breast and throat, generally extending toward midline; spot at base of culmen usually duller and less swollen. **Juvenile** Upperparts as adult but white spotting and edging less prominent; no white markings on rump or upper tail-coverts, and secondary coverts more heavily spotted with white. Forehead, supercilium and face more olive, tinged buff and heavily flecked white; chin and throat, grey with white flecks or white with dark speckling. Foreneck and centre of breast, medium or dark grey; brownish olive of upperparts extends broadly onto sides of breast and whole of fore-underparts heavily spotted white. Belly, off-white. Flanks, thighs and vent untidily barred dark brown and white, with buff tinge. Bill, at first, greyish-olive with dark-grey culmen and tip; in older birds, similar to adult but base of culmen not swollen, and yellowish brown with buff-yellow hind margin. Iris, at first dark brown, turning red as adult before juvenile plumage lost.

**Similar species** Small size; short greenish bill with reddish or yellowish spot at base; rather dark olive-brown upperparts heavily streaked blackish and spotted white; and dark-grey underbody with barred flanks and white under tail-coverts, diagnostic. Possibly confused with **Baillon's Crake**, which is, in adult, much paler generally, with richer cinnamon-brown upperparts and paler-grey underbody, and uniformly greenish bill; duller juvenile Baillon's more similar to juvenile Australian Crake, but generally paler, with clean white belly, and much finer pattern of dark mottling on foreneck and breast; all ages readily distinguished by barred, not white, under tail-coverts; and calls clearly different. Could be confused with **Spotless Crake**, which is darker and more uniform, with no dark patterning or pale spotting above, and unbarred flanks; barred under tail-coverts; darker, blackish bill and pinkish or reddish legs; calls clearly different. For differences from **Lewin's Rail**, q.v.

Singly, in pairs, occasionally in groups in well-vegetated

freshwater or brackish wetlands; also in samphire and other scrubby cover round saltmarshes and saltworks. Unobtrusive but not shy, generally bolder than other crakes. Gait a slow, stalking walk with tail constantly flicking; and sudden crouching run with tail cocked when disturbed. Swim and dive readily, but only over short distances in cover or across channels or streams. Seldom seen in flight; over short distance, flight laboured and fluttering like moorhen, on short rounded wings with legs dangling. Prefer to forage on open mud or wade in very shallow water, though never far from cover; often forage farther out from cover than other crakes but dash back at hint of danger. Voice varied: a sharp staccato call; an abrupt two-syllable note; and high-pitched, rapid chatter; also prolonged wheezing note.

**HABITAT** Well-vegetated margins of permanent or ephemeral terrestrial and maritime wetlands. Often in saline, including tidal, wetlands, but also in brackish and fresh wetlands. Found round estuaries, tidal creeks, saltmarshes, swamps, marshes, lakes, ponds, billabongs, lagoons, claypans, floodplains and artificial wetlands, such as sewage ponds and saltworks. Though said to be less dependent on dense cover than Spotless Crakes (Bryant & Amos 1949), usually among dense vegetation such as samphire, lignum, canegrass, bluebush, saltbush, reeds and rushes, mangroves, rank grass or dense thickets of *Callistemon, Melaleuca* or other shrubs (Bright & Taysom 1932; Bryant & Amos 1949; Hobbs 1961; Ford 1962; Eckert 1971; Cox 1974; Chinner 1977; Czechura 1983; Jaensch 1989) or floating water-ribbon or water-lilies. May occur some distance from water (Geary 1922).

Breed in clumps of dense vegetation, such as samphire, lignum, rushes, sedges, long grass or *Sesbania* or other shrubs in swamps and other inundated wetlands (Bright & Taysom 1932; Bryant & Amos 1949; Watson 1955; Jaensch 1989; Aust. NRS). Mainly forage at margins of wetlands in shallow (<5 cm) water or on mud or peat near or among reeds, rushes, saltmarsh, grass or other shrubs (Bryant & Amos 1949; Ford 1962; Vestjens 1972; Badman 1979; Patterson 1989); also among floating water-ribbon on billabongs (Bryant & Amos 1949). Roost among dense vegetation. Once, recorded resting on platform of criss-crossed water-ribbons (Bryant & Amos 1949).

Habitat destroyed by reclamation of wetlands (Littler 1910; North); grazing cattle may trample vegetation round wetlands (Badman 1979). Often recorded at artificial wetlands including saltworks and sewage farms (Bryant & Amos 1949; Parker 1969; Cox 1974; Cox & Pedler 1977; Roberts 1980, 1981; Jaensch 1989), round bores (Cox & Pedler 1977; Badman 1979; Schrader 1981), drains (Vic. Bird Rep. 1982) and flooded gravel pits (Vic. Bird Rep. 1985). Once recorded using puddles formed by water from washing of cattle trucks (Sharland 1958). Occasionally in grassy areas, such as lawns, pasture or golf courses (Geary 1922; Storr 1984; North; Vic. Bird Rep. 1985). Recorded at rubbish tip (SA Bird Rep. 1969–70).

**DISTRIBUTION AND POPULATION** Endemic to Aust. Mainly in SE and SW, with sparse records elsewhere.

**Qld** Rare. Sparsely distributed from Booby I., Torres Str., along e. coast to Brisbane district. No Atlas records for e. coast, but several before and since (Stokes 1983; Aust. Atlas; Qld Bird Reps). More common in SW and L. Eyre Drainage Basin (Storr 1973; Schrader 1981; Qld Bird Rep. 1983; Aust. Atlas). Vagrant to Mt Isa (Horton 1975; Qld Bird Rep. 1984); recorded at Karumba Plain (Qld Bird Rep. 1985). **NSW** Widespread, sparse in coastal and subcoastal regions (Aust. Atlas), including Illawarra (Wood 1985; NSW Bird Reps 1983, 1985), but rare on s. coast (Aust. Atlas). Mostly S of 33°S in Murrumbidgee–Murray drainage basin; also Upper and Lower Western regions (Aust. Atlas). **Vic.** Widespread in most regions, but sparse or absent in Mallee, E. Gippsland and North East (Vic. Atlas). **Tas.** Uncommon. Mainly E of line from George Town to Hobart (Thomas 1979; Aust. Atlas; Tas. Bird Reps), to Swan I. and Rushy Lagoon in NE (Patterson 1985; Tas. Bird Rep. 18). Vagrant to King I.; first record: single, Tatham's Lagoon, Feb. 1979 (Tas. Bird Rep. 9). Vagrant to Flinders I.: first record: single, Logan Lagoon, 2 May 1987 (Tas. Bird Rep. 17). **SA** Mainly in E, N of 30°S; common from Oolgawa Waterhole and w. L. Eyre, E to Qld border (Cox & Pedler 1977; Badman 1979, 1981; Aust. Atlas); S of 30°S, mainly E of 136°E, but also on Eyre Pen.; W to Streaky Bay (Aust. Atlas). **WA** Recorded Eyre Bird Observatory July–Sept. 1985 (Dymond 1988); in SW, from Shark L., N to near Perth (Jaensch *et al.* 1988; Aust. Atlas; Aust. NRS). Sparse from Port Gregory and Shark Bay region N to Pilbara region, including Hamersley Ra. NP (Ford & Teague 1959; Ford 1962; Johnstone 1980; Aust. Atlas; Aust. NRS). Widespread in Kimberley Div. (Jaensch 1989). **NT** First record: single, Pine Ck, 8 Jan. 1967 (Gee 1967). Probably moderately common round Alice Springs since first sighting 3 June 1967 (Parker 1969; Chinner 1977; Roberts 1980, 1981; Aust. Atlas); also recorded S to Palm Valley (Chinner 1977).

**Breeding** Few records; recorded in se. Qld, near Newcastle, Murray–Darling Basin, ACT, near Melbourne, se. SA, s. Eyre Pen., sw. WA and Pilbara region (Aust. NRS; Aust. Atlas, ACT Atlas). Nesting colony of c. 30 reported at Gulliver's Swamp, Finley, Feb. 1972 (NSW Bird Rep. 1972).

Range (and abundance?) reduced in Tas. by 1910 because wetlands drained (Littler 1910). Construction of inland dams and sewage farms has allowed range to expand, e.g. Alice Springs, Mt Isa (Horton 1975; Roberts 1980).

**Irruptions** Laverton, 80–90 in Apr. 1951, gone by May; c. 500 estimated round Berri, SA, Sept. 1972 to Jan. 1973, dropping to c. 100; suddenly disappeared from Le Fevre Pen., SA, after numbers had steadily increased in June 1975; many reports from NSW in Oct. 1977; Wentworth region, June–Dec. 1984; at Coongie L. 'almost in 100s' Aug.–Sept. 1979; 10s and 20s in Kimberley, Western Desert and Pilbara regions as wetlands dried after good rains in 1980–81; influx into Vic., spring and early summer 1982; 15+ in Hunter Valley, 1 Jan. 1983; at Dareton, NSW, numbers peaked at 29, mid-Jan. to Apr. 1985; ne. Kimberley, 40+, 7–9 May 1988; Derby sewage ponds, 20+, 22–25 Mar. 1988 (Watson 1955; Penhallurick 1981; Winslet & Winslet 1987; Jaensch 1989; SA Bird Rep. 1972–73; Vic. Bird Rep. 1982; NSW Bird Reps 1977, 1983, 1984, 1985; Aust. Atlas). Sometimes reported in greater numbers after heavy rains, e.g. L. Cooper, Vic., 1931 (Bright & Taysom 1932); sw. NSW, 1956 (Hobbs 1961). Several scattered records in central and n. Aust. (Mt Isa, Alice Springs, Pine Ck) in 1966–67 (Gee 1967; Parker 1969; Horton 1975).

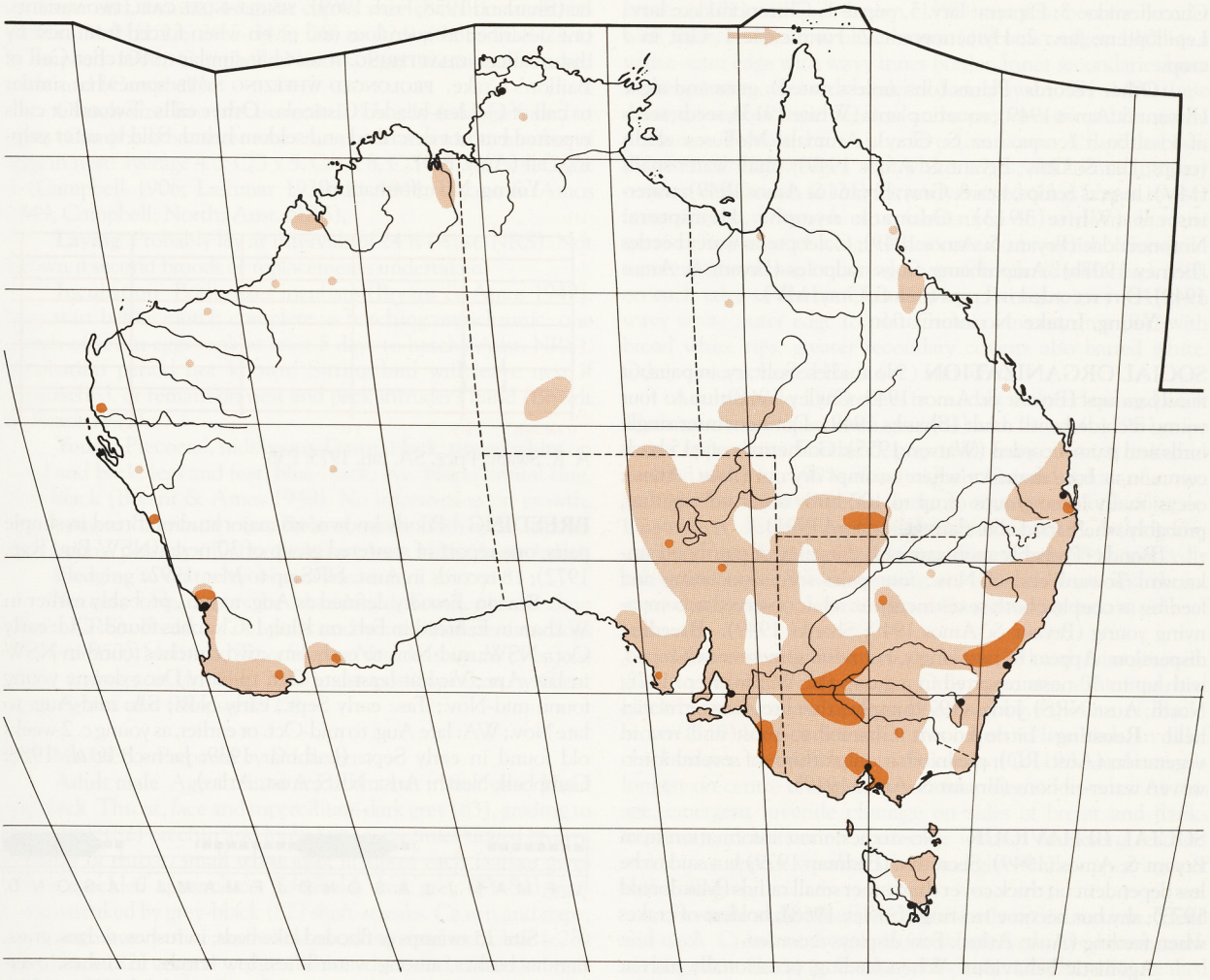
Estimated 500 birds round Berri, Sept. 1972 (SA Bird Rep.

---

**Plate 43**

Chestnut Rail *Eulabeornis castaneoventris* (page 571)
**1** Adult, olive form, nw. WA; **2** Adult, chestnut form, NT;
**3** Adult, intermediate bird; **4** Adult

Bush-hen *Amaurornis olivacea* (page 538)
**5** Adult, with dark throat (possibly breeding plumage);
**6** Adult, with pale throat (possibly non-breeding plumage);
**7** Downy young; **8** Juvenile; **9** Adult



1972–73); maximum number of 20 at Thompson's L. NR (509 ha) (Jaensch *et al.* 1988); 1–39 birds in Swan R. estuary (Jaensch 1987). Birds nesting in paddocks may be run over and decapitated by lawn-mowers (Geary 1922). Killed by dogs and feral cats (Brown 1950; D. Quinn).

**MOVEMENTS** Unknown; possibly dispersive. In parts of s. Murray–Darling and w. L. Eyre region present throughout year (Hobbs 1961; Badman 1979). At times occur in exceptional numbers; possibly irruptive as suddenly appear and depart (see Distribution). No seasonal movements suggested despite higher reporting rates in summer; possibly because birds more conspicuous when calling though possibly related to drying of inland swamps (Aust. Atlas; Vic. Atlas). In some areas present during winter and autumn (Tas. Bird Rep. 1980). Report from Booby I., Torres Str. (Draffan *et al.* 1983; Stokes 1983) possibly erroneous (Ingram *et al.* 1986). May move across Bass Str., being recorded on King and Flinders Is (Tas. Bird Rep. 1979, 1988); also on Pelsart I., WA (Garston 1978).

Abundant after floods and heavy rains (Bright & Taysom 1932; Hobbs 1961) but seem to follow receding water rather than deeper flooded wetlands (Aust. Atlas); recorded leaving drying wetland near Melbourne (Bryant & Amos 1949).

**FOOD** Seeds, molluscs, insects, crustaceans and spiders. **Behaviour** Diurnal, particularly early and late in day. Feed on ground. Glean and probe on mudflats and in reed beds. Wade in shallow water and swim, probing and lunging under water and at emergent vegetation. Often submerge whole head. Large items brought ashore, knocked on ground, and swallowed in several gulps (Bryant & Amos 1949).

**Adult** At **L. Cowal, NSW** (9 crops; Vestjens 1977): seeds in 3 crops; Cyperaceae: sds; Fabaceae: *Medicago* sds; *Trifolium* sds. Molluscs: Gastropods: freshwater snails 4. Crustaceans: Ostracods 5. Arachnids: spiders 2. Insects: Dermaptera 1; Orthoptera: Acrididae 2; Hemiptera: Cicadellidae 1; others 1; Coleoptera: Carabidae 3; water-beetles: ads 4, larv. 2; Chrysomelidae 3;

---

**Plate 44**

Baillon's Crake *Porzana pusilla* (page 544)
**1** Adult male, subspecies *palustris*; **2** Adult male, subspecies *affinis*; **3** Adult female, subspecies *palustris*; **4** Downy young; **5** Juvenile; **6** Adult

Australian Crake *Porzana fluminea* (page 551)
**7** Adult male; **8** Adult female; **9** Downy young; **10** Juvenile; **11** Immature; **12** Adult

Curculionidae 3; Diptera: larv. 5, pupae 1; Chironomidae: larv.; Lepidoptera; larv. 2; Hymenoptera: 2; Formicidae 1. Grit in 3 crops.

**Other records** Plants (obs. unless stated): grass and algae (Bryant & Amos 1949); aquatic plants (White 1913); seeds; seeds of a saltbush (crops, Lea & Gray). Animals: Molluscs: shells (crops, Lea & Gray; Bryant & Amos 1949); small water-snails (MV). Insects (crops, Lea & Gray; Bryant & Amos 1949): water-insects (White 1913); Odonata: nymphs; Hemiptera: Notonectidae (Bryant & Amos 1949); Coleoptera: water beetles (Berney 1907b). Amphibians: frogs: tadpoles (Bryant & Amos 1949). Dirt recorded in crops (Lea & Gray; MV).

**Young, Intake** No information.

**SOCIAL ORGANIZATION** No studies. Solitary, in pairs, or family groups (Bryant & Amos 1949; Cayley 1968); up to four young recorded with adult (Shanks 1949). During winter single birds and pairs recorded (Watson 1955). Gatherings of ≥15 birds common at bore drains or where swamps dry out (Aust. Atlas); occasionally loose groups of up to 100 birds observed together, probably where food abundant (Kingsford 1991).

**Bonds** Probably monogamous; duration of pair-bond unknown. Toward end of Nov., four pairs seen associating and feeding as couples; both sexes incubate; adult observed accompanying young (Bryant & Amos 1949; Shanks 1949). **Breeding dispersion** Appear to nest singly, but nests sometimes clumped, with up to 30 nests reported in a group (NSW Bird Rep. 1972; North; Aust. NRS). Jones (1979) implies that breeding territories held. **Roosting** Little known. Claimed to roost and rest in vegetation (Aust. RD); preen or sit on platform of several interwoven water-ribbons (Bryant & Amos 1949).

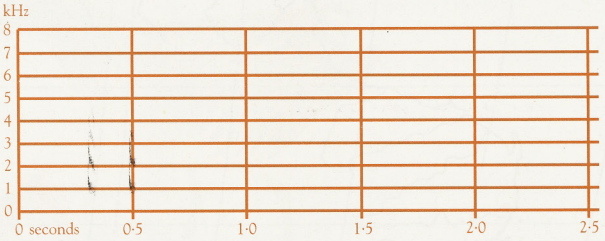
**SOCIAL BEHAVIOUR** No studies; most information from Bryant & Amos (1949). Secretive (Badman 1979) but said to be less dependent on thick cover than other small rallids (Macdonald 1973); shy but become trusting (Cayley 1968); boldest of crakes when feeding (Aust. Atlas). Few displays recorded.

**Agonistic behaviour** When feeding, occasionally rush at each other when close, but no attempt to fight or drive other birds from area. Two birds recorded constantly driving another two (Bryant & Amos 1949). **Alarm** Dash to cover when alarmed, e.g. in response to flock of Silver Gulls *Larus novaehollandiae* overhead. If pressed, fly away; if predator close probably freeze, and watch (Bryant & Amos 1949); may wade to cover (Berney 1907a); take to water if forced from cover (Cayley 1968). Continuous flicking of tail possibly related to Alarm. When one bird chased by Black Falcon *Falco subniger*, it took refuge in a house (McGilp 1923). **Relations within family group** Sitting bird pulls vegetation over itself, and turns eggs before settling (Bryant & Amos 1949). **Anti-predator responses of young** Chick gives squeaking call if handled, which attracts adult. **Parental anti-predator strategies** When disturbed at nest, recorded standing at entrance with wings raised, and calling continuously. One incubating adult pecked intruder, before leaving nest and feeding nearby; later returned to attack intruder's hand in nest; stood on edge of nest, jumped on hand, and dug bill into fingers (Bryant & Amos 1949). Give alarm call when disturbed at nest or to warn partner (Fletcher 1924; Bryant & Amos 1949).

**VOICE** Virtually unknown; some information in Bryant & Amos (1949), which followed here. Most common call a sharp metallic double note. No information on geographical variation, sexual or individual differences.

**Adult** DOUBLE-NOTE CALL (sonagram A): sharp and metallic (Sharland 1958; Frith 1969). SINGLE-NOTE CALL: two variants, one described as querulous and given when forced from nest by disturbance. CHATTERING: somewhat similar to Ratchet Call of Baillon's Crake. PROLONGED WHEEZING NOTE: somewhat similar to call of Golden-headed Cisticola. **Other calls** Two other calls reported but not described and seldom heard. Said to utter yelping call (Aust. RD).

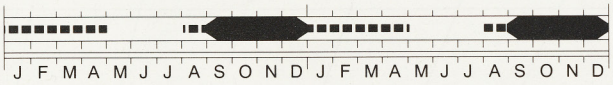
**Young** No information.




A R. Swaby; Price, SA, Jan. 1975; P36

**BREEDING** Poorly known, no major studies. Breed in simple pairs; one report of scattered group of 30 nests (NSW Bird Rep. 1972); 18 records in Aust. NRS up to Mar. 1992.

**Season** Broadly defined as Aug. to Jan., probably earlier in W than in E; breed in Feb. on King I. Clutches found: Qld: early Oct.; NSW: mid-Nov. to early Jan., two clutches found in NSW in late Apr.; Vic.: at least late Oct. to early Dec.; downy young found mid-Nov.; Tas.: early Sept., early Nov.; SA: mid-Aug. to late Nov.; WA: late Aug. to mid-Oct. or earlier, as young *c.* 2 weeks old found in early Sept. (Lashmar 1939; Jaensch *et al.* 1988; Campbell; North; Aust. NRS; Aust. Atlas).




**Site** In swamps or flooded lake beds; in rushes, sedges, grass, lignum bushes, among water-lilies, low shrubs in rushes, overhanging tree-branches, native liquorice bush *Glycyrrhiza acanthocarpa*, in roly-poly with grass growing through in recently flooded lake; nearly always above water; one nest on ground partly shaded by samphire (Bright & Taysom 1932; Jaensch *et al.* 1988; Campbell; Aust. NRS). Often in centre of clump of rushes, grass or lignum; height above water: 18 (16; 2.5–50; 12) (Campbell 1906; Bryant & Amos 1949; Aust. NRS). Some nests have a stage or track leading to them (Campbell 1906; Campbell). Two nests 50–60 m apart (Aust. NRS).

**Nest, Materials** Vary from flat flimsy nest to cup of fine woven material, sometimes with dome or with rushes interlaced over nest (Campbell 1906; Bright & Taysom 1932; Bryant & Amos 1949; Campbell). No material used for nest found on ground (Aust. NRS). No information on construction; sitting bird will pull grass round and over nest for concealment; add to nest during incubation; material for one nest probably gathered from bank of swamp *c.* 4.6 m away (Bryant & Amos 1949). Nests constructed out of wet or dry rushes, dry grass; lined with soft grass (Bright & Taysom 1932; Campbell). MEASUREMENTS: diameter of two nests, 7.6, 8.9 cm; depth, 5 cm (Condon & Rix 1936; Bryant & Amos 1949).

**Eggs** Oval-rounded, or elongate oval; close-grained, smooth, lustrous, occasionally lustreless; pale stone-brown lined olive, some light greenish-olive, freckled, spotted and blotched shades of purplish brown and purplish grey, latter frequently appearing as if beneath surface; sometimes uniformly spotted, others blotched

on larger end, forming irregular cap or zone (North). MEASUREMENTS: 31.0 (1.23; 29.5–34.5; 28) x 22.9 (0.65; 20.8–24.4) (Campbell 1906; Campbell; North). Eggs occasionally caked with mud (Campbell).

**Clutch-size** Few precise records. Usually 4–5 eggs found in nests (Campbell) but three or six not uncommon; from number of eggs in nest: average 4.6: C/3 x 5, C/4 x 8, C/5 x 5, C/6 x 4, C/7 x 2 (Campbell 1906; Lashmar 1939; Ey 1944; Bryant & Amos 1949; Campbell; North; Aust. NRS).

**Laying** Probably lay at intervals of 24 h (Aust. NRS). Not known if second broods or replacements undertaken.

**Incubation** Both sexes incubate (Bryant & Amos 1949). May start before clutch complete as hatching asynchronic; one clutch of seven eggs took at least 5 days to hatch (Aust. NRS). Incubation period not known. Sitting bird will leave nest if approached, or remain on nest and peck intruder's hand (Bryant & Amos 1949).

**Young** Precocial, nidifugous. Down, black, tipped white on head and back; legs and feet, blue-black; eye, black; orbital ring, blue-black (Bryant & Amos 1949). No information on growth, development. **Parental care, Role of sexes** Both sexes accompany young, possibly till after fledging (Aust. NRS; Aust. Atlas).

**Fledging to maturity** No information.

**Success** Nests may be abandoned if water-levels drop (Aust. NRS). Predators of adults and young include cats, dogs (Brown 1950), Mainland Tiger Snakes *Notechis scutatus* (Vestjens 1977) and raptors (McGilp 1923); also possibly taken by Great Egret *Egretta alba* (Klapste 1975).

PLUMAGES Prepared by D.I.Rogers.

**Adult male** Age attained unknown, but in first year. **Head and neck** Throat, face and supercilium, dark grey (83), grading to grey-black (82) on chin and lores; lores sometimes tinged brown. At edge of throat, small white spot at tip of each feather gives throat speckled appearance. Forehead, dark grey (83–84), narrowly streaked by grey-black (82) shaft-streaks. Crown and nape, black with heavy olive and white streaking; feathers, olive (c28) with black (82) central wedges, white edges, and concealed grey (84) bases. Hindneck, olive with narrow black-and-white streaks; feathers as crown, but dark central wedges and white edges both narrower. Ear-coverts, grey, streaked or mottled white in *c.* 60% of individuals; feathers, grey, sometimes with 1–2 white bars, narrowly bordered grey-black (82). **Upperparts** Mantle and back, brownish olive with blackish streaks and bold white spots; feathers, brownish olive (cinnamon 48) with black (82–89) shaft-streaks, concealed grey (84) bases and a white spot bordered black (82–89) at the outer corner of each web. Scapulars, similar but uppermost have no black shaft-streaks; longest have black (82) central wedges and white spots are elongate, forming white edges. Rump, black, mottled brownish olive and finely spotted white; feathers, grey-black (82) with brownish-olive (cinnamon 48) fringes interrupted by white spots on each edge, which have black (89) lower margin. Upper tail-coverts, brownish olive (cinnamon 48) with largely concealed blackish (82) shaft-streaks; edges of lateral feathers have series of white spots; central feathers have white edges. **Underparts** Breast, dark grey (83); feathers at sides have small white spot narrowly bordered black (c89) at corner of each web. Flanks, axillaries and sides of belly, black (89) barred white. Central belly and thighs, dark grey (83) with untidy white barring; feathers, dark grey (83) with white fringes 2–3 mm wide. Under tail-coverts, white. **Tail** Mostly black (82–89) with brownish-olive (cinnamon 48) fringes and white spots (narrowly bordered black) along edges. Toward centre of tail, brownish-olive fringes and white spots widen. **Upperwing** Remiges, dark brown (c121) with pale-brown (119D) tips that become broader with wear, and narrow olive-brown (28) outer edges. P10 has a white outer edge with wavy inner border. Inner secondaries have white spots on outer web bordered dark brown (c121–119); these occur on various inner remiges and sometimes extend to central primaries. Tertials, brownish olive (cinnamon 48) with black (82–89) central wedges and white edges. Alula and primary coverts, dark brown (c121) narrowly fringed olive. Upper rows of lesser coverts, brownish olive (cinnamon 48) with small white spots at fore-edge of wing. Other coverts, brownish olive (cinnamon 48) with one or two white spots bordered with black (89), on each edge of feather. **Underwing** Remiges, grey (84) with wavy white outer edge to p10. Greater coverts, grey (84) with broad white tips; greater secondary coverts also barred white. Other coverts, barred black (82) and white.

**Adult female** Differences from adult male. **Head and neck** Throat, face and supercilium, grey (84) with brown (c119B) stripe across upper lores. Forehead, grey (84). Ear-coverts, streaked or mottled white in *c.* 90% of individuals. Ground-colour of crown and hindneck, olive (c28), lacking cinnamon tinge of male. **Upperparts** Broad fringes of feathers, olive (c48), lacking cinnamon tinge of male. **Underparts** Breast, grey (84), markedly paler than male. White spotting on sides of breast and throat somewhat more extensive, generally extending below sides of body.

**Downy young** When young, black (89) with faint greenish gloss to head and upperparts. Only specimen examined had black-brown tinge to upperparts caused by exposure of black-brown (119) bases; unknown if this occurs in live birds. In older chicks, down on body fades to dark brown (c119A) and remains longest on centre of upper breast and under tail-coverts. At this age, emergent juvenile plumage on sides of breast and flanks important identification character; whitish fringes to feathers make areas appear streaked white and give flanks appearance of buff scalloping.

**Juvenile male** Moult feathers of body in first autumn. **Head and neck** Crown and nape, blackish streaked olive-brown, with varying white flecking. Feathers, blackish (119) broadly streaked olive-brown (123 tinged cinnamon), sometimes with narrow white edges. Hindneck, olive-brown (cinnamon 123), sometimes streaked by semi-concealed black-brown (119) shaft-streaks and often flecked by narrow white edges to feathers. Lores, white, dusted blackish (82) or greyish olive (c43) by narrow dark tips to short white feathers. Supercilium, light brown (124) to dark olive-brown (c129), heavily flecked white by white bases and edges to feathers. Ear-coverts olive-brown (c129) with varying buff wash; feathers olive-brown (c129) with white or buff bases. Chin and throat vary; feathers, white with dark grey-brown (c121) or dark-grey (c83) bars that have an olive tinge towards sides of neck. In some, area looks white speckled dark grey-brown or dark grey; in others dark bars are broad, making area look grey or olive-grey with varying white flecking. **Upperparts** Similar to adult male but white spots lack black borders (except for occasional traces on scapulars) and thus seem less striking. No white markings on rump or upper tail-coverts. **Underparts** Breast, olive-brown (c123) spotted white, with varying grey patch in centre that is scalloped white. Feathers in centre, grey (84) to dark grey (83) with white tips; just to the side, feathers have olive-brown (c123) subterminal band that becomes broader towards wings; at sides of breast, subterminal band has white border. Belly off-white; feathers cream-white, with dark-grey (83) bases. Flanks and thighs, untidily barred dark brown and white, with buff tinge strongest towards tail. Feathers alternately barred with 2–3 pairs of white bars and dark-brown (121) bars that grade to olive-brown (c123)

in centres; fringes, white, grading to buff-white tips; concealed bases, grey (84) to dark grey (83). Under tail-coverts, white. **Tail** White spots tend to be less prominent than in adults because they lack dark borders; also smaller and some do not have them; usually, white spots are restricted to t1. **Upperwing** Similar to adult but lesser, median and greater secondary coverts all have white tips of c. 1 mm. White spots on lesser and median coverts are generally smaller than in adults but overlap occurs. **Underwing** Only innermost greater secondary coverts have white barring; others have only white tips.

**Juvenile female** Ground-colour of crown, hindneck, upperparts and breast, olive-brown (c123), more olive and less cinnamon than juvenile male.

**Immature** (First basic). Very similar to adult. Grey feathers of breast have narrow white fringes that can wear away. Wing often, perhaps always, as in juvenile. Narrow white tips to coverts are lost with wear, sometimes before and sometimes after white fringes to feathers of breast have been lost.

**BARE PARTS** Based on photos (NPIAW 1985; Aust. RD; unpubl.: J.N. Davies, R. Davies) and labels (ANWC, HLW, MV, SAM, WAM) except where stated.

**Adult male** Bill, mostly light green (159, c158) or olive-yellow (52), often with more yellow tinge (157, 158) at base. Mandibular rami occasionally have reddish tinge at base. Culmen has dark patch, varying from olive-brown (c 29) or dark olive-grey to dark grey (–), beginning just behind nares and extending over half of length, sometimes reaching tip of lower mandible. Base of culmen usually swollen and red (14) or orange-red (15), perhaps always with narrow buff-yellow (53) strip at junction with feathering. When base of culmen has an orange tinge it tends to be less swollen, and in three of 25 adult males for which colour of bill available (one photo, two labels) there was no swelling and the base of the culmen was brownish yellow (c123C); brownish yellow only in May and June may imply seasonal variation, but four others collected in winter had swollen red base of culmen. Narrow eye-ring, dark grey (83) to black (89). Iris, red (14–12); at least some have narrow yellowish (c53) or yellow-olive (c51) inner ring only visible in close view. Brown and orange-red irides also reported. Legs and feet, green (61) to olive-yellow (52), tending to be clearest yellow on front and toes. Labels also refer to birds with brown feet and legs, and to olive-black feet and legs mottled olive-yellow; these may have been affected by post-mortem discoloration. Claws dark brown (–) to dark grey (83). **Adult female** Mostly as male, but base of culmen is usually duller and less swollen; rufous-brown (240), brownish yellow (123C) and orange-rufous (132C) often reported. In eight of the 18 females for which colour recorded, base of culmen, red; in most, orange-red (15) or brick-red (–) but two with 'red' bases of culmen may have been as bright as most males. Unknown if colour related to breeding condition; it bears no obvious relation with date. **Downy young** Only data on small chicks comes from one label (MV), a bird described in Bryant & Amos (1949) and four birds seen by Shanks (1949). Bill, black (–) with red (–) base and white egg-tooth; pale-olive hue of juvenile begins to spread from centre of bill before all down is lost. Iris, black (–), surrounded by ring of blue-black (–) skin. Feet, dark olive-green (–) or blue-black (–). **Juvenile** In younger individuals (including birds still growing juvenile wing), bill pale greyish-olive (c92) with dark-grey (83) culmen and tip; lose red base before wing fully grown. Older juveniles have bill similar to adult, but base of culmen not swollen, yellowish-brown (c123) with buff-yellow hind margin. Iris, brown (23) to dark brown (219); may become red in some before juvenile plumage lost. Legs and feet as adult. **Immature** Similar to adult. Unknown if any develop vivid red base of culmen of some adult males, but there are photographs of a bird with unswollen orange-red (15) base to culmen.

**MOULTS** **Adult post-breeding** Complete. Primaries probably simultaneous as in other *Porzana*, but no specimens collected while moulting. Primary wear of non-moulting birds suggests timing of primary-moult varies and can occur at least as early as Nov., at least as late as Apr. Body-moult has been recorded in all months from Dec. to Apr. **Post-juvenile** Partial in most, perhaps in all, involving only body-feathers. Recorded Jan–Apr. Upperparts and centre of breast, first areas to complete moult; last juvenile feathers to be lost are usually on flanks and sides of breast and throat. Unknown when wing is moulted; at least some retain juvenile feathering through first winter.

**MEASUREMENTS** Throughout Aust., adult, skins (ANWC, HLW, MV, SAM, WAM).

| | MALES | FEMALES | |
|---|---|---|---|
| WING | 101.3 (3.94; 88–108; 34) | 97.9 (2.13; 94–103; 17) | ** |
| 8TH P | 71.5 (3.22; 59–77; 34) | 69.6 (1.80; 67–74; 18) | * |
| TAIL | 51.7 (2.81; 46–58; 31) | 50.3 (2.41; 45–53; 15)ns | |
| BILL | 20.6 (0.83; 18.7–22.1; 31) | 18.7 (1.14; 15.9–21.2; 17) | ** |
| TARSUS | 30.1 (1.09; 27.5–31.6; 33) | 28.6 (0.72; 27.6–29.9; 16) | ** |
| TOE C | 35.6 (1.48; 32.8–37.4; 15) | 33.6 (0.50; 32.8–34.3; 5) | ** |

Juveniles, including birds in post-juvenile moult, sexes combined (AM, ANWC, HLW, MV, SAM, WAM).

| | UNSEXED |
|---|---|
| WING | 98.0 (2.67; 93–100; 8) |
| 8TH P | 68.5 (2.33; 65–72; 8) |
| TAIL | 48.6 (1.95; 47–53; 7) |
| BILL | 18.4 (1.23; 16.6–19.8; 10) |
| TARSUS | 28.8 (1.20; 26.8–30.3; 11) |
| TOE C | 33.6 (1.02; 32.5–34.8; 7) |

**WEIGHTS** From labels (AM, ANWC, MV, SAM, WAM): adult males 65.6 (6.86; 50–75; 10), including two birds with thick subcutaneous fat, each weighing 70 g; adult females 57.3 (5.19; 50–61; 3); juveniles, including birds in post-juvenile moult, 48.1 (9.67; 35.6–64.6; 6). Adults and juveniles, combined, live (mist-netted): 68.1 (6.86; 57–81; 12) (ABBBS). Unknown if any seasonal variation.

**STRUCTURE** Wing, short and slightly rounded. Ten primaries; p9 and p8 longest; p10 11–15 shorter, p7 1–3, p6 4–6, p5 7–11, p4 11–16, p3 15–21, p2 20–26, p1 26–32. Twelve secondaries, including four long tertials extending to between p3 and p6 on folded wing. Tips of tertials rounded in fresh adults, pointed in juveniles and worn adults. Tail, short, narrow and graduated; 12 soft pointed feathers; t1–t6 16–23 mm. Body, laterally compressed. Bill, fairly stout and slightly shorter than head; deeper than broad at base. Mostly straight, but tomia decurved slightly at tip; gonys, curved upwards. Base of upper mandible, often swollen, particularly in birds with red base of culmen; swelling perhaps associated with breeding condition. Tarsus, slender and slightly laterally compressed; scutellate with some reticulate scaling on sides. Claws narrow, slightly decurved and pointed. Outer toe c. 81% of middle, inner c. 78%, hind c. 35%.

**RECOGNITION** Small downy young distinguished by colour of bill; large downy young distinguished from Baillon's Crake by red base of bill (may not always be present) and pattern of emerging juvenile plumage on sides of breast and upperparts.

**GEOGRAPHICAL VARIATION** None.

**REFERENCES**


Badman, F.J. 1979. *S. Aust. Orn.* 28: 29–54.
—— 1981. *S. Aust. Orn.* 28: 141–53.
Berney, F.L. 1907a. *Emu* 6: 106–15.
—— 1907b. *Emu* 7: 79–81.
Bright, J., & A.R. Taysom. 1932. *Emu* 32: 42–8.
Brown, A.G. 1950. *Emu* 50: 105–13.
Bryant, C.E., & B. Amos. 1949. *Emu* 48: 249–75.
Campbell, A.J. 1906. *Emu* 5: 195–9.
Cayley, N.W. 1968. *What Bird is That?* Angus & Robertson, Sydney.
Chinner, D.W. 1977. *S. Aust. Orn.* 27: 188–92.
Condon, H.T., & C.E. Rix. 1936. *S. Aust. Orn.* 13: 203–19.
Cox, J.B. 1974. *S. Aust. Orn.* 26: 142–4.
——, & L.P. Pedler. 1977. *S. Aust. Orn.* 27: 188–92.
Czechura, G.V. 1983. *Sunbird* 13: 31–5.
Draffan, R.D.W., *et al.* 1983. *Emu* 83: 207–34.
Dymond, N. 1988. *RAOU Rep.* 38: 13–64.
Eckert, J. 1971. *S. Aust. Orn.* 26: 42–7.
Ey, A.E. 1944. *S. Aust. Orn.* 17: 32–7.
Fletcher, J.A. 1924. *Emu* 23: 293.
Ford, J.R. 1962. *Emu* 62: 61–2.
——, & B.L. Teague. 1959. *Emu* 59: 89–92.
Frith, H.J. (Ed.) 1969. *Birds of the Australian High Country.* Reed, Sydney.
Garston, R. 1978. *West. Aust. Nat.* 14: 62–4.
Geary, N. 1922. *Emu* 21: 312.
Gee, J.P. 1967. *Qld Bird Notes* 3: 9.
Hobbs, J.N. 1961. *Emu* 61: 21–55.
Horton, W. 1975. *Sunbird* 6: 49–69.
Ingram, G.J., *et al.* 1986. *Sunbird* 16: 12–24.
Jaensch, R.P. 1987. *Curtin Univ. Env. Studies Grp Rep.* 1: 202–12.
—— 1989. *RAOU Rep.* 61.
——, *et al.* 1988. *RAOU Rep.* 30.
Johnstone, R.E. 1980. **In**: Muir 1980.
Jones, W.G. 1979. *Tas. Bird Rep.* 9: 23–38.
Kingsford, R. 1991. *Australian Waterbirds.* Kangaroo Press, Sydney.
Klapste, J. 1975. *Aust. Bird Watcher* 6: 164.
Lashmar, A.F.C. 1939. *S. Aust. Orn.* 15: 13.
Littler, F.M. 1910. *A Handbook of the Birds of Tasmania and its Dependencies.* Author, Launceston.
Macdonald, J.D. 1973. *Birds of Australia.* Reed, Sydney.
McGilp, J.N. 1923. *Emu* 22: 237–43.
Muir, B.G. (Ed.) 1980. *Fauna Survey of the Hamersley Range National Park, West. Aust.*
NPIAW. 1985. *The Waterbirds of Australia.* Angus & Robertson, Sydney.
Parker, S.A. 1969. *S. Aust. Orn.* 25: 59–71.
Patterson, R.M. 1985. *Tas. Bird Rep.* 14: 14–16.
—— 1989. *Tas. Bird Rep.* 18: 29–30.
Penhallurick, J. 1981. *Canberra Bird Notes* 6: 115–16.
Roberts, G.J. 1980. *S. Aust. Orn.* 28: 99–102.
—— 1981. *S. Aust. Orn.* 28: 175–7.
Schrader, N.W. 1981. *Aust. Bird Watcher* 9: 80–7.
Shanks, D. 1949. *Emu* 49: 132–41.
Sharland, M. 1958. *Tasmanian Birds.* Angus & Robertson, Sydney.
Stokes, T. 1983. *Sunbird* 13: 53–8.
Storr, G.M. 1973. *Spec. Publs West. Aust. Mus.* 5.
—— 1984. *Rec. West. Aust. Mus. Suppl.* 19.
Thomas, D. 1979. *Tasmanian Bird Atlas.* Fauna Tas. Comm., Univ. Tas., Hobart.
Vestjens, W.J.M. 1972. *Canberra Bird Notes* 2: 17–18.
—— 1977. *Tech. Memo. Div. Wildl. Res. CSIRO, Aust.* 12.
Watson, I.M. 1955. *Emu* 55: 224–48.
White, S.A. 1913. *Emu* 7: 179–85.
Winslet, J., & B. Winslet. 1987. *S. Aust. Orn.* 30: 103–10.
Wood, K. 1985. *Aust. Birds* 19: 17–38.


Sponsor: Dr J Whitelaw


**Volume 2, Plate 44**

Baillon's Crake *Porzana pusilla* (page 544)
**1** Adult male, subspecies *palustris*; **2** Adult male, subspecies *affinis*; **3** Adult female, subspecies *palustris*; **4** Downy young; **5** Juvenile; **6** Adult

Australian Crake *Porzana fluminea* (page 551)
**7** Adult male; **8** Adult female; **9** Downy young; **10** Juvenile; **11** Immature; **12** Adult