Brolga habitat management opportunities in the Rutherglen region

Report prepared for the North East Catchment Authority and Rutherglen Landcare

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1. Introduction and background

The Rutherglen region regularly supports a small group of brolgas (6–8 individuals). Brolga (*Antigone rubicunda*) is considered vulnerable in Victoria and is listed on the *Flora and Fauna Guarantee Act 1988* (FFG Act). An action statement under the FFG Act outlining threats and intended management actions has been prepared for the species (DuGuesclin 2003). The stronghold of Victoria’s population is in the state’s south-west where the population is estimated to consist of 600–650 individuals (White 1987). More recently up to 907 were counted at Victorian and South Australian non-breeding sites, during the 2013 annual census. The northern Victorian population consists of 50–100 individuals (White 1987, DuGuescin, Herring 2001, Herring 2005). The total Victorian population therefore consists of about 650–1000 individuals, and these numbers are likely to fluctuate depending on overall annual breeding success.

The Rutherglen brolgas thus represent approximately 1% of the Victorian brolga population. Small flocks were reportedly common historically and the last known breeding event was in 1963 (White 1987), until more recently. According to landholder and Landcare reports, a breeding pair and a small number of non-breeding brolgas have more recently become established again in the region (Don Nash pers. comm., Jenny Davidson pers. comm.). This is thought to have occurred within the last 10–15 years.

The Rutherglen Landcare Group and the North East Catchment Management Authority are interested in protecting and managing brolga (*Antigone rubicunda*) habitat in the Rutherglen region. A community presentation was held in Rutherglen in 2015, which included a presentation by Inka Veltheim (Federation University Australia) on ecological requirements of brolgas, main threats, and actions to protect the species. This was followed by a field trip to familiarise community members and landholders with local brolga breeding habitats. Members of the local community, Rutherglen Landcare Group, North East Catchment Management Authority (NECMA), Trust for Nature and Inka Veltheim were present.

An additional field trip took place in February 2016 to identify and discuss opportunities to ensure long-term persistence of brolgas in the region. This trip was attended by:

- Jenny Davidson, Rutherglen Landcare Group
- Don Nash, a local landholder who has been undertaking fox control
- Mary Anderson, Trust for Nature
- Stephen Routledge, Swamps, Rivers and Ranges
- Gayle South, Ovens Landcare Network
- Inka Veltheim, PhD candidate (Brolga ecology and movements), Federation University Australia

The main aim of the trip was to further inspect wetlands currently used by brolgas, and identify wetlands that could be enhanced to provide additional habitat. Another aim was to identify activities that can be taken by landholders, Rutherglen Landcare and North East Catchment Management Authority (NECMA) to protect brolgas and enhance their habitat. This report provides information on the wetlands visited, and recommendations based on discussions with Rutherglen Landcare and NECMA including:

- Current knowledge of brolgas and their habitat in the Rutherglen region (Section 2);
- Threats (Section 3);
- Recent management actions (Section 4);
- Constraints and opportunities (Section 5);
• Practical measures for managing and enhancing brolga habitat – both in the short-term and long-term – that can be used to form the basis of grant applications (Section 6);
• Suggestions on how to engage the community (Section 6);
• Other considerations for future work to further local understanding of the Rutherglen brolga population and their habitat use and requirements (Section 6);
• Resources for farm dam construction and enhancement to create brolga breeding habitat (Appendix 1).
• Resources for brolga-friendly fending (Appendix 2).

2. Existing brolga habitat in Rutherglen surrounds

2.1 Wetland habitat in the region

The majority of suitable, and potentially suitable, wetland habitat for brolgas appears to be concentrated north-east of Rutherglen town centre and west of Rutherglen between Black Swamp, Diddah Diddah Creek, Murray River and Ovens River. The area contains breeding and non-breeding habitat and a maximum of eight brolgas has been recorded at any one time.

2.2 Breeding habitat

Brolgas prefer shallow, herb-dominated, freshwater marshes and meadows for breeding (White 1987, Corrick 1982, Marchant and Higgins 1993). Maintaining water levels in breeding wetlands until fledging is likely to be important for post-hatching chick survival (Herring 2005). Brolgas nest in wetlands with water levels of 0.2 – 0.7 m and dense emergent vegetation of about 90 cm high and 25% aerial cover (Herring 2005). Incubation in brolgas takes a month and chicks fledge at 12-14 weeks (Marchant and Higgins 1993). Thus a minimum required length of wetland inundation is 4-5 months to enable successful breeding (defined as survival of chicks to fledging).

Predation by the Red Fox is considered to be the main factor contributing to chick mortality and low breeding success (Arnol et al. 1984, Herring 2001, Myers 2001, DuGuesclin 2003), although chick mortality due to native predators is unknown. Known native predators of brolga chicks in Victoria include birds of prey such as Whistling Kite (*Haliastur sphenurus*) (Herring 2005), Little Eagle (*Hieraaetus morphnoides*) (Parks Victoria, Serendip Sanctuary) and Wedge-tailed Eagle (*Aquila audax*). Herring (2001) lists a number of other likely predators of chicks and eggs: Purple Swamphens (*Porphyrio porphyria*), Swamp Harriers (*Circus approximans*), ravens (*Corvus spp.*), goannas (*Varanus spp.*) and Water Rats (*Hydromys chrysogaster*). There is some evidence that fox control may have little to no effect on brolga breeding success (Herring 2001, Myers 2001), suggesting such programs should be monitored to ensure fox control is effective in increasing brolga chick survival and fledging.

Brolga breeding has been recorded at four sites in the Rutherglen region (Figure 1):

• Walsh’s Swamp;
• Wetland on disused gold mining site on Gooramadda Road;
• Hiskin’s Swamp
• Wetland at Great Southern Road.

One pair breeds in the region regularly and is known to move between the Gooramadda Road wetland (which appears to be a favoured breeding site), Walsh’s Swamp and Hiskin’s Swamp (Jenny Davidson pers. comm.).
The breeding wetlands are described in more detail in the below sections. An additional wetland on Police Paddock Road, which may provide breeding habitat, was also visited in February 2016.

Figure 1. Google Earth map showing the three known breeding sites (cyan circles) near Rutherglen (Walsh’s Swamp, wetland at a disused gold mine site, Great Southern Road) and another wetland used by a breeding pair with a chick (Hiskin’s Swamp).

Walsh’s Swamp

Walsh’s Swamp is covenanted by Trust for Nature and is located on the corner of Humphreys Road and Walsh’s Road, some 3.3 km from Rutherglen town centre (Figure 2). The wetland has a drain through it (east-west) (Figure 3). Water drains to the north (north-west) across Walsh’s Road, through remnant block of vegetation, across Eggleston’s Road and eventually into the Murray River.

Brolgas have successfully bred at Walsh’s Swamp in the past, moving there after having their nest trampled at Hiskin’s Swamp (2011). More recently, the pair bred at Walsh’s Swamp in 2016 after their nest at Gooramadda Road wetland drowned. The chicks, however, did not survive to fledging in 2016 (Jenny Davidson pers. comm.).

Due to the drain, this wetland is unlikely to hold sufficient amount of water for brolga breeding every year, though may do so in very wet years (such as in 2016). When it does hold water, it may dry before the end of the breeding season and before chicks fledge. Evidence of this exists from a previous brolga breeding event when the pair walked to Hiskin’s Swamp with a pre-fledged chick due to Walsh’s Swamp drying out.
Wetland on disused gold mining site on Gooramadda Road

This site is located on Gooramadda Road, approximately 2.5 km north-east of Rutherglen town centre. This site was historically used for gold mining and contains two deeper wetlands with shallow edges (Figure 4). These wetlands are likely to hold some water throughout the year, and will contain water when other wetlands in the region are dry (Jenny Davidson pers. comm.). Signs of past land use and disturbance is evident and current land use includes sheep and cattle grazing. The introduced spiny rush (*Juncus acutus*) is dominant, and forms dense clusters around and in the wetlands. African boxthorn (*Lycium ferocissimum*), Phalaris and scattered eucalypts are also present along the edges (Figure 5). The wetlands are filled as water drains northwards from the town.
A pair of brolgas has successfully bred at this site for the past 4-5 years and raised a clutch of two chicks in 2014 and 2015 breeding season (Jenny Davidson pers. comm.). In the past, a pair built a nest on the edge of the wetland but failed, and has since nested on small islands among spiny rush in the northernmost wetland (Figure 4). The pair with chicks is regularly seen feeding in the surrounding paddocks, and is also likely to roost in the wetland given the presence of permanent water.

Figure 4. Known, regular, breeding site of brolgas at Gooramadda Road at an old gold mine site. Brolgas nest on the islands amongst clumps of spiny rush (photo by Inka Veltheim).
Hiskin’s Swamp

Hiskin’s Swamp is on the corner of Kilborn Road and Gooramadda Road. The wetland has an island in the middle. A mixed species flock of waterbirds was roosting on the island during the February 2016 site visit. The wetland edges are shallow and well vegetated with *Eleocharis* sp. and other native wetland plants, and the island is mostly devoid of vegetation (Figure 6). Surrounding land use is grazing and dams are located on the western and southern part of the wetland.

Water appears to flow into Hiskin’s Swamp from the south and is connected to the Gooramadda Road disused gold mine wetland, another known brolga breeding site. Water flows from Hiskin’s Swamp to the east, across a wetland on Great Southern Road adjacent to Hiskin’s Swamp, and to the north, eventually flowing to Murdering Hut Creek. A smaller wetland immediately to the west of Hiskin’s Swamp, next to a large dam, has a drain through it.

Brologas nested on the island in Hiskin’s Swamp in 2011. Cattle trampled the nest and the pair relocated to Walsh’s Swamp, but returned to Hiskin’s Swamp with the pre-fledged chick when Walsh’s Swamp dried up (Jenny Davidson pers.comm.). The family group also used a paddock north of the wetland.

Hiskin’s Swamp has been known to dry up during summer/autumn and during drought years. In April 2015 it was dry, however, a group of seven brologas was recorded there in May 2015. The wetland also supports other waterbirds and frogs. During the February 2016 field visit, a pair of adult brologas was observed in the southern part of the wetland. Diversity of waterbirds...
was also present, roosting on the island, around the dam banks and using the open water. These included Eastern Great Egret (*Ardea modesta*), Yellow-billed Spoonbill (*Platalea flavipes*) and Royal Spoonbill (*Platalea regia*), Australian Pelican (*Pelecanus conspicillatus*), Grey Teal (*Anas gracilis*), Australasian Grebe (*Tachybaptus novaehollandiae*), Straw-necked Ibis (*Threskiornis spinicollis*) and Australian White Ibis (*Threskiornis molucca*). Glossy Ibis (*Plegadis falcinellus*) has also been previously recorded.

Figure 6. Hiskin’s Swamp provides habitat for breeding and non-breeding brolgas as well as a diversity of other waterbirds, frogs and native wetland plants, such as *Eleocharis* sp. (photo by Inka Veltheim).

**Wetland at Great Southern Road.**

This unnamed wetland is located to the east of Hiskin’s Swamp, across Gooramadda Road and Great Southern Road. It was not visited in February 2016. However, brolgas have nested in this wetland once and the young hit power lines (Rachelle Enever pers. comm. via Jenny Davidson).

**Police Paddock Road wetland**

Several wetlands are present along both sides of Police Paddock Road. One was visited in February 2016 and was judged to contain potential breeding habitat and non-breeding habitat. The wetland has a dam in the middle, shallow edges and a band of vegetation (*Eleocharis* sp., rushes) approximately 30 metres wide around its perimeter (Figure 7, Figure 8).
2.3 Non-breeding habitat

During the non-breeding season brolgas use wetlands and dams as night roosts as well as for roosting during the heat of the day (White 1987, Sheldon 2004, I.Veltheim unpubl. data). They generally forage in cropping and grazing fields during the day (White 1987, Sheldon 2004) and are known to feed on grain, corn, legumes, potatoes and invertebrates (Pizzey 1994, I. Veltheim, unpubl. data). Roost sites consist of deep freshwater marshes and
permanent open water habitats with shallow edges and usually with low cover of emergent vegetation, as well as farm dams (Sheldon 2004, I. Veltheim pers. obs.). Brolgas are likely to use this type of habitat in the Rutherglen during the non-breeding period (December to May).

Brolgas are regularly observed during the non-breeding season (December to May) in the Rutherglen area. Sightings consist of pairs or groups of up to eight birds. A pair with juveniles is also frequently observed, suggesting the breeding pairs spend at least some of the non-breeding season in the local region.

Habitat use in the non-breeding season in the Rutherglen region is not as well understood as the local breeding sites. This is mostly due to lack of survey effort at this time of the year. During the April 2015 and February 2016 field visits brolgas were observed at four locations (Figure 9). They were seen using dams and the edges of an open water area associated with a dam (Figure 10, Figure 11). NECMA has additional observations of brolgas in the wider Rutherglen region (Figure 12) and a group of seven was recorded at Hiskin’s Swamp in May 2015.

The Great Northern Swamp was visited in February 2016 to investigate its habitat potential for brolgas. Brolgas have been observed to visit the northern part of the wetland, but it is not clear how regularly. This wetland is essentially a permanent deep-water storage mostly lacking in shallow edges. It is not considered to support brolgas regularly. The shallow southern edge may provide roosting habitat, albeit its extent is limited. The Great Northern Swamp is likely to support waterbirds that prefer deep water, such as Musk Ducks (*Biziura lobata*) and grebes, which were observed during the visit. A Black-winged Stilt (*Himantopus himantopus*) and Black-fronted Dotterel (*Elsevornis melanops*) were observed using the shallow, muddy habitat on the southern edge.

![Google Earth map showing locations, number and age of brolgas seen during recent field visits (magenta circles). Known breeding sites are also shown (cyan circles).](image-url)
Figure 10. Brolgas using a dam overflow area between Police Paddock Road and Cullens Lane (photo by Inka Veltheim).

Figure 11. Brolgas were found using this dam on Gooramadda Road, located just south of Hiskin’s Swamp (photo by Inka Veltheim).
3. Current threats

3.1 Breeding habitat

Walsh’s Swamp

As with many shallow wetlands in Victoria, Walsh’s Swamp has a drain through it, which alters its natural hydrology. The presence of the drain reduces the wetland’s water holding capacity and sufficient water may not be present for long enough to enable successful breeding of brolgas. In its current state as seen during field visit, Walsh’s Swamp is unlikely to regularly support breeding brolgas. Currently the wetland is not being grazed, which has resulted in overgrowth of grassy vegetation (Jenny Davidson pers. comm.).

Wetland on disused gold mining site on Gooramadda Road

This wetland is regularly used by a breeding pair, which frequently raise young to fledging (Jenny Davidson pers. comm.). The wetland has a high water holding capacity and is likely to have sufficient amount of water consistently, and for long enough (4-5 months), to enable successful breeding. The main threat to pre-fledged chicks at this site is likely to be predation by foxes and potentially by native predators (see Section 2.2), which may reduce breeding success. Another threat noted by Jenny Davidson is collision with nearby power lines and a nearby proposal for a residential development, which will overlap with areas used by the brolgas. Old fences, which may increase collision and entanglement risk, are also present (Figure 13).
Hiskin’s Swamp

Hiskin’s Swamp provides suitable habitat for breeding and non-breeding brolgas, as well as a diversity of other waterbirds and frogs. The main threat to brolgas during the breeding season is potential trampling of the nest due to stock access to the wetland. Collision with power lines and fences is also a potential threat. Power lines are located to the east of the wetland and brolgas are known to cross over and collide with them along the Gooramadda Road and Great Southern Road. Power lines adjacent to Hiskin’s Swamp have been marked recently, in an effort to reduce such collisions.

A new ring lock/barbed wire fence has recently been built on the northern side of the wetland (Figure 14). The fence may inhibit movements of breeding brolgas, increase risk of predation of chicks if they become separated from their parents, and there may be a risk of collision or entanglement with the top wire.
3.2 Non-breeding habitat

Little is known currently about non-breeding habitat used by brolgas in the Rutherglen region. It is therefore difficult to assess threats to them. The presence of open water and wetlands with shallow edges, which are suitable as day and night roosts, is important. Availability of food (e.g. grain, invertebrates) in areas surrounding roost sites is also important in maintaining non-breeding groups in the Rutherglen region.
Main general threats to non-breeding sites are likely to be:

- altered hydrology, which may result in poor water holding capacity over the summer months; and
- disturbance from human activity.

4. Recent management actions

4.1 Breeding habitat

Walsh’s Swamp

Approximately 800 meters of power line has been marked adjacent to Walsh’s Swamp to reduce collision risk across Humphreys Road.

Wetland on disused gold mining site on Gooramadda Road

Fox control has been undertaken at this site and in the surrounding properties by local landholders Don Nash and Keith Buckingham. Five foxes in total were shot or baited in the 2015 brolga breeding season (Don Nash pers. comm.)

Hiskin’s Swamp

Approximately 200 metres of power line have been marked at the eastern end of Hiskin’s Swamp, along Great Southern Road.

Wetland at Great Southern Road

None that are known.

Police Paddock Road wetland

None that are known.

4.2 Non-breeding habitat

None that are known.

5. Constraints and opportunities

5.1 Breeding habitat

Walsh’s Swamp

Walsh’s Swamp is covenanted by Trust for Nature and the covenant does not allow modifications. Thus, restoring the hydrological regime by blocking or filling the drain is very unlikely to be an option at this site. In addition, the recent tree plantings may be affected if the natural water regime is returned. Given the money and resources already spent, it may not be
wise to make changes at this site, but to focus habitat enhancement and management efforts at other sites in the Rutherglen area.

The decision on whether to actively manage this site for brolgas is thus largely dependent on what other values are currently present and opportunities for restoring the water regime. There are potential opportunities to restore some of the wetland’s water holding capacity, as the landholder has expressed interested in doing this.

**Wetland on disused gold mining site on Gooramadda Road**

Although the wetland is dominated by weedy vegetation, it is likely to provide some protection for the nest and growing chicks. On the other hand, it also provides habitat for rabbits and foxes and may spread. Thus the main constraint at this site is how to manage the invasive species while ensuring brolga breeding habitat values are maintained. Opportunities for habitat enhancement and management could include concurrent weed control and planting of native wetland vegetation.

This site provides opportunities for ongoing fox control – particularly during the breeding season. However, undue disturbance around the site should be avoided while the brolgas are breeding and baiting may be more appropriate near the nest site, compared with shooting. Success of fox control programs in relation to brolga breeding success should be monitored, to ensure such programs are effective.

The site provides potential opportunities for larger scale wetland restoration and planting to increase its area and value to brolgas and other wetland species. Such works could extend from the north-eastern part to the south-western part of this parcel of land (Figure 15). The site provides opportunities for retaining deeper water areas, connecting wetlands, creating shallow edges and shallow inundated areas next to dams. Stock should be excluded from the breeding habitat – currently stock access is not managed and cattle can get into the wetland.

The main constraint at this site is the land tenure and proposed residential subdivision. The breeding wetland is Crown Land and the surrounding land is in private ownership, with proposed lots extending to the edge of the brolga breeding and foraging habitat. This proposal is likely to reduce the quality of the breeding site and potentially impact on the pair’s breeding success.
Hiskin’s Swamp

The main constraint at Hiskin’s Swamp is ensuring the landholder’s requirements are compatible with brolga habitat management. Opportunities exist to control stock access to the wetland. Excluding stock during breeding season will reduce the risk of nest trampling, negative impacts of stock such as soil compaction, loss of and damage to wetland vegetation, general wetland degradation and disturbance to waterbirds (Herring n.d.). Opportunities at this site may also include providing stock with alternative water sources, such as troughs, outside of the wetland. Additional opportunities for enhancing and creating more wetland habitat exist in the southern part of the wetland, near a dam (Figure 16).
Wetland at Great Southern Road.

Little is known about the constraints and opportunities at this site. However, the landholders are sympathetic to brolgas (Jenny Davidson pers. comm.), which provides potential opportunities for engaging them in brolga habitat management. Aerial photography suggests that land adjacent to the wetland where brolgas have bred before could be modified to provide a larger wetland area, incorporating shallow areas (Figure 17). Wetland plantings could be used to increase its suitability to brolgas and other wetland wildlife.

Figure 17. Google Earth map showing potential area of enhancing and creating additional wetland habitat at a wetland adjacent to Great Southern Road (breeding record shown as cyan circle).

Police Paddock Road wetland

Little is known about this site currently. It appears suitable for supporting breeding brolgas. This site has recently been sold to a landholder who appears sympathetic to brolgas. Opportunities may thus exist to work closely with the landholder to enhance and manage the wetland for brolgas and other wetland wildlife.

5.2 Non-breeding habitat

Little is known currently about non-breeding habitat used by brolgas in the Rutherglen region. It is therefore difficult to identify constraints and opportunities. Brolgas have been observed using Hiskin’s Swamp during the non-breeding season, so constraints and opportunities for that site apply (see Section ‘5.1 Breeding habitat’). The dam on Gooramadda Road, where brolgas were observed in February 2016, may offer opportunities to connect to Hiskin’s Swamp. Such works could increase the wetland’s area and suitability for feeding and roosting during the non-breeding season (Figure 18).
6. Recommendations

6.1 Breeding habitat

Walsh’s Swamp

- Short-term

Due to the limited opportunities for restoring the water holding capacity of Walsh’s Swamp, it is recommended that no changes be made at this site. Focus should instead be on other known and potential sites in the Rutherglen region.

The site could, however, be monitored for its year-to-year suitability as a breeding site. This could form part of a school educational program, incorporating monitoring of water levels and brolga breeding events. Such a program could provide information on how frequently the wetland holds sufficient amount of water for breeding brolgas, and identify its importance as a breeding site in the Rutherglen region.

- Long-term

Discussions between Rutherglen Landcare, Trust for Nature (TFN) and NECMA should explore whether any opportunities exist to restore Walsh’s Swamp water holding capacity. These discussions may require liaison with the region’s water authority. An agreement on the values to be managed at this site should also be made – i.e. should it be managed in the future for brolgas or other biodiversity values, which the TFN plantings may support. The results of such discussions can provide future management priorities and directions for this site.
Wetland on disused gold mining site on Gooramadda Road

• Short-term

This wetland is important in the region, as it reliably supports successfully breeding brolgas. Managing this site to retain and enhance its values for brolgas, and to reduce mortality, should therefore be of high priority. Fox control should continue and is important during the breeding season to reduce the risk of chick predation. The success of fox control programs should be monitored to gauge their effectiveness on improving brolga breeding success.

Old and unnecessary fences should be removed, provided this does not influence requirements of adjacent landholders to control stock movements. This would reduce potential collision risk for the brolgas.

Control stock access to the wetland/s and prevent access when breeding brolgas are present.

• Long-term

Develop a staged plan for weed removal, which would involve replacing invasive weeds with local native plants suitable for wetlands and wetland edges. A staged approach is recommended to avoid removing all vegetation at once, which may provide protection for growing chicks. Planting shallow edges with suitable wetland species is also recommended. Such plantings can provide habitat for aquatic vertebrates and invertebrates, which in turn provide food for brolgas and other wetland birds, as well as protection for brolga chicks before they fledge. Prior to planting, water quality assessment is recommended as the presence of spiny rush suggests that the soil or water is saline. Any works to remove and plant vegetation should be undertaken outside of the breeding season (i.e. during summer/autumn) to avoid disturbance.

Investigate potential for restoring and rehabilitating a larger wetland area to connect wetlands on the site (Figure 15). Increasing suitable habitat area may be particularly important for brolgas, given the proposed development on the adjoining land. Any such works should be undertaken during the brolga non-breeding season to avoid disturbance (i.e. during summer/autumn). Explore possibilities for increasing and managing flow into restored/created wetland areas by draining surface water off Gooramadda Road.

If low-density residential development goes ahead, appropriate buffer around the wetland should be created to protect brolga habitat and disturbance from humans and domestic pets. This would require investigating space use of the local brolga pair, e.g. by colour marking, GPS-tracking and/or frequent observations to understand home range use and requirements. Alternatively, existing knowledge of home range area requirements of brolgas from south-west Victoria could be applied. Engage with the local Council early and work towards protecting brolga habitat if the development is granted approval.

Hiskin’s Swamp

• Short-term

Consider marking the top wire of fences around the wetland. Ensure that a sufficient length of power line has been marked. The corner of Gooramadda Road, Great Southern Road, Kilborn Road and Savage Road is a high collision risk area for brolgas where a number of collisions have occurred in the past. Marking the power lines will also reduce collision risk of other waterbirds using Hiskin’s Swamp and surrounding wetlands.
• Long-term
Investigate opportunities with the landholder to exclude stock and to provide alternative water sources for stock outside of the wetland.
Investigate opportunities for enhancing and creating habitat in the southern portion of Hiskin’s Swamp (Figure 16, Figure 18). Explore possibilities for increasing and managing flow into restored/created wetland areas by draining surface water off Gooramadda Road.

Wetland at Great Southern Road
• Short-term
Identify site-specific threats, constraints and opportunities, including water-holding capacity. Engage with the local landholders and explore potential for habitat enhancement works.
Ensure sufficient length of power line has been marked around this site, given previous collisions.
• Long-term
If landholders are interested and willing, enhance and increase the area of this wetland and plant it with native wetland vegetation. Explore possibilities for increasing and managing flow into the current, as well as restored/created, wetland areas by draining surface water off Gooramadda Road and Great Southern Road.

Police Paddock Road wetland
• Short-term
Identify site-specific threats, constraints and opportunities, including water-holding capacity. Engage with the local landholders to manage the site for brolgas, such as stock exclusion during the breeding season.
• Long-term
Engage with the new landholders and explore possibilities for ongoing management of this wetland.

6.2 Non-breeding habitat
• Short-term
Due to the gap in knowledge about non-breeding habitats and roost sites, identify day and night time roosts, site-specific threats, constraints, opportunities, and water-holding capacity of these sites.
Identifying roosts could be done by detailed observations at potential sites – i.e. those that have deep, permanent and open water with shallow edges for roosting. Roosts can also be identified by observing brolgas in feeding areas (generally paddocks with grain), waiting until they depart to roost, and following birds to the roost. This is likely to require several days of observation during the non-breeding season and could potentially be undertaken by interested members of the community or local, experienced, bird observers.
Aerial imagery and wetland GIS layers indicate there may be potential non-breeding roost habitat south and east of Rutherglen, i.e. permanent water bodies with shallow edges (Figure 19). Further field assessment and surveys are recommended, to identify how likely these sites are to support brolgas.

- Long-term

See long-term recommendation for Hiskin’s Swamp, and opportunities for enhancing a dam on Gooramadda Road (Figure 18).

![Figure 19. Google Earth map showing potential brolga roost sites to be investigated further.](image)

### 6.3 Community activities and engagement

Further information on habitat use and potentially suitable habitat should be gathered. It is important to understand whether:

- other brolga pairs stay in the Rutherglen region during the breeding season;
- other pairs attempt to breed, and whether they are unsuccessful if they do breed;
- Rutherglen brolgas are part of a larger subpopulation, or group, in the wider region (northern Victoria/southern New South Wales), or whether they remain resident near Rutherglen.

This can inform creation, enhancement and management of brolga habitat. Engaging community with brolgas, wetland birds and other regional biodiversity is likely to result in local ownership of these natural values and in better outcomes in managing and enhancing the region’s wetland habitat.

Community members, local schools and landholders could participate in the following activities at known and potential brolga breeding habitat sites, which would increase knowledge about the local brolga population:
• Camera surveys at breeding wetlands, an potential non-breeding wetlands;
• Observational surveys during non-breeding and breeding season;
• Monitoring water levels and quality, and relating them to brolga use of the wetland habitats;
• Recording observations onto a ‘brolga’ calendar (e.g. similar to one used in south-west Victoria);
• Recording other species, including threatened species.

In addition, landholders sympathetic to brolgas, and interested in creating and enhancing habitat, could actively participate in managing the local population.

Signage and brochures about the brolgas in the region could be displayed in Rutherglen town, near information boards, at information centres and local businesses.

6.4 Other general considerations for further work in the long-term

Landscape scale study of movements, habitat use and wetland dynamics

There are potential opportunities for encouraging more breeding pairs into the Rutherglen region by creating additional breeding habitat. Minimum of six adult brolgas are regularly seen and one pair is known to nest. Creating breeding habitat in an area already used by these individuals may encourage brolgas to breed locally. However, a better understanding of used and available habitat and their suitability for brolgas is needed in the Rutherglen region.

Further work involving surveys, community engagement and studies into brolga movements could greatly increase knowledge and identify opportunities for attracting more brolgas into the Rutherglen region.

A landscape level approach is likely to prove most successful, if the main objective is to attract brolgas into the Rutherglen region by creating additional habitat. Brolgas occur at nearby sites in Corowa (NSW), Tungamah (VIC) and Katamatite (VIC). A tracking project across these sites is recommended to firstly understand whether several pairs remain in Rutherglen and attempt to breed. In such a case, creating new habitat and enhancing existing breeding sites could potentially increase the Rutherglen breeding population and boost the northern Victorian brolga population. Secondly, as the Rutherglen brolgas are part of a larger population in north-east Victoria/south-east New South Wales, an understanding of movements, habitat use and juvenile dispersal, across the wider region is important. Such information can help identify key wetland habitats used throughout brolgas’ life cycle and thus direct landscape scale management of the population and key wetland habitats.

A landscape scale study to investigate year-to-year presence and dynamics of suitable wetland habitat could also be undertaken using spatial mapping (e.g. Landsat), to identify additional potential brolga habitat.

Summary

The Rutherglen region supports a small group of brolgas, which are part of the north-east Victorian population. There is a lack of comprehensive knowledge of brolga habitat use in the region, which could be improved with a number short- and long-term projects outlined in this report. Such projects are likely to improve long-term outcomes for maintaining the local brolga population into the future.
References


Myers, A. *Factors influencing the nesting success of Brolgas, Grus rubicundus, in Western Victoria*. Honours thesis. School of Ecology and Environment, Deakin University, Burwood.

Appendix 1. Resources for managing, creating and enhancing brolga breeding habitat

Characteristics of brolga breeding habitat, based on work by Herring (2001, 2005) and Myers (2001) (slides from a presentation given by Inka Velttheim to Rutherglen Landcare and NECMA) (Photo credits: Slide 1, top: Matt Herring, bottom: Inka Velttheim; Slide 2, Inka Velttheim; Slide 3, left: Matt Herring, right: Inka Velttheim).

Breeding habitat

- Freshwater meadows
- Shallow freshwater marshes
- Flood for 2-6 months, then dry
- Mean water depth 0.3 m (sw Vic), 0.5 m (ne Vic)
- Little to no tree cover
- Area: <5 ha – >50 ha (sw Vic), 115.2 ha (ne Vic)

Breeding habitat

- Dense emergent vegetation, about 0.9 m in height and 25% aerial cover (Herring 2001)
- Wetland complexes
  - important (Herring 2001, Velttheim unpublished data)
Creating brolga breeding habitat. Figures from Herring (2005), reproduced here with permission, based on suggestions for creating and enhancing brolga habitat by Arnol et al. (1984) and Herring (2001).
The following resources contain practical management guidelines for creating and managing habitat for biodiversity, including brolgas, on farm dams. They can be accessed and downloaded using the provided links.


Appendix 2. Resources for brolga-friendly fencing

Things to consider if fencing brolga breeding wetlands (slide from a presentation given by Inka Veltheim to Rutherglen Landcare and NECMA) (Photo credits: Slide 1, top: http://ozcranes.net/consv/fences.html, bottom: Inka Veltheim).

If wetlands are fenced to manage stock, the following resources should be used to guide decisions about fence types and designs.


Arnol et al. (1984) provides recommendations for fencing types and designs that enable movement of brolgas between nesting, roosting and feeding habitat at breeding wetlands.