



Understanding the impact of seasonality on waterbird abundance and how this may affect responses to environmental water.

Aim

To describe the seasonality of waterbird abundances in Victoria quantitatively, to inform the planning and evaluation of environmental watering in wetlands.

Background

There is currently a limited understanding of how seasonality affects the abundance of waterbirds in wetlands which receive environmental water. Data which are available however indicate that the effects are substantial. For example, long-term monitoring of waterbirds at a few near-coastal wetlands in Victoria indicates clear patterns in seasonality of waterbird occurrence, which differ between species. For many species, bird numbers at some times of year are a small fraction (e.g. <10%) of those found at peak times of year.

During WetMAP Stage 3, monitoring of waterbirds in many northern Victorian wetlands which receive environmental water indicated similar patterns. While these seasonal patterns have been described in general terms for a few species, no quantitative analysis of existing long-term datasets has occurred. Studying data from consistently watered sites (e.g. sewage treatment plants) can be particularly helpful when analysing bird seasonality, given it is not complicated by within-year fluctuations in bird numbers because of local changes in water levels.

Investigating bird seasonality patterns must consider the enormous diversity of migration strategies. These can include predictable movements of birds between breeding and non-breeding areas, as well as irregular patterns and routes which can link to temporary breeding sites when conditions are favourable.

Wetland monitoring and assessment program for environmental water

Research questions

Research questions target knowledge gaps about the seasonal movement of waterbirds and the design of annual environmental watering to benefit these birds:

1. At what time of year do waterbird numbers (by species) peak in Victorian wetlands, especially in wetlands identified as assets for environmental water management?
2. Does the timing of these peaks differ between wetlands, especially those in coastal and inland Victoria?
3. Does the timing of these peaks vary from year to year (implying nomadism or facultative migration) or is it strictly predictable (obligate migration or resident status)?
4. How many categories of phenology (in terms of timing of occurrence, and inter-annual variation in this timing) can be identified amongst Victorian waterbird species and which of these can be influenced by environmental water management?
5. How can environmental watering be optimised, particularly the timing of the inundation for waterbird outcomes/objectives (by species, or by the phenological category)?
6. How can the monitoring of the ecological responses of waterbirds to environmental watering be optimised in terms of timing, cost and information value?

Approach

- Identify and analyse relevant bird datasets, working with collaborators who have supported development of long-term waterbird count data (notably Birdlife Australia and Melbourne Water). These datasets include regular waterbird counts from sites with consistent water levels (including previous WetMAP data and other ARI datasets), and Birdlife Australia's Atlas database of presence/absence records (Birdata).
- Using these data, identify:
 - o Estimates of periods of peak numbers, arrival time and departure time for each waterbird species, and estimates of the variability of these factors
 - o The migratory status of different species of waterbirds (i.e. obligate migrants, nomads, facultative migrants, and variations of these)
 - o The optimal timing of environmental watering for waterbirds
 - o The optimal timing of waterbird monitoring to assess the effectiveness of environmental watering.

Data availability is geographically patchy, given the historical focus on monitoring wetlands that support threatened species, are the focus of conservation work, or are easily accessed by birdwatchers. However, the high mobility of most waterbird species means that the findings will be transferable to other sites across the state.

Timeline November 2021 to November 2022

Outputs

- **A revised conceptual model** clarifying the relationship between environmental water management and ecological responses of waterbirds.
- **Project updates** will be provided to waterway managers on request to allow them to adjust their immediate decisions regarding environmental watering during the year.
- **A final report** summarising the project approach, findings and recommendations for waterbird management.

Outcomes

- Specific advice to inform seasonal and annual watering decisions to benefit waterbirds.
- Recommendations on the time intervals at which the presence of water in wetlands (which receive environmental water) would be beneficial to waterbirds.
- Recommendations on time intervals in which peak numbers of waterbirds can be assessed by monitoring programs in these wetlands.

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Red-necked Avocets, Grey Teal and Pink-eared Ducks