



## Management of the Ramsar-listed Vasse-Wonnerup wetlands

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### Background

The Vasse-Wonnerup wetland system at Busselton supports approximately 35,000 waterbirds each year and on this basis is listed as a Wetland of International Importance under the *Ramsar Convention on Wetlands*. There is a long history of mass fish deaths during summer in the lowest reaches of the system. The frequency and severity of these incidents can be reduced by timely openings of the Wonnerup Inlet sandbar and two sets of floodgates on the estuaries' exit channels. Careful management of seawater inflows and estuary water levels is needed to prevent adverse impacts on fringing vegetation, waterbirds and adjoining low-lying properties. Following a mass fish kill in 1997, the former Department of Conservation and Land Management, now the Department of Environment and Conservation (DEC), formed an inter-agency technical working group to co-ordinate the activities of relevant agencies. The history of management of the system was reviewed, agency roles were clarified, operational refinements introduced, vital monitoring programs established and essential investigations were initiated.



The fish kill of 1988. © C. Bywaters.

### *Objectives and achievements*

The principal objective of this program of interrelated research, management and monitoring activities is to maintain Vasse-Wonnerup's capacity to support the tens of thousands of waterbirds on which its continued listing as a Wetland of International Importance depends. Associated objectives are the prevention of fish kills, the retention of fringing vegetation and the avoidance of impacts on adjoining lands. Principal activities and achievements since 1997 have been as follows:

- Formation of the Vasse Estuary Technical Working Group, convened by DEC Science Division with representatives from the Water Corporation, the departments of Water, Fisheries and Agriculture, Busselton Shire and Geographe Catchment Council. This group meets annually.
- Comprehensive review of the history of Vasse-Wonnerup fish kills; sandbar openings; floodgate design, construction, replacement and operation; water levels, flows and salinities and previous efforts to prevent mass fish deaths.
- Refinement of the Water Corporation's sandbar opening and floodgate operational guidelines of 1990 to reduce the incidence of fish kills without impacting adversely on Ramsar Site values.
- Establishment of summer water level, temperature, salinity, dissolved oxygen, microalgae and fish monitoring programs to continually assess environmental conditions for fish.
- Adoption of coordinated, multi-agency response, investigation and cleanup arrangements to be implemented in the event of further fish kills.

- Advice to the Water Corporation concerning design of replacement floodgates to incorporate improved water level monitoring, flow control, fish monitoring and fish escape mechanisms.
- Surveys during 1998-2000 to assess Vasse-Wonnerup waterbird numbers and species diversity following implementation of the refined water level management guidelines.
- Simultaneous profiling of water depths and salinities during 1998-2000 to ascertain waterbird preferences and tolerances and to develop an improved understanding of the hydrology of the system and the potential to impact on adjoining properties.
- Continuous monitoring of water levels on the downstream (tidal) and upstream (non-tidal) sides of the estuaries' floodgates to identify optimal timing for fish releases and for water quality improvement in the Vasse estuary exit channel through controlled tidal flushing.
- Surveys of submerged aquatic plant and microalgae species composition, distribution and abundance and nutrient concentrations in November 2006, 2007 and 2008 and February 2009.
- Macroinvertebrate survey in February 2009, timed to coincide with submerged aquatic plant and waterbird surveys of the same month. Submerged aquatic plants and macroinvertebrates are the principal food sources for the waterbirds of Vasse-Wonnerup.
- Survey of sediment nutrient, heavy metal and pesticide concentrations and distributions in February 2008. High levels could be potentially harmful to the food webs that support the waterbirds and to the waterbirds themselves.
- Detailed bathymetric survey of the wetlands and adjoining lands in 2008-2009 so that potential consequences of altered hydrological regimes may be predicted with greater accuracy.
- Documentation of use and management of the wetland system and floodplain for agriculture since the 1830s, as a precursor to preparation of a statutory management plan for the site.

## Management Implications

Effective procedures for improving environmental conditions for fish and for fish release have been developed and are now routinely applied each summer. There have been no mass fish death events in the Vasse-Wonnerup wetlands system during the past decade.

The death of fringing vegetation due to excessive seawater intrusion in the 1990s has been halted and some natural regeneration is occurring. Salting of adjoining farmland has also been prevented.

Vasse-Wonnerup continues to support the tens of thousands of waterbirds on which its listing as a Wetland of International Importance under the Ramsar Convention is based.

Knowledge of the composition and dynamics of the submerged aquatic plant component of the Vasse-Wonnerup food web – and of the substantial threats posed by excessive nutrient levels – has been greatly improved. This will assist other agencies in their efforts to reduce nutrient inputs from the catchment.



Pelicans engage in pre-dawn fish-feeding frenzies each December. © C. Winfield

### Selected reading

- Lane, Hardcastle, Tregonning & Holtfreter (1997). *Management of the Vasse-Wonnerup Wetland System in relation to sudden, mass fish deaths*. Vasse Estuary Technical Working Group report. 55pp.
- Lane (2009). *Monitoring conservation values of a Ramsar wetland: Vasse-Wonnerup wetlands system, Busselton*. Department of Environment and Conservation Science Information Sheet 2/2009.
- Wilson, Chambers, Lane, Clarke & Paling (2008). *Snapshot survey of the distribution and abundance of the macroalgae and macrophytes of the Vasse-Wonnerup lagoons in 2007*. Murdoch University Marine & Freshwater Laboratory Report 08/1.