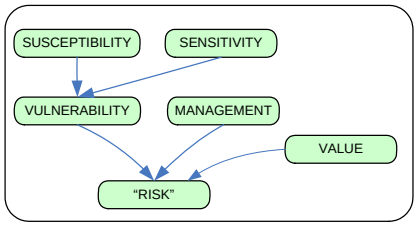
The Wetland Tool



Guidelines for managing risk to wetlands posed by irrigation developments in the Loddon-Murray region 2002-2003

In 2002, DPI developed a 'Wetland Tool' to be used by planners assessing irrigation proposals in the Loddon Murray region in Northern Victoria. The Loddon Murray region contains approximately 100 wetlands many of which are internationally significant and coincide with Torrumbarry Irrigation Area managed by Goulburn-Murray Water (Savage and McNeill 2003). There were concerns that irrigation developments and irrigation practices may threaten the ecology of the wetlands. Rather than producing a generic set of irrigation buffer guidelines covering all wetlands in the region, a risk-based approach was adopted. The LUIM was adapted as a decision support tool, with a user interface called the Wetland tool (Figure 13), for assessing proposed irrigation developments for their potential impacts on individual wetlands.

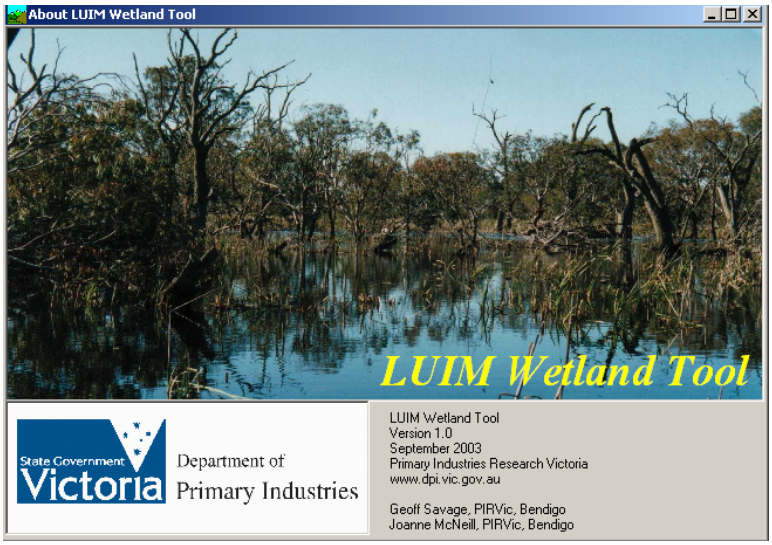


Figure 13 The LUIM Wetland Tool User Interface

Key achievements in this project were:

- Development of guidelines for assessing irrigation proposals for wetland protection.
- Development of the LUIM Wetland Tool planning decision support system.
- The LUIM Wetland Tool was passed on to planners to use in the Loddon Murray region for assessing irrigation proposals.

Elements/data requirements

The scale, purpose and reporting requirements for the wetland risk assessment differed considerably from that of the Victorian Catchment Indicators program (State of Victoria 2001). The purpose of the Catchment Indicators program was the development of a state wide reporting mechanism for catchment condition, whereas the wetland risk assessment project planned to assess the risk to individual environmental assets (wetlands) from specific management systems. Their risk framework needed to incorporate:

- A measure of wetland value.
- Assessment of vulnerability of the wetland to threatening processes.
- A finer scale of assessment (individual wetlands and irrigation proposals).
- A user-friendly front end.

Vulnerability was defined as the product of inherent susceptibility of a wetland to a threatening process, and the inherent sensitivity of a wetland to that threatening process.

SUSCEPTIBILITY × SENSITIVITY = VULNERABILITY

Wetland Value was based on the rating system detailed in Conservation Value of the Wetlands in the Kerang Lakes Area (Lugg *et al*. 1989).

Risk was defined as the product of wetland vulnerability and wetland value.

VULNERABILITY × VALUE = RISK

All of the wetlands in the Loddon Murray irrigation region were assessed for their vulnerability to five threatening processes:

1. Increased groundwater input,
2. Increased surface water input,
3. Increased wetting frequency,
4. Increased wetting duration, and
5. Salinisation.

Assessment process

The main components of the wetland risk assessment were:

- Identification of the inherent vulnerability of the wetland to each of the threatening processes.
- Identification of the wetland and its value.
- Development of the irrigation practice classification rules.
- Classification of irrigation management scenarios for their degradation potential using the LUIM.
- Alignment of the irrigation practice rules against the wetland's vulnerability information to derive a degradation risk using the Wetland Tool.

The process for the combined LUIM and Wetland tool risk assessment is summarised in Figure 14.

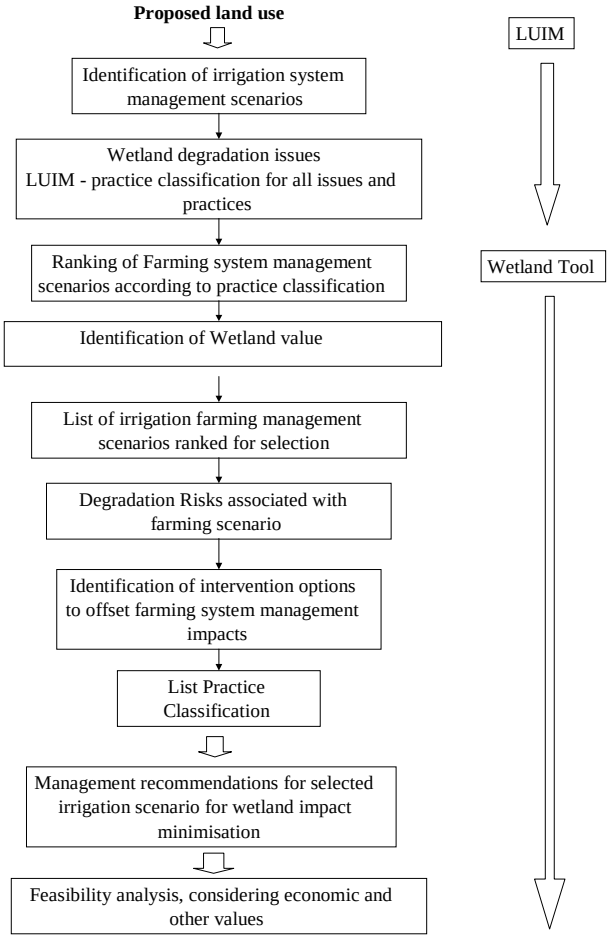


Figure 14 Process for assessing risk to wetlands from irrigation proposals using the LUIM and the Wetland Tool.

Each wetland was assigned a rating for susceptibility and sensitivity to each of the degradation issues using a five class rating system (1= lowest, and 5 = highest). These scores were combined using a matrix, based on the NRE Risk management Strategic Framework (NRE 1999) to derive a vulnerability rating.

Each wetland was also assigned a value, based on the rating system detailed in Conservation Value of the Wetlands in the Kerang Lakes Area (Lugg *et al.* 1989). The vulnerability and value information for each wetland was entered into the Wetland Tool and could be accessed via the user interface (Figure 15).

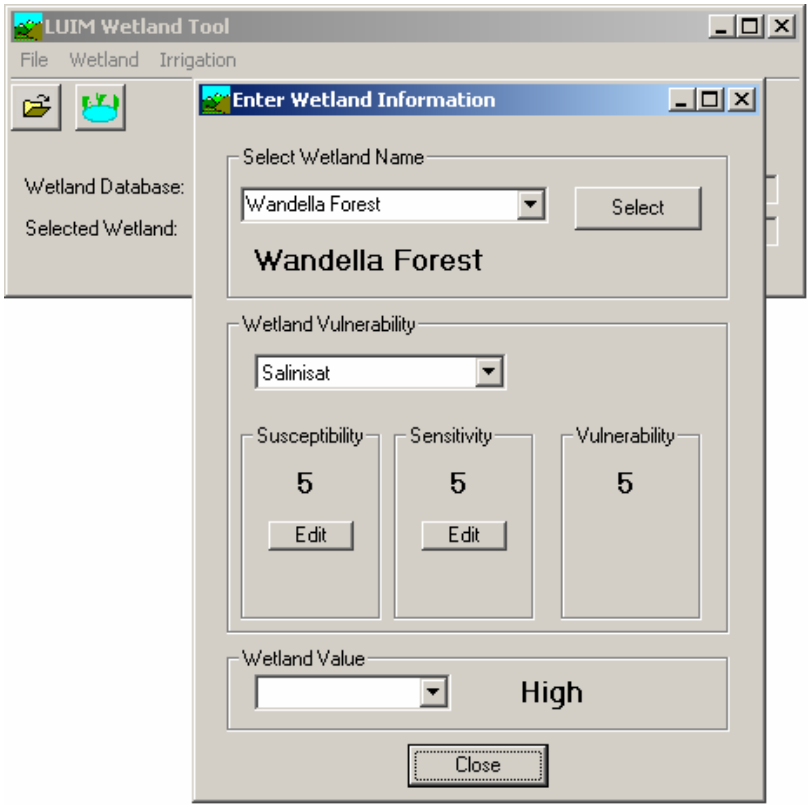


Figure 15 Example of the Wetland Tool User interface and wetland information for the Wandella Forest wetland.

Management practice options for irrigation developments were rated for their relationship to each degradation issue (as for the example in Figure 7). This information was imported into the Wetland Tool and used to rank the management practice scenarios (combinations of practices) from best to worst for each degradation issue. This ranking was based on the number of adverse practices in the scenario, and the strength of the ratings. The Wetland Tool was also populated with the intervention options for each degradation issue.

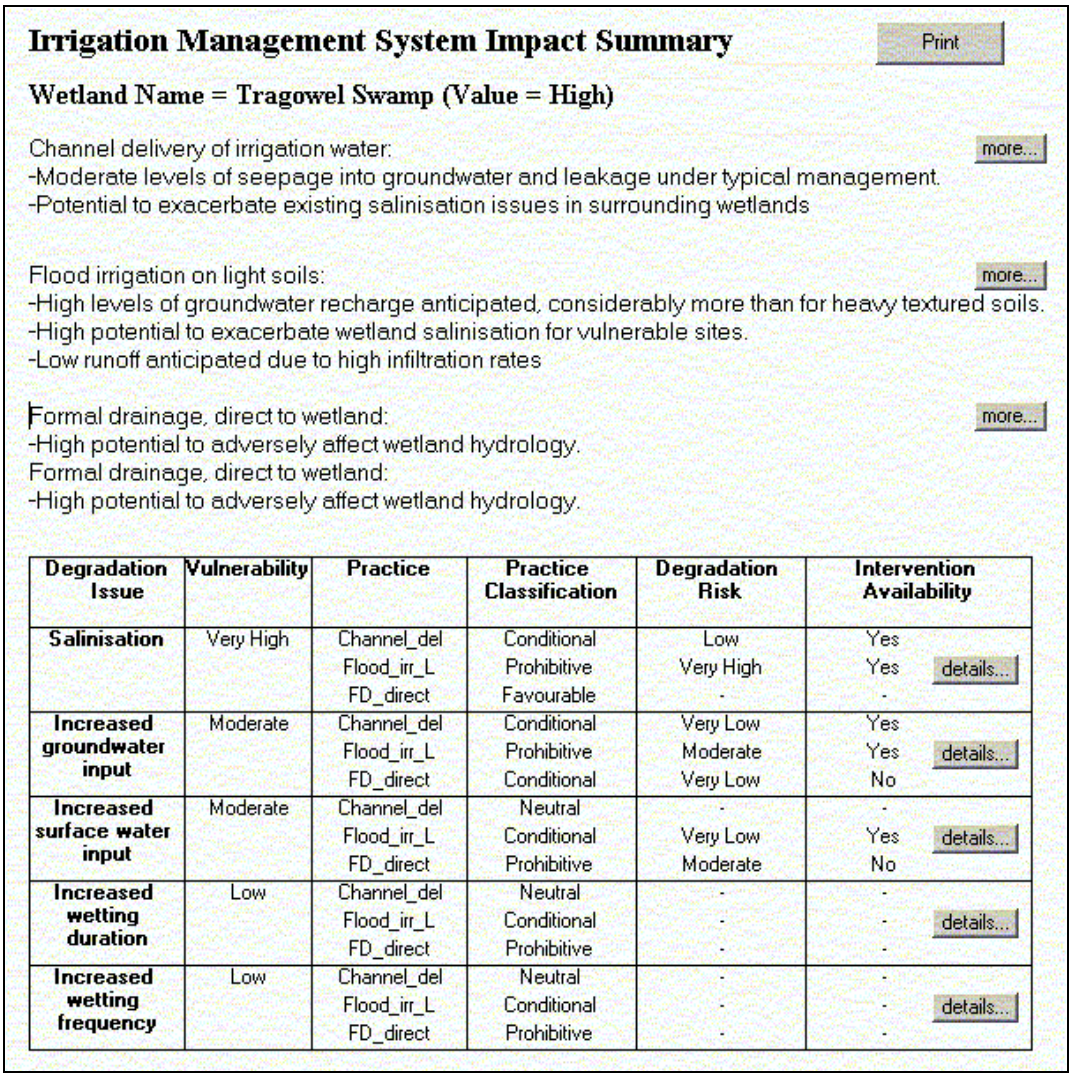
Results

Individual wetlands can be assessed for impact from different irrigation proposals. Using the Wetland Tool, a wetland is selected from the drop down list (Figure 15) and an irrigation scenario selected. A report would be produced (Figure 16) listing the following information:

- Wetland name and value
- Brief description of potential irrigation practice impacts
- Vulnerability rating for each of the five degradation issues
- Irrigation practice classifications
- Degradation risks associated with a particular irrigation practice for each degradation issue
- Availability of intervention practices to offset the degrading practices identified.
- Degradation risk related to the proposed development as well as management recommendations.

The Impact Summary page forms the basis for the guidelines and presents all relevant information for a given wetland and adjacent irrigation management scenario. In the example in Figure 16, the proposed

irrigation practices were piped delivery of the water (Piped_del), flood irrigation on light soils (Flood_irr_L) with formal drainage direct to the wetland (FD_direct).



Irrigation Management System Impact Summary Print

Wetland Name = Tragowel Swamp (Value = High)

Channel delivery of irrigation water: more...
-Moderate levels of seepage into groundwater and leakage under typical management.
-Potential to exacerbate existing salinisation issues in surrounding wetlands

Flood irrigation on light soils: more...
-High levels of groundwater recharge anticipated, considerably more than for heavy textured soils.
-High potential to exacerbate wetland salinisation for vulnerable sites.
-Low runoff anticipated due to high infiltration rates

Formal drainage, direct to wetland: more...
-High potential to adversely affect wetland hydrology.
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-High potential to adversely affect wetland hydrology.

Degradation Issue	Vulnerability	Practice	Practice Classification	Degradation Risk	Intervention Availability	
Salinisation	Very High	Channel_del	Conditional	Low	Yes	
		Flood_irr_L	Prohibitive	Very High	Yes	details...
		FD_direct	Favourable	-	-	
Increased groundwater input	Moderate	Channel_del	Conditional	Very Low	Yes	
		Flood_irr_L	Prohibitive	Moderate	Yes	details...
		FD_direct	Conditional	Very Low	No	
Increased surface water input	Moderate	Channel_del	Neutral	-	-	
		Flood_irr_L	Conditional	Very Low	Yes	details...
		FD_direct	Prohibitive	Moderate	No	
Increased wetting duration	Low	Channel_del	Neutral	-	-	
		Flood_irr_L	Conditional	-	-	details...
		FD_direct	Prohibitive	-	-	
Increased wetting frequency	Low	Channel_del	Neutral	-	-	
		Flood_irr_L	Conditional	-	-	details...
		FD_direct	Prohibitive	-	-	

Figure 16 Example output page from the Wetland Tool after selection of an irrigation management scenario.

The grey buttons on the right hand side of the page link to other information for each management practice scenario. Details of intervention options to minimise the risk identified for each of the degradation issues are also available.

When a particular irrigation management scenario is selected, an additional report is produced which lists intervention options available to offset the impacts of irrigation management (Figure 17). A safety factor required for a particular wetland linked to the value of the wetland and the level of degradation risk associated with the proposal is included in each report. A text box explains to the user that a high safety factor (associated with high value wetlands and high level of risk) requires a maximum level of intervention management and that exclusion from irrigation and further investigation is recommended.

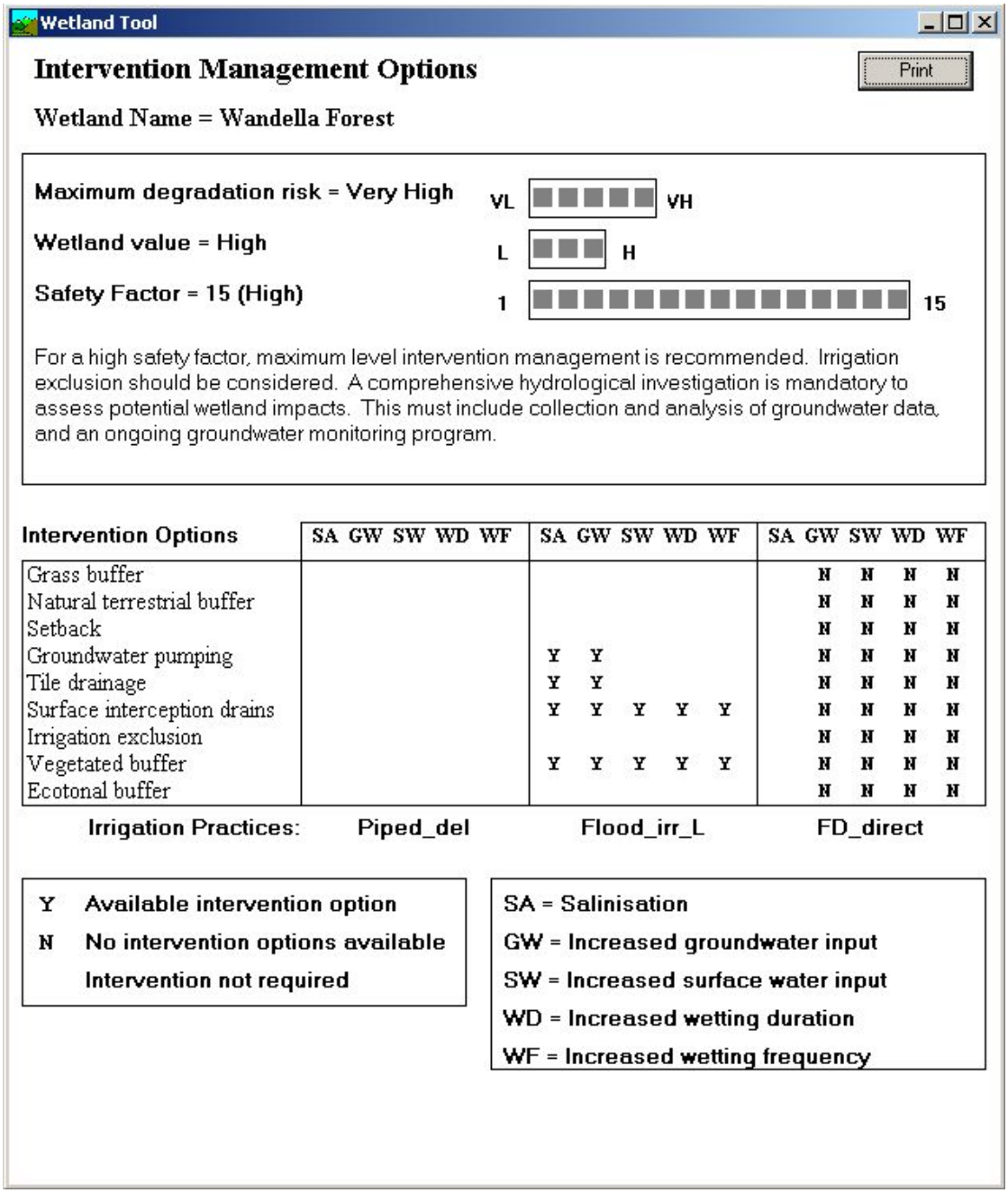

Figure 17 An example output from the LUIM Wetland Tool for a single wetland – land management scenario.

The degradation risk from the proposal for the Wandella Forest wetland was Very High (Figure 17). Due to the high value of the wetland and the very high degradation risk, a safety factor of 15 (high) was given with the associated recommendations as text below the safety factor rating. In the case of an unfavourable report for a proposal, alternative management scenarios could be proposed and assessed.