

# **SOUTH WEST WETLANDS MONITORING PROGRAM REPORT 1977 – 2009**



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Cover photograph of Owingup Swamp on May 20<sup>th</sup>, 2008. © A.Lorkiewicz & DEC.

The Kent River flows into (foreground) and then out of (not visible) Owingup Swamp before discharging into Irwin Inlet on the south coast of Western Australia between the towns of Walpole and Denmark. This large, freshwater swamp is a haunt of the Australasian Bittern *Botaurus poiciloptilus*, a threatened species that is thought to be declining in numbers. High resolution, aerial oblique photographs of Owingup Swamp and other SWWMP wetlands may be obtained from the custodian, J. Lane of DEC Busselton.

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## SUMMARY

This report presents 1977-2009 data from SWWMP, the South West Wetlands Monitoring Program conducted by the Western Australian Department of Environment and Conservation (DEC). Since 1997, this program has been funded under the WA Salinity Action Plan / Salinity Strategy as updated by the Government's response to the Salinity Taskforce report.

In this report we present all routinely-collected September and November water level, salinity and pH data to 2009. These data are presented in graphical form for all 103 currently-monitored SWWMP wetlands. Data concerning nutrients (not monitored beyond 2007) in these wetlands, and concerning water level, salinity, pH and nutrients of another 49 historically-monitored wetlands, may be found in Lane *et al.* (2009a). Administrative information concerning all 152 SWWMP wetlands, their map coordinates, the periods during which each has been monitored, their locations in terms of DEC Regions and Districts and Local Government Authorities (LGA's), and their tenure, is also presented.

This report provides an up-to-date overview of the data that have been collected over the past three decades and ready-reference lists of the wetlands. This information should be useful for those with a responsibility or interest in the conservation and management of these and other wetlands in south-western Australia. Most of the monitored wetlands are within Nature Reserves or National Parks and DEC is responsible for their management. Some are also within Natural Diversity Recovery Catchments and 'Ramsar' Sites and many are 'Directory' (nationally significant) Sites.

Researchers will also find the report useful as it identifies wetlands that have long periods of systematic monitoring of physico-chemical attributes, knowledge which will assist in the selection of most-suitable wetlands for study. Pronounced year-to-year or longer-term variations or trends are readily apparent in the graphs of some wetlands, as is the absence of pronounced variations or trends in others. Thus the wetlands of SWWMP demonstrate a wide variety of hydrological responses to landscape setting, surface and groundwater catchment characteristics, local climate and, in some cases, management intervention.

Attention is drawn to a number of wetlands (LGA in brackets) of particular interest or concern. These are Bambun (Gingin), Boat Harbour 1 (Denmark), Byenup (Manjimup), Chandala (Chittering), Clifton (Mandurah), Coomalbidgup (Esperance), Corrigin 12900 (Corrigin), Crackers (Dandaragan), Davies (Augusta-Margaret River), Dumbleyung (Dumbleyung/Wagin), Esperance 26410 (Esperance), Forrestdale (Armadale), Gore (Esperance), Guraga (Dandaragan), Harvey 12632 (Harvey), Hinds (Wongan-Ballidu), Jandabup (Wanneroo), Jasper (Nannup), Jerdacuttup (Ravensthorpe), Kent 29020 (Kent), Logue (Carnamah), Muir (Manjimup), Ngopitchup (Broomehill), Nine Mile (Murray), Noobjup (Cranbrook), Noonying (Tammin), Shark (Esperance), Pillenorup (Plantagenet), Taarblin (Narrogin), Thomsons (Cockburn), Toolibin (Wickepin), Tordit-Gurrup (Manjimup), Unicup (Cranbrook), Warden (Esperance), Warrinup (Cranbrook), White (Narrogin), Yarnup (Cranbrook) and Yellilup (Jerramungup).

Regional, District and specialist branch staff of DEC are encouraged to examine the data for all wetlands in their respective areas of responsibility as other wetlands may also show changes of interest or management concern.

Since 1997, the bathymetry (lakebed and shoreline contours and inflow and outflow channels) of 19 monitored wetlands has been mapped under SWWMP, with DEC Regional and District funding support. This work enables water surface areas, water volumes and salt loads to be calculated from SWWMP water level and salinity data. This permits modelling of water and salt balances and will facilitate assessments of likely hydrological and ecological impacts of drainage, diversion, pumping and storage proposals, proposed land use changes and predicted climate change. All SWWMP wetlands known by the authors to have been bathymetrically-mapped are listed in this report, together with the years of mapping, methods employed, products and custodians / sources.

High resolution, low altitude, aerial oblique photography is useful for wetland vegetation mapping, condition monitoring, the planning and conduct of biological surveys, and publicity. During the past three years, 133 SWWMP wetlands have been flown and photographed for these purposes. A sample of low resolution prints and enlargements is presented in this report. Copies of original, high resolution photographs may be obtained on request.

In 2009-10, continuous water level recorders were installed on Broadwater, Nine Mile, McLarty, Chandala and Crackers and tipping-bucket rainfall gauges on McLarty and Chandala on a trial basis. It is envisaged that these will be kept in place for 2-3 years and then moved to other high conservation value SWWMP wetlands under threat. Collection of continuous water level and rainfall data will assist in the development of simple salt and water balance models for these and other south-western Australian wetlands and will thereby assist in their conservation management.

## 1. INTRODUCTION

This report presents 1977-2009 data and other information from SWWMP, the South West Wetlands Monitoring Program conducted by the Western Australian Department of Environment and Conservation (DEC) and its predecessors over more than three decades. Since 1997, this program has been funded under the Western Australian Salinity Action Plan (Government of Western Australia 1996a) and State Salinity Strategy (State Salinity Council 2000a) as updated by the Government's response (Government of Western Australia 2002) to the Salinity Taskforce report (Frost *et al.* 2001). A detailed account of SWWMP, including analyses of data to 2000, may be found in Lane *et al.* (2004). A review of this and other programs under the Salinity Action Plan has been published (Wallace 2001).

In this report we present, in graphical form, all September and November water depth, salinity and pH data routinely collected from 103<sup>1</sup> currently-monitored SWWMP wetlands since the program's commencement in 1977. Data concerning nutrients<sup>2</sup> in these wetlands, and concerning water level, salinity, pH and nutrients of another 49 historically-monitored SWWMP wetlands, may be found in Lane *et al.* (2009a) and are not repeated here. The locations of all 152 SWWMP wetlands are shown in Figure 1. Administrative information concerning these wetlands, their map coordinates, the periods during which each has been monitored, their locations in terms of DEC Regions and Districts and Local Government Authorities (LGA's), and their tenure, is also presented (Tables 1-3).

The main purposes of this report are to provide an up-to-date visual overview of data that have been collected over the past thirty-three years and ready-reference lists of the wetlands. This information should be useful for those with a responsibility or interest in the conservation and management of these and other wetlands in south-western Australia. Most of the monitored wetlands are within Nature Reserves or National Parks vested in the Conservation Commission of Western Australia and DEC is responsible for their management. Some are within Natural Diversity Recovery Catchments (Government of Western Australia 1996a; Wallace & Lloyd 2008) and Ramsar Sites (Government of Western Australia 1990, 2000; Wetlands International 2002) and many are Directory Sites (Environment Australia 2001) (Tables 4 & 5).

Researchers will also find the report useful as it identifies those wetlands that have long periods of systematic monitoring of physico-chemical attributes, knowledge which will assist in the selection of wetlands most-suitable for study. Pronounced year-to-year or longer-term variations or trends are readily apparent in the graphs of some wetlands, as is the absence of pronounced variations or trends in others. Thus the wetlands of SWWMP demonstrate a wide variety of hydrological responses to landscape setting, surface and groundwater catchment characteristics, local climate and, in some cases, management intervention.

## 2. RESULTS

In order to make this report available in a timely fashion, statistical trend analyses to 2009 have not been performed on most of the physico-chemical data presented here. Trends to 2000 of 41 of these wetlands (those monitored for 20 or more years at that time) have previously been reported (Lane *et al.* 2004) and readers may find it helpful to compare the latest data with the results of that earlier work.

Without statistical analysis, it would be potentially misleading to present lists of wetlands that appear to show trends, as opposed to those that do not. On the other hand, it is considered useful to draw the reader's attention here to a number of wetlands of particular interest or concern. These wetlands follow below, with the relevant LGA's in brackets. The data referred to are presented in the relevant Graphs (page 39 onwards), which are also arranged alphabetically.

**Bambun (Gingin):** This is one of few SWWMP wetlands that have shown a persistent long-term decrease in salinity. It remains very fresh (<1ppt)<sup>3</sup> to 2009, whereas from 1979 (when monitoring began) to 1985 it was fresh (1<3ppt). It is perhaps trending upwards in water levels, though to 2000 this trend was not statistically significant ( $p=0.085$ ) (Lane *et al.* 2004).

**Boat Harbour 1 (Denmark):** Salinities had been trending upwards, particularly since 2000, the beginning of a period in which water levels were generally lower. In 2009, water levels were markedly higher (the September 2009 recording of 1.29m was the highest in 18 years of monitoring) and salinities returned to within the former range of 0.5-0.8ppt.

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<sup>1</sup> Monitoring was resumed at two 'historical' wetlands, Albany 27157 and Yurine, in Sep 2009, raising the total number of 'current' SWWMP wetlands from 101 to 103 and reducing the number of 'historical' wetlands from 51 to 49.

<sup>2</sup> Total nitrogen and total phosphorus, both filtered and unfiltered. These parameters have not been monitored beyond 2007.

<sup>3</sup> In this report, the salinity categories 'very fresh' (<1ppt), 'fresh' (1<3ppt), 'brackish' (3<10ppt), 'saline' (10<50ppt) and 'hypersaline' ( $\geq 50$ ppt) are used, as in Lane *et al.* (2004). ppt = parts per thousand.

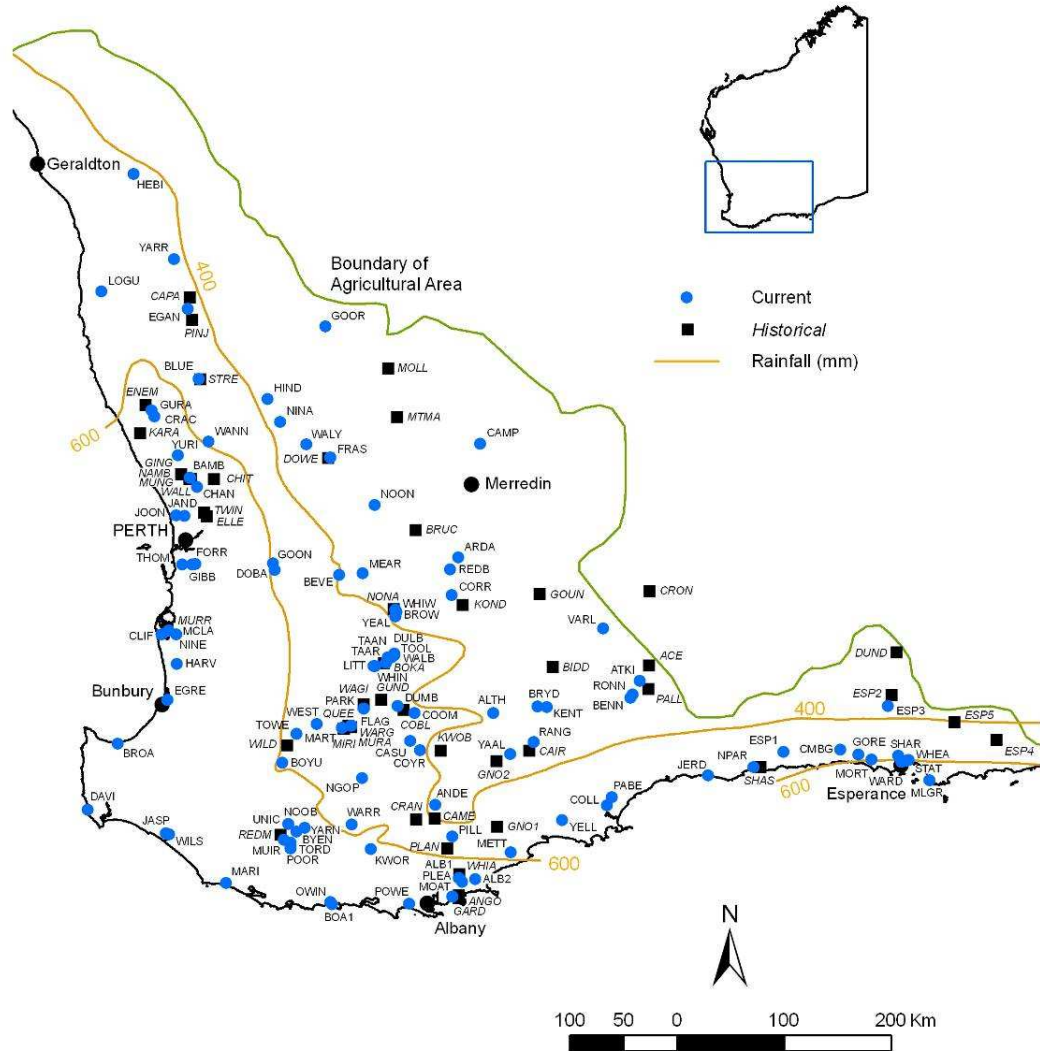


Figure 1. Wetlands currently and previously monitored under the South West Wetlands Monitoring Program.

**Byenup (Manjimup):** As is the case with nearby (and hydrologically-connected) Tordit-Gurru (see below), there is a pronounced inverse relationship between water levels and salinities, with levels lowest and salinities highest in 1987, 1995, 2001 and 2007. During the past two years (2008 and 2009) water levels have risen and salinities have fallen to former, long term levels.

**Chandala (Chittering):** Water levels and salinities remain within their usual ranges (0.7-1.0m, 0.5-1.5ppt) with no apparent long term trends of concern. This 120ha melaleuca – eucalypt swamp at times supports thousands of nesting Straw-necked Ibis *Threskiornis spinicollis* and has previously been considered a candidate for listing as a Wetland of International Importance under the Ramsar *Convention on Wetlands* (Jaensch & Watkins 1999). Stray cattle were causing considerable pugging of the entire wetted area and some damage to vegetation in autumn 2009 (J. Lane pers. obs.).

**Clifton (Mandurah):** Knot *et al.* (2003) reported an increase in salinities and salt loads of Lake Clifton from the early 1990s to 2000. Monitoring to 2008 indicated that this trend was continuing. In November 2008 the authors initiated routine sampling at three fixed sites extending from near the shoreline to the end of the boardwalk (jetty), rather than one non-fixed site in this general area, as previously. In November 2008 (at water level 4.24m) the salinity values at these three sites were fairly similar, however in September 2009 (water level 4.14m) and November 2009 (water level 4.02m) the values were very different, due to the influence of freshwater seepage near the shoreline. It will be important to continue to sample from these three sites in the future, rather than just one, as in the past. Comparison of recent and historical data concerning the composition of the lake's internationally significant thrombolite community indicates a large reduction in relative abundance of cyanobacterial species believed to be fundamental for the thrombolite structure (Smith *et al.* (2010).

**Coomalbidgup (Esperance):** Depths have declined markedly over the past decade of monitoring, from a peak of  $\approx 3$ m in 2000 to  $< 0.5$ m in 2006, 2008 and 2009. Salinities have risen dramatically over this period and pH values have also increased. The significance of these changes in a long term (30+ years) context remains to be seen. Similar changes in water levels and salinities have occurred during the same period at Mortijinup (26 km south-east), but not at Gore (13 km south-east), Shark or Warden (both 45 km east) where water levels have been consistently high for the past decade or more.

**Corrigin 12900, also known as Paperbark Swamp (Corrigin):** This wetland has now been dry in September and November each year for three years (2007-09). This is an unusually long period for Corrigin 12900, which has been monitored under SWWMP for nearly three decades.

**Crackers (Dandaragan):** The statistically-significant upward trend in salinities from 1981 to 2000 (Lane *et al.* 2004) is continuing, with salinities from 2002 to 2009 being predominantly in the fresh ( $1 < 3$ ppt), rather than very fresh ( $< 1$ ppt), category. The extensive lake floor vegetation could be under threat.

**Davies (Augusta-Margaret River):** Salinities have risen since 2000, after a period of eight years (1993-2000) of little change preceded by an apparent rise in earlier years (monitoring began in 1991). This wetland is now at the high end (2.6ppt) of fresh ( $1 < 3$ ppt). The possible causes of this rise, and the impacts on flora and fauna, have been the subject of recent work by Davies (2010).

**Dumbleyung (Dumbleyung / Wagin):** Dumbleyung last overflowed in 1983, following the post-cyclonic rains (Cyclone Bruno) of January 1982 and heavy winter rains the following year. Since 1983, there have been only two major filling events, in 1988 and 2005. In most years, the waters of Dumbleyung are hypersaline ( $\geq 50$ ppt), but in years of major inflow, September and November salinities may fall as low as 13ppt. In 2009, September and November water levels remained low ( $\approx 0.5$ m) and salinities were hypersaline.

**Esperance 26410 (Esperance):** This Flat-topped Yate *Eucalyptus occidentalis* lake has a narrow inner zone of dead trees, with some regeneration (Jaensch *et al.* 2009). The deaths, which have not been mapped or aged, could be due to salinity or perhaps to prolonged inundation, as occurred for example in 1986-88 and 1989-91. 'Similar depth' (0.5-1.0m) salinity comparisons (depth range 0.5-1.0m; years 1988, 1991, 1999, 2002 and 2008) made previously (Lane *et al.* 2009b) suggested that salinities are slowly increasing. Salinities in 2009 were higher than all previous records and in November were markedly so. 'Similar depth' comparisons between 1984, 2005, 2006 and 2009 indicate a very substantial increase in the salt load of this wetland in recent years.

**Forrestdale (Armadale):** September and November water levels have trended lower since the mid 1990s and salinities, though still mainly fresh ( $1 < 3$ ppt), appear to have trended slightly higher. Since 1998, pH values have mainly been within the range 9-10 pH units, whereas in preceding years (1983-1997) they frequently ranged lower, to  $\approx 7$  pH units. Lower water levels have facilitated the spread of bulrush *Typha orientalis* in shallow parts of the lake.

**Gore (Esperance):** September and November water levels have been more-consistently high during the past 13 years (1997-2009 inclusive) than in the preceding 18 years (1979-96 inclusive). Shark and Warden, 30 km to the east, have shown similar patterns of consistently high water levels since 1999, whereas Mortijinup (10 km east) and Coomalbidgup



(13 km north-west) have exhibited declining levels over the past decade. Gore's September and November salinities have been relatively stable within the range 31-58ppt since 2002, whereas in preceding years (1979-2001) they ranged 6-250ppt.

**Guraga (Dandaragan):** September and November water levels have declined since their peak of  $\approx 3\text{m}$  in 1999-2000 and have been consistently low (0.65-0.0m) for the past three years (2007-09). The most-recent, comparable, three-year period of very low levels was almost two decades ago, in 1989-91.

**Harvey 12632 (Harvey):** September and November water levels have been trending downwards since the early 1990s. The pattern of water level change over this period is similar in appearance to that of Clifton (12 km north-west), however the magnitude appears to be greater. Nine Mile (27 km north) has shown a similar downward trend over a longer period.

**Hinds (Wongan-Ballidu):** There was an exceptional filling event (to  $>4\text{m}$ ) in 1999 and it took 2-3 years for water levels to decline to 'normal' (for the period 1979-2009). There have been no major filling events since. Note that this wetland was not monitored from 1992 (when recreational duck hunting in Western Australia was banned) to 1996 (when the WA Salinity Action Plan was launched) (See Section 2 of Lane *et al.* 2004 for the relevant history).

**Jandabup (Wanneroo):** September and November pH values have returned to 'normal' (for the periods 1983-1997 and 2000-09) since their fall to low levels (pH 4-5) in 1998 and 1999. This temporary acidification initially followed (lag of one year), and then coincided with, a period of 2-3 years of lower water levels and prolonged drying of the lake bed and is thought to have possibly been due to the oxidation of sulfur compounds from one or more sources (Sommer & Horwitz 2001). Pumping of groundwater was recommenced in summer 1999-2000 (it had ceased in autumn 1996), because minimum water level criteria were not reached during the previous two summers. This prevented the wetland from drying in summer 1999-2000 (Sommer & Horwitz *op. cit.*).

**Jasper (Nannup):** From 2001 to 2008, water levels were lower (by up to 0.5m) than in most preceding years (see graph with depth axis 8-10m) and some salinities were higher (to  $\approx 0.3\text{ppt}$ ) than the 1985-2000 average of  $\approx 0.2\text{ppt}$ . In 2009, water levels returned to their former (late 1980s to 2000) heights of 9.5-10.0m, however salinities remained elevated. Probing of a peat deposit in the south-east corner of Jasper in 1995 by divers with steel rods has revealed that Jasper is, by one estimation (Dortch 1996), at least 16m deep, not 9-10m. Whichever measurement / estimate is used, Jasper is the deepest of all SWWMP wetlands, the second-deepest being Maringup (Lane *et al.* 2004).

**Jerdacuttup (Ravensthorpe):** Water levels (0.0-4.5m) and salinities (5-250ppt) of Jerdacuttup continue to oscillate markedly over 5-15 year time periods, there being a strong inverse relationship between these two parameters in this wetland.

**Kent 29020, also known as East Lake Bryde (Kent):** Salinities in this wetland were markedly higher (2.3-2.8ppt) in 2008 than in previous years ( $\leq 1\text{ppt}$ ). This is presumably due to the concentration of salts by evaporation following the major filling event of 2006. In September and November of 2009 this wetland was dry, as has often been the case.

**Logue (Carnamah):** This wetland was dry / near-dry in September and November each year for five years (2004-2008). This was an unusually long period for Logue, which has been monitored under SWWMP for three decades. In September 2009 a large proportion of the lake's bed was shallowly inundated (maximum depth 0.22m) and many hundreds, possibly thousands, of waterbirds were present (J. Lane pers. obs.). Trend analyses have revealed statistically-significant increases ( $p=0.0105$  and  $p=0.0056$  respectively) in Logue's combined (Sep+Nov) salinities and Logue's pH from the commencement of monitoring to 2005.

**Mortijinup (Esperance):** Depths have declined over the past decade of monitoring, from  $>3\text{m}$  in 2000 to  $<2\text{m}$  in recent years. Salinities have risen from  $\approx 3\text{ppt}$  to  $>7\text{ppt}$  over this period. The significance of these changes in a long term (30+ years) context remains to be seen. Similar trends and even greater changes have occurred in water levels and salinities (and pH values) during the same period at Coomalbidgup (26 km north-west).

**Muir (Manjimup):** Spring water levels in 2009 ( $\approx 0.90\text{m}$ ) were well within the range ( $\approx 0.25 - 1.30\text{m}$ ) of the past three decades and far below the level ( $\approx 4.0\text{m}$ ) at which this 4,600 ha lake would overflow into the Deep River, an event that is thought to have last occurred around 1900-1901 (pers. comm. Ash Muir via Roger Hearn, 07 August 2009).

As previously noted (Lane *et al.* 2004), from 1979 to 1989 SWWMP monitoring of Muir was undertaken at the northern end of the lake, near the discharge point of a seasonally-inflowing drain. From 1990 onwards, all monitoring has been undertaken at a more satisfactory, deeper-water location near the eastern shoreline, away from drainage discharge points.

**Ngopitchup (Broomehill):** September and November depths have ranged between 0.0m and 0.5m since monitoring began in 2000. On occasions (e.g. in 2008), an adjoining landholder may lawfully draw water from Ngopitchup. This wetland, vested in the Water & Rivers Commission (now Department of Water), is of interest from a biodiversity perspective as it is the only known habitat of at least one species of aquatic invertebrate (A. Pinder, pers. comm., 30 September 2008).

**Nine Mile (Murray):** The pronounced downward trend in water levels which began in 1983 has continued to 2009. Salinities have remained very fresh (<1ppt) over the entire period of monitoring. ‘Harvey 12632’ (27 km south) has shown a similar downward trend since 1991. The long-term decline in Nine Mile’s water levels has been accompanied by substantial spreading of bulrush *Typha orientalis*, which now covers most of the wetland area (Jaensch *et al.* 2009).

**Noobijup (Cranbrook):** Depths have risen somewhat in 2008 (to ≈0.5m) and 2009 (to ≈0.7m) after declining steeply from ≈1.6m in 1999 to ≈0.2m in 2007. There has also been a slight rise in pH (to 4.6) since the pronounced fall from ≈7 in 1999-2003 to 4.0 in 2007. Similar declines (and recoveries) in pH have been observed at nearby Unicup and Yarnup (see below) and also at distant Jandabup (see above). Salinities have declined in the past two years of rising water levels.

**Noonying (Tammin):** This wetland has been dry or very shallow (<0.15m) in most Septembers and Novembers for the past nine years (2001-2009). This is an exceptionally long period for Noonying. From 1979 to 1990, and possibly to 1999 (there was a gap in monitoring from 1992 to 1996), Noonying water levels were often in the range 1.0-1.4m.

**Pillenorup (Plantagenet):** Over the past four years, water levels in this large and relatively pristine wetland on the south side of the Stirling Ranges have continued to fall, from a flood level of ≈2.7m in Sep-Nov 2005 to ≈0.8m in Sep 2009. It will be interesting to see what impact this prolonged period of inundation has on the swamp’s fringing and emergent vegetation, which includes many eucalypts. As the water levels have fallen, salinities have risen, from 0.2ppt in 2005 to 2.6ppt in 2009, the highest salinity recorded since monitoring began in 2000.

**Shark (Esperance):** This lake’s depths and salinities exhibit an unusual pattern (though see nearby Warden and Gore), with considerable variation from 1979 (the start of monitoring) to 1998 and relatively little since. Salinities in the earlier period ranged 0.5-2.5ppt, whereas from 1999 to 2009 the range has been narrower, at 0.7-1.5ppt. Shark remains an important freshwater habitat for waterbirds, including species particularly sensitive to the loss (which is limited at this site) of fringing and emergent vegetation (Jaensch *et al.* 2009).

**Taarblin South and Taarblin North (Narrogin):** The 1983 filling (to 2.4m) of this large, formerly ‘live-treed’, now mainly ‘dead-treed’, lake near the northern (upper) end of the Blackwood River catchment was a 1 in 30 year - and possibly longer - event. For the remainder of the period 1979-2009, September and November water levels in the southern basin (Taarblin South) have mostly been within the range 0.0-0.5m, though they did reach ≈0.9m in September 1996. Recent high resolution, aerial oblique photography shows long, narrow bands of living trees (Swamp Sheoak *Casuarina obesa*) on elevated ground within this basin. The northern basin (Taarblin North) receives pumped saline groundwater from bores in the bed of Toolibin (Durell *et al.* 2010).

**Thomsons (Cockburn):** Water supply to this Ramsar-listed wetland has been supplemented by diversion of surface drainage each winter-spring since and including 2004 (DEC 2009). Supplementation is intended ‘... to help ensure that water levels remain adequate for the protection of the reserve’s Ramsar values and water bird habitat, and to enable the fledgling cygnets to survive at the lake until they are able to fly’ (CALM 2005) and is subject to a specific plan (CALM 2004). In 2009, supplementation was from 15 July to 30 November. The level of public and private compliance with minimum water level criteria for Thomsons Lake, which is impacted by a variety of factors including rainfall, stormwater disposal and groundwater pumping from the Jandakot Mound, is reported annually by the Water Corporation to the EPA (CALM 2005).

**Toolibin (Wickepin):** This iconic wetland (Hooper & Wallace 1994) has now been dry / near-dry in September and November each year for ten years (2000-2009). This in an unusually long period for Toolibin (at least in the past three decades) and is due to a combination of drier years and diversion of higher-salinity surface flows away from the lake (Jones *et al.* 2009).

**Tordit-Gurrup (Manjimup):** As is the case with nearby (and hydrologically-connected) Byenup (see above), there is a pronounced inverse relationship between water levels and salinities of Tordit-Gurrup, with levels lowest and salinities highest in 1987, 1995, 2007 and 2008. When water levels are in the range 2.5-3.0m salinities are 0.5-1.5ppt, whereas when levels are ≈1.5m (as, for example, in 2008) salinities are ≈3ppt.

**Unicup (Cranbrook):** pH values rose after the major filling event of 1988 and have consistently been within the range 7-9 pH units since 1991. Prior to 1988, values were generally within the range 4-6. Note that Gibson *et al.* (2004) reported a ‘major collapse’ of Jointed Twig-rush *Baumea articulata* in a Unicup (and nearby Yarnup, see below) vegetation monitoring quadrat between October 1997 and October 2002, with cover abundance scores changing from 30-70% to 2-10%. These authors did not identify the cause of the collapse, but did point to ‘a marked decline in water depth – and increase in salinity – of Lake Unicup in 2001 and 2002’.

**Warden (Esperance):** Water levels have remained high for the past eleven years (1999-2009). This is an exceptionally long period (at least in the past three decades) for Warden and is due to a combination of catchment clearing, resulting in increased run-off and groundwater rise (Marimuthu *et al.* 2005), and extreme rainfall events (Kusumastuti 2006). Rises in

groundwater levels started directly impacting the wetlands by prolonging inundation from about 1986 onwards (Robertson & Massenbauer 2005). Engineering works are considered essential to reduce Warden's water levels and thereby recover shorebird habitat and degraded riparian vegetation (Walshe & Massenbauer 2008). A pump station and pipeline to the Southern Ocean are proposed.

**Warrinup (Cranbrook):** In the eight years prior to the filling event of 1988, September and November water levels did not exceed 0.3m. Since 1988, levels have generally been higher, frequently exceeding 0.4m and occasionally 0.8m. Perhaps this represents a marked shift in the hydrological balance of this 'very fresh' (<1ppt) swamp.

**White (Narrogin):** The filling event (to ≈2m) of 1983 was perhaps a 1 in 30 year event, like that of Taarblin, 7 km to the north-east. However, due to a gap in monitoring from 1985 to 1996, this is not known for certain. Since 1996, water levels in spring have not exceeded 0.2m and have mostly been 0.0m, i.e. the lake has mostly been dry.

**Yarnup (Cranbrook):** Salinities in 2008 and 2009 were lower than in the two preceding years. However, when the inverse relationship between depth and salinity is taken into account and 'same depth' salinity comparisons (e.g. 1985, 1990 with 2008, and 1984, 1991, 1996 with 2009) are made, it is clear that the general trend of secondary salinisation (1980-2000; Lane *et al.* 2004) continues. pH values, which are normally within the range 6-8 pH units, have been lower (3-5 pH units) during and immediately following recent years (2001, 2007) of lower water levels. They recovered to ≈6.5 pH units in 2009. Note that Gibson *et al.* (2004) reported a 'major collapse' of *Baumea articulata* in a Yarnup (and nearby Unicup, see above) vegetation monitoring quadrat between October 1997 and October 2002, with cover abundance scores changing from 30-70% to 2-10%. These authors did not identify the cause of the collapse, but did point to markedly lower water depth and pH in 2001, with pH remaining low in 2002, and higher salinities in both years. Rising acid saline groundwater is a threat to this and other wetlands in the Muir-Unicup catchment (Smith & Hearn 2006).

**Yellilup (Jerramungup):** Salinities have risen dramatically since the mid 1990s when water levels began to fall following the exceptional filling event (to >4m) of 1988. The waters of Yellilup Lake (not to be confused with nearby Yellilup Swamp) were predominantly fresh (1<3ppt) prior to 1992 but are now hypersaline (≥50ppt). Prolonged inundation (1988-1994 at least) is thought to have been the primary cause of the extensive death of Flat-topped Yates *Eucalyptus occidentalis* and melaleucas that once extended over a large part of the lake floor. These changes have had major consequences for use by waterbirds (Jaensch *et al.* 2009).

### 3. CONCLUDING REMARKS

Readers are encouraged to view all Graphs (Albany 26385 to Yurine) of this report for other changes of possible interest or concern and perhaps for reassurance that, three decades since commencement of SWWMP, some wetlands clearly remain in good condition, at least in terms of the monitored key parameters.

Regional and District staff of the Department of Environment and Conservation may find it useful to refer to Table 2 in order to readily identify monitored wetlands in their areas of management responsibility. Requests for data should be directed to [jim.lane@dec.wa.gov.au](mailto:jim.lane@dec.wa.gov.au).

SWWMP depth gauges at the 49 historically-monitored wetlands (monitored under SWWMP at some time in the past but not currently; see Tables 1-3) are not maintained and many are now totally illegible or even missing altogether. Readers with an interest in the resumption of monitoring at one or more of these wetlands, even for a short period, are encouraged to contact SWWMP staff to find out details of the legally-protected Landgate<sup>1</sup> Bench Marks (local survey datums) at each of these wetlands, so that new depth gauges, if needed, can be installed to the same elevation as those previously installed. Water level data 'continuity' can thereby be maintained.

Since 1997, SWWMP staff, working with Landgate and contract surveyors, and with significant funding support from several DEC Regions and Districts, have mapped the bathymetry (lakebed and shoreline contours and inflow and outflow channels) of 19 SWWMP wetlands (Table 6). This enables water surface areas, water volumes and salt loads (tonnes) to be calculated from measured depths and salinities and thereby assists in water balance and salt balance modelling and the assessment of likely impacts on specific wetlands of drainage, diversion, pumping and storage proposals, proposed land use changes and predicted climate change. Requests for this mapping should also be directed to [jim.lane@dec.wa.gov.au](mailto:jim.lane@dec.wa.gov.au). Funded requests to map the bathymetry of other SWWMP wetlands, particularly wetlands of high conservation value under threat, are welcome. SWWMP Senior Technical Officer Alan Clarke has considerable experience and expertise in organising, supervising and conducting work of this nature.

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<sup>1</sup> Formerly known as the WA Department of Land Information.

High resolution, low altitude, aerial oblique photography is useful for wetland vegetation mapping, condition monitoring, planning and conduct of biological surveys, and publicity. During the past three years, 133 of the 152 SWWMP wetlands have been flown and photographed with specialised camera equipment for these purposes. A sample of low resolution prints and enlargements is presented in this report (cover photo and photos 17-24 & 32-43). Digital copies of original, high resolution photographs of any of the 133 wetlands (see Table 8 for a list) may be obtained by directing requests to [jim.lane@dec.wa.gov.au](mailto:jim.lane@dec.wa.gov.au)

In 2009-10, SWWMP staff installed continuous water level recorders on Broadwater, Nine Mile, McLarty, Chandala and Crackers and tipping-bucket rainfall gauges on McLarty and Chandala on a trial basis. In 2010-11, water level recorders will also be installed in Pleasant View and 'Albany 27157'. It is envisaged that this equipment will be kept in operation at these locations for 2-3 years and then moved to other high conservation value SWWMP wetlands under threat. Collection of continuous water level and rainfall data in this manner will assist in the development of salt and water balance models (see Peck 2000 for examples using SWWMP data from Coyrecup) for these and other south-western Australian wetlands and will thereby assist in their conservation management. .

This report has been prepared as the third in a series of annual reports aimed at putting the most-recent SWWMP data in front of readers in un-analysed form as soon as possible after data collection. Results and interpretations of statistical trend analyses are to be presented in other, less frequent reports covering the longer time periods required to assess such trends.

Finally, readers' attention is also drawn to the numerous reports and publications (e.g. Cale *et al.* 2004, 2010; Cale & Halse 2006a-u; Gibson *et al.* 2004; Halse *et al.* 2002; Lyons *et al.* 2007) concerning the fringing and emergent vegetation, waterbirds, aquatic invertebrates, groundwater and detailed water chemistry of the 25 SWWMP wetlands (shown in bold in Table 1) that are intensively monitored by other DEC scientists and collaborators under the State Salinity Strategy.

#### 4. ACKNOWLEDGEMENTS

The authors wish to thank the many people who have participated in SWWMP or assisted in other ways over the past three decades.

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DEC Director General Keiran McNamara and DEC Natural Resources Branch Manager Ken Wallace had lead roles in securing the funds needed for SWWMP to continue beyond 1996 and for all data collected since 1977 to be secured, stored, analysed and reported.

SWWMP has been entirely funded by the Government of Western Australia through the Department of Environment and Conservation (2006-present) and its predecessors the Department of Conservation and Land Management (1985-2006) and the Department of Fisheries and Wildlife (1977-1985).

**Photograph credits:** Photos 1 & 3 were taken by volunteer John Winchcombe; 2 & 4-9 by Jim Lane; 10, 16, 25, 26, 28 & 29 by Yvonne Winchcombe; 11-15 by Alan Clarke; 27 by Saul Cowen and 31 by Bill Muir. The cover photo and photos 17-24 & 32-43 were taken by Alf Lorkiewicz of DEC Bunbury and entirely funded under SWWMP and Jim Lane is custodian of these.

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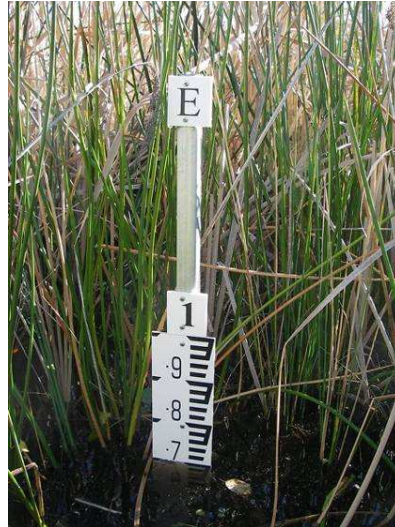
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# PHOTOS



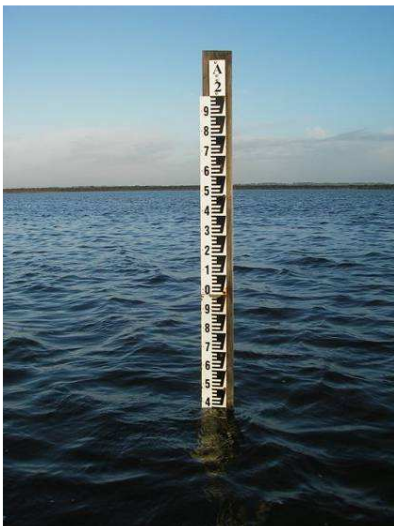
**Photo 1:** DEC depth gauge 'D' at Lake Muir on 18Sep2008 read 0.74m.



**Photo 2:** DEC depth gauge 'E' at Thomsons Lake on 04Aug2008 read 0.70m.



**Photo 3:** DEC depth gauge 'A' at Lake Wilson on 03Nov2008 read 3.85m.



**Photo 4:** DEC depth gauge 'A' at Parkeyerring Lake on 18Jul2008 read 0.40m.



**Photo 5:** DEC depth gauge 'C' at Lake Clifton on 13Sep2008 read 4.30m.



**Photo 6:** DoW depth gauge at Gibbs Road Swamp on 04Aug2008 read 24.59m AHD

**Photographs 1-6: SWWMP Depth Gauges.** Each depth gauge consists of one or more 1.00m metal or plastic gauge plates attached to a metal or wooden post. The gauge plate markings are in 0.01m increments, with labelling at 0.10m intervals. Labels 1, 2, 3, etc., at the top of each depth gauge indicate the height in metres (i.e. 1.00m, 2.00m, etc.) at the top of the uppermost gauge plate. Labels A, B, C, etc., where present, identify individual depth gauges at each wetland.

DEC gauge readings indicate the water depth at the deepest location in the wetland, even though gauges are usually not at the deepest location, but instead are closer to the shore, to facilitate viewing.

Readings are taken from Department of Water (DoW) gauges at several metropolitan wetlands. These DoW gauges indicate height above Australian Height Datum (mean sea level), which SWWMP personnel convert to wetland water depth.

Since 2007, the standard practice of SWWMP personnel when taking gauge readings has been to take a digital photograph of the gauge at the time of reading, so that all records may be checked and verified or corrected back in the office.





**Photo 7:** 'Munro Datum' (3.00m) at Lake Logue in Sep 2008.



**Photo 8:** 'Landgate' Bench Mark HZ929 at Thomsons Lake in Aug 2008.



**Photo 9:** 'Landgate' Witness Plate at Goonaping Swamp in Sep 2008.



**Photo 10:** 'Landgate' Bench Mark and Witness Plate at Cranbrook 25812 in Nov 2008.

**Photographs 7-10: SWWMP Datums and Bench Marks.** Depth gauges installed prior to 1997 were surveyed to a nearby 'Munro Datum'; a block of concrete installed by (then) SWWMP Senior Technical Officer Don Munro (dec.) for data security. Numbers on top of these Datums indicate the height (m) above the deepest location in the wetland.

Since 1997, legally-protected 'Landgate' (WA Department of Land Information) Bench Marks (BM's) have been installed at each wetland and the gauges and Munro Datums have been surveyed to them. All of these BM's have since been surveyed to Australian Height Datum (mean sea level). BM installation and survey has been a cooperative program of DEC and 'Landgate'.



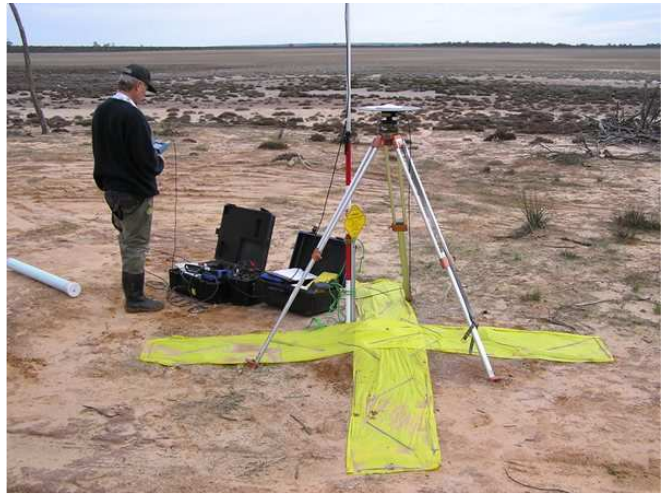
**Photo 11:** An amphibious vehicle is used to traverse the long distances involved in bathymetric survey of large dry or very shallow lakes. Steven Lowth, Lake Campion, 24May2004.



**Photo 12:** Vegetated lake beds and banks are traversed on foot. Brian Hugessen of Landgate, Byenup Lagoon, 26Mar2009.



**Photo 13:** Deeper wetlands are traversed by flat-bottomed punt. Lindsey Schuiling of Landgate, Byenup Lagoon, 22Mar2009.



**Photo 14:** Photogrammetric surveys require targets (e.g. yellow crosses) with accurately-known positions and elevations. Doug Hardman of Landgate, Mollerin Lake, 16Jun2004.



**Photo 15:** Thick vegetation may pose a challenge for surveyors. Brian Hugessen of Landgate, Byenup Lagoon, 30Mar2009.



**Photo 16:** Unconventional flotation devices may be needed to reach depth gauges at large flooded wetlands accessible only on foot. Alan Clarke, Pillenorup Swamp, 22Mar2007.



**Photo 17:** Lake Jasper (Nannup Shire) is the deepest of all SWWMP monitored wetlands. Photo 20May2008.



**Photo 18:** Yarnup Swamp (Cranbrook) values are threatened by salinisation and acidification. Photo 24May2008.



**Photo 19:** Boat Harbour 1 Lake (Denmark) water levels and salinities returned to former levels in 2009. Photo 20May2008.



**Photo 20:** Lake Muir (Manjimup) is thought to have last overflowed into the Deep River around 1900. Photo 20May2008.



**Photo 21:** Yellilup Lake (Jerramungup) trees were killed by continuous flooding from 1988 to 1994. Photo 21May2008.



**Photo 22:** Nine Mile Swamp (Murray), once open water, is now covered by Bulrush due to 26 yrs of declining water levels. Photo 19May2008.



**Photo 23:** Lake Warden (Esperance) water levels have been too high for shorebirds and fringing vegetation over the past decade and are to be reduced by engineering. Photo 16May2009.



**Photo 24:** Jerdacuttup Lakes (Ravensthorpe) water levels and salinities oscillate markedly over 5-15 yr time periods. Photo 16May2009.



**Photo 25:** Depth gauge installation. Alan Clarke, Yurine Swamp, 02Jun2010.



**Photo 26:** Water level logger, support tube and supporting angle iron. Nine Mile Swamp, 04Aug2009.



**Photo 27:** Telemetric download of water level logger data to laptop. Alan Clarke, Lake Pleasant View, 10Aug2010.



**Photo 28:** Tipping bucket rainfall recorders are being trialled on two SWWMP wetlands. Alan Clarke, 17Jun2009.



**Photo 29:** Reading the gauge and collecting water samples. Volunteer John Winchcombe, 'Albany 26385', 07Nov2006.



**Photo 30:** 'Careful, the bottom gets quite soft ... there'. Location, date and photographer unknown.



**Photo 31:** Common in and around many SWWMP wetlands is the Tiger Snake *Notechis scutatus*. Yaalup Lagoon, 08Dec2005.



**Photo 32:** Lake Bambun (Gingin) is one of few SWWMP wetlands to have shown a persistent long-term decrease in salinity, from fresh to very fresh. Photo 06Jun2010.



**Photo 33:** Chandala Swamp (Chittering) is a freshwater, melaleuca – eucalypt swamp that, at times, supports thousands of nesting Straw-necked Ibis *Threskiornis spinicollis*. Photo 06Jun2010.



**Photo 34:** Crackers Swamp (Dandaragan) salinities are trending upwards and its extensive lake floor vegetation could be under threat. Photo 07Jun2010.



**Photo 35:** Taarblin Lake (Narrogin), though secondarily salinised, has bands of young, live Swamp Sheoak *Casuarina obesa* on elevated ground in the southern basin. Photo 26May2010.



**Photo 36:** Mortijinup Lake (Esperance) water levels have been falling and salinities rising in the ten years since monitoring began. Photo 16May2009.



**Photo 37:** Forrestdale Lake (Armadale) depths have trended lower since the mid 1970s, facilitating the spread of the introduced bulrush *Typha orientalis*. Photo 06Jun2010.



**Photo 38:** High resolution aerial oblique photos, e.g. of Atkins Yate Swamp (Lake Grace) are suitable for enlargement. Photo 17May2009.



**Photo 39:** Enlarged section of Photo 38 (Atkins Yate Swamp), showing vegetation banding, structure, composition and vigour. Photo 17May2009.



**Photo 40:** Shallowly-inundated eastern floor and distant shoreline of Dumbleyung Lake (Dumbleyung / Wagin). Photo 26May2010.



**Photo 41:** Enlarged section of Photo 36 (Dumbleyung Lake), showing shoreline vegetation structure, composition and vigour. Photo 26May2010.



**Photo 42:** Dulbinning Lake (Wickepin) is immediately upstream of Toolibin and has also been affected by secondary salinisation. Photo 26May2010.



**Photo 43:** Enlarged section of Photo 42 (Dulbinning Lake), showing live *Casuarina obesa* on elevated banks of old dam and dead trees on lake floor. Photo 26May2010.

# TABLES

**Table 1. Monitored wetlands, codes, coordinates, tenure, Local Government Authorities and monitoring periods. This Table includes all wetlands ('current' and 'historical') regularly monitored at any time since commencement of the South West Wetlands Monitoring Program in 1977, sorted alphabetically by wetland name.**

Wetland Name <sup>1</sup>	Code	Easting <sup>2</sup>	Northing <sup>2</sup>	Zone	Tenure <sup>3</sup>	Local Government Authority	Period monitored <sup>4,5,6</sup>
<i>Ace</i> <sup>7</sup>	ACE	758001	6344738	50	CCWA	Lake Grace	7/80 - 5/85, 4/00
Albany 26385 <sup>8</sup>	ALB1	606041	6148594	50	CCWA	Albany	5/81 - 5/85, 9/98 onwards
Albany 27157	ALB2	618826	6147490	50	CCWA	Albany	3/80 - 5/85, 9/08, 9/09 onwards
<b>Altham</b> <sup>9</sup>	ALTH	634562	6302593	50	CCWA	Kent	7/80 - 11/91, 4/00 onwards
Anderson	ANDE	588666	6217158	50	CCWA	Tambellup	5/81 - 3/92, 9/00 onwards
<i>Angove</i>	ANGO	605824	6132574	50	CCWA	Albany	11/79 - 5/85, 9/90, 4/00
<b>Ardath</b>	ARDA	609068	6448377	50	CCWA	Bruce Rock	9/99 onwards
Atkins Yate	ATKI	750071	6330498	50	Private	Lake Grace	4/00 onwards
Bambun	BAMB	394880	6522829	50	CCWA	Gingin	5/79 onwards
<b>Bennetts</b>	BENN	742440	6314572	50	CCWA	Lake Grace	9/92 onwards
Beverley <sup>10</sup>	BEVE	514297	6432612	50	CCWA / LGA	Beverley / Brookton / Quairading	6/78 onwards
<i>Biddy</i>	BIDD	682152	6344888	50	CCWA	Lake Grace	7/82 - 5/85, 9/91 - 1/93, 4/00
<b>Blue Gum</b>	BLUE	401231	6615183	50	Private	Moora	11/99 onwards
Boat Harbour 1	BOA1	508245	6124962	50	CCWA	Denmark	8/91 onwards
<i>Bokan</i>	BOKA	549253	6349883	50	CCWA	Narrogin	7/79 - 5/85
<b>Boyup Brook 18239</b> <sup>10</sup>	BOYU	469777	6257199	50	CCWA	Boyup Brook	9/80 onwards
Broadwater	BROA	341176	6273426	50	CCWA	Busselton	11/85 onwards
Brown	BROW	559606	6397735	50	CCWA	Corrigin	7/79 - 11/91, 9/97 onwards
<i>Bruce Rock 30969</i>	BRUC	575133	6473941	50	CCWA	Bruce Rock	5/82 - 5/85
<b>Bryde</b>	BRYD	669625	6308051	50	MWR	Kent	6/79 onwards
Byenup	BYEN	476449	6182437	50	CCWA	Manjimup	6/77 onwards
<i>Cairlocup</i>	CAIR	662520	6266817	50	CCWA	Kent	9/80 - 5/85, 4/00
<i>Camel</i>	CAME	588040	6204777	50	CCWA	Cranbrook	8/80 - 5/85, 4/00
<b>Campion</b>	CAMP	627676	6554227	50	CCWA	Nungarin / Merredin	3/79 - 11/91, 9/99 onwards
<i>Capamaura</i>	CAPA	393132	6691441	50	CCWA	Carnamah	7/80 - 5/85, 3/90
Casuarina	CASU	569525	6277315	50	CCWA	Katanning	5/78 onwards
Chandala	CHAN	400545	6514425	50	CCWA	Chittering	5/79 onwards
<i>Chittering</i>	CHIT	414089	6521328	50	CCWA	Chittering	4/78 - 11/86
Clifton	CLIF	374037	6376139	50	CCWA	Mandurah	11/85 onwards
<i>Cobline</i>	COBL	564476	6306117	50	CCWA	Dumbleyung	6/79 - 11/91
Collets Road	COLL			50	CCWA	Jerramungup	9/01 onwards
<b>Coomalbidgup</b>	CMBG	349163	6267892	51	LGA	Esperance	11/99 onwards
<b>Coomelberrup</b>	COOM	573060	6303130	50	CCWA	Dumbleyung	5/78 - 5/85, 3/93, 9/97 onwards
<b>Corrigin 12900</b> <sup>10</sup>	CORR	603415	6413294	50	CCWA	Corrigin	7/82 onwards
<b>Coyrecup</b>	COYR	577072	6268374	50	CCWA	Katanning	5/78 onwards
Crackers	CRAC	365586	6579519	50	CCWA	Dandaragan	7/80 onwards
<i>Cranbrook 25812</i>	CRAN	573707	6203482	50	CCWA	Cranbrook	8/80 - 8/85, 4/00
<i>Cronin</i>	CRON	760036	6413700	50	CCWA	Kondinin	4/81 - 5/85, 11/95, 4/01
Davies	DAVI	318852	6211560	50	CCWA	Augusta-Margaret River	4/91 onwards
Dobaderry	DOBA	463077	6437224	50	CCWA	Beverley	9/80 onwards
<i>Dowerin</i>	DOWE	505689	6541494	50	LGA	Dowerin	6/79 - 5/81, 9/99
Dulbinning	DULB	557418	6359015	50	CCWA	Wickepin	7/79 onwards
<b>Dumbleyung</b>	DUMB	560071	6309876	50	CCWA / LGA	Dumbleyung / Wagin	6/79 onwards



**Table 1 continued.**

Wetland Name	Code	Easting	Northing	Zone	Tenure	Local Government Authority	Period monitored
<i>Dundas 33113</i>	<i>DUND</i>	391998	6359382	51	CCWA	<i>Dundas</i>	11/79 – 11/91, 4/00
<b>Eganu</b>	EGAN	391567	6680556	50	CCWA	Coorow	7/78 onwards
Egret	EGRE	379666	6314855	50	CCWA	Harvey	5/85 onwards
<i>Ellen Brook</i>	<i>ELLE</i>	408758	6486521	50	CCWA	<i>Swan</i>	7/79 – 11/84
<i>Eneminga</i>	<i>ENEM</i>	358697	6590178	50	CCWA	<i>Dandaragan</i>	7/80 – 11/91
Esperance 26410	ESP1	304849	6265010	51	CCWA	Esperance	11/81 onwards
<i>Esperance 27768</i>	<i>ESP2</i>	388786	6319769	51	CCWA	<i>Esperance</i>	6/81 - 5/85, 4/00
Esperance 27985	ESP3	385963	6309342	51	CCWA	Esperance	6/81 – 11/91, 4/00 onwards
<i>Esperance 32128</i>	<i>ESP4</i>	471131	6278515	51	CCWA	<i>Esperance</i>	7/82 - 5/85
<i>Esperance 32776</i>	<i>ESP5</i>	438276	6294610	51	CCWA	<i>Esperance</i>	6/81 - 5/85, 4/00
Flagstaff	FLAG	523642	6291467	50	CCWA	Woodanilling	6/79 – 11/91, 9/97 onwards
Forrestdale	FORR	400062	6442240	50	CCWA	Armadale	11/77 onwards
<b>Fraser<sup>10</sup></b>	FRAS	507236	6542443	50	Private	Dowerin	11/99 onwards
<i>Gardner</i>	<i>GARD</i>	605828	6129943	50	CCWA	<i>Albany</i>	5/81 - 5/85, 9/89, 9/90, 4/00
Gibbs	GIBB	397627	6441667	50	CCWA	Armadale	9/92 onwards
<i>Gingin 31241</i>	<i>GING</i>	387922	6525676	50	CCWA	<i>Gingin</i>	6/79 - 5/85
<i>Gnowangerup 26264</i>	<i>GNO1</i>	636100	6196278	50	CCWA	<i>Gnowangerup</i>	3/80 – 11/91
<i>Gnowangerup 26569</i>	<i>GNO2</i>	636830	6257497	50	CCWA	<i>Gnowangerup</i>	7/82 - 5/85, 4/00
<b>Goonaping</b>	GOON	461797	6443309	50	CCWA	Beverley	11/99 onwards
Goorly	GOOR	503350	6664801	50	UCL	Dalwallinu	9/00 onwards
Gore	GORE	363166	6263536	51	CCWA	Esperance	11/79 onwards
<i>Gounter</i>	<i>GOUN</i>	672878	6413022	50	CCWA	<i>Kondinin</i>	7/80 – 11/91, 5/98
<i>Gundaring</i>	<i>GUND</i>	546974	6315587	50	CCWA	<i>Wagin</i>	5/78 – 11/91
Guraga	GURA	363476	6585412	50	LGA	Dandaragan	9/82 onwards
Harvey 12632	HARV	386550	6348919	50	CCWA	Harvey	8/80 onwards
Hebitons	HEBI	345831	6806160	50	Private	Mullewa	9/00 onwards
Hinds	HIND	456859	6596884	50	CCWA	Wongan-Ballidu	6/79 – 11/91, 9/97 onwards
Jandabup	JAND	390937	6486982	50	CCWA	Wanneroo	4/78 onwards
Jasper	JASP	379737	6190394	50	CCWA	Nannup	11/85 onwards
Jerdacuttup	JERD	246655	6241791	51	CCWA	Ravensthorpe	11/79 onwards
Joondalup	JOON	384352	6487445	50	CCWA	Joondalup	4/78 onwards
<i>Karakin</i>	<i>KARA</i>	354428	6563848	50	WRC	<i>Gingin</i>	5/79 - 5/85, 9/87
Kent 29020 <sup>10</sup>	KENT	676818	6307259	50	CCWA	Kent	9/80 - 5/85, 4/00 onwards
<i>Kondinin</i>	<i>KOND</i>	612045	6404006	50	CCWA	<i>Kondinin</i>	6/79 – 11/91, 4/00
<i>Kwobrup</i>	<i>KWOB</i>	593500	6267648	50	Private	<i>Kent</i>	6/79 – 11/91, 4/00
Kwornicup	KWOR	538575	6176168	50	CCWA	Plantagenet	11/79 onwards
Little White	LITT	541357	6347281	50	CCWA	Narrogin	7/79 – 11/91, 9/97 onwards
<b>Logue</b>	LOGU	321114	6695888	50	CCWA	Carnamah	5/79 onwards
Maringup	MARI	426553	6144690	50	CCWA	Manjimup	6/91 onwards
Martinup	MART	516363	6289934	50	CCWA	Woodanilling	6/79 – 11/91, 9/97 onwards
McLarty	MCLA	379489	6379596	50	CCWA	Murray	11/93 - 11/94, 9/96 onwards
Mears	MEAR	533098	6433941	50	CCWA	Brookton	6/78 – 11/91, 9/97 onwards
Mettler	METT	646369	6172015	50	CCWA	Albany	9/82 onwards
<i>Miripin</i>	<i>MIRI</i>	518297	6288850	50	CCWA	<i>Woodanilling</i>	6/81 - 5/85, 5/92
Moates	MOAT	600908	6131536	50	CCWA	Albany	11/79 onwards

**Table 1 continued.**

Wetland Name	Code	Easting	Northing	Zone	Tenure	Local Government Authority	Period monitored
<i>Mollerin</i>	MOLL	554214	6625482	50	CCWA	<i>Koorda</i>	7/80 – 5/85
Mortijinup	MORT	373710	6259469	51	CCWA	Esperance	4/00 onwards
Mount Le Grand	MLGR	419066	6240163	51	CCWA	Esperance	9/00 onwards
<i>Mount Marshall</i> 26687 <sup>10</sup>	MTMA	560937	6579648	50	CCWA	<i>Mt Marshall</i>	7/81 – 11/91, 5/99
Muir	MUIR	471032	6185028	50	CCWA	Manjimup	11/79 onwards
<i>Mungala</i>	MUNG	395151	6521364	50	CCWA	<i>Gingin</i>	6/79 – 5/85
<i>Murapin</i>	MURA	517769	6289522	50	CCWA	<i>Woodanilling</i>	6/81 – 5/85
<i>Murray 24739</i>	MURR	378784	6382052	50	CCWA	<i>Murray</i>	9/80 – 5/85
<i>Nambung</i>	NAMB	394607	6521821	50	CCWA	<i>Gingin</i>	6/79 – 5/85
Ngopitchup	NGOP	531747	6242644	50	WRC	Broomehill	4/00 onwards
Ninan	NINA	467029	6575597	50	CCWA	Wongan-Ballidu	7/78 – 11/91, 9/97 onwards
Nine Mile	NINE	385536	6376505	50	CCWA	Murray	6/81 onwards
<i>Nonalling</i>	NONA	557243	6400132	50	CCWA	<i>Corrigin</i>	7/79 – 5/85
<b>Noobijup</b>	NOOB	480867	6192653	50	CCWA	Cranbrook	9/99 onwards
Noonying	NOON	542507	6497744	50	CCWA	Tammin	6/79 – 11/91, 9/97 onwards
North Parriup	NPAR	281562	6250268	51	CCWA	Ravensthorpe	4/00 onwards
Owingup	OWIN	507258	6126756	50	CCWA	Denmark	7/91 onwards
Pabelup South	PABE	725800	6222286	50	CCWA	Jerramungup	4/00 onwards
<i>Pallarup</i>	PALL	756890	6322416	50	CCWA	<i>Lake Grace</i>	7/80 – 11/91, 4/00
<b>Parkeyerring</b>	PARK	533156	6307263	50	CCWA	Wagin	5/78 – 11/91, 9/97 onwards
Pillenorup	PILL	601412	6187773	50	CCWA	Plantagenet	4/00 onwards
<i>Pinjarrega</i>	PINJ	395416	6670552	50	CCWA	<i>Coorow</i>	5/79 – 11/91
<i>Plantagenet 25386</i>	PLAN	597710	6176617	50	CCWA	<i>Plantagenet</i>	11/79 – 5/85, 11/93 – 11/96, 6/98
<b>Pleasant View</b>	PLEA	608357	6145314	50	CCWA	Albany	11/79 onwards
Pooginup	POOR	476447	6177128	50	CCWA	Manjimup	6/77 onwards
Powell	POWE	567497	6125091	50	CCWA	Albany	6/81 onwards
<i>Queerearrup</i>	QUEE	521251	6291518	50	LGA	<i>Woodanilling</i>	10/78 – 5/85, 9/88
Range Road Yate	RANG	666083	6275186	50	MWR	Kent	4/00 onwards
Red (Bruce Rock)	REDB	602548	6437065	50	CCWA	Bruce Rock	7/81 – 5/85, 9/00 onwards
<i>Red (Manjimup)</i>	REDM	468592	6189580	50	UCL	<i>Manjimup</i>	11/81 – 11/91, 4/00
<b>Ronnerup</b>	RONN	744169	6317786	50	CCWA	Lake Grace	4/00 onwards
Shark	SHAR	394568	6263073	51	CCWA	Esperance	11/79 onwards
<i>Shaster</i>	SHAS	287219	6250710	51	CCWA	<i>Ravensthorpe</i>	11/79 – 11/91
Station	STAT	402615	6259237	51	CCWA	Esperance	3/80 onwards
<i>Streets</i>	STRE	402493	6614985	50	Private	<i>Moora</i>	10/78 – 11/91
Taarblin North <sup>11</sup>	TAAN			50	CCWA	Narrogin	9/04 onwards
Taarblin South <sup>11</sup>	TAAR	551258	6350395	50	CCWA	Narrogin	5/78 onwards
Thomsons	THOM	389516	6441482	50	CCWA	Cockburn	11/78 onwards
<b>Toolibin</b>	TOOL	557650	6357248	50	CCWA	Wickepin	5/78 onwards
Tordit-Gurru	TORD	476135	6179406	50	CCWA	Manjimup	6/77 onwards
<b>Towerrinning</b>	TOWE	480708	6283950	50	CCWA	West Arthur	12/77 onwards
<i>Twin Swamps N-W</i>	TWIN	406579	6490175	50	CCWA	<i>Swan</i>	7/79 – 11/84
Unicup	UNIC	474399	6200082	50	CCWA	Cranbrook	9/80 onwards
Varley	VARL	722520	6379843	50	CCWA	Kulin	9/81 – 11/91, 4/00 onwards

**Table 1 continued.**

Wetland Name	Code	Easting	Northing	Zone	Tenure	Local Government Authority	Period monitored
<i>Wagin 2088</i>	WAGI	533281	6311808	50	CCWA	<i>Wagin</i>	7/82 – 5/85
Walbyring	WALB	555534	6355214	50	CCWA	Wickepin	7/79 onwards
<i>Walling</i>	WALL	395706	6521624	50	CCWA	<i>Gingin</i>	7/81 – 5/85
<b>Walyormouring</b>	WALY	488021	6554454	50	CCWA	Goomalling	7/78 – 11/91, 9/97 onwards
Wannamal	WANN	409642	6556691	50	CCWA	Gingin	7/78 onwards
Warden	WARD	396947	6257428	51	CCWA	Esperance	11/79 onwards
<i>Wardering</i>	WARG	523478	6290378	50	CCWA	<i>Woodanilling</i>	5/78 – 11/91
Warrinup	WARR	523495	6199485	50	CCWA	Cranbrook	3/80 onwards
West Arthur 5456	WEST	496510	6293047	50	CCWA	West Arthur	8/80 – 11/91, 9/97 onwards
<b>Wheatfield</b>	WHEA	401069	6258818	51	CCWA	Esperance	11/99 onwards
<i>White (Albany)</i>	WHIA	606407	6152434	50	CCWA	<i>Albany</i>	6/81 - 5/85, 9/98
White (Narrogin)	WHIN	542630	6347335	50	CCWA	Narrogin	6/81 - 5/85, 9/97 onwards
White Water	WHIW	558770	6399914	50	CCWA	Corrigin	6/81 - 11/91, 9/97 onwards
<i>Wild Horse</i>	WILD	473739	6273448	50	CCWA	<i>West Arthur</i>	6/81 - 5/85, 4/00
Wilson	WILS	382325	6189429	50	CCWA	Manjimup	5/91 onwards
<b>Yaalup</b>	YAAL	647443	6263830	50	CCWA	Kent	7/82 onwards
Yarnup	YARN	487368	6196543	50	CCWA	Cranbrook	9/80 onwards
Yarra Yarra	YARR	379957	6726980	50	CCWA	Carnamah	7/81 - 5/85, 9/97 onwards
Yealering	YEAL	558587	6393389	50	LGA	Wickepin	6/78 onwards
Yellilup	YELL	686899	6201353	50	Private	Jerramungup	11/85 onwards
Yurine	YURI	385171	6543598	50	CCWA	Gingin	5/79 - 11/91, 9/09 onwards

**Notes:**

1. Wetlands without official names at the commencement of monitoring are identified by Local Government Authority and Reserve Number (e.g. Albany 26385).
2. Coordinates (eastings and northings) are of depth gauge Bench Marks (local survey datums). These have been installed on higher ground at or near the edge of each monitored wetland, close to the depth gauge or gauge 'cluster' of that wetland. The accuracy of the coordinates of most (all coordinates **except those highlighted in gray**) were improved from approx ±100m to approx ±5m during 2008-09 by re-survey with hand-held GPS units (Garmin GPSmap 60Cx), using the WGS84 world datum, which for practical purposes equates to GDA94. The 'Taarblin North' and 'Colletts Road' Bench Marks have not yet been installed.
3. CCWA (Conservation Commission of Western Australia); LGA (Local Government Authority); MWR (Minister for Water Resources); UCL (Unallocated Crown Land); WRC (Water & Rivers Commission). DEC has management responsibility for wetlands vested in CCWA.
4. 'Period Monitored' is described by the first and last records, for any parameter, of discrete periods of monitoring.
5. Routine monitoring was conducted every second month (Jan, Mar, May, Jul, Sep, Nov) from May 1981 to May 1985 and twice-yearly (Sep, Nov) prior to and after that four-year period and, in the case of the 103 'current' wetlands (i.e. those not shown in italics above) is ongoing.
6. A few wetlands (e.g. Forrestdale, Clifton) have been monitored more frequently than two-month intervals for varying periods.
7. The 49 SWWMP wetlands shown in *italics* have been monitored under SWWMP at various times in the past, but are not currently monitored, not at least under SWWMP. They are additional to the 103 'current' wetlands.
8. Wetlands not shown in italics are the 103 'current' SWWMP wetlands being routinely monitored by the authors for surface water depth, salinity, pH and (until 2007) nutrients, under the State Salinity Strategy. These include the 25 Intensively Monitored wetlands shown in bold.
9. Wetlands shown in **bold** are the 25 SWWMP wetlands being Intensively Monitored by other DEC scientific staff for potential changes in plant and animal communities, shallow groundwater levels and detailed water chemistry under the State Salinity Strategy. They are a subset of the 103 'current' wetlands.
10. Beverley Lakes is also known as Yenyenning Lakes; Boyup Brook 18239 as Kulicup Swamp; Corrigin 12900 as Paperbark Swamp, Frasers Lake as Maisey's 1 or Maisey's A; Kent 29020 as East Lake Bryde and Mt Marshall 26687 as Wallambin North.
11. Taarblin North and Taarblin South refer to the northern and southern basins respectively of one wetland (Taarblin).

**Table 2. Monitored wetlands by DEC Regions and Districts, with tenure, Reserve No. and Name.**  
See Table 1 for the coordinates (eastings and northings) of each wetland.

No.	DEC Region	No.	DEC District	No.	Wetland <sup>1</sup>	Tenure <sup>2</sup>	Reserve No.	Reserve Name <sup>3</sup>
1	Midwest	1	Geraldton	1	Hebitons	Private	-	-
2	Midwest	2	Moora	1	<b>Blue Gum</b> <sup>4</sup>	Private	-	-
3	Midwest	3	Moora	2	<i>Capamaura</i> <sup>5</sup>	CCWA	A 24618	Capamauro NR
4	Midwest	4	Moora	3	Crackers	CCWA	28558	Namming NR
5	Midwest	5	Moora	4	<b>Eganu</b>	CCWA	A 25210	Pimjarrega NR
6	Midwest	6	Moora	5	<i>Eneminga</i>	CCWA	A 27394	<i>Eneminga NR</i>
7	Midwest	7	Moora	6	Guraga	LGA	31223	-
8	Midwest	8	Moora	7	<b>Logue</b>	CCWA	29073	Lake Logue NR
9	Midwest	9	Moora	8	<i>Pinjarrega</i>	CCWA	A 25210	<i>Pinjarrega NR</i>
10	Midwest	10	Moora	9	<i>Streets</i>	Private	-	-
11	Midwest	11	Moora	10	Yarra Yarra	CCWA	A 26442	Yarra Yarra Lakes NR
12	South Coast	1	Albany	1	Albany 26385	CCWA	26385	-
13	South Coast	2	Albany	2	Albany 27157	CCWA	27157	Cheyne Road NR
14	South Coast	3	Albany	3	<i>Angove</i>	CCWA	A 27956	<i>Two Peoples Bay NR</i>
15	South Coast	4	Albany	4	<i>Camel</i>	CCWA	A 26161	<i>Camel Lake NR</i>
16	South Coast	5	Albany	5	Collets Road	CCWA	-	Fitzgerald River NP
17	South Coast	6	Albany	6	<i>Cranbrook 25812</i>	CCWA	A 25812	-
18	South Coast	7	Albany	7	<i>Gardner</i>	CCWA	A 27956	<i>Two Peoples Bay NR</i>
19	South Coast	8	Albany	8	<i>Gnowangerup 26264</i>	CCWA	26264	<i>Mailalup NR</i>
20	South Coast	9	Albany	9	Jerdacuttup	CCWA	A 40156	Jerdacuttup Lakes NR
21	South Coast	10	Albany	10	Mettler	CCWA	26894	Mettler Lake NR
22	South Coast	11	Albany	11	Moates	CCWA	A 27956	Two Peoples Bay NR
23	South Coast	12	Albany	12	Pabelup South	CCWA	-	Fitzgerald River NP
24	South Coast	13	Albany	13	Pillenorup	CCWA	-	Stirling Range NP
25	South Coast	14	Albany	14	<i>Plantagenet 25386</i>	CCWA	A 25386	<i>Chillinup NR</i>
26	South Coast	15	Albany	15	<b>Pleasant View</b>	CCWA	A 15107	Lake Pleasant View NR
27	South Coast	16	Albany	16	Powell	CCWA	A 25809	Lake Powell NR
28	South Coast	17	Albany	17	<i>White (Albany)</i>	CCWA	A 36550	<i>North Sister NR</i>
29	South Coast	18	Albany	18	Yellilup	Private	-	-
30	South Coast	19	Esperance	1	<b>Coomalbidgup</b>	LGA	24633	-
31	South Coast	20	Esperance	2	<i>Dundas 33113</i>	CCWA	A 33113	-
32	South Coast	21	Esperance	3	Esperance 26410	CCWA	26410	-
33	South Coast	22	Esperance	4	<i>Esperance 27768</i>	CCWA	27768	-
34	South Coast	23	Esperance	5	Esperance 27985	CCWA	27985	-
35	South Coast	24	Esperance	6	<i>Esperance 32128</i>	CCWA	A 32128	-
36	South Coast	25	Esperance	7	<i>Esperance 32776</i>	CCWA	A 32776	-
37	South Coast	26	Esperance	8	Gore	CCWA	A 32419	Lake Gore NR
38	South Coast	27	Esperance	9	Mortijinup	CCWA	A 35557	Lake Mortijinup NR
39	South Coast	28	Esperance	10	Mount Le Grand	CCWA	A 22795	Cape Le Grand NP
40	South Coast	29	Esperance	11	North Parriup	CCWA	A 32339	Lake Shaster NR
41	South Coast	30	Esperance	12	Shark	CCWA	A 31197	Shark Lake NR
42	South Coast	31	Esperance	13	<i>Shaster</i>	CCWA	A 32339	<i>Lake Shaster NR</i>
43	South Coast	32	Esperance	14	Station	CCWA	A 23825	Mullet Lake NR
44	South Coast	33	Esperance	15	Warden	CCWA	A 32257	Lake Warden NR
45	South Coast	34	Esperance	16	<b>Wheatfield</b>	CCWA	A 15231	Woody Lake NR
46	South West	1	Blackwood	1	<b>Boyup Brook 18239</b> <sup>6</sup>	CCWA	18239	Kulicup NR
47	South West	2	Blackwood	2	Broadwater	CCWA	27080	-
48	South West	3	Blackwood	3	Davies	CCWA	30826	Leeuwin-Naturaliste NP
49	South West	4	Wellington	1	Egret	CCWA	38393	Morangell NR
50	South West	5	Wellington	2	Harvey 12632	CCWA	12632	Riverdale NR
51	South West	6	Wellington	3	<b>Towerrinning</b>	CCWA	A 24917	Towerrinning NR
52	South West	7	Wellington	4	<i>Wild Horse</i>	CCWA	A 1740	<i>Wild Horse Swamp NR</i>
53	Swan	1	Perth Hills	1	Chandala	CCWA	A 37060	Chandala NR
54	Swan	2	Perth Hills	2	<i>Chittering</i>	CCWA	A 29538	<i>Chittering Lakes NR</i>
55	Swan	3	Perth Hills	3	Dobaderry	CCWA	A 43281	Wandoo Cons. Park

Table 2 continued.

No.	DEC Region	No.	DEC District	No.	Wetland	Tenure	Reserve No.	Reserve Name
56	Swan	4	Perth Hills	4	Goonaping	CCWA	A 43281	Wandoo Cons. Park
57	Swan	5	Swan Coastal	1	Bambun	CCWA	A 26756	Bambanup NR
58	Swan	6	Swan Coastal	2	Clifton	CCWA		Yalgorup NP
59	Swan	7	Swan Coastal	3	Ellen Brook	CCWA	A 27620	Ellen Brook NR
60	Swan	8	Swan Coastal	4	Forrestdale	CCWA	A 24781	Forrestdale Lake NR
61	Swan	9	Swan Coastal	5	Gibbs	CCWA	48797	
62	Swan	10	Swan Coastal	6	Gingin 31241	CCWA	31241	
63	Swan	11	Swan Coastal	7	Jandabup	CCWA	7349	Jandabup NR
64	Swan	12	Swan Coastal	8	Joondalup	CCWA	A 31048	Lake Joondalup NR
65	Swan	13	Swan Coastal	9	Karakin	WRC	7504	-
66	Swan	14	Swan Coastal	10	McLarty	CCWA	A 39404	Lake McLarty NR
67	Swan	15	Swan Coastal	11	Mungala	CCWA	A 26756	Bambanup NR
68	Swan	16	Swan Coastal	12	Murray 24739	CCWA	A 24739	
69	Swan	17	Swan Coastal	13	Nambung	CCWA	A 26756	Bambanup NR
70	Swan	18	Swan Coastal	14	Nine Mile	CCWA	A 16907	Nine Mile Lake NR
71	Swan	19	Swan Coastal	15	Thomsons	CCWA	A 15556	Thomsons Lake NR
72	Swan	20	Swan Coastal	16	Twin Swamps N-W	CCWA	A 27621	Twin Swamps NR
73	Swan	21	Swan Coastal	17	Wallering	CCWA	A 26756	Bambanup NR
74	Swan	22	Swan Coastal	18	Wannamal	CCWA	A 9838	Lake Wannamal NR
75	Swan	23	Swan Coastal	19	Yurine	CCWA	A 9676	Yurine Swamp NR
76	Warren	1	Donnelly	1	Byenup	CCWA	A 31880	Lake Muir NR
77	Warren	2	Donnelly	2	Jasper	CCWA	36996	D'Entrecasteaux NP
78	Warren	3	Donnelly	3	Maringup	CCWA	36996	D'Entrecasteaux NP
79	Warren	4	Donnelly	4	Muir	CCWA	A 31880	Lake Muir NR
80	Warren	5	Donnelly	5	Noobijup	CCWA	A 26680	Noobijup NR
81	Warren	6	Donnelly	6	Pooringup	CCWA	A 31880	Lake Muir NR
82	Warren	7	Donnelly	7	Red (Manjimup)	UCL		
83	Warren	8	Donnelly	8	Tordit-Gurru	CCWA	A 31880	Lake Muir NR
84	Warren	9	Donnelly	9	Unicup	CCWA	A 25798	Unicup NR
85	Warren	10	Donnelly	10	Wilson	CCWA	36996	D'Entrecasteaux NP
86	Warren	11	Donnelly	11	Yarnup	CCWA	29601	Yarnup NR
87	Warren	12	Frankland	1	Boat Harbour 1	CCWA	A 41010	Owingup NR
88	Warren	13	Frankland	2	Kwornicup	CCWA	32284	Kwornicup NR
89	Warren	14	Frankland	3	Owingup	CCWA	A 41010	Owingup NR
90	Wheatbelt	1	Central	1	Ardath	CCWA	A 25062	Seagroatt NR
91	Wheatbelt	2	Central	2	Beverley <sup>6</sup>	CCWA / LGA	31837	Yenning Lakes NR
92	Wheatbelt	3	Central	3	Bruce Rock 30969	CCWA	A 30969	Kwoylin NR
93	Wheatbelt	4	Central	4	Campion	CCWA	24789	Lake Campion NR
94	Wheatbelt	5	Central	5	Cronin	CCWA	A 36526	Lake Cronin NR
95	Wheatbelt	6	Central	6	Dowerin	LGA	4244	
96	Wheatbelt	7	Central	7	Frasers <sup>6</sup>	Private	-	-
97	Wheatbelt	8	Central	8	Goorly	UCL	-	-
98	Wheatbelt	9	Central	9	Hinds	CCWA	A 16305	Lake Hinds NR
99	Wheatbelt	10	Central	10	Mollerin	CCWA	A 14429	Mollerin NR
100	Wheatbelt	11	Central	11	Mt Marshall 26687 <sup>6</sup>	CCWA	A 26687	North Wallambin NR
101	Wheatbelt	12	Central	12	Ninan	CCWA	A 27026	Lake Ninan NR
102	Wheatbelt	13	Central	13	Noonying	CCWA	A 10313	Noonying NR
103	Wheatbelt	14	Central	14	Red (Bruce Rock)	CCWA	A 16493	Red Lake NR
104	Wheatbelt	15	Central	15	Walyormouring	CCWA	A 17186	Walyormouring NR
105	Wheatbelt	16	Great Southern	1	Ace	CCWA	A 34522	Lake Ace NR
106	Wheatbelt	17	Great Southern	2	Altham	CCWA	A 28395	Chinocup NR
107	Wheatbelt	18	Great Southern	3	Anderson	CCWA	A 25914	Anderson Lake NR
108	Wheatbelt	19	Great Southern	4	Atkins Yate	Private	-	-
109	Wheatbelt	20	Great Southern	5	Bennetts	CCWA	36445	Dunn Rock NR
110	Wheatbelt	21	Great Southern	6	Biddy	CCWA	17617	Lake Biddy NR
111	Wheatbelt	22	Great Southern	7	Bokan	CCWA	9628	Bokan NR
112	Wheatbelt	23	Great Southern	8	Brown	CCWA	A 24428	Nonalling NR

**Table 2 continued.**

No.	DEC Region	No.	DEC District	No.	Wetland	Tenure	Reserve No.	Reserve Name
113	Wheatbelt	24	Great Southern	9	<b>Bryde</b>	MWR	28667	
114	Wheatbelt	25	Great Southern	10	<i>Cairlocup</i>	CCWA	28324	<i>Cairlocup NR</i>
115	Wheatbelt	26	Great Southern	11	Casuarina	CCWA	A 25136	Cobline NR
116	Wheatbelt	27	Great Southern	12	<i>Cobline</i>	CCWA	A 25133	<i>Cobline NR</i>
117	Wheatbelt	28	Great Southern	13	<b>Coomelberrup</b>	CCWA	A 10472	Coomelberrup NR
118	Wheatbelt	29	Great Southern	14	<b>Corrigin 12900<sup>6</sup></b>	CCWA	12900	Paperbark NR
119	Wheatbelt	30	Great Southern	15	<b>Coyrecup</b>	CCWA	A 28552	Coyrecup NR
120	Wheatbelt	31	Great Southern	16	Dulbinning	CCWA	A 9617	
121	Wheatbelt	32	Great Southern	17	<b>Dumbleyung</b>	CCWA / LGA	26664	Dumbleyung Lake NR
122	Wheatbelt	33	Great Southern	18	Flagstaff	CCWA	A 27609	Flagstaff Lake NR
123	Wheatbelt	34	Great Southern	19	<i>Gnowangerup 26569</i>	CCWA	A 26569	
124	Wheatbelt	35	Great Southern	20	<i>Gounter</i>	CCWA	A 21253	<i>Lake Gounter NR</i>
125	Wheatbelt	36	Great Southern	21	<i>Gundaring</i>	CCWA	A 24373	<i>Gundaring Lake NR</i>
126	Wheatbelt	37	Great Southern	22	Kent 29020 <sup>6</sup>	CCWA	A 29020	Lake Bryde NR
127	Wheatbelt	38	Great Southern	23	<i>Kondinin</i>	CCWA	A 22519	<i>Kondinin Lake NR</i>
128	Wheatbelt	39	Great Southern	24	<i>Kwobrup</i>	Private	-	-
129	Wheatbelt	40	Great Southern	25	Little White	CCWA	A 26786	Carmody NR
130	Wheatbelt	41	Great Southern	26	Martinup	CCWA	A 17055	Martinup NR
131	Wheatbelt	42	Great Southern	27	Mears	CCWA	A 12398	Lake Mears NR
132	Wheatbelt	43	Great Southern	28	<i>Miripin</i>	CCWA	A 24912	<i>Miripin NR</i>
133	Wheatbelt	44	Great Southern	29	<i>Murapin</i>	CCWA	A 17257	<i>Murapin NR</i>
134	Wheatbelt	45	Great Southern	30	Ngopitchup	WRC	2184	
135	Wheatbelt	46	Great Southern	31	<i>Nonalling</i>	CCWA	A 24428	<i>Nonalling NR</i>
136	Wheatbelt	47	Great Southern	32	<i>Pallarup</i>	CCWA	A 29860	<i>Pallarup NR</i>
137	Wheatbelt	48	Great Southern	33	<b>Parkeyerring</b>	CCWA	A 10733	Parkeyerring NR
138	Wheatbelt	49	Great Southern	34	<i>Queerearrup</i>	LGA	17255	
139	Wheatbelt	50	Great Southern	35	Range Road Yate	MWR	29124	
140	Wheatbelt	51	Great Southern	36	<b>Ronnerup</b>	CCWA	A 39422	Lake King NR
141a	Wheatbelt	52a	Great Southern	37a	Taarblin North	CCWA	A 9550	Taarblin Lake NR
141b	Wheatbelt	52b	Great Southern	38b	Taarblin South	CCWA	A 9550	Taarblin Lake NR
142	Wheatbelt	53	Great Southern	38	<b>Toolibin</b>	CCWA	A 24556	Toolibin NR
143	Wheatbelt	54	Great Southern	39	<i>Varley</i>	CCWA	A 27928	<i>Lake Varley NR</i>
144	Wheatbelt	55	Great Southern	40	<i>Wagin 2088</i>	CCWA	A 2088	<i>Casuarina NR</i>
145	Wheatbelt	56	Great Southern	41	Walbyring	CCWA	A 14398	Walbyring NR
146	Wheatbelt	57	Great Southern	42	<i>Wardering</i>	CCWA	A 17258	<i>Wardering Lake NR</i>
147	Wheatbelt	58	Great Southern	43	<i>Warrinup</i>	CCWA	A 1931	<i>Warrenup NR</i>
148	Wheatbelt	59	Great Southern	44	West Arthur 5456	CCWA	A 5456	Dead Mans Swamp NR
149	Wheatbelt	60	Great Southern	45	White (Narrogin)	CCWA	A 21284	Quongunnerunding NR
150	Wheatbelt	61	Great Southern	46	White Water	CCWA	A 24428	Nonalling NR
151	Wheatbelt	62	Great Southern	47	<b>Yaalup</b>	CCWA	A 36967	
152	Wheatbelt	63	Great Southern	48	Yealering	LGA	9610	

**Notes:**

1. Wetlands without official names at the commencement of monitoring are identified by Local Government Authority and Reserve Number, e.g. Albany 26385.
2. CCWA (Conservation Commission of Western Australia); LGA (Local Government Authority); MWR (Minister for Water Resources); UCL (Unallocated Crown Land); WRC (Water & Rivers Commission). DEC has management responsibility for wetlands vested in CCWA.
3. Entries in the 'Reserve Name' column are incomplete and unchecked.
4. Wetlands shown in **bold** are in the group of 25 Intensively Monitored wetlands (see Note 9 of Table 1).
5. In addition to the 103 SWWMP wetlands currently being monitored under the State Salinity Strategy there are 49 SWWMP wetlands that have been monitored at some time in the past, but are not currently being monitored under SWWMP. These 49 are shown above in *italics*.
6. Beverley Lakes is also known as Yenyenning Lakes, Boyup Brook 18239 as Kulicup Swamp; Corrigin 12900 as Paperbark Swamp, Frasers Lake as Maisey's 1 or Maisey's A; Kent 29020 as East Lake Bryde and Mt Marshall 26687 as Wallambin North.

Reserves listed above (Reserve No. and Reserve Name) in some instances do not include the entire named wetland.

**Table 3. Number of current and historically-monitored wetlands in each DEC Region and District.**

<b>DEC Region (Current, historical)</b>	<b>DEC District</b>	<b>Current</b>	<b>Historical</b>
Midwest (7, 4)	Geraldton	1	0
	Moora	6	4
South Coast (22, 12)	Albany	11	7
	Esperance	11	5
South West (6, 1)	Blackwood	3	0
	Wellington	3	1
Swan (14, 9)	Perth Hills	3	1
	Swan Coastal	11	8
Warren (13, 1)	Donnelly	10	1
	Frankland	3	0
Wheatbelt (41, 22)	Central	10	5
	Great Southern	31	17
<b>Totals (103, 49)</b>		<b>103</b>	<b>49</b>

The locations of DEC Regional and District Headquarters are, in most instances, not obvious from Region or District names and are therefore listed below, for the convenience of readers.

<b>DEC Region / District</b>	<b>HQ Location</b>
Midwest /	Geraldton
Geraldton	Geraldton
Moora	Jurien Bay
South Coast /	Albany
Albany	Albany
Esperance	Esperance
South West /	Bunbury
Blackwood	Busselton
Wellington	Collie
Swan /	Bentley
Perth Hills	Mundaring
Swan Coastal	Wanneroo
Warren /	Manjimup
Donnelly	Pemberton
Frankland	Walpole
Wheatbelt /	Narrogin
Central	Merredin
Great Southern	Narrogin

**Table 4. Ramsar and Directory Sites of south-western Australia, and their SWWMP wetlands.**

**A. Ramsar Sites (each contains one or more Directory Site).**

Ramsar Site	Directory Site	SWWMP wetland
Becher Point Wetlands	Becher Point Wetlands	-
Forrestdale & Thomsons Lakes	Forrestdale Lake	Forrestdale
	Thomsons Lake	Thomsons
Lake Gore	Lake Gore System	Gore
Muir-Byenup System	(southern part of) Byenup Lagoon System	Byenup, Poorginup, Tordit-Gurrup
	Lake Muir	Muir
Peel-Yalgorup System	Yalgorup Lakes System	Clifton
	Lake McLarty System	McLarty, <i>Murray 24739</i>
Toolibin Lake	Toolibin Lake	<b>Toolibin</b>
Vasse-Wonnerup System	Vasse-Wonnerup Wetland System	-
Lake Warden System	Lake Warden System	Station, Warden, <b>Wheatfield</b>
		13 Current      1 Historical

**B. Other Directory Sites (not within Ramsar Sites).**

Directory Site	SWWMP wetland
Balicup Lake System	<i>Camel</i>
Barraghup Swamp	-
Benger Swamp	-
Bennetts Lake	<b>Bennetts</b>
Booragoon Lake	-
Brixton Street Swamps	-
Lake Bryde – East Lake Bryde	<b>Bryde</b> , Kent 29020
(northern part of) Byenup Lagoon System	<b>Noobijup</b> , Unicap, Yarnup
Cape Leeuwin System	-
Chandala Swamp	Chandala
Chittering-Needonga Lakes	<i>Chittering</i>
Coyrecup Lake	<b>Coyrecup</b>
Lake Cronin	<i>Cronin</i>
Doggerup Creek System	-
Dumbleyung Lake	<b>Dumbleyung</b>
Dunn Rock Gnamma Holes	-
Ellen Brook Swamps System	<i>Ellen Brook, Twin Swamps NW</i>
Gibbs Road Swamp System	Gibbs
Gingilup-Jasper Wetland System	Jasper, Wilson
Lake Grace System	<b>Altham</b>
Guraga Lake	Guraga
Herdsmen Lake	-
Hutt Lagoon System	-
Joondalup Lake	Joondalup
Karakin Lakes	<i>Karakin</i>
Kondinin Samphire Marsh	-
Lancelin Defence Training Area (Cwlth)	-
Lake Logue-Indoon System	<b>Logue</b>
Maringup Lake	Maringup

Directory Site	SWWMP wetland
McCarley's Swamp (Ludlow Swamp)	-
Loch McNess System	-
Moates Lake System	Moates, <i>Angove, Gardner</i>
Mortijinup Lake System	Mortijinup
Mount Soho Swamps	-
Owingup Swamp System	Boat Harbour 1, Owingup
Palmer Barracks, Guildford (Cwlth)	-
Paperbark Swamp	<b>Corrigin 12900</b>
Perth Airport Woodland Swamps (Cwlth)	-
Pink Lake	-
Lake Pleasant View System	Albany 26385, <b>Pleasant View</b>
RAAF Caversham (Cwlth)	-
Rottnest Island Lakes	-
Spectacles Swamp	-
Lake Thetis	-
Wannamal Lakes System	Wannamal
Yealering Lakes System	Brown, White Water, Yealering, <i>Nonalling</i>
Yellilup Yate Swamp System	Yellilup
Yorkrakine Rock Pools	-
29 Current      9 Historical	

The 'Directory' is 'A Directory of Important Wetlands in Australia', a cooperative project of the State, Territory and Commonwealth Governments. Three editions have been published, in 1993, 1996 and 2001. The Directory continues to be added to and updated from time to time, e.g. in 2009. It is accessible online at <http://www.environment.gov.au/water/publications/environmental/wetlands/database/>

Nine south-west Western Australian Directory Sites are not listed in Tables 4A or 4B, because they are essentially riverine or estuarine and do not contain SWWMP-monitored wetlands. They are Peel-Harvey Estuary (part of Peel-Yalgorup Ramsar Site), Avon River Valley, Blackwood River (Lower Reaches) and Tributaries, Broke Inlet System, Culham Lake System, Fitzgerald Inlet System, Murchison River (Lower Reaches), Oyster Harbour and Swan-Canning Estuary.

Wetlands shown in *italics* have been monitored in the past under SWWMP, but not currently.

Wetlands shown in **bold** are in the group of 25 Intensively Monitored wetlands (see Note 9 of Table 1).



**Table 5. Natural Diversity Recovery Catchments and their SWWMP wetlands.**

Natural Diversity Recovery Catchment	DEC Region	DEC District	SWWMP-monitored wetlands
Lake Bryde	Wheatbelt	Great Southern	<b>Bryde</b> , Kent 29020
Buntine-Marchagee	Wheatbelt	Central	-
Drummond	Swan	Perth Hills	-
Esperance Lakes	South Coast	Esperance	<b>Shark</b> , Station, Warden, <b>Wheatfield</b>
Muir-Unicup	Warren	Donnelly	Byenup, Muir, <b>Noobijup</b> , Pooginup, Tordit-Gurru, Unicup, Yarnup, <i>Red (Manjimup)</i>
Toolibin Lake	Wheatbelt	Great Southern	Dulbinning, Taarblin, <b>Toolibin</b> , Walbyring
			17 Current      1 Historical

**Notes:**

1. Kent 29020 is also known as East Lake Bryde
2. Taarblin has two basins, north and south. Both are monitored.
3. *Red (Manjimup)* has been monitored in the past under SWWMP, but is not currently.
4. Most of the wetlands listed above, and some others not listed, are also monitored under Recovery Catchment programs. Nonetheless it is considered important to continue the twice-yearly routine monitoring under SWWMP, which in all cases pre-dates the establishment of the Natural Diversity Recovery Catchments and their programs.
5. Wetlands shown in **bold** are in the group of 25 Intensively Monitored wetlands (see Note 9 of Table 1).

**Table 6. Bathymetrically-mapped SWWMP wetlands.**

All SWWMP wetlands known by the authors to have been bathymetrically-mapped are listed in the Table below, together with the years of mapping, methods employed, products and custodians / sources.

No.	Wetland	Custodian / Source	Year of Mapping	Products	Methods / Comment
1	<b>Ardath</b> <sup>1</sup>	DEC	2004	Paper map. Digital data. D-V calc. <sup>4</sup>	RTK <sup>5</sup>
2	Beverley <sup>2</sup>	DEC	2002/3	Paper map. Digital data. D-V calc.	RTK
3	<b>Bryde</b>	DEC	2002	Paper map. Digital data. D-V calc.	RTK
4	Byenup	DEC	2009	Digital data. Maps in preparation.	RTK
5	Clifton	DoW		Not seen.	Mapping referred to by Knott <i>et al.</i> (2003).
6	<b>Campion</b>	DEC	2004/6/7	Paper map. Digital data. D-V calc.	RTK
7	<b>Coyrecup</b>	DEC	2001	Paper map. Digital data. D-V calc. D-SA calc. <sup>4</sup>	RTK at 100m intervals on 9 E-W transects 300m apart.
	Dulbinning	-	-	-	See Water Authority file 00617SW for inflow & outflow channel and some lakebed elevns.
8	<b>Dumbleyung</b>	DEC	1998/01	Paper map. Digital data. D-V calc. D-SA calc.	RTK of bed at 100m intervals on 8 E-W transects 1km apart; Photogrammetry of shore. Correction of outflow elevation in 2002.
9	Forrestdale	DoW		Paper map.	Metropolitan Water Board Special Plan 81C, FB 11318, Stadia Book 11319. Arnold (1990d) pp 356, 357, 359, 360.
10	Gore	DEC	2003	Paper map. Digital data. D-V calc.	Boat-based RTK and echo-sounding.
11	Hinds	DEC	2000/1	Paper & PDF maps. Digital data. D-V calc.	
12	Jandabup	DoW		Paper map. 1:5,000.	MWB Special Plan 115, File 763107/74, Stadia L.B. 11650. Arnold (1990a) pp 60, 61, 66.
13	Jasper				Depth transects are shown in Dortch (1996).
14	Joondalup	DoW		Paper map. 1:5,000.	MWB Special Plan 117B, File 763107/74, Stadia L.B. 11651. Arnold (1990b) pp 104, 110-112.
15	Kent 29020 <sup>2</sup>	DEC	2002	Paper map. Digital data. D-V calc.	RTK
16	Mears	DEC	2003	Paper map. Digital data. D-V calc.	RTK
17	<i>Mollerin</i> <sup>3</sup>	DEC	2004	<i>Paper map. Digital data</i>	<i>Photogrammetry and RTK ground truthing.</i>
18	<i>Mt Marshall 26687</i> <sup>2</sup>	DEC	2004	<i>Paper map. Digital data. D-V calc.</i>	RTK
19	Ninan	DEC	2000	Paper & PDF maps. Digital data. D-V calc.	Boat-based RTK and echo-sounding.
20	Powell	DoW	2003?		
21	Shark	DEC	2003	Paper map. Digital data. D-V calc.	Boat-based RTK.
22	Station	DEC	2002	Paper map. Digital data. D-V calc.	RTK
23a	Taarblin North	DEC	2004	Paper & PDF maps. Digital data. D-V calc.	RTK
24	Thomsons			Paper maps.	See Arnold (1990c) pp 266, 267, 269, 270. Davis <i>et al.</i> (2001).
25	<b>Toolibin</b>	DoW		Scanned copy of paper map, '609 009 PWD WA 54732', with spot heights and 0.5m AHD contours	Also see Water Authority file 00617SW for inflow & outflow channel and W bank elevns.
26	<b>Towerrinning</b>	Froend & McComb (1991)	1986	≈1:25,000 paper map (<A4); 0.5m contours to -2.5m, shoreline = 0.0m	Weighted graduated rope; ≈50m intervals on 7 transects (4 E-W, 3 N-S) ≈500m apart.
	Walbyring	-	-	-	See DoW (Water Authority) file 00617SW for inflow channel elevations.
27	Warden	DEC	2002	Paper map. Digital data. D-V calc.	Boat-based RTK and echo-sounding.
28	<b>Wheatfield</b>	DEC	2002	Paper map. Digital data. D-V calc.	Boat-based RTK.

**Notes:**

1. Wetlands shown in **bold** are in the group of 25 Intensively Monitored wetlands (see Note 9 of Table 1).
2. Beverley Lakes is also known as Yenyenning Lakes, Kent 29020 as East Lake Bryde and Mt Marshall 26687 as Wallambin North.
3. Wetlands shown in *italics* have been monitored in the past under SWWMP, but not currently.
4. 'D-V calc.' and 'D-SA calc.' are Depth to Volume and Depth to Surface Area calculators, derived from the bathymetry.
5. 'RTK' refers to collecting 3-dimensional position (point) data using the Real-Time Kinematic Differential Global Positioning System (RTK DGPS).
6. SWWMP personnel have participated in mapping of several non-SWWMP wetlands, these being Bokarup, Brown (connected to Campion), Cowcowing, Quallilip, and other wetlands (in addition to Station, Warden and Wheatfield) in the Lake Warden System, namely Ewans, Mullet, Windabout and Woody.

**Table 7. SWWMP wetlands being bathymetrically-mapped by walking water edges.**

In 2008, SWWMP personnel began opportunistic mapping of the bathymetry of SWWMP wetlands, by walking and logging GPS waypoints along all or part of the surface water edge at a variety of water levels. This work is undertaken while at wetlands for other reasons such as routine monitoring in September and November, gauge maintenance in autumn and multiple point data collection at any time of the year. It is anticipated that, over the long term, the accumulated data will provide rudimentary, low cost bathymetric maps, depth - volume calculators and depth - surface area calculators for many wetlands. These are a fundamental requirement for water and salt balance investigations and related eco-hydrological studies.

To date, the following contours have been logged.

Wetland	Bathym. Survey No.	Date	Depth gauge reading (m)	% of surface water edge mapped	Who	Comment
Blue Gum	1.1	03 Nov 2008	0.07	100%	JL	
“	1.2	17 Sep 2009	0.275	100%	JL	
Chandala	2.1	31 Jul 2008	1.11	≈70%	JL	Logged waypoints along W, N and S edges
“	2.2	11 May 2009	0.15	100%	JL	
“		13 May 2009	-	-	JL	Logged waypoints along NE stream inflow.
“	2.3	13 Nov 2009	0.75	≈40%	JL	
“	2.4	18 Dec 2009	0.56	100%	JL	
“	2.5	14 Jan 2010	0.335	100%	JL	Many small islands within mapped contour.
Cronin	3	16 July 2009	TBD	≈95%	JL	Logged all of basin water edge but not all of inlet channel.
Esperance 26410	4	17 Jul 2008	0.79	100%	JL	
Frasers	5	19 Sep 2009	0.23	100%	JL	
Guraga	6.1	16 Sep 2008	0.41	≈7%	JL	Logged waypoints for 0.5km along E edge.
“	6.2	17 Sep 2009	0.65	100%	JL	
Harvey 12632	7.1	06 Aug 2008	0.94	100%	JL	
“		18 Mar 2008	0.00	-	JL	Lake dry. Logged ≈95% of distinct peat edge.
“	7.2	22 Jul 2009	0.26	100%	JL	
“	7.3	17 Nov 2009	0.46	100%	JL	
McLarty	8.1	27 Aug 2008	1.18	100%	JL	
“	8.2	17 Nov 2009	0.56	100%	JL	
“	8.3	20 Dec 2009	0.30	100%	JL	
West Arthur 5456	9	18 Jul 2008	0.15	100%	JL	
Yellilup	10	07 Dec 2009	0.995	100%	AC	
<b>10 Wetlands</b>	<b>20 Surveys</b>					

**Table 8. SWWMP wetlands for which aerial oblique photography is available. High-resolution, low altitude, aerial oblique photographs of the following SWWMP wetlands were captured by DEC during 2008-2010. Requests for these photographs should be directed to [jim.lane@dec.wa.gov.au](mailto:jim.lane@dec.wa.gov.au). A small charge for supply may be required.**

No.	Wetland Name <sup>1</sup>	Code	Tenure <sup>2</sup>	Local Government Authority	Date of Photography
1	<i>Ace</i> <sup>3</sup>	ACE	CCWA	Lake Grace	17 May 2009
2	Albany 26385 <sup>4</sup>	ALB1	CCWA	Albany	21 May 2008
3	<i>Albany 27157</i>	ALB2	CCWA	Albany	21 May 2008
4	<b>Altham</b> <sup>5</sup>	ALTH	CCWA	Kent	17 May 2009
5	Anderson	ANDE	CCWA	Tambellup	21 May 2008
6	<i>Angove</i>	ANGO	CCWA	Albany	21 May 2008
7	<b>Ardath</b>	ARDA	CCWA	Bruce Rock	07 June 2010
8	Atkins Yate	ATKI	Private	Lake Grace	17 May 2009
9	Bambun	BAMB	CCWA	Gingin	06 June 2010
10	<b>Bennetts</b>	BENN	CCWA	Lake Grace	17 May 2009
11	Beverley <sup>6</sup>	BEVE	CCWA / LGA	Beverley / Brookton / Quairading	07 June 2010
12	<i>Biddy</i>	BIDD	CCWA	Lake Grace	26 May 2010
13	<b>Blue Gum</b>	BLUE	Private	Moora	07 June 2010
14	Boat Harbour 1	BOA1	CCWA	Denmark	26 May 2008
15	<i>Bokan</i>	BOKA	CCWA	Narrogin	26 May 2010
16	<b>Boyup Brook 18239</b> <sup>6</sup>	BOYU	CCWA	Boyup Brook	19 May 2008
17	Brown	BROW	CCWA	Corrigin	07 June 2010
18	<b>Bryde</b>	BRYD	CCWA	Kent	17 May 2009
19	Byenup	BYEN	CCWA	Manjimup	24 May 2008
20	<i>Cairlocup</i>	CAIR	CCWA	Kent	17 May 2009
21	<i>Camel</i>	CAME	CCWA	Cranbrook	21 May 2008
22	<i>Capamaura</i>	CAPA	CCWA	Carnamah	07 June 2010
23	Casuarina	CASU	CCWA	Katanning	17 May 2009
24	Chandala	CHAN	CCWA	Chittering	06 June 2010
25	<i>Chittering</i>	CHIT	CCWA	Chittering	06 June 2010
26	<i>Cobline</i>	COBL	CCWA	Dumbleyung	17 May 2009
27	Collets Road	COLL	CCWA	Jerramungup	16 May 2009
28	<b>Coomalbidgup</b>	CMBG	LGA	Esperance	16 May 2009
29	<b>Coomelberrup</b>	COOM	CCWA	Dumbleyung	17 May 2009
30	<b>Corrigin 12900</b> <sup>6</sup>	CORR	CCWA	Corrigin	07 June 2010
31	<b>Coyrecup</b>	COYR	CCWA	Katanning	17 May 2009
32	Crackers	CRAC	CCWA	Dandaragan	07 June 2010
33	<i>Cranbrook 25812</i>	CRAN	CCWA	Cranbrook	21 May 2008
34	<i>Cronin</i>	CRON	CCWA	Kondinin	26 May 2010
35	Davies	DAVI	CCWA	Augusta-Margaret River	19 May 2008
36	Dobaderry	DOBA	CCWA	Beverley	07 June 2010
37	Dulbinning	DULB	CCWA	Wickepin	26 May 2010
38	<b>Dumbleyung</b>	DUMB	CCWA / LGA	Dumbleyung / Wagin	17May2009, 26May2010
39	<i>Dundas 33113</i>	DUND	CCWA	Dundas	16 May 2009
40	<b>Eganu</b>	EGAN	CCWA	Coorow	07 June 2010
41	Egret	EGRE	CCWA	Harvey	19 May 2008
42	<i>Ellen Brook</i>	ELLE	CCWA	Swan	06 June 2010
43	<i>Eneminga</i>	ENEM	CCWA	Dandaragan	07 June 2010
44	Esperance 26410	ESP1	CCWA	Esperance	16 May 2009

**Table 8 continued.**

No.	Wetland Name <sup>1</sup>	Code	Tenure <sup>2</sup>	Local Government Authority	Date of Photography
45	<i>Esperance 27768</i>	ESP2	CCWA	<i>Esperance</i>	16 May 2009
46	Esperance 27985	ESP3	CCWA	Esperance	16 May 2009
47	<i>Esperance 32128</i>	ESP4	CCWA	<i>Esperance</i>	16 May 2009
48	<i>Esperance 32776</i>	ESP5	CCWA	<i>Esperance</i>	16 May 2009
49	Flagstaff	FLAG	CCWA	Woodanilling	17 May 2009
50	<i>Gardner</i>	GARD	CCWA	<i>Albany</i>	21 May 2008
51	Gibbs	GIBB	CCWA	Armadale	06 June 2010
52	<i>Gingin 31241</i>	GING	CCWA	<i>Gingin</i>	06 June 2010
53	<i>Gnowangerup 26264</i>	GNO1	CCWA	<i>Gnowangerup</i>	21 May 2008
54	<i>Gnowangerup 26569</i>	GNO2	CCWA	<i>Gnowangerup</i>	17 May 2009
55	<b>Goonaping</b>	GOON	CCWA	Beverly	07 June 2010
56	Gore	GORE	CCWA	Esperance	16 May 2009
57	<i>Gounter</i>	GOUN	CCWA	<i>Kondinin</i>	26 May 2010
58	<i>Gundaring</i>	GUND	CCWA	<i>Wagin</i>	17 May 2009
59	Guraga	GURA	LGA	Dandaragan	07 June 2010
60	Harvey 12632	HARV	CCWA	Harvey	19 May 2008
61	Jandabup	JAND	CCWA	Wanneroo	06 June 2010
62	Jasper	JASP	CCWA	Nannup	20 May 2008
63	Jerdacuttup	JERD	CCWA	Ravensthorpe	16 May 2009
64	Joondalup	JOON	CCWA	Joondalup	06 June 2010
65	<i>Karakin</i>	KARA	WRC	<i>Gingin</i>	06 June 2010
66	Kent 29020 <sup>6</sup>	KENT	CCWA	Kent	17 May 2009
67	<i>Kondinin</i>	KOND	CCWA	<i>Kondinin</i>	07 June 2010
68	<i>Kwobrup</i>	KWOB	Private	<i>Kent</i>	17 May 2009
69	Kwornicup	KWOR	CCWA	Plantagenet	21 May 2008
70	Little White	LITT	CCWA	Narrogin	26 May 2010
71	Maringup	MARI	CCWA	Manjimup	20 May 2008
72	Martinup	MART	CCWA	Woodanilling	17 May 2009
73	McLarty	MCLA	CCWA	Murray	21 May 2008
74	Mears	MEAR	CCWA	Brookton	07 June 2010
75	Mettler	METT	CCWA	Albany	21 May 2008
76	<i>Miripin</i>	MIRI	CCWA	<i>Woodanilling</i>	17 May 2009
77	Moates	MOAT	CCWA	Albany	21 May 2008
78	Mortjinup	MORT	CCWA	Esperance	16 May 2009
79	Mount Le Grand	MLGR	CCWA	Esperance	16 May 2009
80	Muir	MUIR	CCWA	Manjimup	20 & 24 May 2008
81	<i>Mungala</i>	MUNG	CCWA	<i>Gingin</i>	06 June 2010
82	<i>Murapin</i>	MURA	CCWA	<i>Woodanilling</i>	17 May 2009
83	<i>Murray 24739</i>	MURR	CCWA	<i>Murray</i>	21 May 2008
84	<i>Nambung</i>	NAMB	CCWA	<i>Gingin</i>	06 June 2010
85	Ngopitchup	NGOP	WRC	Broomehill	24 May 2008
86	Nine Mile	NINE	CCWA	Murray	19 May 2008
87	<i>Nonalling</i>	NONA	CCWA	<i>Corrigin</i>	07 June 2010
88	<b>Noobijup</b>	NOOB	CCWA	Cranbrook	24 May 2008
89	North Parriup	NPAR	CCWA	Ravensthorpe	16 May 2009
90	Owningup	OWIN	CCWA	Denmark	20 May 2008

**Table 8 continued.**

No.	Wetland Name <sup>1</sup>	Code	Tenure <sup>2</sup>	Local Government Authority	Date of Photography
91	Pabelup South	PABE	CCWA	Jerramungup	16 May 2009
92	<i>Pallarup</i>	PALL	CCWA	Lake Grace	17 May 2009
<b>93</b>	<b>Parkeyerring</b>	PARK	CCWA	Wagin	17 May 2009
94	Pillenorup	PILL	CCWA	Plantagenet	21 May 2008
95	<i>Pinjarrega</i>	PINJ	CCWA	Coorow	07 June 2010
96	<i>Plantagenet 25386</i>	PLAN	CCWA	Plantagenet	21 May 2008
<b>97</b>	<b>Pleasant View</b>	PLEA	CCWA	Albany	21 May 2008
98	Pooginup	POOR	CCWA	Manjimup	20 May 2008
99	Powell	POWE	CCWA	Albany	21 May 2008
100	<i>Queerearrup</i>	QUEE	LGA	Woodanilling	17 May 2009
101	Range Road Yate	RANG	MWR	Kent	17 May 2009
102	Red (Bruce Rock)	REDB	CCWA	Bruce Rock	07 June 2010
103	<i>Red (Manjimup)</i>	REDM	UCL	Manjimup	24 May 2008
<b>104</b>	<b>Ronnerup</b>	RONN	CCWA	Lake Grace	17 May 2009
105	Shark	SHAR	CCWA	Esperance	16 May 2009
106	<i>Shaster</i>	SHAS	CCWA	Ravensthorpe	16 May 2009
107	Station	STAT	CCWA	Esperance	16 May 2009
108	<i>Streets</i>	STRE	Private	Moora	07 June 2010
109a	Taarblin North <sup>7</sup>	TAAN	CCWA	Narrogin	26 May 2010
109b	Taarblin South <sup>7</sup>	TAAR	CCWA	Narrogin	26 May 2010
110	Thomsons	THOM	CCWA	Cockburn	06 June 2010
111	<b>Toolibin</b>	TOOL	CCWA	Wickepin	26May2010, 07Jun2010
112	Tordit-Gurrup	TORD	CCWA	Manjimup	20 May 2008 (limited)
<b>113</b>	<b>Towerrinning</b>	TOWE	CCWA	West Arthur	24 May 2008
114	<i>Twin Swamps N-W</i>	TWIN	CCWA	Swan	06 June 2010
115	Varley	VARL	CCWA	Kulin	26 May 2010
116	<i>Wagin 2088</i>	WAGI	CCWA	Wagin	17 May 2009
117	Walbyring	WALB	CCWA	Wickepin	26May2010, 07Jun2010
118	<i>Walling</i>	WALL	CCWA	Gingin	06 June 2010
119	Wannamal	WANN	CCWA	Gingin	06 June 2010
120	Warden	WARD	CCWA	Esperance	16 May 2009
121	<i>Wardering</i>	WARG	CCWA	Woodanilling	17 May 2009
122	Warrinup	WARR	CCWA	Cranbrook	24 May 2008
<b>123</b>	<b>Wheatfield</b>	WHEA	CCWA	Esperance	16 May 2009
124	<i>White (Albany)</i>	WHIA	CCWA	Albany	21 May 2008
125	White (Narrogin)	WHIN	CCWA	Narrogin	26May2010, 07Jun2010
126	White Water	WHIW	CCWA	Corrigin	07 June 2010
127	<i>Wild Horse</i>	WILD	CCWA	West Arthur	19 May 2008
128	Wilson	WILS	CCWA	Manjimup	20 May 2008
<b>129</b>	<b>Yaalup</b>	YAAL	CCWA	Kent	17 May 2009
130	Yarnup	YARN	CCWA	Cranbrook	24 May 2008
131	Yealering	YEAL	LGA	Wickepin	07 June 2010
132	Yellilup	YELL	Private	Jerramungup	21 May 2008
133	Yurine	YURI	CCWA	Gingin	06 June 2010

**Notes:**

1. Wetlands without official names at the commencement of monitoring are identified by Local Government Authority and Reserve Number (e.g. Albany 26385).

2. CCWA (Conservation Commission of Western Australia); LGA (Local Government Authority); MWR (Minister for Water Resources); UCL (Unallocated Crown Land), WRC (Water & Rivers Commission). DEC has management responsibility for wetlands vested in CCWA.
3. The SWWMP wetlands shown in *italics* have been monitored under SWWMP at various times in the past, but are not currently monitored, not at least under SWWMP.
4. Wetlands not shown in italics are 'current' SWWMP wetlands being routinely monitored by the authors for surface water depth, salinity, pH and (until 2007) nutrients, under the State Salinity Strategy. These include the Intensively Monitored wetlands shown in bold.
5. Wetlands shown in **bold** are SWWMP wetlands being Intensively Monitored by other DEC scientific staff for potential changes in plant and animal communities, shallow groundwater levels and detailed water chemistry under the State Salinity Strategy. They are a subset of the 'current' wetlands.
6. Beverley Lakes is also known as Yenyenning Lakes; Boyup Brook 18239 as Kulicup Swamp; Corrigin 12900 as Paperbark Swamp and Kent 29020 as East Lake Bryde.
7. Taarblin North and Taarblin South refer to the northern and southern basins respectively of one wetland (Taarblin).

## APPENDIX 1. Reports, publications and databases in which use is made of SWWMP data.

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# GRAPHS

The following graphs of wetland water depth, pH and salinity are arranged in the same order (alphabetical by wetland name) as in Table 1 where coordinates, tenure and location (by Local Government Authority) are provided.

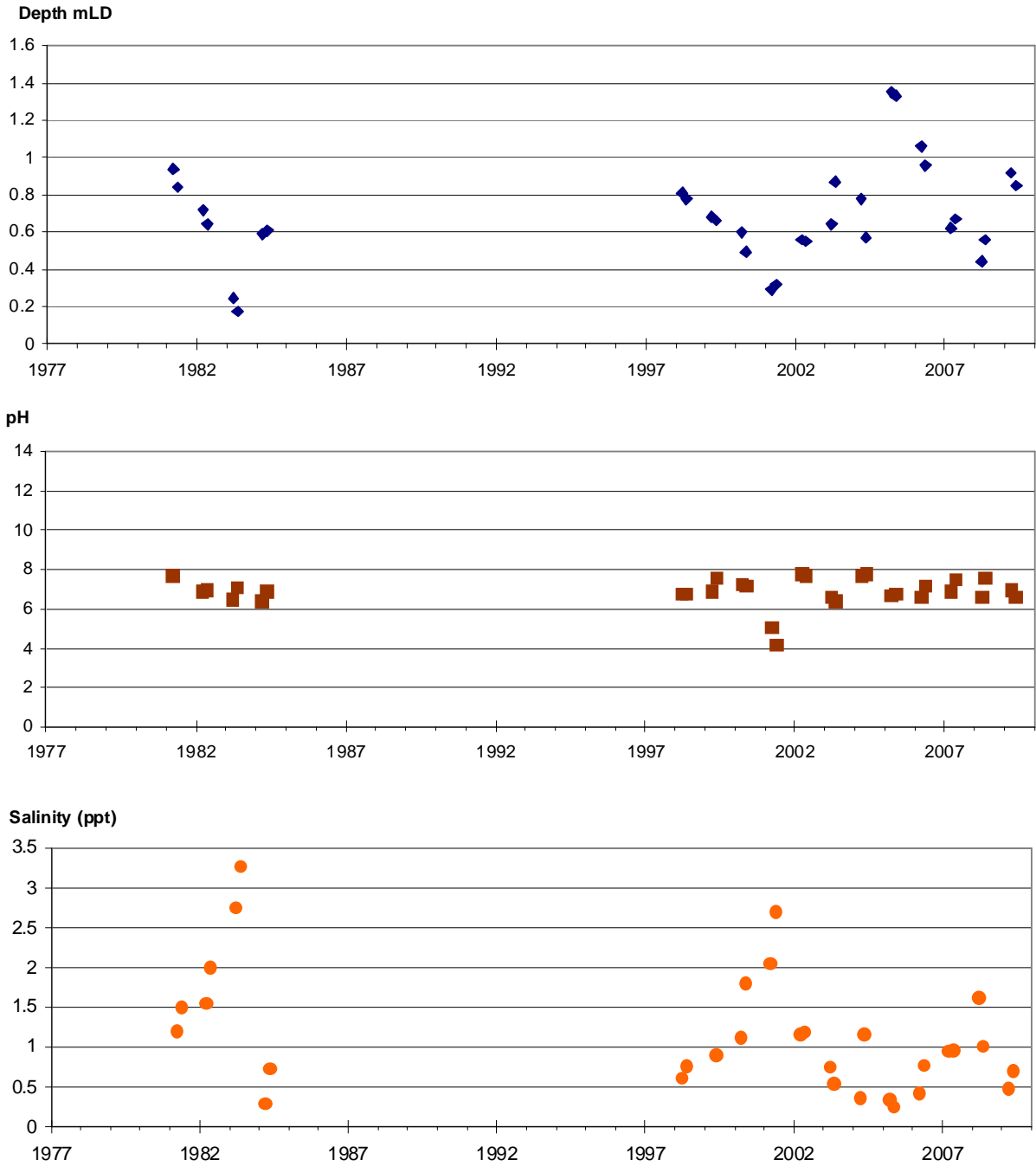
Only routinely-collected September and November data from the 103 SWWMP wetlands currently monitored under the State Salinity Strategy are displayed.

The 25 wetlands Intensively Monitored by DEC scientific staff for additional biological and physico-chemical attributes (see first paragraph of Section 2 and Note 9 of Table 1) are indicated.

Listing as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands (Government of Western Australia 1990, 2000; Wetlands International 2002) and listing in 'A Directory of Important Wetlands in Australia' (Environment Australia 2001) is indicated where this is the case.

Inclusion in a Natural Diversity Recovery Catchment (Government of Western Australia 1996a; Wallace & Lloyd 2008) is also indicated where applicable.

## ALBANY 26385



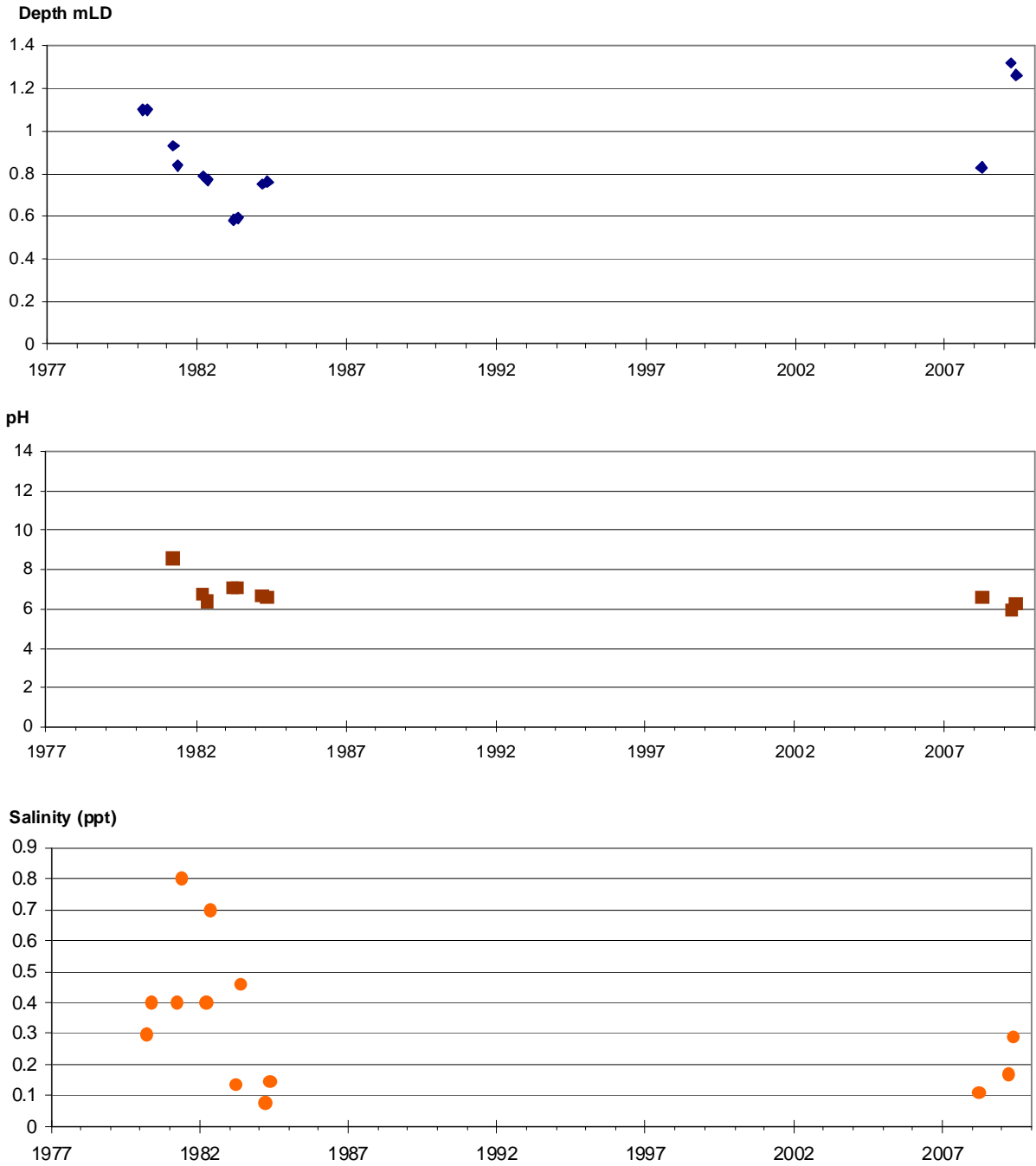
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Albany 26385 is a component of the 'Lake Pleasant View System', which is listed in the 'Directory of Important Wetlands in Australia'.

Albany 26385 is in the Albany District of the South Coast DEC Region

## ALBANY 27157



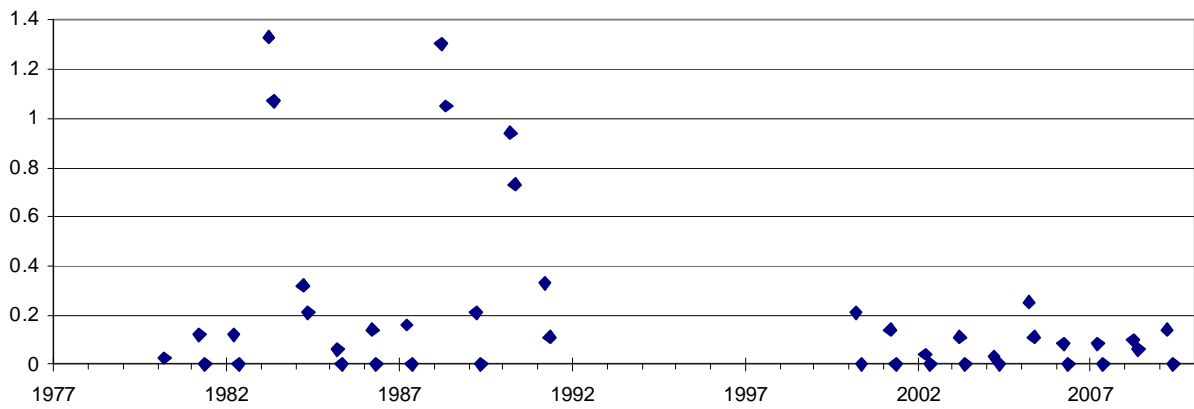
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

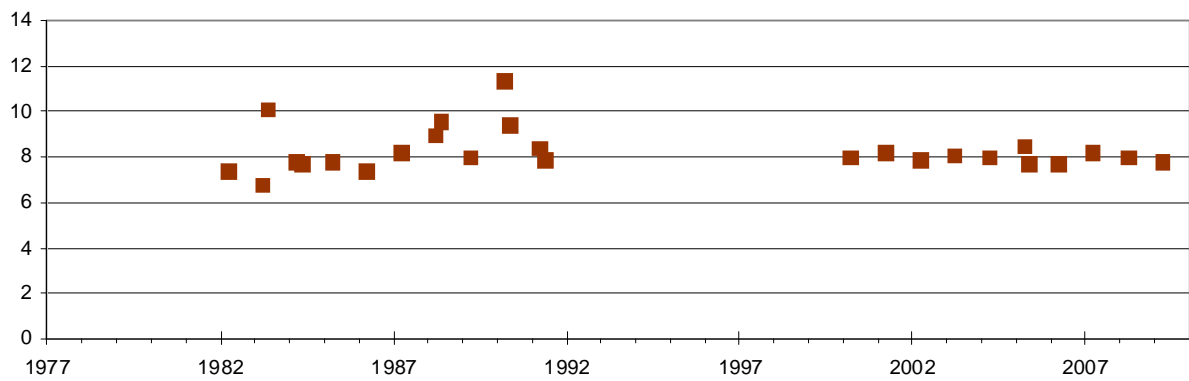
Albany 27157 is in the Albany District of the South Coast DEC Region

# ALTHAM<sup>IM</sup>

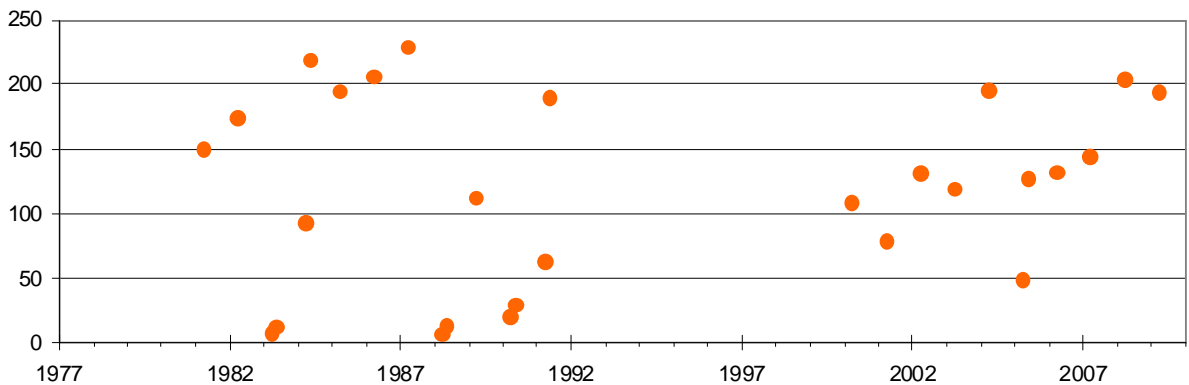
Depth mLD



pH



Salinity (ppt)



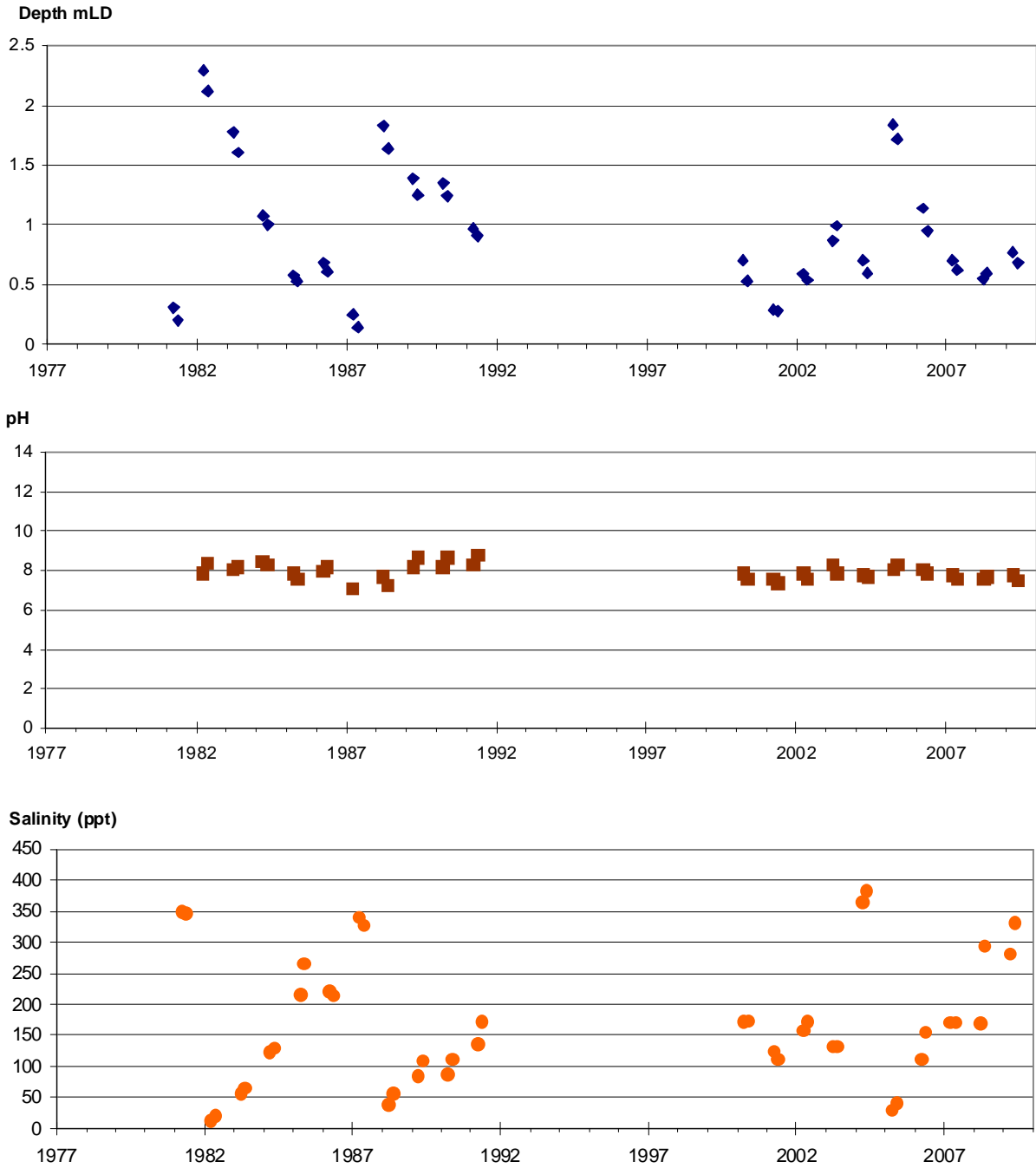
**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Altham is a component of the 'Lake Grace System', which is listed in the 'Directory of Important Wetlands in Australia'.

Altham is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# ANDERSON



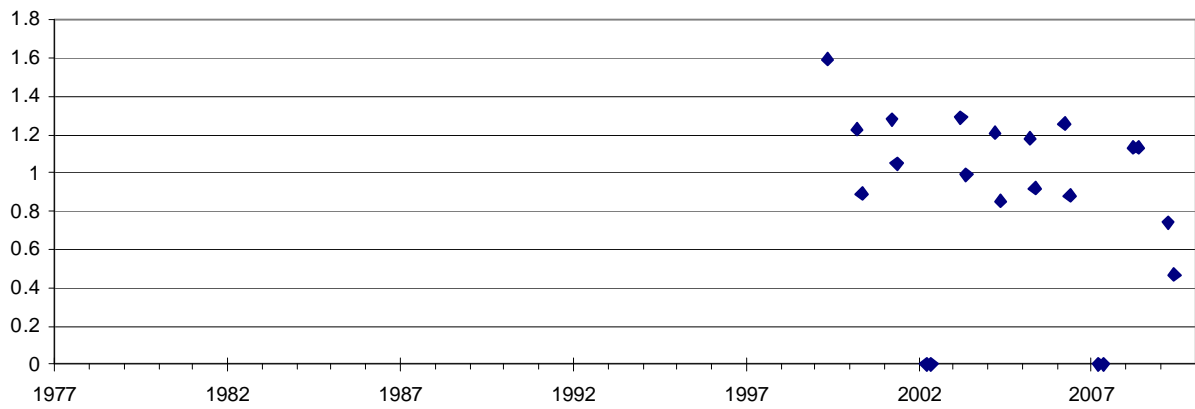
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

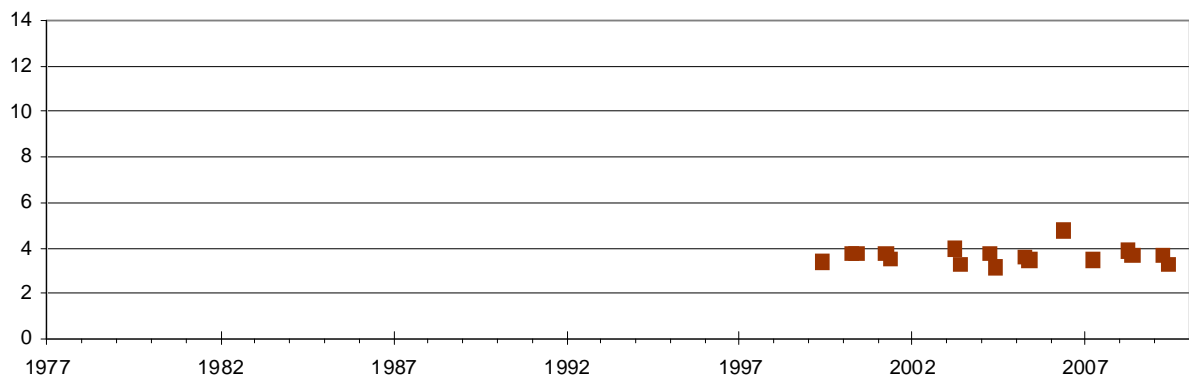
Anderson is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# ARDATH<sup>IM</sup>

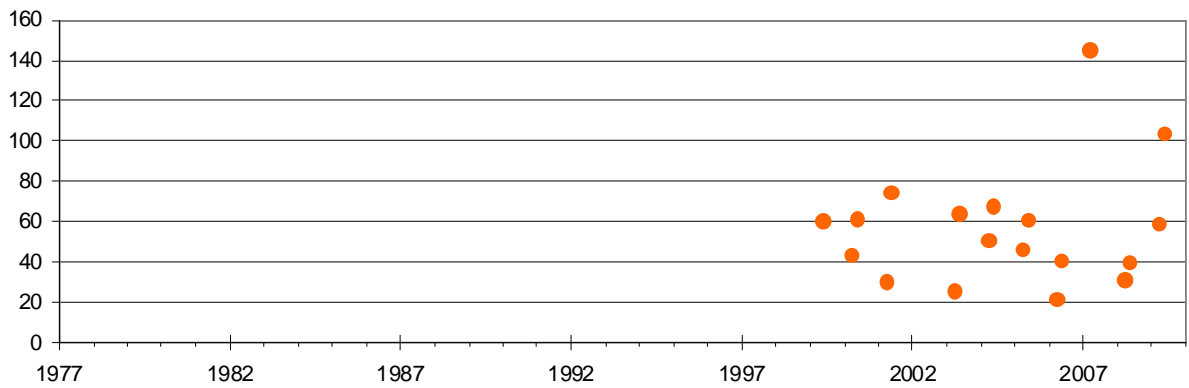
## Depth mLD



## pH



## Salinity (ppt)



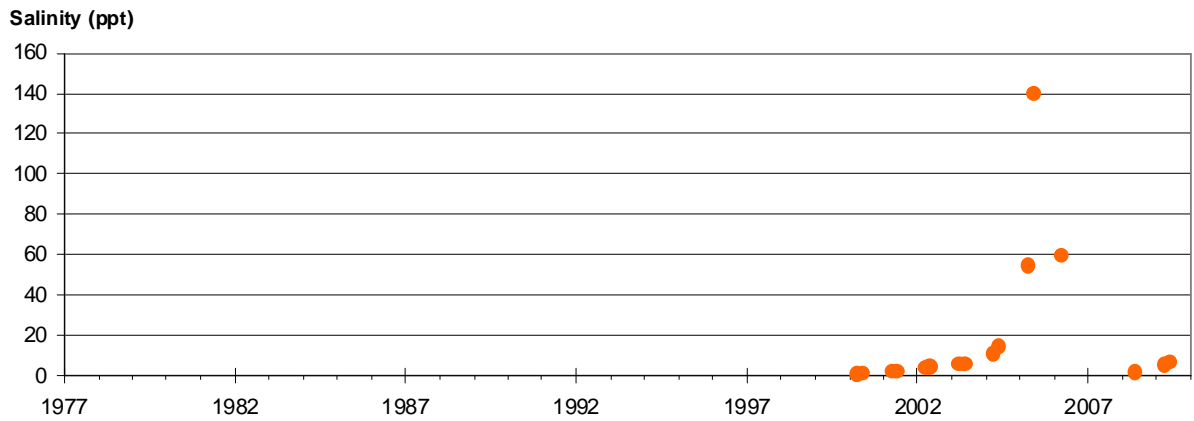
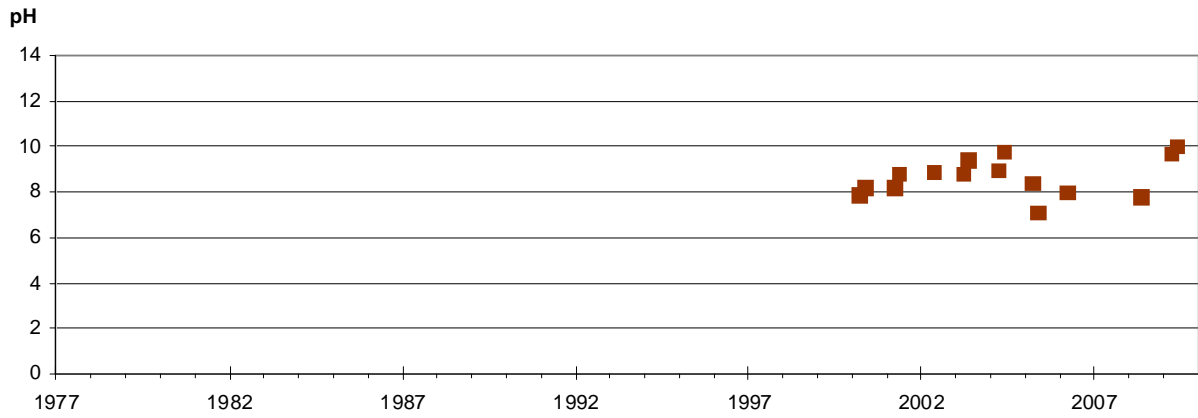
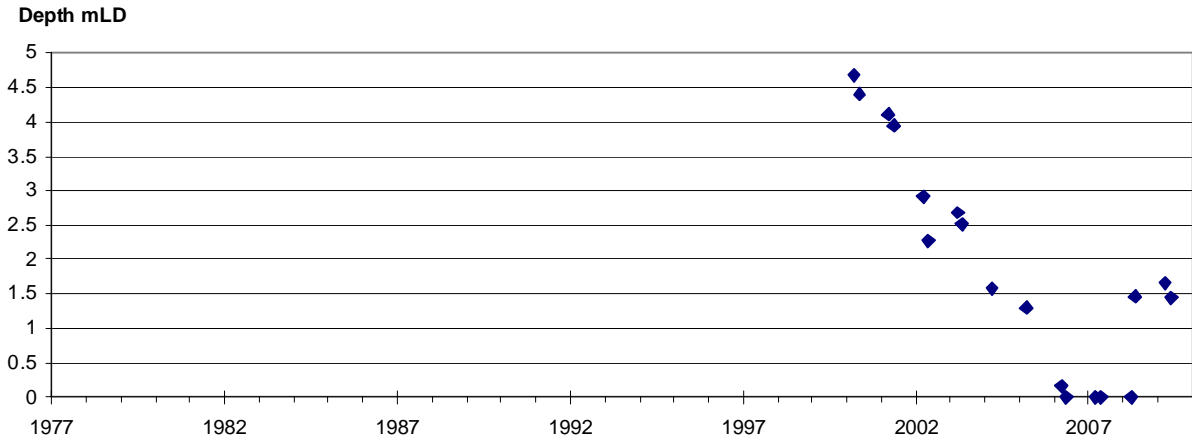
### Notes:

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Ardath is in the Central District (headquartered in Merredin) of the Wheatbelt DEC Region.



# ATKINS YATE

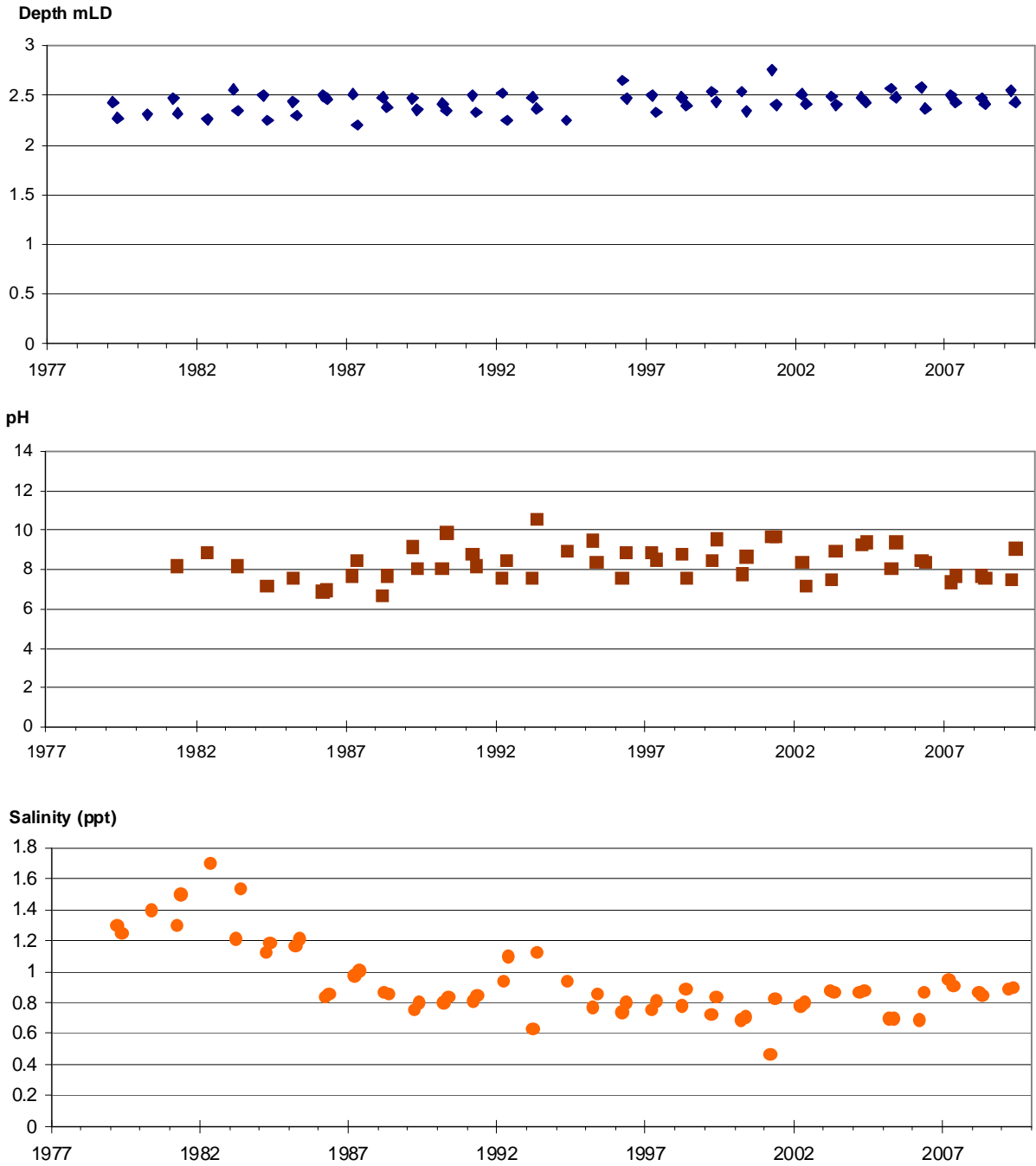


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Atkins Yate is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# BAMBUN

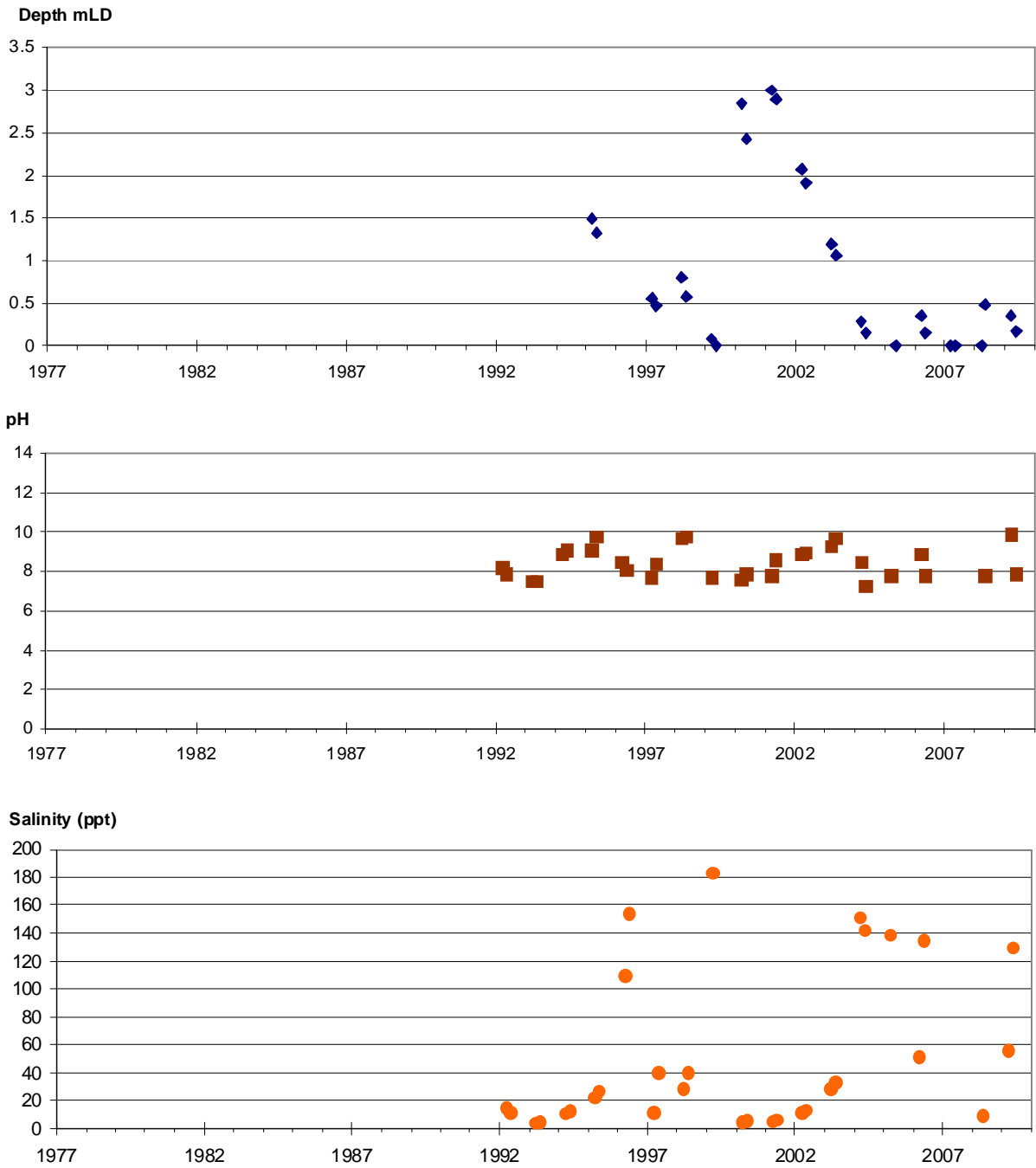


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Bambun is in the Swan Coastal District (headquartered in Wanneroo) of the Swan DEC Region.

# BENNETTS<sup>IM</sup>

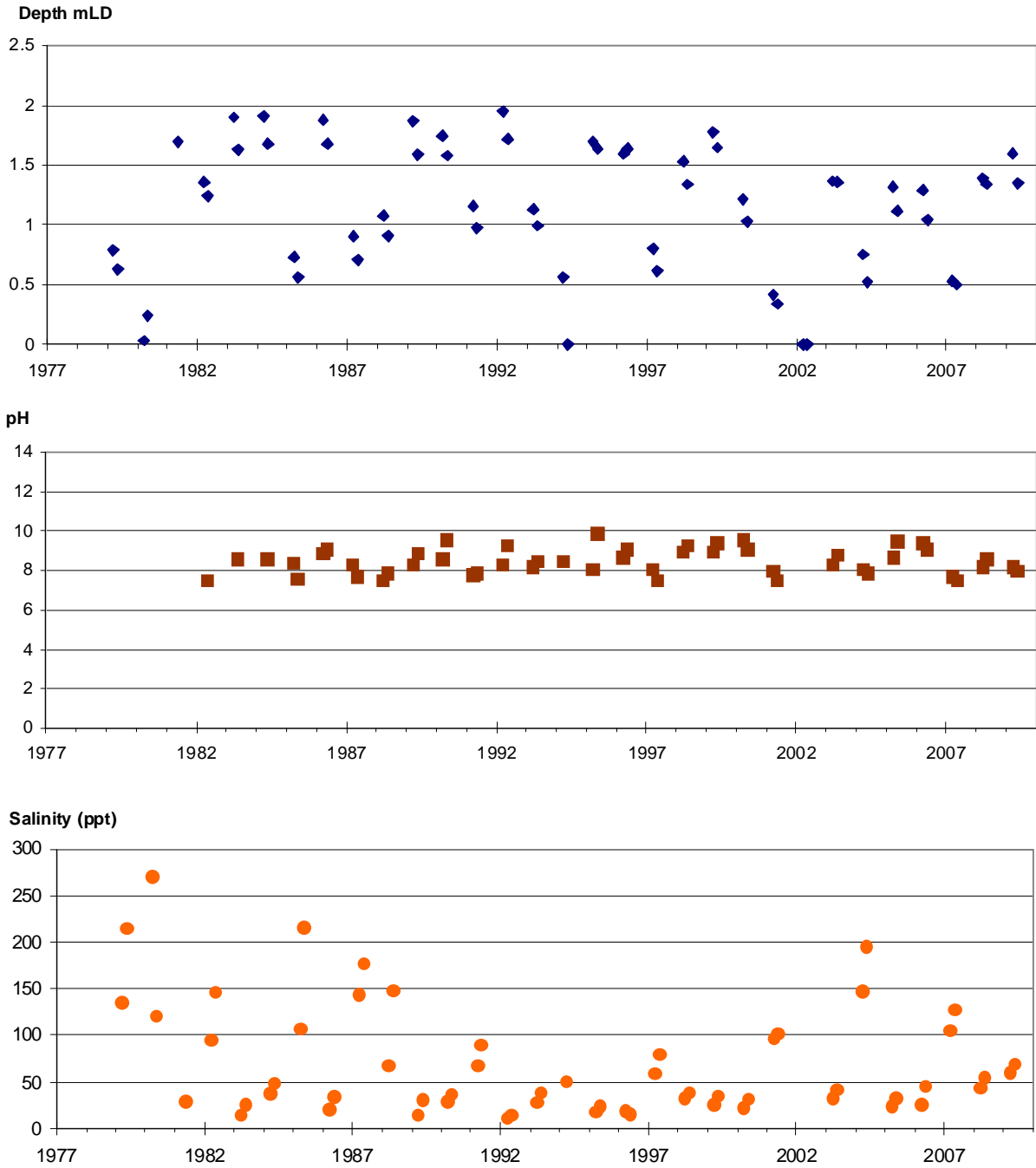


**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Bennetts is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# BEVERLEY



**Notes:**

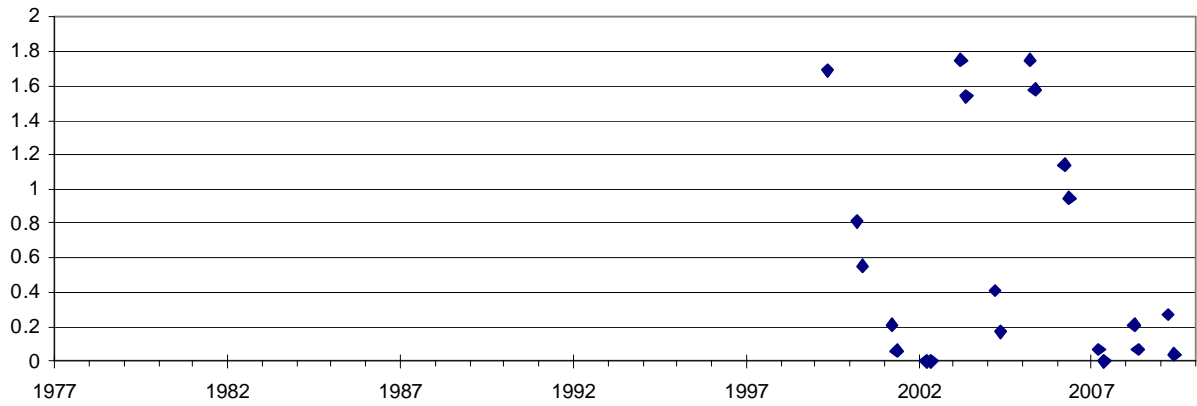
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Beverley Lakes is also known as Yenyenning Lakes.

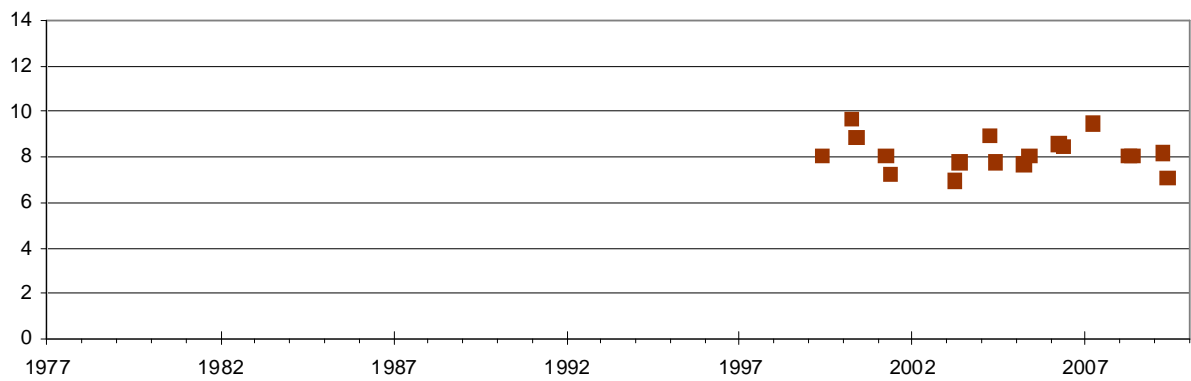
Beverley is in the Central District (headquartered in Merredin) of the Wheatbelt DEC Region.

# BLUE GUM<sup>IM</sup>

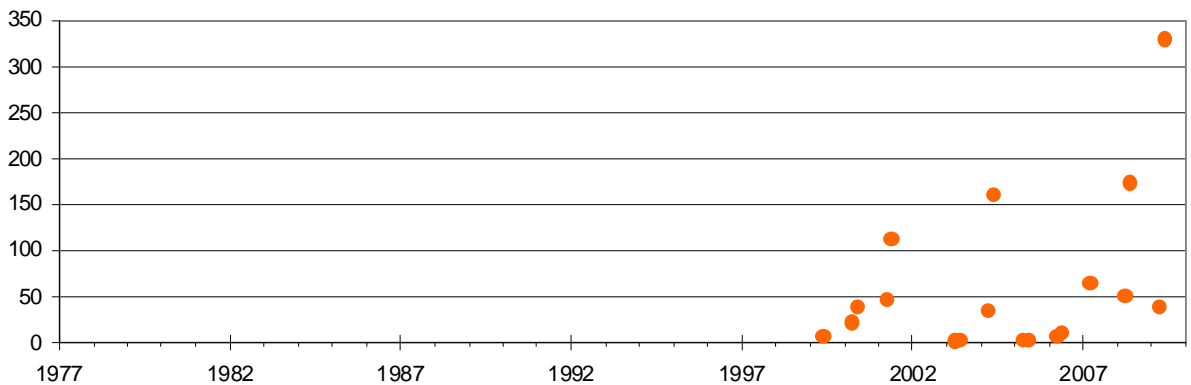
## Depth mLD



## pH



## Salinity (ppt)

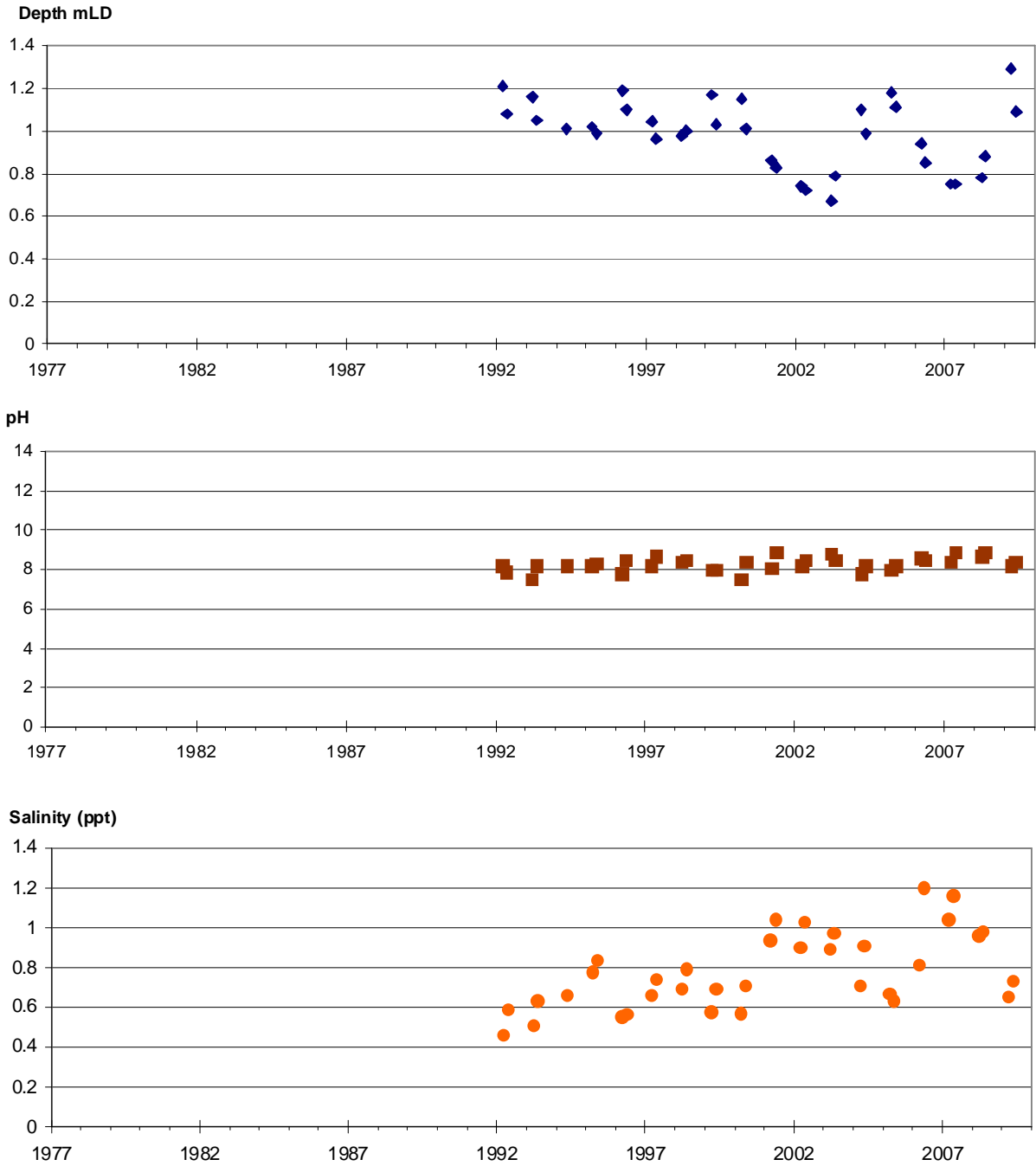


### Notes:

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Blue Gum is in the Moora District (headquartered in Jurien Bay) of the Midwest DEC Region.

# BOAT HARBOUR 1



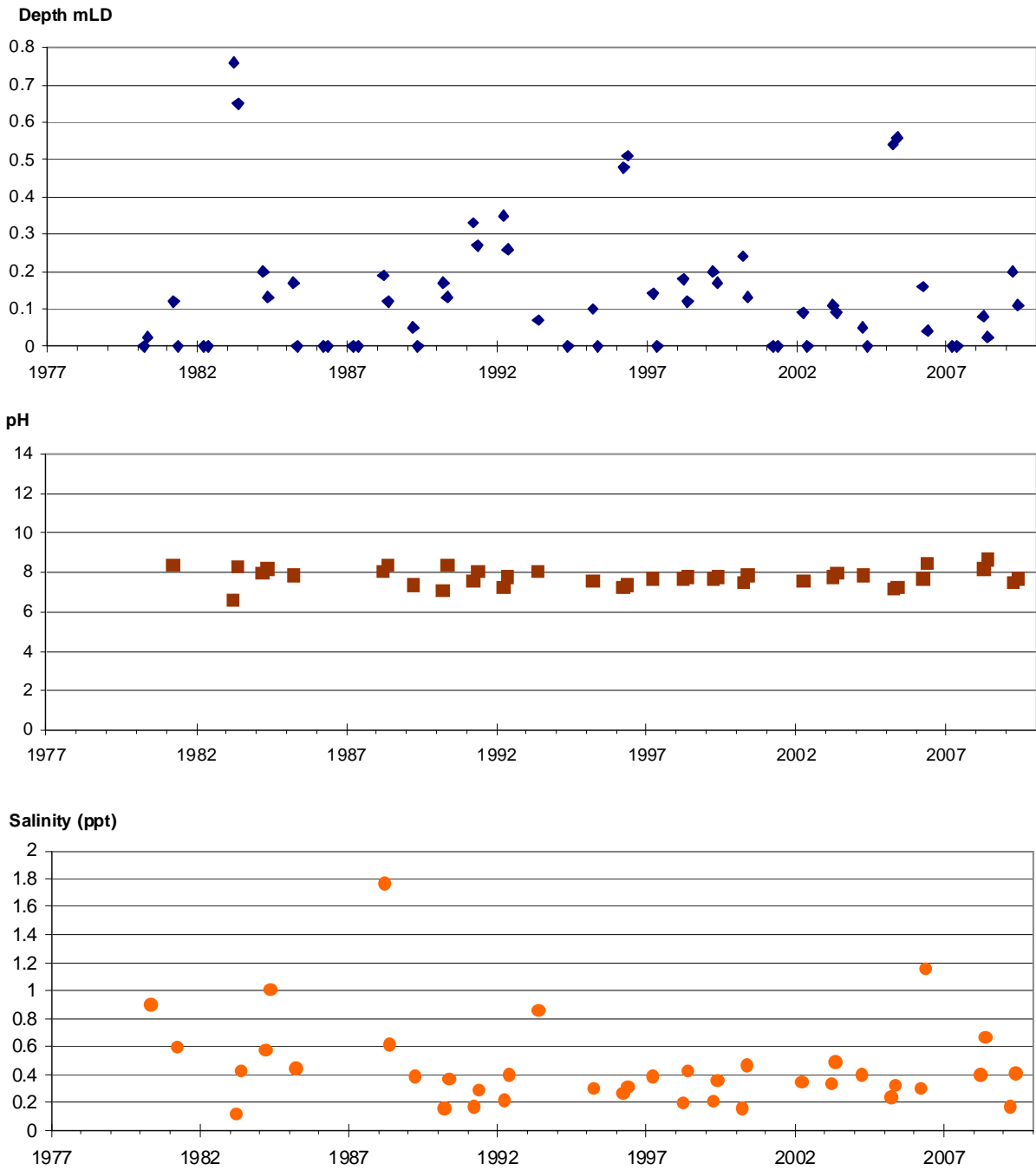
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Boat Harbour 1 is a component of the 'Owingup Swamp System', which is listed in the 'Directory of Important Wetlands in Australia'.

Boat Harbour 1 is in the Frankland District (headquartered in Walpole) of the Warren DEC Region.

## BOYUP BROOK 18239<sup>IM</sup>



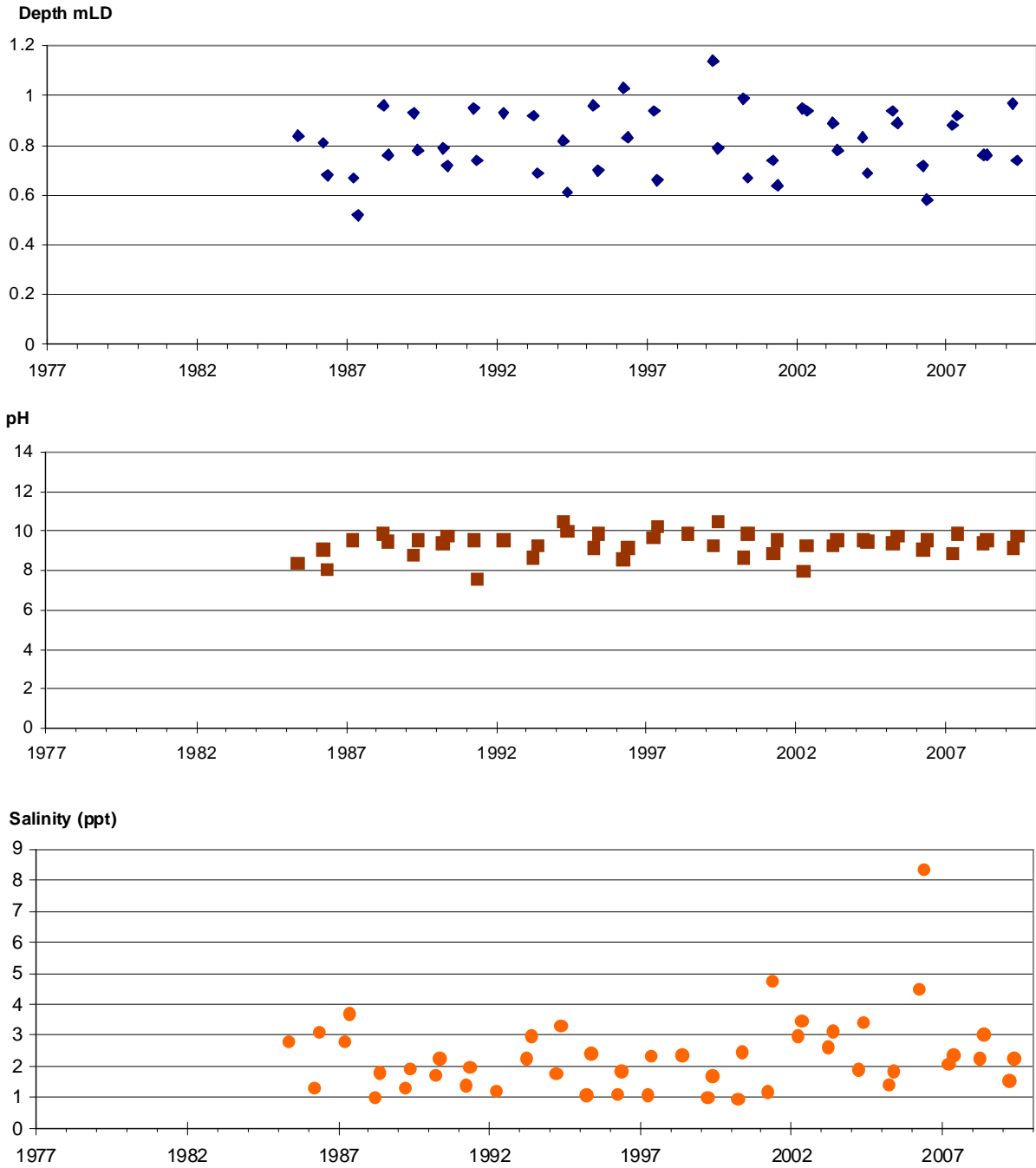
**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Boyup Brook 18239 is also known as Kulicup Swamp.

Boyup Brook 18239 is in the Blackwood District (headquartered in Busselton) of the South West DEC Region.

# BROADWATER



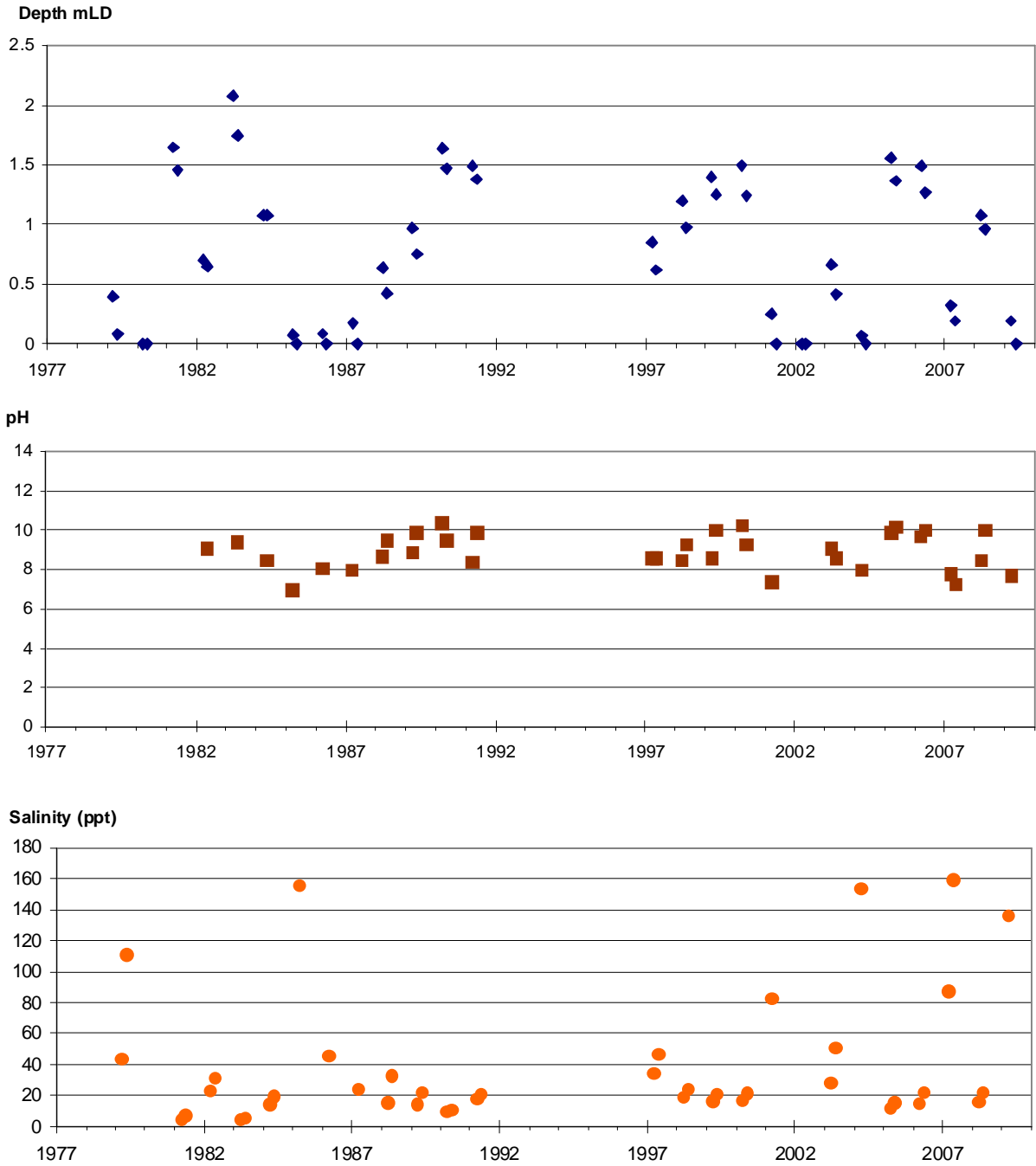
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Broadwater is in the Blackwood District (headquartered in Busselton) of the South West DEC Region.



# BROWN



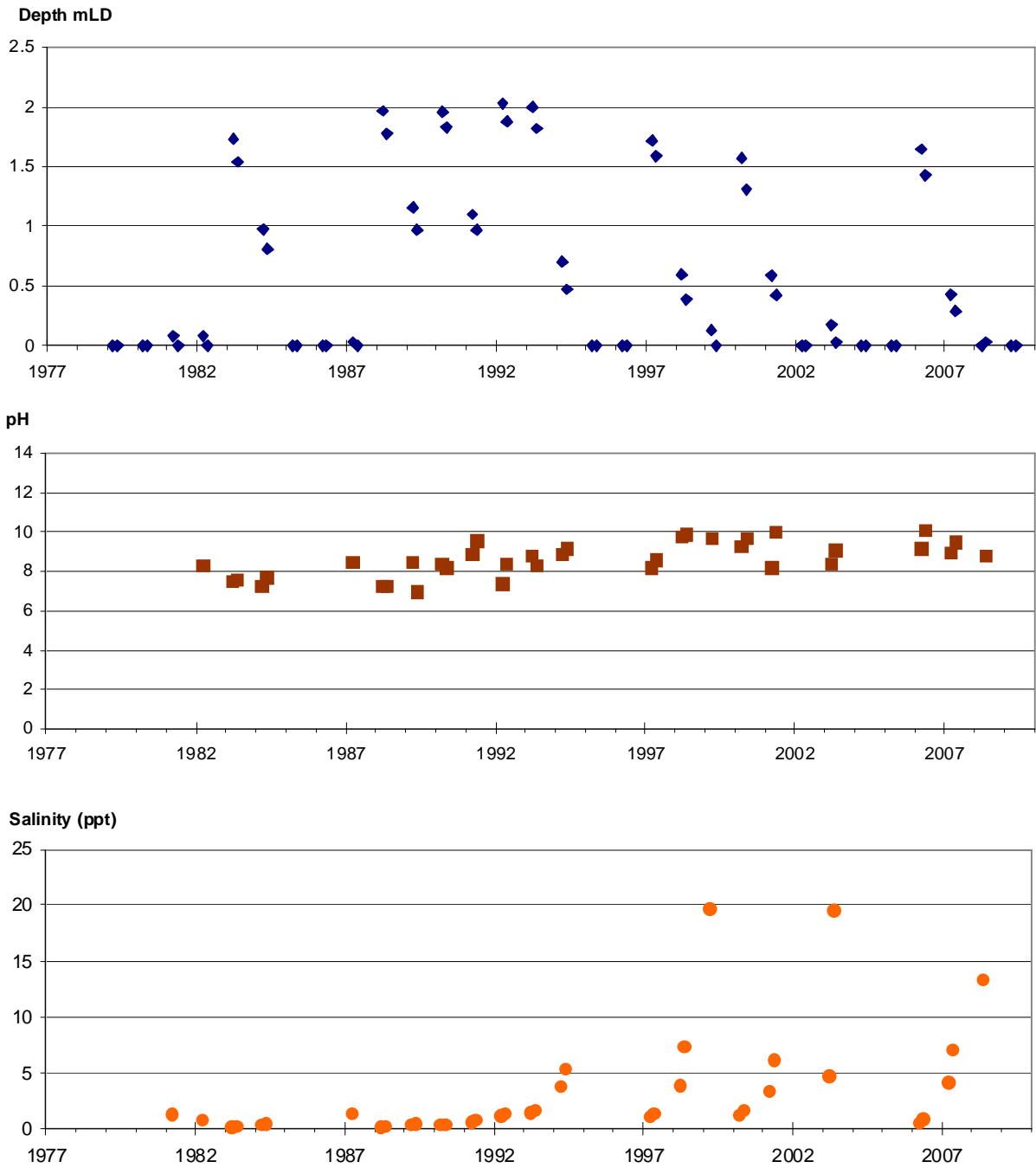
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Brown is a component of the 'Yealering Lakes System', which is listed in the 'Directory of Important Wetlands in Australia'.

Brown is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## BRYDE<sup>IM</sup>



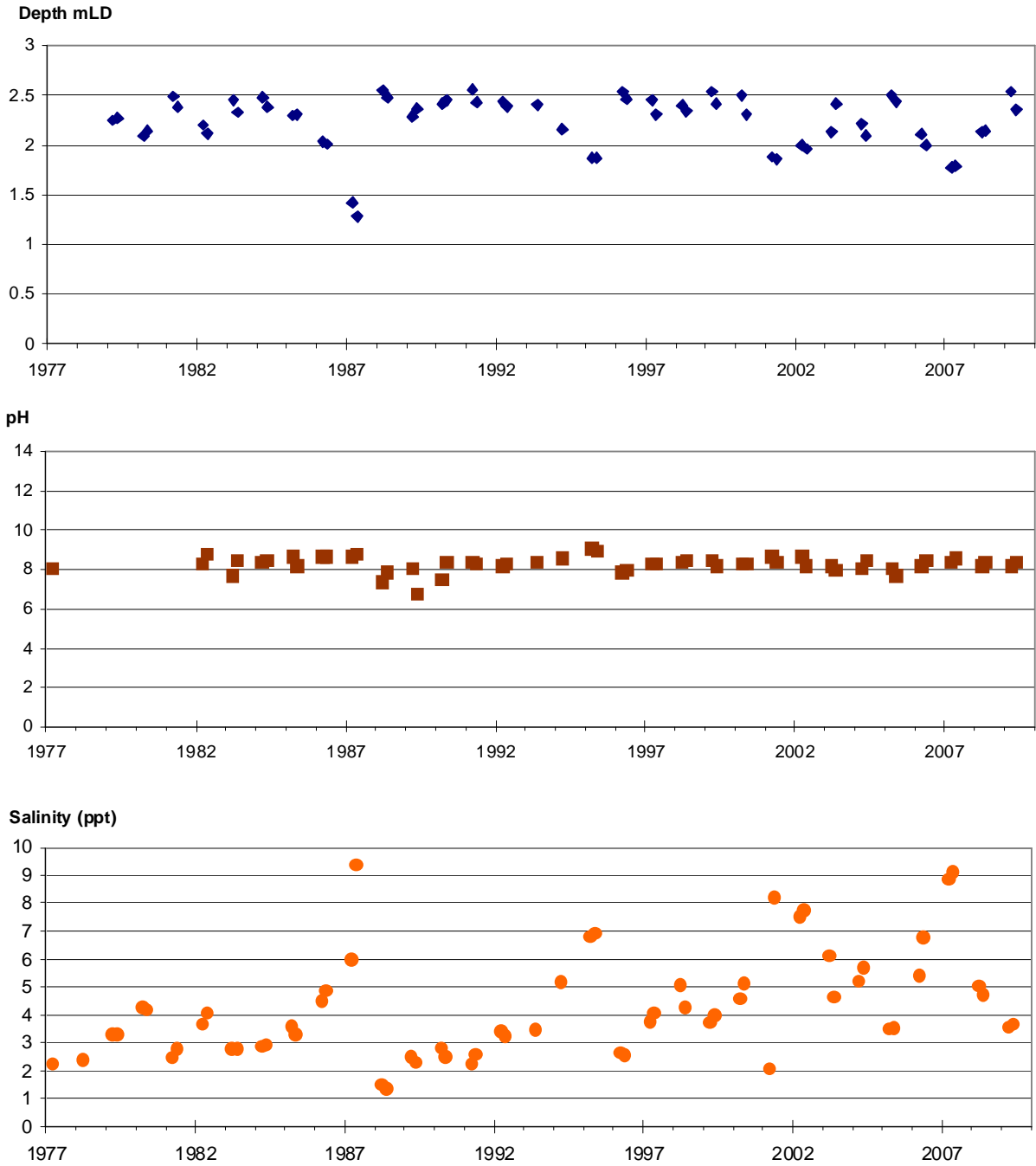
### Notes:

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Bryde is part of the 'Lake Bryde – East Lake Bryde System' listed in the 'Directory of Important Wetlands in Australia'.

Bryde is within the Lake Bryde Natural Diversity Recovery Catchment and is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## BYENUP



**Notes:**

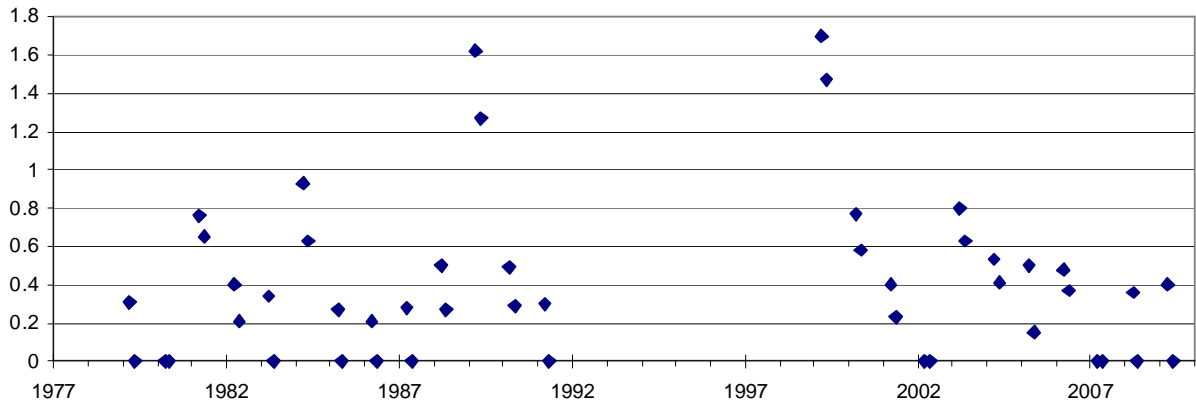
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Byenup is a component of the 'Muir-Byenup System', which is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands, and is also part of the 'Byenup Lagoon System' listed in the 'Directory of Important Wetlands in Australia'.

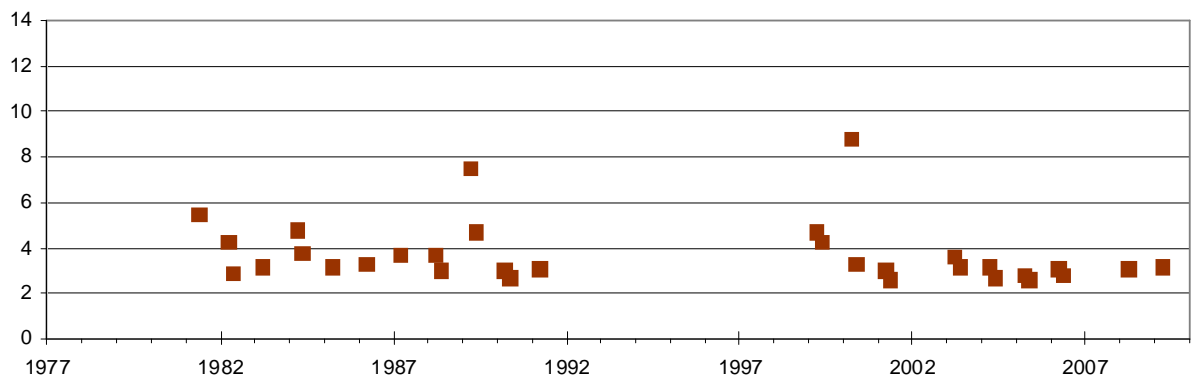
Byenup is within the Muir-Unicup Natural Diversity Recovery Catchment and is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

## CAMPION<sup>IM</sup>

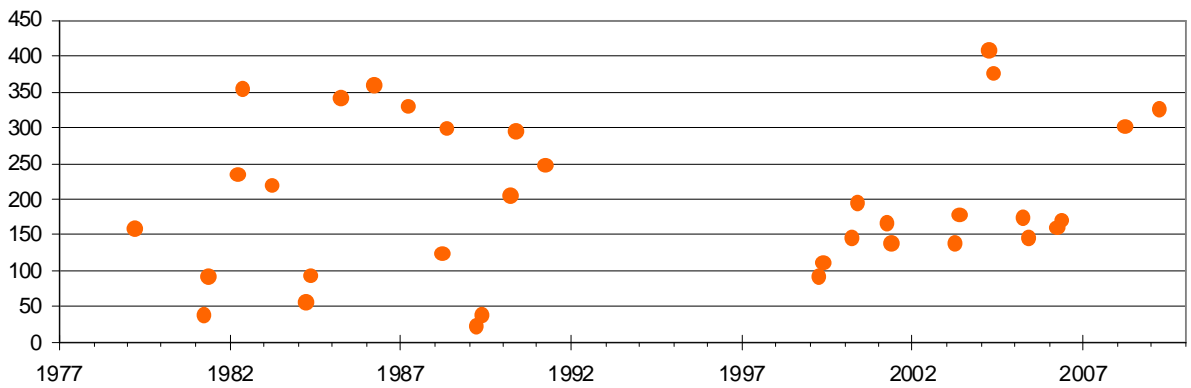
**Depth mLD**



**pH**



**Salinity (ppt)**

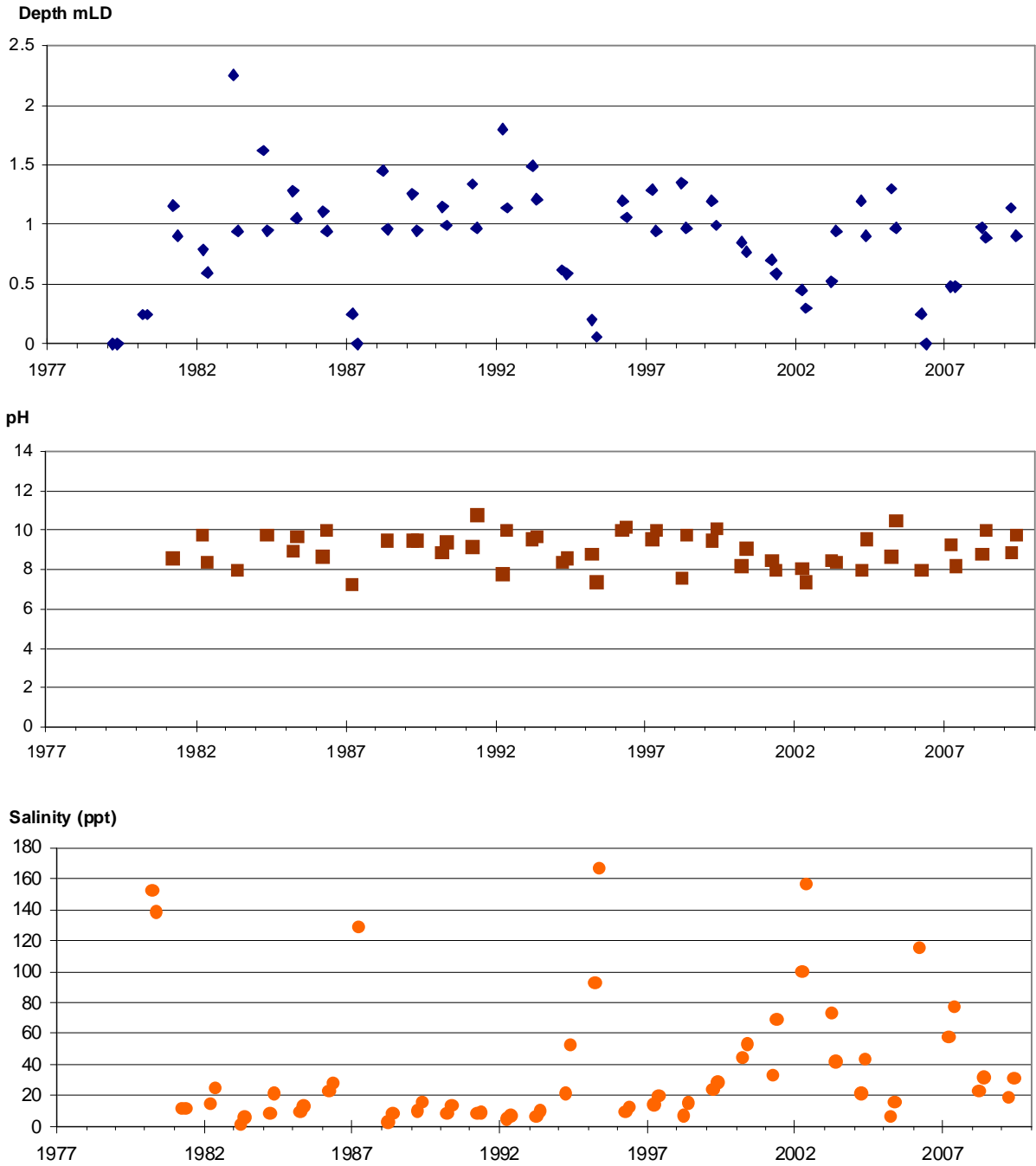


**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Campion is in the Central District (headquartered in Merredin) of the Wheatbelt DEC Region.

# CASUARINA

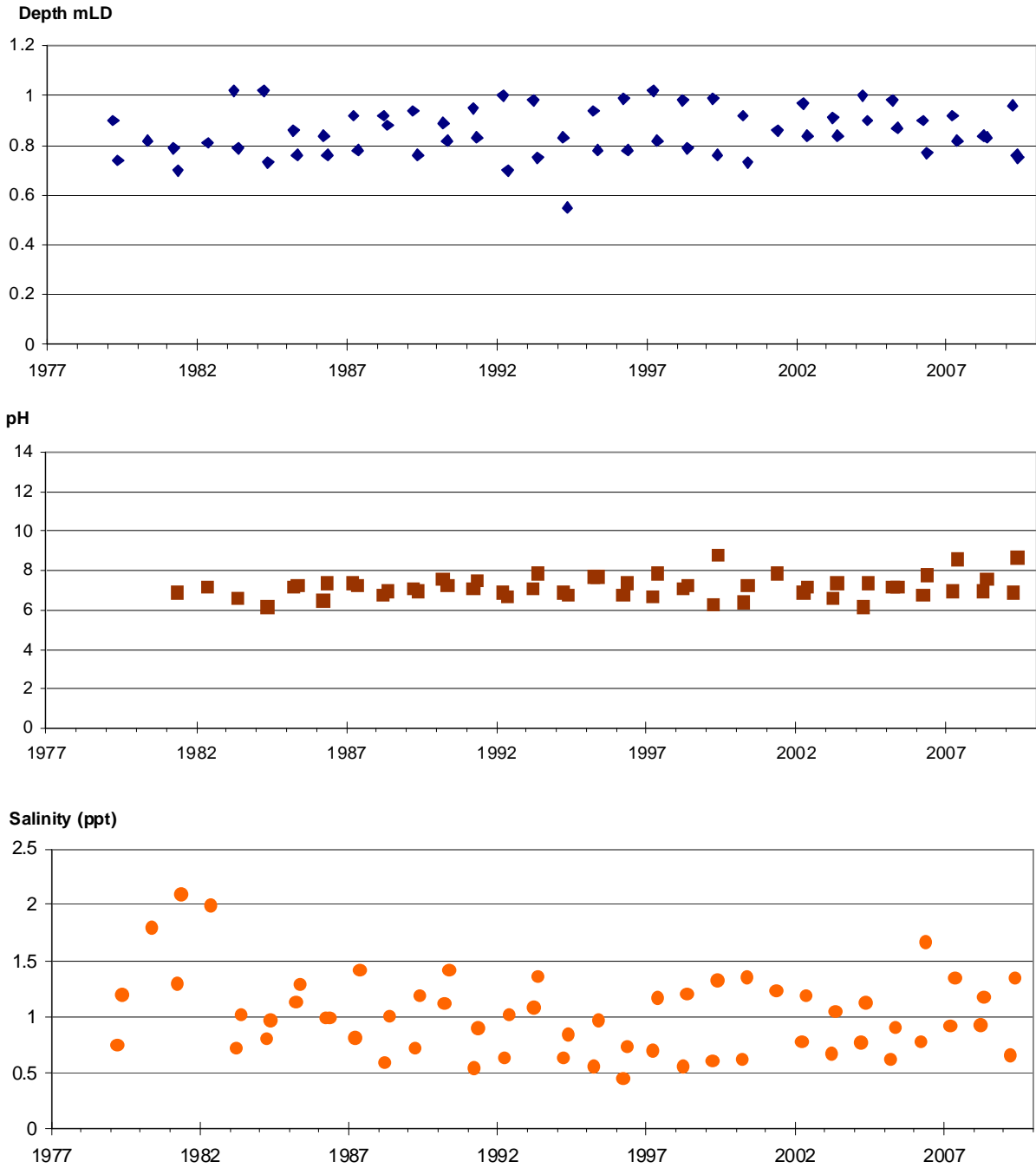


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Casuarina is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# CHANDALA



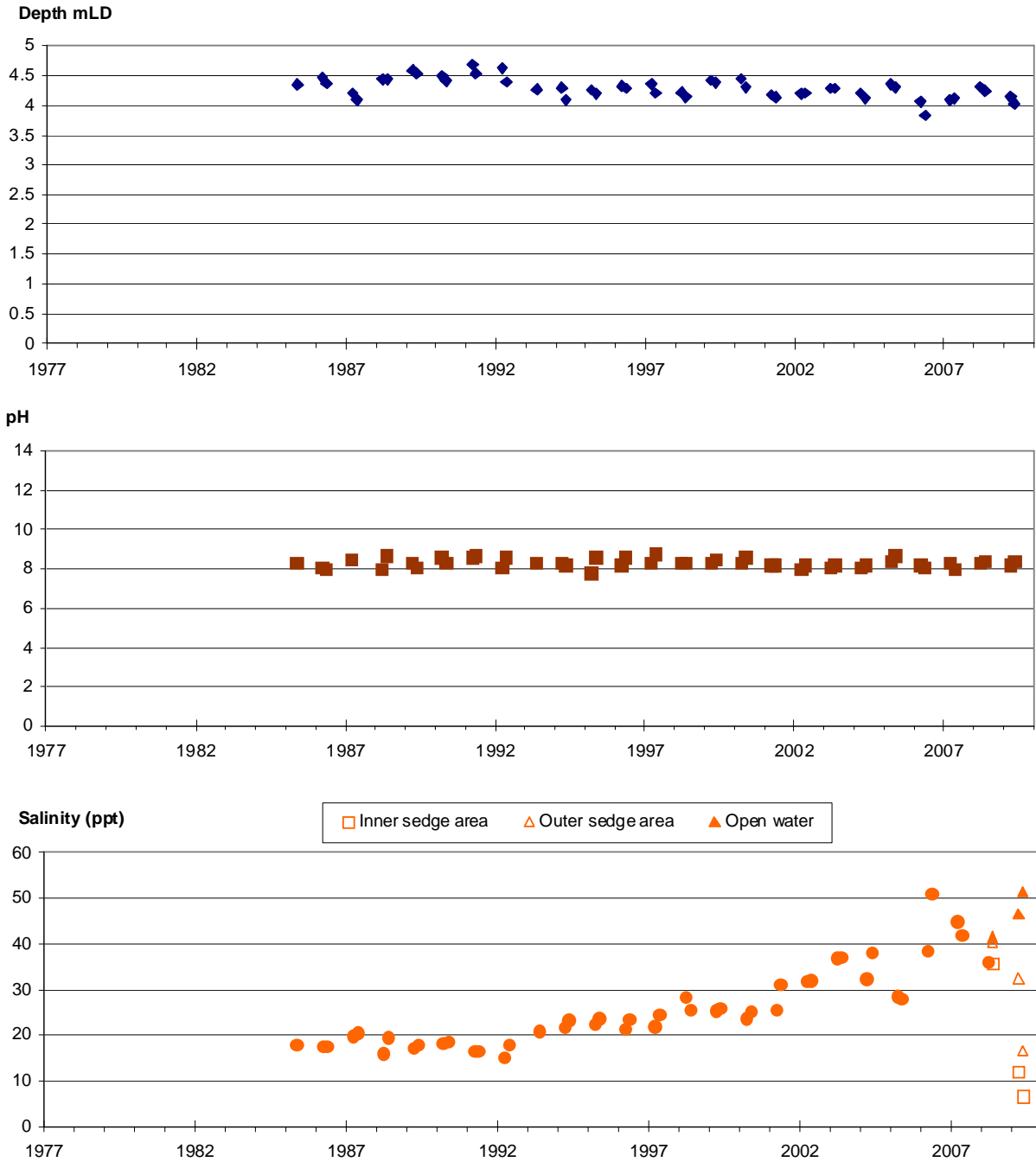
**Notes:**

- 1. Year labels are positioned at 1<sup>st</sup> July each year.
- 2. Data are from September and November routine monitoring periods only.

Chandala Swamp is listed in the 'Directory of Important Wetlands in Australia'.

Chandala is in the Perth Hills District (headquartered in Mundaring) of the Swan DEC Region.

## CLIFTON (with Depth axis 0-5m)



**Notes:**

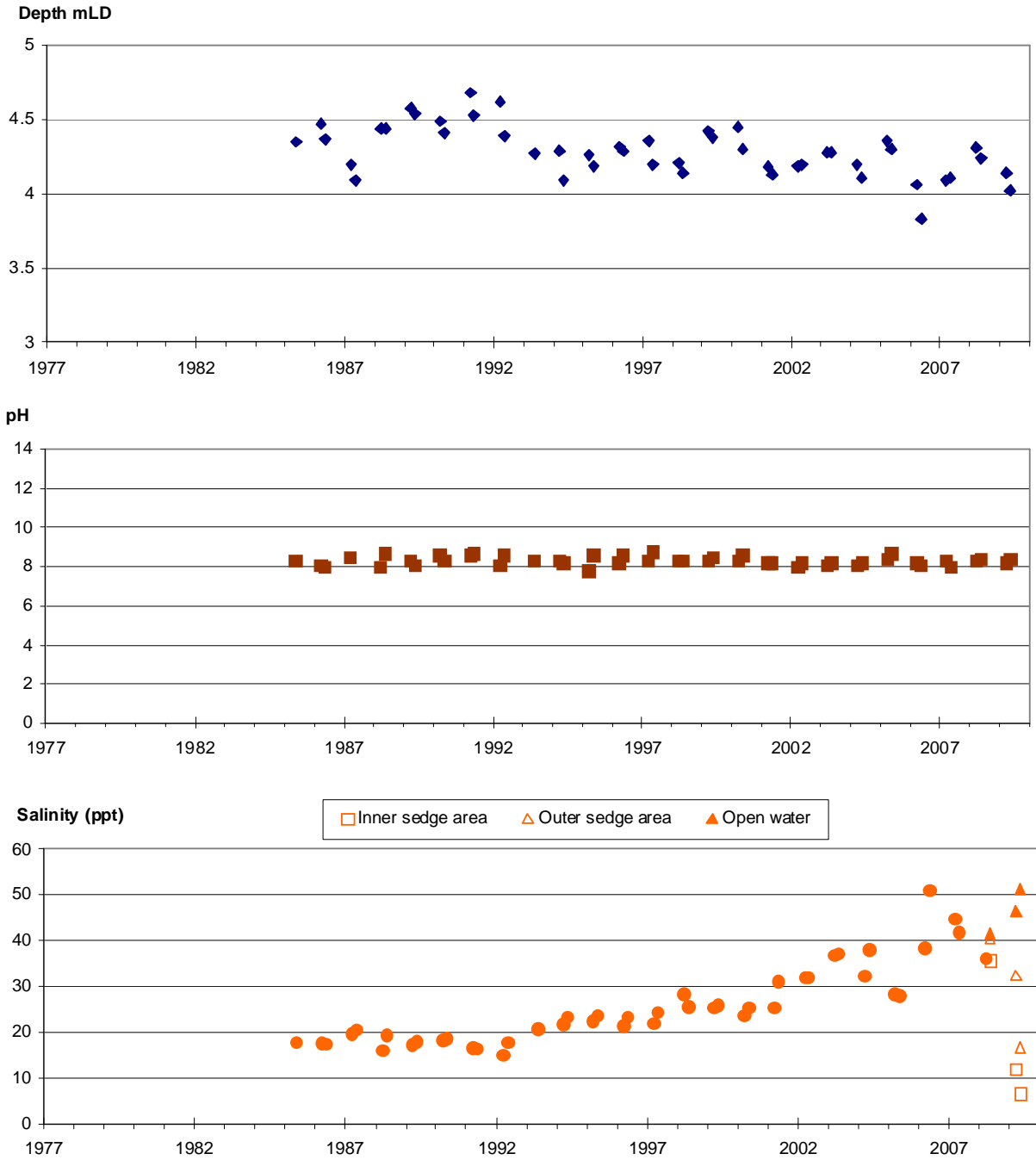
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Clifton is a component of the 'Peel-Yalgorup System', which is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands.

Clifton is also a component of the 'Yalgorup Lakes System', which is listed in the 'Directory of Important Wetlands in Australia'.

Clifton is in the Swan Coastal District (headquartered in Wanneroo) of the Swan DEC Region.

## CLIFTON (with Depth axis 3-5m)



**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

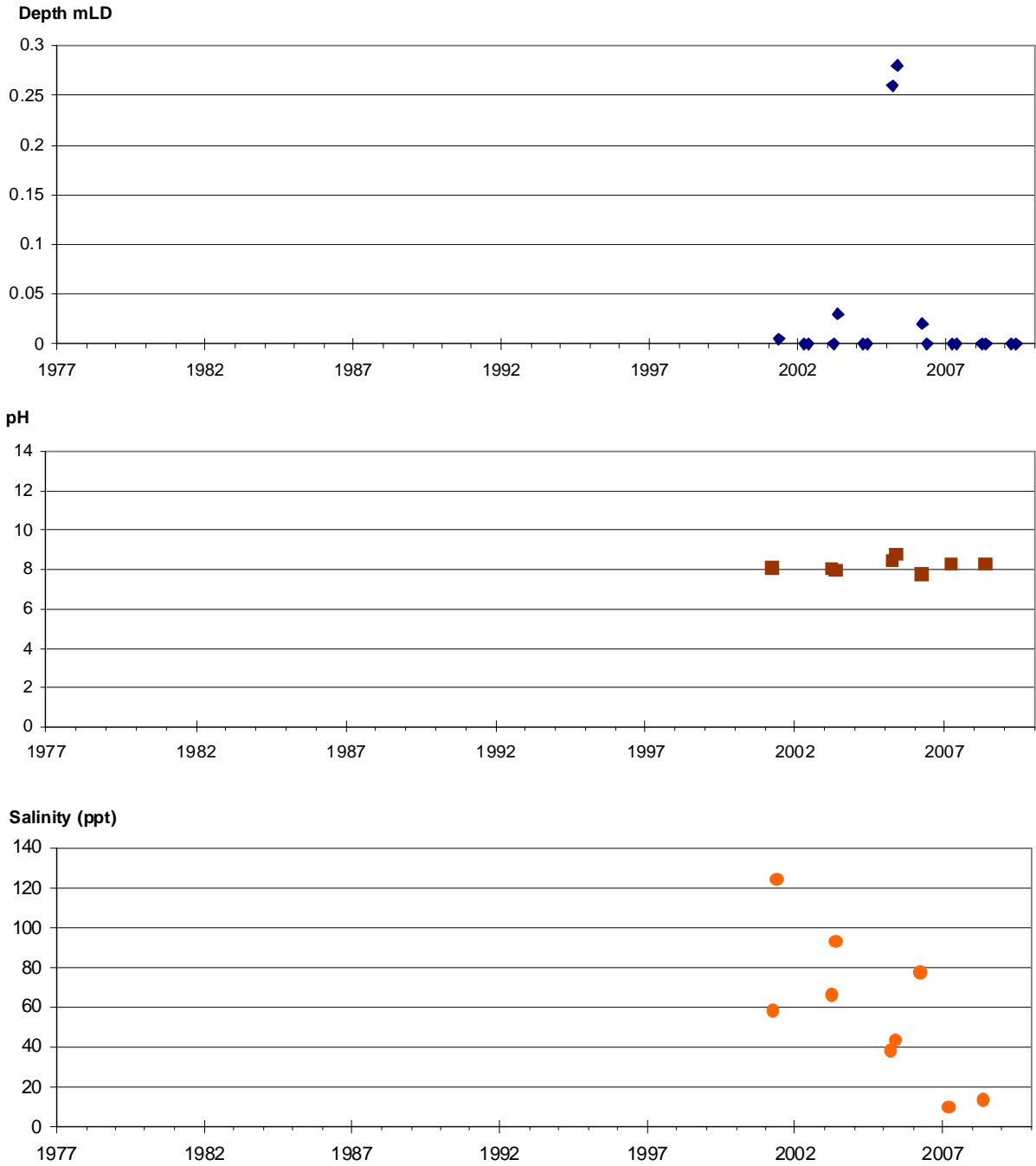
Clifton is a component of the 'Peel-Yalgorup System', which is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands.

Clifton is also a component of the 'Yalgorup Lakes System', which is listed in the 'Directory of Important Wetlands in Australia'.

Clifton is in the Swan Coastal District (headquartered in Wanneroo) of the Swan DEC Region.



## COLLETS ROAD

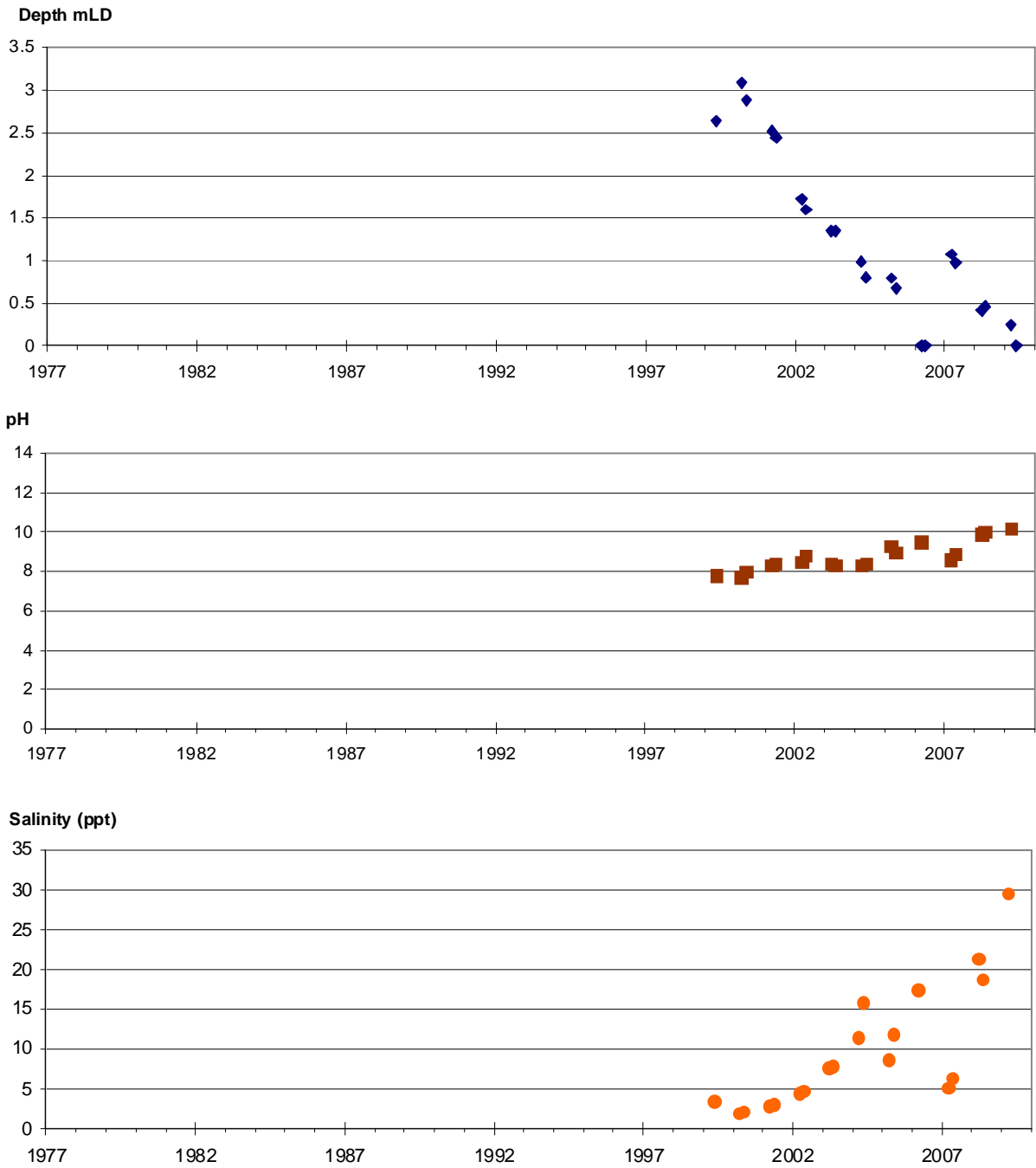


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Collets Road Swamp is in the Albany District of the South Coast DEC Region

# COOMALBIDGUP<sup>IM</sup>

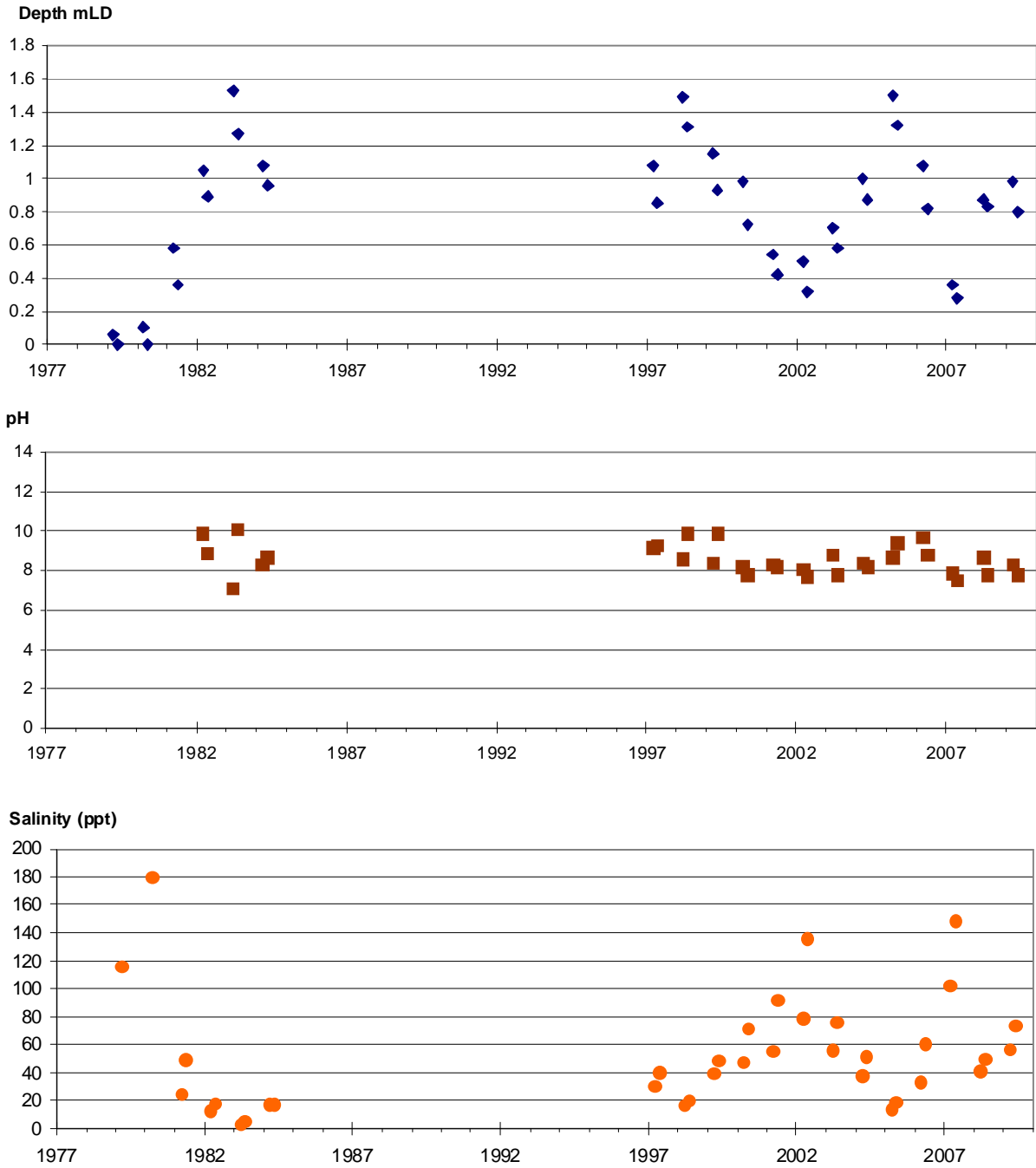


**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Coomalbidgup is in the Esperance District of the South Coast DEC Region.

## COOMELBERRUP<sup>IM</sup>

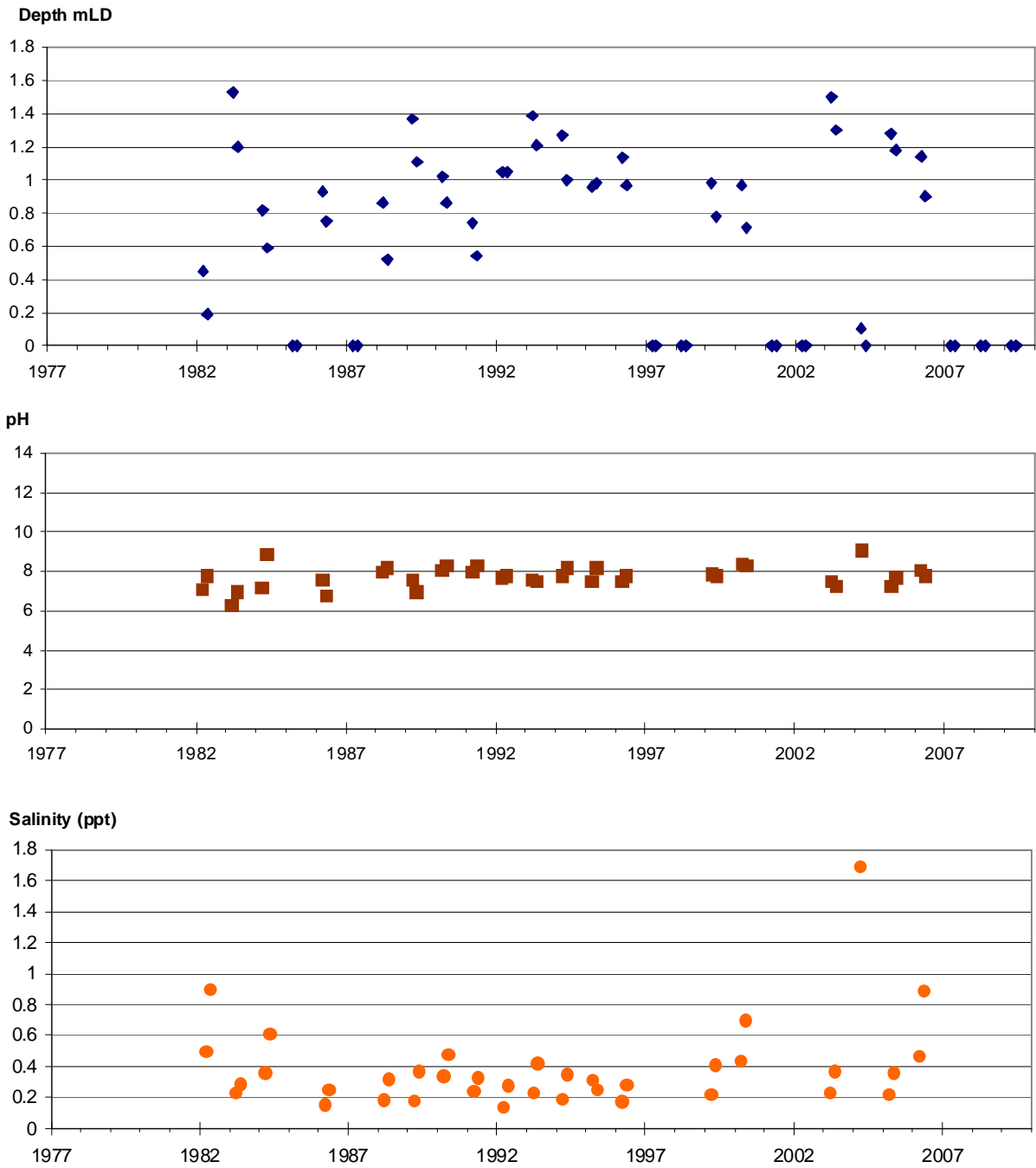


**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Coomelberrup is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## CORRIGIN 12900<sup>IM</sup>



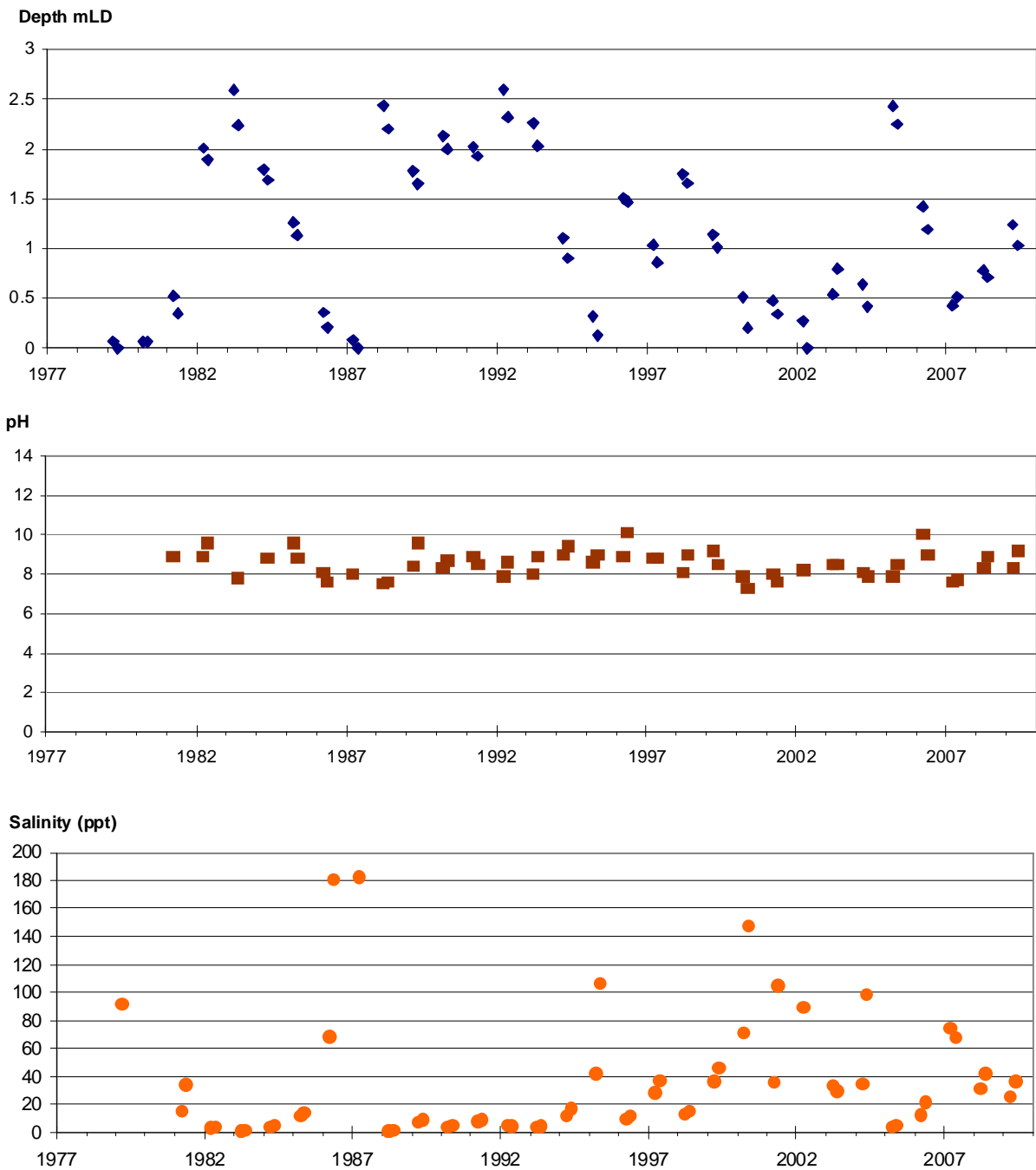
**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Corrigin 12900 is also known as Paperbark Swamp.

Corrigin 12900 is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## COYRECUP<sup>IM</sup>



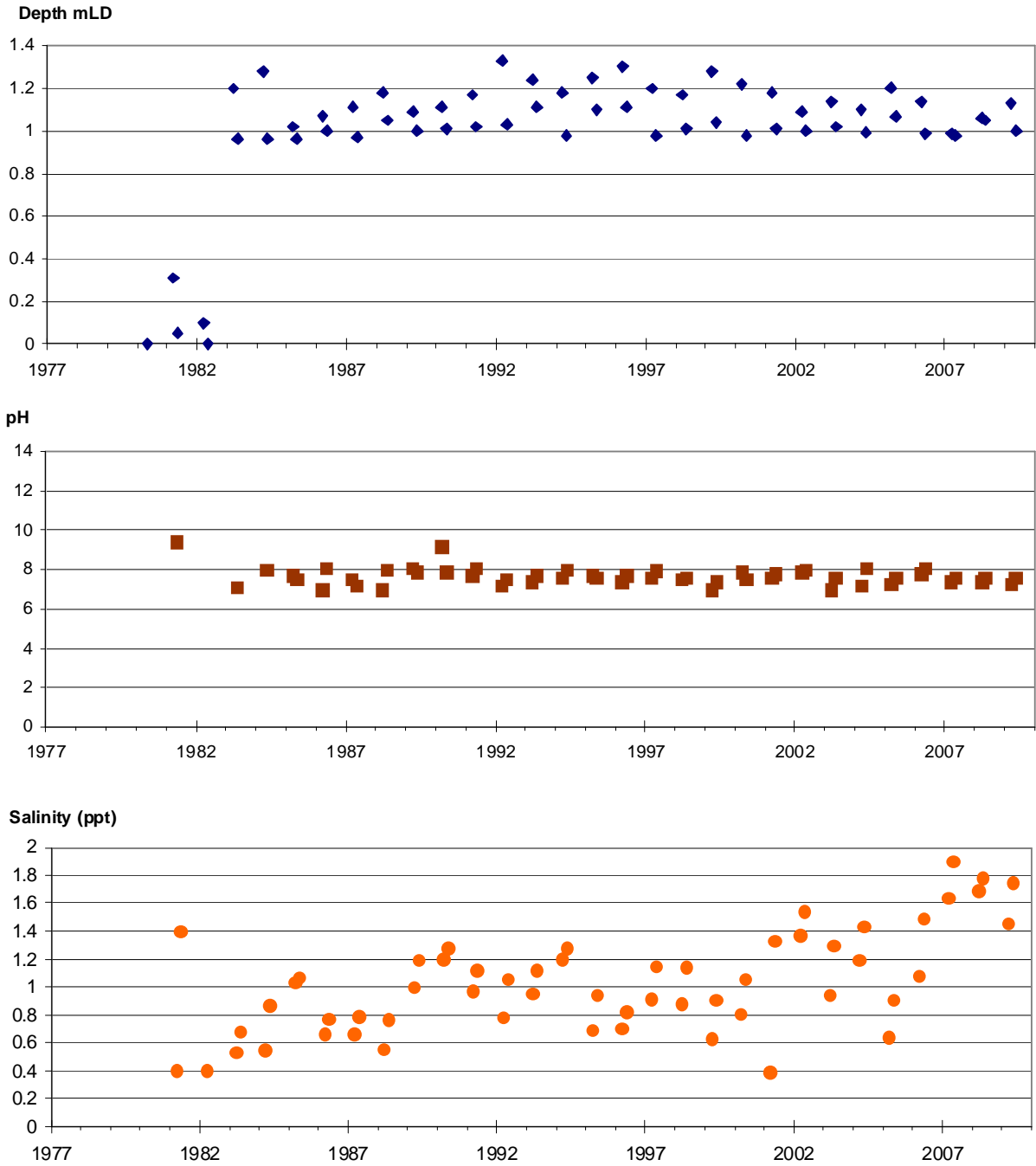
**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Coyrecup Lake is listed in the 'Directory of Important Wetlands in Australia'.

Coyrecup is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# CRACKERS

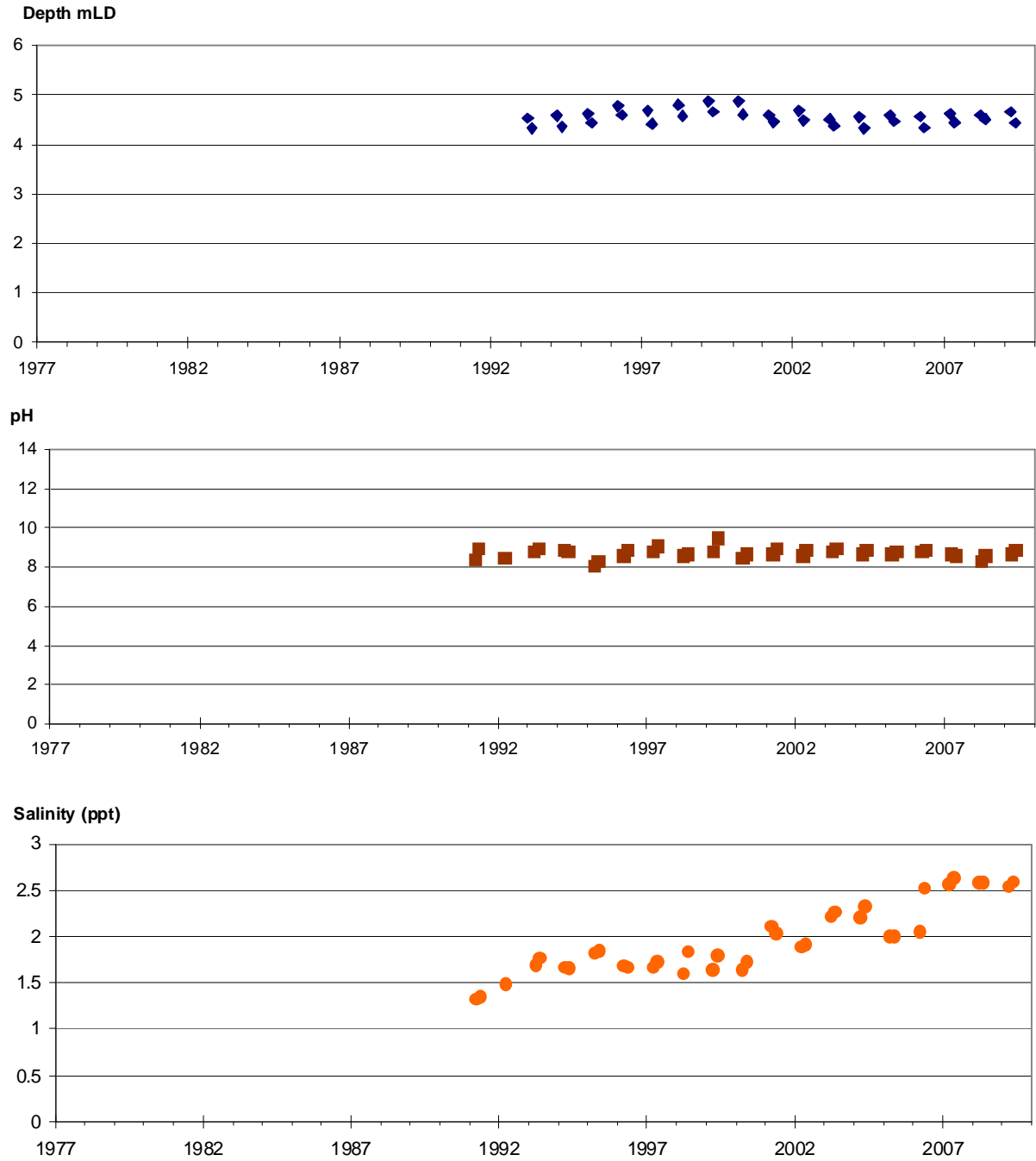


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Crackers is in the Moora District (headquartered in Jurien Bay) of the Midwest DEC Region.

## DAVIES (with Depth axis 0-6m)

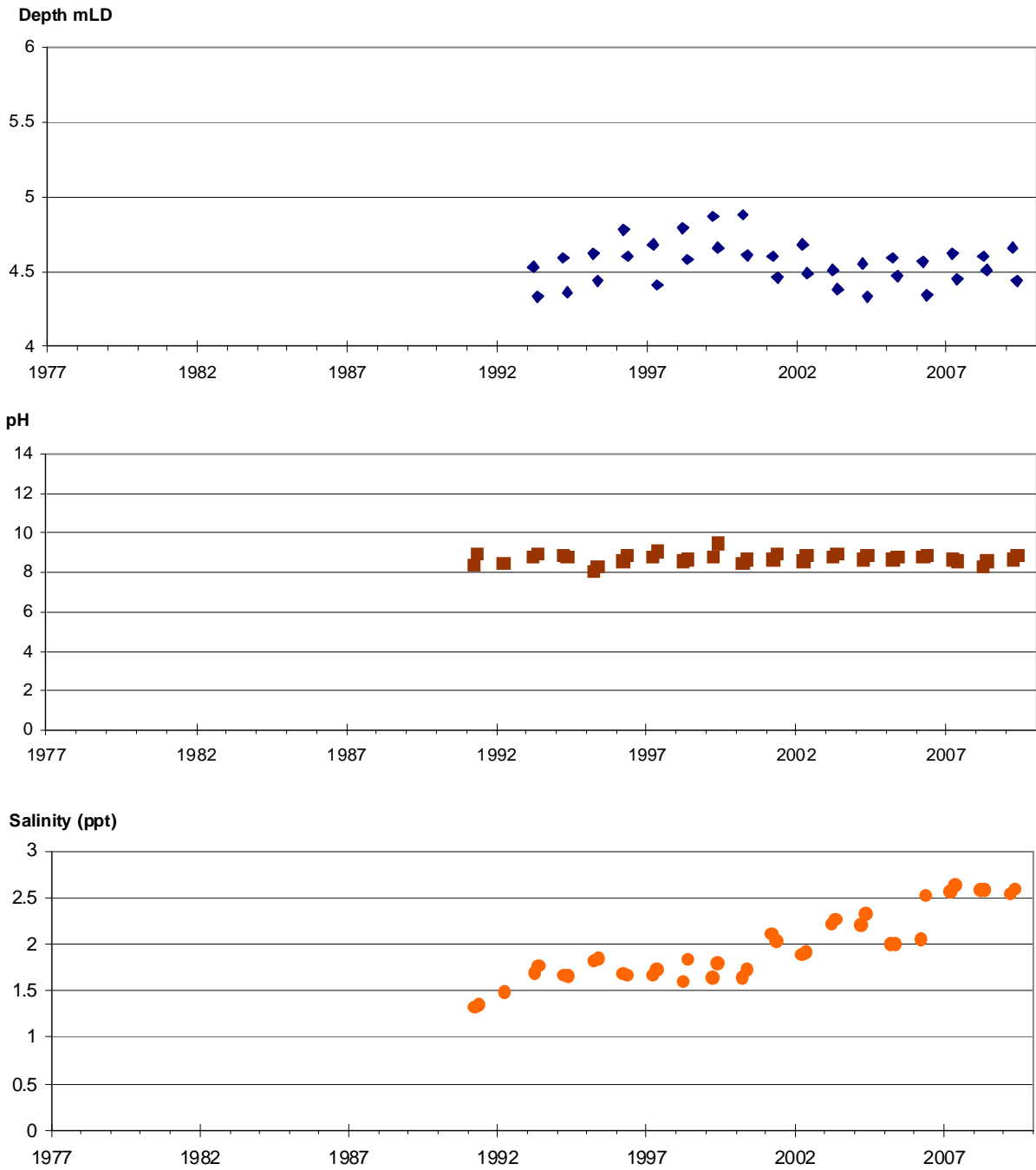


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Davies is in the Blackwood District (headquartered in Busselton) of the South West DEC Region.

## DAVIES (with Depth axis 4-6m)



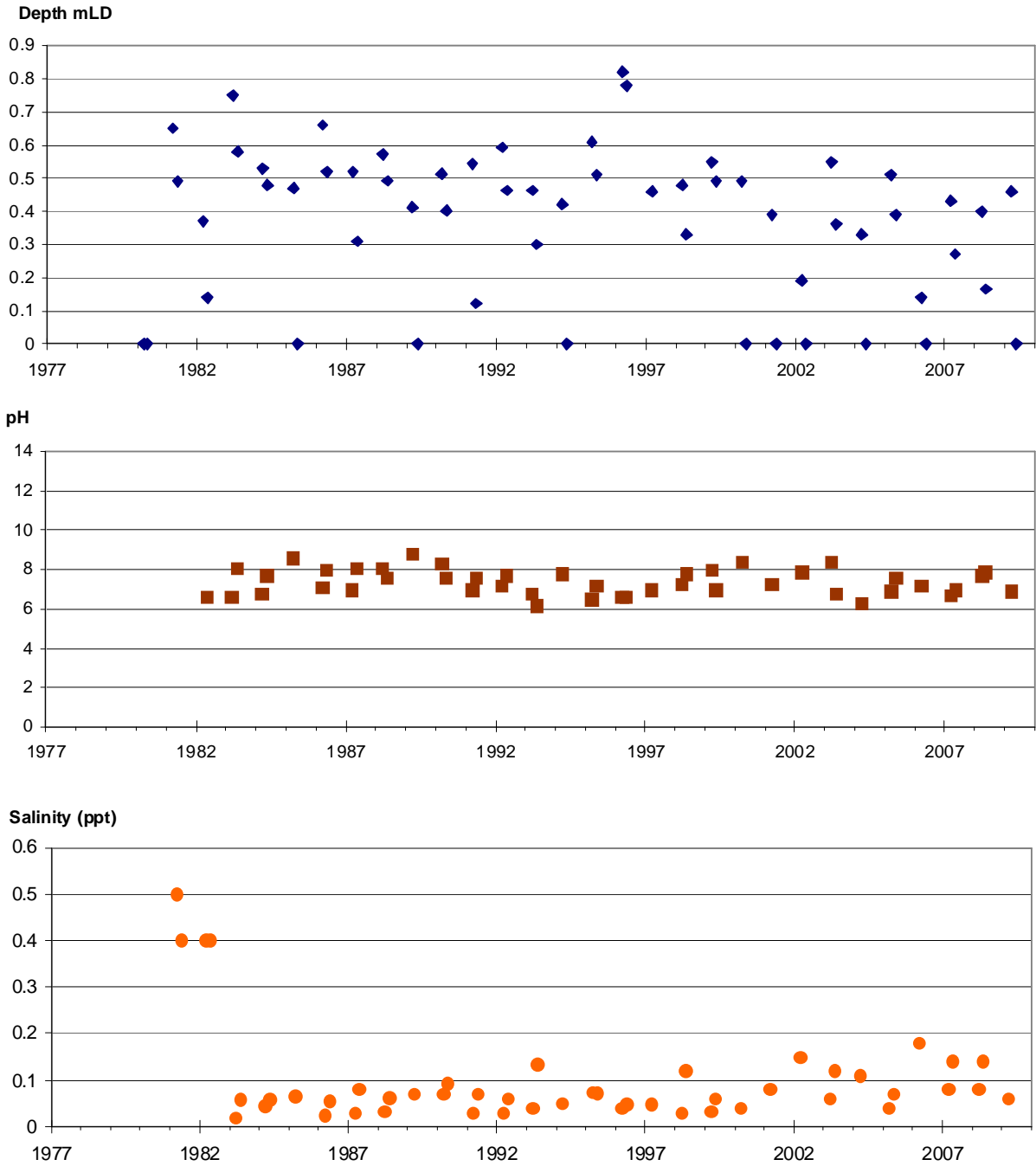
### Notes:

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Davies is in the Blackwood District (headquartered in Busselton) of the South West DEC Region.



# DOBADERRY

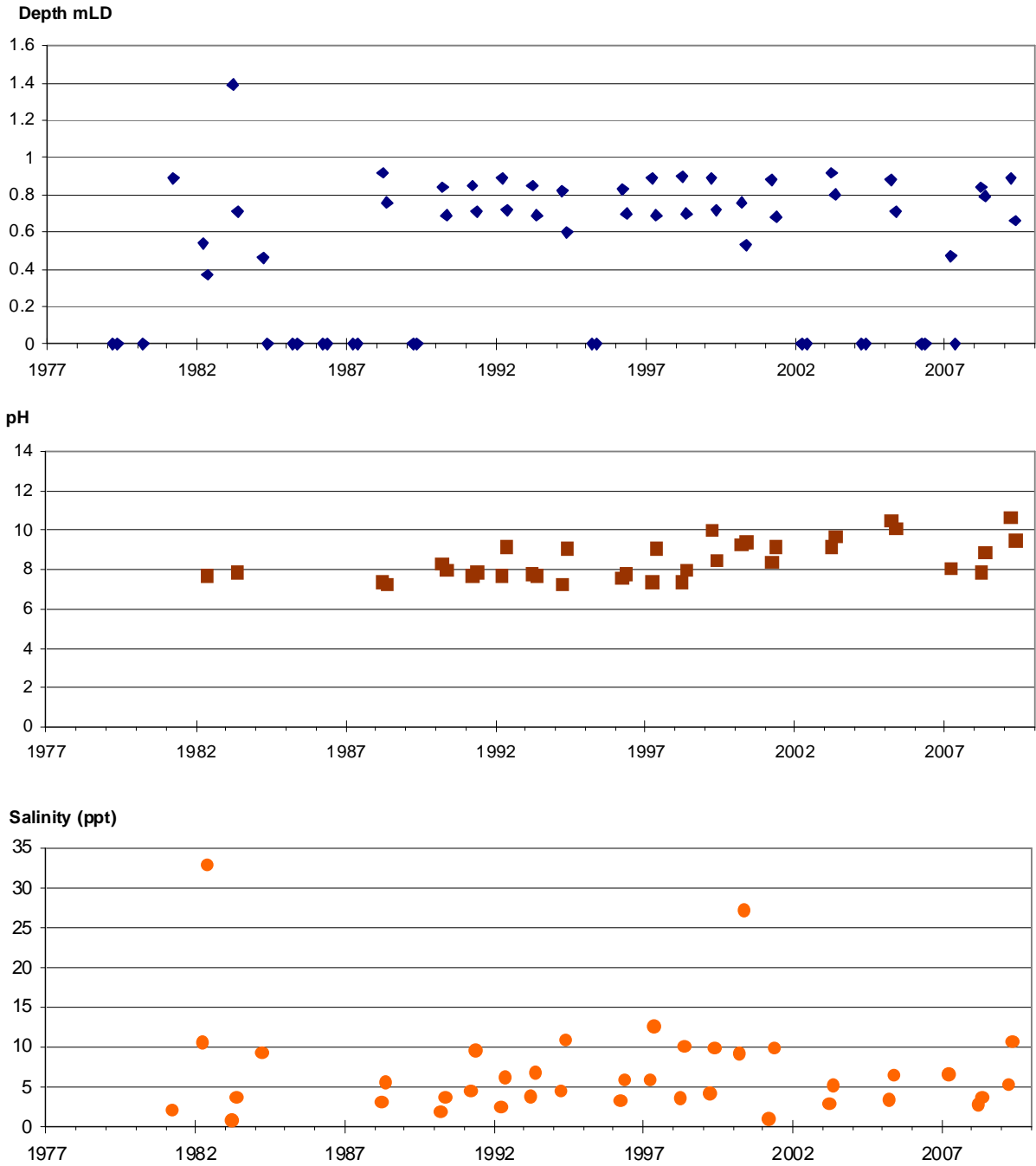


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Dobaderry is in the Perth Hills District (headquartered in Mundaring) of the Swan DEC Region.

# DULBINNING



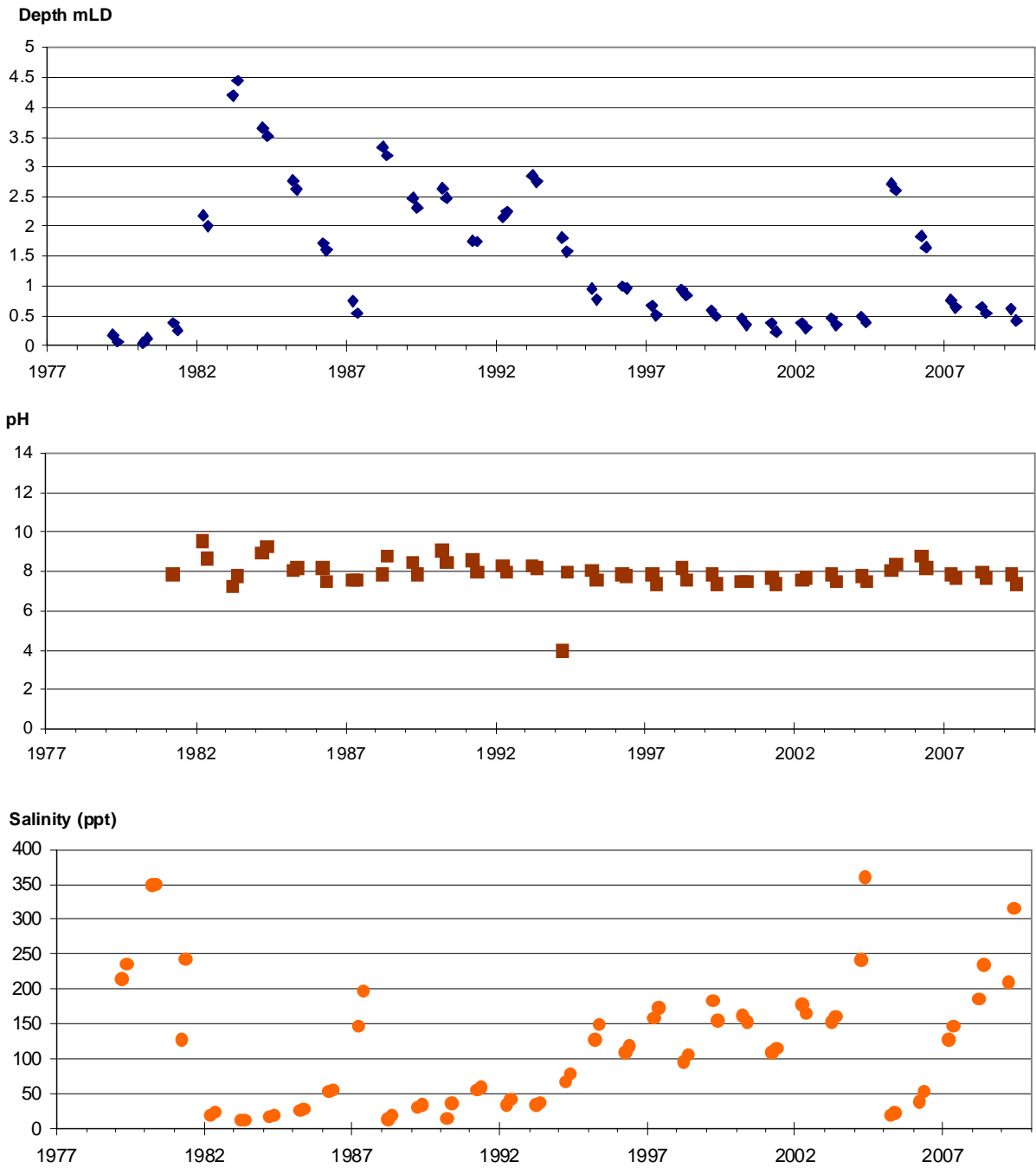
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Dulbinning is within the Toolibin Lake Natural Diversity Recovery Catchment.

Dulbinning is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## DUMBLEYUNG<sup>IM</sup>



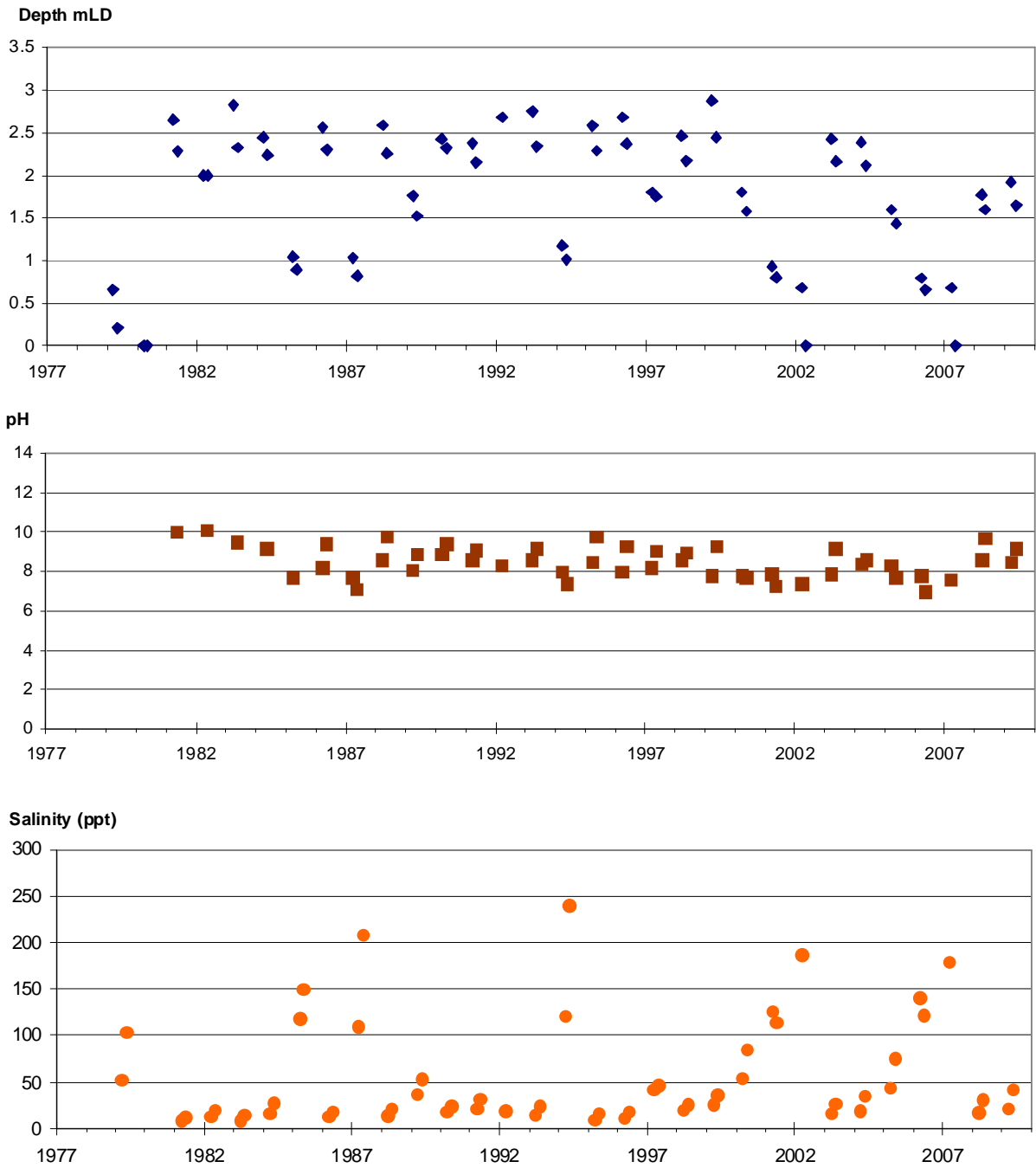
**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Dumbleyung Lake is listed in the 'Directory of Important Wetlands in Australia'.

Dumbleyung is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# EGANU<sup>IM</sup>

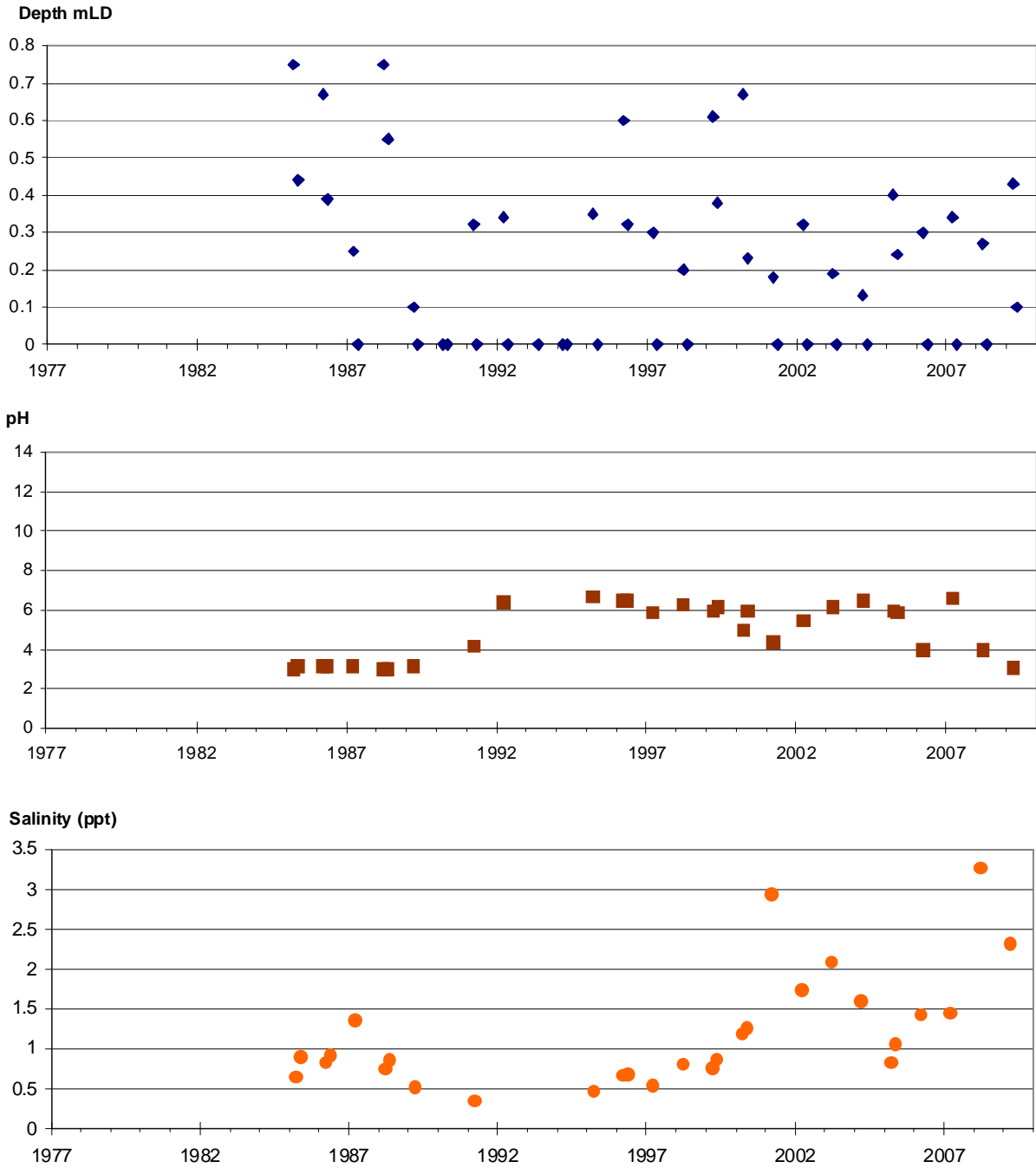


**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Eganu is in the Moora District (headquartered in Jurien Bay) of the Midwest DEC Region.

# EGRET

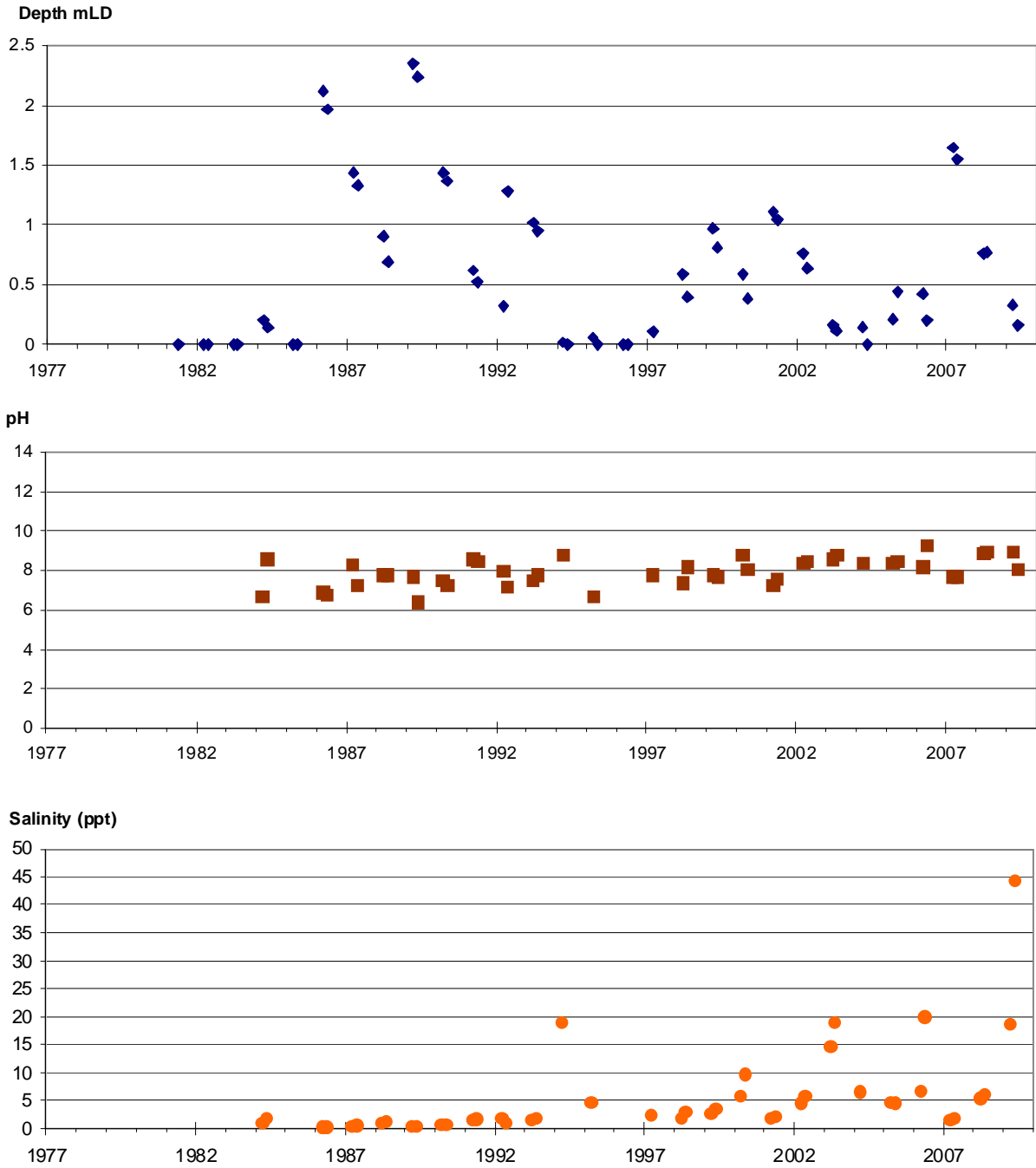


**Notes:**

- 1. Year labels are positioned at 1<sup>st</sup> July each year.
- 2. Data are from September and November routine monitoring periods only.

Egret is in the Wellington District (headquartered in Collie) of the South West DEC Region.

# ESPERANCE 26410

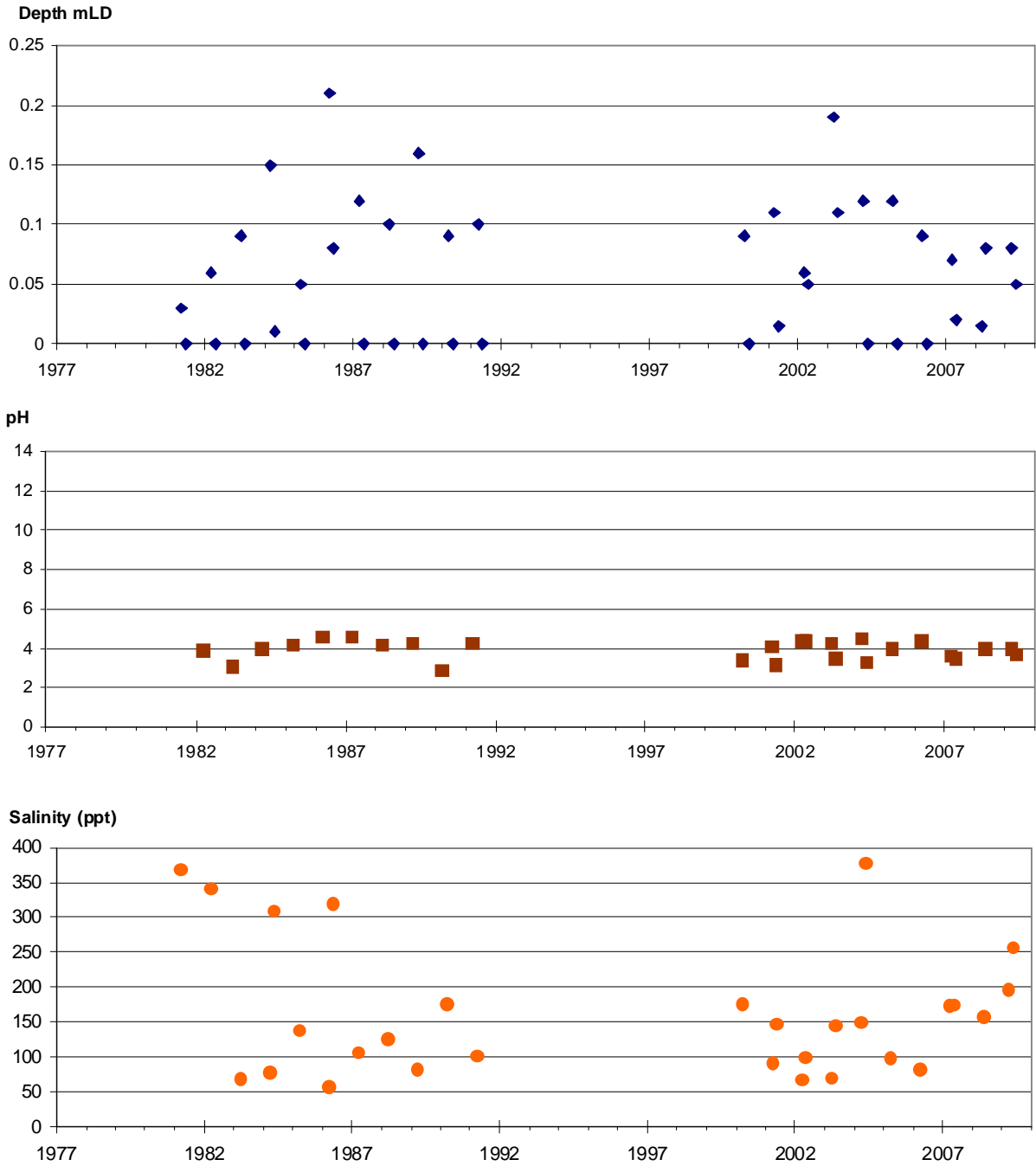


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Esperance 26410 is in the Esperance District of the South Coast DEC Region.

## ESPERANCE 27985



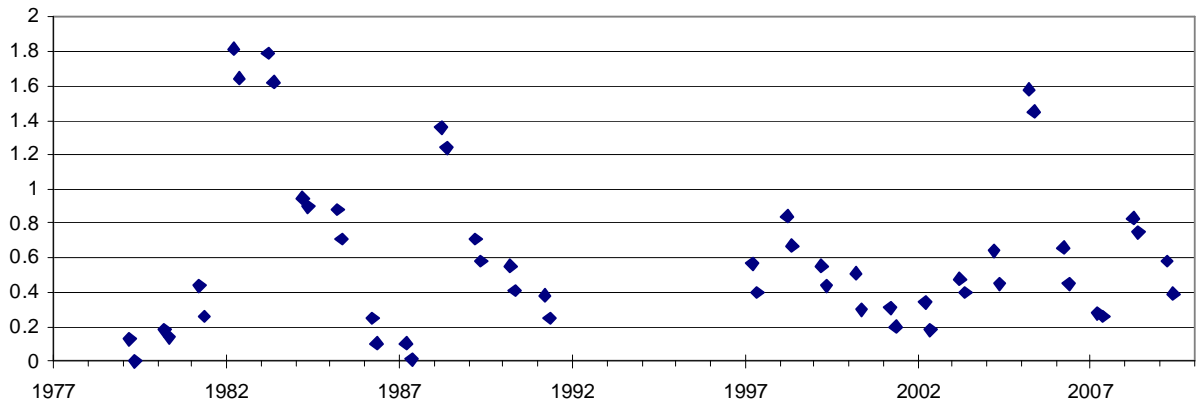
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

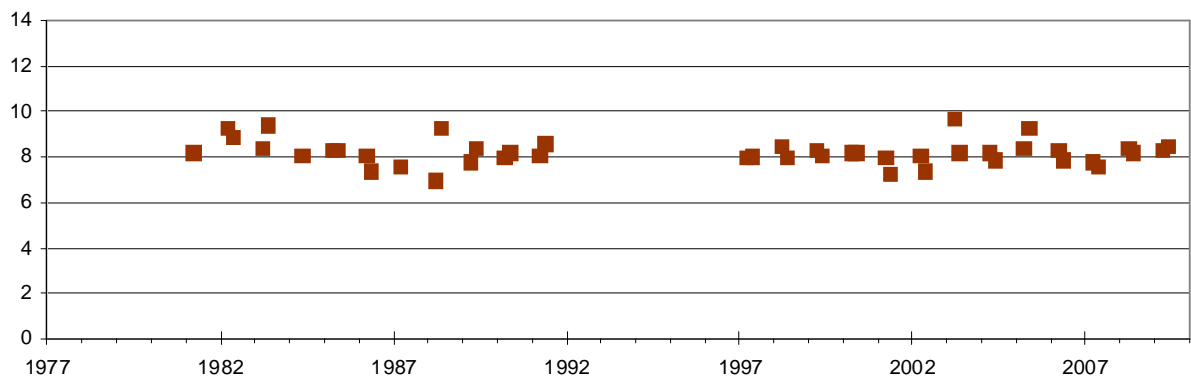
Esperance 27985 is in the Esperance District of the South Coast DEC Region.

# FLAGSTAFF

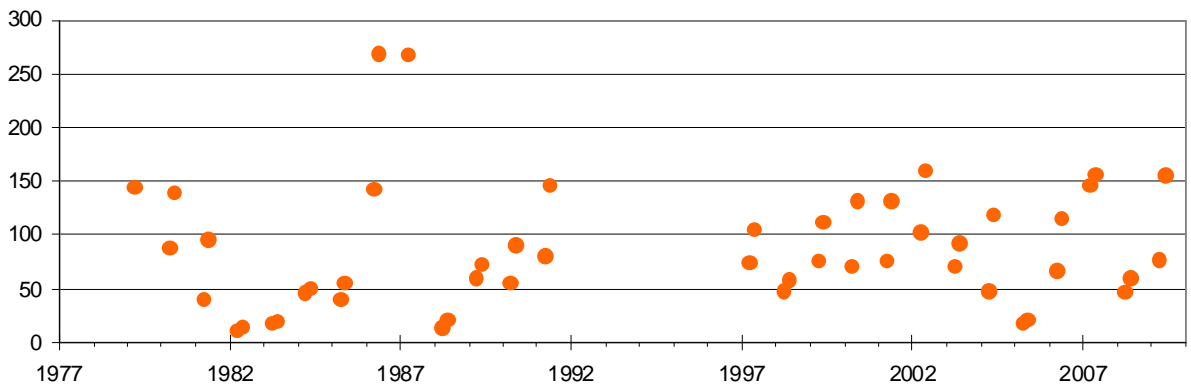
Depth mLD



pH



Salinity (ppt)



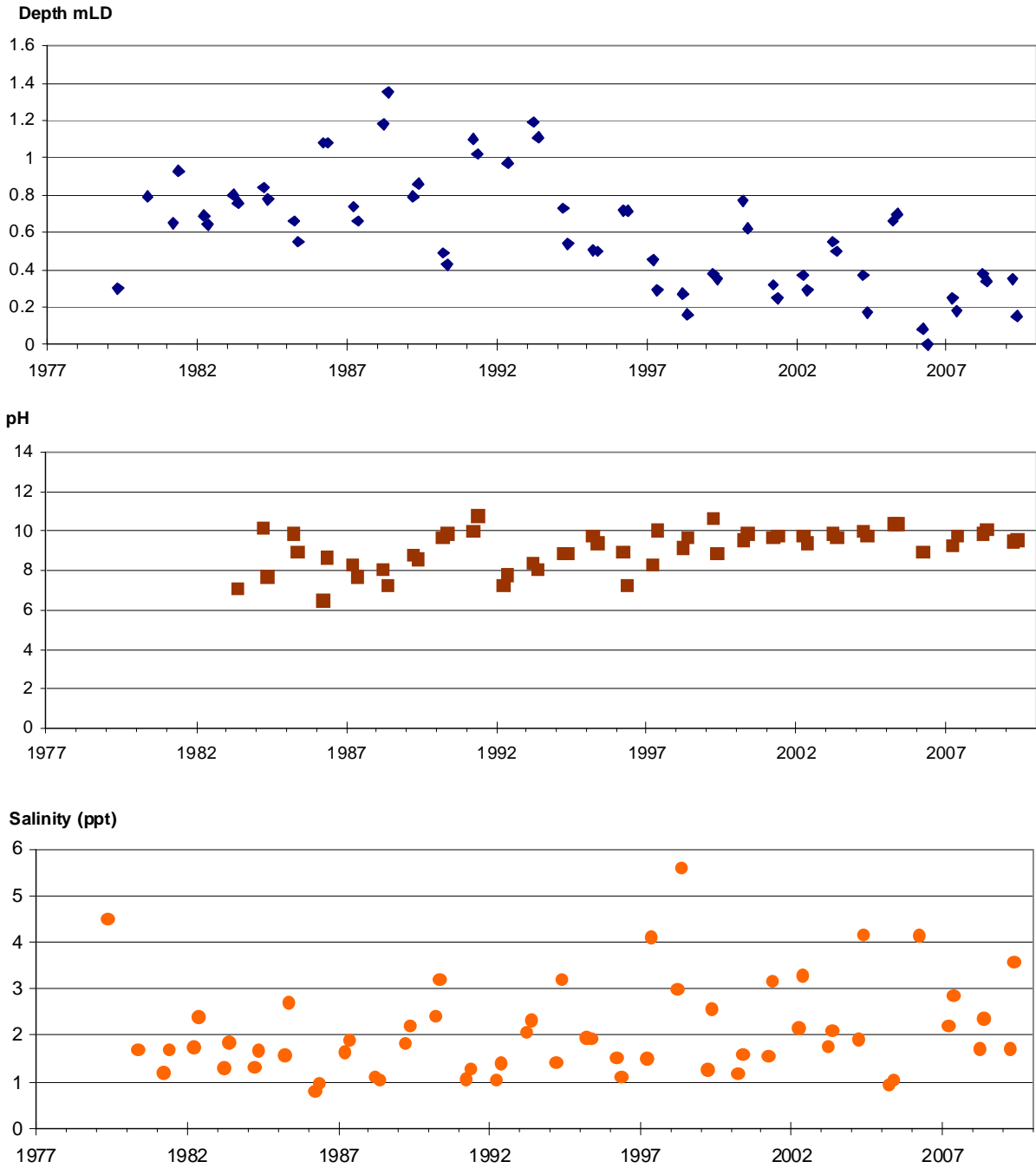
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Flagstaff is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.



## FORRESTDALE



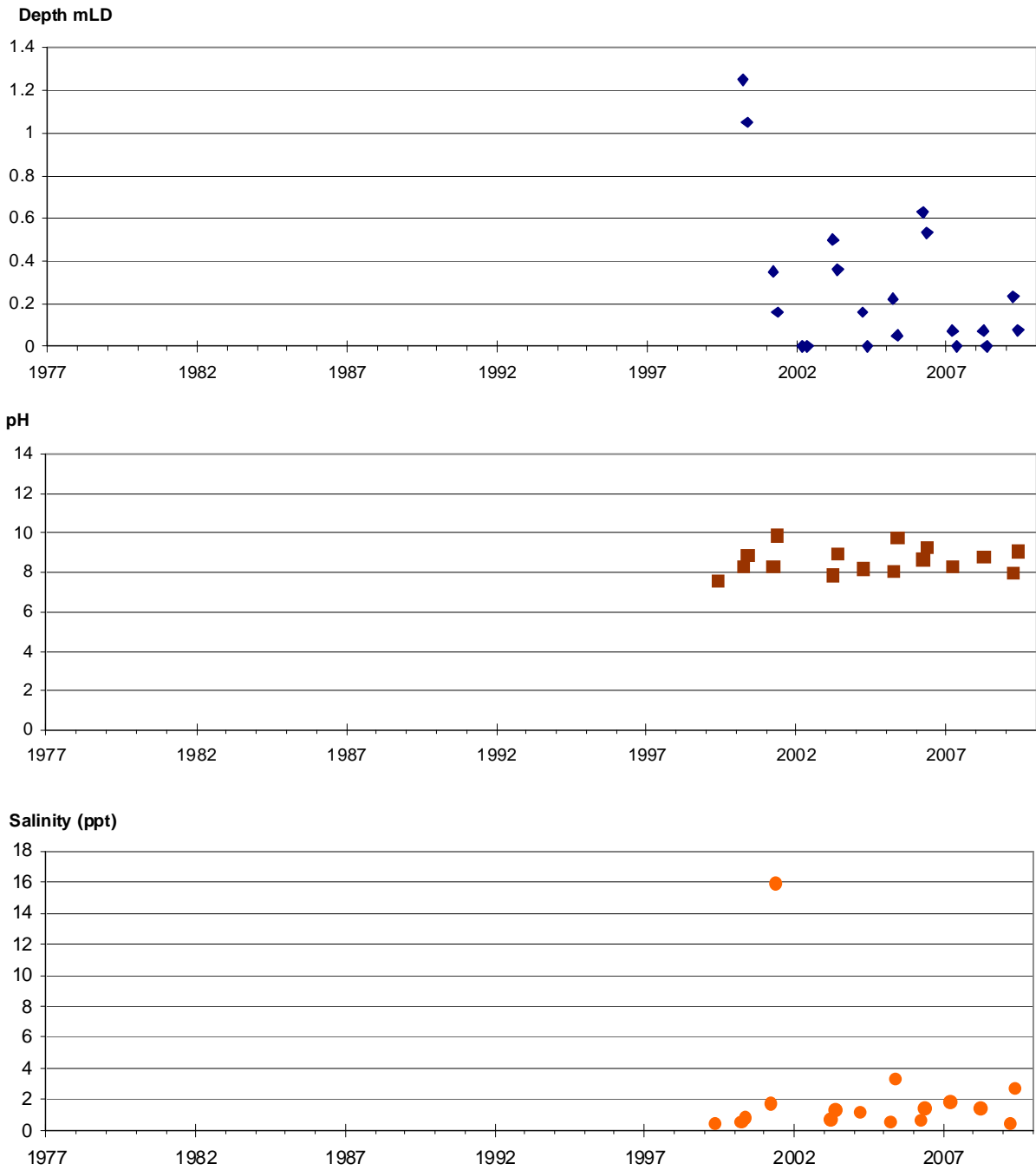
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Forrestdale Lake is a component of the 'Forrestdale and Thomsons Lakes' system, which is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands, and is also listed in the 'Directory of Important Wetlands in Australia'.

Forrestdale is in the Swan Coastal District (headquartered in Wanneroo) of the Swan DEC Region.

## FRASERS<sup>IM</sup>



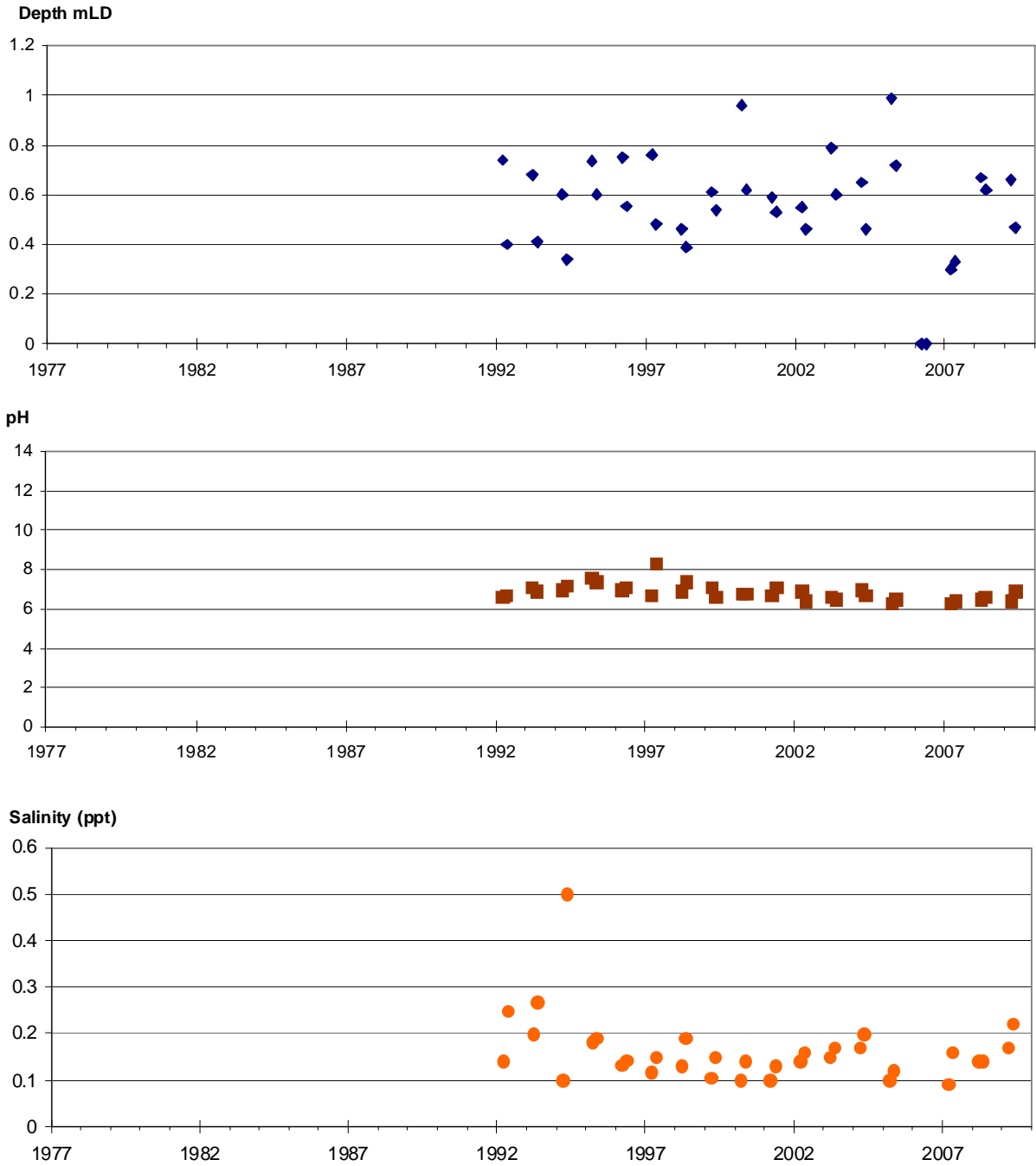
**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Frasers is also known as Maisey's 1 or Maisey's A.

Frasers is in the Central District (headquartered in Merredin) of the Wheatbelt DEC Region.

# GIBBS



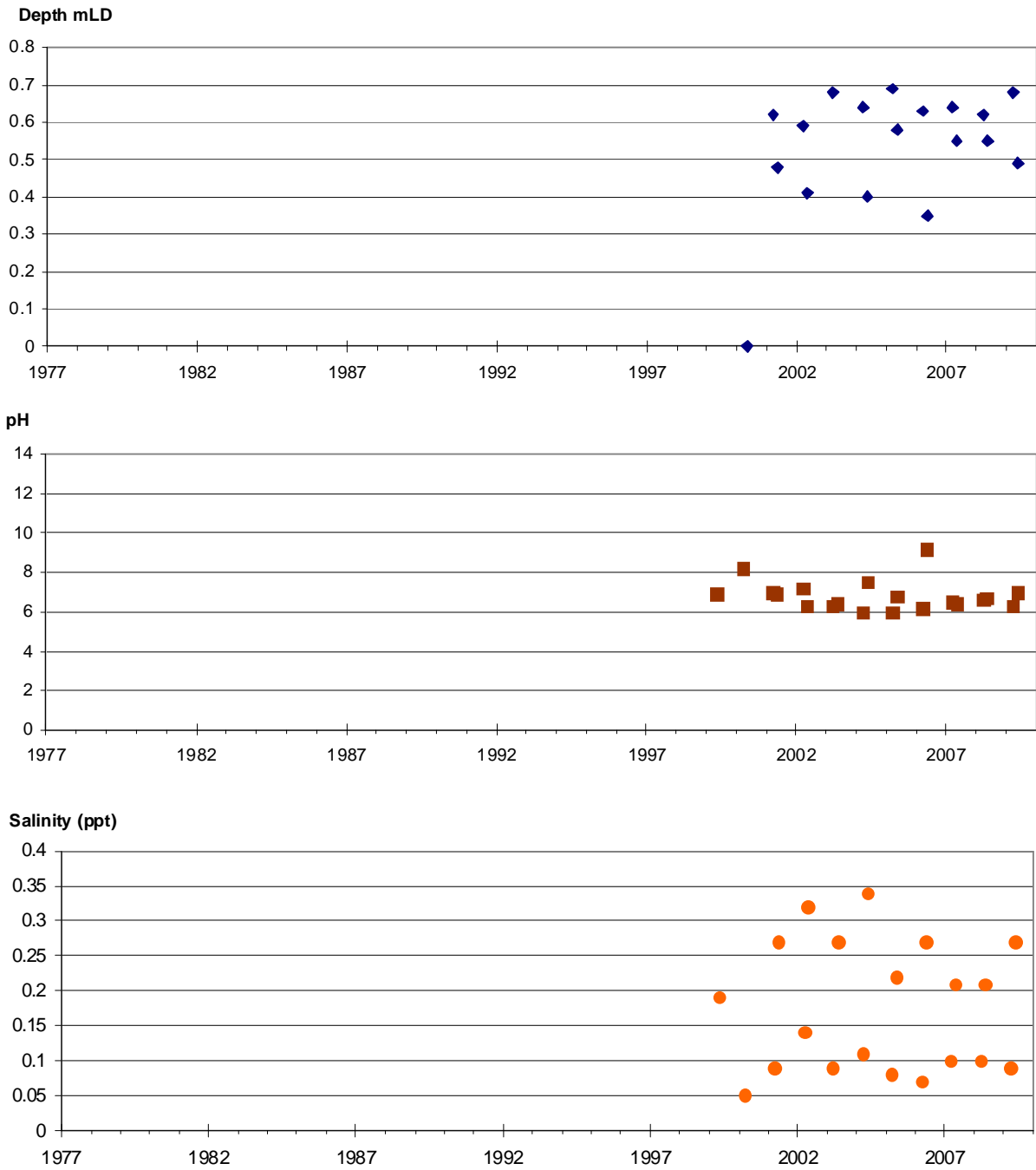
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Gibbs is a component of the 'Gibbs Road Swamp System', which is listed in the 'Directory of Important Wetlands in Australia'.

Gibbs is in the Swan Coastal District (headquartered in Wanneroo) of the Swan DEC Region.

# GOONAPING<sup>IM</sup>

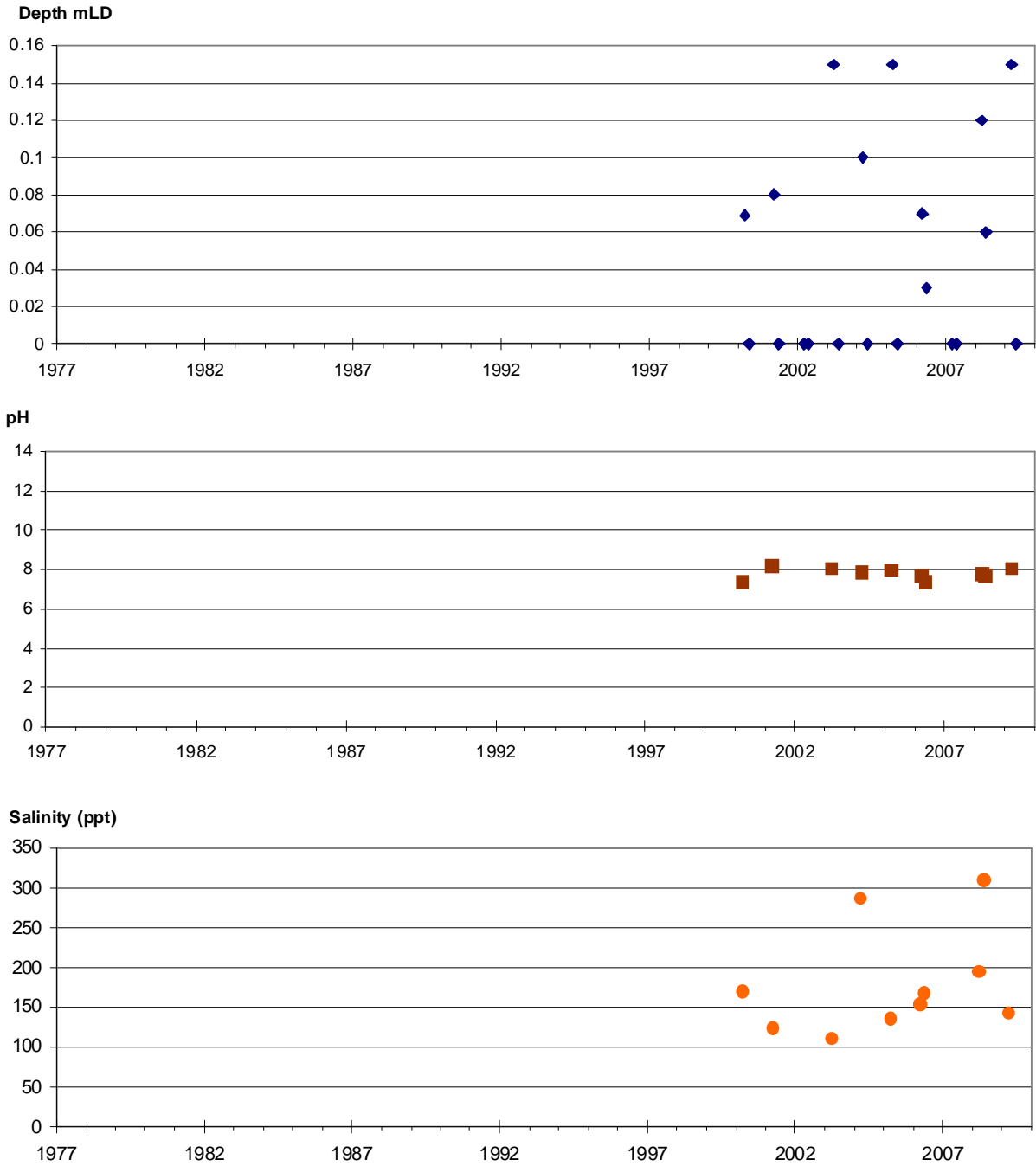


**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Goonaping is in the Perth Hills District (headquartered in Mundaring) of the Swan DEC Region.

# GOORLY

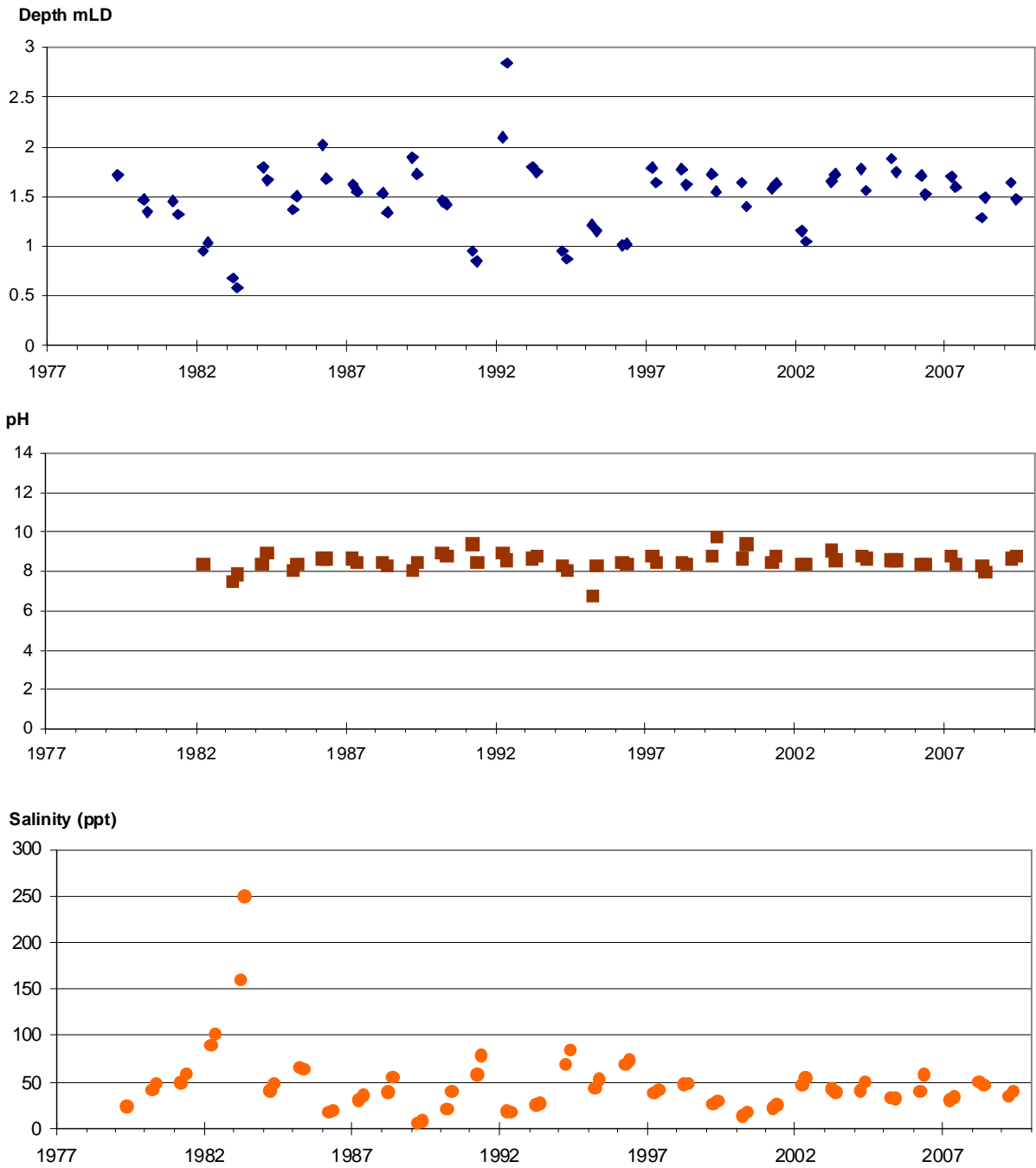


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Goorly is in the Central District (headquartered in Merredin) of the Wheatbelt DEC Region.

## GORE



**Notes:**

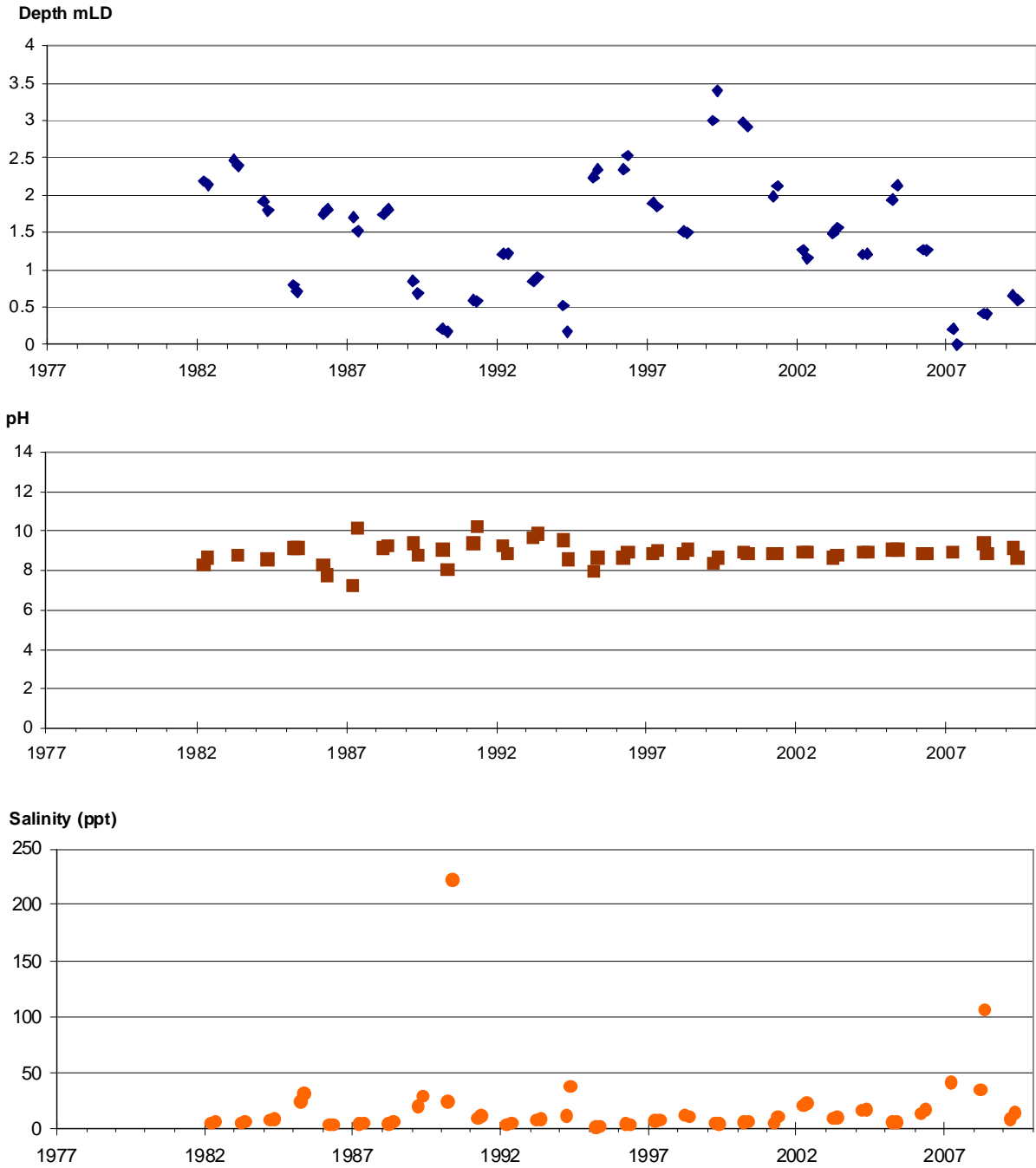
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Lake Gore is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands.

Lake Gore is also a component of the 'Lake Gore System', which is listed in the 'Directory of Important Wetlands in Australia'.

Gore is in the Esperance District of the South Coast DEC Region.

# GURAGA



**Notes:**

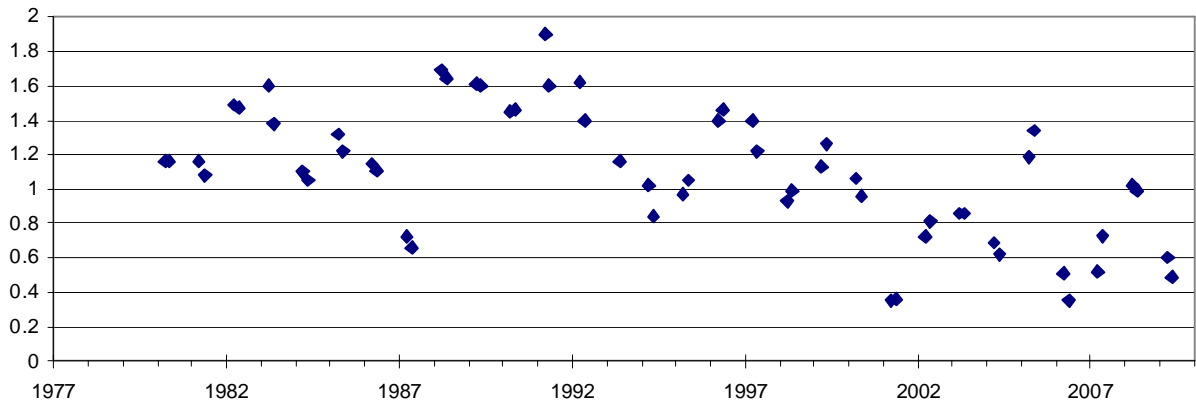
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Guraga Lake is listed in the 'Directory of Important Wetlands in Australia'.

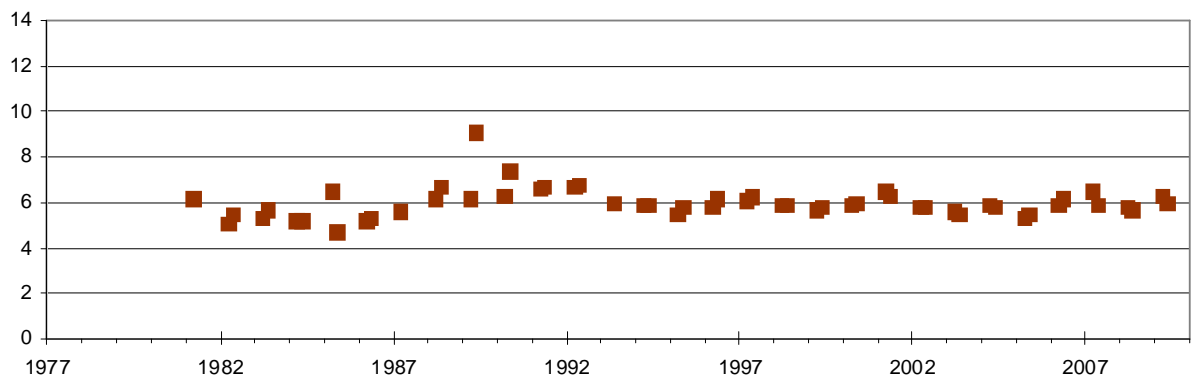
Guraga is in the Moora District (headquartered in Jurien Bay) of the Midwest DEC Region.

## HARVEY 12632

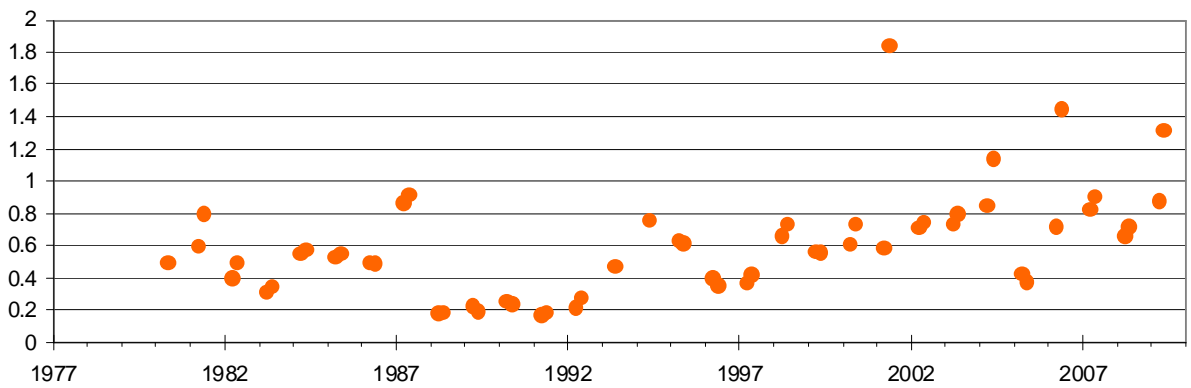
### Depth mLD



### pH



### Salinity (ppt)



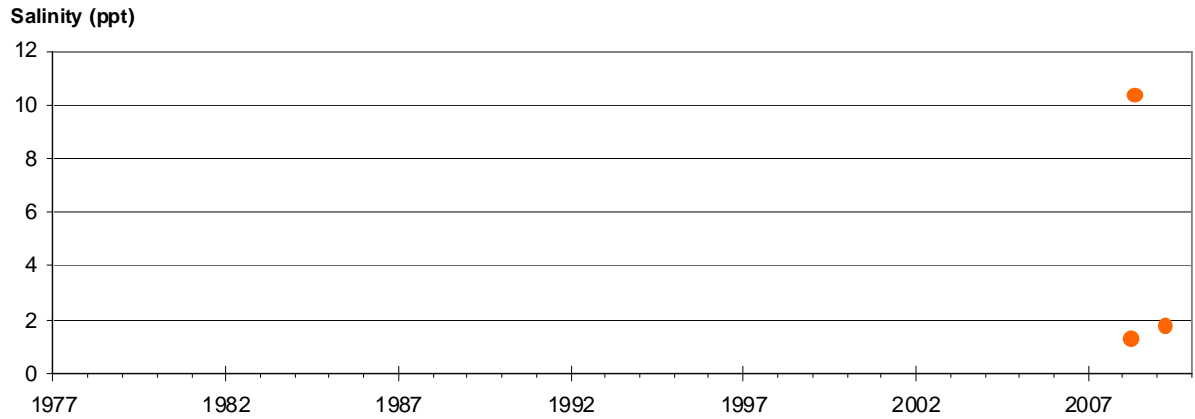
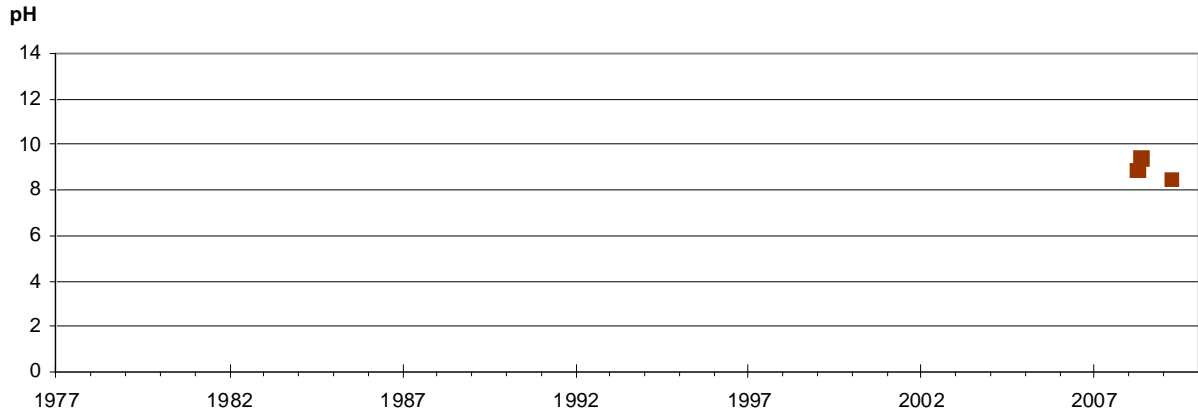
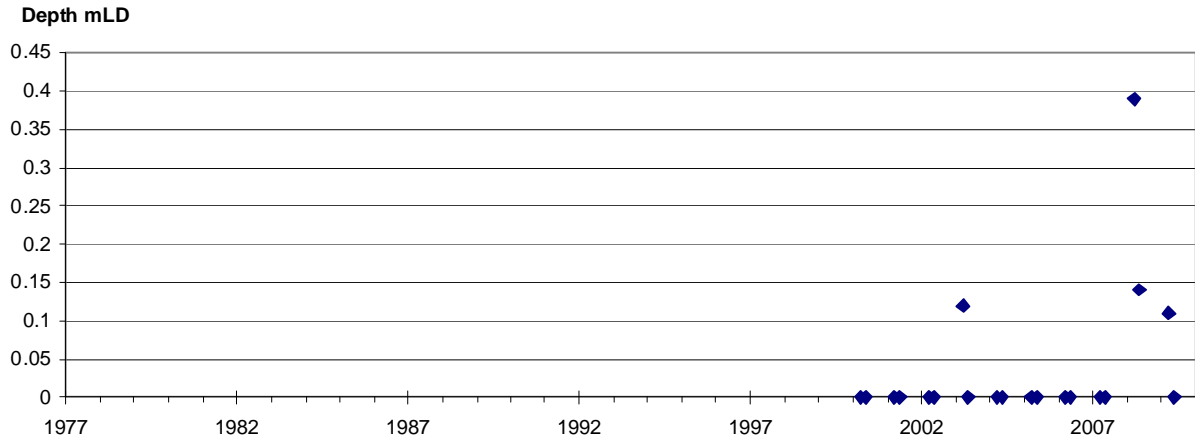
#### Notes:

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Harvey 12632 is in the Wellington District (headquartered in Collie) of the South West DEC Region.



# HEBITONS



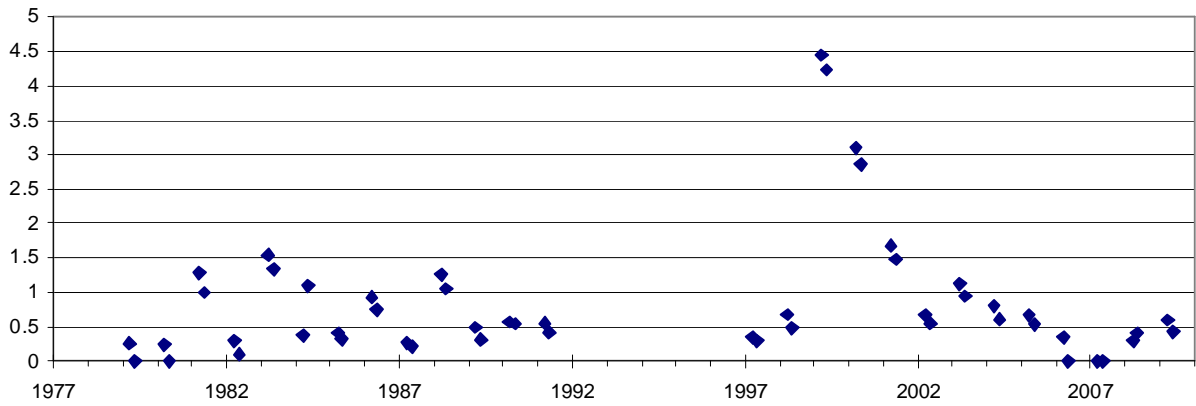
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

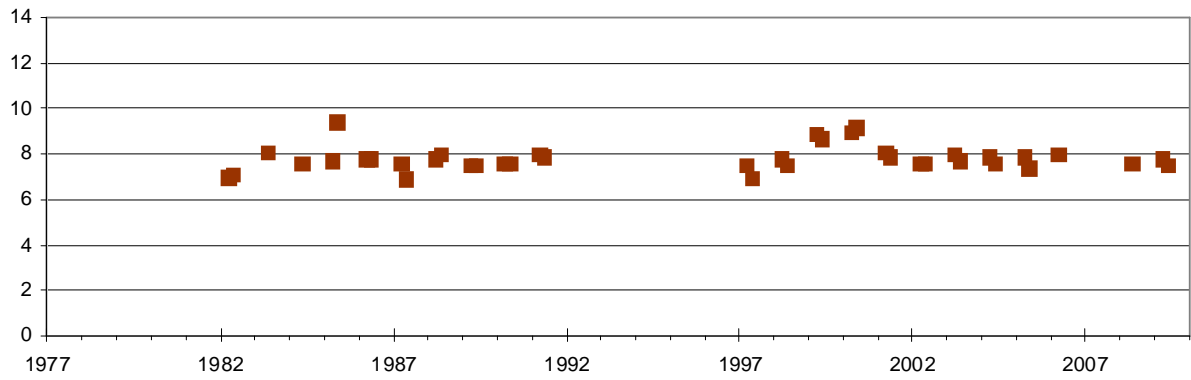
Hebitons is in the Geraldton District of the Midwest DEC Region

# HINDS

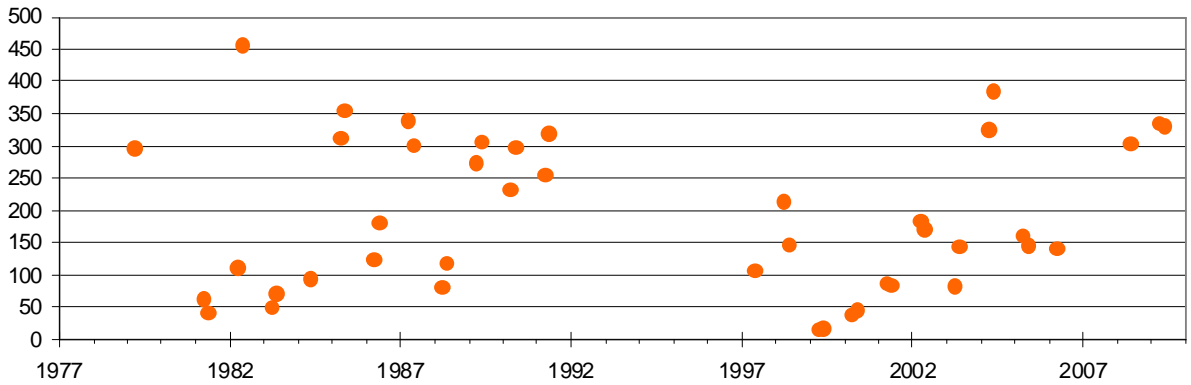
Depth mLD



pH



Salinity (ppt)



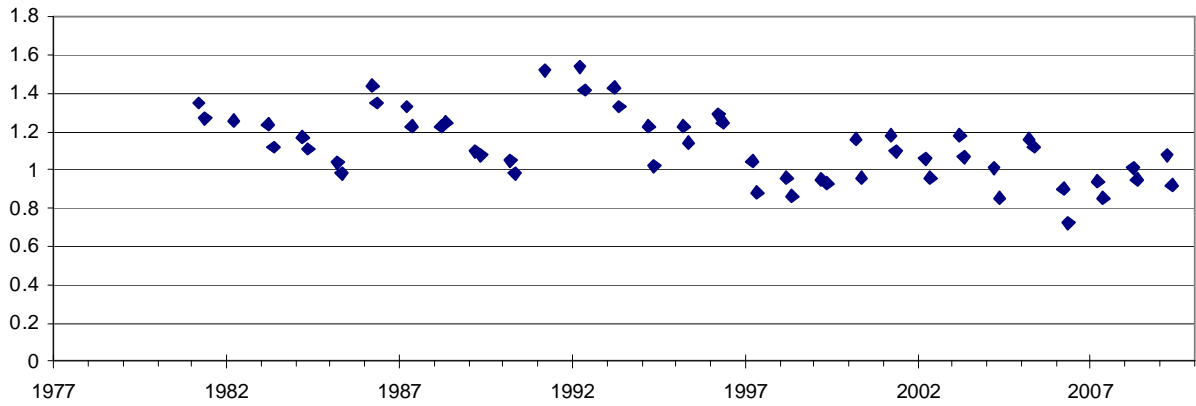
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

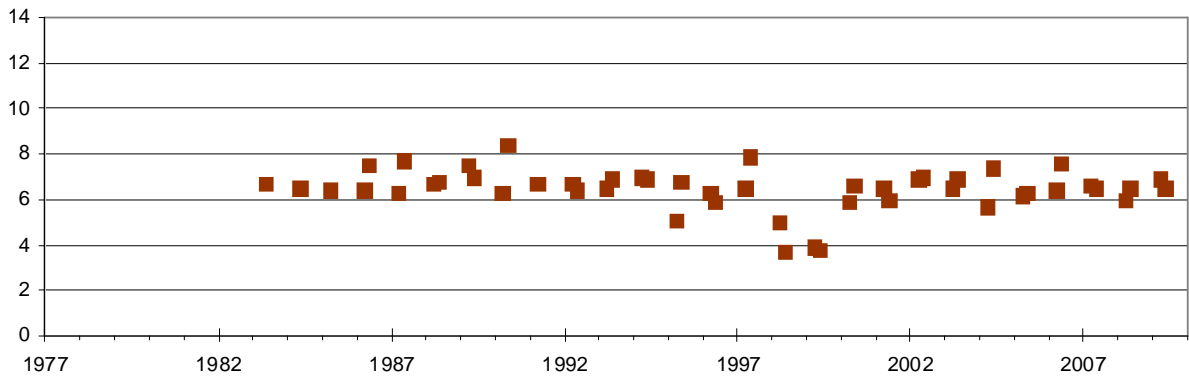
Hinds is in the Central District (headquartered in Merredin) of the Wheatbelt DEC Region.

# JANDABUP

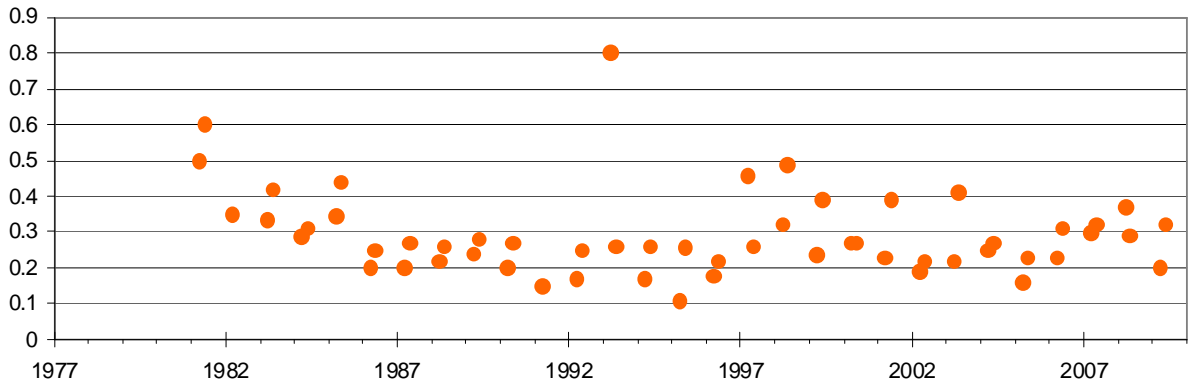
Depth mLD



pH



Salinity (ppt)

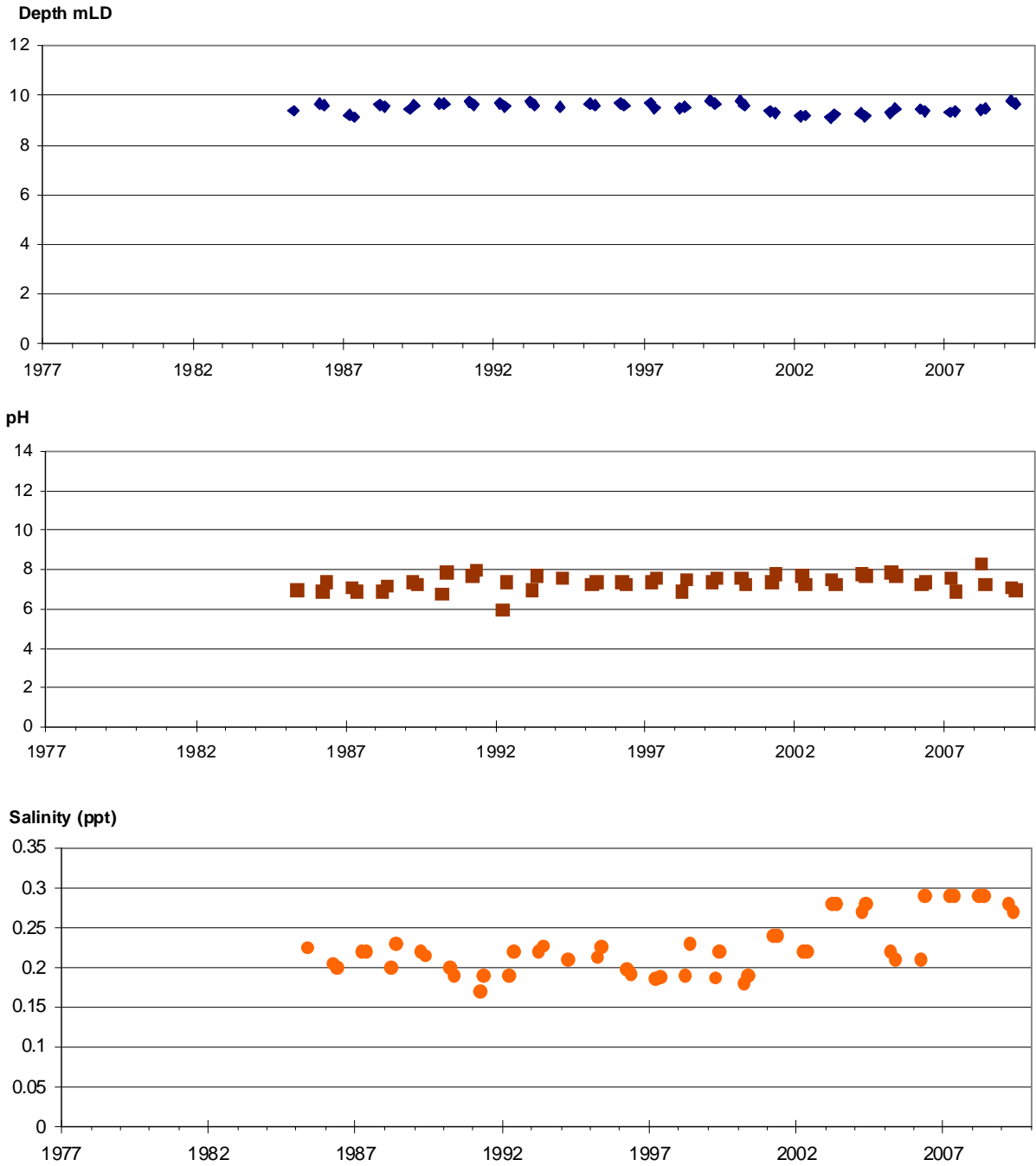


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Jandabup is in the Swan Coastal District (headquartered in Wanneroo) of the Swan DEC Region.

## JASPER (with Depth axis 0-12m)



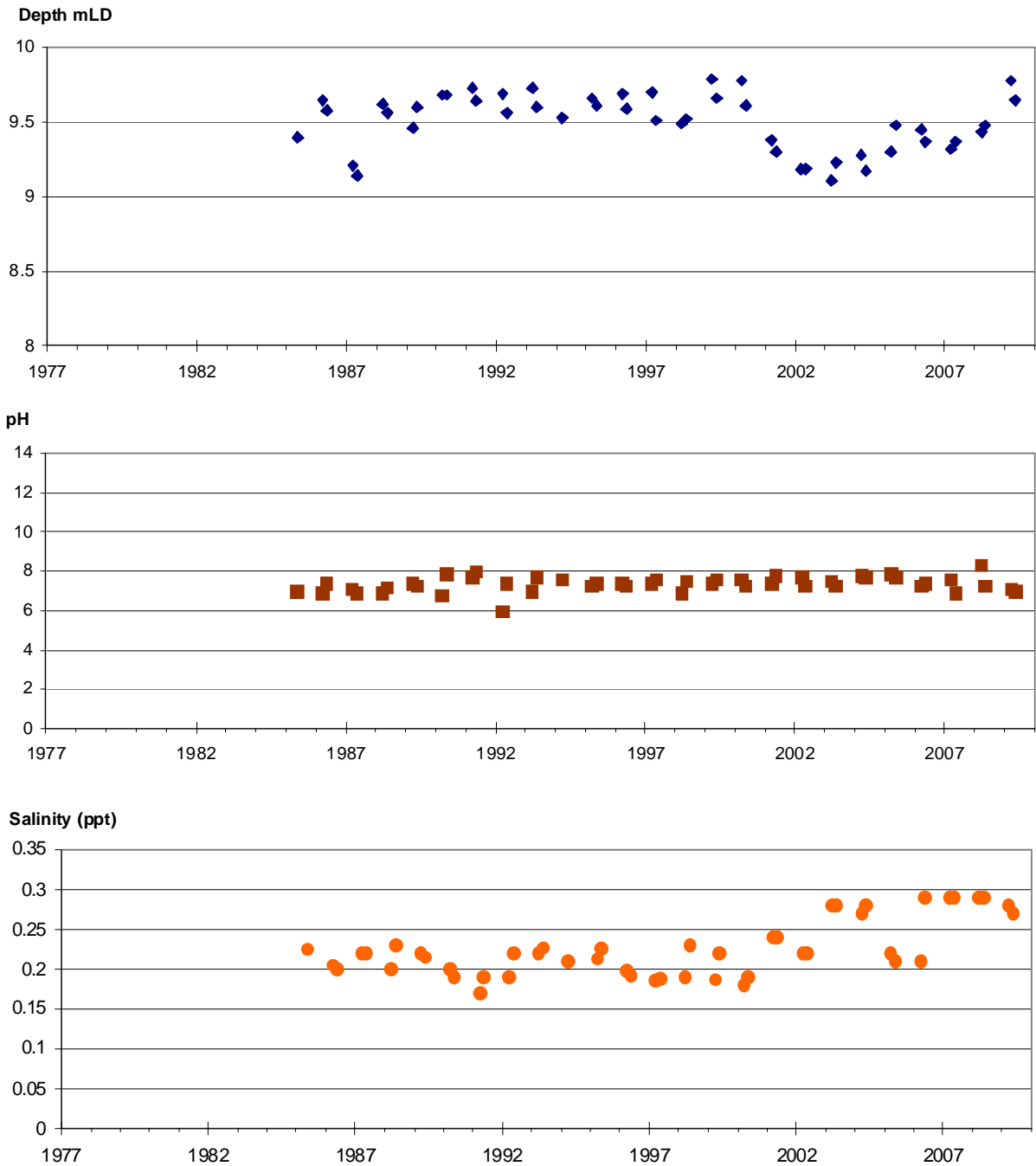
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Jasper is a component of the 'Gingilup-Jasper Wetland System', which is listed in the 'Directory of Important Wetlands in Australia'.

Jasper is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

## JASPER (with Depth axis 8-10m)



**Notes:**

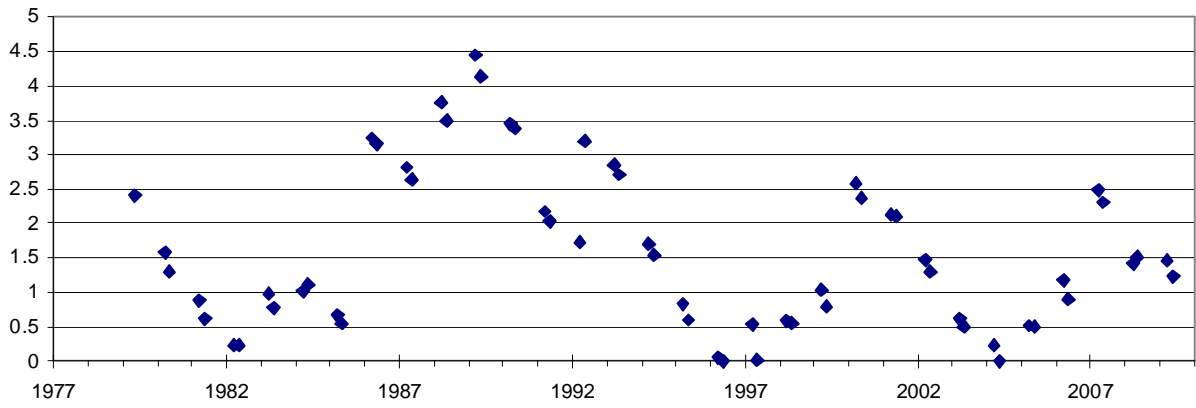
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Jasper is a component of the 'Gingilup-Jasper Wetland System', which is listed in the 'Directory of Important Wetlands in Australia'.

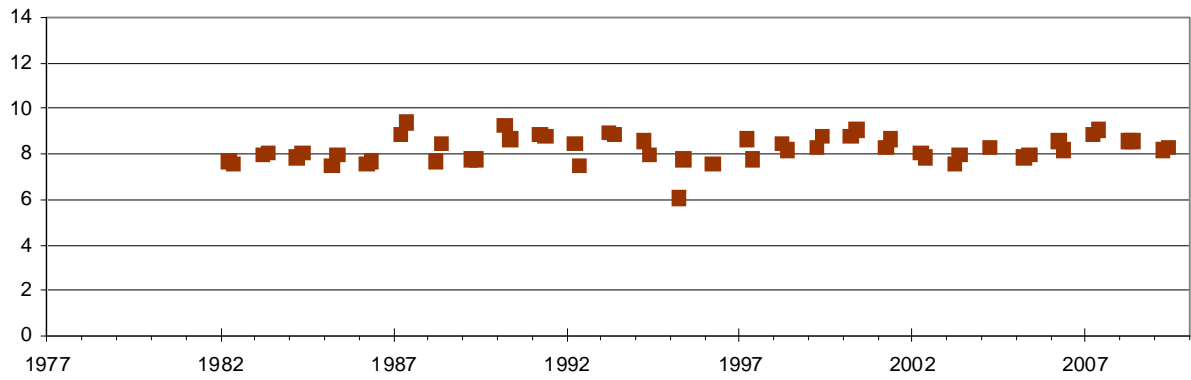
Jasper is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

# JERDACUTTUP

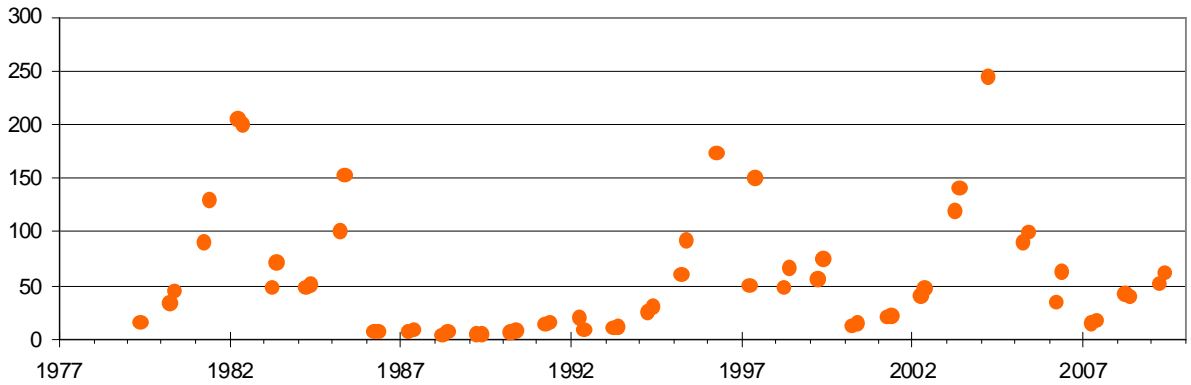
Depth mLD



pH



Salinity (ppt)

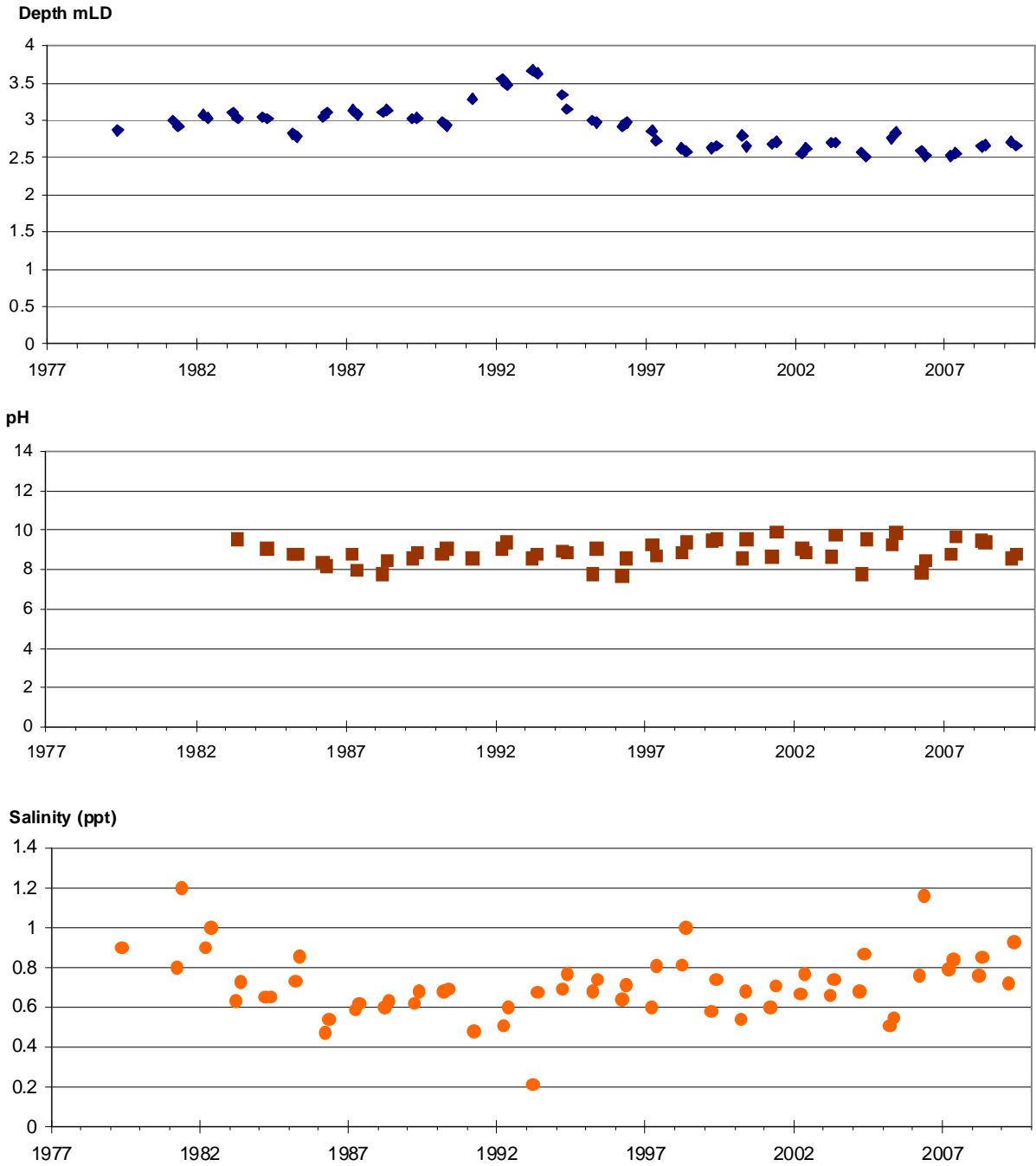


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Jerdacuttup is in the Albany District of the South Coast DEC Region

# JOONDALUP



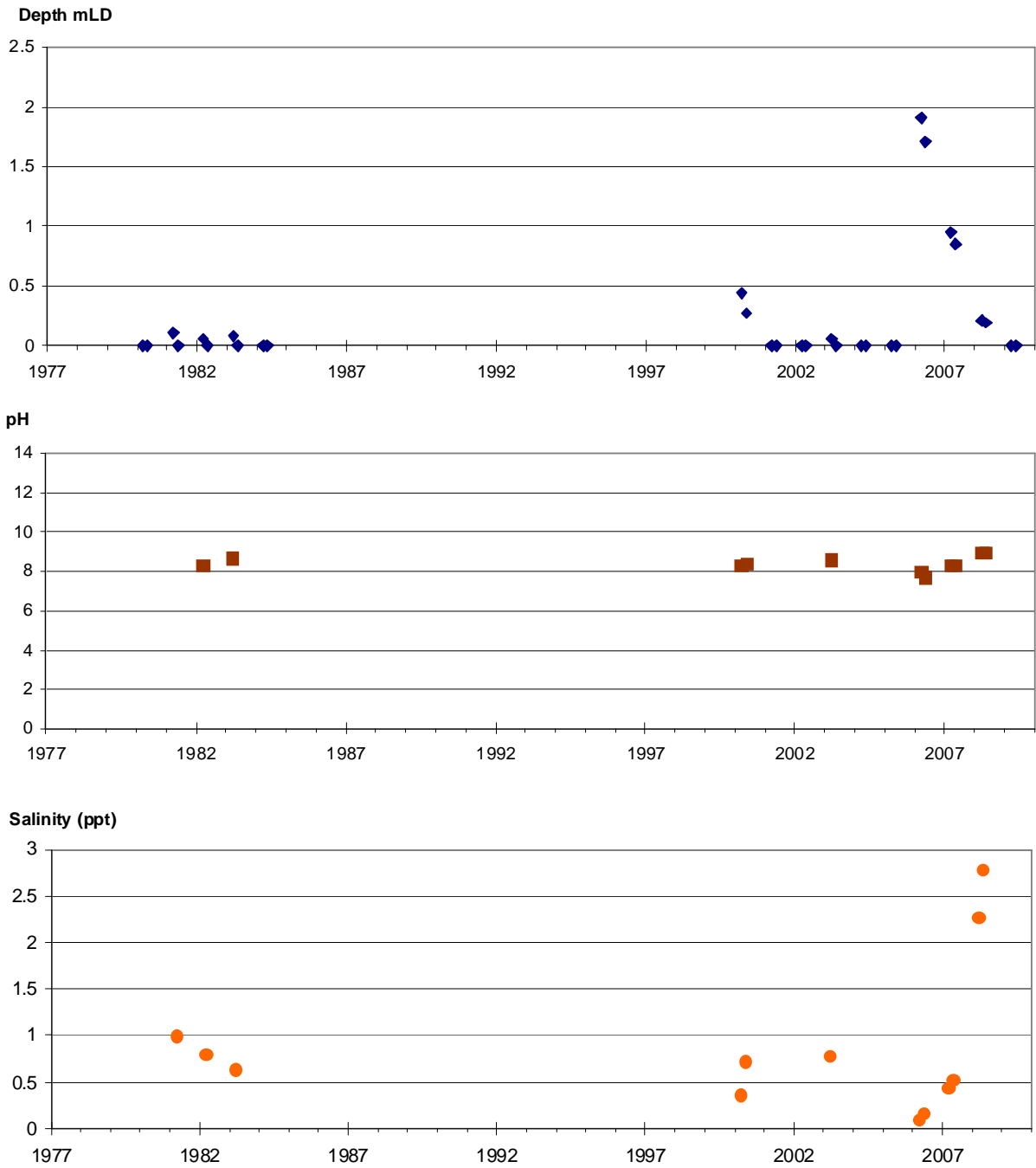
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Joondalup Lake is listed in the 'Directory of Important Wetlands in Australia'.

Joondalup is in the Swan Coastal District (headquartered in Wanneroo) of the Swan DEC Region.

## KENT 29020



**Notes:**

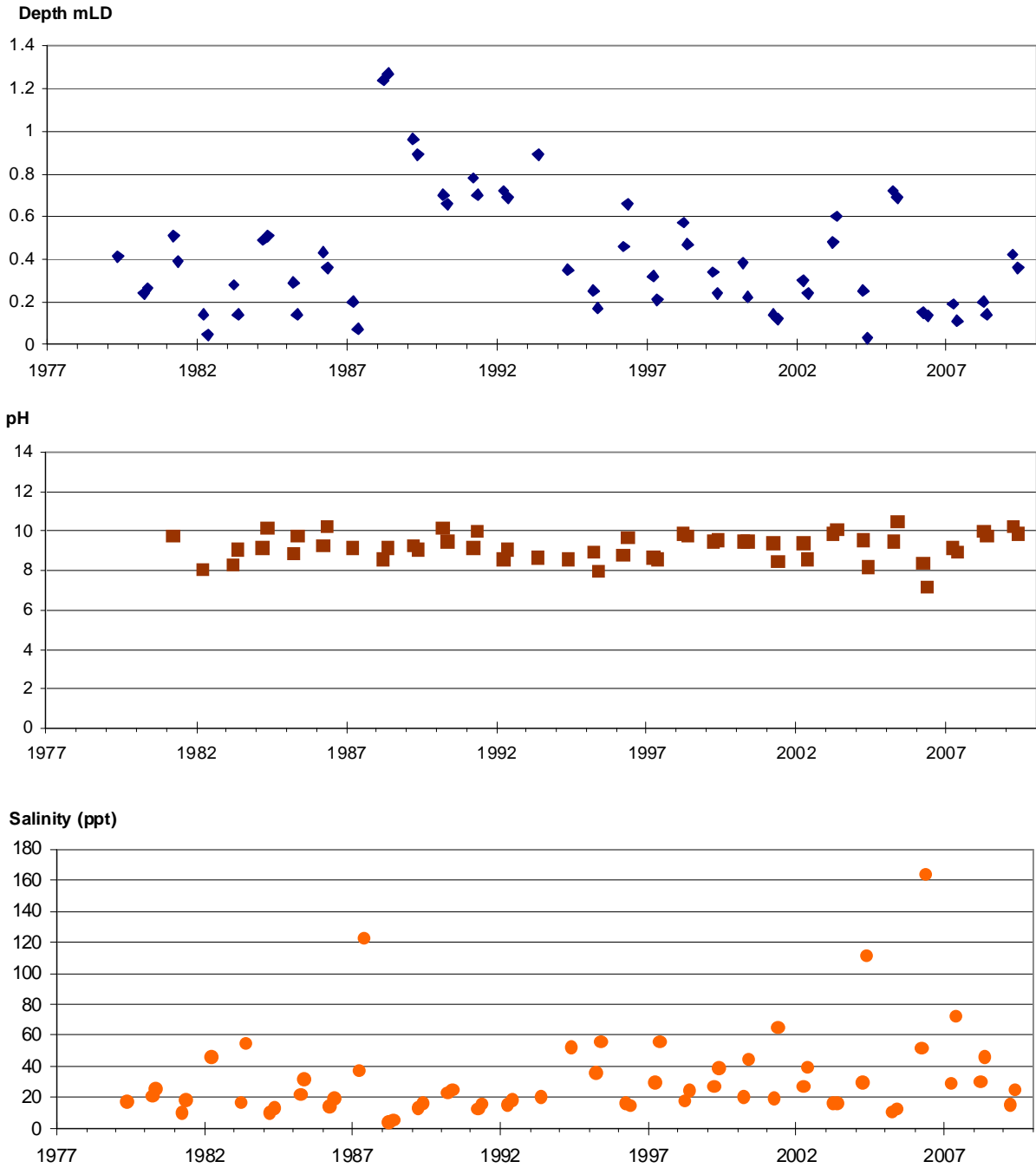
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Kent 29020 (also known as East Lake Bryde) is a component of the 'Lake Bryde – East Lake Bryde System', which is listed in the 'Directory of Important Wetlands in Australia'.

Kent 29020 is within the Lake Bryde Natural Diversity Recovery Catchment and is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.



# KWORNICUP



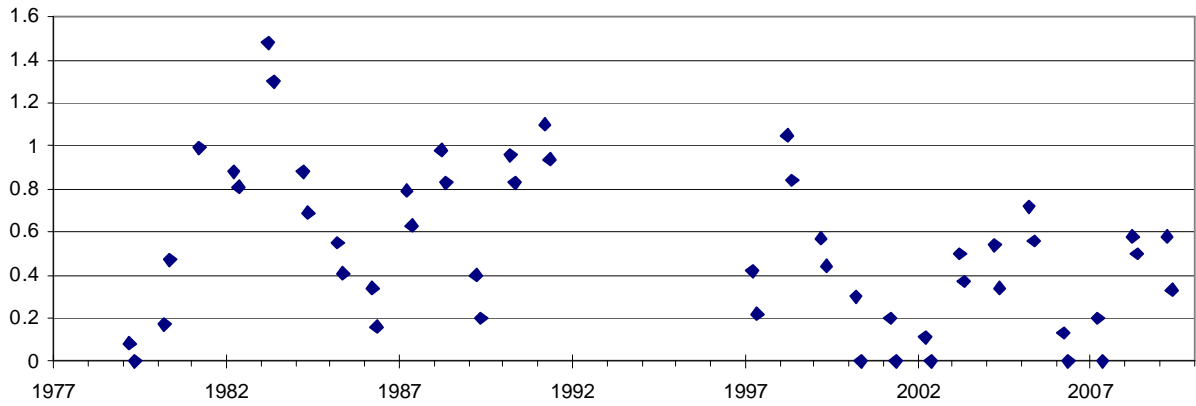
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

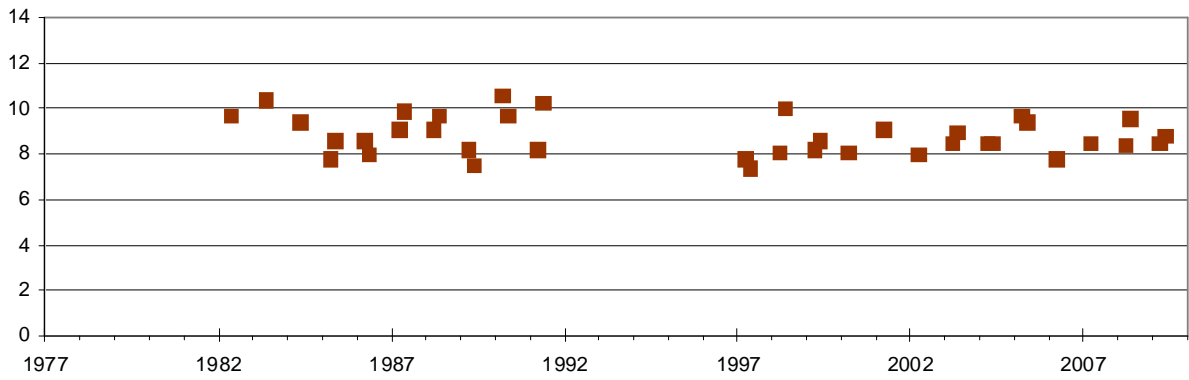
Kwornicup is in the Frankland District (headquartered in Walpole) of the Warren DEC Region.

# LITTLE WHITE

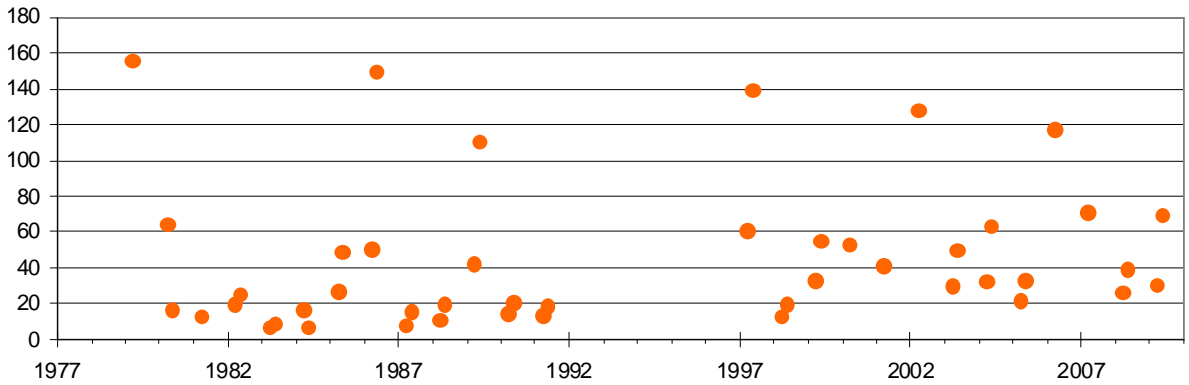
Depth mLD



pH



Salinity (ppt)

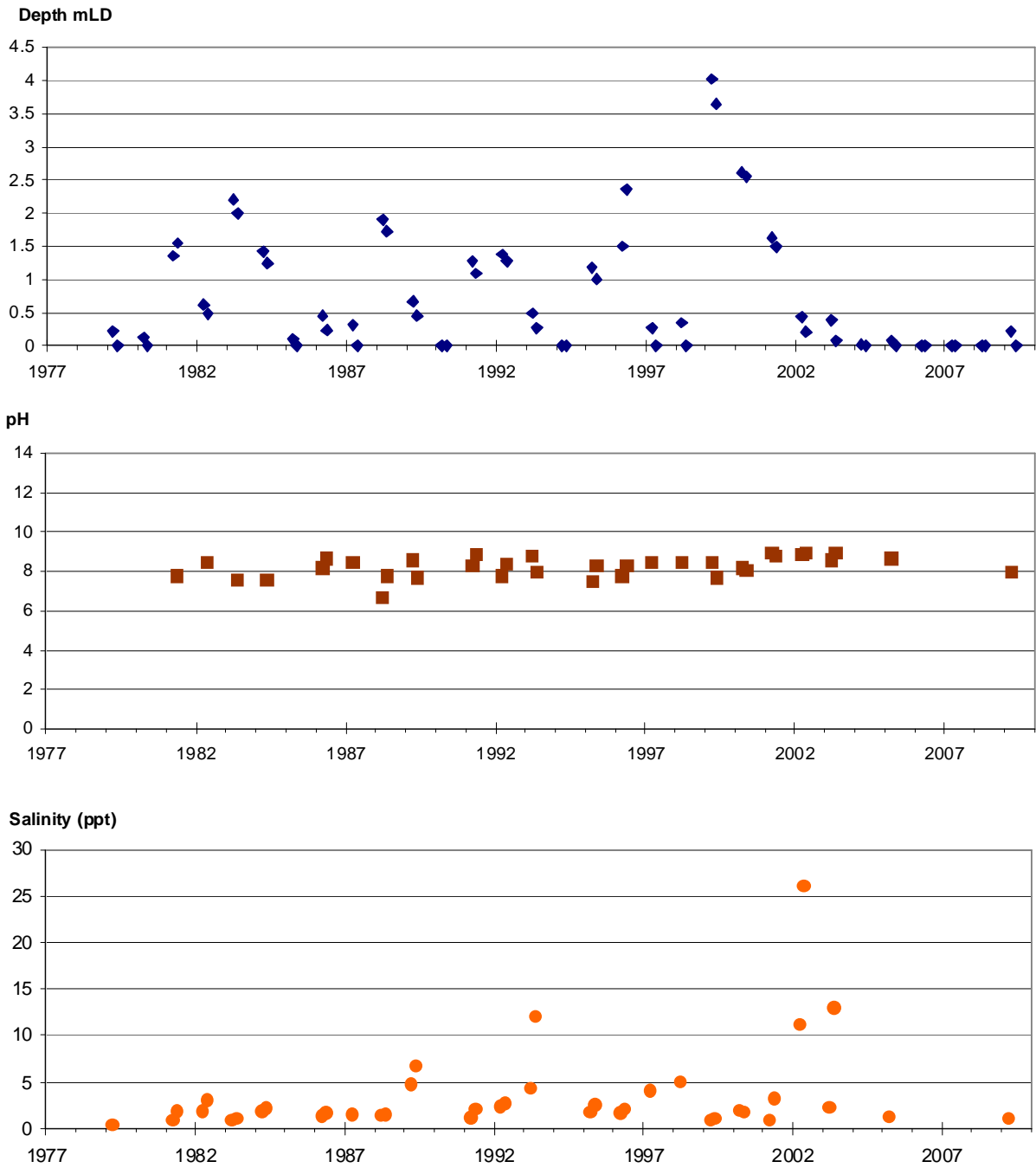


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Little White is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# LOGUE<sup>IM</sup>



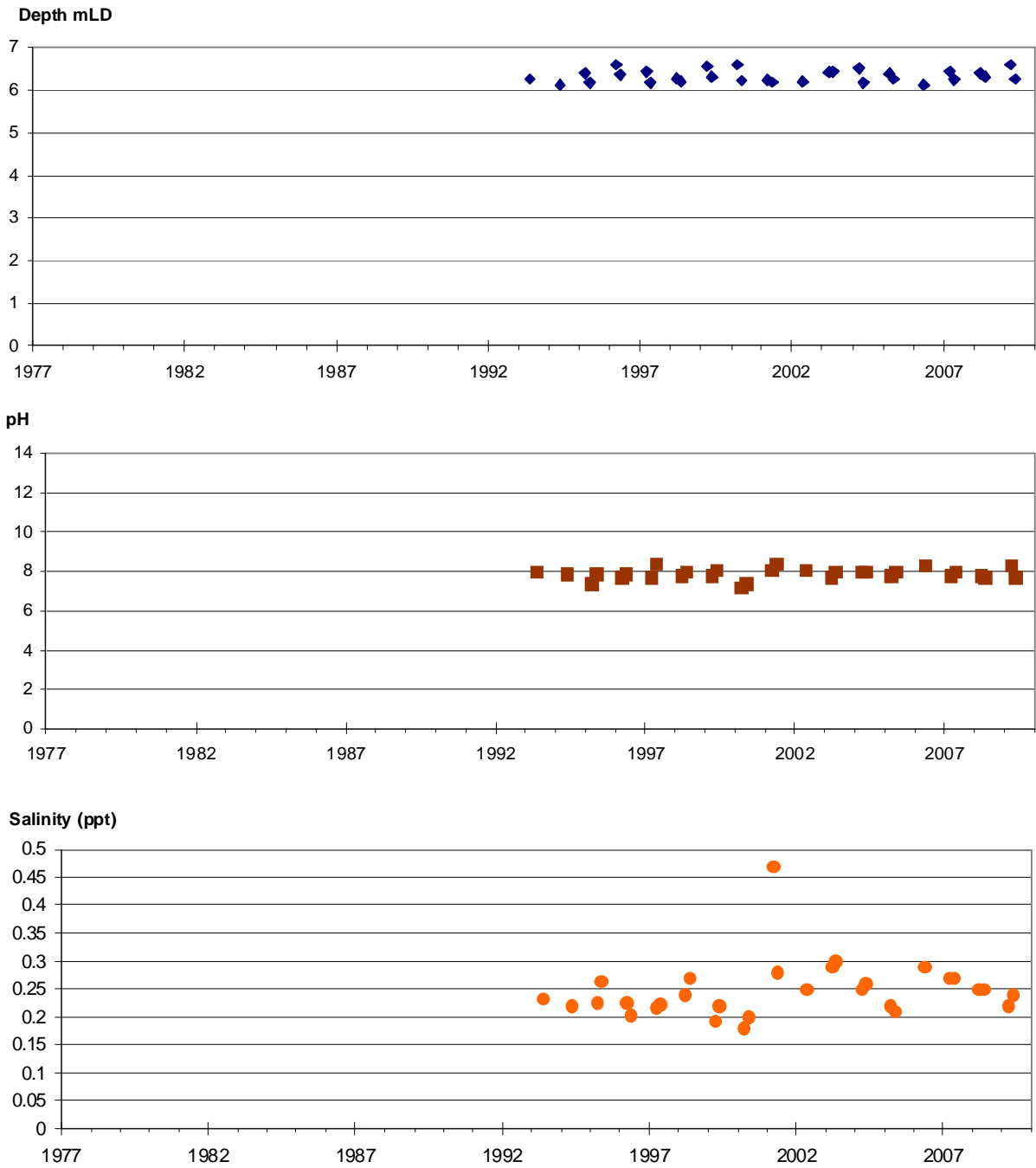
**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Logue is a component of the 'Lake Logue-Indoon System', which is listed in the 'Directory of Important Wetlands in Australia'.

Logue is in the Moora District (headquartered in Jurien Bay) of the Midwest DEC Region.

## MARINGUP (with Depth axis 0-7m)



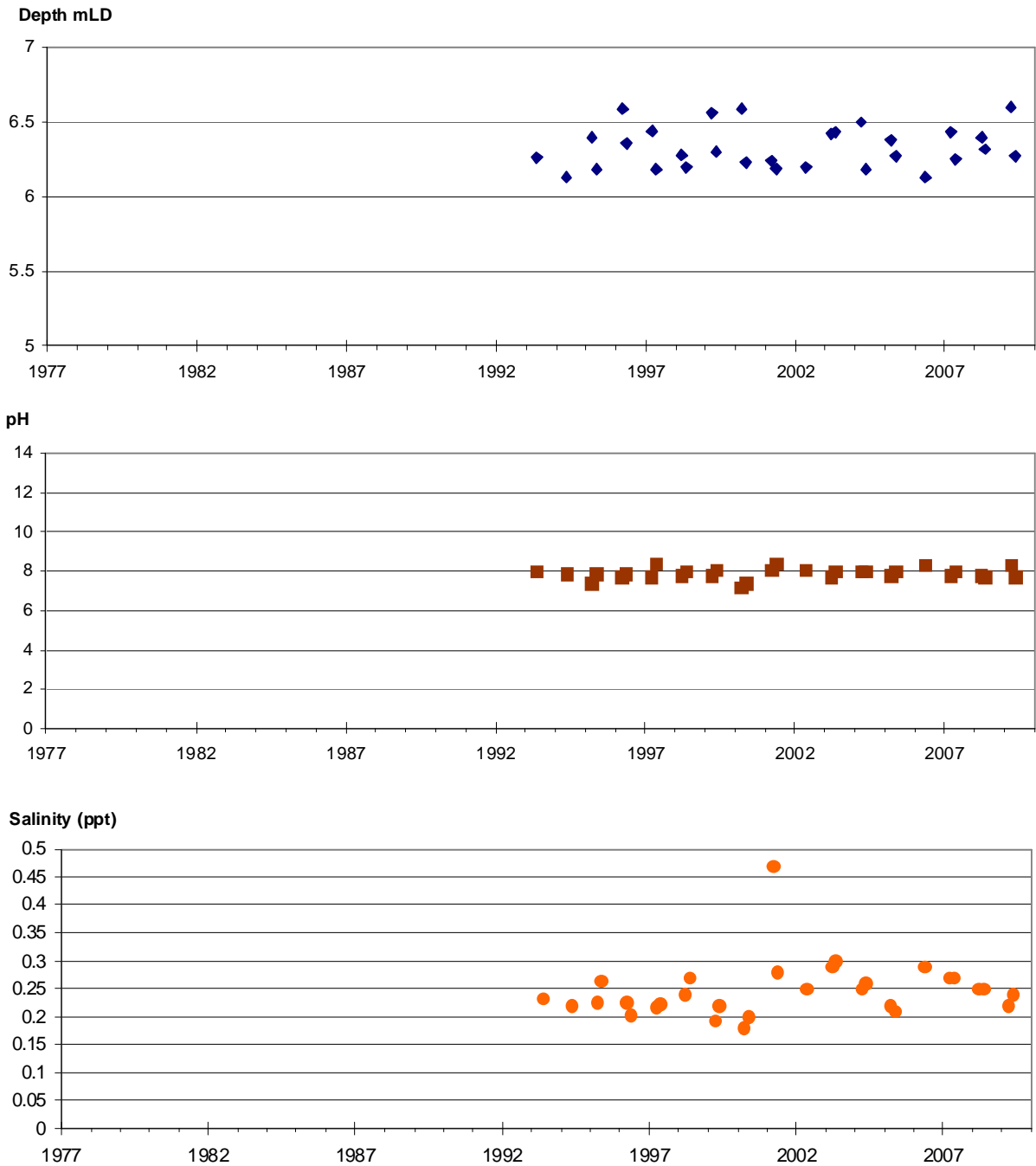
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Maringup Lake is listed in the 'Directory of Important Wetlands in Australia'.

Maringup is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

## MARINGUP (with Depth axis 5-7m)



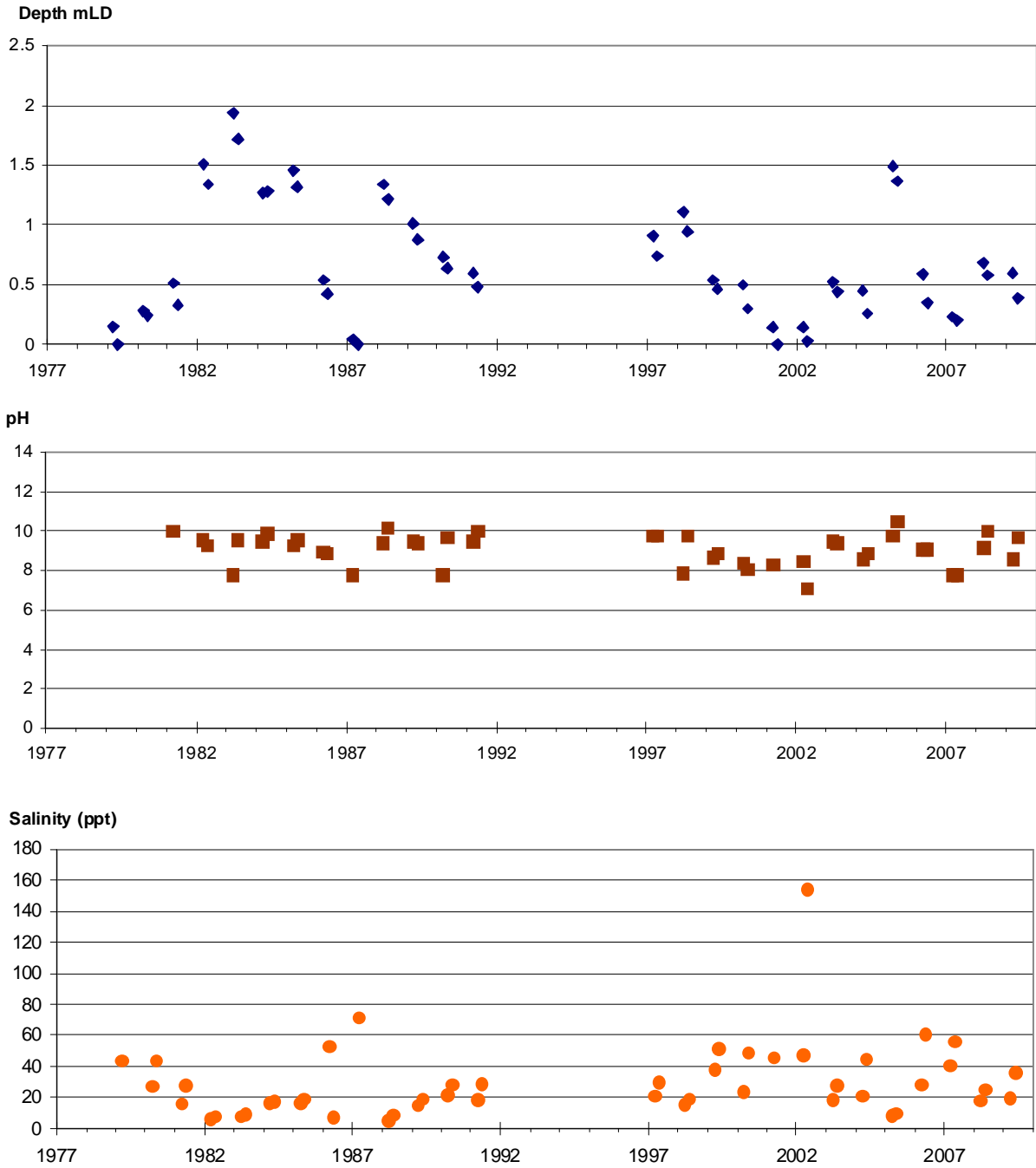
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Maringup Lake is listed in the 'Directory of Important Wetlands in Australia'.

Maringup is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

# MARTINUP

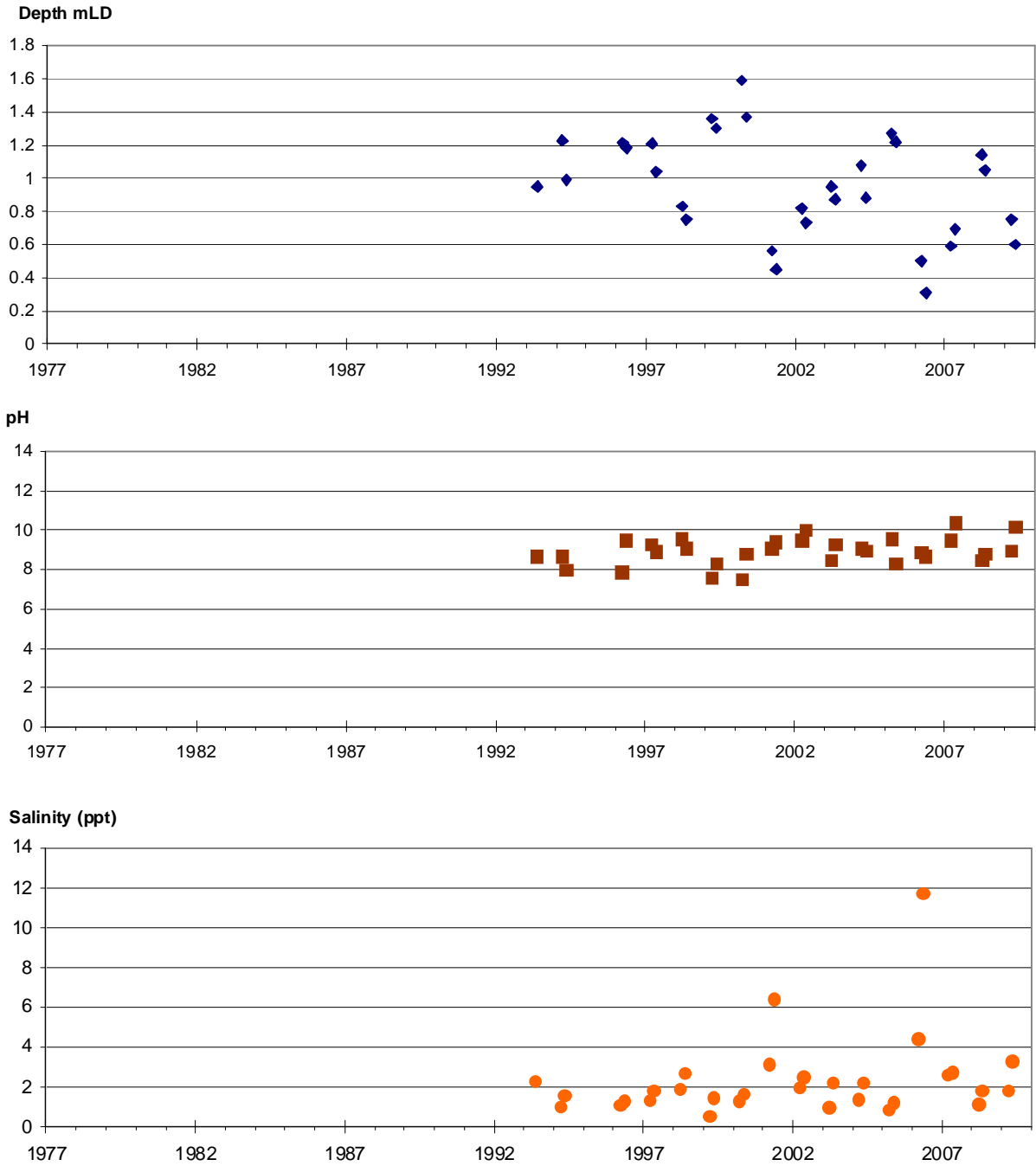


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Martinup is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## McLARTY



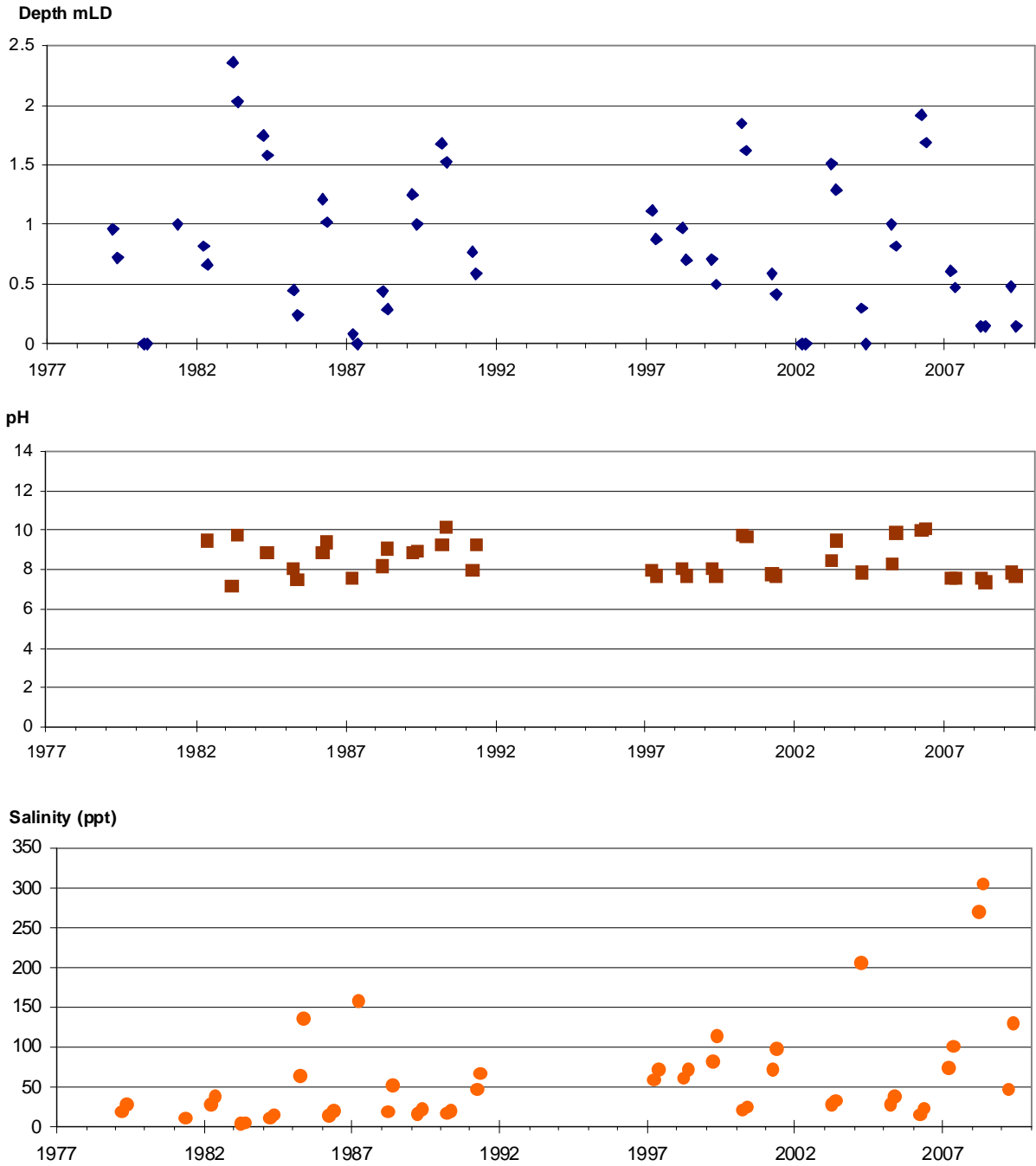
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

McLarty is a component of the 'Peel-Yalgorup System', which is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands, and is also a component of the 'Lake McLarty System' listed in the 'Directory of Important Wetlands in Australia'.

McLarty is in the Swan Coastal District (headquartered in Wanneroo) of the Swan DEC Region.

# MEARS



**Notes:**

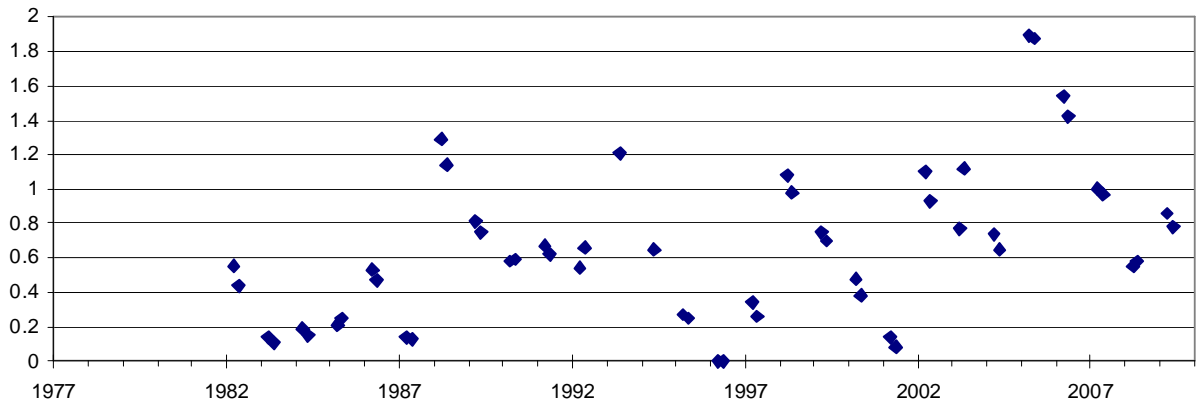
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Mears is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

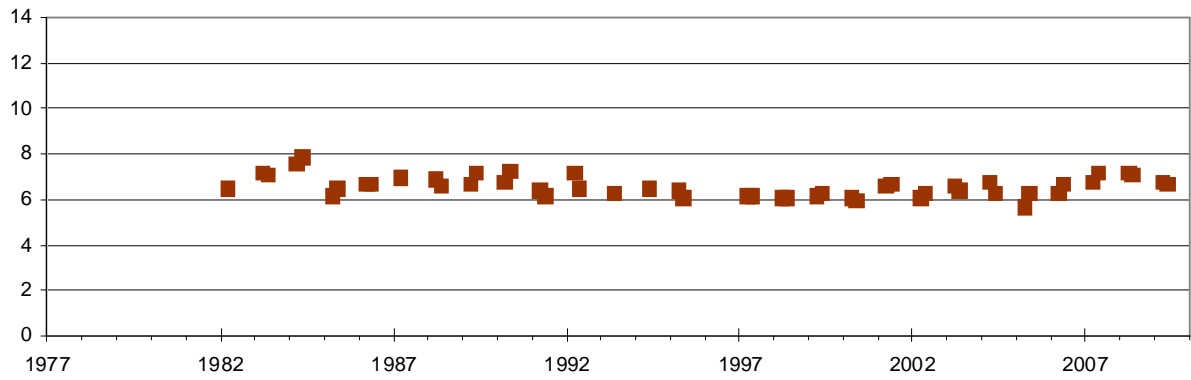


# METTLER

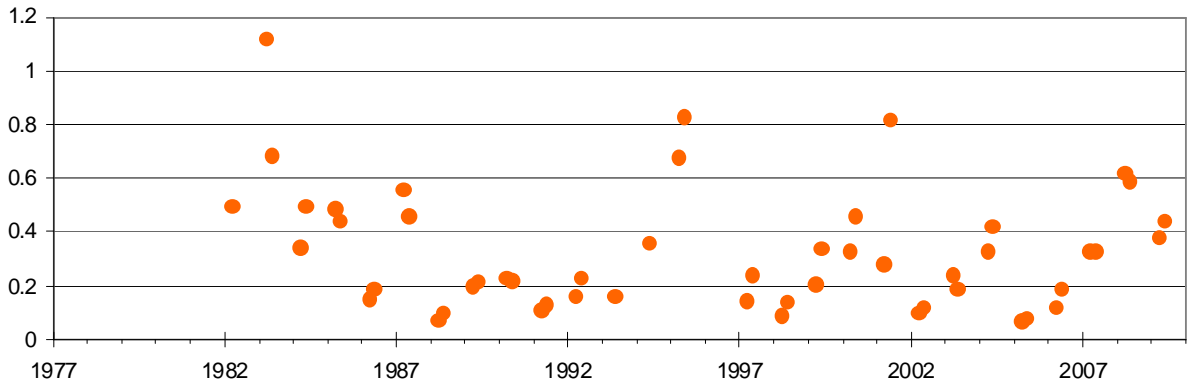
Depth mLD



pH



Salinity (ppt)

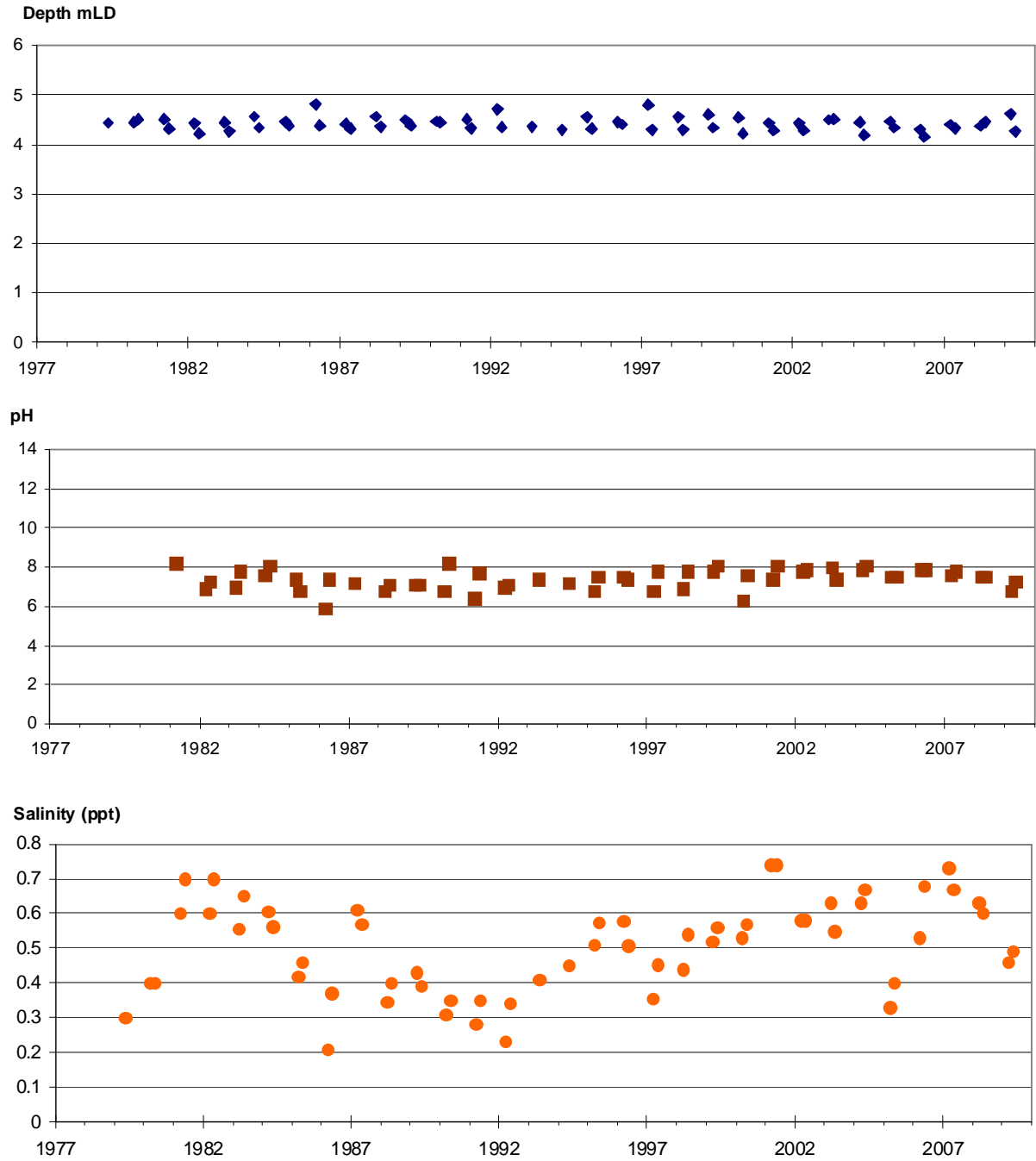


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Mettler is in the Albany District of the South Coast DEC Region

## MOATES (with Depth axis 0-6m)



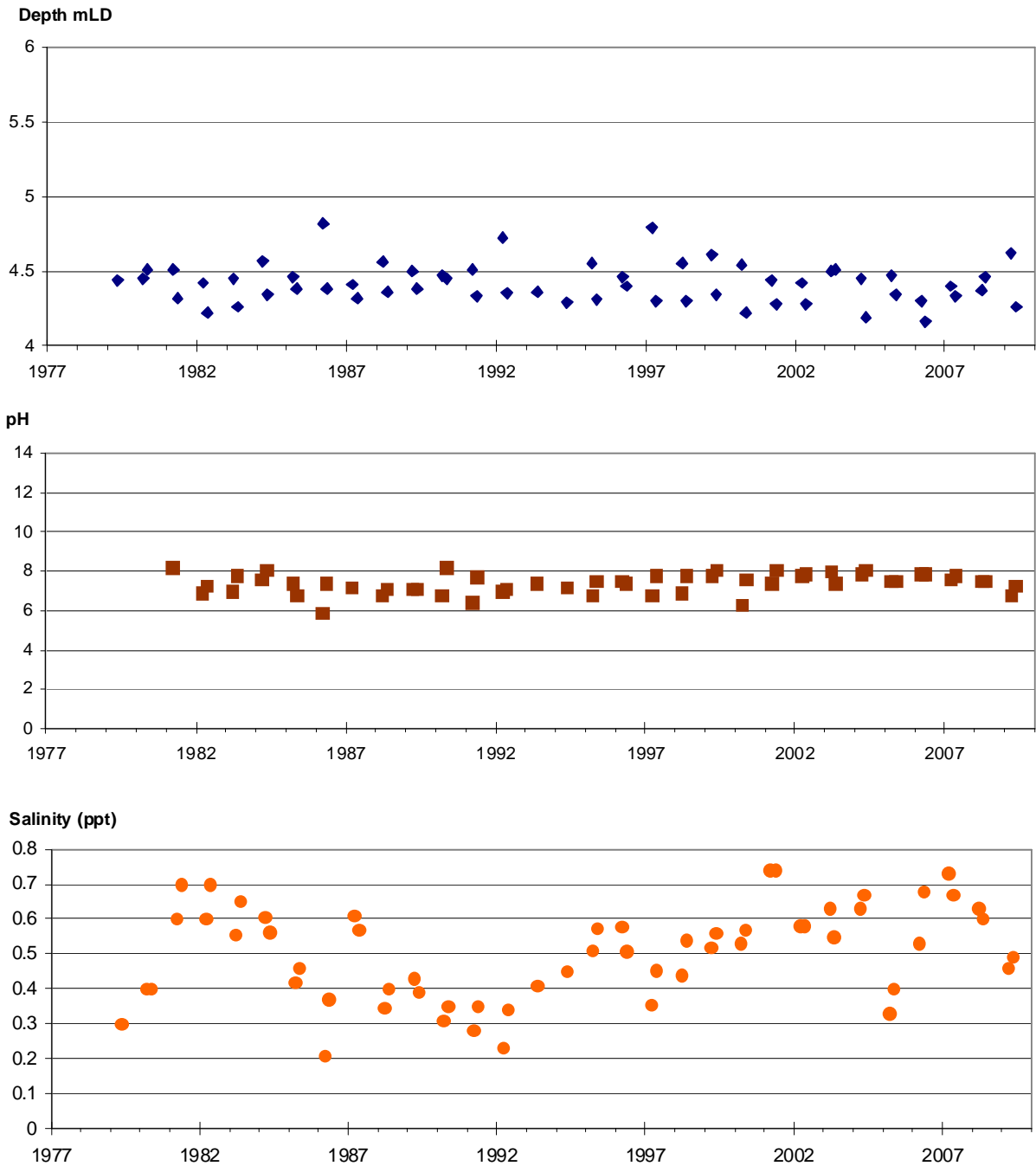
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Moates is a component of the 'Moates Lake System', which is listed in the 'Directory of Important Wetlands in Australia'.

Moates is in the Albany District of the South Coast DEC Region

## MOATES (with Depth axis 4-6m)



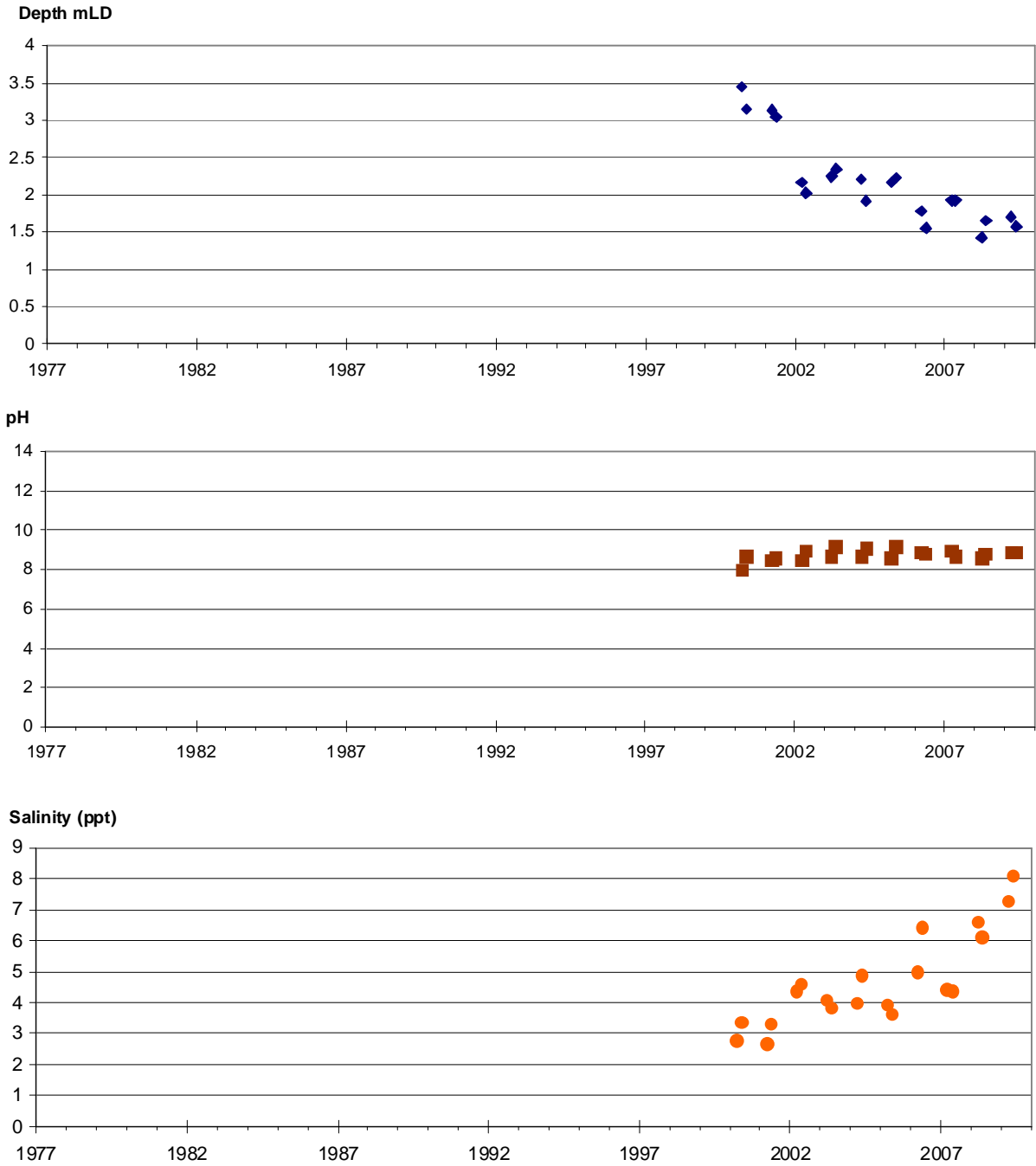
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Moates is a component of the 'Moates Lake System', which is listed in the 'Directory of Important Wetlands in Australia'.

Moates is in the Albany District of the South Coast DEC Region

# MORTIJINUP



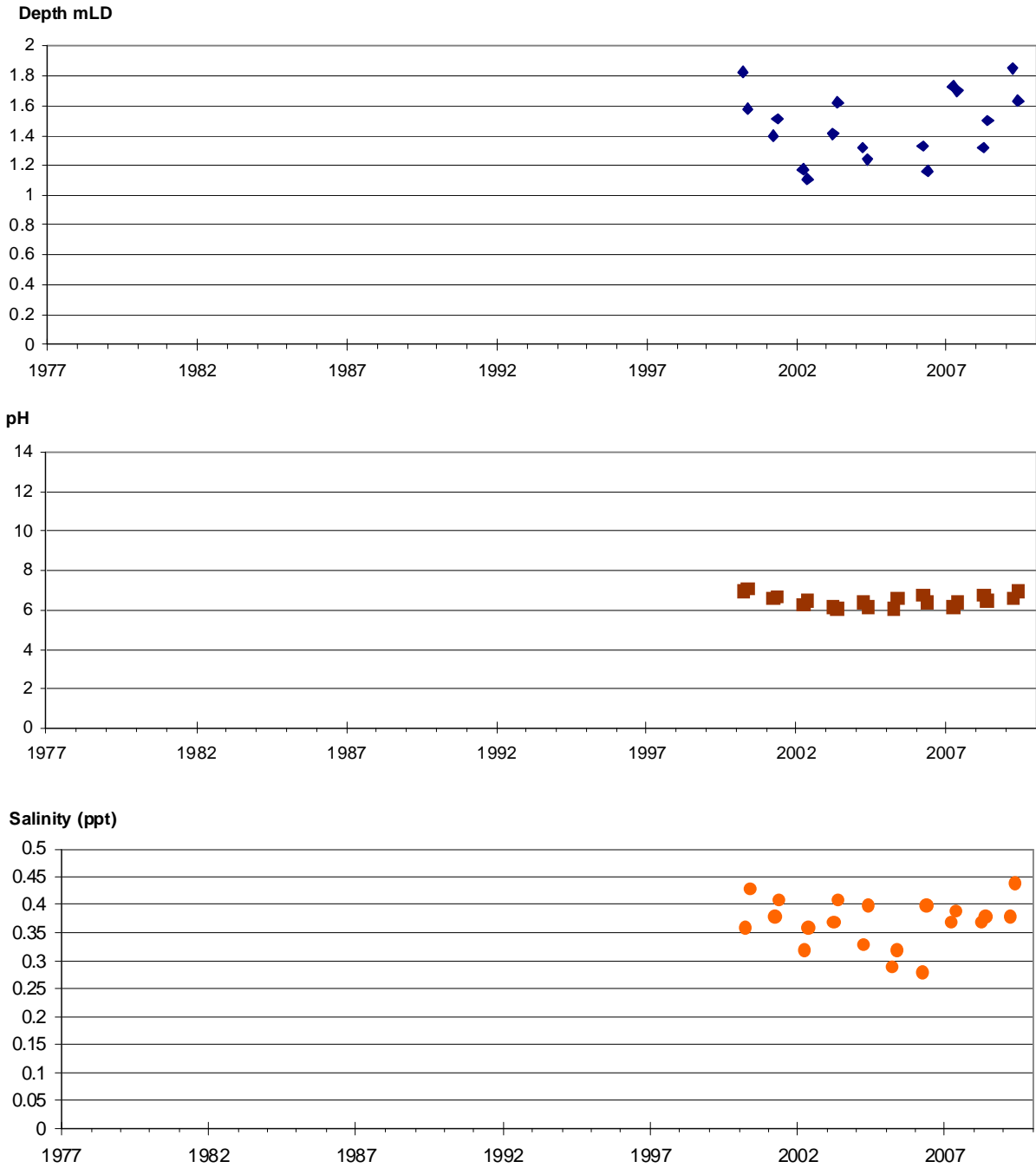
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Mortijinup is a component of the 'Mortijinup Lake System', which is listed in the 'Directory of Important Wetlands in Australia'.

Mortijinup is in the Esperance District of the South Coast DEC Region.

# MOUNT LE GRAND

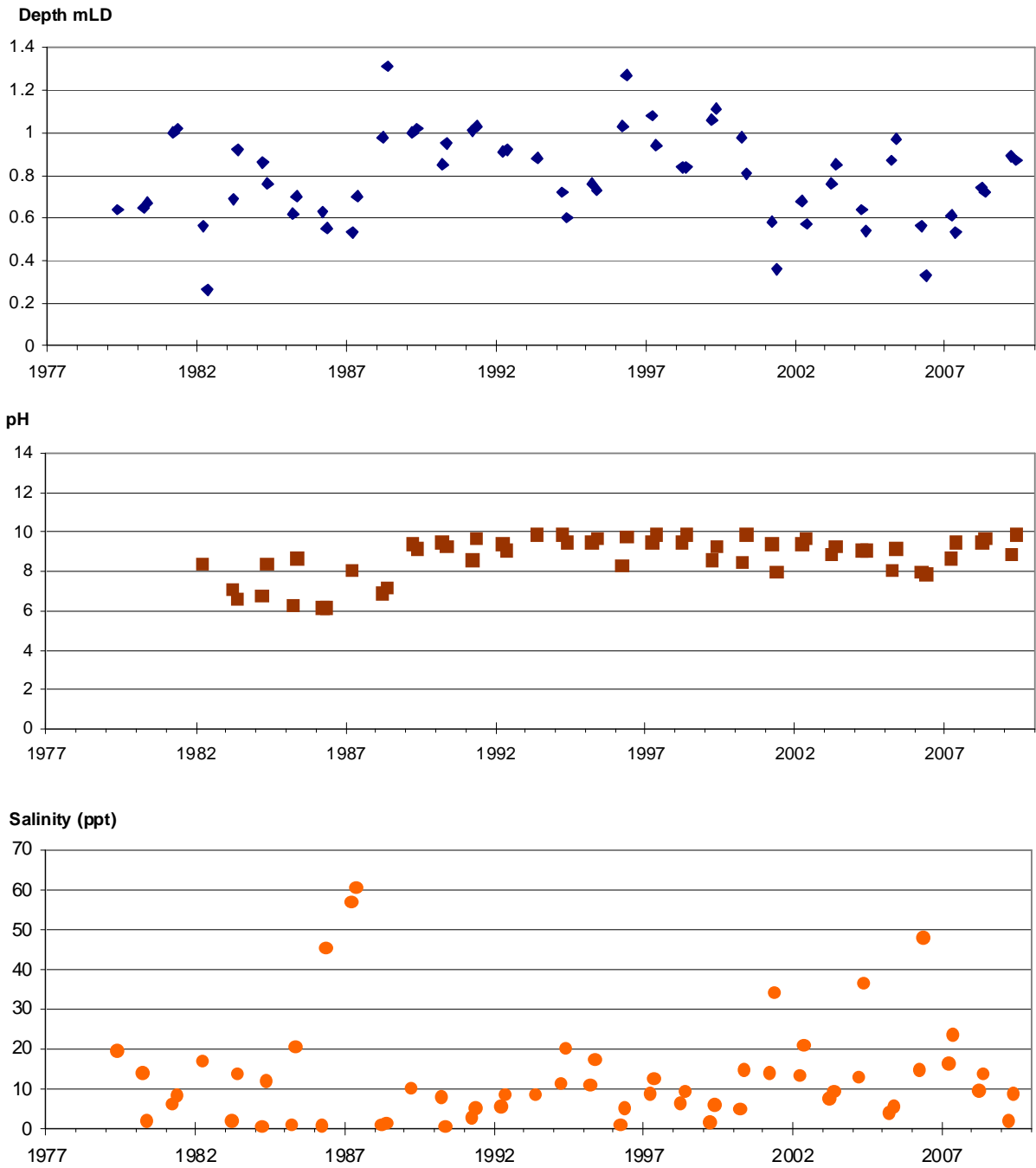


**Notes:**

- 1. Year labels are positioned at 1<sup>st</sup> July each year.
- 2. Data are from September and November routine monitoring periods only.

Mount Le Grand is in the Esperance District of the South Coast DEC Region.

# MUIR



**Notes:**

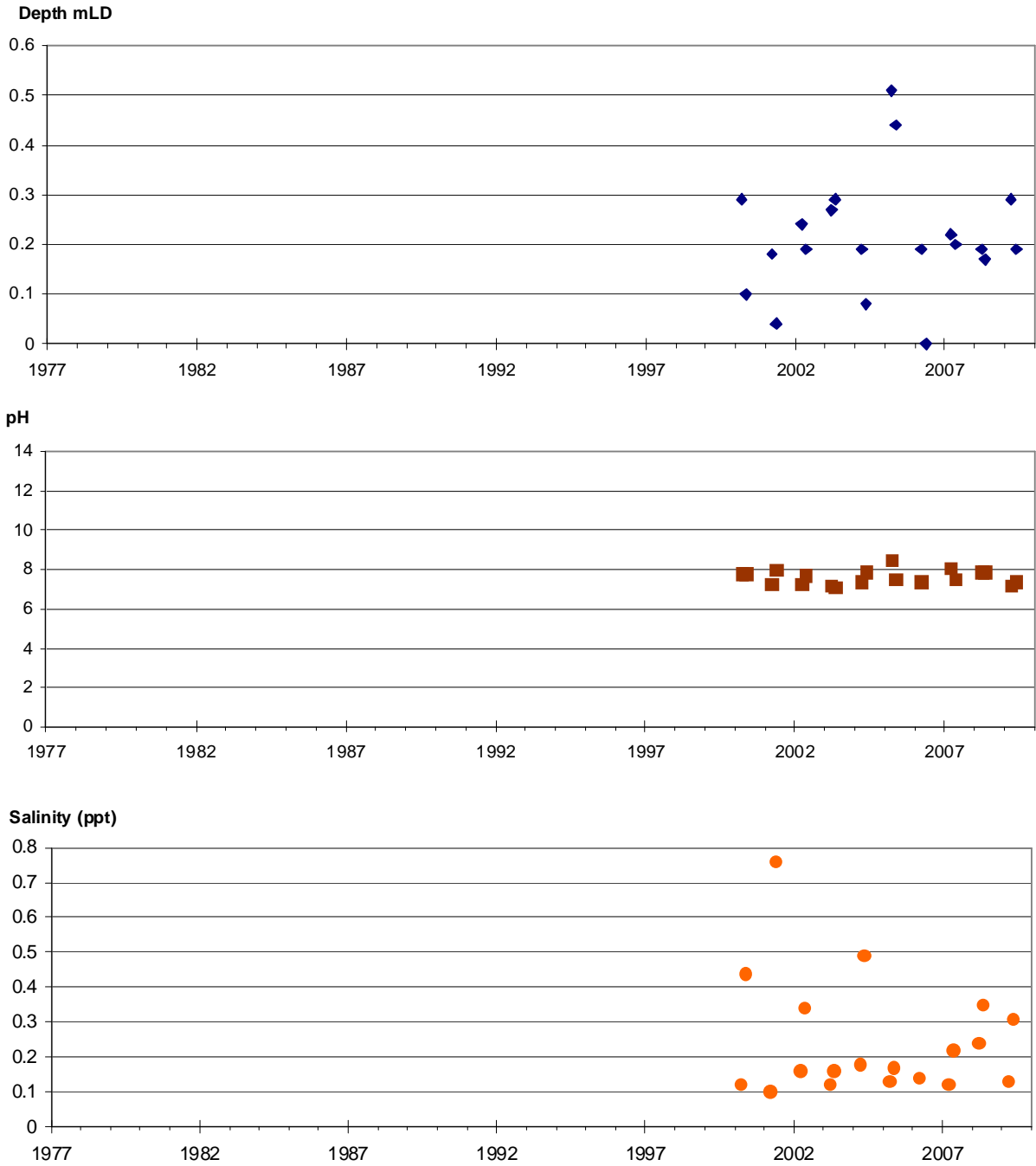
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Lake Muir is a component of the 'Muir-Byenup System', which is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands.

Lake Muir is also listed in the 'Directory of Important Wetlands in Australia'.

Muir is within the Muir-Unicup Natural Diversity Recovery Catchment and is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

# NGOPITCHUP



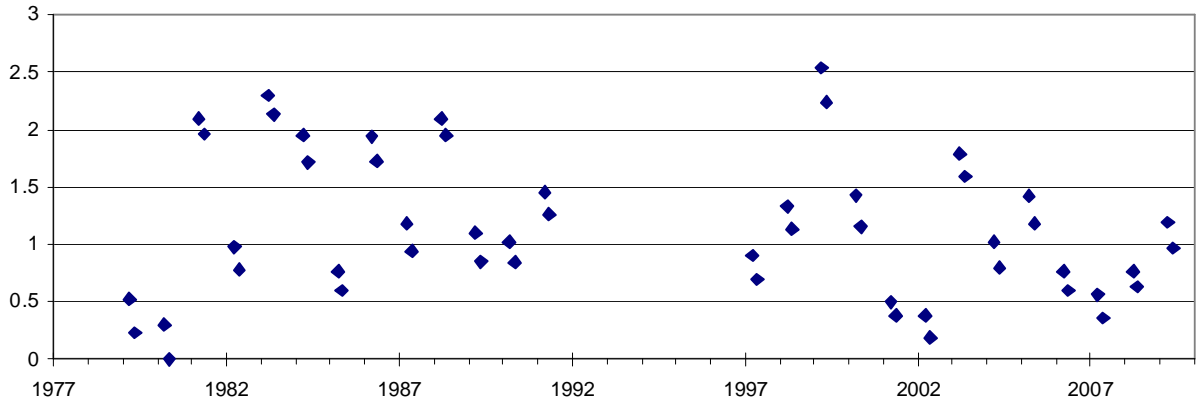
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

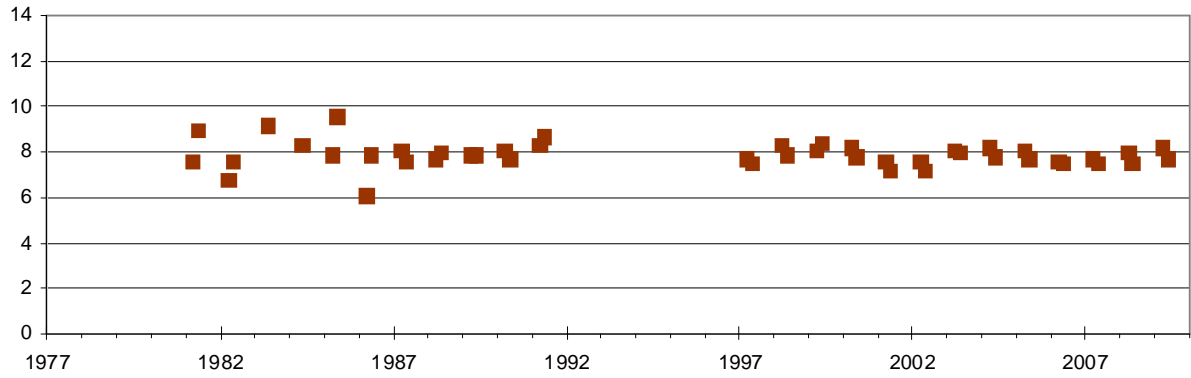
Ngopitchup is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# NINAN

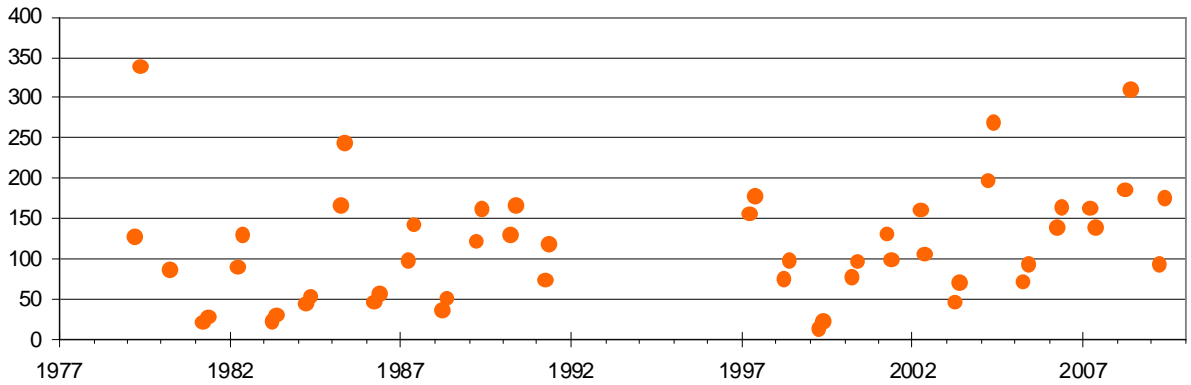
Depth mLD



pH



Salinity (ppt)



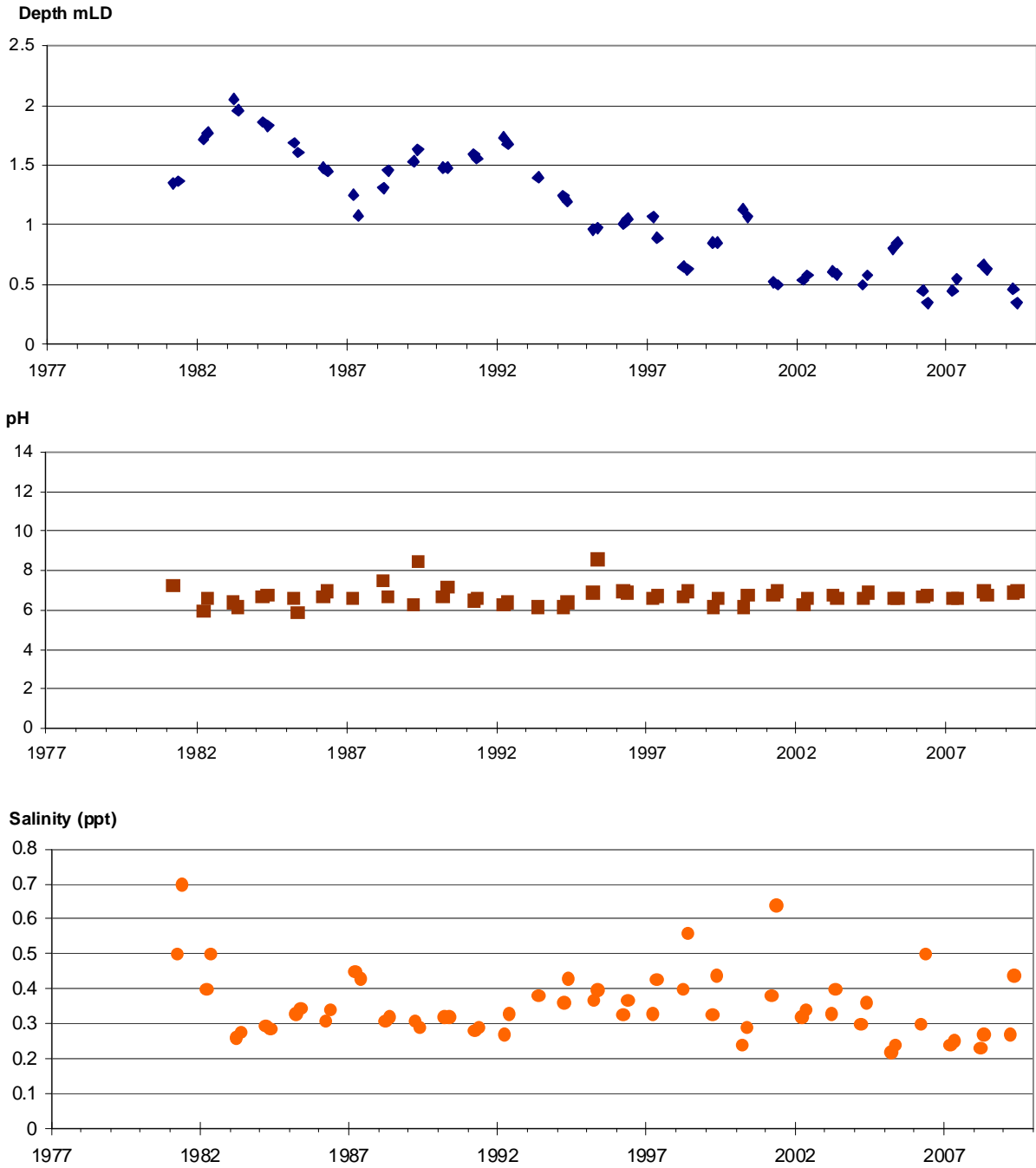
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Ninan is in the Central District (headquartered in Merredin) of the Wheatbelt DEC Region.



# NINE MILE

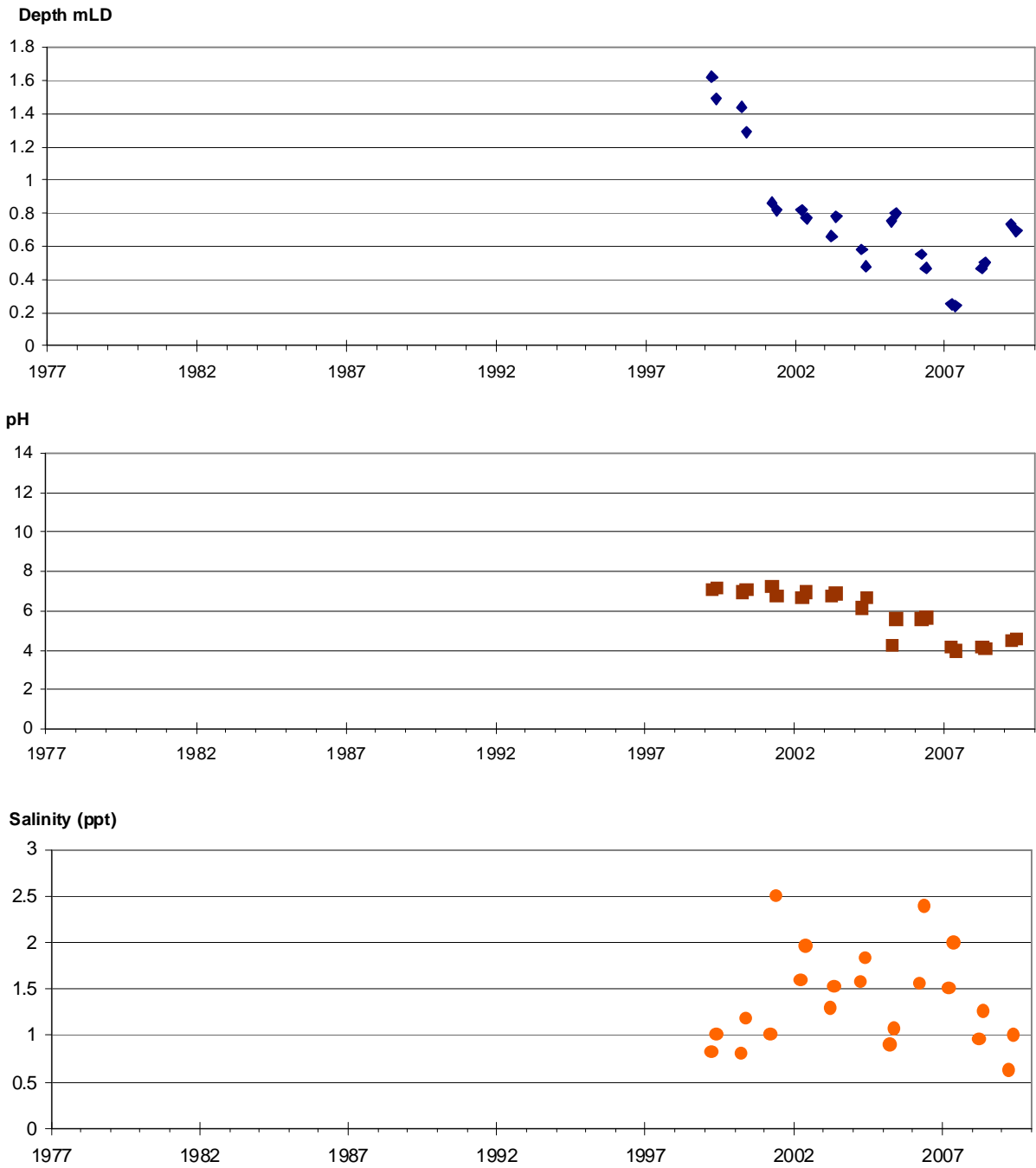


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Nine Mile is in the Swan Coastal District (headquartered in Wanneroo) of the Swan DEC Region.

## NOOBIJUP<sup>IM</sup>



**Notes:**

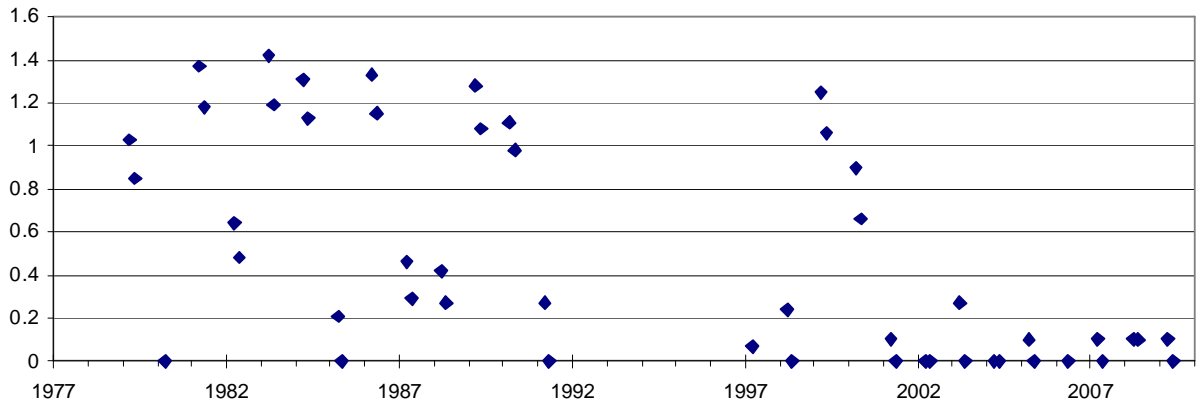
1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Noobijup is a component of the 'Byenup Lagoon System', which is listed in the 'Directory of Important Wetlands in Australia'.

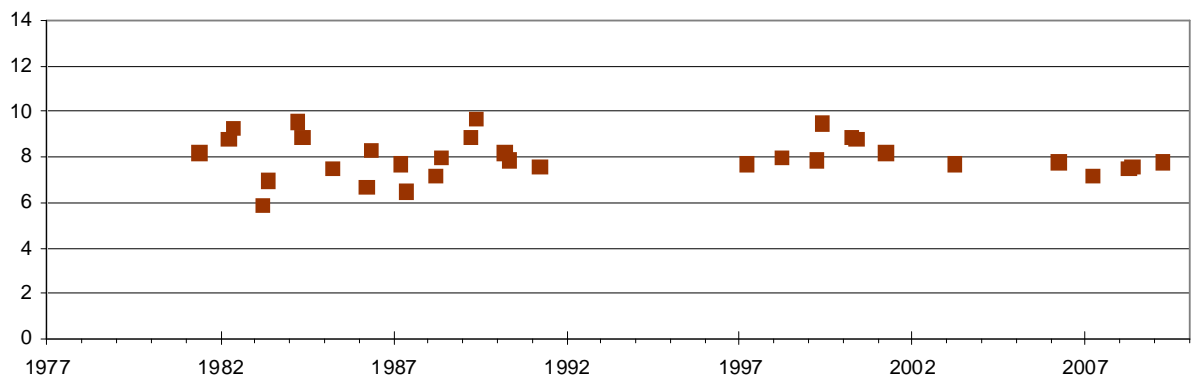
Noobijup is within the Muir-Unicup Natural Diversity Recovery Catchment and is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

# NOONYING

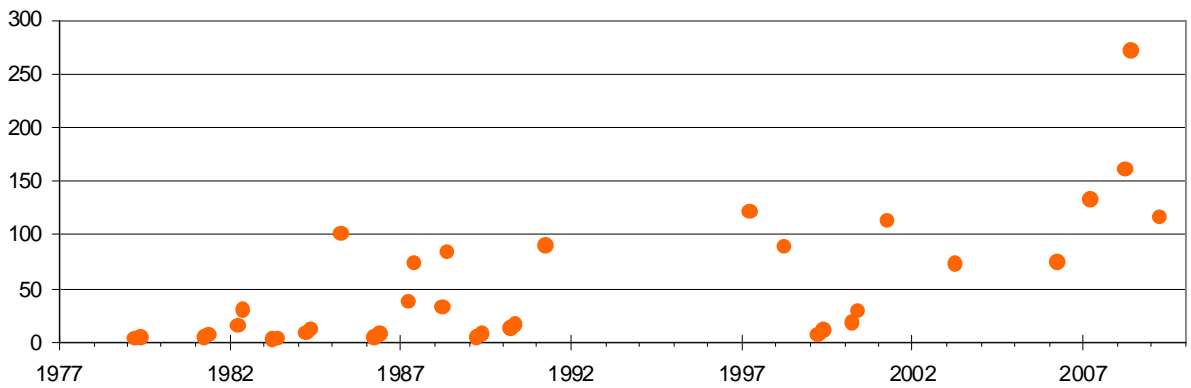
Depth mLD



pH



Salinity (ppt)

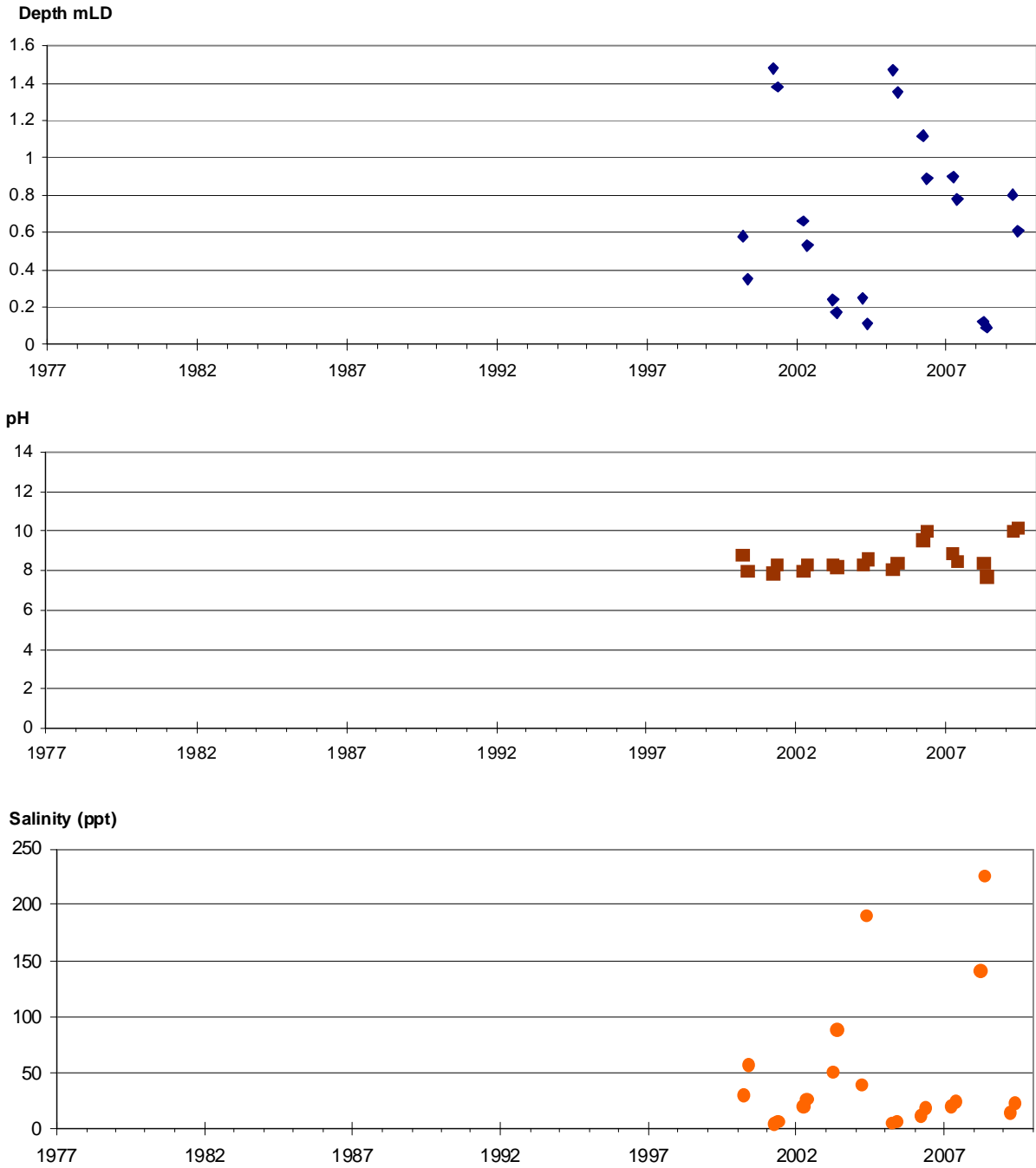


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Noonying is in the Central District (headquartered in Merredin) of the Wheatbelt DEC Region.

# NORTH PARRIUP



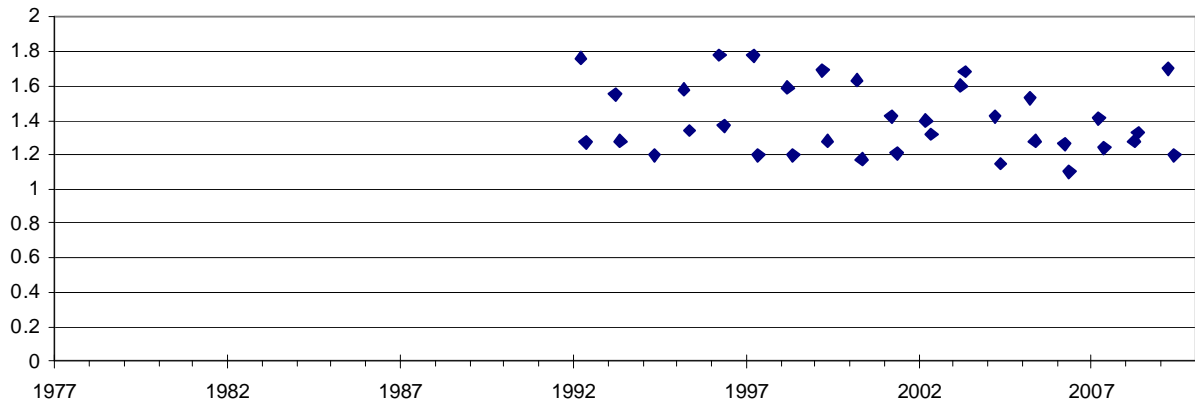
**Notes:**

- 1. Year labels are positioned at 1<sup>st</sup> July each year.
- 2. Data are from September and November routine monitoring periods only.

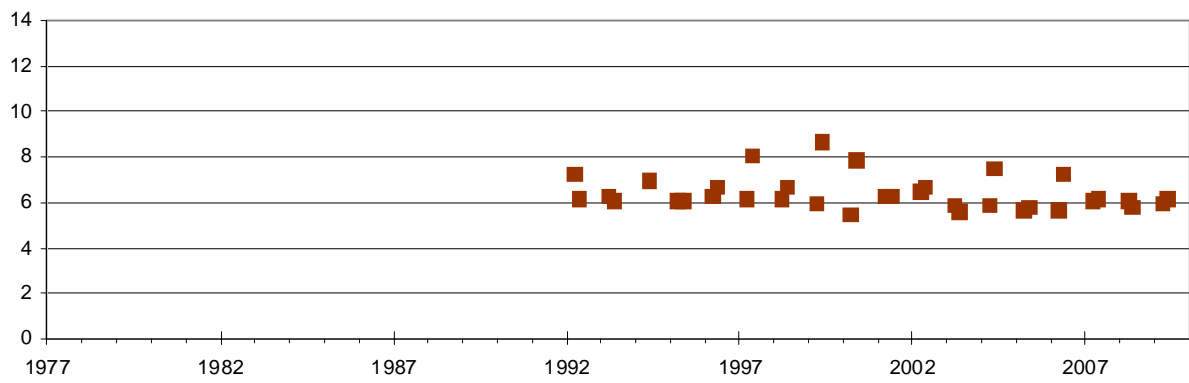
North Parriup is in the Esperance District of the South Coast DEC Region.

# OWINGUP

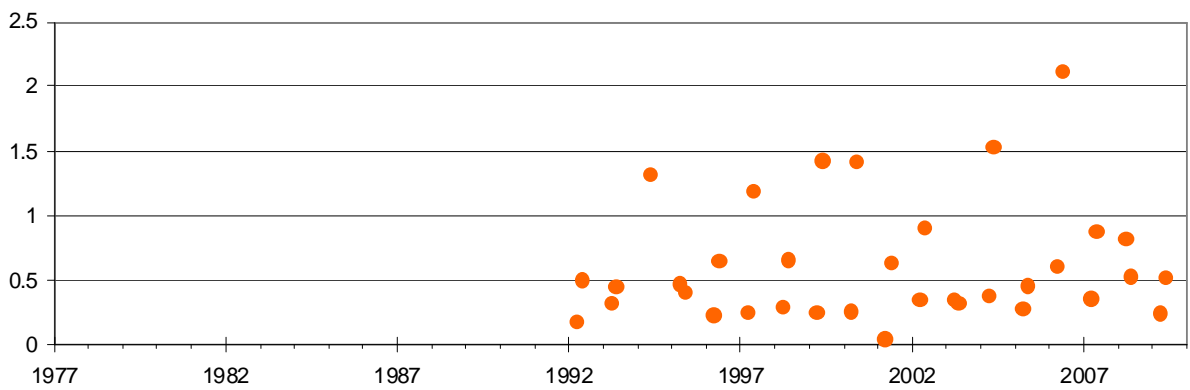
Depth mLD



pH



Salinity (ppt)



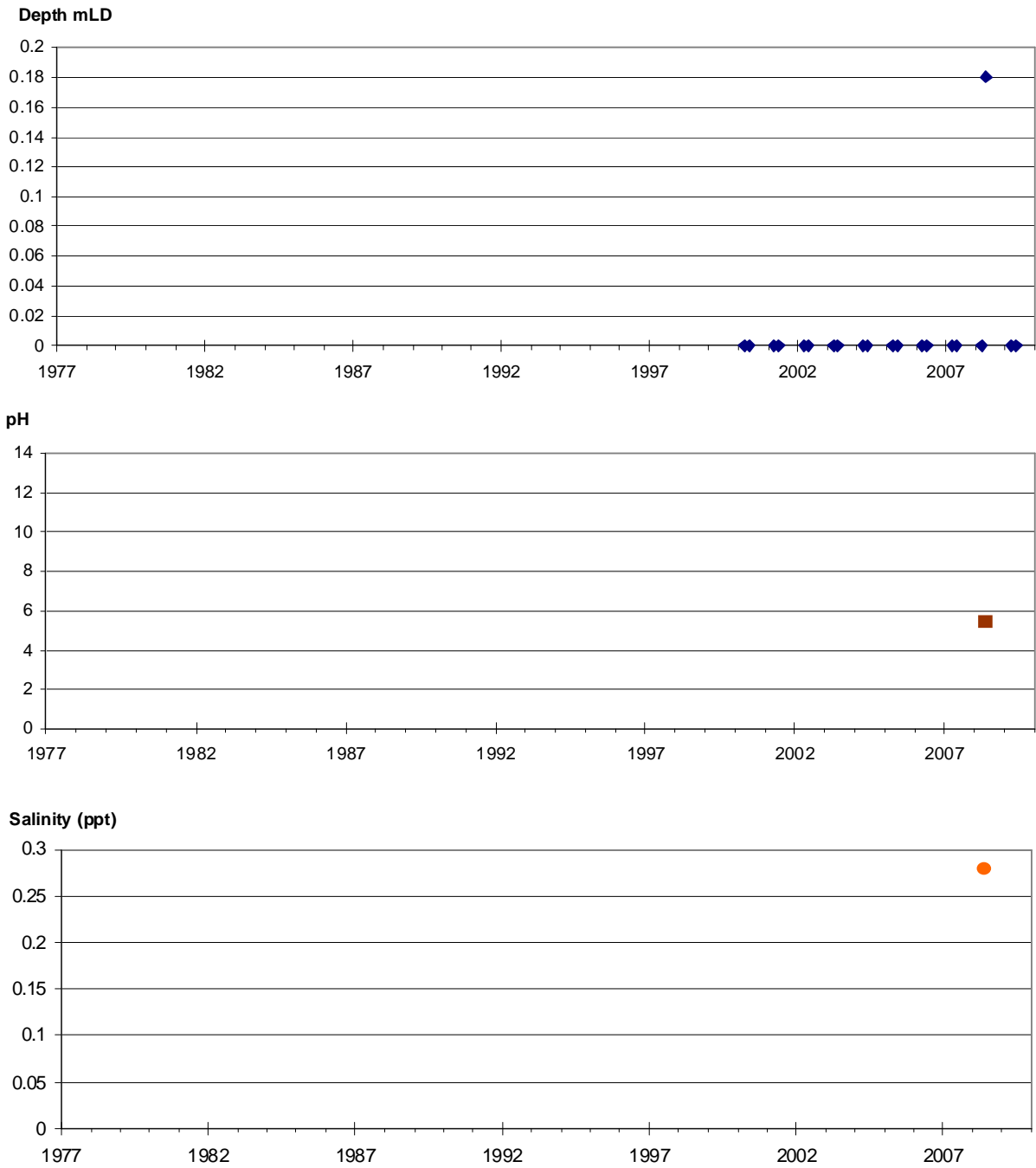
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Owingup is a component of the 'Owingup Swamp System', which is listed in the 'Directory of Important Wetlands in Australia'.

Owingup is in the Frankland District (headquartered in Walpole) of the Warren DEC Region.

## PABELUP SOUTH

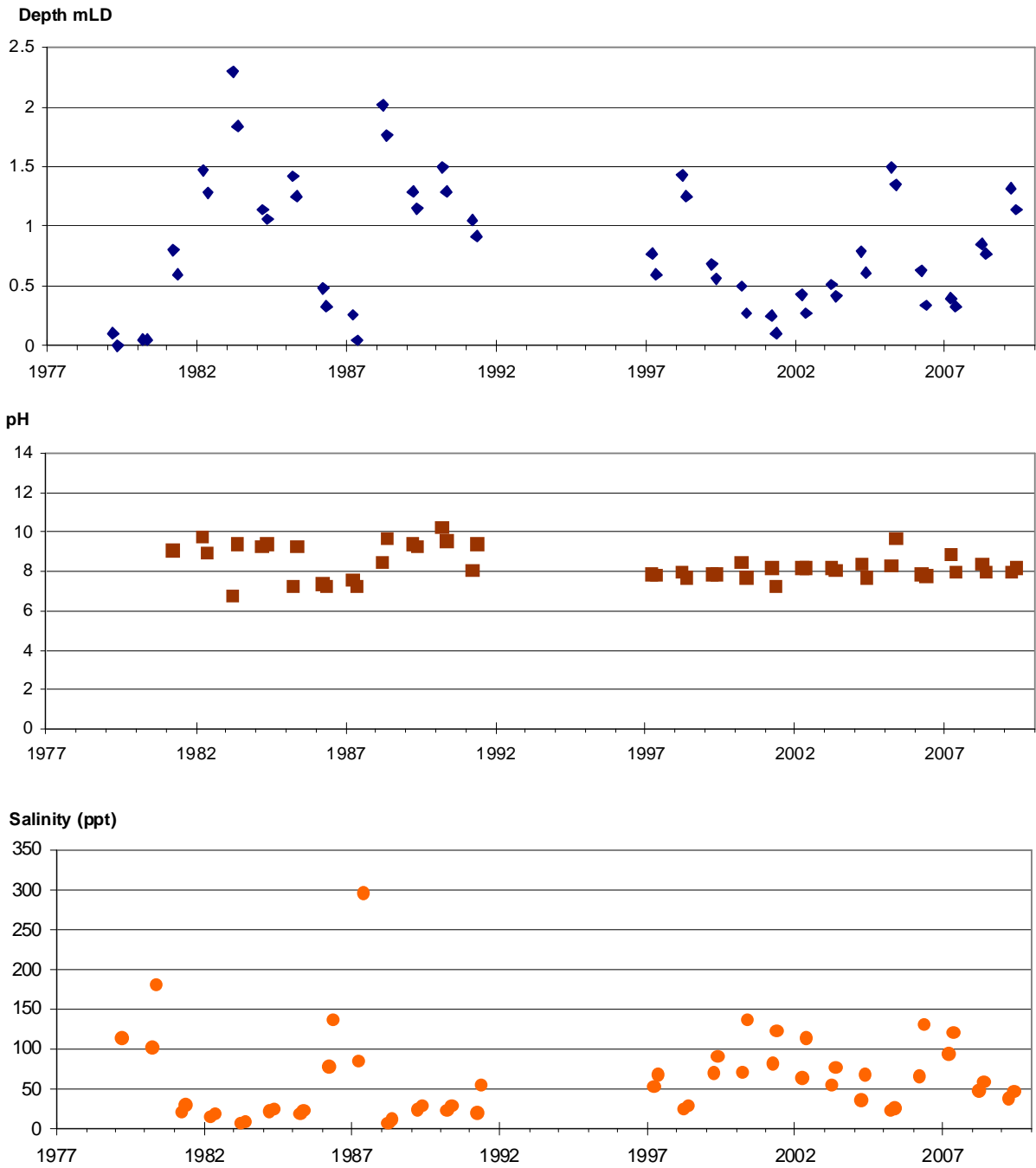


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Pabelup South is in the Albany District of the South Coast DEC Region

## PARKEYERRING<sup>IM</sup>

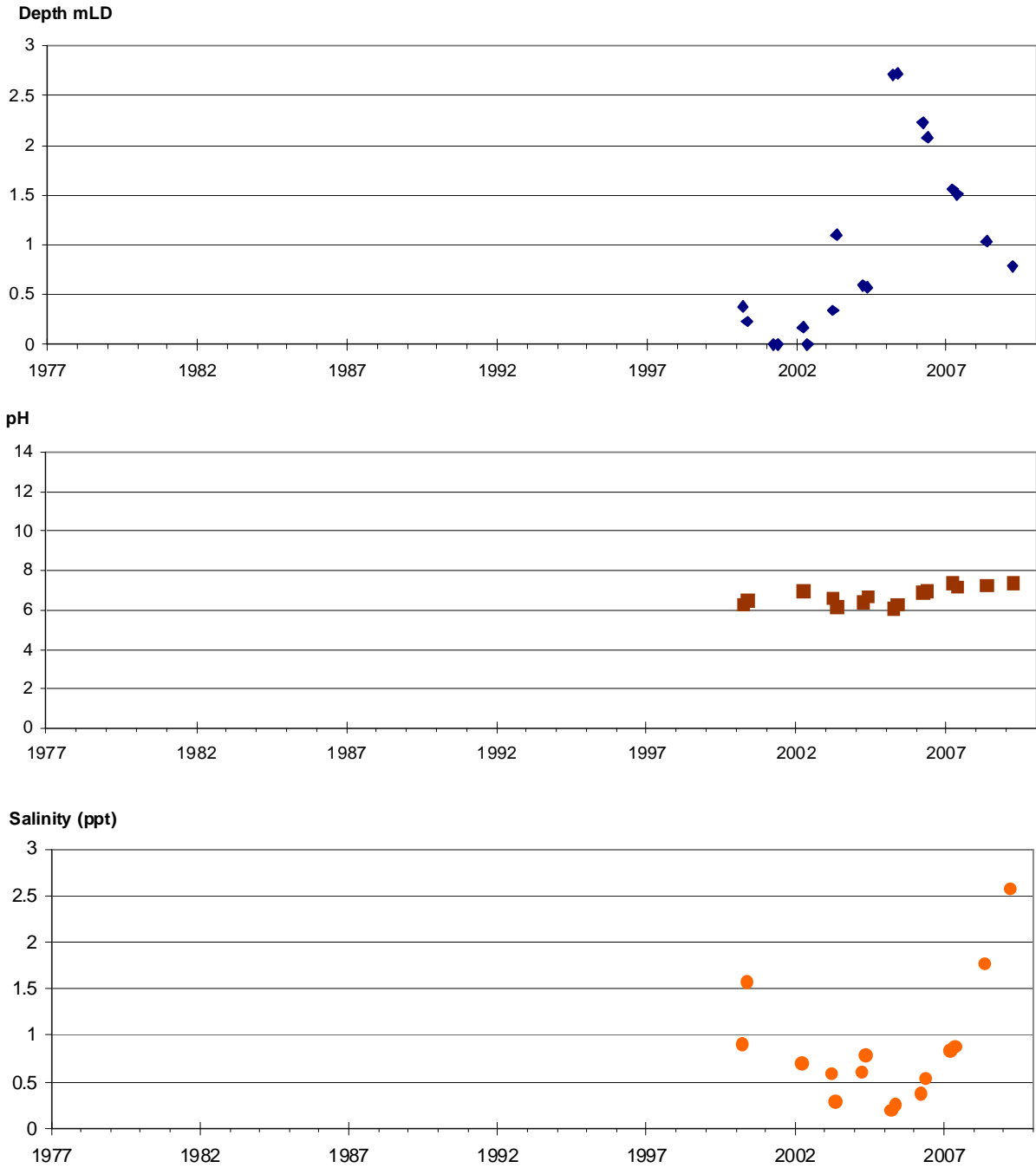


**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Parkeyerring is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# PILLENORUP



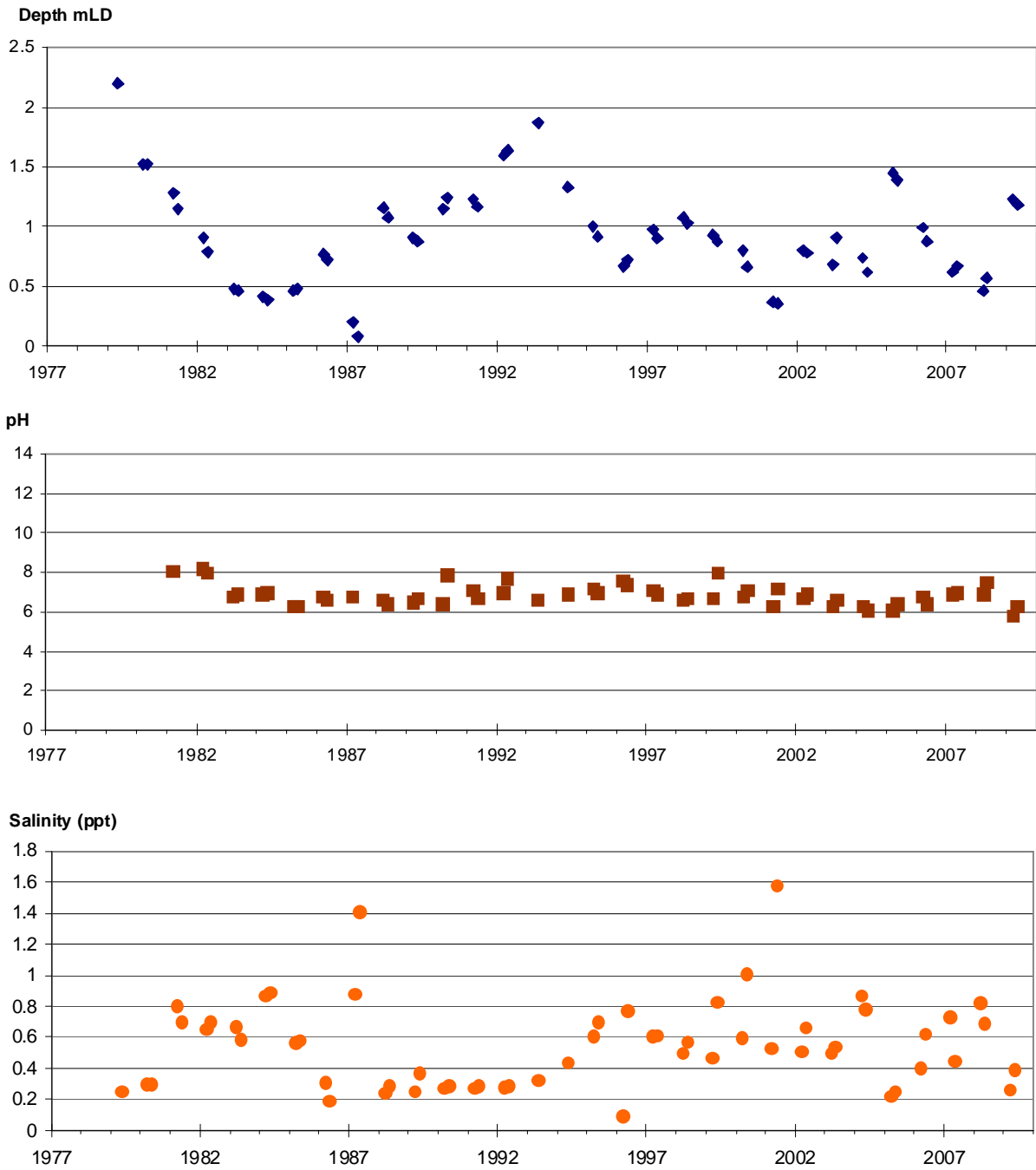
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Pilleonorup is in the Albany District of the South Coast DEC Region



## PLEASANT VIEW <sup>IM</sup>



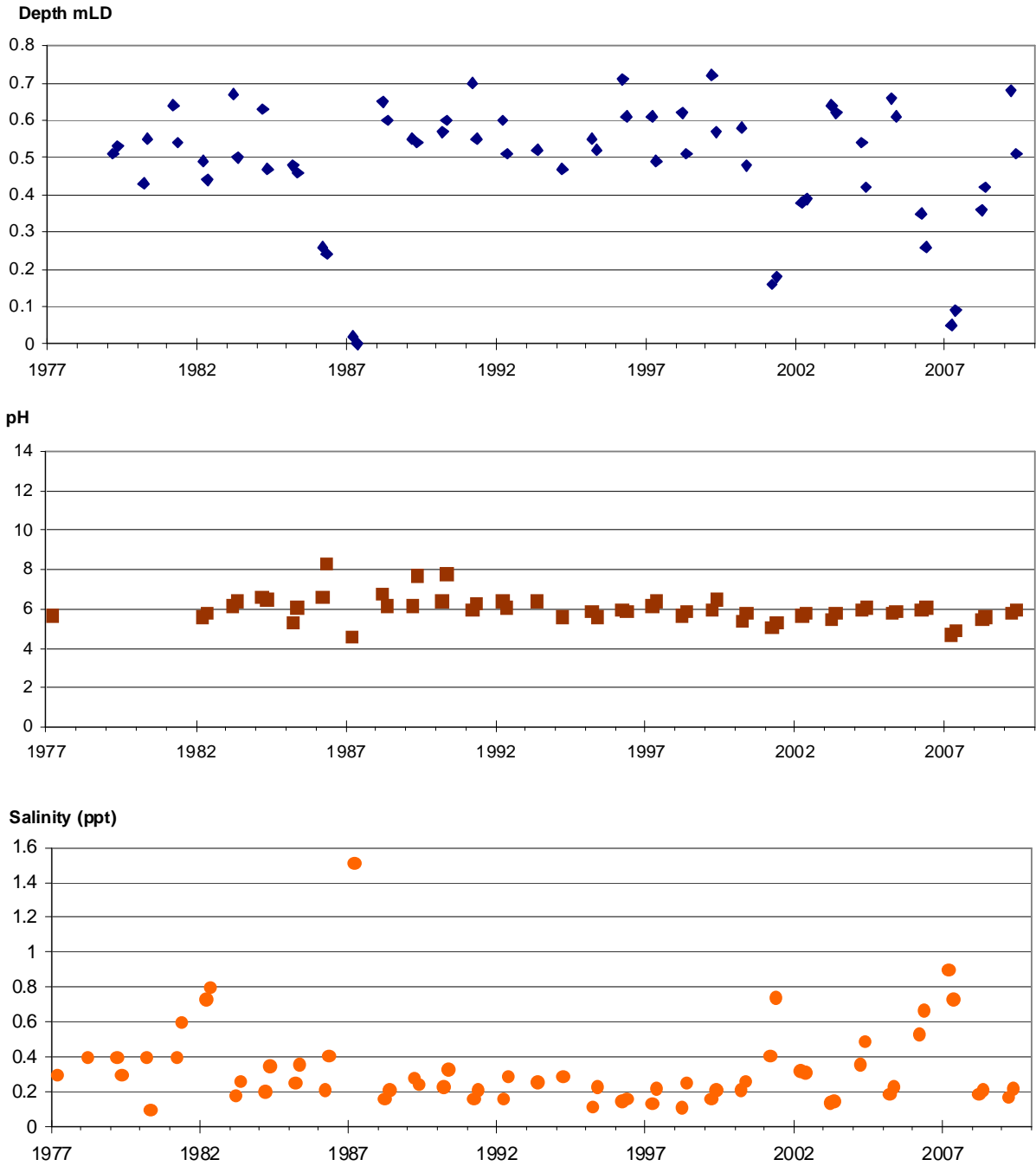
**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Pleasant View is a component of the 'Lake Pleasant View System', which is listed in the 'Directory of Important Wetlands in Australia'.

Pleasant View is in the Albany District of the South Coast DEC Region

## POORGINUP



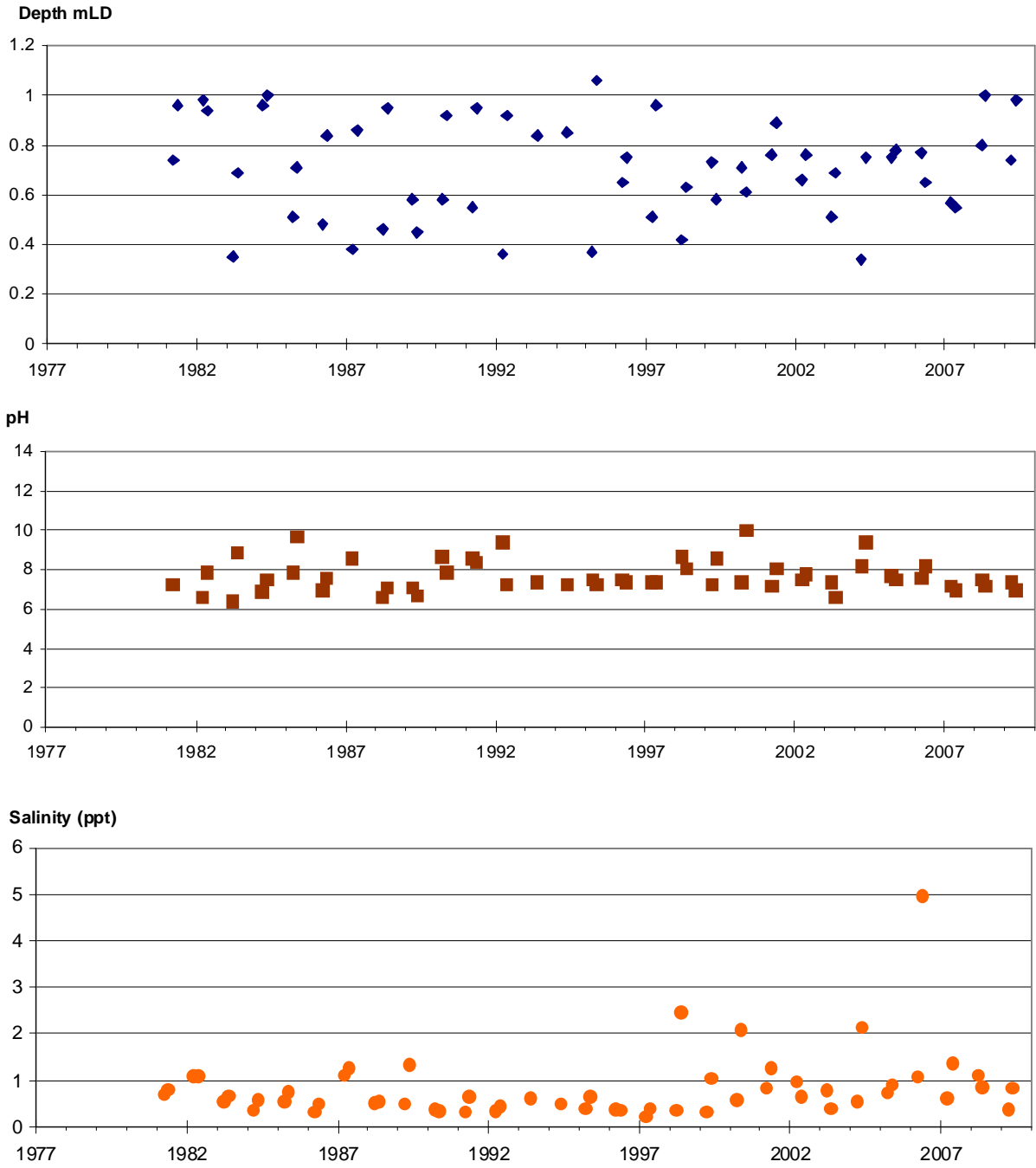
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Poorginup is a component of the 'Muir-Byenup System', which is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands, and is also a component of the 'Byenup Lagoon System', which is listed in the 'Directory of Important Wetlands in Australia'.

Poorginup is within the Muir-Unicup Natural Diversity Recovery Catchment and is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

# POWELL

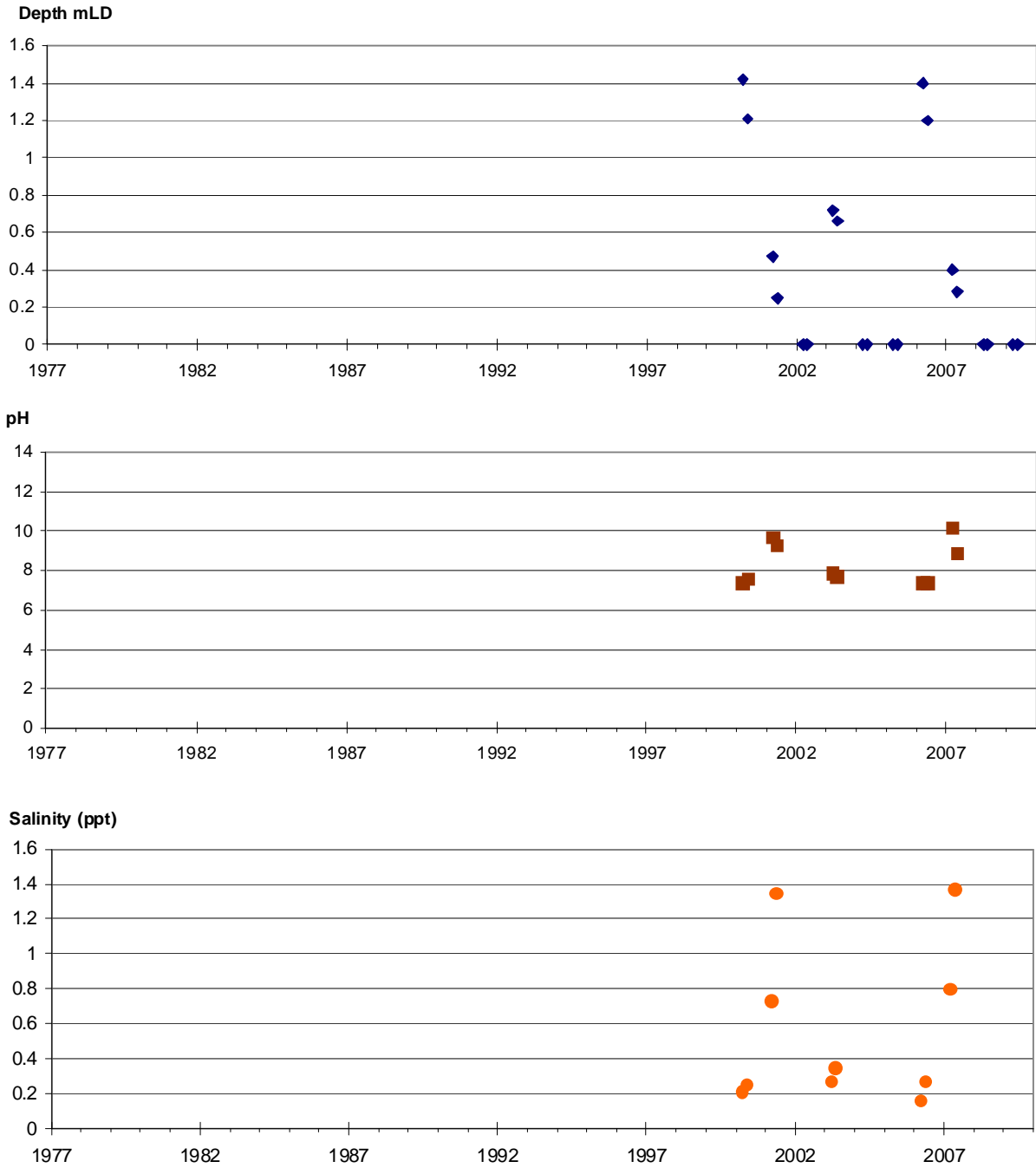


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Powell is in the Albany District of the South Coast DEC Region

## RANGE ROAD YATE

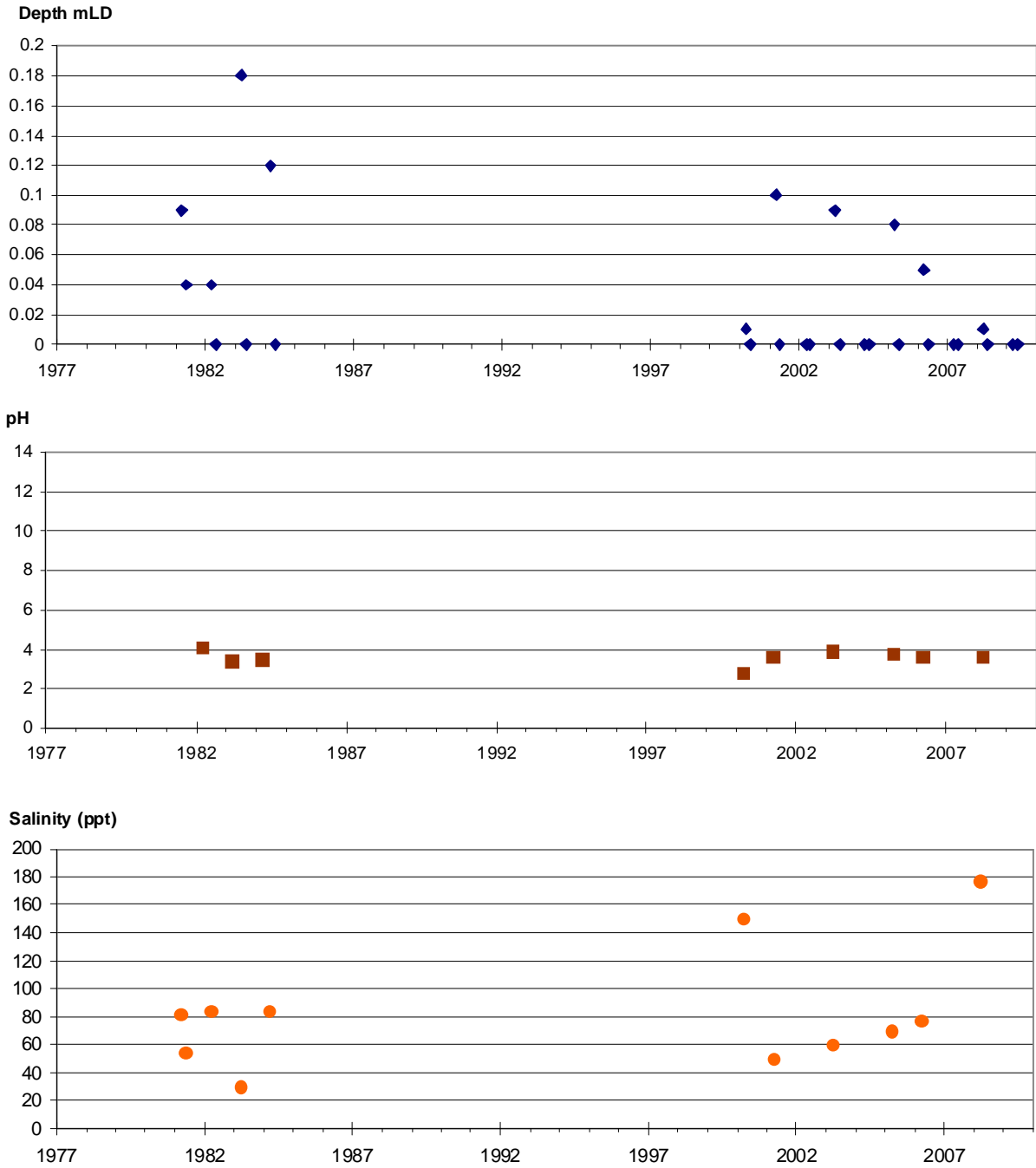


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Range Road Yate is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## RED (BRUCE ROCK)

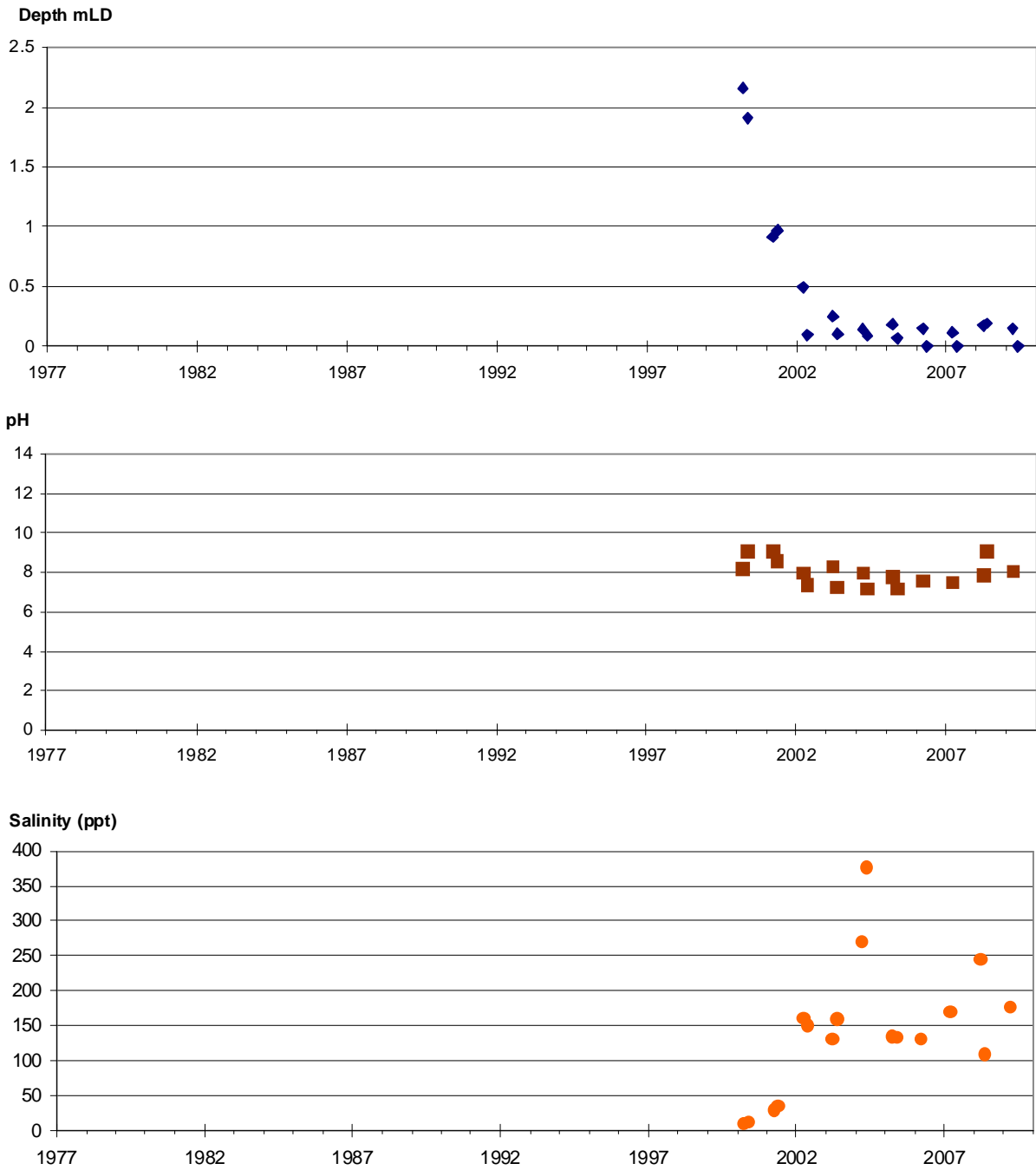


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Red (Bruce Rock) is in the Central District (headquartered in Merredin) of the Wheatbelt DEC Region.

# RONNERUP<sup>IM</sup>

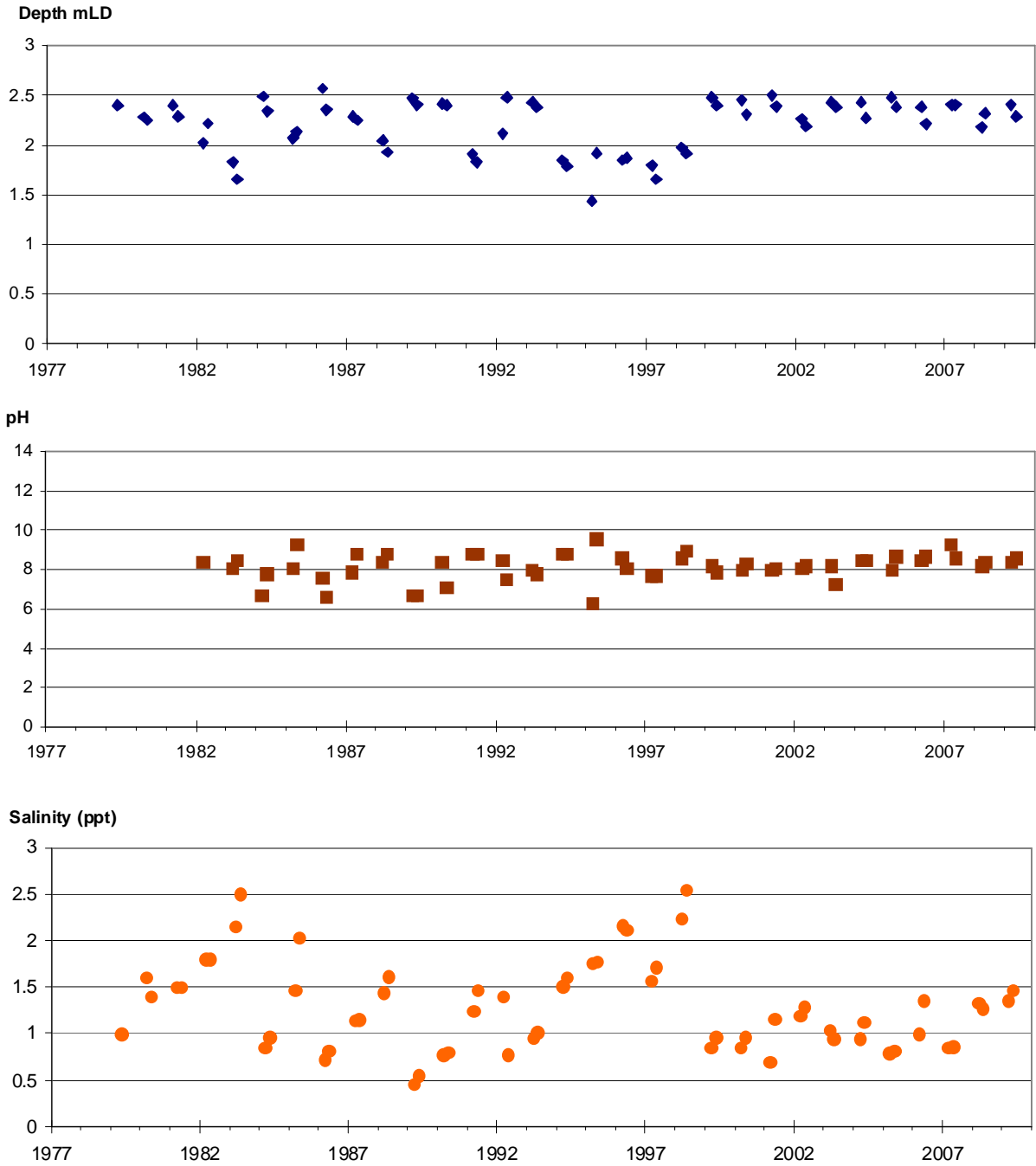


**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Ronnerup is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# SHARK



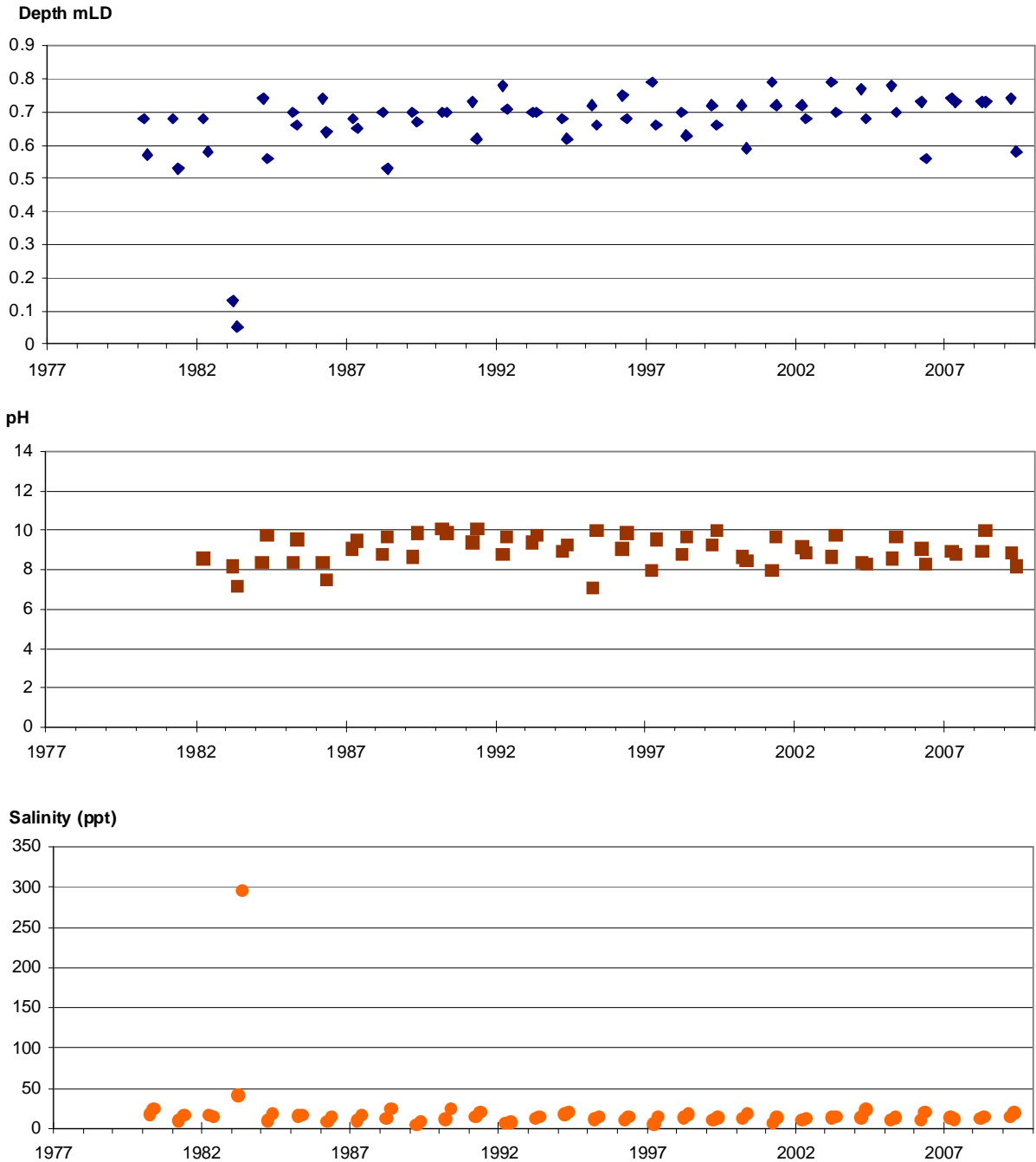
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Shark is within the Esperance Lakes Natural Diversity Recovery Catchment.

Shark is in the Esperance District of the South Coast DEC Region.

## STATION



**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

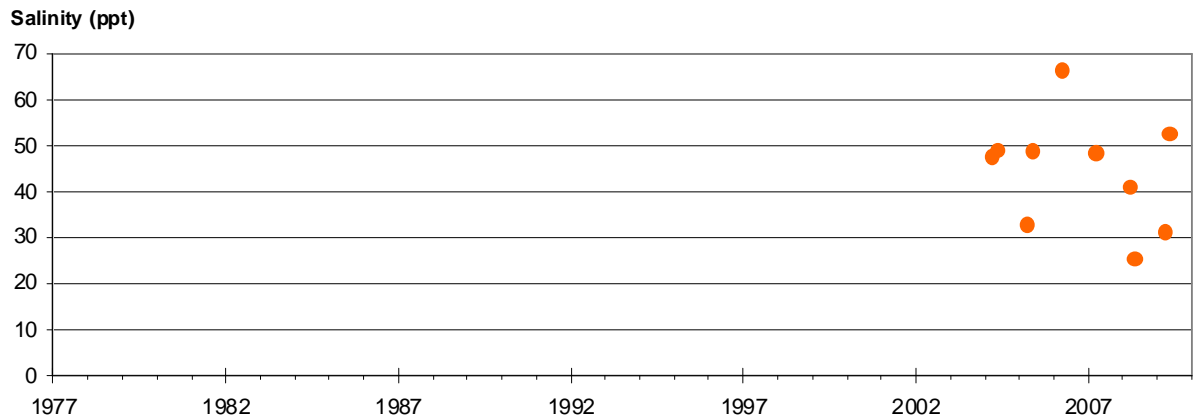
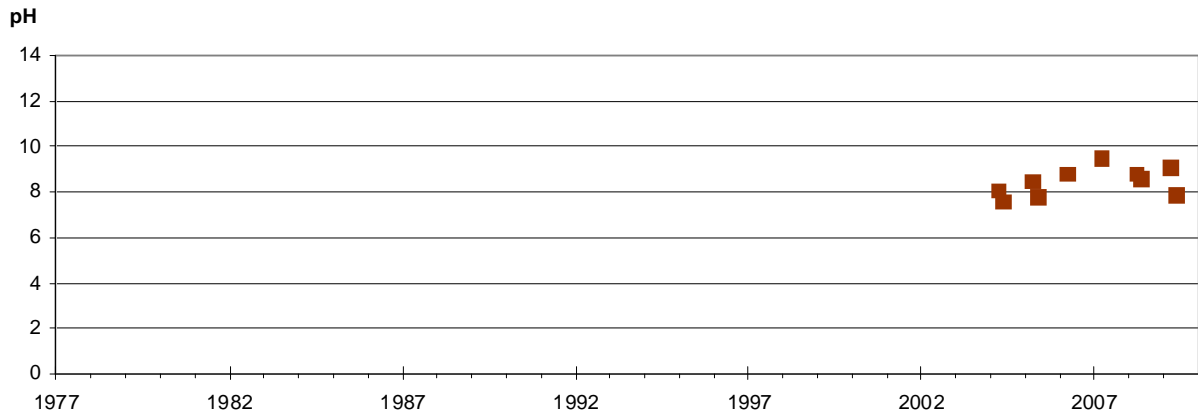
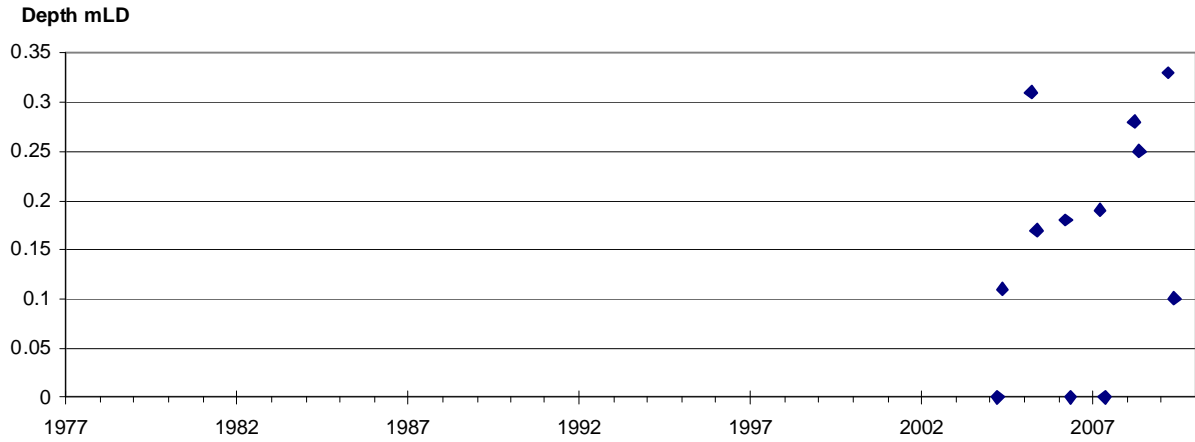
Station is a component of the 'Lake Warden System', which is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands.

Station is also a component of the 'Lake Warden System' listed in the 'Directory of Important Wetlands in Australia'.

Station is within the Esperance Lakes Natural Diversity Recovery Catchment and is in the Esperance District of the South Coast DEC Region.



## TAARBLIN (NORTH)



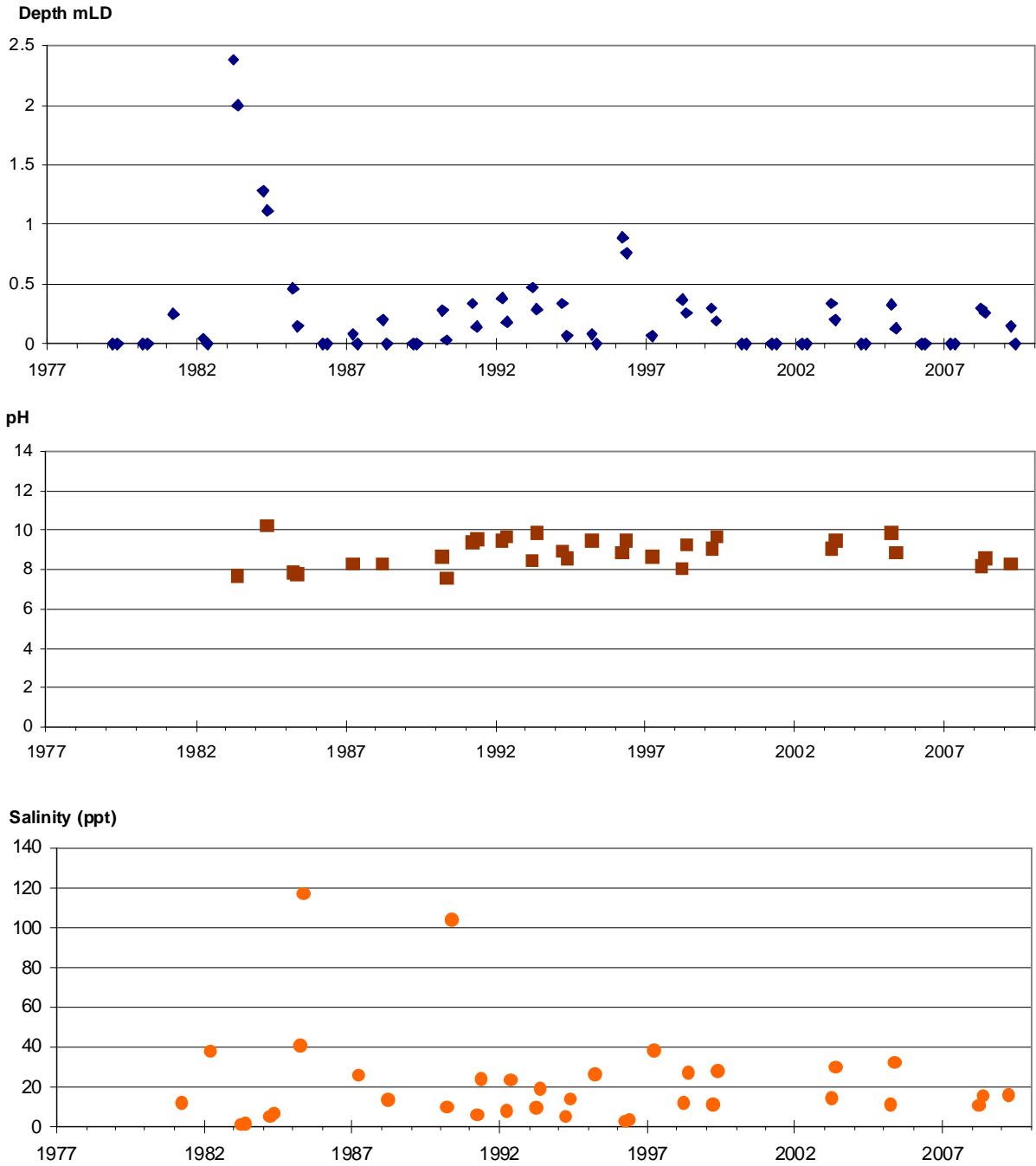
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Taarblin (North) is a short distance downstream from, and receives pumped, bypassed and potentially overflow water from, the Toolibin Lake Natural Diversity Recovery Catchment.

Taarblin (North) is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## TAARBLIN (SOUTH)

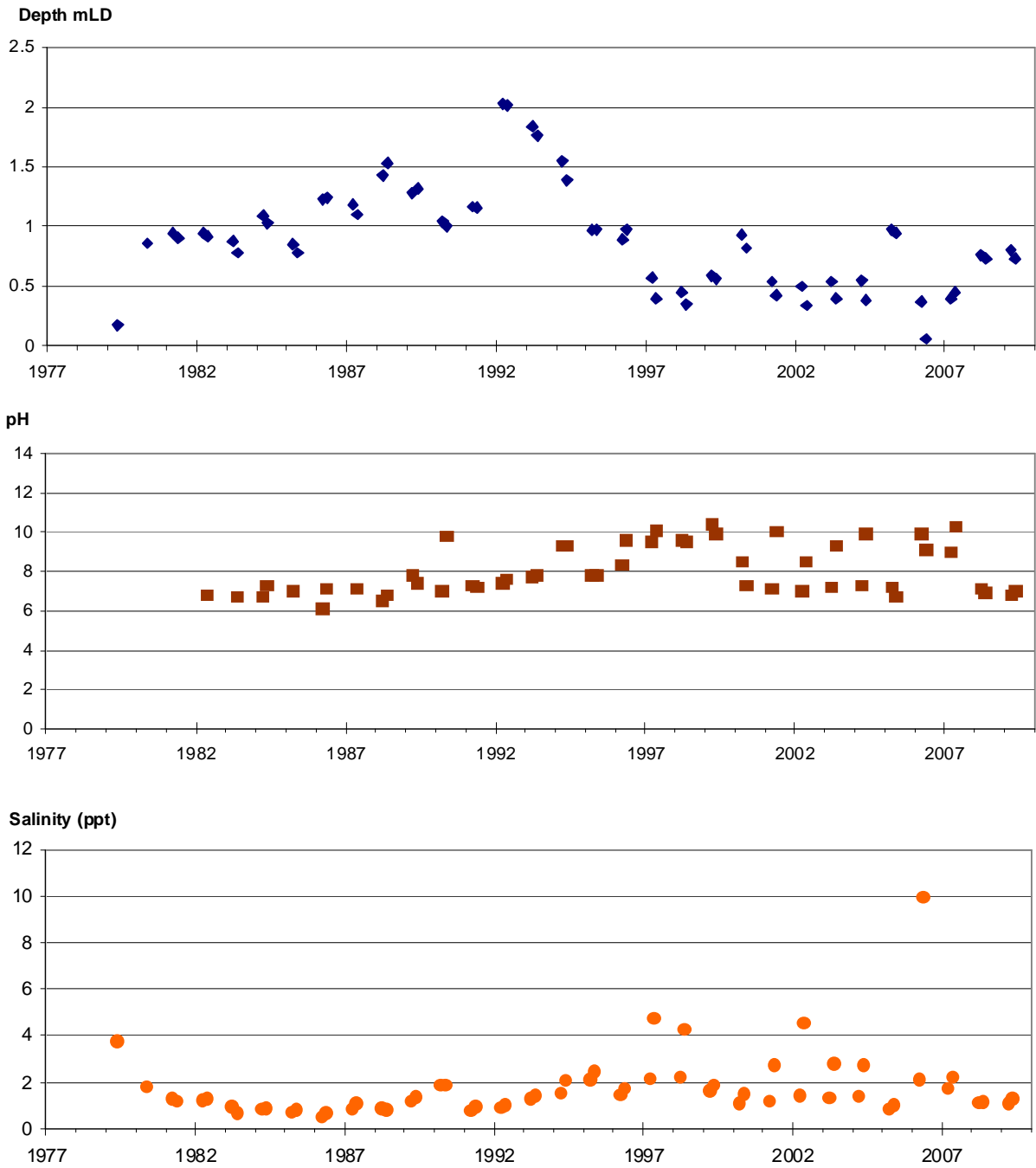


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Taarblin (South) is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## THOMSONS



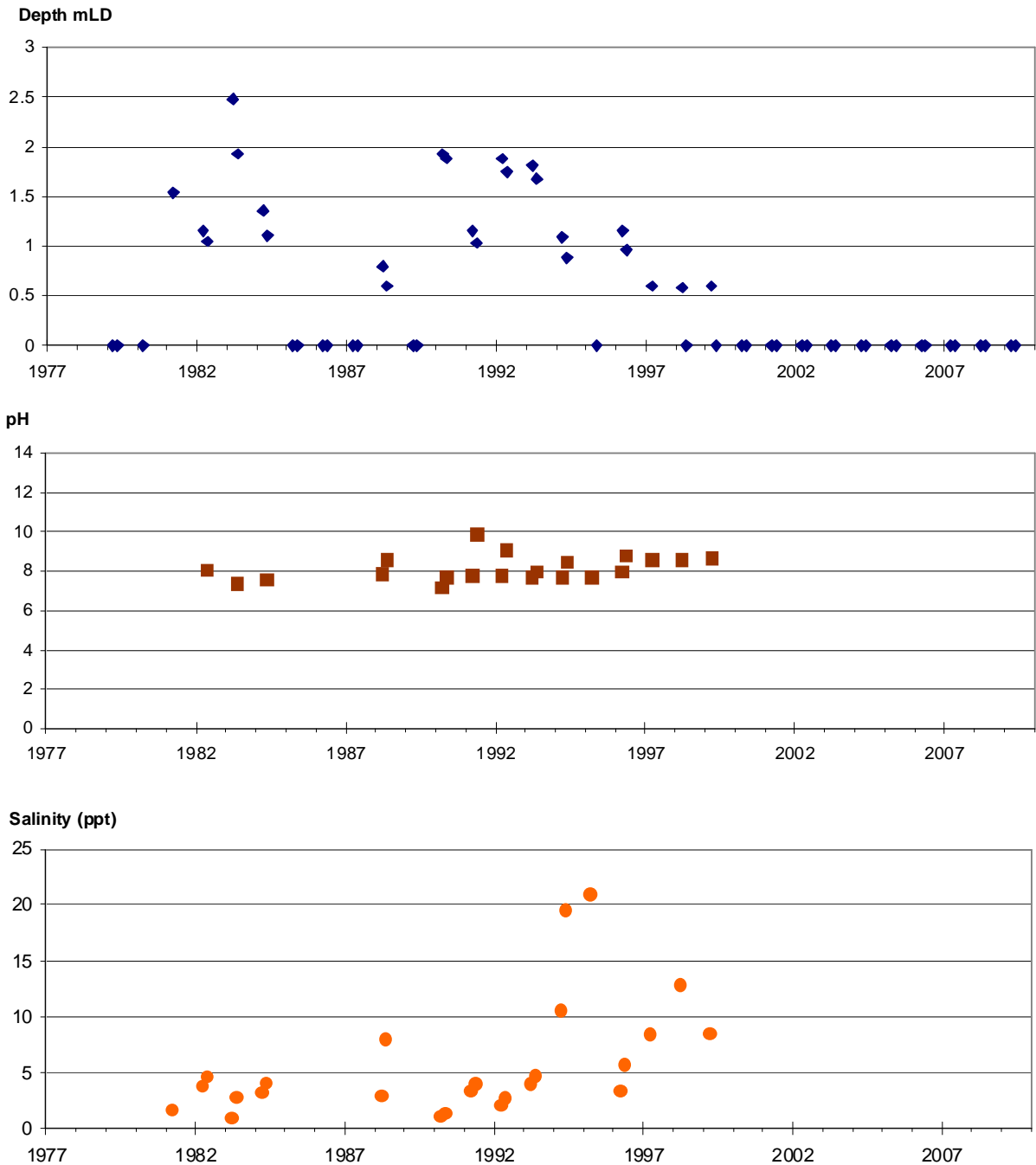
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Thomsons Lake is a component of the 'Forrestdale and Thomsons Lakes' system, which is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands, and is also listed in the 'Directory of Important Wetlands in Australia'.

Thomsons is in the Swan Coastal District (headquartered in Wanneroo) of the Swan DEC Region.

# TOOLIBIN<sup>IM</sup>



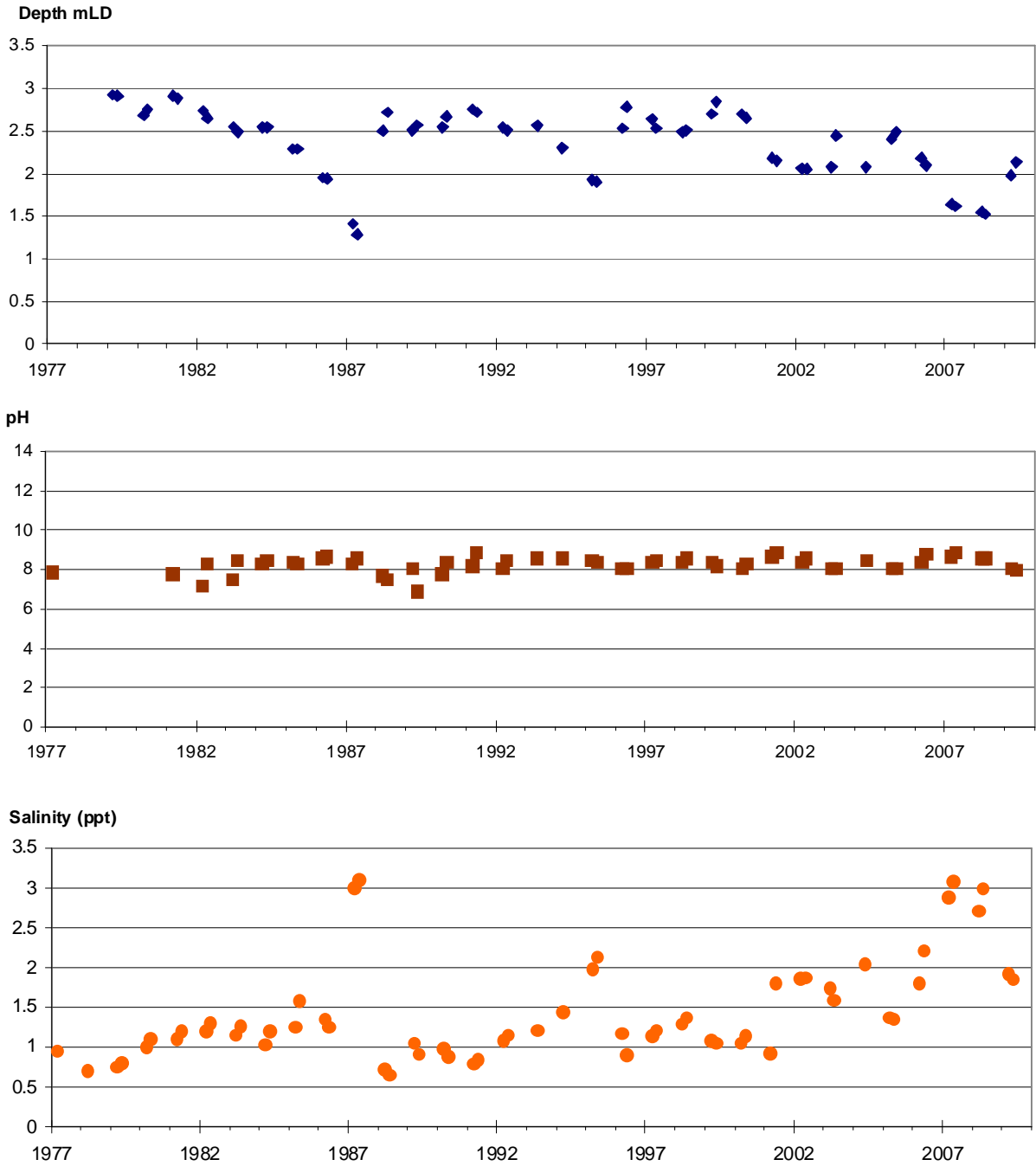
**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Toolibin Lake is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands and is also listed in the 'Directory of Important Wetlands in Australia'.

Toolibin is in the Toolibin Lake Natural Diversity Recovery Catchment and is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## TORDIT-GURRUP



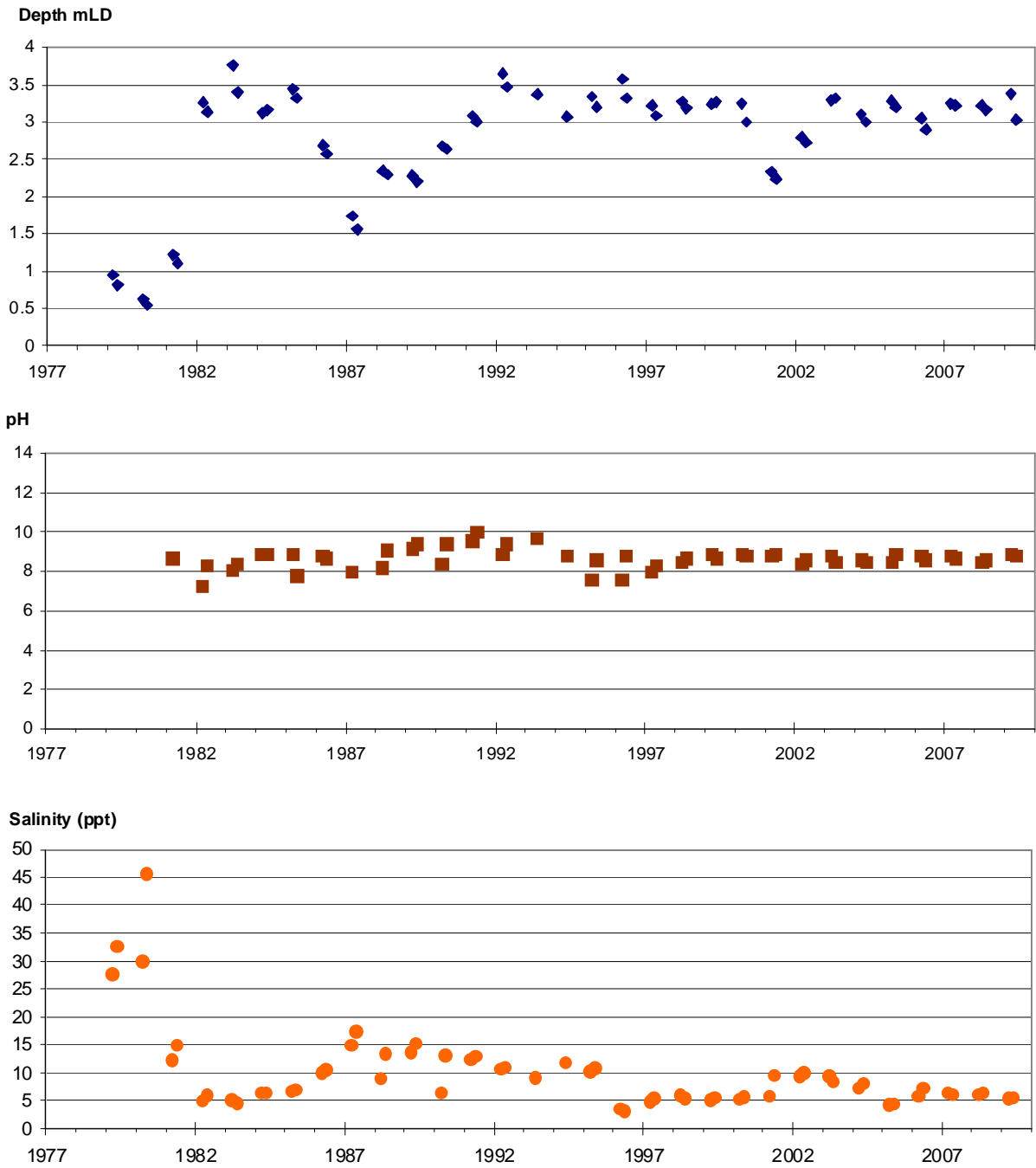
### Notes:

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Tordit-Gurrup is a component of the 'Muir-Byenup System', which is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands, and is also a component of the 'Byenup Lagoon System' listed in the 'Directory of Important Wetlands in Australia'.

Tordit-Gurrup is within the Muir-Unicup Natural Diversity Recovery Catchment and is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

## TOWERRINNING<sup>IM</sup>

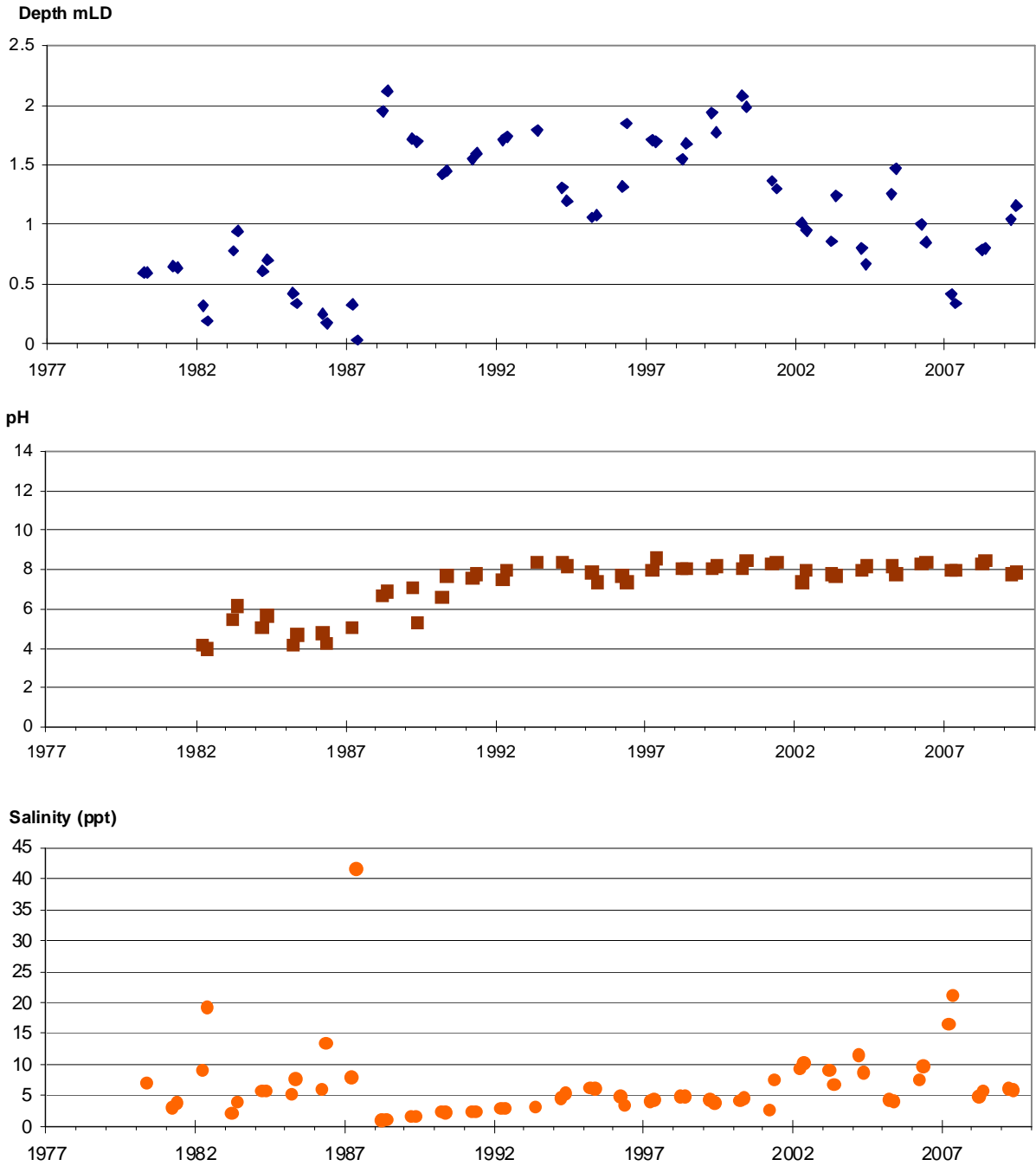


**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Towerinning is in the Wellington District (headquartered in Collie) of the South West DEC Region.

# UNICUP



**Notes:**

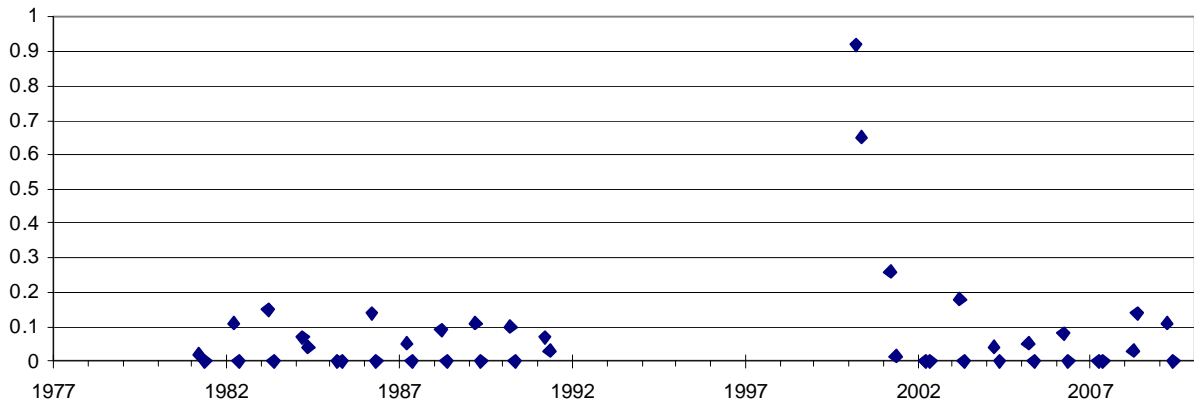
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Unicup is a component of the 'Byenup Lagoon System', which is listed in the 'Directory of Important Wetlands in Australia'.

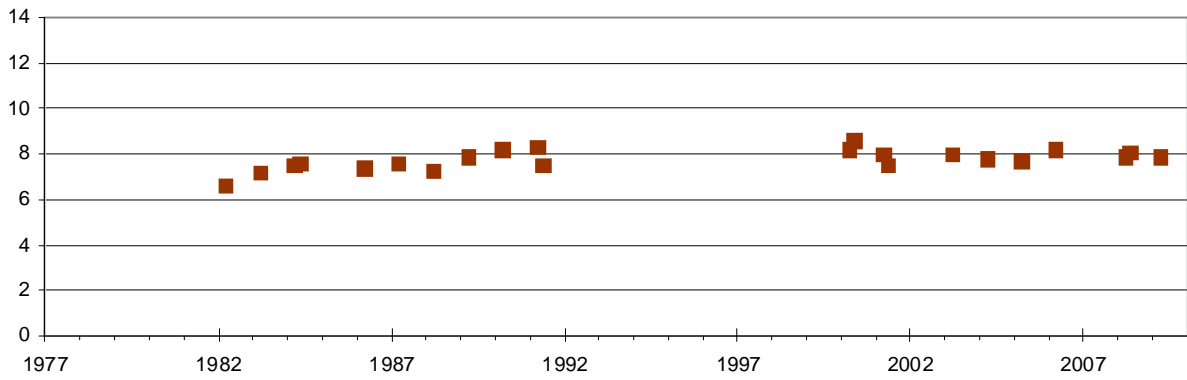
Unicup is within the Muir-Unicup Natural Diversity Recovery Catchment and is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

# VARLEY

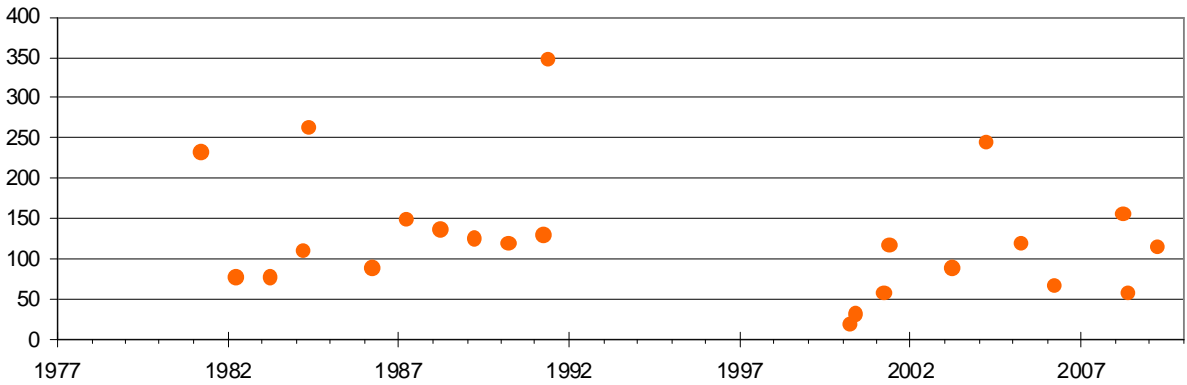
**Depth mLD**



**pH**



**Salinity (ppt)**



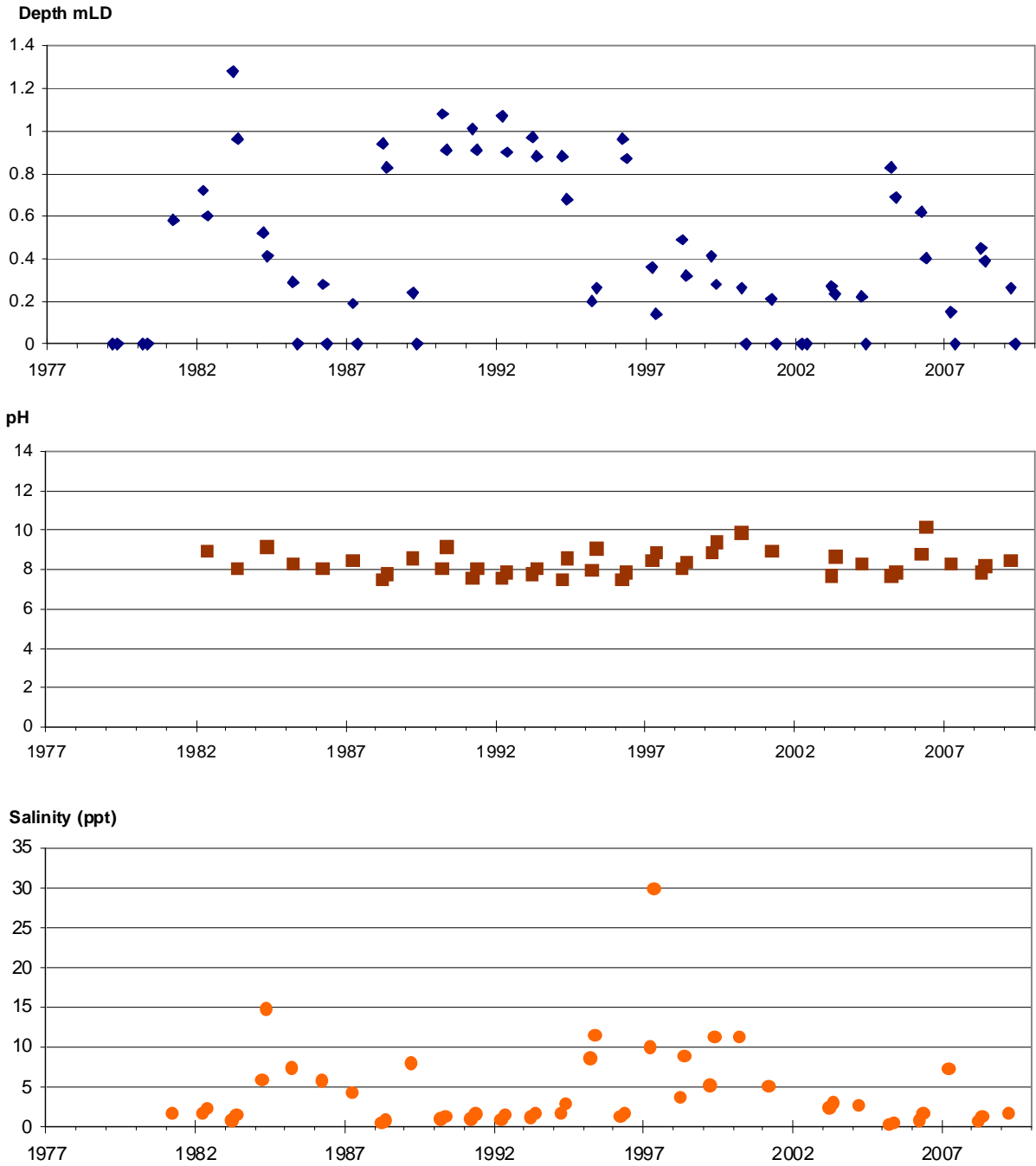
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Varley is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.



# WALBYRING



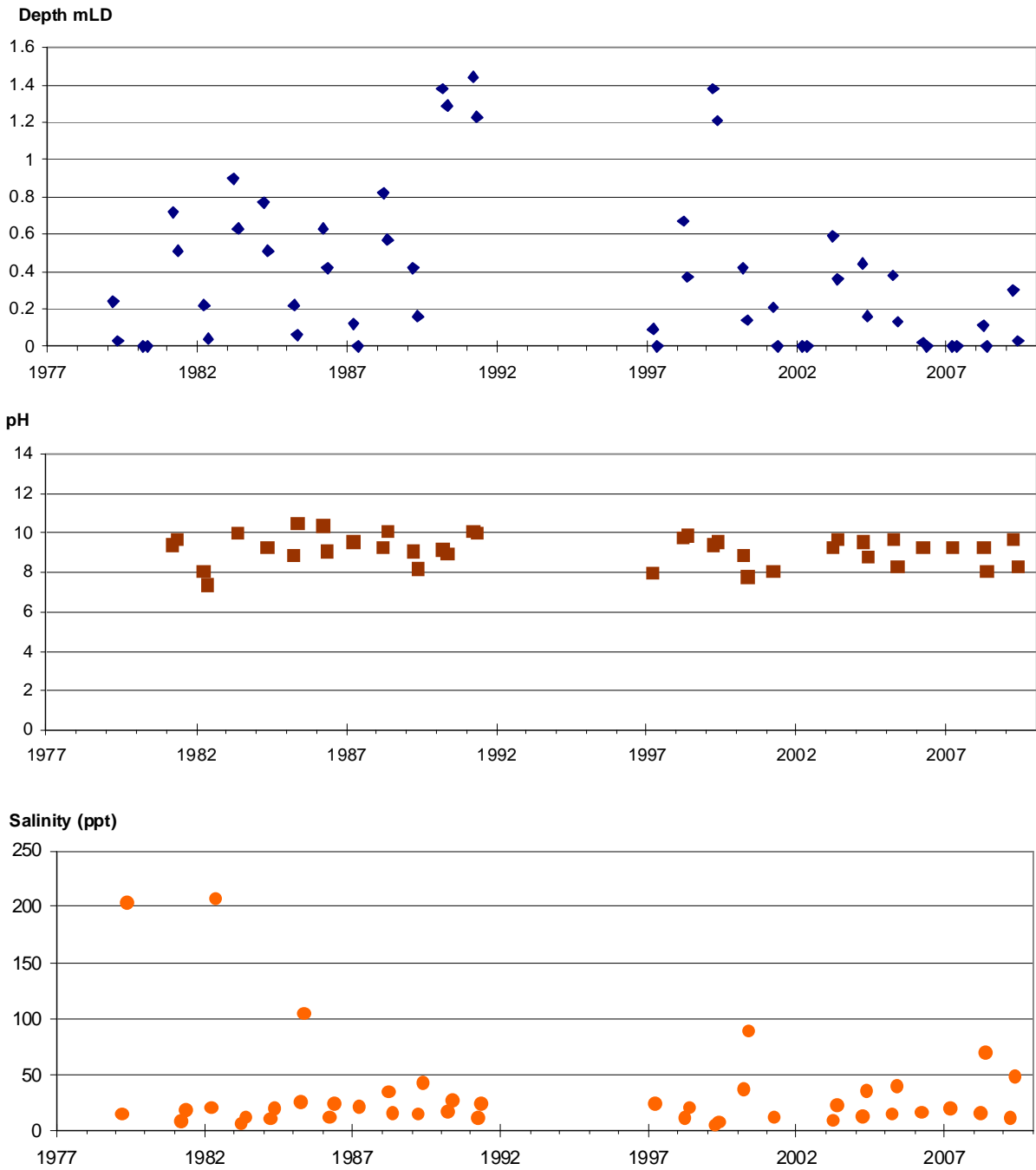
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Walbyring is a short distance downstream from, and potentially receives overflow water from, the Toolibin Lake Natural Diversity Recovery Catchment.

Walbyring is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## WALYORMOURING<sup>IM</sup>



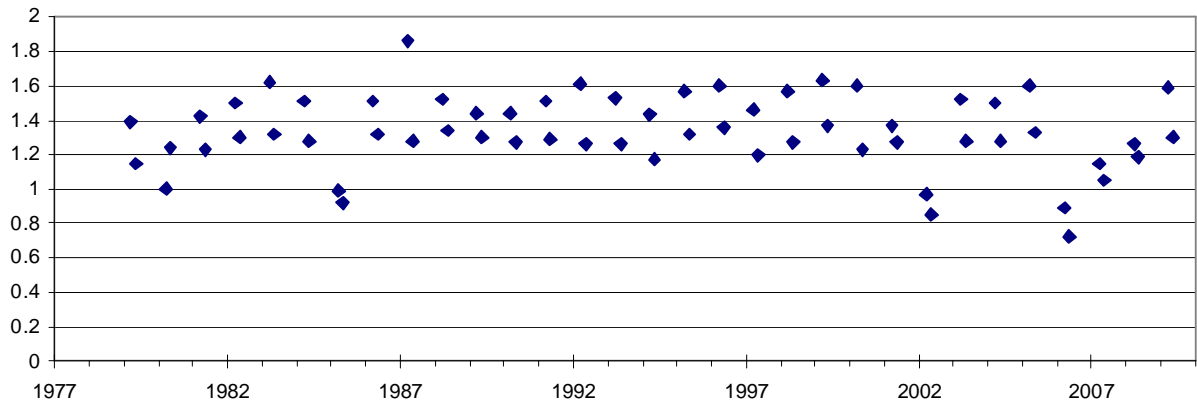
**Notes:**

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

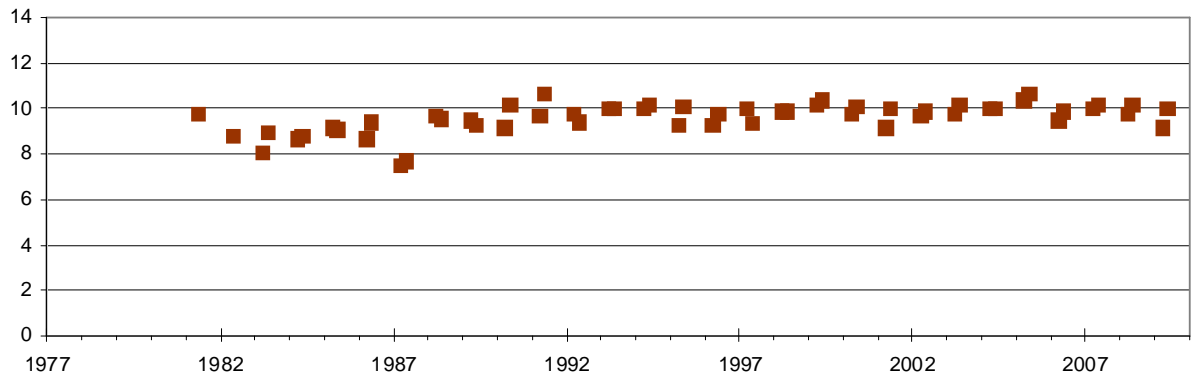
Walymouring is in the Central District (headquartered in Merredin) of the Wheatbelt DEC Region.

# WANNAMAL

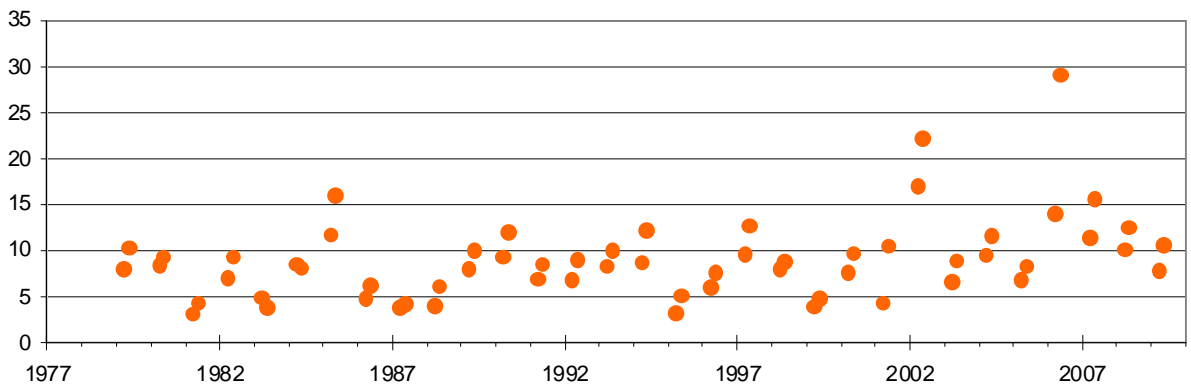
Depth mLD



pH



Salinity (ppt)



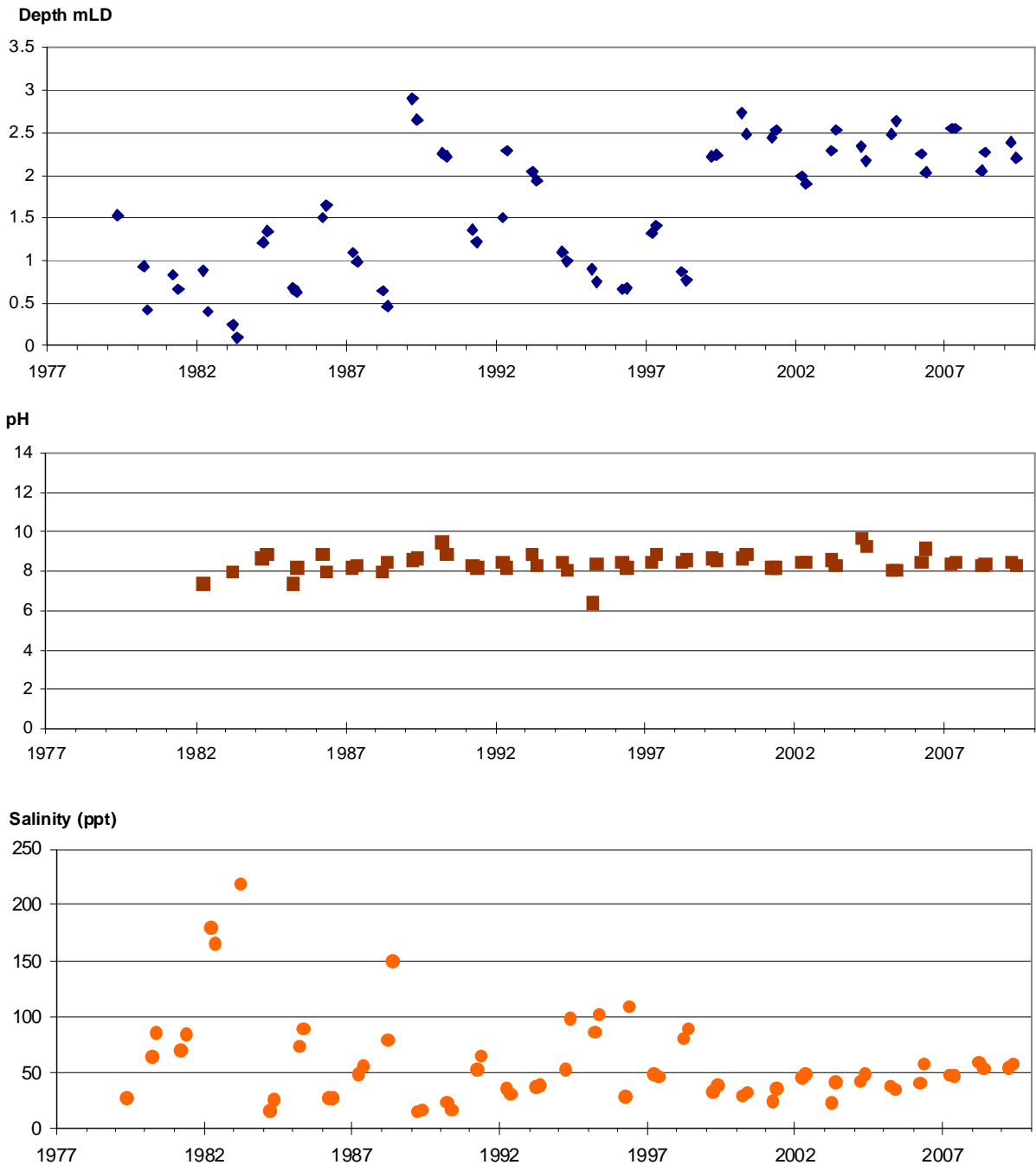
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Wannamal is a component of the 'Wannamal Lakes System', which is listed in the 'Directory of Important Wetlands in Australia'.

Wannamal is in the Swan Coastal District (headquartered in Wanneroo) of the Swan DEC Region.

## WARDEN



**Notes:**

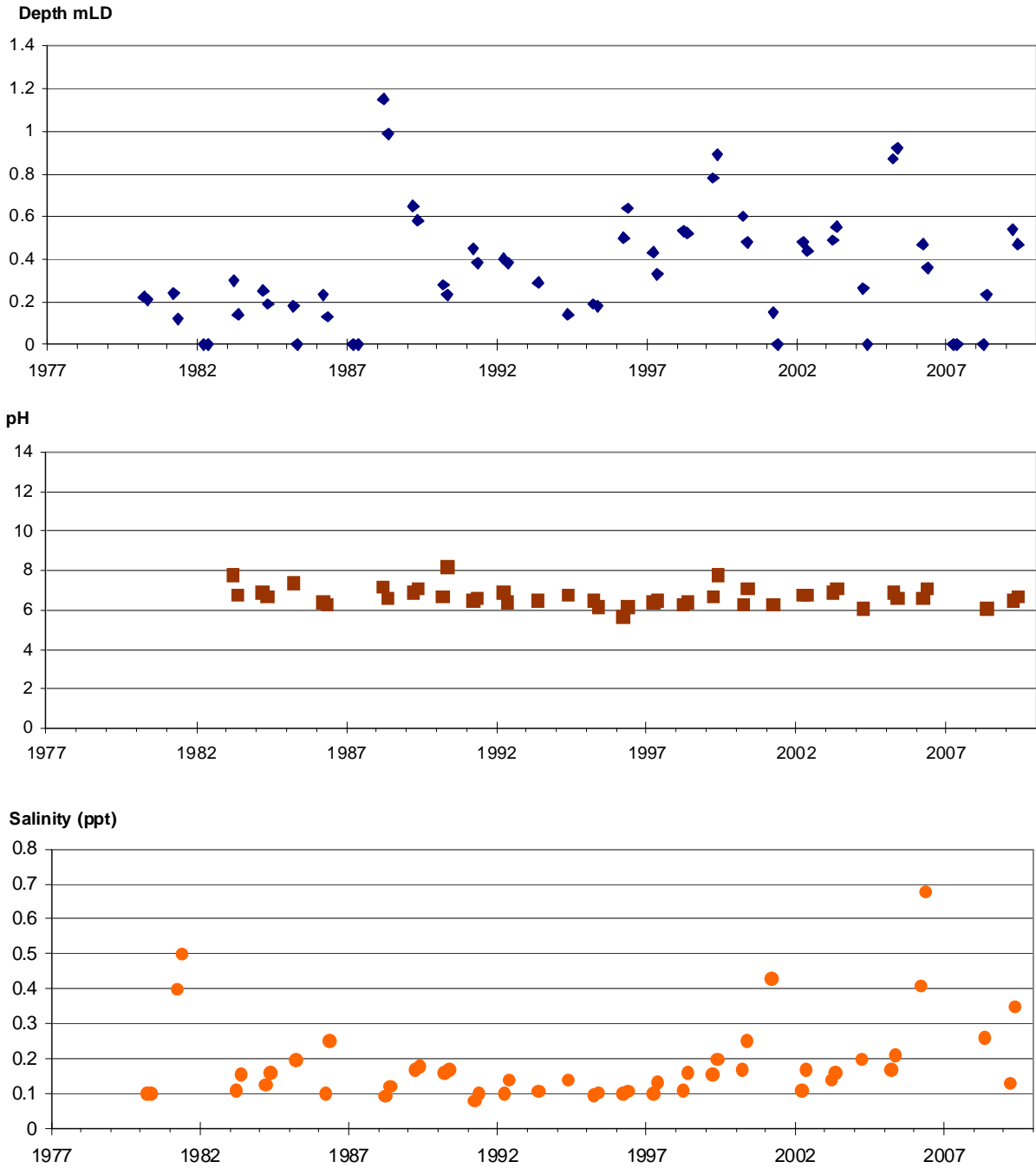
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Warden is a component of the 'Lake Warden System', which is listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands.

Warden is also a component of the 'Lake Warden System' listed in the 'Directory of Important Wetlands in Australia'.

Warden is within the Esperance Lakes Natural Diversity Recovery Catchment and is in the Esperance District of the South Coast DEC Region.

# WARRINUP

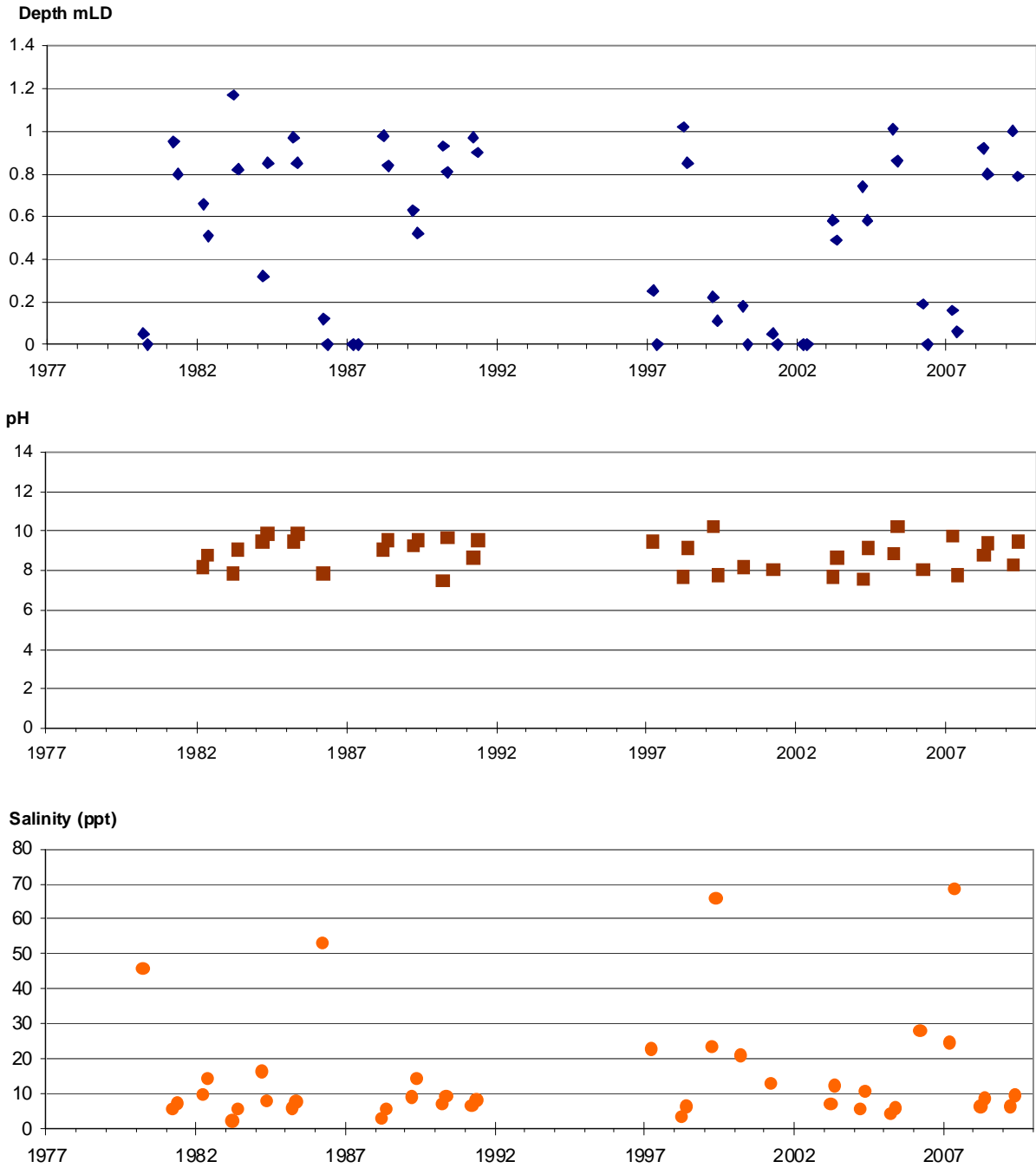


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Warrinup is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## WEST ARTHUR 5456

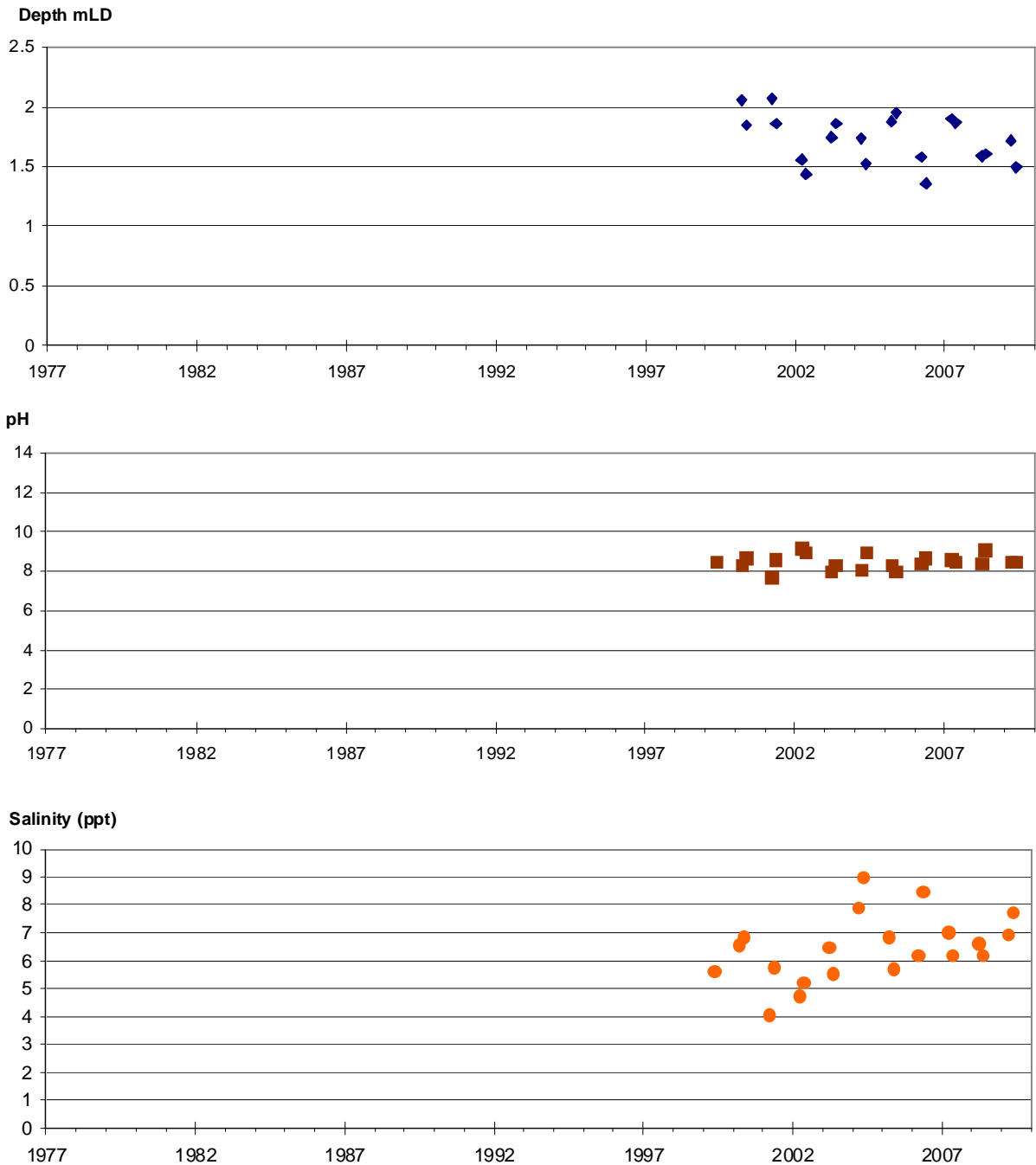


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

West Arthur 5456 is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

## WHEATFIELD <sup>IM</sup>



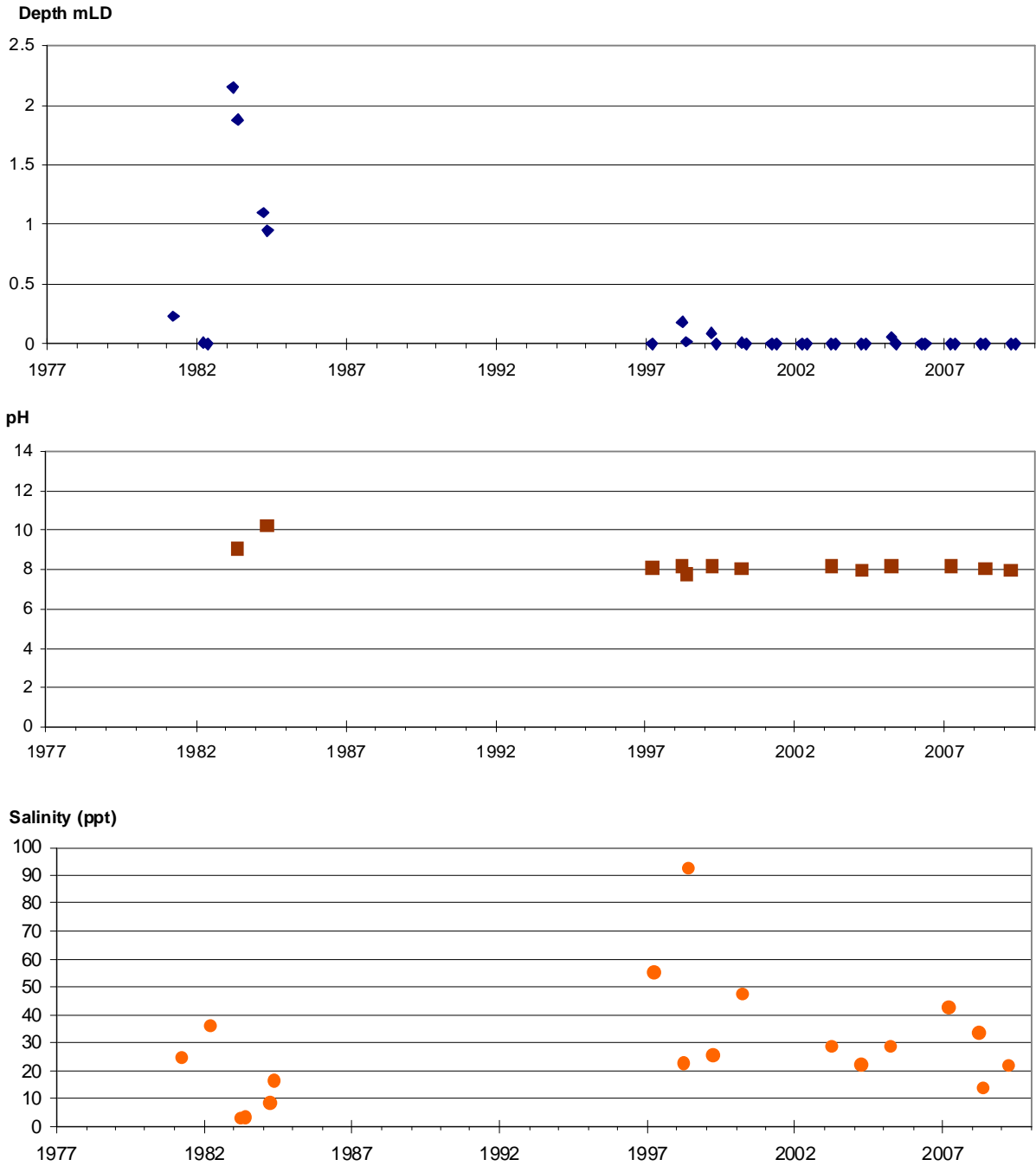
### Notes:

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Wheatfield is part of the 'Lake Warden System' listed as a Wetland of International Importance under the 'Ramsar' Convention on Wetlands and is also part of the 'Lake Warden System' listed in the 'Directory of Important Wetlands in Australia'.

Wheatfield is within the Esperance Lakes Natural Diversity Recovery Catchment and is in the Esperance District of the South Coast DEC Region.

## WHITE (NARROGIN)



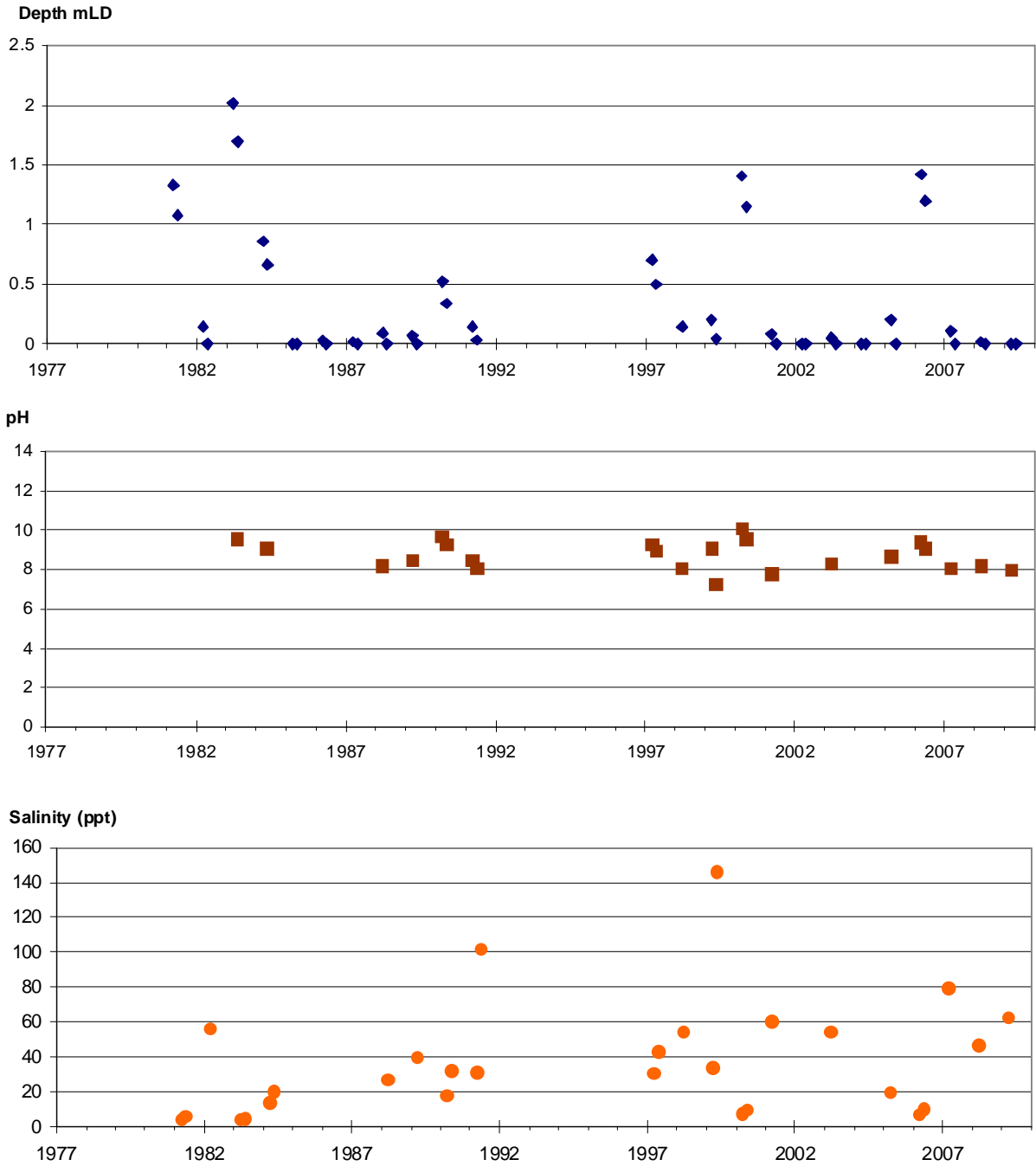
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

White (Narrogin) is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.



# WHITE WATER



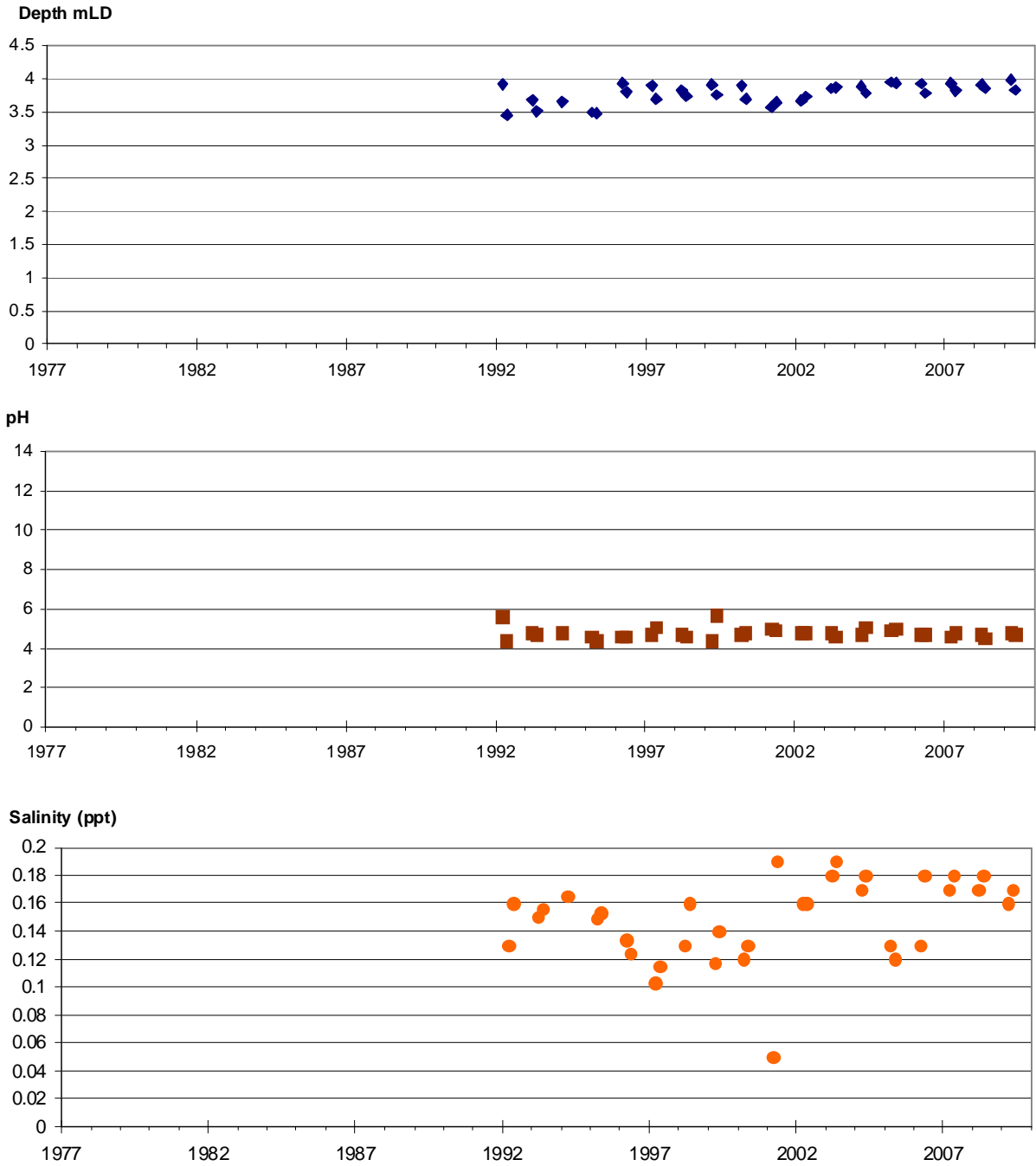
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

White Water is a component of the 'Yealering Lakes System', which is listed in the 'Directory of Important Wetlands in Australia'.

White Water is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# WILSON



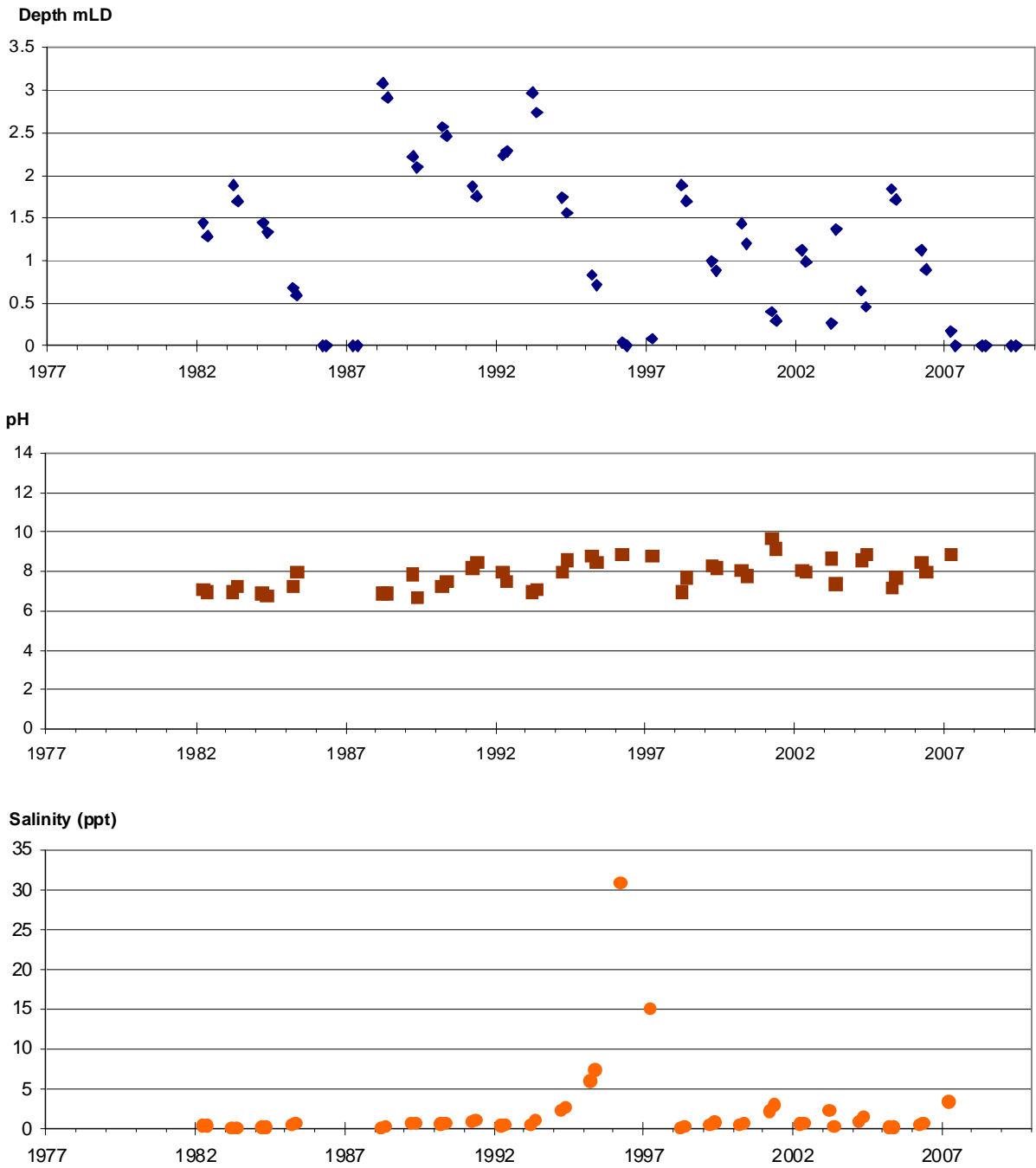
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Wilson is a component of the 'Gingilup-Jasper Wetland System', which is listed in the 'Directory of Important Wetlands in Australia'.

Wilson is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

# YAALUP<sup>IM</sup>

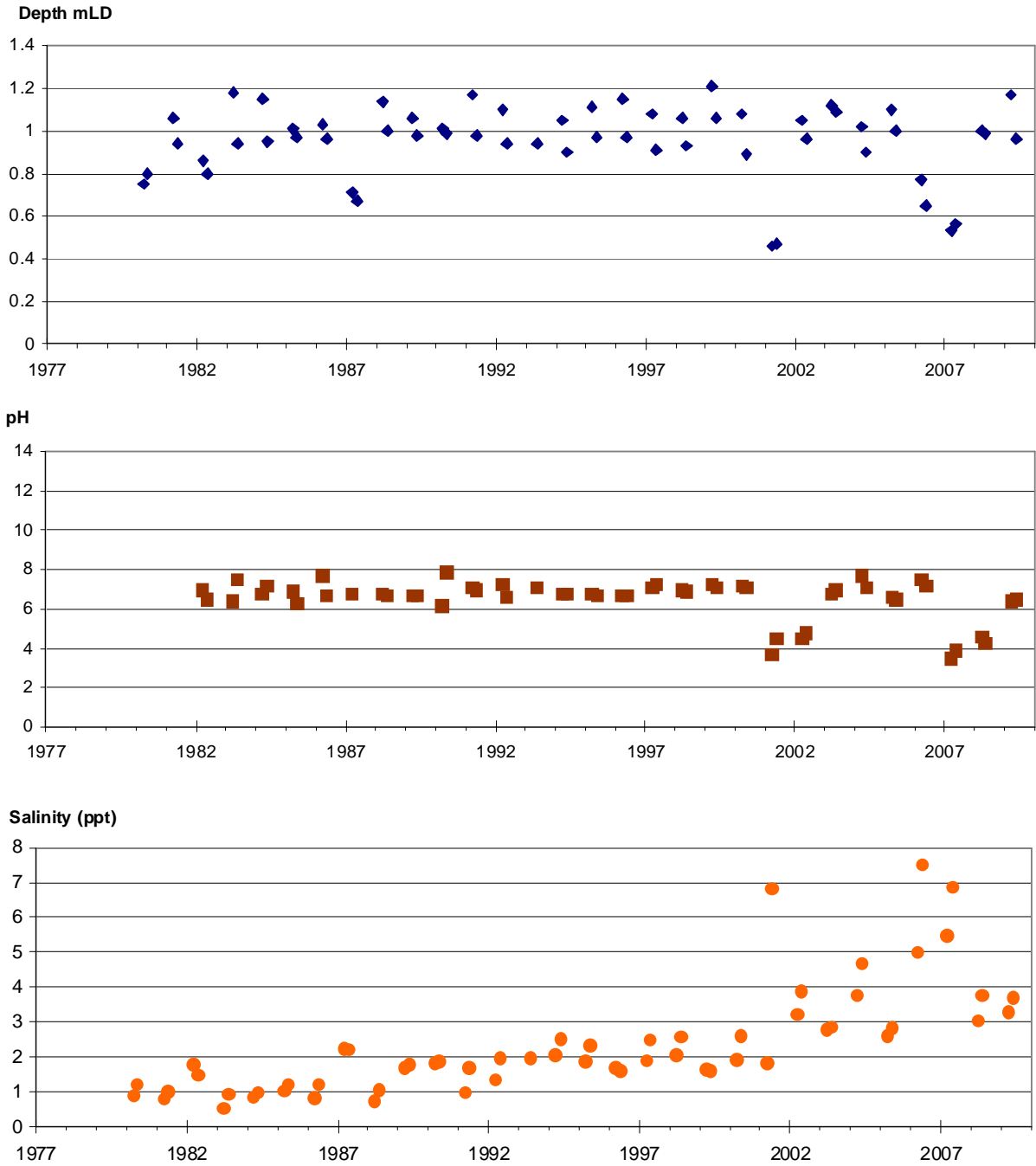


### Notes:

1. <sup>IM</sup> indicates this is one of 25 wetlands Intensively Monitored for additional biological and physico-chemical attributes.
2. Year labels are positioned at 1<sup>st</sup> July each year.
3. Data are from September and November routine monitoring periods only.

Yaalup is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# YARNUP



**Notes:**

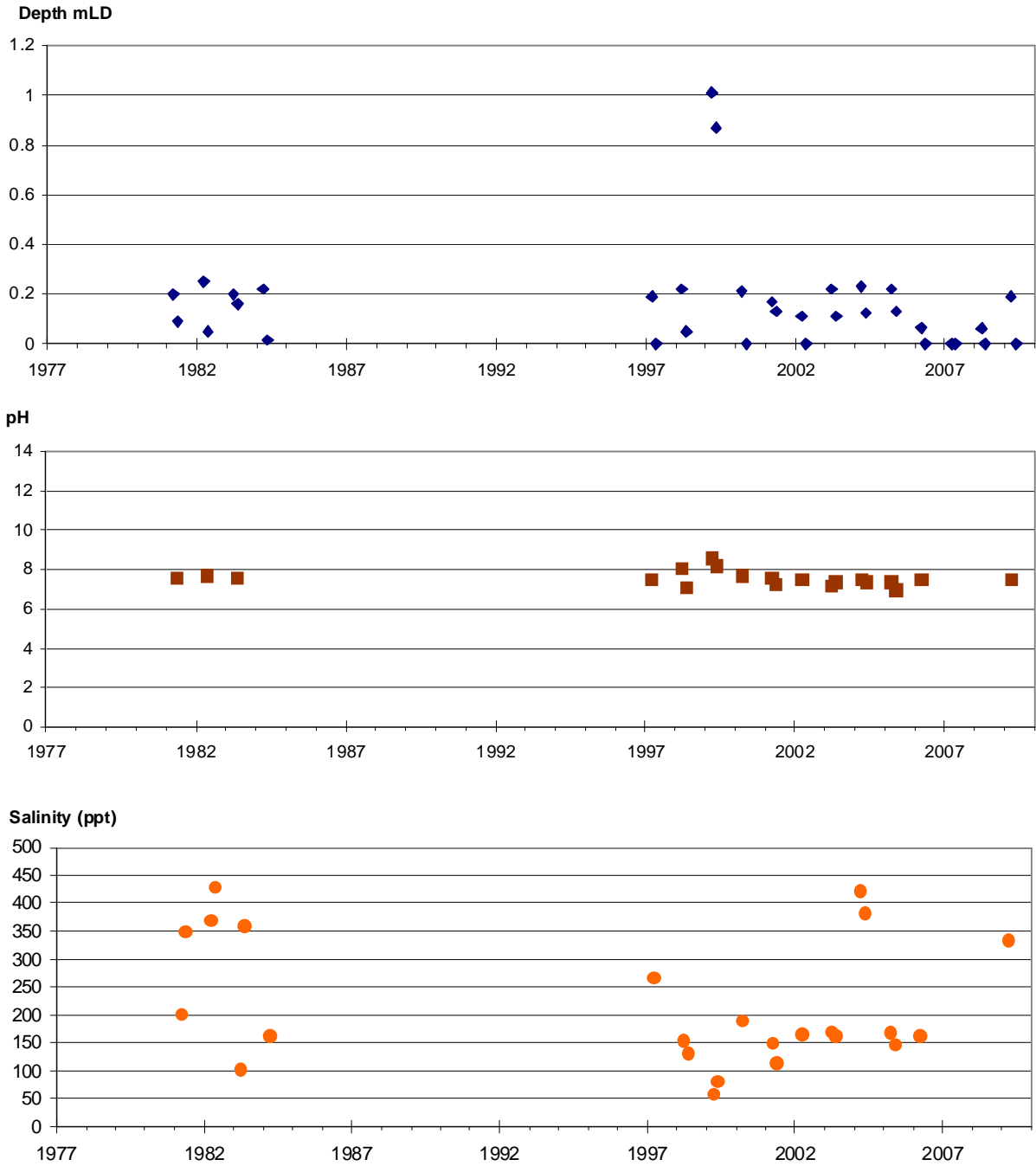
1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Yarnup is a component of the 'Byenup Lagoon System', which is listed in the 'Directory of Important Wetlands in Australia'.

Yarnup is within the Muir-Unicup Natural Diversity Recovery Catchment.

Yarnup is in the Donnelly District (headquartered in Pemberton) of the Warren DEC Region.

# YARRA YARRA

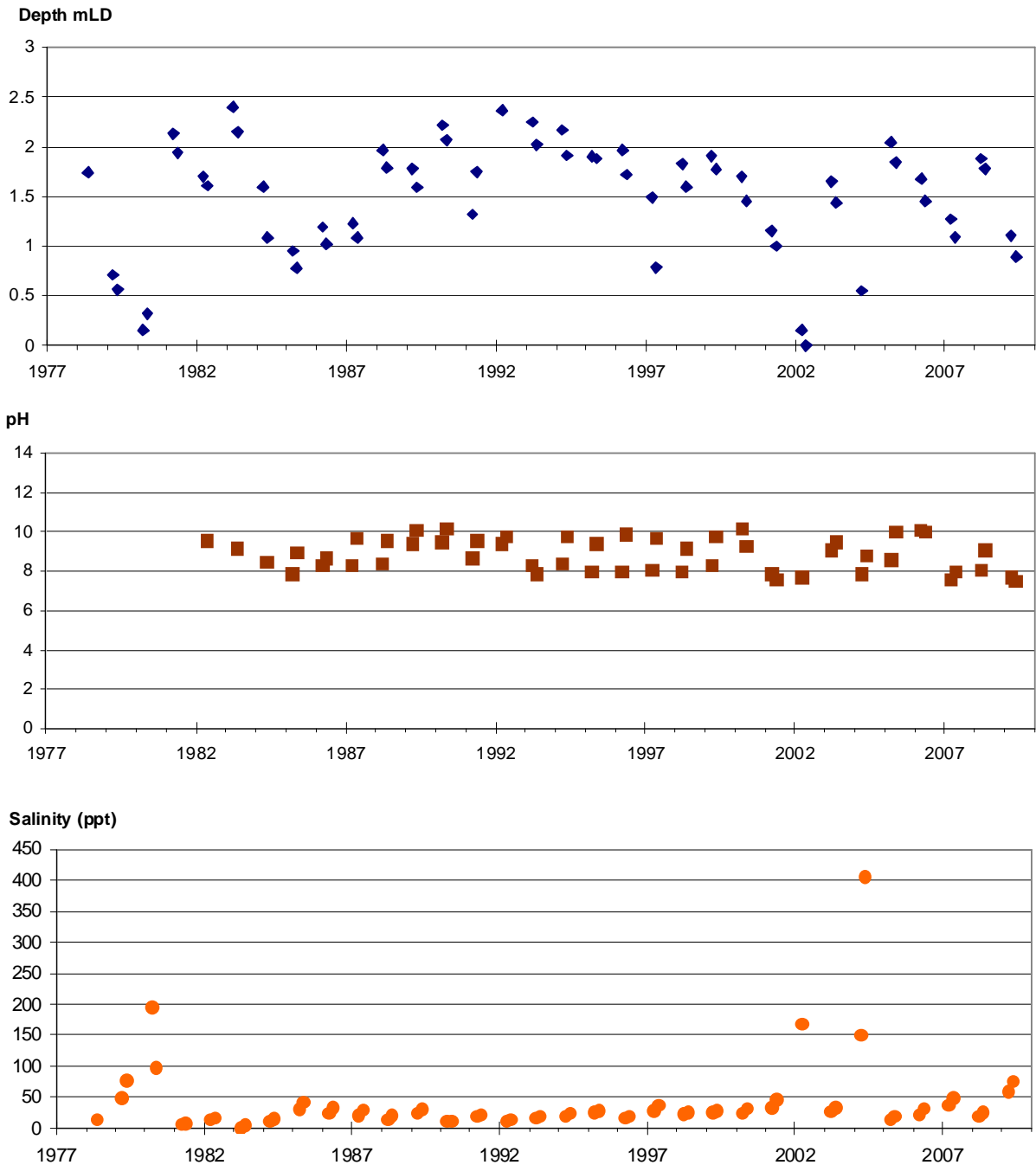


**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Yarra Yarra is in the Moora District (headquartered in Jurien Bay) of the Midwest DEC Region.

## YEALERING



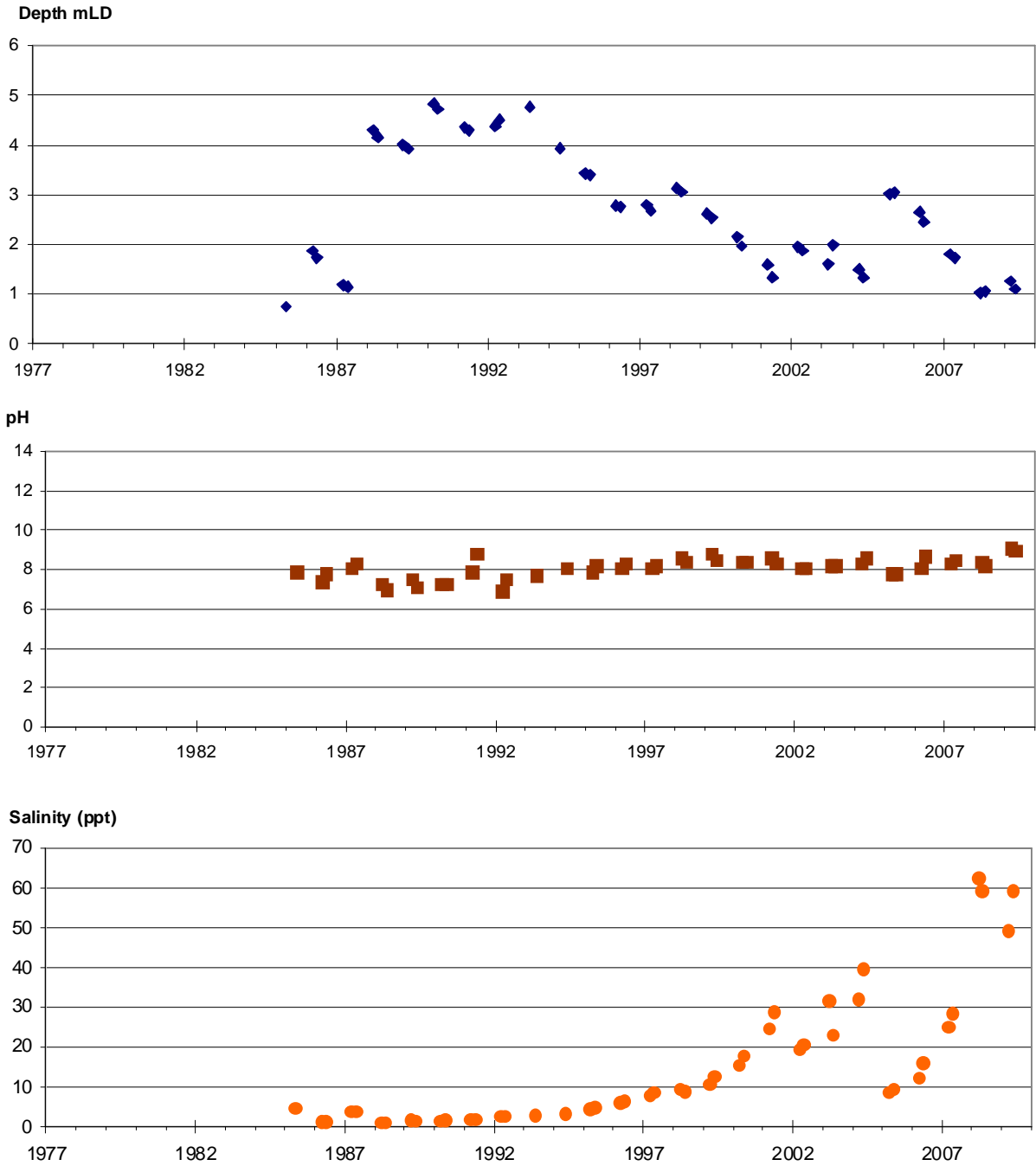
### Notes:

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Yealering is a component of the 'Yealering Lakes System', which is listed in the 'Directory of Important Wetlands in Australia'.

Yealering is in the Great Southern District (headquartered in Narrogin) of the Wheatbelt DEC Region.

# YELLILUP



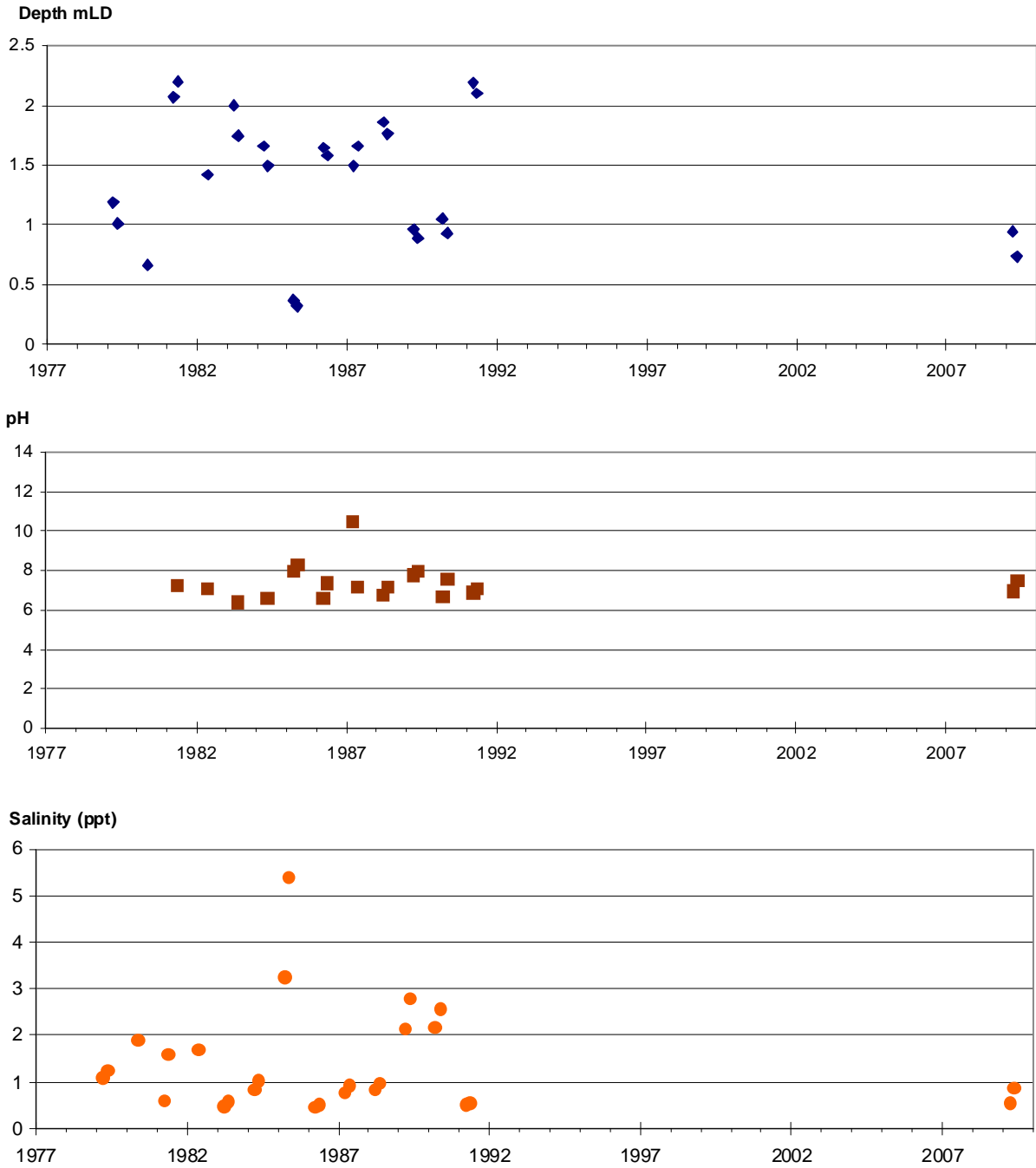
**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Yellilup Lake is a component of the 'Yellilup Yate Swamp System', which is listed in the 'Directory of Important Wetlands in Australia'.

Yellilup is in the Albany District of the South Coast DEC Region

# YURINE



**Notes:**

1. Year labels are positioned at 1<sup>st</sup> July each year.
2. Data are from September and November routine monitoring periods only.

Yurine is in the Swan Coastal District of the Swan DEC Region



