Birds Tasmania response to Proofs of Evidence by Charles Meredith and John Delaney on behalf of Walker Corp., 24 June 2009.

Birds Tasmania claim/statement in 6 Apr 2009 submission to RPDC		Response from Charles Meredith to Birds Tas claim/statement	Response to Meredith
4.1 – 4.6	Disparity in numbers of shorebirds, survey issues, errors in assumptions: • survey sites not visited simultaneously, surveys inadequate, no banding, no data on flux • behaviour categories ambiguous • errors in demographic parameters	• The survey did simultaneously survey a selection of sites in and adjacent to Ralph's Bay and Pittwater/Orielton. It is not necessary to monitor all sites in southeast Tasmania in order to inform the impact assessment process. We did not attempt to census the entire local population, but the survey was designed to sample the population in a manner that could ascertain the relative use of various sites/habitats and to assess variable use of individual sites at various times and conditions. The monitoring regime monitored three or more sites within Ralph's Bay & Pittwater/Orielton simultaneously. Counts in the data are numbers of birds at particular sites and it is appropriate only to sum the numbers from those sites that were visited simultaneously. It was not the intent of the monitoring regime that it would provide a comprehensive census of the entire system. Rather the study was designed to assess relative numbers of birds and variance in those numbers at the key sites monitored. Long time frames necessary for banding studies to provide informative results were not available and it was already known that such study of Pied Oystercatchers (at least) had already been undertaken. Unfortunately, these data have not been made publicly available.	Page 71 of Appendix 4 of DIIS Appendix S4 [Aquenal] "1.7 Examination of linkages between sites 1.7.1 Examination of … **It was not logistically possible to survey each site for bird abundance contemporaneously."** Page 18 of Appendix S4 notes that 4 observers conducted counts – how can 4 persons count 7 sites simultaneously? If the surveys were not designed to provide contemporary census data, how can the full impacts of the proposal be assessed? Meredith's response shows a lack of knowledge of the literature. Important banding information is available in references cited in the proponents literature review and other material available in *An Occasional Stint* see papers by Newman (2) on the dispersal of Pied Oystercatchers and Harris (2) on mortality of Red-necked Stint and Curlew Sandpipers; all these papers are based on banding and provide quantified information on both survival and the movement of birds within the DEPA. 2 papers by Harris and 2 by Newman in *An Occasional Stint* provide relevant data on bird location between locations; further papers in *Emu* and *The Stilt* contain banding results on Pied Oystercatcher; HANZAB contains conclusions

			from banding data analysis.
		• There was no ambiguity in behaviour categories. Behaviours were documented according to actual behaviour and postures of birds wherever they occurred, not according to whether they were at a known 'roost site' or not. Roosting should not be defined by location but by the behaviour of birds wherever a particular behaviour occurs and this is how our data was recorded. Thus Oystercatchers that were standing, often on one leg, with head tucked into back in 'sleeping' posture were recorded as roosting. This behaviour was not confined to 'roost sites' and some Pied Oystercatchers did this on some sandflat locations including some in S1. There are also small routine roost locations in and adjacent to small areas of saltmarsh at extreme NE and at SW of area S1.	Sleeping birds are not 'roosting' – they are resting or loafing. Roosting is a behaviour that includes "the act of going to or taking up a roost, ie travelling, gathering and establishment of site" Campbell & Lack 1985. By describing sleeping birds (digesting their prey) as roosting on the inter-tidal mudflats, the importance of the Lauderdale Spit (to be destroyed) as a roost site is diminished. This is a crucial point. It appears that the proponent did not undertake any specific studies of roost options and use strategies under adverse climatic conditions. For example, when all the birds are driven out of Mortimer Bay or when birds from South Arm are forced to use Blackjack Rocks. Lauderdale has the attribute of two roost options, which is very important for oystercatchers. Ambiguity in behaviour categories is acknowledged in Delaney PoE 4.5, where some, "overlap" between behaviour categories is acknowledged. Loafing is perhaps a better description.
		• These demographic data are not used in the model.	
4.12	There are insufficient data to support the assumption that habitat use by shorebirds in Ralph's Bay is similar during day and night times.	In the apparent absence of any comparable information on nocturnal wader activity for SE Tasmania, the data obtained were never intended to be quantitative but aimed to see what could be learnt about nocturnal behaviours. That is quite explicit in the Appendix report. The data demonstrated that the oystercatchers *foraged* according to tide, in a similar manner to how they foraged during daylight, but there was substantial difference between day and night high tide *roosting* behaviour. It should be noted that waders have excellent night vision and that there is likely to be little difference in their sight perception abilities between night and day	Nocturnal surveys limited in time to 4 days in Jan 2008 using thermal imaging. Mid-summer, warmest conditions and minimal winds. Suggest East Marsh Lagoon roost used differently in winter months when strong SW winds present.
7.3 – 7.5	Errors in oystercatcher modeling: • invertebrate production not estimated and	• The model does not assume no changes in prey populations – it simply inputs a prey biomass at the start of the season. In order to investigate the sensitivity of outcomes to reduced prey populations	All comments re models of pied oystercatcher carrying capacity and invertebrate densities etc will be referred to Dr Matt Edmunds on behalf of

	assumed constant; population structure assumed constant • prey switching not assessed • energetic requirements assumed constant • interference competition threshold too high • no assessment of intra- and interspecific competition from displacement • population not at *k* (carrying capacity)	from higher mortality/predation, the model was re-run with a 50% reduction in prey biomass (Atkinson and Stillman, Section 2.5.4.2) • Prey switching is not assessed as there are no data on which to base such an assessment; there are number of such factors of detail that the model does not specifically assess (and probably no model could assess them all), as models are all about attempting to model complex systems in a simplified manner that, by selecting the most important parameters, provides a good fit to reality • Energetic requirements – see Atkinson and Stillman Section 5.5.5.5: *"For simplicity it was assumed that no time and energy costs were associated with moving between patches. If, in reality, birds frequently move between sites, the model will underestimate the time and energy costs of the real birds. However, the standard simulations predicted that birds at Lauderdale could survive without moving to other sites (see below), implying that frequent movements were unlikely to be driven by limitation of food resources (although other factors may cause such movements)."* • The interference parameter is discussed in Atkinson and Stillman 2.5.5.9: *"The way in which interference was incorporated into the model was consistent with the approach used for models of European waders. We had no reason to expect that these relationships were inappropriate for Pied Oystercatcher given the similarity in the behaviour of Pied and Eurasian Oystercatchers, and similarities in their prey species."* See also response to Submission 470 - App. 7, pt 3. • The modeling report does not claim that the population is not at carrying capacity due only to prey resources: *"The model simulations showed that the intertidal food resources at Lauderdale could support many more birds than they currently do. The consequence of this was that the model predicted that habitat could be removed, thus decreasing the amount of food available, without increasing the mortality rate of the number of birds currently found on the site. It is not necessarily surprising that the intertidal areas of Lauderdale are not at carrying capacity, defined as the maximum sustainable density of birds. Studies of other shorebirds have in fact shown that it is most unlikely that carrying capacity defined in this way is reached at either local (Goss-*	Birds Tasmania. Dr Newman will also discuss carrying capacity and demographic model for Pied Oystercatchers.

		Custard et al., 2002) or global scales (Goss-Custard, 1993). This occurs because population size may be limited by other factors (e.g. reproduction), either on the site in question or on other sites on which the species occurs at some stage of the annual cycle." (Atkinson and Stillman, p.50).	
Birds Tasmania claim/statement in 6 Apr 2009 submission to RPDC		Response from John Delaney to Birds Tas claim/statement	Response to Delaney
1.3	A graph of Birds Tasmania data for Ralphs Bay Pied Oystercatcher is attached. The total numbers clearly exceed those recorded by Walker's consultants and this is due to the poor survey methods used (see below).	The numbers of Pied Oystercatcher observed at Lauderdale during the DIIS surveys are equivalent to, and in some instances exceed, the numbers observed by Birds Tasmania. Refer to Table 45, Section 5.11.1.2 of the DIIS.	Table 45 (p236) shows maximum number of Pied oystercatchers at Lauderdale to be 318, which does not exceed the numbers observed by Birds Tasmania (max **554** in summer 2006). **There are 4 summer counts and 3 winter counts since 2000 that exceed the max count of 318 by Walker.**
2.4	Thousands of Red-necked Stints migrate to Southeast Tasmania each year to feed for up to six months. The intertidal mudflats in Ralphs Bay are important feeding and roosting (resting) sites for stints and other migratory shorebirds. The proposed development will destroy an important feeding area for migratory species and contribute to an ever-increasing list of pressures (particularly habitat loss) on these species. Habitat loss is the single greatest pressure on populations of migratory shorebirds.	94.8% of all observations of the Red-necked Stint that were made during the 1,107 DIIS wader surveys were made at DEPA survey site's other than Lauderdale. Refer Table 45, Section 5.11.1.2 of the DIIS. The potential nature and magnitude of the impacts of the proposal on Red-necked Stint has been recognised in the DIIS.	Table 45 is a meaningless table as it simply adds the numbers of individuals seen for each species during counts. As not all sites were visited in equal numbers, there are unbalanced/biased totals – inappropriate to compare. This generates massive biases and inequities in the data. Further, it is inappropriate to tally residents and migrants – makes poor assumptions re fidelity and capacity to move among sites. Over-emphasises residents and diminishes migrants. Historically Lauderdale held higher numbers and proportions of Red-necked Stints and banding showed it was an area favoured by first-year birds. Recruitment of Red-necked Stints is episodic, hence problems with proponents short term perspective.
4.1	Surveys for the proponent reported approximately half of the Pied Oystercatchers reported by Birds Tasmania. This disparity in numbers is due	The numbers of Pied Oystercatcher observed at Lauderdale during the DIIS surveys are equivalent to, and in some instances exceed, the numbers observed by Birds Tasmania. Refer to Attachment 6 of the Birds Tasmania Submission and Table 45, Section 5.11.1.2	See point above – totals since 2000 have exceeded max count of 318 by Walker.

<table>
<tr>
<td></td>
<td>to the survey method used by Walker's consultants – they were unable to visit all sites in southeast Tasmania simultaneously (as is done for Birds Tasmania surveys), and hence they were unable to obtain an accurate estimate of the total numbers of birds using the various sites surveyed, and substantially under-estimated the significance of Ralphs Bay to the tune of 50% for the Pied Oystercatcher, a resident species.</td>
<td>of the DIIS.

Table 12 of Appendix S4, partially reproduced below, summarises the Birds Tasmania Pied Oystercatcher survey results for the broader DEPA complex.
Table 12: The mean (range; number of counts) number of birds per sit priority wader species from Birds Tasmania annual wader count data (summer) and 1980 (winter). Source: Tasmanian Bird Reports (TBR) 3-3 counted in every year and, therefore, the number of counts (n) is given fo site.
<table>
<tr><th>Species and season</th><th>Lauderdale</th><th>Mortimer Bay</th><th>Pipeclay Lagoon</th><th>South Arm neck</th><th>Barilla Bay</th><th>Orielton Sorell</th></tr>
<tr><td>Pied Oystercatchers summer</td><td>142 (10-423; n=33)</td><td>42 (6-102; n=25)</td><td>92 (12-177; n=33)</td><td>94 (13-235; n=33)</td><td>55 (9-109; n=33)</td><td>58 (2-162; n=33)</td></tr>
<tr><td>Pied Oystercatchers winter</td><td>150 (0-373; n=26)</td><td>34 (0-130; n=25)</td><td>101 (0-168; n=25)</td><td>140 (61-448; n=26)</td><td>64 (34-114; n=25)</td><td>44 (4-105; n=26)</td></tr>
</table>

With reference to the above and the table below, which is extracted from Table 6 of Appendix S4, the numbers of Pied Oystercatcher observed during the DIIS wader surveys are equivalent to the Birds Tasmania data:

It is recognised that there is a greater level of disparity between the Birds Tasmania (most recent 5 year) count data and the DIIS wader survey count data, as presented in Table 26 of DIIS Appendix S4, however this is most likely to be a function of the increased variability in wader numbers that have been observed in the DEPA complex over the last five years.</td>
<td>Table 12 also contradicts claim that Walker numbers higher than Birds Tas counts.

All Pied Oystercatcher counts by Birds Tas were based on accurately determining the size of the migrant wader populations. The Pied Oystercatchers in particular exploit many areas never used by migrant waders and hence not counted. Hence the count data are conservative under-estimate of what is happening to the SE Tasmania oystercatcher population. What is central to the argument is the importance of Ralphs Bay, in particular, Lauderdale and adjacent Mortimer Bay.

The numbers of Pied Oystercatchers using Ralphs Bay is increasing – we have reduced the data to decadal-scale bins (1970s, 1980s, 1990s and 2000+) to clarify the data set (see last page of this response). There has clearly been an increase in numbers and this trend commenced well before the Lauderdale Quay proposal was made. Last month Newman saw 100+ at Mortimer Bay. This did not happen in the mid 1980s

It appears that the proponent has compared the average of a long tem data set that is trending upwards with the results of the proponent's short-term data set made when numbers may have peaked.

Is the source of the alleged increase in variability claimed by proponent?</td>
</tr>
<tr>
<td>4.2</td>
<td>We believe that all of the shorebird surveys conducted for the proponent are hopelessly inadequate, and do not provide the data required to address the impacts of</td>
<td>I defer to the evidence of Dr Charles Meredith of Biosis Pty Ltd in respect of this submission.</td>
<td>No estimates available of total numbers of birds that rely on Lauderdale and Ralphs Bay. Ratios and relative use not sufficient to determine total abundances. Ratios use skewed and biased data</td>
</tr>
</table>

	the proposed development. No birds were marked or tagged in any way, thus there are no data to assess site utilisation or flux among sites.		and do not provide true indication of numbers of birds affected by proposal.
4.3	Most critically, there are no data on shorebird flux among sites – the poor survey design and lack of simultaneous surveys meant that the flux of shorebirds among sites could not be assessed. Thus the number and species diversity of shorebirds using each site are under-estimated and the consequent impacts under-estimated. These are fatal flaws to the analyses of shorebird numbers and impacts in the DIIS.	This is not an accurate statement. Appendix S4 of the DIIS presents data and analyses concerning patterns of flux in bird numbers amongst the surveyed sites. This analysis is based on contemporaneous survey data and enabled an examination of correlations (linkages) between bird numbers at the various sites and takes into account the influence of a range of factors such as time of day, tidal regimes, meteorological variables. Inferential statistical methods were employed to analyse the data and justification for the use of these methods is provided in Appendix S4. The findings of the DIIS are based on data obtained from 1,107 surveys, covering a broad range of summer and winter conditions and carried out by appropriately qualified and experienced observers. The correlation between the Birds Tasmania bird count data and that collated by Aquenal in the DIIS surveys indicates that appropriate survey methods have been employed and the number and diversity of waders using the various DEPA survey sites has been accurately documented.	Flux estimates and calculations based on asynchronous and skewed counts, therefore erroneous. Flux estimates require synchronous counts to ensure birds not missed or double counted. Fluxes are INFERRED based on counts – absence at site 1 and present at site 2, but the birds could have flown to site 3, site 4, etc. Surveys for Walker are not DEPA counts and cannot be compared to DEPA counts by Birds Tas. At best, Walker counts are <u>subset</u> of counts, but not comparable.
4.4	The population estimates for shorebirds in the DIIS must be considered absolute minima for the species surveyed for the areas visited. Without simultaneous surveys of all roosting and feeding sites (as is the case for Birds Tasmania counts), the birds can easily (and more rapidly) fly between/among sites faster than the counters can travel. Thus all estimates of numbers and calculations derived from counts etc are absolute minima, and represent the very lowest estimates of shorebird numbers in the area. See Section 5 below for further concerns re flux.	The purpose of the surveys was not to determine or estimate total numbers of waders within the DEPA complex of wetlands. The surveys were carried out to document and investigate patterns of variation in the relative abundance of waders at the different DEPA survey sites In respect of ascertaining the importance of the various DEPA survey sites, and different sectors of the Lauderdale site, to the overall DEPA wader populations, the longer-term Birds Tasmania population estimates were used (refer DIIS Tables 47, 49, 52 and	Without total numbers, how can total impacts be assessed? Why is “variation in the relative abundance of waders” at DIIS survey sites [NOT DEPA sites] more useful than absolute population sizes/abundances of waders? This is used as not all sites visited with equal frequency, and some sites visited intensively (ie Lauderdale), thus ‘totals” are skewed/biased to those sites with high visits and the data incorporate sampling bias. Cannot compare Walker “DIIS DEPA” counts with Birds Tasmania DEPA data. Acknowledges Birds Tas data better quality for

		53.)	DEPA area, including Ralphs Bay.
4.5	The behaviour categories roosting/resting/feeding are ambiguous and, as noted by the proponent, overlapping and non-exclusive. This is symptomatic of poor survey design/analyses. This particular ambiguity resulted in confusion in the persons undertaking the shorebird surveys and documenting their behaviours. One significant result of this confusion/ambiguity is the observers recorded roosting in Area S1 (when the birds were in between feeding bouts); this reduced the importance of the Spit at Lauderdale as the primary roosting site – pied oystercatchers do not roost on intertidal mudflats.	The behavioural categories used in the surveys are clearly defined in Appendix S4, Section 2.2.3.1 including recognition of some "overlap" between categories. Neither the data nor associated analysis reduces the importance of the Spit at Lauderdale as a roost site as suggested.	See comments above re 'roosting' re Meredith. If "roosting" was recorded all over the inter-tidal areas, this will reduce the relative proportion of roosting observed at roost sites on Spit.
4.6	Substantial errors are incorporated into demographic calculations for pied oystercatchers. The errors are in the estimates for breeding success used to model population parameters. The assumptions for chick fledging are too high and over-estimate breeding success. These erroneous assumptions are compounded by the surveys to determine breeding population size. Consequently, analyses and their interpretation regarding demographic parameters are incorrect and misleading. Further, due to low sample size, the consultants were unable to demonstrate differences in breeding success in pied oystercatchers at disturbed sites compared to less disturbed sites. We believe this to be an artefact of small sample size and low statistical power.	1The survey data and analysis relating to breeding success were not used to parameterise any population models for the Pied Oystercatcher.	Dr Newman will address issues relating to surveys of nesting oystercatchers and the errors introduced into the demographic models. Surveys not comparable to DEPA surveys. Point 1 Carrying capacity models alone will not allow prediction of future trends in population size. They need to be coupled with a population balance model that shows dynamic trends in the population size. The role of the carrying capacity model is to support the premise that the mortality of birds, particularly flocks of non-breeding birds is not limiting the size of the population. (i.e. replacements for deceased breeding adults are available). The survival of inexperienced immature birds is of paramount concern. Hence in the absence of such modelling any conclusions drawn concerning future population trends are speculative. The increase in oystercatcher numbers in recent years indicates the population model must be dynamic and a simplistic steady state approach (as used in my 1991predictions) is

			inadequate.
		2 The purpose of the survey and subsequent data analysis was to determine whether there were any substantial differences between the breeding success rates observed at Lauderdale and those observed at other surveyed sites. The purpose of the analysis was to determine whether the loss of nesting sites at Lauderdale would have an impact on the overall breeding success rate for the DEPA complex that was disproportionate to the number of breed (nesting) sites lost (i.e. are the Lauderdale nest sites characterised by a significantly higher (lower) success rates in comparison to other nest sites within the DEPA complex).	Point 2 The breeding population at Lauderdale is small and its net annual production rate is not a major factor in determining the DEPA population size. However, It would be lamentable if these breeding birds were lost because they are very observable and have educational value to the community.
		3 The survey and data analysis results are generally consistent with other published studies and indicate that breeding success rates at Lauderdale are no different from the other DEPA sites.	Point 3 We continue to strongly contend that the proponent has provided a misleading indication of breeding success rate that overestimates breeding success. However we would agree that the proponent's results, including Lauderdale fall within the range of published results for the DEPA, but at the lower not upper end of that range. This is important because artificially high estimates of breeding success would give erroneously favourable conclusions concerning the viability of the DEPA oystercatcher population if modelling had been undertaken. The flawed interpretation of the results arises from a fundamental lack of understanding of the breeding behaviour of Australian Pied Oystercatchers which impacts on the design of the surveys and the analysis of the results. These flaws are summarised below: (A) Breeding success rate must be assessed on the number of occupied territories, not the number of nests found. In the second year of the study the number of nests found was 21% lower than in the previous year's pilot study. As oystercatchers have high fidelity to their breeding territories and low adult mortality this is not a credible result and this factor alone suggests that the breeding success rate may have been over

			estimated. The reason for this deficiency is that the surveys while covering a broad area only involved three visits. Consequently visits may be made after a clutch loss by inundation and before replacement that typically takes about 18 days. (B) The upper level estimate assumed that all runners survived to fledging. This is a false assumption because runners are lost at any time during the seven-week period they are unable to fly. This falsely creates the impression that the breeding success rate may be at the upper level recorded in the literature. The need to make this erroneous assumption is again a consequence of making too few surveys with final survey conducted well before many runners were fledged. We suggest that correctly interpreted the proponents figures indicate a relative low breeding rate of 0.24 fledged young/pair.
		4 The study identified nest site location and associated exposure to inundation/flooding as having a significant influence on breeding success rates.	Point 4 We agree: inundation is a well-known cause of clutch loss. The tendency for nests at the beach edge (historically the preferred nest site) to be inundated has increased during the last three decades because of rising sea levels, particularly from the impact of storm driven high tides, exacerbated by unfavourable changes in beach structure (e.g. loss of spits and shell grit banks in the bays). As a consequence oystercatchers have adapted to the use of different types of nest site back from the beach. These sites are a trade off between fewer losses from inundation and increased losses from predation. However the use of these sites has allowed additional pairs of oystercatchers to nest that provides an explanation of the increased numbers of oystercatchers recorded in the DEPA during the past two decades (i.e. the net breeding productivity of the DEPA may have increased). This needs to be assed by population balance modelling as discussed under point 1.

		5 No significant relationship was identified between breeding success rate and the disturbance levels, although a nonnegative trend between disturbance and breeding success rate was recognised. The limitations of the data and statistical analyses are recognised in the DIIS Appendix S6 (refer Section 4, pg 17).	Point 5 One of the difficulties with proponents design is the failure to appreciate the complex interplay between the various factors associated with the loss of eggs and runners. Hence disturbance is only one of a set of parameters impacting on failure through egg and runner loss. For instance undisturbed nest placed back from the beach face less disturbance but may suffer other adverse factors such as increased predation of runners and the difficulty of getting food to runners, particularly when they are small. These factors are only apparent when intensive surveys are conducted involving multiple visits (e.g. weekly or more frequently). Point 6 This issue has already been discussed under point 3.
4.7	The proponent uses the acronym 'DEPA' to make comparisons with other data sets, such as those collected by Birds Tasmania. DEPA is an acronym for 'Derwent Estuary Pittwater Area', and the use throughout the DIIS is misleading at best, as it suggests compatibility with other data sets. This is not the case as not every site was visited, not all birds were counted, and thus any comparisons between survey data collected for the DIIS and other data sets is invalid, and any conclusions drawn from those comparisons are incorrect.	The DIIS appropriately defines the acronym DEPA (refer page 230). All of the sites surveyed in the preparation of the DIIS are located within and form part of the DEPA complex of wetlands and are generally referred to as the "DEPA survey sites" in the DIIS. It is recognised that the DEPA survey sites do not include all of the wetlands in the DEPA complex or all of the DEPA sites that are the subject of annual surveys by Birds Tasmania. The DIIS contains comparisons of the wader count data obtained from the DIIS DEPA survey sites and the longer term and broader scale DEPA surveys carried out by Birds Tasmania that were used to estimate the population sizes of waders within the DEPA complex. Such comparisons are considered appropriate as the Birds Tasmania DEPA survey data is considered to provide a more reliable estimate of the overall population sizes of wader species within the DEPA complex. When data or population size estimates obtained from the Birds Tasmania DEPA surveys are used appropriate references are provided (e.g. Tables 49, 52 and 53).	Disparity between "DIIS DEPA" and Birds Tas DEPA surveys results in confusion. Walker surveys are a subset of DEPA and thus can not be described as DEPA surveys. Acknowledges Birds Tas data better quality for DEPA area, including Ralphs Bay.

4.10	The proponents are incorrect when they claim that human disturbance is high at Lauderdale and on the adjacent foreshore. In fact, the area supports a large roosting population of pied oystercatchers because it is relatively undisturbed, providing a safe roosting area close to a preferred feeding area. Disturbance is also a key factor with an adverse impact on displaced birds (see below), Schekkerman et al. (1994).	I disagree with this submission and consider that the wader habitat at Lauderdale is exposed to a high level of disturbance associated with the activities of existing residents of Lauderdale, their pets, and the vehicular traffic moving along South Arm Road. The fact that large numbers of waders continue to use the area, particularly Pied Oystercatchers, indicates that the waders are capable of tolerating the existing disturbance regime.	We stand by our original claim. Compared to other shorebird sites in DEPA, disturbance levels are low. Where are the data to claim high levels? We have data from B Priest's MSc thesis re rates of disturbance at Lauderdale foreshore, where rates of disturbance are lower compared to other sites measured in SE Tasmania. Tolerance = habituation – not good for birds when increased people/dogs etc proposed. Irrespective of arguments concerning disturbance levels, it is clear that Lauderdale is a good roost option, probably the best, for the Pied Oystercatchers in SE Tasmania, who are worse off at other locations. At Lauderdale, they have a second roost possibility. Also human activity is at a minimum under high tide and storm driven conditions when the birds are most in need of a secure roost.
4.11	The DIIS fails to make any mention of indirect impacts on shorebirds arising from the resulting increase in human population in the area. Dogs are known predators of shorebirds, and a major source of disturbance. What impacts will the increased recreational activities in the area have on the remaining/surviving shorebirds? Fuel and oil spills from boats moored in the marina will destroy invertebrates living in the benthos. Illumination from houses, walkways, cars etc will improve the visibility of roosting and feeding shorebirds to predators.	The DIIS recognises all of the factors noted. The Lauderdale Quay development will be physically isolated from the retained areas of wader habitat by boating channels and a linear band of open space, which will effectively restrict access to these areas by most residents/visitors and domestic pets (cats and dogs) and reduce the potential for disturbance associated with light and noise emissions from houses and streets. The Lauderdale Quay development makes provision for a comprehensive network of open space reserves within the development and it is anticipated that these reserves will be the primary focus of recreational activities by residents or and visitors to the development. The potential for oils spills and the need for appropriate monitoring and management of that potential is recognized in the DIIS.	Any cat/dog will be able to visit roosting sites. <u>Restriction is not prevention.</u> How will you confine people to these open spaces and reduce disturbance to any shorebirds? Response is a furphey and inadequate in preventing increased disturbance to any remaining birds.

4.12	There are insufficient data to support the assumption that habitat use by shorebirds in Ralphs Bay is similar during day and night times. Differences are well known, as many shorebird species feed on the basis of the tidal cycle rather than light availability (eg Burton & Armitage 2005). Again, assumptions that have not been tested are incorporated without any validity, resulting in poor science and inappropriate conclusions.	The Nocturnal Wader Survey presented as Appendix S5 of the DIIS indicates that (i) the numbers of birds observed during the night do not appear to be substantially larger or smaller than those observed during the day (although these data primarily relate to the Pied Oystercatcher), (ii) waders will forage during the night if the foraging habitat is exposed, and (iii) different roost sites may be used, in part, during the night than during the day. The report is clear in respect of its limitations and the conclusions that it draws, and the implications for other work that relies on same (e.g. the Pied Oystercatcher Carrying Capacity Model), are valid.	Nocturnal surveys appear to be limited to 4 days using thermal imaging. January is not representative of annual pattern of weather conditions experienced at Lauderdale, and especially not of extreme conditions.
5.1	To correctly address the questions of flux, and to assess the total numbers of birds and the species diversity using Ralphs Bay for feeding and roosting, birds would need to be banded and/or marked in some way to allow the identification of individuals. Surveys of marked birds will then enable a more appropriate and more correct assessment of fluxes among sites. Unless and until such data are collected, analyses and interpretation are flawed and true impacts cannot be assessed.	Appendix S4 of the DIIS presents data and analyses concerning patterns of flux in bird numbers amongst the surveyed sites. This analysis is based on contemporaneous survey data and enabled an examination of correlations (linkages) between bird numbers at the various sites and takes into account the influence of a range of factors such as time of day, tidal regimes, meteorological variables. Inferential statistical methods were employed to analyse the data and justification for the use of these methods is provided in Appendix S4. The value of bird banding data is recognised but is not considered essential to the RPDC process. Birds Tasmania has bird banding data for the DEPA complex but would not release this data to Walker's consultants for use in the preparation of the DIIS (refer Sub # 5.2 and Appendix S4).	Surveys not contemporaneous (see Meredith 4.1 response). Analyses treated residents and migrants similarly. Although Birds Tasmania did not release the raw data for reason stated previously (we note that the proponent did not release Atkinson's BTO report until requested by Birds Tasmania and we only knew of its existence because it was referenced in one of the proponent's appendices; this is example of suppression and selective use of information vindicates our position), segments of the Birds Tasmania 1980s banding work were published and available to the proponent in the four volumes of *An Occasional Stint* and in the summarised information on the Pied Oystercatcher in HANZAB. See also two articles in *An Occasional Stint* by Newman on the movement of non-breeding Pied Oystercatchers by resighting colour banded birds; Also two articles one each in *Emu* and *The Stilt* describing the fidelity (limited of movement of adult Pied Oystercatchers) to their breeding territories). See summarised results in HANZAB concerning

			the movement of Pied Oystercatchers between their natal site and their territory having entered the breeding population.
5.2	Birds Tasmania conducted such research in a preliminary study of shorebird flux among sites in the 1980s. We did not make these data available to the consultants for the DIIS, as we were concerned about how these data would be used and abused. We consider this position totally vindicated in view of the manner in which consultants' data were inappropriately used, analysed and synthesised in the DIIS. As demonstrated to the Commission during the Bruny Bioregion MPA Enquiry, shorebird flux among wetlands, lagoons and inter-tidal feeding areas occurs throughout southeast Tasmania. Importantly, the Pittwater Orielton Lagoon Ramsar site is part of this network, and impacts to shorebirds at Ralphs Bay will have an impact on the Ramsar values at Pittwater-Orielton.	The DIIS recognises that there is substantial movement of birds throughout the DEPA complex and the potential linkages between Lauderdale, the Pittwater Orielton Lagoon Ramsar site, and other wetlands forming part of the DEPA complex. The Report of Matters of National Environmental Significance, presented in DIIS Appendix U, also recognises that "*Whilst it is likely that there will be some increased competition amongst waders and shorebirds for available resources at the Ramsar site, due to the displacement of some birds from the Lauderdale habitats, the magnitude of such effects are unlikely to be significant*."	Draft EPBC Guidelines for migratory shorebirds indicates 0.1% threshold for significant impacts.
5.3	The analyses of inter-site movements by shorebirds are fundamentally flawed, and thus the interpretations and conclusions are flawed. It is totally inappropriate to use the same methods for resident and migratory species during the summer months. This is the time that resident species such as red-capped plovers and pied oystercatchers are nesting, and incapable of any inter-site movements. The breeding adults stay in close proximity to the nest in order to protect the eggs and chicks, and to defend their territory. This behaviour and nest-site constraint occurs for periods up to 6 months, from September until February every summer.	The analyses presented in Appendix S4 were undertaken independently for each wader species and take into account seasonal (summer and winter) effects such as breeding activity. As such this is not a valid criticism.	We stand by our original claim. You cannot analyse movements of resident and migratory shorebirds in the same way. Differences in habitat use between resident and migratory species cannot be ignored.

5.4	In contrast to residents, migratory species are not constrained in their movements and thus move freely among the feeding and roosting sites in response to tidal conditions, disturbance etc. Using similar analyses for nesting birds and for migratory species is inappropriate, incorrect and poor science. By using similar analyses, the study assumes similarities in behaviours and habitat use for resident and migratory species that are not present. Thus the conclusions are erroneous and flawed.	It would be generally inappropriate to use different methods to analyse data relating to resident and migratory species. As noted above the analyses were carried out for each species individually and took into account seasonal influences. If different methods were used to analyse the data it would be difficult to make meaningful comparisons between species and detect differences in habitat use.	You cannot analyse movements of resident and migratory shorebirds in the same way. Differences in habitat use between resident and migratory species cannot be ignored. Acknowledged that same methods used to analyse resident and migratory data. See comment above.
5.5	Many of the analyses treat Lauderdale in isolation, ignoring the context of an inter-connected network of coastal intertidal areas and lagoons that are significant feeding and roosting areas. In particular, Lauderdale is treated as a single site for migrants when assessing the numbers of migrants using the site.	The analyses presented in the DIIS and associated appendices appropriately provide a balanced mixture of: • intra-site analyses for the Lauderdale data which are required to have an understanding of how waders utilize different parts of the Lauderdale habitat and the implications of the proposal; and • inter-site analyses which investigate the role that Lauderdale plays as part of the broader DEPA complex of wetlands. The meaning of comments concerning the treatment of migratory species is not understood.	Unbalanced mix and biased/skewed due to uneven sampling of sites for counts. See our comments below re 1% threshold re model estimates. See also our comments at 7.7 as an example.
6.3	It is relatively easy to create roosting habitat (ie areas used by birds to rest at high tide); this has been achieved in Australia and elsewhere. It is another proposal altogether to create feeding habitat – ie an area where a functioning ecosystem is present to provide ongoing prey to predators, nutrient cycling occurs and all natural ecosystems functions are present without intervention. Such functioning and ecologically sound habitat is beyond the capacity of developers to 'create' as offset. We are unaware of viable, inter-tidal shorebird feeding habitat being created in Australia.	Birds Tasmania's recognition of the feasibility of creating an alternative high-tide roost habitat as part of the offset strategy is noted. The Offset Strategy does not propose to "create" inter-tidal wader foraging habitat due to the recognised difficulties, including non-target impacts, of doing so and the available evidence that indicates there is sufficient food resources available within the DEPA complex to cater for displaced birds. The Offset Strategy proposes to:	Offset strategy is flawed – to propose protecting off-site habitat elsewhere has no validity when existing Conservation Area, recognised by Tasmanian and Federal Governments, can be revoked, so can any wader habitat used as mitigation for Walker destruction. This is NOT a viable offset strategy as the offset site could be revoked in the future. Mitigation only until next coastal development comes along. Proposal destroys foraging habitat with no replacement and off-site offset has no assurance of protection into the future. Off-site offset area not identified, so its relevance/value is unknown.

		• reinstate tidal flows into EML and across RCF to restore the ecological functioning of this area to a more natural state; and	Surely to reinstate tidal flows "across RCF [Race Course Flats] and EML [East Marsh Lagoon] these have to be flooded? This is contradicted below (6.9 and 6.11).
		• secure and protect an alternative area of wader habitat and adjacent land into which the landward progression of wader habitat would be allowed as sea level rise eventuates.	How to secure and protect an alternative area of wader habitat? If the existing Ralphs Bay Conservation Area, recognised by Tasmanian and Federal Governments, can be revoked, so can any wader habitat used as mitigation for Walker destruction. This is NOT a viable offset strategy. The proponent should not be allowed to destroy prime feeding habitat without replacing feeding habitat. It creates a dangerous precedent in Australia for it to be argued it is not needed. Note that Atkinson quotes UK ratios of between 1 and 2 times the lost area based on risk. Furthermore Atkinson states mitigation should be in place **before** development and there is a five-year lead-time for seed areas to "mature". In NSW, offsets are looked as a standard strategy by government, but not always implemented because it is not possible. The issue for compensation of the Deep Pond in the Hunter Estuary [$1.3 million was committed by NSW State Government] but compensation has still to be delivered because there are no suitable areas. It is not an acceptable argument that habitat can be destroyed without compensation based on inexact and un-validated modelling of carrying capacity. One scenario is that Pied Oystercatchers continue to increase in numbers; has this been taken into account? Finally the government should not be allowed to fund its obligations to making contingencies for future sea level change by "selling off" the optimal habitat for a resident wader species that

			is a relatively scarce species of Oystercatcher. As indicated earlier, it is inappropriate to discuss foraging and roost issues separately; Lauderdale is a package involving two roost options and excellent foraging habitat.
6.7	All offset calculations and options assume that 100% of offset area will develop into inter-tidal habitat that is similar to that to be destroyed. This is a completely unrealistic assumption or expectation and does not reflect the challenges in creating 'functionally equivalent' inter-tidal shorebird feeding habitat from an alternative (terrestrial saltmarsh) habitat. We predict that any offset areas or 'created' will be smaller in extent, poorer in quality, lower in "functional equivalence" and thus the habitat loss will be significantly greater.	The extent of wader habitat loss is documented in the DIIS and its extent will not vary dependent on the success or otherwise of the offset works. As noted above there is no intent to create intertidal wader habitat from salt-marsh habitat.	Offset strategy proposed flooding Race Course Flats and East Marsh Lagoon to form inter-tidal habitat. Proposal is to create tidal regime in Race Course Flats and East Marsh Lagoon.
6.8	There is the VERY REAL potential for the loss of the current foraging habitat and the complete failure of proposed mitigation strategy to provide foraging habitat to shorebirds. All offset habitat compensation strategies are high-risk ventures, with no money back guarantee if they fail. What price the cost of failure here at Lauderdale? The most likely outcome is a population crash of pied oystercatchers in southeast Tasmania, with little hope of recovery without massive management efforts.	The DIIS does not assume any substantive replacement of wader foraging habitat that will be lost with created or restored habitat in EML, RCF or elsewhere in the DEPA complex. The submission that "*The most likely outcome is a population crash of pied-oystercatchers in southeast Tasmania*" is not in any way consistent with the results of the DIIS investigations.	No replacement for foraging habitat will see dramatic reduction in foraging habitat available to all shorebirds (resident and migratory) in DEPA. Model only looked at PIOY for carrying capacity – no modelling for other species displaced by destruction of mudflats. This answer is not consistent with 7.2 where a permanent population decrease in Pied Oystercatchers is predicted by proponent. Does the model consider the reduction in foraging habitat as a consequence of increased sea levels? There may be excess capacity now but what will happen in future. We believe that the issue of inexperienced birds requiring specialised food and foraging niches has not been examined.
6.9	The proponent proposes destroying	There is no proposal to create inter-tidal wader habit via the	Areas of Race Course Flats and East Marsh

	saltmarsh to create intertidal habitat as mitigation, with no guarantee of success. The saltmarsh community is not listed as a threatened community, but several species of salt marsh plants are listed under state and federal legislations. The proponent's documentation notes the greatest reductions in saltmarsh in Tasmania and Victoria, then in the next breath, proposes to destroy even more of this community, with no suggestion of mitigation for the loss of saltmarsh.	destruction of salt-marsh, although this option was considered and rejected in part for the reasons put forward by Birds Tasmania. The offset strategy provides for the reinstatement of tidal flows across Racecourse Flats and a range of other measures which will enhance the quality of salt-marsh communities growing in this area.	Lagoon include salt marsh that will be destroyed by "tidal flows". Tidal flows across Racecourse Flats = flooding, contradicts comments at 6.3. **What surveys conducted for RCF & EML? What impacts associated with reinstating tidal flows?**
6.10	The proposed offset options include the flooding of some of Race Course Flats. This seems a particularly risky strategy in light of Chris Sharple's work in identifying high-risk areas to coastal erosion and flooding in light of predicted sea level rises.	One of the reasons for using sluice gates on the culverts to East Marsh Lagoon is to enable some regulation of climate change induced sea level rise impacts upon areas to the east of South-Arm Road.	
6.11	What effects might be predicted from the combined effects arising from the proposed flooding of Race Course Flats AND predicted sea level rises (ie a water table close to the ground surface) regarding the increased potential for leachates from the closed Lauderdale Tip entering the created habitat through the flooded areas?	There is no proposal to flood Racecourse Flats.	Contradicts comments at 6.3.
6.12	East Marsh Lagoon is presently anoxic and when the proposed flooding occurs as part of the habitat creation/mitigation, it is likely that unexpected consequences will arise that are likely to be adverse to any shorebirds' prey species in the benthos. This issue compounds the concerns regarding the leachates being remobilised into the created habitat, described above.	As recognised by Birds Tasmania, East Marsh Lagoon is currently in an anoxic state and in that state has the potential to be an ongoing source of contaminant release into the downstream environment with the potential to adversely affect the foraging habitat of waders. The offset strategy proposes works that will convert East Marsh Lagoon from its current anoxic state to a functioning ecosystem which contributes to the productivity of the area. As recognised in the Offset Strategy presented in DIIS Appendix W this will be done in accordance with an East Marsh Lagoon and Racecourse Flats Management Plan. This plan should make provisions to ensure that there is no inappropriate release of	This East Marsh Lagoon and Racecourse Flats Management Plan does not exist, so can not make any assessment of proposed Offset Strategy re its viability and likelihood of success.

		potentially contaminated water into the receiving environment.	Stating what a non-existent MP "should" make provisions for is not sufficient.
6.13	The loss of the intertidal feeding and roosting areas at Lauderdale is functionally equivalent to habitat fragmentation, reducing the options for shorebirds in the southeast of Tasmania to fully utilise the network of lagoons, wetlands and inter-tidal feeding areas. Each area is used for differing purposes under differing circumstances, such as tide cycle, weather conditions, avoidance of human disturbance, escape from predators, etc.	The DIIS recognises that the individual wetlands that make up the DEPA complex are not homogenous in terms of the resources that they provide and the manners in which they are utilised by waders. Analysis of the fundamental differences between sites, in respect of the abundance and diversity of wader prey, availability of foraging habitat as determined by tidal cycles and overall abundance of wader species, were all accounted for in the Pied Oystercatcher Carrying Capacity Model and have been considered in the DIIS.	
6.14	It is in appropriate and incorrect to assume that all sites used by shorebirds are functionally the same. Different sites play different roles for shorebirds – some are more important as feeding area, others as refuges from predators. Losing the foraging area at Lauderdale can not be dismissed by claiming other areas are available as feeding areas by being functionally equivalent – they are not.	Appendix S4 (pages 33-45) details the results of analyses of observed variation in the usage of different DEPA survey sites by various species of wader and these results were considered in the preparation of the impact analysis presented in Section 5.11 of the DIIS.	
7.1	The proponent claims without any evidence that all shorebirds displaced by the proposed development will simply move somewhere else. This argument is partly 'supported' by further claims that there is more than sufficient food resources elsewhere and that the birds will be able to forage elsewhere on these food resources.	The DIIS and other published literature indicates that there is movement of waders between the various wetlands that comprise the DEPA complex and the Pied Oystercatcher Carrying Capacity Model (and the foraging ecology and wader prey surveys) clearly provide a sound evidentiary basis for the DIIS finding that remaining areas of foraging habitat at Lauderdale and within the DEPA complex have the capacity to accommodate Pied Oystercatcher displaced by the Lauderdale Quay development.	Why are the other areas not supporting more Pied Oystercatchers if this abundance of food is present? It is likely that disturbance, predation and competition are all contributing to the reduced numbers of Pied Oystercatchers at other sites in DEPA and that food availability is not the limiting factor.
7.2	This overly simplistic claim overlooks many key aspects of the biology of the resident pied oystercatchers. It assumes that displaced birds will also be able to establish breeding territories elsewhere adjacent to these under-used food reserves. It assumes that resident pied oystercatchers elsewhere will accommodate the influx of these displaced	The DIIS also recognises that this movement of birds would result in increased competition for foraging resources. The DIIS also recognises that there would be increased competition for nesting resources due to the loss of such resources associated with the Lauderdale Quay development and that the contribution that the Lauderdale habitats make towards the recruitment of individuals into the local Pied Oystercatcher	Concurs with Birds Tasmania's prediction that there will be a decrease in Pied Oystercatcher population. This decrease will be permanent and can not be mitigated.

	birds. It assumes that prey resources elsewhere will allow for increased predation pressure by the increased number of pied oystercatchers.	population will reduce (i.e. a **decline in the local population size is anticipated over time**). The DIIS recognises that there are some measures that can be taken to mitigate and offset the impacts associated with the loss of wader habitat resources that will occur as a result of the development. Taking all of these factors into consideration the DIIS concludes, at Section 5.11.7 that "*The Pied oystercatcher, Red-capped plover, Sooty oystercatcher and Masked lapwing are the remaining wader species regularly observed at Lauderdale. None of these species is listed under the threatened or migratory species provisions of either the EPBC Act or the TSP Act. The Lauderdale Quay development will impact upon these species and the nature and scales of these impacts are likely to be discernible at the local Lauderdale and broader DEPA levels. The anticipated impacts of the Lauderdale Quay development will not however be likely to result in a significant reduction in the DEPA, State, National or International populations of these species*."	Proposal will destroy feeding habitat with no replacement and the off-site offset has no assurance of continued protection. Mitigation strategy is not viable.
7.3 – 7.6	These submissions deal specifically with the Pied Oystercatcher Carrying Capacity Model	I defer to the evidence of Dr Charles Meredith of Biosis Pty Ltd in respect of these submission.	Dr Edmund will comment on the model on behalf of Birds Tasmania.
7.7	Why are there no model estimates for Red-necked Stints? This species uses southeast Tasmania (including Ralphs Bay) and is present in internationally significant numbers (>1% population) and warrants analyses. Any future analyses would need to address our concerns as to the usefulness and applicability of the model's assumptions etc.	As detailed in Table 47 of the DIIS the numbers of Red-necked Stints observed at Lauderdale do not constitute 1% of the national or global population of this species. There is no known Carrying Capacity Model that has been developed for the Red-necked Stint.	This is an example where Ralphs Bay is treated in isolation. Elsewhere DIIS Ralphs Bay acknowledged as part of DEPA network of sites and yet here because Ralphs Bay in isolation does not meet 1% criterion, no Carrying Capacity Model was attempted. Need to develop model for southeast Tasmania that holds 1% of Red-necked Stints population and meets thresholds for 'significant impact' (ie 0.1%) under draft EPBC guidelines.
7.8	We have provided a number of papers that contradict the proponent's claims that displaced birds will be able to establish elsewhere with no impact on their survivorship. Studies in the UK have clearly shown decreased breeding success and lower survival of shorebirds displaced from	The DIIS does not suggest that "displaced birds will be able to establish elsewhere with no impact on their survivorship" and recognises that there will be a range of impacts upon waders resulting from the Lauderdale Quay development. In this respect at page 256 it is recognised that Potential impacts of the Lauderdale Quay development on wader and shorebird populations that utilise available habitat at Lauderdale include:	

	their preferred feeding habitats (see below).	5. mortality, reduced condition, or displacement of birds from the project area and adjacent areas due to one or more of the above; 6. increased competition for available resources at other bays and lagoons due to the displacement of birds from Lauderdale; 7. direct loss of nesting sites and reduced breeding success due to increased levels of indirect disturbance; and 8. consequential reductions in the overall size, health and viability of populations that are affected by one or more of the above. The DIIS (Table 55) further states that in most instances in the absence of mitigation and offset measures these impacts will have a Moderate magnitude with "discernible changes in the size and/or behaviour of the local wader populations are anticipated, but all species are likely to persist in the Lauderdale locality".	Long term permanent decrease in pied oystercatcher population in DEPA, likely that other species also decrease in numbers. Persistence at what level? What numbers? Unlikely to be at the same levels.
7.13	Sutherland & Dolman (1994) provide a modelling approach to predict the impacts of displaced shorebirds arising from increased competition for prey resources. This method should be explored to assess its utility for the proposed destruction of Ralphs Bay.	I defer to the evidence of Dr Charles Meredith of Biosis Pty Ltd in respect of this submission	
7.14	The appropriate method to assess the impact of the proposed development on the resident and migratory shorebirds (and indeed all species likely to be affected by the proposal) would be a Population Viability Analysis (PVA) that quantifies ecological relationships and provides greater confidence in the results than the current approach.	I defer to the evidence of Dr Charles Meredith of Biosis Pty Ltd in respect of this submission	
8.1	A recent study (Cook et al. 2008) predicts massive (92%) loss of primary productivity in the bay with "significant flow-on effects for higher trophic levels such as migratory wading birds".	It is understood that the predicted 92% reduction in primary productivity relates to the area that would be directly impacted by the Lauderdale Quay development (i.e. the development footprint) and does not apply to the remaining areas of inter-tidal and sub-tidal habitat at Lauderdale or throughout Ralphs Bay. (Refer	The footprint of the development destroys the highest quality feeding habitat for shorebirds in Ralphs Bay. Further details of the Cook et al. study and its implications will be presented by the author(s) of the paper.

	Predictably, this study has been dismissed by the proponent, but it is critical to note that the Cook research has been scrutinised, peer-reviewed and approved by independent, international scientists – in stark contrast to the technical reports commissioned and prepared for the DIIS by the proponent, of which none have been scrutinised to the same extent.	Submission #519, pg 1 where it is stated by two of the co-authors of the Cook et al 2008 study that "Our figure of a 92% reduction applies only to the area that is developed and not to the whole bay."	
8.3	Impacts to many EPBC-listed species are not assessed and completely ignored in the DIIS– it is not just the Spotted Handfish that will be impacted in the marine environment by the proposal, but all other listed species. Why have these species been omitted from the DIIS?	All relevant EPBC listed species are considered in both the main DIIS document and in Appendix U of the DIIS.	
Conc 3	There is no discussion of the issue of Cumulative Impacts arising from the proposal. The development is treated in isolation, with no consideration of its contribution to existing, on-going decreases in shorebird populations throughout the East Asian-Australasian Flyway. Ralphs Bay is internationally significant for resident and migratory species, and the destruction of a major feeding and roosting area is considered in isolation, as though Ralphs Bay were on the Moon, with no linkage to the local, national and international populations it supports.	Consideration of the potential cumulative impact that the Lauderdale Quay development may have at local, regional, national and international levels is provided in the DIIS in respect of the potential magnitude of reductions in wader population sizes. The DIIS also considers and recognises the pressures that wader populations are under at national and international levels and the linkages that exist between habitats at Lauderdale, within the DEPA complex and at national and global levels. The consequence of the observed declines in wader numbers at both a global and national level is that there is likely to be fewer migratory birds relying upon resources available within the DEPA complex. This will reduce competition for available resources and reduces the likely significance of the loss of resources that would occur if the Lauderdale Quay development proceeds.	Same questionable logic as Conc 4 below – because wader populations are predicted to decrease globally, the destruction of Lauderdale will have less impact into the future because there will be fewer birds alive in the future! This is a pessimistic outlook that overlooks all the conservation efforts underway to conserve shorebirds. Argues that competition for food will be greater if development doesn't proceed – offensive and arrogant. A perverse pro-construction argument.
Conc 4	The proponent argues that the area to be developed will be lost in the future from rising sea levels is offensive and contrary to efforts elsewhere in the world where pro-active management strategies are under development to accommodate sea level	The DIIS does not argue that the Lauderdale Quay development should proceed because the affected wader habitat will eventually be lost due to climate change effects. The DIIS addresses the RPDC Guidelines which require consideration of the impacts of projected climate change induced	This assumes that no measures to protect shorebird habitat will be made. Elsewhere around

	rise. Using sea level rise as an argument in support for the premature destruction of internationally significant wetlands and shorebird populations carries no scientific validity or credibility.	sea-level rise. The consequence of these projections, if realised, is that the majority of the existing wader foraging, roosting and nesting habitats in the northern parts of Lauderdale will be lost irrespective of whether or not the Lauderdale Quay development proceeds. As noted in the RPDC Guidelines this is a matter of relevance for consideration by the RPDC when it takes into account the short and long-term environmental, social and economic impacts and benefits of the proposal.	the world, coastal management strategies are providing for accommodating to rising sea levels. Makes assumption that no capacity for formation/development of inter-tidal feeding habitat will form as sea level rises.

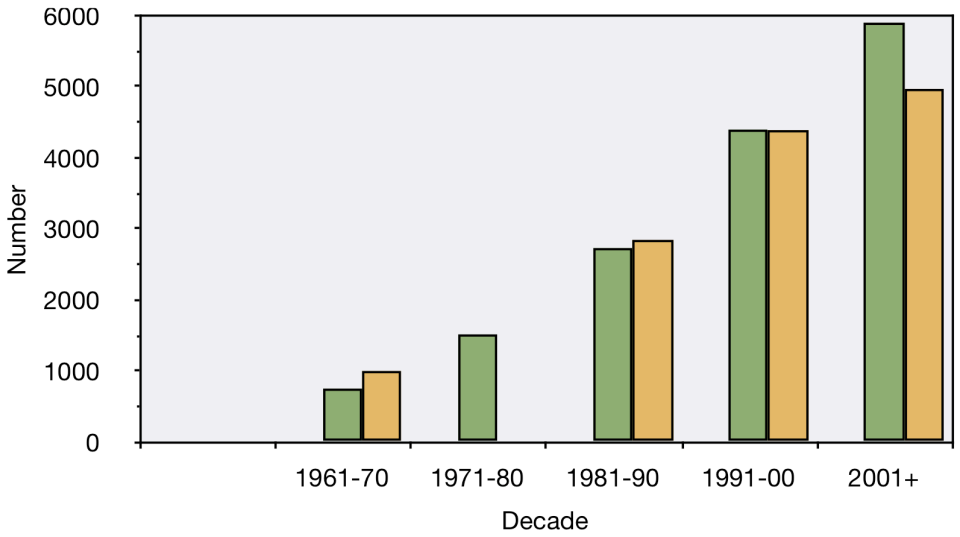

Figure 1. Decadal data for Pied Oystercatchers in Ralphs Bay.
Summer counts are shown in green, winter in orange (ref Delaney 4.1, page 5.).