Appendix 6: Jurien Bay
Human Uses of the Marine and Coastal Environment around Jurien Bay

(Source: Google Earth, 2008)
1 Introduction

Jurien Bay is the largest town within the Shire of Dandaragan. For many years, Jurien was widely regarded as a fishing village, with a small amount of tourism. However, in recent years the town has been experiencing significant development. Demand for land and housing, particularly for holiday homes, has been increasing rapidly, and is anticipated to continue into the future. Located two and a half hours drive north of Perth, Jurien Bay services smaller surrounding settlements of Green Head, Leeman and Cervantes. Figure 1 illustrates the location of Jurien Bay and the Dandaragan Statistical Local Area.

Over the past two decades Jurien Bay has experienced sustained population growth. Population decline from the greater Dandaragan Statistical Local Area however has moderated the impact of the population growth in Jurien Bay, with the region overall experiencing little growth. Figure 2 illustrates the population growth in the region between 1996 and 2006.
Figure 2 Population Change in Dandaragan Statistical Local Area 1996 to 2006*

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>2,000</td>
</tr>
<tr>
<td>2001</td>
<td>2,500</td>
</tr>
<tr>
<td>2006</td>
<td>3,000</td>
</tr>
</tbody>
</table>


The town hosts a significant transient or short-term population, driven by the seasonal nature of the fishing and agricultural industries, and the popularity of the town among semi retirees. Plate 1 shows temporary accommodation available at the local caravan park. Table 1 and Figure 3 illustrate ageing trends in the area’s population, with growth in the number of people above the age of 65 evident over the past five years. Figure 4 provides a comparison of Western Australia and Jurien Bay urban locality in terms of age structure for 2006. From this figure, the age groups above 65 are shown to be present in higher percentage than for the remainder of Western Australia. There is also a high proportion of children from 0 to 14 years, indicating the popularity of Jurien Bay for young families. The lack of teenage children in the town can be attributed to a lack of secondary schooling facilities available locally.
Plate 1 Tourist and Semi Permanent Accommodation

Table 1 Ageing Trends in the Dandaragan Statistical Local Area

<table>
<thead>
<tr>
<th>Year</th>
<th>0-9</th>
<th>10-19</th>
<th>20-29</th>
<th>30-39</th>
<th>40-49</th>
<th>50-59</th>
<th>60-69</th>
<th>70-79</th>
<th>80+</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>410</td>
<td>254</td>
<td>367</td>
<td>437</td>
<td>360</td>
<td>320</td>
<td>298</td>
<td>107</td>
<td>15</td>
</tr>
<tr>
<td>2001</td>
<td>478</td>
<td>303</td>
<td>327</td>
<td>432</td>
<td>448</td>
<td>444</td>
<td>332</td>
<td>175</td>
<td>49</td>
</tr>
<tr>
<td>2006</td>
<td>439</td>
<td>266</td>
<td>262</td>
<td>439</td>
<td>497</td>
<td>456</td>
<td>407</td>
<td>205</td>
<td>80</td>
</tr>
</tbody>
</table>

The Indigenous population of the town has more than doubled over the past five years. However, in 2006, the Indigenous population represented only 2.3 per cent of the total population.

In conjunction with continuing population growth, urban development has been ongoing in the town. Plate 2 shows a new housing development in Jurien Bay. In recent years, the
rate of residential development has increased rapidly. Industry and business expansion has also occurred, and average incomes have increased (Figure 5). However, the cost of housing has increased significantly over the past decade as demand for housing has increased. Average median housing loan repayments have increased by 69 per cent from 1996 to 2006. Median rents in the town have experienced similar changes, increasing 61 per cent over the same period. Changes in median rents and loan repayments are shown in Figure 6.

Plate 2 A New Housing Development in Jurien Bay
Figure 5 Increasing Incomes in Dandaragan Statistical Local Area Between 1996 and 2006

![Graph showing increasing incomes between 1996 and 2006.](image)


Figure 6 Increasing Cost of Housing in Dandaragan Statistical Local Area Between 1996 and 2006

![Graph showing increasing cost of housing between 1996 and 2006.](image)


Substantial development of the coastline between Jurien and Cervantes is also planned for the future. Referred to as the Turquoise Coast Development, it will provide a mixture of residential and rural land as well as tourist facilities. Closer to the Jurien Bay town site, land is zoned for medium density residential housing and tourist accommodation. Further south, land has been zoned as rural and rural residential. The Turquoise Coast Development is anticipated to occur over the next 40 to 50 years.

A number of new commercial and community properties are also due to be upgraded and developed in the near future to service the needs of a growing community. These include a new shopping centre, school and retirement village.
In conjunction with Tourism WA, the Shire of Dandaragan has in place a strategy for the
development of Jurien Bay as a tourist icon. Part of the Coral Coast, the future
development of tourism will maintain a particular focus on marketing of the marine park,
as well as improving existing, and constructing new tourist facilities. Due for completion
in 2008, the Jurien Bay Marina Resort will provide a mixture of tourist accommodation
and residential housing overlooking the marina. Recent upgrades of eco-tourist camping
and caravan facilities at Sandy Cape have also been undertaken.

As part of the Turquoise Coast Development, there are plans to construct low impact
tourist accommodation, including 1400 tourist beds and 500 caravan sites south of the
current Jurien Bay town site (Tourism Western Australia, 2007). There are also plans to
develop a wilderness retreat 20km north of Jurien, which would provide eco-tourist,
lodge style accommodation, with the current landholding bordering onto the Mt Lesueur
National Park (Tourism Western Australia, 2007). The Jurien Bay Beach Resort,
comprising 106 holiday units close to the town centre, received council approval in early
2007 and construction is due to be completed in 2008. Development of chalet and motel
units at Sandy Cape is currently in the planning phase and is due to be completed by
2010.

There are also a number of other tourist developments planned for the region however
developers are awaiting completion of the Indian Ocean Drive extension prior to
submitting plans for council approval.

Rapid tourist and residential development in Jurien Bay and the surrounding areas has
largely come about as a result of the proposed Indian Ocean Drive extension. This road
will reduce total distance and travelling time from Perth, increasing opportunities for
tourism in the region as well as attracting more permanent residents. The Indian Ocean
Drive extension is identified by Tourism Western Australia as the top infrastructure
priority for the State with the first stage due for completion by mid 2008. Upgrades to
other infrastructure in the area, including the Jurien Bay airstrip, were also recently
completed by the Shire.

Anticipated tourist development in the region is likely to increase the importance of the
sector for the region’s economy. Traditionally, Jurien Bay has been reliant on agriculture
and fishing as a major contributor to the local economy. In recent years, however, the
economic structure has diversified. In 2006, the largest employers in the town included:

- Construction (13 per cent of the workforce)
- Accommodation and food services (12 per cent of the workforce)
- Public administration and safety (12 per cent of the workforce)
- Retail trade (11 per cent of the workforce)

Table 2 shows the total employment by industry and provides an indication of the
importance of each sector to the town. Table 3 shows the total employment by industry
for the Dandaragan Statistical Local Area, clearly showing the difference in economic
function between Jurien Bay town and the greater region.
## Table 2 Number of Persons Employed by Industry Sector in Jurien Bay (urban locality) 2006

<table>
<thead>
<tr>
<th>ANZIC Industry Category (Division)</th>
<th>Number of Persons Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
</tr>
<tr>
<td>Agriculture, forestry &amp; fishing</td>
<td>23</td>
</tr>
<tr>
<td>Mining</td>
<td>18</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>30</td>
</tr>
<tr>
<td>Electricity, gas, water &amp; waste services</td>
<td>13</td>
</tr>
<tr>
<td>Construction</td>
<td>53</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>3</td>
</tr>
<tr>
<td>Retail trade</td>
<td>15</td>
</tr>
<tr>
<td>Accommodation &amp; food services</td>
<td>10</td>
</tr>
<tr>
<td>Transport, postal &amp; warehousing</td>
<td>10</td>
</tr>
<tr>
<td>Information media &amp; telecommunications</td>
<td>0</td>
</tr>
<tr>
<td>Financial &amp; insurance services</td>
<td>0</td>
</tr>
<tr>
<td>Rental, hiring &amp; real estate services</td>
<td>6</td>
</tr>
<tr>
<td>Professional, scientific &amp; technical services</td>
<td>4</td>
</tr>
<tr>
<td>Administrative &amp; support services</td>
<td>0</td>
</tr>
<tr>
<td>Public administration &amp; safety</td>
<td>33</td>
</tr>
<tr>
<td>Education &amp; training</td>
<td>9</td>
</tr>
<tr>
<td>Health care &amp; social assistance</td>
<td>0</td>
</tr>
<tr>
<td>Arts &amp; recreation services</td>
<td>0</td>
</tr>
<tr>
<td>Other services</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>253</strong></td>
</tr>
</tbody>
</table>

(Source: Australian Bureau of Statistics, 2006)
### Table 3 Number of Persons Employed by Industry Sector in the Dandaragan Statistical Local Area 2006

<table>
<thead>
<tr>
<th>ANZIC Industry Category (Division)</th>
<th>Number of Persons Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
</tr>
<tr>
<td>Agriculture, forestry &amp; fishing</td>
<td>282</td>
</tr>
<tr>
<td>Mining</td>
<td>76</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>83</td>
</tr>
<tr>
<td>Electricity, gas, water &amp; waste services</td>
<td>15</td>
</tr>
<tr>
<td>Construction</td>
<td>104</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>21</td>
</tr>
<tr>
<td>Retail trade</td>
<td>30</td>
</tr>
<tr>
<td>Accommodation &amp; food services</td>
<td>33</td>
</tr>
<tr>
<td>Transport, postal &amp; warehousing</td>
<td>31</td>
</tr>
<tr>
<td>Information media &amp; telecommunications</td>
<td>0</td>
</tr>
<tr>
<td>Financial &amp; insurance services</td>
<td>3</td>
</tr>
<tr>
<td>Rental, hiring &amp; real estate services</td>
<td>11</td>
</tr>
<tr>
<td>Professional, scientific &amp; technical services</td>
<td>13</td>
</tr>
<tr>
<td>Administrative &amp; support services</td>
<td>9</td>
</tr>
<tr>
<td>Public administration &amp; safety</td>
<td>55</td>
</tr>
<tr>
<td>Education &amp; training</td>
<td>14</td>
</tr>
<tr>
<td>Health care &amp; social assistance</td>
<td>5</td>
</tr>
<tr>
<td>Arts &amp; recreation services</td>
<td>4</td>
</tr>
<tr>
<td>Other services</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>836</strong></td>
</tr>
</tbody>
</table>

(Source: Australian Bureau of Statistics, 2006)

Using location quotients for various local industries, the relative importance of certain sectors in the regional economy can be observed. Location quotients provide an indication of the significance of certain industries to a region compared to the national average for the particular industry. In Jurien Bay, a number of industries are seen to be more important for the region than expected, including:

- Retail trade
- Education and training
- Accommodation and food services
- Manufacturing
- Rental, hiring and real estate services
- Electricity, gas, water and waste services

Retail trade in particular was seen to be more significant than anticipated for the town. In 2006, 52 people were employed in the industry however this represented over ten times...
the expected level of employment given the population size. A similar situation was seen in the education and training industry, with employment four times greater than expected. Significant employment in rental, hiring and real estate services in the town can be attributed to recent land releases and new residential developments planned for the area. These figures further indicate the transition of the town from a reliance on traditional extractive industries such as fishing and mining to a more diverse economic base, a trend likely to continue into the future.
2 Location of Human Use and Changes over Time

This section of the profile provides an overview of the major human uses of the marine environment around Jurien Bay, particularly those in or around the ‘Marine Futures’ study site. The uses examined in detail include:

- Noongar Uses and Values
- Commercial Fishing
- Recreational Fishing
- Charter Fishing and Diving
- Surfing, Windsurfing and Recreational Boat Use
- Mining and Defence
- Conservation and Aesthetic Values

This section also outlines changes to commercial and recreational fishing, and diving activities, as well as perceptions of changes in the natural environment over time. Furthermore, various local and state planning policies that could potentially influence future uses of the coastal and marine environment in the areas are reviewed.
2.1 Noongar Uses and Values

Anthropological evidence suggests the Amangu and Yued clans of the Noongar people occupied the Jurien Bay region from around 30,000 years ago. The formal registration of sacred and culturally important sites has been undertaken by the Government of Western Australia in order to recognise the traditional value of the area to Indigenous people. As of November 2007, 64 registered Indigenous heritage sites had been identified in the Shire of Dandaragan, with certain sites in the area adjacent to the Jurien Bay Marine Park. Table 4 details the registered Indigenous heritage sites in the areas.

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Status</th>
<th>Access Type</th>
<th>Site Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wedge Island Coast Sandune Quinilup Springs/Yonga Kep Wari</td>
<td>Permanent Register</td>
<td>Open Access</td>
<td>Ceremonial</td>
</tr>
<tr>
<td>Wedge Island Camping Ground Shell Middens</td>
<td>Interim Register</td>
<td>Open Access</td>
<td>Art, Midden, History, Grinding Grove</td>
</tr>
<tr>
<td>Middle Head Midden</td>
<td>Permanent Register</td>
<td>Open Access</td>
<td>Art, Midden</td>
</tr>
<tr>
<td>Sandland Island</td>
<td>Interim Register</td>
<td>Open Access</td>
<td>Art, Midden</td>
</tr>
<tr>
<td>Kwelena Mambakort – Wedge Island</td>
<td>Interim Register</td>
<td>Closed Access</td>
<td>Ceremonial, Art, Midden, History, Grinding Grove</td>
</tr>
</tbody>
</table>

(Source: Department of Indigenous Affairs, 2006)

Archaeological evidence also exists, indicating the Indigenous occupation of a series of limestone caves in the area and the use of coastal dunes as burial sites (Marine Parks and Reserves Authority and Department of Conservation and Land Management, 2005). The coastal area between Green Head and Jurien Bay has one of the largest concentrations of midden deposits on the south-west coast of the State, with the deposits containing remnants of marine shells and fish remains. These finds indicate the importance of the coastal environment and its resources for the Indigenous people of the region. At present, there is no evidence to suggest Indigenous use of the coastline extended beyond coastal waters. Currently, there is one registered Native Title Claim in the Jurien Bay area. Held by the Yued clan, the claim covers a vast area including the Jurien Bay town site and adjacent marine areas.
2.2 Commercial Fishing

A number of commercial fisheries operate in the waters off the coast of Jurien Bay. These include:

- Western Rock Lobster (*Panulirus cygnus*)
- Demersal Gilnet and Demersal Longline, targeting Gummy Shark (*Mustelus antarcticus*) and Dusky Whaler Shark (*Carcharhinus obscurus*), Whiskery Shark (*Furgaleus macki*), Dhufish (*Glaucosoma hebraicum*) and Snapper species.
- Abalone
- Specimen shell and aquarium fish collecting (short-term, seasonal)

The Western Rock Lobster fishery is the highest value commercial fishery operating in the region and the most significant contributor to the local economy. Extending from Shark Bay to Cape Leeuwin, Jurien Bay is located in management Zone C of the fishery. Total annual catch across the State is valued at around $300 million (Department of Fisheries, 2006). This, however, does fluctuate slightly from year to year. Regionally, there are also seasonal variations in total catch rates.

Regulation of the Rock Lobster fishery is based on a total allowable effort (TAE) system, considering the total number of pots licensed per fisher and correspondingly, the rate of
use. In 2004/05, new management measures were introduced resulting in a five percent reduction in effort and increased temporal closures throughout the season (Department of Fisheries, 2006). Approximately 140 vessels operate around the Jurien Bay region and are based at various settlements along the central west coast. Catch in this area is equal to approximately 1.6 million kilograms live weight of lobster each season (Marine Parks and Reserves Authority, 2005).

Figure 7 illustrates the relative intensity of Rock Lobster fishing activity around Jurien Bay as compared to other areas of the State.

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**Figure 7 Intensity of Commercial Rock Lobster Fishing Activity**

(Source: Department of Fisheries, 2006)

*Note: Values of 0 indicate no activity and 1 represents high activity. Fishing intensity calculated by number of pot lifts.*

In addition to the Rock Lobster fishery, the Demersal gillnet and Demersal longline managed fishery also operates in the area. The fishery is limited entry and management is predominantly through the regulation of effort, fishing gear and fishing location. There are approximately six vessels, which regularly operate in the waters of the Jurien Bay Marine Park (Marine Parks and Reserves Authority, 2005). Target species include Gummy, Whiskery and Dusky Whaler Shark species, as well as Dhufish and Snapper.

Two of the smaller commercial fisheries operating in the waters around Jurien Bay are Abalone and specimen shell collection. Divers in the Abalone fishery mainly target inshore reefs of the marine park. Divided into eight management zones, Jurien Bay is
located in area seven, and strict catch limits apply. Although there is some Abalone fishing in the area, Jurien is not regarded as an area of significant importance for Abalone harvest. With regards to the collection of shells and aquarium species, there is no regular activity undertaken in Jurien Bay but licensed collectors have been known to regularly visit the area for short periods of time (Marine Parks and Reserves Authority, 2005).

2.2.1 Observed changes to Fishing Effort, Fishing location and the Ecosystem

In deducing changes in fishing effort and location, a series of in depth interview were conducted in order to identify the nature of changes over the past four decades. Interviewees included long-term local commercial fishers, fisheries managers and marine scientists. Interviewees’ observations of change in the fishing sector and also the marine environment are presented in this section, and reflect the consenting views of interview participants rather than dissenting views.

From the interviews conducted, a number of trends were identified regarding commercial fishing activity in the area. These include:

- Decrease in the number of commercial fishers
- Increasing mobility and size of commercial vessels
- Increasing use of technologically advanced fishing gear, including GPS
- Decrease in fish stocks, particularly Shark and Dhufish
- Decrease in the economic viability of the industry

2.2.1.1 Decrease in the number of commercial fishers

A decrease in the total number of commercial fishing operators in the region has been observed. Correspondingly, there has been a reduction in the number of vessels active in the region. This has come about for a number of reasons including increasing regulation of the industry, which has discouraged some operators from participating fully in the fishery, technological advances in gear resulting in greater efficiency, and the increasing costs of maintaining vessels. Currently, there are around 15 commercial operators based in Jurien. However, due to the mobility of the fishing fleet, a number of operators fish in the area but are based elsewhere.

While management arrangements for the Rock Lobster fishery, such as ongoing pot reductions, have contributed to a reduction in the number of active vessels, it has not necessarily translated into reduced catch rates. One Rock Lobster fisher comments:

There were a few boats that had 200 [pots], but not that many. There used to be around 800 boats [in the State], now its down to 500...or less now. That’s the way the rules have gone, its made the industry smaller...so if you lost 20% [of your pots though government pot reductions], turn around and bought another 20% off someone who was looking to get out...that is what made less and less boats...you can still catch the same amount of crays with less pots, don’t need all those pots (J_3_2006).
In Demersal Gillnet and Long-line Fisheries, government regulation and market factors have contributed to a general decline in industry profitability, the major reason for the reduction in the number of active vessels in the Jurien Bay area.

### 2.2.1.2 Increasing mobility and size of commercial vessels

Mobility of commercial fishing vessels has increased over time. This has been both facilitated by, and the result of, increasing vessel size and the need to maintain competitiveness in the industry. Increasing vessel size has allowed increased accessibility to offshore areas and has changed the traditional approach to fishing. Two long-term commercial fishers comment on fishing methods and changes in the industry:

*When I first started, we fished the inshore, we only had a small boat...then as we got bigger boats...we were fishing further, off the edge of the continental shelf... your costs are astronomical these days [compared] to what they were in the old days, so you make the most of it and fish where and when you can, at different times, to maximise your income (J_4_2006).*

*Boats move up and down the coast, more freely now. Hardly anyone did when I first started, now half the fleet moves around, at least half. If there are good catches down south, then people go down there and vice versa. You can be here today and Fremantle tomorrow...they can all be mobile, but maybe 14-15 [boats] hang around, take a chance not spending the money on fuel and stuff, because it is an extra cost (J_3_2006).*

Commercial fishers in Jurien indicated these trends have contributed to increased catch rates as larger vessels can cover more ground in less time. Smaller boats are then forced to farm their immediate areas more intensively in order to keep up with the competition. However, increasing mobility of the commercial fishing fleet has also had a number of socio-economic consequences for the Jurien community. Namely, it contributed to a reduction in the town’s fishing fleet, particularly with the lifting of the ‘home porting rule’ in 1992, which directly facilitated for greater mobility along the coast (Huddleston and Tonts, 2007).

### 2.2.1.3 Increasing use of technologically advanced fishing gear

Along with an increase in the mobility and size of vessels there have also been improvements in the technology used by commercial fishers. Satellite navigation systems (GPS) in particular have changed the way commercial fishers operated, with effort being much more targeted to particular locations. Unproductive areas tend to be bypassed in favour of those that have abundant stocks. However, despite increased efficiency in effort/catch ratios though technological advancements in fishing gear, fishers still record
high fluctuations in catch from year to year. Such fluctuations are due to environmental factors.

Fishing efficiency has also improved due to the mechanisation of hauling gear and improvements in the design and quality of materials used in the manufacture of ropes, lines and pots. There was little distinction made on the impact on net and line fishing in the area. However, the comment was made that the move to greater mechanisation discouraged many part time fishers in the Demersal gillnet and longline fisheries due to the cost of fitting boats with new gear. Greater mechanisation of fishing gear has also reduced the need for manual labour on commercial boats (Huddleston and Tonts, 2007).

Access to the same technology used on commercial vessels by recreational anglers was frequently identified by commercial fishers as an issue of concern. It was noted the use of GPS navigation systems by recreational anglers allowed for greater catch rates and more targeted effort. A commercial fisher describes the situation:

*He [a recreational fisher] shares the mark [on GPS] between the fishing clubs. That’s how the pressure gets put on. He might share the mark with someone who has come up from Marmion, one guy is fishing north, one fishing south, ‘I’ll give you some marks if you share yours’, and it just gets worse and worse for the poor fish (J_3_2006).*

In this respect, technological advances were seen to be detrimental to the industry as they facilitated increased competition among different interest groups for the same resource.

### 2.2.1.4 Decrease in some fish stocks, particularly Shark and Dhufish

There has been a decrease in overall fish stocks. Commercial fishers attribute this to overfishing by a small minority of commercial fishers and to increasing fishing pressure generated by the recreational sector. A minority of commercial operators are known to exceed their catch limits in order to maintain their position in the industry, as described by one commercial fisher:

*There are some [commercial fishers] who will abuse the system to their benefit. They make a living off fishing and think it’s their right to take what they want (J_7_2006).*

Shark and Dhufish species are believed to have declined in the area as a result of previous unregulated commercial fishing activities. In regards to the decline in Shark and Dhufish stocks, commercial fishers commented:

*We used to average 150 Sharks a day, 20 Dhufish, 20 Snapper, that would be an average. You wouldn’t catch anything like that now. And we used to pull by hand...there was heaps of fish then [in 1986], but you can see the difference in the fishing now though (J_3_2006).*
The offshore fishing is definitely dropping, because I have a diary from when I was [in my] early 20’s and the amount of Dhufish I would catch…now…can hardly catch a fish (J_1_2006).

[There was] abuse of the wetline [licences] in the 1950’s and 1960’s. People were catching as much as they wanted as there were no restrictions…especially with the Dhufish [Dhufish] populations (J_7_2006).

The recreational fishing sector was noted as placing increasing pressure on fish stocks, in particular on Dhufish populations. Commercial fishers commented the majority of pressure was not due to the activities of the commercial sector, which is already highly regulated, rather was the result of increasing numbers of recreational fishers. ‘Upsizing’ of Dhufish was identified as a particular problem. One commercial fisher also added:

I have heard of people with 4 year old kids, getting a license for ‘little Joey’. He can’t even pull the pots, but we will take him with us so I can use 2 more pots (J_1_2006).

There were few other changes identified with regard to the marine environment in the area. However, one long-term fisher commented that there were more whales in the area now than in the past, and that seal numbers remained constant.

**2.2.1.5 Decrease in the economic viability of the industry**

Due to a variety of reasons, the economic viability of commercial fisheries in Jurien Bay has decreased over time. Despite improvements in technology and satellite navigation, fish stocks appear to have decreased, meaning that making a living from the industry has become more difficult. Increasing costs across the industry have made it difficult for small-scale operators to maintain competitiveness. This has resulted in the majority of smaller operators being forced out of the industry. Furthermore, Department of Fisheries regulations have resulted in increased financial pressure on many fishers thereby decreasing the economic viability of the operation. One fisher describes the situation in the industry:

The price of fuel has sky-rocketed…that has a big impact on us at the moment…and the bait, every year it goes up and up and up, its starting to get quite expensive. A few years ago we never used to worry about fuel, it was a minor expense, now it is a major expense…[fishers must] weigh up the options, if you don’t think you can catch a certain amount… then yeah, you stay home because it costs you to run the boat [so] your out of pocket. And that takes a bit of effort out of the industry, because you have to watch what it costs to go to work these days. And you never used to years ago (J_4_2006).
Fishers commented that this would become an increasing problem particularly in the Rock Lobster industry if regulation was to move to a quota system. Maintaining constant mobility and industry competitiveness also involves additional costs. Commercial fishers in Jurien Bay commented:

The area is just not viable in terms of wet lining now...you would go broke...most of us [fishers] don’t work in the fishery full time. I’m in hardware and my mate, he is a tradesman...you just can’t fish one spot or one town. It doesn’t make sense economically, it’s just not valid (J_7_2006).

20 years ago...we used to average 150 sharks a day...you would not catch anything like that now...these days you get about 15-20 sharks...there just wasn’t much money in [fishing]. We used to catch the fish, but sometimes it was down to $1.20 a kilo for shark (J_3_2006).

Regulation of the industry has further decreased industry viability for smaller operators, particularly for the Wetline industry. Licence renewal is based on catch history and the current management approaches taken by Department of Fisheries are aimed at maintaining sustainable yields and preventing further growth.

The declining viability of the industry has repercussions for the social and economic prosperity of the local community. For many years, the local fishing industry has generated significant economic multipliers in the community, and has also had a key role in the social activities of the community.

2.2.2 Conclusion: Priority Considerations for Management

Over the past four decades, a number of changes have been observed in the nature of commercial fishing around Jurien Bay. Table 5 presents a summary of the observations made by local commercial fishers along with the perceived impacts.
<table>
<thead>
<tr>
<th>Observed Changes</th>
<th>Perceived Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes to licensing arrangements and regulation across</td>
<td>• Increase in costs for individual fishers to participate in</td>
</tr>
<tr>
<td>the industry</td>
<td>commercial fishing</td>
</tr>
<tr>
<td></td>
<td>• Increase in the distances travelled by vessels in order</td>
</tr>
<tr>
<td></td>
<td>to maintain profits</td>
</tr>
<tr>
<td>Increase in use of technology on commercial vessels</td>
<td>• Increase in efficiency of catch influencing a reduction</td>
</tr>
<tr>
<td></td>
<td>in the number of active vessels</td>
</tr>
<tr>
<td>Rising industry costs related to changes in licensing</td>
<td>• Reduced effort in certain fisheries</td>
</tr>
<tr>
<td>and management arrangements</td>
<td>• Declining profitability of some fisheries</td>
</tr>
<tr>
<td>Increase in recreational fishing</td>
<td>• Decline in the number of certain fish species</td>
</tr>
</tbody>
</table>

Based on the observed changes in commercial fishing and the marine environment, commercial fishers would like to see more comprehensive management of recreational fisheries. In particular, it was seen as necessary for regulation of both the recreational and commercial sector to be undertaken using the same guiding principles, eliminating the perceived preferential treatment of the recreational sector. Commercial fishers also identified the need for better monitoring and policing of minority groups of both commercial and recreational fishers who refuse to adhere to the regulations.
2.3 Recreational Fishing

Recreational fishing is one of the most popular pastime activities on the Jurien Bay coastline and a major lifestyle attraction for permanent residents in the region. The Jurien Bay Marine Park provides habitat for a diversity of fish and marine life. Generally, the zoning of the park has not had a major impact on recreational fishing effort in the area, with around 96 per cent of the park’s shoreline accessible to recreational anglers.

Both shore and boat based fishing is undertaken in the waters around Jurien Bay. A number of locations along the coast are highly popular among shore-based fishers. These include:

- The jetty at Jurien Bay
- Jurien Bay Marina
- Jurien beaches
- Hill River
- Around Green Head and Leeman

Shore based fishing locations are popular among tourists and locals alike. Generally the transient fishing population increases significantly during school holidays, and long
weekends. The exact participation rate for recreational fishing is unknown, however in 2005 it was estimated an approximate 36 per cent of the combined resident and tourist population participate in some form of recreational angling (Marine Park and Reserves Authority, 2005). Local recreational fishers also identified a swell in the population during the Rock Lobster fishing season but this did not necessarily translate to increased effort. Overall, an increase in fishing participation was correlated with continued population growth and the increasing popularity of the central coast among boat fishers.

Local fishers commented the town was a popular fishing location for visitors from the nearby mining town of Eneabba and surrounding agricultural hinterland. There are also a high number of holiday home owners who regularly visit Jurien Bay, with recreational fishing being one of the major activities undertaken.

Specific fish species were targeted by onshore fishers. These included:
- Western Australian Salmon (*Arripis truttaceus*)
- Australian Herring (*Arripis georgianus*)
- Whiting (*Sillaginidae*)
- Tailor (*Pomatomus saltatrix*)
- Baldchin Groper (*Choerodon rubescens*)
- Mullet species
- Abalone

Recreational fishers who tend to fish offshore and out to the continental shelf boundary target particular fish species including:
- Samson fish (*Seriola hippos*)
- Dhufish (*Glaucosoma hebraicum*)
- Baldchin Groper (*Choerodon rubescens*)
- Snapper species

Western Rock Lobster are also fished recreationally around Jurien Bay. A recreational fishing licence is, however, required from the State Department of Fisheries. The number of recreational fishing licences in each local government area around Jurien is illustrated in Figure 8. Licences are also required for recreational catch of abalone.
Within the Jurien Bay Marine Park there are various sanctuary and exclusions zones where fishing activity is restricted or prohibited. Certain areas popular among recreational fishers are only accessible by four wheel drive vehicles. This is particularly the case in areas further from the Jurien Bay town site where the roads have not yet been sealed.

Over the last two decades, recreational fishers have noticed a change in stocks of certain fish and crustacean species. Many fishers believe that these changes have been a consequence of fishing efforts.

2.3.1 Observed Changes to Fishing Effort, Fishing Location and the Ecosystem

In deducing changes in recreational fishing effort and location, a series of in depth interviews were conducted in order to identify the nature of changes over the past four decades. Interviewees included local recreational fishers, both long and short-term, visiting recreational fishers, tackle shop owners, fisheries managers and scientists. ‘Observations’ of change presented in this section reflect the consenting views of interview participants, rather than dissenting views.

A number of trends were identified from the interviews, including:
- Increasing numbers of recreational fishers
- Increasing popularity of boat-based fishing and increase in the size of boats
Changes in the use of technology in recreational fishing
Recreational fishers are generally travelling greater distances to fish
Decline in the number and size of certain fish species
Increase in the number of some fish species

2.3.1.1 Increasing number of recreational fishers

A number of resident Jurien Bay recreational fishers observed a significant increase in the popularity of Jurien Bay among recreational anglers. Over the past 20 years, local recreational fishers have noticed a substantial increase in the number of tourists and visiting recreational anglers. Local fishers attribute this to a number of factors including:

- Growing population of the town of Jurien Bay
- Increasing affluence of the State’s population meaning greater investment in boats and advanced fishing gear
- Affordability of holiday homes in the area leading to a greater seasonal population
- Overcrowding in the south west of the State, particularly at good fishing locations, has resulted in many holidaymakers seeking less populated locations such as Jurien Bay.
- Depletion of fish stock in the south west of the State and metropolitan area
- Construction of the Jurien Bay marina which significantly improved boat launching facilities in the region

One of the reasons for the increasing popularity of Jurien Bay among tourists was described by a local resident:

*Generally the increase in population has meant changes in participation and a decrease in catch rate. Why? In the south, places like Dunsborough are full, so people are moving further north. Jurien is seen as the Dunsborough of the North (J_9_2006).*

A long-term resident and local fisher commented on the population growth of the town and the impact on fishing in the area:

*The population has a big thing to do with it too, more population, more people are looking for something to do, of course [with] fishing you pay $20-$30 for your licence and away you go, get abalone, crabs, crayfish…three blokes put a few grand in and get a boat, they can hit and miss or get some good gear [and catch more fish] (J_12_2006).*

Another commented:

*Jurien is becoming more popular now…more of a central place [along the coast]…most of the people that come over are holiday makers, a lot of them have holiday homes…a*
lot of these [new] homes have been sold and are now holiday homes (J_13_2006).

The seasonal influx of visiting fishers to the region was also of some concern to local fishers, particularly with the impact on fish stocks. One visiting fisher stated the increase at peak times is ten fold, particularly over the school holidays and long weekends. Two resident fishers commented:

*If you come down at Christmas time, they have boats and trailers parked up and down the street, 200-300 boats. [That has] had an impact on what is available and what is not. A lot of them catch nothing (J_6_2006).*

*Here on the weekend...you’re bumper to bumper trying to get your boat into the water, and at Christmas and Easter time, it’s just a madhouse. You can’t head out past the reef, there are just so many boats out there (J_12_2006).*

With the population growth in Jurien anticipated to continue into the future, increasing pressure on fish stocks from recreational fishing is a probable trend.

### 2.3.1.2 Increasing popularity of boat-based fishing and increase in the size of boats

In addition to trends of increasing numbers of recreational fishers, there has been a corresponding increase in the percentage of boat based fishing activity in Jurien Bay. Accurate estimates of the levels of boat fishing are difficult to source. The most recent creel survey of the Jurien area conducted by the Department of Fisheries was in 1996/97. From this survey it was concluded around 12 per cent of the total boat based fishing effort along the West Coast bioregion was in waters between Lancelin and Leeman.

An increase in offshore boat based fishing has placed increasing pressure on a number of different fish species. In conjunction with this, the increase in boat size has made offshore locations more accessible to recreational anglers, increasingly placing more pressure on those areas with greater catch rates. One local fisher described the situation:

*Boating has become much more popular, I would say boating would be more popular than beach fishing...and as the boats get bigger and better, people are going further and further. They can stay out longer, even when the wind does come up a little bit (J_13_2006).*

### 2.3.1.3 Changes in the use of technology in recreational fishing

With ongoing developments in technology, fishing gear is constantly refined and upgraded in order to ensure efficiency and improved catch rates. Some of the major changes in recreational fishing gear mentioned by fishers in Jurien Bay included:
- Use of GPS
- More advanced electronic fish finders and depth sounders
- Improvements in fishing line – from nylon to braided line
- Use of synthetic lures and baits
- Lightweight and scientifically engineered rods and reels
- More advanced release weights for deep sea fish species

Fishers believe these improvements have contributed to increasing catch rates. However, they have also led to changes in fishing methods, particularly in boat fishing. Increasingly, with the use of lures and other technologies, fishers are drifting with the current as opposed to anchoring in one area for long periods of time. In addition, improvements in the effectiveness of release weights have resulted in an increase in catch and release fishing from the past.

Effort is also generally more targeted, with the ability to return to the same fishing spot on a daily basis. Many of the local fishers also commented on the ability to travel further offshore being tied to improvements in navigation technology. Areas further offshore are more accessible because of increasing boat size, as described above. A long-term recreational fisher observed the changes:

_The up side [of GPS] would be you can fish quicker, where as years ago you would go by landmarks, nowadays [it is] so much easier to fish all the lumps, but they are getting fished out...so virtually your nearly going out further_ (J_11_2006).

### 2.3.1.4 Recreational fishers are generally travelling greater distances to fish

Recreational fishers observed a tendency among anglers to travel further distances to access good fishing grounds. This observation was made both in relation to resident and visiting fishers. Both groups of anglers were prepared to head out further offshore, north or south of the Jurien town site in order to fish. Generally, fishing in the area was undertaken between 5 and 25 nautical miles from the coastline.

Visiting fishers were also more likely to travel to Jurien Bay from elsewhere in the State rather than to fish closer to more metropolitan areas. One of the major reasons for this was a perceived decline in fish stocks due to intensive fishing pressure in both metropolitan areas and near shore areas around the Jurien Bay town site.

However, one frequent visitor and recreational fisher in the area suggests there are other factors also contributing to the locations used by recreational anglers, namely fisher perceptions and views:

_The fish are still there though, people have a perception that they need to go out further to catch bigger or better fish. They don’t even bother fishing inshore, they will zip out straight away to areas they know their mates caught fish_ (J_8_2006).
2.3.1.5 Decline in the number and size of certain fish species

Recreational fishers observed a decrease in the number of certain fish species. Complex fish migration patterns and seasonal fluctuations in catch rate were generally acknowledged by local recreational fishers. However, despite this awareness, local anglers believed intensified fishing pressure was contributing to the decline. A long-term fisher in the area described the changes seen over time:

I guess you do see a lot of changes...before you could just about guarantee catches, enough fish for a meal in a few hours...now I guess it takes a bit longer than that (J_13_2006).

Decline in the number of Dhufish were of particular concern for Jurien Bay recreational fishers.

The stocks of the big fish have dwindled a little bit, you don’t get the whopping big Dhufies (Dhufish) like we used to 30 years ago, but you still get the range. You get a lot more smaller ones and people put these back quick smart...conservation 30 years ago was very limited (J_12_2006).

Another mentioned:

I reckon going back 28 years ago, we never saw a small Dhui, never. All the Dhuees were big then, you could catch them in the bay there (points). That’s where I caught my first Dhui (J_11_2006).

Despite these observations, generally recreational anglers in the area believed the health of the marine environment had been maintained. However, there was some concern over the impact commercial fishing was having on the populations of Dhufish and certain Shark species.

2.3.1.6 Increase in the number of some fish species

Certain fish species were observed to have increased in numbers over time. In particular, tropical fish species are now seen and caught more frequently in the area. This change has been noticed particularly over the past five to ten years. Some of the species seen more frequently observed in the area include:

- Mackerel species
- North West Snapper
- Red Throat Emperor
- Coral Trout
- North West Blowfish
One visiting recreational fisher also observed a pod of killer whales while boat fishing in the area and commented this was an indication of changes in the natural environment.

### 2.3.2 Conclusion: Priority Considerations for Management

Over time, a number of changes have been observed in the nature of recreational fishing activity around Jurien Bay. Table 6 presents a summary of the observations made by local fishers along with the perceived impacts.

**Table 6 Changes Observed by Recreational Fishers and their Perceived Impacts**

<table>
<thead>
<tr>
<th>Observed Changes</th>
<th>Perceived Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in the number of recreational anglers</td>
<td>• More fishers fishing in areas further offshore or along the coast of the Jurien Bay town site</td>
</tr>
<tr>
<td></td>
<td>• Congestion around boat launching facilities and popular fishing locations</td>
</tr>
<tr>
<td></td>
<td>• Increase pressure on some fish stocks</td>
</tr>
<tr>
<td>Increase in popularity of boat based fishing</td>
<td>• Greater accessibility to offshore fishing locations</td>
</tr>
<tr>
<td></td>
<td>• Increase pressure on some deep sea species</td>
</tr>
<tr>
<td>Improvements in local infrastructure, particularly the construction of the new marina</td>
<td>• Greater popularity of Jurien Bay among boat fishers due to the ease of launching</td>
</tr>
<tr>
<td>Changes in water temperatures and currents</td>
<td>• Increase in species diversity, particularly in number of temperate fish</td>
</tr>
</tbody>
</table>

The perceived decline in Dhufish stocks was a major concern for local recreational anglers. As a result, they would like to see tighter restrictions or the complete removal of rights for commercial operators to catch finfish. Improved policing and monitoring of recreational anglers was also seen as necessary. There was a perception that a large majority of visiting anglers to the area were unaware of catch regulations or were deliberately choosing not to abide by them. One fisher mentioned the possibility of adjusting current bag limits to weight limits in an attempt to discourage upsizing.
2.4 Fishing Charters, Eco-tourism and Diving Activities

Currently, there is one charter operator based in Jurien Bay. However, as identified from interviews in the region, other operators were active in the area but based in Perth or elsewhere along the coast. The designation of the Jurien Bay Marine Park has facilitated the growth of eco-tourism in the area, with diving and wildlife charters very popular among visitors.

Coastal and transport infrastructure constraints have generally limited development of the charter industry in Jurien. Figure 9 illustrates intensity of charter activity in the area. When compared to the remainder of the State, Jurien Bay is considered a low use area. Charter activity is likely to intensify in the future with continued development of the town and promotion as a major tourist node on the west coast, in close proximity to metropolitan Perth.

Figure 9 Intensity of Charter Activity around Jurien Bay

![Map illustrating charter activity intensity](Source: Department of Fisheries, 2006)

Note: The number of people on charters is calculated over a four year period, between 2001/02 and 2005/06.

The Jurien Bay Marine Park provides habitat for a variety of temperate and tropical marine species. With a number of seal and sea lion colonies inhabiting the area, the interaction with marine mammals is an additional attraction to divers and snorkelers in the area. Some of the popular dive locations around Jurien Bay include:

- North Head
- Favourite Island
Eco-charters are regularly conducted around the waters of Jurien Bay. A major attraction and focus for eco-tourism around Jurien Bay is the interaction with seals inhabiting a number of the offshore islands. There are also a number of sea lion and sea bird breeding colonies in the area, and whales can be seen off the coast during their annual migrations south. As of July 2006, there were 138 licensed fishing charter operators and 23 eco-tour operators registered in the West Coast bioregion. Approximately only 55 per cent of license holders were active in the bioregion (Department of Fisheries, 2006).

Fishing charters are also undertaken in Jurien Bay. A number of local and visiting operators offer full and half day charter options, depending on the type of fish being targeted. Overall, there has been a decline in the number of fishing only charters undertaken across the state, representing a decrease of 18 per cent in charter fishing effort from 2002 to 2005 (Department of Fisheries, 2006).

All charter operators are required to hold a licence, issued and monitored by the State Department of Fisheries. There are three types of charter licence available: fishing, restricted fishing and aquatic eco-tours. Restricted fishing licences also apply to snorkelling and diving charter operations. These regulations allow operators (and their clients) to catch and keep fish but only for the purpose of a meal to be eaten during the course of the charter. Additionally, all charter operators must submit monthly log books to the Department of Fisheries which are analysed to monitor the industry’s impact on fish stocks and habitats. Eco-tour licence holders must also keep a record of any whale sightings and any interaction with marine mammals.
2.4.1 Observed Changes to Charter Boat Fishing and Diving Locations and the Ecosystem

From interviews with a number of charter operators active in the area and long term divers, a number of trends were identified with regards to changes in the nature of diving and charter activity. Figure 10 illustrates popular dive and charter fishing locations, as indicated by interview participants. Interviewees’ observations of change in charter fishing and diving activities and also the marine environment are presented in this section, and reflect the consenting views of interview participants rather than dissenting views.
The observed changes over time included:

- Little change in locations used for diving and charter activity
- Divers observed a decrease in the number of certain fish species
- Increase in the popularity of eco-charters over the past few years
- Increase in the number of fishing charters conducted by non-local operators

### 2.4.1.1 Little change in locations used for diving and charter activity

Divers and charter operators observed little change in the locations commonly used for diving and charter activity in the area. The establishment of the Jurien Bay Marine Park resulted in certain areas being used more frequently for diving due to the community perceptions of sanctuary areas as more pristine locations. However, divers were unable to identify if the conditions of the marine environment had improved following the establishment of the marine park.

### 2.4.1.2 Divers observed a decrease in the number certain fish species

Both charter operators and long-term divers around Jurien Bay commented there had been a decline in the number of certain fish species observed. Of particular concern was the perceived decline in the number of Dhufish. One diver commented there has also
been a reduction in the numbers of some fish species that were not actively targeted by recreational anglers:

For example Buff Bream. We used to see them in large numbers out diving, but over the last five years, there is almost none [J_5_2006].

Despite this decline, other divers commented there had been little change in the number of other fish species. Herring were noted as remaining numerous in the area.

2.4.1.3 Increase in the popularity of eco-charters over the past few years

Over time, the number of people participating in eco-charters has increased. Charter operators attributed this increase in the popularity of eco-tourism to a growing conservation mentality and environmental consciousness among the general population. In addition, population growth in Jurien Bay over time and the increasing popularity of the area among tourists was also attributed to this increase. One charter operator commented the local shire had recently received funding to promote tourism in the area. This was expected to have positive impacts on the charter and diving industry, but the town was seen as still in the stages of creating a reputation as a desirable tourist destination for visitors.

2.4.1.4 Increase in the number of fishing charters conducted by non-local operators

Both local and visiting charter operators commented there had been an increase in the number of non-local charter operators working in the area. Due to the seasonal nature of the charter industry, charter vessels are highly mobile. The proximity of Jurien Bay to Perth makes it an attractive alternative for charter operators based in Perth. This change was attributed to perceived declines in fish stocks in the Perth metropolitan area, forcing operators to travel further north to satisfy customers.

2.4.2 Conclusion: Major Considerations for Management

Divers and charter boat operators noticed certain change in the nature of the industry over time. The changes observed and their perceived impacts on the area are listed in Table 6. In response to these changes, local charter operators would like to see the unification of industry management procedures. Currently, charter operators must report to a number of agencies, and various licences must be renewed periodically. Some operators commented the costs involved in the industry are prohibitive to its future development.
<table>
<thead>
<tr>
<th>Observed Changes</th>
<th>Perceived Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in the population of the town, and visitors from the Perth region</td>
<td>• Recent increase in the number of people participating in charters, particularly eco-charters</td>
</tr>
<tr>
<td>Increase in the number of recreational fishers visiting from the Perth region</td>
<td>• Greater pressure on fish resources from visiting recreational anglers and fishing charter operators</td>
</tr>
<tr>
<td>Designation of the Jurien Bay Marine Park</td>
<td>• Increased the popularity of the area for recreational diving</td>
</tr>
<tr>
<td></td>
<td>• Provided a foundation for the promotion of the area as a tourist destination</td>
</tr>
</tbody>
</table>
2.5 Surfing, Windsurfing and Recreational Boat Use

Surfing is a popular recreational activity in Jurien Bay, with beach and coastal reef breaks favoured locations. Also popular in the area is windsurfing. The reliable and strong wind conditions and mixture of protected and swell consistent locations have resulted in the location being internationally regarded as a good windsurfing location. The nearby settlement of Cervantes is a centre for windsurfing activity along the coast, with international and national windsurfing competitions and time trials held frequently.

The facilities of the Jurien Bay Marina have attracted an increasing number of recreational boat owners to the region. Initially opened in 1988, the marina was designed to provide for the needs of the town’s commercial fishing fleet. Over recent years the facilities have been upgraded and extended to provide for the needs of local and visiting recreational fishers and boaters. The marina provides the only public sealed boat ramp facilities between Quinn’s Rocks, just north of Perth, and Port Denison, an approximate 350km stretch of coastline. As the region grows in popularity as a tourist destination, it is probable that traffic at the marina will also increase, placing added pressure on the facilities. Local boat owners are already concerned with overcrowding at peak use times such as weekends and school holidays. This suggests there will be a need to upgrade marina facilities in order to cater for intensification of future recreational boat use.

Data on the intensity of boating activity in the area are somewhat limited and unreliable. However, aerial surveys conducted by the Department of Environment and Conservation between 2003 and 2006 give some indication as to the locations where boating is most frequently undertaken. These data were collected from aerial surveys monitoring the number of recreational vessels (Figure 11) and the number of cars with trailers (Figure 12) along the coast between Wedge Island and Sandy Point.
Figure 11 Location of Recreational Boating around Jurien Bay between 2003 and 2006

(Source: Department of Fisheries, 2006)
Figure 12 Location of Recreational Boating (Vehicles with Trailers) around Jurien Bay between 2003 and 2006

(SOURCE: Department of Fisheries, 2006)
2.6 Mining and Defence

Currently, there is no petroleum or mineral exploration undertaken in the Jurien Bay area. However, there has been some interest expressed in the region’s potential due to onshore gas production in the vicinity of Dongara and Eneabba. In 2006, the Australian Government released acreage in offshore areas adjacent to Jurien Bay bordering partially onto marine park boundaries. Currently exploratory drilling or production is not permitted in sanctuary and recreation zones, or in special purpose zones of the Jurien Bay Marine Park. It is, however, permitted in general use zones and some special purpose zones of marine parks leaving open the possibility for future exploration in the area. Figure 13 illustrates current exploration permits and release areas current as of December 2007.

Figure 13 Exploration Permits and Release Areas around Jurien Bay

![Exploration map](https://example.com/explore_map.png)

(Source: Department of Industry and Resources, 2008)

The Royal Australian Navy has two exercise and training areas located near Jurien Bay, at Lancelin and Flat Rock. Military flying, firing and explosive demolition are practiced in Lancelin. Flat Rock is used exclusively for air to surface weapons firing (Australian Hydrographic Service, 2006). The types of firing occurring within the training areas include bombing practice from aircraft, air to sea, on ground firing, anti-aircraft firing and firing from shore batteries or ships (Australian Hydrographic Service, 2006). Jurien Bay is located within the area allocated to military flying for defence training purposes.
2.7 Conservation and Aesthetic Values

2.7.1 The Jurien Bay Marine Park

The Jurien Bay Marine Park was officially designated in 2003 and provides management arrangements to ensure the conservation of the area. Extending from Wedge Island in the south to Green Head in the north, there are a number of special use and sanctuary zones within park boundaries. These include:

- General Use zones
- Sanctuary Zones, including:
  - Fisherman Islands
  - North Head
  - Pumpkin Hollow
  - Boullanger Island
  - Booker Rocks
  - Nambung Bay
  - Cavanagh Reef
  - Grey
  - Target Rock
  - Wedge Island
- Special Purpose Zones, including:
  - Aquaculture, located at:
    - Seaward Ledge
    - Hill River
    - Emu Rocks
    - Cervantes Islands
  - Puerulus Monitoring Zone, located at:
    - North of Boullanger Island
    - Scientific Reference
    - Fisherman Islands
    - Hill River
    - Green Islands
  - Shore Based Activities, located at:
    - North Head
    - Boullanger Island
    - Nambung Bay

Around 96 per cent of the marine park shore line is accessible to recreational shore based fishing, with only selected sanctuary zones restricting angling activity. Selected general use zones are accessible by commercial rock lobster fishers. Diving and wildlife observation is permitted across all areas of the park.

Many recreational fishers commented that the establishment of the Marine Park had not greatly impacted on their fishing grounds as they more commonly used areas outside of park boundaries or within general use zones.
Figure 14 illustrates the extent of boundaries and use zones within the Jurien Bay Marine Park.

**Figure 14 Recreational Use Zones of the Jurien Bay Marine Park**

(Source: Department of Conservation and Land Management, 2003)
There are only a few formalised community groups concerned with environmental conservation/protection of the marine environment in Jurien Bay. The Jurien Bay Regional Herbarium Group and the Jurien Bay Marine Park Advisory Group are both voluntary groups and are involved in maintaining conservation values of the marine and coastal environment. The Jurien Bay Marine Park Advisory Group is responsible for providing input regarding the State management of the marine park. Members of the group include community members, commercial fishers and marine scientists.

### 2.7.2 Planning policies and strategies

The need to protect the unique marine environment of the Jurien Bay region as well as to maintain ongoing development of the town has been acknowledged by state and local government planning bodies. At the local level, the District Town Planning Scheme No 7 is currently in force in the Shire of Dandaragan, and complements the Local Planning Strategy for the Shire. Currently, there is no other specific legislation in place with respect to maintaining social and ecological values of Jurien Bay.

At the State level, there are a number of policies related to the development of coastal lands which aim to ensure social, cultural and ecological values are maintained. These policies include:

- State Coastal Planning Policy (2.6)
- Coastal Zone Management Policy for Western Australia
- Country Coastal Planning Policy (DC 6.1)

There are strict policies and guidelines in place governing the development of residential land in the town. These policies and guidelines are to ensure the social viability of new developments, with various developments having slightly different requirements in terms of building codes.
3 Conclusion

The Jurien Bay marine area is used for a variety of passive and extractive activities. From interviews with the local users, it was apparent that the nature and intensity of uses had changed over the past four decades. The main uses of the marine environment and the changes seen over time are presented in Table 8

<table>
<thead>
<tr>
<th>Major Use</th>
<th>Observed Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial fishing</td>
<td>• Decline in the number of fishers</td>
</tr>
<tr>
<td></td>
<td>• Increased fleet mobility and vessel size</td>
</tr>
<tr>
<td></td>
<td>• Greater use of advanced technology</td>
</tr>
<tr>
<td>Recreational fishing</td>
<td>• Greater use of advanced technology</td>
</tr>
<tr>
<td></td>
<td>• Increase in participation, particularly boat based fishing</td>
</tr>
<tr>
<td></td>
<td>• Greater crowding at marina during school holiday periods</td>
</tr>
<tr>
<td></td>
<td>• Increase in the proportion of boat-based fishers</td>
</tr>
<tr>
<td></td>
<td>• Greater regulation of fishing over time</td>
</tr>
<tr>
<td>Diving and charter activity</td>
<td>• Increase in popularity of eco-charters in the recent past</td>
</tr>
<tr>
<td></td>
<td>• Greater number of non-local operators visiting the area</td>
</tr>
<tr>
<td>Surfing, windsurfing &amp; recreational boating</td>
<td>• Growth in popularity of windsurfing activity, particularly at Cervantes</td>
</tr>
<tr>
<td></td>
<td>• New marina has increased recreational boat use in the area</td>
</tr>
<tr>
<td>Mining &amp; defence</td>
<td>• Little change in activities</td>
</tr>
<tr>
<td>Conservation &amp; aesthetic values</td>
<td>• Designation of Jurien Bay Marine Park in 2003</td>
</tr>
</tbody>
</table>

Marine users in the Jurien Bay area identified a number of changes in the nature of the marine environment over the past few decades. These changes along with their perceived causes are listed in Table 9
<table>
<thead>
<tr>
<th>Observed Change</th>
<th>Perceived Causes</th>
</tr>
</thead>
</table>
| Decrease in the number of certain fish species, particularly Shark and Dhufish | • Increased recreational fishing effort related to increased tourism in the area  
• Commercial fishing effort for scale fish and by-catch of net fisheries  
• Improvements in the technology used by both commercial and recreational fishers, which has increase fishing efficiency and caused an increase in pressure on fish stocks |
| Increase in the number of certain fish species and marine mammals              | • Changes to water temperatures and currents                                                                                                                                                       |
4 References


