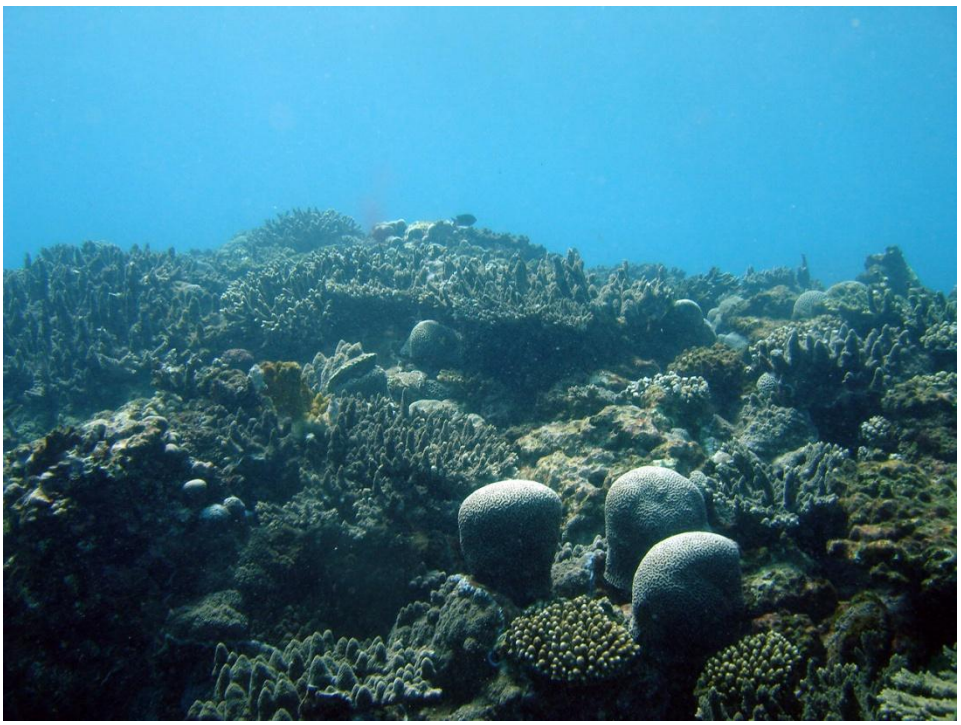
Improving management effectiveness for the Marine Protected Areas of Rodrigues (Indian Ocean).



Marine Reserve Status Reports

September 2011

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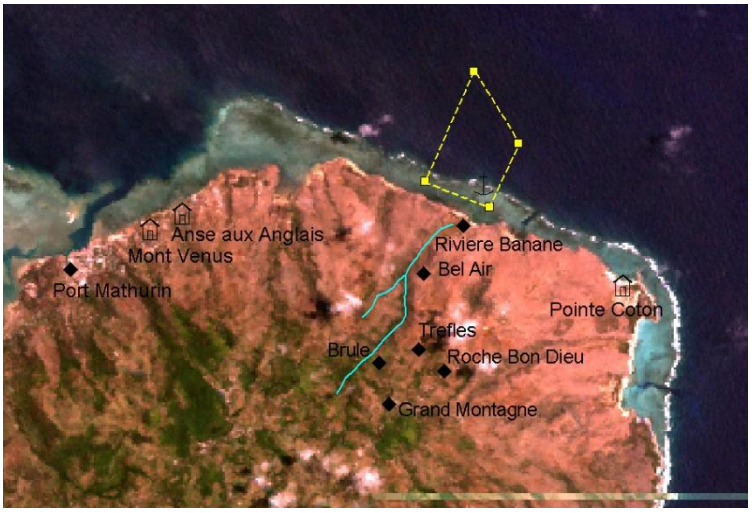
1. Riviere Banane

Name: Riviere Banane Marine Reserve

Location:

	Area (Km^2)	Perimeter (Km)	Boundaries			
			Outside lagoon		Inside lagoon	
Riviere Banane	1.5	5.3	19° 39.936 63° 28.874	19° 39.328 63° 28.500	19° 40.473 63° 28.628	19° 40.257 63° 28.085



Depth: 0.5 – 20m.

Main habitats: The Riviere Banane Marine Reserve includes an area of the lagoon extending out towards the reef flat and the shallow fore-reef slope to a depth of 20m. The lagoon habitat is composed mostly of sand and coral rubble, overlying a coralline platform (Orr, 2008). The reef flat consists of a coralline platform covered with turf algae and small compact coral colonies. The shallow reef slope is dominated by live coral, consisting of branching *Acropora* (*Acropora abrotanoides*).

Current status: In the lagoon, the dominant biological cover is brown and green macroalgae (50 % cover); coral colonies occur in the lagoon habitat as small isolated blocks on the sand and coral rubble substrate (Orr, 2008). Coral cover is high on the edges of 'Aquarium', however the area appears to be impacted by fishing activities (discarded and broken basket traps, fishing line).

The reef flat is degraded with low live coral cover (19% cover in 2010) and high turf algae (66%) (Shoals Rodrigues, unpublished data). Changes have occurred over time, with high macro-algal cover recorded in March 2003 (17%) and

high turf algae (>70%) in October 2003, March 2006 and March 2007 (Hardman et al., 2008a). The macro-invertebrate community on the reef flat is dominated by *Echinometra mathaei*, which is very abundant (>600 individuals per 100m^2) (Shoals Rodrigues, unpublished data); this species has increased in abundance from October 2005 onwards (Hardman et al., 2008a). Fish are neither abundant nor diverse on the reef flat, with Parrotfish, Wrasse, Damselfish and Surgeonfish most commonly observed; large predatory fish are rare, indicating overfishing.

The reef slope is healthy with 69% coral cover (Shoals Rodrigues, unpublished data). There have been changes over time due to very high macro-algal cover in October 2004 (40%) and increased turf algal cover from March 2006 onwards (>20%) (Hardman et al., 2008a). Invertebrates are less common on the reef slope, with *E. mathaei* and *Echinothrix diadema* most commonly recorded (Shoals Rodrigues, unpublished data). Fish are more common on the reef slope, but the community is still dominated by Surgeonfish and Damselfish and large predatory fish are rare.

Although corals have bleached in other parts of Rodrigues during 2002, 2005 the corals within the Riviere Banane Marine Reserve have not been affected by bleaching and remain healthy (Hardman et al., 2007a; Vaughan, 2010). The coral disease white syndrome was observed at Aquarium (Vaughan, 2010).

Surveys have identified 102 reef fish species, 71 species of hard coral and 37 species of invertebrates (Shoals Rodrigues data and Alemu, 2008; Fenner et al., 2004).

Endemic information:

The endemic coral, *Acropora rodriguensis* is found on the reef flat. The damselfish, *Pomacentrus rodriguesensis* which is found only in Mauritius and Rodrigues, is common on the shallow reef slope (5 – 10m depth) (Hardman et al., 2006a). The anemonefish, *Amphiprion chysogaster* which is found only in Mauritius and Rodrigues, occurs within Aquarium.

Survey information:

Shoals Rodrigues has carried out the following surveys:

- Annual monitoring surveys (benthos, reef fish and invertebrates) on the reef flat and reef slope in the Riviere Banane Marine Reserve since 2002 using the

Global Coral Reef Monitoring Network methodology (see Coral Reef Monitoring Reports in bibliography).

- Seine net fishery monitoring surveys within the boundaries of Riviere Banane Marine Reserve since 2002 (see Seine Net Fishing Monitoring Reports in bibliography).
- Coral bleaching surveys in 2002, 2005, 2006 and 2010 (Hardman et al., 2004; 2007a; 2008b; Stampfli, 2006; Vaughan, 2010).
- A socio economic baseline study conducted in May-July 2006 using the Soc-Mon methodology in Riviere Banane, Rodrigues (Hardman et al., 2006b).
- Other surveys have been undertaken within the Riviere Banane Marine Reserve by MSc students (Alemu, 2008; Chapman, 2000; Knott, 2010; Mrowicki, 2006: Orr, 2008).

Main resources uses: Officially, there are 39 registered fishers at the Riviere Banane Fish Landing Station (FPS, unpublished data). Fishers come from Rivière Banane, Brulé, Trefles, Roche Bon Dieu, Bel Air and Grand Montagne. Fishing is carried out for octopus using harpoons and fish using basket traps and lines. Seine net fishing is undertaken by the team from Pointe l'Aigle (0.7% of hauls between 2002 and 2006) and the team from Pointe Coton with *Siganus sutor* being the most commonly caught species.

Recreational and tourism uses: There are at least 6 tour operators who offer snorkelling and diving within the Marine Reserve (Blais et al., 2011). Snorkelling takes place at 'Aquarium' organised by hotels and tour operators from Port Mathurin, Anse aux Anglais and Grand Baie. Three dive operators (Pointe Venus Hotel, Cotton Bay Hotel, Rodriguez Diving Pointe Monier) operate within the Marine Reserve.

Conflicts: Fishers believe that tourists destroy traps in 'Aquarium' and release the fish (Hardman et al., 2006c). The fishers from Riviere Banane feel that other tour operators should not bring tourists into the reserve as they are not earning any income from the glass bottom boat due to lack of clients. They are also concerned that the zoning for the bad weather

allowance may conflict with the reserve and that there may not be an allowance (Blais et al., 2011). Illegal seine net fishing and spear fishing take place in the reserve (Blais et al., 2011).

Community support: At community consultation meetings, the fishers from Rivière Banane and Baladirou supported the development of the reserve in general as their catches had declined. They think that the marine reserve will result in more fish and octopus (Blais et al., 2011; Hardman et al., 2006c; 2007b; 2008c).

Community concerns: The fishers from Riviere Banane, Baladirou and Roche Bon Dieu all felt that there needs to be better enforcement of the Marine Reserve regulations with more patrols and patrols at night as there is a lot of illegal fishing (particularly snorkelling for octopus) (Blais et al., 2011; Hardman et al., 2006c; 2007b; Perrine et al., 2011). Some fishers in Riviere Banane thought that the Marine Reserve is too large (Blais et al, 2011; Hardman et al., 2006c). They were also concerned about the number of un-registered fishers, particularly young people, who fish in the area and how these would be regulated (Hardman et al., 2006c).

Reasons for selection: The marine reserve was suggested by fishers from Riviere Banane as the area includes badly degraded regions requiring rehabilitation (particularly on the lagoon flats) and a relatively pristine area of high potential for tourism activities such as snorkelling (in 'Aquarium') (Gell *et al*., 2003).

Socio-economic information: Fishing is the primary source of income for 30% of households in Riviere Banane, and 63% of households are dependent on fishing as either their primary or secondary source of income. All households plant vegetables or raise livestock to supplement their income; no households are involved in tourism activities. The community is young, with 80% aged less than 50 years, and 50% aged less than 30 years. The majority have received less than 9 years of schooling and only speak Creole. Only 10% speak French and 5% speak English and French; unemployment is high. Nearly everyone in the community has their own house with concrete roofs and walls, glass windows and cement floors, piped water and mains electricity. Only 13% of respondents own a boat, 60% are wood and 40% fibreglass, and only 20%

have an engine (Hardman et al., 2006b). In Baladirou, 81% of households surveyed included fishers and fishing constituted 51% of the employment activities. Households supplement their income and on average there are 2.44 occupations per household. Other employment activities included planting vegetables and raising livestock. The average amount of schooling is 5.98 years. The majority of people have their own house. Households have an average of 3.68 rooms; over half have concrete roofs and walls and almost all have electricity and piped water; only 3% own a vehicle (Stead et al., 2009).

References:

Alemu I, B.J. (2008) Spatial variation in reef fish assemblages between protected and non-protected areas in the northern lagoon of Rodrigues. Unpublished MSc thesis, University of Wales, Bangor, 96 pp.

Blais, E., Perrine, S., Raffin, J. Desire, S., Raffaut, R., Francois, L. Hardman, E. and Klaus, R. (2011). Report on Community Consultation 1 (November 2010- January 2011). Improving management effectiveness for the Marine Protected Areas of Rodrigues (Indian Ocean). 20p + annexes.

Chapman, B.. (2000). Marine Biotope Classification and Mapping of Rodrigues using Landsat 7 ETM+ satellite Imagery. Unpublished MSc thesis, University of Wales, Bangor, 212 pp.

Fenner, D., Clarke, T.H., Turner, J.R. and Chapman, B. (2004). A checklist of the corals of the island state of Rodrigues, Mauritius. *Journal of Natural History* 38, 3091-3102.

Gell, F. R., Lynch, T. L., Meunier, M. S., Blais, F. E. I. and Hooper, T. E. J. (2003). Marine reserves for sustainable fisheries and conservation in Rodrigues. Shoals Rodrigues report, 32pp.

Hardman, E. R., Meunier, M. S., Turner, J. R., Lynch, T., L., Taylor, M. and Klaus, R. (2004). The extent of coral bleaching in Rodrigues, 2002. *Journal of Natural History* **38**: 3077-3089.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J., Perrine, S., Chinien-Chetty, M., Felicité, C. and Towill, J. (2006a). Survey of endemic coral and fish species on the coral reefs of Rodrigues. Shoals Rodrigues report, 8pp + appendices

Hardman, E. R., Bunce, M., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J. and Perrine, S. (2006b). Report of Socio-economic Monitoring in Rivière Banane, Rodrigues. Shoals Rodrigues report, 23pp.

Hardman, E. R., Gell, F. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Chinien-Chetty, M. (2006c). Marine reserves for sustainable fisheries management in Rodrigues. *Shoals Rodrigues* report, 13pp

Hardman, E. R., Stampfli, N. S. Hunt, L., Perrine, S., Perry, A. and Raffin, J. S. J. (2007a). The Impacts of Coral Bleaching in Rodrigues, western Indian Ocean. *Atoll Research Bulletin* **555**: 1-10.

Hardman, E. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Gell, F. R. (2007b). Marine Reserves for Sustainable Fisheries Management in Rodrigues: Alternative Livelihood Options. *Shoals Rodrigues* report, 13pp.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J., Perrine, S., Taylor, L. (2008a). Annual report of benthos, reef fish and invertebrate surveys for reef slope and reef flat areas in Rodrigues 2007. Shoals Rodrigues report, 40pp.

Hardman, E. R., Thoma, J., Stampfli, N. S., Desiré, M. S. & Perrine, S. (2008b). Small-scale variations in the effects of coral bleaching in Rodrigues. *Proceedings of the 11th International Coral Reef Symposium:* 742-746.

Hardman, E. R., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Gell, F. R. (2008c). Marine Reserves for Sustainable Fisheries Management in Rodrigues: Alternative Livelihood Options. *Shoals Rodrigues* report, 7pp.

Knott, M. (2010) The Abundance and Distribution of Holothurians (Echinodermata: Holothuroidea) in the Shallow Coastal Lagoon of Rodrigues, Mauritius, Western Indian Ocean – a Comparative Study to assess changes following a period of intense fishing. Unpublished MSc thesis, Univ. of Wales, Bangor, 144 pp.

Mrowicki, R. (2006). The abundance and distribution of Holothurians (Echinodermata: Holothuroidea) in the shallow coastal lagoon of Rodrigues, Mauritius. Unpublished MSc thesis, Univ. of Wales, Bangor, 94 pp.

Orr, J.R. (2008) The coral community and coral species diversity represented in two proposed marine reserves, Rodrigues. Unpublished MSc thesis, University of Wales, Bangor, 111 pp.

Perrine, S., Raffaut, R., Raffin, J., Hardman, E. and Klaus, R. (2011). Report on Community Consultation 2 (April to July 2011). Improving management effectiveness for the Marine Protected Areas of Rodrigues (Indian Ocean).

Stampfli, N. (2006) Coral reefs in Rodrigues – An assessment of the health status. Unpublished MSc thesis, Swiss Federal Institute of Technology, Zürich, 57 pp.

Stead, S., Peterson, A., Mill, A. and Rushton, S. (2009). Marine Socio-economic Scoping Study of the North Coast of Rodrigues. Newcastle University, 26pp.

Vaughan, G. (2010) Coral bleaching effects on the reefs of Rodrigues, Western Indian Ocean. Unpublished MSc thesis, Bangor University, Bangor, 50 pp.

2. Anse aux Anglais

Name: Anse Aux Anglais Marine Reserve

Location

	Area (Km^2)	Perimeter (Km)	Boundaries			
			Outside lagoon		Inside lagoon	
Anse aux Anglais	1.5	5.0	19º 39.286 63º 26.040	19º 39.136 63º 26.821	19º 39.932 63º 26.343	19º 39.904 63º 26.858

Depth: 0.5 - 20m

Main Habitats: Two main habitats were observed within the lagoon. The east side of the lagoon consisted of continuous limestone pavement with macroalgae and rubble, whereas the majority of the substrate in the west side of the proposed MPA was dominated by consolidated rubble (Jacob 2005).

The reef flat is characterised by a limestone pavement covered with turf algae and small coral colonies. The reef slope has a gently sloping spur and groove structure. The grooves are approximately 5 m wide and filled with coarse rubble and sand; the spurs are dominated by branching *Acropora* coral colonies (Jacob, 2005).

Current Status: In the lagoon, the eastern area is characterised by coral gardens. The most dominant coral species are *Porites rus* and the branching corals, *Acropora formosa* and *Acropora digitifera* (Jacob, 2005). The sea cucumbers *Synapta maculata* and *Holothuria atra* are abundant in the lagoon (Knott, 2010). The abundance of fish is greatest in the east side of the lagoon, with Pomacentrids being the most

abundant family and a lack of large predators at all sites. Fish in the lagoon are smaller (majority between 0 -10 cm) than those on the reef slope, possibly due to over-fishing or to the presence of juveniles (Jacob, 2005).

Live coral cover is low on the reef flat (18%), with the benthic cover dominated by turf algae (42%). Macro-invertebrates on the reef flat are dominated by *Echinometra mathaei* and the gastropod *Trochus maculatus* (Shoals Rodrigues, unpublished data); the abundance of *E. mathaei* has increased since October 2005 (Hardman et al., 2008a). The most common fish families on the reef flat are Parrotfish, Surgeonfish and Damselfish and large predatory fish are rare, indicating overfishing (Shoals Rodrigues, unpublished data).

On the shallow reef slope (8m depth), rapid assessment surveys indicated that coral cover ranges from 51 – 75 % and is dominated by *Acropora abrotanoides*, *Acropora austera* (31-50%) and *Platygyra daedalea,* (11-30%) with soft coral S*inularia* sp. (11-30%). At deeper depths (16m), live coral cover is between 51 – 75 % on the spurs and is dominated by diverse massive, submassive and encrusting species with some tabular *Acropora* colonies and soft corals. Members of the Pomacentridae family dominate the fish communities on the reef slope; small (<20 cm) and large (20-40 cm) dark Acanthuridae sp. are also abundant (Jacob, 2005).

Coral bleaching occurred on the shallow reef flat during 2005 when 11 - 30% of coral colonies bleached (Hardman et al., 2007a). During 2010, coral bleaching was rare, however 16% of coral colonies had died recently. The coral disease, white syndrome was also observed (Vaughan, 2010).

Surveys have identified 108 reef fish species, 80 species of hard coral and 21 species of invertebrates (Shoals Rodrigues data and Alemu, 2008; Fenner et al., 2004).

Survey Information:

Shoals Rodrigues has carried out the following surveys:

- Annual monitoring surveys (benthos, reef fish and invertebrates) on the reef flat and reef slope in the Riviere Banane Marine Reserve since 2002 using the Global Coral Reef Monitoring Network methodology (see Coral Reef Monitoring Reports in bibliography).

- Seine net fishery monitoring surveys within the boundaries of Riviere Banane Marine Reserve since 2002 (see Seine Net Fishing Monitoring Reports in bibliography).
- Coral bleaching surveys in 2002, 2005 and 2006 (Hardman et al., 2004; 2007a; 2008b; Stampfli, 2006; Thoma, 2007; Vaughan, 2010).
- A socio economic baseline study conducted in April 2009 (Stead al, 2009).
- Other surveys have been undertaken within the Anse aux Anglais Marine Reserve by MSc students (Alemu, 2008; Chapman, 2000; Jacob, 2005; Knott, 2010; Mrowicki, 2006).

Endemic information: **T**he endemic fish *Pomacentrus rodriguesensis* is very abundant at depths of between 3m- 20m within the Anse aux Anglais Marine Reserve, while *Acropora rodriguensis* occurs in very few colonies on the reef crest (Hardman et al 2006a).

Main Resources Uses: Officially, there are 144 registered fishers at the Grand Baie and Anse aux Anglais Fish Landing Stations (FPS, unpublished data). According to fishers, there are around 100 traps around Passe Cabri (Blais et al., 2011). During August 2005, up to 63 octopus fishers were counted on the lowest tide of the month (tidal height, 90 cm) (Jacob, 2005). Fishers come from Roseaux, Vangar, Citronelle, Terre Rouge and Grand Baie. Fishing is carried out for octopus using harpoons and fish using basket traps and lines. The seine net fishing team from Pointe l'Aigle used to fish along the reef edge within the reserve but this team has now relinquished their nets. Trolling is undertaken in the off lagoon section of the reserve and there is also an active squid fishery that operates during winter.

Recreational and tourism uses: Tourism activities by 5 tour operators who offer diving and snorkelling outside the reef and inside the reserves.

Conflicts: The fishers from Anse aux Anglais say that tourists take shells and octopus from the reef when they go diving and snorkelling (Hardman et al., 2006b). There are always conflicts between the registered fishers and the illegal fishers (Blais et al., 2011).

Community support:	In general, the fishers from Anse aux Anglais and Grand Baie supported the development of marine reserves as their catches had declined (Hardman et al, 2006b). The fishers from Roseaux also felt that the Marine Reserve is in a good place and is productive (Blais et al., 2011). Fishers from Anse aux Anglais and Roseaux said that they and the fishers would be happy to stop fishing if offered alternative employment (Blais et al., 2011; Hardman et al., 2007b)
.	The majority of octopus fishers (82%) felt that the plan for a marine reserve was a good idea despite the fact that they anticipated that they would catch less octopus/fish as an immediate result of the protection (Jacob, 2005).
Community concerns:	The fishers from Anse aux Anglais were concerned by the location of the reserve as this is where the coral is still healthy and where they catch the most fish and octopus (Hardman et al, 2006b). The fishers from Roseaux said that they need money to live and that fishers are suffering, but they don't like to complain. They think that the Marine Reserves have taken too long to establish, and there is illegal fishing (Blais et al., 2011).
Reasons for selection:	Fishers from Baladirou suggested Grand Baie and the areas of reef in front of it, extending to the east to include Passe Cabri (an interesting site with large numbers of commercial fish and extensive coral cover). They viewed the channel at Passe Cabri as the source of fish for areas to the east towards Riviere Banane. The Anse aux Anglais area was suggested as the habitats are badly degraded and protection would allow them to recover. There are also excellent snorkelling and diving opportunities around Totor, and so tourism potential is also a consideration here *(*Gell et al., 2003*).* The majority of the fishers believed the proposed area to be important for juvenile fish (Jacob, 2005).
Socio-economic information:	Fishing is less important in the villages of Grand Baie, Terre Rouge and Roseaux with only 18% of households including fishers in Grand Baie, 12% in Terre Rouge and 8% in Roseaux and the majority of people involved in other employment activities. The average number of occupations per household ranges from 1.03 in Grand Baie to 1.47 in Roseaux. The majority of people have their own house. Households have an average of between 4.34 (Grand Baie) and 4.67 (Terre Rouge) rooms; the majority have concrete roofs and walls and almost all have electricity and piped

water; 12% own a vehicle in Terre Rouge, however this is less in Grand Baie (5%) and Roseaux (3%)(Stead et al., 2009).

References:

Alemu I, B.J. (2008) Spatial variation in reef fish assemblages between protected and non-protected areas in the northern lagoon of Rodrigues. Unpublished MSc thesis, University of Wales, Bangor, 96 pp.

Blais, E., Perrine, S., Raffin, J. Desire, S., Raffaut, R., Francois, L. Hardman, E. and Klaus, R. (2011). Report on Community Consultation 1 (November 2010- January 2011). Improving management effectiveness for the Marine Protected Areas of Rodrigues (Indian Ocean). 20p + annexes.

Chapman, B.. (2000). Marine Biotope Classification and Mapping of Rodrigues using Landsat 7 ETM+ satellite Imagery. Unpublished MSc thesis, University of Wales, Bangor, 212 pp.

Fenner, D., Clarke, T.H., Turner, J.R. and Chapman, B. (2004). A checklist of the corals of the island state of Rodrigues, Mauritius. *Journal of Natural History* 38, 3091-3102.

Gell, F. R., Lynch, T. L., Meunier, M. S., Blais, F. E. I. and Hooper, T. E. J. (2003). Marine reserves for sustainable fisheries and conservation in Rodrigues. Shoals Rodrigues report, 32pp.

Hardman, E. R., Meunier, M. S., Turner, J. R., Lynch, T., L., Taylor, M. and Klaus, R. (2004). The extent of coral bleaching in Rodrigues, 2002. *Journal of Natural History* **38**: 3077-3089.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J., Perrine, S., Chinien-Chetty, M., Felicité, C. and Towill, J. (2006a). Survey of endemic coral and fish species on the coral reefs of Rodrigues. Shoals Rodrigues report, 8pp + appendices

Hardman, E. R., Gell, F. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Chinien-Chetty, M. (2006b). Marine reserves for sustainable fisheries management in Rodrigues. *Shoals Rodrigues* report, 13pp

Hardman, E. R., Stampfli, N. S. Hunt, L., Perrine, S., Perry, A. and Raffin, J. S. J. (2007a). The Impacts of Coral Bleaching in Rodrigues, western Indian Ocean. *Atoll Research Bulletin* **555**: 1-10.

Hardman, E. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Gell, F. R. (2007b). Marine Reserves for Sustainable Fisheries Management in Rodrigues: Alternative Livelihood Options. *Shoals Rodrigues* report, 13pp.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J., Perrine, S., Taylor, L. (2008a). Annual report of benthos, reef

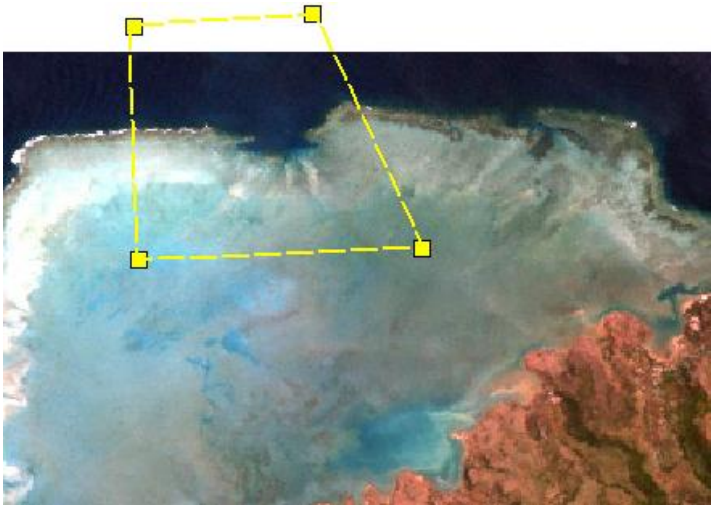
fish and invertebrate surveys for reef slope and reef flat areas in Rodrigues 2007. Shoals Rodrigues report, 40pp.
Hardman, E. R., Thoma, J., Stampfli, N. S., Desiré, M. S. & Perrine, S. (2008b). Small-scale variations in the effects of coral bleaching in Rodrigues. *Proceedings of the 11th International Coral Reef Symposium:* 742-746.
Jacob, L. (2005). A biological and social assessment of a proposed Marine Protected Area in Rodrigues, Mauritius. Unpublished MSc thesis, University of Wales, Bangor, 101 pp.
Knott, M. (2010) The Abundance and Distribution of Holothurians (Echinodermata: Holothuroidea) in the Shallow Coastal Lagoon of Rodrigues, Mauritius, Western Indian Ocean – a Comparative Study to assess changes following a period of intense fishing. Unpublished MSc thesis, Univ. of Wales, Bangor, 144 pp.
Mrowicki, R. (2006). The abundance and distribution of Holothurians (Echinodermata: Holothuroidea) in the shallow coastal lagoon of Rodrigues, Mauritius. Unpublished MSc thesis, Univ. of Wales, Bangor, 94 pp.
Stampfli, N. (2006) Coral reefs in Rodrigues – An assessment of the health status. Unpublished MSc thesis, Swiss Federal Institute of Technology, Zürich, 57 pp.
Stead, S., Peterson, A., Mill, A. and Rushton, S. (2009). Marine Socio-economic Scoping Study of the North Coast of Rodrigues. Newcastle University, 26pp.
Thoma J (2007) Post-bleaching coral mortality in Rodrigues: assessing the impact of the January/February 2007 bleaching event and the succession at previously affected sites. Unpublished MSc thesis, University of Wales, Bangor, 96 pp.
Vaughan, G. (2010) Coral bleaching effects on the reefs of Rodrigues, Western Indian Ocean. Unpublished MSc thesis, Bangor University, Bangor, 50 pp.

3. Grand Bassin

Name: Grand Bassin Marine Reserve

Location:

	Area (Km^2)	Perimeter (Km)	Boundaries			
			Outside lagoon		Inside lagoon	
Grand Bassin	14.1	15.3	19º 38.401 63º 21.372	19º 38.505 63º 19.777	19º 40.589 63º 19.827	19º 40.485 63º 22.340



Depth: 0.5 – 30m.

Main habitats: Sand is the dominant substrate in the lagoon, followed by macroalgae and rubble. The dominant substrate on the reef flat is rubble, followed by branching *Acropora* (13.6%) and then sand (13.0%). The reef slope is dominated by branching *Acropora* (46.3%), followed by coralline algae and then turf algae (Winton, 2006).

Current status: The lagoon is dominated by sand (65%) with macro-algae (21%) and rubble (5%) and coral cover is low (0.5%) (Winton, 2006), which is composed of small massive and sub-massive coral colonies. The invertebrate community is dominated by the sea cucumbers, *Holothuria atra* and *H. leucospilota*; the bivalve *Pinna muricata* is also frequently observed (Hardman et al., 2008). Fish are rare with small damselfish, groupers and triggerfish (*Rhinecanthus aculeatus*) being the most commonly observed families (Hardman et al., 2008a; Winton, 2006).

The reef flat is degraded with low live coral cover (11% cover in 2010) and high coralline algae (60%) (Shoals Rodrigues, unpublished data). Changes have occurred over time, with high dead coral cover recorded in March 2002 (26%) and high turf algae (>25%) from March 2006 onwards (Hardman et al., 2008b). The macro-invertebrate community on the reef flat is dominated by *Echinometra mathaei*, and the cowrie, *Cypraea caputserpentis* is also relatively common (Shoals Rodrigues, unpublished data); *E. mathaei* has increased in abundance from October 2005 onwards (Hardman et al., 2008a). Fish are neither abundant nor diverse on the reef flat, with Parrotfish, Wrasse and Surgeonfish most commonly observed; large predatory fish are rare, indicating overfishing (Shoals Rodrigues, unpublished data).

The reef slope is healthy with 59% coral cover (Shoals Rodrigues, unpublished data). There have been changes over time due to very high macro-algal cover in October 2004 (36%) (Hardman et al., 2008b). Invertebrates are rare and fish are neither abundant nor diverse and dominated by Surgeonfish and Damselfish; large predatory fish are rare (Shoals Rodrigues, unpublished data).

Comparison to a previous biotope map produced by Chapman (2000) revealed considerable habitat change in recent years. Coral cover had increased at 10.2% of sites and decreased at 17.5% while vegetation cover had increased at 49.8% of sites (Winton, 2006).

Humpback whales and turtles have been observed within the Marine Reserve (Winton, 2006).

Coral-bleaching induced mortality was osberved at Grand Bassin in 2002, affecting 30-40% of *Acropora* sp. coral colonies down to 2m depth (Hardman et al., 2004). Further bleaching occurred in 2005, when 30% of coral colonies bleached and coral mortality occurred (Hardman et al., 2007a). Partial bleaching was observed in 2010 affecting 14% of coral colonies. The coral disease, atrementous necrosis was also observed (Vaughan et al., 2010).

Surveys have identified 125 reef fish species, 37 species of hard coral and 33 species of invertebrates (Shoals Rodrigues data and Alemu, 2008; Winton, 2006).

Survey information:

Shoals Rodrigues has carried out the following surveys:

- Annual monitoring surveys (benthos, reef fish and invertebrates) on the reef flat and reef slope in the Riviere Banane Marine Reserve since 2002 using the Global Coral Reef Monitoring Network methodology (see Coral Reef Monitoring Reports in bibliography).
- Annual monitoring surveys (benthos, fish and invertebrates in the lagoon (coral blocks on sand) since 2003 using semi-quantitative survey methods (see Lagoon Habitat Monitoring Reports in bibliography)
- Seine net fishery monitoring surveys within the boundaries of Riviere Banane Marine Reserve since 2002 (see Seine Net Fishing Monitoring Reports in bibliography).
- Coral bleaching surveys in 2002, 2005 and 2006 (Hardman et al., 2004; 2007a; 2008c; Stampfli, 2006; Thoma, 2007; Vaughan, 2010).
- A socio economic baseline study conducted in April 2009 (Stead al, 2009).
- A study of the movement of the bluespine unicornfish, *Naso unicornis* using acoustic tags (Hardman et al., 2010).
- Other surveys have been undertaken within the Anse aux Anglais Marine Reserve by MSc students (Alemu, 2008; Chapman, 2000; Knott, 2010; Mrowicki, 2006; Winton, 2006).

Endemic information:

Occasional colonies of the endemic coral, *Acropora rodriguensis*; A high abundance of *Pomacentrus rodriguesensis* and *Amphiprion chrysogaster* was also observed (Hardman et al., 2006a; Winton, 2006).

Main resources uses:

Officially, there are 320 registered fishers at the 6 Fish Landing Stations between Pointe Monier and Baie du Nord (FPS, unpublished data). Estimates for the number of fishers fishing within the Marine Reserve range from 80 registered fishers (plus non-registered fishers and pleasure fishers) to up to 700 fishers (Blais et al., 2011; Perrine et al., 2011). Data collected on the number of fishing boats within Grand Bassin during July and August 2006 showed that there were up to 18 boats in the reserve at any one time (1.75 boats per km^2) (Winton, 2006). Fishers come from Anse Nicolas,

	Pistache, Camp Pintade, Baie du Nord, Montagne du Sable, Montagne Charlot, Soupir, Baie Malgache, Anse Goeland, Pointe L'Aigle, Montagne Fanal, Pointe la Gueule, Baie aux Huitres, Pointe Monier, Mangues, Grand la Fouche Corail and Quatre Vents. Fishing is carried out for octopus using harpoons and fish using basket traps, lines and seine nets. The seine net teams from Baie du Nord and Pointe l'Aigle fish within the Grand Bassin Marine Reserve, catching 10% and 9% by weight of their fish respectively.
Recreational and tourism uses:	None
Conflicts:	Fishers from Baie aux Huitres thought the declines were due to there being too many fishers and illegal fishing; (Blais et al., 2011); they suggested that fishers who have cards but do not actually fish should be made to hand-in their cards (Hardman et al., 2007b) and that government officials should not be allowed to fish in the lagoon (Blais et al., 2011). Fishers from Baie du Nord also though that there are too many fishers and in particular too many unregistered fishers (Hardman et al., 2008c). Fishers from Anse Goeland think that there are too many illegal fishers and illegal fishing; they also did not agree that there should be tourist activities in the reserves (Blais et al., 2011).
.**Community support**:	The fishers from Baie aux Huitres and Baie Malgache supported the development of marine reserves as their catches of fish and octopus had decreased. They thought that the location of the reserve was good; one fisher at Baie aux Huitres even felt that the area should be larger (Hardman et al., 2006b). The fishers from Montagne Charlot also thought that the reserves are a good thing for Rodrigues (Blais et al., 2011).
Community concerns:	Fishers from Baie du Nord and Anse Goeland did not support development of the marine reserves as they said their catches had improved in recent years and they felt that reserves were not necessary. They say that fishers will die of hunger and they will fight against it (Blais et al., 2011; Hardman et al., 2008d). The fishers from Anse Goeland think that Grand Bassin Marine Reserve is too large and closing it will cause a lot of problems. They didn't feel that there was a good representation of fishers at the workshops and that their views had been misrepresented (Blais et al., 2011; Perrine et al., 2011). The fishers from Pointe Monier and Pistache are also concerned that their fishing area will

diminish and say that for the marine reserves to work there needs to be alternative work for the fishers (Hardman et al., 2008c; Perrine et al., 2011). Fishers from Baie Malgache say that for the reserves to work there needs to be better enforcement (Blais et al., 2011).

Reasons for selection: Fishers from Baie du Nord and Anse Goeland suggested Carcasse because the water is comparatively deep and corals and fish relatively abundant. Fishers believe that the area is a source of fish for a wider region. Grand Bassin was also proposed, as it is a channel in which fish are plentiful and is a transit zone between the lagoon and reef. Carcasse was also suggested by fishers from Baie Malgache and fishers from Pointe Monier also suggested Passe Grand Bassin as a potential site due to the large number of fish seen there (Gell et al., 2003). The fishers from Baie aux Huitres, Pointe l'Aigle, Baie Malgache and Pointe Palmiste think that the area is important because of the channels, and there are lots of small fish and big fish. One village described Grand Bassin as a train station where all the fish pass through into the lagoon (Blais et al., 2011).

Socio-economic information: Fishing is most important in Anse Goeland and Baie du Nord where 63% and 61% of households surveyed included fishers and fishing constituted 53% and 42% of the employment activities. Fishing is less important tin Baie Malagache (31% of households include fishers) and Baie aux Huitres (18%) and planting vegetables and other employment activities are more important in these villages. Households have lower diversity in their income and the average number of occupations per household ranges from 0.86 in Baie du Nord to 1.38 in Anse Goeland. The average amount of schooling ranges from 4.68 years in Baie du Nord to 9.76 years in Baie Malgache. Baie Malgache has a relatively high level of immigration with 19% of households from Mauritius. The majority of people have their own house. Households have an average of between 4.48 (Anse Goeland) and 5.57 (Baie Malgache) rooms; most have concrete roofs and walls and almost all have electricity and piped water. Only 7% of households in Baie du Nord own a vehicle, however this increases to 38% of households in Baie Malgache (Stead et al., 2009).

References:

Alemu I, B.J. (2008) Spatial variation in reef fish assemblages between protected and non-protected areas in the northern

lagoon of Rodrigues. Unpublished MSc thesis, University of Wales, Bangor, 96 pp.

Blais, E., Perrine, S., Raffin, J. Desire, S., Raffaut, R., Francois, L. Hardman, E. and Klaus, R. (2011). Report on Community Consultation 1 (November 2010- January 2011). Improving management effectiveness for the Marine Protected Areas of Rodrigues (Indian Ocean). 20p + annexes.

Chapman, B. (2000). Marine Biotope Classification and Mapping of Rodrigues using Landsat 7 ETM+ satellite Imagery. Unpublished MSc thesis, University of Wales, Bangor, 212 pp.

Gell, F. R., Lynch, T. L., Meunier, M. S., Blais, F. E. I. and Hooper, T. E. J. (2003). Marine reserves for sustainable fisheries and conservation in Rodrigues. Shoals Rodrigues report, 32pp.

Hardman, E. R., Meunier, M. S., Turner, J. R., Lynch, T., L., Taylor, M. and Klaus, R. (2004). The extent of coral bleaching in Rodrigues, 2002. *Journal of Natural History* **38**: 3077-3089.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J., Perrine, S., Chinien-Chetty, M., Felicité, C. and Towill, J. (2006a). Survey of endemic coral and fish species on the coral reefs of Rodrigues. Shoals Rodrigues report, 8pp + appendices

Hardman, E. R., Gell, F. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Chinien-Chetty, M. (2006b). Marine reserves for sustainable fisheries management in Rodrigues. *Shoals Rodrigues* report, 13pp

Hardman, E. R., Stampfli, N. S. Hunt, L., Perrine, S., Perry, A. and Raffin, J. S. J. (2007a). The Impacts of Coral Bleaching in Rodrigues, western Indian Ocean. *Atoll Research Bulletin* **555**: 1-10.

Hardman, E. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Gell, F. R. (2007b). Marine Reserves for Sustainable Fisheries Management in Rodrigues: Alternative Livelihood Options. *Shoals Rodrigues* report, 13pp.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J. and Perrine, S. (2008a). Annual report of benthos, reef fish and invertebrate surveys for lagoon areas in Rodrigues 2007. Shoals Rodrigues report, 20pp.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J., Perrine, S., Taylor, L. (2008b). Annual report of benthos, reef fish and invertebrate surveys for reef slope and reef flat areas in Rodrigues 2007. Shoals Rodrigues report, 40pp.

Hardman, E. R., Thoma, J., Stampfli, N. S., Desiré, M. S. & Perrine, S. (2008c). Small-scale variations in the effects of

coral bleaching in Rodrigues. *Proceedings of the 11th International Coral Reef Symposium:* 742-746.

Hardman, E. R., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Gell, F. R. (2008d). Marine Reserves for Sustainable Fisheries Management in Rodrigues: Alternative Livelihood Options. *Shoals Rodrigues* report, 7pp.

Hardman, E. R., Green, J. M., Desiré, M. S. & Perrine, S. (2010). Movement of sonically tagged bluespine unicornfish, Naso unicornis, in relation to marine reserve boundaries in Rodrigues, western Indian Ocean. *Aquatic Conservation: Marine and Freshwater Ecosystems* 20*:* 357 – 361.

Knott, M. (2010) The Abundance and Distribution of Holothurians (Echinodermata: Holothuroidea) in the Shallow Coastal Lagoon of Rodrigues, Mauritius, Western Indian Ocean – a Comparative Study to assess changes following a period of intense fishing. Unpublished MSc thesis, Univ. of Wales, Bangor, 144 pp.

Mrowicki, R. (2006). The abundance and distribution of Holothurians (Echinodermata: Holothuroidea) in the shallow coastal lagoon of Rodrigues, Mauritius. Unpublished MSc thesis, Univ. of Wales, Bangor, 94 pp.

Perrine, S., Raffaut, R., Raffin, J., Hardman, E. and Klaus, R. (2011). Report on Community Consultation 2 (April to July 2011). Improving management effectiveness for the Marine Protected Areas of Rodrigues (Indian Ocean).

Stampfli, N. (2006) Coral reefs in Rodrigues – An assessment of the health status. Unpublished MSc thesis, Swiss Federal Institute of Technology, Zürich, 57 pp.

Stead, S., Peterson, A., Mill, A. and Rushton, S. (2009). Marine Socio-economic Scoping Study of the North Coast of Rodrigues. Newcastle University, 26pp.

Thoma J (2007) Post-bleaching coral mortality in Rodrigues: assessing the impact of the January/February 2007 bleaching event and the succession at previously affected sites. Unpublished MSc thesis, University of Wales, Bangor, 96 pp.

Vaughan, G. (2010) Coral bleaching effects on the reefs of Rodrigues, Western Indian Ocean. Unpublished MSc thesis, Bangor University, Bangor, 50 pp.

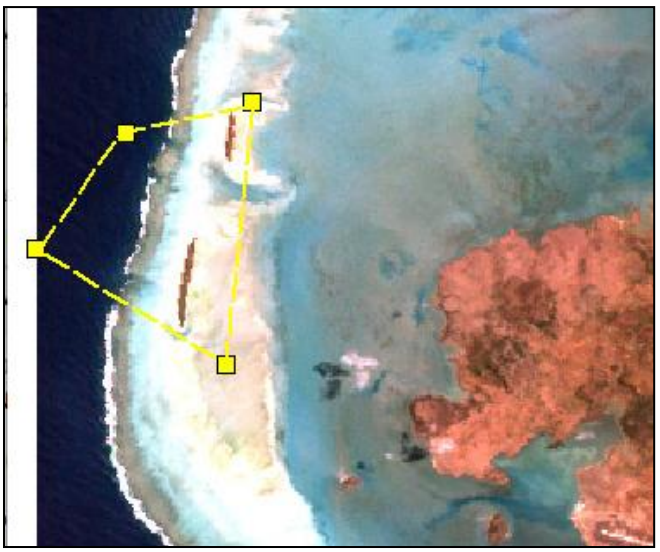
Winton, D.J. (2006) Benthic Habitat and Fish Population Assessment of the Proposed Marine Protected Area (MPA) of Grand Bassin in the Rodrigues Lagoon. Unpublished MSc thesis, Univ. of Wales, Bangor, 118 pp.

4. Passe Demi

Name: Passe Demie Marine Reserve

Location:

	Area (Km^2)	Perimeter (Km)	Boundaries			
			Outside lagoon		Inside lagoon	
Passe Demi	7.2	11.4	19º 42.072 63º 17.471	19º 43.037 63º 16.721	19º 41.814 63º 18.521	19º 43.995 63º 18.293



Depth: 0.5 – 25m

Main habitats: In general, the lagoon habitat is composed of sand (<90%), with smaller proportions of coral rubble and small blocks. The majority of the substrate is bare (67%) with the remaining cover composed of green and brown macroalgae, seagrass, turf algae, living hard coral and cyanobacteria. The reef flat habitat is composed of sand and coral rubble (accounting for at least 40%), interspersed with small and large coral blocks upon which coral colonies are growing. Tabular and branching acroporids usually dominate the coral cover (Orr, 2008).

Current status: The lagoon habitat has a very bare and sparse appearance with abundant cyanobacteria, which often covers the substrate in thick mats. On the reef flat, there are noticeable degraded areas with dead overturned tabular corals, upon which turf and coralline algae grows. Basket

traps that have been weighed down by broken off pieces of *Acropora cytherea* colonies and wedged between stands of coral are regularly observed. In the more degraded areas, turf algae forms thick carpets covering large areas and sometimes growing over live coral colonies. Cyanobacteria also occur in conjunction with low live coral cover, low habitat complexity and a general degraded appearance (Orr, 2008). Invertebrates are rare in both the lagoon and reef flat habitats.

The reef slope has high habitat complexity but relatively low live coral cover. The percentage of live hard coral cover on the reef slope is 23% and there is a high percentage of both coralline and turf algae (35% and 21%, respectively). There have been changes over time due to very high macro-algal cover in October 2004 (40%) and increased turf algal cover from March 2006 onwards (>20%) (Hardman et al., 2008a). Invertebrate species are rare, but the featherstars, *Tropiometra carinata* and *Stephanometra indica* are relatively common. The fish community is dominated by parrotfish, surgeonfish and damselfish, however large predatory fish such as *Caranx ignobilis* and large groupers such as *Cephalopholis argus* are observed (Shoals Rodrigues, unpublished data).

Partial coral bleaching occurred during 2002 (Hardman et al., 2004). During 2005, patchy coral bleaching occurred on the reef flat, affecting 75% of tabular and digitate *Acropora* colonies (Hardman et al., 2005). Coral bleaching occurred again during 2008, affecting 1 - 10% of the live coral cover (1-10 %). The bleaching appeared to be solar-related as it affected the upper branches of branching and tabular Acropora colonies and the parts of the colony that are oriented towards the water surface (Orr, 2008).

Within the Passe Demi Marine Reserve there are two nature reserves which consist of two islets Ile aux Cocos and Ile aux Sables managed to 3 protect the unique flora and sea bird colonies. Large colonies of brown noddies (*Anous stolidus*), lesser noddies (*A. tenuirostris*) and white terns (*Gygis alba*) are found on both islands.

Spinner dolphins and Bottle nose dolphins are observed within the Marine Reserve boundaries outside of the reef (Shoals Rodrigues, 2010).

Surveys have identified 117 reef fish species, 56 species of hard coral and 21 species of invertebrates (Shoals Rodrigues data and Alemu, 2008; Fenner et al., 2004; Orr, 2008).

Survey information:

Shoals Rodrigues has carried out the following surveys:

- Annual monitoring surveys (benthos, reef fish and invertebrates) on the reef flat and reef slope in the Riviere Banane Marine Reserve since 2002 using the Global Coral Reef Monitoring Network methodology (see Coral Reef Monitoring Reports in bibliography).
- Seine net fishery monitoring surveys within the boundaries of Riviere Banane Marine Reserve since 2002 (see Seine Net Fishing Monitoring Reports in bibliography).
- Coral bleaching surveys in 2002, 2005 and 2006 (Hardman et al., 2004; 2007; 2008b; Stampfli, 2006; Thoma, 2007).
- A socio economic baseline study conducted in April 2009 (Stead et al., 2009).
- Other surveys have been undertaken within the Anse aux Anglais Marine Reserve by MSc students (Alemu, 2008; Chapman, 2000; Knott, 2010; Mrowicki, 2006; Orr, 2008; Vaughan, 2010).

Endemic information:

Occasional colonies of the endemic coral, *Acropora rodriguensis* have been observed on the reef (Hardman et al., 2006a).

Main resources uses:

Officially, there are 197 registered fishers at the Baie Malgache, Baie du Nord and Pointe Mathourin Fish Landing Stations (FPS, unpublished data). Fishers come from Pointe Palmiste, Baie du Nord, Baie Malgache, Montagne du Sable (50) and Pistache (40-50), however the majority of fishers are government officials and not registered fishers (Blais et al., 2011; Perrine et al., 2011). Fishing is carried out for octopus using harpoons and fish using seine nets, basket traps and lines. The seine net team from Baie du Nord fishes within the Passe Demi Marine Reserve, catching 12% by weight of their fish. On the sandy patches in the reserve area they target prawn (crevettes) using nets and fish on foot (all year round) on low tide and at night only (Blais et al., 2011).

Recreational and tourism uses: There are various different types of tourism activities that take place in the reserve, including kite surfing, from boats deployed from Baie du Nord and Mourouk throughout the year depending on the tide (high water). There is also surfing in the channel depending on the tide and weather (high tide and windy), diving (2 operators), snorkelling, island visits and swimming (Blais et al., 2011). There are 11 tour operators who bring tourists to Ile aux Cocos, departing from Baie du Nord or Port Mathurin.

Conflicts: Fishers from Baie du Nord also though that there are too many fishers and in particular too many unregistered fishers. Fishers from Pointe Palmiste felt that there are too many people fishing in the lagoon and that there is a lot of illegal fishing going on; they also felt that sand mining was a serious problem affecting the health of the lagoon and the fish stocks. They felt that they should still have the right of passage through the passes near Ile aux Cocos. There was also concern that some fishers spill oil on the sea in order to increase visibility through water to catch octopus and Kono Kono (Hardman et al., 2008c). The tour operators were concerned that they would still be able to take tourists snorkeling and diving in the reserve areas and that they would still have access to Ile aux Cocos (Hardman et al., 2006b).

Community support: The fishers from Pointe Palmiste supported the development of marine reserves as their catches of fish and octopus had decreased (Blais et al., 2011; Hardman et al., 2008c).

Community concerns: Fishers from Baie du Nord and Anse Goeland did not support development of the marine reserves as they said their catches had improved in recent years and they felt that reserves were not necessary (Hardman et al, 2006a; Hardman et al 2007b; Hardman et al., 2008c). The fishers from Anse Goeland did not think that Passe Demi was a suitable place for a marine reserve. They didn't feel that there was a good representation of fishers at the workshops and that their views had been misrepresented (Blais et al., 2011; Perrine et al., 2011). The fishers from Pointe Palmiste were concerned about what they will eat; life is difficult and their families need to live. They felt that for the reserves to work there need to be strict laws and good surveillance (Blais et al., 2011). The fishers from Pistache were also concerned that their fishing area will diminish, so catches

will decline in the short term and they said that for the marine reserves to work better there needs to be alternative work for the fishers (Perrine et al., 2011).

Reasons for selection: Large groupers are seen frequently at Passe Demi and the site has well-developed and diverse coral, large sea fans, and unusual echinoderm communities compared with other reef areas. Local fishers felt that closure of the area to fishing activities would lead to an increase in octopus. Reserves for seabirds already exist around Ile Cocos and Ile aux Sables, and the former islet is a popular tourist destination. Expansion of the reserve to include a greater area of the marine environment would further increase the tourism potential of the site (Gell et al, 2003).

Socio-economic information: In Pointe Palmiste, 43% of households surveyed included fishers. Households supplement their income and on average there are 2.14 occupations per household. Other employment activities included planting vegetables, raising livestock and other employment activities. The average amount of schooling is 4.25 years. The majority of people have their own house. Households have an average of 4.20 rooms; the majority have concrete roofs and walls and all have electricity and piped water; none own a vehicle (Stead et al., 2009).

References:

Alemu I, B.J. (2008) Spatial variation in reef fish assemblages between protected and non-protected areas in the northern lagoon of Rodrigues. Unpublished MSc thesis, University of Wales, Bangor, 96 pp.

Blais, E., Perrine, S., Raffin, J. Desire, S., Raffaut, R., Francois, L. Hardman, E. and Klaus, R. (2011). Report on Community Consultation 1 (November 2010- January 2011). Improving management effectiveness for the Marine Protected Areas of Rodrigues (Indian Ocean). 20p + annexes.

Chapman, B. (2000). Marine Biotope Classification and Mapping of Rodrigues using Landsat 7 ETM+ satellite Imagery. Unpublished MSc thesis, University of Wales, Bangor, 212 pp.

Fenner, D., Clarke, T.H., Turner, J.R. and Chapman, B. (2004). A checklist of the corals of the island state of Rodrigues, Mauritius. *Journal of Natural History* 38, 3091-3102.

Gell, F. R., Lynch, T. L., Meunier, M. S., Blais, F. E. I. and Hooper, T. E. J. (2003). Marine reserves for sustainable fisheries and conservation in Rodrigues. Shoals Rodrigues report, 32pp.

Hardman, E. R., Meunier, M. S., Turner, J. R., Lynch, T., L., Taylor, M. and Klaus, R. (2004). The extent of coral bleaching in Rodrigues, 2002. *Journal of Natural History* **38**: 3077-3089.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J., Perrine, S., Chinien-Chetty, M., Felicité, C. and Towill, J. (2006a). Survey of endemic coral and fish species on the coral reefs of Rodrigues. Shoals Rodrigues report, 8pp + appendices

Hardman, E. R., Gell, F. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Chinien-Chetty, M. (2006b). Marine reserves for sustainable fisheries management in Rodrigues. *Shoals Rodrigues* report, 13pp

Hardman, E. R., Stampfli, N. S. Hunt, L., Perrine, S., Perry, A. and Raffin, J. S. J. (2007a). The Impacts of Coral Bleaching in Rodrigues, western Indian Ocean. *Atoll Research Bulletin* **555**: 1-10.

Hardman, E. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Gell, F. R. (2007b). Marine Reserves for Sustainable Fisheries Management in Rodrigues: Alternative Livelihood Options. *Shoals Rodrigues* report, 13pp.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J., Perrine, S., Taylor, L. (2008a). Annual report of benthos, reef fish and invertebrate surveys for reef slope and reef flat areas in Rodrigues 2007. Shoals Rodrigues report, 40pp.

Hardman, E. R., Thoma, J., Stampfli, N. S., Desiré, M. S. & Perrine, S. (2008b). Small-scale variations in the effects of coral bleaching in Rodrigues. *Proceedings of the 11th International Coral Reef Symposium:* 742-746.

Hardman, E. R., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Gell, F. R. (2008c). Marine Reserves for Sustainable Fisheries Management in Rodrigues: Alternative Livelihood Options. *Shoals Rodrigues* report, 7pp.

Knott, M. (2010) The Abundance and Distribution of Holothurians (Echinodermata: Holothuroidea) in the Shallow Coastal Lagoon of Rodrigues, Mauritius, Western Indian Ocean – a Comparative Study to assess changes following a period of intense fishing. Unpublished MSc thesis, Univ. of Wales, Bangor, 144 pp.

Mrowicki, R. (2006). The abundance and distribution of Holothurians (Echinodermata: Holothuroidea) in the shallow coastal lagoon of Rodrigues, Mauritius. Unpublished MSc thesis, Univ. of Wales, Bangor, 94 pp.

Orr, J.R. (2008) The coral community and coral species diversity represented in two proposed marine reserves,

Rodrigues. Unpublished MSc thesis, University of Wales, Bangor, 111 pp.
Perrine, S., Raffaut, R., Raffin, J., Hardman, E. and Klaus, R. (2011). Report on Community Consultation 2 (April to July 2011). Improving management effectiveness for the Marine Protected Areas of Rodrigues (Indian Ocean).
Stampfli, N. (2006) Coral reefs in Rodrigues – An assessment of the health status. Unpublished MSc thesis, Swiss Federal Institute of Technology, Zürich, 57 pp.
Stead, S., Peterson, A., Mill, A. and Rushton, S. (2009). Marine Socio-economic Scoping Study of the North Coast of Rodrigues. Newcastle University, 26pp.
Thoma J (2007) Post-bleaching coral mortality in Rodrigues: assessing the impact of the January/February 2007 bleaching event and the succession at previously affected sites. Unpublished MSc thesis, University of Wales, Bangor, 96 pp.
Vaughan, G. (2010) Coral bleaching effects on the reefs of Rodrigues, Western Indian Ocean. Unpublished MSc thesis, Bangor University, Bangor, 50 pp.

5. Status Reports Bibliography

Coral Reef Monitoring

Jhangeer-Khan, R., Raffin, J. S. J., Desiré, M. S., Perrine, S. and Migale (2009). Annual report of benthos, reef fish and invertebrate surveys for reef slope and reef flat areas in Rodrigues 2008. Shoals Rodrigues report, 48pp.

Hardman, E. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Taylor, L. (2008). Annual report of benthos, reef fish and invertebrate surveys for reef slope and reef flat areas in Rodrigues 2007. Shoals Rodrigues report, 40pp.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J., Perrine, S., Chinien-Chetty, M. and Towill, J. (2007). Annual report of benthos, reef fish and invertebrate surveys for reef slope and reef flat areas in Rodrigues 2006. Shoals Rodrigues report, 51pp.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J., Perrine, S., Raffaut, R. and Chinien-Chetty, M. (2006). Annual report of benthos, reef fish and invertebrate surveys for reef slope and reef flat areas in Rodrigues 2005. Shoals Rodrigues report, 43pp.

Lynch, T. L., Meunier, M. S., Blais, F. E. I., Raffin, J. S. J., Perrine, S., Raffaut, R. and Perry, A. C. (2004b). Annual report of benthos, reef fish and invertebrate surveys for reef slope and reef flat areas in Rodrigues 2004. Shoals Rodrigues report, 48pp.

Lynch, T. L., Meunier, M. S., Hooper, T. E. J., Blais, F. E. I., Raffin, J. S. J., Perrine, S., and Raffaut, R. (2004a). Annual report of benthos, reef fish and invertebrate surveys for reef slope and reef flat areas in Rodrigues 2003. Shoals Rodrigues report, 52pp.

Lynch T.L., Meunier M.S., Hooper T.E.J., Blais F.E.I., Raffin J.S.J, Perrine S., Félicité N., Lisette J., Grandcourt J.W. (2002). Annual report of benthos, reef fish and invertebrate surveys for Rodrigues 2002. Shoals Rodrigues report, 30pp.

Lagoon Monitoring

Jhangeer-Khan, R., Raffin, J. S. J., Perrine, S and Desiré, S. M. (2009). Annual report of benthos, reef fish and invertebrate surveys for lagoon areas in Rodrigues 2009. Shoals Rodrigues report, 30pp.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J. and Perrine, S. (2008). Annual report of benthos, reef fish and invertebrate surveys for lagoon areas in Rodrigues 2007. Shoals Rodrigues report, 20pp.

Hardman, E. R., Blais, F. E. I., Desiré, S. M., Raffin, J. S. J., Perrine, S. and Chinien-Chetty, M. (2006b). Annual report of benthos, reef fish and invertebrate surveys for lagoon areas in Rodrigues 2006. Shoals Rodrigues report, 20pp.

Hardman, E. R., Blais, F. E. I., Raffin, J. S. J., Perrine, S., Raffaut, R. and Chinien-Chetty, M. (2006a). Annual report of benthos, reef fish and invertebrate surveys for lagoon areas in Rodrigues 2005. Shoals Rodrigues report, 25pp.

Lynch, T. L., Desiré, M. S., Hooper, T. E. J., Blais, F. E. I., Raffin, J. S. J., Perrine, S., Raffaut, R. and Hardman, E. R. (2005). Annual report of benthos, reef fish and invertebrate surveys for lagoon areas in Rodrigues 2004. Shoals Rodrigues report, 31pp.

Lynch, T. L., Meunier, M. S., Hooper, T. E. J., Blais, F. E. I., Raffin, J. S. J., Perrine, S. and Raffaut, R. (2004c). Annual report of benthos, reef fish and invertebrate surveys for lagoon areas in Rodrigues 2003. Shoals Rodrigues report, 44pp.

Seine Net Fishery

Jhangeer-Khan, R., Raffin, J. S. J., Desiré, M. S., Perrine, S. and Raffaut, R. (2009). Annual report on the status of the artisanal seine net fishery of Rodrigues 2009. Shoals Rodrigues report, 33pp.

Hardman, E. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, S. and Meunier, S. (2008). Annual report on the status of the artisanal seine net fishery of Rodrigues 2007. Shoals Rodrigues report, 46pp.

Hardman, E. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, Chinien-Chetty, M. and Meunier, S. (2006b). Annual report on the status of the artisanal seine net fishery of Rodrigues 2006. Shoals Rodrigues report, 59pp.

Hardman, E. R., Blais, F. E. I., Desiré, M. S., Raffin, J. S. J., Perrine, S., Raffaut, R. and Chinien-Chetty, M. (2006a). Annual report on the status of the artisanal seine net fishery of Rodrigues 2005. Shoals Rodrigues report, 56pp.

Lynch, T. L., Hooper, T. E. J., Meunier, M. S., Blais, F. E. I., Raffin, J. S. J., Perrine, S., Raffaut, R. and Hardman, E. R. (2005). Annual report of the status of the artisanal seine net fishery of Rodrigues 2004. Shoals Rodrigues report, 74pp.

Lynch, T. L., Hooper, T. E. J., Meunier, M. S., Blais, F. E. I., Raffin, J. S. J., Perrine, S. and Raffaut, R. (2004). Annual report on the status of the artisanal seine net fishery of Rodrigues 2003. Shoals Rodrigues report, 79pp.

Lynch, T. L., Edwards, A. J., Gell, F. R., Hooper, T. E. J., Gaspard, R., Blais, F. E. I., Raffin, J. S. J., Perrine, S., Milazar, G. and Pierre Louis, J. R. (2003). Preliminary report of the status of artisanal large net, basket trap and line fisheries of Rodrigues. Shoals Rodrigues report, 50pp.

Annex 1: Species lists for Riviere Banane

Fish

Species	Source	
	Shoals Rodrigues	Alemu (2008)
Abudefduf margariteus	x	
Abudefduf septemfasciatus		x
Abudefduf sexfasciatus	x	
Abudefduf sordidus		x
Abudefduf sparoides	x	x
Abudefduf vaigiensis	x	x
Acanthurus nigrofuscus		x
Acanthurus sp (medium)	x	
Acanthurus sp (small)	x	
Acanthurus triostegus	x	x
Amblygobius semicinctus		x
Anampses caeruleopunctatus	x	
Anampses melagrides	x	
Anampses twistii	x	
Apogon taeniophorus		x
Arothron nigropunctatus		x
Bodianus perdotio		x
Caranx ignobilis	x	
Caranx melampygus	x	
Cephalopholis argus	x	
Chaetodon auriga		x
Chaetodon guttatissimus	x	x
Chaetodon lunula		x
Chaetodon melannotus	x	x
Chaetodon trifascialis	x	x
Chaetodon trifasciatus	x	x
Chaetodon unimaculatus	x	x
Chaetodon vagabundus	x	x
Chaetodon xanthocephalus		x
Chaetodon zanzibariensis	x	
Cheatodon auriga	x	
Cheilinus trilobatus	x	x
Chelinus chlrourus	x	x
Chelinus fasciatus		x
Cheilodipterus quinquelineatus		x
Chlorurus sordidus	x	x
Chlorurus stronglyocephalus	x	
Chromis chrysura	x	
Chromis dimidiata	x	

Chromis nigurura	x	
Chromis viridis		x
Chrysiptera annulata		x
Chrysiptera glauca		x
Coris aygula		x
Coris caudimacula		x
Ctenochaetus binotatus		x
Ctenochaetus striatus		x
Dascyllus aruanus		x
Dascyllus melanurus		x
Diodon liturosus		x
Epinephelus mera	x	x
Epinephelus multinotatus		x
Epinephelus spilotoceps	x	x
Forciper flavissimus	x	x
Gnathodentex aurolineatus	x	x
Gomphosus caeruleus	x	x
Halichoeres hortulanus	x	
Halichoeres marginatus	x	x
Halichoeres nebulosus		x
Hemigymnus fasciatus	x	
Heniochus monoceros	x	
Labroides bicolor	x	x
Labroides dimidiata	x	x
Labropsis xanthonata		x
Lethrinus harak		x
Lethrinus nebulosus	x	x
Lutjanus fulviflammus		x
Lutjanus fulvus		x
Lutjanus lutjanus		x
Mulloidichthys flavolineatus		x
Mulloidichthys vanicolensis	x	
Myripridstis murdjan		x
Naso lituratus	x	
Naso unicornis	x	x
Neoniphon sammara		x
Ostracion cubicos		x
Ostracion meleagris		x
Oxymonacanthus longirostris	x	x
Paracirrhites arcatus	x	
Paracirrhites forsteri	x	
Parupeneus barberinus	x	
Parupeneus ciliatus		x
Parupeneus cyclostomus	x	

Parupeneus macronemus	x	
Parupeneus rubescens		x
Parupeneus trifasciatus	x	x
Plectroglyphidodon dickii	x	x
Plectroglyphidodon johnstonianus	x	x
Plectropomus punctatus	x	
Plotosus lineatus		x
Pomacentrus caeruleus	x	x
Pomacentrus indicus	x	
Pomacentrus pikei	x	x
Pomacentrus rodriguensis	x	
Pseudanthias evansi	x	
Pterocaesio tile	x	
Rhinecanthus aculeatus		x
Sargocentron diadema		x
Scarus ghobban	x	x
Scarus scaber	x	x
Siganus sutor	x	
Small immature parrotfish	x	
Stegastes fasciolatus		x
Stegastes limbatus		
Stegastes lividis		x
Stegastes nigricans	x	x
Stegastes peliceri	x	
Stethojulis albovittata	x	x
Synanceia verrusoca		x
Thalassoma genivittatum	x	x
Thalassoma hardwicke	x	x
Thalassoma purpureum		x
Variola louti	x	
Zanclus cornatus	x	x
Zebrasoma desjardinii	x	x
Zebrasoma scopas	x	x
Zebrasoma veliferum		x

Invertebrates

Species	**Source**	
	Shoals Rodrigues	Orr (2008)
Diadema sp	x	
Echinometra mathaei	x	x
Echinothrix diadema	x	
Echinstrephus molaris	x	
Holothuria atra		x

Holothuria leucospilota		x
Stichopus chloronatus		x
Lincki multiflora		x
Nardoa variolata		x
Stephanometra indica	x	
Tropiometra carinata	x	
Ophicoma erinaceus	x	
Tridacna maxima	x	x
Coral oyster		x
Conus sp	x	
Cypraea annulus		x
Cypraea tigris		x
Trochus maculatus	x	
Turbo argyrostomus	x	
Nudibranch	x	
Dardanus sp	x	
Heteractis magnifica	x	x
Entacmaea quadricolor	x	x
Palythoa sp		
Sabellastarte sanctijosephi		x

Hard Corals

Species	**Source**			
	Fenner et al (2004)	Shoals Rodrigues	Hardman et al (2004, 2005, 2007, 2008)	Orr (2008)
Pocillopora damicornis			x	x
Pocillopora eydouxi	x	x	x	
Pocillopora verrucosa	x	x	x	
Montipora capitata	x			
Montipora digitata				x
Montipora monasteriata				x
Montipora tuberculosa			x	
Acropora abrotanoides	x	x		
Acropora austera	x	x		
Acropora digitifera			x	x
Acropora clathrata	x	x		
Acropora cytherea			x	x
Acropora formosa			x	x
Acropora humils			x	x
Acropora nobilis			x	x
Acropora pinguis			x	
Acropora samoensis		x		x
Acropora seriata	x	x		

Acropora valida	x		x	
Acropora verweyi		x		
Astreopora myriophthalma	x			
Porites lutea			x	*x*
Porites lobata				x
Porites rus		x		
Goniopora sp.2	x			
Coscinarea monile	x			
Psammocra obtusangula				x
Gardinoseris planulata	x			
Pavona bipartita		x		
Pavina duerdeni	x			
Pavona varians	x		x	*x*
Fungia granulosa	x			
Fungia scutaria	x			
Galaxea fascicularis		x		
Echinophyllia aspera		x		
Mycedium elephantotus	x			
Oxypora lacera	x			
Acanthastrea echinata	x			
Lobophyllia corymbosa		x		
Lobophyllia hemprichii	x			
Symphyllia recta	x	x	x	
Hydnophora exesa	x			
Hydnophora microconos	x		x	
Cyphastrea microphthalma			x	*x*
Echinopora forskaliana	x	x		*x*
Favia mathaei		x	x	
Favia stelligera	x	x		
Goniastrea pectinata	x		x	*x*
Leptastrea pruinosa	x			
Leptoria phrygia	x	x	x	*x*
Oulophyllia crispa		x		
Platygyra crosslandi				x
Platygyra daedalea	x	x	x	*x*
Turbinaria reniformis			x	*x*
Heliopora coerulea	x			
Millepora exaesa	x			*x*

Annex 2: Species lists for Anse aux Anglais

Fish

Species	Source		
	Shoals Rodrigues	Alemu (2008)	Jacob (2005)
Abudefduf septemfasciatus		x	
Abudefduf sexfasciatus	x	x	x
Abudefduf sparoides		x	x
Acanthurus blochii			x
Acanthurus sp (large)	x		
Acanthurus sp (medium)	x		x
Acanthurus sp (small)	x		x
Acanthurus triostegus	x	x	x
Anampses caeruleopunctatus	x		
Anampses melagrides		x	
Anampses twistii	x		x
Apolemichthys trimaculatus		x	
Aulostomus chinensis		x	
Centropyge debelius		x	
Centropyge multispinis		x	
Cephalopholis nigrinnis			x
Chaetodon auriga	x	x	x
Chaetodon kleinii		x	
Chaetodon lunula		x	x
Chaetodon madagaskariensis		x	
Chaetodon melannotus	x	x	x
Chaetodon trifascialis	x		x
Chaetodon trifasciatus	x	x	x
Chaetodon unimaculatus		x	x
Chaetodon vagabundus	x	x	x
Chaetodon xanthocephalus		x	
Cheilinus trilobatus	x	x	x
Chelinus chlrourus	x	x	x
Chelio inermis		x	
Chlorurus sordidus	x	x	x
Chlorurus stronglyocephalus		x	x
Chromis chrysura			x
Chromis dimidiate			x
Chromis nigrura			x
Chromis viridis		x	
Chrysiptera glauca	x	x	x
Coris aygula	x	x	
Ctenochaetus binotatus		x	
Ctenochaetus marginatus		x	

Ctenochaetus sp		x	
Ctenochaetus striatus		x	
Dascyllus aruanus		x	
Dascyllus trimaculatus		x	
Dascyllus unimaculatus		x	
Epinephelus merra		x	
Epinephelus spilotoceps	x	x	x
Gnathodentex aurolineatus		x	x
Gomphosus caeruleus	x	x	
Grammistes sexlineatus		x	
Halichoeres hortulanus		x	x
Halichoeres marginatus	x	x	
Halichoeres nebulosus	x	x	x
Halichoeres scapularis	x		x
Hemigymnus fasciatus	x	x	
Hipposcarus harid	x	x	
Labroides bicolor		x	x
Labroides dimidiata	x	x	x
Lethrinus harak		x	
Lethrinus nebulosus	x	x	
Lutjanus fulvus		x	
Mulloidichthys flavolineatus		x	
Mulloidichthys vanicolensis		x	
Myripristis murdjan		x	
Naso unicornis		x	x
Neoniphon sammara		x	
Novaculichthys macrolepidotus		x	
Ostracion cubicus		x	
Ostracion meleagris		x	
Oxymonacanthus longirostris	x		
Parupeneus barberinus	x		x
Parupeneus ciliatus		x	
Parupeneus macronemus		x	
Parupeneus rubescens		x	
Parupeneus trifasciatus	x	x	
Plectroglyphidodon dickii	x	x	x
Plectroglyphidodon johnstonianus	x	x	x
Plotosus lineatus		x	
Pomacanthus semicirculatus		x	
Pomacentrus caeruleus		x	x
Pomacentrus indicus	x		x
Pomacentrus pikei	x		x
Pomacentrus rodriguesensis			x
Pseudodax moluccanus		x	

Rhinecanthus aculeatus		x	x
Sargocentron diadema		x	
Scarus falcipinnis		x	
Scarus frenatus		x	
Scarus ghobban	x	x	
Scarus scaber	x	x	x
Scarus tricolor		x	
Scolopsis bilineata		x	
Siganus argenteus	x	x	
Siganus sutor	x	x	x
Small immature parrotfish	x		x
Stegastes limbatus	x	x	x
Stegastes lividis		x	
Stegastes nigricans	x	x	
Stethojulis albovittata	x	x	x
Stethojulis bandanensis		x	
Thalassoma genivittatum	x	x	x
Thalassoma hardwicke	x	x	x
Thalassoma mascarenum		x	
Thalassoma purpureum	x	x	
Thalassoma trilobatum		x	
Zanclus cornatus	x	x	x
Zebrasoma desjardinii			x
Zebrasoma scopas	x	x	x
Zebrasoma veliferum		x	

Invertebrates

Species	**Source**
	Shoals Rodrigues
Diadema sp	x
Echinometra mathaei	x
Echinothrix diadema	x
Toxopneustes pileolus	x
Actinopyga sp	x
Bohadschia sp	x
Holothuria atra	x
Stichopus chloronotus	x
Synapta maculata	x
Featherstars	x
Ophicoma erinaceus	x
Tridacna maxima	x
Conus sp	x
Cypraea annulus	x

Cypraea caputserpentis	x
Drupa sp	x
Morula sp	x
Trochus maculatus	x
Turbo argyrostomus	x
Ocotpus cyanea	x
Dardanus sp	x

Hard Corals

Species	**Source**		
	Fenner et al (2004)	Shoals Rodrigues	Hardman et al (2004, 2005, 2007, 2008)
Pocillopora damicornis	x	x	
Pocillopora eydouxi	x	x	x
Pocillopora verrucosa	x		x
Montipora aequituberculata	x		x
Montipora capitata	x		
Montipora grisea			x
Montipora incrassata	x		
Montipora spumosa			x
Montipora tuberculosa	x		x
Montipora turgescens	x		
Montipora venosa	x		
Acropora austera	x	x	x
Acropora abrotanoides	x	x	x
Acropora clathrata	x		
Acropora cytherea	x	x	x
Acropora digitifera		x	x
Acropora formosa		x	x
Acropora humilis	x		
Acropora cf macrostoma			x
Acropora nasuta			x
Acropora nobilis	x		x
Acropora paniculata	x		
Acropora pinguis			x
Acropora robusta			x
Acropora samoensis			x
Acropora seriata	x		x
Acropora tenuis	x		x
Acropora valida	x		x
Acrpora verweyi			x
Asteopora myriophthalma	x		
Porites lobata	x		x

Porites lutea	x		
Porites monticulosa	x		
Porites rus	x	x	x
Goniopora djiboutiensis			x
Goniopora planulata			x
Goniopora sp2	x		
Alveopora allingi	x		
Coscinerea monile	x		
Psammocora nierstraszi	x		
Psammocora profundacella	x		
Pachyseris speciosa	x		
Pavona bipartita	x		
Pavona cactus	x		
Pavona duerdeni	x		
Pavona frondifera	x		
Pavona maldivensis	x		
Pavona varians	x		x
Fungia concinna	x		
Fungia fungites	x		
Fungia granulosa	x		
Fungia scutaria	x		
Galaxea astreata	x		
Galaxea fascicularis	x		
Echinophyllia aspera	x		
Mycedium elephantotus	x		
Oxypora lacera	x		
Acanthastrea echinata	x		
Lobophyllia corymbosa	x		
Lobophyllia hemprichii	x		
Symphyllia recta	x		
Hydnophora exesa	x		
Hydnophora microconos	x		x
Cyphastrea microphthalma	x		x
Echinopora forskaliana	x		x
Favia matthai			x
Favia stelligera	x		x
Favites sp.1	x		
Goniastrea pectinata	x		x
Leptastrea pruinosa	x		
Leptoria phrygia	x	x	x
Oulophyllia crispa	x		
Oulophyllia levis	x		
Parasimplastrea sheppardi	x		
Platygyra crosslandi	x		

Platygyra daedalea	x		x
Tubastrea coccinea	x		
Turbinaria frondens	x		
Heliopora coerulea	x		
Millepora exaesa	x		x

Annex 3: Species lists for Grand Bassin

Fish

Species	Source			
	Shoals Rodrigues (Coral)	Shoals Rodrigues (lagoon)	Winton (2006)	Alemu (2008)
Abudefduf margariteus	x			
Abudefduf sexfasciatus	x	x		x
Abudefduf sordidus				x
Abudefduf sparoides			x	x
Abudefduf vaigiensis	x			
Acanthurus blochii		x		
Acanthurus sp (medium)	x	x		
Acanthurus sp (small)	x	x		
Acanthurus triostegus	x	x		x
Anampses caeruleopunctatus	x			
Anampses twistii	x			
Arothron nigropunctatus	x			x
Aulostomus chinensis				x
Bodianus macrourus	x			
Caranx melampygus			x	
Centropyge debelius				x
Cephalopholis nigripinnis	x			
Chaetodon auriga	x	x		x
Chaetodon guttatissimus	x			x
Chaetodon lunula	x			x
Chaetodon madagaskariensis	x			x
Chaetodon melannotus	x		x	x
Chaetodon trifascialis	x			x
Chaetodon trifasciatus	x			x
Chaetodon unimaculatus	x			x
Chaetodon vagabundus	x			x
Chaetodon xanthocephalus	x			x
Chaetodon zanzibariensis	x			
Cheilinus trilobatus	x			x
Chelinus chlrourus	x	x		x
Chelinus fasciatus				x
Cheilio inermis				x
Cheilodipterus quiquelineatus				x
Chlorurus sordidus	x			x
Chlorurus stronglyocephalus	x			x
Chromis viridis		x		x
Chromis nigurura	x			
Chrysiptera annulata				x

Chrysiptera glauca	x	x		x
Chrysiptera leucoma	x			
Chrysiptera unimaculata				x
Coris aygula	x			x
Ctenochaetus binotatus				x
Ctenochaetus marginatus				x
Ctenochaetus sp				x
Ctenochaetus striatus				x
Dascyllus aruanus	x	x		x
Dascyllus fasciatus				x
Dascyllus melanurus				x
Dascyllus trimaculatus		x		x
Dascyllus unimaculatus				x
Diodon lituosus				x
Epinephelus mera	x			x
Epinephelus spilotoceps	x	x		x
Fistularia commersonii				x
Forciper flavissimus	x			
Gnathodentex aurolineatus	x	x		x
Gobiidae		x		
Gomphosus caeruleus	x			x
Grammistes caeruleus				x
Halichoeres hortulanus	x			x
Halichoeres marginatus	x			x
Halichoeres nebulosus	x			x
Halichoeres scapularis	x			x
Hemigymnus fasciatus	x	x		x
Heniochus monoceros	x			
Hipposcarus harid	x			x
Labroides bicolor	x			x
Labroides dimidiata	x			x
Lethrinus harak				x
Lethrinus nebulosus	x	x	x	x
Lutjanus fulvus	x	x	x	x
Lutjanus lutjanus				x
Lutjanus kasmira	x	x		
Mulloidichthys flavolineatus	x		x	x
Mulloidichthys vanicolensis	x			x
Myripristis murdjan				x
Naso branchycencon	x			
Naso lituratus	x			
Naso unicornis	x		x	x
Neoniphon sammara				x
Novaculichthys macrolepidotus				x

Ostracion cubicus				x
Ostracion melegris	x	x		x
Oxymonacanthus longirostris	x			
Parupeneus barberinus	x			x
Parupeneus ciliatus		x		x
Parupeneus cyclostomus	x			
Parupeneus macronemus				x
Parupeneus rubescens	x			x
Parupeneus trifasciatus	x			x
Plectroglyphidodon dickii	x			x
Plectroglyphidodon johnstonianus	x			x
Plectropomus punctatus	x			
Pomacentrus caeruleus	x			
Pomacentrus indicus	x			
Pomacentrus pikei	x			x
Pomacentrus rodriguensis	x			
Pterocaesio tile	x			
Rhinecanthus aculeatus	x	x	x	
Sargocentron diadema				x
Scarus falcipinnis				x
Scarus ghobban	x	x	x	
Scarus scaber	x			x
Siganus sutor	x	x		
Small immature parrotfish	x	x		
Stegastes fasciolatus				x
Stegastes limbatus	x	x		x
Stegastes lividus		x		x
Stegastes nigricans	x	x		x
Stegastes peliceri	x	x		
Stethojulis albovittata	x	x		x
Stethojulis bandanensis				x
Stethojulis stiveter	x			
Thalassoma genivittatum	x	x		x
Thalassoma hardwicke	x			x
Thalassoma mascarenum				x
Thalassoma purpureum	x			
Thalassoma trilobatum				x
Trachinotus blochii		x		
Tylosaurus crocodilus				x
Zanclus cornatus	x			
Zebrasoma desjardinii	x			x
Zebrasoma scopas	x			x
Zebrasoma veliferum				x

Invertebrates

Species	Source	
	Shoals Rodrigues (Coral)	Shoals Rodrigues (Lagoon)
Diadema sp	x	
Echinometra mathaei	x	x
Echinothrix diadema	x	
Echinstrphus molaris	x	
Heterocentrotus mammilatus	x	
Actinopyga mauritania	x	
Actinopyga sp	x	
Bohadschia sp	x	x
Holothuria atra	x	x
Holothuria leucospilota	x	x
Stichopus chloronotus	x	
Synapta maculata		x
Linkia multiflora	x	
Tropiometra carinata	x	
Ophicoma erinaceus	x	
Pinna muricata		x
Tridacna maxima	x	
Conus sp	x	
Coral oyster		x
Cypraea caputserpentis	x	
Cypraea sp	x	
Cyprare tigris		x
Drupa sp	x	
Lambis truncata	x	
Morula sp	x	
Pleuroploca trapezium		x
Trochus maculatus	x	
Turbo argyrostomus	x	
Vasum sp	x	
Nudibranch	x	x
Octopus cyanea		x
Dardanus sp	x	
Palythoa sp		

Hard Corals

Species	Source	
	Shoals Rodrigues	Hardman et al (2004, 2005, 2007, 2008)
Pocillopora damicornis	x	x
Pocillopora eydouxi		x

Pocillopora verrucosa	x	x
Stylophora pistillata		x
Montipora aequituberculata		x
Montipora grisea	x	x
Montipora tuberculosa		x
Montipora venosa		x
Acropora austera	x	x
Acropora abrotanoides	x	x
Acropora clathrata	x	x
Acropora cytherea	x	x
Acropora digitifera	x	x
Acropora formosa	x	
Acropora humilis	x	x
Acropora monticulosa	x	
Acropora nobilis	x	x
Acropora pinguis	x	x
Acropora rodriguensis		x
Acropora robusta		x
Acropora samoensis	x	x
Acropora valida		x
Goniopora djiboutiensis		x
Porites massive sp		x
Porites rus	x	
Coscinarea monile		x
Pavona varians		x
Galaxea fascicularis		x
Oxypora lacera	x	
Hydrophora microconos		x
Echinopora forskaliana	x	x
Favia stelligera	x	x
Goniastrea pectinata		x
Platygyra daedalea	x	x
Platygyra lamellina		x
Leptoria phrygia	x	x
Milleapora exaesa		x

Annex 4: Species lists for Passe Demi

Fish

Species	Source	
	Shoals Rodrigues	Alemu (2008)
Abudefduf margariteus	x	
Abudefduf septemfasciatus		x
Abudefduf sexfasciatus	x	
Abudefduf sordidus		x
Abudefduf sparoides	x	x
Abudefduf vaigiensis	x	x
Acanthurus nigrofuscus		x
Acanthurus sp (medium)	x	
Acanthurus sp (small)	x	
Acanthurus triostegus	x	x
Amblygobius semicinctus		x
Anampses caeruleopunctatus	x	
Anampses melagrides	x	
Anampses twistii	x	
Apogon taeniophorus		x
Arothron nigropunctatus		x
Bodianus perdotio		x
Caranx ignobilis	x	
Caranx melampygus	x	
Cephalopholis argus	x	
Chaetodon auriga		x
Chaetodon guttatissimus	x	x
Chaetodon lunula		x
Chaetodon melannotus	x	x
Chaetodon trifascialis	x	x
Chaetodon trifasciatus	x	x
Chaetodon unimaculatus	x	x
Chaetodon vagabundus	x	x
Chaetodon xanthocephalus		x
Chaetodon zanzibariensis	x	
Cheatodon auriga	x	
Cheilinus trilobatus	x	x
Chelinus chlrourus	x	x
Chelinus fasciatus		x
Cheilodipterus quinquelineatus		x
Chlorurus sordidus	x	x
Chlorurus stronglyocephalus	x	
Chromis chrysura	x	
Chromis dimidiata	x	

Chromis nigurura	x	
Chromis viridis		x
Chrysiptera annulata		x
Chrysiptera glauca		x
Coris aygula		x
Coris caudimacula		x
Ctenochaetus binotatus		x
Ctenochaetus striatus		x
Dascyllus aruanus		x
Dascyllus melanurus		x
Diodon liturosus		x
Epinephelus mera	x	x
Epinephelus multinotatus		x
Epinephelus spilotoceps	x	x
Forciper flavissimus	x	x
Gnathodentex aurolineatus	x	x
Gomphosus caeruleus	x	x
Halichoeres hortulanus	x	
Halichoeres marginatus	x	x
Halichoeres nebulosus		x
Hemigymnus fasciatus	x	
Heniochus monoceros	x	
Labroides bicolor	x	x
Labroides dimidiata	x	x
Labropsis xanthonata		x
Lethrinus harak		x
Lethrinus nebulosus	x	x
Lutjanus fulviflammus		x
Lutjanus fulvus		x
Lutjanus lutjanus		x
Mulloidichthys flavolineatus		x
Mulloidichthys vanicolensis	x	
Myripridstis murdjan		x
Naso lituratus	x	
Naso unicornis	x	x
Neoniphon sammara		x
Ostracion cubicos		x
Ostracion meleagris		x
Oxymonacanthus longirostris	x	x
Paracirrhites arcatus	x	
Paracirrhites forsteri	x	
Parupeneus barberinus	x	
Parupeneus ciliatus		x
Parupeneus cyclostomus	x	

Parupeneus macronemus	x	
Parupeneus rubescens		x
Parupeneus trifasciatus	x	x
Plectroglyphidodon dickii	x	x
Plectroglyphidodon johnstonianus	x	x
Plectropomus punctatus	x	
Plotosus lineatus		x
Pomacentrus caeruleus	x	x
Pomacentrus indicus	x	
Pomacentrus pikei	x	x
Pomacentrus rodriguensis	x	
Pseudanthias evansi	x	
Pterocaesio tile	x	
Rhinecanthus aculeatus		x
Sargocentron diadema		x
Scarus ghobban	x	x
Scarus scaber	x	x
Siganus sutor	x	
Small immature parrotfish	x	
Stegastes fasciolatus		x
Stegastes limbatus		
Stegastes lividis		x
Stegastes nigricans	x	x
Stegastes peliceri	x	
Stethojulis albovittata	x	x
Synanceia verrusoca		x
Thalassoma genivittatum	x	x
Thalassoma hardwicke	x	x
Thalassoma purpureum		x
Variola louti	x	
Zanclus cornatus	x	x
Zebrasoma desjardinii	x	x
Zebrasoma scopas	x	x
Zebrasoma veliferum		x

Invertebrates

Species	**Source**	
	Shoals Rodrigues	Orr (2008)
Diadema sp	x	
Echinometra mathaei	x	x
Echinothrix diadema	x	
Echinstrephus molaris	x	
Holothuria atra		x

Holothuria leucospilota		x
Stichopus chloronatus		x
Lincki multiflora		x
Nardoa variolata		x
Stephanometra indica	x	
Tropiometra carinata	x	
Ophicoma erinaceus	x	
Tridacna maxima	x	x
Coral oyster		x
Conus sp	x	
Cypraea annulus		x
Cypraea tigris		x
Trochus maculatus	x	
Turbo argyrostomus	x	
Nudibranch	x	
Dardanus sp	x	
Heteractis magnifica	x	x
Entacmaea quadricolor	x	x
Palythoa sp		
Sabellastarte sanctijosephi		x

Hard Corals

Species	**Source**			
	Fenner et al (2004)	Shoals Rodrigues	Hardman et al (2004, 2005, 2007, 2008)	Orr (2008)
Pocillopora damicornis			x	x
Pocillopora eydouxi	x	x	x	
Pocillopora verrucosa	x	x	x	
Montipora capitata	x			
Montipora digitata				x
Montipora monasteriata				x
Montipora tuberculosa			x	
Acropora abrotanoides	x	x		
Acropora austera	x	x		
Acropora digitifera			x	x
Acropora clathrata	x	x		
Acropora cytherea			x	x
Acropora formosa			x	x
Acropora humils			x	x
Acropora nobilis			x	x
Acropora pinguis			x	
Acropora samoensis		x		x
Acropora seriata	x	x		

Acropora valida	x		x	
Acropora verweyi		x		
Astreopora myriophthalma	x			
Porites lutea			x	*x*
Porites lobata				x
Porites rus		x		
Goniopora sp.2	x			
Coscinarea monile	x			
Psammocra obtusangula				x
Gardinoseris planulata	x			
Pavona bipartita		x		
Pavina duerdeni	x			
Pavona varians	x		x	*x*
Fungia granulosa	x			
Fungia scutaria	x			
Galaxea fascicularis		x		
Echinophyllia aspera		x		
Mycedium elephantotus	x			
Oxypora lacera	x			
Acanthastrea echinata	x			
Lobophyllia corymbosa		x		
Lobophyllia hemprichii	x			
Symphyllia recta	x	x	x	
Hydnophora exesa	x			
Hydnophora microconos	x		x	
Cyphastrea microphthalma			x	*x*
Echinopora forskaliana	x	x		*x*
Favia mathaei		x	x	
Favia stelligera	x	x		
Goniastrea pectinata	x		x	*x*
Leptastrea pruinosa	x			
Leptoria phrygia	x	x	x	*x*
Oulophyllia crispa		x		
Platygyra crosslandi				x
Platygyra daedalea	x	x	x	*x*
Turbinaria reniformis			x	*x*
Heliopora coerulea	x			
Millepora exaesa	x			*x*