

MEET THE FRIENDLY FACES OF OUR COAST

2018 GREAT VICTORIAN FISH COUNT



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VICTORIAN
NATIONAL PARKS
ASSOCIATION
Be part of nature



Victorian National Parks Association

Our vision is to ensure Victoria is a place with a diverse and healthy natural environment that is protected, respected and enjoyed by all.

We work with all levels of government, the scientific community and the general community to achieve long term, best practice environmental outcomes and help shape the agenda for creating and managing national parks, conservation reserves and other important natural areas across land and sea in Victoria.

We are also Victoria's largest bushwalking club and provide a range of education, citizen science and activity programs that encourage Victorians to get active for nature.

ReefWatch

ReefWatch is the Victorian National Parks Association's marine citizen science program. It encourages divers and snorkelers to monitor marine life at their favourite dive sites.

ReefWatch coordinates a number of marine conservation programs, including 'OysterWatch', 'ReefCam', the Melbourne Sea Slug Census, 'Dragon Quest' and the Great Victorian Fish Count.

In 2012, ReefWatch won an award for 'Excellence in Education' from the Victorian Coastal Council.

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Project Partners

Parks Victoria

Parks Victoria's responsibilities under the *Parks Victoria Act 1998* are to manage the state's parks, reserves, waterways and other public land, including a representative system of terrestrial and marine national parks and marine sanctuaries. It is also the local port manager for Port Phillip Bay, Western Port and Port Campbell.

Parks Victoria works in close partnership with other government and non-government organisations and community groups to manage parks and reserved and encourages community participation within them.

Parks Victoria's philosophy of 'Healthy Parks Healthy People' promotes involvement in activities within parks to maintain and improve the health of individuals and the community as well as contributing to a better understanding of Victoria's parks. Participation in the Great Victorian Fish count is a great example of this and for connecting people and communities with parks.

Coastcare Victoria

Coastcare Victoria is a state-wide program run by the Department of Environment, Land, Water and Planning (DELWP). Coastcare Victoria facilitators work directly with these communities and connect them with the state's coastal management system – coastal and natural resource

management planners, managers of public land, local government and government programs targeting issues in coastal areas.

Redmap

Redmap (Range Extension Database and Mapping project) is a national 'citizen science' site that captures data and maps marine species that may be extending their range in Australia in response to changes in the marine environment. In Victoria, Redmap is hosted by Museums Victoria and all recorded sightings are verified by marine scientists.

Museums Victoria

Museums Victoria is Australia's largest public museum organisation. As the state museum for Victoria it is responsible for looking after a collection of nearly 12 million objects, documents, photographs and specimens. Its research, in the fields of science and humanities, uses the museum's collections and expert staff to further what we know about the social and natural history of Victoria and beyond.

The Great Victorian Fish Count is supported by the Victorian Government.





Smiling faces at the Count. Photo: Nicole Mertens

Executive Summary

The Great Victorian Fish Count is Victoria's largest marine citizen science event, and each year it continues to grow! The theme for 2018, 'Meet the friendly faces of our coast', aimed to entice even more people to take to the water and create some lasting memories while recording valuable information on some of Victoria's iconic marine fishes. In total, 37 participating groups completed 66 surveys across the state's beautiful coastal waters, with approximately 750 citizen scientists taking part in the 'dive that counts'. The huge effort from everyone involved is a testament to the passion of the community when it comes to making meaningful contributions to our marine environment.

Key findings were:

- The friendly face of our fish count, the Port Jackson shark, was recorded in 11% of surveys. This is slightly lower than last year (14%), and not an unexpected overall result, given its preference to spend its days hidden under rocky ledges. Several groups were still lucky enough to see large groups of 6 or more sharks during their surveys.
- A draughtboard shark was recorded in one survey (a confirmed sighting).
- All shark and ray species added to the Fish Count in 2017, except for the elephantfish, have now been sighted at least once.
- Following the confirmed sighting of a white barred boxfish in 2017, another confirmed sighting of this species (*Anoplocapros lenticularis*, also known as the humpback boxfish or humpty dumpty) was recorded near Cape Woolamai, at the edge of its known distribution.

- This year, the blue throat wrasse was again the most commonly sighted species, just beating the magpie perch (recorded in 79% and 78% of surveys respectively). Other species recorded in the majority of surveys included:

- Six-spined leatherjacket
- Zebra fish
- Dusky morwong
- Victorian scalyfin

While only 5.3% of our coastal waters are protected, 25% of surveys were done in marine protected areas. Marine parks and sanctuaries continue to be popular sites for the Fish Count.

The results of the fourteenth Great Victorian Fish Count would not be possible without the 700+ enthusiastic divers and snorkelers who took part in this large-scale citizen science research project. The Victorian National Parks Association looks forward to seeing you along with your friends and family at the 2019 Great Victorian Fish Count, which will be held from November 16 until December 15. Let's make this one even bigger!

The data collected from the 2018 Fish Count has been entered into the Atlas of Living Australia and is accessible to scientists, managers and the community to learn more about Victoria's unique marine life.





This year we encouraged everyone to go out and meet the friendly faces of our coasts. Photo: Heidi Harron

Introduction

1.1 Background

Combining the opportunity to collect real data on Victoria's marine life with a chance to dive in and experience our beautiful coast, the Great Victorian Fish Count is Victoria's largest marine citizen science event. Now in its fourteenth year, the Fish Count is held through November and December with dive clubs, environmental groups, 'friends of' groups, local dive operators, local community groups, schools, universities and the VNPA's Wild Families and beginner groups hitting the water to take part in collecting a 'snapshot' of fish diversity in our coastal waters.

Victoria's coastline has a diverse range of habitats that provide homes to a variety of species, many of which are not found anywhere else in the world. Almost a quarter of Australia's fishes are endemic with 60% of these species living only in our southern seas (Bray 2018e). The fish count provides a 'snapshot' of some of these species and involves hundreds of divers recording thousands of fish sightings along the coastline. The data collected can be used to investigate changes in species composition and relative abundance at multiple locations throughout the state's coastal waters.

The Great Victorian Fish Count aims to help passionate people take part in an event that gathers valuable marine data, promotes active learning and the chance to reconnect with their local coastal environment. In turn, this creates understanding, awareness and co-operation between the public, scientists and government agencies.

1.2 Citizen Science

Citizen science is the involvement of community members in scientific projects through the collection of data and/or involvement in project design. It provides an opportunity for participants to learn from each other. For example, the Great Victorian Fish Count brings together scientists, marine managers, divers, snorkelers and community members to increase and share our knowledge about fish found in their local waters.

In 2018 approximately 750 participants collected data on fish species across the Victorian coastline. Having so many pairs of eyes in the water searching for fish provides a large amount of data on the distribution and relative abundance of Victorian fish species. The data collected shows how citizen scientists can collect a vast amount of data, which would be extremely difficult to gather without the support of the community.

1.3 Partnerships with local communities

Over the past 14 years, the Victorian National Parks Association in partnership with Museums Victoria, Parks Victoria, Coastcare Victoria, dive operators and local community groups, has led the Great Victorian Fish Count. In 2015, we were pleased to add Redmap to our list of partners for the first time and continued to do so in 2018.



The Port Jackson shark, the face of the 2018 Great Victorian Fish Count. Photo: Mark Rodrigue

All project partners benefit the Great Victorian Fish Count by providing experience and knowledge on the Victorian marine environment. Project partners provide:

- Scientific expertise;
- Communication skills and knowledge;
- Local, regional and state-based knowledge on coasts, habitats and fish;
- Local community knowledge;
- Connection with local communities and networks;
- Skills, experience and qualifications to lead diving and snorkelling trips

This collaborative approach has made the Great Victorian Fish Count a success and we are grateful for the continued support of all our partners and look forward to continuing to work with them.

1.4 The 2018 fish ‘face’

After the introduction of sharks and rays to the count in 2017, the ‘face’ of the 2018 Great Victorian Fish Count was the Port Jackson shark (*Heterodontus portusjacksoni*). With a peculiar grin and docile nature, this small shark is a favourite among the divers and snorkelers who are lucky enough to encounter them under rocky ledges in shallow coastal waters. With much media attention focusing on negative human-shark encounters, it was time for this group of fish to be represented by a friendly face.

Males reach an average of 75 cm and females usually grow to about 95 cm. They have a distinct, harness-like pattern running down their back and across their body, a blunt head with arched ridges that give the appearance of horns and a single spine on both

dorsal fins. Adding to their unusual features are the curled nostrils attached to their mouth and the two distinct types of teeth. They use their sharp, spiny front teeth to latch on to prey such as crabs, lobsters, octopuses, or sea urchins, and their broad, flat back teeth to crush and grind their catch.

“Researchers have identified that they have distinct personalities”

Unlike most shark species, Port Jackson sharks can eat and breathe at the same time, and don't need to be moving to allow enough water to flow over their gills to breathe. Instead, they can pump water into their first, large gill slit and out through the other four gill slits. This feature means that they can spend a long time lying on the ocean floor, waiting for their prey or mates, or perhaps even inquisitive fish counters.

Port Jackson sharks have complex social interactions, returning to the same sites to breed and preferring to spend their time with individuals of the same gender and size. Researchers have identified that they have distinct personalities, form long term relationships with other Port Jackson sharks, and many make the long journey from their feeding grounds to their breeding grounds in large migratory groups (Byrnes and Brown 2016; Bass et al 2016; Powter and Gladstone 2009).

1.5 The Atlas of Living Australia

Data collected during the Great Victorian Fish Count continues to be entered into the Atlas of Living Australia. The atlas is a collaborative,

national project that brings together biodiversity data from multiple sources and makes it available and usable online. The atlas is an online resource where anyone can go to get information on any species of interest to them. Data is entered via the BioCollect tool developed by the atlas to support citizen scientists, ecologists, scientists and natural resource managers. Currently there is limited information on the distribution of marine species in Victoria, so the Great Victorian Fish count is contributing important data. <http://bit.ly/biocollect>.

The Victorian National Parks Association is currently in the process of collating and uploading all past Great Victorian Fish Count results to the Atlas of Living Australia.

1.6 Praising our sharks and rays

In 2017 the addition of five ray and five shark species to Fish Count coincided with changes to fishing regulations to protect rays in Victoria and with community efforts throughout the marine community to 'rays' awareness of Victorian sharks and rays. It is now prohibited to take stingrays, skates or guitarfish greater than 1.5 m in width, and the daily bag limit for sting rays, skates or guitarfish smaller than 1.5 m in width have been reduced from five to one. Taking these species within 400 m of any pier, jetty, wharf or breakwater is also prohibited, and these species are required to be landed whole so they can be measured by fisheries officers.

These protections are the result of the Project Banjo action group #RaysAwareness working tirelessly with the Victorian Fisheries Authority. Protecting rays, especially around artificial structures, ensures that divers, snorkelers and other beach users



Coming face to face with a Southern Blue Devil, *Paraplesiops meleagris*, at Nepean Wall. Photo: Peter Beaumont

continue to be delighted by sightings of these iconic species and will help ease the pressure on their populations. Relatively little is known about the stock status of many of Victoria's shark and ray species, so reports of sightings are appreciated.

for sightings to be verified and confirmed (photographed) sightings of western blue groppers were instrumental in ReefWatch's efforts to secure their protected status in Victoria.

1.7 Unusual sightings and identification

We continue to receive reports of sightings of uncommon and unusual species. Some species, such as the protected western and eastern blue groppers, are very difficult to tell apart in the field. Other rarely sighted species may be easily confused with similar looking fish. We encourage participating groups to submit photos with their survey data, especially when reporting on uncommon species, as this assists us in confirming their presence and improves the quality of our data sets. Redmap requires photos



The many faces of the 2018 count. Photos: Nicole Filby, Rod Webster, Liz Harper, Nicole Mertens



Fishy hats frame happy faces at Blairgowrie (top) and Rye (bottom). Photos: Nicole Mertens

Methodology

2.1 Survey Period

The Great Victorian Fish count runs during November and December each year. The 2018 Great Victorian Fish Count began on November 17 and finished on December 16.

The dates were initially chosen to coincide with the national Coastcare Week, which is held on the first week of December. To allow for the comparison of results to previous years the fish count will continue to be held during the November/December period.

2.2 Site selection

Surveys took place all along the Victorian Coastline (Figure 1) with participating groups choosing their own sites. To ensure continuity in data over time, groups are encouraged to select a site they are familiar with and will continue to monitor each year.

Below is a list of the sites surveyed during the 2018 Great Victorian Fish Count:

Western Victoria

Eagle Rock
Port Campbell pier
Port Fairy- Pea Soup, South Beach bay
Portland- Lee Breakwater, Nun's Beach
Torquay
Point Addis
Warrnambool- Stingray Bay, Merri Marine Sanctuary

In and around Port Phillip Bay

Barwon Bluff Marine Sanctuary
Beaumaris

Blairgowrie
Brighton Beach
Flinders Pier
Jawbone Marine Sanctuary
Mornington Pier
Mushroom Reef Marine Sanctuary
Parkdale Reef
Point Cooke Marine Sanctuary
Point Ormond
Port Phillip Heads- Castle Rock, Golden Arch, Lonsdale Wall, Nepean Wall, Pt Lonsdale
Popes Eye
Portarlington Pier
Portsea Pier
Ricketts Point Marine Sanctuary
Rye Pier
St Leonards Pier
Tom's Reef
Wreck of the Hurricane

Eastern Victoria

Beware Reef
Bunurong Marine National Park- Cape Patterson, Shack Bay
Wreck Beach, Harmers Haven
Meetung Moorings, Gippsland Lakes
Somers
Phillip Island- Cat Bay, Kitty Miller Bay, Cape Woolamai, the Pinnacles

Over half the individual sites (55%) surveyed were in the Port Philip Bay region where groups continue to show a high level of participation and coverage of the area. Many sites within Port Phillip Bay were host to multiple surveys (e.g. Blairgowrie, Rye).



Figure 1. Areas surveyed in 2018. Photo: Kade Mills

Eastern and Western Victoria continue to have lower representation than the Bay region, but it is encouraging to see additional sites outside of the Bay appearing in the survey data every year. The Victorian National Parks Association will continue to build stronger networks with local communities outside Port Phillip Bay to improve coverage in future Great Victorian Fish Counts.

2.3 Survey Method

Each participating group leader is supplied with a standard Great Victorian Fish Count Kit. The Kit contains training on how to conduct a count and where to upload the data, identification slates, and survey forms.

The 'Roving Diver' Technique

All participants work in buddy pairs or small groups for the entire survey and use one identification slate between them. During the survey the Roving Diver Technique (RDT) is employed, whereby the participants swim freely through the selected site and record all the fish identified on their monitoring slate. Participants are encouraged to follow a route that does not overlap with other buddy pairs or groups in order to cover a wider area and reduce the number of double ups in data and to take regular stops to observe fish that may have been disturbed and had been hiding.

During the survey, participants place the observed fish species into one of three abundance categories on the

identification slate (Figure 2). Each category has a corresponding symbol, which is crossed out progressively as increasing numbers of that particular species are observed (Figure 3).

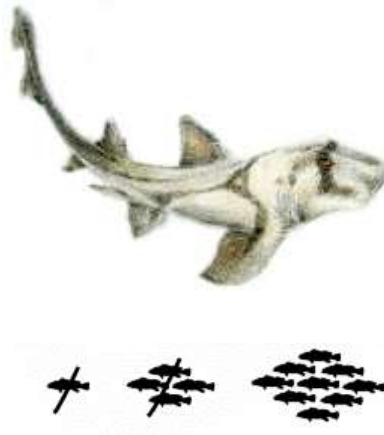


Figure 2. The abundance categories and corresponding symbols used on the Great Victorian Fish Count identification slates.
Illustration: Nicole Mertens.

2.4 Data Summary

At the conclusion of each survey, the Great Victorian Fish Count data sheet (Figure 4) is completed in the company of all the participating buddy pairs and groups. The survey form includes information regarding the survey site location, weather conditions, time spent completing the survey and visibility.

The form is filled out immediately after the dive, and involves consultation with all of the participants in order to ensure a good representation of the average result. The name of the 35 target species are listed on the form with additional space for any species the group would like to add. An abundance category is marked for each of the species observed by the group, with the category being based on the average results from all the participating buddy pairs.

Participating groups either email or post their results to the Victorian National Parks Association or enter

their results and photos directly to the Atlas of Living Australia (ALA) database <http://bit.ly/biocollect>. Many people have commented on the ease and fast nature of submitting their results directly to the database and the Victorian National Parks Association will continue to encourage participants to upload their results this way.

2.5 Data presentation

Survey results emailed or posted to the Victorian National Parks Association were entered into the Atlas of Living Australia database, from where all data were downloaded. This year's results are presented to give an overview of main habitats surveyed and survey methods used, to illustrate the occurrence and abundance of species surveyed in 2018, and compare 2018 to previous years.

The results are displayed as a percentage. This was calculated for each of the target species using the formula (percentage occurrence = number of surveys species sighted in / total number of surveys X 100). This enables a quick overview of which species were sighted more frequently during the Great Victorian Fish Count. All data is presented in the Appendix at the end of this report.

Each year there are some records which are not uploaded to the Atlas of Living Australia despite groups successfully completing their surveys in the field. We encourage every participating group to make sure their data is counted towards official records, and to get in touch with the Fish Count/ReefWatch coordinator if any issues are encountered when submitting results.

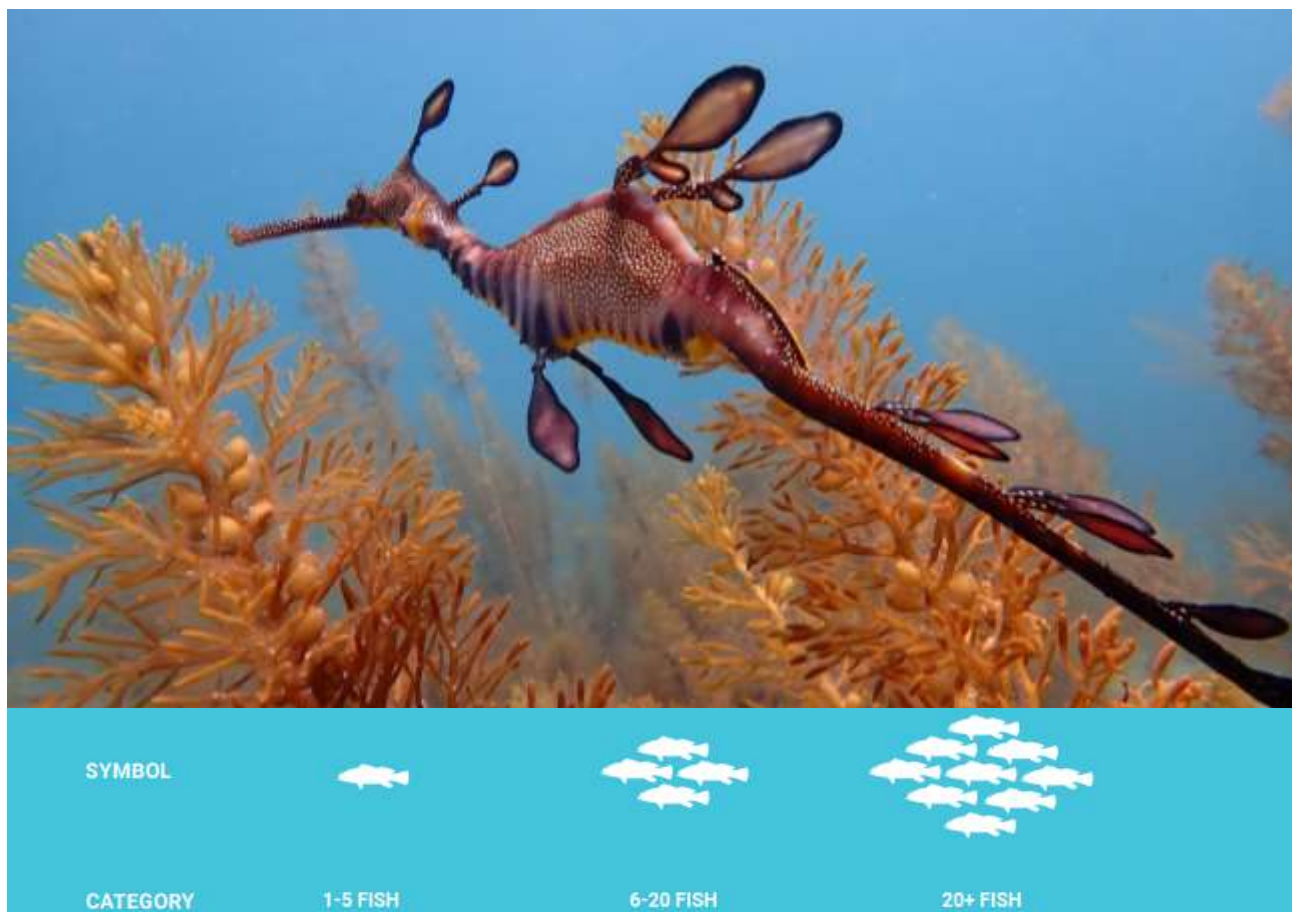


Figure 3. Key to fish abundance categories. Photo: Kade Mills

GVFC Survey Form

Registration Details

Dive Group (registered dive operator/friends group):

Survey Method (SCUBA, Snorkel or SCUBA and Snorkel):

Site Details

Site name:

Location:

Latitude: S Longitude: E

If using a GPS, please use WGS 84 DATUM

Site Description

Habitat (tick all that apply):

☐ Large Rocky Reef (>2m face)
 ☐ Low Rocky Reef (<2m face)
 ☐ Boulder
☐ Artificial Reef (log, pier, wreck)
☐ Sand/Mud
☐ Other

Type of cover (tick all that apply):

☐ Kelp (long, leathery brown algae)
☐ Mixed algae
☐ Seagrass
☐ Sponges, seaanemones & other
☐ Other

If Other, please describe:

Site Conditions

The following are the site conditions on the day of the survey

Date of Survey: DD/MM/YYYY Time Start: 24 hr time Time Finish: 24 hr time

No. of divers: Duration: hours: mins Max. Depth: m Visibility: m Water Temp.: °C

Tide: ☐ High ☐ Low Swell Height: ☐ 0m ☐ 0.5m ☐ 1m ☐ 1.5m ☐ 2m

Tidal stream: ☐ Flood ☐ Ebb ☐ Slack Current: ☐ Strong ☐ Weak ☐ Nil

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GVFC Survey Form

Fish Count data

Common name	1-5	6-20	20+
Dusky Morwong			
Red Morwong			
Banded Morwong			
Maggie Perch			
Bandstand Trumpeter			
Herring Gull			
Horseshoe Leatherjacket			
Star-spined Leatherjacket			
Zebra Fish			
Southern Blue Devil			
Ornate Cowfish			
Shaw's Cowfish			
Victorian Scalyfin			
Long-snouted Hoarfroth			
Old Wife			
Sea Sweep			
Silver Sweep			
Western Blue Groper			
Eastern Blue Groper			
Blue Throat Wrasse			
Goddard Wrasse			
Semitor Wrasse			
Maori Wrasse			
Harlequin Fish			
Weedy Sea Dragon			
Smooth Stingray			
Black Stingray			
Spotted Sturgeon			
Southern Fiddler Ray			
Southern Eagle Ray			
Port Jackson Shark			
Spotted Wobbegong			
Elephant Fish			
Varked Carpshearer			
Daughtershark			

Page 2

Figure 4. The data sheet where results of group surveys are collated

Results

3.1 General summary

3.1.1 Participation and conditions

There were 66 surveys carried out at by 37 groups during the 2018 Great Victorian Fish Count, at 38 different sites along Victoria's coastline (see appendix 1 for data submitted on site locations and conditions).

The depth of sites varied from 2m to 39m, with visibility ranging from 2m to 20m and water temperature ranging from 15°C to 23°C (see Appendix 5.7).

The number of fish counters in each participating group varied from two to 25 with participants spending 30 to 100 minutes conducting their survey. Groups reported participant age ranges from 12 to over 70.

3.1.2 Survey methods

SCUBA dives accounted for 59% of all surveys, with 30% undertaken by snorkelling (Figure 5). This year, 11% of surveys were conducted with a mix of scuba divers and snorkelers, with several groups hosting events that catered for both methods.

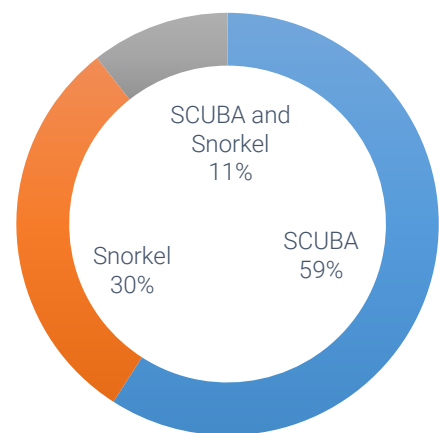


Figure 5: Survey methods used (%) (n=66)



Face down and focused on finding fishes: a buddy pair using the roving diver technique during their survey. Photo: Kade Mills



Time to face the data: meeting up post dive to collate survey results. Photo: Liz Harper

3.1.3 Habitats surveyed

Most surveys were conducted on artificial structures (62%) with the remaining (38%) completed on rocky reefs (Figure 6). Additional habitats present at sites included sponge gardens, seagrass meadows, kelp forests, sandy sediments, and mussel beds (Appendix 5.7).

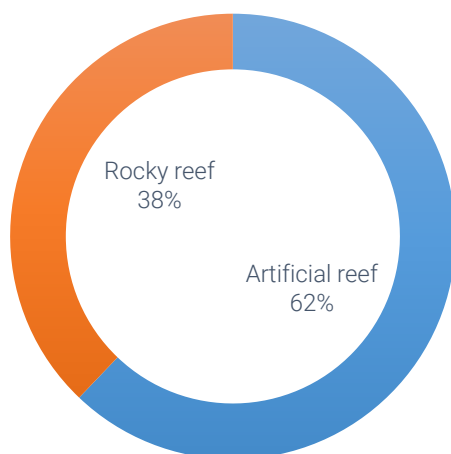


Figure 6: Habitat surveys conducted on (%) (n=66)

3.1.4 Protection status of survey sites

The majority of the surveys (74%) were conducted in unprotected waters with the remaining (26%) undertaken within marine national parks or sanctuaries (Figure 7). Many of the snorkelling surveys were conducted in marine national parks or sanctuaries (Appendix 5.7).

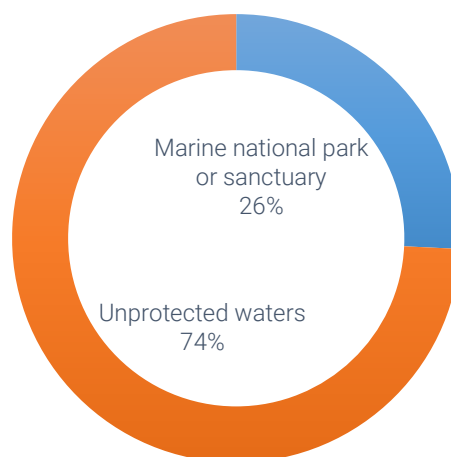


Figure 7: Protection status of survey sites (%) (n=66)

3.2 The fish of 2018

- The 'face' of the 2018 Fish Count, the Port Jackson shark, appeared in 11% of surveys. See figure 9.
- Blue throat wrasse were mostly recorded in abundances of 20 or more individuals and were the most commonly observed fish species, sighted in just under 79% of surveys. Magpie perch were observed at a similarly high rate (78% of surveys) and were mostly recorded in abundances of 1-5 individuals. See figure 8.
- Other bony fish species observed in 50% or more of surveys were six-spined leatherjacket, zebra fish, Victorian scalyfin, and dusky morwong.
- Less common bony fish species included the eastern and western blue groper, southern blue devil, Maori wrasse and red morwong, which appeared in less than 10% of the surveys conducted. The harlequin fish was not sighted at all in 2018 and has not been recorded in the Fish Count from 2015-2018.

- The most commonly sighted of the shark and ray species was the smooth stingray, which was recorded in 53% of surveys.
- Less common shark and ray species include the spotted wobbegong, draughtboard shark and varied carpetshark, which were recorded in less than 2% of surveys.
- Elephantfish were not recorded.
- No sharks or rays were recorded in abundances of 20 or more.

3.3 Comparison of 2018 results to previous years

- Blue throat wrasse were also recorded in the highest percentage from 2015-2017.
- Most species were observed within 5-10% of average sightings (2015-2017), except for the long snouted boarfish, horseshoe leatherjacket, old wife, sea sweep and silver sweep, all sighted 10-17% less frequently. See figure 10.
- All shark and ray species were sighted within 10% of 2017 records (figure 11).



A huddle of fresh-faced Port Jackson Sharks. Photo: Jack Breedon

TARGET BONY FISH SPECIES

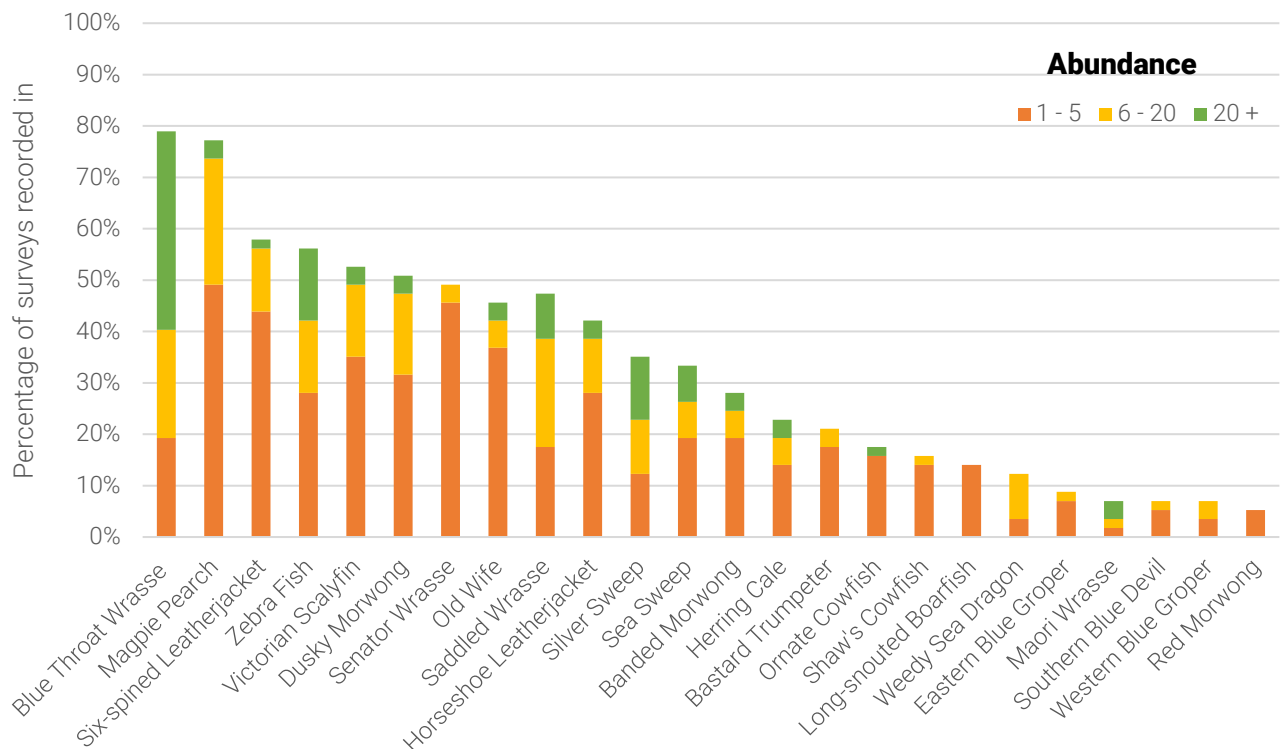


Figure 8. Percentage of surveys each bony fish species was recorded in and abundance category (n=57).

TARGET SHARK AND RAY SPECIES

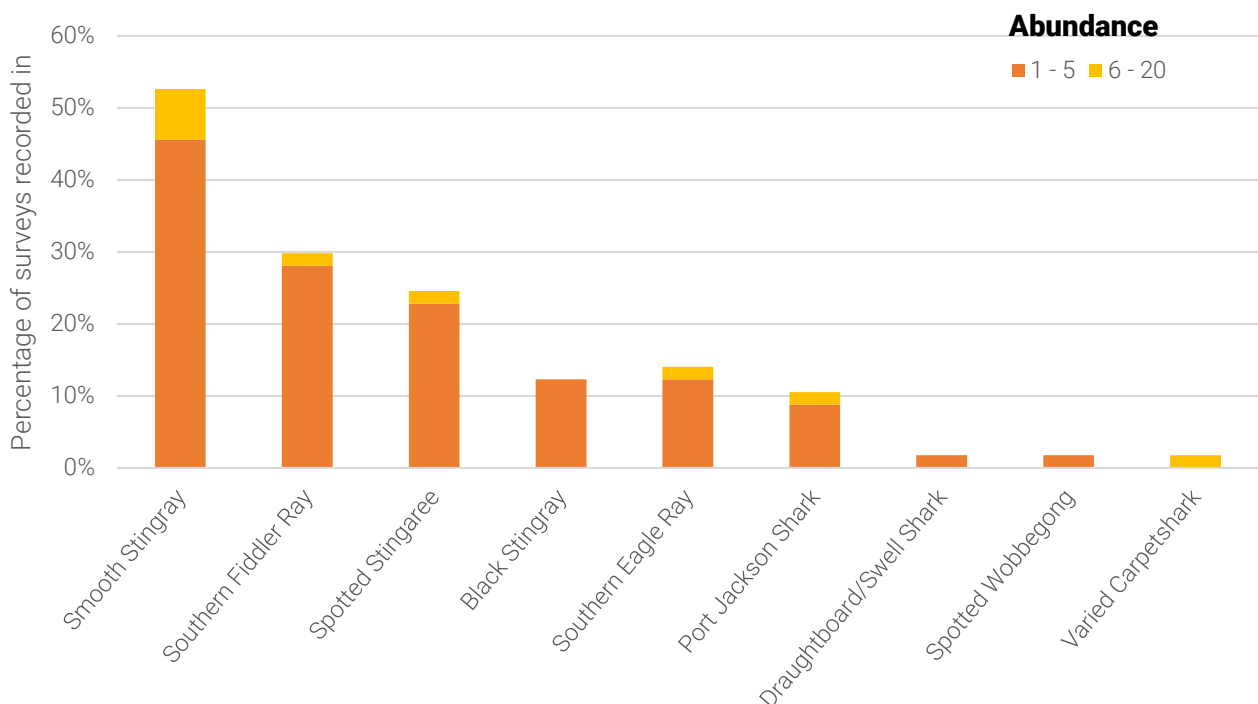
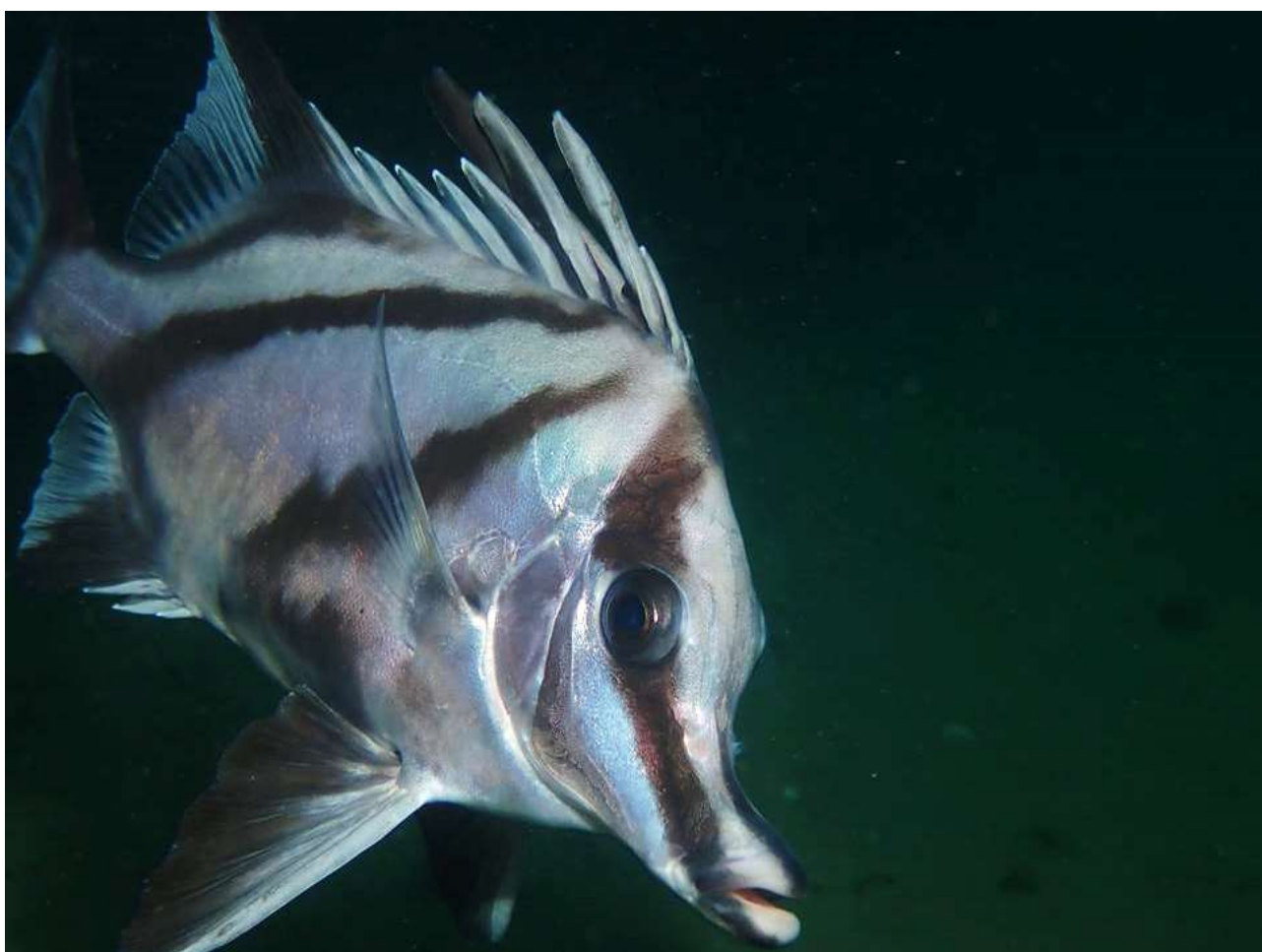


Figure 9. Percentage of surveys each shark and ray species was recorded in and abundance category (n=57).



Above: one of the most commonly sighted faces of 2019, the magpie perch, and below: one of the least sighted faces of 2019, the long snouted boarfish. Both species were encountered at Blairgowrie. Photos: Peter Beaumont and Carol Milligan.



TARGET BONY FISH SPECIES

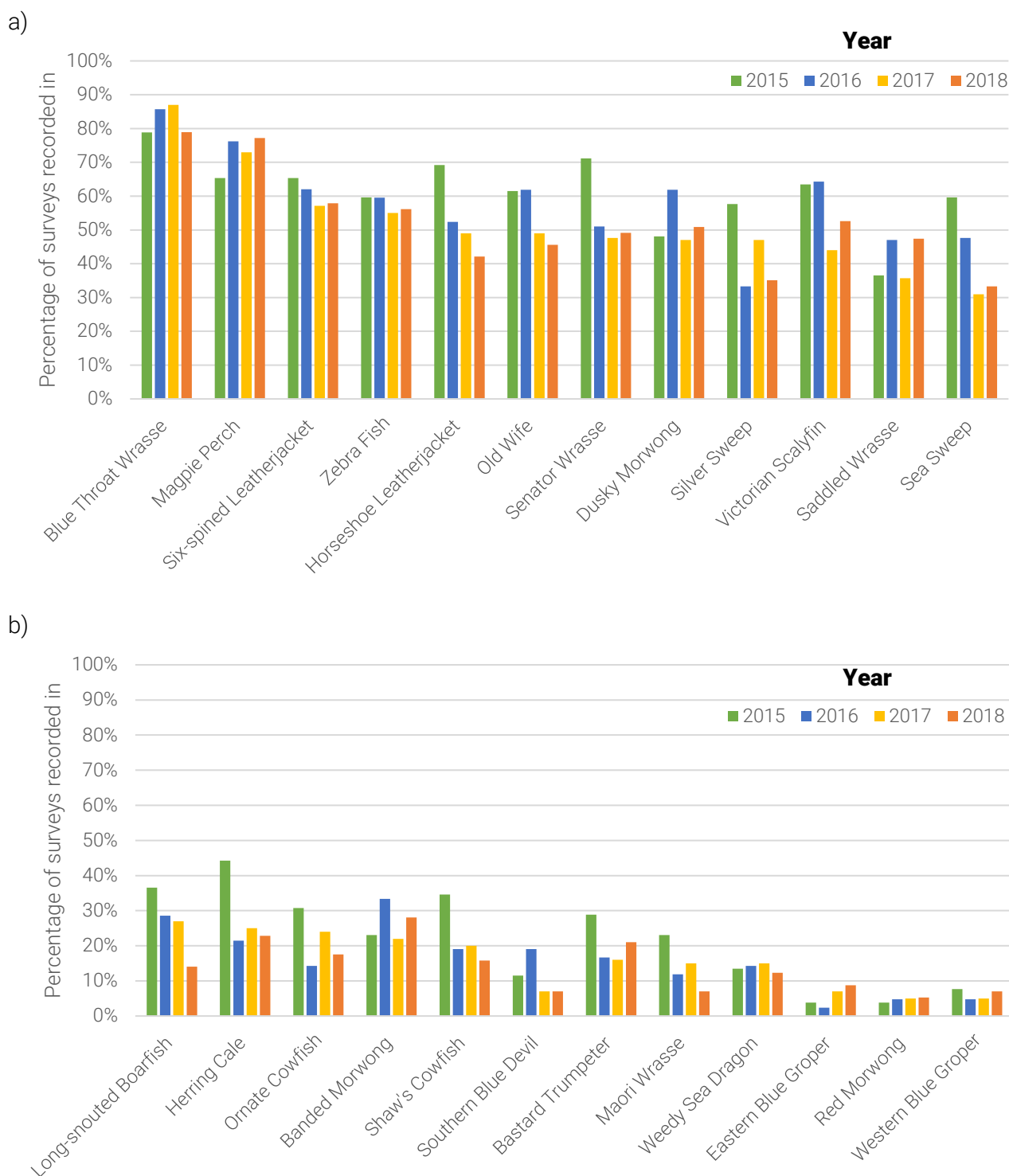


Figure 10. A comparison between the percentage occurrences of a) the most-sighted and b) the least-sighted target species* of bony fishes calculated for the 2015 (n=42), 2016 (n=44), 2017 (n=55) and 2018 (n=57) fish counts. *The harlequin fish was removed due to it not being recorded from 2015-2018. Shark and ray target species comparisons for 2017 and 2018 are shown in Figure 11.

TARGET SHARK AND RAY SPECIES

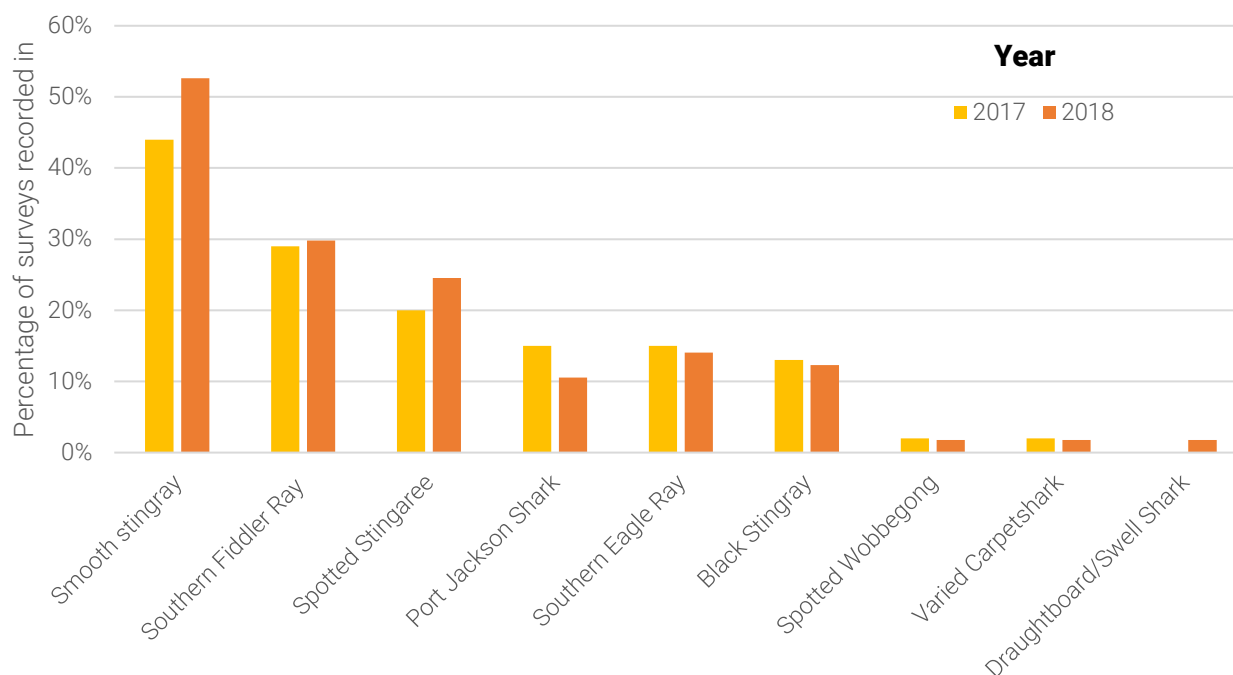


Figure 11. A comparison between the percentage occurrences of each target species* of sharks and rays calculated for the 2017 (n=55) and 2018 (n=57) fish counts. *The elephantfish was removed due to it not being recorded from 2017-2018.



This draughtboard (or swell) shark's face is much fiercer than its nature: when startled, it swallows water to puff itself up and make it hard for predators to attack them. Photo: Jack Breedon

Discussion

4.1 General summary

4.1.1 Participation and conditions

Victoria has a unique and dynamic coastline, and this is reflected in the range of site conditions encountered by participants. Some groups had to reschedule events on more than one occasion due to poor weather conditions, whilst others enjoyed great visibility, warm temperatures and calm waters with little to no swell. Groups undertaking counts on exposed rocky coasts were more likely to encounter unfavourable conditions than those in more sheltered locations, such as the many sites visited throughout Port Phillip Bay.

4.1.2 Survey methods

The large involvement of SCUBA divers is due to the continued support and

enthusiasm of local dive clubs. Many surveys undertaken by snorkelers were in marine national parks or sanctuaries, because events in these areas are generally run by Parks Victoria, Marine Care Friends Groups and/or Schools that are restricted to snorkelling. However, the increased representation of snorkelers in the Fish Count this year may reflect the growing diversity of those taking part, including families, students and culturally and linguistically diverse (CALD) groups.

4.1.3 Habitats surveyed

Established in 2002, Victoria's marine protected areas include marine national parks and marine sanctuaries. Marine protected areas cover approximately 63,000 hectares – 5.3% of Victoria's state marine waters (Parks Victoria 2014). They provide people with the opportunity to experience and observe marine life undisturbed by fishing and other extractive activities.



Facing forwards, shuffling backwards to kick off a survey at Portsea. Photo: Nicole Mertens

Despite only covering a small percentage of Victoria's marine waters, they are embraced and used widely by the diving community. This is evident from the large percentage of surveys carried out in marine protected areas in comparison to the size of coast they cover.

4.2 The fish of 2018

Magpie perch

Growing to about 40 cm in length, the magpie perch is easily recognisable by its three broad black bands and reddy-brown tail. Actually a member of the morwong family, this fish is found on coastal reefs throughout southern Australia. Often seen sheltering in small groups under rocky structures (Bray 2019c), this species was observed in groups of 6-20 individuals in over a quarter of the surveys it was recorded in. It is likely that its presence on both sheltered and exposed coastal reefs accounts for its high rate of observation during the Great Victorian Fish Count.

Blue groper

The low occurrence of blue groper during the Great Victorian Fish Count is due to limited distribution and habitat preference of the two groper species. Eastern blue groper only occur in Victoria east of Wilsons Promontory. With just four surveys conducted in this region around Beware Reef and Lakes Entrance, there were limited opportunities for the fish to be recorded. Encouragingly, it was recorded in three of the four surveys in this region, with one survey observing between 6-20 individuals. This reflects other reports that the species is being sighted in large numbers in the East Gippsland region (Bray 2018b).

The western blue groper on the other hand, only occurs west of Wilsons Promontory. Western blue groper are commonly found on exposed coasts (although there have been sightings at St Leonards and Popes Eye in Port Phillip Bay). With only a limited number of surveys conducted on the open coast, the low occurrence is to be expected. It was recorded in four surveys, at Mushroom Reef, Barwon Bluff, Stingray Bay in Warrnambool and Lee Breakwater in Portland.



A juvenile western blue groper. Photo: Kade Mills

There was an unconfirmed sighting of an eastern blue groper at Rye, however, it is more likely this was in fact a western blue groper (Bray 2018a). The two species are very similar in appearance and without photographic verification, identification often comes down to region the fish was observed in. Reefwatch encourages participants to photograph species recorded in their Fish Count, especially groper, to assist in identification (photographs can be uploaded to the Atlas of Living Australia when making a submission).

Smooth stingray

Once again smooth stingray were the most commonly sighted of the sharks and rays, recorded in over half of all surveys. Smooth stingrays are widespread in southern Australia (Bray 2018c). Two thirds of all surveys conducted on artificial reefs recorded



More than just a pretty face? A rainbow cale showing its breeding colours at the Pinnacles. Photo: Peter Beaumont

sightings of this species. Their large size makes them an easily recognisable species of ray, and their reported tendency to frequent piers throughout Victoria may account for their high rates of observation.

Port Jackson shark

The Port Jackson shark was spotted less frequently in 2018 than 2017. This could be attributed to the lower number of surveys conducted on natural reefs, as this species often shelters under rocky ledges during the day (Bray 2019a).

Draughtboard shark

Draughtboard or swell sharks are endemic to temperate southern Australia, inhabiting the sandy bottoms and rocky reefs of the coast (White and Bray 2019). They can be found at depths of 60m, and one survey recorded this species at 39m.

Elephantfish

The elephantfish or Australian ghost shark is the only target shark or ray species that has not been recorded during the Great Victorian Fish Count. While females move to shallow waters to lay their eggs, and juveniles remain inshore for up to three years, mature sharks are usually found in deeper offshore waters of up to 200m depths (Bray 2018d).

4.3 Comparison of 2018 results to previous years

Some fish such as the southern blue devil, Maori wrasse and the two cowfish species, all sighted 5-10% less frequently compared to previous years, may have been recorded at lower rates due to the reduced number of surveys being conducted on rocky reefs (primary habitat for these species) in 2018 compared to earlier years. This follows the trend seen in 2017 with

other rocky reef species such as the horseshoe leatherjacket. The Victorian National Parks Association hopes to see more surveys conducted on natural reefs in future Fish Counts in order to better compare data for the species that call these habitats home.

4.4 Species not on slates

A number of other species were recorded that do not appear on the official identification slates. Common non-target species included globefish, moonlighters, goatfish, and toadfish.

One of the more colourful additions to off-target reports for 2018, this rainbow cale (*Heteroscarus acroptilus*, see above) was photographed near the Pinnacles, Phillip Island by the Victorian Sub Aqua Club.

4.5 Reports of ‘fish on the move’

The Victorian National Parks Association has continued its partnership with Redmap Victoria.

Once again participants were encouraged to keep an eye out for any fish that seem unusual in the area. The following species indicate that there could be exciting things happening in Victorian waters. However, it should be noted that these are only unconfirmed reports at this stage as species need to be recorded on film for confirmation. The importance of capturing images or footage of any unusual or unfamiliar fish observed when in the water cannot be overstated. The photos can be viewed by staff at the Victorian National Parks Association and referred to marine scientists at both Museums Victoria and Redmap Australia for identification, ensuring the sightings are added to official records.

Red morwong

This fish is rarely found in Victoria west of Wilsons Promontory – it usually exists in the warmer temperate waters of eastern Australia (Bray 2019b). There were three sightings reported in eastern Victoria during the 2018 Great Victorian Fish Count. Two were by long time Great Victorian Fish Count participant and recreational-cum-scientific (Reef Life Survey) diver Don Love at Beware Reef, however, it should be noted that each sighting is unconfirmed - no photos were provided for identification purposes. All three were recorded in eastern Victoria. Two sightings occurred at Beware Reef, where there was also an unconfirmed sighting in 2017. The third sighting (unconfirmed) occurred at Shack Bay in Bunurong Marine National Park.

White-barred boxfish

This year there was one confirmed sighting of a white-barred boxfish near the Pinnacles, Phillip Island. This confirmed (photographed) sighting follows another in 2017 and indicates this previously uncommon species may be expanding its range into Victoria. The Victorian National Parks Association and Redmap Australia are particularly interested in any further sightings of the species in Port Phillip Bay.

We look forward to maintaining a watch for ‘fish on the move’ in Victoria and will contribute any recordings to Redmap – just don’t forget to take a photo of your lucky find!



Facing the facts: sometimes, identifying species in the field is tricky. Photographing unusual species seen during surveys, such as this white-barred boxfish, will help confirm sightings and contribute to Redmap's efforts in mapping changes to species distributions. Photo: Peter Beaumont



References

- Bass, N, Mourier, J, Knott, N, Day, J, Brown, C & Guttridge, T, 2016, Long-term migration patterns and bisexual philopatry in a benthic shark species, *Marine and Freshwater Research*. 68:10.1071. doi:10.1071/MF16122.
- Bray, D.J. 2019a, *Heterodontus portusjacksoni* in Fishes of Australia, accessed 05 Jul 2019, <http://fishesofaustralia.net.au/home/species/1982>
- Bray, D 2019b, *Morwong fuscus* in Fishes of Australia, accessed 04 Jul 2019, <http://fishesofaustralia.net.au/home/species/2416>
- Bray, D 2019c, *Pseudogoniistius nigripes* in Fishes of Australia, accessed 24 Jun 2019, <http://fishesofaustralia.net.au/home/species/2418>
- Bray, D 2018a, *Achoerodus gouldii* in Fishes of Australia, accessed 04 Jul 2019, <http://fishesofaustralia.net.au/home/species/206>
- Bray, D 2018b, *Achoerodus viridis* in Fishes of Australia, accessed 04 Jul 2019, <http://fishesofaustralia.net.au/home/species/207>
- Bray, D.J. 2018c, *Bathytoshia brevicaudata* in Fishes of Australia, accessed 05 Jul 2019, <http://fishesofaustralia.net.au/home/species/2020>
- Bray, D 2018d, *Callorhinchus milii* in Fishes of Australia, accessed 28 Jun 2019, <http://fishesofaustralia.net.au/home/species/1986>
- Bray, D 2018e, Introduction to Australia's Fishes, in Bray, D.J. & Gomon, M.F. (eds) *Fishes of Australia*. Museums Victoria and OzFishNet, accessed 04 Jul 2019, <http://fishesofaustralia.net.au/>
- Byrnes, E & Brown, C 2016, Individual personality differences in Port Jackson sharks *Heterodontus portusjacksoni*, *Journal of Fish Biology*, 89:10.1111. doi: 10.1111/jfb.12993
- Gomon, M, Bray, D & Kuitert, R 2008, *Fishes of Australia's southern coast*, Frenchs Forest, N.S.W. :New Holland Publishers, 2008.
- White, W & Bray, D 2019, *Cephaloscyllium laticeps* in Fishes of Australia, accessed 28 Jun 2019, <http://fishesofaustralia.net.au/home/species/3748>
- Parks Victoria, 2014, Marine protected areas, <http://parkweb.vic.gov.au/explore/find-a-park/marine-protected-areas>.
- Powter, D & Gladstone, W 2009, 'Habitat-Mediated Use of Space by Juvenile and Mating Adult Port Jackson Sharks, *Heterodontus portusjacksoni*, in Eastern Australia,' *Pacific Science*, 63:1-

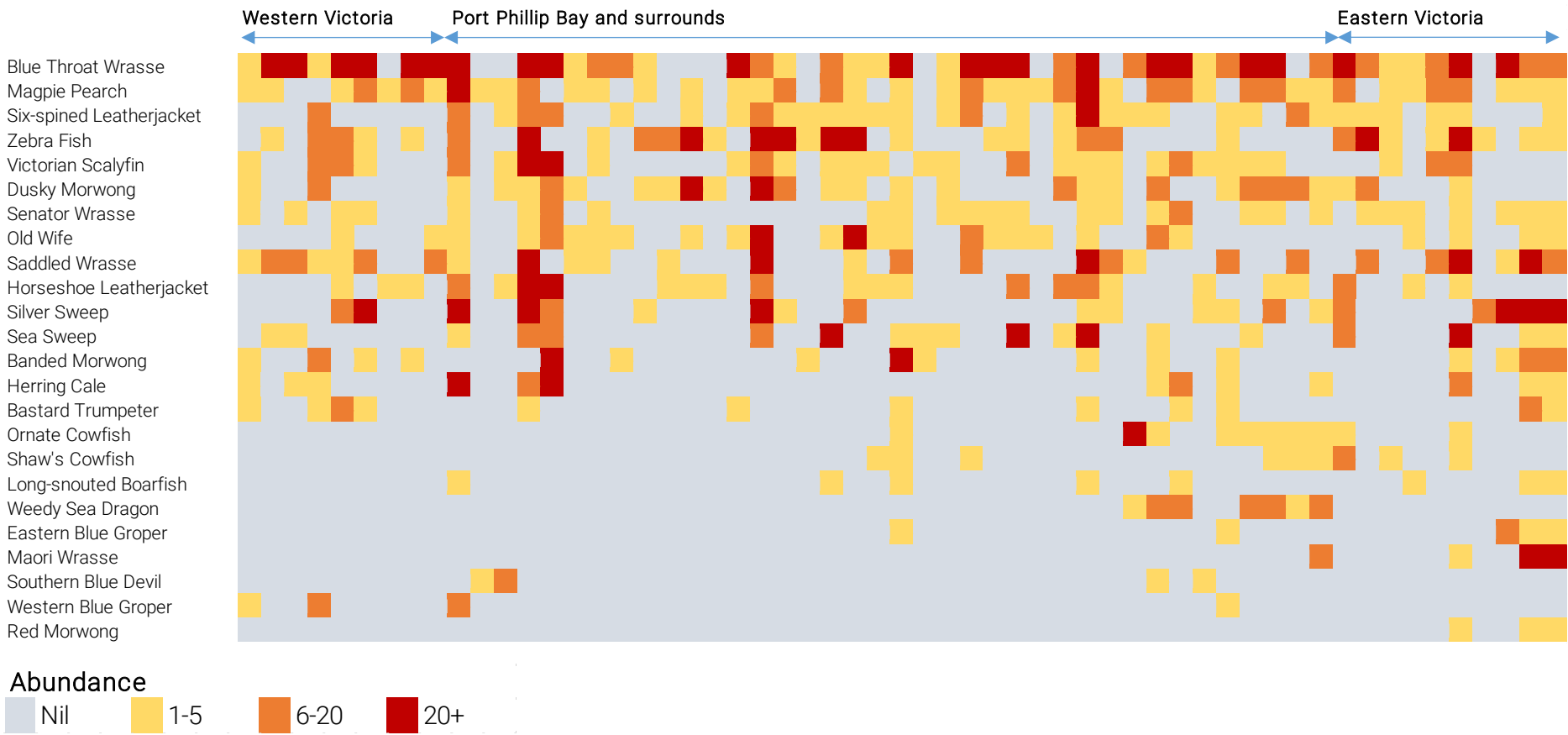
Appendices

- 5.1 Summary of bony fish sightings and abundances across Victoria
- 5.2 Summary of shark and ray sightings and abundances across Victoria
- 5.3 Table of fish species observed at each site surveyed in Western Victoria
- 5.4 Table of fish species observed at each site surveyed in and around Port Phillip Bay
- 5.5 Table of fish species observed at each site surveyed in Eastern Victoria
- 5.6 Table of fish not on slates
- 5.7 Table of the site conditions and habitat types recorded for each survey

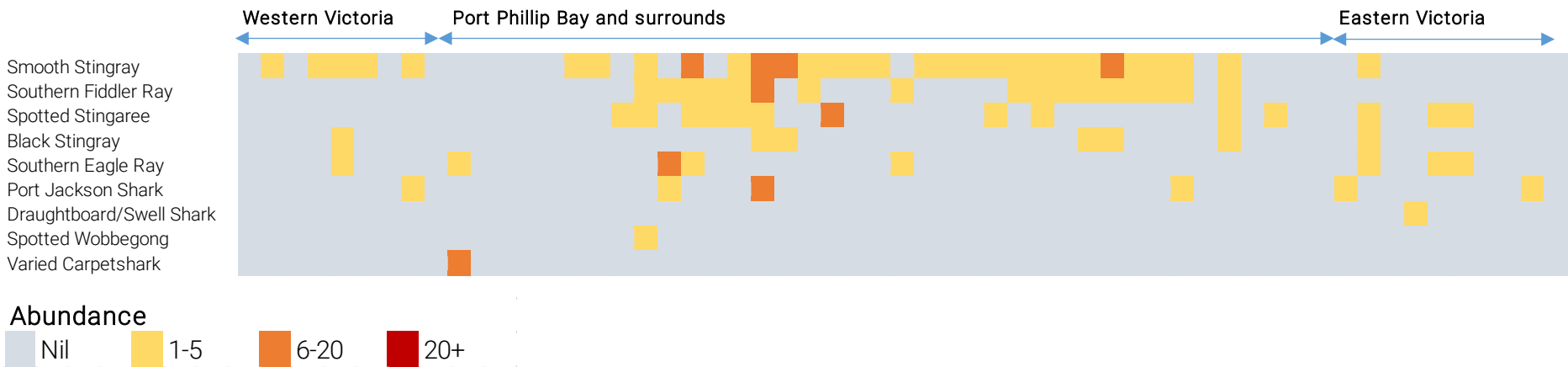


Facing forwards, but ready to jet backwards at a moment's notice. Photo: Kade Mills

5.1 Summary of bony fish sightings and abundances across Victoria



5.2 Summary of shark and ray sightings and abundances across Victoria



5.3 Table of fish species observed at each site surveyed in Western Victoria

[illegible]

Smooth Stingray	Nil	1 - 5	Nil	1 - 5	1 - 5	1 - 5	Nil	1 - 5	Nil
Southern Fiddler Ray	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Spotted Stingaree	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Black Stingray	Nil	Nil	Nil	Nil	1 - 5	Nil	Nil	Nil	Nil
Southern Eagle Ray	Nil	Nil	Nil	Nil	1 - 5	Nil	Nil	Nil	Nil
Port Jackson Shark	Nil	Nil	Nil	Nil	Nil	Nil	Nil	1 - 5	Nil
Draughtboard/S well Shark	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Spotted Wobbegong	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Varied Carpetshark	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

5.4 Table of fish species observed at each site surveyed in and around Port Phillip Bay

Target species	Barwon Bluff Marine Sanctuary (Parks Victoria & Friends of the Bluff)	Golden Arch (VSAG)	Nepean Wall (VSAG)	Pope's Eye (Sea All Dolphin Swims)	Pope's Eye (Sea All Dolphin Swims)	St Leonards (Australian Diving Instruction)	St Leonards (Australian Diving Instruction)	St Leonards (Australian Diving Instruction)	Portarlington (Australian Diving Instruction)
Blue Throat Wrasse	20 +	Nil	Nil	20 +	20 +	1 - 5	6 - 20	6 - 20	1 - 5
Magpie Pearch	20 +	1 - 5	1 - 5	6 - 20	Nil	1 - 5	1 - 5	Nil	1 - 5
Six-spined Leatherjacket	6 - 20	Nil	1 - 5	6 - 20	6 - 20	Nil	Nil	1 - 5	Nil
Zebra Fish	6 - 20	Nil	Nil	20 +	Nil	Nil	1 - 5	Nil	6 - 20
Victorian Scalyfin	6 - 20	Nil	1 - 5	20 +	20 +	Nil	1 - 5	Nil	Nil
Dusky Morwong	1 - 5	Nil	1 - 5	1 - 5	6 - 20	1 - 5	Nil	Nil	1 - 5
Senator Wrasse	1 - 5	Nil	Nil	1 - 5	6 - 20	Nil	1 - 5	Nil	Nil
Old Wife	1 - 5	Nil	Nil	1 - 5	6 - 20	1 - 5	1 - 5	1 - 5	Nil
Saddled Wrasse	1 - 5	Nil	Nil	20 +	Nil	1 - 5	1 - 5	Nil	Nil
Horseshoe Leatherjacket	6 - 20	Nil	1 - 5	20 +	20 +	Nil	Nil	Nil	Nil
Silver Sweep	20 +	Nil	Nil	20 +	6 - 20	Nil	Nil	Nil	1 - 5
Sea Sweep	1 - 5	Nil	Nil	6 - 20	6 - 20	Nil	Nil	Nil	Nil
Banded Morwong	Nil	Nil	Nil	Nil	20 +	Nil	Nil	1 - 5	Nil

Herring Gale	20 +	Nil	Nil	6 - 20	20 +	Nil	Nil	Nil	Nil
Bastard Trumpeter	Nil	Nil	Nil	1 - 5	Nil	Nil	Nil	Nil	Nil
Ornate Cowfish	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Shaw's Cowfish	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Long-snouted Boarfish	1 - 5	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Weedy Sea Dragon	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Eastern Blue Groper	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Maori Wrasse	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Southern Blue Devil	Nil	1 - 5	6 - 20	Nil	Nil	Nil	Nil	Nil	Nil
Western Blue Groper	6 - 20	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Red Morwong	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Smooth Stingray	Nil	Nil	Nil	Nil	Nil	1 - 5	1 - 5	Nil	1 - 5
Southern Fiddler Ray	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	1 - 5
Spotted Stingaree	Nil	Nil	Nil	Nil	Nil	Nil	Nil	1 - 5	1 - 5
Black Stingray	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Southern Eagle Ray	1 - 5	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Port Jackson Shark	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Draughtboard/S well Shark	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Spotted Wobbegong	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	1 - 5
Varied Carpetshark	6 - 20	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

5.4 (continued) Table of fish species observed at each site surveyed in and around Port Phillip Bay

[illegible]

Red Morwong	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Smooth Stingray	Nil	6 - 20	Nil	1 - 5	6 - 20	6 - 20	1 - 5	1 - 5	1 - 5
Southern Fiddler Ray	1 - 5	1 - 5	1 - 5	1 - 5	6 - 20	Nil	1 - 5	Nil	Nil
Spotted Stingaree	Nil	1 - 5	1 - 5	1 - 5	1 - 5	Nil	Nil	6 - 20	Nil
Black Stingray	Nil	Nil	Nil	Nil	1 - 5	1 - 5	Nil	Nil	Nil
Southern Eagle Ray	6 - 20	1 - 5	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Port Jackson Shark	1 - 5	Nil	Nil	Nil	6 - 20	Nil	Nil	Nil	Nil
Draughtboard/S well Shark	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Spotted Wobbegong	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Varied Carpetshark	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

5.4 (continued) Table of fish species observed at each site surveyed in and around Port Phillip Bay

Target species	Hurricane Wreck (Victorian Sub Aqua Group)	Rye Pier (Academy of Scuba)	Rye Pier (SCUBA Culture)	Rye Pier (SCUBA Culture)	Rye Pier (Dive and Dive)	Rye Pier (Dive2U and Wild Families)	Rye Pier (SCUBA Culture)	Blairgowrie (Salesian College)	Blairgowrie (Aquatic Adventures)	Blairgowrie (Ocean Divers)
Blue Throat Wrasse	1 - 5	20 +	Nil	1 - 5	20 +	20 +	20 +	Nil	6 - 20	20 +
Magpie Pearch	Nil	1 - 5	Nil	1 - 5	6 - 20	1 - 5	1 - 5	1 - 5	6 - 20	20 +
Six-spined Leatherjacket	1 - 5	1 - 5	Nil	1 - 5	6 - 20	Nil	1 - 5	Nil	1 - 5	20 +
Zebra Fish	Nil	1 - 5	Nil	Nil	Nil	1 - 5	1 - 5	Nil	1 - 5	6 - 20
Victorian Scalyfin	1 - 5	Nil	1 - 5	1 - 5	Nil	Nil	6 - 20	Nil	1 - 5	1 - 5
Dusky Morwong	Nil	1 - 5	Nil	1 - 5	Nil	Nil	Nil	Nil	6 - 20	1 - 5
Senator Wrasse	1 - 5	1 - 5	Nil	1 - 5	1 - 5	1 - 5	1 - 5	Nil	Nil	1 - 5
Old Wife	1 - 5	1 - 5	Nil	Nil	6 - 20	1 - 5	1 - 5	1 - 5	Nil	1 - 5
Saddled Wrasse	Nil	6 - 20	Nil	Nil	6 - 20	Nil	Nil	Nil	Nil	20 +
Horseshoe Leatherjacket	1 - 5	1 - 5	Nil	Nil	Nil	Nil	6 - 20	Nil	6 - 20	6 - 20
Silver Sweep	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	1 - 5
Sea Sweep	Nil	1 - 5	1 - 5	1 - 5	Nil	Nil	20 +	Nil	1 - 5	20 +

[illegible]

5.4 (continued) Table of fish species observed at each site surveyed in and around Port Phillip Bay

[illegible]

Southern Blue Devil	Nil	Nil	1 - 5	Nil	1 - 5	Nil	Nil	Nil	Nil	Nil
Western Blue Groper	Nil	Nil	Nil	Nil	Nil	1 - 5	Nil	Nil	Nil	Nil
Red Morwong	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Smooth Stingray	6 - 20	1 - 5	1 - 5	1 - 5	Nil	1 - 5	Nil	Nil	Nil	Nil
Southern Fiddler Ray	1 - 5	1 - 5	1 - 5	1 - 5	Nil	1 - 5	Nil	Nil	Nil	Nil
Spotted Stingaree	Nil	Nil	Nil	Nil	Nil	1 - 5	Nil	1 - 5	Nil	Nil
Black Stingray	1 - 5	Nil	Nil	Nil	Nil	1 - 5	Nil	Nil	Nil	Nil
Southern Eagle Ray	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Port Jackson Shark	Nil	Nil	Nil	1 - 5	Nil	Nil	Nil	Nil	Nil	Nil
Draughtboard/ Swell Shark	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Spotted Wobbegong	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Varied Carpetshark	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

5.5 Table of fish species observed at each site surveyed in Eastern Victoria

Target species	Somers (Somers Snorkelling Group)	Kitty Miller Bay (Phillip Island Nature Park)	The Pinnacles (Victorian Sub Aqua Group)	The Pinnacles (Victorian Sub Aqua Group)	Wreck Beach (Friends of Harmers Haven)	Shack Bay (South Gippsland Conservation Society)	Meeting Moorings (Friends of Beware Reef)	Gippsland Lakes (Friends of Beware Reef)	Beware Reef Marine Sanctuary (Friends of Beware Reef)	Beware Reef Marine Sanctuary (Friends of Beware Reef)
Blue Throat Wrasse	20 +	6 - 20	1 - 5	1 - 5	6 - 20	20 +	Nil	20 +	6 - 20	6 - 20
Magpie Pearch	6 - 20	Nil	1 - 5	1 - 5	6 - 20	6 - 20	Nil	1 - 5	1 - 5	1 - 5
Six-spined Leatherjacket	1 - 5	1 - 5	1 - 5	Nil	1 - 5	1 - 5	Nil	Nil	Nil	1 - 5
Zebra Fish	6 - 20	20 +	1 - 5	Nil	1 - 5	20 +	1 - 5	Nil	1 - 5	1 - 5
Victorian Scalyfin	Nil	Nil	1 - 5	Nil	6 - 20	6 - 20	Nil	Nil	Nil	Nil
Dusky Morwong	1 - 5	6 - 20	Nil	Nil	Nil	1 - 5	Nil	Nil	Nil	Nil
Senator Wrasse	Nil	1 - 5	1 - 5	1 - 5	Nil	1 - 5	Nil	1 - 5	1 - 5	1 - 5
Old Wife	Nil	Nil	Nil	1 - 5	Nil	1 - 5	Nil	Nil	1 - 5	1 - 5
Saddled Wrasse	Nil	6 - 20	Nil	Nil	6 - 20	20 +	Nil	1 - 5	20 +	6 - 20

[illegible]

5.6 Table of fish not on slates

Survey Site	Additional Species Recorded
Western Victoria	
Point Addis	Australian Herring, Black Bream, Dusky Flathead, Eastern Kelpfish, Globefish, Moonlighter, Rock Flathead, Smooth Toadfish, Snook, Sparsely Spotted Stingaree, Western Kelpfish
Port Campbell	Common Weedfish, Cuttlefish, Eastern Kelpfish, Marblefish, Rosy Perch, Southern Rock Lobster
Portland	Bluespotted Goatfish
Stingray Bay	Marblefish, Melbourne Skate
Torquay	Barber Perch, Common Bullseye, Yellowtail Scad
Port Phillip Bay	
Barwon Bluff Marine Sanctuary	Eastern Australian Salmon, Luderick, Marblefish, Moonlighter, Smooth Toadfish, Yelloweye Mullet
Beaumaris	Rock Flathead
Blairgowrie	Bluespotted Goatfish, Common Bullseye, Common Stinkfish, Globefish, Grass Whiting, Longfin Pike, Moonlighter, Potbelly Seahorse
Brighton	Snapper
Flinders Pier	Bluespotted Goatfish, Cuttlefish, Grass Whiting, Longfin Pike, Lowfin Silverbelly, Moonlighter, Red Velvetfish, Smooth Toadfish, Southern Moray, Tasmanian Blenny
Hurricane Wreck	Blackbanded Seaperch, Bluespotted Goatfish, Longfin Pike, Moonlighter, Snakeskin Wrasse, Yellowtail Scad
Mornington Pier	Globefish, Longfin Pike, Moonlighter, Tasmanian Blenny
Mushroom Reef Marine Sanctuary	Bluespotted Goatfish, Globefish, Sand Whiting, Lowfin Silverbelly, Southern Garfish, Yelloweye Mullet
Parkdale Reef	Smooth Toadfish, Snapper, Western Australian Salmon
Point Cooke Marine Sanctuary	Dusky Flathead, Eastern Shovelnose Stingaree, Globefish, Port Phillip Pipefish, Victorian Scalyfin, Spotter Flounder
Point Ormond	Globefish, Moonlighter, Prickly Toadfish
Portsea Pier	Bluespotted Goatfish, Globefish
Portarlington Pier	Globefish, Moonlighter, Shorthead Seahorse
Ricketts Point Marine Sanctuary	Moonlighter

Rye Pier	Bluespotted Goatfish, Eastern Australian Salmon, Globefish, Toothbrush Leatherjacket, Western Australian Salmon, Yelloweye Mullet
St Leonards	Globefish, Potbelly Seahorse, Shorthead Seahorse
Tom's Reef	Blackbanded Seaperch, Common Bullseye, Largetooth Beardie, Marblefish, Snakeskin Wrasse, Yellowstriped Leatherjacket
Eastern Victoria	
Phillip Island (Kitty Miller Bay)	Globefish, Smooth Toadfish
Phillip Island (the Pinnacles)	Butterfly Perch, Largetooth Beardie, Rainbow Cale, Whitebarred Boxfish
Somers	Bluespotted Goatfish, Butterfly Perch, Moonlighter, Smooth Toadfish, Rock Ling



Face off with a Tasmanian Blenny. Photo: Peter Beaumont

5.7 Table of the site conditions and habitat types recorded for each survey

Survey Site	Group	Date and Time	No. of participants	Max. Depth (m)	Visibility (m)	Water Temp. (° C)	Tide level	Tidal stream	Swell height (m)	Current	SCUBA/snorkel	Habitat Type
Western Victoria												
Pea Soup, Port Fairy	Daktari Surf/Dive	11/22/2018 11:30AM-12:20PM	3	4.5	15	17	Low	Slack	0.5 m	Nil	SCUBA	Low Rocky Reef (<2m), Rubble, Sand/Mud, Mixed Algae, Sponges, Sea Squirts & Others
Point Addis	Friends of Point Addis	15/01/2019 11:20AM-12:20PM	1	4	4	0	Low	Ebb	1 m	-	Snorkel	Large Rocky Reef (>2m), Low Rocky Reef (<2m), Sand/Mud, Mixed Algae, Seagrass
Point Addis	Friends of Point Addis	23/12/2018 5:20PM-6:00PM	2	3	5	0	Low	Ebb	0.5 m	-	Snorkel	Large Rocky Reef (>2m), Low Rocky Reef (<2m), Sand/Mud, Mixed Algae, Seagrass
Port Campbell	-	15/01/2019 9:45AM-10:30AM	2	7	5	15	Low	Flood	0.5 m	Nil	SCUBA and Snorkel	Large Rocky Reef (>2m), Artificial Reef, Kelp, Mixed Algae, Seagrass
Port Campbell	Daktari Surf/Dive	9/12/2018 10:56AM-11:31AM	5	5.7	10	17	Low	Flood	1.5 m	Weak	SCUBA	Large Rocky Reef (>2m), Artificial Reef, Kelp, Mixed Algae, Seagrass
Portland	Daktari Surf/Dive	25/11/2018 10:45AM-11:22AM	5	7.9	3	15	Low	Slack	0 m	Nil	SCUBA	Large Rocky Reef (<2m), Artificial Reef, Seagrass, Sponges, Sea Squirts & Other
Southbeach Bay, Port Fairy	Daktari Surf/Dive	18/11/2018 4:02PM-4:26PM	2	4	10	17	Low	Flood	2 m	Weak	SCUBA	Large Rocky Reef (>2m), Artificial Reef, Kelp, Mixed Algae
Stingray Bay	Daktari Surf/Dive	8/12/2018 10:54AM-11:44AM	6	5	10	17	Low	Flood	1.5 m	Weak	SCUBA	Low Rocky Reef (<2m), Sand/Mud, Kelp, Mixed Algae, Sponges, Sea Squirts & Others
Torquay offshore reef	-	20/11/2018-	2	28	15	16	High	Flood	0.5 m	Weak	SCUBA	Artificial reef, Sand/Mud, Kelp, Mixed Algae, Sponges, Seasquirts & Other
Port Phillip Bay												

Barwon Bluff Marine Sanctuary	Parks Victoria & Friends of the Bluff	24/02/2019 9:30AM-12:30PM	24	2	5	20	Low	Flood	1.5 m	Weak	Snorkel	Large Rocky Reef (>2m), Sand/Mud, Kelp, Mixed Algae, Seagrass, Sponges, Sea Squirts & Other
Beaumaris	Scuba Scouts Victoria	15/12/2018 10:31AM-11:30AM	16	4	2	21	Mid	Ebb	0 m	Nil	SCUBA	Low Rocky Reef (<2m), Sand/Mud, Mixed Algae, Sponges, Sea Squirts & Others
Blairgowrie	Salesian College	23/11/2018 11:30AM-12:30PM	25	6	8	16	High	Flood	0 m	-	Snorkel	Artificial Reef, Sand/Mud, Mixed Algae, Sponges, Sea Squirts & Other
Blairgowrie	Victorian Sub Aqua Group	23/11/2018 12:10PM-1:38PM	1	5	5	16	High	Flood	0 m	Weak	SCUBA	Artificial Reef, Sand/Mud, Mixed Algae, Sponges, Sea Squirts & Other
Blairgowrie	Aquatic Adventures	11/12/2018 8:30PM-9:45PM	2	6	10	23	Mid	Ebb	0 m	Nil	SCUBA	Artificial Reef, Sand/Mud, Mixed Algae, Sponges, Sea Squirts & Other
Blairgowrie	Ocean Divers	15/12/2018 10:00AM-11:15AM	25	5	10	20	High	Ebb	0 m	Nil	SCUBA and Snorkel	Artificial Reef, Sand/Mud, Mixed Algae, Sponges, Sea Squirts & Other
Brighton	Scuba Scouts Victoria	1/12/2018 11:15PM-12:15PM	3	7	4	19	High	Slack	0 m	Nil	SCUBA	Low Rocky Reef (<2m), Artificial Reef, Kelp, Mixed Algae, Sponges, Sea Squirts & Other
Flinders Pier	Victorian Sub Aqua Group	20/11/2018 8:00AM-9:42AM	1	5	8	16	High		0 m	Nil	SCUBA	Artificial Reef, Rubble, Sand/Mud, Seagrass
Flinders Pier	Melbourne University Underwater Club	1/12/2018 9:00AM-3:00PM	6	5	15	18	Low	Slack	0.5 m	Nil	SCUBA	Artificial Reef, Rubble, Sand/Mud, Seagrass
Flinders Pier	Mornington Peninsula Scuba Dive Club	2/12/2018 9:30PM-10:30PM	4	5	12	18	Mid	Ebb	0 m	Nil	SCUBA	Artificial Reef, Rubble, Sand/Mud, Seagrass
Flinders Pier	Mornington Peninsula Scuba Dive Club	9/12/2018 9:30PM-10:30PM	4	5	16	18	Low	Slack	0 m	Nil	SCUBA	Artificial Reef, Rubble, Sand/Mud, Seagrass
Golden Arch, Queenscliff	Victorian Sub Aqua Group	16/12/2018 10:38AM-11:11AM	2	19	8	16	Mid	Ebb	0.5 m	Weak	SCUBA	Large Rocky Reef (>2m), Sand/Mud, Kelp

Hurricane Wreck	Victorian Sub Aqua Group	29/11/2018 8:01AM-9:00AM	2	12	3	17	High	Flood	0.5 m	Weak	SCUBA	Artificial Reef, Sand/Mud, Sponges, Sea Squirts & Other
Jawbone Marine Sanctuary	Jawbone Marine Sanctuary Care Group	2/12/2018 10:00AM-11:00AM	17	3	3	17	Low	Flood	0 m	Nil	Snorkel	Low Rocky Reef (>2m), Sand/Mud, Mixed Algae, Seagrass
Mornington Pier	Victorian Sub Aqua Group	18/11/2018 9:16AM-9:56AM	4	10	2	18	Low	Slack	0 m	Nil	SCUBA	Artificial Reef, Sand/Mud, Mixed Algae, Seagrass
Mornington Pier	Mornington Peninsula Scuba Dive Club	5/12/2018 6:25AM-7:29AM	2	9	5	15	Low	Ebb	0 m	Weak	SCUBA	Artificial Reef, Sand/Mud, Mixed Algae, Seagrass
Mushroom Reef Marine Sanctuary	Friends of Mushroom Reef Marine Sanctuary	1/12/2018 11:05AM-12:20PM	12	3	10	16	Low	Ebb	0.5 m	Weak	Snorkel	Large Rocky Reef (>2m), Low Rocky Reef (<2m), Kelp, Mixed Algae, Seagrass
Nepean Wall	Victorian Sub Aqua Group	9/12/2018 10:38AM-11:23AM	2	28	15	16	Low	Flood	1 m	Weak	SCUBA	Large Rocky Reef (>2m), Kelp, Sponges, Sea Squirts & Other
Parkdale Reef	Parkdale Reef Divers	8/12/2018 1:10PM-2:00PM	6	5	5	20	High	Flood	0 m	Nil	Snorkel	Low Rocky Reef (<2m), Rubble, Sand/Mud, Mixed Algae, Sponges, Sea Squirts & Others
Point Cooke Marine Sanctuary	Marine Care Point Cooke	8/12/2018 10:45AM-12:00PM	12	4	4	19	Low	Flood	0 m	Nil	Snorkel	Low Rocky Reef (<2m), Sand/Mud, Mixed Algae, Sponges, Sea Squirts & Others
Point Ormond	Port Phillip Eco Centre	6/12/2018 6:30PM-7:15PM	6	4	5	18	Low	Flood	0 m	Nil	Snorkel	Low Rocky Reef (<2m), Rubble, Sand/Mud, Kelp, Mixed Algae, Sponges, Sea Squirts & Others
Pope's Eye	Sea All Dolphin Swims	19/11/2018 10:00AM-10:30AM	23	10	15	16	High	Ebb	0 m	-	Snorkel	Large Rocky Reef (>2m), Low Rocky Reef (<2m), Artificial Reef, Sand/Mud, Kelp, Mixed Algae, Sponges, Sea Squirts & Other
Pope's Eye	Sea All Dolphin Swims	29/11/2018 10:00AM-10:30AM	19	5	15	17	Low	Slack	0 m	Weak	Snorkel	Large Rocky Reef (>2m), Low Rocky Reef (<2m), Artificial Reef, Sand/Mud, Kelp, Mixed Algae,

												Sponges, Sea Squirts & Other
Port Arlington	Australian Diving Instruction	25/11/2018 1:35PM-2:28PM	2	4.6	5	17	Low	Flood	0 m	Nil	SCUBA	Large Rocky Reef (>2m), Low Rocky Reef (<2m), Artificial Reef, Sand/Mud, Seagrass
Portsea Pier	Aquatic Adventures	9/12/2018 12:00PM-12:45PM	6	4.5	9	17	High	Flood	0.5 m	Weak	SCUBA	Low Rocky Reef, Artificial Reef, Rubble, Sand/Mud, Kelp, Mixed Algae, Seagrass, Sponges, Sea Squirts & Others
Portsea Pier	Bayplay	15/12/2018 11:00AM-12:00PM	7	5	10	19	Mid	Ebb	0 m	Nil	Snorkel	Low Rocky Reef, Artificial Reef, Rubble, Sand/Mud, Kelp, Mixed Algae, Seagrass, Sponges, Sea Squirts & Others
Portsea Pier	Bayplay	15/12/2018 12:30PM-1:30PM	13	5	12	18	Mid	Ebb	0.5 m	Weak	Snorkel	Low Rocky Reef, Artificial Reef, Rubble, Sand/Mud, Kelp, Mixed Algae, Seagrass, Sponges, Sea Squirts & Others
Rickett's Point Marine Sanctuary	Marine Care Ricketts Point	1/12/2018 9:15AM-10:15AM	22	5	4	17	High	Ebb	-	Weak	Snorkel	Large Rocky Reef (>2m), Kelp, Mixed Algae, Sponges, Sea Squirts & Other, Mussels
Rye Pier	Dive and Dive	17/11/2018 1:00PM-1:45PM	5	8	10	17	High	Flood	0 m	Nil	SCUBA	Low Rocky Reef, Artificial Reef, Rubble, Sand/Mud, Kelp, Mixed Algae, Seagrass, Sponges, Sea Squirts & Others
Rye Pier	Scuba Culture	17/11/2018 9:00AM-1:00PM	9	7	10	16	High	Flood	0.5 m	Weak	SCUBA	Low Rocky Reef, Artificial Reef, Rubble, Sand/Mud, Kelp, Mixed Algae, Seagrass, Sponges, Sea Squirts & Others
Rye Pier	Dive2U and VNPA Wild Families	25/11/2018 11:00AM-12:00PM	4	4	7	17	Low	Flood	0 m	-	Snorkel	Low Rocky Reef, Artificial Reef, Rubble, Sand/Mud, Kelp, Mixed Algae, Seagrass, Sponges, Sea Squirts & Others
Rye Pier	Scuba Culture	1/12/2018 9:00AM-12:30PM	2	7	4	17	High	Ebb	0.5 m	Weak	SCUBA	Low Rocky Reef, Artificial Reef, Rubble, Sand/Mud, Kelp, Mixed Algae,

												Seagrass, Sponges, Sea Squirts & Others
Rye Pier	Academy of Scuba	9/12/2018 10:30AM-11:30AM	7	7	10	19	High	Slack	0 m	Nil	SCUBA	Low Rocky Reef, Artificial Reef, Rubble, Sand/Mud, Kelp, Mixed Algae, Seagrass, Sponges, Sea Squirts & Others
Rye Pier	Scuba Culture	15/12/2018 9:53AM-10:39AM	9	4.8	8	19	High	Ebb	0 m	Weak	SCUBA	Low Rocky Reef, Artificial Reef, Rubble, Sand/Mud, Kelp, Mixed Algae, Seagrass, Sponges, Sea Squirts & Others
St Leonards	Australian Diving Instruction	24/11/2018 4:00PM-4:50PM	3	5	5	17	High	Ebb	-	Weak	SCUBA and Snorkel	Low Rocky Reef, Artificial Reef, Sand/Mud, Seagrass
St Leonards	Australian Diving Instruction	24/11/2018 4:29PM-5:17PM	3	4	5	17	High	Ebb	-	Weak	SCUBA and Snorkel	Low Rocky Reef, Artificial Reef, Sand/Mud, Seagrass
St Leonards	Australian Diving Instruction	25/11/2018 4:15PM-4:52PM	2	3.9	8	18	Low	Flood	0 m	Nil	SCUBA and Snorkel	Low Rocky Reef, Artificial Reef, Sand/Mud, Seagrass
Tom's Reef	Victorian Sub Aqua Group	16/12/2018 8:29AM-9:06AM	3	25	5	16	High	Flood	0.5 m	Weak	SCUBA	Large Rocky Reef (>2m), Sand/Mud, Kelp
Eastern Victoria												
Beware Reef Marine Sanctuary	Friends of Beware Reef	5/12/2018 11:00AM-12:15PM	4	16	7	17	High	-	1.5 m	Weak	SCUBA	Large Rocky Reef (>2m), Kelp, Mixed Algae, Sponges, Sea Squirts & Other
Beware Reef Marine Sanctuary	Friends of Beware Reef	5/12/2018 1:00PM-1:35PM	4	16	7	17	High	-	1.5 m	Weak	SCUBA	Large Rocky Reef (>2m), Kelp, Mixed Algae, Sponges, Sea Squirts & Other
Gippsland Lakes	Friends of Beware Reef	11/11/2018 10:30AM-11:15AM	3	7	8	17	High	Flood	0 m	Weak	SCUBA	Artificial Reef, Sand/Mud, Mixed Algae
Kitty Miller Bay	Phillip Island Nature Park	16/12/2018 3:40PM-4:30PM	8	2.5	2	18	High	Ebb	1 m	Weak	Snorkel	Low Rocky Reef (<2m), Kelp, Mixed Algae, Seagrass
Meeting Moorings	Friends of Beware Reef	15/12/2018 12:45PM-1:45PM	2	3	4	21	Low	Ebb	0 m	Weak	SCUBA	Artificial Reef, Sand/Mud, Seagrass

Shack Bay	South Gippsland Conservation Society	18/11/2018 1:15PM-2:15PM	19	5	6	15	Low	Flood	0.5 m	Weak	Snorkel	Large Rocky Reef (>2m), Low Rocky Reef (<2m), Sand/Mud, Mixed Algae, Sponges, Sea Squirts & Other
Somers	Somers Snorkelling Group	1/12/2018 1:00PM-1:40PM	1	5	5	0	Low	Slack	0.5 m	Nil	Snorkel	Low Rocky Reef (<2m), Rubble, Mixed Algae, Seagrass, Sponges, Sea Squirts & Others
The Pinnacles	Victorian Sub Aqua Group	26/11/2018 9:48AM-10:21AM	2	33	20	15	Mid	Flood	1 m	Weak	SCUBA	Large Rocky Reef (>2m, Kelp, Sponges, Sea Squirts & Others
The Pinnacles	Victorian Sub Aqua Group	6/12/2018 8:58AM-9:33AM	3	39	15	16	Mid	Flood	0.5 m	Weak	SCUBA	Large Rocky Reef (>2m, Kelp, Sponges, Sea Squirts & Others
Wreck Beach	Friends of Harmers Haven	16/12/2018 12:15PM-1:15PM	4	4	3	16	Low	Flood	1 m	Nil	Snorkel	Large Rocky Reef (>2m), Low Rocky Reef (<2m), Sand/Mud, Mixed Algae, Seagrass, Sponges, Sea Squirts & Other

