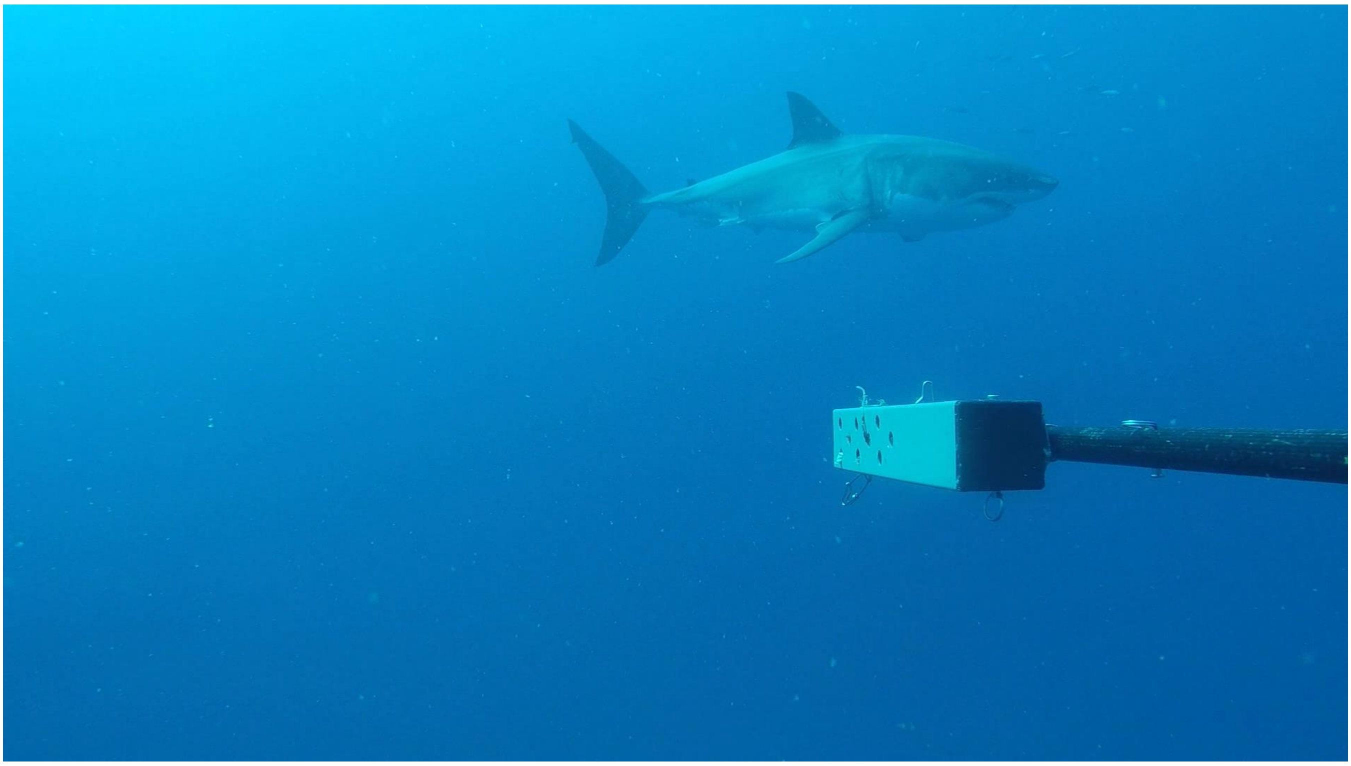
A temporal analysis of the pelagic fish assemblages in two marine protected areas, South-western Australia



Julien Magne

Cover photo: Great white shark (*Carcharodon carcharias*, Linnaeus, 1758)

Host organization

Marine Futures Lab

School of Biological Sciences, University of Western Australia

3 Hackett Drive, Crawley WA, 6009

Internship supervisor

Professor Jessica Meeuwig

E-mail: jessica.meeuwig@uwa.edu.au

University tutor

Professor Eric Durieux

E-mail: durieux_e@univ-corse.fr

Université de Corse

Faculté de Science et Techniques: Master GILVHa, Gestion

Intégrée du Littoral et Valorisation Halieutique

16/06/2023

Acknowledgement:

I would like to acknowledge and thank Professor Jessica Meeuwig for allowing me to live this journey. Being constantly patient and persistent in noticing all the mistakes that were made in this paper, and taking time to explain and answer every little question I could have. To thank everyone in the lab and its partners for their constant good mood and will to teach me when given the occasion. I am deeply grateful that I had the chance to be a part of this wonderful group of people. Thank you, Adam, Vyv, Nico, Andrea, Rang, Shona, Hector, Maicey, Shaun, Chris, Lincoln, Kristina, Hanna, Tom, Jack, Bianca… Everyone willing to come over every time I saw a cool fish or could not ID one. To acknowledge everyone involved with the fieldwork. There would be no data without them.

I also want to thank my teachers in France for your guidance and allowing this internship and Master to happen. Lastly, I would like to thank my family and friends, for all the support and patience all this time, listening to all my never-ending stories about Australia and its wildlife. You all made the 14,600 km of distance seem a lot shorter. I could not have done this all without you all.

Table of Contents

1. Introduction

Oceans are one of our greatest natural assets, generating USD 406 billion from the fishery and aquaculture sectors worldwide for the year 2020 alone (FAO, 2022). However, fish stocks are globally in decline, with 35% of all stocks considered to be currently unsustainably exploited (FAO, 2022). One solution to restore fish populations is the implementation of marine sanctuaries, more commonly called marine protected areas (MPAs). A large body of research on coastally located MPAs has shown that they increase biodiversity, abundance, and biomass, generate fisheries benefits and build ecological resilience (Halpern, 2003, McCook *et al,* 2010, Mellin *et al*, 2016). Edgar *et al* (2014) identified the five key factors for success: No take; well enforced; age (>10 years); size (>100 km^2); and isolated. In addition to failing to meet these criteria, MPAs also may be rendered ineffective as a result of fish movement patterns (Takashina and Mougi, 2014), as well as the intensity of previous human impacts (Davies *et al*, 2012).

Pelagic ecosystems are one of the least protected ecosystems on Earth (Forrest *et al.,* 2021) yet occupy the greatest volume of the world's oceans and face many threats. These threats include, but are not limited to, overfishing, pollution, climate change, ocean acidification, shipping, eutrophication, and invasive species (Maxwell *et al.,* 2014). Furthermore, epipelagic waters, the first 200 m of the ocean, are a layer in which many data deficient species subject to high extinction risk are primarily restricted (Priede *et al.* 2006, Dulvy *et al*. 2014). These issues translate to many pelagic species being listed as endangered. For instance, 44% of neritic and epipelagic sharks are listed as threatened with extinction (Dulvy *et al*., 2014) with some shark populations having declined by over 90% in regions such as the Gulf of Mexico and the Great Barrier Reef (Baum and Myers, 2004 Roff *et al*, 2018). Tunas are another example of pelagic declines. Tuna fisheries are among the oldest in the world, with evidence of this activity dating to 3950 BP (Majkowski, 2007). In 1950, as industrial fishing expanded, global tuna landings were less than 100,000 tonnes, yet they increased 30-fold to almost 3 million tonnes within 50 years (Majkowski, 2007). Consequently, tuna populations have reduced by 60% on average in this past half-century (Juan-Jordà *et al*, 2011). Following this trend, small pelagic fish are also of concern as they comprise 50% of the total landings of all marine species and 20% of global catch value, yet their status is generally undocumented (Fréon *et al*., 2005 and Pikitch *et al*, 2014). Human impacts, such as fisheries, climate change, pollution, mining industry and many other activities affect ocean's ecosystems on every possible scale (Halpern, 2003). Therefore, protecting and studying ocean ecosystems is of paramount importance.

Building on the general success of coastal MPAs, the establishment of large scale MPAs in offshore pelagic waters is accelerating. This acceleration is aided by global commitments such as 30 by 30, a global initiative within which nations commit to protect 30% of their land and ocean by the year 2030 (Dinerstein *et al*, 2019), which is, nevertheless considered to be on the lower end of what is necessary to protect for the world's seas (O'Leary *et al*, 2016). Along with the recently drafted High Seas Treaty, a legally binding instrument for conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction that will allow for more high seas MPAs to be created with fewer difficulties (Intergovernmental Conference on Marine Biodiversity of Areas Beyond National Jurisdiction, Stokstad, 2023, www.un.org).

The conservation outcomes of large scale MPAs are, however, poorly understood. The sheer size of the pelagic realm can make it difficult to identify priority areas for the establishment of MPAs, given our limited knowledge of the open ocean. Large scale pelagic MPAs are also the "new kids on the block" and thus the extended time series that are used to assess coastal MPAs established decades ago are not available. Their size, remoteness, and relatively low wildlife density (Ramirez-Llodra *et al*, 2010) also complicates any assessment of conservation benefits (Pala, 2013). Common criticisms of large scale MPAs include not solving obvious conservation problems, absorbing an already limited number of resources that could be used more effectively elsewhere, being less efficient than fishery management, and providing a false sense of progress toward protecting marine biodiversity and meeting global targets, although these claims are largely disputed (O'Leary *et al,* 2018). Furthermore, species associated with pelagic habitats are often highly mobile with suggestion that space limited MPAs will be insufficient to meet the conservation needs of these species. These critiques further emphasise the need for MPA monitoring and assessment with respect to pelagic species.

Our understanding of pelagic shark and fish has been largely underpinned by fisheries data (Letessier *et al,* 2013). Additionally, tagging (Block *et* al, 2005), acoustics (Brierely *et al*, 1998), and modelling (Davis *et al*, 2012) have increased our understanding of pelagic wildlife. In the last decade, baited remote underwater video systems (BRUVS) have been adapted from reefs to the open ocean (Letessier *et al,* 2013, Meeuwig *et al*, 2021).

BRUVS have traditionally been used in temperate and tropical reefs (Mallet and Pelletier, 2014) estuaries (Gladstone *et al*, 2012), and abyssal depths (Leitner *et al*, 2021). More recently, they have been adapted to the epipelagic habitat as drifting deployments (Bouchet and Meeuwig 2015, Meeuwig *et al*, 2021). BRUVS have shown a number of advantages in pelagic habitat monitoring, the vastness of the pelagic habitat, and the patchiness and rarity of its inhabitants render it difficult to assess populations using traditional methods such as trawling, trapping, and long-lining, with the additional benefit of being non-extractive. BRUVS also benefit from the speed of their deployment, relative affordability, and reusability. This allows for efficient sampling of large areas and is particularly useful in assessing density-poor pelagic species. BRUVS also stand out by the use of stereo cameras allowing for estimation of size and therefore age structure of populations. Other characteristics from BRUVS include the use of *Max N* to conservatively estimate abundances and have shown to be a good indicator (Letessier *et al*, 2013) as well as estimate biomass, diversity, and distribution on a vast array of marines species ranging from fish and sharks, turtles, and marine mammals (Van Elden *et al,* 2022). In addition, application of BRUVS to offshore waters has led to a rapid accumulation of high-quality footage facilitating the study of pelagic animal behaviour (Thomson and Meeuwig, 2022).

Australia has been on the forefront of ocean protection and is a signatory to 30 by 30 (Convention on biological diversity, 2022, https://www.cbd.int/conferences/2021-2022/cop-15/documents) With its vibrant marine life and ecosystems ranging from temperate cold water to tropical coral reefs, Australia has all the reasons in the world to protect its waters. Australia has established an MPA network of 3.1 million km^2 of marine protected areas across 5 marine park networks, the Coral Sea marine park and island marine reserves, covering in total 38% of its Exclusive Economic Zone. However, despite Australia's enthusiasm for establishing MPAs, less work has been done on their monitoring and the assessment of their benefits (Fraschetti *et al,* 2005).

The focus of this paper is two Commonwealth marine parks located within the South-west Network: the Geographe Bay Marine Park and the South-west Corner (SWC) Marine Park. These two marine parks are separated by approximately 60 km but are distinct in their biogeophysical characteristics and exposure to anthropogenic pressures. Using stereo-BRUVS, I analyse the trends in pelagic fish assemblages between 2017 and 2022 and compare them in the two marine parks. Finally, I will explore factors that explain how and why the fish assemblages have changed throughout the years and the conservation implications of these results.

2. Material and methods

2.1 Study site

Australia has established a network of Commonwealth Marine Reserves in its continental waters (Figure 1). These reserves can be established from the three nautical mile limit of State waters to the 200 nautical mile limit of Australia’s Exclusive Economic Zone. State marine parks may be established between the coastline and the 3 nautical miles mark. The Commonwealth marine park networks encompass a variety of ecosystems, and all require monitoring if their conservation benefits are to be documented. The first Commonwealth Marine Reserve to be created was the South-east network in 2012, with the remaining networks and the Coral Sea Marine Park established in 2018.

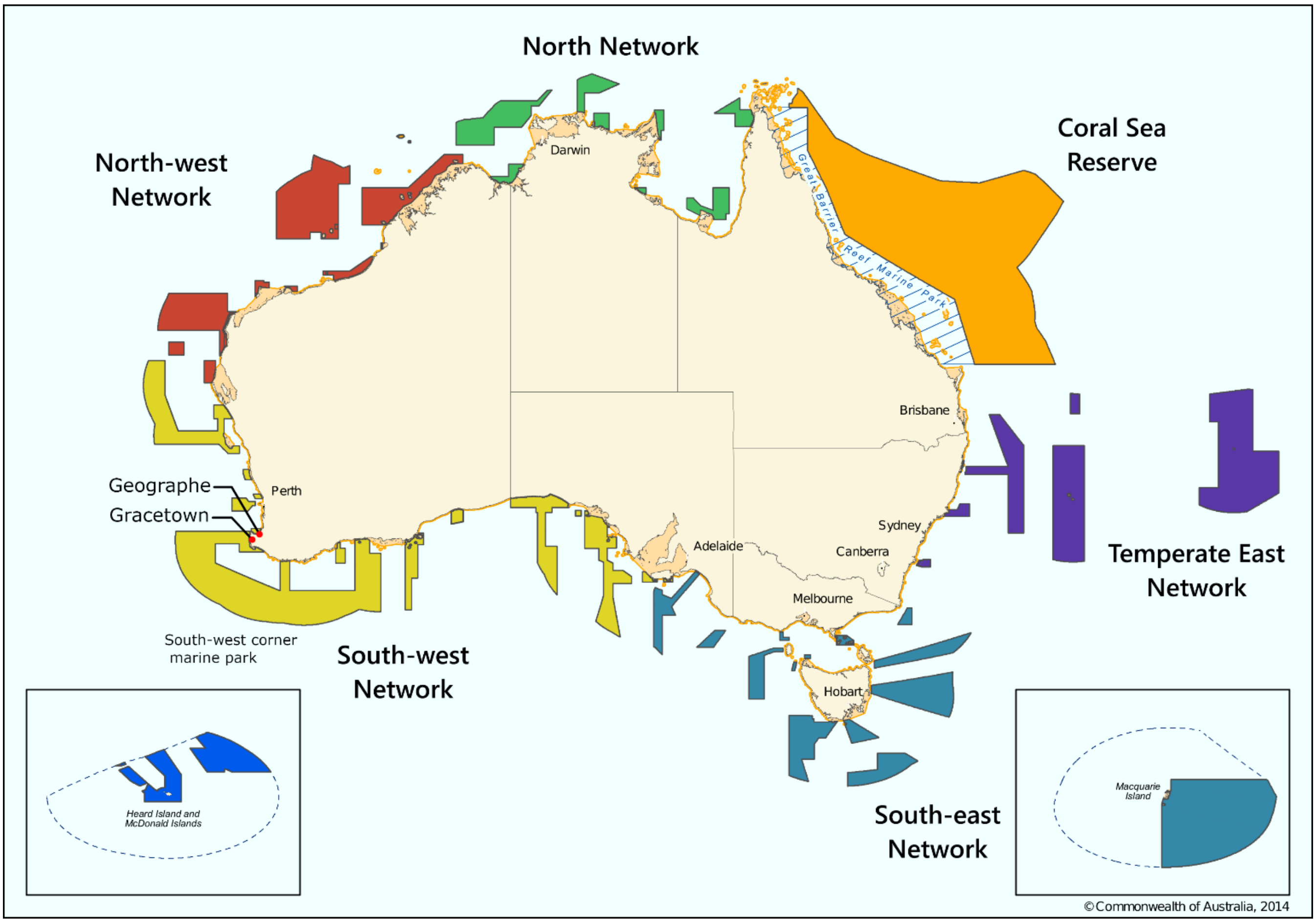


Figure 1: Distribution of 2019 Australia marine parks, adapted from © Commonwealth of Australia.

This study focuses on two sites located within the South-west Network (Figure 1), a network of 14 marine parks geographically spanning the region from the Abrolhos Islands in Western Australia to Kangaroo Island in Southern Australia. The South-west network covers an area of 508,371 km^2, or 14% of the entire network, and is the third largest marine protected network in Australia, following the Coral Sea Marine Park and Indian Ocean Territories Marine Parks.

The first site is located within the Geographe Marine Park (GEO) (33°31'05.8"S 115°14'34.4"E). The Geographe Marine Park is a 977 km^2 protected area that extends from Eagle Bay to Bunbury, the regional capital of south western Australia. The region's other major population centre, Busselton, is also located adjacent to the Marine Park. The Geographe Marine Park's landward boundary commences 3 nautical miles from shore with the area between this boundary and the high water mark designated as the Ngari Capes Marine Park. The Geographe Marine Park is situated within a relatively shallow bay, with depths between 15 and 70 m. It receives significant nutrients from runoff, is partially protected from the southern Indian Ocean climate, and is generally warmer than other more exposed regions. These characteristics support growth of some of the largest continuous seagrass meadows of Australia and provide a nursery habitat for a large range of species including a number of whales species, endangered and migratory birds, and marine reptiles (Galaiduk *et al*, 2018). Geographe is comprised of three IUCN zones. The majority of the park (96.4%) is zoned as IUCN VI which includes a Special Purpose Zone with mining restriction and a Multiple Use Zone. A Multiple Use IUCN IV zone, representing 21 km^2 or 2.1% of the park and is established as a Habitat Protection Zone which protects the seabed from fishing. Lastly, the park also has an IUCN II, National Park Zone, representing 14.5 km^2 or 1.4% of the park in which all extractive activities are excluded, although boat access is still permitted (Figure 2).

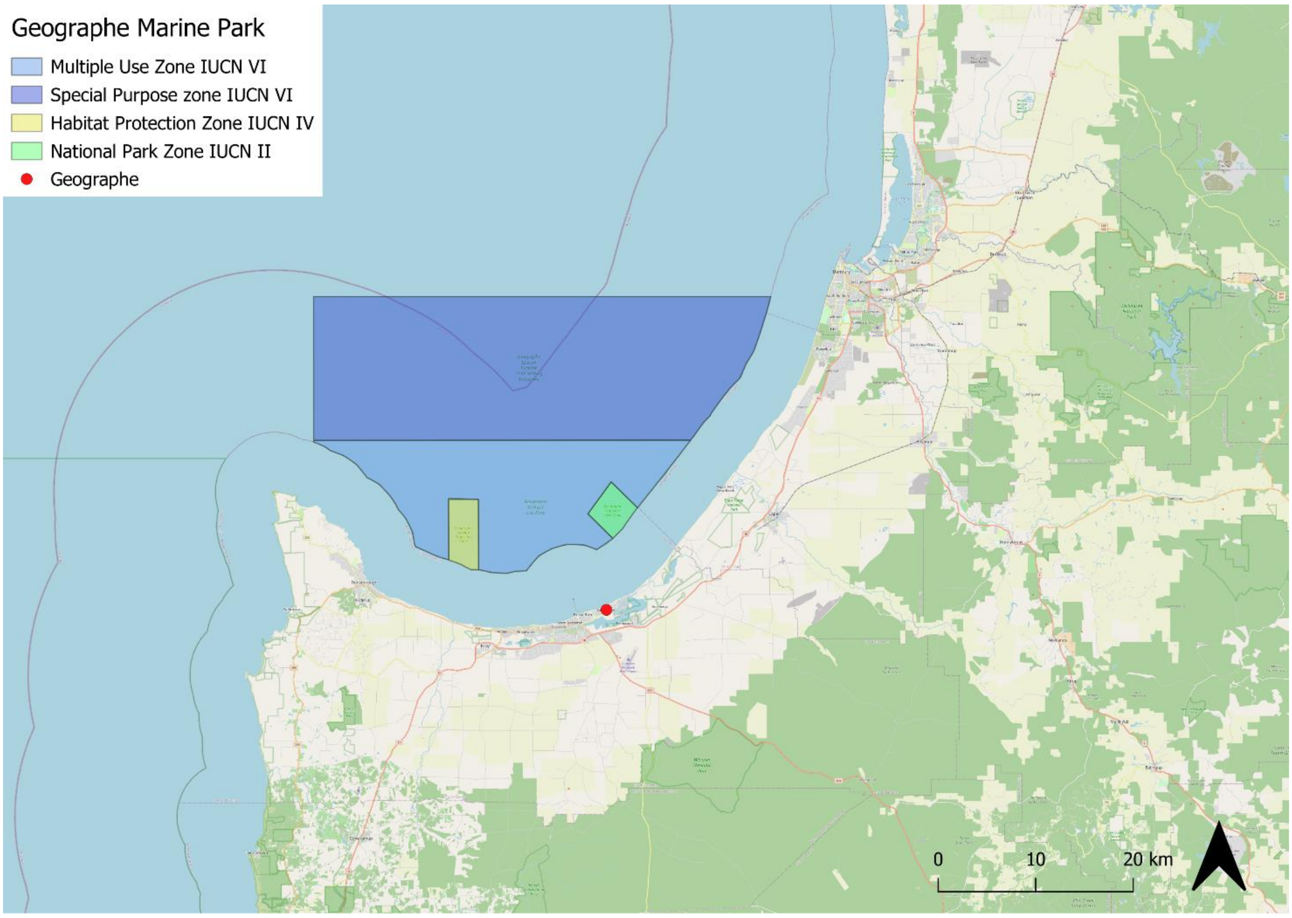


Figure 2: Geographe Marine Park and its zones

The second study site, Gracetown (GCT), is located within the South-west Corner (SWC) Marine Park, (34°02'40.7"S 114°48'20.3"E), The SWC Marine Park covers an area of

271,833 km^2 (Figure 3); the study site at Gracetown is however, similar in size (approximately 950 km^2) to Geographe. As with the Geographe Bay Marine Park, the Ngari Capes Marine Park occupies the area between the landward boundary of the SWC Marine Park and the high water mark; the townships of Margaret River and Gracetown are on or near the coast. The SWC Marine Park extends across the continental shelf and down the continental slope. It traverses depths between 50 m to 150 m and is characterised by localised upwelling of nutrient-rich water at the shelf break. The SWC Marine Park is recognised as a biodiversity hotspot known for supporting a variety of whales, sharks, sea lions and many other species. The SWC Park is composed of multiple zones: however, the majority of Gracetown is a Special Purpose Zone with mining exclusion classed IUCN VI which represents 650 km^2 or 69% of the park that allows most extractive activities while the second type of zoning is an IUCN II National Park Zone which represents 298 km^2 or 31% excludes extractive activities such as fishing but allows boat access (Appendix 1)

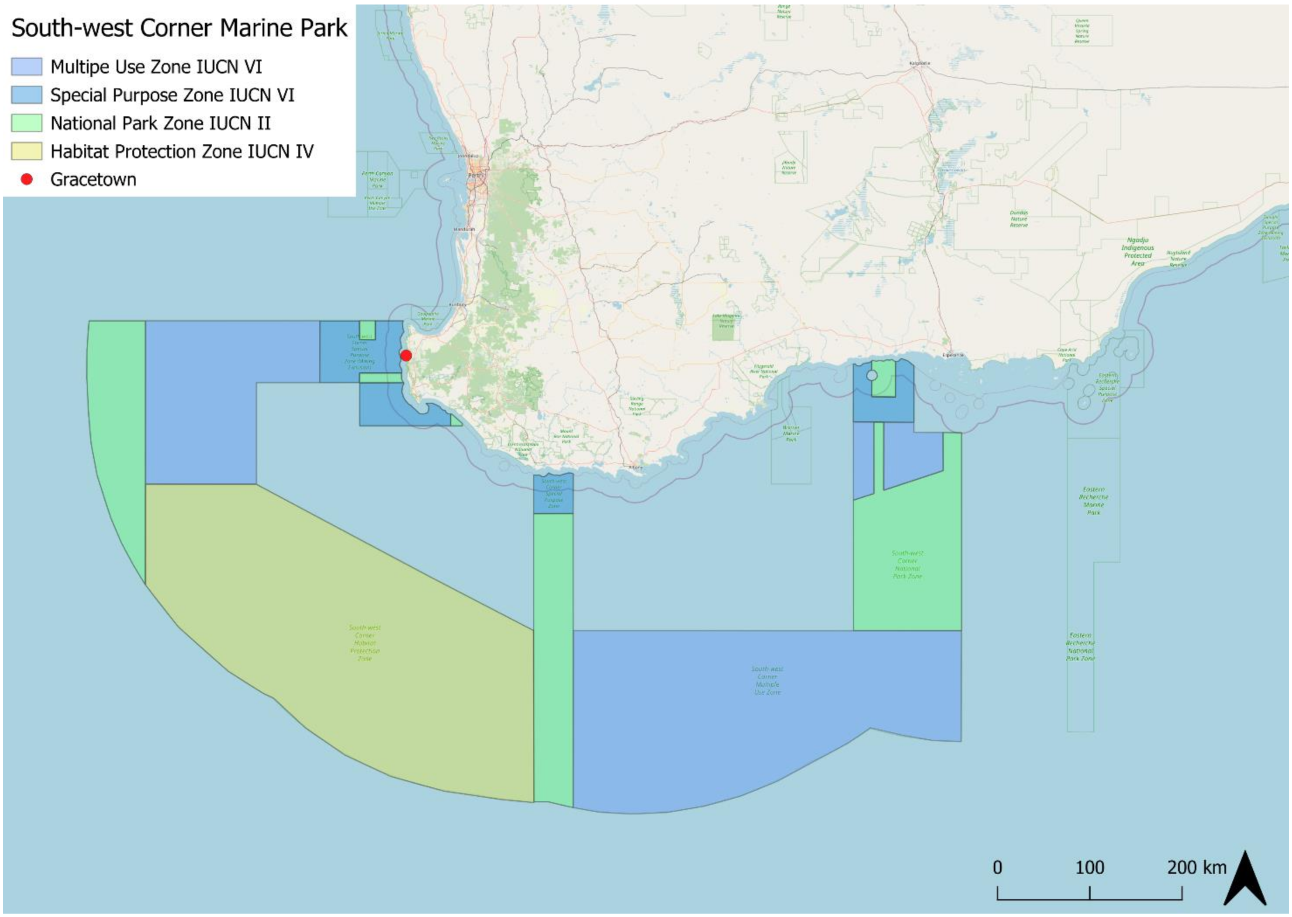


Figure 3: South-west Corner Marine Park and its zones.

Both marine parks are strongly influenced by the Leeuwin Current which transports warm, oligotrophic water from Northern Australia as far south as Tasmania. The Leeuwin Current influences associated marine life. For instance, it plays a major role in the life cycle of important commercial species such as Southern bluefin tuna (*Thunnus maccoyii*, Castelnau, 1872), Western rock lobster (*Panulirus cygnus*, George, 1962), Australian salmon (*Arripis truttaceus*, Cuvier 1829) as well as the pilchard (*Sardinops sagax*, Jenyns, 1842) amongst others. (Caputi *et al,* 1996).

2.2 Sampling protocol: Mid-water stereo-BRUVS

Each BRUVS (Baited Remote Underwater Video System) or rig used for this study consisted of two GoPro cameras mounted on a metallic cross bar 800 mm apart and inclined inwardly at an angle of 4 degrees. This configuration creates a field of view of 127 degrees. The cameras were directed toward a baited canister placed on an adjustable 1.2 m arm. This 450 mm perforated canister contains a standardised 1 kg of crushed bait which allows for attraction of species, stabilize the rotational movement of the rig in the water and acts as a keel which aligns it downstream of the current and horizontally. A weight below the rig also assists in stabilising the rig and maintains it in a horizontal orientation and at the desired depth. Each rig was suspended 10 m below the surface, with a sub-surface buoy for additional stabilisation and surface buoys to maintain overall buoyancy at the surface and allow recovery (Figure 4). Rigs were deployed in a longline configuration of strings of five; each rig was attached to the sequential rig by a 200 m surface line, resulting in a total string length of 800 m for each string deployed. A flagpole equipped with a radio transmitter aids recovery. The strings were deployed for a drift of 2 hours prior to recovery. Following daily field work, all video samples were transferred from camera SD cards to external hard drives, with a duplicate copy made. Metadata was also entered as a record of the rig used, location and timing of each deployment (Appendix 2).

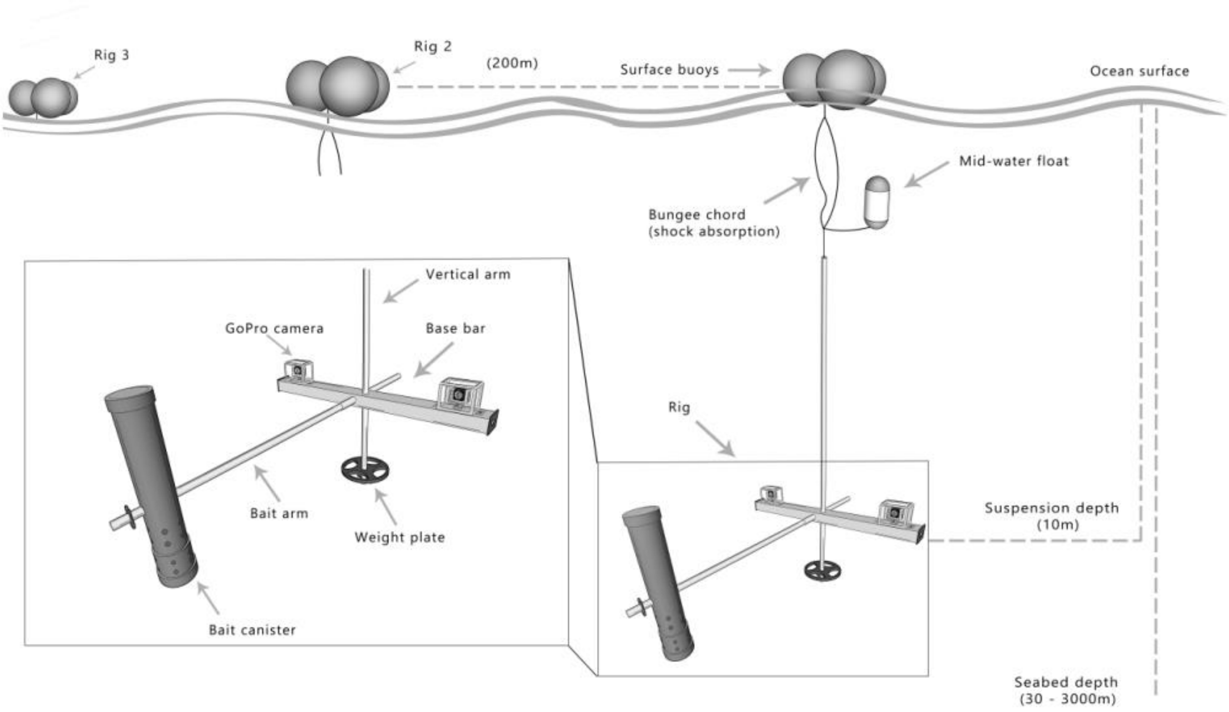


Figure 4: Schematics of a drifting BRUVS used in pelagic studies, flagpole and radio transmitter not pictured, adapted from Bouchet and Meeuwig (2015).

The sampling design was stratified and haphazard. Deployments were stratified across all three IUCN zones in Geographe and the IUCN VI and IUCN II at Gracetown, recognizing that the IUCN II zone near Gracetown represents a significantly larger area (298 km^2 vs 14.2 km^2 (Figure 5). For each survey, the aim is to deploy 100 rigs, or 20 strings. However, logistics and weather can constrain sampling and the 2017 field survey at Geographe totalled 50 deployments, or 10 strings. The following surveys were completed with 100 deployments. However, not all videos were usable for a total of 838 deployments across the nine surveys, (table 1).

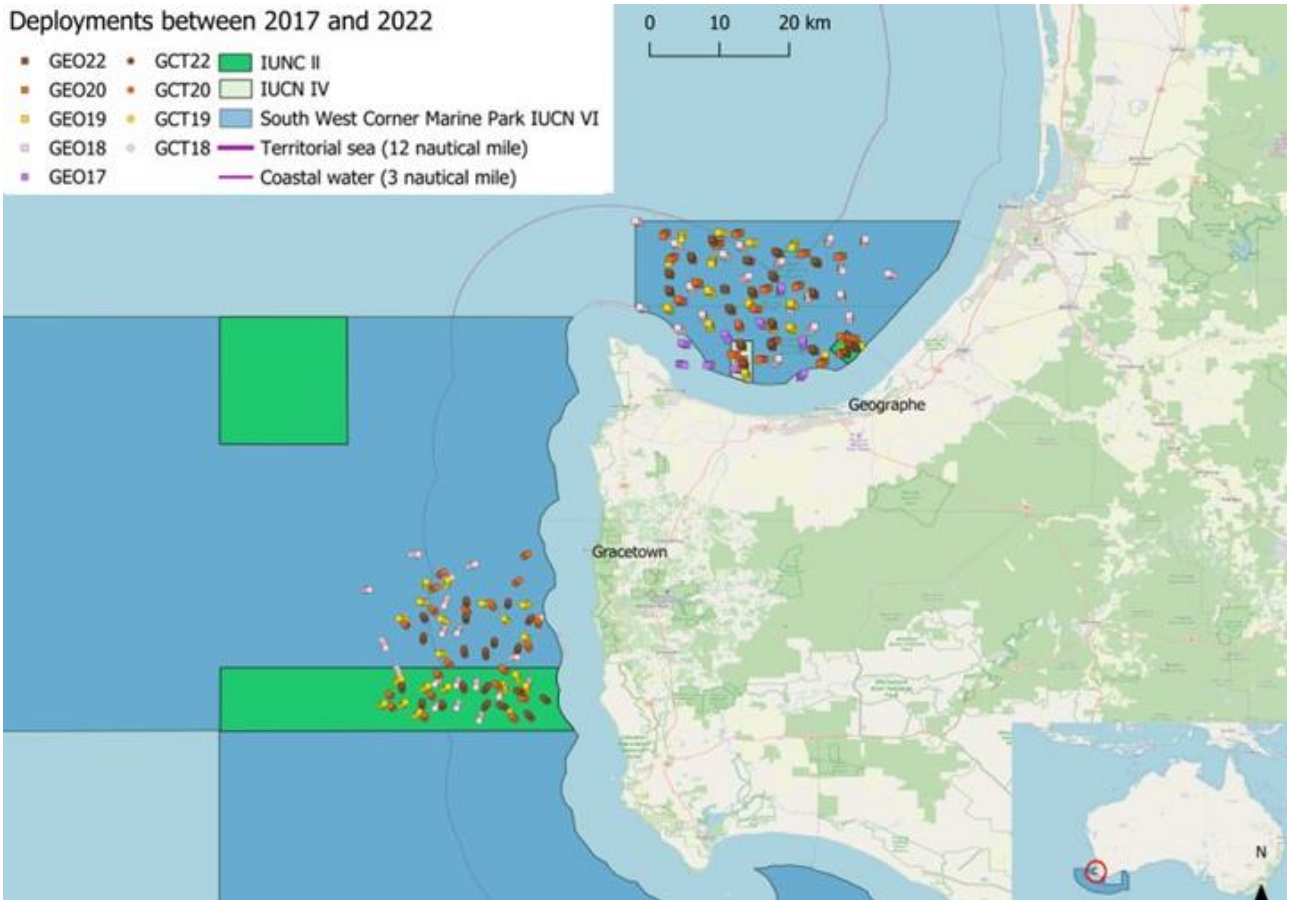


Figure 5: Map of the two sampling locations and their deployment per year.

Table 1: Number of deployments in each survey by location and year.

Location	2017	2018	2019	2020	2022	Total
Geographe	45	100	97	100	97	439
Gracetown	-	99	100	100	100	399
Total	45	199	197	200	197	838

2.3 Image analysis

Image analysis consists of a series of steps. The calibration files for each rig were first sourced. Calibration files were obtained using a standard calibration cube (1000*1000*500 mm) in a swimming pool. Rotating the cube at different angles in front of a stereo system generates the calibration file for each specific rig, using the CAL software from the SeaGIS package. Synchronisation of the two cameras was assured by a series of three slow claps in front of both cameras at the start of each rig deployment.

The raw video files from the field were converted to AVI format for image analysis. The left-hand camera footage was then manually reviewed in EventMeasure with the rig-specific calibration file uploaded to allow the length measurements. Individual fishes were identified to the lowest taxonomic level possible. Relative abundance was estimated as MaxN which is defined as the maximum number of individuals of a species seen in a single frame and is a conservative measure of abundance (Letessier *et al*, 2013). Using the synchronised left and right-hand camera footage, all individuals who came within a range of 7 m from the rig were measured. The type of length measure depended on the taxa with the lengths of fishes and sharks, rays, and squids estimated as fork length, disk width, and mantle length respectively. Measurements were retained only if the measured precision was less than 10% of the individual length and if the predicted Residual Mean Square (RMS) was less than 20. Approximately 20% of records were independently verified with respect to identifications and MaxN by another team member to minimise errors.

2.4 Data analysis

The data obtained from EventMeasure were exported to Excel for data cleaning and preparation. Data for all fish and sharks taxa were retained. Invertebrates, seabirds, whales, and sea turtles were excluded from the data set as they typically are not measured, and in the case of whales, are large, and thus disproportionately skew estimates of biomass. For measurements, ideally, each taxon on a given sample was measured. However, when this was not the case, the mean length of the taxon on the same string was used, followed hierarchically by the mean length from the expedition, location, and as a last resort, from FishBase. Taxon weight was estimated using length weight relationships using a and b coefficients from FishBase where:

$$W=aL^b \qquad \text{[eq. 1]}$$

Each rig is deployed in a string of 5 rigs and is therefore not independent of the other rigs. Specifically, the metrics for taxonomic richness (TR), abundance (TA), biomass (TB) and fork length (FL) were calculated for each rig where taxonomic richness is the count of the number of fish and sharks taxa, abundance and biomass are the sum of the abundances and biomasses of all fish and sharks, and length as the mean of the lengths of each taxa. For the strings, the averages of TR, TA and TB including zeros, were then calculated. Mean FL by string was calculated on the basis of where animals were present and measured.

Transformations were considered on the basis of the range and structure of taxonomic richness, abundance, biomass, and length. The range in taxonomic richness was small and thus these values were not transformed. Mean abundance, biomass and fork length had much larger ranges and thus a $\log_{10}$ transformation was applied to minimise heteroscedasticity in the data.

Linear regression was used to observe the patterns through time for each dependent metrics, namely taxonomic richness, abundance, biomass, and fork length (Table 3 and 4, Figure 6). While it is recognised that autocorrelation between years challenges the overall assumptions of regression, the goal was to describe trends rather than to create a predictive model, and as such, linear regression is an appropriate method (Poole and O'Farrel, 1971).

The effect of time and location on the composition of wildlife was tested with a 2 factor multivariate permutational ANOVA using the software Primer-e v7. Abundance for each taxa was calculated as a mean of the string abundance (including zeros). The imported data were square-root transformed to down-weight and up-weight abundant and rare taxa respectively. A Bray-Curtis resemblance matrix was then calculated to avoid the problem of joint-zeros. The 2 factor ANOVA was then applied with both year and location as fixed. Pair-wise tests for years were then conducted (Table 5). The results were visualised using a canonical analysis of principal coordinates. The analysis followed recommendations in the Primer manual (Clarke and Gorley, 2015).

3. Results

At Geographe, a total of 12,722 individuals were identified, representing 51 species from 36 families. Of the 12,722 individuals, 18% were identified to species, 14% to genus and 57% to family. Approximately 9.8% of fish were identified as juvenile fish and 0.1% of larger fish could not be identified. The taxa included 31 families of fishes, one marine reptile family and four invertebrates families.

The most abundant taxa were anchovies (Clupeidae sp; 51%) which due to their small size and similarity among taxa, could only be identified to family. Jacks (Carangidae sp; 19%), scads (*Decapterus* sp; 10%) and silver trevally (P*seudocaranx georgianus*, Cuvier, 1833; 4%) followed in abundance (Appendix 3). The largest individuals included a great white shark (416 cm, *Carcharodon carcharias*, Linnaeus, 1758), a tiger shark (334 cm, *Galeocerdo cuvier*, Peron and Lesueur, 1822) and a copper shark (231 cm, *Carcharhinus brachyurus*, Günther, 1870). The smallest individuals included a juvenile fish (0.4 cm), a jack (Carangidae sp; 0.6 cm) and a leatherjacket (Monacanthidae sp; 0.9 cm) (Appendix 4).

At Gracetown, a total of 4,481 individuals were identified representing 17 species from 23 families. Of the 4,481 individuals, 10% were identified to species, 25% to genus and 49% to family. Approximately 16% of fish were identified as juveniles and 0.1% of larger fish could not be identified. The taxa included 17 families of fishes, two of marine mammals and four of invertebrates. The most abundant taxa were anchovies (Clupeidae sp; 30%) followed by scads (*Decapterus* sp; 22%), jacks (Carangidae sp; 12%) and Southern bluefin tuna (*Thunnus maccoyii;* 4%). Some of the larger individuals included a Northern minke whale (541 cm, *Balaenoptera acutorostrata*, Lacépède, 1804), a copper shark (296 cm, *Carcharhinus brachyurus*) and a scalloped hammerhead shark (268 cm, *Sphyrna* *lewini*,Griffith & Smith, 1834). The smallest individuals were similar to Geographe with a juvenile fish (0.6 cm), and a scad (*Decapterus* sp; 0.7 cm)(Figure 6).

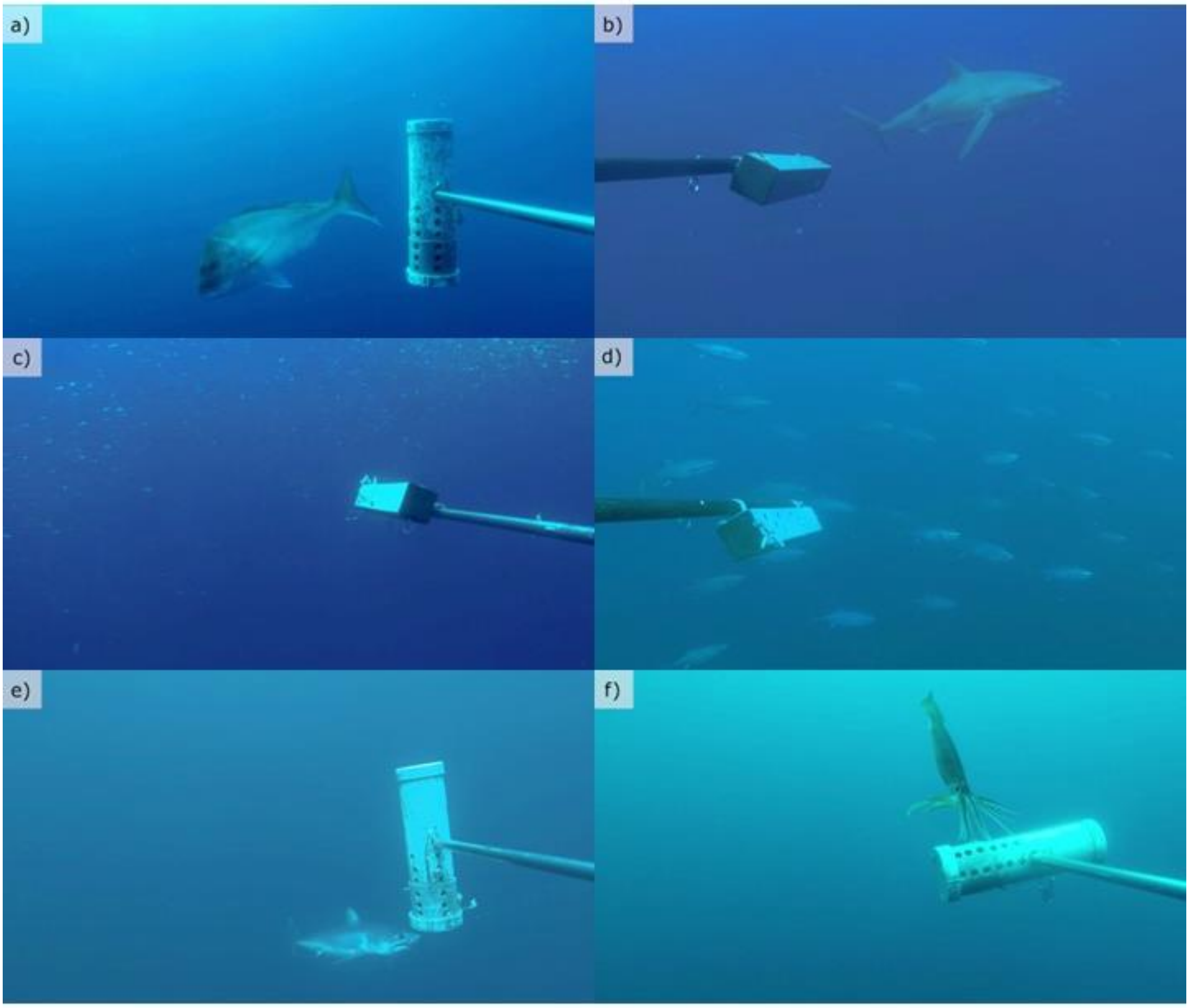


Figure 6: Example of some mid-water taxa observed in Geographe and Gracetown in 2022 including a) pink snapper (*Chrysophrys auratus*, Forster 1801), b) copper shark (*Carcharhinus brachyurus* , Günther, 1870), c) mixed school of anchovies (Clupeidae sp) and jacks (*Decapterus* sp), d) school of southern bluefin tuna (*Thunnus maccoyii*, Castelnau, 1872), e) shortfin mako shark (*Isurus oxyrinchus,* Rafinesque, 1810) and Gould's squid *(Nototodarus gouldi,* McCoy, 1888).

Taxonomic richness, abundance, biomass, and fork length varied between strings at both locations. At Geographe Marine Park, across all surveys, the mean of taxonomic richness per string was 1.9 and ranged from 0 to 14.4, while mean of string abundance was 28.7 and varied from 0 to 323. biomass varied from 0 g to a maximum of 200,263 g with a mean of 17,134 g and mean fork length was 12.0 cm ranging from 0 cm to 96.7 cm. At Gracetown, across all surveys, the mean of taxonomic richness per string was 1.8 and varied from 0.2 to 4.4. Mean abundance was 11.2 individuals and varied from a minimum of 0.2 to a maximum of 252. The mean biomass of a string was 33,131 g and it varied from 0.1 g to 1,291,501 g. The mean fork length of a string was 71 cm ranging from 0.4 cm to 1,263 cm. However, Gracetown was characterised on average by having more taxa (Fig 7).

Trends through time varied in their significance by location and with respect to specific assemblage metrics (Table 3 and 4). Taxonomic richness increased significantly at both Geographe and Gracetown, with the rate of increase greater at Geographe (Figure 7) . There was also a statistically significant increase in abundance with time at Geographe however abundance did not increase significantly at Gracetown. Biomass had a near significant positive correlation with time at Geographe but showed no significant trend at Gracetown; there was some indication of a decrease in biomass at the latter location. Size increased over the years at Geographe and decreased at Gracetown despite no significance for either of the location. Geographe had all four metrics start lower in comparison to Gracetown with taxonomic richness, abundance, and biomass higher than at Geographe relative to Gracetown in 2022.

Table 2: Evolution of Total Richness (Mean(TR)), Total Abundance (Mean(log(TA)), Total Biomass (Mean(log(TA)), and Fork length (Mean(log(FL)) through the years in Gracetown and Geographe.

Location	Expedition	Year	Mean(TR)	Mean(log(TA))	Mean(log(TB))	Mean(log(FL))
Geographe	GEO17	2017	0,47	0,2	0,58	0,27
Geographe	GEO18	2018	0,92	0,2	0,46	0,24
Gracetown	GCT18	2018	1,56	0,4	1,47	0,83
Geographe	GEO19	2019	1,63	0,2	0,63	0,31
Gracetown	GCT19	2019	1,64	0,4	0,67	0,55
Geographe	GEO20	2020	2,3	0,4	0,78	0,31
Gracetown	GCT20	2020	2,14	0,3	0,89	0,5
Geographe	GEO22	2022	3,5	0,4	0,84	0,32
Gracetown	GCT22	2022	3,1	0,4	0,76	0,46

Table 3 Results of the regression analysis between the expedition and taxonomic richness (TR), total abundance (TA), total Biomass (TB) and fork length (FL), significant p-value are in bold.

Location	variable	p-value	R square	Slope	Int
GEO	TR	**0,0001*** **	0,99	0,62	-0,22
GCT		**0,0213***	0,96	0,405	0,99
GEO	TA	**0,0373***	0,81	0,055	0,13
GCT		0,7743	ns	-0,004	0,37
GEO	TB	0,0613*	0,74	0,07	0,43
GCT		0,3883	0,37	-0,129	1,3
GEO	FL	0,1077	0,63	0,01	0,25
GCT		0,1761	0,68	-0,081	0,8

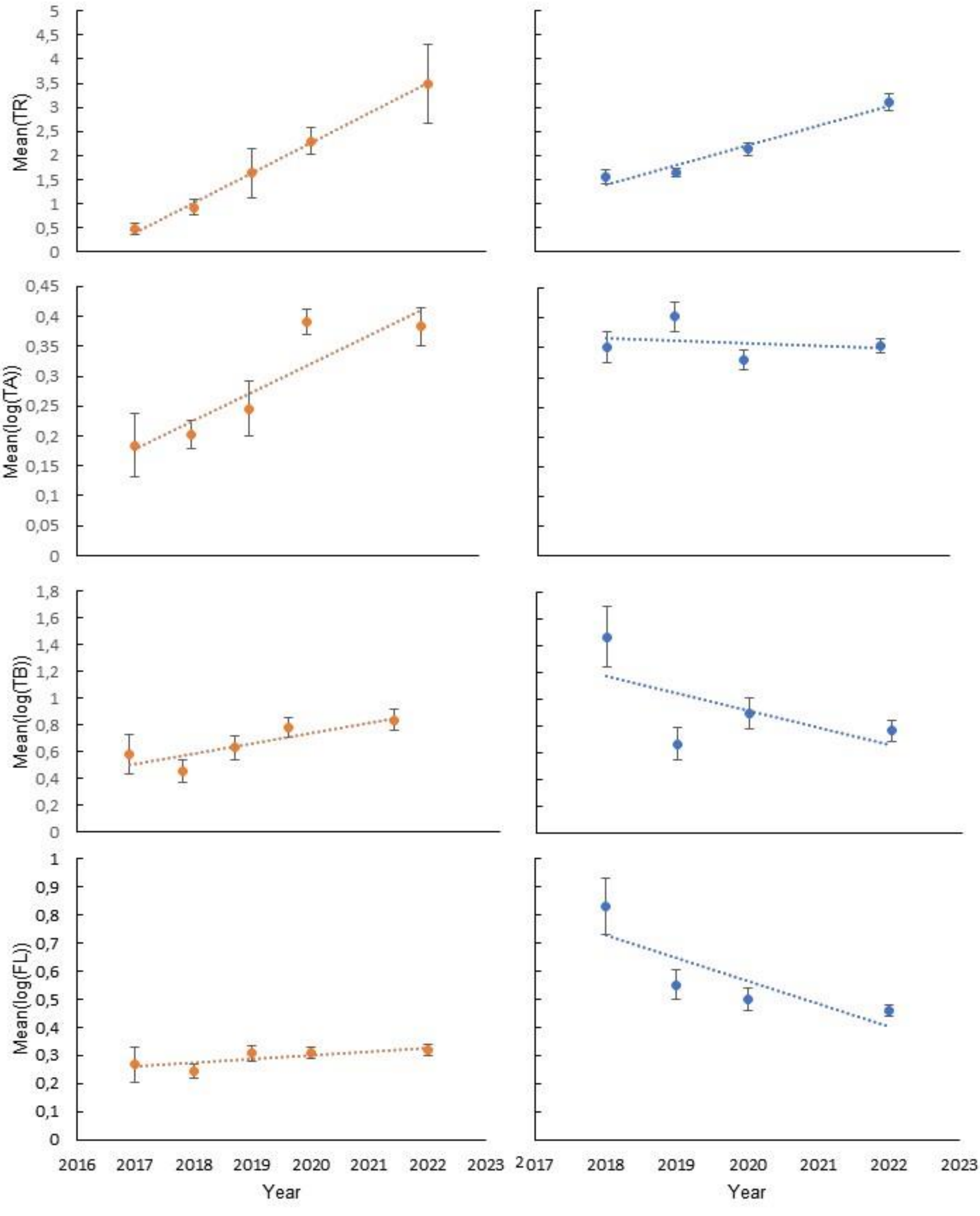


Figure 7: Evolution of the Total Richness (TR), Total Abundance (TA), Total Biomass (TB) and Fork length (FL) through the years in Geographe (left) and Gracetown (right).

The 2-factor PERMANOVA indicated a significant effect of location and year on the fish and sharks assemblage, as well as an interaction between these two factors (Table 5). Pairwise tests indicated that significant differences exist among both location and year combinations with p<0.01. Visualising the data, the CAP indicates that three main groups are formed (Figure 8). Taxonomic composition in the early surveys between 2017 and 2019 in Geographe and 2018 and 2020 at Gracetown are similar. These surveys are characterised by small species such as ocean jacket (*Nelusetta ayraud*, Quoy & Gaimard 1824) and jacks (Carangidae sp). The 2022 assemblage at Gracetown was distinct from the latter and characterised by tunas (*Thunnus* sp) The Geographe 2022 and 2022 surveys were also distinct and defined by samson fish (*Seriola hippos*, Günther, 1876) tiger sharks and pink snappers (*Chrysophys auratus,* Forster 1801). Two other taxa were characteristics for both latter assemblages and were decapterus scads (*Decapterus* sp) and requiem sharks (*Carcharhinus* sp)(Figure 9).

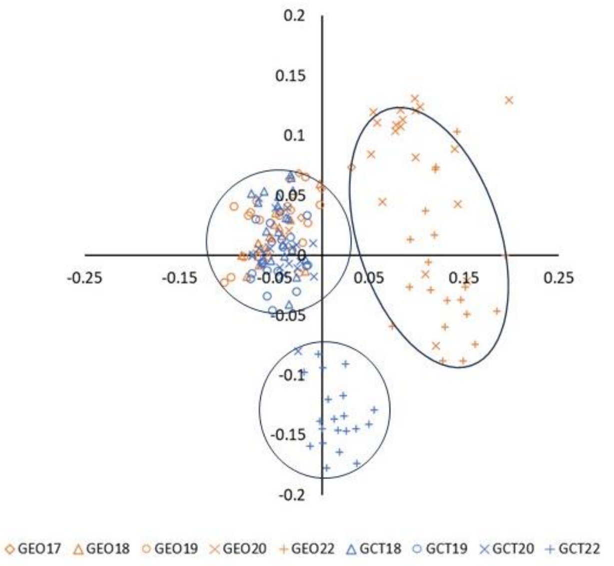


Figure 8:Canonical analysis of principal coordinates (CAP) ordination for Geographe and Gracetown mid-water data, each point represents a string, the circled areas represented the three identified species assemblages with, in clockwise order on top left side, a Geographe 2017, 2018, 2019 and Gracetown 2018, 2019, 2020 assemblage, a Geographe 2020, 2022 assemblage and a Gracetown 2022 assemblage.

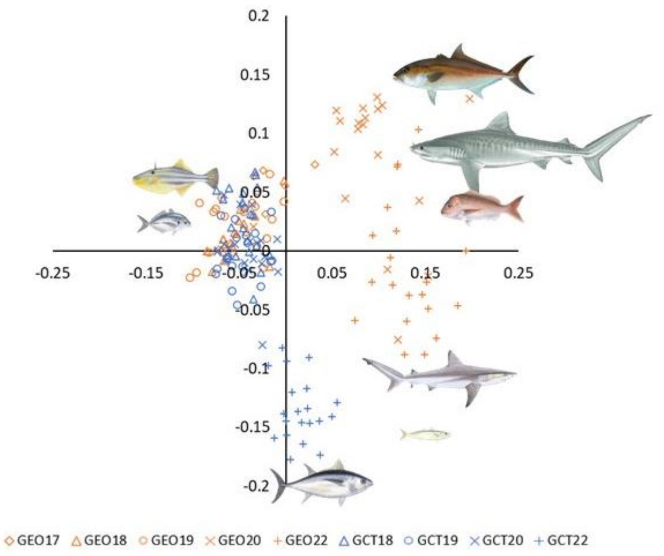


Figure 8: Canonical analysis of principal coordinates (CAP) ordination for Geographe and Gracetown mid-water data, each point represents a string, represented species were the most defining of each assemblages and were in clockwise order samson fish, tiger shark, pink snapper, requiem shark (*Carcharhinus* sp) scad, thunas, jacks and ocean jacket *(Nelusetta ayraud*, Quoy & Gaimard 1824).

Table 4: Standard analysis table of the PERMANOVA analysis comparing abundance with Years, Locations and Years x Location based on 9999 permutations, degree of freedom is reported as df, Sum of Squares as SS, Mean of squares as MS

Source	df	SS	MS	Pseudo-F	p(perms)
Years	4	81918	20480	12,944	**1,00E-05*** **
Location	1	16238	16238	10,263	**1,00E-05*** **
Years x Location	3	11230	11230	7,0977	**1,00E-05*** **
Res	156	2,47E+05	15822		
Total	164	3,79E+05			

4. Discussion

This study focused on determining the degree to which pelagic fish and sharks responded to the establishment of MPAs in Australia's south-west. The hypothesis was that the establishment of MPAs would increase taxonomic richness, abundance, biomass, and fork length, consistent with observations from coastal MPAs (c.f. Halpern, 2003). At Geographe Bay, increases in fish taxonomic richness, abundance, biomass, and fork length were observed, but these ecological responses were less clear at the Gracetown site.

The ecological response of fishes to the implementation of these MPAs is inconsistent with previous reports in that MPAs have typically led to increases in average fish size, overall biomass, and taxonomic richness (Halpern, 2003; McCook *et al*, 2010). However, such results are reported for demersal species. The focus of this study is on pelagic species. Pelagic species, in contrast to demersal species, tend to be more mobile (Carliste *et al*, 2019). The increased taxonomic richness may reflect climate-driven trends of species moving poleward (Cheung *et al*, 2011) with pelagic species travelling through and potentially migrating into MPAs. The observed increase in fish abundance at Geographe may have several contributing factors, such as ocean warming, habitat changes and reduction of fishing activity, for which MPAs provide a refuge. An increase in abundance through reproduction and site-attachment can be observed as a result of MPA establishment (Planes *et al*, 2002). Trophic cascades of carbon and nutrients and an increase in the abundance of mid-trophic level species may have been galvanised by predator removal (Baum and Worm, 2009). The increase of biomass and average fish size over time after the introduction of an

MPA is consistent with previous literature (Halpern, 2003). The relatively rapid increase of taxonomic richness at Geographe suggests that it has benefited from the establishment of a marine park and provides further evidence to the effectiveness of MPAs.

We also observed substantial differences between Geographe and Gracetown. Overall, Gracetown had higher metrics than Geographe during most of the time series. This is unexpected because, as an oligotrophic, open ocean area, Gracetown would be predicted to have lower diversity and abundance than Geographe, a warmer, more sheltered, nutrient rich embayment (Ramirez-Llodra et al, 2010). Since both study areas are geographically close, latitudinal variation in rainfall and a potential influence of El Niño, La Niña or the Leeuwin current are unlikely to explain the differences we observed between the two sites. Proximity to humans is one potential explanation. Cinner *et al* (2012) found human density and their associated fishing industry to be one of the most important factors affecting fish populations in coastal areas. The human population in Geographe was, in 2021, 2.5-fold greater than the population in and around Gracetown (40,000 vs 16,000 inhabitants respectively, Australian Bureau of Statistics, 2021, https://www.abs.gov.au/census/find-census-data/search-by-area). One last factor to consider when looking at human impact is the recreational fisheries sector. Recreational fishers tend to target larger, more fecund individuals (Sutter *et al*, 2012) which leads to a decrease in fish size over time (Shepard *et al*, 2012). This difference in adjacent human population and their implied impacts could be the reason why Geographe has historically low metrics in terms of taxonomic richness , abundance, biomass, and fork length. The area was in an extremely degraded state prior to being designated as an MPA. However, local human impact has stayed relatively similar. Overall, commercial fisheries in the marine ecoregion of Leeuwin have steadily decreased since 1990.The total catch declined from 21,000 tonnes in 1988 to 10,000 tonnes in 2019 (Pauly and Zeller, 2020, www.seaaroundus.org). This decrease may be large enough to explain the recovery of the resident fish populations to the present levels. It is unclear whether the recovery observed in Geographe reflects the age of the park itself. Possibly, the implementation of the MPA in 2018, however small it is, was sufficient to improve the degraded fish assemblage at the Geographe study site. In this context it is important to consider that overall fishing pressure at Gracetown is relatively low compared to Geographe and therefore Gracetown has naturally been in a better state and had less space for improvement.

Changes observed in species assemblage through time may be indicative that the fish populations at the two locations are improving and the protected areas are working as intended. The earlier fish assemblage of Geographe between 2017 to 2019 and Gracetown between 2018 to 2020 are largely represented by low trophic level species. The assemblages in the later survey years are associated with high trophic level species such as *Thunnus* sp at Gracetown and *Galeocerdo cuvier* in Geographe among other top-level predators. The abundance of species exhibiting vulnerable characteristics (low resilience, sedentary behaviour, and susceptibility to fishing activities) appear to increase with reduced fishing pressure. Fishing pressure also tends to homogenize fish assemblages (Pauly *et al*, 1998, Henrique *et al*, 2014). The two locations showed similar low trophic level species for the early years of the study. Over time, the present fish assemblage featured an increasing amount of vulnerable species such as sharks and high trophic level fish, suggesting a decrease in fishing pressure and corroborating the positive trends observed in Geographe.

This study provides insight on the effect of management on the fish and sharks assemblages at Geographe and Gracetown. There are, however, a number of caveats that should be considered. For instance, there were no field surveys in 2021, which was the year following the State restrictions on travel associated with the COVID-19 epidemic. Anecdotal evidence suggests that recreational fishing increased substantially in regional Western Australia during this time as people were unable to travel interstate or internationally (Ryan *et al*, 2021). As such, there is a possibility that the lack of positive trends in some variables reflected a set-back due to increased exploitation from recreational fishery.

Another caveat reflects the relatively short time series of data for these parks. Studies on the Great Barrier Reef Marine Park, for instance, were based on more than 10 years of data (Sweatman *et al*, 2012). The newness of the Commonwealth Marine Parks, combined with challenges of pelagic sampling, means that we have only 4 and 5 year time series. To this end, we relaxed the degree of acceptance for our p-value compared to the generally accepted levels with supporting arguments such as seen in Altman and Bland (1995) and Berner and Amrhein (2022). It should be noted however, that the time series for the Geographe and Gracetown are amongst the longest available for pelagic fishes in marine parks globally (Meeuwig, pers. comm.).

Several points remain unclear: to what degree are conservation outcomes at the Geographe Marine Park improving and what exactly causes these improvements. Further it remains to be seen to what degree the metrics of Gracetown site of the SWC Marine Park are stable or not. In order to answer these questions a commitment to ongoing monitoring must be made to assess the evolution of both areas in the next few years. They will be very telling of the actual trends in fish and sharks communities. This commitment is of paramount importance in order to properly manage both areas. Correspondingly, management should closely follow and respond to any present and future changes, as these two MPAs are an important part of the life cycle of various species. Constant work on restoration and maintenance of the two marine ecosystems will contribute to ensuring the sustainability of the pelagic realm in the South-west Network.

5. Conclusion

The use of midwater BRUVS has proven effective in assessing trends in taxonomic richness, abundance, biomass, and fork length through time. Midwater BRUVS also highlighted improvement in three of the four studied metrics, positive changes in historical data as well as changes in species compositions in the Geographe Marine Park. While results were less clear at Gracetown, the desired range of data was still collected and further validated BRUVS as an efficient tool for monitoring large-scale marine protected areas. This study further supported that the implementation of pelagic marine protected areas in highly disturbed ecosystems can provide benefits to the ecosystem despite the mobile nature of the species concerned. Concerns about the benefits of relatively small MPAs on these highly mobile species also seems to be contradicted from the results obtained at Geographe. The relative novelty of pelagic BRUVS monitoring demands for more evidence to inform these hypotheses but also opens the door to a mostly unknown realm. Fortunately, with a worldwide push to increase the protection of the pelagic realm, such as the 30 by 30 initiative, we hope that evidence will continue to accumulate in the years to come.

References

Altman D.G., Bland J.M., 1995. Statistics notes: Absence of evidence is not evidence of absence, BMJ, vol 311: 485, ht

tps://doi.org/10.1136/bmj.311.7003.485

Baum J.K., Myers R.A., 2004. Shifting baselines and the decline of pelagic sharks in the Gulf of Mexico, Ecology Letters, vol 7 (2): 135-145

Baum J.K., Worm B., 2009. Cascading top-down effects of changing oceanic predator abundances, Journal of Animal Ecology, vol 78 (4): 699-714, https://doi.org/10.1111/j.1365-2656.2009.01531.x

Berner D., Amrhein V., 2022. Why and how we should join the shift from significance testing to estimation, Journal of Evolutionary Biology, vol 35 (6): 777-787

Block B.A., Teo S.L.H., Walli A., Boustany A., Stokesbury M.J.W., Farwell C.J., Weng K.C., Dewar H., Williams T.D., 2005. Electronic tagging and population structure of Atlantic bluefin tuna, Nature, vol 434: 1121-1127

Bouchet P. J., Meeuwig J. J., 2015. Drifting baited stereo-videography: a novel sampling tool for surveying pelagic wildlife in offshore marine reserves. Ecosphere, vol 6 (8): 137, http://dx.doi.org/10.1890/ES14-00380.1

Brierley A.S., Brandon M.A., Watkins J.L., 1998. An assessment of the utility of an acoustic Doppler current profiler for biomass estimation, Deep Sea Research, vol 45 (9): 1555-1573, https://doi.org/10.1016/S0967-0637(98)00012-0

Caputi N., Fletcher W. J., Pearce A., Chubb C.F., 1996. Effect of the Leeuwin Current on the Recruitment of Fish and Invertebrates along the Western Australian Coast, Marine. Freshwater Rearch., vol 47: 147-155

Carliste A.B., Tickler D., Dale J.J., Ferretti F., Curnick D.J., Chapple T.K., Schaller R.J., Castleton M., Block B.A., 2019. Estimating Space Use of Mobile Fishes in a Large Marine Protected Area With Methodological Considerations in Acoustic Array Design, Frontier in Marine Science, vol 6, https://doi.org/10.3389/fmars.2019.00256

Cheung W.W. L., Meeuwig J.J., Feng M., Harvey E., Lam V.W. Y., Langlois T., Slawinski D., Sun C., Pauly D., 2011. Climate-change induced tropicalisation of marine communities in Western Australia, Marine and Freshwater Research, vol 63 (5): 415-427, https://doi.org/10.1071/MF11205

Clarke K.R., Gorley R.N., 2015. PRIMER v7 : User Manual/Tutorial, Primer-E: Plymouth

Cinner J.E., Graham N.A.J. Huchery C., Macneil M.A, 2013. Global Effects of Local Human Population Density and Distance to Markets on the Condition of Coral Reef Fisheries, Conservation Biology, vol 27 (3): 453-458

Davies T.K., Martin S., Mees C., Chassot E., Kaplan D.M., 2012. A review of the conservation benefits of marine protected areas for pelagic species associated with fisheries, ISSF Technical Report 2012-02, International Seafood Sustainability Foundation, McLean, Virginia, USA

DeMartini E.E., Friedlander A.M., Sindin S.A., Sala E., 2008. Differences in fish-assemblage structure between fished and unfished atolls in the northern Line Islands, central Pacific, Marine Ecology Progress Serie, vol 365: 199-215, https://doi.org/10.3354/meps07501

Dinerstein E., Vynne C., Joshi A.R., Fernando S., Lovejoy T.E., Mayorga J., Olson D., Asner G.P., Bailie J.E.M., Burgess N.D., Burkart K., Noss R.F., Zhang Y.P., Baccini A., Birch T., Hahn N., Joppa L.N., Wikramanayake E., 2021. A Global Deal For Nature: Guiding principles, milestones, and targets, Science Advance, vol 5 (4):

Dulvy N. K., Fowler S. L., Musick J. A., Cavanagh R. D., Kyne P. M., Harrison L. R., Carlson J. K., Davidson L. N.K., Fordham S. V., Francis M. P., Pollock C. M. , Simpfendorfer C. A., Burgess G. H., Carpenter K. E., Compagno L. J.V., Ebert D. A., Gibson C., Heupel M. R., Livingstone S. R., Sanciangco J. C., Stevens J. D., Valenti S., White W. T., 2014. Extinction risk and conservation of the world's sharks and rays, eLife 3: e00590, https://doi.org/10.7554/eLife.00590

Edgar G. J., Stuart-Smith R. D., Willis T. J., Kininmonth S., Baker S. C., Banks S., Barrett N. S., Becerro M. A., Bernard A. T. F., Berkhout J., Buxton C. D., Campbell S. J., Cooper A. T., Davey M., Edgar S. C., Försterra G., Galván D. E., Irigoyen A. J., Kushner D. J., Moura R., Parnell P. E., Shears N. T., Soler G., Strain E. M. A. & Thomson R. J., 2014. Global conservation outcomes depend on marine protected areas with five key features, Nature, vol 506: 216-220, https://doi.org/10.1038/nature13022

FAO. 2022. The State of World Fisheries and Aquaculture 2022. Towards Blue Transformation. Rome, FAO, https://doi.org/10.4060/cc0461en

Forrest J. A. H., Bouchet P. J., Barley S. C., McLennan A. G., Meeuwig J. J., 2021. True blue: Temporal and spatial stability of pelagic wildlife at a submarine canyon, Ecosphere, vol 12 (3), https://doi.org/10.1002/ecs2.3423

Fossheim M., Primicerio R., Johannesen E., Ingvaldsen R.B., Aschan M.M., Dolgov A.V., 2015. Recent warming leads to a rapid borealization of fish communities in the Arctic, Nature Climate Change, vol 5: 673-677, https://doi.org/10.1038/nclimate2647

Galaiduk R., Nanson R., Huang Z., Nichol S., Miller K., 2018. An eco-narrative of Geographe Marine Park – South-west marine region, Marine Biodiversity Hub, vol 14

Gladston W., Lindfield S., Coleman M., Kelaher B., 2012. Optimisation of baited remote underwater video sampling designs for estuarine fish assemblages, Journal of Experimental Marine Biology and Ecology, vol 429: 28-35, https://doi.org/10.1016/j.jembe.2012.06.013

Fraschetti S., Terlizzi A., Micheli F., Benedetti-Cecchi L., Boero F., 2005. Marine Protected Areas in the Mediterranean Sea: Objectives, Effectiveness and Monitoring, Marine Ecology vol 23 (1): 190-200

Fréon P., Cury P., Shannon L., Roy C., 2005. Sustainable Exploitation of small pelagic fish stocks challenged by environmental and ecosystem changes: a review, Bulletin of marine science, 76 (2): 385-462

Halpern B.S., 2003. The impact of marine reserves: Do reserves work and does reserve size matter? Ecological Applications, vol 13, (1): 117-137, https://doi.org/10.1890/1051-0761(2003)013[0117:TIOMRD]2.0.CO;2

Henrique S., Pais M.P., Vasconcelos R.P., Murta A., Azevedo M., Costa M.J., Cabral N.H., 2014. Structural and functional trends indicate fishing pressure on marine fish assemblages, Journal of Applied Ecology, vol 51 (3): 623-631

Juan-Jordà M.J., Mosqueira I., Cooper A.B., Freire J., Dulvy N.K., 2011. Global population trajectories of tunas and their relatives. PNAS, vol 108 (51): 20650–5, https://doi.org/10.1073/pnas.1107743108

Leitner A.B., Durden J.M., Smith C.R., Klingberg E.D., Drazen J.C., 2021. Synaphobranchid eel swarms on abyssal seamounts: Largest aggregation of fishes ever observed at abyssal depths, Deep Sea Research, vol 167

Letessier T., Meeuwig J. J., Gollock M., Groves L., Bouchet P. J., Chapuis L., Vianna G. M. S., Kemp K., Koldewey H., 2013. Assessing pelagic fish populations: The application of demersal video techniques to the mid-water environment, Methods in oceanography, vol 8: 41-55

Lohrer A.M., McCrartain L.D., Buckthought D., McDonald I., Parsons D.M., 2018. Benthic Structure and Pelagic Food Sources Determine Post-settlement Snapper (Chrysophrys auratus) Abundance, Frontiers in Marine Science. vol 5, https://doi.org/10.3389/fmars.2018.00427

Majkowski J., 2007. Global Fishery Resources of Tuna and Tuna-like Species, FAO Fisheries Technical Paper 483, 54 pages, ISSN 0429-9345

Mallet D., Pelletier D., 2014. Underwater video technique for observing coastal marine biodiversity: a review of sixty years of publications (1952-2012), Fisheries research, Vol 154: 44-62

Maxwell S. M., Ban N. C., Morgan L. E., 2014. Pragmatic approaches for effective management of pelagic marine protected areas, Endangered Species Research, vol 26: 59-74, https://doi.org/10.3354/esr00617

McCook L.J., Ayling T., Cappo M., Choat J.H., Evans R.D., De Freitas D.M., Heupel M., Hughes T.P., Jones G.P., Mapstone B., Marsh H., Mills M., Molloy F.J., Pitcher C.R., Pressey R.L., Russ G.R., Sutton S., Sweatman H., Tobin R., Wachenfeld D.R., Williamson D.H., 2010. Adaptive management of the Great Barrier Reef: A globally significant demonstration of the benefits of networks of marine reserves, PNAS, vol 107 (43): 18278-18285, https://www.pnas.org/doi/10.1073/pnas.0909335107

Meeuwig J.J., Thompson C.D.H., Forrest J.A., Christ H.J., Letessier T.B., Meeuwig D.J., 2021. Pulling Back the Blue Curtain: A Pelagic Monitoring Program for the Blue Belt, Frontiers in Marine Science, vol 8, https://doi.org/10.3389/fmars.2021.649123

Mellin C., MacNeil M.A., Cheal A.J., Emslie M.J., Caley M.J., 2016. Marine protected areas increase resilience among coral reef communities, Ecology Letters, vol 19 (6): 629-637, https://doi.org/10.1111/ele.12598

O'Leary B.C., Winther-Janson M., Bainbridge J.M., Hawkins J.P., Roberts C.M., 2016. Effective Coverage Targets for Ocean Protection, Conservation Letters, vol 9 (6): 1-6

O'Leary B.C., Ban N.C., Fernandez M., Friedlander A.M., García-Borboroglu P., Golbuu Y., Guidetti P., Harris J.M., Hawkins J.P., Langlois T, McCauley D.J., Pikitch E.K., Richmond R.H., Roberts C.M., 2018. Addressing Criticisms of Large-Scale Marine Protected Areas, BioScience, vol 68 (5): 359-370, https://doi.org/10.1093/biosci/biy021

Pala C., (2013). Giant marine reserves pose vast challenges. Science 339:640–641.

Pauly D.V., Christensen V., Dalsgaard J., Froese R.M., 1998. Fishing down Marine Food Webs, Science, vol 279 (5352): 860-3, DOI:10.1126/science.279.5352.860

Pauly D. and Zeller D., 2015. Catch Reconstruction: concepts, methods and data sources. Online Publication. Sea Around Us (www.seaaroundus.org). University of British Columbia.

Pikitch E.K., Rountos K.J., Essington T.E., Santora C. Pauly D., Watson R., Sumaila U.R., Boersma P.D., Boyd I.L., Conover D.O., Cury P., Heppell S.S., Houde E.D., Mangel M., Plaganyi E., Sainsbury K., Steneck R.S., Geers T.M., Gownaris N., Munch S.B., 2014. The global contribution of forage fish to marine fisheries and ecosystems, FISH and FISHERIES, vol 15: 43-64

Planes S., Galzin R., RUBIES A,G., Goni R., Harmelin J.G., LE DIRÉACH L., LENFANT P. QUETGLAS A., 2002. Effects of marine protected areas on recruitment processes with special reference to Mediterranean littoral ecosystems, Environmental Conservation, vol 27(2): 126-143, https://doi.org/10.1017/S0376892900000175

Poole M.A., O'Farrel P.N., 1971. The Assumptions of the Linear Regression Model, The Royal Geographical Society, vol 52: 145-158, https://doi.org/10.2307/621706

Priede I.G., Froese R., Bailey D.M., Bergstad O.A., Collins M.A., Dyb J.E., Henriques C., Jones E.G., King N., 2006. The absence of sharks from abyssal regions of the world's oceans, Proceedings of the Royal Society, vol 273: 1435-1440

Ramirez-Llodra E., Brandt A., Danovaro R., Escobar E., German C. R., Levin L. A., Martinez Arbizu P., Menot L., Buhl-Mortensen P., Narayanaswamy B.E., Smith C.R., Tittensor D.P., Tyler P.A., Vanreusel A., Vecchione M., 2010. Deep, diverse and definitely different: unique attributes of the world's largest ecosystem. Biogeosciences 7: 2361–2485, https://doi.org/10.5194/bg-7-2851-2010

Roff G., Brown C.J., Priest M.A., Mumby J.P., 2018. Decline of coastal apex shark populations over the past half century, Communication Biology, vol 1 (223)

Ryan K.L., Desfosses C.J., Denham A.M., Taylor S.M., Jackson G., 2021. Initial insights on the impact of COVID-19 on boat-based recreational fishing in Western Australia, Marine Policy, vol 132, https://doi.org/10.1016/j.marpol.2021.104646

Santana-Garcon J., Newman S., Langlois T., Harvey E., 2014. Effect of a spatial closure on highly mobile fish species: an assessment using pelagic stereo BRUVs, Journal of Experimental Marine Biology and Ecology, Volume 460: 153-161,https://doi.org/10.1016/j.jembe.2014.07.003

Shepard S., Fung T., Houle J.E., Farnsworth K.D., Reid D.G., Rossberg A.G., 2012. Size-selective fishing drives species composition in the Celtic Sea, ICES Journal of Marine Science, vol 69 (2): 223-234, https://doi.org/10.1093/icesjms/fsr200

Stokstad, 2023. Nations agree on long-sought high seas biodiversity treaty, Science, vol 379 (6636): 971

Sutter D.A.H., Susky C.D., Phillip D.P., Klefoth T., Walh D.H., Kersten P., Cook S.J., Arlinghaus R., 2012. Recreationnal fishing selectively captures individuals with the highest fitness potential, PNAS, vol 109 (51), https://doi.org/10.1073/pnas.1212536109

Sweatman H., Delean S., Syns C., 2011. Assessing loss of coral cover on Australia's Great Barrier Reef over two decades, with implications for longer-term trends, Coral Reefs, vol 30: 521-531

Takashina N., Mougi A., 2014. Effects of marine protected areas on overfished fishing stocks with multiple stable states. Journal of Theoretical Biology, vol 341: 64-70, https://doi.org/10.1016/j.jtbi.2013.09.027

Thomson C. D. H., Meeuwig J. J., 2022. Sharks are the preferred scraping surface for large pelagic fishes: Possible implications for parasite removal and fitness in a changing ocean, PLOS ONE, vol 17(10): e0275458, https://doi.org/10.1371/journal.pone.0275458

Van Beveren E., Fromentin J.M., Bonhommeau S., Nieblas A.E., Metral L., Brisset B., Jusup M., Bauer R.K., Brosset P., Saraux C., (2017) Predator–prey interactions in the face of management regulations: changes in Mediterranean small pelagic species are not due to increased tuna predation, Canadian Journal of Fisheries and Aquatic Sciences, vol 74 (9)

Van Elden S., Meeuwig J.J., Hobbs R.J., 2022. Offshore platforms as novel ecosystems: A case study from Australia's Northwest Shelf, Ecology and Evolution, vol 12 (2), https://doi.org/10.1002/ece3.8496.

Abstract

This study uses mid-water BRUVS as a sampling tool to compare two geographically close offshore marine parks in South-west Australia. Taxonomic richness, abundance, fork length and biomass were measured in 2017, 2018, 2019, 2020 and 2022 at Geographe site and 2018, 2019, 2020 and 2022 at Gracetown. For all four of these metrics, we analysed trends through time, and using species abundance for each survey we established changes in species composition through the years and location. Trends and fish and shark assemblages in Geographe pointed toward an improvement from a human induced degraded ecosystem prior to the marine park establishment. Gracetown study site however did not have clear ecological response and pointed to both improvement and degradation of the ecosystem. Both parks are relatively recent, therefore, we recommend continuing monitoring and adapted management in future years to further assess the benefits of these parks.

Résumé

Cette étude emploi des BRUVS semi flottants comme outil afin de comparer deux parcs marins protégés géographiquement proches situés en milieu pélagique en Australie du Sud-ouest. La richesse taxonomique, abondance, longueur de fourche et biomasse ont été obtenues pour les années 2017, 2018, 2019, 2020 et 2022 au site de Geographe et 2018, 2019, 2020 et 2022 au site de Gracetown. Pour chacune de ces quatre métriques, les tendances temporelles ont été analysé, l'abondance spécifique de chaque année d'étude a également permis d'établir les changements d'assemblages spécifiques pour les deux locations et à travers les ans. Les tendances observées dans les assemblages de poissons et requins à Geographe indiquait des changements d'un écosystème dégradé par les impacts humains vers un écosystème en meilleur santé. D'un autre côté, le site de Gracetown montrait à la fois des changements positifs et négatifs au sein de son écosystème. Les deux parcs étant relativement récents, nous recommandons un suivi continu ainsi que la mise en place d'une gestion adaptée afin d'évaluer au mieux les bénéfices de l'implémentation de ces parcs.

Mots clés : BRUVS, pélagique, écosystème, assemblage, tendance.

Supplementary material

Appendix 1: Overview of the rules for activities in Geographe and Gracetown Marine parks, ✓ are allowed, X are not allowed, A require autorisation, B Anchoring is not allowed except for determined areas, C, activity is only allowed in the purpose of protection, conservation, or restoration of habitats, adapted from: parksaustralia.gov.au.

	Activity	**IUCN VI, Special Purpose Zone (Mining Exclusion)**	**IUCN VI, Multiple Use Zone**	**IUCN IV, Habitat Protection Zone**	**IUCN II National Park Zone**
GENERAL USE, ACCESS, AND WASTE MANAGEMENT	Ballast water discharge and exchange	✓	✓	✓	✓
	Disposal of waste from normal operations	✓	✓	✓	✓
	Camping	A	A	A	A
	Recreational use	✓	✓	✓	✓
COMMERCIAL SHIPPING	Non-commercial remote piloted aircraft, drones etc.	A	A	A	A
	Anchoring	✓	✓	B	B
	Vessel transiting	✓	✓	✓	✓
COMMERCIAL FISHING	Dropline	A	A	A	X
	Hand collection	A	A	A	X
	Hand net	A	A	A	X
	Longline (demersal)	A	X	X	X
	Longline (pelagic)	A	A	A	X
	Minor line	A	A	A	X
	Net (demersal)	A	X	X	X
	Net (pelagic)	X	X	X	X
	Purse seine	A	A	A	X
	Trap, pot	A	A	X	X
	Trawl (demersal)	X	X	X	X
	Trawl (midwater)	A	A	A	X
	Trotline	A	X	X	X
COMMERCIAL AQUACULTURE	Aquaculture	A	A	A	X
COMMERCIAL MEDIA	Media	A	A	A	A

COMMERCIAL TOURISM	Non-fishing related tourism	A	A	A	A
	Charter fishing tours	A	A	A	X
	Commercial aviation tours	A	A	A	A
RECREATIONAL FISHING	Recreational fishing	✓	✓	✓	X
	Anchoring and vessel transiting	✓	✓	✓	✓
MINING	Mining operations including exploration	X	X	X	X
	Construction and operation of pipelines	A	A	A	A
STRUCTURES AND WORKS	Excavation, erection/maintenance of structures	A	A	A	A
	Dredging and disposal of dredged material	A	A	X	X
	Artificial reefs	A	A	A	C
	Fish aggregating devices	A	A	A	X
RESEARCH AND MONITORING	Research	A	A	A	A
TRADITIONAL USE	Non-commercial hunting/food gathering, ceremonial and cultural use	✓	✓	✓	✓
NATIONAL SECURITY AND EMERGENCY RESPONSE	National security and emergency response	✓	✓	✓	✓

Appendix 2: Metadata describing the Mid-water deployments with from left to right, Rig code identification, string, expedition, location, IUCN zoning, date, coordinates of deployment (longitude out and latitude out) and retrieval (long out and lat out) in decimal degrees, as well as time of deployment and retrieval in 24h clock format.

Sample ID	String ID	Exped.	Location	IUCN	Date	Long in	Lat in	Long out	Lat out	Time In	Time Out
GEO17_001	GEO17_01	GEO2017	Geographe	VI	04/02/2017	115,19670	-33,53780	115,19583	-33,53035	08:30	10:32
GEO17_002	GEO17_01	GEO2017	Geographe	VI	04/02/2017	115,19520	-33,53510	115,19528	-33,52896	08:32	10:40
GEO17_003	GEO17_01	GEO2017	Geographe	VI	04/02/2017	115,19363	-33,53285	115,19419	-33,52708	08:34	10:45
GEO17_004	GEO17_01	GEO2017	Geographe	VI	04/02/2017	115,19108	-33,52834	115,19290	-33,52515	08:36	10:48
GEO17_005	GEO17_01	GEO2017	Geographe	VI	04/02/2017	115,19000	-33,52628	115,19246	-33,52423	08:40	10:50
GEO17_006	GEO17_02	GEO2017	Geographe	VI	04/02/2017	115,31236	-33,54645	115,31598	-33,53731	11:10	13:21
GEO17_007	GEO17_02	GEO2017	Geographe	VI	04/02/2017	115,31282	-33,54394	115,31557	-33,53586	11:13	13:25
GEO17_008	GEO17_02	GEO2017	Geographe	VI	04/02/2017	115,31268	-33,54155	115,31525	-33,53390	11:14	13:28
GEO17_009	GEO17_02	GEO2017	Geographe	VI	04/02/2017	115,31256	-33,53916	115,31500	-33,53165	11:15	13:33
GEO17_010	GEO17_02	GEO2017	Geographe	VI	04/02/2017	115,31194	-33,53689	115,31480	-33,52987	11:17	13:37
GEO17_011	GEO17_03	GEO2017	Geographe	IV	05/02/2017	115,21512	-33,58369	115,21158	-33,57987	08:04	10:12
GEO17_012	GEO17_03	GEO2017	Geographe	IV	05/02/2017	115,21200	-33,58303	115,20967	-33,57952	08:08	10:17
GEO17_013	GEO17_03	GEO2017	Geographe	IV	05/02/2017	115,20890	-33,58246	115,20740	-33,57935	08:11	10:21
GEO17_014	GEO17_03	GEO2017	Geographe	IV	05/02/2017	115,20638	-33,58210	115,20490	-33,57911	08:14	10:25
GEO17_015	GEO17_03	GEO2017	Geographe	IV	05/02/2017	115,20436	-33,58127	115,20220	-33,57898	08:17	10:28
GEO17_016	GEO17_04	GEO2017	Geographe	VI	05/02/2017	115,13171	-33,54418	115,12761	-33,54396	10:49	13:00
GEO17_017	GEO17_04	GEO2017	Geographe	VI	05/02/2017	115,12931	-33,54339	115,12550	-33,54326	10:53	13:04
GEO17_018	GEO17_04	GEO2017	Geographe	VI	05/02/2017	115,12671	-33,54253	115,12335	-33,54253	10:57	13:07
GEO17_019	GEO17_04	GEO2017	Geographe	VI	05/02/2017	115,12437	-33,54160	115,12142	-33,54174	11:00	13:11
GEO17_020	GEO17_04	GEO2017	Geographe	VI	05/02/2017	115,12197	-33,54084	115,11953	-33,54107	11:03	13:14
GEO17_021	GEO17_05	GEO2017	Geographe	VI	06/02/2017	115,17023	-33,57506	115,16176	-33,57542	07:57	10:04
GEO17_022	GEO17_05	GEO2017	Geographe	VI	06/02/2017	115,16727	-33,57529	115,15948	-33,57557	08:01	10:09
GEO17_023	GEO17_05	GEO2017	Geographe	VI	06/02/2017	115,16718	-33,57531	115,15720	-33,57564	08:04	10:12
GEO17_024	GEO17_05	GEO2017	Geographe	VI	06/02/2017	115,16443	-33,57569	115,15461	-33,57594	08:07	10:16
GEO17_025	GEO17_05	GEO2017	Geographe	VI	06/02/2017	115,16180	-33,57622	115,15285	-33,57609	08:10	10:19
GEO17_026	GEO17_06	GEO2017	Geographe	VI	06/02/2017	115,12738	-33,47588	115,12413	-33,47617	10:34	12:52
GEO17_027	GEO17_06	GEO2017	Geographe	VI	06/02/2017	115,12532	-33,47596	115,12207	-33,47625	10:39	12:56
GEO17_028	GEO17_06	GEO2017	Geographe	VI	06/02/2017	115,12278	-33,47607	115,11971	-33,47640	10:42	13:00
GEO17_029	GEO17_06	GEO2017	Geographe	VI	06/02/2017	115,12019	-33,47602	115,11772	-33,47641	10:45	13:03

GEO17_030	GEO17_06	GEO2017	Geographe	VI	06/02/2017	115,12011	-33,47581	115,11766	-33,47621	10:48	13:07
GEO17_031	GEO17_07	GEO2017	Geographe	VI	06/02/2017	115,11900	-33,57364	115,12222	-33,57348	13:24	15:31
GEO17_032	GEO17_07	GEO2017	Geographe	VI	06/02/2017	115,12102	-33,57433	115,12433	-33,57414	13:27	15:35
GEO17_033	GEO17_07	GEO2017	Geographe	VI	06/02/2017	115,12334	-33,57478	115,12672	-33,57460	13:30	15:39
GEO17_034	GEO17_07	GEO2017	Geographe	VI	06/02/2017	115,12594	-33,57512	115,12870	-33,57494	13:33	15:41
GEO17_035	GEO17_07	GEO2017	Geographe	VI	06/02/2017	115,12799	-33,57580	115,13072	-33,57486	13:36	15:45
GEO17_036	GEO17_08	GEO2017	Geographe	VI	07/02/2017	115,27667	-33,46108	115,27885	-33,45400	07:39	10:01
GEO17_037	GEO17_08	GEO2017	Geographe	VI	07/02/2017	115,27714	-33,45930	115,27901	-33,45272	07:42	10:06
GEO17_038	GEO17_08	GEO2017	Geographe	VI	07/02/2017	115,27751	-33,45756	115,27934	-33,45076	07:45	10:10
GEO17_039	GEO17_08	GEO2017	Geographe	VI	07/02/2017	115,27807	-33,45566	115,27968	-33,44903	07:47	10:13
GEO17_040	GEO17_08	GEO2017	Geographe	VI	07/02/2017	115,27855	-33,45329	115,28065	-33,44654	07:50	10:16
GEO17_046	GEO17_10	GEO2017	Geographe	VI	08/02/2017	115,25113	-33,51452	115,25219	-33,50742	07:46	09:54
GEO17_047	GEO17_10	GEO2017	Geographe	VI	08/02/2017	115,24958	-33,51272	115,25047	-33,50643	07:49	10:37
GEO17_048	GEO17_10	GEO2017	Geographe	VI	08/02/2017	115,24811	-33,51100	115,24891	-33,50535	07:52	10:00
GEO17_049	GEO17_10	GEO2017	Geographe	VI	08/02/2017	115,24648	-33,50925	115,24734	-33,50355	07:54	10:04
GEO17_050	GEO17_10	GEO2017	Geographe	VI	08/02/2017	115,24492	-33,50764	115,24592	-33,50257	07:57	10:08
GEO18_001	GEO18_01	GEO2018	Geographe	VI	09/02/2018	115,31934	-33,47314	115,32555	-33,46174	07:13	09:13
GEO18_002	GEO18_01	GEO2018	Geographe	VI	09/02/2018	115,32018	-33,47053	115,32605	-33,46103	07:17	09:19
GEO18_003	GEO18_01	GEO2018	Geographe	VI	09/02/2018	115,32105	-33,46871	115,32724	-33,45742	07:19	09:25
GEO18_004	GEO18_01	GEO2018	Geographe	VI	09/02/2018	115,32117	-33,46633	115,32764	-33,45543	07:23	09:28
GEO18_005	GEO18_01	GEO2018	Geographe	VI	09/02/2018	115,32243	-33,46393	115,32818	-33,45326	07:27	09:31
GEO18_006	GEO18_02	GEO2018	Geographe	VI	09/02/2018	115,29250	-33,48846	115,29894	-33,47790	07:42	09:42
GEO18_007	GEO18_02	GEO2018	Geographe	VI	09/02/2018	115,29272	-33,48559	115,29989	-33,47583	07:45	09:46
GEO18_008	GEO18_02	GEO2018	Geographe	VI	09/02/2018	115,29360	-33,48321	115,30046	-33,47380	07:50	09:49
GEO18_009	GEO18_02	GEO2018	Geographe	VI	09/02/2018	115,29454	-33,48093	115,30162	-33,47164	07:53	09:53
GEO18_010	GEO18_02	GEO2018	Geographe	VI	09/02/2018	115,29549	-33,47886	115,30238	-33,47009	07:55	09:56
GEO18_011	GEO18_03	GEO2018	Geographe	VI	09/02/2018	115,32420	-33,52246	115,33302	-33,51103	10:17	12:17
GEO18_012	GEO18_03	GEO2018	Geographe	VI	09/02/2018	115,32544	-33,52078	115,33440	-33,50917	10:21	12:23
GEO18_013	GEO18_03	GEO2018	Geographe	VI	09/02/2018	115,32709	-33,51888	115,33593	-33,50720	10:23	12:28
GEO18_014	GEO18_03	GEO2018	Geographe	VI	09/02/2018	115,32884	-33,51707	115,33754	-33,50550	10:26	12:31
GEO18_015	GEO18_03	GEO2018	Geographe	VI	09/02/2018	115,33055	-33,51500	115,33868	-33,50349	10:29	12:34
GEO18_016	GEO18_04	GEO2018	Geographe	VI	09/02/2018	115,26836	-33,57230	115,27903	-33,56392	10:44	12:52

GEO18_017	GEO18_04	GEO2018	Geographe	VI	09/02/2018	115,27023	-33,57033	115,28076	-33,56179	10:52	12:55
GEO18_018	GEO18_04	GEO2018	Geographe	VI	09/02/2018	115,27163	-33,56857	115,28189	-33,56023	10:55	12:58
GEO18_019	GEO18_04	GEO2018	Geographe	VI	09/02/2018	115,27291	-33,56702	115,28281	-33,55881	10:58	13:01
GEO18_020	GEO18_04	GEO2018	Geographe	VI	09/02/2018	115,27454	-33,56530	115,28425	-33,55730	11:01	13:05
GEO18_021	GEO18_05	GEO2018	Geographe	VI	10/02/2018	115,05753	-33,35449	115,05841	-33,35229	06:53	08:55
GEO18_022	GEO18_05	GEO2018	Geographe	VI	10/02/2018	115,05565	-33,35276	115,05580	-33,34760	06:57	08:59
GEO18_023	GEO18_05	GEO2018	Geographe	No	10/02/2018	115,05435	-33,35155	115,05461	-33,34697	07:03	09:03
GEO18_024	GEO18_05	GEO2018	Geographe	No	10/02/2018	115,05216	-33,35057	115,05309	-33,34580	07:06	09:06
GEO18_025	GEO18_05	GEO2018	Geographe	No	10/02/2018	115,04997	-33,34945	115,05152	-33,34454	07:09	09:09
GEO18_026	GEO18_06	GEO2018	Geographe	VI	10/02/2018	115,11921	-33,39012	115,11940	-33,38511	07:30	09:30
GEO18_027	GEO18_06	GEO2018	Geographe	VI	10/02/2018	115,11701	-33,38851	115,11657	-33,38404	07:34	09:34
GEO18_028	GEO18_06	GEO2018	Geographe	VI	10/02/2018	115,11486	-33,38704	115,11373	-33,38296	07:36	09:36
GEO18_029	GEO18_06	GEO2018	Geographe	VI	10/02/2018	115,11283	-33,38559	115,11090	-33,38189	07:38	09:39
GEO18_030	GEO18_06	GEO2018	Geographe	VI	10/02/2018	115,11096	-33,38435	115,10806	-33,38081	07:40	09:42
GEO18_031	GEO18_07	GEO2018	Geographe	VI	10/02/2018	115,19424	-33,40700	115,19420	-33,40131	10:07	12:10
GEO18_032	GEO18_07	GEO2018	Geographe	VI	10/02/2018	115,19247	-33,40563	115,19192	-33,40032	10:09	12:12
GEO18_033	GEO18_07	GEO2018	Geographe	VI	10/02/2018	115,19039	-33,40429	115,19037	-33,39909	10:13	12:15
GEO18_034	GEO18_07	GEO2018	Geographe	VI	10/02/2018	115,18866	-33,40280	115,18902	-33,39757	10:15	12:17
GEO18_035	GEO18_07	GEO2018	Geographe	VI	10/02/2018	115,18721	-33,40117	115,18823	-33,39631	10:18	12:22
GEO18_036	GEO18_08	GEO2018	Geographe	VI	10/02/2018	115,21879	-33,39288	115,21865	-33,38906	10:28	12:35
GEO18_037	GEO18_08	GEO2018	Geographe	VI	10/02/2018	115,21684	-33,39126	115,21717	-33,38728	10:31	12:37
GEO18_038	GEO18_08	GEO2018	Geographe	VI	10/02/2018	115,21518	-33,38978	115,21627	-33,38578	10:33	12:40
GEO18_039	GEO18_08	GEO2018	Geographe	VI	10/02/2018	115,21408	-33,38865	115,21546	-33,38448	10:35	12:43
GEO18_040	GEO18_08	GEO2018	Geographe	VI	10/02/2018	115,21277	-33,38712	115,21543	-33,38303	10:37	12:45
GEO18_041	GEO18_09	GEO2018	Geographe	VI	10/02/2018	115,27310	-33,41838	115,28351	-33,41388	12:53	14:53
GEO18_042	GEO18_09	GEO2018	Geographe	VI	10/02/2018	115,27418	-33,41662	115,28568	-33,41243	12:55	14:56
GEO18_043	GEO18_09	GEO2018	Geographe	VI	10/02/2018	115,27545	-33,41523	115,28711	-33,41121	12:59	14:00
GEO18_044	GEO18_09	GEO2018	Geographe	VI	10/02/2018	115,27714	-33,41378	115,28858	-33,40991	13:02	15:03
GEO18_045	GEO18_09	GEO2018	Geographe	VI	10/02/2018	115,27927	-33,41245	115,29046	-33,40897	13:04	15:05
GEO18_046	GEO18_10	GEO2018	Geographe	VI	10/02/2018	115,21977	-33,44182	115,23375	-33,43630	13:13	15:15
GEO18_047	GEO18_10	GEO2018	Geographe	VI	10/02/2018	115,22198	-33,44007	115,23587	-33,43469	13:15	15:17
GEO18_048	GEO18_10	GEO2018	Geographe	VI	10/02/2018	115,22394	-33,43857	115,23780	-33,43312	13:18	15:19

GEO18_049	GEO18_10	GEO2018	Geographe	VI	10/02/2018	115,22607	-33,43716	115,23967	-33,43203	13:20	15:22
GEO18_050	GEO18_10	GEO2018	Geographe	VI	10/02/2018	115,22790	-33,43567	115,24187	-33,43130	13:23	15:30
GEO18_051	GEO18_11	GEO2018	Geographe	VI	11/02/2018	115,13991	-33,45873	115,13902	-33,45369	06:42	08:46
GEO18_052	GEO18_11	GEO2018	Geographe	VI	11/02/2018	115,13847	-33,45682	115,13805	-33,45195	06:45	08:49
GEO18_053	GEO18_11	GEO2018	Geographe	VI	11/02/2018	115,13729	-33,45503	115,13719	-33,45021	06:48	08:51
GEO18_054	GEO18_11	GEO2018	Geographe	VI	11/02/2018	115,13622	-33,45314	115,13564	-33,44860	06:50	08:54
GEO18_055	GEO18_11	GEO2018	Geographe	VI	11/02/2018	115,13508	-33,45132	115,13486	-33,44772	06:53	08:58
GEO18_056	GEO18_12	GEO2018	Geographe	VI	11/02/2018	115,15891	-33,50269	115,15619	-33,49810	07:11	09:13
GEO18_057	GEO18_12	GEO2018	Geographe	VI	11/02/2018	115,15758	-33,50056	115,15570	-33,49622	07:14	09:15
GEO18_058	GEO18_12	GEO2018	Geographe	VI	11/02/2018	115,15642	-33,49870	115,15406	-33,49418	07:16	09:17
GEO18_059	GEO18_12	GEO2018	Geographe	VI	11/02/2018	115,15552	-33,49732	115,15367	-33,49311	07:19	09:21
GEO18_060	GEO18_12	GEO2018	Geographe	VI	11/02/2018	115,15485	-33,49571	115,15285	-33,49177	07:22	09:23
GEO18_061	GEO18_13	GEO2018	Geographe	VI	11/02/2018	115,06425	-33,48852	115,06329	-33,48701	09:50	11:51
GEO18_062	GEO18_13	GEO2018	Geographe	VI	11/02/2018	115,06228	-33,48741	115,06148	-33,48577	09:52	11:54
GEO18_063	GEO18_13	GEO2018	Geographe	VI	11/02/2018	115,06077	-33,48671	115,05991	-33,48457	09:54	11:56
GEO18_064	GEO18_13	GEO2018	Geographe	VI	11/02/2018	115,05869	-33,48592	115,05856	-33,48346	09:57	11:59
GEO18_065	GEO18_13	GEO2018	Geographe	VI	11/02/2018	115,05686	-33,48470	115,05761	-33,48228	10:01	12:02
GEO18_066	GEO18_14	GEO2018	Geographe	VI	11/02/2018	115,12295	-33,52329	115,11748	-33,51938	10:17	12:19
GEO18_067	GEO18_14	GEO2018	Geographe	VI	11/02/2018	115,12083	-33,52182	115,11574	-33,51789	10:20	12:21
GEO18_068	GEO18_14	GEO2018	Geographe	VI	11/02/2018	115,11921	-33,52092	115,11431	-33,51647	10:23	12:23
GEO18_069	GEO18_14	GEO2018	Geographe	VI	11/02/2018	115,11773	-33,51842	115,11240	-33,51434	10:26	12:27
GEO18_070	GEO18_14	GEO2018	Geographe	VI	11/02/2018	115,11626	-33,51687	115,11150	-33,51358	10:28	12:31
GEO18_071	GEO18_15	GEO2018	Geographe	VI	12/02/2018	115,38642	-33,50648	115,38279	-33,50262	07:13	09:15
GEO18_072	GEO18_15	GEO2018	Geographe	VI	12/02/2018	115,38581	-33,50444	115,38195	-33,50103	07:15	09:18
GEO18_073	GEO18_15	GEO2018	Geographe	VI	12/02/2018	115,38541	-33,50238	115,38110	-33,49947	07:17	09:22
GEO18_074	GEO18_15	GEO2018	Geographe	VI	12/02/2018	115,38525	-33,50018	115,38050	-33,49749	07:19	09:27
GEO18_075	GEO18_15	GEO2018	Geographe	VI	12/02/2018	115,38467	-33,49775	115,37897	-33,49600	07:21	09:36
GEO18_076	GEO18_16	GEO2018	Geographe	VI	12/02/2018	115,37421	-33,47090	115,36928	-33,46729	07:31	09:43
GEO18_077	GEO18_16	GEO2018	Geographe	VI	12/02/2018	115,37353	-33,46882	115,36843	-33,46555	07:33	09:45
GEO18_078	GEO18_16	GEO2018	Geographe	VI	12/02/2018	115,37283	-33,46697	115,36750	-33,46389	07:36	09:47
GEO18_079	GEO18_16	GEO2018	Geographe	VI	12/02/2018	115,37199	-33,46555	115,36669	-33,46283	07:38	09:49
GEO18_080	GEO18_16	GEO2018	Geographe	VI	12/02/2018	115,37095	-33,46397	115,36559	-33,46195	07:40	09:52

GEO18_081	GEO18_17	GEO2018	Geographe	VI	12/02/2018	115,37145	-33,42183	115,37009	-33,41849	10:07	12:10
GEO18_082	GEO18_17	GEO2018	Geographe	VI	12/02/2018	115,37195	-33,42341	115,36878	-33,41728	10:09	12:13
GEO18_083	GEO18_17	GEO2018	Geographe	VI	12/02/2018	115,37245	-33,42499	115,36768	-33,41651	10:11	12:15
GEO18_084	GEO18_17	GEO2018	Geographe	VI	12/02/2018	115,37295	-33,42657	115,36649	-33,41532	10:13	12:17
GEO18_085	GEO18_17	GEO2018	Geographe	VI	12/02/2018	115,37447	-33,42815	115,36621	-33,41391	10:16	12:19
GEO18_086	GEO18_18	GEO2018	Geographe	VI	12/02/2018	115,45459	-33,43621	115,45329	-33,43276	10:28	12:29
GEO18_087	GEO18_18	GEO2018	Geographe	VI	12/02/2018	115,45247	-33,43459	115,45197	-33,43167	10:31	12:31
GEO18_088	GEO18_18	GEO2018	Geographe	VI	12/02/2018	115,44994	-33,43366	115,45051	-33,43092	10:33	12:34
GEO18_089	GEO18_18	GEO2018	Geographe	VI	12/02/2018	115,44743	-33,43282	115,44859	-33,43025	10:35	12:37
GEO18_090	GEO18_18	GEO2018	Geographe	VI	12/02/2018	115,44523	-33,43233	115,44811	-33,42911	10:37	12:40
GEO18_091	GEO18_19	GEO2018	Geographe	VI	13/02/2018	115,35188	-33,38441	115,35395	-33,37870	06:53	08:55
GEO18_092	GEO18_19	GEO2018	Geographe	VI	13/02/2018	115,35227	-33,38239	115,35419	-33,37702	06:55	08:59
GEO18_093	GEO18_19	GEO2018	Geographe	VI	13/02/2018	115,35305	-33,38027	115,35502	-33,37494	06:58	09:02
GEO18_094	GEO18_19	GEO2018	Geographe	VI	13/02/2018	115,35419	-33,37840	115,35546	-33,37313	07:00	09:04
GEO18_095	GEO18_19	GEO2018	Geographe	VI	13/02/2018	115,35566	-33,37664	115,35658	-33,37172	07:03	09:06
GEO18_096	GEO18_20	GEO2018	Geographe	VI	13/02/2018	115,40732	-33,38555	115,41059	-33,37818	07:13	09:17
GEO18_097	GEO18_20	GEO2018	Geographe	VI	13/02/2018	115,40816	-33,38327	115,41112	-33,37614	07:15	09:19
GEO18_098	GEO18_20	GEO2018	Geographe	VI	13/02/2018	115,40911	-33,38129	115,41159	-33,37394	07:17	09:21
GEO18_099	GEO18_20	GEO2018	Geographe	VI	13/02/2018	115,40952	-33,37972	115,41210	-33,37298	07:20	09:23
GEO18_100	GEO18_20	GEO2018	Geographe	VI	13/02/2018	115,41032	-33,37786	115,41270	-33,37156	07:23	09:25
GEO19_001	GEO19_01	GEO2019	Geographe	VI	07/03/2019	115,30108	-33,38424	115,29407	-33,39155	06:28	08:28
GEO19_002	GEO19_01	GEO2019	Geographe	VI	07/03/2019	115,29962	-33,38633	115,29248	-33,39338	06:30	08:30
GEO19_003	GEO19_01	GEO2019	Geographe	VI	07/03/2019	115,29814	-33,38800	115,29107	-33,39491	06:32	08:32
GEO19_004	GEO19_01	GEO2019	Geographe	VI	07/03/2019	115,29629	-33,38968	115,28952	-33,39644	06:34	08:34
GEO19_005	GEO19_01	GEO2019	Geographe	VI	07/03/2019	115,29470	-33,39129	115,28815	-33,39787	06:36	08:36
GEO19_006	GEO19_02	GEO2019	Geographe	VI	07/03/2019	115,23669	-33,38415	115,22707	-33,39212	06:42	08:45
GEO19_007	GEO19_02	GEO2019	Geographe	VI	07/03/2019	115,23433	-33,38390	115,22512	-33,39271	06:44	08:47
GEO19_008	GEO19_02	GEO2019	Geographe	VI	07/03/2019	115,23187	-33,38405	115,22324	-33,39266	06:46	08:49
GEO19_010	GEO19_02	GEO2019	Geographe	VI	07/03/2019	115,22750	-33,38354	115,22020	-33,39281	06:50	08:53
GEO19_011	GEO19_03	GEO2019	Geographe	VI	07/03/2019	115,18879	-33,36997	115,17986	-33,38102	09:17	11:20
GEO19_012	GEO19_03	GEO2019	Geographe	VI	07/03/2019	115,18600	-33,36928	115,17850	-33,38168	09:19	11:22
GEO19_013	GEO19_03	GEO2019	Geographe	VI	07/03/2019	115,18406	-33,36898	115,17697	-33,38156	09:21	11:24

GEO19_014	GEO19_03	GEO2019	Geographe	VI	07/03/2019	115,18171	-33,36850	115,17510	-33,38126	09:23	11:26
GEO19_015	GEO19_03	GEO2019	Geographe	VI	07/03/2019	115,17957	-33,36780	115,17407	-33,38041	09:25	11:28
GEO19_016	GEO19_04	GEO2019	Geographe	VI	07/03/2019	115,12498	-33,37000	115,11739	-33,38097	09:30	11:35
GEO19_017	GEO19_04	GEO2019	Geographe	VI	07/03/2019	115,12312	-33,37171	115,11635	-33,38261	09:33	11:37
GEO19_018	GEO19_04	GEO2019	Geographe	VI	07/03/2019	115,12243	-33,37415	115,11542	-33,38427	09:36	11:39
GEO19_019	GEO19_04	GEO2019	Geographe	VI	07/03/2019	115,12244	-33,37633	115,11499	-33,38603	09:39	11:41
GEO19_020	GEO19_04	GEO2019	Geographe	VI	07/03/2019	115,12228	-33,37881	115,11464	-33,38760	09:42	11:43
GEO19_021	GEO19_05	GEO2019	Geographe	VI	07/03/2019	115,10709	-33,40831	115,09986	-33,41969	11:54	13:58
GEO19_022	GEO19_05	GEO2019	Geographe	VI	07/03/2019	115,10681	-33,41060	115,09991	-33,42154	11:56	14:00
GEO19_023	GEO19_05	GEO2019	Geographe	VI	07/03/2019	115,10562	-33,41243	115,09928	-33,42333	11:58	14:02
GEO19_024	GEO19_05	GEO2019	Geographe	VI	07/03/2019	115,10395	-33,41417	115,09806	-33,42488	12:00	14:04
GEO19_025	GEO19_05	GEO2019	Geographe	VI	07/03/2019	115,10230	-33,41584	115,09626	-33,42584	12:02	14:06
GEO19_026	GEO19_06	GEO2019	Geographe	VI	07/03/2019	115,17237	-33,40982	115,16632	-33,42086	12:09	14:15
GEO19_027	GEO19_06	GEO2019	Geographe	VI	07/03/2019	115,17158	-33,41201	115,16663	-33,42250	12:11	14:17
GEO19_028	GEO19_06	GEO2019	Geographe	VI	07/03/2019	115,17071	-33,41393	115,16599	-33,42425	12:13	14:19
GEO19_029	GEO19_06	GEO2019	Geographe	VI	07/03/2019	115,16974	-33,41545	115,16538	-33,42538	12:15	14:21
GEO19_030	GEO19_06	GEO2019	Geographe	VI	07/03/2019	115,16856	-33,41741	115,16399	-33,42631	12:17	14:23
GEO19_031	GEO19_07	GEO2019	Geographe	VI	08/03/2019	115,10544	-33,49044	115,09374	-33,48764	06:03	08:03
GEO19_032	GEO19_07	GEO2019	Geographe	VI	08/03/2019	115,10415	-33,48943	115,09210	-33,48634	06:09	08:09
GEO19_033	GEO19_07	GEO2019	Geographe	VI	08/03/2019	115,10280	-33,48817	115,09058	-33,48549	06:11	08:11
GEO19_034	GEO19_07	GEO2019	Geographe	VI	08/03/2019	115,10111	-33,48676	115,08894	-33,48411	06:13	08:13
GEO19_035	GEO19_07	GEO2019	Geographe	VI	08/03/2019	115,09940	-33,48518	115,08724	-33,48266	06:15	08:15
GEO19_036	GEO19_08	GEO2019	Geographe	VI	08/03/2019	115,17100	-33,46411	115,15847	-33,46247	06:26	08:30
GEO19_037	GEO19_08	GEO2019	Geographe	VI	08/03/2019	115,16872	-33,46232	115,15646	-33,46160	06:28	08:32
GEO19_038	GEO19_08	GEO2019	Geographe	VI	08/03/2019	115,16643	-33,46106	115,15440	-33,46063	06:31	08:34
GEO19_039	GEO19_08	GEO2019	Geographe	VI	08/03/2019	115,16451	-33,45974	115,15300	-33,45922	06:33	08:36
GEO19_040	GEO19_08	GEO2019	Geographe	VI	08/03/2019	115,16285	-33,45818	115,15100	-33,45800	06:35	08:45
GEO19_041	GEO19_09	GEO2019	Geographe	VI	08/03/2019	115,23327	-33,48452	115,22008	-33,48595	09:06	11:06
GEO19_042	GEO19_09	GEO2019	Geographe	VI	08/03/2019	115,23119	-33,48323	115,21823	-33,48478	09:09	11:09
GEO19_043	GEO19_09	GEO2019	Geographe	VI	08/03/2019	115,22977	-33,48163	115,21708	-33,48345	09:11	11:11
GEO19_044	GEO19_09	GEO2019	Geographe	VI	08/03/2019	115,22842	-33,47985	115,21603	-33,48171	09:13	11:13
GEO19_045	GEO19_09	GEO2019	Geographe	VI	08/03/2019	115,22697	-33,47813	115,21466	-33,48031	09:15	11:15

GEO19_046	GEO19_10	GEO2019	Geographe	VI	08/03/2019	115,26629	-33,51991	115,25254	-33,51983	09:25	11:30
GEO19_047	GEO19_10	GEO2019	Geographe	VI	08/03/2019	115,26464	-33,51799	115,25110	-33,51856	09:27	11:32
GEO19_048	GEO19_10	GEO2019	Geographe	VI	08/03/2019	115,26322	-33,51632	115,24979	-33,51708	09:29	11:34
GEO19_050	GEO19_10	GEO2019	Geographe	VI	08/03/2019	115,26081	-33,51345	115,24807	-33,51445	09:33	11:38
GEO19_051	GEO19_11	GEO2019	Geographe	VI	08/03/2019	115,29936	-33,48361	115,28818	-33,48548	11:48	13:48
GEO19_052	GEO19_11	GEO2019	Geographe	VI	08/03/2019	115,29734	-33,48243	115,28660	-33,48450	11:50	13:50
GEO19_053	GEO19_11	GEO2019	Geographe	VI	08/03/2019	115,29574	-33,48153	115,28530	-33,48350	11:52	13:52
GEO19_054	GEO19_11	GEO2019	Geographe	VI	08/03/2019	115,29418	-33,48010	115,28394	-33,48223	11:54	13:54
GEO19_055	GEO19_11	GEO2019	Geographe	VI	08/03/2019	115,29277	-33,47844	115,28260	-33,48065	11:56	13:56
GEO19_056	GEO19_12	GEO2019	Geographe	VI	08/03/2019	115,29855	-33,52127	115,28499	-33,52224	12:03	14:08
GEO19_057	GEO19_12	GEO2019	Geographe	VI	08/03/2019	115,29634	-33,51985	115,28294	-33,52132	12:05	14:10
GEO19_058	GEO19_12	GEO2019	Geographe	VI	08/03/2019	115,29447	-33,51832	115,28139	-33,52028	12:07	14:12
GEO19_059	GEO19_12	GEO2019	Geographe	VI	08/03/2019	115,29275	-33,51696	115,27974	-33,51899	12:09	14:14
GEO19_060	GEO19_12	GEO2019	Geographe	VI	08/03/2019	115,29116	-33,51525	115,27888	-33,51784	12:11	14:16
GEO19_061	GEO19_13	GEO2019	Geographe	VI	09/03/2019	115,34686	-33,56752	115,34448	-33,56716	06:23	08:23
GEO19_062	GEO19_13	GEO2019	Geographe	VI	09/03/2019	115,34691	-33,56524	115,34408	-33,56583	06:26	08:26
GEO19_063	GEO19_13	GEO2019	Geographe	VI	09/03/2019	115,34687	-33,56334	115,34401	-33,56420	06:29	08:29
GEO19_064	GEO19_13	GEO2019	Geographe	VI	09/03/2019	115,34688	-33,56115	115,34428	-33,56264	06:31	08:31
GEO19_065	GEO19_13	GEO2019	Geographe	VI	09/03/2019	115,34678	-33,55907	115,34479	-33,56088	06:33	08:34
GEO19_066	GEO19_14	GEO2019	Geographe	II	09/03/2019	115,37523	-33,55695	115,37258	-33,55747	06:37	08:41
GEO19_067	GEO19_14	GEO2019	Geographe	II	09/03/2019	115,37497	-33,55481	115,37241	-33,55612	06:40	08:43
GEO19_068	GEO19_14	GEO2019	Geographe	II	09/03/2019	115,37475	-33,55293	115,37224	-33,55459	06:42	08:45
GEO19_069	GEO19_14	GEO2019	Geographe	II	09/03/2019	115,37447	-33,55136	115,37194	-33,55334	06:44	08:47
GEO19_070	GEO19_14	GEO2019	Geographe	II	09/03/2019	115,37413	-33,54963	115,37215	-33,55203	06:45	08:50
GEO19_071	GEO19_15	GEO2019	Geographe	II	09/03/2019	115,39514	-33,54859	115,39496	-33,55184	08:58	10:59
GEO19_072	GEO19_15	GEO2019	Geographe	II	09/03/2019	115,39732	-33,54806	115,39676	-33,55199	09:00	11:01
GEO19_073	GEO19_15	GEO2019	Geographe	II	09/03/2019	115,39917	-33,54731	115,39807	-33,55147	09:02	11:03
GEO19_074	GEO19_15	GEO2019	Geographe	II	09/03/2019	115,40117	-33,54655	115,39989	-33,55105	09:04	11:05
GEO19_075	GEO19_15	GEO2019	Geographe	II	09/03/2019	115,40331	-33,54574	115,40158	-33,55053	09:06	11:07
GEO19_076	GEO19_16	GEO2019	Geographe	II	09/03/2019	115,38035	-33,53582	115,37948	-33,54052	09:12	11:20
GEO19_077	GEO19_16	GEO2019	Geographe	II	09/03/2019	115,38235	-33,53737	115,38093	-33,54166	09:14	11:22
GEO19_078	GEO19_16	GEO2019	Geographe	II	09/03/2019	115,38423	-33,53893	115,38262	-33,54298	09:16	11:24

GEO19_079	GEO19_16	GEO2019	Geographe	II	09/03/2019	115,38602	-33,54033	115,38405	-33,54419	09:19	11:26
GEO19_080	GEO19_16	GEO2019	Geographe	II	09/03/2019	115,38784	-33,54175	115,38562	-33,54561	09:20	11:28
GEO19_081	GEO19_17	GEO2019	Geographe	VI	10/03/2019	115,16884	-33,51789	115,16378	-33,51516	06:07	08:07
GEO19_083	GEO19_17	GEO2019	Geographe	VI	10/03/2019	115,16658	-33,51401	115,16183	-33,51162	06:11	08:11
GEO19_084	GEO19_17	GEO2019	Geographe	VI	10/03/2019	115,16554	-33,51201	115,16053	-33,50990	06:13	08:13
GEO19_085	GEO19_17	GEO2019	Geographe	VI	10/03/2019	115,16474	-33,51009	115,15961	-33,50823	06:15	08:15
GEO19_086	GEO19_18	GEO2019	Geographe	IV	10/03/2019	115,21871	-33,54754	115,21521	-33,54523	06:25	08:30
GEO19_087	GEO19_18	GEO2019	Geographe	IV	10/03/2019	115,21692	-33,54596	115,21399	-33,54366	06:27	08:32
GEO19_088	GEO19_18	GEO2019	Geographe	IV	10/03/2019	115,21529	-33,54450	115,21256	-33,54249	06:29	08:34
GEO19_089	GEO19_18	GEO2019	Geographe	IV	10/03/2019	115,21433	-33,54317	115,21181	-33,54133	06:31	08:36
GEO19_090	GEO19_18	GEO2019	Geographe	IV	10/03/2019	115,21327	-33,54153	115,21062	-33,53993	06:33	08:38
GEO19_091	GEO19_19	GEO2019	Geographe	IV	10/03/2019	115,22130	-33,57521	115,21797	-33,57221	08:50	10:50
GEO19_092	GEO19_19	GEO2019	Geographe	IV	10/03/2019	115,22050	-33,57335	115,21700	-33,57082	08:52	10:53
GEO19_093	GEO19_19	GEO2019	Geographe	IV	10/03/2019	115,21972	-33,57197	115,21614	-33,56946	08:54	10:56
GEO19_094	GEO19_19	GEO2019	Geographe	IV	10/03/2019	115,21896	-33,57014	115,21532	-33,56794	08:56	10:59
GEO19_095	GEO19_19	GEO2019	Geographe	IV	10/03/2019	115,21810	-33,56817	115,21441	-33,56627	08:58	11:02
GEO19_096	GEO19_20	GEO2019	Geographe	IV	10/03/2019	115,22440	-33,59346	115,22065	-33,59027	09:03	11:08
GEO19_097	GEO19_20	GEO2019	Geographe	IV	10/03/2019	115,22345	-33,59135	115,22007	-33,58861	09:06	11:11
GEO19_098	GEO19_20	GEO2019	Geographe	IV	10/03/2019	115,22247	-33,58931	115,21931	-33,58678	09:09	11:14
GEO19_099	GEO19_20	GEO2019	Geographe	IV	10/03/2019	115,22179	-33,58741	115,21854	-33,58516	09:11	11:17
GEO19_100	GEO19_20	GEO2019	Geographe	IV	10/03/2019	115,22105	-33,58547	115,21781	-33,58334	09:13	11:20
GEO20_001	GEO20_01	GEO2020	Geographe	II	22/03/2020	115,39613	-33,53442	115,38370	-33,53803	08:09	10:11
GEO20_002	GEO20_01	GEO2020	Geographe	II	22/03/2020	115,39375	-33,53449	115,38132	-33,53800	08:11	10:15
GEO20_003	GEO20_01	GEO2020	Geographe	II	22/03/2020	115,39152	-33,53450	115,37928	-33,53807	08:15	10:18
GEO20_004	GEO20_01	GEO2020	Geographe	II	22/03/2020	115,38871	-33,53445	115,37694	-33,53808	08:18	10:21
GEO20_005	GEO20_01	GEO2020	Geographe	II	22/03/2020	115,38621	-33,53429	115,37447	-33,53785	08:21	10:24
GEO20_006	GEO20_02	GEO2020	Geographe	VI	22/03/2020	115,38028	-33,53127	115,36948	-33,53362	08:30	10:36
GEO20_007	GEO20_02	GEO2020	Geographe	VI	22/03/2020	115,37715	-33,53126	115,36661	-33,53420	08:34	10:41
GEO20_008	GEO20_02	GEO2020	Geographe	VI	22/03/2020	115,37470	-33,53117	115,36407	-33,53420	08:36	10:45
GEO20_009	GEO20_02	GEO2020	Geographe	VI	22/03/2020	115,37257	-33,53096	115,36154	-33,53405	08:38	10:49
GEO20_010	GEO20_02	GEO2020	Geographe	VI	22/03/2020	115,36999	-33,53118	115,35899	-33,53407	08:41	10:53
GEO20_011	GEO20_03	GEO2020	Geographe	II	22/03/2020	115,37903	-33,55434	115,36772	-33,55831	11:06	13:06

GEO20_012	GEO20_03	GEO2020	Geographe	II	22/03/2020	115,37678	-33,55540	115,36559	-33,55894	11:09	13:08
GEO20_013	GEO20_03	GEO2020	Geographe	II	22/03/2020	115,37478	-33,55646	115,36350	-33,55974	11:12	13:12
GEO20_014	GEO20_03	GEO2020	Geographe	II	22/03/2020	115,37268	-33,55758	115,36136	-33,56072	11:14	13:15
GEO20_015	GEO20_03	GEO2020	Geographe	II	22/03/2020	115,37034	-33,55854	115,35912	-33,56153	11:17	13:19
GEO20_016	GEO20_04	GEO2020	Geographe	VI	22/03/2020	115,34754	-33,56988	115,33680	-33,57323	11:27	13:25
GEO20_017	GEO20_04	GEO2020	Geographe	VI	22/03/2020	115,34566	-33,57059	115,33487	-33,57381	11:29	13:28
GEO20_018	GEO20_04	GEO2020	Geographe	VI	22/03/2020	115,34346	-33,57152	115,33251	-33,57470	11:32	13:33
GEO20_019	GEO20_04	GEO2020	Geographe	VI	22/03/2020	115,34112	-33,57241	115,32988	-33,57513	11:35	13:38
GEO20_020	GEO20_04	GEO2020	Geographe	VI	22/03/2020	115,33853	-33,57340	115,32796	-33,57583	11:38	13:43
GEO20_021	GEO20_05	GEO2020	Geographe	VI	23/03/2020	115,37526	-33,40508	115,36869	-33,40979	08:09	10:01
GEO20_022	GEO20_05	GEO2020	Geographe	VI	23/03/2020	115,37295	-33,40497	115,36659	-33,40993	08:12	10:14
GEO20_023	GEO20_05	GEO2020	Geographe	VI	23/03/2020	115,37108	-33,40527	115,36476	-33,41032	08:14	10:16
GEO20_024	GEO20_05	GEO2020	Geographe	VI	23/03/2020	115,36789	-33,40604	115,36240	-33,41057	08:22	10:02
GEO20_025	GEO20_05	GEO2020	Geographe	VI	23/03/2020	115,36581	-33,40643	115,36013	-33,41061	08:25	10:23
GEO20_026	GEO20_06	GEO2020	Geographe	VI	23/03/2020	115,31825	-33,39997	115,31188	-33,40467	08:37	10:36
GEO20_027	GEO20_06	GEO2020	Geographe	VI	23/03/2020	115,31599	-33,40047	115,30965	-33,40523	08:04	10:04
GEO20_028	GEO20_06	GEO2020	Geographe	VI	23/03/2020	115,31362	-33,40086	115,30739	-33,40564	08:42	10:44
GEO20_029	GEO20_06	GEO2020	Geographe	VI	23/03/2020	115,31131	-33,40151	115,30494	-33,40611	08:45	10:05
GEO20_030	GEO20_06	GEO2020	Geographe	VI	23/03/2020	115,30893	-33,40204	115,30265	-33,40674	08:48	10:55
GEO20_031	GEO20_07	GEO2020	Geographe	VI	23/03/2020	115,30894	-33,45005	115,30311	-33,45468	11:07	13:09
GEO20_032	GEO20_07	GEO2020	Geographe	VI	23/03/2020	115,30685	-33,45105	115,30161	-33,45517	11:11	13:11
GEO20_033	GEO20_07	GEO2020	Geographe	VI	23/03/2020	115,30449	-33,45169	115,29969	-33,45586	11:14	13:14
GEO20_034	GEO20_07	GEO2020	Geographe	VI	23/03/2020	115,30241	-33,45277	115,29779	-33,45670	11:16	13:18
GEO20_035	GEO20_07	GEO2020	Geographe	VI	23/03/2020	115,30028	-33,45386	115,29597	-33,45752	11:19	13:21
GEO20_036	GEO20_08	GEO2020	Geographe	VI	23/03/2020	115,25936	-33,45509	115,25323	-33,45893	11:03	13:03
GEO20_037	GEO20_08	GEO2020	Geographe	VI	23/03/2020	115,25717	-33,45577	115,25143	-33,45947	11:32	13:34
GEO20_038	GEO20_08	GEO2020	Geographe	VI	23/03/2020	115,25483	-33,45638	115,24925	-33,45998	11:34	13:38
GEO20_039	GEO20_08	GEO2020	Geographe	VI	23/03/2020	115,25229	-33,45704	115,24714	-33,46039	11:36	13:43
GEO20_040	GEO20_08	GEO2020	Geographe	VI	23/03/2020	115,25007	-33,45783	115,24535	-33,46113	11:39	13:48
GEO20_041	GEO20_09	GEO2020	Geographe	VI	24/03/2020	115,21456	-33,36808	115,20698	-33,37447	07:29	09:30
GEO20_042	GEO20_09	GEO2020	Geographe	VI	24/03/2020	115,21191	-33,36889	115,20461	-33,37499	07:32	09:35
GEO20_043	GEO20_09	GEO2020	Geographe	VI	24/03/2020	115,20974	-33,36966	115,20252	-33,37577	07:35	09:38

GEO20_044	GEO20_09	GEO2020	Geographe	VI	24/03/2020	115,20757	-33,37053	115,20047	-33,37678	07:37	09:41
GEO20_045	GEO20_09	GEO2020	Geographe	VI	24/03/2020	115,20599	-33,37132	115,19881	-33,37739	07:39	09:44
GEO20_046	GEO20_10	GEO2020	Geographe	VI	24/03/2020	115,18389	-33,38399	115,17562	-33,39049	07:47	09:51
GEO20_047	GEO20_10	GEO2020	Geographe	VI	24/03/2020	115,18170	-33,38524	115,17342	-33,39142	07:50	09:55
GEO20_048	GEO20_10	GEO2020	Geographe	VI	24/03/2020	115,17952	-33,38646	115,17142	-33,39270	07:52	10:01
GEO20_049	GEO20_10	GEO2020	Geographe	VI	24/03/2020	115,17794	-33,38764	115,16957	-33,39404	07:54	10:06
GEO20_050	GEO20_10	GEO2020	Geographe	VI	24/03/2020	115,17578	-33,38900	115,16748	-33,39512	07:57	10:12
GEO20_051	GEO20_11	GEO2020	Geographe	VI	24/03/2020	115,09961	-33,36803	115,08780	-33,37547	10:28	12:31
GEO20_052	GEO20_11	GEO2020	Geographe	VI	24/03/2020	115,09761	-33,36921	115,08560	-33,37620	10:31	12:35
GEO20_053	GEO20_11	GEO2020	Geographe	VI	24/03/2020	115,09613	-33,37084	115,08390	-33,37752	10:32	12:38
GEO20_054	GEO20_11	GEO2020	Geographe	VI	24/03/2020	115,09463	-33,37246	115,08243	-33,37886	10:35	12:41
GEO20_055	GEO20_11	GEO2020	Geographe	VI	24/03/2020	115,09303	-33,37406	115,08111	-33,38010	10:37	12:44
GEO20_056	GEO20_12	GEO2020	Geographe	VI	24/03/2020	115,11267	-33,40578	115,09988	-33,41234	10:48	12:54
GEO20_057	GEO20_12	GEO2020	Geographe	VI	24/03/2020	115,11079	-33,40658	115,09793	-33,41250	10:49	12:57
GEO20_058	GEO20_12	GEO2020	Geographe	VI	24/03/2020	115,10858	-33,40748	115,09529	-33,41316	10:53	13:02
GEO20_059	GEO20_12	GEO2020	Geographe	VI	24/03/2020	115,10626	-33,40867	115,09273	-33,41383	10:55	13:07
GEO20_060	GEO20_12	GEO2020	Geographe	VI	24/03/2020	115,10394	-33,40973	115,09056	-33,41487	10:57	13:12
GEO20_061	GEO20_13	GEO2020	Geographe	IV	25/03/2020	115,22093	-33,56713	115,21325	-33,56772	07:14	09:21
GEO20_062	GEO20_13	GEO2020	Geographe	IV	25/03/2020	115,21821	-33,56716	115,21108	-33,56786	07:21	09:24
GEO20_063	GEO20_13	GEO2020	Geographe	IV	25/03/2020	115,21544	-33,56754	115,20861	-33,56811	07:22	09:26
GEO20_064	GEO20_13	GEO2020	Geographe	IV	25/03/2020	115,21291	-33,56756	115,20670	-33,56830	07:26	09:03
GEO20_065	GEO20_13	GEO2020	Geographe	IV	25/03/2020	115,21078	-33,56770	115,20429	-33,56840	07:28	09:33
GEO20_066	GEO20_14	GEO2020	Geographe	IV	25/03/2020	115,20937	-33,55844	115,20283	-33,55959	07:38	09:39
GEO20_067	GEO20_14	GEO2020	Geographe	IV	25/03/2020	115,20627	-33,55878	115,20033	-33,55971	07:04	09:43
GEO20_068	GEO20_14	GEO2020	Geographe	IV	25/03/2020	115,20422	-33,55889	115,19783	-33,55968	07:42	09:47
GEO20_069	GEO20_14	GEO2020	Geographe	IV	25/03/2020	115,20186	-33,55876	115,19533	-33,55986	07:44	09:53
GEO20_070	GEO20_14	GEO2020	Geographe	IV	25/03/2020	115,19929	-33,55899	115,19282	-33,55990	07:46	09:58
GEO20_071	GEO20_15	GEO2020	Geographe	VI	25/03/2020	115,25266	-33,56624	115,24121	-33,56961	10:15	12:16
GEO20_072	GEO20_15	GEO2020	Geographe	VI	25/03/2020	115,25027	-33,56658	115,23911	-33,57035	10:17	12:22
GEO20_073	GEO20_15	GEO2020	Geographe	VI	25/03/2020	115,24775	-33,56687	115,23659	-33,57078	10:02	12:26
GEO20_074	GEO20_15	GEO2020	Geographe	VI	25/03/2020	115,24505	-33,56722	115,23504	-33,57102	10:22	12:03
GEO20_075	GEO20_15	GEO2020	Geographe	VI	25/03/2020	115,24296	-33,56755	115,23325	-33,57108	10:26	12:33

GEO20_076	GEO20_16	GEO2020	Geographe	VI	25/03/2020	115,27225	-33,53705	115,26173	-33,54381	10:36	12:43
GEO20_077	GEO20_16	GEO2020	Geographe	VI	25/03/2020	115,26998	-33,53798	115,25964	-33,54469	10:38	12:49
GEO20_078	GEO20_16	GEO2020	Geographe	VI	25/03/2020	115,26795	-33,53878	115,25736	-33,54576	10:04	12:54
GEO20_079	GEO20_16	GEO2020	Geographe	VI	25/03/2020	115,26555	-33,53978	115,25537	-33,54654	10:43	12:58
GEO20_080	GEO20_16	GEO2020	Geographe	VI	25/03/2020	115,26340	-33,54064	115,25318	-33,54752	10:45	13:01
GEO20_081	GEO20_17	GEO2020	Geographe	VI	26/03/2020	115,15160	-33,44933	115,14187	-33,45403	07:37	09:37
GEO20_082	GEO20_17	GEO2020	Geographe	VI	26/03/2020	115,14974	-33,44818	115,13972	-33,45310	07:39	09:41
GEO20_083	GEO20_17	GEO2020	Geographe	VI	26/03/2020	115,14740	-33,44735	115,13717	-33,45303	07:41	09:44
GEO20_084	GEO20_17	GEO2020	Geographe	VI	26/03/2020	115,14572	-33,44610	115,13492	-33,45237	07:43	09:48
GEO20_085	GEO20_17	GEO2020	Geographe	VI	26/03/2020	115,14368	-33,44504	115,13287	-33,45117	07:45	09:54
GEO20_086	GEO20_18	GEO2020	Geographe	VI	26/03/2020	115,12309	-33,47740	115,10921	-33,48072	07:57	10:01
GEO20_087	GEO20_18	GEO2020	Geographe	VI	26/03/2020	115,12146	-33,47608	115,10714	-33,48017	07:59	10:05
GEO20_088	GEO20_18	GEO2020	Geographe	VI	26/03/2020	115,12013	-33,47476	115,10577	-33,47922	08:01	10:10
GEO20_089	GEO20_18	GEO2020	Geographe	VI	26/03/2020	115,11794	-33,47363	115,10393	-33,47853	08:05	10:15
GEO20_090	GEO20_18	GEO2020	Geographe	VI	26/03/2020	115,11578	-33,47258	115,10221	-33,47778	08:07	10:20
GEO20_091	GEO20_19	GEO2020	Geographe	VI	26/03/2020	115,21439	-33,51773	115,20097	-33,51682	10:44	12:51
GEO20_092	GEO20_19	GEO2020	Geographe	VI	26/03/2020	115,21355	-33,51597	115,20014	-33,51515	10:47	12:54
GEO20_093	GEO20_19	GEO2020	Geographe	VI	26/03/2020	115,21250	-33,51421	115,19907	-33,51369	10:49	12:57
GEO20_094	GEO20_19	GEO2020	Geographe	VI	26/03/2020	115,21179	-33,51249	115,19807	-33,51210	10:52	13:00
GEO20_095	GEO20_19	GEO2020	Geographe	VI	26/03/2020	115,21081	-33,51069	115,19740	-33,51035	10:55	13:03
GEO20_096	GEO20_20	GEO2020	Geographe	VI	26/03/2020	115,24335	-33,48836	115,22819	-33,49068	11:04	13:11
GEO20_097	GEO20_20	GEO2020	Geographe	VI	26/03/2020	115,24085	-33,48801	115,22594	-33,49024	11:06	13:14
GEO20_098	GEO20_20	GEO2020	Geographe	VI	26/03/2020	115,23903	-33,48756	115,22345	-33,48990	11:08	13:19
GEO20_099	GEO20_20	GEO2020	Geographe	VI	26/03/2020	115,23651	-33,48705	115,22105	-33,48978	11:11	13:23
GEO20_100	GEO20_20	GEO2020	Geographe	VI	26/03/2020	115,23403	-33,48687	115,21894	-33,48902	11:14	13:28
GEO22_002	GEO22_01	GEO2022	Geographe	II	23/02/2022	115,39556	-33,54915	115,39322	-33,54243	08:12	10:13
GEO22_003	GEO22_01	GEO2022	Geographe	II	23/02/2022	115,39404	-33,54773	115,39178	-33,54116	08:14	10:15
GEO22_004	GEO22_01	GEO2022	Geographe	II	23/02/2022	115,39272	-33,54631	115,39064	-33,53952	08:16	10:17
GEO22_005	GEO22_01	GEO2022	Geographe	II	23/02/2022	115,39128	-33,54499	115,38946	-33,53782	08:18	10:19
GEO22_006	GEO22_02	GEO2022	Geographe	II	23/02/2022	115,38173	-33,55933	115,38012	-33,55228	08:41	10:42
GEO22_007	GEO22_02	GEO2022	Geographe	II	23/02/2022	115,38078	-33,55744	115,37869	-33,55092	08:43	10:44
GEO22_008	GEO22_02	GEO2022	Geographe	II	23/02/2022	115,37933	-33,55658	115,37754	-33,55001	08:45	10:46

GEO22_009	GEO22_02	GEO2022	Geographe	II	23/02/2022	115,37776	-33,55522	115,37591	-33,54873	08:47	10:48
GEO22_010	GEO22_02	GEO2022	Geographe	II	23/02/2022	115,37622	-33,55391	115,37464	-33,54770	08:49	10:50
GEO22_011	GEO22_03	GEO2022	Geographe	II	23/02/2022	115,38741	-33,54847	115,38622	-33,54111	11:01	13:02
GEO22_012	GEO22_03	GEO2022	Geographe	II	23/02/2022	115,38615	-33,54672	115,38547	-33,53991	11:03	13:04
GEO22_013	GEO22_03	GEO2022	Geographe	II	23/02/2022	115,38509	-33,54510	115,38422	-33,53850	11:05	13:06
GEO22_014	GEO22_03	GEO2022	Geographe	II	23/02/2022	115,38359	-33,54293	115,38302	-33,53726	11:07	13:08
GEO22_015	GEO22_03	GEO2022	Geographe	II	23/02/2022	115,38280	-33,54191	115,38217	-33,53533	11:09	13:10
GEO22_016	GEO22_04	GEO2022	Geographe	VI	23/02/2022	115,33164	-33,55491	115,33145	-33,54709	11:27	13:34
GEO22_017	GEO22_04	GEO2022	Geographe	VI	23/02/2022	115,33010	-33,55311	115,32996	-33,54615	11:29	13:37
GEO22_018	GEO22_04	GEO2022	Geographe	VI	23/02/2022	115,32876	-33,55211	115,32857	-33,54500	11:31	13:40
GEO22_019	GEO22_04	GEO2022	Geographe	VI	23/02/2022	115,32719	-33,55073	115,32718	-33,54381	11:33	13:43
GEO22_020	GEO22_04	GEO2022	Geographe	VI	23/02/2022	115,32562	-33,54960	115,32579	-33,54242	11:35	13:46
GEO22_021	GEO22_05	GEO2022	Geographe	VI	24/02/2022	115,33148	-33,46675	115,32814	-33,46181	07:55	09:56
GEO22_022	GEO22_05	GEO2022	Geographe	VI	24/02/2022	115,33002	-33,46503	115,32603	-33,46071	07:57	09:58
GEO22_023	GEO22_05	GEO2022	Geographe	VI	24/02/2022	115,32879	-33,46343	115,32449	-33,45974	07:59	10:00
GEO22_024	GEO22_05	GEO2022	Geographe	VI	24/02/2022	115,32732	-33,46199	115,32346	-33,45791	08:01	10:02
GEO22_025	GEO22_05	GEO2022	Geographe	VI	24/02/2022	115,32631	-33,46039	115,32245	-33,45683	08:03	10:04
GEO22_026	GEO22_06	GEO2022	Geographe	VI	24/02/2022	115,33596	-33,41725	115,33200	-33,41208	08:19	10:25
GEO22_027	GEO22_06	GEO2022	Geographe	VI	24/02/2022	115,33469	-33,41602	115,33112	-33,41077	08:21	10:27
GEO22_028	GEO22_06	GEO2022	Geographe	VI	24/02/2022	115,33331	-33,41472	115,32985	-33,40923	08:23	10:29
GEO22_029	GEO22_06	GEO2022	Geographe	VI	24/02/2022	115,33217	-33,41339	115,32849	-33,40794	08:25	10:31
GEO22_030	GEO22_06	GEO2022	Geographe	VI	24/02/2022	115,33053	-33,41185	115,32703	-33,40645	08:27	10:33
GEO22_031	GEO22_07	GEO2022	Geographe	VI	24/02/2022	115,27643	-33,40188	115,27312	-33,39741	10:52	12:54
GEO22_032	GEO22_07	GEO2022	Geographe	VI	24/02/2022	115,27409	-33,40055	115,27073	-33,39574	10:54	12:57
GEO22_033	GEO22_07	GEO2022	Geographe	VI	24/02/2022	115,27259	-33,39942	115,26915	-33,39491	10:56	13:00
GEO22_034	GEO22_07	GEO2022	Geographe	VI	24/02/2022	115,27074	-33,39837	115,26820	-33,39408	10:58	13:03
GEO22_035	GEO22_07	GEO2022	Geographe	VI	24/02/2022	115,26903	-33,39714	115,26661	-33,39325	11:00	13:06
GEO22_036	GEO22_08	GEO2022	Geographe	VI	24/02/2022	115,23076	-33,41367	115,22769	-33,41065	11:10	13:20
GEO22_037	GEO22_08	GEO2022	Geographe	VI	24/02/2022	115,22888	-33,41316	115,22603	-33,40980	11:12	13:23
GEO22_038	GEO22_08	GEO2022	Geographe	VI	24/02/2022	115,22731	-33,41263	115,22428	-33,40908	11:14	13:26
GEO22_039	GEO22_08	GEO2022	Geographe	VI	24/02/2022	115,22534	-33,41191	115,22286	-33,40849	11:16	13:29
GEO22_040	GEO22_08	GEO2022	Geographe	VI	24/02/2022	115,22368	-33,41106	115,22118	-33,40783	11:18	13:32

GEO22_041	GEO22_09	GEO2022	Geographe	VI	25/02/2022	115,14067	-33,41156	115,14301	-33,41110	08:10	10:01
GEO22_042	GEO22_09	GEO2022	Geographe	VI	25/02/2022	115,13908	-33,40882	115,14222	-33,40949	08:12	10:03
GEO22_043	GEO22_09	GEO2022	Geographe	VI	25/02/2022	115,13842	-33,40736	115,14166	-33,40798	08:14	10:05
GEO22_044	GEO22_09	GEO2022	Geographe	VI	25/02/2022	115,13752	-33,40587	115,14107	-33,40663	08:16	10:07
GEO22_045	GEO22_09	GEO2022	Geographe	VI	25/02/2022	115,13685	-33,40418	115,14081	-33,40622	08:18	10:09
GEO22_046	GEO22_10	GEO2022	Geographe	VI	25/02/2022	115,17375	-33,38438	115,17683	-33,38073	08:23	10:26
GEO22_047	GEO22_10	GEO2022	Geographe	VI	25/02/2022	115,17305	-33,38288	115,17545	-33,37944	08:25	10:29
GEO22_048	GEO22_10	GEO2022	Geographe	VI	25/02/2022	115,17204	-33,38140	115,17448	-33,37767	08:27	10:32
GEO22_049	GEO22_10	GEO2022	Geographe	VI	25/02/2022	115,17009	-33,37819	115,17346	-33,37626	08:29	10:35
GEO22_050	GEO22_10	GEO2022	Geographe	VI	25/02/2022	115,16977	-33,37779	115,17222	-33,37476	08:31	10:38
GEO22_052	GEO22_11	GEO2022	Geographe	VI	25/02/2022	115,10450	-33,43396	115,10959	-33,42943	11:04	13:06
GEO22_053	GEO22_11	GEO2022	Geographe	VI	25/02/2022	115,10410	-33,43340	115,10754	-33,42673	11:06	13:09
GEO22_054	GEO22_11	GEO2022	Geographe	VI	25/02/2022	115,10293	-33,43192	115,10680	-33,42566	11:08	13:12
GEO22_055	GEO22_11	GEO2022	Geographe	VI	25/02/2022	115,10180	-33,43037	115,10606	-33,42675	11:10	13:15
GEO22_056	GEO22_12	GEO2022	Geographe	VI	25/02/2022	115,10563	-33,46267	115,10779	-33,45910	11:20	13:28
GEO22_057	GEO22_12	GEO2022	Geographe	VI	25/02/2022	115,10490	-33,46163	115,10684	-33,45757	11:22	13:31
GEO22_058	GEO22_12	GEO2022	Geographe	VI	25/02/2022	115,10362	-33,45925	115,10605	-33,45575	11:24	13:34
GEO22_059	GEO22_12	GEO2022	Geographe	VI	25/02/2022	115,10309	-33,45855	115,10613	-33,45446	11:26	13:37
GEO22_060	GEO22_12	GEO2022	Geographe	VI	25/02/2022	115,10221	-33,45698	115,10617	-33,45284	11:28	13:40
GEO22_061	GEO22_13	GEO2022	Geographe	IV	26/02/2022	115,22238	-33,57681	115,22074	-33,57210	07:04	09:06
GEO22_062	GEO22_13	GEO2022	Geographe	IV	26/02/2022	115,22120	-33,57547	115,21976	-33,57065	07:06	09:08
GEO22_063	GEO22_13	GEO2022	Geographe	IV	26/02/2022	115,21915	-33,57331	115,21895	-33,56944	07:08	09:10
GEO22_064	GEO22_13	GEO2022	Geographe	IV	26/02/2022	115,21842	-33,57247	115,21756	-33,56788	07:10	09:12
GEO22_065	GEO22_13	GEO2022	Geographe	IV	26/02/2022	115,21698	-33,57082	115,21555	-33,56596	07:12	09:14
GEO22_066	GEO22_14	GEO2022	Geographe	IV	26/02/2022	115,21877	-33,54779	115,21656	-33,54344	07:21	09:24
GEO22_067	GEO22_14	GEO2022	Geographe	IV	26/02/2022	115,21754	-33,54618	115,21533	-33,54221	07:23	09:26
GEO22_068	GEO22_14	GEO2022	Geographe	IV	26/02/2022	115,21638	-33,54467	115,21417	-33,54046	07:25	09:28
GEO22_069	GEO22_14	GEO2022	Geographe	IV	26/02/2022	115,21509	-33,54307	115,21312	-33,53901	07:27	09:30
GEO22_070	GEO22_14	GEO2022	Geographe	IV	26/02/2022	115,21403	-33,54161	115,21200	-33,53750	07:29	09:32
GEO22_071	GEO22_15	GEO2022	Geographe	VI	26/02/2022	115,26649	-33,51467	115,26531	-33,50922	09:52	11:58
GEO22_072	GEO22_15	GEO2022	Geographe	VI	26/02/2022	115,26537	-33,51276	115,26445	-33,50813	09:55	12:01
GEO22_073	GEO22_15	GEO2022	Geographe	VI	26/02/2022	115,26441	-33,51116	115,26352	-33,50656	09:58	12:04

GEO22_074	GEO22_15	GEO2022	Geographe	VI	26/02/2022	115,26350	-33,50960	115,26260	-33,50556	10:01	12:07
GEO22_075	GEO22_15	GEO2022	Geographe	VI	26/02/2022	115,26249	-33,50808	115,26152	-33,50404	10:04	12:10
GEO22_076	GEO22_16	GEO2022	Geographe	VI	26/02/2022	115,26563	-33,54803	115,26340	-33,54218	10:13	12:21
GEO22_077	GEO22_16	GEO2022	Geographe	VI	26/02/2022	115,26423	-33,54564	115,26214	-33,54069	10:16	12:24
GEO22_078	GEO22_16	GEO2022	Geographe	VI	26/02/2022	115,26334	-33,54418	115,26142	-33,53975	10:19	12:27
GEO22_079	GEO22_16	GEO2022	Geographe	VI	26/02/2022	115,26236	-33,54266	115,26031	-33,53735	10:22	12:30
GEO22_080	GEO22_16	GEO2022	Geographe	VI	26/02/2022	115,26146	-33,54129	115,25949	-33,53596	10:25	12:33
GEO22_081	GEO22_17	GEO2022	Geographe	VI	27/02/2022	115,26908	-33,44046	115,26731	-33,43254	07:35	09:39
GEO22_082	GEO22_17	GEO2022	Geographe	VI	27/02/2022	115,26737	-33,43820	115,26660	-33,43077	07:37	09:42
GEO22_083	GEO22_17	GEO2022	Geographe	VI	27/02/2022	115,26616	-33,43674	115,26542	-33,42934	07:39	09:45
GEO22_084	GEO22_17	GEO2022	Geographe	VI	27/02/2022	115,26489	-33,43513	115,26485	-33,42778	07:41	09:48
GEO22_085	GEO22_17	GEO2022	Geographe	VI	27/02/2022	115,26385	-33,43368	115,26413	-33,42641	07:43	09:51
GEO22_086	GEO22_18	GEO2022	Geographe	VI	27/02/2022	115,23619	-33,46575	115,23625	-33,45778	07:57	12:04
GEO22_087	GEO22_18	GEO2022	Geographe	VI	27/02/2022	115,23421	-33,46314	115,23440	-33,45632	07:59	12:07
GEO22_088	GEO22_18	GEO2022	Geographe	VI	27/02/2022	115,23352	-33,46189	115,23374	-33,45511	08:01	12:10
GEO22_089	GEO22_18	GEO2022	Geographe	VI	27/02/2022	115,23243	-33,46017	115,23321	-33,45334	08:03	12:13
GEO22_090	GEO22_18	GEO2022	Geographe	VI	27/02/2022	115,23129	-33,45859	115,23228	-33,45190	08:05	12:16
GEO22_092	GEO22_19	GEO2022	Geographe	VI	27/02/2022	115,19073	-33,45689	115,19639	-33,45237	10:28	10:32
GEO22_093	GEO22_19	GEO2022	Geographe	VI	27/02/2022	115,18934	-33,45586	115,19446	-33,45180	10:30	10:35
GEO22_094	GEO22_19	GEO2022	Geographe	VI	27/02/2022	115,18894	-33,45610	115,19260	-33,45092	10:32	10:38
GEO22_095	GEO22_19	GEO2022	Geographe	VI	27/02/2022	115,18932	-33,45701	115,19209	-33,44928	10:34	10:41
GEO22_096	GEO22_20	GEO2022	Geographe	VI	27/02/2022	115,20225	-33,49162	115,20317	-33,48639	10:48	10:51
GEO22_097	GEO22_20	GEO2022	Geographe	VI	27/02/2022	115,20020	-33,48968	115,20130	-33,48525	10:50	10:54
GEO22_098	GEO22_20	GEO2022	Geographe	VI	27/02/2022	115,19888	-33,48857	115,19920	-33,48446	10:52	10:57
GEO22_099	GEO22_20	GEO2022	Geographe	VI	27/02/2022	115,19726	-33,48721	115,19717	-33,48368	10:54	11:00
GEO22_100	GEO22_20	GEO2022	Geographe	VI	27/02/2022	115,19629	-33,48606	115,19592	-33,48285	10:56	11:03
GCT18_001	GCT18_01	GCT 2018	Gracetown	II	21/05/2018	114,74237	-34,10650	114,74308	-34,13480	07:33	09:34
GCT18_002	GCT18_01	GCT 2018	Gracetown	II	21/05/2018	114,74131	-34,10788	114,74219	-34,13680	07:36	09:37
GCT18_003	GCT18_01	GCT 2018	Gracetown	II	21/05/2018	114,73999	-34,10934	114,74137	-34,13832	07:39	09:40
GCT18_004	GCT18_01	GCT 2018	Gracetown	II	21/05/2018	114,73836	-34,11120	114,74030	-34,14048	07:42	09:41
GCT18_005	GCT18_01	GCT 2018	Gracetown	II	21/05/2018	114,73688	-34,11365	114,73996	-34,14260	07:44	09:43
GCT18_006	GCT18_02	GCT 2018	Gracetown	II	21/05/2018	114,74362	-34,06917	114,73997	-34,09814	07:56	09:56

GCT18_007	GCT18_02	GCT 2018	Gracetown	II	21/05/2018	114,74184	-34,07062	114,73914	-34,09986	07:58	09:58
GCT18_008	GCT18_02	GCT 2018	Gracetown	II	21/05/2018	114,74004	-34,07243	114,73798	-34,10221	08:00	09:59
GCT18_009	GCT18_02	GCT 2018	Gracetown	II	21/05/2018	114,73819	-34,07428	114,73584	-34,10373	08:02	10:01
GCT18_010	GCT18_02	GCT 2018	Gracetown	II	21/05/2018	114,73655	-34,07596	114,73550	-34,10436	08:04	10:04
GCT18_011	GCT18_03	GCT 2018	Gracetown	II	21/05/2018	114,77324	-34,06888	114,77056	-34,09319	10:33	12:33
GCT18_012	GCT18_03	GCT 2018	Gracetown	II	21/05/2018	114,77305	-34,07120	114,77031	-34,09576	10:35	12:36
GCT18_013	GCT18_03	GCT 2018	Gracetown	II	21/05/2018	114,77220	-34,07352	114,76953	-34,09768	10:37	12:39
GCT18_014	GCT18_03	GCT 2018	Gracetown	II	21/05/2018	114,77143	-34,07574	114,76808	-34,09961	10:39	12:42
GCT18_015	GCT18_03	GCT 2018	Gracetown	II	21/05/2018	114,77044	-34,07795	114,76704	-34,10536	10:41	12:46
GCT18_016	GCT18_04	GCT 2018	Gracetown	II	21/05/2018	114,77345	-34,10471	114,77294	-34,13626	10:48	12:56
GCT18_017	GCT18_04	GCT 2018	Gracetown	II	21/05/2018	114,77311	-34,10766	114,77309	-34,13979	10:51	12:59
GCT18_018	GCT18_04	GCT 2018	Gracetown	II	21/05/2018	114,77204	-34,10982	114,77353	-34,14218	10:52	13:02
GCT18_019	GCT18_04	GCT 2018	Gracetown	II	21/05/2018	114,77145	-34,11157	114,77330	-34,14412	10:54	13:05
GCT18_020	GCT18_04	GCT 2018	Gracetown	II	21/05/2018	114,77064	-34,11349	114,77338	-34,14638	10:56	13:09
GCT18_021	GCT18_05	GCT 2018	Gracetown	II	21/05/2018	114,80857	-34,12457	114,81125	-34,15293	13:27	15:31
GCT18_022	GCT18_05	GCT 2018	Gracetown	II	21/05/2018	114,80823	-34,12751	114,81189	-34,15625	13:29	15:33
GCT18_023	GCT18_05	GCT 2018	Gracetown	II	21/05/2018	114,80715	-34,12967	114,81206	-34,15770	13:31	15:35
GCT18_024	GCT18_05	GCT 2018	Gracetown	II	21/05/2018	114,80656	-34,13143	114,81199	-34,15914	13:33	15:37
GCT18_025	GCT18_05	GCT 2018	Gracetown	II	21/05/2018	114,80576	-34,13335	114,81195	-34,16019	13:35	15:40
GCT18_026	GCT18_06	GCT 2018	Gracetown	II	21/05/2018	114,80240	-34,07060	114,80403	-34,09557	13:56	16:02
GCT18_027	GCT18_06	GCT 2018	Gracetown	II	21/05/2018	114,80190	-34,07200	114,80351	-34,09742	13:58	16:04
GCT18_028	GCT18_06	GCT 2018	Gracetown	II	21/05/2018	114,80150	-34,07500	114,80260	-34,09951	14:00	16:07
GCT18_029	GCT18_06	GCT 2018	Gracetown	II	21/05/2018	114,80120	-34,07850	114,80243	-34,10127	14:03	16:10
GCT18_030	GCT18_06	GCT 2018	Gracetown	II	21/05/2018	114,80092	-34,08086	114,80278	-34,10327	14:05	16:14
GCT18_031	GCT18_07	GCT 2018	Gracetown	VI	22/05/2018	114,75195	-33,98819	114,75728	-34,00577	07:14	09:14
GCT18_032	GCT18_07	GCT 2018	Gracetown	VI	22/05/2018	114,75088	-33,99138	114,75663	-34,00806	07:16	09:18
GCT18_033	GCT18_07	GCT 2018	Gracetown	VI	22/05/2018	114,74964	-33,99328	114,75590	-34,01112	07:18	09:21
GCT18_034	GCT18_07	GCT 2018	Gracetown	VI	22/05/2018	114,74859	-33,99532	114,75609	-34,01243	07:21	09:24
GCT18_035	GCT18_07	GCT 2018	Gracetown	VI	22/05/2018	114,74765	-33,99738	114,75546	-34,01458	07:24	09:27
GCT18_036	GCT18_08	GCT 2018	Gracetown	VI	22/05/2018	114,77423	-33,98832	114,77804	-34,00051	07:33	09:39
GCT18_037	GCT18_08	GCT 2018	Gracetown	VI	22/05/2018	114,77394	-33,99078	114,77775	-34,00236	07:35	09:41
GCT18_038	GCT18_08	GCT 2018	Gracetown	VI	22/05/2018	114,77290	-33,99258	114,77739	-34,00428	07:36	09:43

GCT18_039	GCT18_08	GCT 2018	Gracetown	VI	22/05/2018	114,77207	-33,99412	114,77704	-34,00579	07:38	09:46
GCT18_040	GCT18_08	GCT 2018	Gracetown	VI	22/05/2018	114,77137	-33,99611	114,77605	-34,00748	07:40	09:49
GCT18_041	GCT18_09	GCT 2018	Gracetown	II	22/05/2018	114,83937	-34,08837	114,84631	-34,09567	10:12	12:14
GCT18_042	GCT18_09	GCT 2018	Gracetown	II	22/05/2018	114,83891	-34,09060	114,84644	-34,09767	10:15	12:18
GCT18_043	GCT18_09	GCT 2018	Gracetown	II	22/05/2018	114,83824	-34,09198	114,84632	-34,09927	10:18	12:22
GCT18_044	GCT18_09	GCT 2018	Gracetown	II	22/05/2018	114,83773	-34,09387	114,84589	-34,10138	10:20	12:24
GCT18_045	GCT18_09	GCT 2018	Gracetown	II	22/05/2018	114,83706	-34,09579	114,84593	-34,10270	10:22	12:27
GCT18_046	GCT18_10	GCT 2018	Gracetown	II	22/05/2018	114,88384	-34,06977	114,88578	-34,07326	10:35	12:46
GCT18_047	GCT18_10	GCT 2018	Gracetown	II	22/05/2018	114,88340	-34,07214	114,88516	-34,07476	10:37	12:49
GCT18_048	GCT18_10	GCT 2018	Gracetown	II	22/05/2018	114,88217	-34,07383	114,88423	-34,07581	10:39	12:52
GCT18_049	GCT18_10	GCT 2018	Gracetown	II	22/05/2018	114,88119	-34,07573	114,88316	-34,07704	10:42	12:55
GCT18_050	GCT18_10	GCT 2018	Gracetown	II	22/05/2018	114,88039	-34,07760	114,88228	-34,07837	10:46	12:59
GCT18_051	GCT18_11	GCT 2018	Gracetown	VI	01/06/2018	114,85589	-34,03447	114,86554	-34,05158	08:01	10:01
GCT18_052	GCT18_11	GCT 2018	Gracetown	VI	01/06/2018	114,85799	-34,03363	114,86763	-34,05153	08:04	10:04
GCT18_053	GCT18_11	GCT 2018	Gracetown	VI	01/06/2018	114,86057	-34,03361	114,87018	-34,05146	08:07	10:08
GCT18_054	GCT18_11	GCT 2018	Gracetown	VI	01/06/2018	114,86318	-34,03362	114,87244	-34,05133	08:10	10:11
GCT18_055	GCT18_11	GCT 2018	Gracetown	VI	01/06/2018	114,86550	-34,03332	114,87437	-34,05139	08:13	10:14
GCT18_056	GCT18_12	GCT 2018	Gracetown	VI	01/06/2018	114,89288	-33,97278	114,90334	-33,98696	08:26	10:28
GCT18_057	GCT18_12	GCT 2018	Gracetown	VI	01/06/2018	114,89589	-33,97242	114,90565	-33,98669	08:29	10:30
GCT18_058	GCT18_12	GCT 2018	Gracetown	VI	01/06/2018	114,89844	-33,97224	114,90754	-33,98666	08:32	10:33
GCT18_059	GCT18_12	GCT 2018	Gracetown	VI	01/06/2018	114,90044	-33,97208	114,90911	-33,98648	08:34	10:36
GCT18_060	GCT18_12	GCT 2018	Gracetown	VI	01/06/2018	114,90262	-33,97160	114,91076	-33,98659	08:37	10:39
GCT18_061	GCT18_13	GCT 2018	Gracetown	VI	01/06/2018	114,62646	-33,92777	114,64736	-33,98342	11:34	13:36
GCT18_062	GCT18_13	GCT 2018	Gracetown	VI	01/06/2018	114,62867	-33,92813	114,64865	-33,98359	11:37	13:39
GCT18_063	GCT18_13	GCT 2018	Gracetown	VI	01/06/2018	114,63022	-33,92819	114,65004	-33,98356	11:39	13:41
GCT18_064	GCT18_13	GCT 2018	Gracetown	VI	01/06/2018	114,63223	-33,92789	114,65032	-33,98387	11:42	13:44
GCT18_065	GCT18_13	GCT 2018	Gracetown	VI	01/06/2018	114,63427	-33,92777	114,65128	-33,98380	11:44	13:48
GCT18_066	GCT18_14	GCT 2018	Gracetown	VI	01/06/2018	114,69985	-33,87280	114,71727	-33,89944	12:02	14:11
GCT18_067	GCT18_14	GCT 2018	Gracetown	VI	01/06/2018	114,70317	-33,87231	114,71985	-33,89957	12:05	14:14
GCT18_068	GCT18_14	GCT 2018	Gracetown	VI	01/06/2018	114,70583	-33,87210	114,72208	-33,89907	12:07	14:17
GCT18_069	GCT18_14	GCT 2018	Gracetown	VI	01/06/2018	114,70926	-33,87253	114,72444	-33,89864	12:10	14:20
GCT18_070	GCT18_14	GCT 2018	Gracetown	VI	01/06/2018	114,71104	-33,87206	114,72724	-33,89871	12:12	14:29

GCT18_071	GCT18_15	GCT 2018	Gracetown	II	02/06/2018	114,67731	-34,05103	114,69918	-34,11973	07:40	09:40
GCT18_072	GCT18_15	GCT 2018	Gracetown	II	02/06/2018	114,67931	-34,05457	114,70123	-34,12276	07:42	09:43
GCT18_073	GCT18_15	GCT 2018	Gracetown	II	02/06/2018	114,68021	-34,05742	114,70312	-34,12672	07:44	09:46
GCT18_074	GCT18_15	GCT 2018	Gracetown	II	02/06/2018	114,68125	-34,06090	114,70485	-34,12997	07:47	09:49
GCT18_075	GCT18_15	GCT 2018	Gracetown	II	02/06/2018	114,68220	-34,06433	114,70583	-34,13253	07:50	09:52
GCT18_076	GCT18_16	GCT 2018	Gracetown	II	02/06/2018	114,65394	-34,00713	114,68293	-34,09916	08:05	10:27
GCT18_077	GCT18_16	GCT 2018	Gracetown	II	02/06/2018	114,65654	-34,01048	114,68506	-34,10182	08:08	10:29
GCT18_078	GCT18_16	GCT 2018	Gracetown	II	02/06/2018	114,65800	-34,01365	114,68595	-34,10433	08:10	10:32
GCT18_079	GCT18_16	GCT 2018	Gracetown	II	02/06/2018	114,65908	-34,01681	114,68636	-34,10673	08:12	10:35
GCT18_080	GCT18_16	GCT 2018	Gracetown	II	02/06/2018	114,66005	-34,01927	114,68719	-34,10924	08:14	10:38
GCT18_081	GCT18_17	GCT 2018	Gracetown	VI	02/06/2018	114,69130	-33,97028	114,70517	-34,04124	11:10	15:11
GCT18_082	GCT18_17	GCT 2018	Gracetown	VI	02/06/2018	114,69213	-33,97352	114,70660	-34,04395	11:12	15:14
GCT18_083	GCT18_17	GCT 2018	Gracetown	VI	02/06/2018	114,69281	-33,97615	114,70734	-34,04592	11:15	15:18
GCT18_084	GCT18_17	GCT 2018	Gracetown	VI	02/06/2018	114,69223	-33,97891	114,70767	-34,04930	11:18	15:21
GCT18_085	GCT18_17	GCT 2018	Gracetown	VI	02/06/2018	114,69210	-33,98200	114,70833	-34,05169	11:21	15:24
GCT18_087	GCT18_18	GCT 2018	Gracetown	VI	02/06/2018	114,75467	-33,94430	114,78482	-34,00324	11:34	15:47
GCT18_088	GCT18_18	GCT 2018	Gracetown	VI	02/06/2018	114,75345	-33,94733	114,78517	-34,00576	11:37	15:50
GCT18_089	GCT18_18	GCT 2018	Gracetown	VI	02/06/2018	114,75223	-33,95037	114,78545	-34,00837	11:39	15:53
GCT18_090	GCT18_18	GCT 2018	Gracetown	VI	02/06/2018	114,75100	-33,95340	114,78581	-34,01046	11:41	15:56
GCT18_091	GCT18_19	GCT 2018	Gracetown	VI	02/06/2018	114,75328	-33,91042	114,78619	-33,94723	14:19	16:20
GCT18_092	GCT18_19	GCT 2018	Gracetown	VI	02/06/2018	114,75580	-33,91024	114,78895	-33,94680	14:21	16:22
GCT18_093	GCT18_19	GCT 2018	Gracetown	VI	02/06/2018	114,75842	-33,90998	114,79098	-33,94585	14:23	16:24
GCT18_094	GCT18_19	GCT 2018	Gracetown	VI	02/06/2018	114,76086	-33,90947	114,79269	-33,94463	14:25	16:27
GCT18_095	GCT18_19	GCT 2018	Gracetown	VI	02/06/2018	114,76311	-33,90880	114,79394	-33,94411	14:27	16:30
GCT18_096	GCT18_20	GCT 2018	Gracetown	VI	02/06/2018	114,79060	-33,89111	114,82881	-33,90913	14:33	16:45
GCT18_097	GCT18_20	GCT 2018	Gracetown	VI	02/06/2018	114,79354	-33,89023	114,83070	-33,90778	14:35	16:47
GCT18_098	GCT18_20	GCT 2018	Gracetown	VI	02/06/2018	114,79590	-33,88939	114,83208	-33,90647	14:37	16:49
GCT18_099	GCT18_20	GCT 2018	Gracetown	VI	02/06/2018	114,79773	-33,88847	114,83323	-33,90538	14:38	16:52
GCT18_100	GCT18_20	GCT 2018	Gracetown	VI	02/06/2018	114,80005	-33,88762	114,83455	-33,90425	14:40	16:55
GCT19_001	GCT19_01	GCT 2019	Gracetown	II	28/02/2019	114,85917	-34,12853	114,84738	-34,11896	06:50	08:50
GCT19_002	GCT19_01	GCT 2019	Gracetown	II	28/02/2019	114,85764	-34,12565	114,84635	-34,11722	06:55	08:55
GCT19_003	GCT19_01	GCT 2019	Gracetown	II	28/02/2019	114,85645	-34,12340	114,84559	-34,11553	06:58	08:58

GCT19_004	GCT19_01	GCT 2019	Gracetown	II	28/02/2019	114,85554	-34,12127	114,84444	-34,11352	07:00	09:00
GCT19_005	GCT19_01	GCT 2019	Gracetown	II	28/02/2019	114,85454	-34,11902	114,84303	-34,11194	07:03	09:03
GCT19_006	GCT19_02	GCT 2019	Gracetown	II	28/02/2019	114,84721	-34,08589	114,82946	-34,07515	07:09	09:09
GCT19_007	GCT19_02	GCT 2019	Gracetown	II	28/02/2019	114,84598	-34,08336	114,82948	-34,07341	07:12	09:12
GCT19_008	GCT19_02	GCT 2019	Gracetown	II	28/02/2019	114,84521	-34,08121	114,82973	-34,07168	07:15	09:15
GCT19_009	GCT19_02	GCT 2019	Gracetown	II	28/02/2019	114,84406	-34,07954	114,82981	-34,07037	07:18	09:18
GCT19_010	GCT19_02	GCT 2019	Gracetown	II	28/02/2019	114,84225	-34,07578	114,82989	-34,06906	07:21	09:21
GCT19_011	GCT19_03	GCT 2019	Gracetown	II	28/02/2019	114,88061	-34,08605	114,86841	-34,07526	09:34	11:34
GCT19_012	GCT19_03	GCT 2019	Gracetown	II	28/02/2019	114,87996	-34,08383	114,86853	-34,07386	09:36	11:36
GCT19_013	GCT19_03	GCT 2019	Gracetown	II	28/02/2019	114,87965	-34,08211	114,86866	-34,07245	09:38	11:38
GCT19_014	GCT19_03	GCT 2019	Gracetown	II	28/02/2019	114,87928	-34,08009	114,86919	-34,07113	09:40	11:40
GCT19_015	GCT19_03	GCT 2019	Gracetown	II	28/02/2019	114,87870	-34,07785	114,86910	-34,06922	09:42	11:42
GCT19_016	GCT19_04	GCT 2019	Gracetown	II	28/02/2019	114,86653	-34,06933	114,85609	-34,06012	09:46	11:48
GCT19_017	GCT19_04	GCT 2019	Gracetown	II	28/02/2019	114,86568	-34,06671	114,85491	-34,05819	09:48	11:50
GCT19_018	GCT19_04	GCT 2019	Gracetown	II	28/02/2019	114,86462	-34,06453	114,85367	-34,05672	09:50	11:52
GCT19_019	GCT19_04	GCT 2019	Gracetown	II	28/02/2019	114,86377	-34,06256	114,85413	-34,05583	09:52	11:54
GCT19_020	GCT19_04	GCT 2019	Gracetown	II	28/02/2019	114,86262	-34,06034	114,85501	-34,05529	09:54	11:56
GCT19_021	GCT19_05	GCT 2019	Gracetown	II	02/03/2019	114,70557	-34,12593	114,72115	-34,12215	07:11	09:12
GCT19_022	GCT19_05	GCT 2019	Gracetown	II	02/03/2019	114,70819	-34,12441	114,72302	-34,12087	07:13	09:14
GCT19_023	GCT19_05	GCT 2019	Gracetown	II	02/03/2019	114,70977	-34,12283	114,72449	-34,11964	07:15	09:16
GCT19_024	GCT19_05	GCT 2019	Gracetown	II	02/03/2019	114,71151	-34,12115	114,72532	-34,11878	07:17	09:18
GCT19_025	GCT19_05	GCT 2019	Gracetown	II	02/03/2019	114,71335	-34,11961	114,72565	-34,11973	07:19	09:20
GCT19_026	GCT19_06	GCT 2019	Gracetown	II	02/03/2019	114,68426	-34,10953	114,69785	-34,11313	07:29	09:30
GCT19_027	GCT19_06	GCT 2019	Gracetown	II	02/03/2019	114,68634	-34,10809	114,69964	-34,11175	07:31	09:32
GCT19_028	GCT19_06	GCT 2019	Gracetown	II	02/03/2019	114,68790	-34,10652	114,70091	-34,11042	07:33	09:34
GCT19_029	GCT19_06	GCT 2019	Gracetown	II	02/03/2019	114,68919	-34,10539	114,70190	-34,10938	07:35	09:36
GCT19_030	GCT19_06	GCT 2019	Gracetown	II	02/03/2019	114,69071	-34,10387	114,70278	-34,10820	07:37	09:38
GCT19_031	GCT19_07	GCT 2019	Gracetown	II	02/03/2019	114,65126	-34,10983	114,66011	-34,12651	09:54	11:54
GCT19_032	GCT19_07	GCT 2019	Gracetown	II	02/03/2019	114,65332	-34,10902	114,66169	-34,12579	09:56	11:56
GCT19_033	GCT19_07	GCT 2019	Gracetown	II	02/03/2019	114,65474	-34,10824	114,66290	-34,12502	09:58	11:58
GCT19_034	GCT19_07	GCT 2019	Gracetown	II	02/03/2019	114,65650	-34,10723	114,66455	-34,12405	10:00	12:00
GCT19_035	GCT19_07	GCT 2019	Gracetown	II	02/03/2019	114,65816	-34,10597	114,66587	-34,12279	10:02	12:02

GCT19_036	GCT19_08	GCT 2019	Gracetown	II	02/03/2019	114,67605	-34,07267	114,68503	-34,08080	10:09	12:10
GCT19_037	GCT19_08	GCT 2019	Gracetown	II	02/03/2019	114,67789	-34,07100	114,68651	-34,07952	10:11	12:12
GCT19_038	GCT19_08	GCT 2019	Gracetown	II	02/03/2019	114,67968	-34,06953	114,68776	-34,07809	10:13	12:14
GCT19_039	GCT19_08	GCT 2019	Gracetown	II	02/03/2019	114,68155	-34,06858	114,68933	-34,07696	10:15	12:16
GCT19_040	GCT19_08	GCT 2019	Gracetown	II	02/03/2019	114,68414	-34,06766	114,69080	-34,07583	10:17	12:18
GCT19_041	GCT19_09	GCT 2019	Gracetown	II	02/03/2019	114,71790	-34,08373	114,72268	-34,07677	12:30	14:30
GCT19_042	GCT19_09	GCT 2019	Gracetown	II	02/03/2019	114,72014	-34,08253	114,72411	-34,07532	12:32	14:32
GCT19_043	GCT19_09	GCT 2019	Gracetown	II	02/03/2019	114,72237	-34,08147	114,72518	-34,07397	12:34	14:34
GCT19_044	GCT19_09	GCT 2019	Gracetown	II	02/03/2019	114,72444	-34,08012	114,72623	-34,07292	12:36	14:36
GCT19_045	GCT19_09	GCT 2019	Gracetown	II	02/03/2019	114,72628	-34,07855	114,72694	-34,07344	12:38	14:38
GCT19_046	GCT19_10	GCT 2019	Gracetown	II	02/03/2019	114,75025	-34,08414	114,75260	-34,08278	12:45	14:45
GCT19_047	GCT19_10	GCT 2019	Gracetown	II	02/03/2019	114,75266	-34,08317	114,75398	-34,08144	12:47	14:47
GCT19_048	GCT19_10	GCT 2019	Gracetown	II	02/03/2019	114,75446	-34,08184	114,75555	-34,07978	12:49	14:49
GCT19_049	GCT19_10	GCT 2019	Gracetown	II	02/03/2019	114,75578	-34,08081	114,75630	-34,07873	12:51	14:51
GCT19_050	GCT19_10	GCT 2019	Gracetown	II	02/03/2019	114,75750	-34,07956	114,75778	-34,07772	12:53	14:53
GCT19_051	GCT19_11	GCT 2019	Gracetown	VI	03/03/2019	114,75181	-34,02821	114,74250	-34,02469	06:22	08:23
GCT19_052	GCT19_11	GCT 2019	Gracetown	VI	03/03/2019	114,74924	-34,02803	114,74076	-34,02528	06:25	08:24
GCT19_053	GCT19_11	GCT 2019	Gracetown	VI	03/03/2019	114,74729	-34,02833	114,73951	-34,02592	06:28	08:25
GCT19_054	GCT19_11	GCT 2019	Gracetown	VI	03/03/2019	114,74473	-34,02844	114,73796	-34,02598	06:31	08:26
GCT19_055	GCT19_11	GCT 2019	Gracetown	VI	03/03/2019	114,74217	-34,02852	114,73586	-34,02628	06:34	08:27
GCT19_056	GCT19_12	GCT 2019	Gracetown	VI	03/03/2019	114,75505	-33,97740	114,75087	-33,96852	06:45	08:45
GCT19_057	GCT19_12	GCT 2019	Gracetown	VI	03/03/2019	114,75262	-33,97615	114,75001	-33,96648	06:47	08:47
GCT19_058	GCT19_12	GCT 2019	Gracetown	VI	03/03/2019	114,75006	-33,97510	114,74903	-33,96445	06:49	08:49
GCT19_059	GCT19_12	GCT 2019	Gracetown	VI	03/03/2019	114,74773	-33,97421	114,74818	-33,96269	06:51	08:51
GCT19_060	GCT19_12	GCT 2019	Gracetown	VI	03/03/2019	114,74494	-33,97337	114,74671	-33,96111	06:53	08:53
GCT19_061	GCT19_13	GCT 2019	Gracetown	VI	03/03/2019	114,69038	-33,97462	114,67974	-33,98166	09:08	11:09
GCT19_062	GCT19_13	GCT 2019	Gracetown	VI	03/03/2019	114,68745	-33,97457	114,67759	-33,98200	09:10	11:11
GCT19_063	GCT19_13	GCT 2019	Gracetown	VI	03/03/2019	114,68502	-33,97391	114,67528	-33,98265	09:12	11:13
GCT19_064	GCT19_13	GCT 2019	Gracetown	VI	03/03/2019	114,68252	-33,97323	114,67282	-33,98302	09:14	11:15
GCT19_065	GCT19_13	GCT 2019	Gracetown	VI	03/03/2019	114,68006	-33,97264	114,67038	-33,98349	09:16	11:17
GCT19_066	GCT19_14	GCT 2019	Gracetown	VI	03/03/2019	114,72185	-33,94767	114,71101	-33,94385	09:25	11:25
GCT19_067	GCT19_14	GCT 2019	Gracetown	VI	03/03/2019	114,71901	-33,94760	114,70920	-33,94352	09:27	11:27

GCT19_068	GCT19_14	GCT 2019	Gracetown	VI	03/03/2019	114,71664	-33,94716	114,70759	-33,94396	09:29	11:29
GCT19_069	GCT19_14	GCT 2019	Gracetown	VI	03/03/2019	114,71471	-33,94680	114,70610	-33,94451	09:31	11:31
GCT19_070	GCT19_14	GCT 2019	Gracetown	VI	03/03/2019	114,71244	-33,94627	114,70465	-33,94507	09:33	11:33
GCT19_071	GCT19_15	GCT 2019	Gracetown	VI	03/03/2019	114,72241	-33,92268	114,72339	-33,91549	11:48	13:48
GCT19_072	GCT19_15	GCT 2019	Gracetown	VI	03/03/2019	114,72218	-33,92072	114,72350	-33,91363	11:50	13:50
GCT19_073	GCT19_15	GCT 2019	Gracetown	VI	03/03/2019	114,72217	-33,91910	114,72373	-33,91204	11:52	13:52
GCT19_074	GCT19_15	GCT 2019	Gracetown	VI	03/03/2019	114,72261	-33,91711	114,72423	-33,91023	11:54	13:54
GCT19_075	GCT19_15	GCT 2019	Gracetown	VI	03/03/2019	114,72304	-33,91506	114,72472	-33,90848	11:56	13:56
GCT19_076	GCT19_16	GCT 2019	Gracetown	VI	03/03/2019	114,75490	-33,92164	114,75782	-33,90460	12:05	14:06
GCT19_077	GCT19_16	GCT 2019	Gracetown	VI	03/03/2019	114,75534	-33,91919	114,75828	-33,90204	12:07	14:08
GCT19_078	GCT19_16	GCT 2019	Gracetown	VI	03/03/2019	114,75585	-33,91686	114,75881	-33,89974	12:09	14:10
GCT19_079	GCT19_16	GCT 2019	Gracetown	VI	03/03/2019	114,75643	-33,91456	114,75952	-33,89781	12:11	14:12
GCT19_080	GCT19_16	GCT 2019	Gracetown	VI	03/03/2019	114,75737	-33,91233	114,76003	-33,89571	12:13	14:14
GCT19_081	GCT19_17	GCT 2019	Gracetown	VI	06/03/2019	114,81939	-33,95018	114,81394	-33,96099	06:10	08:16
GCT19_082	GCT19_17	GCT 2019	Gracetown	VI	06/03/2019	114,81666	-33,94985	114,81207	-33,96029	06:13	08:18
GCT19_083	GCT19_17	GCT 2019	Gracetown	VI	06/03/2019	114,81427	-33,94937	114,81016	-33,95974	06:18	08:20
GCT19_084	GCT19_17	GCT 2019	Gracetown	VI	06/03/2019	114,81186	-33,94906	114,80796	-33,95922	06:20	08:22
GCT19_085	GCT19_17	GCT 2019	Gracetown	VI	06/03/2019	114,80940	-33,94902	114,80583	-33,95887	06:22	08:24
GCT19_086	GCT19_18	GCT 2019	Gracetown	VI	06/03/2019	114,85058	-33,97784	114,84695	-33,98671	06:31	08:35
GCT19_087	GCT19_18	GCT 2019	Gracetown	VI	06/03/2019	114,84887	-33,97633	114,84585	-33,98536	06:34	08:38
GCT19_088	GCT19_18	GCT 2019	Gracetown	VI	06/03/2019	114,84738	-33,97500	114,84474	-33,98414	06:36	08:41
GCT19_089	GCT19_18	GCT 2019	Gracetown	VI	06/03/2019	114,84600	-33,97412	114,84369	-33,98327	06:38	08:44
GCT19_090	GCT19_18	GCT 2019	Gracetown	VI	06/03/2019	114,84469	-33,97293	114,84243	-33,98238	06:40	08:47
GCT19_091	GCT19_19	GCT 2019	Gracetown	VI	06/03/2019	114,88259	-34,00535	114,87855	-34,01760	08:52	10:52
GCT19_092	GCT19_19	GCT 2019	Gracetown	VI	06/03/2019	114,88082	-34,00438	114,87695	-34,01758	08:56	10:55
GCT19_093	GCT19_19	GCT 2019	Gracetown	VI	06/03/2019	114,87954	-34,00349	114,87573	-34,01738	08:58	10:59
GCT19_094	GCT19_19	GCT 2019	Gracetown	VI	06/03/2019	114,87752	-34,00265	114,87426	-34,01676	09:00	11:03
GCT19_095	GCT19_19	GCT 2019	Gracetown	VI	06/03/2019	114,87600	-34,00142	114,87255	-34,01628	09:02	11:03
GCT19_096	GCT19_20	GCT 2019	Gracetown	VI	06/03/2019	114,88371	-33,95057	114,87929	-33,96868	09:08	11:20
GCT19_097	GCT19_20	GCT 2019	Gracetown	VI	06/03/2019	114,88128	-33,95112	114,87714	-33,96929	09:11	11:22
GCT19_098	GCT19_20	GCT 2019	Gracetown	VI	06/03/2019	114,87872	-33,95152	114,87487	-33,96944	09:13	11:24
GCT19_099	GCT19_20	GCT 2019	Gracetown	VI	06/03/2019	114,87636	-33,95123	114,87287	-33,96934	09:15	11:26

GCT19_100	GCT19_20	GCT 2019	Gracetown	VI	06/03/2019	114,87360	-33,95142	114,87076	-33,96952	09:18	11:28
GCT20_001	GCT20_01	GCT 2020	Gracetown	IV	07/03/2020	114,73245	-33,92710	114,74636	-33,93274	09:40	11:48
GCT20_002	GCT20_01	GCT 2020	Gracetown	IV	07/03/2020	114,73463	-33,92617	114,74677	-33,93310	09:43	11:52
GCT20_003	GCT20_01	GCT 2020	Gracetown	IV	07/03/2020	114,73635	-33,92524	114,74749	-33,93354	09:47	11:57
GCT20_004	GCT20_01	GCT 2020	Gracetown	IV	07/03/2020	114,73822	-33,92450	114,74890	-33,93166	09:51	12:02
GCT20_005	GCT20_01	GCT 2020	Gracetown	IV	07/03/2020	114,74039	-33,92344	114,75036	-33,93097	09:57	12:07
GCT20_006	GCT20_02	GCT 2020	Gracetown	IV	07/03/2020	114,74367	-33,90522	114,75395	-33,91207	10:08	12:17
GCT20_007	GCT20_02	GCT 2020	Gracetown	IV	07/03/2020	114,74495	-33,90356	114,75447	-33,91127	10:12	12:21
GCT20_008	GCT20_02	GCT 2020	Gracetown	IV	07/03/2020	114,74674	-33,90245	114,75502	-33,91040	10:16	12:25
GCT20_009	GCT20_02	GCT 2020	Gracetown	IV	07/03/2020	114,74834	-33,90114	114,75587	-33,91002	10:20	12:30
GCT20_010	GCT20_02	GCT 2020	Gracetown	IV	07/03/2020	114,75021	-33,90004	114,75726	-33,90892	10:29	12:35
GCT20_011	GCT20_03	GCT 2020	Gracetown	IV	07/03/2020	114,86278	-33,91785	114,87294	-33,92601	12:58	14:59
GCT20_012	GCT20_03	GCT 2020	Gracetown	IV	07/03/2020	114,86448	-33,91630	114,87466	-33,92474	13:02	15:03
GCT20_013	GCT20_03	GCT 2020	Gracetown	IV	07/03/2020	114,86608	-33,91518	114,87542	-33,92321	13:04	15:06
GCT20_014	GCT20_03	GCT 2020	Gracetown	IV	07/03/2020	114,86777	-33,91408	114,87652	-33,92172	13:08	15:12
GCT20_015	GCT20_03	GCT 2020	Gracetown	IV	07/03/2020	114,86932	-33,91269	114,87723	-33,92011	13:11	15:16
GCT20_016	GCT20_04	GCT 2020	Gracetown	IV	07/03/2020	114,87590	-33,87568	114,88326	-33,88061	13:24	15:27
GCT20_017	GCT20_04	GCT 2020	Gracetown	IV	07/03/2020	114,87764	-33,87440	114,88455	-33,87954	13:31	15:31
GCT20_018	GCT20_04	GCT 2020	Gracetown	IV	07/03/2020	114,87924	-33,87324	114,88632	-33,87876	13:33	15:34
GCT20_019	GCT20_04	GCT 2020	Gracetown	IV	07/03/2020	114,88101	-33,87214	114,88830	-33,87838	13:36	15:38
GCT20_020	GCT20_04	GCT 2020	Gracetown	IV	07/03/2020	114,88314	-33,87147	114,89010	-33,87860	13:38	15:43
GCT20_021	GCT20_05	GCT 2020	Gracetown	II	08/03/2020	114,72121	-34,12980	114,72142	-34,14521	08:12	10:15
GCT20_022	GCT20_05	GCT 2020	Gracetown	II	08/03/2020	114,72114	-34,12832	114,72080	-34,14412	08:15	10:17
GCT20_023	GCT20_05	GCT 2020	Gracetown	II	08/03/2020	114,72069	-34,12667	114,72012	-34,14276	08:18	10:19
GCT20_024	GCT20_05	GCT 2020	Gracetown	II	08/03/2020	114,72039	-34,12537	114,71918	-34,14165	08:21	10:21
GCT20_025	GCT20_05	GCT 2020	Gracetown	II	08/03/2020	114,71973	-34,12377	114,71808	-34,14053	08:24	10:23
GCT20_026	GCT20_06	GCT 2020	Gracetown	II	08/03/2020	114,73286	-34,09573	114,73141	-34,10817	08:38	10:49
GCT20_027	GCT20_06	GCT 2020	Gracetown	II	08/03/2020	114,73188	-34,09442	114,72968	-34,10760	08:40	10:52
GCT20_028	GCT20_06	GCT 2020	Gracetown	II	08/03/2020	114,73106	-34,09332	114,72869	-34,10720	08:42	10:55
GCT20_029	GCT20_06	GCT 2020	Gracetown	II	08/03/2020	114,72992	-34,09187	114,72735	-34,10650	08:44	10:58
GCT20_030	GCT20_06	GCT 2020	Gracetown	II	08/03/2020	114,72877	-34,09064	114,72632	-34,10596	08:46	11:01
GCT20_031	GCT20_07	GCT 2020	Gracetown	II	08/03/2020	114,67057	-34,11341	114,66709	-34,14055	11:25	13:26

GCT20_032	GCT20_07	GCT 2020	Gracetown	II	08/03/2020	114,66971	-34,11224	114,66573	-34,14004	11:27	13:28
GCT20_033	GCT20_07	GCT 2020	Gracetown	II	08/03/2020	114,66887	-34,11091	114,66539	-34,13986	11:29	13:30
GCT20_034	GCT20_07	GCT 2020	Gracetown	II	08/03/2020	114,66821	-34,11010	114,66520	-34,13955	11:31	13:32
GCT20_035	GCT20_07	GCT 2020	Gracetown	II	08/03/2020	114,66717	-34,10917	114,66439	-34,13868	11:33	13:34
GCT20_036	GCT20_08	GCT 2020	Gracetown	II	08/03/2020	114,66785	-34,09480	114,66444	-34,12337	11:46	13:56
GCT20_037	GCT20_08	GCT 2020	Gracetown	II	08/03/2020	114,66674	-34,09362	114,66341	-34,12252	11:49	13:59
GCT20_038	GCT20_08	GCT 2020	Gracetown	II	08/03/2020	114,66567	-34,09254	114,66289	-34,12188	11:52	14:02
GCT20_039	GCT20_08	GCT 2020	Gracetown	II	08/03/2020	114,66475	-34,09129	114,66224	-34,12170	11:55	14:05
GCT20_040	GCT20_08	GCT 2020	Gracetown	II	08/03/2020	114,66383	-34,09017	114,66136	-34,12153	11:58	14:08
GCT20_041	GCT20_09	GCT 2020	Gracetown	II	09/03/2020	114,86250	-34,13098	114,86210	-34,12621	07:26	09:27
GCT20_042	GCT20_09	GCT 2020	Gracetown	II	09/03/2020	114,86099	-34,12940	114,86245	-34,12422	07:28	09:31
GCT20_043	GCT20_09	GCT 2020	Gracetown	II	09/03/2020	114,85960	-34,12780	114,86323	-34,12223	07:31	09:35
GCT20_044	GCT20_09	GCT 2020	Gracetown	II	09/03/2020	114,85797	-34,12639	114,86306	-34,12019	07:33	09:38
GCT20_045	GCT20_09	GCT 2020	Gracetown	II	09/03/2020	114,85637	-34,12476	114,86278	-34,11818	07:37	09:42
GCT20_046	GCT20_10	GCT 2020	Gracetown	II	09/03/2020	114,87954	-34,09883	114,87807	-34,09552	07:47	09:52
GCT20_047	GCT20_10	GCT 2020	Gracetown	II	09/03/2020	114,87736	-34,09842	114,87785	-34,09346	07:50	09:56
GCT20_048	GCT20_10	GCT 2020	Gracetown	II	09/03/2020	114,87552	-34,09844	114,87809	-34,09180	07:53	10:04
GCT20_049	GCT20_10	GCT 2020	Gracetown	II	09/03/2020	114,87328	-34,09805	114,87795	-34,08967	07:56	10:06
GCT20_050	GCT20_10	GCT 2020	Gracetown	II	09/03/2020	114,87111	-34,09779	114,87688	-34,08792	07:59	10:08
GCT20_051	GCT20_11	GCT 2020	Gracetown	II	09/03/2020	114,83833	-34,07976	114,83288	-34,07136	10:19	10:10
GCT20_052	GCT20_11	GCT 2020	Gracetown	II	09/03/2020	114,83661	-34,07837	114,83146	-34,06951	10:21	10:12
GCT20_053	GCT20_11	GCT 2020	Gracetown	II	09/03/2020	114,83468	-34,07727	114,82957	-34,06849	10:23	12:19
GCT20_054	GCT20_11	GCT 2020	Gracetown	II	09/03/2020	114,83300	-34,07645	114,82802	-34,06808	10:25	12:22
GCT20_055	GCT20_11	GCT 2020	Gracetown	II	09/03/2020	114,83082	-34,07520	114,82633	-34,06720	10:27	12:25
GCT20_056	GCT20_12	GCT 2020	Gracetown	II	09/03/2020	114,84782	-34,05642	114,83961	-34,05446	10:35	12:28
GCT20_057	GCT20_12	GCT 2020	Gracetown	II	09/03/2020	114,84616	-34,05496	114,83828	-34,05292	10:38	12:31
GCT20_058	GCT20_12	GCT 2020	Gracetown	II	09/03/2020	114,84471	-34,05364	114,83795	-34,05166	10:41	12:41
GCT20_059	GCT20_12	GCT 2020	Gracetown	II	09/03/2020	114,84292	-34,05204	114,83690	-34,05014	10:44	12:44
GCT20_060	GCT20_12	GCT 2020	Gracetown	II	09/03/2020	114,84115	-34,05046	114,83608	-34,04825	10:47	12:47
GCT20_061	GCT20_13	GCT 2020	Gracetown	IV	09/03/2020	114,88396	-34,02025	114,88069	-34,01481	13:17	12:50
GCT20_062	GCT20_13	GCT 2020	Gracetown	IV	09/03/2020	114,88353	-34,01813	114,88102	-34,01321	13:20	15:19
GCT20_063	GCT20_13	GCT 2020	Gracetown	IV	09/03/2020	114,88287	-34,01627	114,88091	-34,01170	13:23	15:24

GCT20_064	GCT20_13	GCT 2020	Gracetown	IV	09/03/2020	114,88206	-34,01428	114,88052	-34,00990	13:26	15:27
GCT20_065	GCT20_13	GCT 2020	Gracetown	IV	09/03/2020	114,88164	-34,01246	114,88008	-34,00816	13:29	15:33
GCT20_066	GCT20_14	GCT 2020	Gracetown	IV	09/03/2020	114,89876	-33,98339	114,89831	-33,97650	13:38	15:37
GCT20_067	GCT20_14	GCT 2020	Gracetown	IV	09/03/2020	114,89863	-33,98130	114,89814	-33,97443	13:40	16:00
GCT20_068	GCT20_14	GCT 2020	Gracetown	IV	09/03/2020	114,89797	-33,97936	114,89779	-33,97237	13:42	16:02
GCT20_069	GCT20_14	GCT 2020	Gracetown	IV	09/03/2020	114,89796	-33,97755	114,89745	-33,97026	13:44	16:04
GCT20_070	GCT20_14	GCT 2020	Gracetown	IV	09/03/2020	114,89800	-33,97586	114,89767	-33,96882	13:46	16:06
GCT20_071	GCT20_15	GCT 2020	Gracetown	IV	10/03/2020	114,82874	-33,95637	114,82673	-33,93327	06:57	08:57
GCT20_072	GCT20_15	GCT 2020	Gracetown	IV	10/03/2020	114,82735	-33,95464	114,82584	-33,93142	07:00	08:59
GCT20_073	GCT20_15	GCT 2020	Gracetown	IV	10/03/2020	114,82631	-33,95262	114,82492	-33,92924	07:02	09:03
GCT20_074	GCT20_15	GCT 2020	Gracetown	IV	10/03/2020	114,82533	-33,95071	114,82378	-33,92730	07:04	09:06
GCT20_075	GCT20_15	GCT 2020	Gracetown	IV	10/03/2020	114,82401	-33,94817	114,82172	-33,92565	07:07	09:10
GCT20_076	GCT20_16	GCT 2020	Gracetown	IV	10/03/2020	114,78916	-33,96407	114,78145	-33,95383	07:18	09:26
GCT20_077	GCT20_16	GCT 2020	Gracetown	IV	10/03/2020	114,78759	-33,96220	114,77991	-33,95223	07:21	09:29
GCT20_078	GCT20_16	GCT 2020	Gracetown	IV	10/03/2020	114,78615	-33,96034	114,77905	-33,95092	07:23	09:33
GCT20_079	GCT20_16	GCT 2020	Gracetown	IV	10/03/2020	114,78501	-33,95887	114,77798	-33,94960	07:25	09:37
GCT20_080	GCT20_16	GCT 2020	Gracetown	IV	10/03/2020	114,78316	-33,95683	114,77653	-33,94825	07:29	09:41
GCT20_081	GCT20_17	GCT 2020	Gracetown	IV	10/03/2020	114,69275	-33,98470	114,69826	-33,99958	10:06	12:05
GCT20_082	GCT20_17	GCT 2020	Gracetown	IV	10/03/2020	114,69167	-33,98381	114,69698	-33,99887	10:09	12:09
GCT20_083	GCT20_17	GCT 2020	Gracetown	IV	10/03/2020	114,69046	-33,98289	114,69559	-33,99852	10:13	12:11
GCT20_084	GCT20_17	GCT 2020	Gracetown	IV	10/03/2020	114,68922	-33,98177	114,69395	-33,99765	10:15	12:15
GCT20_085	GCT20_17	GCT 2020	Gracetown	IV	10/03/2020	114,68815	-33,98038	114,69289	-33,99662	10:18	12:19
GCT20_086	GCT20_18	GCT 2020	Gracetown	IV	10/03/2020	114,73697	-33,96292	114,73952	-33,96863	10:31	12:47
GCT20_087	GCT20_18	GCT 2020	Gracetown	IV	10/03/2020	114,73577	-33,96134	114,73854	-33,96707	10:34	12:50
GCT20_088	GCT20_18	GCT 2020	Gracetown	IV	10/03/2020	114,73433	-33,96007	114,73720	-33,96615	10:36	12:54
GCT20_089	GCT20_18	GCT 2020	Gracetown	IV	10/03/2020	114,73332	-33,95881	114,73622	-33,96534	10:38	12:58
GCT20_090	GCT20_18	GCT 2020	Gracetown	IV	10/03/2020	114,73187	-33,95736	114,73573	-33,96442	10:40	13:02
GCT20_091	GCT20_19	GCT 2020	Gracetown	IV	11/03/2020	114,76091	-34,04658	114,76096	-34,04701	07:30	09:30
GCT20_092	GCT20_19	GCT 2020	Gracetown	IV	11/03/2020	114,75965	-34,04517	114,75936	-34,04616	07:32	09:33
GCT20_093	GCT20_19	GCT 2020	Gracetown	IV	11/03/2020	114,75852	-34,04346	114,75774	-34,04536	07:35	09:37
GCT20_094	GCT20_19	GCT 2020	Gracetown	IV	11/03/2020	114,75714	-34,04199	114,75668	-34,04401	07:38	09:40
GCT20_095	GCT20_19	GCT 2020	Gracetown	IV	11/03/2020	114,75577	-34,04053	114,75527	-34,04278	07:41	09:44

GCT20_096	GCT20_20	GCT 2020	Gracetown	II	11/03/2020	114,74413	-34,06285	114,74457	-34,06991	07:53	09:55
GCT20_097	GCT20_20	GCT 2020	Gracetown	II	11/03/2020	114,74297	-34,06179	114,74375	-34,06915	07:56	09:58
GCT20_098	GCT20_20	GCT 2020	Gracetown	II	11/03/2020	114,74145	-34,06065	114,74278	-34,06781	07:59	10:01
GCT20_099	GCT20_20	GCT 2020	Gracetown	II	11/03/2020	114,74018	-34,05920	114,74180	-34,06685	08:02	10:06
GCT20_100	GCT20_20	GCT 2020	Gracetown	II	11/03/2020	114,73884	-34,05787	114,74069	-34,06557	08:04	10:10
GCT22_001	GCT22_01	GCT 2022	Gracetown	II	22/02/2022	114,71682	-34,11028	114,72045	-34,11341	08:10	10:10
GCT22_002	GCT22_01	GCT 2022	Gracetown	II	22/02/2022	114,71679	-34,10883	114,72066	-34,11540	08:12	10:13
GCT22_003	GCT22_01	GCT 2022	Gracetown	II	22/02/2022	114,71699	-34,10587	114,72056	-34,11731	08:14	10:16
GCT22_004	GCT22_01	GCT 2022	Gracetown	II	22/02/2022	114,71702	-34,10375	114,71995	-34,11923	08:16	10:19
GCT22_005	GCT22_01	GCT 2022	Gracetown	II	22/02/2022	114,71701	-34,10347	114,72032	-34,12106	08:18	10:24
GCT22_006	GCT22_02	GCT 2022	Gracetown	II	22/02/2022	114,68552	-34,08499	114,69812	-34,09675	08:33	10:45
GCT22_007	GCT22_02	GCT 2022	Gracetown	II	22/02/2022	114,68517	-34,08189	114,69761	-34,09532	08:35	10:47
GCT22_008	GCT22_02	GCT 2022	Gracetown	II	22/02/2022	114,68511	-34,07990	114,69745	-34,09436	08:37	10:49
GCT22_009	GCT22_02	GCT 2022	Gracetown	II	22/02/2022	114,68521	-34,07765	114,69750	-34,09339	08:39	10:51
GCT22_010	GCT22_02	GCT 2022	Gracetown	II	22/02/2022	114,68528	-34,07735	114,69738	-34,09252	08:41	10:53
GCT22_011	GCT22_03	GCT 2022	Gracetown	II	22/02/2022	114,74757	-34,11229	114,75131	-34,11353	11:18	13:19
GCT22_012	GCT22_03	GCT 2022	Gracetown	II	22/02/2022	114,74958	-34,11071	114,75079	-34,11209	11:20	13:22
GCT22_013	GCT22_03	GCT 2022	Gracetown	II	22/02/2022	114,74904	-34,10826	114,75077	-34,11062	11:22	13:25
GCT22_014	GCT22_03	GCT 2022	Gracetown	II	22/02/2022	114,74872	-34,10714	114,75164	-34,10869	11:24	13:28
GCT22_015	GCT22_03	GCT 2022	Gracetown	II	22/02/2022	114,74786	-34,10579	114,75257	-34,10709	11:26	13:31
GCT22_016	GCT22_04	GCT 2022	Gracetown	II	22/02/2022	114,78261	-34,08511	114,78241	-34,07086	11:41	13:56
GCT22_017	GCT22_04	GCT 2022	Gracetown	II	22/02/2022	114,78218	-34,08155	114,78088	-34,06699	11:43	13:59
GCT22_018	GCT22_04	GCT 2022	Gracetown	II	22/02/2022	114,78131	-34,07976	114,78010	-34,06596	11:45	14:02
GCT22_019	GCT22_04	GCT 2022	Gracetown	II	22/02/2022	114,78010	-34,07810	114,77887	-34,06408	11:47	14:05
GCT22_020	GCT22_04	GCT 2022	Gracetown	II	22/02/2022	114,77974	-34,07646	114,77963	-34,06378	11:49	14:08
GCT22_021	GCT22_05	GCT 2022	Gracetown	VI	28/02/2022	114,78627	-33,95090	114,78425	-33,94900	08:57	10:58
GCT22_022	GCT22_05	GCT 2022	Gracetown	VI	28/02/2022	114,78607	-33,94836	114,78618	-33,94827	08:59	11:01
GCT22_023	GCT22_05	GCT 2022	Gracetown	VI	28/02/2022	114,78601	-33,94682	114,78704	-33,94670	09:01	11:04
GCT22_024	GCT22_05	GCT 2022	Gracetown	VI	28/02/2022	114,78577	-33,94492	114,78703	-33,94475	09:03	11:07
GCT22_025	GCT22_05	GCT 2022	Gracetown	VI	28/02/2022	114,78579	-33,94348	114,78677	-33,94302	09:05	11:10
GCT22_026	GCT22_06	GCT 2022	Gracetown	VI	28/02/2022	114,78554	-33,97632	114,77505	-33,96767	09:15	11:38
GCT22_027	GCT22_06	GCT 2022	Gracetown	VI	28/02/2022	114,78523	-33,97447	114,77404	-33,96611	09:17	11:41

GCT22_028	GCT22_06	GCT 2022	Gracetown	VI	28/02/2022	114,78499	-33,97252	114,77300	-33,96425	09:19	11:44
GCT22_029	GCT22_06	GCT 2022	Gracetown	VI	28/02/2022	114,78462	-33,97060	114,77199	-33,96237	09:21	11:47
GCT22_030	GCT22_06	GCT 2022	Gracetown	VI	28/02/2022	114,78440	-33,96866	114,77113	-33,96059	09:23	11:50
GCT22_031	GCT22_07	GCT 2022	Gracetown	VI	28/02/2022	114,72104	-33,97507	114,71628	-33,96868	12:03	14:04
GCT22_032	GCT22_07	GCT 2022	Gracetown	VI	28/02/2022	114,72030	-33,97348	114,71826	-33,96727	12:05	14:07
GCT22_033	GCT22_07	GCT 2022	Gracetown	VI	28/02/2022	114,71952	-33,97181	114,72000	-33,96633	12:07	14:10
GCT22_034	GCT22_07	GCT 2022	Gracetown	VI	28/02/2022	114,71872	-33,97008	114,72182	-33,96511	12:09	14:13
GCT22_035	GCT22_07	GCT 2022	Gracetown	VI	28/02/2022	114,71808	-33,96854	114,72383	-33,96359	12:11	14:16
GCT22_036	GCT22_08	GCT 2022	Gracetown	VI	28/02/2022	114,71843	-34,00858	114,70859	-34,00248	12:20	14:30
GCT22_037	GCT22_08	GCT 2022	Gracetown	VI	28/02/2022	114,71870	-34,00621	114,70689	-34,00107	12:22	14:33
GCT22_038	GCT22_08	GCT 2022	Gracetown	VI	28/02/2022	114,71892	-34,00379	114,70569	-33,99923	12:24	14:36
GCT22_039	GCT22_08	GCT 2022	Gracetown	VI	28/02/2022	114,71896	-34,00168	114,70547	-33,99748	12:26	14:39
GCT22_040	GCT22_08	GCT 2022	Gracetown	VI	28/02/2022	114,71906	-33,99989	114,70525	-33,99562	12:28	14:42
GCT22_041	GCT22_09	GCT 2022	Gracetown	VI	28/02/2022	114,85069	-33,95287	114,85277	-33,96117	15:20	17:23
GCT22_042	GCT22_09	GCT 2022	Gracetown	VI	28/02/2022	114,85102	-33,95116	114,85290	-33,95986	15:22	17:26
GCT22_043	GCT22_09	GCT 2022	Gracetown	VI	28/02/2022	114,85132	-33,94948	114,85338	-33,95853	15:24	17:29
GCT22_044	GCT22_09	GCT 2022	Gracetown	VI	28/02/2022	114,85162	-33,94796	114,85414	-33,95744	15:26	17:32
GCT22_045	GCT22_09	GCT 2022	Gracetown	VI	28/02/2022	114,85191	-33,94654	114,85539	-33,95626	15:28	17:35
GCT22_046	GCT22_10	GCT 2022	Gracetown	VI	28/02/2022	114,88322	-33,97825	114,88790	-33,98422	15:40	17:43
GCT22_047	GCT22_10	GCT 2022	Gracetown	VI	28/02/2022	114,88446	-33,97670	114,88833	-33,98283	15:42	17:46
GCT22_048	GCT22_10	GCT 2022	Gracetown	VI	28/02/2022	114,88564	-33,97530	114,88949	-33,98146	15:44	17:49
GCT22_049	GCT22_10	GCT 2022	Gracetown	VI	28/02/2022	114,88710	-33,97328	114,89124	-33,98043	15:46	17:52
GCT22_050	GCT22_10	GCT 2022	Gracetown	VI	28/02/2022	114,88814	-33,97153	114,89273	-33,97954	15:48	17:55
GCT22_051	GCT22_11	GCT 2022	Gracetown	II	03/03/2022	114,81442	-34,11252	114,81882	-34,07411	07:37	09:47
GCT22_052	GCT22_11	GCT 2022	Gracetown	II	03/03/2022	114,81563	-34,11055	114,81793	-34,07443	07:39	09:50
GCT22_053	GCT22_11	GCT 2022	Gracetown	II	03/03/2022	114,81710	-34,10871	114,81702	-34,07483	07:41	09:53
GCT22_054	GCT22_11	GCT 2022	Gracetown	II	03/03/2022	114,81810	-34,10731	114,81654	-34,07581	07:43	09:56
GCT22_055	GCT22_11	GCT 2022	Gracetown	II	03/03/2022	114,81962	-34,10556	114,81603	-34,07672	07:45	09:59
GCT22_056	GCT22_12	GCT 2022	Gracetown	II	03/03/2022	114,81397	-34,08635	114,80619	-34,05079	07:50	10:11
GCT22_057	GCT22_12	GCT 2022	Gracetown	II	03/03/2022	114,81576	-34,08336	114,80633	-34,04844	07:52	10:14
GCT22_058	GCT22_12	GCT 2022	Gracetown	II	03/03/2022	114,81684	-34,08208	114,80702	-34,04647	07:54	10:17
GCT22_059	GCT22_12	GCT 2022	Gracetown	II	03/03/2022	114,81851	-34,07990	114,80818	-34,04500	07:56	10:20

GCT22_060	GCT22_12	GCT 2022	Gracetown	II	03/03/2022	114,81987	-34,07786	114,80816	-34,04284	07:58	10:23
GCT22_061	GCT22_13	GCT 2022	Gracetown	VI	03/03/2022	114,78368	-34,02997	114,76384	-34,01004	10:35	12:37
GCT22_062	GCT22_13	GCT 2022	Gracetown	VI	03/03/2022	114,78328	-34,02805	114,76275	-34,00802	10:37	12:39
GCT22_063	GCT22_13	GCT 2022	Gracetown	VI	03/03/2022	114,78285	-34,02547	114,76196	-34,00580	10:39	12:41
GCT22_064	GCT22_13	GCT 2022	Gracetown	VI	03/03/2022	114,78265	-34,02260	114,76051	-34,00174	10:41	12:43
GCT22_065	GCT22_13	GCT 2022	Gracetown	VI	03/03/2022	114,78246	-34,02016	114,76041	-34,00162	10:43	12:45
GCT22_066	GCT22_14	GCT 2022	Gracetown	VI	03/03/2022	114,81665	-34,03347	114,79642	-34,00646	10:52	12:55
GCT22_067	GCT22_14	GCT 2022	Gracetown	VI	03/03/2022	114,81641	-34,02968	114,79594	-34,00673	10:54	12:58
GCT22_068	GCT22_14	GCT 2022	Gracetown	VI	03/03/2022	114,81652	-34,02763	114,79467	-34,00618	10:56	13:01
GCT22_069	GCT22_14	GCT 2022	Gracetown	VI	03/03/2022	114,81630	-34,02547	114,79453	-34,00674	10:58	13:04
GCT22_070	GCT22_14	GCT 2022	Gracetown	VI	03/03/2022	114,81568	-34,02364	114,79392	-34,00689	11:00	13:07
GCT22_071	GCT22_15	GCT 2022	Gracetown	VI	03/03/2022	114,82951	-34,01425	114,81461	-34,00653	13:39	15:39
GCT22_072	GCT22_15	GCT 2022	Gracetown	VI	03/03/2022	114,82974	-34,01228	114,81496	-34,00526	13:41	15:41
GCT22_073	GCT22_15	GCT 2022	Gracetown	VI	03/03/2022	114,82985	-34,00963	114,81542	-34,00252	13:43	15:43
GCT22_074	GCT22_15	GCT 2022	Gracetown	VI	03/03/2022	114,82989	-34,00827	114,81627	-34,00116	13:45	15:45
GCT22_075	GCT22_15	GCT 2022	Gracetown	VI	03/03/2022	114,82984	-34,00738	114,81680	-34,00126	13:47	15:47
GCT22_076	GCT22_16	GCT 2022	Gracetown	VI	03/03/2022	114,86575	-34,02403	114,85966	-34,01117	13:49	15:49
GCT22_077	GCT22_16	GCT 2022	Gracetown	VI	03/03/2022	114,86616	-34,02167	114,86053	-34,01011	13:51	15:51
GCT22_078	GCT22_16	GCT 2022	Gracetown	VI	03/03/2022	114,86659	-34,01999	114,86089	-34,00887	13:53	15:53
GCT22_079	GCT22_16	GCT 2022	Gracetown	VI	03/03/2022	114,86739	-34,01828	114,86174	-34,00759	13:55	15:55
GCT22_080	GCT22_16	GCT 2022	Gracetown	VI	03/03/2022	114,86817	-34,01658	114,86252	-34,00645	13:57	15:57
GCT22_081	GCT22_17	GCT 2022	Gracetown	II	04/03/2022	114,84669	-34,11178	114,83014	-34,09687	07:30	09:32
GCT22_082	GCT22_17	GCT 2022	Gracetown	II	04/03/2022	114,84428	-34,11097	114,82768	-34,09651	07:32	09:35
GCT22_083	GCT22_17	GCT 2022	Gracetown	II	04/03/2022	114,84190	-34,11025	114,82495	-34,09593	07:34	09:38
GCT22_084	GCT22_17	GCT 2022	Gracetown	II	04/03/2022	114,83954	-34,10941	114,82265	-34,09544	07:36	09:41
GCT22_085	GCT22_17	GCT 2022	Gracetown	II	04/03/2022	114,83748	-34,10867	114,82002	-34,09453	07:38	09:44
GCT22_086	GCT22_18	GCT 2022	Gracetown	II	04/03/2022	114,87303	-34,08930	114,86315	-34,07679	07:52	09:54
GCT22_087	GCT22_18	GCT 2022	Gracetown	II	04/03/2022	114,87085	-34,08834	114,86193	-34,07816	07:54	09:57
GCT22_088	GCT22_18	GCT 2022	Gracetown	II	04/03/2022	114,86870	-34,08734	114,86085	-34,07875	07:56	10:00
GCT22_089	GCT22_18	GCT 2022	Gracetown	II	04/03/2022	114,86680	-34,08657	114,85892	-34,07936	07:58	10:03
GCT22_090	GCT22_18	GCT 2022	Gracetown	II	04/03/2022	114,86453	-34,08556	114,85682	-34,07899	08:00	10:06
GCT22_091	GCT22_19	GCT 2022	Gracetown	II	04/03/2022	114,91272	-34,10232	114,90310	-34,08202	10:30	12:32

GCT22_092	GCT22_19	GCT 2022	Gracetown	II	04/03/2022	114,91085	-34,10075	114,90191	-34,07999	10:32	12:35
GCT22_093	GCT22_19	GCT 2022	Gracetown	II	04/03/2022	114,90952	-34,09977	114,90071	-34,07850	10:34	12:38
GCT22_094	GCT22_19	GCT 2022	Gracetown	II	04/03/2022	114,90776	-34,09831	114,89934	-34,07658	10:36	12:41
GCT22_095	GCT22_19	GCT 2022	Gracetown	II	04/03/2022	114,90613	-34,09696	114,89810	-34,07485	10:38	12:44
GCT22_096	GCT22_20	GCT 2022	Gracetown	II	04/03/2022	114,88808	-34,12926	114,88253	-34,09876	10:50	12:52
GCT22_097	GCT22_20	GCT 2022	Gracetown	II	04/03/2022	114,88588	-34,12683	114,88091	-34,09948	10:52	12:55
GCT22_098	GCT22_20	GCT 2022	Gracetown	II	04/03/2022	114,88386	-34,12466	114,87977	-34,09890	10:54	12:58
GCT22_099	GCT22_20	GCT 2022	Gracetown	II	04/03/2022	114,88286	-34,12344	114,87842	-34,09976	10:56	13:01
GCT22_100	GCT22_20	GCT 2022	Gracetown	II	04/03/2022	114,88102	-34,12146	114,87789	-34,09987	10:58	13:04

Appendix 3: Abundance of species observed in Geographe and Gracetown in Mid-Water BRUVS, by taxa, lowest taxonomic identification, common name, total abundance across all survey, abundance for each survey.

Taxa	Binomial	Common Name	Total	GEO17	GEO18	GEO19	GEO20	GEO22	GCT18	GCT19	GCT20	GCT22
Fishes and sharks												
Apogonidae	Apogonidae sp	cardinalfishes	107					107				
Aracanidae	*Anoplocapros amygdaloides*	western smooth boxfish	1		1							
	Anoplocapros lenticularis	white-barred boxfish	1					1				
Arripidae	*Arripis georgianus*	Australian herring	132			132						
Carangidae	Carangidae sp	jacks	821	6	105	61	1	96	30	121	332	69
	Carangoides sp	Carangoides trevally	2						2			
	Decapterus muroadsi	amberstripe scad	1						1			
	Decapterus sp	Decapterus scad	2283			4	558	723	10	21	17	950
	Naucrates ductor	pilotfish	6								5	1
	Pseudocaranx dentex	white trevally	75			75						
	Pseudocaranx georgianus	silver trevally	624				285	339				
	Pseudocaranx sp	Pseudocaranx trevally	122				14	89	1		1	17
	Pseudocaranx wrighti	skipjack trevally	3				2	1				
	Seriola hippos	samson fish	53		17	11	11	14				
	Seriola lalandi	yellowtail amberjack	3					1	1			1
	Seriola sp	amberjack	4		1						3	
	Trachurus sp	horse mackerel	3				3					
Carcharhinidae	*Carcharhinus brachyurus*	copper shark	38			5	2	4	15	4	7	1
	Carcharhinus obscurus	dusky shark	17					16				1
	Carcharhinus sp	requiem shark	22					11			2	9
	Galeocerdo cuvier	tiger shark	17	3		2	6	6				
Cheilodactylidae	*Dactylophora nigricans*	dusky morwong	7			2	2	3				
	Nemadactylus valenciennesi	sea carp	1					1				
Clupeidae	*Clupeidae* sp	herrings	7918	256		2726	1197	2358	70	1311		
Coryphaenidae	*Coryphaena hippurus*	common dolphinfish	18						2		16	
Dasyatidae	*Bathytoshia brevicaudata*	short-tail stingray	9			6	1	2				
	Dasyatidae sp	whiptail stingrays	2		2							
Dinolestidae	*Dinolestes lewini*	longfin pike	36					36				
Echeneidae	*Echeneidae* sp	remoras	1									1
	Echeneis naucrates	live sharksucker	4			1		1	1			1

	Remora remora	shark sucker	3	3													
Enoplosidae	*Enoplosus armatus*	old wife	3							1		2					
Fistulariidae	*Fistularia petimba*	red cornetfish	1							1							
	Fistularia sp	cornetfish	7							1		1	1				4
Glaucosomatidae	*Glaucosoma hebraicum*	West Australian dhufish	2									2					
Juvenile	*Juvenile* sp	juvenile	1976	2	168		228		835			16		107	306		222	92
Kyphosidae	*Girella zebra*	zebra fish	10							6		4					
	Kyphosus sydneyanus	silver drummer	7				7										
	Neatypus obliquus	footballer sweep	44					12		8	24						
	Scorpis aequipinnis	sea sweep	2					2									
	Tilodon sexfasciatus	moonlighter	4							1	3						
Labridae	*Bodianus frenchii*	foxfish	1							1							
	Choerodon rubescens	baldchin groper	12				3			1		8					
	Coris auricularis	western king wrasse	109					52		28		29					
	Labridae sp	wrasses	49									49					
	Notolabrus parilus	brownspotted wrasse	14				4		4			6					
	Ophthalmolepis lineolata	southern maori wrasse	60					18		22		20					
	Pseudolabrus biserialis	redband wrasse	3									3					
	Suezichthys sp	rainbow wrasse	1				1										
Lamnidae	*Carcharodon carcharias*	white pointer	1								1						
	Isurus oxyrinchus	shortfin mako	7	1	1									1			3	1
	Sepioteuthis australis	southern calamari	9					3			5					1		
Monacanthidae	*Acanthaluteres* sp	Acanthaluteres leatherjacket	203					203									
	Acanthaluteres vittiger	toothbush leatherjacket	21							21							
	Meuschenia flavolineata	yellow-striped leatherjacket	1									1					
	Meuschenia hippocrepis	horse-shoe leatherjacket	1									1					
	Meuschenia sp	Meuschenia leatherjacket	7									7					
	Monacanthidae sp	leatherjackets	76		8		34		1			12		1	2		1	17
	Nelusetta ayraud	ocean leatherjacket	78			4		72								2		
Mullidae	*Upeneichthys vlamingii*	southern goatfish	4					4									

Taxa	Binomial	Common Name	Total	GEO17	GEO18	GEO19	GEO20	GEO22	GCT18	GCT19	GCT20	GCT22
Myliobatidae	*Myliobatis australis*	Australian bull ray	3			3						
	Myliobatis tenuicaudatus	eagle ray	3				1	2				
Nomeidae	*Nomeidae* sp	driftfishes	1						1			
Pempheridae	*Pempheridae* sp	sweeper	3			3						
Pomacentridae	*Chromis klunzingeri*	black-headed puller	423			302	95	26				
	Chromis sp	damselfish	260					260				
	Parma sp	scalyfin	2			1		1				
Priacanthidae	*Priacanthidae* sp	bigeyes	1									1
Scombridae	*Katsuwonus pelamis*	skipjack tuna	186							186		
	Sarda sp	bonito	15						15			
	Scomber australasicus	blue mackerel	80			56	13			11		
	Scomberomorus commerson	Spanish mackerel	1					1				
	Scombridae sp	mackerels, tunas, bonitos	1						1			
	Thunnus maccoyii	southern bluefin tuna	272		27	3	25	29	25	9	107	47
	Thunnus sp	Thunnus tuna	51				1				5	45
Serranidae	*Caesioscorpis theagenes*	blowhole perch	272					272				
	Epinephelides armatus	breaksea cod	1			1						
Sillaginidae	*Sillaginodes punctatus*	King George whiting	1					1				
Sparidae	*Pagrus auratus*	pink snapper	31			8	11	12				
Sphyraenidae	*sphyraena novaehollandiae*	Australian barracuda	6					6				
	sphyraena sp	barracudas	1			1						
Sphyrnidae	*sphyrna lewini*	scalloped hammerhead	5								5	
	sphyrna zygaena	smooth hammerhead	1								1	
Syngnathidae	*Syngnathidae* sp	Pipefishes	4					1		3		
Tetraodontidae	*Lagocephalus sceleratus*	silver-cheeked toadfish	3					3				
Trygonorrhinidae	*Trygonorrhina dumerilii*	Southern fiddler ray	1					1				
Unknown	*Unknown sp*	unknown fish	6	3					3			
Invertebrates												
Asteroidea	Asteroidea sp	sea star	1					1				
Hydrozoa	Hydrozoa sp	sea jellies	15		11		3	1				
Loliginidae	Loliginidae sp	pencil squid	1					1				

Ommastrephidae	Nototodarus gouldi	Gould's flying squid	4				2	2				1		
	Ommastrephidae sp	flying squids	1										1	
Salpidae	Salpidae sp	salps	31								28			3
Scyphozoa	Scyphozoa sp	true sea jellies	4			1								3
Tentaculata	Tentaculata sp	comb jellies	420		70	201				7				142
Thaliacea	Thaliacea sp	salps	18								11			7
Others														
Balaenopteridae	Balaenoptera acutorostrata	northern minke whale	2				2							
Delphinidae	Delphinidae sp	dolphins	2											2
Cheloniidae	Cheloniidae sp	turtles	1	1										
Aves	Aves sp	seabirds	17						10	7				
Procellariidae	Puffinus sp	puffin	4											4

Appendix 4: Species observed in Geographe and Gracetown with, from left to right, their taxa, lowest identification level, mean of both location length, minimum and maximum length in centimetres.

Taxa	Binomial	Common Name	mean FL	min FL	max FL
Fishes and sharks					
Apogonidae	Apogonidae sp	cardinalfishes	8,3	-	-
Aracanidae	*Anoplocapros amygdaloides*	western smooth boxfish	21,1	-	-
	Anoplocapros lenticularis	white-barred boxfish	21,9	-	-
Arripidae	*Arripis georgianus*	Australian herring	25,5	-	-
Carangidae	Carangidae sp	jacks	3,4	1,0	40,5
	Carangoides sp	Carangoides trevally	4,1	-	-
	Decapterus muroadsi	amberstripe scad	13,0	-	-
	Decapterus sp	Decapterus scad	6,3	0,8	37,1
	Naucrates ductor	pilotfish	11,1	2,6	19,5
	Pseudocaranx dentex	white trevally	16,3	7,7	32,7
	Pseudocaranx georgianus	silver trevally	20,2	7,1	54,1
	Pseudocaranx sp	Pseudocaranx trevally	16,5	8,2	29,5
	Pseudocaranx wrighti	skipjack trevally	14,4	-	-
	Seriola hippos	samson fish	71,3	11,4	110,2
	Seriola lalandi	yellowtail amberjack	56,9	30,7	71,7
	Seriola sp	amberjack	2,9	2,2	3,5
	Trachurus sp	horse mackerel	32,4	-	-
Carcharhinidae	*Carcharhinus brachyurus*	copper shark	173,0	71,7	296,4
	Carcharhinus obscurus	dusky shark	102,9	72,1	243,0
	Carcharhinus sp	requiem shark	171,8	70,7	304,9
	Galeocerdo cuvier	tiger shark	193,0	115,2	334,3
Cheilodactylidae	*Dactylophora nigricans*	dusky morwong	74,7	51,0	94,6
	Nemadactylus valenciennesi	sea carp	63,1	-	-
Clupeidae	*Clupeidae* sp	herrings	18,3	5,1	34,6
Coryphaenidae	*Coryphaena hippurus*	common dolphinfish	66,6	54,2	82,5
Dasyatidae	*Bathytoshia brevicaudata*	short-tail stingray	140,4	71,8	209,0
	Dasyatidae sp	whiptail stingrays	85,0	-	-
Dinolestidae	*Dinolestes lewini*	longfin pike	32,5	-	-
Echeneidae	*Echeneidae* sp	remoras	38,6	-	-
	Echeneis naucrates	live sharksucker	31,4	24,2	38,6

	Remora remora	shark sucker	16,8	13,0	20,7
Enoplosidae	*Enoplosus armatus*	old wife	30,0	-	-
Fistulariidae	*Fistularia petimba*	red cornetfish	130,1	-	-
	Fistularia sp	cornetfish	13,9	12,6	19,1
Glaucosomatidae	*Glaucosoma hebraicum*	West Australian dhufish	50,5	-	-
Juvenile	*Juvenile* sp	juvenile	2,0	0,6	14,2
Kyphosidae	*Girella zebra*	zebra fish	39,8	-	-
	Kyphosus sydneyanus	silver drummer	50,8	-	-
	Neatypus obliquus	footballer sweep	14,6	10,6	17,1
	Scorpis aequipinnis	sea sweep	36,1	-	-
	Tilodon sexfasciatus	moonlighter	30,8	23,5	38,0
Labridae	*Bodianus frenchii*	foxfish	25,0	-	-
	Choerodon rubescens	baldchin groper	42,8	29,8	88,6
	Coris auricularis	western king wrasse	31,7	18,5	43,3
	Labridae sp	wrasses	33,9	-	-
	Notolabrus parilus	brownspotted wrasse	38,6	34,5	43,1
	Ophthalmolepis lineolata	southern maori wrasse	29,4	19,0	36,3
	Pseudolabrus biserialis	redband wrasse	20,9	20,9	21,0
	Suezichthys sp	rainbow wrasse	9,5	-	-
Lamnidae	*Carcharodon carcharias*	white pointer	416,2	-	-
	Isurus oxyrinchus	shortfin mako	148,1	81,8	210,4
	Sepioteuthis australis	southern calamari	18,7	7,9	32,0
Monacanthidae	*Acanthaluteres* sp	Acanthaluteres leatherjacket	25,0	-	-
	Acanthaluteres vittiger	toothbush leatherjacket	25,0	-	-
	Meuschenia flavolineata	yellow-striped leatherjacket	25,0	-	-
	Meuschenia hippocrepis	horse-shoe leatherjacket	40,0	-	-
	Meuschenia sp	Meuschenia leatherjacket	30,0	-	-
	Monacanthidae sp	leatherjackets	5,9	0,9	27,1
	Nelusetta ayraud	ocean leatherjacket	17,3	13,0	36,8
Mullidae	*Upeneichthys vlamingii*	southern goatfish	21,5	-	-

Myliobatidae	*Myliobatis australis*	Australian bull ray	78,8	-	-
	Myliobatis tenuicaudatus	eagle ray	100,0	-	-
Nomeidae	*Nomeidae* sp	driftfishes	4,3	-	-
Pempheridae	*Pempheridae* sp	sweeper	10,9	-	-
Pomacentridae	*Chromis klunzingeri*	black-headed puller	5,3	-	-
	Chromis sp	damselfish	5,0	-	-
	Parma sp	scalyfin	14,0	-	-
Priacanthidae	*Priacanthidae* sp	bigeyes	3,5	-	-
Scombridae	*Katsuwonus pelamis*	skipjack tuna	46,7	39,4	61,3
	Sarda sp	bonito	28,4	23,6	37,9
	Scomber australasicus	blue mackerel	31,5	25,0	37,3
	Scomberomorus commerson	Spanish mackerel	137,9	-	-
	Scombridae sp	mackerels, tunas, bonitos	27,3	-	-
	Thunnus maccoyii	southern bluefin tuna	49,4	28,7	79,2
	Thunnus sp	Thunnus tuna	35,9	20,2	54,7
Serranidae	*Caesioscorpis theagenes*	blowhole perch	20,0	-	-
	Epinephelides armatus	breaksea cod	37,8	-	-
Sillaginidae	*Sillaginodes punctatus*	King George whiting	63,5	-	-
Sparidae	*Pagrus auratus*	pink snapper	39,8	22,8	66,0
Sphyraenidae	*sphyraena novaehollandiae*	Australian barracuda	70,0	38,3	86,8
	sphyraena sp	barracudas	70,0	-	-
Sphyrnidae	*sphyrna lewini*	scalloped hammerhead	218,7	150,7	268,8
	sphyrna zygaena	smooth hammerhead	244,6	-	-
Syngnathidae	*Syngnathidae* sp	Pipefishes	8,5	6,6	14,3
Tetraodontidae	*Lagocephalus sceleratus*	silver-cheeked toadfish	52,3	48,4	56,1
Trygonorrhinidae	*Trygonorrhina dumerilii*	Southern fiddler ray	53,0	-	-
Unknown	Unknown sp	unknown fish	-	-	-
Invertebrates					
Asteroidea	Asteroidea sp	sea star	-	-	-
Hydrozoa	Hydrozoa sp	sea jellies	-	-	-
Loliginidae	Loliginidae sp	pencil squid	-	-	-

Ommastrephidae	Nototodarus gouldi	Gould's flying squid	-	-	-
	Ommastrephidae sp	flying squids	-	-	-
Salpidae	Salpidae sp	salps	-	-	-
Scyphozoa	Scyphozoa sp	true sea jellies	-	-	-
Tentaculata	Tentaculata sp	comb jellies	-	-	-
Thaliacea	Thaliacea sp	salps	-	-	-
Others					
Balaenopteridae	Balaenoptera acutorostrata	northern minke whale	541,2	-	-
Delphinidae	Delphinidae sp	dolphins	-	-	-
Cheloniidae	Cheloniidae sp	turtles	-	-	-
Aves	Aves sp	seabirds	-	-	-
Procellariidae	Puffinus sp	puffin	-	-	-