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Boat-based recreational fishing in Western Australia 2020/21

K.L. Ryan, E.K.M. Lai, C.B. Smallwood

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Enquiries:

WA Fisheries and Marine Research Laboratories,
PO Box 20,
North Beach, WA 6920

Tel: +61 8 9203 0111
Email: library@fish.wa.gov.au
Website: fish.wa.gov.au

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Department of Primary Industries and Regional Development
Gordon Stephenson House, 140 William Street, PERTH WA 6000
Telephone: (08) 6551 4444
Website: dpird.wa.gov.au
ABN: 18 951 343 745

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Executive Summary

The integrated surveys of boat-based recreational fishing include three components: (i) off-site Phone Surveys (encompassing an initial Screening Survey, a longitudinal Phone-Diary Survey, and Post-Enumeration Surveys); (ii) on-site Boat Ramp Surveys; and (iii) Remote Camera Surveys. The main data collection period from September 2020 to August 2021 (inclusive) provides comparisons with previous surveys in 2017/18 (September 2017 to August 2018), 2015/16 (September 2015 to August 2016), 2013/14 (May 2013 to April 2014) and 2011/12 (March 2011 to February 2012).

A total of 3,044 fishers completed the Phone-Diary Survey with 206,230 individual fish (including invertebrates) caught (kept or released) by fishers who participated in the survey. Fishing activity reported during the survey included 12,723 boat days, 13,808 fishing events and 37,475 fishing hours, across every day of the survey year and the majority of the State's coastline. Additionally, 5,398 fishers were interviewed in the Boat Ramp Surveys with 13,221 individual fish (or invertebrates) measured.

A diverse range of species/taxa were caught, including scalefish (209 species/taxa), elasmobranchs (20), crustaceans (7) and molluscs (6). A total of 3.02 million individual fish (including invertebrates) were caught from boat-based recreational fishing in 2020/21.

A similar proportion of the catch was either kept (1.66 million or 55%) or released (1.36 million or 45%). Approximately half of the total catch were finfish (1.64 million scalefish or elasmobranchs; 54%) in comparison to invertebrates (1.38 million crustaceans or molluscs; 48%). The proportion of finfish released (58%) was similar to the proportion of invertebrates released (42%).

School Whiting (*Sillago bassensis*, *S. vittata* and *S. schomburgkii*) were the most commonly caught finfish species statewide (320,029 kept or released by number, or 19% of the finfish catch), followed by Australian Herring (*Arripis georgianus*; 190,206 or 12%), Pink Snapper (*Chrysophrys auratus*; 136,268 or 8%), King George Whiting (*Sillaginodes punctatus*; 91,636 or 6%), Black Bream (*Acanthopagrus butcheri*; 61,500 or 4%), Grass Emperor (*Lethrinus laticaudis*; 58,256 or 4%), Silver Trevally (*Pseudocaranx* spp. complex; 55,109 or 3%), West Australian Dhufish (*Glaucosoma hebraicum*; 43,510 or 3%), Western King Wrasse (*Coris auricularis*; 40,587 or 2%), Chinaman Rockcod (*Epinephelus rivulatus*; 35,712 or 2%), Western Butterfish (*Pentapodus vitta*; 35,447 or 2%) and Baldchin Groper (*Choerodon rubescens*; 30,998 or 2%).

High release rates were observed for many of these species, including Black Bream (83%), Western King Wrasse (80%), Pink Snapper (76%), Western Butterfish (75%), Grass Emperor (66%), Chinaman Rockcod (56%) and West Australian Dhufish (50%). Release rates were lower for Silver Trevally (37%), Baldchin Groper (35%), King George Whiting (27%), Australian Herring (21%) and School Whiting (18%).

Western Rock Lobster (*Panulirus cygnus*) was the most commonly caught invertebrate statewide (662,583 kept or released by number, or 48% of the invertebrate catch),

followed by Blue Swimmer Crab (*Portunus armatus*; 571,240 or 41%), Squid (Order Teuthoidea; 104,478 or 8%). High release rates were observed for Blue Swimmer Crab (65%) compared with Western Rock Lobster (28%) and Squid (5%). These estimates exclude catches from boat-based recreational fishers that only held a Rock Lobster licence and shore-based recreational fishers.

At a statewide level, boat-based recreational fishing catches were generally consistent across the five surveys. At a resource level, comparisons can be made for the aggregated harvest (kept catch by weight) and the harvest range (95% confidence intervals of the kept catch by weight) of the top 10 or 15 species in each resource.

Nearshore and Estuarine species

The harvest ranges for the top 10 nearshore and estuarine species in the North Coast (representing 80% of the resource kept catch by numbers) were steady at 18 t (95% CI 12–23) in 2020/21 compared with 15 t (95% CI 9–20) in 2017/18, 21 t (95% CI 12–30) in 2015/16, 19 t (95% CI 12–26) in 2013/14 and 21 t (95% CI 11–32) in 2011/12.

The harvest ranges for the top 10 nearshore and estuarine species in the Gascoyne Coast (representing 89% of the resource kept catch by numbers) were steady at 10 t (95% CI 5–15) in 2020/21 compared with 7 t (95% CI 4–10) in 2017/18, 6 t (95% CI 3–9) in 2015/16, 10 t (95% CI 3–17) in 2013/14 and 8 t (95% CI 4–12) in 2011/12.

The harvest ranges for the top 10 nearshore and estuarine species in the West Coast (representing 95% of the resource kept catch by numbers) were steady at 78 t (95% CI 62–94) in 2020/21 compared with 53 t (95% CI 44–62) in 2017/18, 56 t (95% CI 46–67) in 2015/16, 67 t (95% CI 57–77) in 2013/14 and 106 t (95% CI 88–123) in 2011/12.

The harvest ranges for the top 10 nearshore and estuarine species in the South Coast (representing 97% of the resource kept catch by numbers) were steady at 24 t (95% CI 17–31) in 2020/21 compared with 13 t (95% CI 8–18) in 2017/18, 17 t (95% CI 11–22) in 2015/16 and 29 t (95% CI 20–39) in 2013/14, but lower than 46 t (95% CI 33–59) in 2011/12.

Demersal species

The harvest ranges for the top 15 demersal species in the North Coast (representing 86% of the resource kept catch by numbers) were steady at 52 t (95% CI 41–63) in 2020/21 compared with 70 t (95% CI 54–86) in 2017/18, 37 t (95% CI 29–45) in 2015/16 and 50 t (95% CI 39–61) in 2013/14, but lower than 76 t (95% CI 64–89) in 2011/12.

The harvest range for Spangled Emperor in the North Coast was steady at 3 t (95% CI 1–5) in 2020/21 compared with 3 t (95% CI 1–5) in 2017/18, 3 t (95% CI 1–6) in 2015/16 and 6 t (95% CI 1–10) in 2013/14, but lower than 14 t (95% CI 9–19) in 2011/12.

Harvest ranges in 2020/21 were steady compared with previous years for Coral Trout, Red Emperor, Grass Emperor, Rankin Cod, Blackspot Tuskfish, Saddletail Snapper, Stripey Snapper, Golden Snapper, Crimson Snapper, Mangrove Jack, Redthroat Emperor, Goldband Snapper, Brownstripe Snapper and Bluespotted Emperor.

The harvest ranges for the top 15 demersal species in the Gascoyne Coast (representing 79% of the resource kept catch by numbers) were steady at 93 t (95% CI 74–112) in 2020/21 compared with 86 t (95% CI 69–103) in 2017/18, 100 t (95% CI 80–120) in 2015/16 and 94 t (95% CI 76–112) in 2013/14, but lower than 143 t (95% CI 120–166) in 2011/12.

The harvest range for Spangled Emperor in the Gascoyne Coast was steady at 12 t (95% CI 7–17) in 2020/21 compared with 12 t (95% CI 6–18) in 2017/18, 12 t (95% CI 7–18) in 2015/16 and 16 t (95% CI 9–24) in 2013/14, but lower than 35 t (95% CI 21–49) in 2011/12.

Harvest ranges in 2020/21 were steady compared with previous years for Grass Emperor, Pink Snapper, Red Emperor, Goldband Snapper, Rankin Cod, Redthroat Emperor, Baldchin Groper, Coral Trout, Stripey Snapper, Saddletail Snapper, Mangrove Jack, Bluespotted Emperor, Crimson Snapper and Brownstripe Snapper.

The harvest ranges for the top 15 demersal species in the in the West Coast (representing 93% of the resource kept catch by numbers) were steady at 228 t (95% CI 200–256) in 2020/21 compared with 234 t (95% CI 203–266) in 2017/18 and 208 t (95% CI 181–235) in 2015/16, but higher than 152 t (95% CI 132–173) in 2013/14 and 162 t (95% CI 141–184) in 2011/12.

The harvest range for West Australian Dhufish was steady at 108 t (95% CI 85–130) in 2020/21 compared with 127 t (95% CI 100–153) in 2017/18, 113 t (95% CI 89–136) in 2015/16, 82 t (95% CI 64–100) in 2013/14 and 78 t (95% CI 60–97) in 2011/12.

The harvest range for Pink Snapper was steady at 52 t (95% CI 40–64) in 2020/21 compared with 48 t (95% CI 37–60) in 2017/18, 36 t (95% CI 27–45) in 2015/16 and 32 t (95% CI 25–40) in 2011/12, but higher than 30 t (95% CI 22–38) in 2013/14.

The harvest range for Baldchin Groper was steady at 38 t (95% CI 29–48) in 2020/21 compared with 32 t (95% CI 23–41) in 2017/18, 32 t (95% CI 23–40) in 2015/16 and 29 t (95% CI 21–37) in 2011/12, but higher than 20 t (95% CI 15–26) in 2013/14.

Harvest ranges in 2020/21 were steady compared with previous years for Breaksea Cod, Blue Morwong, Blue-eye Trevalla, Eightbar Grouper, Hapuku, Bass Groper, Emperors, Bight Redfish, Foxfish, Sergeant Baker, Sea Sweep and Ruby Snapper.

Harvest ranges for the top 10 demersal species in the South Coast (representing 96% of the resource kept catch by numbers) were steady at 47 t (95% CI 34–60) in 2020/21 compared with 62 t (95% CI 49–75) in 2017/18, 55 t (95% CI 40–69) in 2015/16, 37 t (95% CI 30–45) in 2013/14 and 58 t (95% CI 44–73) in 2011/12.

Harvest ranges in 2020/21 were steady compared with previous years for all species (Pink Snapper, Bight Redfish, Blue Morwong, West Australian Dhufish, Hapuku, Breaksea Cod, Harlequin Fish, Sea Sweep, Sergeant Baker and Foxfish).

Pelagic species

Harvest ranges for the top 15 pelagic species (or species groupings, representing 99% of the resource kept catch by numbers) were steady at 114 t (95% CI 89–138) in 2020/21 compared with 112 t (95% CI 91–133) in 2017/18, 119 t (95% CI 100–139) in 2015/16 and 152 t (95% CI 126–178) in 2013/14, but lower than 186 t (95% CI 160–212) in 2011/12.

The harvest range for Spanish Mackerel was steady at 56 t (95% CI 35–78) in 2020/21 compared with 49 t (95% CI 33–64) in 2017/18 and 43 t (95% CI 30–56) in 2015/16, 78 t (95% CI 56–100) in 2013/14 and 89 t (95% CI 69–109) in 2011/12.

The harvest range for Samsonfish was steady at 7 t (95% CI 4–10) in 2020/21 compared with 13 t (95% CI 8–18) in 2017/18 and 15 t (95% CI 10–21) in 2015/16, but lower than 22 t (95% CI 13–31) in 2013/14 and 17 t (95% CI 12–23) in 2011/12.

Harvest ranges in 2020/21 were steady compared with previous years for Yellowfin Tuna, Cobia, Southern Bluefin Tuna, Yellowtail Kingfish, Skipjack Tuna, Other Tuna, School Mackerel, Mackerels, Grey Mackerel, Shark Mackerel, Mahi Mahi, Mackerel Tuna and Spotted Mackerel.

Invertebrate species

Harvest ranges for Mud Crab in the North Coast (representing 91% of the statewide catch in 2020/21) were steady at 3.0 t (95% CI 1.0–4.9) in 2020/21 compared with 2.3 t (95% CI 1.1–3.6) in 2017/18, 2.4 t (95% CI 1.0–3.8) in 2015/16, 7.2 t (95% CI 4.0–10.4) in 2013/14 and 7.1 t (95% CI 4.1–10.2) in 2011/12.

Harvest ranges for Blue Swimmer Crab in the West Coast (representing 96% of the statewide catch in 2020/21) were steady at 43 t (95% CI 29–57) in 2020/21 compared with 59 t (95% CI 45–72) in 2017/18, 41 t (95% CI 32–51) in 2015/16 and 64 t (95% CI 50–78) in 2013/14, but lower than 85 t (95% CI 69–101) in 2011/12.

Future research

While this report compares five boat-based recreational fishing surveys, additional catches from charter-boat recreational fishing (reported in Tour Operator Returns) and shore-based fishing (where available) are used to determine the total catch from the recreational sector.

Data collected from the integrated surveys are extensive. While this report summarises key findings, further analyses are underway to investigate spatial and temporal changes in effort and catch; and refinement of sample weighting to identify any improvements that can be made. Additional reports will document vessel activity from remote camera surveys, as well as social and economic dimensions of boat-based recreational fishing.

Results will also contribute to management reviews for a number of aquatic resources. Specific performance indicators, reference levels and catch tolerances will be reported separately, and used to provide trends in total catch to assist in developing, monitoring and refining management arrangements.

1 Introduction

1.1 Importance of recreational fishing in Western Australia

Recreational fishing is a popular activity in Western Australia, providing important social and economic benefits to the State's population. The number of recreational fishers has increased from 315,000 in 1989/90 (Lindner and McLeod 1991) to 620,000 (95% CI 541,000–699,000) in 2020/21 (DPIRD 2021). The participation rate in recreational fishing is generally above the national average, with 26.6% of the population (aged 15 years or older) in 1989/90 (Lindner and McLeod 1991), 28.5% (aged 5 years or older) in 2000/01 (Henry and Lyle 2003), and 25.4% (95% CI 32–28.7%) in 2020/21 (DPIRD 2021). The expenditure attributable to recreational fishing in Western Australia has been estimated at $55–130 million in 1989/90 (Lindner and McLeod 1991), $338 million in 2000/01 (Henry and Lyle 2003) and $2.4 billion in 2015/16 (McLeod and Lindner 2018).

Recreational fishers often have important catch-related motives such as fishing to 'obtain a feed' or 'for fresh seafood'. However, there are also significant social benefits from recreational fishing. Recreational fishers in Western Australia also have non-catch related motives (e.g. 'to relax and unwind', 'to be outdoors', 'for solitude', or 'to be with family and friends') as their primary motive for fishing (Henry and Lyle 2003). While most recreational fishers only catch a relatively small number of fish, collectively the recreational catch can be substantial. In 2000/01, the total catch from boat- and shore-based recreational fishing in Western Australia included over 10.4 million finfish (by number) and 3.8 million invertebrates (by number; including crabs, prawns, lobster, and cephalopods) (Henry and Lyle 2003). The total catch from boat-based recreational fishing was: 2.4 million finfish (by number) and 1.4 million invertebrates in 2011/12 (Ryan et al. 2013); 2.0 million finfish and 1.4 million invertebrates in 2013/14 (Ryan et al. 2015); 1.3 million finfish and 1.5 million invertebrates in 2015/16 (Ryan et al. 2017); and 1.3 million finfish and 1.5 million invertebrates in 2017/18 (Ryan et al. 2019). This report provides an update of the estimated recreational catches from boat-based recreational fishing in 2020/21.

1.2 Need for recreational fishing information

Information on recreational fishing effort and catch is used to inform stock assessments, resource allocation between fishing sectors, and the development, implementation and review of management plans. Effective management of fish resources requires accurate information on the catch taken by all sectors; therefore, a high priority has been placed on the collection of data for key recreational fisheries in Western Australia (Wise and Fletcher 2013, Ryan et al. 2016).

Obtaining suitable recreational fishing data in Western Australia is challenging because of the State's large coastline (20,781 km), as well as ongoing regional development, which is changing the distribution and intensity of recreational fishing activity. In 2017/18, the proportion of days fished (by recall) from the annual Community Survey was highest in the West Coast bioregion (50%), around the capital city (Perth) and several of the

State's large regional centres (Bunbury, Busselton and Geraldton) (DPIRD 2018). Recreational fishing effort in marine waters was lower in the South Coast (17.9%), Gascoyne Coast (5.6%) and North Coast (17.9%) (DPIRD 2018).

Estimating the total recreational catch can be logistically difficult and is often relatively costly. These difficulties are especially apparent where there is no licence available to use as a sampling frame to easily identify recreational fishers. Historically, recreational fishers in Western Australia only required a licence for rock lobster, abalone, marron, freshwater angling and netting. Although the Recreational Boat Fishing Licence (RBFL) was introduced in March 2010, there is still no licence required for shore-based recreational fishing. As a result, there are no contemporary estimates of the shore-based catch. Importantly, in 2000/01, 57% of fishing effort and 54% of the recreational harvest was attributed to shore-based recreational fishing (Henry and Lyle 2003). It is likely that shore-based recreational fishing still represents a substantial component of the total recreational effort and harvest.

Recreational fishing licence fees generated $9.25 million in 2021 (DPIRD 2021). This revenue is invested in initiatives with direct benefit to recreational fishers in Western Australia, including recreational fishing surveys. These surveys provide harvest estimates and socio-economic information to inform management and policy, including Marine Stewardship Council (MSC) certification and Integrated Fisheries Management (IFM), to ensure fish resources are managed sustainably and shared between fishing sectors. To date, resource allocations have been developed for Western Rock Lobster (5% recreational, 95% commercial), metropolitan Roe's Abalone (with proportional allocation based on habitat biomass and sectorial effort), and the West Coast Demersal Scalefish Fishery (36% recreational, 64% commercial). The implementation of the new *Aquatic Resources Management Act 2016* (which will replace the *Fish Resources Management Act 1984*) will require all new Aquatic Resource Management Strategies to have sectoral allocations.

Long-term monitoring of recreational fishing will provide a greater understanding of spatial and temporal variability and trends in effort and catch that are essential for the assessment of stocks, resource allocation and management settings within the broad context of Ecologically Sustainable Development and Ecosystem Based Fisheries Management (DPIRD 2021, Newman et al. 2022).

1.3 Recreational fishing surveys in Australia

The spatial resolution of monitoring recreational fishing needs to be matched to the spatial scale at which fisheries are managed. For many jurisdictions, this requires off-site methods that are appropriate for sampling large geographical areas with numerous access points to the fishery and many recreational fishers (Pollock et al. 1994). The sampling frame used to randomly select recreational fishers for an off-site survey can range from a general population list (e.g. telephone directories) to specific lists (e.g. licence database). Sampling from telephone directories requires contacting many non-fishing households to locate fishing households and does not include unlisted (silent or

mobile) numbers (Taylor and Ryan 2019). Sampling from licence databases has a higher probability of contacting fishers and includes fishers with or without a listed telephone; however, effectiveness is determined by exemptions, data availability and non-compliance (Ryan et al. 2009, Hartill et al. 2012).

The National Recreational and Indigenous Fishing Survey (NRFS) provided statewide estimates of recreational fishing across Australia from 1 May 2000 to 30 April 2001 (Henry and Lyle 2003). This survey used telephone interviews of fishers who were randomly selected from White Pages telephone directories. This methodology has been employed in subsequent surveys in: South Australia from November 2007 to October 2008 (Jones 2009), December 2013 to November 2014 (Giri and Hall 2015), and February 2021 to February 2022 (in prep); Tasmania from December 2007 to November 2008 (Lyle et al. 2009), November 2012 to October 2013 (Lyle et al. 2014), and November 2017 to October 2018 (Lyle et al. 2019); New South Wales from June 2013 to May 2014 (West et al. 2015), October 2017 to September 2018 (Murphy et al. 2020); and November 2021 to October 2022 (Murphy et al. 2022); Northern Territory from April 2009 to March 2010 (West et al. 2012), and October 2018 to September 2019 (West et al. 2022); and Queensland from October 2010 to September 2011 (Taylor et al. 2012); November 2013 to October 2014 (Webley et al. 2015); and April 2019 to April 2020 (Misson et al. 2020a, 2020b, Teixeira et al. 2020).

Licence databases have been used as sampling frames for surveys designed to estimate the recreational catch for many specialised, low participation, licensed fisheries (e.g. abalone and rock lobster) (e.g. Lyle et al. 2021, Smallwood et al. 2021). The advantages of sampling from a licence database include reduced costs for the initial Screening Survey, high response rates (reducing non-response bias), and the ability to use an optimal survey design where avid fishers are oversampled, which can effectively increase the number of fishing events in the sample and improve precision (Ryan et al. 2009).

1.4 Recreational fishing surveys in Western Australia

This report presents results for the 12 months from September 2020 to August 2021 and provides comparisons with previous surveys conducted from March 2011 to February 2012, May 2013 to April 2014, September 2015 to August 2016, and September 2017 to August 2018 (Ryan et al. 2013, 2015, 2017, 2019). Prior to 2011, large scale surveys of boat-based recreational fishing in Western Australia included the statewide component of the National Recreational and Indigenous Fishing Survey (Henry and Lyle 2003), and Boat Ramp Surveys at a bioregion level. These included 12 month surveys in the West Coast in 1996/97 and 2005/06 (Sumner and Williamson 1999, Sumner et al. 2008, Wise and Fletcher 2013); Gascoyne Coast in 1998/99 (Sumner et al. 2002, Wise and Fletcher 2013) and 2007/08 (Marriott et al. 2012); North Coast in 1999/00 (Williamson et al. 2006); and South Coast in 2002/03 (Smallwood and Sumner 2007). The introduction of the Recreational Boat Fishing Licence (RBFL) provided a suitable sampling frame for a comprehensive surveys (both spatially and temporally) to estimate catch from boat-based recreational fishing in Western Australia. An integrated system that obtained data from

several survey methods, utilising the RBFL as the basis for sampling recreational fishers, was developed to provide the most robust approach for obtaining regular estimates of catch from boat-based recreational fishing at both statewide and bioregion levels (Wise and Fletcher 2013).

1.5 Integrated survey of boat-based recreational fishing

The integrated survey includes three complementary components: (i) off-site Phone Surveys using the RBFL as a sampling frame, with an initial Screening Survey to recruit respondents for the longitudinal Phone-Diary Survey, followed by Post-Enumeration Surveys to detect differences among licence holders (Wash-Up/Attitudinal, Non-Intending Fisher and Benchmark Surveys); (ii) on-site Boat Ramp Surveys to provide biological information; and (iii) Remote Camera Surveys using digital cameras mounted at key access points to record 24/7 launches and retrievals. The main period of data collection was the 12 months from September 2020 to August 2021, with the Post-Enumeration Surveys occurring from September to December 2021.

1.6 Survey objectives

The objectives of this survey were to estimate participation (by number of RBFL holders), effort (boat days and hours fished), catch for all species (total, kept and released, by number) and harvest ranges for key resources from boat-based recreational fishing for 12 months at statewide and bioregion levels. These estimates will complement data obtained routinely from the commercial sector. Additional objectives include estimating release rates and reasons for releasing any catch (e.g. size or bag limits, catch and release, or personal preference). The implementation of regular, reliable and cost-effective surveys will provide data that will allow more realistic and rigorous assessments of recreational fisheries.

1.7 Report structure

This report provides statewide and bioregion estimates of effort and catch from boat-based recreational fishing in Western Australia, with complete coverage temporally, spatially and for all recreational fishing methods (including line, pot, net and diving), from September 2020 to August 2021. Where appropriate, comparisons are made with previous surveys conducted biennially from 2011/12 to 2017/18.

Each chapter covers specific details or outputs, including:

Chapter 2 (Survey Design and Analysis) outlines the survey design and scope for the Phone, Boat Ramp and Remote Camera Surveys. Methods used for the expansion, weighting and analysis of survey data are discussed, along with measures of uncertainty associated with survey estimates.

Chapter 3 (Participation) presents estimates of the total number of RBFL holders that fished between September 2019 to August 2020 (Screening Survey) and September

2020 to August 2021 (Benchmark Survey). Participation has been summarised by age, gender, bioregion fished and avidity.

Chapter 4 (Fishing Effort) presents estimates of effort from boat-based recreational fishing during the Phone-Diary Survey, including annual effort (boat days and hours fished), statewide and for each bioregion, by habitat, fishing method and month.

Chapter 5 (Statewide Recreational Catch) presents estimates of catch from boat-based recreational fishing during the Phone-Diary Survey, including annual catch (total, kept and released, by number), proportions released (release rates) and reasons for release for all species.

Chapter 6 (Catch for Key Species) summarises estimates of catch from boat-based recreational fishing by bioregion, habitat, fishing method and season for key species, including indicator species within the Resource Assessment Framework.

Chapter 7 (Catch by Bioregion) provides an overview of species composition and estimates of catch from boat-based recreational fishing in each bioregion, including annual catch (total, kept and released, by number) and proportions released for all species.

Chapter 8 (Catch by Zone) provides an overview of species composition and estimates of catch from boat-based recreational fishing for zones within each bioregion, including annual catch (total, kept and released, by number) and proportions released for species where the sample size and relative standard error was considered acceptable (i.e. sample size ≥ 30 and relative standard error ≤ 40%.

Chapter 9 (Harvest Weights) provides an overview of the boat-based recreational catch (kept, by number), average weight and harvest (by weight) for the most commonly caught demersal, nearshore, pelagic and crab species/species groupings in each bioregion.

2 Survey Design and Analysis

This section outlines the survey design and scope for the Phone, Boat Ramp and Remote Camera Surveys, methods used for weighting and analysis of survey data, and measures of uncertainty associated with survey estimates. Most aspects were consistent with the previous surveys, with any differences discussed below.

2.1 Survey Scope

The integrated survey includes three complementary components: (i) off-site Phone Surveys (an initial Screening Survey, a longitudinal Phone-Diary Survey, followed by post-enumeration Wash-Up/Attitudinal, Non-Intending Fisher and Benchmark Surveys); (ii) on-site Boat Ramp Surveys; and (iii) Remote Camera Surveys. Output specifications are listed in Table 1 to identify what was considered in-scope for each survey.

2.1.1 Who was included in the survey?

Persons in scope included recreational fishers that held a Recreational Boat Fishing Licence (RBFL), which is required to undertake any general fishing activity from a motorised vessel in Western Australia. Boat-based recreational fishers are required to have a minimum of one RBFL holder on board and adhere to boat limits according to the number of licensed fishers, and in practice, the number of fishers generally equals the number of licensed fishers on board. In the Phone Surveys, fishers that held their licence in the 12 months prior to each survey component were in scope. An additional criterion for the Phone-Diary Survey was an intention to fish in the next 12 months (either from a boat or the shore). Commercial fishers were considered in scope if they held a RBFL, but any commercial catches by these fishers were not included. Indigenous fishing was not considered to be in the scope of this survey.

Persons in scope were comparable with previous surveys across all survey components, with an additional sample for the Screening Survey. Consistent with previous Screening Surveys, the additional sample was randomly selected from the RBFL database. This included any licence holders that concurrently held a Rock Lobster (RL) licence. However, approximately 40% of RL licence holders do not have a RBFL; consequently, previous surveys have underestimated the recreational catch of Western Rock Lobster. For this reason, the Screening Survey included an additional sample of 600 fishers who only held RL licences, with subsequent recruitment of intending fishers into the Phone-Diary Survey. This sample provided the appropriate data to estimate recreational catch of Western Rock Lobster by fishers that only held the species-specific licence for Rock Lobster. Results from the RL only sample will be reported separately (in comparison with results from mail and phone-recall surveys). Only the results from the RBFL sample are presented in this report to maintain consistency and comparability with previous surveys.

A minimum age criterion of 5 years was applied to all surveys. In the Phone Surveys, parents were always a proxy for children aged 5–13 years and parent permission was required for children aged 14–17 years. No further proxies were allowed, except for

nominated individuals within a household where there was language difficulty or illness. No substitution of respondents occurred during the Phone Surveys.

2.1.2 What fishing activities were covered?

All boat-based recreational fishing methods were in scope, including line fishing, diving, netting, potting and spear fishing, undertaken from a motorised vessel as per recreational fishing rules. Respondents in the Phone-Diary Survey reported the effort and catch for all fishers on the boat, which were standardised by the number of licensed fishers on each boat (i.e. catch per RBFL holder). Although fishers reported catch information from any charter-boat recreational fishing, this information was excluded from analysis because charter-boat catches are reported through mandatory Tour Operator Returns (Charter Logbooks). Unreported illegal (non-compliant) recreational fishing activity was not included in the surveys. The proportion of RBFL holders that fished from the shore was assessed in the Screening and Benchmark Surveys.

Activities in scope were comparable with recent surveys across all survey components. Only boat-based recreational fishing information was included in Phone-Diary Surveys in 2011/12 and 2013/14 (i.e. shore-based recreational fishers, and their attributable catch, were not collected). Both boat- and shore-based recreational fishing information by licensed fishers was included in Phone-Diary Surveys in 2015/16, 2017/18 and 2020/21, with shore-based fishing events reported on an individual basis. It is not known if the sample of RBFL holders is representative of shore-based recreational fishers that do not hold a RBFL, therefore, shore-based recreational fishing data collected in the Phone-Diary Surveys requires subsequent adjustment (Taylor and Ryan 2019).

Only the results from boat-based recreational fishing are presented in this report to maintain consistency and comparability with previous surveys. Results from shore-based recreational fishing will be reported separately.

2.1.3 What species were covered?

Species in scope included any aquatic animal species caught by recreational fishers. This includes both finfish (e.g. scalefish, sharks and rays) and invertebrates (e.g. abalone, cephalopods, crabs, lobsters and prawns). Most catches are reported for individual species, but there are some instances where species have been reported in taxonomic groups (e.g. School Whiting includes Southern School Whiting, Western School Whiting and Yellowfin Whiting, King Snapper includes *Pristipomoides* spp., Whaler Sharks includes Bronze Whaler and Dusky Sharks). Aggregating species at higher-level reporting groups is particularly relevant for species where misidentification can occur, despite attempts to assist fishers in identifying fish. Where species or taxa groups are represented by few records, catches are reported in broad taxonomic categories (e.g. ‘Other scalefish’). Species taxonomy follows the Codes for Australian Aquatic Biota (Rees et al. 2012, www.marine.csiro.au/caab/). Consistent with the management of many of the multi-species fisheries in Western Australia, the results were in some instances also reported at the species suite level.

2.1.4 Survey area

The geographic scope was fishing activity in Western Australia only. Consistent with the bioregion approach to fisheries management, the spatial strata for boat-based recreational fishing were the four marine bioregions off Western Australia (Figure 1). The Phone Surveys provided statewide coverage from all access points, while the Boat Ramp and Remote Camera Surveys provided statewide coverage as accessible from key access points (e.g. boat ramps or choke points) in each bioregion. Based on Ecosystem Based Fisheries Management policy, bioregions are divided into broad ecological depth-based habitats. These are pelagic (surface waters across all depths), offshore demersal (greater than 250m), inshore demersal (20–250m), nearshore (to 20m deep), estuarine (saltwater and 'brackish' to river mouth), and freshwater (river, stream, dams) (Figure 2).

2.1.5 Survey duration

The 12 months from September 2020 to August 2021 applied to the Phone-Diary, Boat Ramp and Remote Camera Surveys. The Phone Surveys included an initial Screening Survey during the three months prior to the Phone-Diary Survey, and Post-Enumeration Surveys during the three months following the Phone-Diary Survey. This survey period was consistent with recent surveys (September 2015 to August 2016, and September 2017 to August 2018), but different to earlier surveys (May 2013 to April 2014, and March 2011 to February 2012). These adjustments were made to transition the commencement of the Phone-Diary Survey to a month with low fishing activity across all bioregions.

The 12 months from September to August provides continuous coverage of peak fishing seasons in the West Coast and South Coast (i.e. summer and autumn) and peak fishing seasons in the North Coast and Gascoyne Coast (i.e. autumn and winter) (Ryan et al. 2013, 2015, 2017, 2019). The September to August survey period also includes complete fishing seasons for blue swimmer crab in Peel Harvey Estuary from November to August (i.e. closed season from September to October) and most of the fishing season for West Coast Demersal Scalefish (i.e. closed season mid-October to mid-December).

2.1.6 Survey data elements

Inherent differences between off-site (e.g. phone) and on-site (e.g. face-to-face) sampling was considered to ensure consistency (where possible) in the information collected from each survey component. A key difference between off-site and on-site sampling is whether fishing activity is recorded on an event or trip basis. For the Phone-Diary Survey, fishing information was collected on an 'event' basis, where separate events were recorded for changes in location, habitat, target species and/or fishing method. For example, line fishing and diving during a single trip would be recorded as separate events. Fishing activity in the Boat Ramp Surveys was recorded on a 'trip' or day basis. Where possible, data elements were standardised between surveys, in terms of question wording and responses. Reference tables for data elements (such as boat ramp, species, fishing method) were also standardised among survey components.

Table 1. Output Specifications for each survey component.

Specification		Phone Surveys			Boat Ramp Surveys	Camera Survey
		Screening	*Phone-Diary*	*Benchmark*		
Persons in scope	Residency status	All, including Western Australian residents and interstate visitors			All	N/A
	Age	<5 years excluded			All	N/A
	Sampling frame	RBFL Jul 2019 to Jun 2020		RBFL Sep 2020 to Aug 2021	Spatio-temporal frame	
Activities	Sectors	Recreational fishing only (traditional/indigenous fishing excluded)				
	Platform	Boat- and shore-based recreational fishing (by RBFL holders only)			Boat-based recreational fishing only	
	Boat type	All, including private-boat, for-hire and charter-boat*			Private-boat and for-hire (charter-boat excluded)	All, as per camera view at each ramp
	Methods	All methods including line fishing, diving, netting, potting, and spearing				
Species	Species	All aquatic (animal) species				N/A
	Catch	Kept and released			Kept	N/A
Geographic scope	Residency status	Western Australian residents, and interstate visitors			N/A	
	Fishing activity	Bioregion, marine vs freshwater	10x10 nautical mile grids statewide	Bioregion, marine vs freshwater	10x10 nautical mile grids statewide	N/A
	Fishing access	N/A	All, boat ramps (public and private), moorings and marinas	N/A	Key public boat ramps statewide	
Temporal scope	Annual coverage	12 months prior to Screening (by recall)	12 month longitudinal survey	12 months as per Phone-Diary (by recall)	Jan–Jul 2021	12 months as per Phone-Diary
	Day hours	All			Daylight hours	All
	Survey dates	Jun–Aug 2020	1 Sep 2020–31 Sep 2021	Sep–Nov 2021	Jan–Jul 2021	1 Sep 2020–31 Aug 2021

* charter-boat recreational fishing (i.e. tour operators) was excluded from analysis in the report

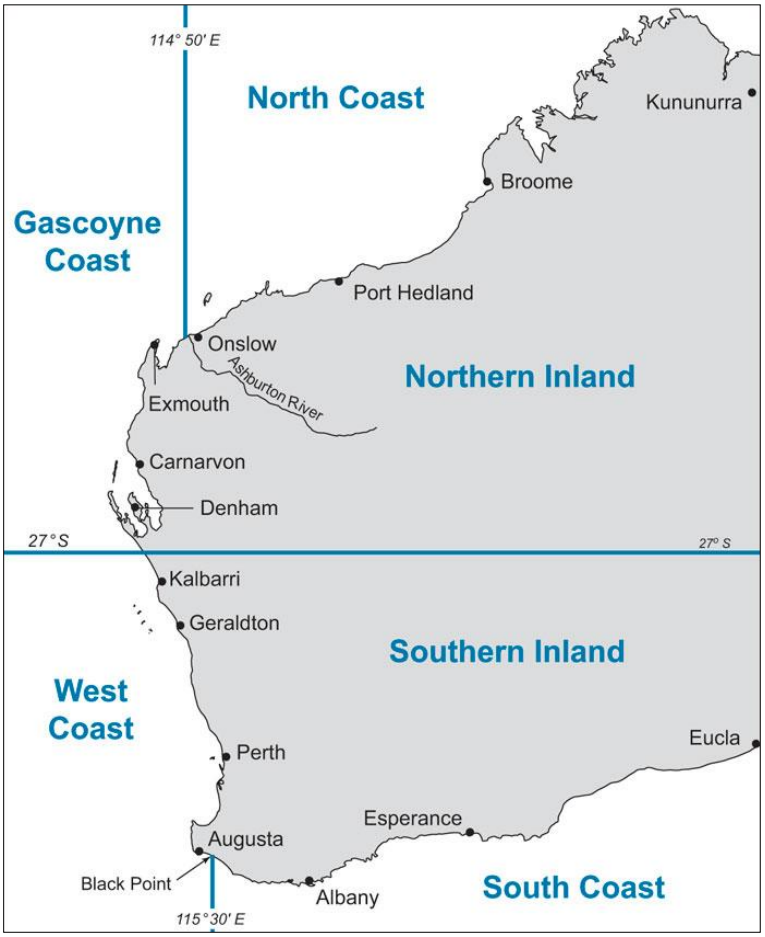


Figure 1. Marine bioregions for management of fisheries resources in Western Australia.

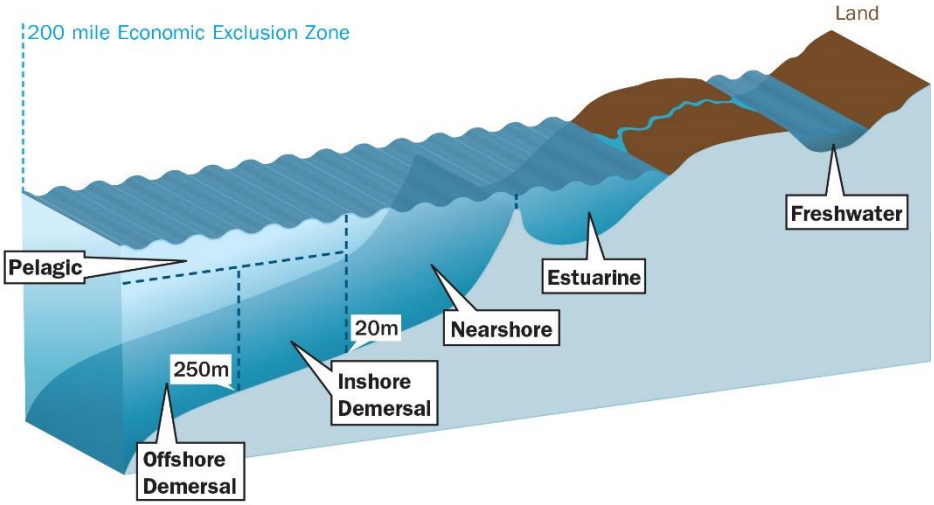


Figure 2. Habitat groups for management of fisheries resources in Western Australia.

2.2 Survey Components

2.2.1 Phone Surveys

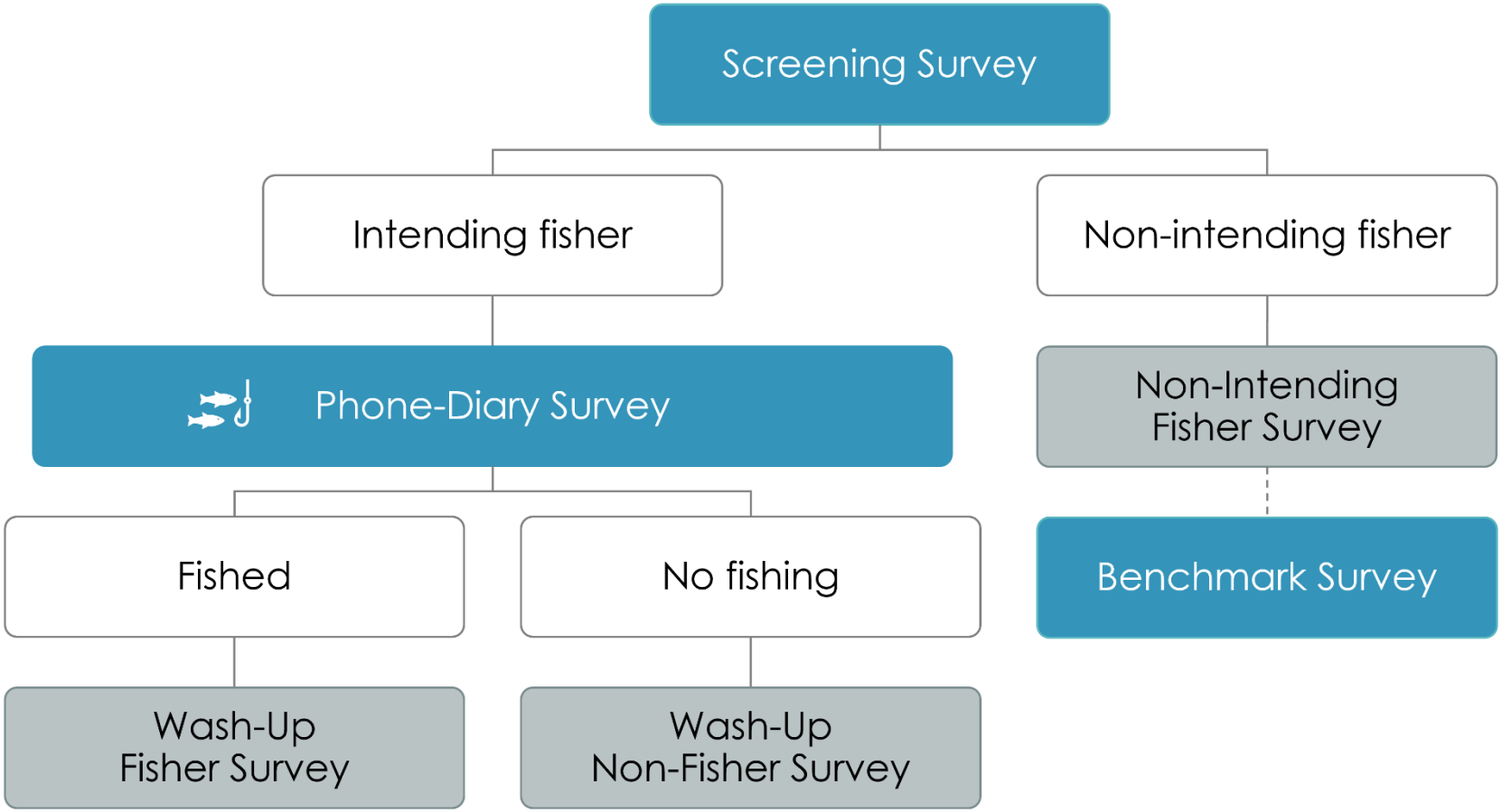
The Phone Surveys were the main component of the integrated survey. The primary objectives were to estimate participation (by number of RBFL holders), effort (boat days and hours fished), and catch for all species (total, kept and released, by number) for recreational fishing for 12 months at statewide and bioregion levels. A total of 3,044 fishers completed the Phone-Diary Survey with 206,230 individual fish (including invertebrates) caught (kept or released) during the 12 month survey by those fishers who participated in the survey. Fishing activity reported by fishers during the survey included 12,723 boat days, 13,808 fishing events and 37,475 fishing hours, across every day of the survey year and the majority of the State's coastline.

The Phone Surveys used a multi-phase survey design with an initial Screening Survey to recruit fishers to the Phone-Diary Survey, a longitudinal Phone-Diary Survey to provide detailed effort and catch information over 12 months, and Post-Enumeration Surveys (i.e. Wash Up/Attitudinal, Non-Intending Fisher and Benchmark Surveys) (Figure 3). These separate Post-Enumeration Surveys were conducted concurrently at the end of the 12 month Phone-Diary Survey to determine and adjust for exceptions outside the distribution of behaviours covered by the Phone-Diary Survey, particularly new licence holders and non-respondents, and to enquire about opinions of RBFL holders for various fishing-related matters.

This off-site survey was based on the telephone/diary methodology, which has been developed and proven to provide cost-effective data over large spatial scales (i.e. statewide and bioregion). Detailed descriptions of the design philosophy and methodology are provided in Lyle et al. (2002) and Henry and Lyle (2003). Key features of this methodology include: (i) tested survey instruments to minimise recall bias (e.g. Diary Card); and (ii) frequent telephone contact by trained interviewers to collect data at consistent standards, reduce potential bias, explain difficult concepts, counter resistance and ensure confidentiality. The combination of the Diary Card and structured interviews is designed to minimise respondent burden, increase response rates, and ensure data quality.

Interviews were conducted by Computer-Assisted Telephone Interview (CATI), which provides a cost-effective and flexible means of recording questionnaire data that is entered directly into survey databases during interviews. It also provides an effective system for ensuring data quality as workstations are networked with a supervisor. Electronic survey data is contained within secure computer networks with appropriate management systems. Interviewers were allocated fishers from a variety of Regional Development Commission (RDC) boundaries to reduce the potential for interviewer bias between strata. Where possible and practical, the same interviewer maintained repeat contacts with the same respondent. When required, interviewer notes were made available for alternative interviewers on subsequent follow-up calls.

Figure 3. Components for off-site boat-based recreational fishing surveys in Western Australia 2020/21.



Screening Survey

The Screening Survey aims to collect profiling information (i.e. avidity, previous and intended fishing activity) from a random sample of RBFL holders and identifies RBFL holders that intended to fish in Western Australia during 2020/21 that were eligible for the Phone-Diary Survey. The Screening Survey was conducted by telephone interview during June to August 2020, therefore, the sampling frame was obtained from a database of fishers who purchased a RBFL from July 2019 to June 2020. The earlier timing of this sample was required to complete the survey before commencement of the Phone-Diary Survey (i.e. September 2020), and was considered to represent the population of interest (i.e. September 2019 to August 2020, Figure 4).

Phone-Diary Survey

The Phone-Diary Survey was conducted from 1 September 2020 to 31 August 2021 to estimate effort (boat days and hours fished), and catch for all species (total, kept and released, by number) for recreational fishing for 12 months at statewide and bioregion levels. Other information was also obtained in terms of public ramp usage, fishing method, fishing location, target species and reasons for release. The Phone-Diary Survey included all (boat- and shore-based) recreational fishing in Western Australia, using all fishing methods (such as line fishing, diving, nets, traps, and spearfishing). Fishing activity was classified in terms of bioregion, habitat and fishing location as defined by unique location name, latitude and longitude co-ordinates, or 10 by 10 nautical mile grid blocks (DPIRD 2020a).

Respondents received a Diary Kit containing a Welcome Letter, Diary Card, Species Identification Guide (with clear colour images of common species) and Fishing Location Guide. The Diary Card was similar in format to that used previously in other surveys and is designed to be a 'memory jogger' rather than a traditional fishing logbook. Respondents were encouraged to use the Diary Card to record key fishing data that could easily be forgotten (e.g. start and finish times, number of fish kept and released) and were contacted regularly by survey interviewers, who were responsible for collecting this information. Respondents also received a brief Diary Explanation Interview with the survey interviewer after receiving the Diary Kit.

Species Identification Guides (DPIRD 2020b) were developed to help respondents identify common species and to enhance consistent and accurate species identification. Interviewers were trained in species identification throughout the Phone-Diary Survey and provided with relevant taxonomic references (Hutchins and Swainston 1999, Jones and Morgan 2002, Allen 2009, Rome and Newman 2010).

Fishing information was collected by monthly telephone interviews, even for fishers who indicated they were unlikely to fish in the subsequent month. More regular telephone interviews were made to the more avid fishers to minimise the potential for recall bias to influence fishing information. Some respondents did not actually fish during the Phone-Diary Survey, despite intending to during the Screening Survey. These fishers ‘dropped-out’ of the fishery, but this was in the range of expected behaviours for the survey.

Wash-Up/Attitudinal Surveys

The Wash-Up/Attitudinal Survey was conducted during September to November 2021 to confirm completion of the survey, assess opinions and attitudes for a range of fisheries related issues, and collect boat-profiling information. Other questions were included to assess respondents' perceptions as to whether they fished 'more, less or about the same' amount of time in the last 12 months, compared with the prior 12 months. Different Wash-Up/Attitudinal Surveys were administered (as appropriate) for respondents that fished, or did not fish, during the Phone-Diary Survey. Social and economic information collected from this survey will be published separately.

Non-Intending Fisher Survey

The Non-Intending Fisher Survey was conducted during September to November 2021 to record the incidence of fishing by RBFL holders sampled in the Screening Survey that were not intending to fish in the next 12 months. These respondents were not eligible for the Phone-Diary Survey, but it was important to identify and account for 'unexpected fishing' that may have occurred during the 12 months. This 'call-back' survey determined the impact of unexpected 'drop-ins' to the fishery.

Benchmark Survey

The Benchmark Survey was conducted during September to November 2021 to identify the impact of additional 'drop-ins' to the fishery, such as RBFL holders who purchased a new licence in 2020/21 after the initial sample was drawn. This survey was essentially a repeat of the Screening Survey, with aims to collect profiling information (i.e. avidity, previous and intended fishing activity) for a random sample of people that were in possession of an RBFL for 12 months concurrent with the Phone-Diary Survey. Therefore, the sampling frame for the Benchmark Survey was obtained from a database of fishers who purchased a RBFL between September 2020 and August 2021, excluding RBFL holders that had been selected for the Screening Survey. The Benchmark Survey provided the necessary information for licence holders from the current RBFL population for calibration and expansion of results from the Phone-Diary Survey (Figure 5).

Survey documentation

The Phone Survey methodology utilises survey instruments, including questionnaires and interviewer manuals, to facilitate the collection/recording of survey data. These were initially produced following extensive design and testing (Survey Development Working Group 2000) and have been revised with subsequent surveys which have occurred in each state and Territory. Highly structured questionnaires, with due consideration to question wording, instructions to interviewers and pre-coded answer categories were included in accordance with a range of standardised interviewing conventions. An equivalent approach was employed for all Phone Survey components in the present study, including thorough training and monitoring of interviewers, and development of a comprehensive interviewer manual.

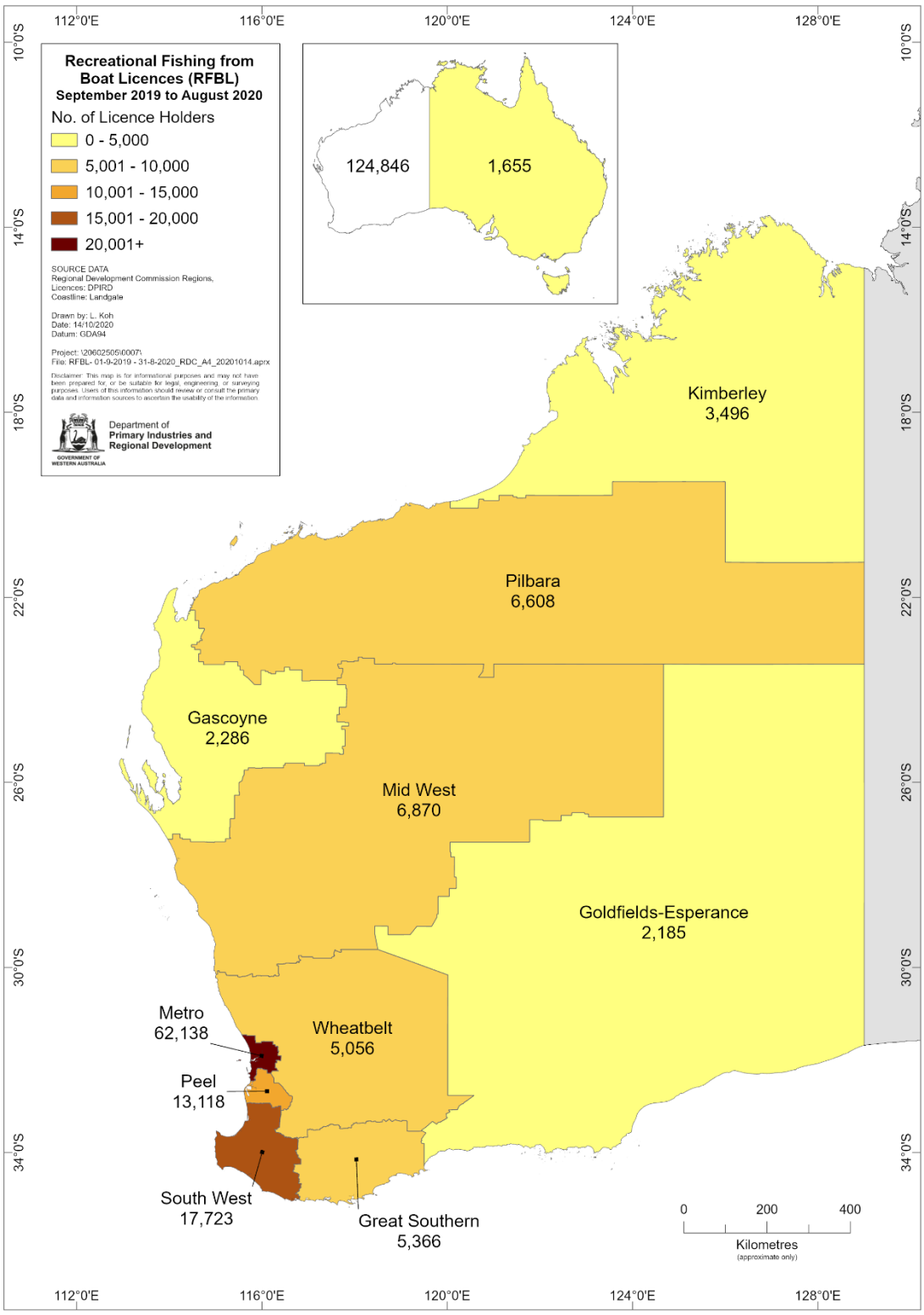


Figure 4. Number of RBFL holders within Regional Development Commission areas from September 2019 to August 2020.

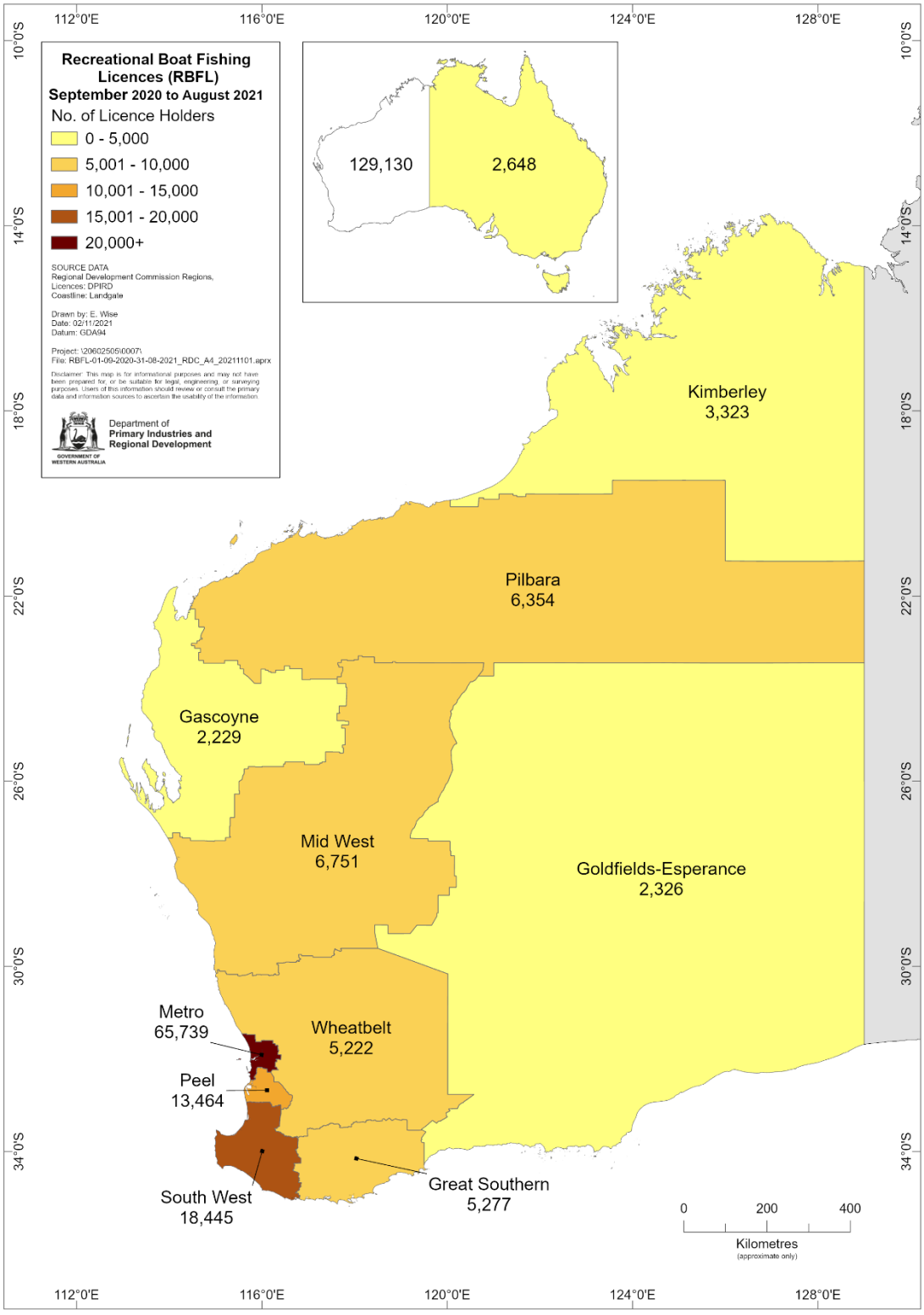


Figure 5. Number of RBFL holders within Regional Development Commission areas from September 2020 to August 2021.

Response Profiles

A summary of response profiles relating to the Screening, Phone-Diary and Benchmark Surveys is given in Table 2. The initial Screening Survey conducted prior to the Phone-Diary Survey was based on a sample of 5,600 RBFL holders, of which 97% were fully responding (i.e. completed all required interview questions) (Table 2). The majority (74%) of sample loss in the Screening Survey was from disconnected telephone numbers (2% of the gross sample) and from mobile phones being switched off (5% of gross sample). Sample loss also occurred where the respondent was not known at the number (1% of the gross sample), the respondent had moved and was known, but no new contact details were available (0.3%), the respondent was away for the survey (0.5%), language difficulties (0.1%), duplicate number (0.5%), or respondent incapacitated or deceased (0.5%).

There were 3,887 RBFL holders identified as eligible for the Phone-Diary Survey (i.e. having an intention to fish in Western Australia during September 2020 to August 2021). This represented 78% of the fully responding group from the Screening Survey. Of the eligible RBFL holders, 3,634 (93%) agreed to participate in the Phone-Diary Survey. Subsequently, 3,044 respondents completed the Phone-Diary Survey, representing 84% completion rate among uptake, or 78% among eligible (Table 2). The 590 respondents that did not complete the Phone-Diary Survey were mainly from sample loss (4% of eligible sample), non contacts (6% of eligible sample) and refusals (2% of eligible sample).

The Benchmark Survey conducted after the Phone-Diary Survey was based on a sample of 5,410 RBFL holders, of which 85% were fully responding. The majority (67%) of sample loss in the Benchmark Survey was from disconnected telephone numbers (2% of the gross sample) and from mobile phones being switched off (6% of gross sample). Sample loss also occurred where the respondent was not known at the number (1% of the gross sample), the respondent had moved and was known, but no new contact details were available (0.3%), the respondent was away for the survey (1.1%), language differences (0.1%), duplicate number (0.5%), or respondent incapacitated or deceased (0.5%).

Non-response in the Screening and Benchmark Surveys were minimised by completing a minimum 15 effective calls to each respondent number, over a range of day times and days of the week, during the survey. Refusal rates were low for both surveys and could be attributable to the use of experienced interviewers and the fact that relevance of the subject matter strongly correlates with response propensity (i.e. an ‘interest’ in fishing).

Response rates for the Screening Survey were consistent (across sampling strata and overall) with previous surveys, while response rates for the Benchmark Survey where lower due to a higher number of non contacts and refusals (see Ryan et al. 2013, 2015, 2017, 2019). However, the response rates achieved in all components of this study were high, which provides confidence in overall data quality and minimises the impact of non-response bias.

Table 2. Sample size and response profile for Screening, Phone-Diary and Benchmark Surveys by stratum.

Screening Survey	RBF licence population	Initial sample	Sample loss	Net sample	Non-response	Full response	Response rate
Kimberley	3,496	249	23	226	7	219	96.90%
Pilbara	6,608	250	24	226	9	217	96.02%
Gascoyne	2,286	249	32	217	11	206	94.93%
Mid West	6,870	351	34	317	10	307	96.85%
Wheat Belt	5,056	251	16	235	4	231	98.30%
Metro	62,138	2,403	191	2,212	61	2,151	97.24%
Peel	13,118	399	40	359	7	352	98.05%
South West	17,723	698	63	635	13	622	97.95%
Great Sth'n	5,366	250	21	229	3	226	98.69%
Gold fields	2,185	250	19	231	6	225	97.40%
Interstate	1,655	250	18	232	1	231	99.57%
TOTAL	**126,501**	**5,600**	**481**	**5,119**	**132**	**4,987**	**97.42%**

Phone-Diary Survey	Full response at screening	Eligible for the Diary Survey	Diary Uptake	Diary Completed	Uptake rate from eligible (%)	Completion rate from uptake (%)	Completion rate from eligible (%)
Kimberley	219	189	182	135	96.30%	74.18%	71.43%
Pilbara	217	178	162	131	91.01%	80.86%	73.60%
Gascoyne	206	169	163	129	96.45%	79.14%	76.33%
Mid West	307	238	220	176	92.44%	80.00%	73.95%
Wheatbelt	231	182	176	156	96.70%	88.64%	85.71%
Metro	2,151	1,714	1,601	1,369	93.41%	85.51%	79.87%
Peel	352	274	250	212	91.24%	84.80%	77.37%
South West	622	508	481	398	94.69%	82.74%	78.35%
Great Sth'n	226	190	177	146	93.16%	82.49%	76.84%
Goldfields	225	181	165	144	91.16%	87.27%	79.56%
Interstate	231	64	57	48	89.06%	84.21%	75.00%
TOTAL	**4,987**	**3,887**	**3,634**	**3,044**	**93.49%**	**83.76%**	**78.31%**

Benchmark Survey	RBF licence population	Initial sample	Sample loss	Net sample	Non-response	Full response	Response rate
Kimberley	3,323	280	34	246	36	210	85.37%
Pilbara	6,354	280	42	238	32	206	86.55%
Gascoyne	2,229	266	35	231	44	187	80.95%
Mid West	6,751	304	48	256	38	218	85.16%
Wheatbelt	5,222	284	29	255	43	212	83.14%
Metro	65,739	2,146	212	1,934	308	1,626	84.07%
Peel	13,464	435	47	388	53	335	86.34%
South West	18,445	575	53	522	93	429	82.18%
Great Sth'n	5,277	280	37	243	43	200	82.30%
Goldfields	2,326	280	28	252	27	225	89.29%
Interstate	2,648	280	40	240	22	218	90.83%
TOTAL	**131,778**	**5,410**	**605**	**4,805**	**739**	**4,066**	**84.62%**

2.2.2 Boat Ramp Surveys

On-site Biological Surveys were completed in the West Coast and South Coast at 21 boat ramps from January to April 2021 and in the North Coast and Gascoyne Coast at 8 boat ramps from April to July 2021. These surveys are designed to obtain length and weight information enabling estimates of catch (by number) from the Phone-Diary Survey to be converted to catch (by weight). This allows direct comparison of recreational harvest to commercial fishery information, which is routinely recorded as weights. Data were collected from 5,398 boat-based recreational fishing parties, with over 13,221 fish and other aquatic organisms measured.

The target population included boat-based recreational fishers who retrieved their vessels at key boat ramps where research staff conducted face-to-face interviews with recreational fishers. The survey was based on a restricted spatio-temporal design informed by data collected from previous Biological and Remote Camera Surveys (see Ryan et al. 2013, 2015, 2017, 2019). By targeting key boat ramps at peak times of fishing activity (i.e. season, day type and time of day) the surveys aimed to maximise the collection of biological information (Smallwood and Ryan 2020). The primary sampling unit was sample day, and the secondary sampling unit was fishing party, which could include both RBFL holders and non-licensed fishers.

Spatial stratification for the Biological Survey includes regions and zones, with 4 ramps in the North Coast (in the Kimberley zone); 4 ramps in the Gascoyne Coast (in the Ningaloo zone); 17 ramps in the West Coast (4 in the North zone, 9 in the Metro zone and 4 in the South zone); 4 ramps in the South Coast (2 ramps in the Albany zone and 2 ramps in the Esperance zone).

The temporal stratification varied for each bioregion, depending on factors that are known to influence boating activity. In the Gascoyne Coast, West Coast and South Coast, day type and time of day were the factors which influenced boating activity. Surveys were therefore scheduled during the middle of the day and predominately on weekends or public holidays, to coincide with the busiest periods of boating activity. In the North Coast surveys were scheduled around the high tide, as this had a greatest influence on boating activity. In the West Coast bioregion, the aim was to collect similar numbers of measurements as previous surveys and, as a result 1-2 surveys per week were schedule at each ramp. In all other bioregions, it was aimed to maximise the number of fish measurement and surveys were completed up to 5 days per week. In all bioregions, sample days were approximately 4-hours duration and confined to daylight hours only.

Prior to the commencement of the survey, interviewers were provided with training in interview techniques, survey instruments and species identification as well as documentation relating to interviewer guidelines, forms, and questionnaires.

The average weights of key species obtained from the Biological Surveys are utilised in Chapter 9 (Harvest Weights) to convert catch (by numbers) to harvest (by weight). Depending on the species, its distribution and the number of measurements obtained, a statewide or bioregional value may be applied. Alternatively, if insufficient data are

available from the Biological Survey, then data from unpublished Tour Operator Returns may be used as an alternative data source.

Summaries of average weight for all species collected during the Boat Ramp Surveys are given in Appendix 1. This includes the number of weight measurements recorded, average weight (measured in grams where >10 measurements were obtained statewide) and standard error. Additional results from the previous Biological Surveys are provided in a separate report (Smallwood et al. 2018). Estimates of average weight from boat ramp surveys have also been reported in separate publications. These include an assessment of a restricted spatial and temporal survey design for determining average weight (Smallwood and Ryan 2020), and model-based estimation of average weights for indicator species in the West Coast Bioregion (Crisafulli et al. 2022).

2.2.3 Remote Camera Surveys

Remote Camera Surveys monitor recreational boating activity via digital cameras at key boat ramps and choke points to assist with corroborating and validating estimated effort from the Phone-Diary Survey, and for some resources, with determining levels of boating activity between surveys. The position of cameras at each access point was determined by the available infrastructure and logistics of transmitting information (Blight and Smallwood 2015). Cameras were positioned at boat ramps (which excludes boat movements from moorings) or choke points (which includes boat movements from moorings). A framework for the integration of Remote Camera Surveys with recreational fishing surveys is provided in a separate report (Steffe et al. 2017).

Although remote cameras are expected to operate continuously, outages can occur as a result of technological failure and extreme weather (e.g. power loss and cyclones). A new method of accommodating short- and medium-term data loss due to outages has been generated that uses climatic and temporal variables to “fill in” missing gaps in the camera footage (Afrifa-Yamoah et al. 2020a, 2020b). Ongoing research is also investigating the trade-off between the cost of reading the camera data and the precision of the estimates of boating activity obtained for the various sampling designs and sample sizes (Afrifa-Yamoah et al. 2021a) and imputation of missing data (Afrifa-Yamoah et al. 2021b). This has improved ongoing monitoring of boating activity at key access points, including the cost-effective reading of remote camera data and provision of timely information.

Camera data are aggregated to provide the number of powerboat retrievals over 24-hours to estimate the number of powerboat retrievals by year and month. Estimates of boating activity from public boat ramps have been updated using revised approaches for imputation and estimation for 12 months concurrent with each of the previous Phone-Diary Surveys. These will be reported in a separate publication.

Estimates of boating activity from public boat ramps have also been reported in separate publications. These include ramp-based estimation of the recreational catch in inner Shark Bay (Denham, Monkey Mia and Nanga, where there was minimal missing data) (Taylor et al. 2019), and an assessment of the impact of COVID-19 on recreational fishing by comparing recreational vessel activity during March to August 2020 with previous

years at two metropolitan boat ramps (Hillarys and Woodman Point) and five regional boat ramps (Broome, Exmouth, Monkey Mia, Denham and Albany) (Ryan et al. 2021).

2.3 Phone-Diary Survey Expansion, Weighting and Analysis

The Phone Survey design incorporates stratified random sampling with samples divided into homogenous units to reduce sampling variance (Cochran 1977, Pollock et al. 1994, Lohr 2010, Särndal et al. 2003). These strata relate to Regional Development Commission areas and the Perth Metropolitan region in Western Australia. The number of samples within each stratum were selected proportionally to the size of the stratum. A single residential stratum applied to interstate RBFL holders (<2% of all RBFL holders). Overseas RBFL holders (<0.02% of all RBFL holders) were excluded from the Phone Surveys. Exclusions from the sampling frame occurred before sample selection where currency of address information was invalid, or fishers were identified as having multiple licences. All sampling was done without replacement.

Data from Phone Surveys that use telephone directories as a sampling frame can be expanded to the Estimated Residential Population using profiles from the Australian Bureau of Statistics, based on household structure, age and gender (Henry and Lyle 2003). However, a different approach is required for surveys that use licence sampling frames (Murphy et al. 2020), particularly if the database is constantly changing. Analysis of the RBFL database indicates that approximately 25% of RBFL holders do not renew their licence (i.e. 'drop-out'), while approximately 25% of RBFL holders take up a new licence (i.e. 'drop-in') each year. Samples were taken prior to each Screening Survey for all licence holders eligible to fish in the previous 12 months and the Phone-Diary Survey did not progressively sample and recruit new entrants to the RBFL population during the survey.

The Benchmark and Non-Intending Fisher Surveys were designed to assist in matching respondents from the Phone-Diary Survey (sampled from the RBFL population in 2019/20) to the RBFL population in 2020/21 (i.e. people that had a licence) during the Phone-Diary Survey. Calculation of weighting factors requires counter-parting respondents in the Phone-Diary Survey (based on actual days fished) with respondents in the Benchmark Survey (based on recalled days fished). This process accounts for behavioural differences that result from the dynamic nature of the RBFL population. Counter-parting was based on actual effort collected during the Phone-Diary Survey to account for a likely overestimate of recalled effort in the Benchmark Survey.

The sample weight for a diarist (a RBFL holder) i in stratum m was determined by the inverse of the fraction it represented in the population according to the equation $a_{mi} = L_m/l_m$ where a_{mi} = weight for RBFL holder i in stratum m, L_m= total number of RBFL holders in stratum m, l_m= number of RBFL holders sampled in stratum m.

Catch and effort estimates were calculated by expanding the catch and effort reported by diarists to the RBFL population. For example, fishing effort (days fished) reported by diarists from a sample of l_m diarists in stratum m was denoted by Y_{mi}, with the total fishing effort in stratum m given by

$$\hat{E}_m = \sum_i^{l_m} a_{mi} Y_{mi} = \frac{L_m}{l_m} \sum_i^{l_m} Y_{mi}$$

The variance term was

$$Var(\hat{E}_m) = Var\left(\frac{L_m}{l_m} \sum_i^{l_m} Y_{mi}\right) = {L_m}^2 Var(\overline{Y_m}) = {L_m}^2 \frac{Var(Y_m)}{l_m}$$

Total fishing effort $\hat{E}$ was estimated by summing the effort over all strata. The method described above to calculate the total fishing effort was also applied to calculate the total kept or released catch $\hat{C}$.

Survey data from the Benchmark Survey accounts for: fishers that unexpectedly 'drop-out' from the Phone-Diary Survey (i.e. respondents that intended to fish, but did not); fishers that unexpectedly 'drop-in' during the Phone-Diary Survey (i.e. respondents in the Screening Survey that did not intend to fish during the Phone-Diary Survey, but actually did); and additional 'drop-in' fishers (i.e. fishers who were not eligible for sample selection for the Screening Survey, but purchased a RBFL during the Phone-Diary Survey). While survey data have been expanded by the total number of RBFL holders in each stratum divided by the number of RBFL holders sampled in each stratum, future estimates may be based on adjustment of weighting factors to account for avidity bias and non-intending fishing and will be reported separately (as required).

Estimates of participation (by number of RBFL holders), effort (boat days and hours fished) and catch for all species (total, kept and released, by number) are based on expanded data, scaled-up to represent each stratum population. Estimates of average weight were obtained from Boat Ramp Surveys or Tour Operator Returns. Expansion of Phone Survey data to population estimates was undertaken using the survey package (Lumley 2004, 2010) in the statistical computing language R (R Core Team 2016). Detailed descriptions of the survey and recsurvey packages are given in Lumley (2010) and Lyle et al. (2010) respectively.

2.4 Uncertainty

The integrated surveys provide catch estimates in a cost-effective manner; however, they cannot be expected to provide the level of precision that would be available from a census, or mandatory reporting. As such, three measures of uncertainty are used:

1) Standard error (SE) indicates the difference between the estimate (obtained from a sample) and the true value (of the population). The standard error of the estimate is calculated from the standard deviation of the sample divided by the sample size.

2) Relative standard error (RSE) indicates the uncertainty expressed as a percentage of the estimate (or as decimal values from 0.00 to 1.00), allowing comparisons between estimates that accounts for differences in the magnitude of estimates. The

Relative Standard Error of the estimate is calculated from the Standard Error of the sample divided by the estimate.

3) Confidence Intervals (CI) represent the range in which the population value is likely to occur as determined by the estimate and associated standard error. The 95% confidence intervals are equal to the estimate plus or minus 1.96 multiplied by the Standard Error. This indicates the chance of the population value occurring within approximately two SE of the estimate. Confidence intervals are most frequently used to determine statistical significance where the difference between two estimates is considered statistically significant if the probability that they are different is at least 95%.

Interpretation of estimates requires consideration of both the number of fishers that contributed to the estimate and the magnitude of the Relative Standard Error (Standard Error divided by the estimate). Where required, estimates in tables have been highlighted to identify sample size <30 fishers and relative standard error >40% (or 0.40) (Henry and Lyle 2003). For estimates of catch, the sample size refers to the number of fishers reporting a catch of that species (either kept or released). These cautions indicate that estimates may not be robust (i.e. reliable).

2.5 Reporting Notes

Estimates include uncertainty, with associated SE provided in all tables and figures, although these are not routinely cited in text. The tables also provide an indication of whether estimates are considered robust (i.e. sample size ≥30 and relative standard error ≤0.40). Estimates from the current survey are compared with previous surveys conducted biennially from 2011/12 to 2017/18, as appropriate.

Recreational fishers that did not hold a RBFL (including many shore-based only recreational fishers) and RBFL holders that intended to fish only in freshwater were out of scope for the Phone-Diary Survey. Therefore, estimates of catch for inland, estuarine and nearshore species provided in this report, particularly those harvested with high proportions of shore-based effort, will be underestimated. Additionally, catch estimates for Western Rock Lobster and Abalone, which can be harvested by fishers with only a species-specific licence, will also be underestimated.

This report presents estimates for boat-based recreational fishing to maintain consistency and comparability with estimates from previous surveys. Estimates for shore-based recreational fishing and Rock Lobster will be reported separately.

Confidence intervals are used to summarise temporal changes between annual estimates. If the 95% confidence intervals overlap, then there is assumed to be no statistical difference, and this is described in this report as “steady” or “similar”. If the 95% confidence intervals do not overlap, then there is a statistical difference (i.e. the probability that they are different is at least 95%), which is described in this report as “increasing” (if the latest estimate is higher than previous) or “decreasing” (if the latest estimate is lower than previous).

While this report compares estimates from five boat-based recreational fishing surveys, additional catches from charter-boat recreational fishing (reported in Tour Operator Returns), RL-only licences and shore-based fishing (where available) are used to determine the total catch from the recreational sector. Specific performance indicators, reference levels and catch tolerances will be reported separately, and used to provide trends in total catch to assist in developing, monitoring and refining management arrangements.

3 Participation

This section presents results from the Screening and Benchmark Surveys. These repeated cross-sectional surveys were based on respondents that held a Recreational Boat Fishing Licence (RBFL) between September 2019 to August 2020 (Screening) and September 2020 to August 2021 (Benchmark). These results are highly comparable to those from previous surveys.

3.1 Fishing Participation

From the population of 126,501 RBFL holders that held a licence in the 12 months prior to September 2020 (2019/20; Figure 4), 101,389 (80%) fished at least once, and 25,112 (20%) did not fish in Western Australia (Figure 6a). Similarly, from the population of 131,778 RBFL holders in the 12 months prior to September 2021 (2020/21; Figure 5), 105,152 (80%) fished at least once, and 26,626 (20%) did not fish.

Higher participation occurred for exclusively boat-based recreational fishing compared with exclusively shore-based and from both the shore and a boat (Figure 6b). Similarly, there was higher participation for fishing in exclusively in marine waters compared with exclusively freshwater and in both salt and freshwater (Figure 6c). However, participation in shore-based and freshwater recreational fishing may be lower for RBFL holders than fishers (i.e. non-RBFL holders).

Males accounted for the majority of RBFL holders that fished (86% of all RBFL holders in 2019/20 and 84% in 2020/21). Females accounted for 14% in 2019/20 and 16% of RBFL holders in 2020/21 (Figure 6c).

The highest numbers of RBFL holders that fished were in the 45 to 59-year age group (29% in 2019/20 and 2020/21), followed by 60 years and older (26% in 2019/20 and 2020/21; Figure 6d), 30 to 44-years (26% in 2019/20 and 2020/21), and 15 to 29-years (14% in 2019/20 and 2020/21). The lowest numbers of RBFL holders that fished were in the 5 to 14-year age group (4% in 2019/20 and 2020/21).

The number of days fished (by recall) in the previous 12 months is a measure of the fishing avidity. RBFL holders were equally likely to recall fishing 5 to 14 days (34% in 2019/20 and 36% in 2020/21) or 15 days or more (39% in 2019/20 and 36% in 2020/21; Figure 6e). Lower proportions of RBFL holders (27% in 2019/20 and 28% in 2020/21) recalled fishing less than 5 days during the previous 12 months.

RBFL holders were most likely to recall fishing in the West Coast (68% in 2019/20 and 60% in 2020/21; Figure 6f). Lower proportions of RBFL holders recalled fishing in the South Coast (13% in 2019/20 and 2020/21); North Coast (12% in 2019/20 and 14% 2020/21); and Gascoyne Coast (8% in 2019/20 and 13% in 2020/21).

Similar statewide trends were observed in participation for the 12 months prior to previous Screening and Benchmark Surveys (see Ryan et al. 2013, 2015, 2017, 2019). However, differences in participation occurred according to residence (Perth Metropolitan, Regional Development Commission areas (RDC), and Interstate), which are discussed in the

remainder of this chapter. Notably, RBFL holders were most likely to fish in the bioregion closest to their home residence (e.g. residents from the Kimberley and Pilbara were most likely to fish in the North Coast). However, many RBFL holders travel throughout the state.

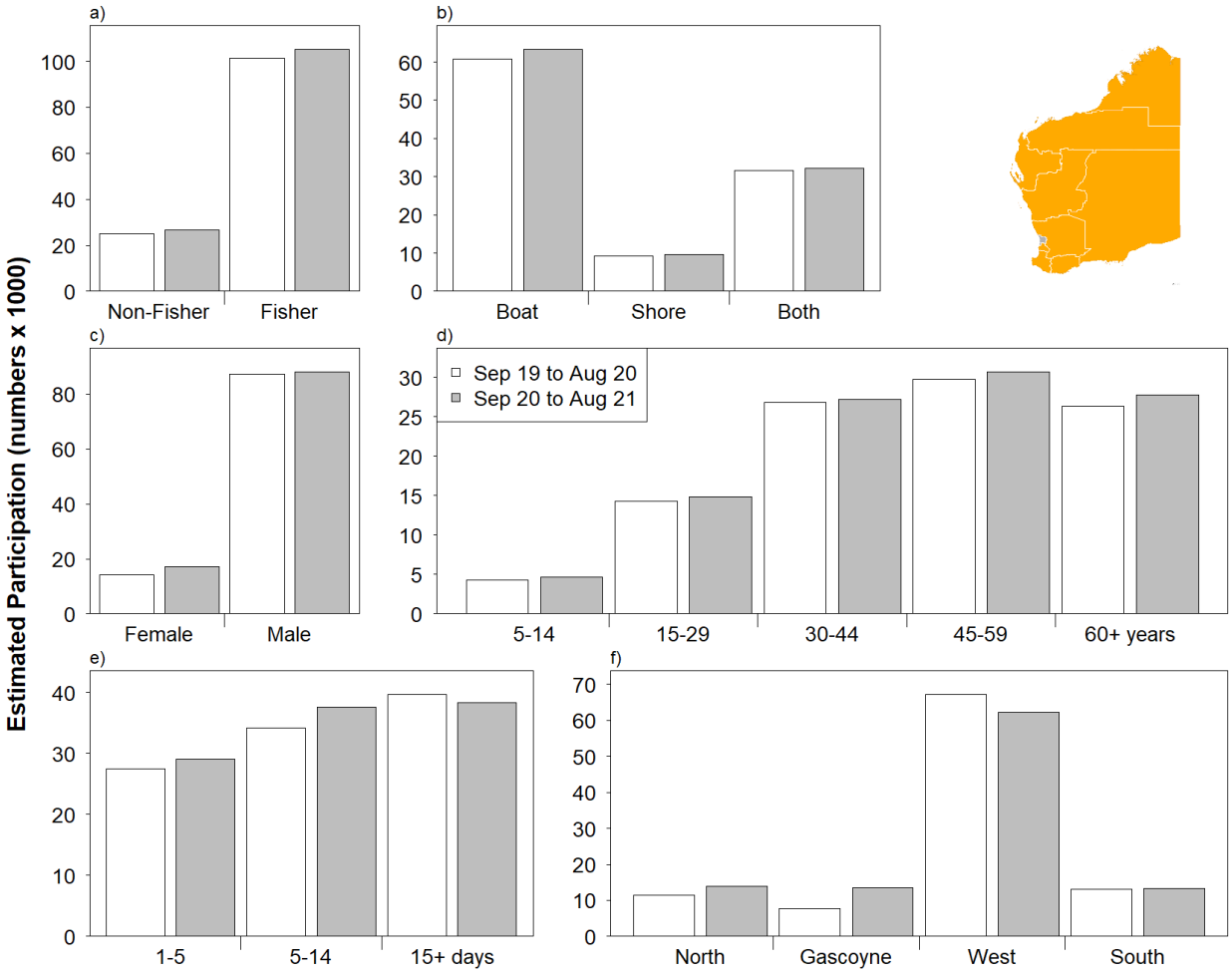


Figure 6. Statewide participation in recreational fishing by RBFL holders, including Metro (grey) and Regional (orange) residents, in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

3.2 Kimberley

A total of 3,496 residents in the Kimberley RDC held an RBFL in the 12 months prior to September 2020 (Figure 4), with 3,166 (91%) fishing at least once in 2019/20; Figure 7a). Similarly, 3,323 residents held a RBFL in the 12 months prior to September 2021 (Figure 5), with 2,891 (87%) fishing at least once in 2020/21. Most RBFL holders that fished were male (78% in 2019/20 and 79% in 2020/21; Figure 7c), and a higher proportion of females fished compared with statewide participation. Most RBFL holders that fished were 30 to 44-years of age (34% in 2019/20 and 35% in 2020/21) or 45 to 59-years (31% in 2019/20 and 32% in 2020/21; Figure 7d). Most RBFL holders fished 15 days or more (60% in 2019/20 and 54% in 2020/21; Figure 7e) and fished in the North Coast (96% in 2019/20 and 99% in 2020/21; Figure 7f).

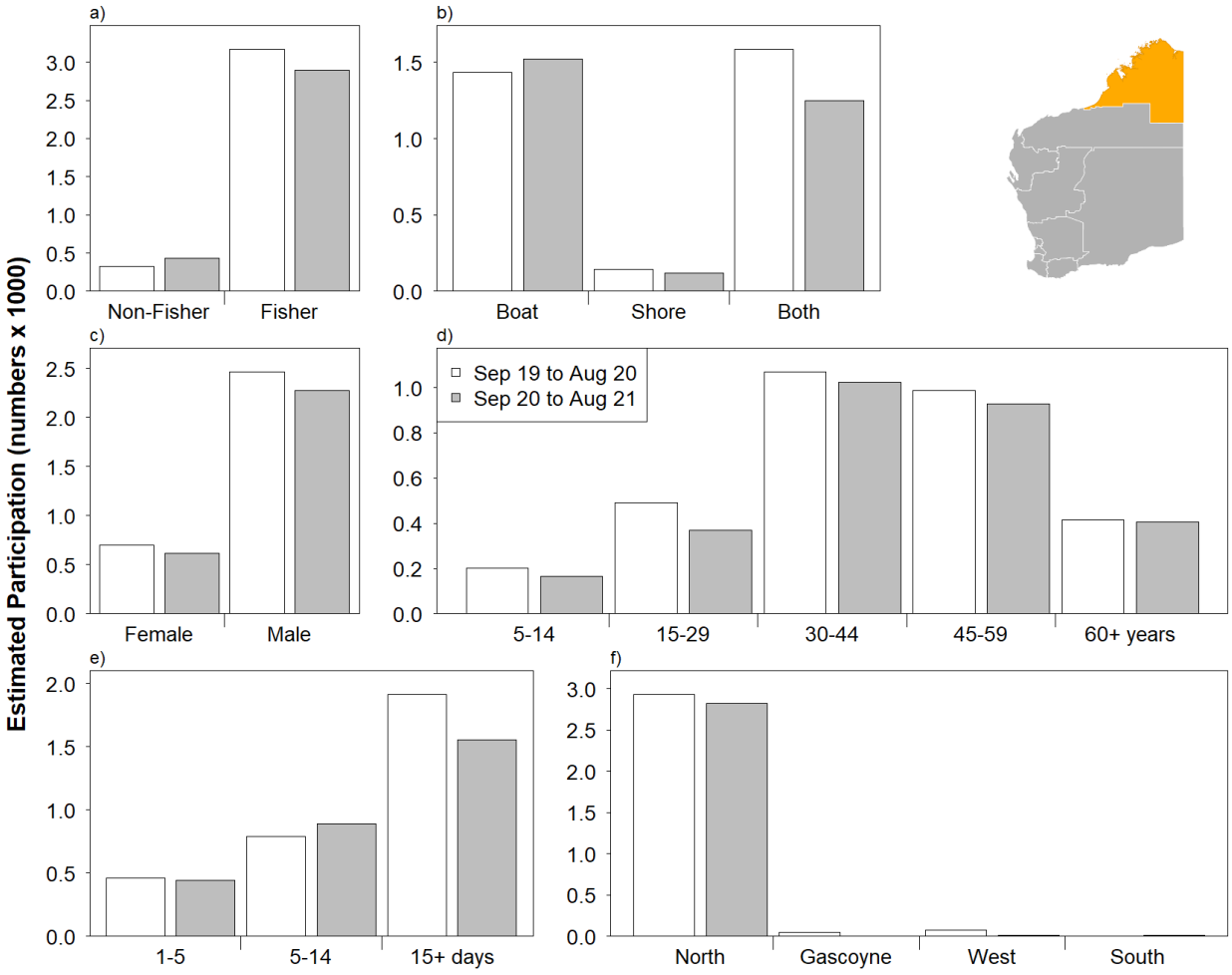


Figure 7. Participation in recreational fishing by Kimberley RDC residents in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

3.3 Pilbara

A total of 6,608 residents in the Pilbara RDC held an RBFL in the 12 months prior to September 2020 (Figure 4), with 5,702 (86%) fishing at least once in 2019/20 (Figure 8a). Similarly, 6,354 residents held an RBFL in the 12 months prior to September 2021 (Figure 5), with 5,132 (81%) fishing at least once in 2020/21. Most RBFL holders that fished were male (80% in 2019/20 and 82% in 2020/21; Figure 8c) and a higher proportion of females fished compared with statewide participation. Most RBFL holders that fished were in the 30 to 44-year age group (46% in 2019/20 and 44% in 2020/21) or the 45 to 59-year age group (26% in 2019/20 and 28% in 2020/21; Figure 8d). Most RBFL holders fished 15 days or more (49% in 2019/20 and 45% in 2020/21; Figure 8e) and fished in the North Coast (89% in 2019/20 and 93% in 2020/21; Figure 8f).

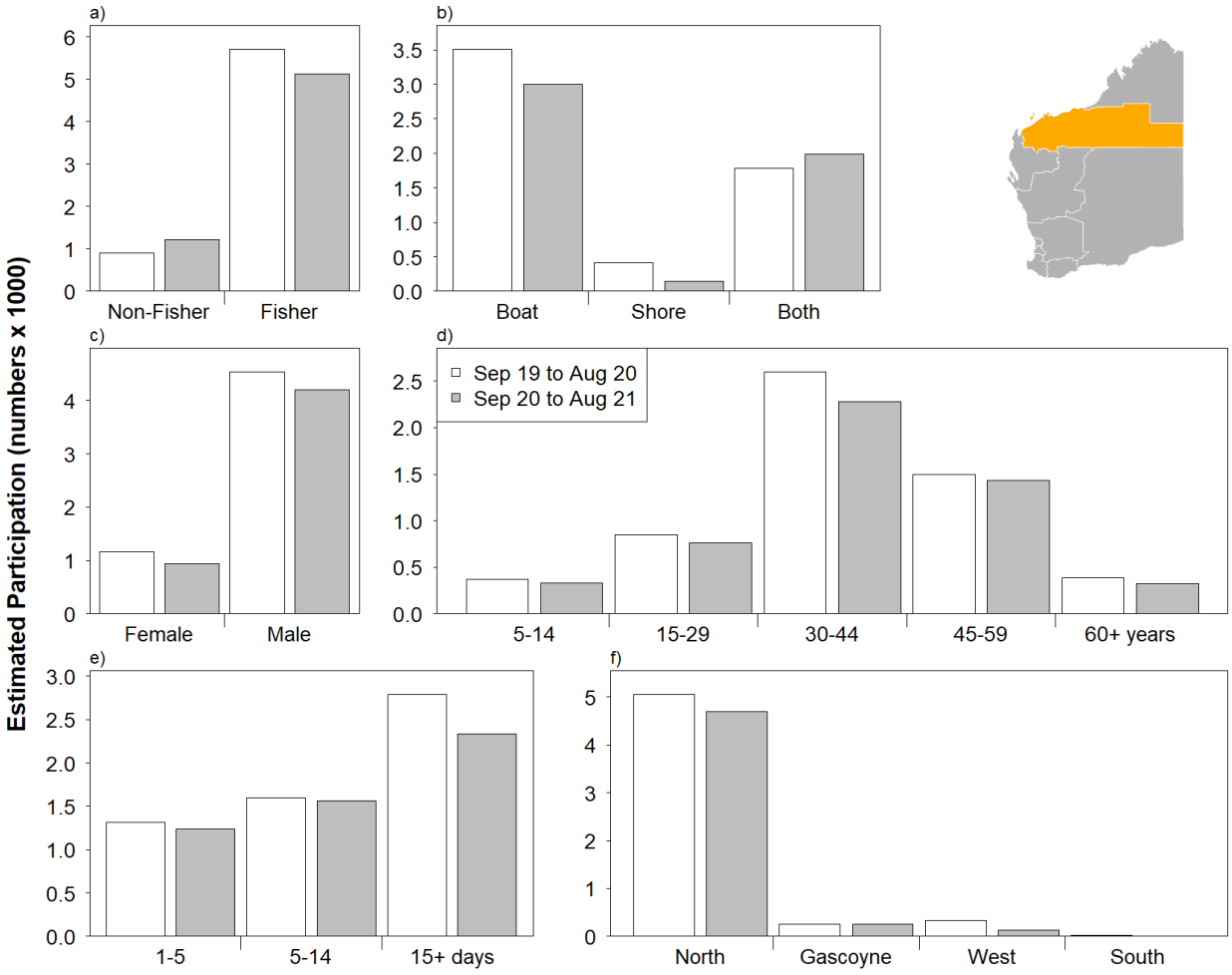


Figure 8. Participation in recreational fishing by Pilbara RDC residents in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

3.4 Gascoyne

A total of 2,286 residents in the Gascoyne RDC held a RBFL in the 12 months prior to September 2020 (Figure 4), with 1,903 (83%) fishing at least once in 2019/20 (Figure 9a). Similarly, 2,229 residents held a RBFL in the 12 months prior to September 2021 (Figure 5), with 1,778 (80%) fishing at least once in 2020/21. Most RBFL holders that fished were male (77% in 2019/20 and 76% in 2020/21; Figure 9c) and a higher proportion of females fished compared with statewide participation. Most RBFL holders that fished were in the 30 to 44-year age group (29% in 2019/20 and 2020/21) or the 45 to 59-year age group (28% in 2019/20 and 27% in 2020/21; Figure 9d). Most RBFL holders fished 15 days or more (52% in 2019/20 and 43% in 2020/21; Figure 9e) and fished in the Gascoyne Coast (98% in 2019/20 and 95% in 2020/21; Figure 9f).

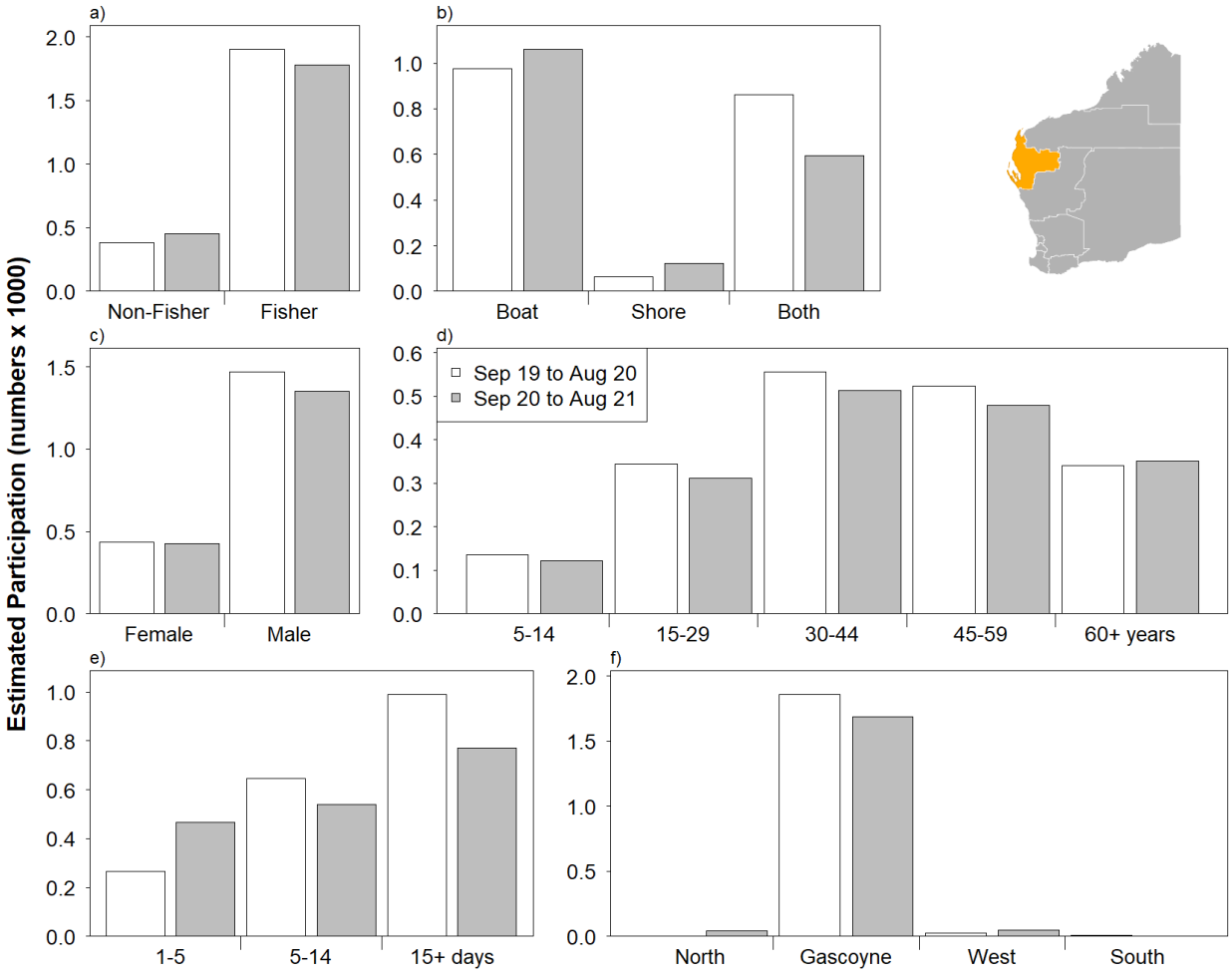


Figure 9. Participation in recreational fishing by Gascoyne RDC residents in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

3.5 Mid West

A total of 6,870 residents in the Mid West RDC held a RBFL in the 12 months prior to September 2020 (Figure 4), with 5,130 (75%) fishing at least once in 2019/20 (Figure 10a). Similarly, 6,751 residents held a RBFL in the 12 months prior to September 2021 (Figure 5), with 4,745 (70%) fishing at least once in 2020/21. Most RBFL holders that fished were male (91% in 2019/20 and 74% in 2020/21; Figure 10c) and the proportion of females that fished was consistent with statewide participation. Most RBFL holders that fished were 60 years or older (28% in 2019/20 and 30% in 2020/21) and 45 to 59-years (28% in 2019/20 and 27% in 2020/21; Figure 10d). Most RBFL holders fished 15 to 14 days (35% in 2019/20 and 30% in 2020/21) or 15 days or more (38% in 2019/20 and 42% in 2020/21; Figure 10e) and fished in the West Coast (88% in 2019/20 and 80% in 2020/21; Figure 10f).

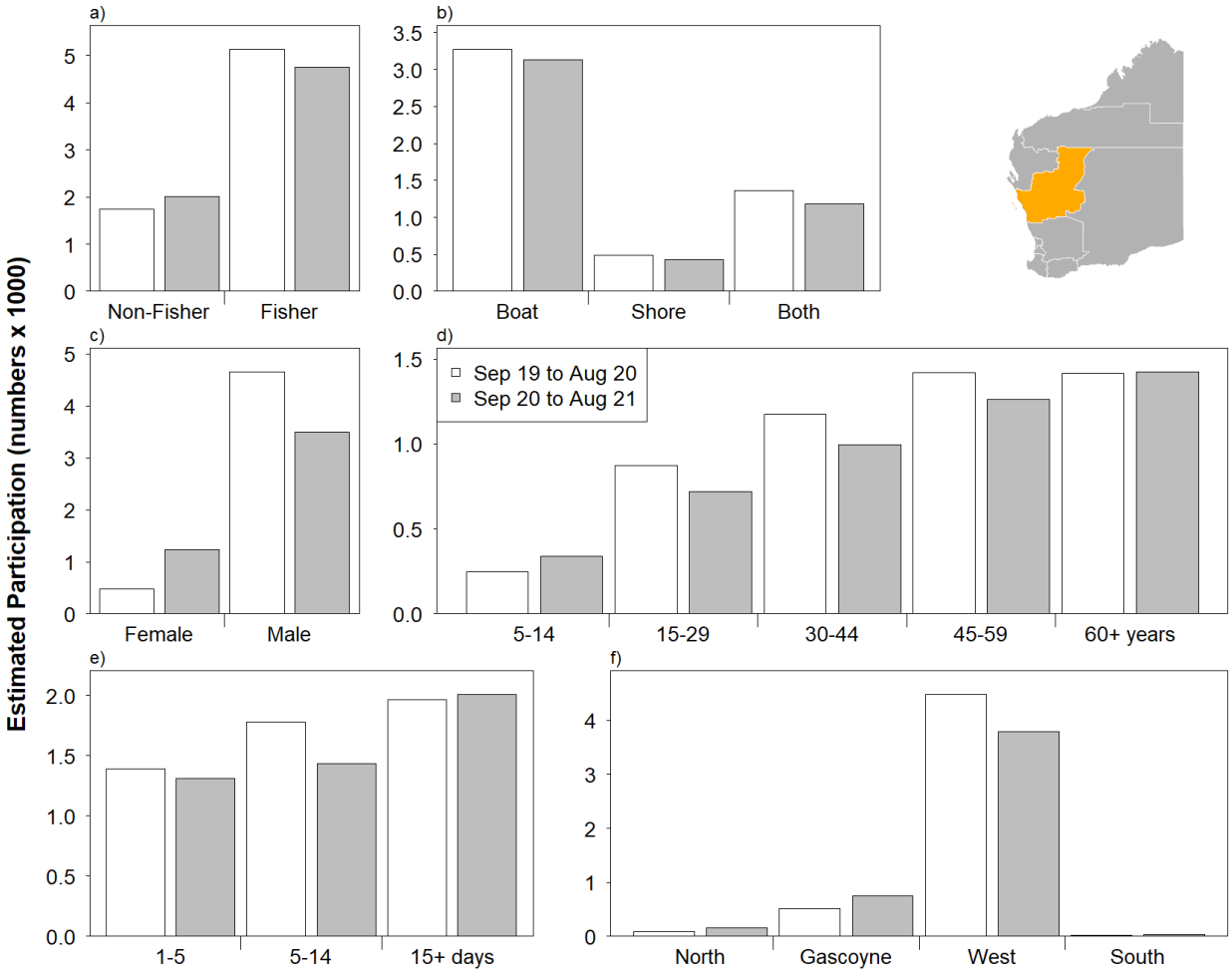


Figure 10. Participation in recreational fishing by Mid West RDC residents in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

3.6 Wheatbelt

A total of 5,056 residents in the Wheatbelt RDC held a RBFL in the 12 months prior to September 2020 (Figure 4), with 3,886 (77%) fishing at least once in 2019/20 (Figure 11a). Similarly, 5,222 residents held a RBFL in the 12 months prior to September 2021 (Figure 5), with 3,900 (75%) fishing at least once in 2020/21. Most RBFL holders that fished were male (85% in 2019/20 and 81% in 2020/21; Figure 11c) and a higher proportion of females fished compared with statewide participation. Most RBFL holders were in the 45 to 59-year age group (31% in 2019/20 and 30% in 2020/21), or 60 years or older (27% in 2019/20 and 31% in 2020/21; Figure 11d). Most RBFL holders fished less than 5 days in 2019/20 (40%) and 5 to 14 days in 2020/21 (37%; Figure 11e) and fished in the West Coast (69% in 2019/20 and 56% in 2020/21; Figure 11f).

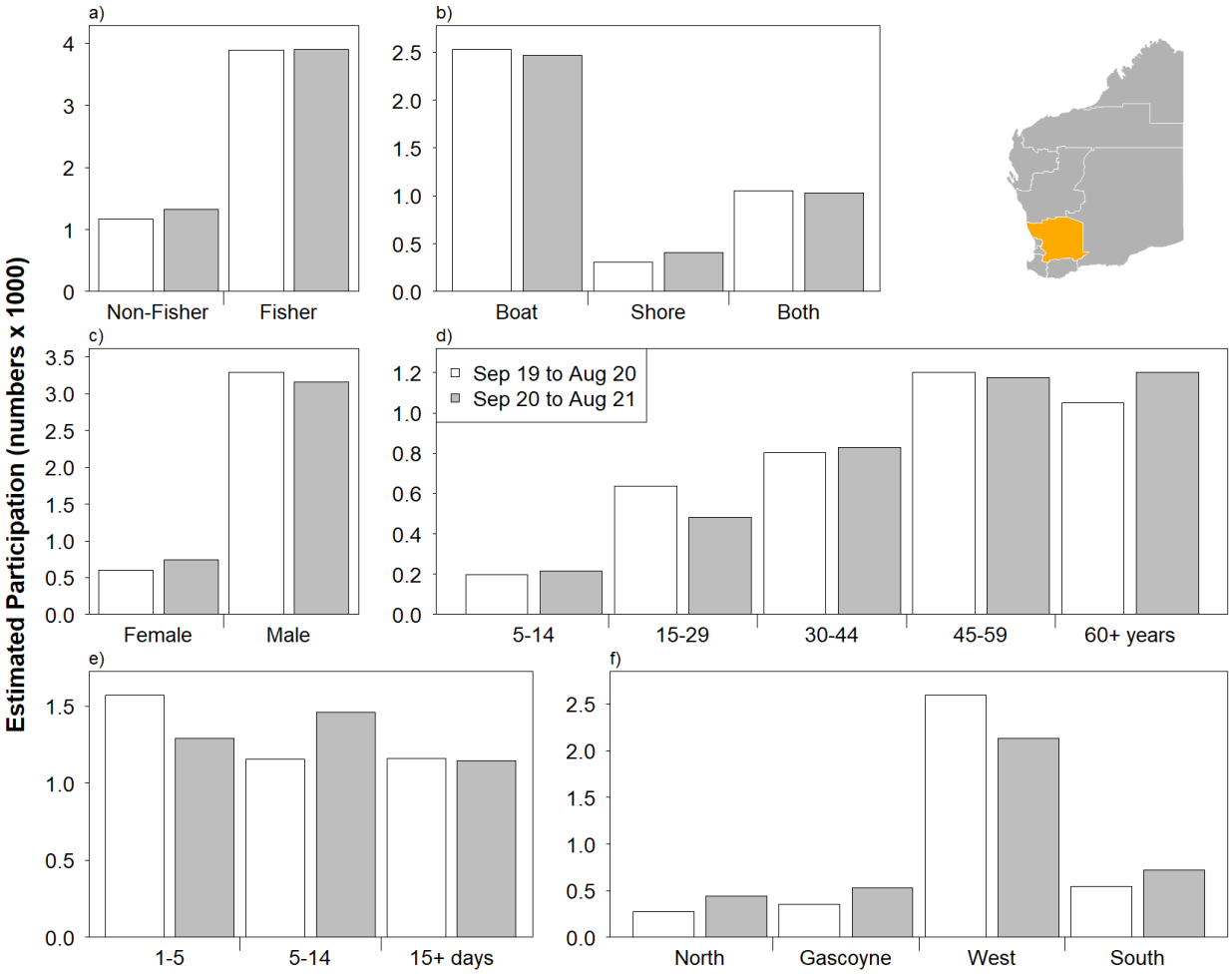


Figure 11. Participation in recreational fishing by Wheatbelt RDC residents in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

3.7 Perth Metropolitan

A total of 62,138 residents in Perth Metropolitan held a RBFL in the 12 months prior to September 2020 (Figure 4), with 49,474 (80%) fishing at least once in 2019/20 (Figure 12a). Similarly, 65,739 residents in Perth Metropolitan held a RBFL in the 12 months prior to September 2021 (Figure 5), with 52,986 (81%) fishing at least once in 2020/21. Most RBFL holders that fished were male (88% in 2019/20 and 87% in 2020/21; Figure 12c) and the proportion of females that fished was consistent with statewide participation. Most RBFL holders were in the 45 to 59-year age group (31% in 2019/20 and 30% in 2020/21; Figure 12d). Most RBFL holders fished 5 to 14 days (35% in 2019/20 and 2020/21) or 15 days or more (38% in 2019/20 and 37% in 2020/21; Figure 12e) and fished in the West Coast (85% in 2019/20 and 76% in 2020/21; Figure 12f).

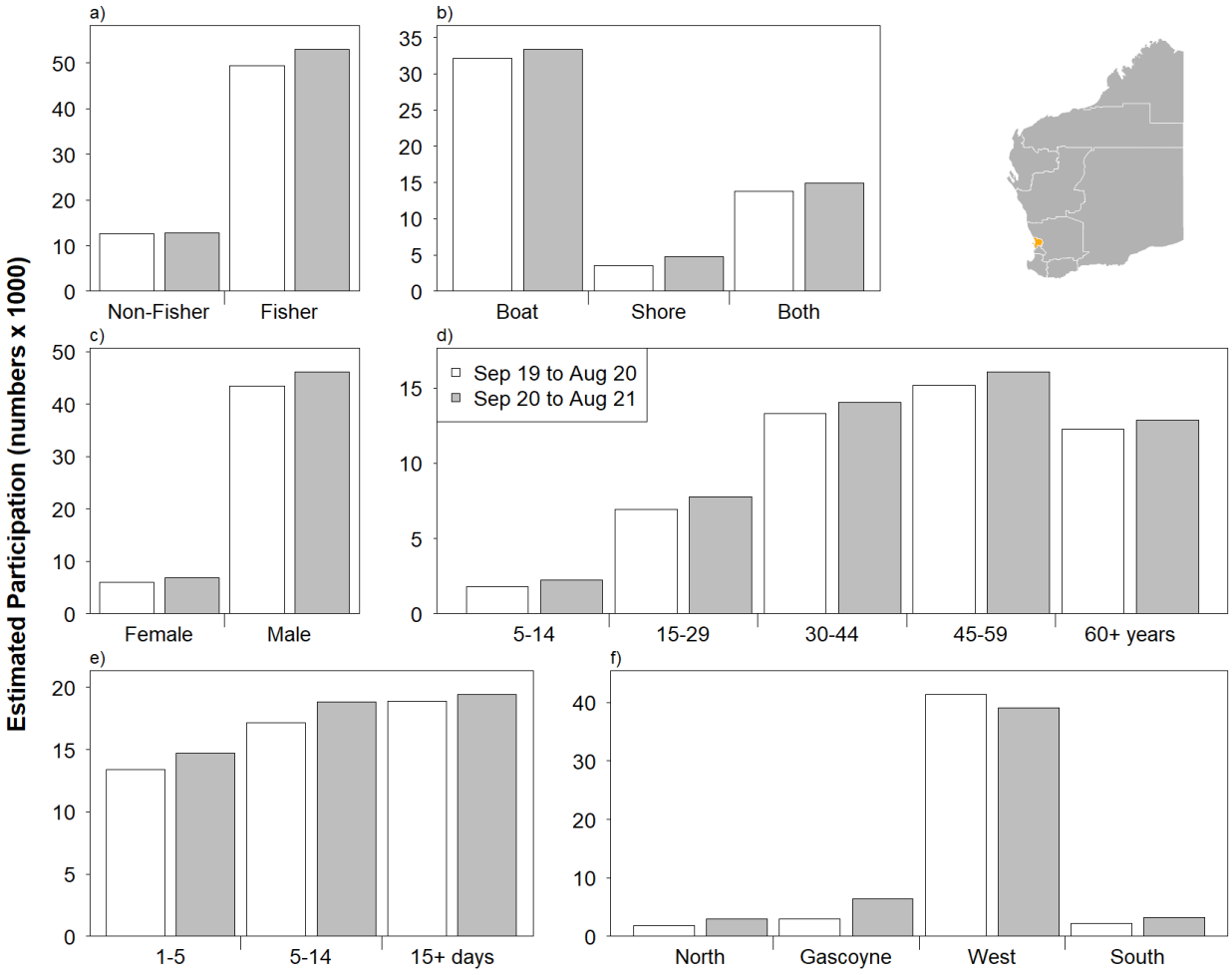


Figure 12. Participation in recreational fishing by Perth Metropolitan residents in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

3.8 Peel

A total of 13,118 residents in the Peel RDC held a RBFL in the 12 months prior to September 2020 (Figure 4), with 10,306 (79%) fishing at least once in 2019/20 (Figure 13a). Similarly, 13,464 residents held a RBFL in the 12 months prior to September 2021 (Figure 5), with 10,910 (81%) fishing at least once in 2020/21. Most RBFL holders that fished were male (85% in 2019/20 and 81% in 2020/21; Figure 13c) and the proportion of females that fished compared was consistent with statewide participation. Most RBFL holders were in 60 years or older (38% in 2019/20 and 2020/21; Figure 13d). Most RBFL holders fished 15 days or more in 2019/20 (38%) and 5 to 14 days in 2020/21 (37%; Figure 13e) and fished in the West Coast (84% in 2019/20 and 75% in 2020/21; Figure 13f).

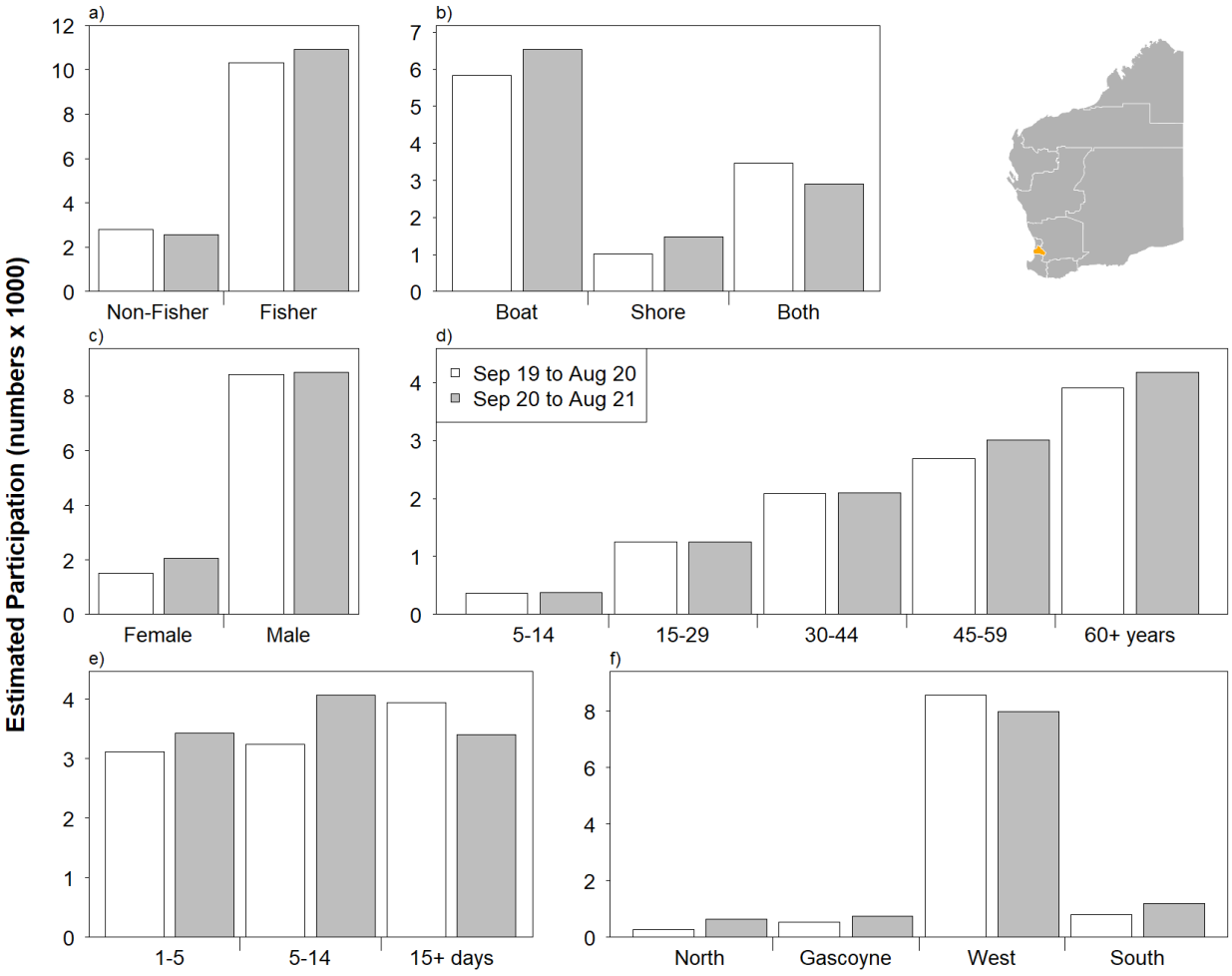


Figure 13. Participation in recreational fishing by Peel RDC residents in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

3.9 South West

A total of 17,723 residents in the South West RDC held a RBFL in the 12 months prior to September 2020 (Figure 4), with 14,694 (83%) fishing at least once in 2019/20 (Figure 14a). Similarly, 18,445 residents held a RBFL in the 12 months prior to September 2021 (Figure 5), with 15,020 (81%) fishing at least once in 2020/21. Most RBFL holders that fished were male (84% in 2019/20 and 81% in 2020/21; Figure 14c) and a higher proportion of females fished compared with statewide participation. Most RBFL holders were 60 years or older (31% in 2019/20 and 30% in 2020/21; Figure 14d). Most RBFL holders fished 5 to 14 days (36% in 2019/20 and 41% in 2020/21) or 15 days or more (37% in 2019/20 and 34% in 2020/21; Figure 14e), and fished in the West Coast (65% in 2019/20 and 57% in 2020/21), followed by the South Coast (27% in 2019/20 and 25% in 2020/21; Figure 14f).

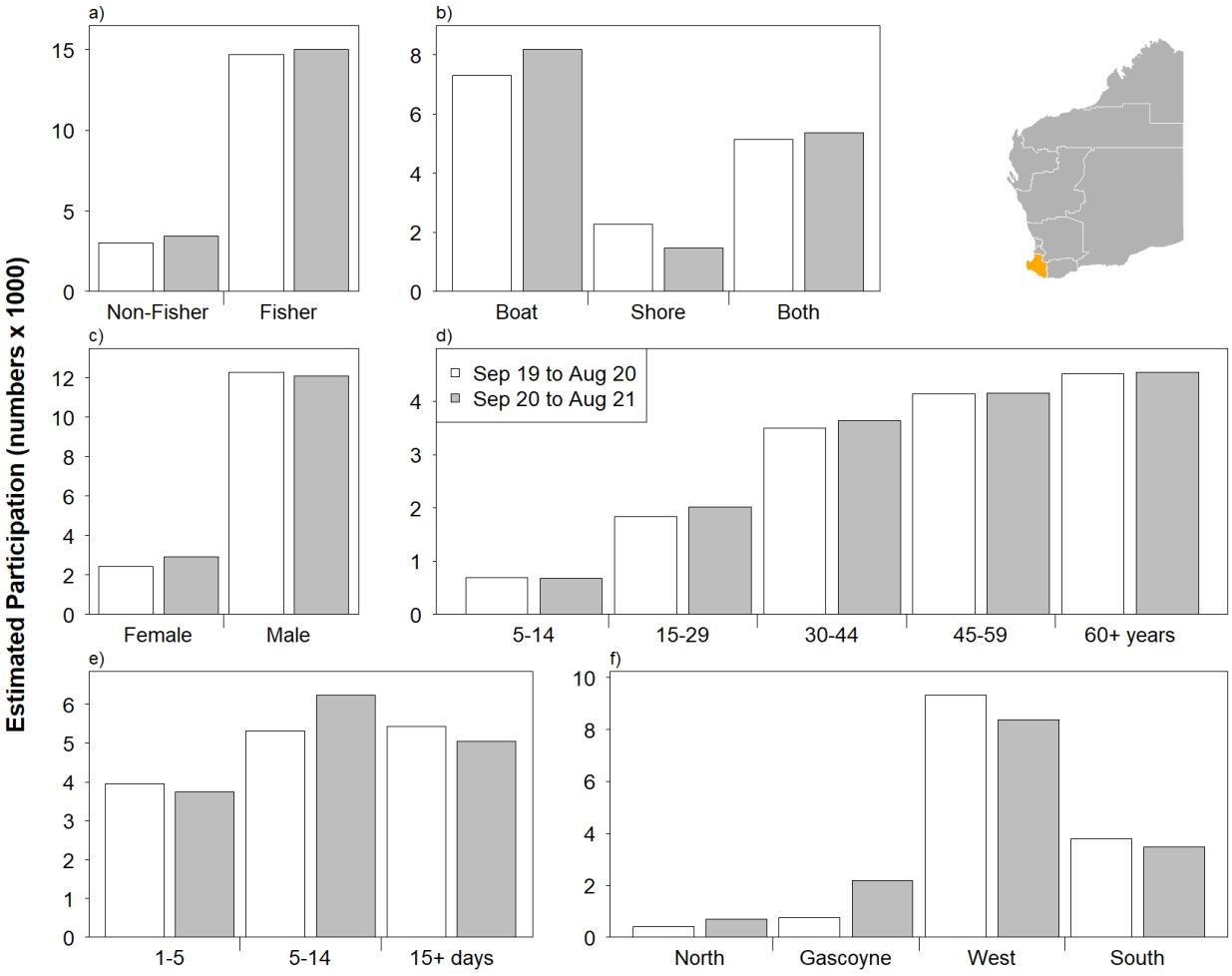


Figure 14. Participation in recreational fishing by South West RDC residents in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

3.10 Great Southern

A total of 5,366 residents in the Great Southern RDC held a RBFL in the 12 months prior to September 2020 (Figure 4), with 4,381 (82%) fishing at least once in 2019/20 (Figure 15a). Similarly, 5,277 residents held a RBFL in the 12 months prior to September 2021 (Figure 5), with 3,990 (76%) fishing at least once in 2020/21. Most RBFL holders that fished were male (88% in 2019/20 and 85% in 2020/21; Figure 15c) and the proportion of females that fished was consistent with statewide participation. Most RBFL holders were in the 45 to 59-year age group (31% in 2019/20 and 29% in 2020/21) and 60 years or older (29% in 2019/20 and 33% in 2020/21; Figure 15d). Most RBFL holders fished 5 to 14 days (33% in 2019/20 and 37% in 2020/21) or 15 days or more (41% in 2019/20 and 35% in 2020/21; Figure 15e) and fished in the South Coast (96% in 2019/20 and 84% in 2020/21; Figure 15f).

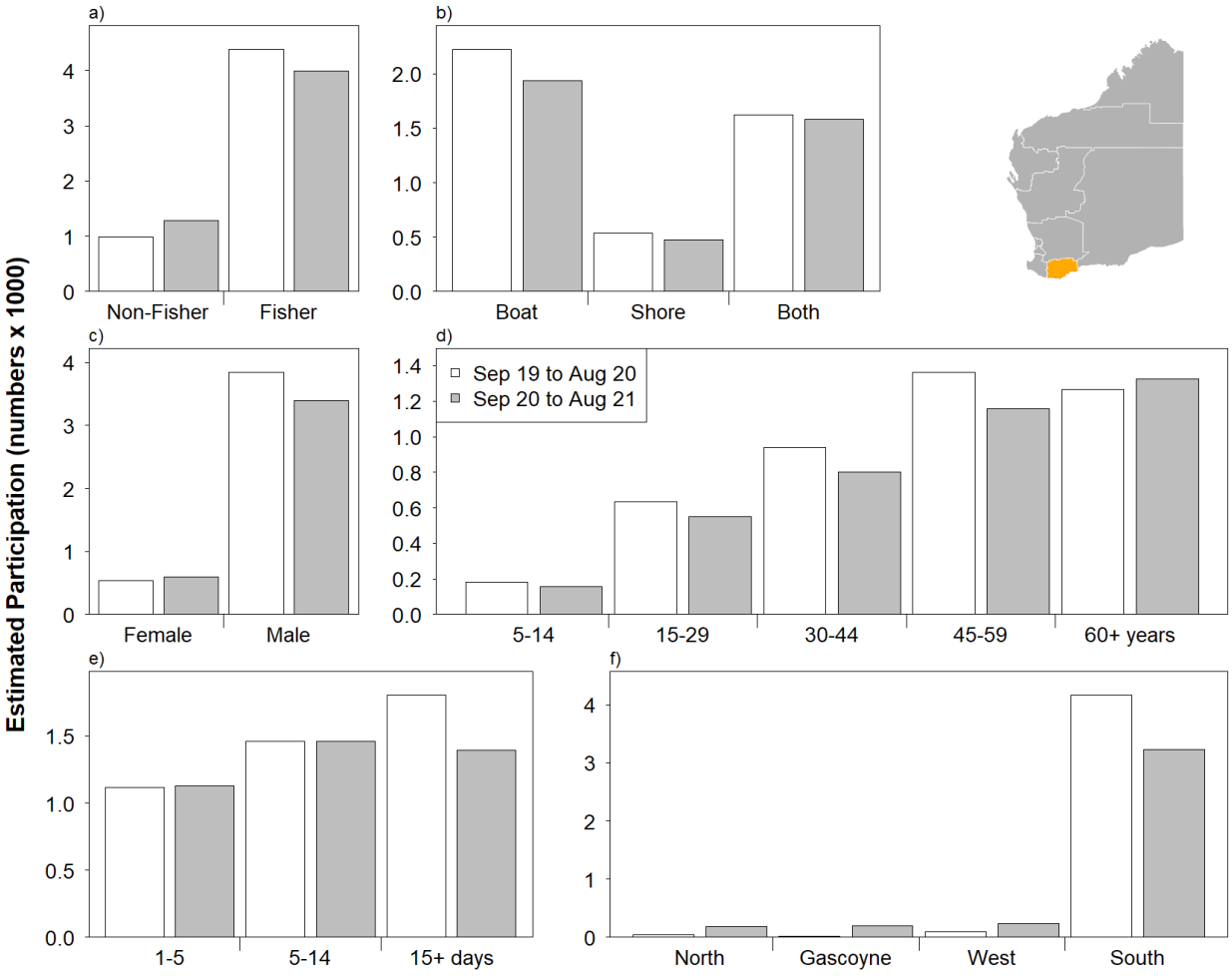


Figure 15. Participation in recreational fishing by Great Southern RDC residents in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

3.11 Goldfields-Esperance

A total of 2,185 residents in the Goldfields-Esperance RDC held a RBFL in the 12 months prior to September 2020 (Figure 4), with 1,663 (76%) fishing at least once in 2019/20 (Figure 16a). Similarly, 2,326 residents held a RBFL in the 12 months prior to September 2021 (Figure 5), with 1,700 (73%) fishing at least once in 2020/21. Most RBFL holders that fished were male (89% in 2019/20 and 83% in 2020/21; Figure 16c) and the proportion of females that fished was consistent with statewide participation. Most RBFL holders were in the 30 to 44-year age group (27% in 2019/20 and 28% in 2020/21) and the 45 to 59-year age group (27% in 2019/20 and 32% in 2020/21; Figure 16d). Most RBFL holders fished less than 5 days (33% in 2019/20 and 41% in 2020/21) or 5 to 14 days (40% in 2019/20 and 34% in 2020/21; Figure 16e) and fished in the South Coast (86% in 2019/20 and 78% in 2020/21; Figure 16f).

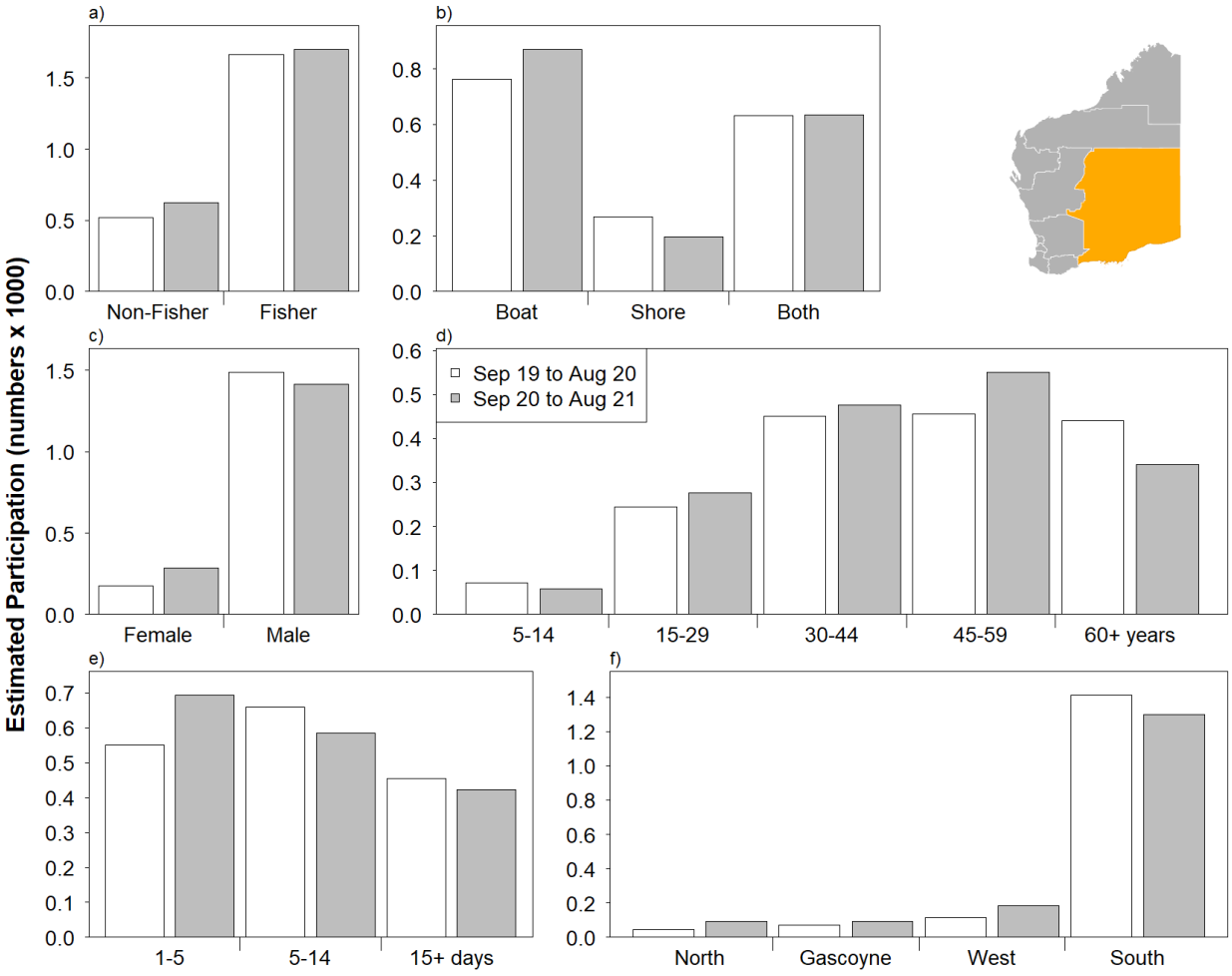


Figure 16. Participation in recreational fishing by Goldfields-Esperance RDC residents in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

3.12 Interstate

A total of 1,655 interstate visitors held a RBFL in the 12 months prior to September 2020 (Figure 4), with 1,084 (65%) fishing at least once in 2019/20 (Figure 17a). A total of 2,648 interstate visitors held a RBFL in the 12 months prior to September 2021 (Figure 5), with 2,099 (79%) fishing at least once in 2020/21. Most RBFL holders that fished were male (85% in 2019/20 and 78% in 2020/21; Figure 17c) and the proportion of females that fished was consistent with statewide participation. Most RBFL holders that fished were in the 30 to 44-year age group in 2019/20 (30%) and 60 years or older in 2020/21 (38%; Figure 17d). Most RBFL holders fished 5 to 14 days (39% in 2019/20 and 29% in 2020/21) or 15 days or more (35% in 2019/20 and 43% in 2020/21; Figure 17e) and fished in the North Coast (51% in 2019/20 and 55% in 2020/21), followed by the Gascoyne Coast (27% in 2019/20 and 31% in 2020/21) and the West Coast (17% in 2019/20 and 12% in 2020/21; Figure 17f).

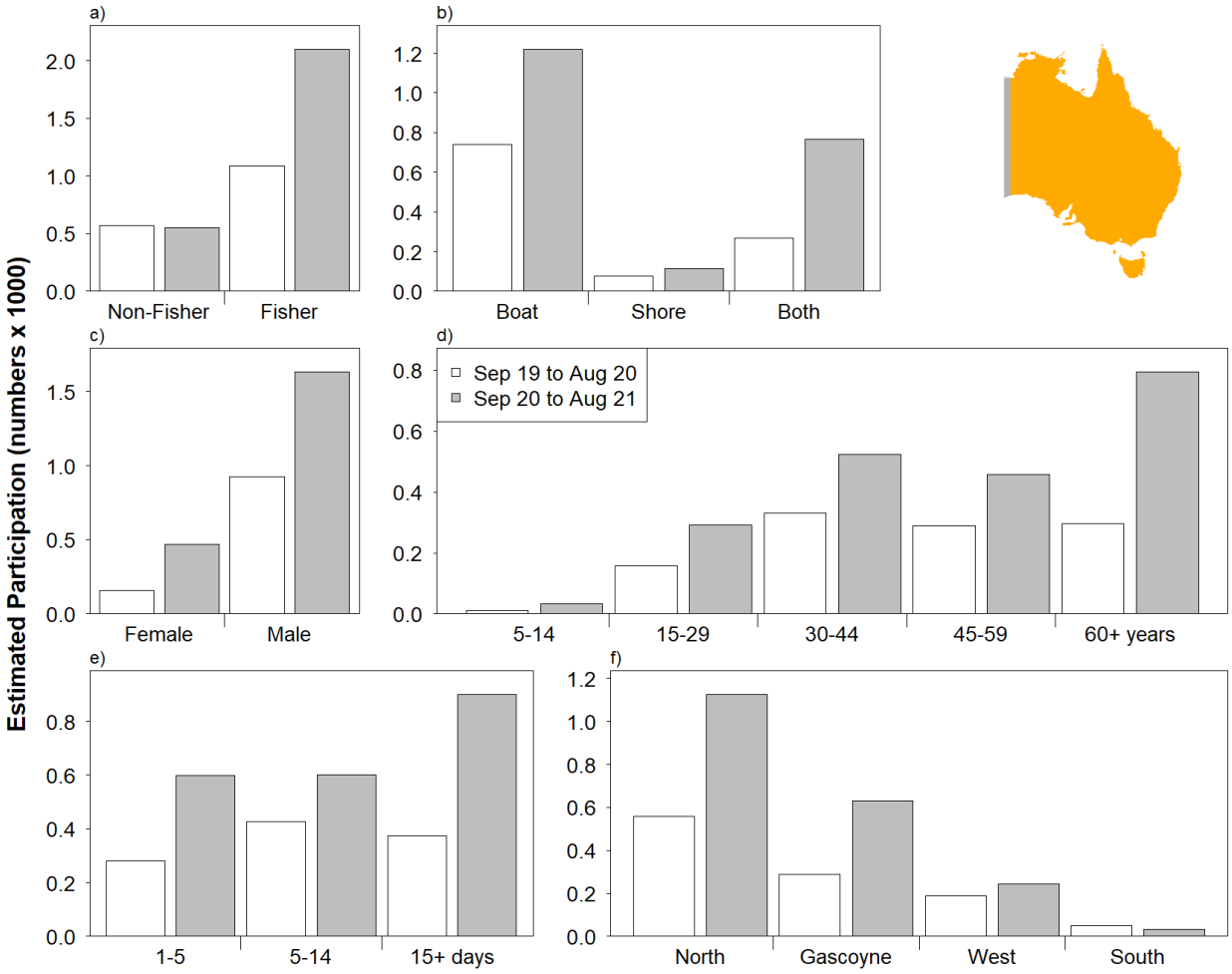


Figure 17. Participation in recreational fishing by interstate residents in the 12 months prior to September 2020 (white bars) and September 2021 (grey bars); a) non-fishers and fishers; b) platform; c) gender; d) age (years); e) avidity (days fished per year); and f) bioregion fished.

4 Fishing Effort

This section presents results from the Phone-Diary Survey relating to boat-based recreational fishing effort for the 12 months from September 2020 to August 2021. Effort is summarised for the state (Figure 18) and for each bioregion: North Coast (Figure 19), Gascoyne Coast (Figure 20), West Coast (Figure 21) and South Coast (Figure 22), by habitat, fishing method and month.

Effort is measured in boat days (separate days in which fishing occurred on a 'boat party' basis, regardless of the number of fishers or RBFL holders on board), number of fishing events, which accounts for multiple events during a boat day (i.e. where the fishing method or location fished changed during the boat day) and fishing hours (time spent boat-based recreational fishing, exclusive of any breaks, regardless of fishing method).

Boat-based recreational fishing effort for the 12 months from September 2020 to August 2021 was 431,175 boat days, with 468,682 separate fishing events (Table 3). Fishers had an average of 1.09 fishing events per boat day (ranging from 1.07 to 1.10 across all bioregions). The total time spent boat-based recreational fishing in 202/21 was 1,248,093 hours. The statewide number of boat days and number of fishing hours in 2020/21 were similar to previous survey years.

Three quarters of the statewide number of boat days occurred in the West Coast (73%), followed by the Gascoyne (13%), North Coast (8%) and South Coast (6%). The highest proportion of fishing hours also occurred in the West Coast (63%), followed by the Gascoyne (18%), North Coast (11%) and South Coast (8%).

For all bioregions, the number of boat days and fishing hours in 2020/21 were similar to previous years (Table 3). For all zones, the number of boat days and fishing hours in 2020/21 were similar to previous years (Table 4), with one exception. The number of boat days and fishing hours in the Metro zone was higher in 2020/21 compared with 2013/14.

Table 3. Annual fishing effort, expressed as boat days, fishing events, and hours fished for boat-based recreational fishing in Western Australia during 2011/12, 2013/14, 2015/16, 2017/18 and 2020/21 (se=standard error).

Bioregion	Boat Days	se	Fishing Events	se	Hours Fished	se
2011/12						
North Coast	45,986	5,671	49,806	6,650	174,611	19,140
Gascoyne Coast	58,378	5,391	62,356	5,809	232,523	23,026
West Coast	299,573	16,699	326,885	18,743	839,585	45,445
South Coast	42,070	5,440	44,323	5,793	145,483	20,347
Statewide Total	**445,820**	**19,141**	**483,371**	**21,530**	**1,392,202**	**58,090**
2013/14						
North Coast	41,629	4,834	44,329	5,111	163,346	19,898
Gascoyne Coast	50,810	4,957	53,674	5,277	203,933	22,284
West Coast	242,499	14,047	262,777	15,555	693,397	41,988
South Coast	27,837	3,314	29,774	3,610	91,753	10,847
Statewide Total	**362,746**	**15,953**	**390,554**	**17,527**	**1,152,429**	**53,610**
2015/16						
North Coast	29,889	3,465	31,481	3,628	118,597	13,896
Gascoyne Coast	42,511	4,442	43,687	4,569	168,573	18,729
West Coast	260,207	15,058	273,561	16,028	725,425	41,283
South Coast	24,658	3,266	25,267	3,340	83,972	11,397
Statewide Total	**357,265**	**16,610**	**373,996**	**17,576**	**1,096,567**	**50,548**
2017/18						
North Coast	32,279	3,807	33,498	3,965	127,952	15,309
Gascoyne Coast	42,367	4,428	44,083	4,614	178,633	19,916
West Coast	306,761	18,023	327,687	19,403	774,101	43,754
South Coast	21,631	2,557	22,637	2,684	83,147	11,400
Statewide Total	**403,039**	**19,421**	**427,905**	**20,837**	**1,163,833**	**54,782**
2020/21						
North Coast	36,089	4,085	38,510	4,335	140,371	17,060
Gascoyne Coast	55,327	6,054	59,113	6,632	220,919	25,249
West Coast	313,873	19,274	343,735	22,305	791,963	51,144
South Coast	25,886	3,329	27,325	3,525	94,839	12,497
Statewide Total	**431,175**	**21,306**	**468,682**	**24,423**	**1,248,093**	**62,977**

Table 4. Annual fishing effort, expressed as boat days, fishing events, and hours fished for boat-based recreational fishing in Western Australia during 2011/12, 2013/14, 2015/16, 2017/18 and 2020/21 by zone (se=standard error).

Zone	Year	Boat Days	se	Fishing Events	se	Hours Fished	se
Kimberley	1112	17,463	3,840	19,342	4,900	60,093	9,894
	1314	17,586	3,172	18,873	3,381	68,994	13,526
	1516	14,577	2,575	15,477	2,701	56,266	9,943
	1718	12,823	2,239	13,243	2,309	50,873	9,202
	2021	18,029	2,966	18,837	3,106	68,995	11,889
Pilbara	1112	28,576	4,075	30,464	4,394	114,519	16,031
	1314	24,066	3,546	25,456	3,726	94,352	13,930
	1516	15,313	2,333	16,004	2,435	62,331	9,719
	1718	19,491	2,985	20,255	3,123	77,078	11,993
	2021	18,060	2,535	19,673	2,754	71,376	10,781
Ningaloo	1112	25,402	3,738	27,103	4,017	106,775	17,089
	1314	21,922	3,441	23,054	3,592	92,390	16,857
	1516	13,898	2,626	14,523	2,734	57,678	12,035
	1718	18,938	2,945	19,696	3,095	80,597	13,616
	2021	26,237	3,779	27,605	3,966	100,930	15,239
Carnarvon/	1112	33,014	3,802	35,253	4,096	125,748	15,207
Shark Bay	1314	28,949	3,550	30,620	3,846	111,543	14,473
	1516	28,613	3,615	29,163	3,687	110,895	14,522
	1718	23,438	3,335	24,387	3,449	98,036	14,613
	2021	29,089	4,535	31,508	5,097	119,990	19,487
Mid West	1112	69,863	10,401	76,308	11,276	150,529	17,367
(including	1314	43,563	5,919	49,137	6,904	109,365	13,879
Kalbarri)	1516	47,593	6,792	49,941	7,126	112,429	13,488
	1718	58,222	8,233	61,788	8,680	139,281	16,478
	2021	53,080	6,846	56,611	7,202	120,045	14,351
Metro	1112	175,742	11,175	191,270	12,992	510,702	33,842
	1314	153,323	9,945	164,716	10,915	448,387	31,834
	1516	162,874	11,993	171,275	12,811	441,875	31,297
	1718	196,764	14,201	209,857	15,315	477,462	32,890
	2021	203,328	14,884	221,595	16,998	505,707	42,254
South	1112	54,233	6,356	59,307	6,895	178,355	23,731
	1314	45,722	7,436	48,923	7,786	135,644	20,436
	1516	50,069	6,014	52,346	6,298	171,122	21,896
	1718	51,843	6,559	56,041	7,168	157,359	20,675
	2021	57,521	10,071	65,529	12,368	166,211	22,959
Albany	1112	36,944	5,338	38,973	5,690	129,245	20,077
	1314	23,766	3,218	25,483	3,507	78,618	10,563
	1516	20,661	3,107	21,197	3,180	70,362	10,765
	1718	18,504	2,456	19,426	2,580	71,507	11,054
	2021	22,902	3,231	24,208	3,426	83,089	12,121
Esperance	1112	5,135	945	5,351	982	16,238	3,083
	1314	4,079	809	4,291	879	13,135	2,583
	1516	3,996	853	4,069	869	13,610	3,082
	1718	3,127	707	3,211	734	11,640	2,852
	2021	2,984	630	3,117	669	11,750	2,591

4.1 Statewide

At a statewide level, most boat-based recreational fishing effort (boat days) occurred in nearshore habitat (62%), followed by inshore demersal (25%) and estuarine (10%), with lower proportions in pelagic (2%), offshore demersal (1%) and freshwater (<1%; Figure 18a). Most boat-based recreational fishing effort was attributed to line fishing (59%) and pots (35%), with lower proportions from diving (4%), nets (1%) and other (1%; Figure 18b). Most fishing effort occurred during summer (38%), followed by autumn (24%), spring (23%) and winter (14%). Effort was lowest from June to August 2021 (5% per month; Figure 18c). Fishing effort in December 2020 (20%) was higher than previous years, as was effort for potting and fishing in nearshore habitats.

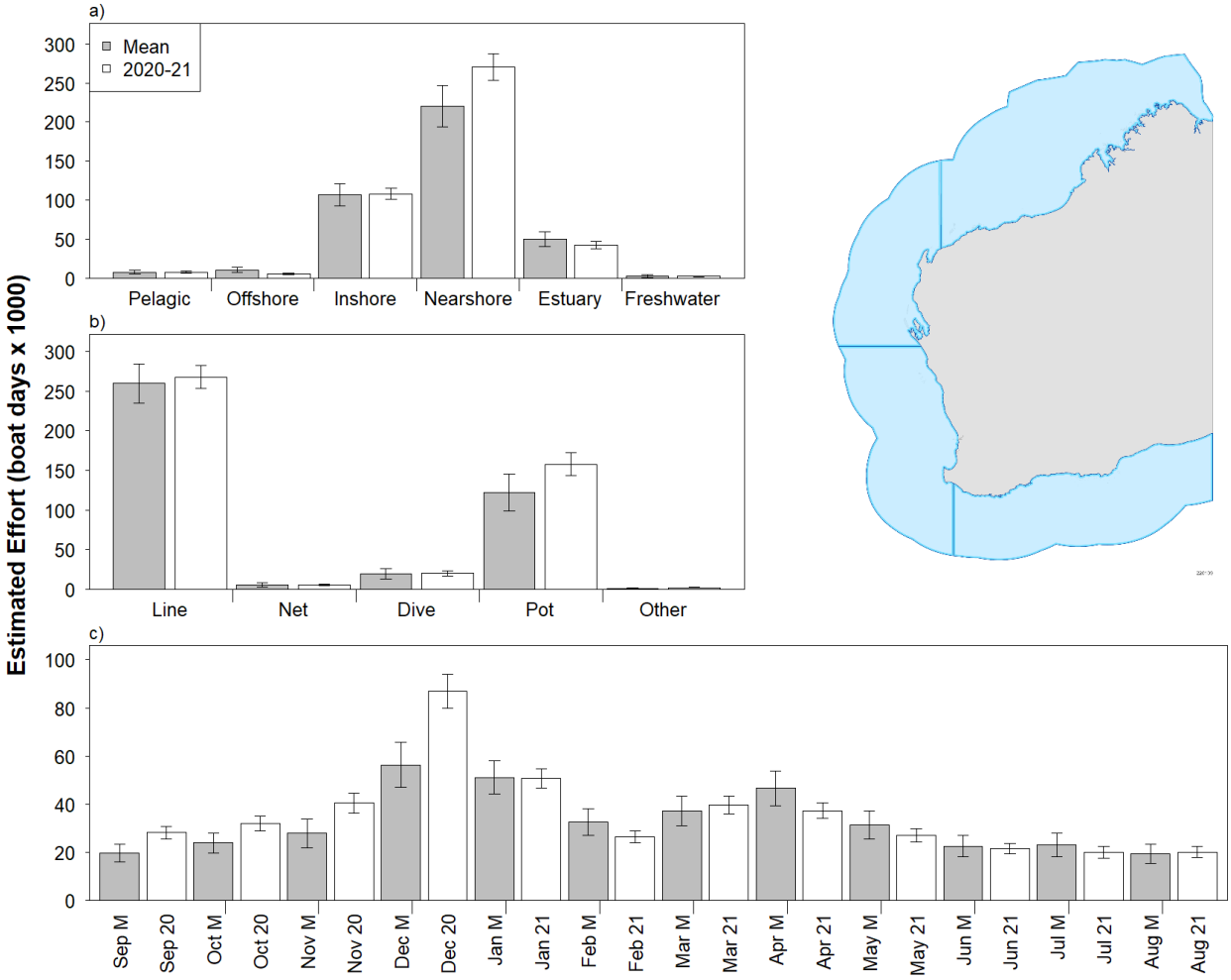


Figure 18. Boat-based recreational fishing effort (boat days x 1000 ± SE) in Western Australia during 2020/21 (white bars) compared with the mean from the 4 previous surveys (grey bars); a) effort by habitat; b) effort by fishing method; and c) effort by month.

4.2 North Coast

Most boat-based recreational fishing effort (boat days) during September 2020 to August 2021 in the North Coast occurred in nearshore habitat (46%), followed by inshore demersal (32%) and estuarine (14%), with lower proportions in pelagic (4%), offshore demersal (2%) and freshwater (2%; Figure 19a). Most fishing effort was attributed to line fishing (87%), with lower proportions from pots (6%), diving (5%) and nets (2%; Figure 19b). Most fishing effort occurred during winter (42%), followed by spring (25%), autumn (22%) and summer (11%). Fishing effort was highest in July 2021 (19%) and lowest from December 2020 to April 2021 (≤6% per month; Figure 19c). Fishing effort in the North Coast in 2020/21 was generally consistent with previous years, however, there was lower effort in March and April 2021 during Covid-19 regional travel restrictions.

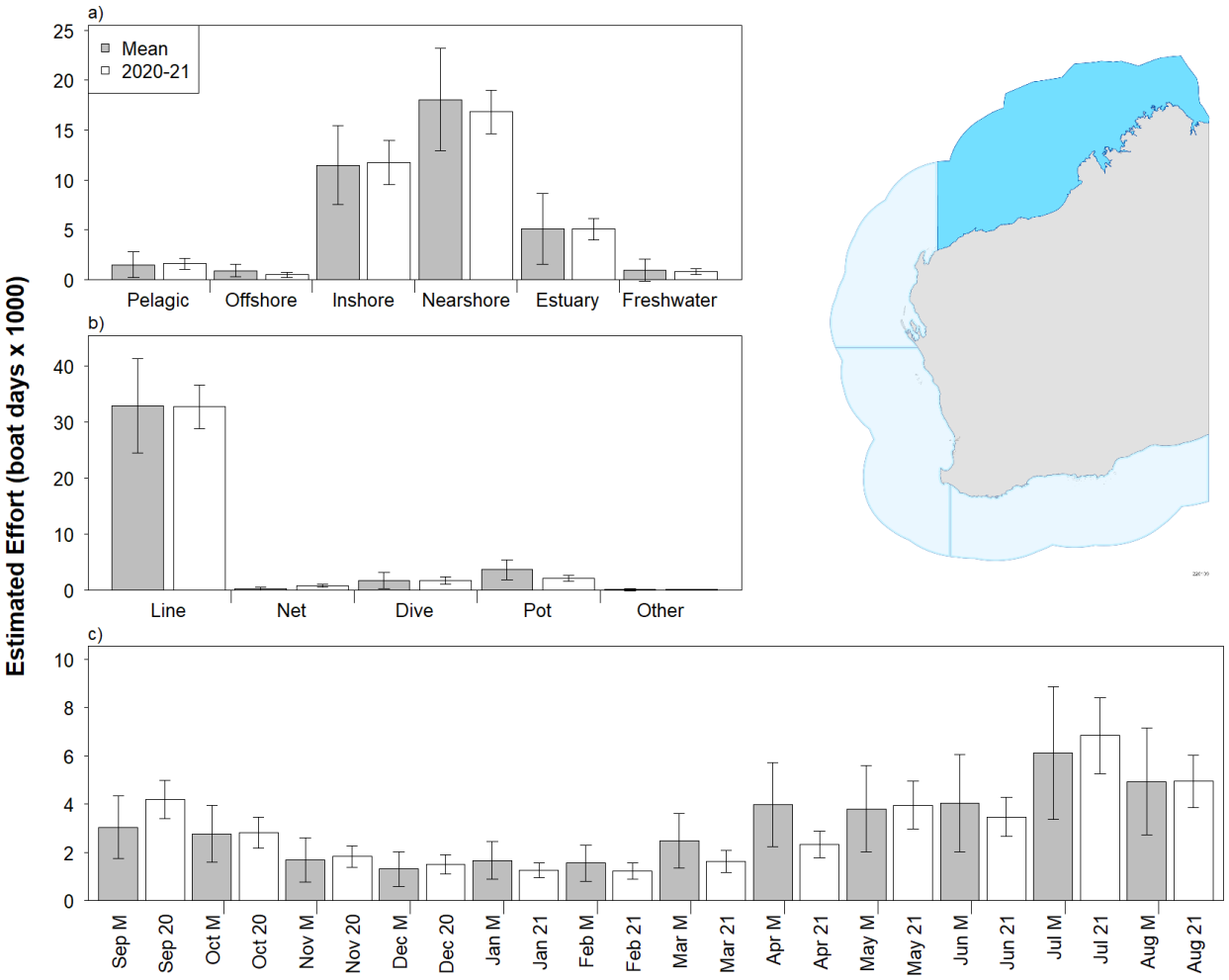


Figure 19. Boat-based recreational fishing effort (boat days x 1000 ± SE) in the North Coast during 2020/21 (white bars) compared with the mean from the 4 previous surveys (grey bars); a) effort by habitat; b) effort by fishing method; and c) effort by month.

4.3 Gascoyne Coast

Most boat-based recreational fishing effort (boat days) during September 2020 to August 2021 in the Gascoyne Coast occurred in nearshore (54%) and inshore demersal (39%) habitats, with lower proportions in pelagic (5%) and offshore demersal (2%; Figure 20a). Most fishing effort was attributed to line fishing (91%), with lower proportions from diving (4%), pots (4%), nets (1%; Figure 20b). Most fishing effort occurred during autumn (36%), winter (32%) and spring (24%), and was lowest in summer (8%). Fishing effort was highest in May 2021 (18%) and lowest from November 2020 to March 2021 (≤6% per month; Figure 20c). Fishing effort in the Gascoyne Coast in 2020/21 was generally consistent with previous years, notably for line fishing and fishing in inshore habitat.

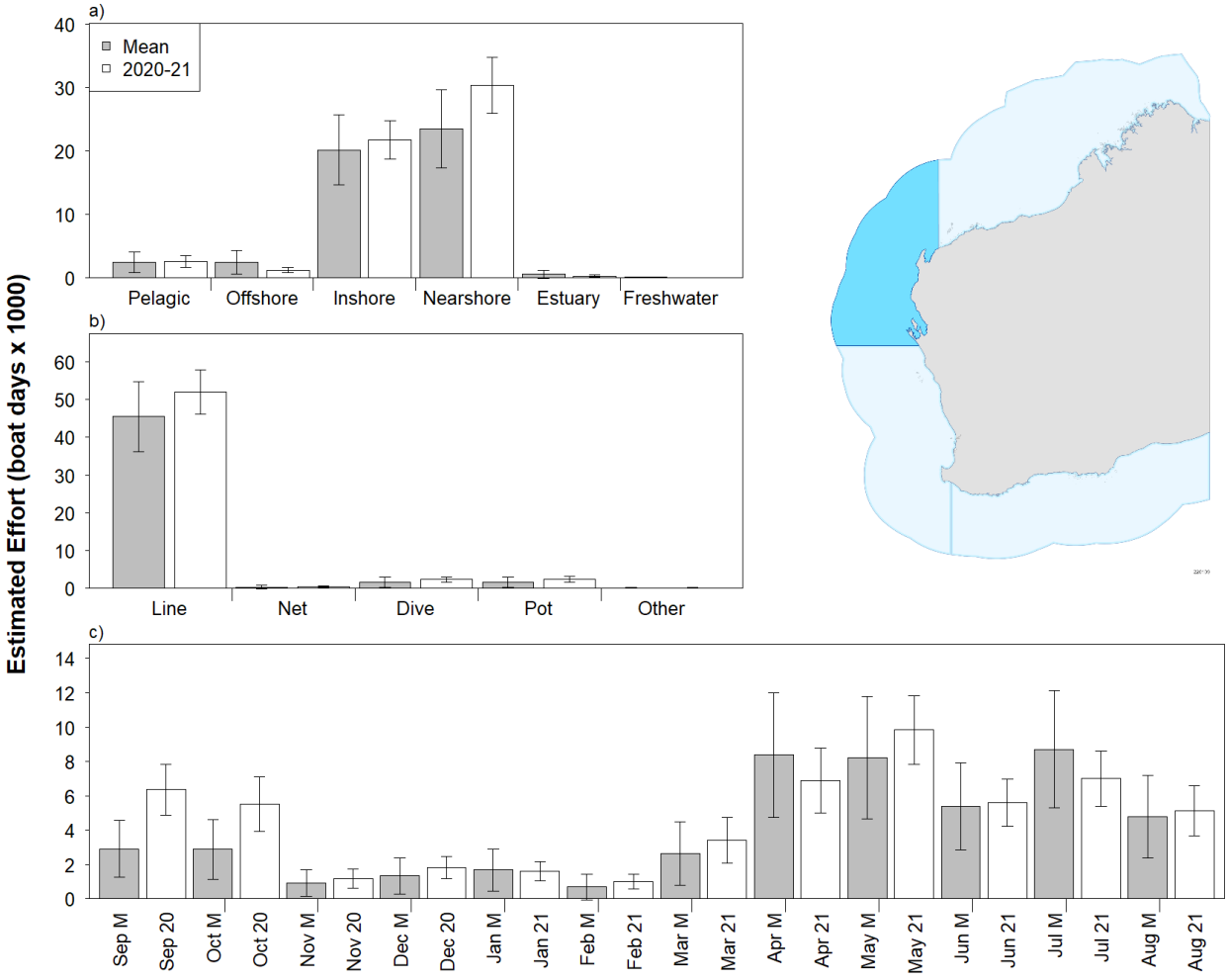


Figure 20. Boat-based recreational fishing effort (boat days x 1000 ± SE) in the Gascoyne Coast during 2020/21 (white bars) compared with the mean from the 4 previous surveys (grey bars); a) effort by habitat; b) effort by fishing method; and c) effort by month.

4.4 West Coast

Most boat-based recreational fishing effort (boat days) during September 2020 to August 2021 in the West Coast occurred in nearshore habitat (66%), followed by inshore demersal (21%) and estuarine (10%), with lower proportions in offshore demersal (1%), pelagic (1%) and freshwater (1%; Figure 21a). Most fishing effort was attributed to line fishing (47%) and pots (46%), with lower proportions from diving (5%), nets (1%) and other (1%; Figure 21b). Most fishing effort occurred during summer (47%), spring (23%) and autumn (22%) and was lowest in winter (8%). Fishing effort was highest in December 2020 (26%) and lowest from May to September 2021 (≤5% per month; Figure 21c). Fishing effort in the West Coast in 2020/21 was generally consistent with previous years, with higher effort for potting and fishing in nearshore habitat.

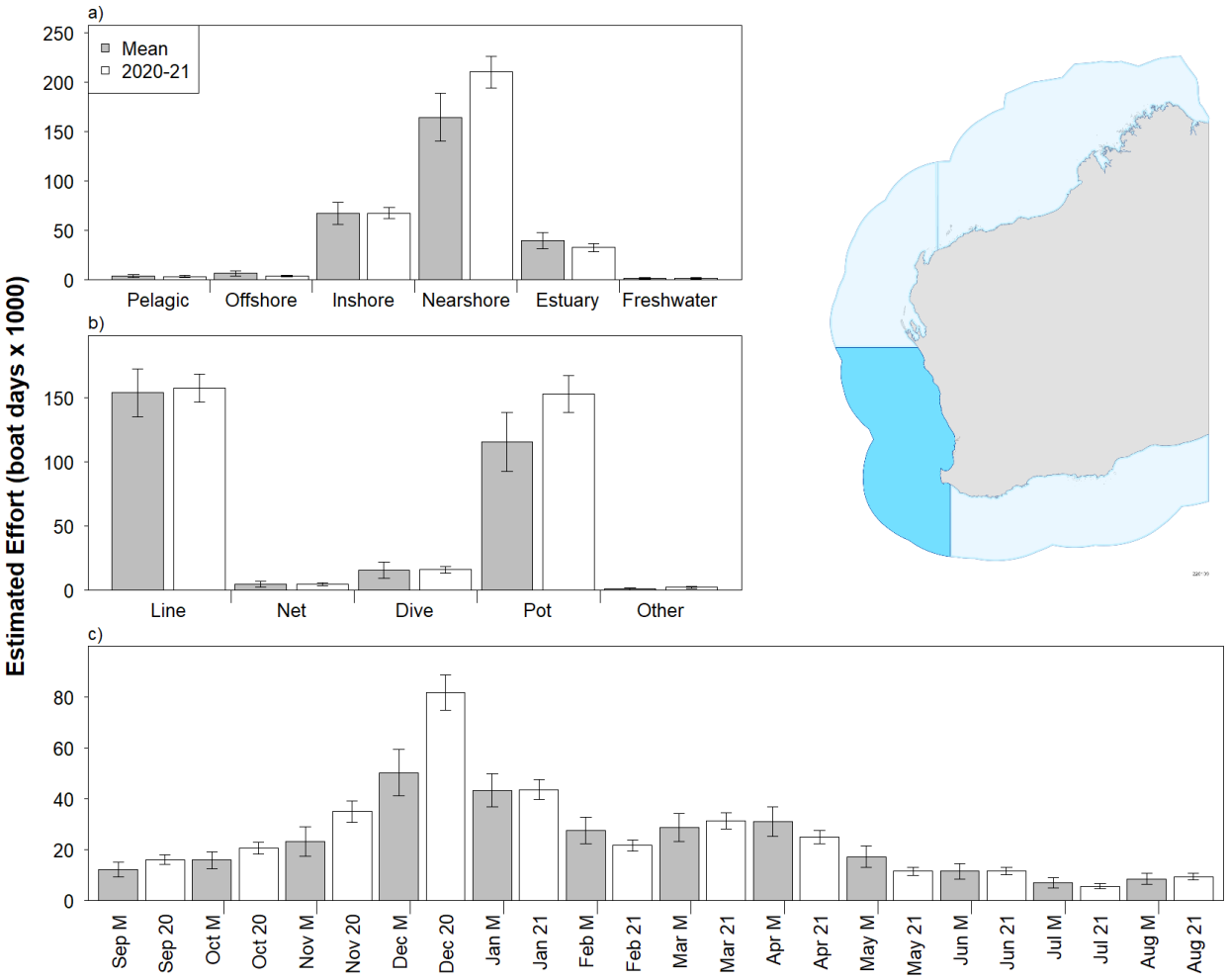


Figure 21. Boat-based recreational fishing effort (boat days x 1000 ± SE) in the West Coast during 2020/21 (white bars) compared with the mean from the 4 previous surveys (grey bars); a) effort by habitat; b) effort by fishing method; and c) effort by month.

4.5 South Coast

Most boat-based recreational fishing effort (boat days) during September 2020 to August 2021 in the South Coast occurred in nearshore habitat (50%), followed by inshore demersal (28%) and estuarine (18%), with lower proportions in offshore demersal (2%), pelagic (1%) and freshwater (1%; Figure 22a). Most fishing effort was attributed to line fishing (97%), with lower proportions from pots (1%), diving (1%) and nets (1%; Figure 22b). Most fishing effort occurred during summer (34%), autumn (31%) and spring (28%) and was lowest in winter (7%). Fishing effort was highest in January 2021 (17%) and lowest from June to August 2021 (≤3% per month; Figure 22c). Fishing effort in the South Coast in 2020/21 was generally consistent with previous years, notably for line fishing and fishing in inshore and nearshore habitats.

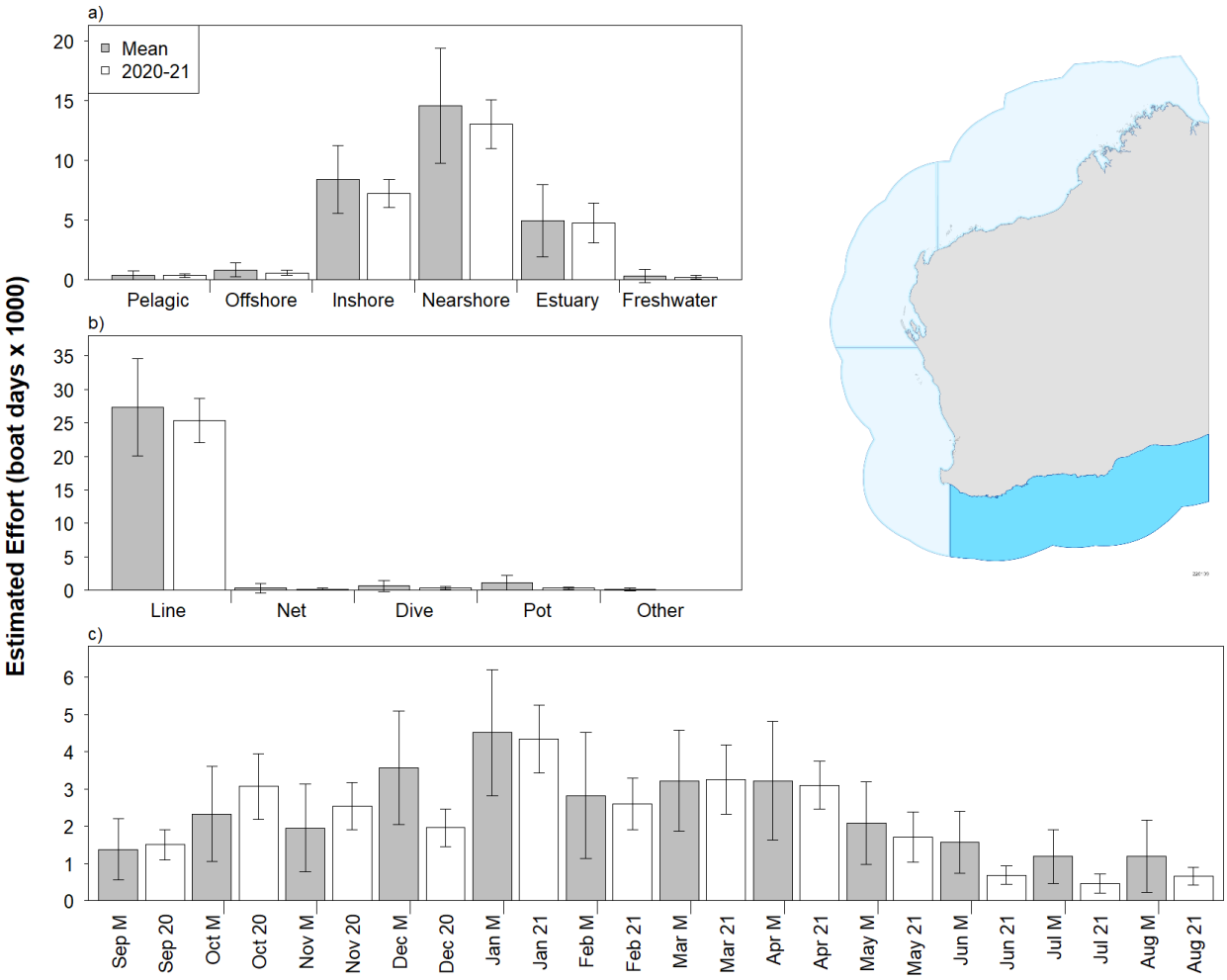


Figure 22. Boat-based recreational fishing effort (boat days x 1000 ± SE) in the South Coast during 2020/21 (white bars) compared with the mean from the 4 previous surveys (grey bars); a) effort by habitat; b) effort by fishing method; and c) effort by month.

5 Statewide Recreational Catch

This section presents results from the Phone-Diary Survey relating to boat-based recreational fishing catch for the 12 months from September 2020 to August 2021. Estimates presented for all species include annual catch (total, kept and released, by number), proportions released (% released) and reasons for release.

5.1 Annual Catch (Total, Kept and Released Numbers)

The annual catch (total, kept and released numbers) for the 12 months from September 2020 to August 2021 is given in Table 5. A diverse range of species/taxa were caught, including scalefish (209 species/taxa), elasmobranchs (20), crustaceans (7) and molluscs (6). A total of 3.03 million individual fish (including invertebrates) were caught from boat-based recreational fishing in 2020/21. A similar proportion of the catch was either kept (1.66 million or 55%) or released (1.36 million or 45%). Approximately half of the total catch were finfish (1.64 million scalefish or elasmobranchs; 54%) in comparison to invertebrates (1.38 million crustaceans or molluscs; 48%). The proportion of finfish released (58%) was similar to the proportion of invertebrates released (42%).

School Whiting (*Sillago bassensis*, *S. vittata* and *S. schomburgkii*) were the most commonly caught finfish species statewide (320,029 kept or released by number, or 19% of the finfish catch), followed by Australian Herring (*Arripis georgianus*; 190,206 or 12%), Pink Snapper (*Chrysophrys auratus*; 136,268 or 8%), King George Whiting (*Sillaginodes punctatus*; 91,636 or 6%), Black Bream (*Acanthopagrus butcheri*; 61,500 or 4%), Grass Emperor (*Lethrinus laticaudis*; 58,256 or 4%), Silver Trevally (*Pseudocaranx* spp. complex; 55,109 or 3%), West Australian Dhufish (*Glaucosoma hebraicum*; 43,510 or 3%), Western King Wrasse (*Coris auricularis*; 40,587 or 2%), Chinaman Rockcod (*Epinephelus rivulatus*; 35,712 or 2%), Western Butterfish (*Pentapodus vitta*; 35,447 or 2%) and Baldchin Groper (*Choerodon rubescens*; 30,998 or 2%).

High release rates were observed for many of these species, including Black Bream (83%), Western King Wrasse (80%), Pink Snapper (76%), Western Butterfish (75%), Grass Emperor (66%), Chinaman Rockcod (56%) and West Australian Dhufish (50%). Release rates were lower for Silver Trevally (37%), Baldchin Groper (35%), King George Whiting (27%), Australian Herring (21%) and School Whiting (18%).

Western Rock Lobster (*Panulirus cygnus*) was the most commonly caught invertebrate statewide (662,583 kept or released by number, or 48% of the invertebrate catch), followed by Blue Swimmer Crab (*Portunus armatus*; 571,240 or 41%), Squid (Order Teuthoidea; 104,478 or 8%). High release rates were observed for Blue Swimmer Crab (65%) compared with Western Rock Lobster (28%) and Squid (5%).

5.2 Release Rates

The proportion released for each species during 2020/21 is given in Table 5. Lowest release rates were observed for Squid (5%), Goldband Snapper (7%), Octopus (12%),

Northern Pearl Perch (17%), Harlequin Fish (18%), School Whiting (18%), Eightbar Grouper (20%), Southern Bluefin Tuna (20%), Bight Redfish (20%), Australian Herring (21%), Robinson's Seabream (22%) and Blue Morwong (23%),. Highest release rates were observed for Giant Trevally (90%), Dusky Whaler (93%), Bludger Trevally (93%), Sea Trumpeter (94%), Blacktip Reef Shark (96%), Giant Sea Catfish (97%), Western Shovelnose Ray (98%), Silver Toadfish (100%) and Weeping Toadfish (100%).

5.3 Reasons for Release

A summary of the proportions for common reasons for release during 2020/21 is given in Table 6. The most common reasons for release were: ‘too small’ (personal preference), ‘under size’ (below legal limit), ‘too many’ (personal preference), ‘over limit’ (Above legal bag limit), ‘catch and release’ (sport fishing) and ‘other’, which includes protected females and species.

‘Too small’ includes catches that are too small in terms of personal preference, not related to regulations. This reason for release occurred in proportions of 30% or more for Australian Herring, Bight Redfish, Crimson Snapper, Northwest Black Bream, School Whiting, Squid and Swallowtail.

‘Under size’ includes catches below the legal size. This reason for release occurred in proportions of 60% or more for Baldchin Groper, Barcheek Coral Trout, Blackspot Tuskfish, Blue Swimmer Crab, Blue Tuskfish, Bluespotted Tuskfish, Breaksea Cod, Brown Mud Crab, Grass Emperor, King George Whiting, Pink Snapper, Red Emperor, Redthroat Emperor, Robinson's Seabream and West Australian Dhufish.

‘Too many’ includes catches that were excess in terms of personal preference (including catches above what was required, as well as catches not wanted, needed or targeted, or no preference for that species). This reason for release occurred in proportions of 60% for more for Blacktip Reef Shark, Bludger Trevally, Golden Trevally, Leatherjackets, Sergeant Baker, Western King Wrasse, Western Trumpeter Whiting and Yellowtail Scad.

‘Over Limit’ includes catches above the legal bag limit. This reason for release did not occur in proportions greater than 20%, except for Goldband Snapper (40%), Painted Sweelips (32%) and Western Rock Lobster (25%). ‘Over limit’ catches occurred in proportions of 10–20% for Bight Redfish (12%), Blue Morwong (13%), Southern Bluefin Tuna (16%), West Australian Dhufish (14%) and Yelloweye Redfish (18%).

‘Catch and release’ fishing includes sport fishing, where fish are not tagged before release. This reason for release occurred in proportions of 50% or more for Barramundi, Bluespotted Emperor, Grey Mackerel, King Threadfin, Longtail Tuna, Sailfish and Yellowfin Tuna.

‘Other’ reasons for release included greater than legal limit, too big, too few (not enough for a meal/dinner/all of us), tag and release, conservation (other than legally protected species), sick (fish has signs of disease), damaged, deformed (not sick or damaged), dangerous, female (berried, eggs, setose, tar spot), poor eating quality (don't taste good, not nice to eat, slimy, hard to clean, many bones, too much effort to cook, perceived or

known), species unknown (not sure about species, eating quality or taste), poisonous (flesh or spines), protected species (e.g. sawfish), mistake (caught but got away, nothing to store fish in) or depredated (taken or damaged by another animal either below or at the surface). Collectively, these ‘other’ reasons for release occurred in proportions of 50% or more for Bluebarred Parrotfish, Great Barracuda, Parrotfish – undifferentiated, Sea Sweep, Silver Toadfish, Southern Garfish, Striped Grunter – undifferentiated, Weeping Toadfish and Wrasses – undifferentiated.

Table 5. Annual catch (total, kept and released numbers) and proportion released during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); values in italics indicate <30 respondents recorded catches of the species).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Abalone	Roe's Abalone	*Haliotis roei*	*18,276*	*6,658*	***225***	***271***	*18,501*	*6,701*	1%
	Greenlip Abalone	*Haliotis laevigata*	***1,113***	***956***	***44***	***60***	***1,157***	***1,012***	4%
	Brownlip Abalone	*Haliotis conicopora*	***651***	***607***	0	0	***651***	***607***	0%
Cephalopods	Cuttlefish	*Sepia spp.*	1,656	388	**689**	**279**	2,345	481	29%
	Octopus	Octopodidae - undifferentiated	**3,049**	**1,607**	430	150	**3,478**	**1,622**	12%
	Squid	Order Teuthoidea - undifferentiated	99,377	14,700	5,101	1,791	104,478	15,111	5%
Lobster	Western Rock Lobster	*Panulirus cygnus*	474,331	50,223	188,253	30,722	662,583	73,575	28%
	Southern Rock Lobster	*Jasus edwardsii*	***488***	***272***	***182***	***147***	***670***	***381***	27%
	Painted Rock Lobster	*Panulirus versicolor*	***340***	***214***	***14***	***19***	***354***	***218***	4%
	Ornate Rock Lobster	*Panulirus ornatus*	***195***	***129***	0	0	***195***	***129***	0%
Crab	Blue Swimmer Crab	*Portunus armatus*	199,159	30,879	372,081	113,367	571,240	140,167	65%
	Green Mud Crab	*Scylla serrata*	**1,785**	**825**	1,207	471	2,992	1,178	40%
	Brown Mud Crab	*Scylla olivacea*	2,121	775	**2,063**	**935**	4,184	1,632	49%
Sharks	Blacktip Reef Shark	*Carcharhinus melanopterus*	**102**	**69**	2,782	852	2,884	856	96%
	Bronze Whaler	*Carcharhinus brachyurus*	**212**	**112**	836	308	1,048	337	80%
	Dusky Whaler	*Carcharhinus obscurus*	**85**	**53**	1,159	440	1,245	445	93%
	Lemon Shark	*Negaprion acutidens*	0	0	***19***	***20***	***19***	***20***	100%
	Sandbar Shark	*Carcharhinus plumbeus*	***27***	***26***	***415***	***201***	***442***	***202***	94%
	Tiger Shark	*Galeocerdo cuvier*	0	0	***148***	***65***	***148***	***65***	100%
	Whitetip Reef Shark	*Triaenodon obesus*	***10***	***14***	***387***	***206***	***397***	***206***	97%
	Whaler Sharks	Carcharhinidae - undifferentiated	***80***	***59***	***861***	***385***	***941***	***402***	91%
	Hammerhead Sharks	Sphyrnidae - undifferentiated	***43***	***48***	***204***	***128***	***247***	***137***	83%
	Gummy Shark	*Mustelus antarcticus*	1,451	360	**603**	**271**	2,054	467	29%
	Western Spotted Gummy Shark	*Mustelus stevensi*	***194***	***131***	***170***	***129***	***364***	***191***	47%
	Whiskery Shark	*Furgaleus macki*	***128***	***66***	***361***	***161***	*489*	*176*	74%
	Port Jackson Shark	*Heterodontus portusjacksoni*	***13***	***18***	*729*	*290*	*743*	*290*	98%
	Greynurse Shark	*Carcharias taurus*	***11***	***15***	***215***	***193***	***226***	***202***	95%
	Wobbegong	Orectolobidae - undifferentiated	***87***	***50***	*448*	*173*	*535*	*188*	84%
	Sawsharks	*Pristiophorus spp.*	***22***	***30***	0	0	***22***	***30***	0%
	Sharks	Sharks - undifferentiated	**364**	**206**	5,075	1,114	5,438	1,140	93%
Rays	Sawfish	Pristidae - undifferentiated	0	0	***98***	***55***	***98***	***55***	100%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Western Shovelnose Ray	*Aptychotrema vincentiana*	**20**	**27**	1,061	327	1,081	328	98%
	Rays	Order Rajiformes - undifferentiated	0	0	3,478	1,017	3,478	1,017	100%
Barracouta	Barracouta	*Thyrsites atun*	***15***	***20***	0	0	***15***	***20***	0%
Billfish	Black Marlin	*Makaira indica*	***6***	***8***	***314***	***140***	***320***	***143***	98%
	Blue Marlin	*Makaira nigricans*	***25***	***25***	***188***	***121***	***213***	***124***	88%
	Sailfish	*Istiophorus platypterus*	***15***	***19***	***1,189***	***599***	***1,203***	***600***	99%
	Striped Marlin	*Tetrapturus audax*	0	0	***32***	***26***	***32***	***26***	100%
Bonito	Bonito	*Sarda australis & Cybiosarda elegans*	***253***	***148***	***58***	***47***	***311***	***175***	19%
	Oriental Bonito	*Sarda orientalis*	***222***	***121***	***86***	***72***	***307***	***159***	28%
Breams	Black Bream	*Acanthopagrus butcheri*	**10,629**	**4,557**	50,871	16,000	61,500	19,021	83%
	Frypan Bream	*Argyrops notialis*	***481***	***286***	***156***	***137***	***637***	***338***	24%
	Northwest Black Bream	*Acanthopagrus palmaris*	***139***	***89***	***1,191***	***581***	***1,330***	***594***	90%
	Pink Snapper	*Chrysophrys auratus*	32,197	3,672	104,071	13,782	136,268	15,793	76%
	Tarwhine	*Rhabdosargus sarba*	2,718	1,015	**7,899**	**3,833**	10,616	4,205	74%
	Western Yellowfin Bream	*Acanthopagrus morrisoni*	***615***	***453***	*1,618*	*640*	***2,233***	***932***	72%
	Breams	Sparidae - undifferentiated	***445***	***277***	***745***	***525***	***1,189***	***612***	63%
Catfish	Eeltail Catfish	Plotosidae - undifferentiated	***67***	***67***	***747***	***341***	***814***	***369***	92%
	Giant Sea Catfish	*Netuma thalassina*	**123**	**168**	3,822	1,003	3,945	1,017	97%
	Silver Cobbler	*Neoarius midgleyi*	***80***	***75***	***844***	***556***	***924***	***572***	91%
	Forktail Catfishes	Ariidae - undifferentiated	**79**	**107**	2,814	1,053	2,893	1,060	97%
Cobia	Cobia	*Rachycentron canadum*	1,146	271	671	203	1,817	375	37%
Cods	Barramundi Cod	*Chromileptes altivelis*	***40***	***28***	***5***	***7***	***45***	***31***	11%
	Blackspotted Rockcod	*Epinephelus malabaricus*	**2,439**	**1,191**	5,191	1,279	7,630	2,101	68%
	Blacktip Rockcod	*Epinephelus fasciatus*	***91***	***94***	***247***	***181***	***338***	***204***	73%
	Breaksea Cod	*Epinephelides armatus*	14,356	1,568	8,288	1,349	22,643	2,472	37%
	Chinaman Rockcod	*Epinephelus rivulatus*	15,856	5,347	19,857	5,835	35,712	10,059	56%
	Eightbar Grouper	*Hyporthodus cf octofasciatus*	1,042	341	**256**	**227**	1,298	410	20%
	Frostback Rockcod	*Epinephelus bilobatus*	***71***	***58***	***258***	***175***	***329***	***192***	78%
	Goldspotted Rockcod	*Epinephelus coioides*	3,014	791	6,063	1,526	9,077	1,956	67%
	Harlequin Fish	*Othos dentex*	1,787	340	**402**	**174**	2,190	398	18%
	Potato Rockcod	*Epinephelus tukula*	0	0	***46***	***50***	***46***	***50***	100%
	Queensland Groper	*Epinephelus lanceolatus*	***18***	***24***	***9***	***8***	***27***	***25***	34%
	Rankin Cod	*Epinephelus multinotatus*	4,593	772	1,848	463	6,441	1,027	29%
	Tomato Rockcod	*Cephalopholis sonnerati*	468	152	**266**	**117**	734	196	36%
	Yellowspotted Rockcod	*Epinephelus areolatus*	**1,251**	**559**	**1,254**	**552**	2,506	800	50%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Temperate Basses & Rockcods	Percichthyidae, Serranidae - undifferentiated	**504**	**275**	4,051	1,299	4,555	1,415	89%
Coral Trout	Barcheek Coral Trout	*Plectropomus maculatus*	1,805	425	**1,251**	**503**	3,056	802	41%
	Common Coral Trout	*Plectropomus leopardus*	3,087	527	2,467	685	5,554	1,018	44%
	Yellowedge Coronation Trout	*Variola louti*	*299*	*115*	***262***	***161***	*561*	*209*	47%
Emperors	Bluespotted Emperor	*Lethrinus punctulatus*	***685***	***294***	***1,909***	***1,452***	***2,594***	***1,529***	74%
	Grass Emperor	*Lethrinus laticaudis*	19,911	4,598	38,345	10,158	58,256	13,695	66%
	Longnose Emperor	*Lethrinus olivaceus*	***353***	***156***	***371***	***433***	***725***	***493***	51%
	Redspot Emperor	*Lethrinus lentjan*	***15***	***19***	***104***	***100***	***119***	***111***	88%
	Redthroat Emperor	*Lethrinus miniatus*	9,534	2,395	14,296	5,180	23,830	6,795	60%
	Robinson's Seabream	*Gymnocranius grandoculis*	2,008	619	**583**	**444**	2,591	822	22%
	Spangled Emperor	*Lethrinus nebulosus*	8,119	1,450	12,376	3,037	20,495	3,913	60%
	Yellowtail Emperor	*Lethrinus atkinsoni*	***45***	***42***	***1,026***	***978***	***1,071***	***984***	96%
	Emperors	Lethrinidae - undifferentiated	***12***	***15***	***49***	***38***	***61***	***51***	81%
Flatheads	Northern Sand Flathead	*Platycephalus endrachtensis*	***112***	***68***	***241***	***236***	***353***	***284***	68%
	Southern Bluespotted Flathead	*Platycephalus speculator*	3,486	789	9,863	2,994	13,349	3,389	74%
	Yellowtail Flathead	*Platycephalus westraliae*	1,511	548	7,640	2,970	9,152	3,140	83%
	Flatheads	Platycephalidae - undifferentiated	1,300	465	**8,317**	**3,871**	**9,617**	**4,141**	86%
Flatfish	Smalltooth Flounder	*Pseudorhombus jenynsii*	***282***	***117***	***272***	***130***	*555*	*196*	49%
	Flounders	*Bothidae, Psettodidae & Pleuronectidae*	*429*	*158*	***183***	***138***	*612*	*210*	30%
Giant Perch	Barramundi	*Lates calcarifer*	1,450	441	**5,282**	**2,164**	6,732	2,472	78%
	Sand Bass	*Psammoperca waigiensis*	***93***	***109***	***142***	***122***	***235***	***164***	60%
Goatfish	Bluespotted Goatfish	*Upeneichthys vlamingii*	**818**	**412**	2,121	763	2,938	883	72%
Grunter Breams	Barred Javelin	*Pomadasys kaakan*	***269***	***124***	***646***	***294***	***915***	***371***	71%
	Blotched Javelin	*Pomadasys maculatus*	***69***	***63***	***153***	***104***	***222***	***126***	69%
	Grunter Bream	Haemulidae - undifferentiated	***18***	***24***	***427***	***497***	***445***	***498***	96%
	Painted Sweetlips	*Diagramma labiosum*	1,894	706	**1,482**	**664**	3,376	1,199	44%
Grunters	Sea Trumpeter	*Pelsartia humeralis*	**1,124**	**784**	17,113	4,573	18,236	5,017	94%
	Western Striped Grunter	*Pelates octolineatus*	***288***	***341***	***4,162***	***1,737***	*4,449*	*1,770*	94%
	Striped Grunter	Terapontidae - undifferentiated	***256***	***349***	***839***	***560***	***1,095***	***660***	77%
	Western Sooty Grunter	*Hephaestus jenkinsi*	***87***	***70***	***245***	***253***	***333***	***263***	74%
Gurnards	Bighead Gurnard Perch	*Neosebastes pandus*	**484**	**362**	2,031	804	2,515	923	81%
	Gurnard Perch	Neosebastidae - undifferentiated	**216**	**139**	**1,477**	**624**	1,693	647	87%
Halfbeaks	Southern Garfish	*Hyporhamphus melanochir*	***1,343***	***768***	***589***	***336***	***1,933***	***886***	30%
	Three-by-two Garfish	*Hemiramphus robustus*	***1,434***	***1,285***	***20***	***27***	***1,454***	***1,285***	1%
	Garfish	Hemiramphidae - undifferentiated	***718***	***669***	***42***	***57***	***760***	***671***	5%

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	Longtom	Belonidae - undifferentiated	***76***	***64***	***179***	***87***	***255***	***121***	70%
Herrings	Australian Sardine	*Sardinops sagax*	***144***	***151***	0	0	***144***	***151***	0%
	Herrings & Ilishas	Clupeidae, Pristigasteridae - undifferentiated	***5,466***	***5,439***	***703***	***532***	***6,169***	***5,756***	11%
Jewfish	Black Jewfish	*Protonibea diacanthus*	*187*	*65*	***276***	***164***	***463***	***206***	60%
	Mulloway	*Argyrosomus japonicus*	***350***	***163***	***604***	***424***	***954***	***472***	63%
King Snapper	Goldband Snapper	*Pristipomoides multidens*	4,827	1,441	**360**	**187**	5,186	1,495	7%
	Rosy Snapper	*Pristipomoides filamentosus*	***319***	***189***	***260***	***219***	***579***	***339***	45%
	Sharptooth Snapper	*Pristipomoides typus*	***79***	***108***	***189***	***205***	***268***	***232***	71%
Lizardfish	Lizardfishes & Grinners	Bathysauridae, Synodontidae - undifferentiated	***26***	***36***	***847***	***623***	***873***	***626***	97%
	Sergeant Baker	*Latropiscis purpurissatus*	1,270	320	3,438	698	4,708	798	73%
Mackerels	Blue Mackerel	*Scomber australasicus*	***1,149***	***902***	***610***	***304***	***1,759***	***1,029***	35%
	Grey Mackerel	*Scomberomorus semifasciatus*	***355***	***211***	***457***	***308***	***812***	***476***	56%
	School Mackerel	*Scomberomorus queenslandicus*	**1,589**	**662**	1,043	374	2,632	923	40%
	Shark Mackerel	*Grammatorcynus bicarinatus*	**275**	**180**	**1,050**	**593**	**1,325**	**622**	79%
	Spanish Mackerel	*Scomberomorus commerson*	6,241	1,224	4,344	1,495	10,585	2,362	41%
	Spotted Mackerel	*Scomberomorus munroi*	***175***	***86***	***171***	***118***	***347***	***145***	49%
	Wahoo	*Acanthocybium solandri*	***139***	***75***	***170***	***106***	***309***	***141***	55%
	Mackerels	*Scombridae spp. (tribes Scomberomorini & Scombrini)*	***82***	***112***	***89***	***61***	***171***	***128***	52%
Mahi Mahi	Mahi Mahi	*Coryphaena spp.*	***461***	***246***	***139***	***122***	***600***	***283***	23%
Morwongs	Blue Morwong	*Nemadactylus valenciennesi*	3,879	634	1,130	427	5,008	876	23%
	Dusky Morwong	*Dactylophora nigricans*	0	0	***34***	***42***	***34***	***42***	100%
	Morwongs	Cheilodactylidae - undifferentiated	***18***	***24***	***145***	***182***	***162***	***184***	89%
Mullets	Bluetail Mullet	*Valamugil buchanani*	***1,757***	***2,251***	***1,838***	***2,355***	***3,594***	***4,607***	51%
	Diamondscale Mullet	*Liza vaigiensis*	***238***	***306***	***15***	***19***	***253***	***308***	6%
	Greenback Mullet	*Liza subviridis*	0	0	***147***	***189***	***147***	***189***	100%
	Sea Mullet	*Mugil cephalus*	***1,717***	***1,241***	***689***	***620***	***2,406***	***1,406***	29%
	Yelloweye Mullet	*Aldrichetta forsteri*	***39***	***54***	***100***	***80***	***139***	***96***	72%
	Mullets	Mugilidae - undifferentiated	***3,219***	***1,844***	0	0	***3,219***	***1,844***	0%
Pearl Perch	Northern Pearl Perch	*Glaucosoma buergeri*	**851**	**343**	**170**	**108**	1,021	371	17%
	West Australian Dhufish	*Glaucosoma hebraicum*	21,595	2,169	21,915	2,738	43,510	4,554	50%
Pikes	Great Barracuda	*Sphyraena barracuda*	***62***	***43***	*478*	*170*	*539*	*189*	89%
	Pike	Sphyraenidae - undifferentiated	***1,914***	***1,475***	***349***	***224***	***2,263***	***1,516***	15%
	Snook	*Sphyraena novaehollandiae*	**3,470**	**1,773**	**2,065**	**852**	5,535	2,202	37%
	Yellowtail Barracuda	*Sphyraena obtusata*	***555***	***396***	***224***	***110***	***778***	***418***	29%

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Pufferfish	Horseshoe Leatherjacket	*Meuschenia hippocrepis*	**403**	**191**	564	223	968	294	58%
	Sixspine Leatherjacket	*Meuschenia freycineti*	***170***	***93***	***769***	***392***	***939***	***403***	82%
	Leatherjackets	Monacanthidae - undifferentiated	387	146	**3,703**	**2,223**	**4,091**	**2,237**	91%
	Silver Toadfish	*Lagocephalus sceleratus*	0	0	897	279	897	279	100%
	Weeping Toadfish	*Torquigener pleurogramma*	0	0	6,161	1,898	6,161	1,898	100%
	Toadfish	Tetraodontidae - undifferentiated	0	0	16,014	4,428	16,014	4,428	100%
Redfish	Bight Redfish	*Centroberyx gerrardi*	8,987	2,872	2,300	748	11,287	3,222	20%
	Swallowtail	*Centroberyx lineatus*	665	243	**437**	**179**	1,102	376	40%
	Yelloweye Redfish	*Centroberyx australis*	***73***	***96***	***224***	***181***	***297***	***270***	75%
Salmon Herrings	Australian Herring	*Arripis georgianus*	150,256	31,546	39,949	8,319	190,206	35,194	21%
	Western Australian Salmon	*Arripis truttaceus*	1,654	653	**3,602**	**1,563**	5,256	1,832	69%
Sweeps	Banded Sweep	*Scorpis georgiana*	***167***	***93***	***932***	***618***	***1,099***	***625***	85%
	Sea Sweep	*Scorpis aequipinnis*	738	238	**769**	**371**	1,507	445	51%
	Silver Drummer	*Kyphosus sydneyanus*	***64***	***59***	***186***	***136***	***250***	***148***	74%
Tailor	Tailor	*Pomatomus saltatrix*	**8,875**	**4,318**	5,361	1,935	14,236	5,445	38%
Threadfins	Blue Threadfin	*Eleutheronema tetradactylum*	1,961	599	1,286	505	3,247	856	40%
	King Threadfin	*Polydactylus macrochir*	1,092	360	**1,439**	**919**	**2,531**	**1,032**	57%
Threadfin Breams	Rosy Threadfin Bream	*Nemipterus furcosus*	***43***	***42***	***301***	***298***	***344***	***301***	87%
	Western Butterfish	*Pentapodus vitta*	**8,946**	**7,233**	26,502	6,627	35,447	9,958	75%
Trevalla	Blue-eye Trevalla	*Hyperoglyphe antarctica*	***377***	***217***	0	0	***377***	***217***	0%
Queenfish	Queenfish	*Scomberoides spp.*	**669**	**369**	**1,110**	**608**	**1,778**	**914**	62%
Trevallies	Amberjack	*Seriola dumerili*	***69***	***47***	***396***	***240***	***464***	***248***	85%
	Bludger Trevally	*Carangoides gymnostethus*	**112**	**70**	1,446	513	1,558	526	93%
	Common Dart	*Trachinotus botla*	0	0	***28***	***30***	***28***	***30***	100%
	Giant Trevally	*Caranx ignobilis*	**336**	**154**	**2,888**	**1,255**	3,224	1,286	90%
	Golden Trevally	*Gnathanodon speciosus*	1,252	426	5,328	1,837	6,580	1,956	81%
	Rainbow Runner	*Elagatis bipinnulata*	***20***	***28***	0	0	***20***	***28***	0%
	Samsonfish	*Seriola hippos*	926	219	4,827	1,133	5,753	1,175	84%
	Silver Trevallies	*Pseudocaranx georgianus* spp. complex	34,704	9,480	20,404	3,805	55,109	10,977	37%
	Turrum	*Carangoides fulvoguttatus*	***20***	***27***	***88***	***61***	***108***	***67***	82%
	Yellowtail Kingfish	*Seriola lalandi*	**903**	**389**	**413**	**204**	1,315	485	31%
	Yellowtail Scad	*Trachurus novaezelandiae*	***751***	***471***	***3,225***	***2,207***	***3,976***	***2,270***	81%
	Trevallies	Carangidae - undifferentiated	***53***	***44***	***1,955***	***1,332***	***2,008***	***1,333***	97%
Tripletail	Tripletail	*Lobotes surinamensis*	***104***	***72***	***136***	***162***	***240***	***180***	57%
Tropical Snappers	Brownstripe Snapper	*Lutjanus vitta*	***363***	***310***	***95***	***87***	***458***	***354***	21%

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	Chinamanfish	*Symphorus nematophorus*	***641***	***326***	***205***	***115***	***847***	***348***	24%
	Crimson Snapper	*Lutjanus erythropterus*	1,058	336	**1,349**	**849**	**2,407**	**1,050**	56%
	Darktail Snapper	*Lutjanus lemniscatus*	***277***	***157***	***288***	***141***	***565***	***273***	51%
	Flame Snapper	*Etelis coruscans*	***226***	***175***	***103***	***101***	***330***	***220***	31%
	Red Emperor	*Lutjanus sebae*	6,264	1,755	**5,363**	**3,018**	11,627	4,649	46%
	Saddletail Snapper	*Lutjanus malabaricus*	**2,061**	**1,176**	**865**	**558**	**2,925**	**1,704**	30%
	Stripey Snapper	*Lutjanus carponotatus*	6,600	1,582	13,580	2,765	20,179	3,717	67%
	Moses' Snapper	*Lutjanus russellii*	856	322	**845**	**346**	1,701	577	50%
	Mangrove Jack	*Lutjanus argentimaculatus*	2,116	608	1,972	648	4,088	1,167	48%
	Golden Snapper	*Lutjanus johnii*	1,798	619	**2,692**	**1,187**	4,490	1,722	60%
	Tropical Snappers	*Lutjanus spp.*	***136***	***132***	***314***	***196***	***450***	***244***	70%
	Maori Snapper	*Lutjanus rivulatus*	***35***	***31***	0	0	***35***	***31***	0%
	Ruby Snapper	*Etelis boweni*	*1,232*	*430*	***130***	***80***	*1,362*	*455*	10%
Western Blue Devil	Western Blue Devil	*Paraplesiops sinclairi*	***31***	***32***	***160***	***99***	***191***	***104***	84%
Tunas	Mackerel Tuna	*Euthynnus affinis*	223	82	1,141	406	1,364	418	84%
	Skipjack Tuna	*Katsuwonus pelamis*	777	240	**1,676**	**824**	2,453	878	68%
	Southern Bluefin Tuna	*Thunnus maccoyii*	1,700	531	**418**	**231**	2,118	624	20%
	Longtail Tuna	*Thunnus tonggol*	***418***	***174***	***338***	***287***	***756***	***381***	45%
	Yellowfin Tuna	*Thunnus albacares*	1,043	301	**917**	**544**	1,960	697	47%
	Tunas	*Scombridae spp. (tribes Sardini & Thunnini)*	***143***	***90***	***157***	***101***	***300***	***159***	52%
	Dogtooth Tuna	*Gymnosarda unicolor*	***45***	***44***	0	0	***45***	***44***	0%
Whitings	King George Whiting	*Sillaginodes punctatus*	67,195	11,571	24,441	6,409	91,636	16,105	27%
	Western Trumpeter Whiting	*Sillago burrus*	***1,701***	***1,520***	***4,045***	***1,657***	*5,745*	*2,248*	70%
	Yellowfin Whiting	*Sillago schomburgkii*	44,013	11,153	8,335	2,697	52,348	12,876	16%
	Goldenline Whiting	*Sillago analis*	***503***	***421***	***102***	***89***	***605***	***438***	17%
	Southern School Whiting	*Sillago bassensis*	106,064	18,869	26,388	6,038	132,452	23,480	20%
	Western School Whiting	*Sillago vittata*	110,748	32,276	**24,481**	**11,198**	135,229	41,530	18%
	Whitings	Sillaginidae - undifferentiated	***2,242***	***2,046***	***479***	***266***	***2,721***	***2,168***	18%
Wrasses	Baldchin Groper	*Choerodon rubescens*	19,998	2,526	11,000	3,115	30,998	5,015	35%
	Blackspot Tuskfish	*Choerodon schoenleinii*	2,032	475	**3,295**	**1,359**	5,328	1,512	62%
	Blue Tuskfish	*Choerodon cyanodus*	**1,278**	**879**	**2,171**	**915**	3,449	1,355	63%
	Bluebarred Parrotfish	*Scarus ghobban* spp. complex	***432***	***291***	***775***	***538***	***1,207***	***763***	64%
	Bluespotted Tuskfish	*Choerodon cauteroma*	***352***	***296***	***1,307***	***783***	***1,659***	***860***	79%
	Brownspotted Wrasse	*Notolabrus parilus*	**2,452**	**1,064**	20,672	3,481	23,123	3,873	89%
	Foxfish	*Bodianus frenchii*	1,408	461	**755**	**309**	2,163	579	35%

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	Sunburnt Pigfish	*Bodianus solatus*	***303***	***142***	***6***	***6***	***310***	***142***	2%
	Purple Tuskfish	*Choerodon cephalotes*	***78***	***107***	***25***	***23***	***103***	***110***	24%
	Southern Maori Wrasse	*Ophthalmolepis lineolatus*	**1,706**	**916**	7,612	2,648	9,318	2,939	82%
	Western Blue Groper	*Achoerodus gouldii*	*446*	*170*	***184***	***168***	***630***	***287***	29%
	Western King Wrasse	*Coris auricularis*	7,991	2,199	32,596	4,979	40,587	6,020	80%
	Parrotfish	Scaridae - undifferentiated	***481***	***374***	***1,271***	***602***	***1,752***	***811***	73%
	Tuskfish	*Choerodon spp.*	***57***	***39***	***152***	***164***	***209***	***169***	73%
	Wrasses	Labridae - undifferentiated	**636**	**366**	4,520	1,755	5,155	1,819	88%
Wreckfish	Bass Groper	*Polyprion americanus*	***117***	***66***	0	0	***117***	***66***	0%
	Hapuku	*Polyprion oxygeneios*	*774*	*307*	***13***	***18***	*787*	*311*	2%
Crab	Sand Crab	*Ovalipes spp.*	***122***	***157***	***237***	***208***	***360***	***260***	66%
Freshwater crayfish	Marron	*Cherax cainii*	***463***	***503***	***113***	***155***	***576***	***571***	20%
Prawns	Prawns	Penaeidae - undifferentiated	***8,186***	***5,249***	0	0	***8,186***	***5,249***	0%
Eels	Conger Eel	Congridae, Colocongridae - undifferentiated	0	0	***41***	***56***	***41***	***56***	100%
	Eels	Order Anguilliformes - undifferentiated	0	0	*265*	*96*	*265*	*96*	100%
Tarpons	Tarpon	*Megalops cyprinoides*	***95***	***125***	***18***	***18***	***113***	***127***	16%
Morid Cods	Morid Cod	Moridae - undifferentiated	***115***	***157***	***92***	***126***	***207***	***283***	44%
Opahs	Batfish	Ephippidae, Drepaneidae - undifferentiated	0	0	***95***	***70***	***95***	***70***	100%
Archerfish	Archerfish	Toxotidae - undifferentiated	***41***	***56***	0	0	***41***	***56***	0%
Boarfish	Boarfish	Pentacerotidae - undifferentiated	***87***	***63***	0	0	***87***	***63***	0%
Butterfish	Butterfish	Stromateidae - undifferentiated	***302***	***228***	***3,953***	***2,286***	***4,255***	***2,328***	93%
Freshwater Perch	Redfin	*Perca fluviatilis*	***2,517***	***3,239***	0	0	***2,517***	***3,239***	0%
Knifejaw	Knifejaw	*Oplegnathus woodwardi*	***25***	***28***	***1,279***	***1,518***	***1,304***	***1,518***	98%
Dories	Dories	Zeidae - undifferentiated	0	0	***35***	***39***	***35***	***39***	100%

Table 6. Proportion released by specified reasons during 2020/21 (values in bold indicate relative standard error >40% (i.e. se >40% of estimate); only species where >30 respondents recorded catches of the species are reported).

Reporting Group	Common Name	Scientific Name	Too Small	Under Size	Too Many	Over Limit	Catch Release	Other
Cephalopods	Cuttlefish	*Sepia spp.*	**4%**	**2%**	**55%**	0%	**8%**	**30%**
	Octopus	Octopodidae - undifferentiated	**14%**	0%	**70%**	0%	**8%**	**8%**
	Squid	Order Teuthoidea - undifferentiated	39%	**19%**	**31%**	0%	**5%**	**6%**
Lobster	Western Rock Lobster	*Panulirus cygnus*	**3%**	57%	**2%**	25%	0%	13%
Crab	Blue Swimmer Crab	*Portunus armatus*	**4%**	86%	**0%**	**1%**	0%	**9%**
	Green Mud Crab	*Scylla serrata*	**9%**	**55%**	**10%**	**5%**	0%	**21%**
	Brown Mud Crab	*Scylla olivacea*	**0%**	**87%**	**2%**	**2%**	**0%**	**9%**
Sharks	Blacktip Reef Shark	*Carcharhinus melanopterus*	**1%**	0%	70%	0%	**7%**	**23%**
	Bronze Whaler	*Carcharhinus brachyurus*	0%	**2%**	92%	0%	0%	**6%**
	Dusky Whaler	*Carcharhinus obscurus*	0%	0%	**66%**	0%	**6%**	**28%**
	Gummy Shark	*Mustelus antarcticus*	**3%**	0%	**63%**	0%	**12%**	**22%**
	Sharks	Sharks - undifferentiated	**1%**	**1%**	70%	0%	**3%**	26%
Rays	Western Shovelnose Ray	*Aptychotrema vincentiana*	**2%**	0%	59%	0%	**20%**	**19%**
	Rays	Order Rajiformes - undifferentiated	0%	**5%**	72%	0%	**9%**	14%
Breams	Black Bream	*Acanthopagrus butcheri*	**18%**	34%	**2%**	**0%**	**45%**	**1%**
	Pink Snapper	*Chrysophrys auratus*	9%	85%	3%	**1%**	**1%**	**1%**
	Tarwhine	*Rhabdosargus sarba*	**3%**	**56%**	**28%**	0%	**10%**	**3%**
Catfish	Giant Sea Catfish	*Netuma thalassina*	**3%**	**2%**	54%	0%	**5%**	**35%**
	Forktail Catfishes	Ariidae - undifferentiated	**1%**	**0%**	**49%**	0%	**2%**	**48%**
Cobia	Cobia	*Rachycentron canadum*	**7%**	**16%**	**51%**	0%	**11%**	**15%**
Cods	Blackspotted Rockcod	*Epinephelus malabaricus*	**9%**	**29%**	30%	**0%**	**16%**	**15%**
	Breaksea Cod	*Epinephelides armatus*	11%	65%	10%	**7%**	**4%**	**3%**
	Chinaman Rockcod	*Epinephelus rivulatus*	**19%**	**34%**	**29%**	**5%**	**7%**	**6%**
	Eightbar Grouper	*Hyporthodus cf octofasciatus*	**36%**	**22%**	**38%**	0%	0%	**5%**
	Goldspotted Rockcod	*Epinephelus coioides*	**23%**	44%	18%	**1%**	**7%**	**8%**
	Harlequin Fish	*Othos dentex*	**18%**	**64%**	**10%**	**7%**	0%	**1%**
	Rankin Cod	*Epinephelus multinotatus*	**25%**	38%	**27%**	**0%**	**5%**	**5%**
	Tomato Rockcod	*Cephalopholis sonnerati*	**6%**	**9%**	**8%**	0%	**35%**	**41%**
	Yellowspotted Rockcod	*Epinephelus areolatus*	**3%**	**37%**	**41%**	0%	**15%**	**4%**
	Temperate Basses & Rockcods	Percichthyidae, Serranidae - undifferentiated	**20%**	**14%**	**42%**	0%	**6%**	**18%**
Coral Trout	Barcheek Coral Trout	*Plectropomus maculatus*	**3%**	**65%**	**24%**	**5%**	**3%**	0%
	Common Coral Trout	*Plectropomus leopardus*	**4%**	59%	**20%**	**3%**	**12%**	**3%**

Reporting Group	Common Name	Scientific Name	Too Small	Under Size	Too Many	Over Limit	Catch Release	Other
Emperors	Grass Emperor	*Lethrinus laticaudis*	11%	72%	**13%**	**1%**	**1%**	**1%**
	Redthroat Emperor	*Lethrinus miniatus*	**9%**	**70%**	**15%**	**1%**	**4%**	**2%**
	Robinson's Seabream	*Gymnocranius grandoculis*	**12%**	**84%**	**1%**	0%	0%	**3%**
	Spangled Emperor	*Lethrinus nebulosus*	**13%**	58%	**17%**	**2%**	**4%**	**6%**
Flatheads	Southern Bluespotted Flathead	*Platycephalus speculator*	**26%**	59%	**12%**	0%	0%	**4%**
	Yellowtail Flathead	*Platycephalus westraliae*	**17%**	**58%**	**19%**	0%	**4%**	**2%**
	Flatheads	Platycephalidae - undifferentiated	**26%**	**41%**	**33%**	0%	0%	**0%**
Giant Perch	Barramundi	*Lates calcarifer*	**3%**	**27%**	**13%**	**1%**	**54%**	**3%**
Goatfish	Bluespotted Goatfish	*Upeneichthys vlamingii*	**6%**	0%	44%	0%	**7%**	**43%**
Grunter Breams	Painted Sweetlips	*Diagramma labiosum*	**1%**	**20%**	**39%**	**32%**	**2%**	**6%**
Grunters	Sea Trumpeter	*Pelsartia humeralis*	0%	**1%**	47%	0%	**6%**	46%
Gurnards	Bighead Gurnard Perch	*Neosebastes pandus*	**4%**	**2%**	34%	0%	**29%**	31%
	Gurnard Perch	Neosebastidae - undifferentiated	**1%**	**3%**	**71%**	0%	0%	**24%**
King Snapper	Goldband Snapper	*Pristipomoides multidens*	**11%**	**21%**	**21%**	**40%**	0%	**7%**
Lizardfish	Sergeant Baker	*Latropiscis purpurissatus*	**5%**	**6%**	61%	0%	**1%**	27%
Mackerels	School Mackerel	*Scomberomorus queenslandicus*	**1%**	**57%**	**27%**	**1%**	**0%**	**13%**
	Shark Mackerel	*Grammatorcynus bicarinatus*	**7%**	**22%**	**24%**	0%	**3%**	**44%**
	Spanish Mackerel	*Scomberomorus commerson*	**6%**	**38%**	13%	**4%**	**7%**	**32%**
Morwongs	Blue Morwong	*Nemadactylus valenciennesi*	**6%**	**37%**	**26%**	**13%**	**7%**	**11%**
Pearl Perch	Northern Pearl Perch	*Glaucosoma buergeri*	**20%**	**14%**	**67%**	0%	0%	0%
	West Australian Dhufish	*Glaucosoma hebraicum*	6%	74%	3%	14%	**1%**	**1%**
Pikes	Snook	*Sphyraena novaehollandiae*	**11%**	**19%**	**51%**	0%	**3%**	**17%**
Pufferfish	Horseshoe Leatherjacket	*Meuschenia hippocrepis*	**12%**	**2%**	**44%**	0%	**3%**	**39%**
	Leatherjackets	Monacanthidae - undifferentiated	**9%**	**4%**	**74%**	0%	**4%**	**9%**
	Silver Toadfish	*Lagocephalus sceleratus*	0%	0%	**14%**	0%	0%	86%
	Weeping Toadfish	*Torquigener pleurogramma*	0%	0%	**14%**	0%	**4%**	82%
	Toadfish	Tetraodontidae - undifferentiated	0%	**5%**	63%	0%	0%	**31%**
Redfish	Bight Redfish	*Centroberyx gerrardi*	**36%**	**39%**	**7%**	**12%**	0%	**5%**
	Swallowtail	*Centroberyx lineatus*	**40%**	**35%**	**16%**	0%	0%	**8%**
Salmon Herrings	Australian Herring	*Arripis georgianus*	31%	12%	41%	**7%**	**7%**	**2%**
	Western Australian Salmon	*Arripis truttaceus*	0%	**52%**	**26%**	0%	**10%**	**11%**
Sweeps	Sea Sweep	*Scorpis aequipinnis*	**2%**	**4%**	**41%**	0%	**2%**	**51%**
Tailor	Tailor	*Pomatomus saltatrix*	**25%**	**55%**	**13%**	0%	**7%**	0%
Threadfins	Blue Threadfin	*Eleutheronema tetradactylum*	**21%**	**16%**	**46%**	**2%**	**14%**	**1%**

Reporting Group	Common Name	Scientific Name	Too Small	Under Size	Too Many	Over Limit	Catch Release	Other
	King Threadfin	*Polydactylus macrochir*	**0%**	**15%**	**2%**	**2%**	**77%**	**4%**
Threadfin Breams	Western Butterfish	*Pentapodus vitta*	**5%**	**4%**	**42%**	0%	**4%**	46%
Queenfish	Queenfish	*Scomberoides spp.*	**1%**	**13%**	**64%**	0%	**7%**	**16%**
Trevallies	Bludger Trevally	*Carangoides gymnostethus*	**8%**	**5%**	**65%**	0%	**2%**	**20%**
	Giant Trevally	*Caranx ignobilis*	**6%**	**2%**	**39%**	0%	**42%**	**11%**
	Golden Trevally	*Gnathanodon speciosus*	**4%**	**13%**	**67%**	0%	**2%**	**15%**
	Samsonfish	*Seriola hippos*	**4%**	**13%**	41%	0%	**10%**	31%
	Silver Trevallies	*Pseudocaranx georgianus* spp. complex	20%	32%	36%	**1%**	**5%**	**5%**
	Yellowtail Kingfish	*Seriola lalandi*	**28%**	**15%**	**23%**	0%	**21%**	**12%**
Tropical Snappers	Crimson Snapper	*Lutjanus erythropterus*	**49%**	**13%**	**32%**	**1%**	**3%**	**1%**
	Red Emperor	*Lutjanus sebae*	**5%**	**82%**	**5%**	**3%**	**2%**	**3%**
	Saddletail Snapper	*Lutjanus malabaricus*	**27%**	**36%**	**37%**	0%	0%	0%
	Stripey Snapper	*Lutjanus carponotatus*	11%	45%	32%	**1%**	**3%**	**7%**
	Moses' Snapper	*Lutjanus russellii*	**19%**	**60%**	**20%**	0%	**1%**	0%
	Mangrove Jack	*Lutjanus argentimaculatus*	**4%**	**38%**	**32%**	**3%**	**22%**	0%
	Golden Snapper	*Lutjanus johnii*	**14%**	**34%**	**39%**	0%	**12%**	0%
Tunas	Mackerel Tuna	*Euthynnus affinis*	**4%**	**2%**	**28%**	0%	**41%**	**25%**
	Skipjack Tuna	*Katsuwonus pelamis*	**7%**	**39%**	**44%**	0%	**2%**	**7%**
	Southern Bluefin Tuna	*Thunnus maccoyii*	**6%**	0%	**32%**	**16%**	**20%**	**26%**
	Yellowfin Tuna	*Thunnus albacares*	**5%**	**7%**	**19%**	0%	**52%**	**17%**
Whitings	King George Whiting	*Sillaginodes punctatus*	**14%**	77%	**4%**	0%	**5%**	**0%**
	Yellowfin Whiting	*Sillago schomburgkii*	56%	**24%**	**15%**	0%	**4%**	**1%**
	Southern School Whiting	*Sillago bassensis*	54%	26%	**11%**	**4%**	**3%**	**2%**
	Western School Whiting	*Sillago vittata*	**69%**	**22%**	**4%**	**5%**	**0%**	0%
Wrasses	Baldchin Groper	*Choerodon rubescens*	**7%**	77%	**6%**	**5%**	**3%**	**2%**
	Blackspot Tuskfish	*Choerodon schoenleinii*	**9%**	**78%**	**10%**	0%	**2%**	**1%**
	Blue Tuskfish	*Choerodon cyanodus*	**7%**	**85%**	**6%**	**0%**	**0%**	**1%**
	Brownspotted Wrasse	*Notolabrus parilus*	**1%**	**6%**	50%	0%	**2%**	40%
	Foxfish	*Bodianus frenchii*	**1%**	**19%**	**32%**	**3%**	**3%**	**43%**
	Southern Maori Wrasse	*Ophthalmolepis lineolatus*	0%	**1%**	**39%**	0%	**21%**	39%
	Western King Wrasse	*Coris auricularis*	**3%**	**3%**	61%	**0%**	**2%**	31%
	Wrasses	Labridae - undifferentiated	**2%**	**9%**	**30%**	0%	**4%**	**56%**

6 Catch for Key Species

This section presents boat-based recreational fishing catch (kept, released and total by number) for the 12 months from September 2020 to August 2021.

Summaries are provided by bioregion, habitat, fishing method and season for key species based on reported catches and management importance. Species have been allocated to habitat types according to the Resource Assessment Framework (RAF) (Department of Fisheries 2012). However, the following RAF indicator species were caught in low numbers and are not included in this section: Blue-eye Trevalla (*Hyperoglyphe antarctica*), Brownstripe Snapper (*Lutjanus vitta*), Estuary Cobbler (*Cnidoglanis macrocephalus*), Perth Herring (*Nematalosa vlaminghi*), Pilchard (*Sardinops sagax*), Silver Cobbler (*Neoarius midgleyi*), Western Blue Groper (*Achoerodus gouldii*), Whiskery Shark (*Furgaleus macki*) and Whitebait (*Hyperlophus vittatus*).

The annual recreational catch is presented by habitat type and taxonomic grouping for the following key species:

- 4 species/taxa for estuarine; Barramundi (*Lates calcarifer*), Black Bream (*Acanthopagrus butcheri*), Southern Bluespotted Flathead (*Platycephalus speculator*) and Yellowtail Flathead (*Platycephalus westraliae*).
- 26 species/taxa for nearshore; Australian Herring (*Arripis georgianus*), Western Australian Salmon (*Arripis truttaceus*), Western Yellowfin Bream (*Acanthopagrus morrisoni*), Giant Sea Catfish (*Netuma thalassina*), Chinaman Rockcod (*Epinephelus rivulatus*), Grunters (*Pelsartia humeralis* and *Pelates octolineatus*), Garfish (*Hyporhamphus melanochir* and *Hemiramphus robustus*), Mulloway (*Argyrosomus japonicus*), Leatherjacket (Family Monacanthidae), Mullet (Family Mugilidae), Snook (*Sphyraena novaehollandiae*), Tailor (*Pomatomus saltatrix*), Western Butterfish (*Pentapodus vitta*), Blue Threadfin (*Eleutheronema tetradactylum*), King Threadfin (*Polydactylus macrochir*), Queenfish (*Scomberoides* spp.), Bludger Trevally (*Carangoides gymnostethus*), Giant Trevally (*Caranx ignobilis*), Golden Trevally (*Gnathanodon speciosus*), Silver Trevally (*Pseudocaranx* spp. complex), Brownspotted Wrasse (*Notolabrus parilus*), Southern Maori Wrasse (*Ophthalmolepis lineolatus*), Western King Wrasse (*Coris auricularis*), King George Whiting (*Sillaginodes punctatus*), School Whiting (*Sillago bassensis*, *vittata* and *schomburgkii*) and Western Trumpeter Whiting (*Sillago burrus*).
- 33 species/taxa for inshore demersal; Pink Snapper (*Chrysophrys auratus*), Blackspotted Rockcod (*Epinephelus malabaricus*), Breaksea Cod (*Epinephelides armatus*), Goldspotted Rockcod (*Epinephelus coioides*), Harlequin Fish (*Othos dentex*), Rankin Cod (*Epinephelus multinotatus*), Coral Trout (*Plectropomus maculatus*, *P. leopardus* and *Variola louti*), Bluespotted Emperor (*Lethrinus punctulatus*), Grass Emperor (*Lethrinus laticaudis*), Redthroat Emperor (*Lethrinus miniatus*), Spangled Emperor (*Lethrinus nebulosus*), Painted Sweetlips (*Diagramma labiosum*), Goldband Snapper (*Pristipomoides multidens*), Sergeant Baker (*Aulopus*

purpurissatus), Blue Morwong (*Nemadactylus valenciennesi*), Northern Pearl Perch (*Glaucosoma buergeri*), West Australian Dhufish (*Glaucosoma hebraicum*), Bight Redfish (*Centroberyx gerrardi*), Swallowtail (*Centroberyx lineatus*), Banded Sweep (*Scorpis georgiana*), Sea Sweep (*Scorpis aequipinnis*), Robinson's Seabream (*Gymnocranius grandoculis*), Crimson Snapper (*Lutjanus erythropterus*), Golden Snapper (*Lutjanus johnii*), Mangrove Jack (*Lutjanus argentimaculatus*), Moses' Snapper (*Lutjanus russellii*), Red Emperor (*Lutjanus sebae*), Saddletail Snapper (*Lutjanus malabaricus*), Stripey Snapper (*Lutjanus carponotatus*), Baldchin Groper (*Choerodon rubescens*), Blackspot Tuskfish (*Choerodon schoenleinii*), Blue Tuskfish (*Choerodon cyanodus*) and Foxfish (*Bodianus frenchii*).

- 3 species/taxa for offshore demersal; Eightbar Grouper (*Hyporthodus* cf. *octofasciatus*), Hapuku (*Polyprion oxygeneios*) and Ruby Snapper (*Etelis boweni*).
- 2 species/taxa for small pelagic; Blue Mackerel (*Scomber australasicus*) and Yellowtail Scad (*Trachurus novaezelandiae*).
- 11 species/taxa for large pelagic; Billfish (Family Istiophoridae), Cobia (*Rachycentron canadum*), Grey Mackerel (*Scomberomorus semifasciatus*), School Mackerel (*Scomberomorus queenslandicus*), Shark Mackerel (*Grammatorcynus bicarinatus*), Spanish Mackerel (*Scomberomorus commerson*), Samsonfish (*Seriola hippos*), Yellowtail Kingfish (*Seriola lalandi*), Mackerel Tuna (*Euthynnus affinis*), Southern Bluefin Tuna (*Thunnus maccoyii*) and Yellowfin Tuna (*Thunnus albacares*).
- 4 species/taxa for sharks; Gummy Sharks (*Mustelus antarcticus* and *M. stevensi*), Port Jackson Shark (*Heterodontus portusjacksoni*), Whaler Sharks (Family Carcharhinidae) and Wobbegong (Family Orectolobidae).
- 3 species/taxa for crustaceans; Western Rock Lobster (*Panulirus cygnus*), Blue Swimmer Crab (*Portunus armatus*) and Mud Crab (*Scylla olivacea* and *S. serrata*).
- 1 species/taxa for molluscs; Abalone (*Haliotis* spp.).
- 3 species/taxa for cephalopods; Cuttlefish (Order Sepiidae), Octopus (Order Octopodidae) and Squid (Order Teuthoidea).

6.1 Estuarine

Catches for estuarine species will be underestimated because shore-based catches are not reported.

6.1.1 Barramundi (*Lates calcarifer*)

Barramundi is an indicator species in the North Coast bioregion. All boat-based recreational catches of Barramundi occurred in the North Coast (Figure 23c). The majority of catches were released (78%; Table 5, Figure 23a) and mostly attributed to 'catch and release' or 'under size' (Table 6). Catches were taken predominantly from estuarine and nearshore habitats (Figure 23b) and freshwater (not shown). All catches were taken by line fishing (Figure 23d). Barramundi were harvested throughout the year, with higher catches in autumn and spring (Figure 23e). The kept and released catches of Barramundi in 2020/21 were similar to previous surveys (Figure 23a).

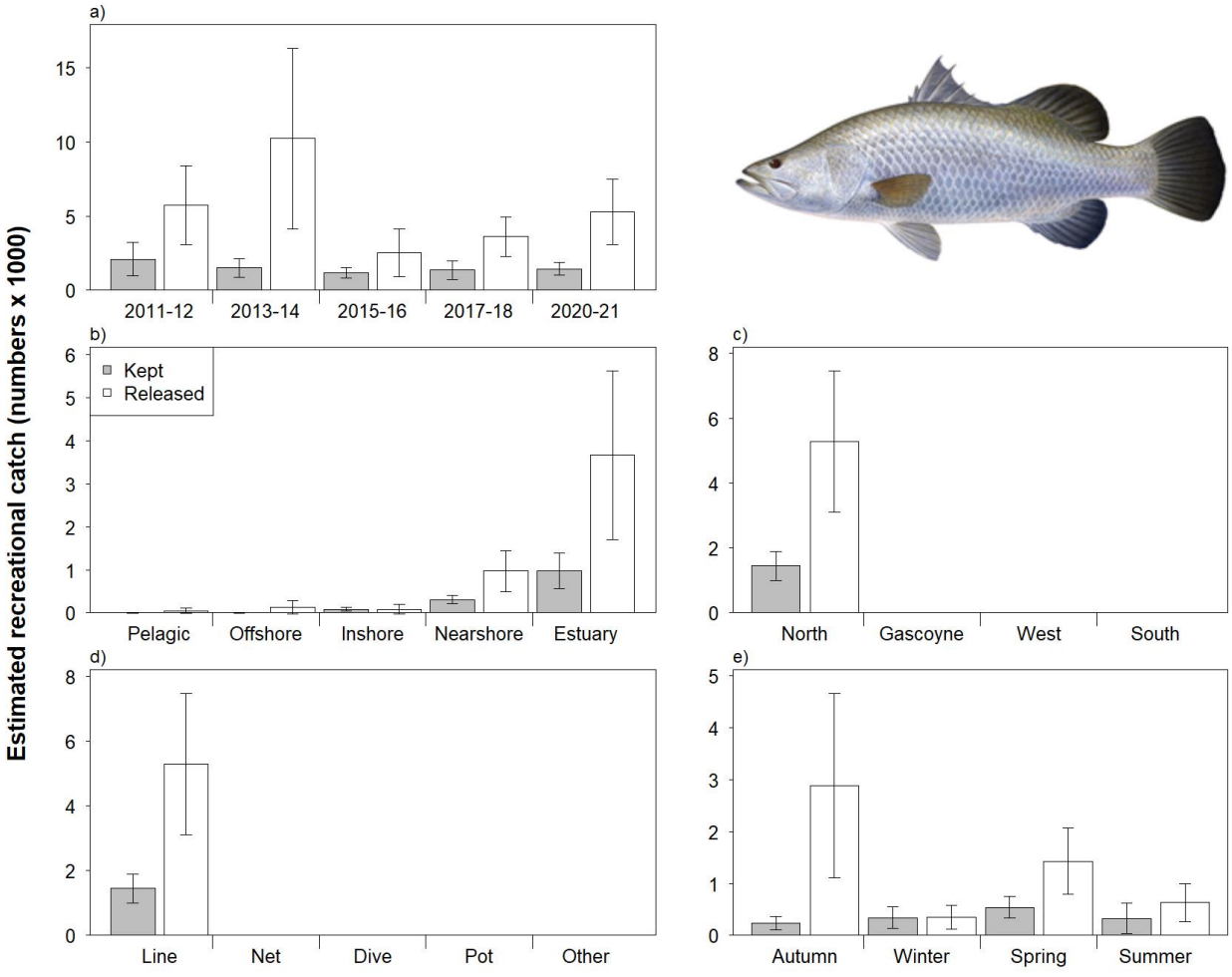


Figure 23. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Barramundi in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.1.2 Black Bream (*Acanthopagrus butcheri*)

Black Bream is an indicator species in the West Coast and South Coast bioregions. Most boat-based recreational catches of Black Bream occurred in the West Coast, followed by the South Coast (Figure 24c). The majority of catches were released (83%; Table 5, Figure 24a) and mostly attributed to 'under size' or 'catch and release' (Table 6). Catches were taken predominantly from estuarine and nearshore habitats (Figure 24b), and freshwater (not shown). All catches were taken by line fishing (Figure 24d). Black Bream were harvested throughout the year, with higher catches in autumn and spring (Figure 24e). The kept and released catches of Black Bream in 2020/21 were similar to previous surveys (Figure 24a).

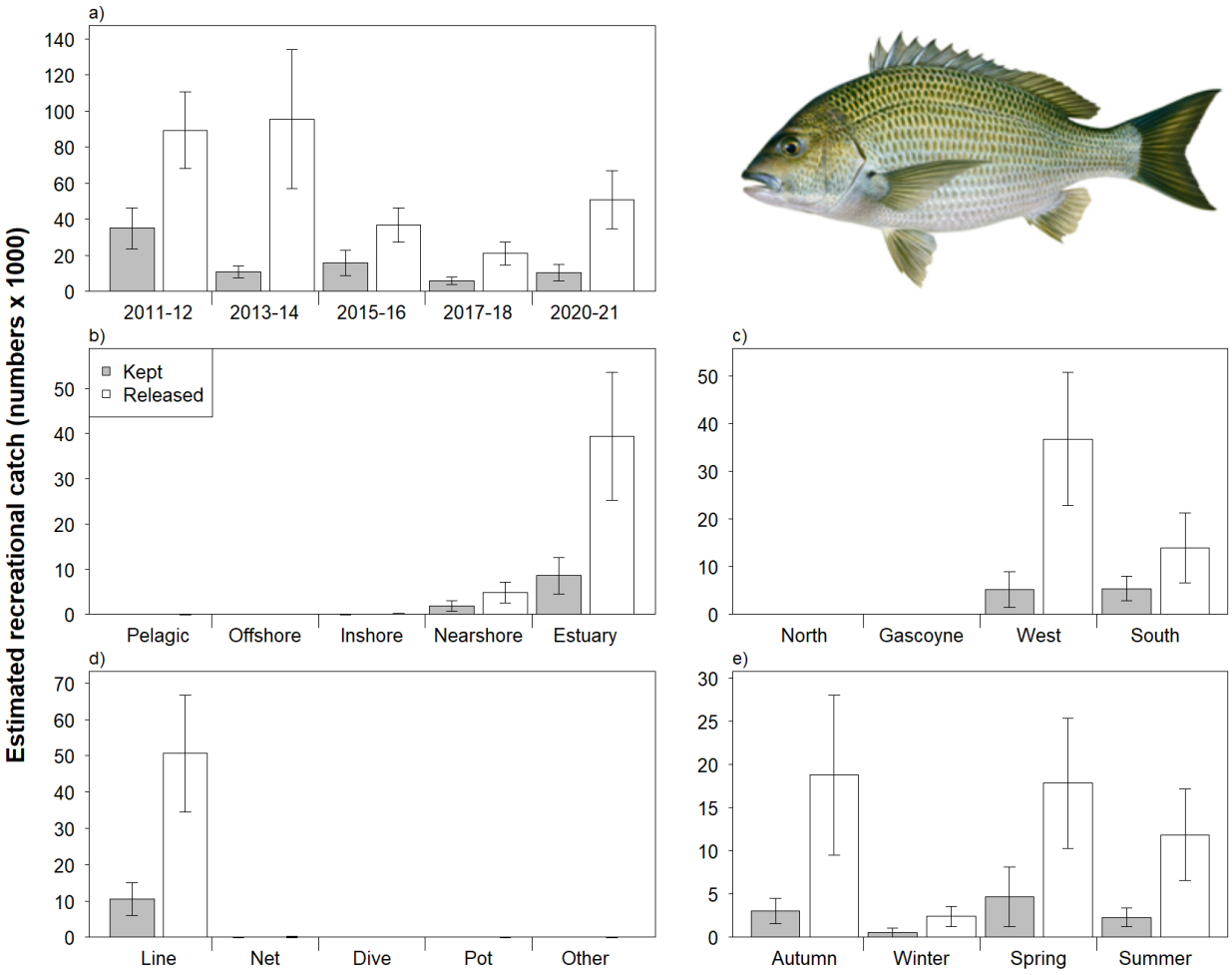


Figure 24. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Black Bream in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.1.3 Southern Bluespotted Flathead (*Platycephalus speculator*)

Most boat-based recreational catches of Southern Bluespotted Flathead occurred in the West Coast, with some catches in the South Coast (Figure 25c). The majority of catches were released (74%; Table 5, Figure 25a) and mostly attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 25b). All catches were taken by line fishing (Figure 25d). Southern Bluespotted Flathead were harvested throughout the year, with higher catches in spring, summer and autumn (Figure 25e). The kept and released catches of Southern Bluespotted Flathead in 2020/21 were similar to previous surveys (Figure 25a).

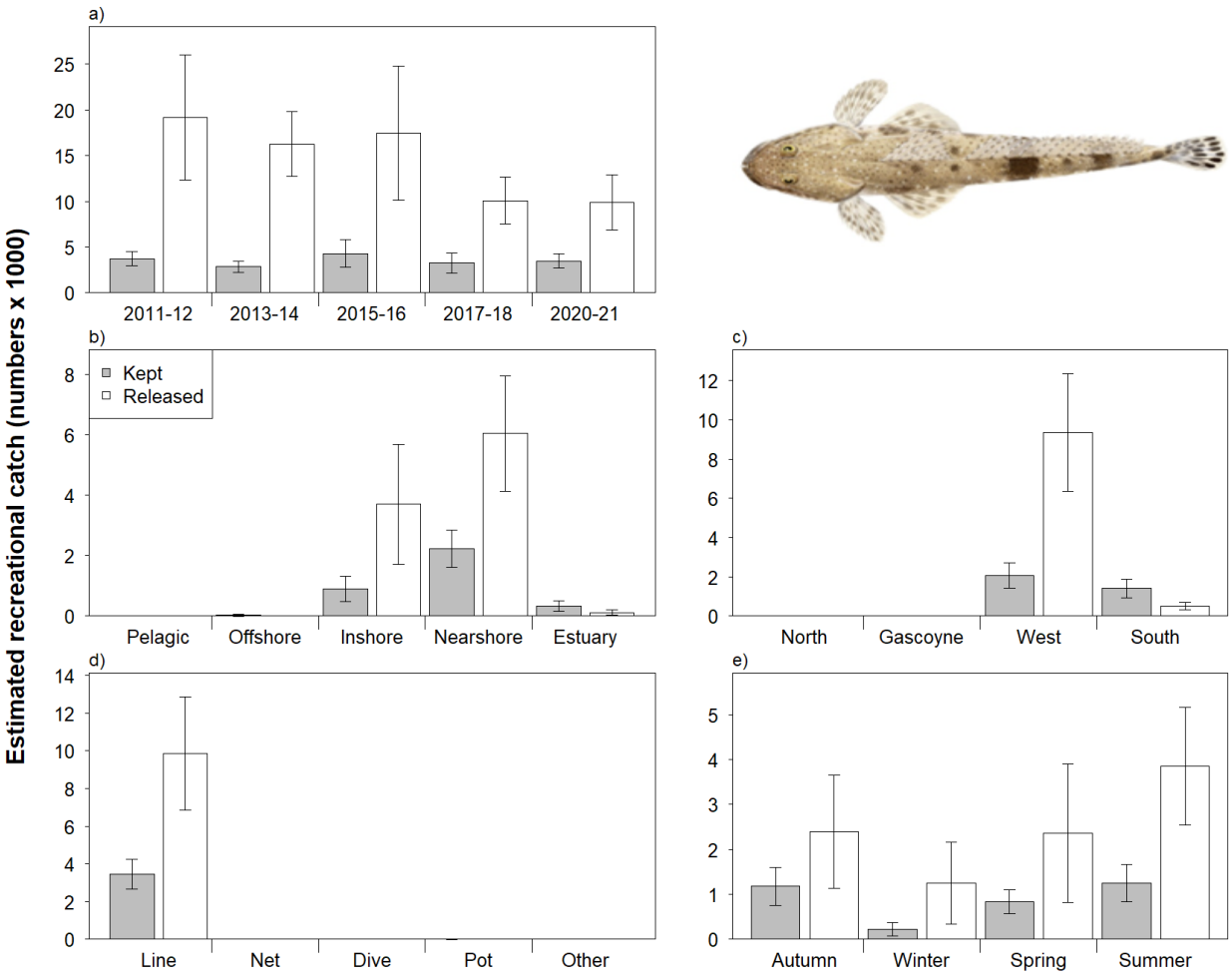


Figure 25. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Southern Bluespotted Flathead in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.1.4 Yellowtail Flathead (*Platycephalus westraliae*)

Most boat-based recreational catches of Yellowtail Flathead occurred in the West Coast (Figure 26c). The majority of catches were released (83%; Table 5, Figure 26a) and mostly attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 26b). Most catches were taken by line fishing (Figure 26d). Yellowtail Flathead were harvested throughout the year, with higher catches in summer and autumn (Figure 26e). The kept and released catches of Yellowtail Flathead in 2020/21 were similar to previous surveys (Figure 26a).

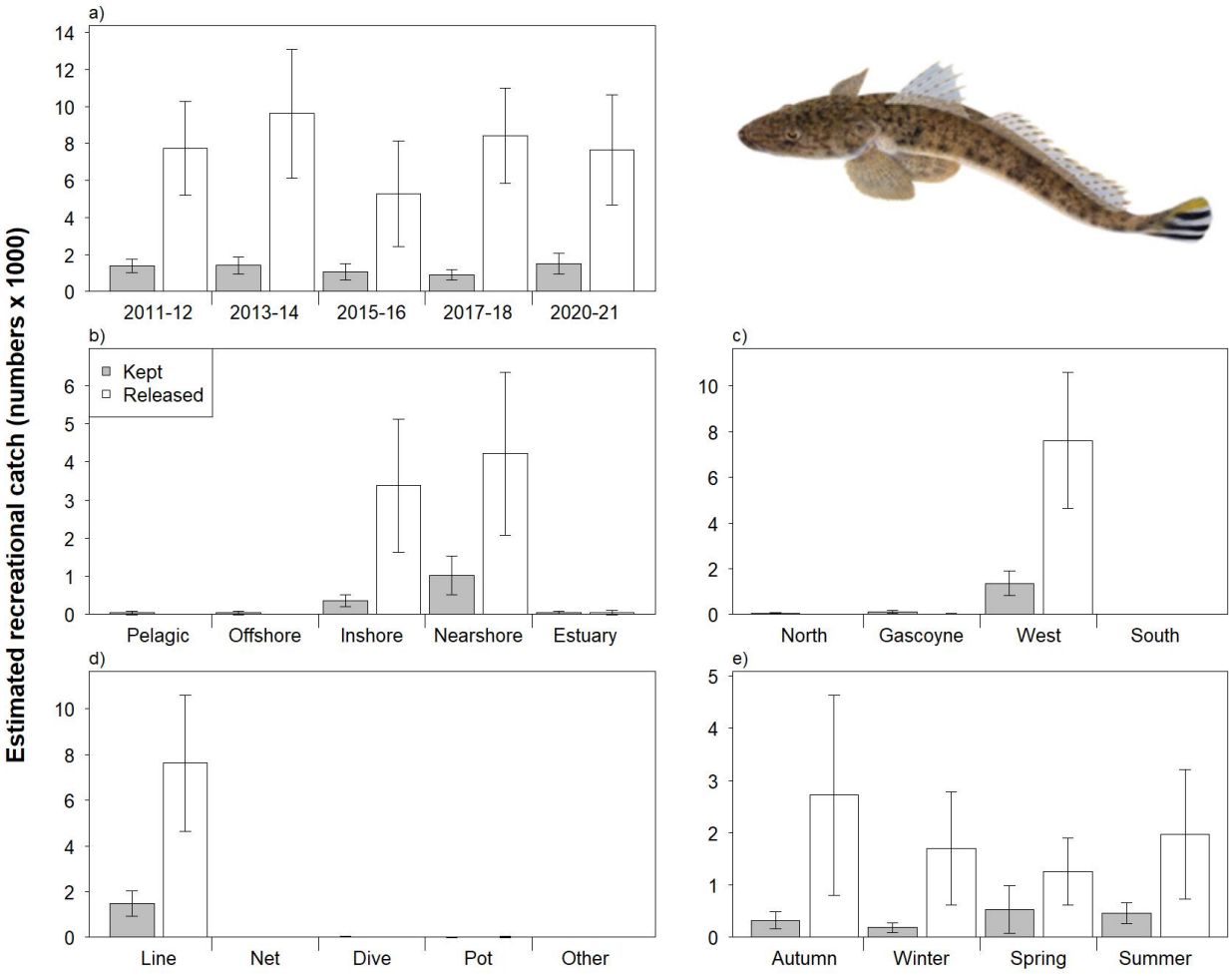


Figure 26. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Yellowtail Flathead in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2 Nearshore

Catches for nearshore species will be underestimated, particularly for species that are harvested by high proportions of shore-based recreational fishers.

6.2.1 Australian Herring (*Arripis georgianus*)

Australian Herring is an indicator species in the West Coast and South Coast bioregions. Most boat-based recreational catches occurred in the West Coast (Figure 27c). The majority of catches were kept (21% released; Table 5, Figure 27a) with releases attributed to 'too many' or 'too small' (Table 6). Catches were taken predominantly from nearshore habitat (Figure 27b). Most catches were taken by line fishing (Figure 27d). Australian Herring were harvested throughout the year, with higher catches in autumn (Figure 27e). The kept and released catches of Australian Herring in 2020/21 were similar to previous surveys (Figure 27a).

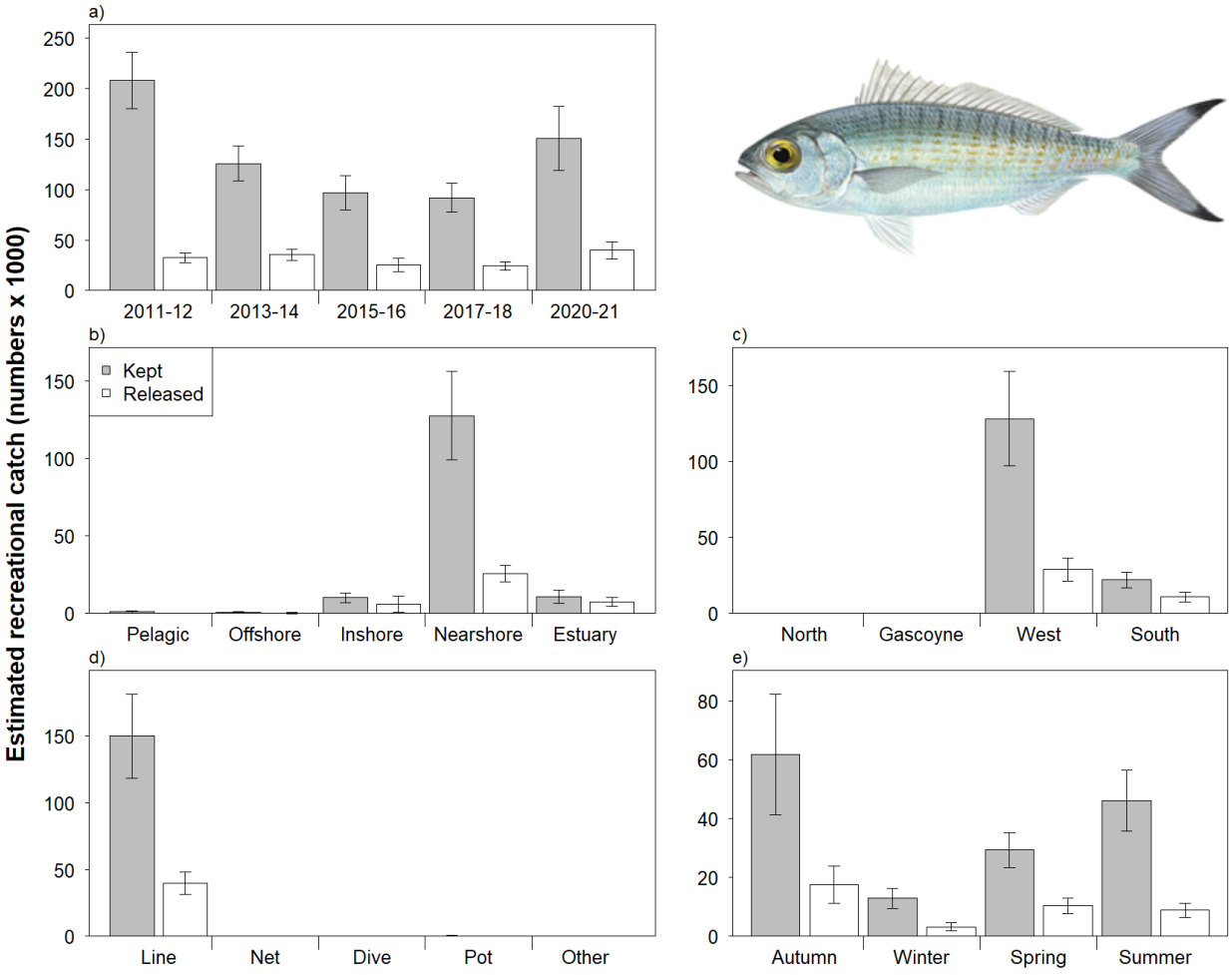


Figure 27. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Australian Herring in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.2 Western Australian Salmon (*Arripis truttaceus*)

Western Australian Salmon is an indicator species in the South Coast bioregion. Most boat-based recreational catches of Western Australian Salmon occurred in the South Coast, followed by the West Coast (Figure 28c). The majority of catches were released (69%; Table 5, Figure 28a) and mostly attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore and estuarine habitats (Figure 28b). All catches were taken by line fishing (Figure 28d). Western Australian Salmon were harvested throughout the year, with higher catches in summer and autumn (Figure 28e). The kept and released catches of Western Australian Salmon in 2020/21 were similar to previous surveys, except the released catch was lower in 2020/21 compared with 2015/16 (Figure 28a).

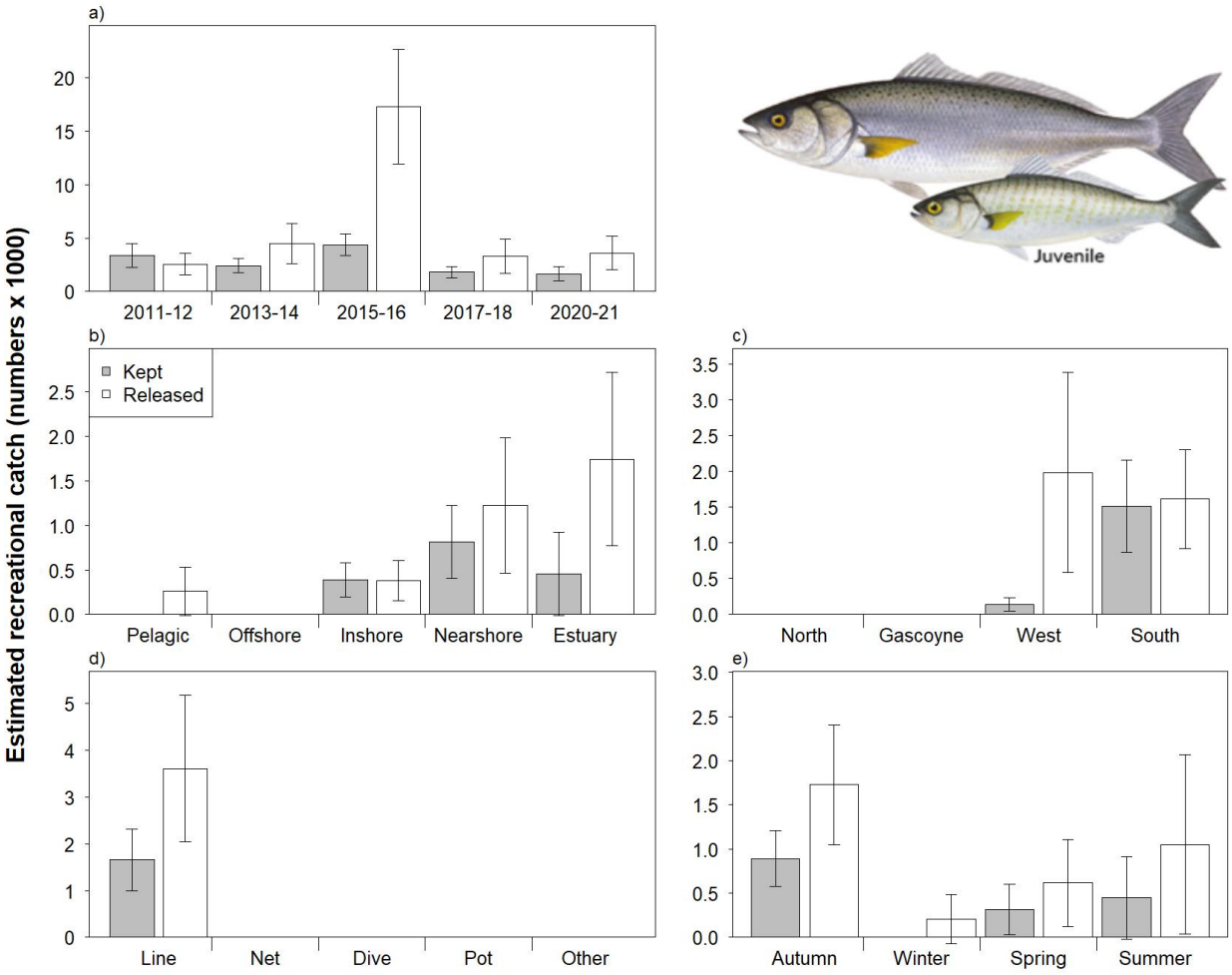


Figure 28. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Western Australian Salmon in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.3 Western Yellowfin Bream (*Acanthopagrus morrisoni*)

Most boat-based recreational catches of Western Yellowfin Bream occurred in the Gascoyne Coast, with some catches in the North Coast (Figure 29c). The majority of catches were released (72%; Table 5, Figure 29a) and mostly attributed to 'too many' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 29b). Most catches were taken by line fishing (Figure 29d). Western Yellowfin Bream were harvested throughout the year, with higher catches in winter and spring (Figure 29e). The kept and released catches of Western Yellowfin Bream in 2020/21 were similar to previous surveys, however, catches for this species have low sample sizes and high uncertainty (Figure 29a).

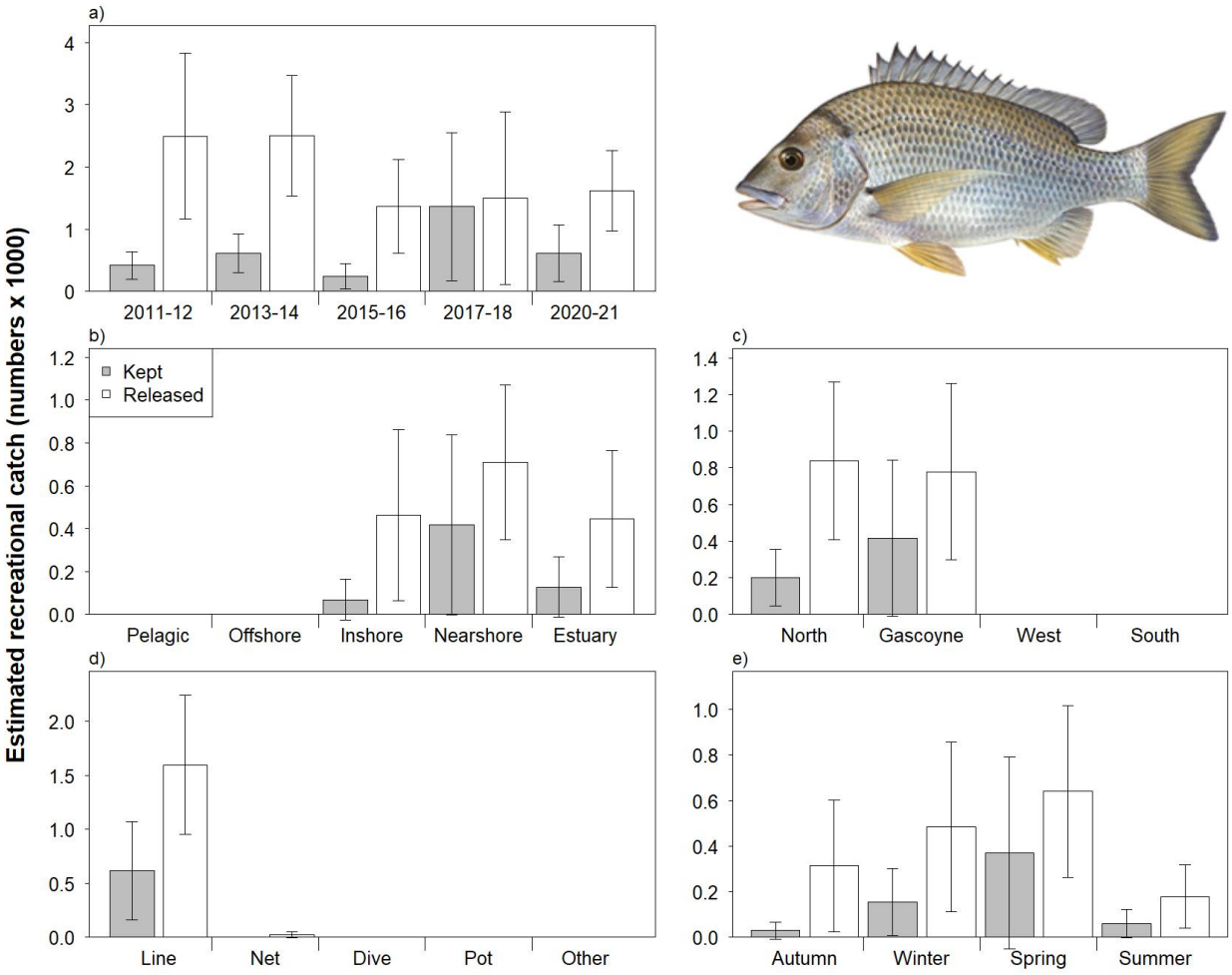


Figure 29. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Western Yellowfin Bream in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.4 Giant Sea Catfish (*Netuma thalassina*)

All boat-based recreational catches of Giant Sea Catfish occurred in the North Coast (Figure 30c). The majority of catches were released (97% released; Table 5, Figure 31a) and mostly attributed to 'too many' or 'other' (Table 6). Catches were taken predominantly from nearshore habitats (Figure 30b). All catches were taken by line fishing (Figure 30d). Giant Sea Catfish were harvested throughout the year, with higher catches in spring (Figure 30e). The kept and released catches of Giant Sea Catfish in 2020/21 were similar to previous surveys; however, catches for this species have high uncertainty in some years (Figure 30a).

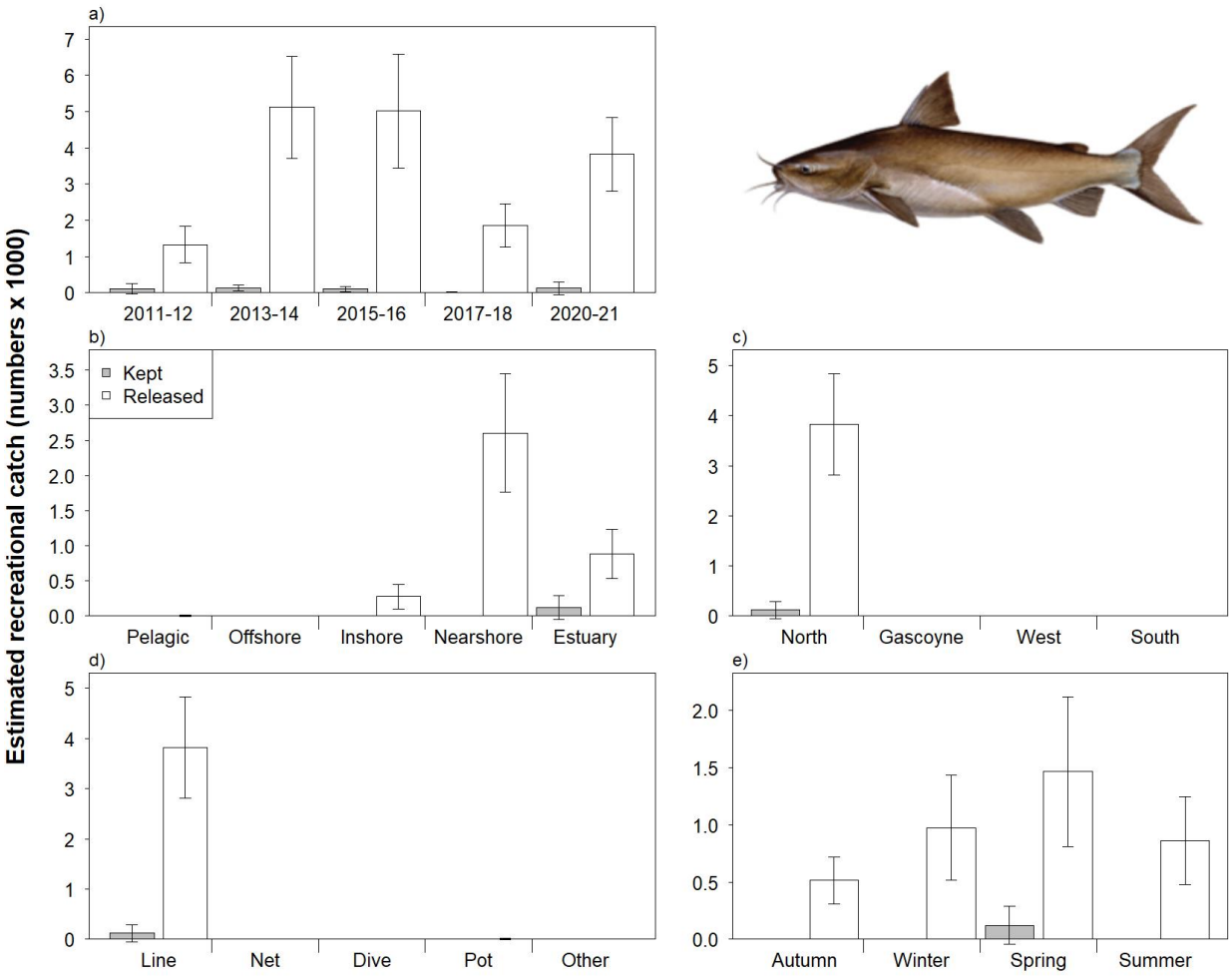


Figure 30. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Giant Sea Catfish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.5 Chinaman Rockcod (*Epinephelus rivulatus*)

Most boat-based recreational catches of Chinaman Rockcod occurred in the Gascoyne Coast, with some catches in the North Coast and West Coast (Figure 31c). Similar proportions of the catch were kept and released (56% released; Table 5, Figure 31a) with most releases attributed to 'under size' or 'too many' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 31b). Most catches were taken by line fishing (Figure 31d). Chinaman Rockcod were harvested throughout the year, with higher catches in autumn and winter (Figure 31e). The kept and released catches of Chinaman Rockcod in 2020/21 were similar to previous surveys (Figure 31a).

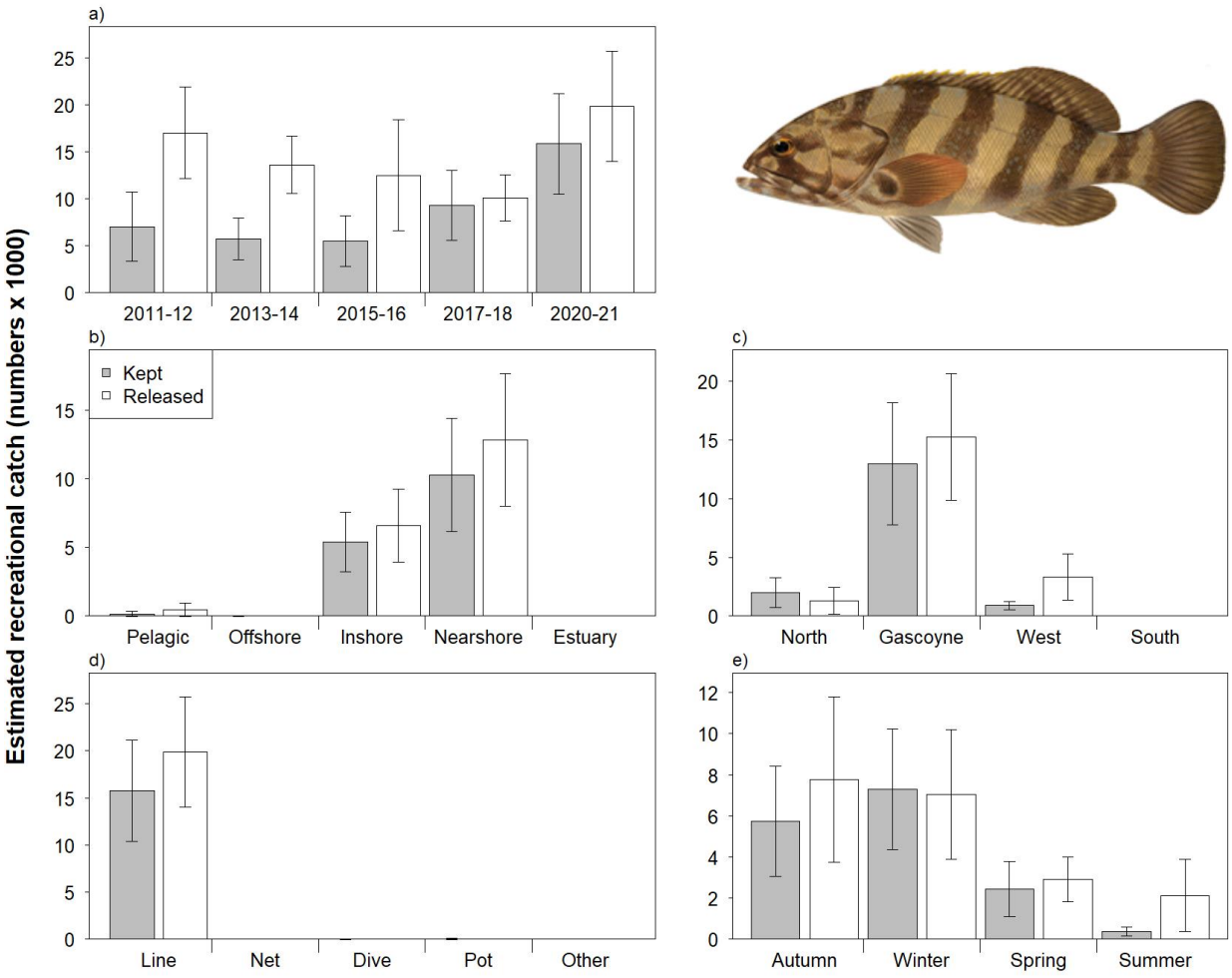


Figure 31. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Chinaman Rockcod in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.6 Grunters (*Pelsartia humeralis* and *Pelates octolineatus*)

Grunter species include Sea Trumpeter (*Pelsartia humeralis*), Western Striped Grunter (*Pelates octolineatus*) and Other Striped Grunters (Terapontidae – undifferentiated). Most boat-based recreational catches of Grunters occurred in the West Coast, with some catches in the South Coast (Figure 32c). The majority of catches were released (93%; Table 5, Figure 32a) and mostly attributed to 'too many' or 'other' (Table 6). Catches were taken predominantly from nearshore habitat (Figure 32b). Most catches were taken by line fishing (Figure 32d). Grunter were harvested throughout the year, with higher catches in spring and summer (Figure 32e). The kept and released recreational catches of Grunter in 2020/21 were similar to previous surveys, except the released catch was lower in 2020/21 compared with 2011/12 (Figure 32a).

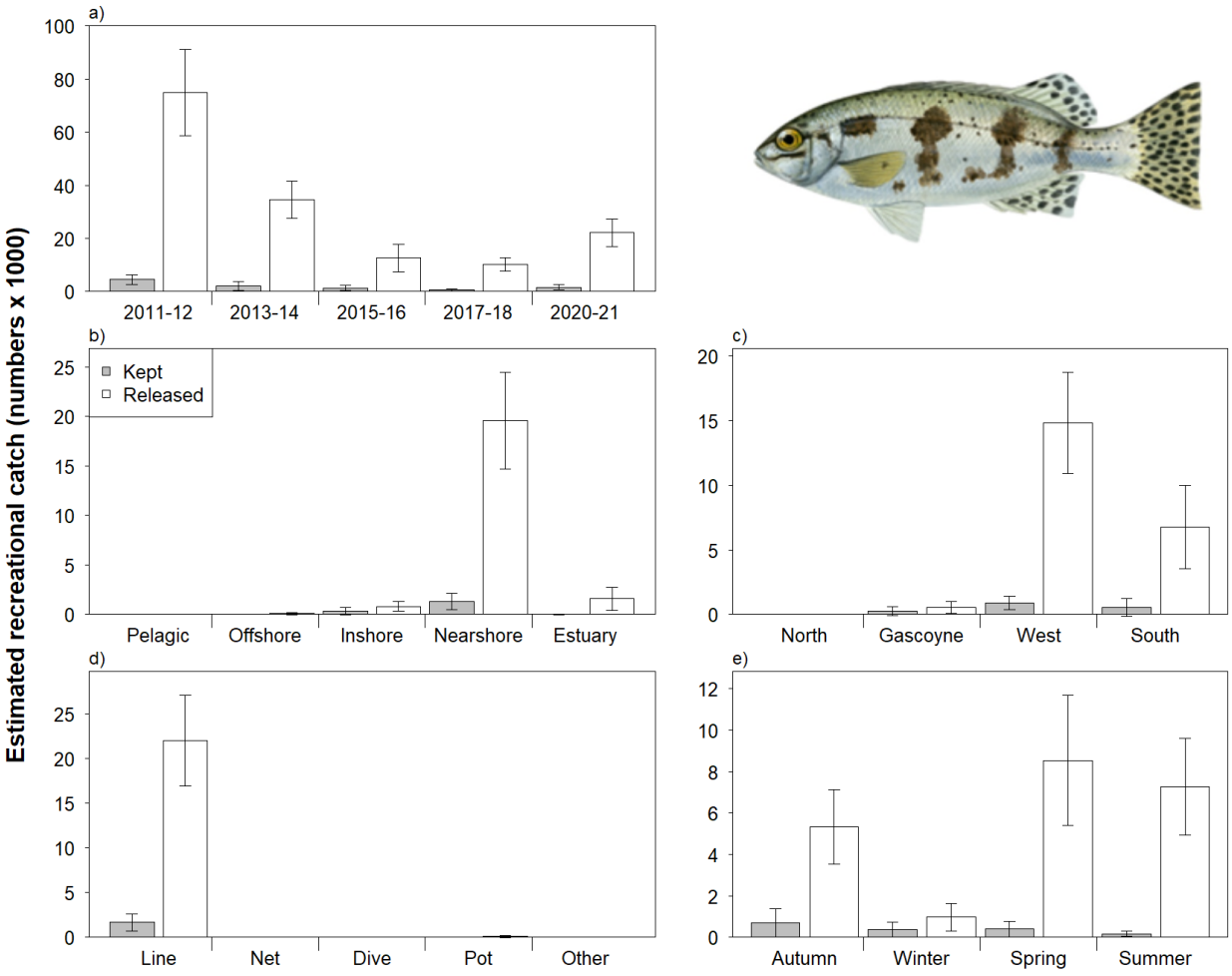


Figure 32. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Grunter in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.7 Garfish (*Hyporhamphus melanochir* and *Hemiramphus robustus*)

Garfish is an indicator species in the West Coast bioregion. Reporting for this species includes Southern Garfish (*Hyporhamphus melanochir*), three-by-two Garfish (*Hemiramphus robustus*) and Other Garfish (Hemiramphidae – undifferentiated). A spatial closure for Southern Garfish in the Metro Zone commenced in 2017. Most boat-based recreational catches of Garfish occurred in the Gascoyne Coast and West Coast (Figure 33c). The majority of catches were kept (16% released; Table 5, Figure 33a). Catches were taken predominantly from nearshore habitat (Figure 33b). Most catches were taken by line fishing (Figure 33d). Garfish were harvested throughout the year, with higher catches in autumn (Figure 33e). The kept and released recreational catches of Garfish in 2020/21 were similar to previous surveys, except the kept catch was lower in 2020/21 compared with 2011/12 (Figure 33a).

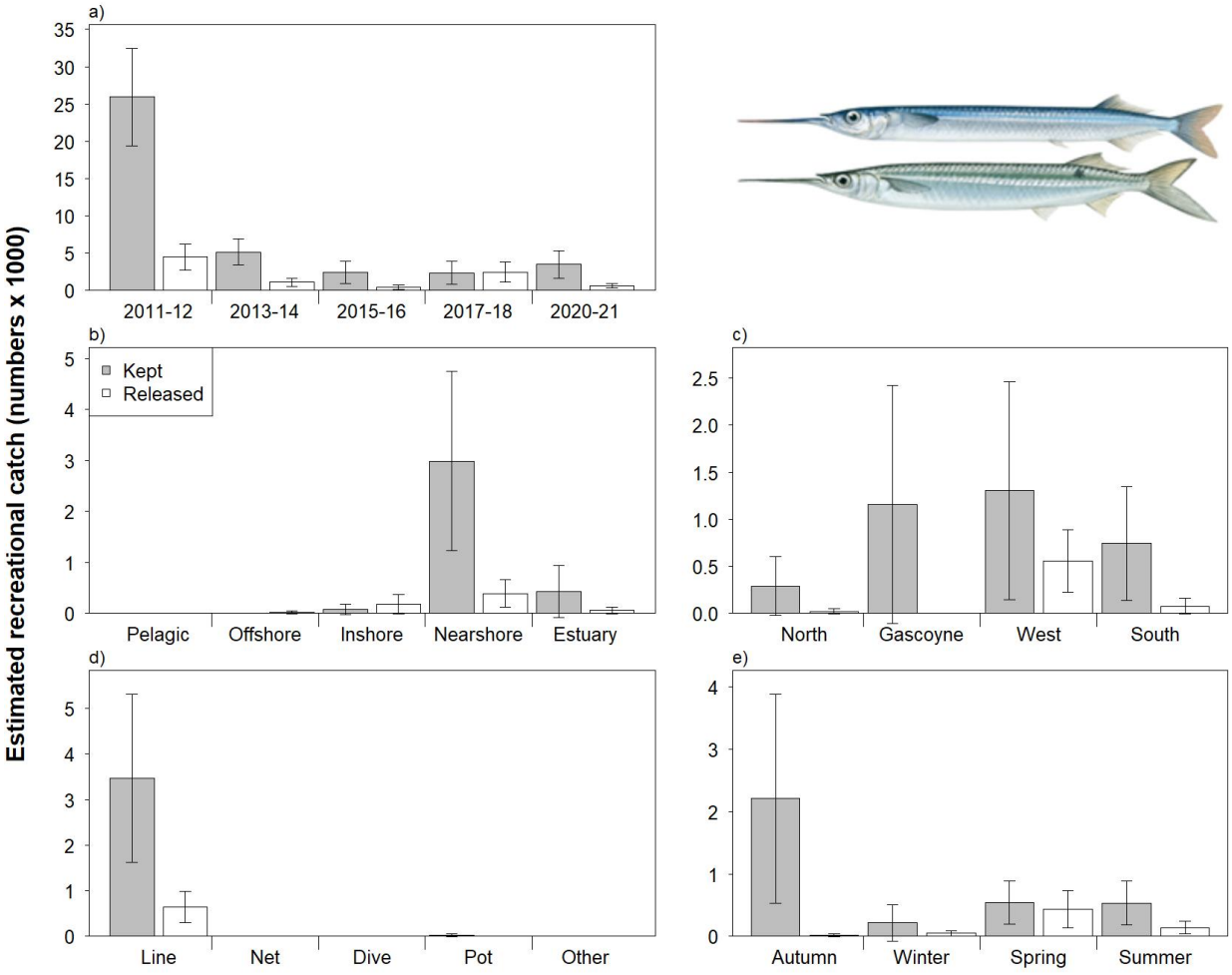


Figure 33. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Garfish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.8 Mulloway (*Argyrosomus japonicus*)

Most boat-based recreational catches of Mulloway occurred in the Gascoyne Coast, followed by the West Coast (Figure 34c). The majority of catches were released (63%; Table 5, Figure 34a) and mostly attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore and estuarine habitats (Figure 34b). All catches were taken by line fishing (Figure 34d). Mulloway were harvested throughout the year, with higher catches in autumn, winter and spring (Figure 34e). The kept and released catches of Mulloway in 2020/21 were similar to previous surveys; however, catches for this species have high uncertainty in some years (Figure 34a).

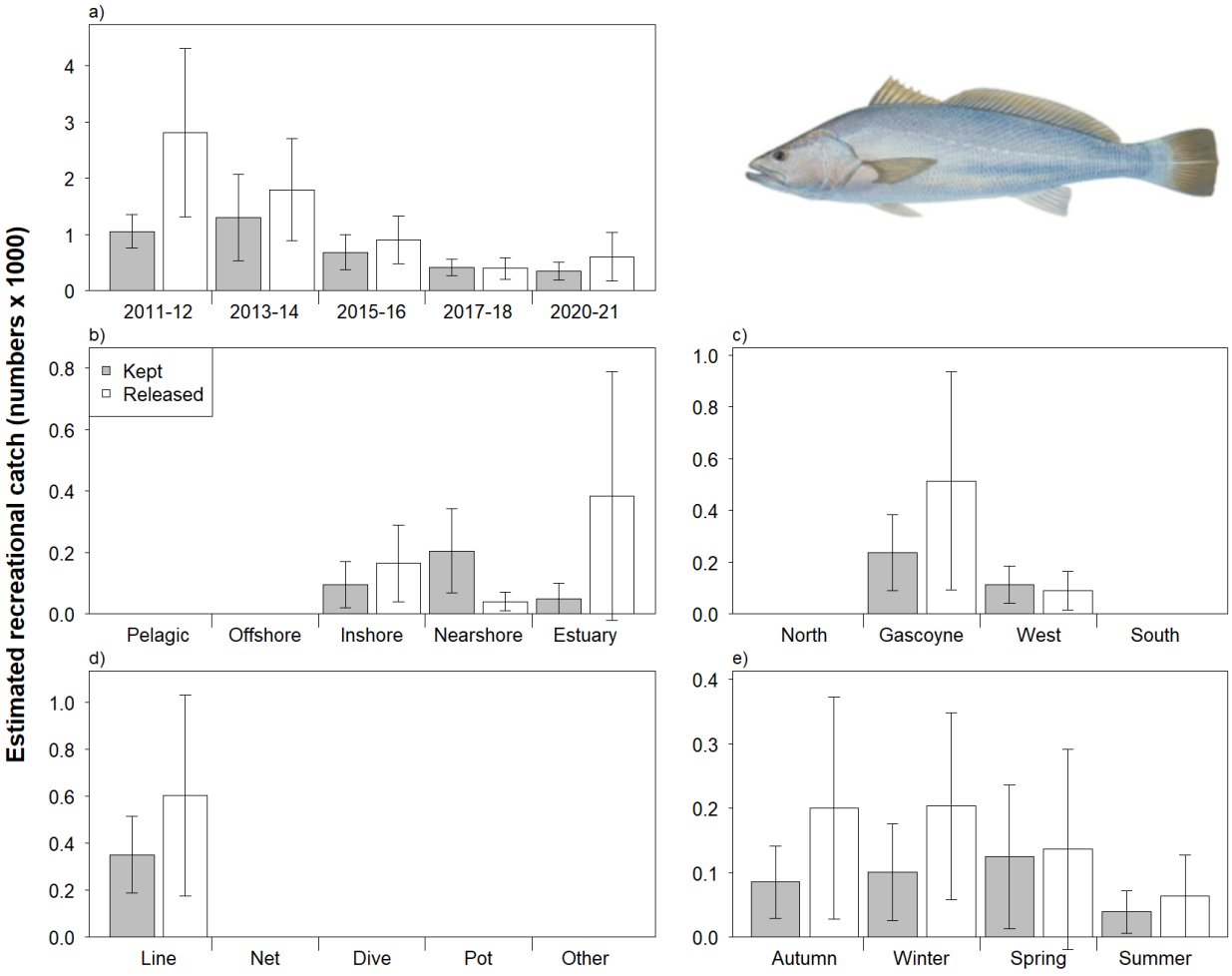


Figure 34. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Mulloway in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.9 Leatherjacket (Family Monacanthidae)

Leatherjacket species include Horseshoe Leatherjacket (*Meuschenia hippocrepis*), Sixspine Leatherjacket (*Meuschenia freycineti*) and Other Leatherjackets (Monacanthidae – undifferentiated). Most boat-based recreational catches of Leatherjacket occurred in the West Coast and South Coast (Figure 35c). The majority of catches were released (84%; Table 5, Figure 35a) and mostly attributed to 'too many' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 35b). Most catches were taken by line fishing (Figure 35d). Leatherjacket were harvested throughout the year, with higher catches in spring (Figure 35e). The kept and released recreational catches of Leatherjackets in 2020/21 were similar to previous surveys, except the kept catch was lower in 2020/21 compared with 2011/12 (Figure 35a).

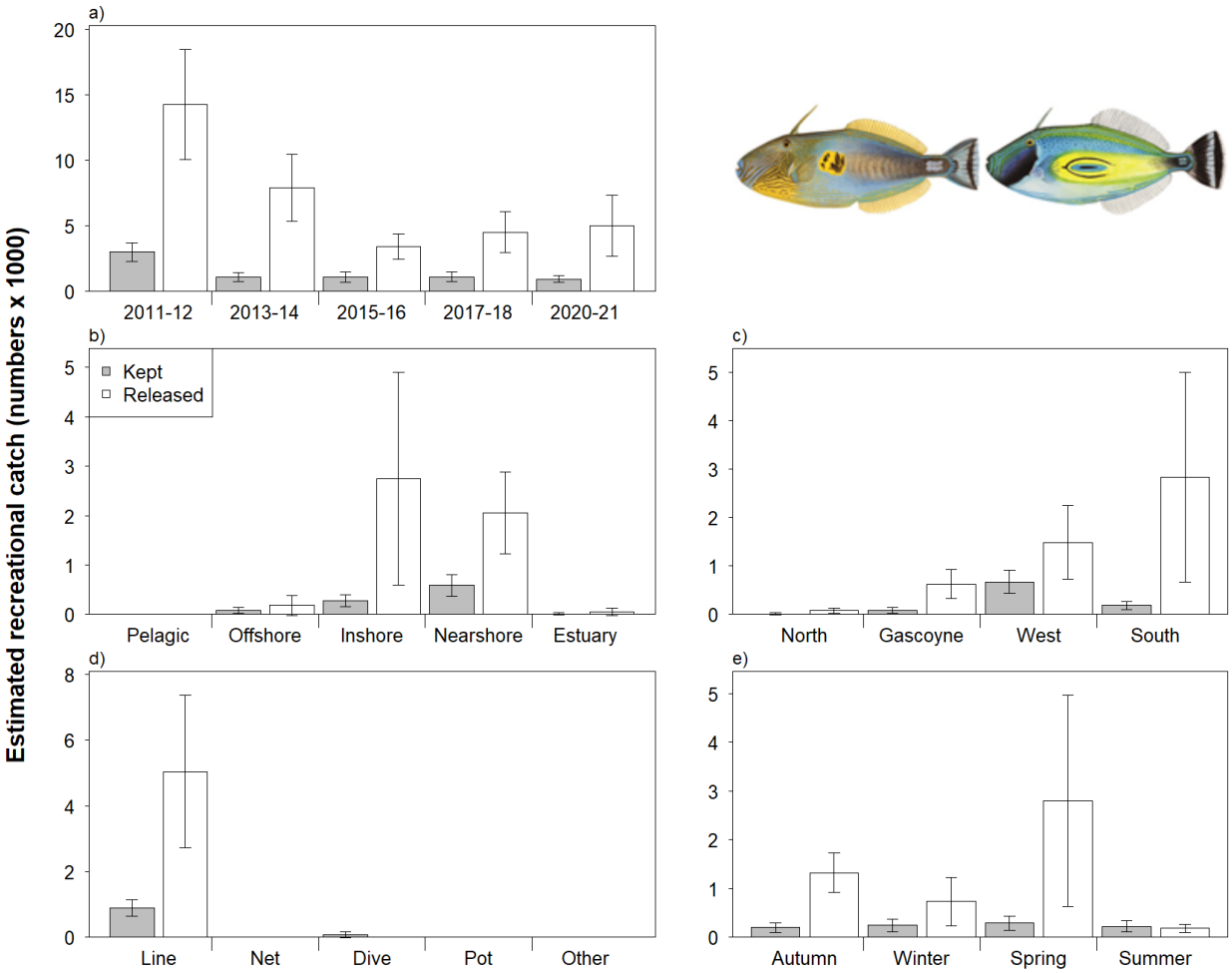


Figure 35. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Leatherjacket in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.10 Mullet (Family Mugilidae)

Mullet species include Sea Mullet (*Mugil cephalus*), Bluetail Mullet (*Valamugil buchanani*), Diamondscale Mullet (*Liza vaigiensis*), Greenback Mullet (*Liza subviridis*), Yelloweye Mullet (*Aldrichetta forsteri*) and Other Mullets (Mugilidae – undifferentiated). Sea Mullet is an indicator species in the Gascoyne, West and South Coast bioregions. Most boat-based recreational catches of Mullet occurred in the North Coast (Figure 36c). The majority of catches were kept (29% released; Table 5, Figure 36a). Catches were taken predominantly from nearshore and estuarine habitats (Figure 36b). Catches were taken by line fishing and netting (Figure 36d). Mullet were harvested throughout the year, with higher catches in spring, summer and autumn (Figure 36e). The kept and released catches of Mullet in 2020/21 were similar to previous surveys; however, catches for this species have high uncertainty in some years (Figure 36a).

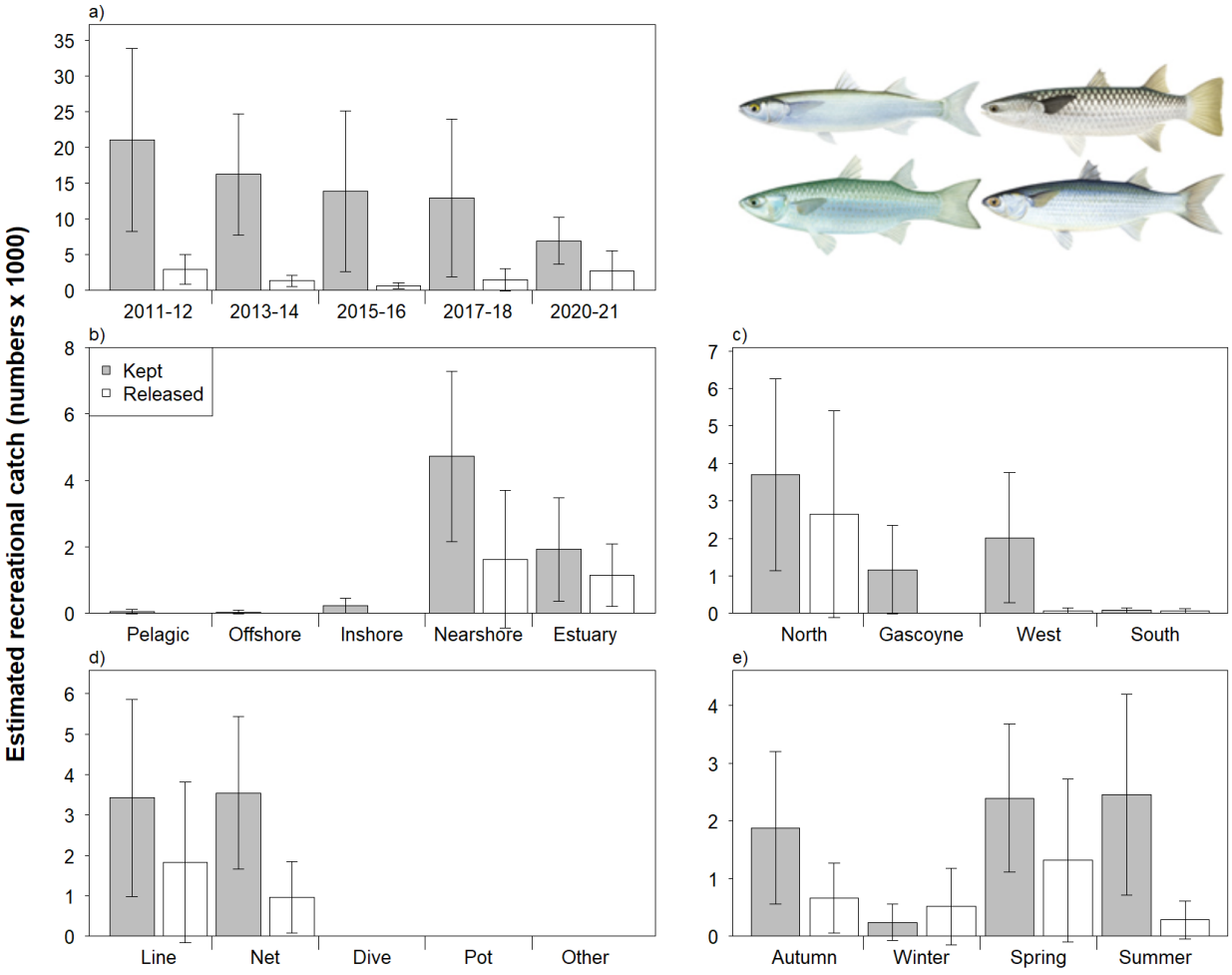


Figure 36. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Mullet in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.11 Snook (*Sphyraena novaehollandiae*)

Most boat-based recreational catches of Snook occurred in the West Coast, with some catches in the South Coast (Figure 37c). The majority of catches were kept (37% released; Table 5, Figure 37a) and mostly attributed to 'too many' (Table 6). Catches were taken predominantly from nearshore habitat (Figure 37b). All catches were taken by line fishing (Figure 37d). Snook were harvested throughout the year, with higher catches in autumn (Figure 37e). The kept and released catches of Snook in 2020/21 were similar to previous surveys; however, catches for this species have high uncertainty in some years (Figure 37a).

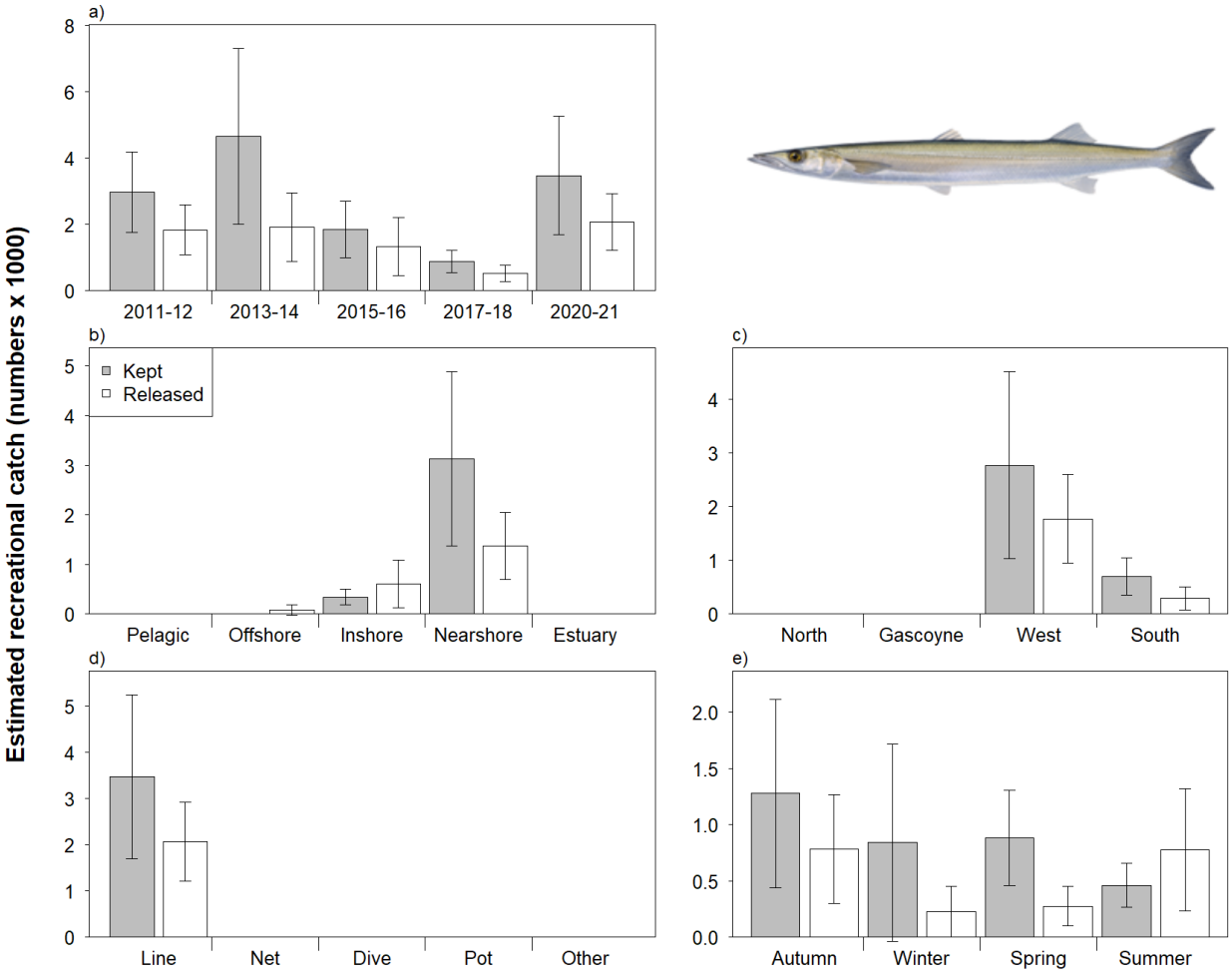


Figure 37. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Snook in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.12 Tailor (*Pomatomus saltatrix*)

Tailor is an indicator species in the Gascoyne Coast and West Coast bioregions. Most boat-based recreational catches of Tailor occurred in the West Coast, with some catches in the Gascoyne Coast and South Coast (Figure 38c). The majority of catches were kept (38% released; Table 5, Figure 38a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore habitat (Figure 38b). Most catches were taken by line fishing (Figure 38d). Tailor were harvested throughout the year, with higher catches in summer (Figure 38e). The kept and released catches of Tailor in 2020/21 were similar to previous surveys (Figure 38a).

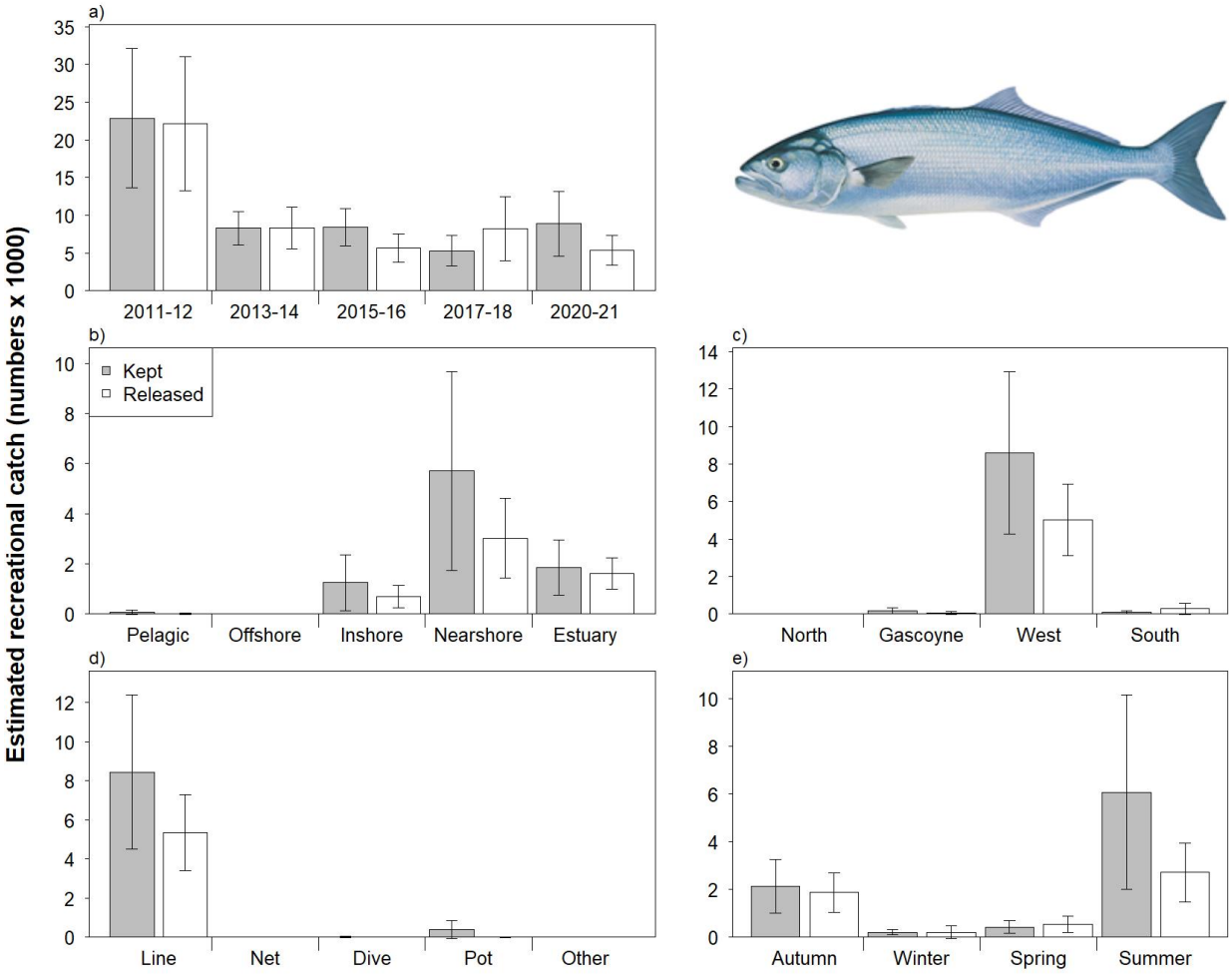


Figure 38. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Tailor in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.13 Western Butterfish (*Pentapodus vitta*)

Most boat-based recreational catches of Western Butterfish occurred in the West Coast, with some catches in the Gascoyne Coast (Figure 39c). The majority of catches were released (75%; Table 5, Figure 39a) and mostly attributed to ‘too many’ or ‘other’ (Table 6). Catches were taken predominantly from nearshore habitat (Figure 39b). All catches were taken by line fishing (Figure 39d). Western Butterfish were harvested throughout the year, with higher catches in spring (Figure 39e). The kept and released catches of Western Butterfish in 2020/21 were similar to previous surveys (Figure 39a).

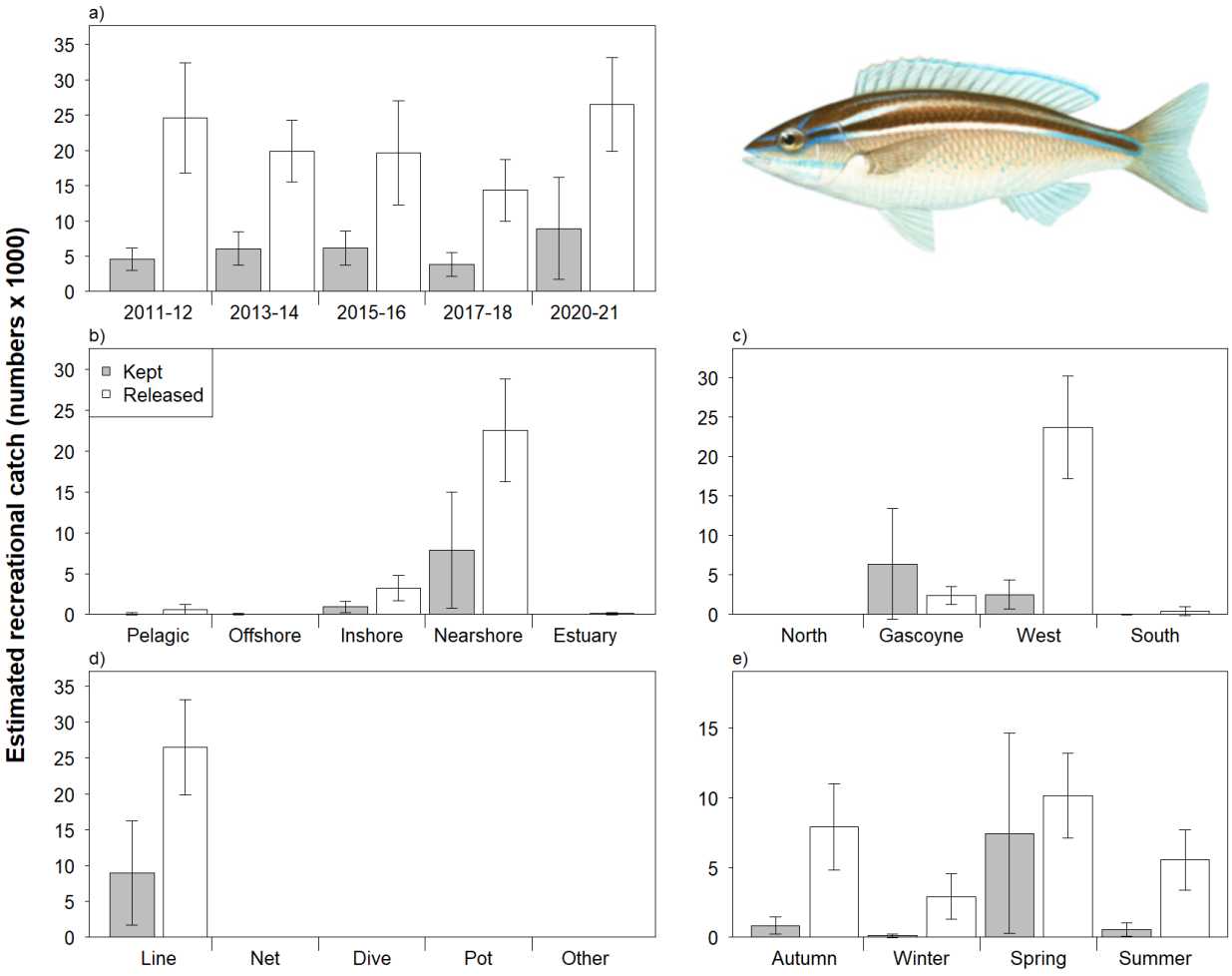


Figure 39. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Western Butterfish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.14 Blue Threadfin (*Eleutheronema tetradactylum*)

Blue Threadfin is an indicator species in the North Coast bioregion. Reporting for this species includes catches for Striped threadfin (*Polydatylus plebius*). All boat-based recreational catches of Blue Threadfin occurred in the North Coast (Figure 40c). The majority of catches were kept (40% released; Table 5, Figure 40a) with most releases attributed to 'too many' (Table 6). Catches were taken predominantly from nearshore and estuarine habitats (Figure 40b). All catches were taken by line fishing (Figure 40d). Blue Threadfin were harvested throughout the year, with higher catches in winter and spring (Figure 40e). The kept and released catches of Blue Threadfin in 2020/21 were similar to previous surveys (Figure 40a).

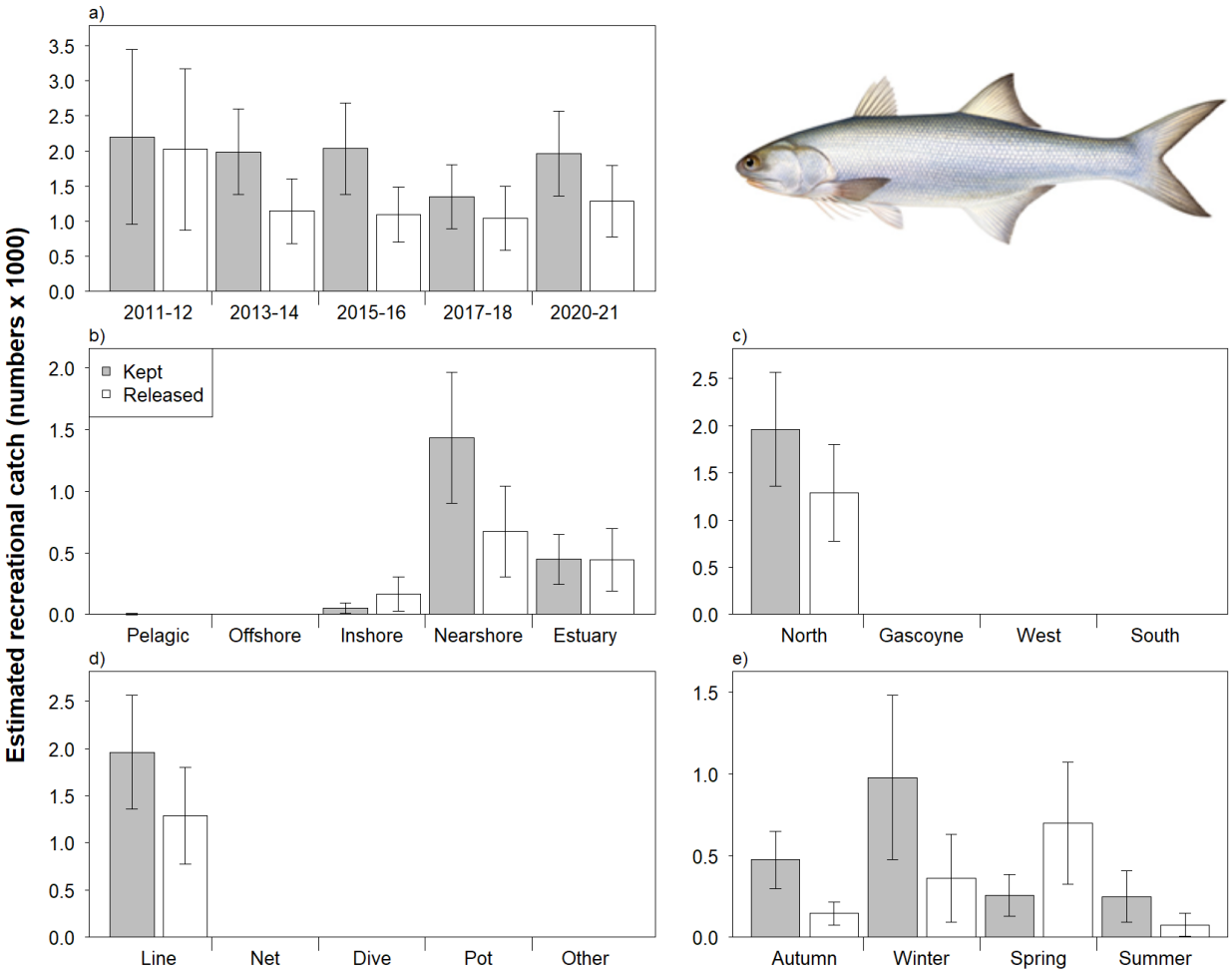


Figure 40. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Blue Threadfin in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.15 King Threadfin (*Polydactylus macrochir*)

King Threadfin is an indicator species in the North Coast bioregion. All boat-based recreational catches of King Threadfin occurred in the North Coast (Figure 41c). The majority of catches were kept (57%; Table 5, Figure 41a) with most releases attributed to 'catch and release' (Table 6). Catches were taken predominantly from nearshore and estuarine habitats (Figure 41b). King Threadfin were harvested throughout the year, with higher catches in spring (Figure 41e). All catches were taken by line fishing (Figure 41d). The kept and released catches of King Threadfin in 2020/21 were similar to previous surveys, except the released catch in 2020/21 was higher compared with 2011/12 and 2013/14 (Figure 41a).

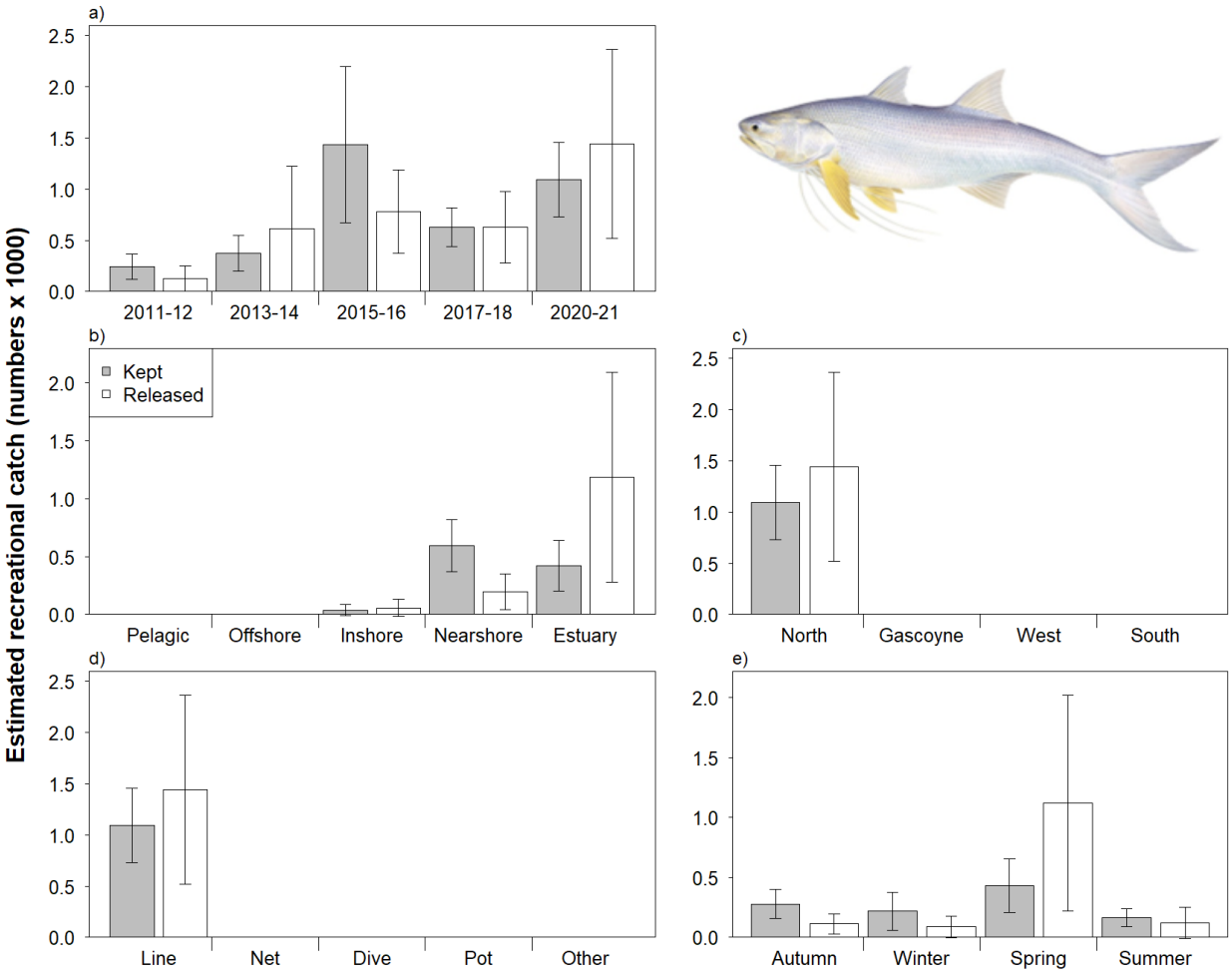


Figure 41. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of King Threadfin in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.16 Queenfish (*Scomberoides* spp.)

Most boat-based recreational catches of Queenfish occurred in the North Coast, followed by the Gascoyne Coast (Figure 42c). The majority of catches were released (62%; Table 5, Figure 42a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore habitat (Figure 42b). Queenfish were harvested throughout the year, with higher catches in autumn and spring (Figure 42e). All catches were taken by line fishing (Figure 42d). The kept and released catches of Queenfish in 2020/21 were similar to previous surveys (Figure 42a).

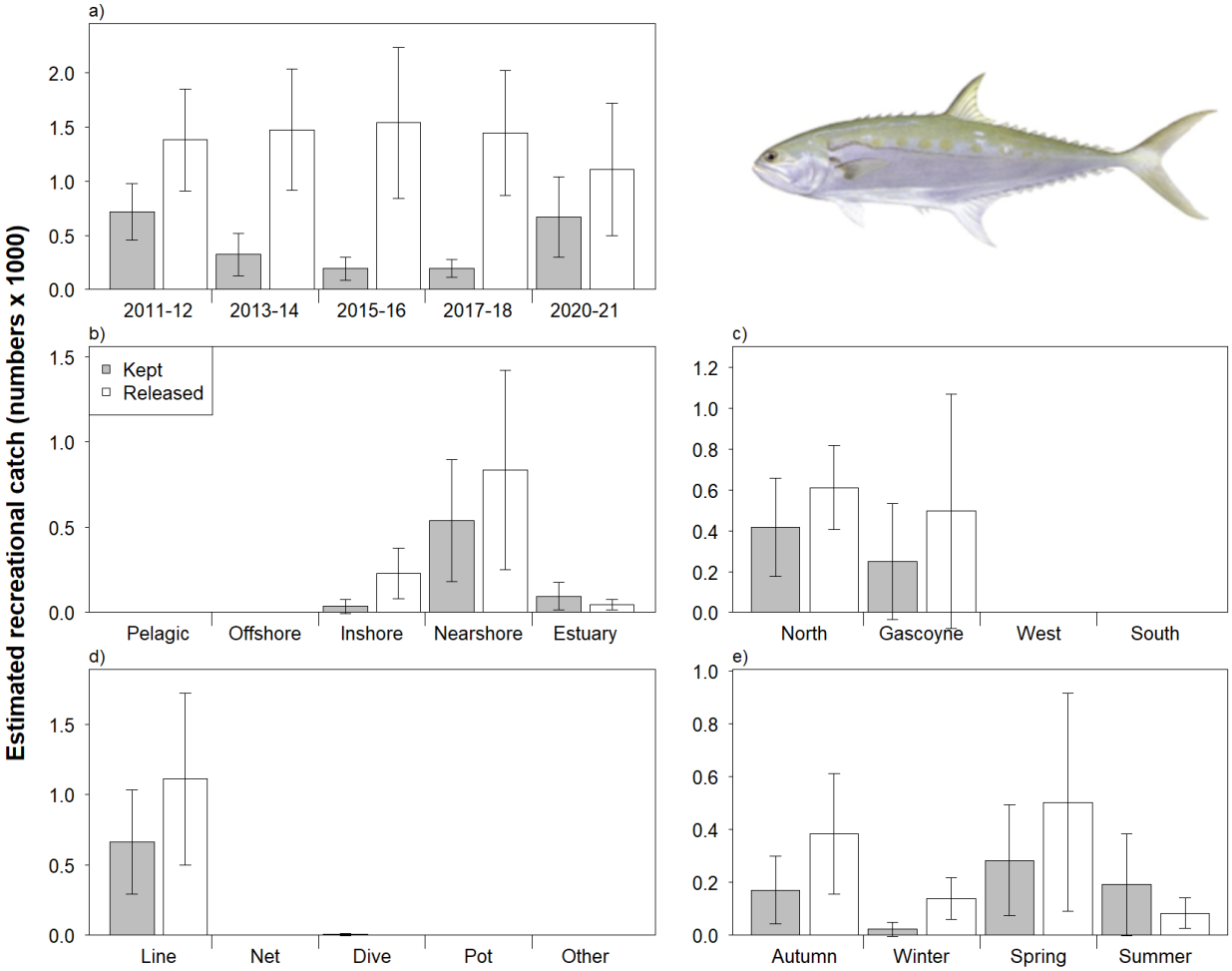


Figure 42. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Queenfish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.17 Bludger Trevally (*Carangoides gymnostethus*)

Boat-based recreational catches of Bludger Trevally occurred in the North Coast and Gascoyne Coast (Figure 43c). Similar proportions of the catch were kept and released (50% released; Table 5, Figure 43a) with most releases attributed to 'too many' (Table 6). Catches were taken predominantly from nearshore and estuarine habitats (Figure 43b). Bludger Trevally were harvested throughout the year, with higher catches in autumn and winter (Figure 43e). Most catches were taken by line fishing (Figure 43d). The kept and released catches of Bludger Trevally in 2020/21 were similar to previous surveys; however, catches for this species have low sample sizes and high uncertainty in some years (Figure 43a).

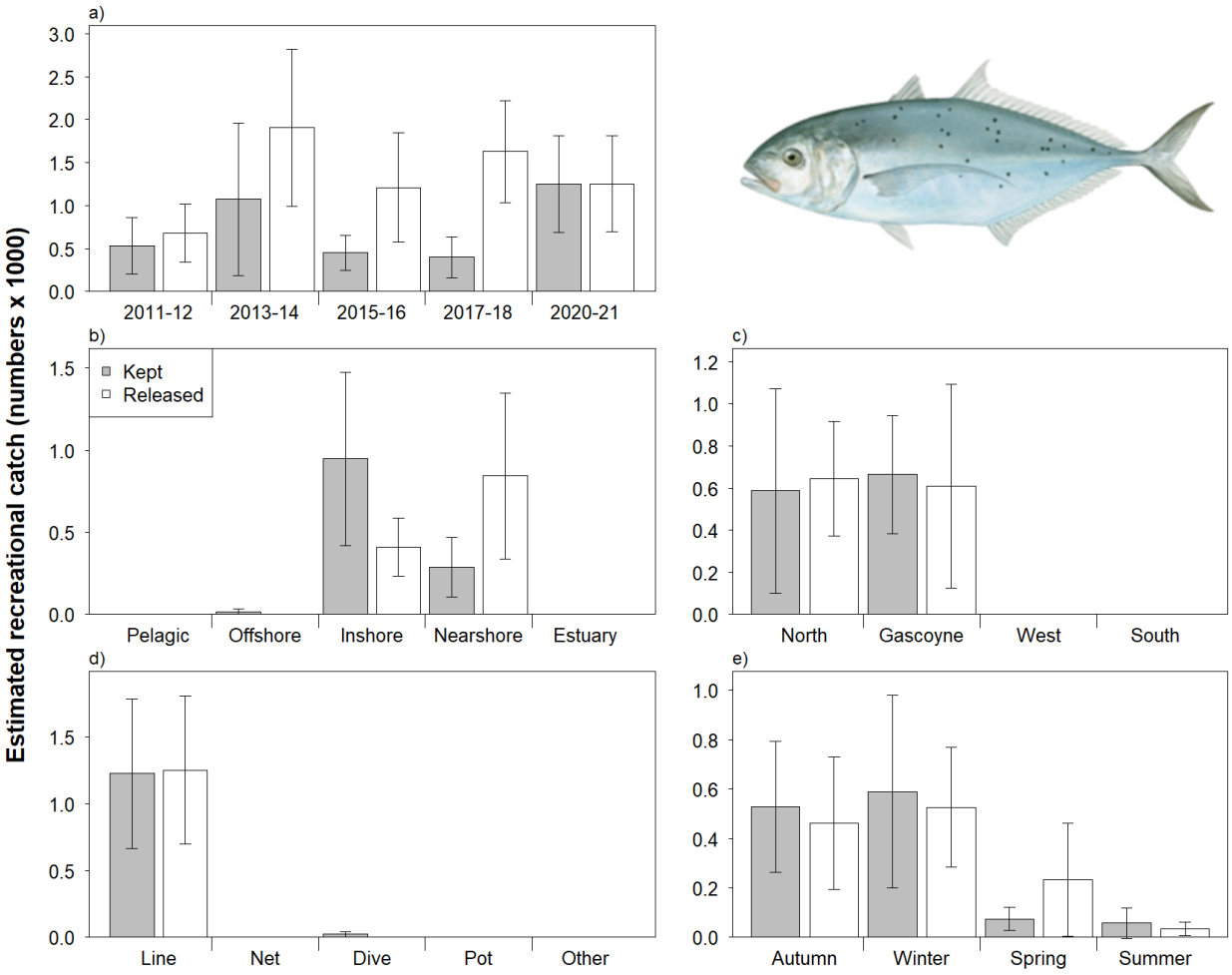


Figure 43. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Bludger Trevally in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.18 Giant Trevally (*Caranx ignobilis*)

Most boat-based recreational catches of Giant Trevally occurred in the North Coast and Gascoyne Coast, with some catches in the West Coast (Figure 44c). The majority of catches were released (90%; Table 5, Figure 44a) and mostly attributed to ‘catch and release’ or ‘too many’ (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 44b). Most catches were taken by line fishing (Figure 44d). Giant Trevally were harvested throughout the year, with higher catches in spring (Figure 44e). The kept and released catches of Giant Trevally in 2020/21 were similar to previous surveys (Figure 44a).

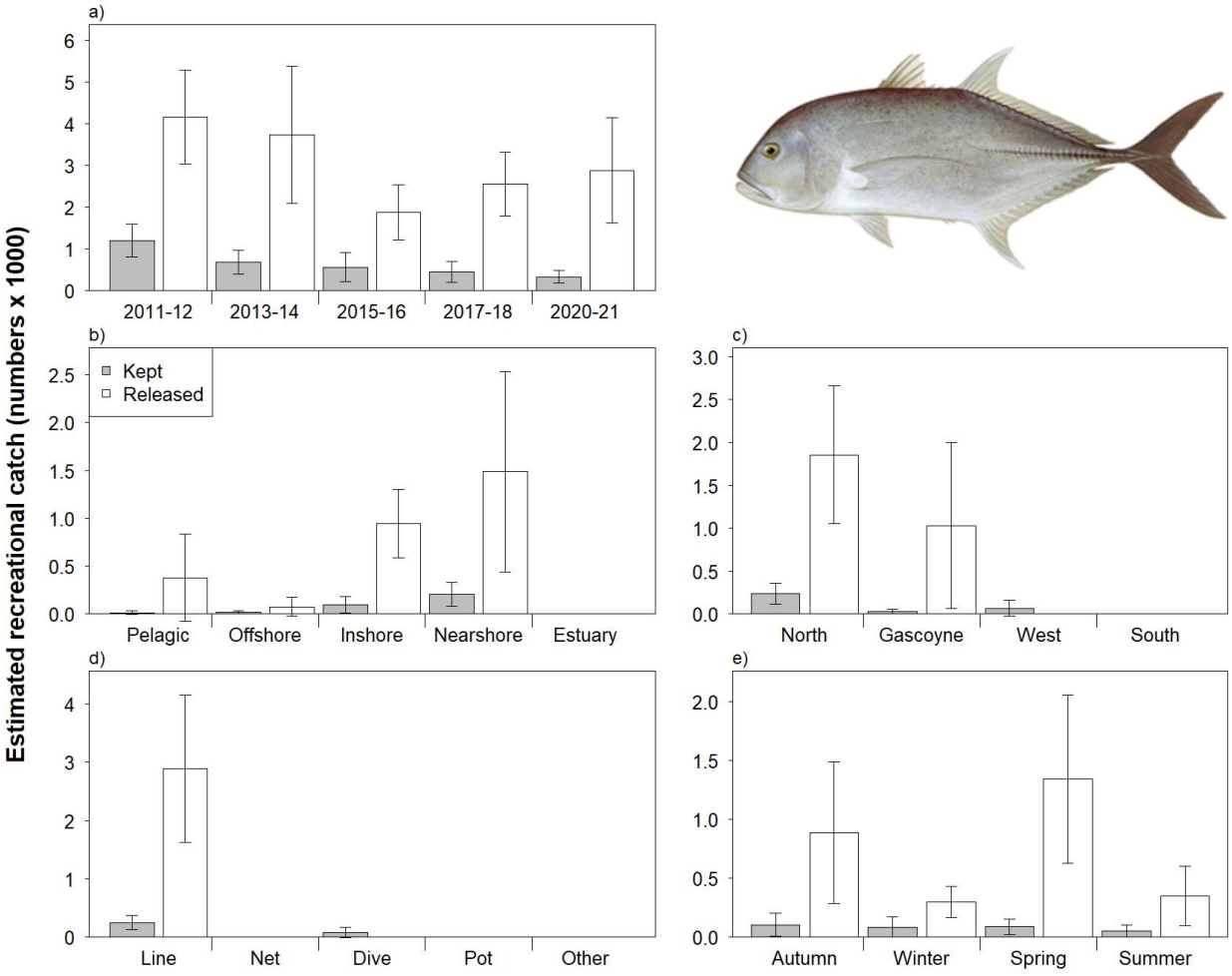


Figure 44. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Golden Trevally in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.19 Golden Trevally (*Gnathanodon speciosus*)

Most boat-based recreational catches of Golden Trevally occurred in the North Coast and Gascoyne Coast, with some catches in the West Coast (Figure 45c). The majority of catches were released (81%; Table 5, Figure 45a) and mostly attributed to 'too many' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 45b). Most catches were taken by line fishing (Figure 45d). Golden Trevally were harvested throughout the year, with higher catches in spring (Figure 45e). The kept and released catches of Golden Trevally in 2020/21 were similar to previous surveys (Figure 45a).

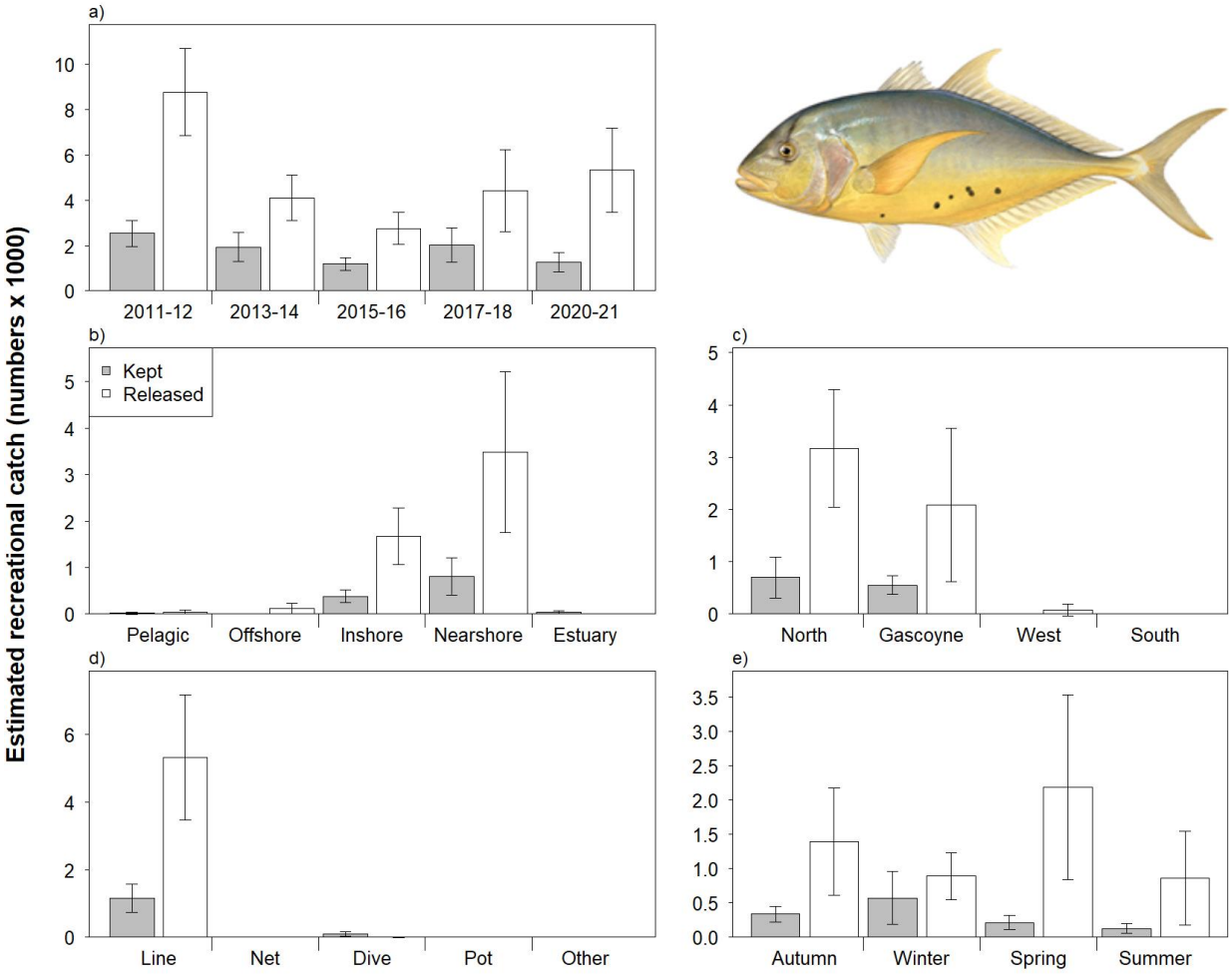


Figure 45. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Golden Trevally in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.20 Silver Trevally (*Pseudocaranx* spp. complex)

Most boat-based recreational catches of Silver Trevally occurred in the West Coast, with some catches in the South Coast (Figure 46c). The majority of catches were kept (37% released; Table 5, Figure 46a) with most releases attributed to ‘too many’ or ‘under size’ (Table 6). Catches were taken predominantly from nearshore habitat (Figure 46b). Silver Trevally were harvested throughout the year, with higher catches in autumn, winter and spring (Figure 46e). Most catches were taken by line fishing (Figure 46d). The kept and released catches of Silver Trevally in 2020/21 were similar to previous surveys (Figure 46a).

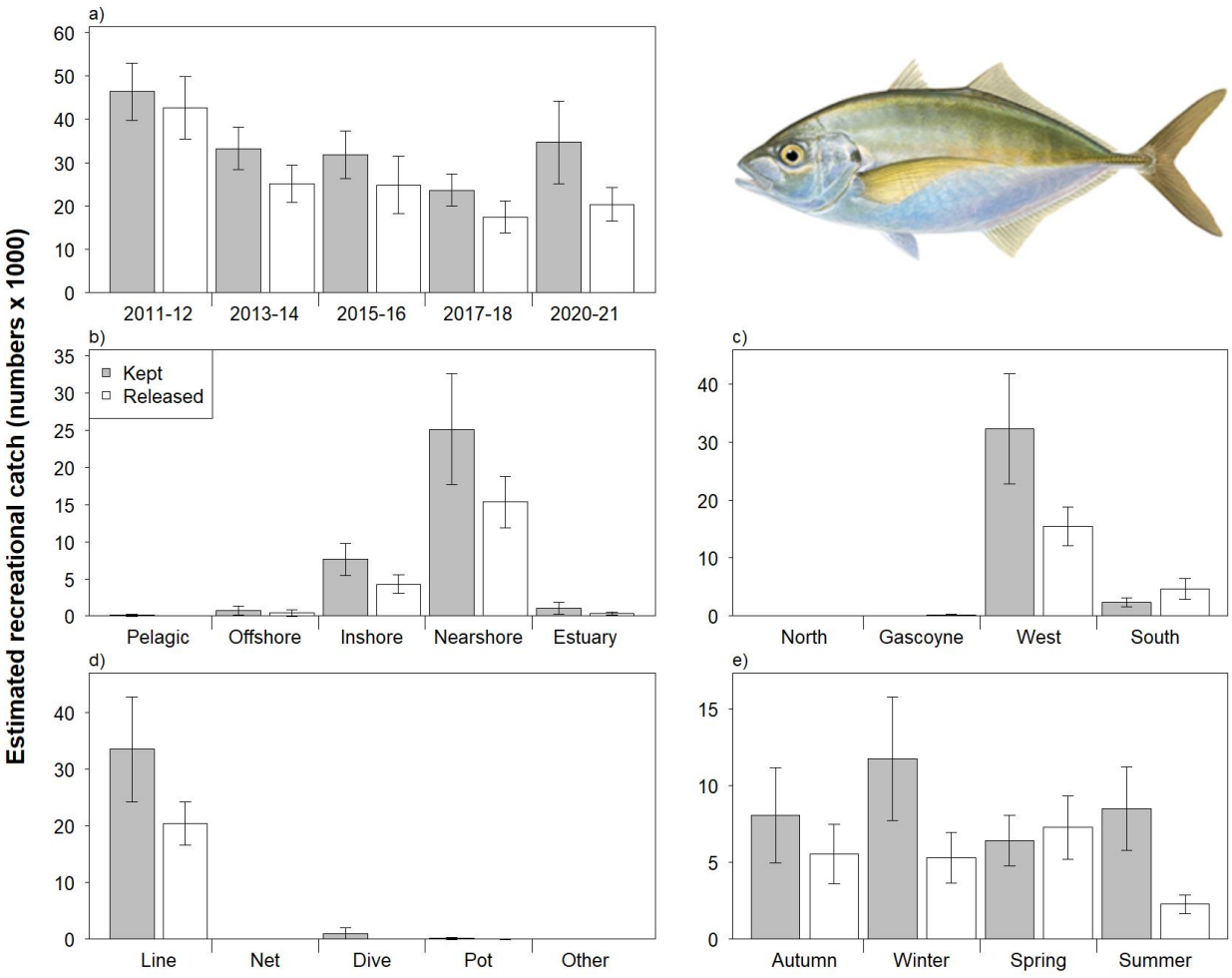


Figure 46. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Silver Trevally in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.21 Brownspotted Wrasse (*Notolabrus parilus*)

Most boat-based recreational catches of Brownspotted Wrasse occurred in the West Coast, with some catches in the South Coast (Figure 47c). The majority of catches were released (89%; Table 5, Figure 47a) and mostly attributed to ‘too many’ or ‘other’ (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 47b). Most catches were taken by line fishing (Figure 47d). Brownspotted Wrasse were harvested throughout the year, with higher catches in spring, summer and autumn (Figure 47e). The kept and released catches of Brownspotted Wrasse in 2020/21 were similar to previous surveys (Figure 47a).

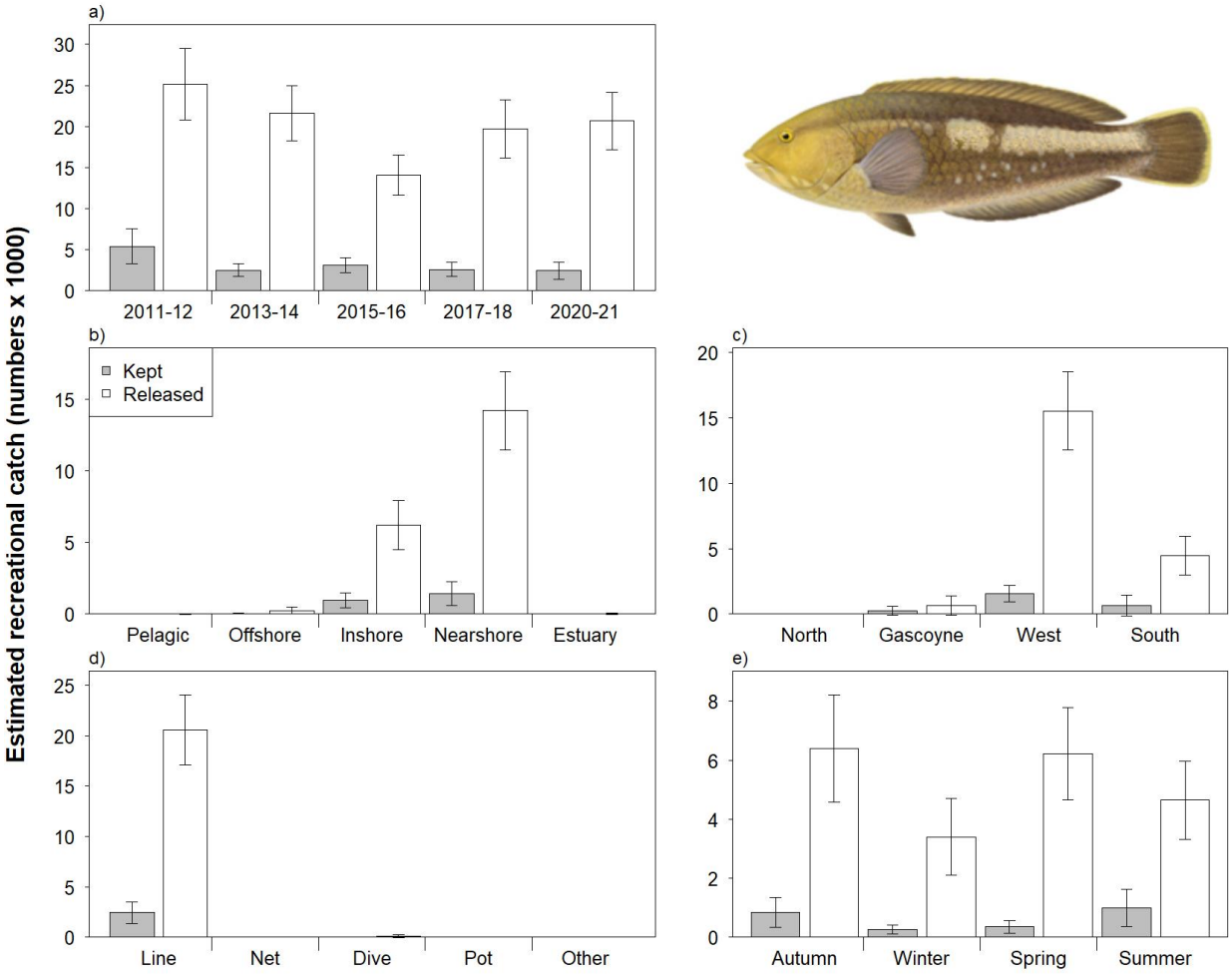


Figure 47. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Brownspotted Wrasse in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.22 Southern Maori Wrasse (*Ophthalmolepis lineolatus*)

Most boat-based recreational catches of Southern Maori Wrasse occurred in the West Coast, with some catches in the South Coast (Figure 48c). The majority of catches were released (82%; Table 5, Figure 48a) and mostly attributed to ‘too many’ or ‘other’ (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 48b). Most catches were taken by line fishing (Figure 48d). Southern Maori Wrasse were harvested throughout the year, with higher catches in spring, summer and autumn (Figure 48e). The kept and released catches of Southern Maori Wrasse in 2020/21 were similar to previous surveys (Figure 48a).

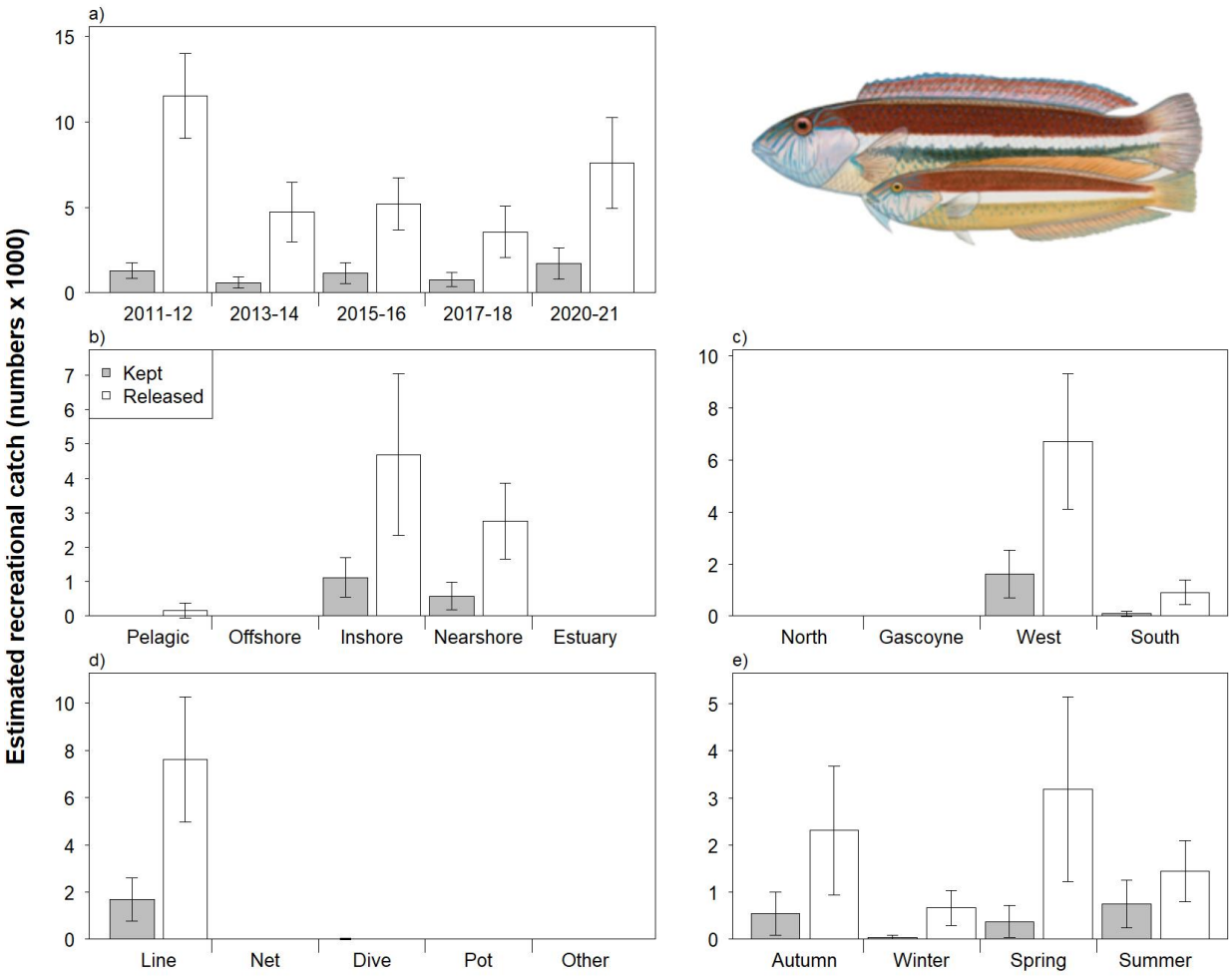


Figure 48. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Southern Maori Wrasse in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.23 Western King Wrasse (*Coris auricularis*)

Most boat-based recreational catches of Western King Wrasse occurred in the West Coast, with some catches in the South Coast (Figure 49c). The majority of catches were released (80%; Table 5, Figure 49a) and mostly attributed to ‘too many’ or ‘other’ (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 49b). Most catches were taken by line fishing (Figure 49d). Western King Wrasse were harvested throughout the year, with higher catches in spring, summer and autumn (Figure 49e). The kept and released catches of Western King Wrasse in 2020/21 were similar to previous surveys (Figure 49a).

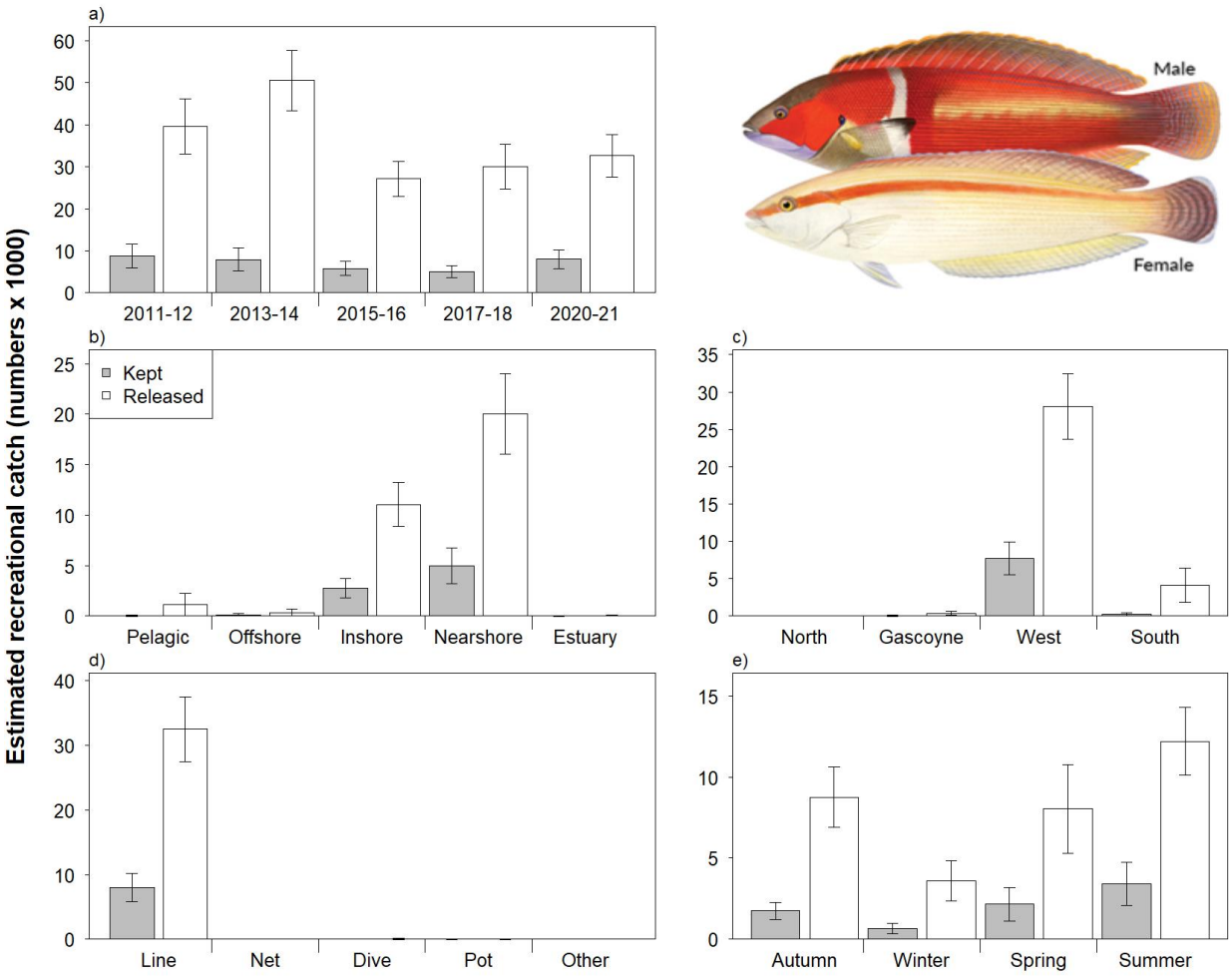


Figure 49. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Western King Wrasse in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.24 King George Whiting (*Sillaginodes punctatus*)

Whiting species, including King George Whiting, are indicator species in the Gascoyne Coast, West Coast and South Coast bioregions. Boat-based recreational catches of King George Whiting occurred in the West Coast and South Coast (Figure 50c). The majority of catches were kept (27% released; Table 5, Figure 50a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore and estuarine habitats (Figure 50b). Most catches were taken by line fishing (Figure 50d). King George Whiting were harvested throughout the year, with higher catches in spring and summer (Figure 50e). The kept and released catches of King George Whiting in 2020/21 were similar to previous surveys (Figure 50a).

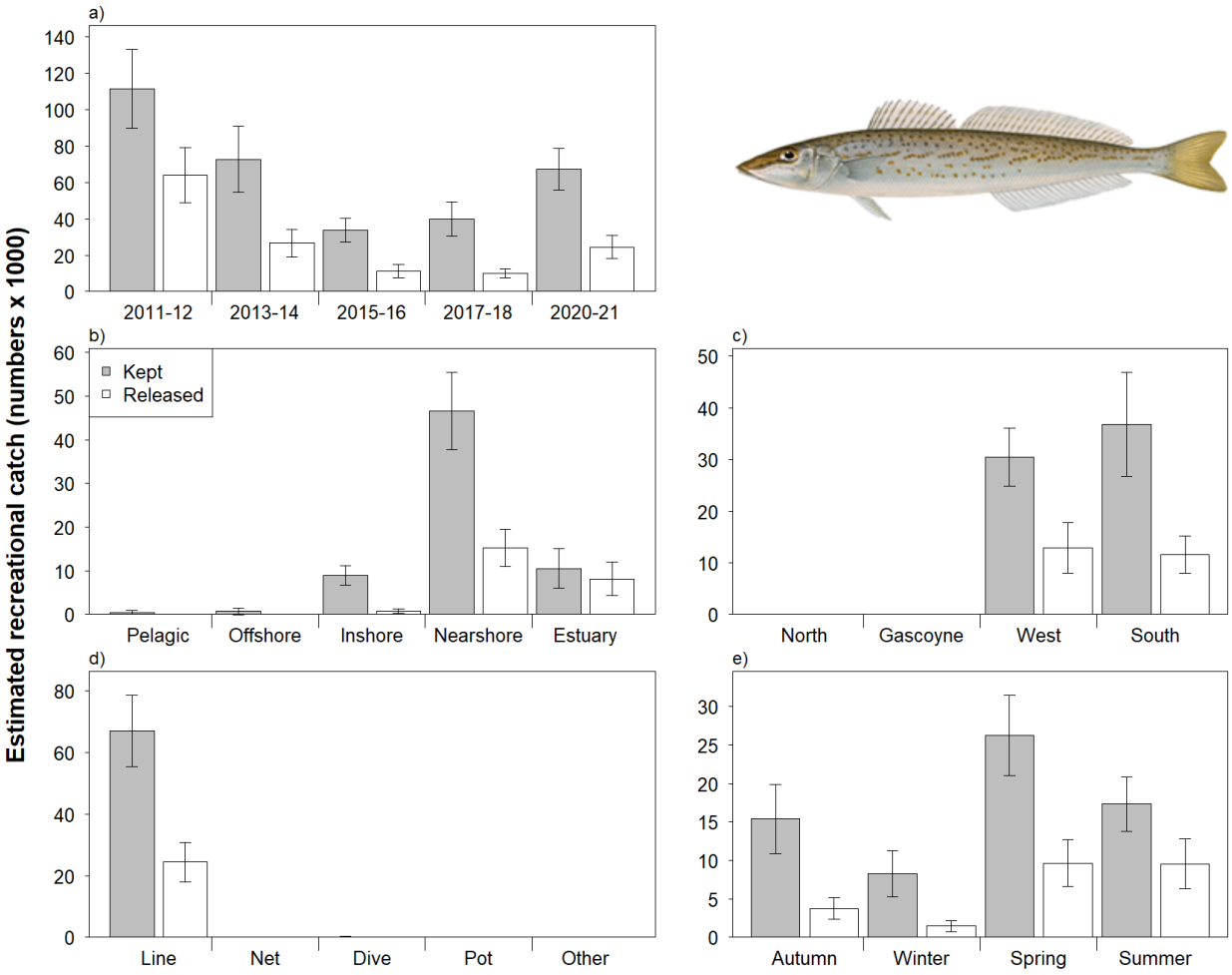


Figure 50. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of King George Whiting in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.25 School Whiting (*Sillago bassensis*, *vittata* and *schomburgkii*)

Whiting species, including School and Yellowfin Whiting, are indicator species in the Gascoyne Coast, West Coast and South Coast bioregions. School Whiting includes Southern School Whiting (*Sillago bassensis*), Western School Whiting (*S. vittata*) and Yellowfin Whiting (*S. schomburgkii*). Most boat-based recreational catches of School Whiting occurred in the West Coast, with some catches in the South Coast (Figure 51c). The majority of catches were kept (18% released; Table 5, Figure 51a) with most releases attributed to 'too small' or 'under size' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 51b). Most catches were taken by line fishing (Figure 51d). School Whiting were harvested throughout the year, with higher catches in spring, summer and autumn (Figure 51e). The kept and released catches of School Whiting in 2020/21 were similar to previous surveys (Figure 51a).

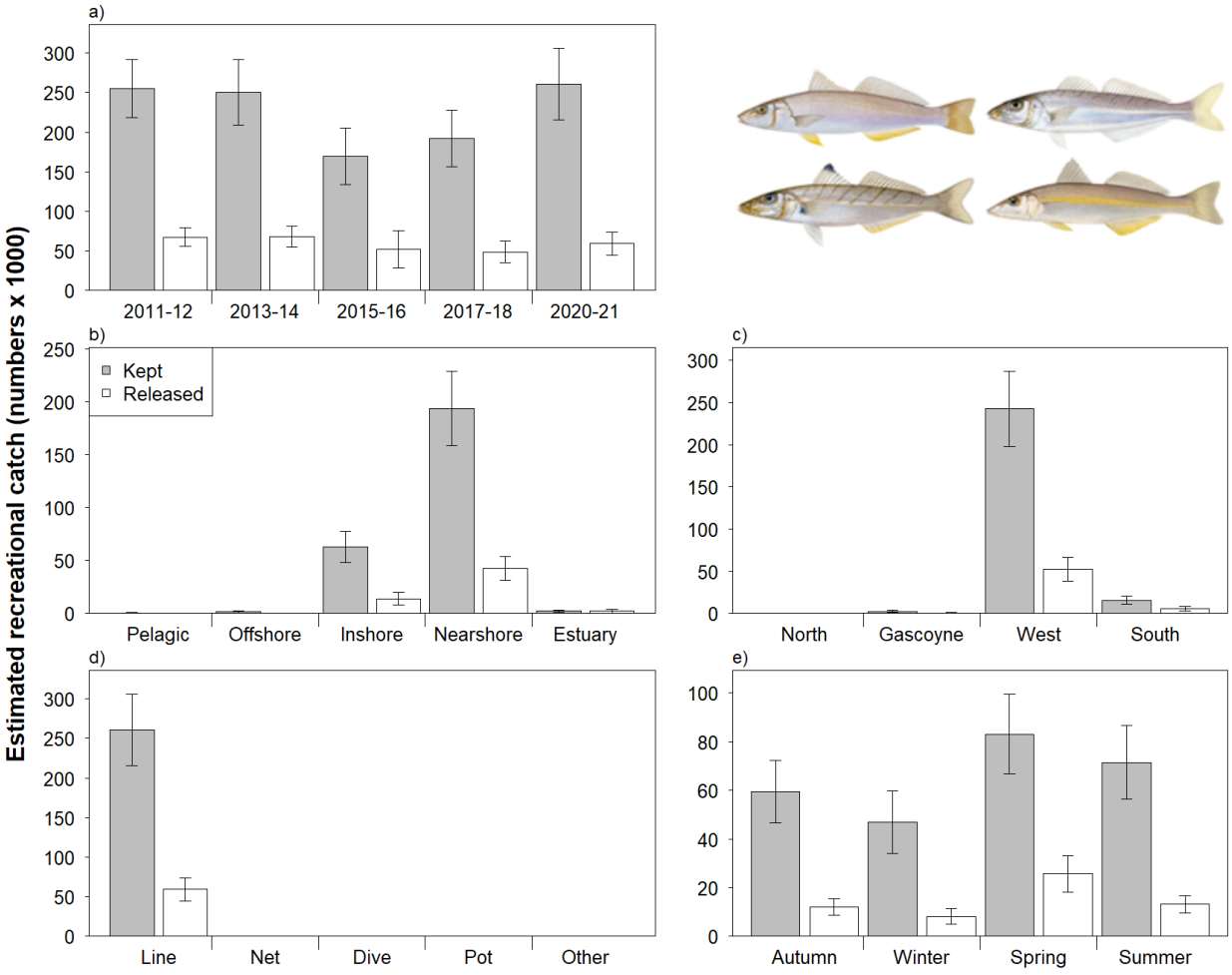


Figure 51. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of School Whiting in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.2.26 Western Trumpeter Whiting (*Sillago burrus*)

Most boat-based recreational catches of Western Trumpeter Whiting occurred in the West Coast, with some catches in the Gascoyne Coast (Figure 52c). The majority of catches were released (70%; Table 5, Figure 52a) with most releases attributed to 'too many' (Table 6). Catches were taken predominantly from nearshore habitat (Figure 52b). All catches were taken by line fishing (Figure 52d). Western Trumpeter Whiting were harvested throughout the year, with higher catches in spring, summer and autumn (Figure 52e). The kept and released catches of Western Trumpeter Whiting in 2020/21 were similar to previous surveys (Figure 52a).

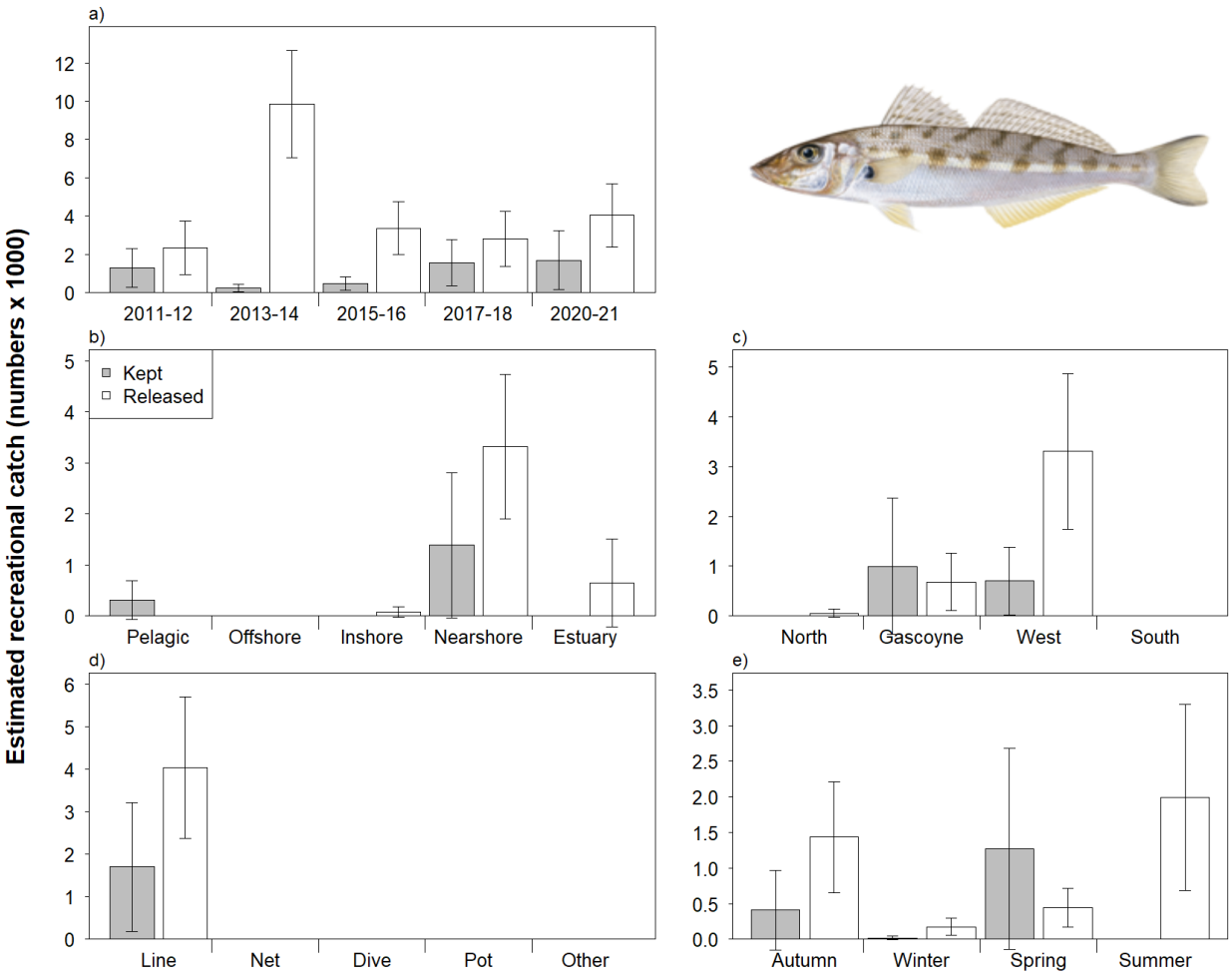


Figure 52. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Western Trumpeter Whiting in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3 Inshore Demersal

6.3.1 Pink Snapper (*Chrysophrys auratus*)

Pink Snapper is an indicator species in the Gascoyne Coast, West Coast and South Coast bioregions. Most boat-based recreational catches occurred in the West Coast, followed by the Gascoyne Coast and South Coast (Figure 53c). The majority of catches were released (76%; Table 5, Figure 53a) and mostly attributed to 'under size' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 53b). All catches were taken by line fishing (Figure 53d). Pink Snapper were harvested throughout the year, with higher catches in autumn, winter and spring (Figure 53e). The kept and released catches of Pink Snapper in 2020/21 were similar to previous surveys (Figure 53a).

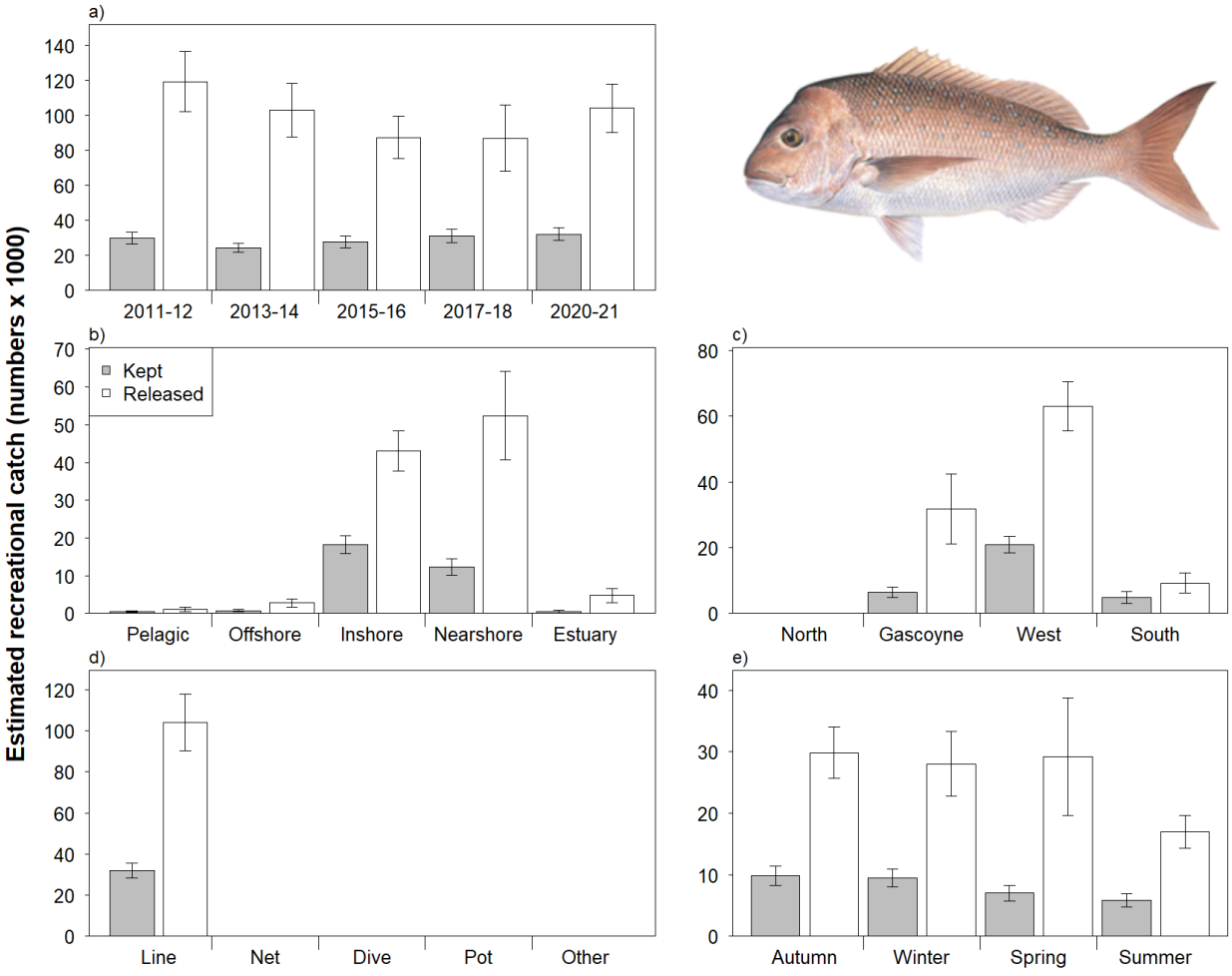


Figure 53. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Pink Snapper in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.2 Blackspotted Rockcod (*Epinephelus malabaricus*)

Most boat-based recreational catches of Blackspotted Rockcod occurred in the North Coast, followed by the Gascoyne Coast and West Coast (Figure 54c). The majority of catches were released (68%; Table 5, Figure 54a) and mostly attributed to 'under size' or 'too many' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 54b). Most catches were taken by line fishing (Figure 54d). Blackspotted Rockcod were harvested throughout the year, with higher catches in autumn (Figure 54e). The kept and released catches of Blackspotted Rockcod in 2020/21 were similar to previous surveys (Figure 54a).

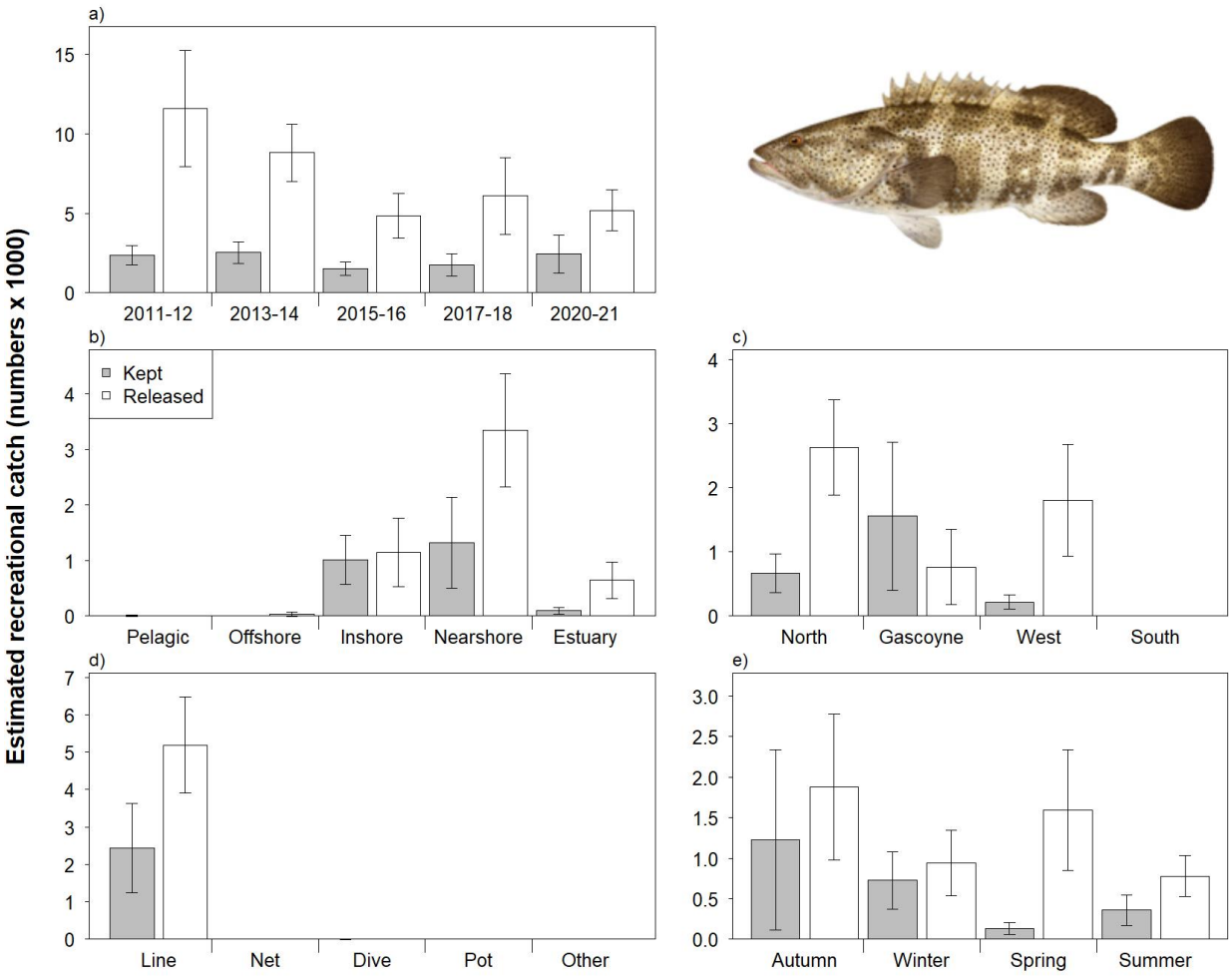


Figure 54. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Blackspotted Rockcod in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.3 Breaksea Cod (*Epinephelides armatus*)

Most boat-based recreational catches of Breaksea Cod occurred in the West Coast, followed by the South Coast (Figure 55c). The majority of catches were kept (37% released; Table 5, Figure 55a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 55b). Most catches were taken by line fishing (Figure 55d). Breaksea Cod were harvested throughout the year, with higher catches in summer and autumn (Figure 55e). The kept and released catches of Breaksea Cod in 2020/21 were similar to previous surveys (Figure 55a).

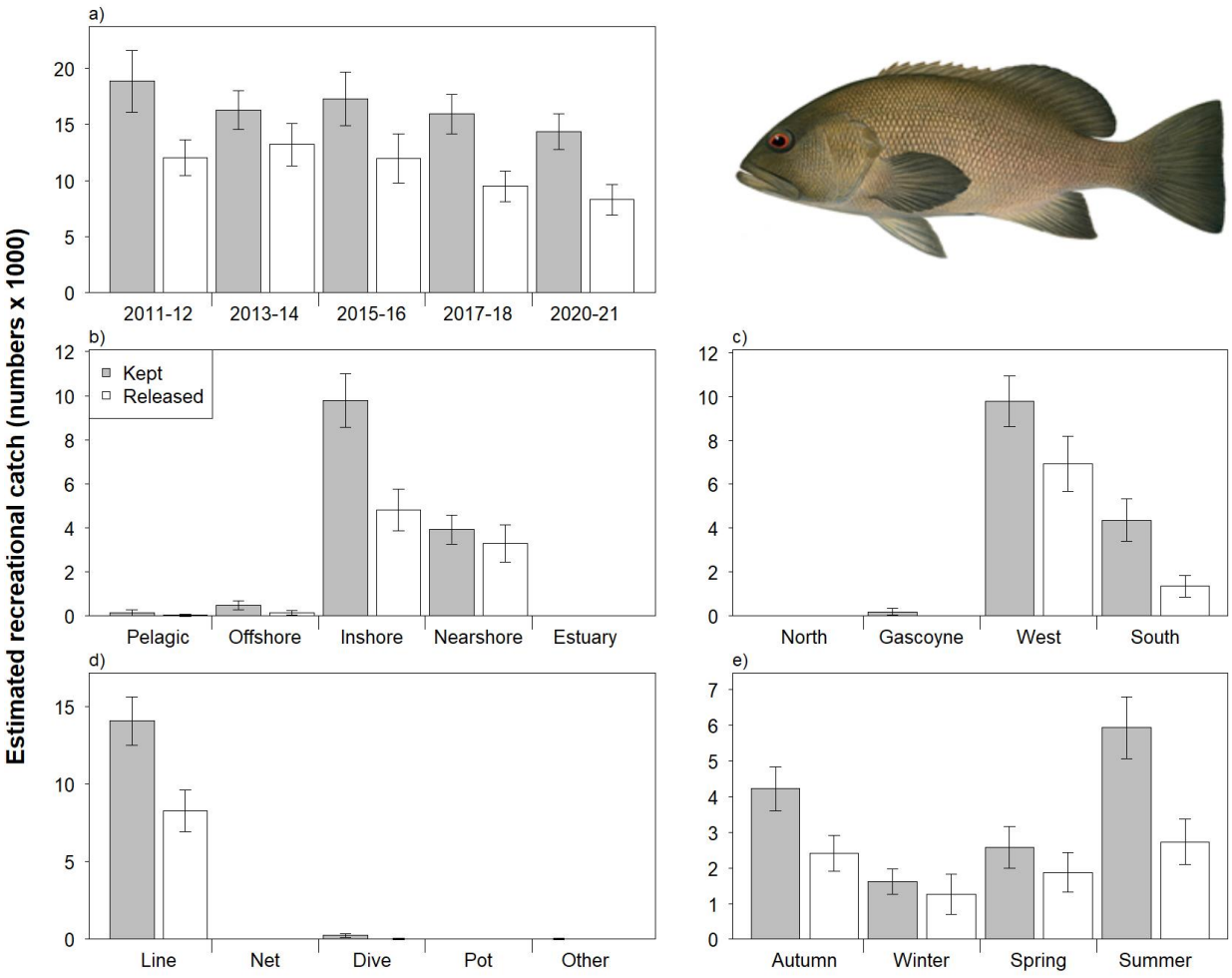


Figure 55. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Breaksea Cod in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.4 Goldspotted Rockcod (*Epinephelus coioides*)

Most boat-based recreational catches of Goldspotted Rockcod occurred in the North Coast, followed by the Gascoyne Coast and West Coast (Figure 56c). The majority of catches were released (68%; Table 4, Figure 56a) with most releases attributed to 'under size' or 'too many' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 56b). Most catches were taken by line fishing (Figure 56d). Goldspotted Rockcod were harvested throughout the year, with higher catches in autumn, winter and spring (Figure 56e). The kept and released catches Goldspotted Rockcod in 2020/21 were similar to previous surveys (Figure 56a).

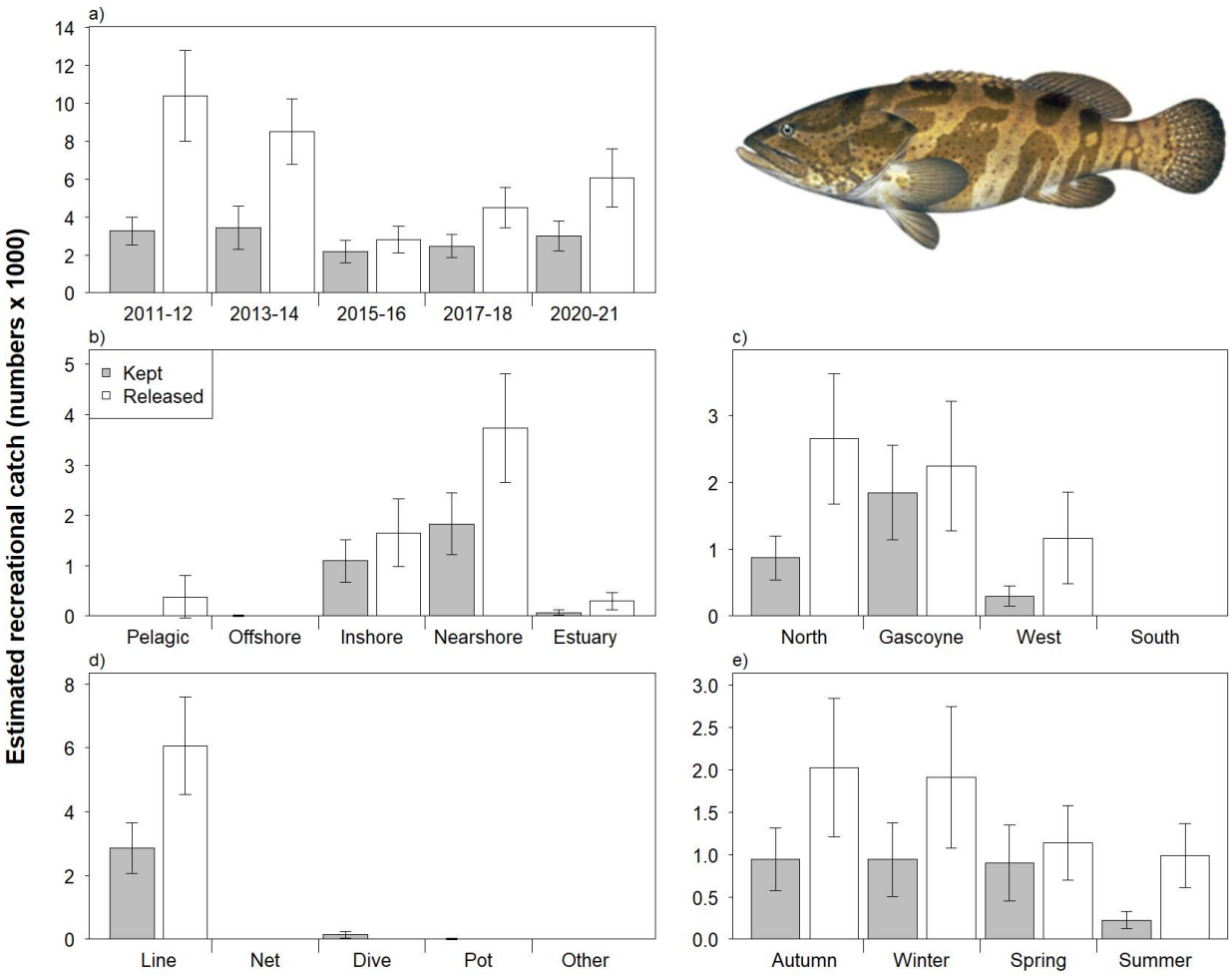


Figure 56. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Goldspotted Rockcod in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.5 Harlequin Fish (*Othos dentex*)

Most boat-based recreational catches of Harlequin Fish occurred in the West Coast, with some catches in the South Coast (Figure 57c). The majority of catches were kept (18% released; Table 4, Figure 57a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 57b). Most catches were taken by line fishing with some fishing from diving (Figure 57d). Harlequin Fish were harvested throughout the year, with higher catches in spring, summer and autumn (Figure 57e). The kept and released catches Harlequin Fish in 2020/21 were similar to previous surveys (Figure 57a).

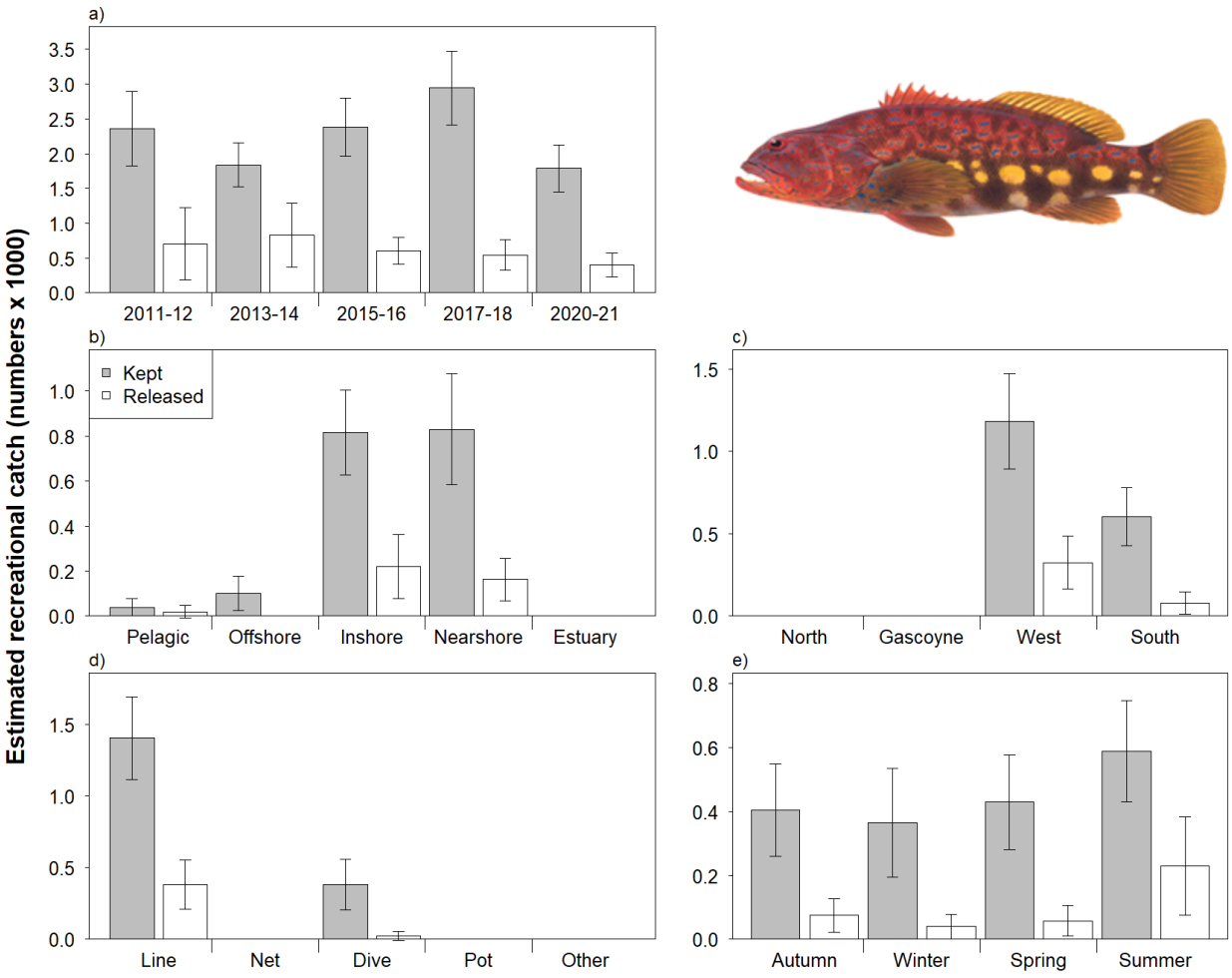


Figure 57. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Harlequin Fish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.6 Rankin Cod (*Epinephelus multinotatus*)

Rankin Cod is an indicator species in the North Coast bioregion. Most boat-based recreational catches of Rankin Cod occurred in the North Coast and Gascoyne Coast, with some catches in the West Coast (Figure 58c). The majority of catches were kept (29% released; Table 5, Figure 58a) with most releases attributed to 'under size' or 'too many' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 58b). Most catches were taken by line fishing (Figure 58d). Rankin Cod were harvested throughout the year, with higher catches in autumn and winter (Figure 58e). The kept and released catches of Rankin Cod in 2020/21 were similar to previous surveys (Figure 58a).

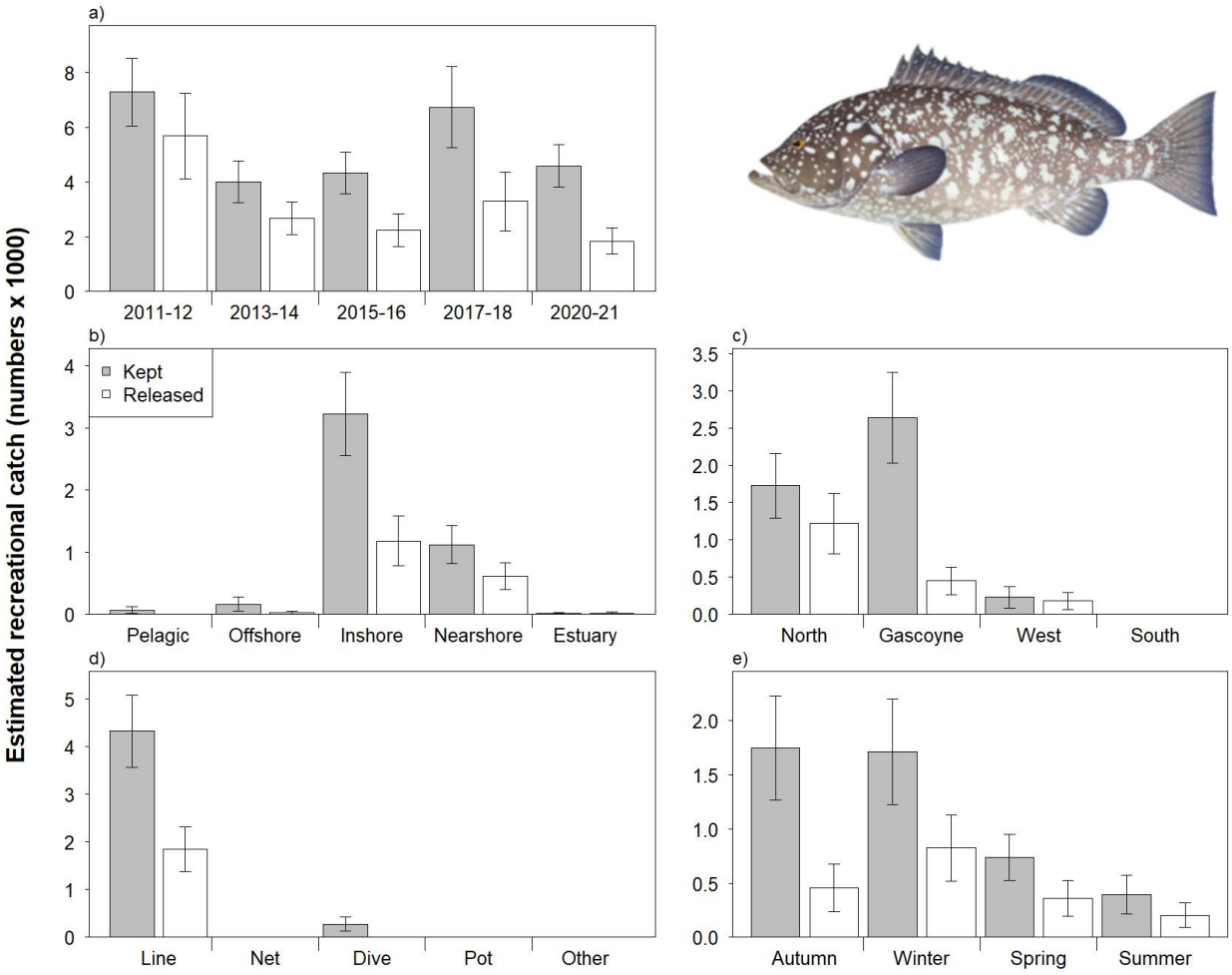


Figure 58. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Rankin Cod in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.7 Coral Trout (*Plectropomus maculatus*, *P. leopardus* and *Variola louti*)

Barcheek Coral Trout is an indicator in the North Coast bioregion. Reporting for this species includes catches for Barcheek Coral Trout (*Plectropomus maculatus*), Common Coral Trout (*Plectropomus leopardus*) and Yellowedge Coronation Trout (*Variola louti*). Most boat-based recreational catches of Barcheek Coral Trout occurred in the North Coast, with some catches in the Gascoyne Coast and West Coast (Figure 59c). The majority of catches were kept (43% released; Table 5, Figure 59a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 59b). Most catches were taken by line fishing, with some fishing from diving (Figure 59d). Coral Trout were harvested throughout the year, with higher catches in autumn and winter (Figure 59e). The kept and released catches of Coral Trout in 2020/21 were similar to previous surveys (Figure 59a).

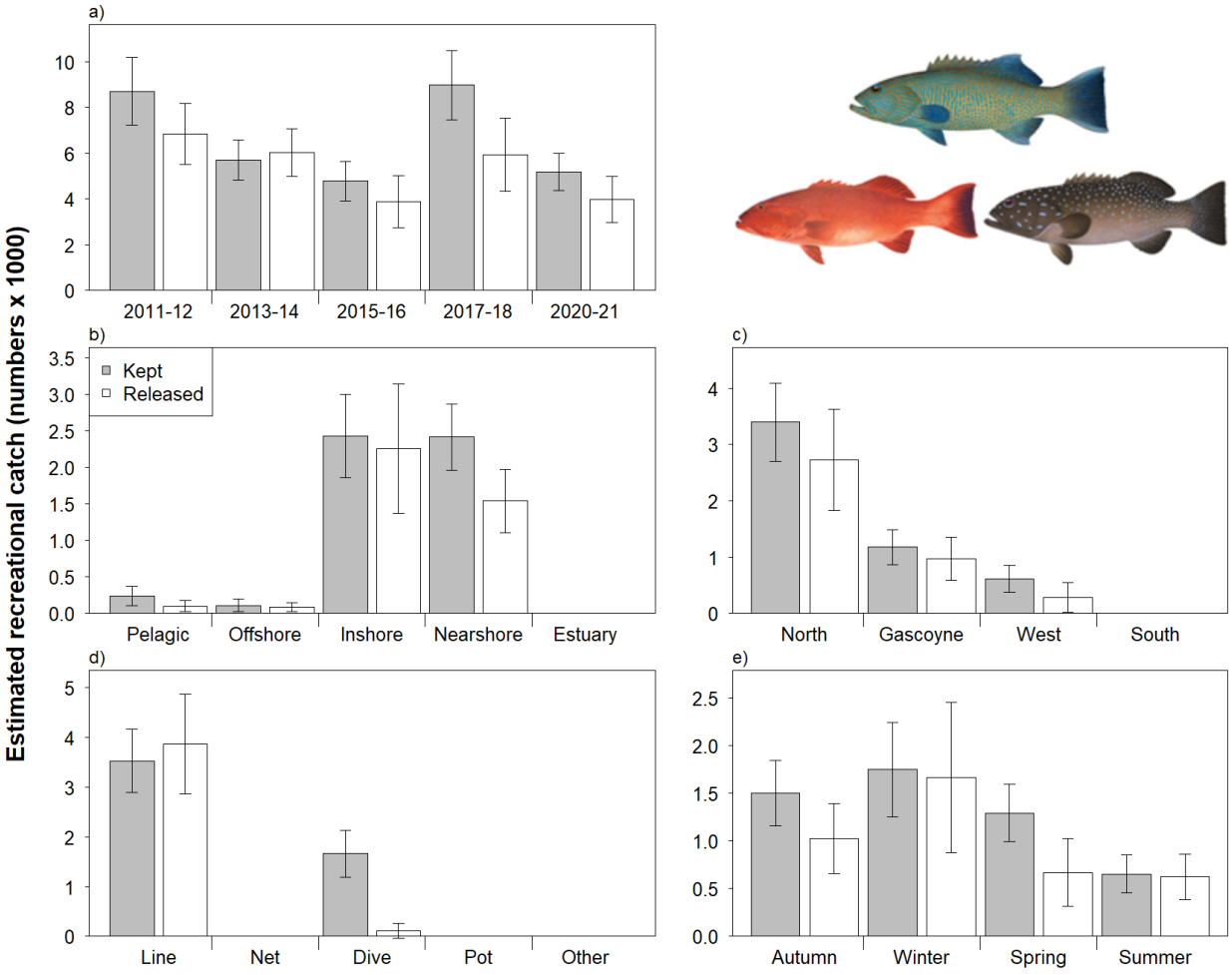


Figure 59. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Barcheek Coral Trout in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.8 Bluespotted Emperor (*Lethrinus punctulatus*)

Bluespotted Emperor is an indicator species in the North Coast bioregion. Most boat-based recreational catches of Bluespotted Emperor occurred in the North Coast and Gascoyne Coast (Figure 60c). The majority of catches were released (74%; Table 5, Figure 60a). Catches were taken from nearshore and inshore demersal habitats (Figure 60b). All catches were taken by line fishing (Figure 60d). Bluespotted Emperor were harvested throughout the year, with higher catches in spring (Figure 60e). The kept and released catches of Bluespotted Emperor in 2020/21 were similar to previous surveys, however, catches for this species have high uncertainty in some years (Figure 60a).

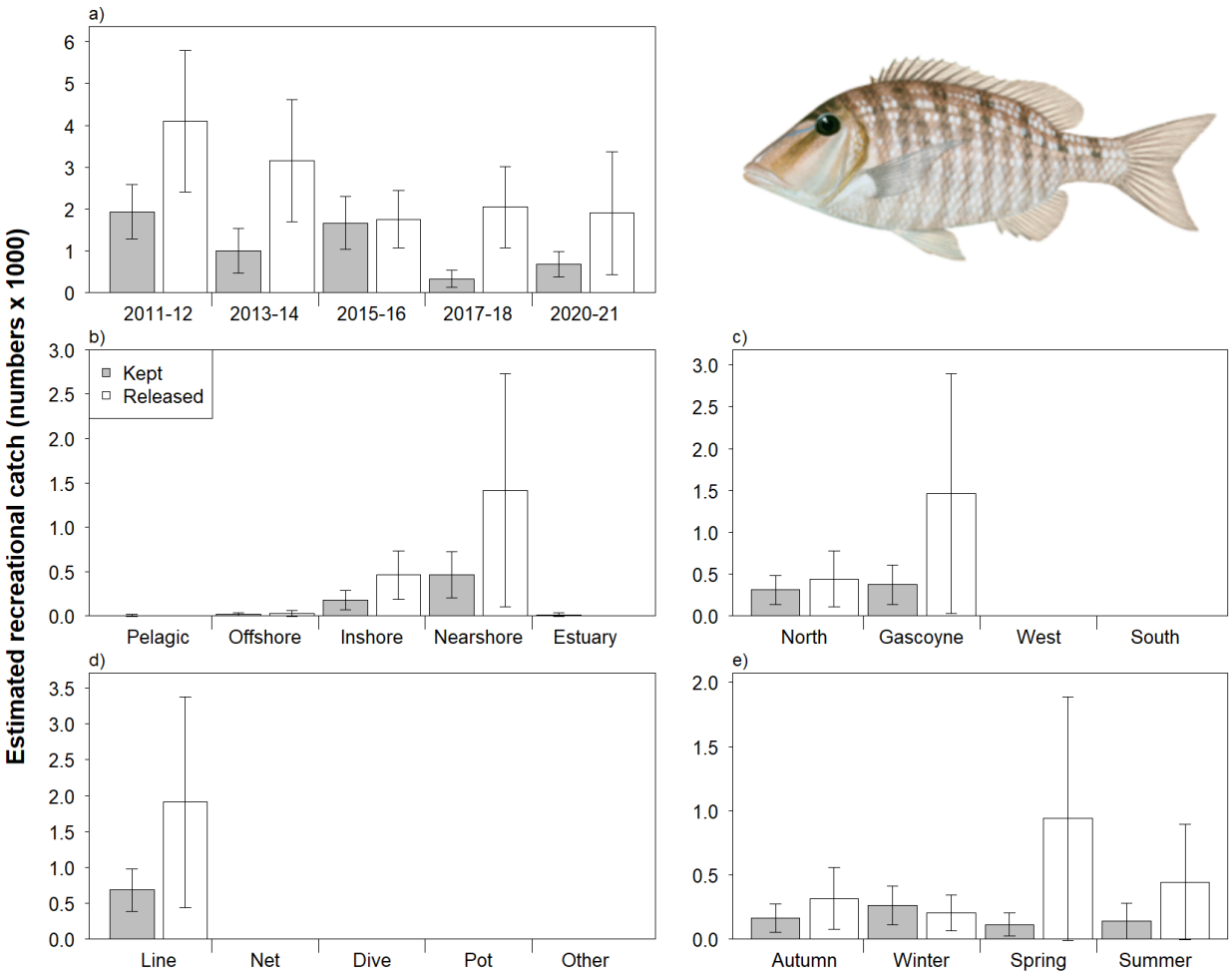


Figure 60. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Bluespotted Emperor in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.9 Grass Emperor (*Lethrinus laticaudis*)

Most boat-based recreational catches of Grass Emperor occurred in the Gascoyne Coast, with some catches in the North Coast (Figure 61c). The majority of catches were released (66%; Table 5, Figure 61a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 61b). Most catches were taken by line fishing (Figure 61d). Grass Emperor were harvested throughout the year, with higher catches in autumn and winter (Figure 61e). The kept and released catches of Grass Emperor in 2020/21 were similar to previous surveys (Figure 61a).

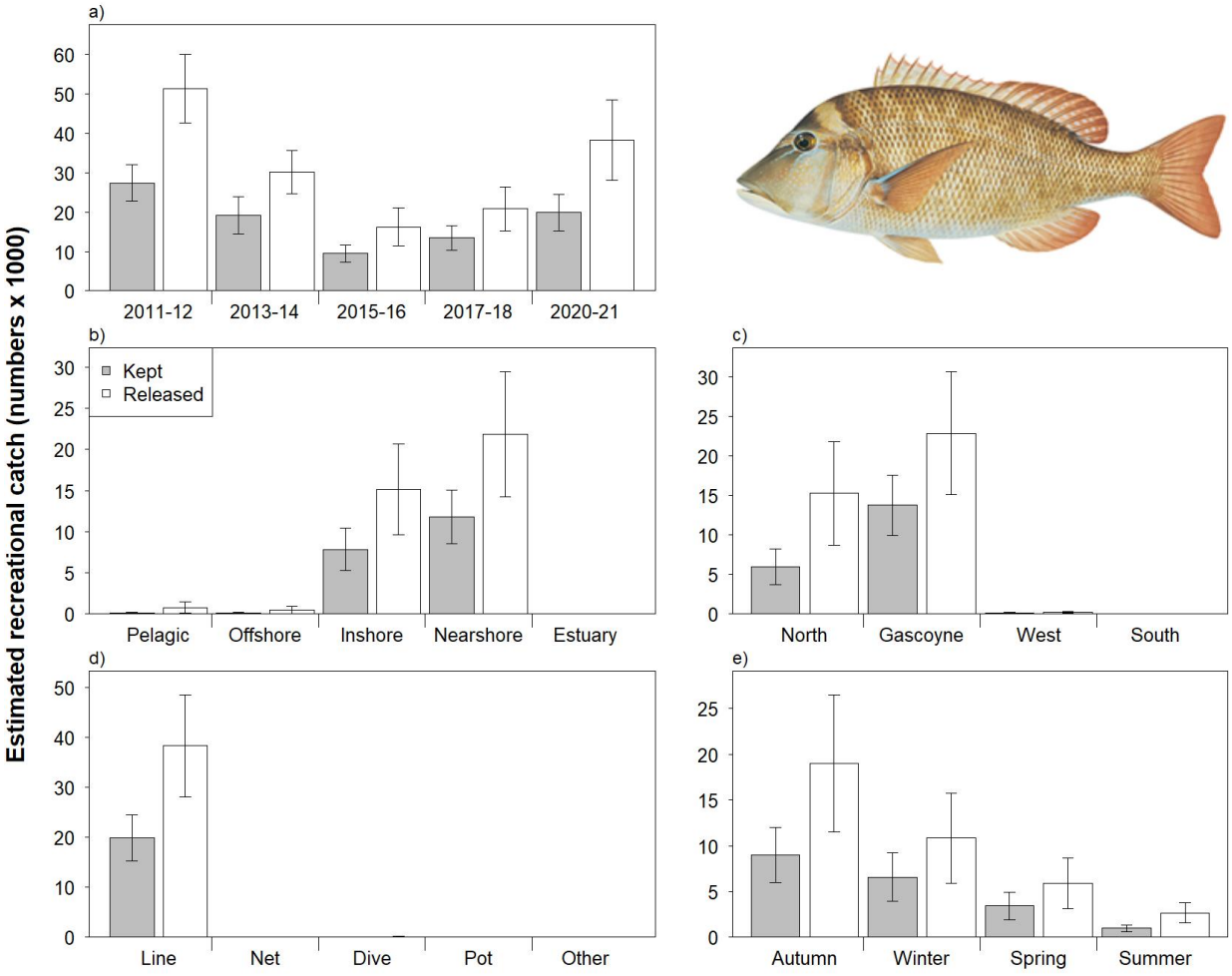


Figure 61. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Grass Emperor in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.10 Redthroat Emperor (*Lethrinus miniatus*)

Redthroat Emperor is an indicator in the West Coast bioregion. Most boat-based recreational catches of Redthroat Emperor occurred in the Gascoyne Coast, with some catches in the North Coast and West Coast (Figure 62c). The majority of catches were released (60%; Table 5, Figure 62a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from inshore demersal and nearshore (Figure 62b). Most catches were taken by line fishing (Figure 62d). Redthroat Emperor were harvested throughout the year, with higher catches in autumn, winter and spring (Figure 62e). The kept and released catches of Redthroat Emperor in 2020/21 were similar to previous surveys (Figure 62a).

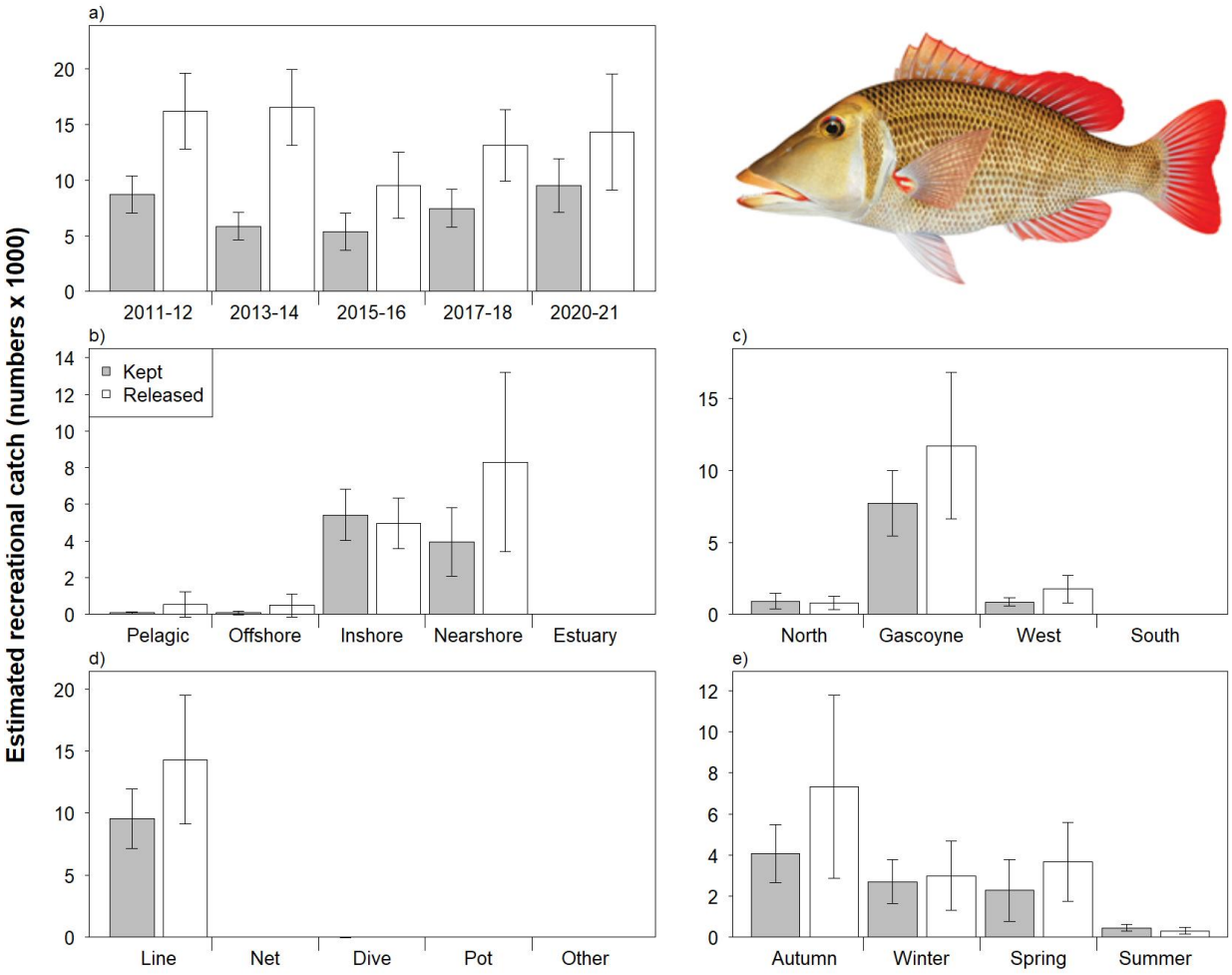


Figure 62. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Redthroat Emperor in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.11 Spangled Emperor (*Lethrinus nebulosus*)

Spangled Emperor is an indicator species in the Gascoyne Coast bioregion. Most boat-based recreational catches of Spangled Emperor occurred in the Gascoyne Coast, with some catches in the North Coast and West Coast (Figure 63c). The majority of catches were released (60%; Table 5, Figure 63a) and mostly attributed to 'under size' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 63b). Most catches were taken by line fishing (Figure 63d). Spangled Emperor were harvested throughout the year, with higher catches in autumn and winter (Figure 63e). The kept and released catches of Spangled Emperor in 2020/21 were similar to previous surveys (Figure 63a).

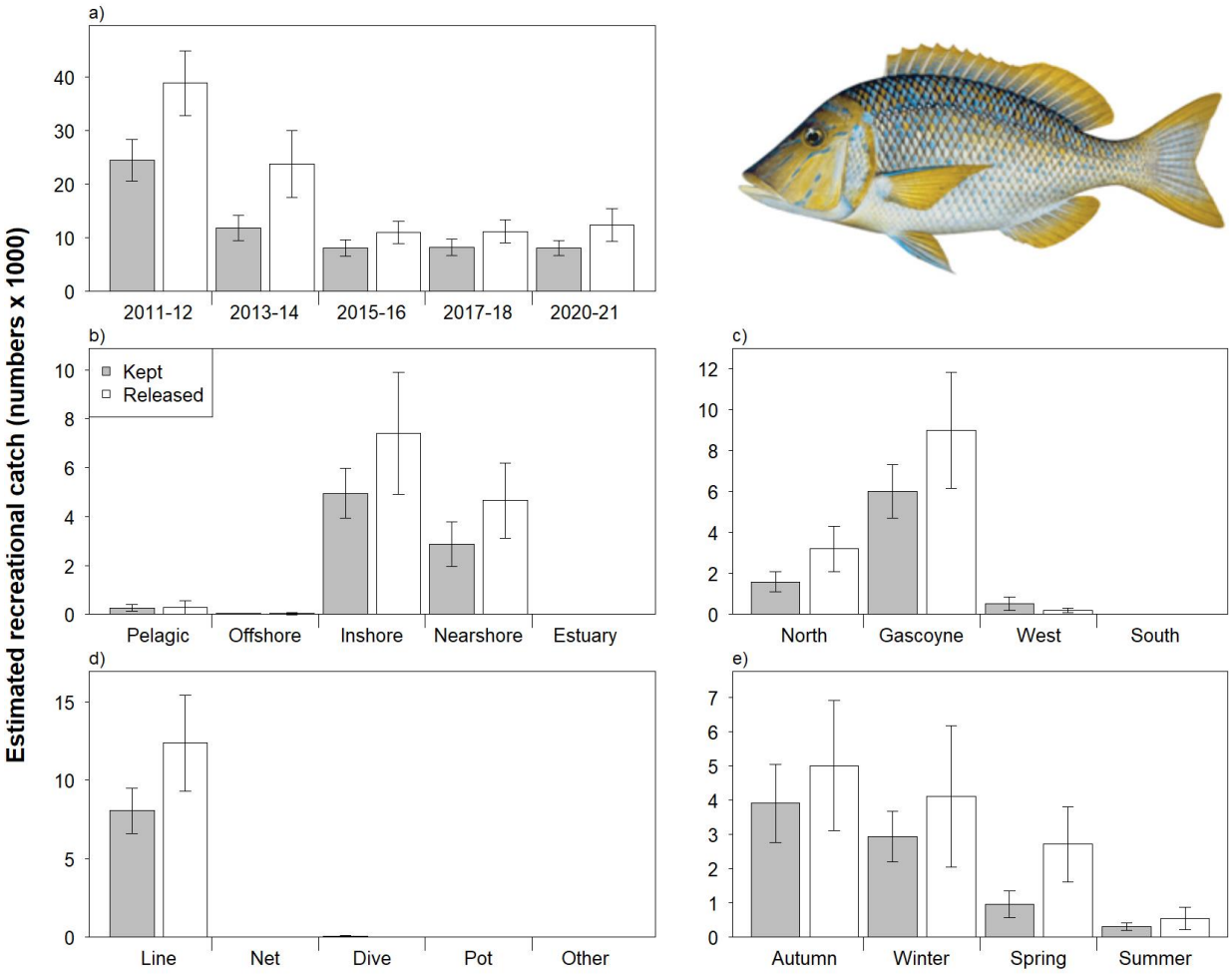


Figure 63. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Spangled Emperor in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.12 Painted Sweetlips (*Diagramma labiosum*)

Boat-based recreational catches of Painted Sweetlips occurred in the Gascoyne Coast, North Coast and West Coast (Figure 64c). Similar proportions of the boat-based recreational catch were kept and released (44% released; Table 5, Figure 64a) with most releases attributed to 'too many' or 'over limit' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 64b). Most catches were taken by line fishing (Figure 64d). Painted Sweetlips were harvested throughout the year, with higher catches in autumn and winter (Figure 64e). The kept and released catches of Painted Sweetlips in 2020/21 were similar to previous surveys (Figure 64a).

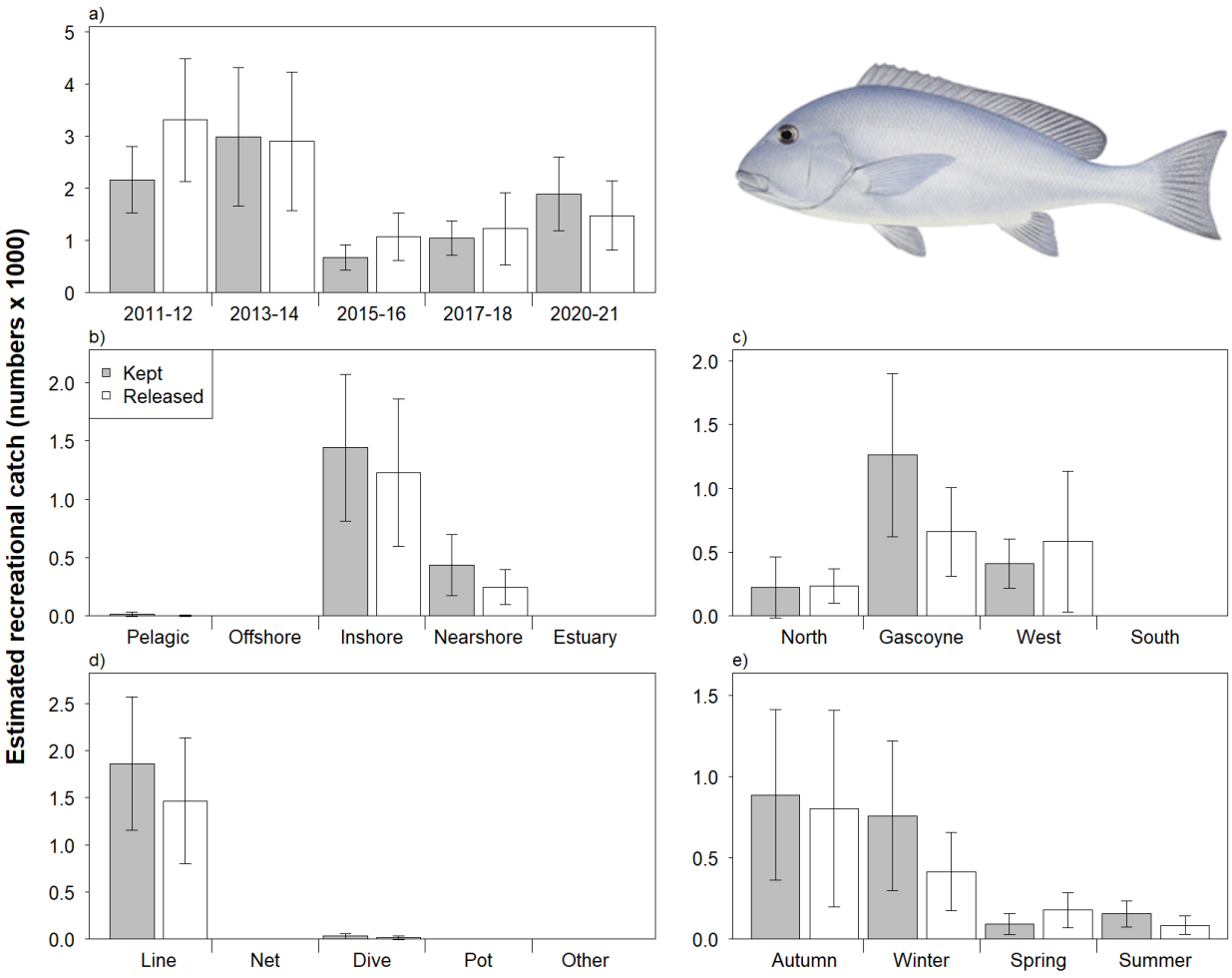


Figure 64. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Painted Sweetlips in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.13 Goldband Snapper (*Pristipomoides multidens*, *filamentosus* and *typus*)

Goldband Snapper is an indicator species in the North Coast and Gascoyne Coast bioregions. Reporting for this species includes Goldband Snapper (*Pristipomoides multidens*), Rosy Snapper (*Pristipomoides filamentosus*) and Sharptooth Snapper (*Pristipomoides typus*). Most boat-based recreational catches of Goldband Snapper occurred in the Gascoyne Coast, with some catches in the North Coast (Figure 65c). The majority of catches were kept (13% released; Table 5, Figure 65a) with most releases attributed to 'over limit' (Table 6). Catches were taken predominantly from inshore demersal habitat (Figure 65b). Most catches were taken by line fishing (Figure 65d). Goldband Snapper were harvested throughout the year, with higher catches in autumn, winter and spring (Figure 65e). The kept and released catches of Goldband Snapper in 2020/21 were similar to previous surveys (Figure 65a).

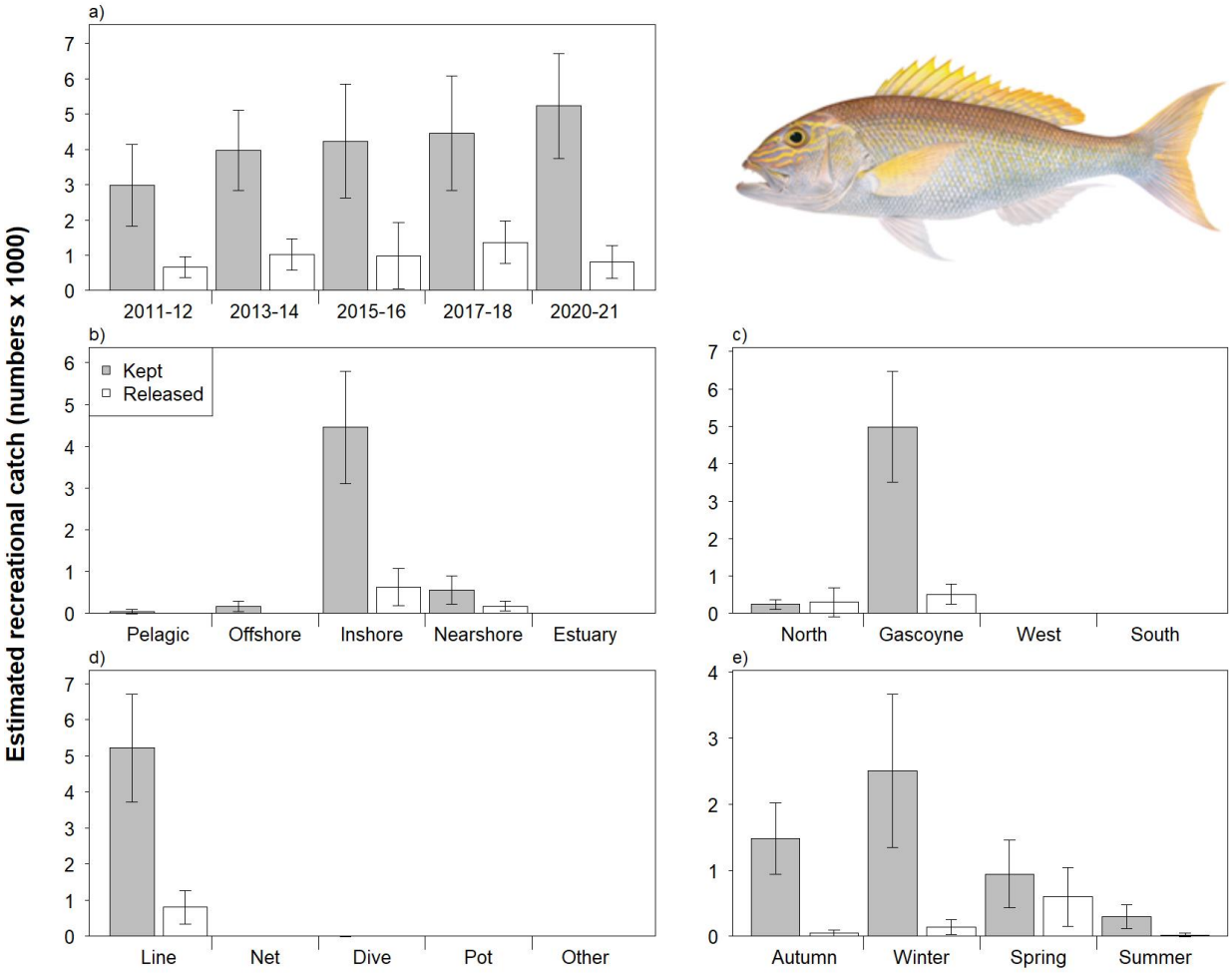


Figure 65. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Goldband Snapper in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.14 Sergeant Baker (*Aulopus purpurissatus*)

Most boat-based recreational catches of Sergeant Baker occurred in the West Coast, with some catches in the South Coast (Figure 66c). The majority of catches were released (73%; Table 5, Figure 66a) and mostly attributed to 'too many' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 66b). All catches were taken by line fishing (Figure 66d). Sergeant Baker were harvested throughout the year, with higher catches in summer and autumn (Figure 66e). The kept and released catches of Sergeant Baker in 2020/21 were similar to previous surveys (Figure 66a).

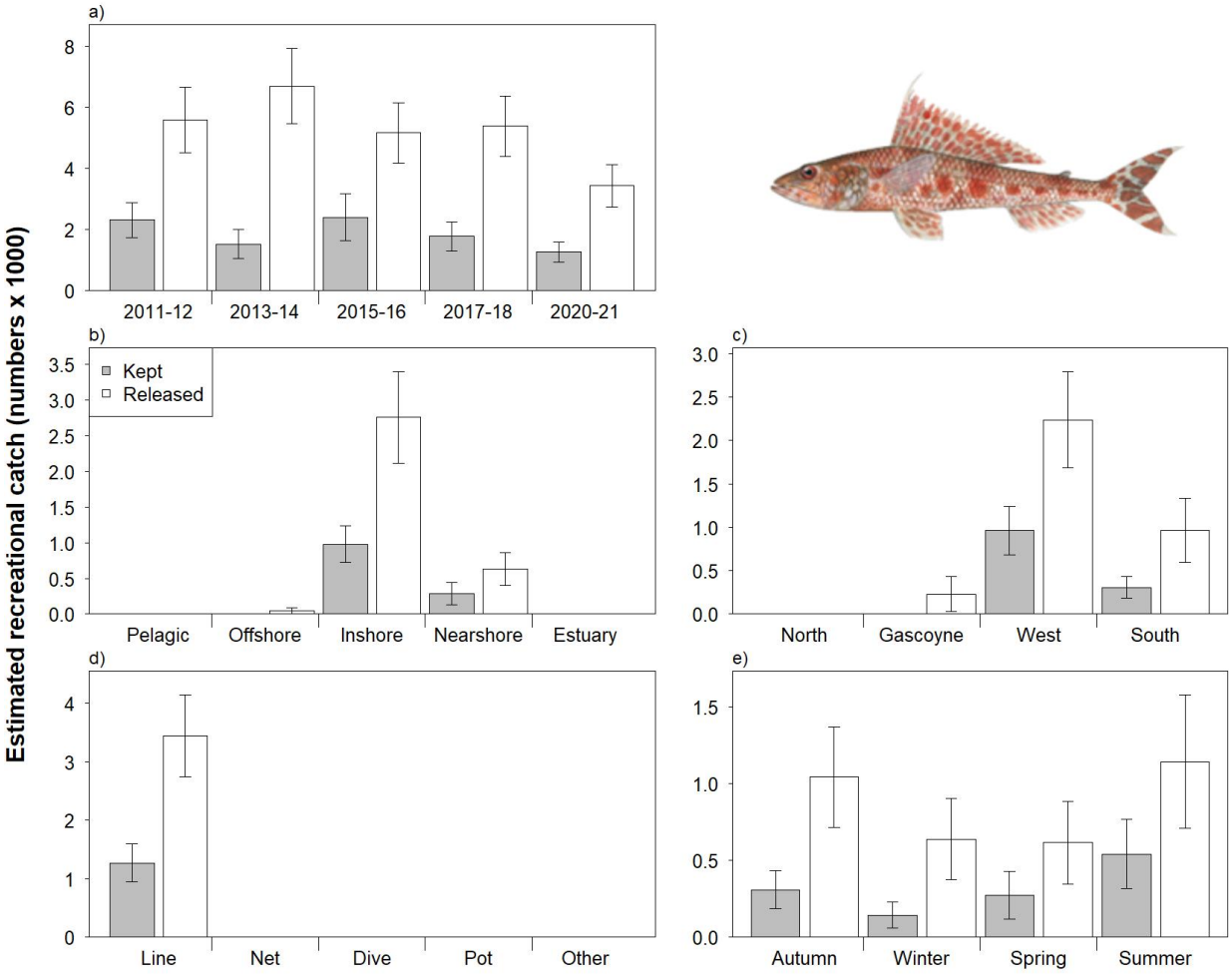


Figure 66. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Sergeant Baker in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.15 Blue Morwong (*Nemadactylus valenciennesi*)

Blue Morwong is an indicator species in the South Coast bioregion. Most boat-based recreational catches of Blue Morwong occurred in the South Coast, followed by the West Coast (Figure 67c). The majority of catches were kept (23% released; Table 5, Figure 67a) with most releases attributed to 'under size' or 'too many' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 67b). Most catches were taken by line fishing, with some fishing from diving (Figure 67d). Blue Morwong were harvested throughout the year, with higher catches spring and summer (Figure 67e). The kept and released catches of Blue Morwong were similar in 2020/21 compared with previous surveys (Figure 67a).

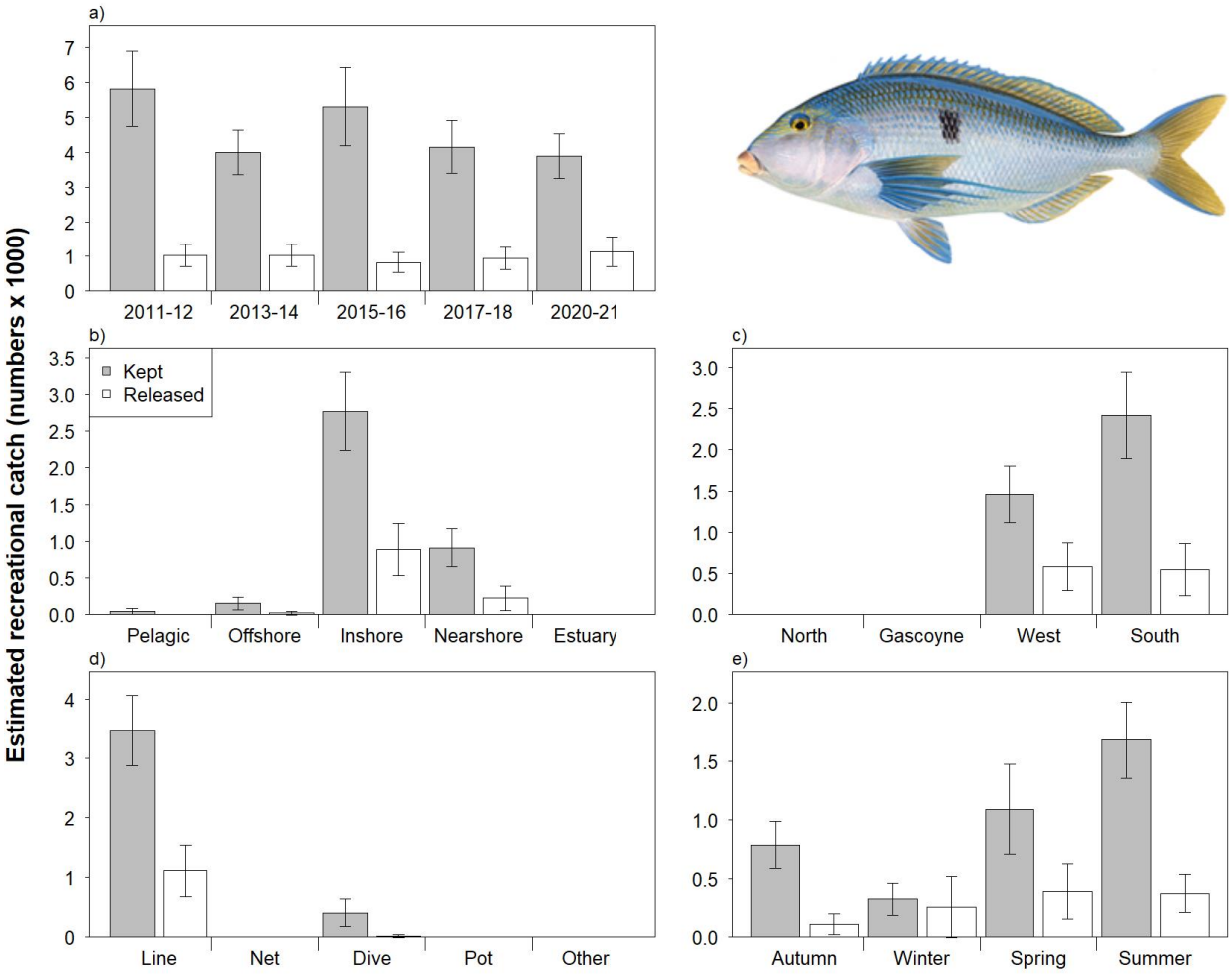


Figure 67. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Blue Morwong in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.16 Northern Pearl Perch (Glaucosoma buergeri)

Most boat-based recreational catches of Northern Pearl Perch occurred in the Gascoyne Coast, with some catches in the North Coast (Figure 68c). The majority of catches were kept (17% released; Table 5, Figure 68a) with most releases attributed to 'too many' (Table 6). Catches were taken predominantly from inshore demersal habitat (Figure 68b). All catches were taken by line fishing (Figure 68d). Northern Pearl Perch were harvested throughout the year, with higher catches in winter (Figure 68e). The kept and released catches of Northern Pearl Perch in 2020/21 were similar to previous surveys (Figure 68a).

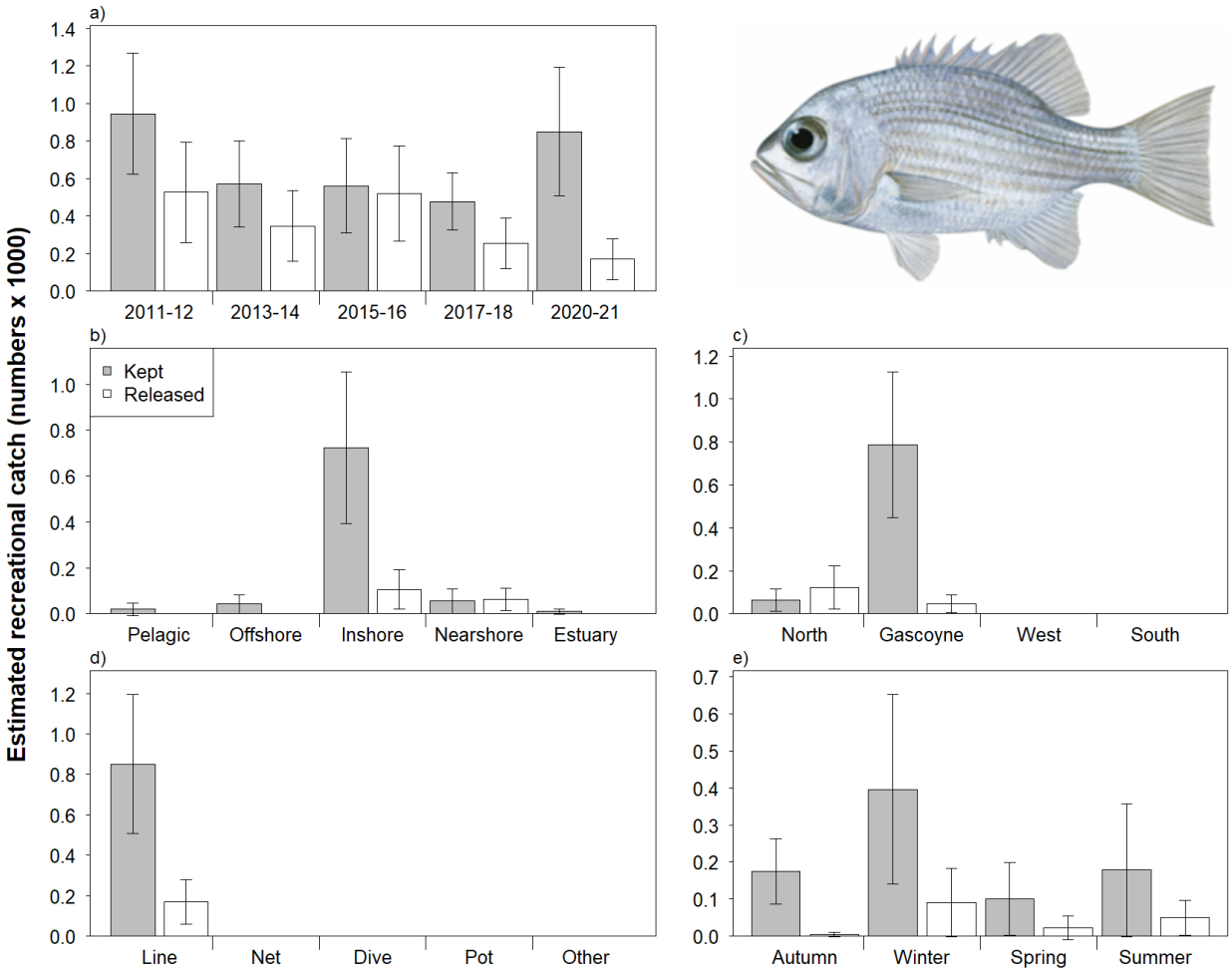


Figure 68. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Northern Pearl Perch in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.17 West Australian Dhufish (*Glaucosoma hebraicum*)

West Australian Dhufish is an indicator species in the West Coast bioregion. Most boat-based recreational catches of West Australian Dhufish occurred in the West Coast, with some catches in the South Coast (Figure 69c). Similar proportions of the catch were kept and released (50%; Table 5, Figure 69a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from inshore demersal habitat (Figure 69b). Most catches were taken by line fishing (Figure 69d). West Australian Dhufish were harvested throughout the year, with higher catches in summer and autumn (Figure 69e). The kept and released catches of West Australian Dhufish in 2020/21 were similar to previous surveys, except the released catch in 2020/21 was lower compared with 2015/16 (Figure 69a).

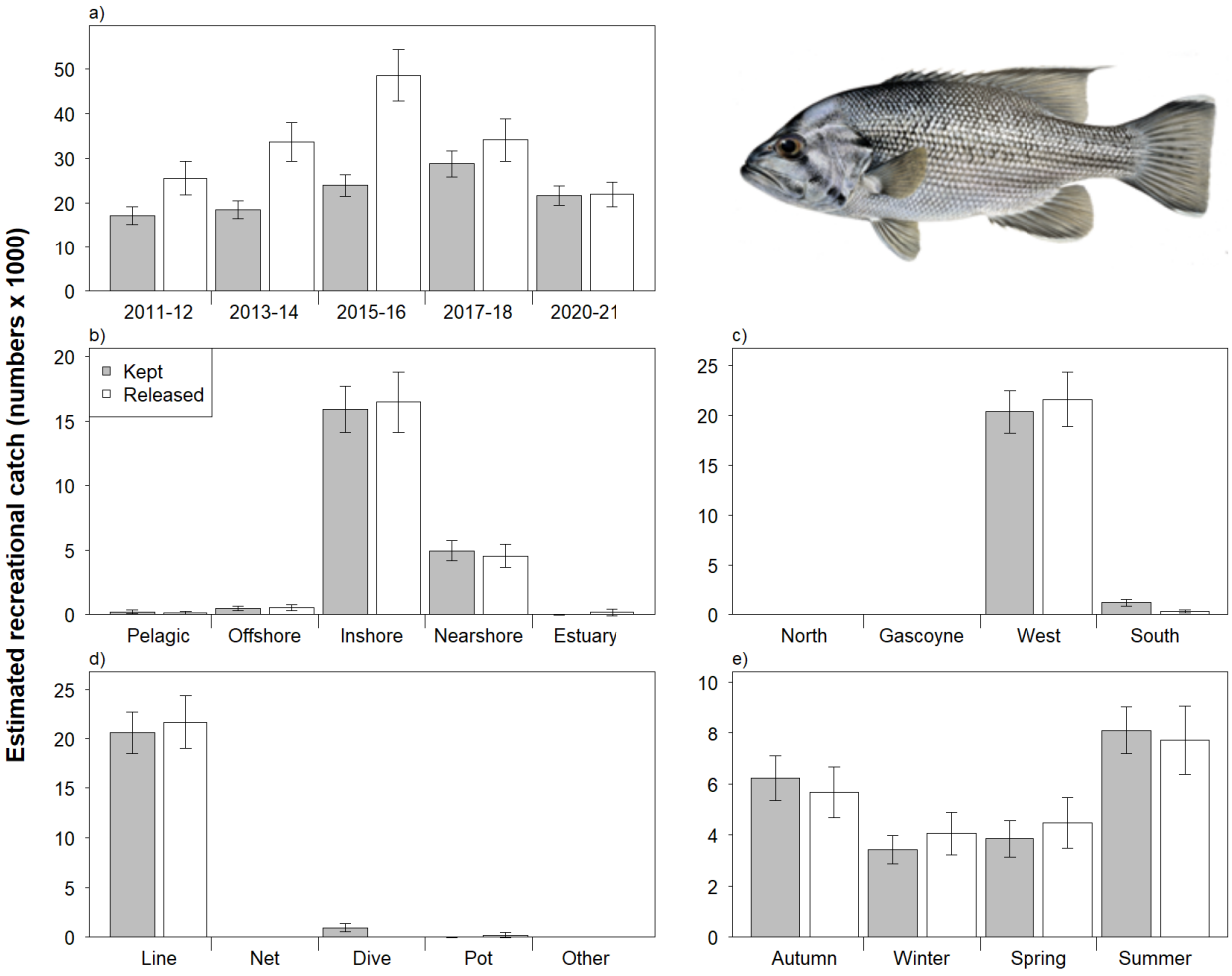


Figure 69. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of West Australian Dhufish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.18 Bight Redfish (*Centroberyx gerrardi*)

Bight Redfish is an indicator species in the West and South Coast bioregions. Most boat-based recreational catches of Bight Redfish occurred in the South Coast, with some catches in the West Coast (Figure 70c). The majority of catches were kept (20% released; Table 5, Figure 70a) with most releases attributed to 'too small' or 'under size' (Table 6). Catches were taken predominantly from inshore demersal habitat (Figure 70b). Most catches were taken by line fishing (Figure 70d). Bight Redfish were harvested throughout the year, with higher catches in spring and summer (Figure 70e). The kept and released catches of Bight Redfish in 2020/21 were similar to previous surveys (Figure 70a).

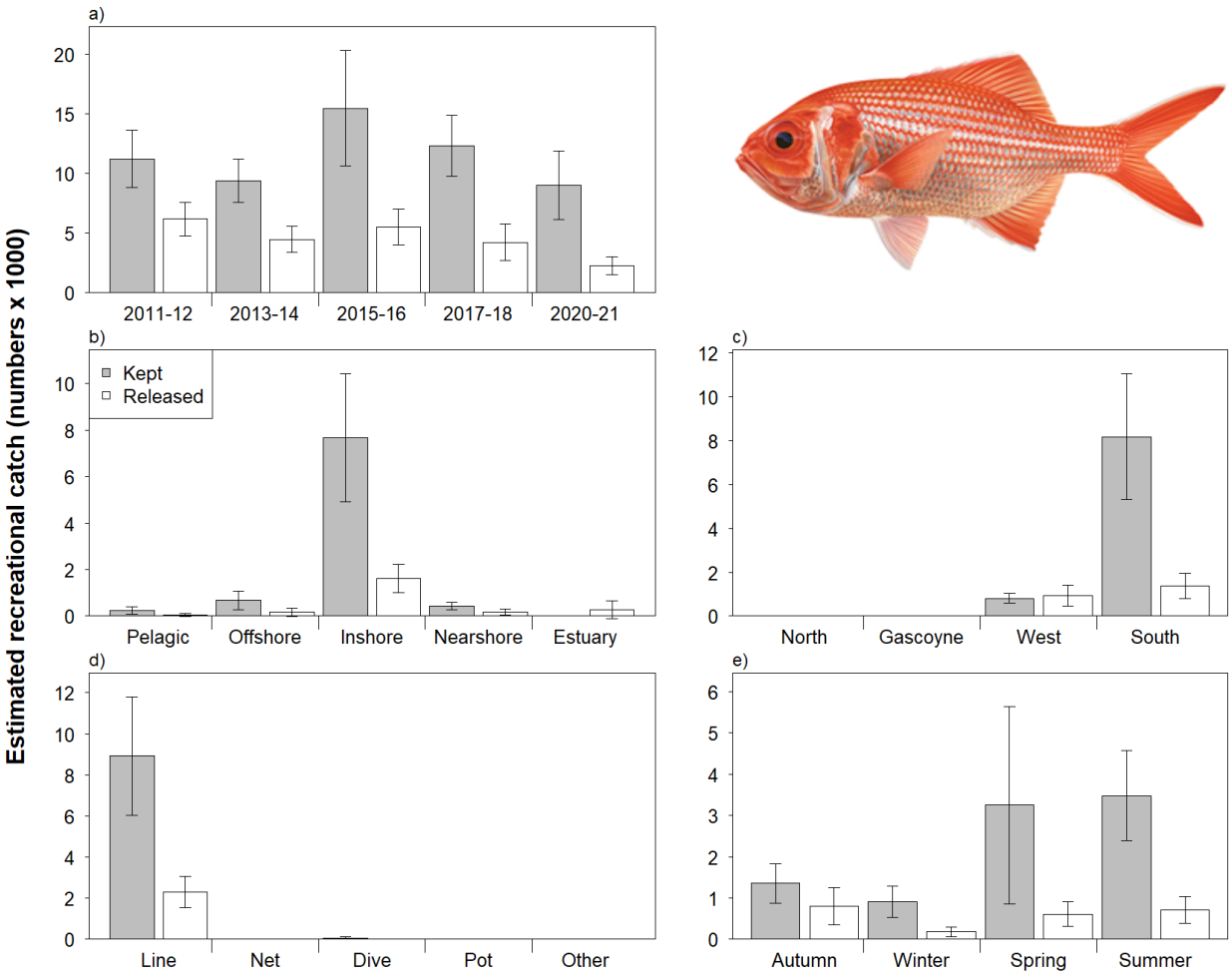


Figure 70. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Bight Redfish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.19 Swallowtail (*Centroberyx lineatus*)

Most boat-based recreational catches of Swallowtail occurred in the South Coast, with some catches in the West Coast (Figure 71c). The majority of catches were kept (40% released; Table 5, Figure 71a) with most releases attributed to ‘too small’ or ‘under size’ (Table 6). Catches were taken predominantly from inshore demersal habitat (Figure 71b). Most catches were taken by line fishing (Figure 71d). Swallowtail were harvested throughout the year, with highest catches in spring, summer and autumn (Figure 71e). The kept catch of Swallowtail in 2020/21 was lower compared with 2011/12 and 2017/18, while the released catch in 2020/21 was lower compared with 2011/12, 2013/14 and 2017/18 (Figure 71a).

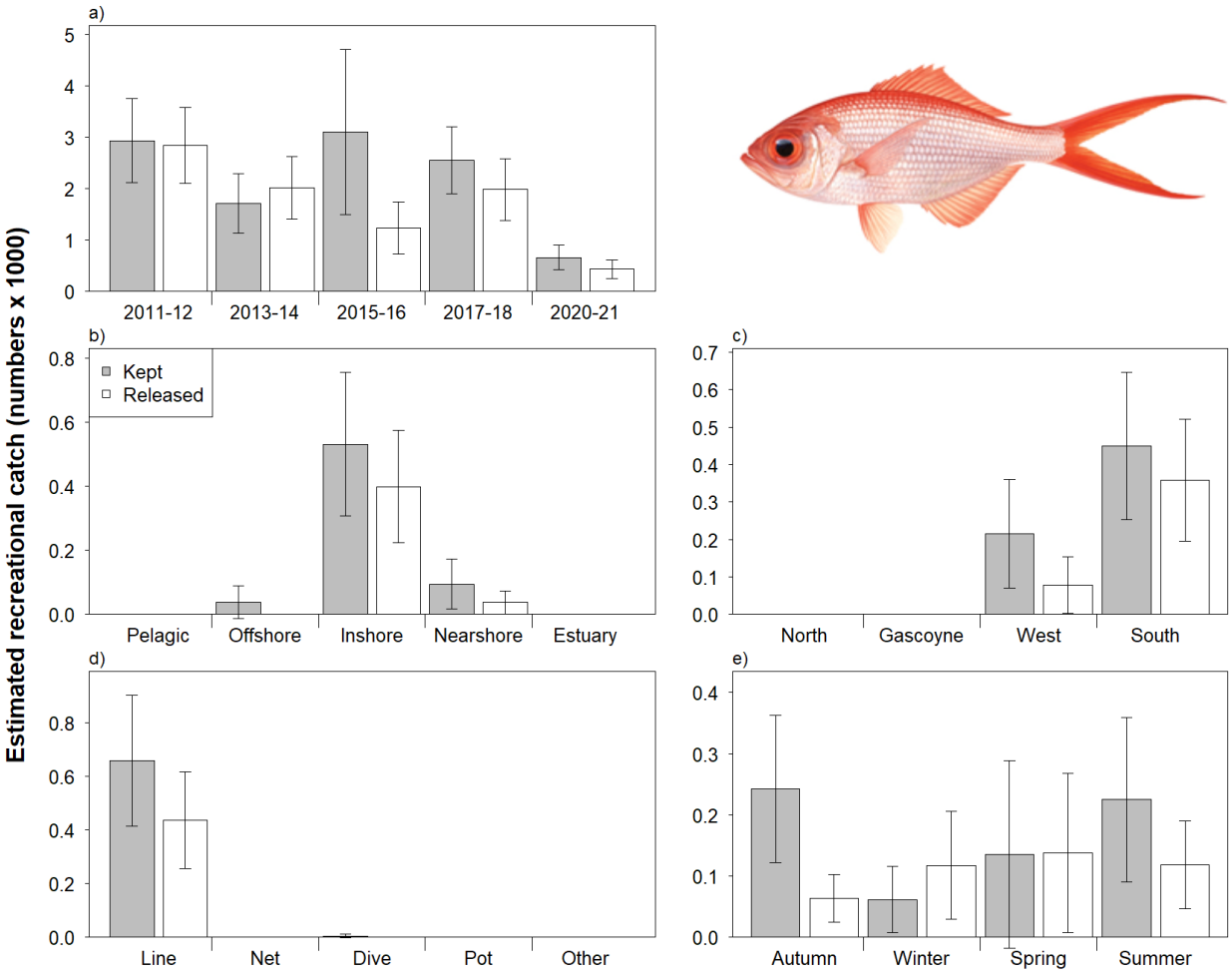


Figure 71. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Swallowtail in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.20 Banded Sweep (*Scorpis georgiana*)

Most boat-based recreational catches of Banded Sweep occurred in the West Coast, with some catches in the South Coast (Figure 72c). The majority of catches were released (85%; Table 5, Figure 72a) with most releases attributed to 'too many' (Table 6). Catches were taken predominantly from inshore demersal habitat (Figure 72b). Most catches were taken by line fishing (Figure 72d). Banded Sweep were harvested throughout the year, with highest catches in summer (Figure 72e). The kept and released catches of Banded Sweep in 2020/21 was similar to previous surveys (Figure 72a).

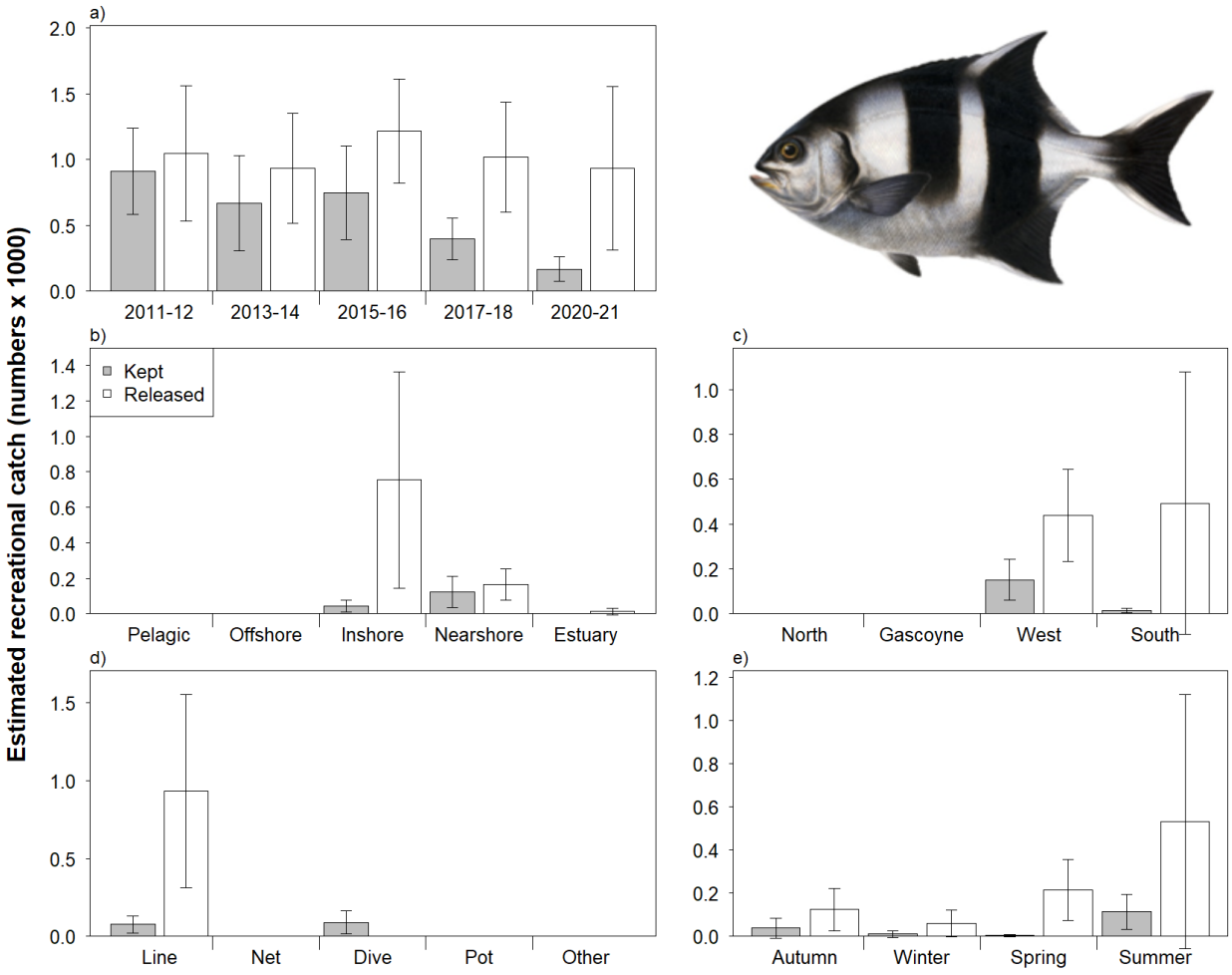


Figure 72. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Banded Sweep in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.21 Sea Sweep (*Scorpis aequipinnis*)

Most boat-based recreational catches of Sea Sweep occurred in the South Coast, with some catches in the West Coast (Figure 73c). Similar proportions of the catch were kept and released (51% released; Table 5, Figure 73a) with most releases attributed to 'too many' or 'other' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 73b). Most catches were taken by line fishing (Figure 73d). Sea Sweep were harvested throughout the year, with highest catches in summer (Figure 73e). The kept and released catches of Sea Sweep in 2020/21 were similar to previous surveys, except the kept catch in 2020/21 was lower than 2017/18 (Figure 73a).

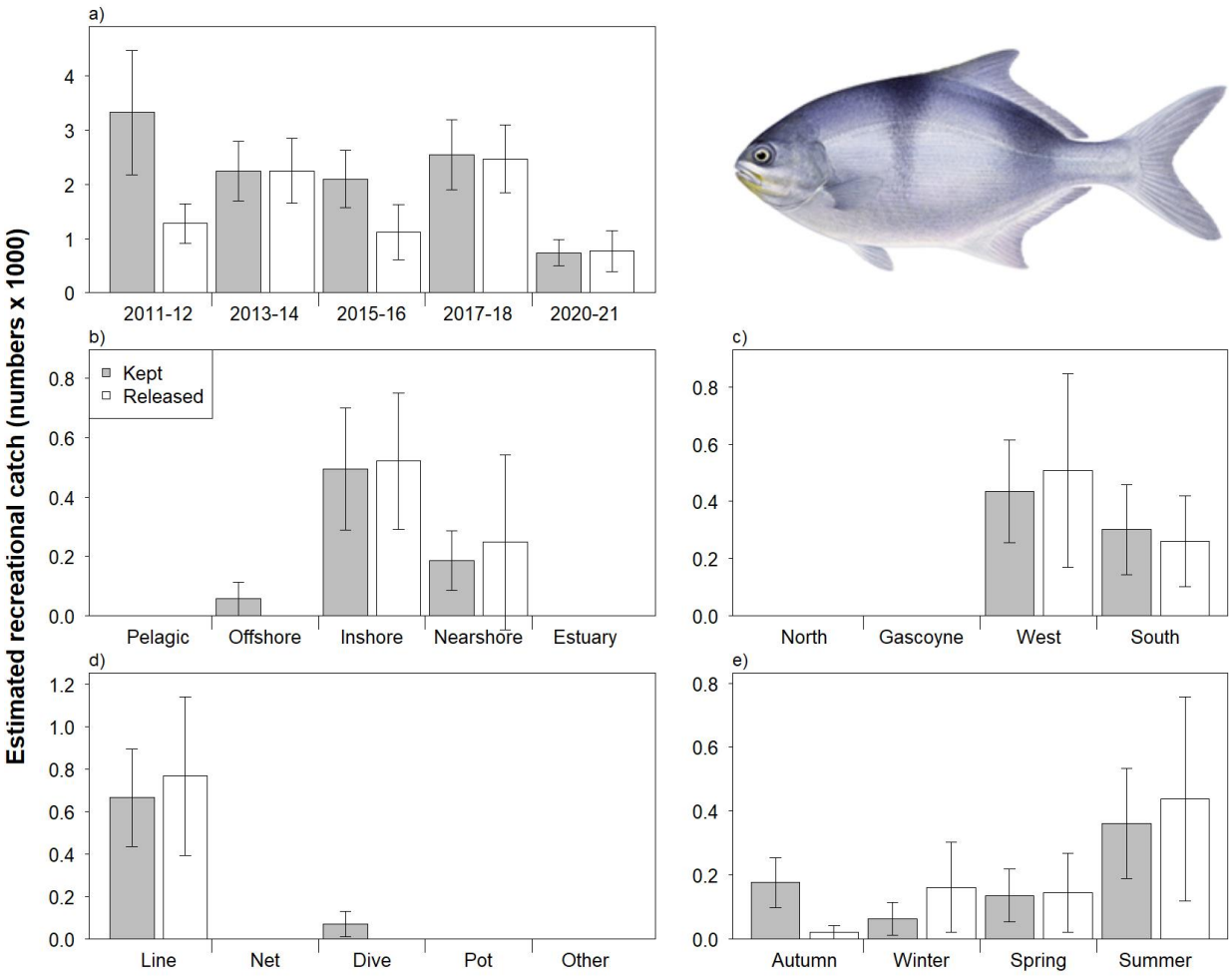


Figure 73. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Sea Sweep in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.22 Robinson's Seabream (*Gymnocranius grandoculis*)

Most boat-based recreational catches of Robinson's Seabream occurred in the Gascoyne Coast, with some catches in the North Coast and West Coast (Figure 74c). The majority of catches were kept (22% released; Table 5, Figure 74a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 74b). Most catches were taken by line fishing (Figure 74d). Robinson's Seabream were mostly harvested in autumn and winter (Figure 74e). The kept and released catches of Robinson's Seabream in 2020/21 were similar to previous surveys (Figure 74a).

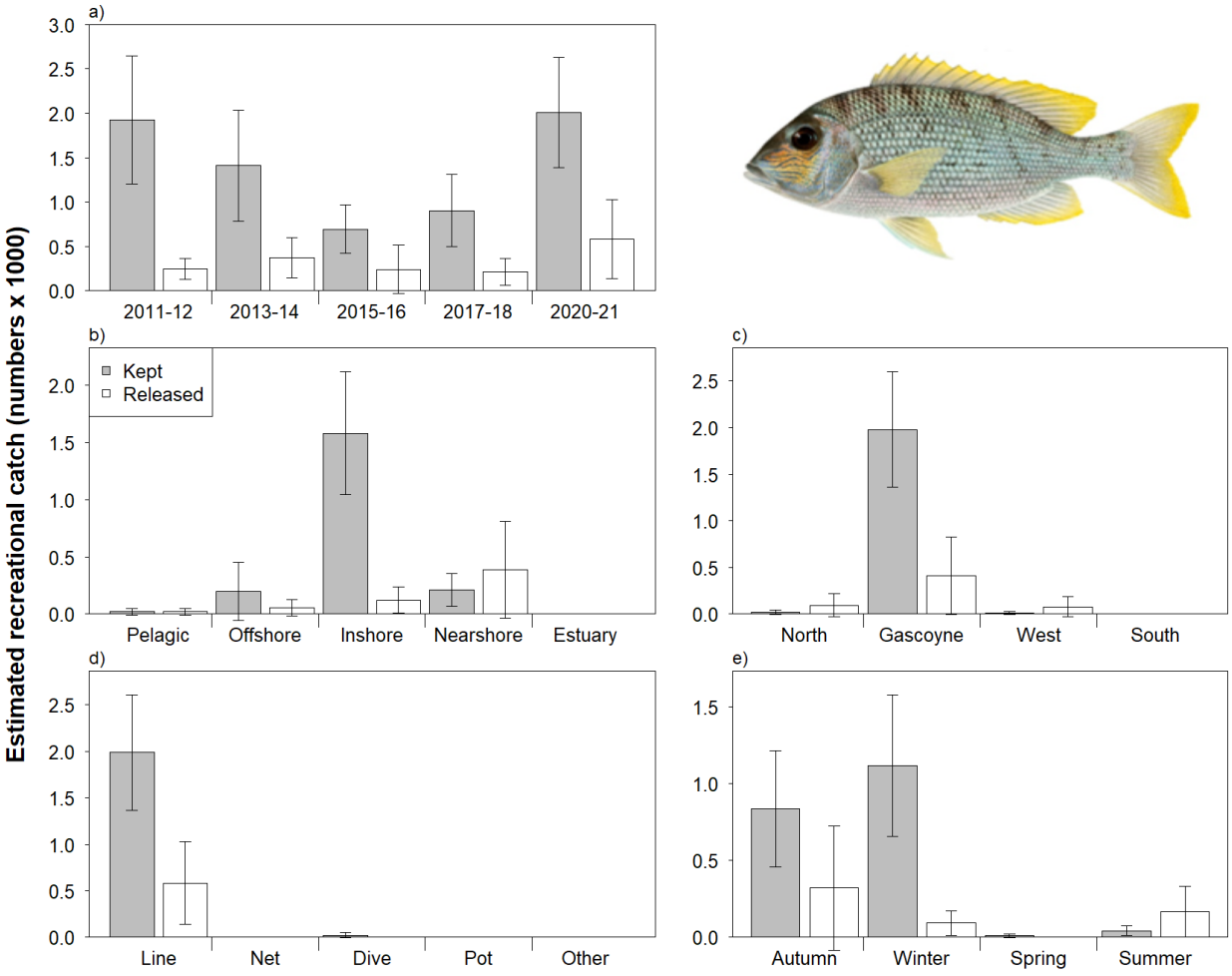


Figure 74. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Robinson's Seabream in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.23 Crimson Snapper (*Lutjanus erythropterus*)

Most boat-based recreational catches of Crimson Snapper occurred in the North Coast, with some catches in the Gascoyne Coast and West Coast (Figure 75c). The majority of catches were kept (56% released; Table 5, Figure 75a) with most releases attributed to 'too small' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 75b). All catches were taken by line fishing (Figure 75d). Crimson Snapper were harvested throughout the year, with higher catches in autumn, winter and spring (Figure 75e). The kept and released catches of Crimson Snapper in 2020/21 were similar to previous surveys (Figure 75a).

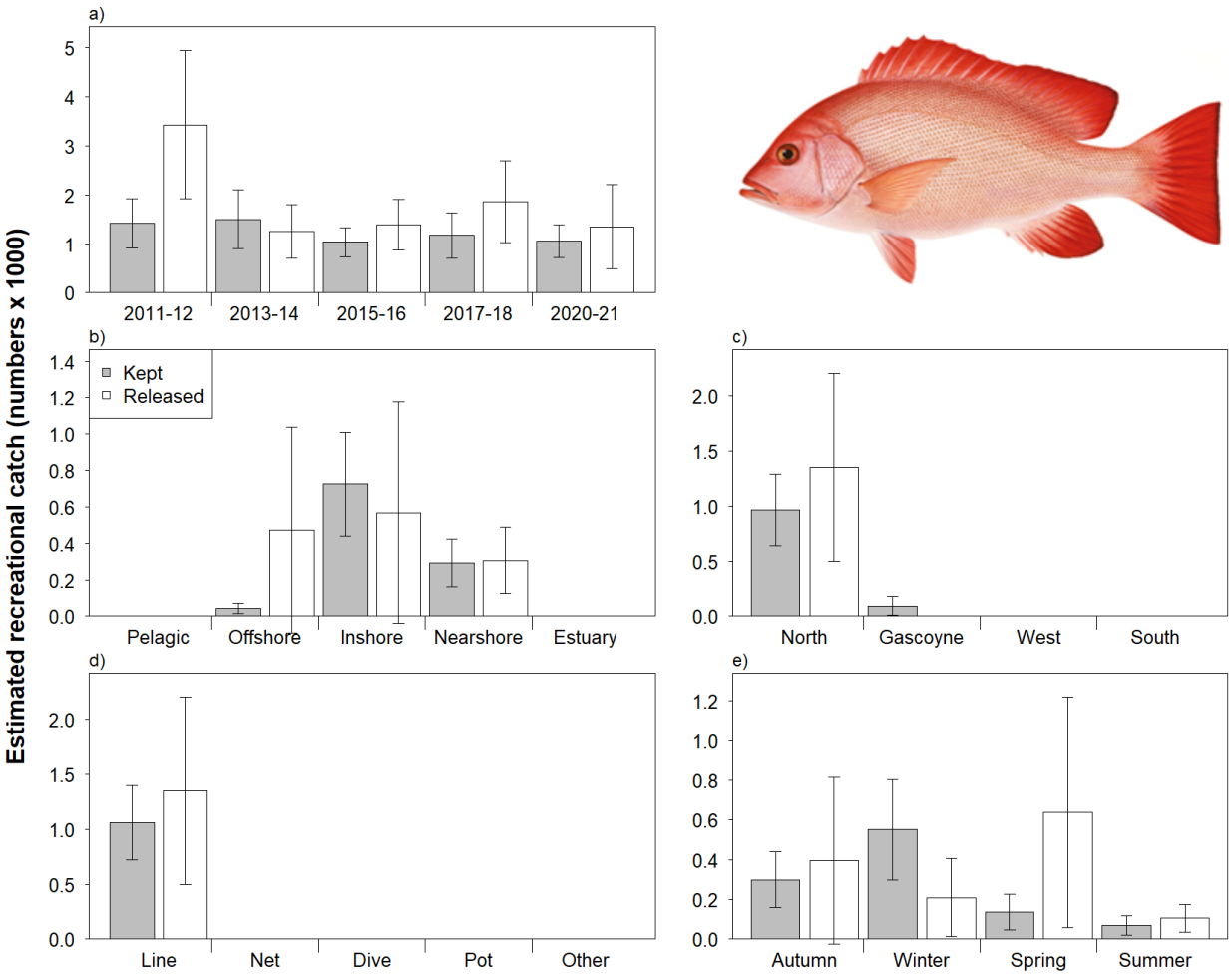


Figure 75. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Crimson Snapper in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.24 Golden Snapper (*Lutjanus johnii*)

Boat-based recreational catches of Golden Snapper occurred in the North Coast (Figure 76c). The majority of catches were released (60%; Table 5, Figure 76a) with most releases attributed to ‘too many’ or ‘under size’ (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 76b). Most catches were taken by line fishing Figure 76d). Golden Snapper were harvested throughout the year, with higher catches in autumn and winter (Figure 76e). The kept and released catches of Golden Snapper in 2020/21 were similar to previous surveys (Figure 76a).

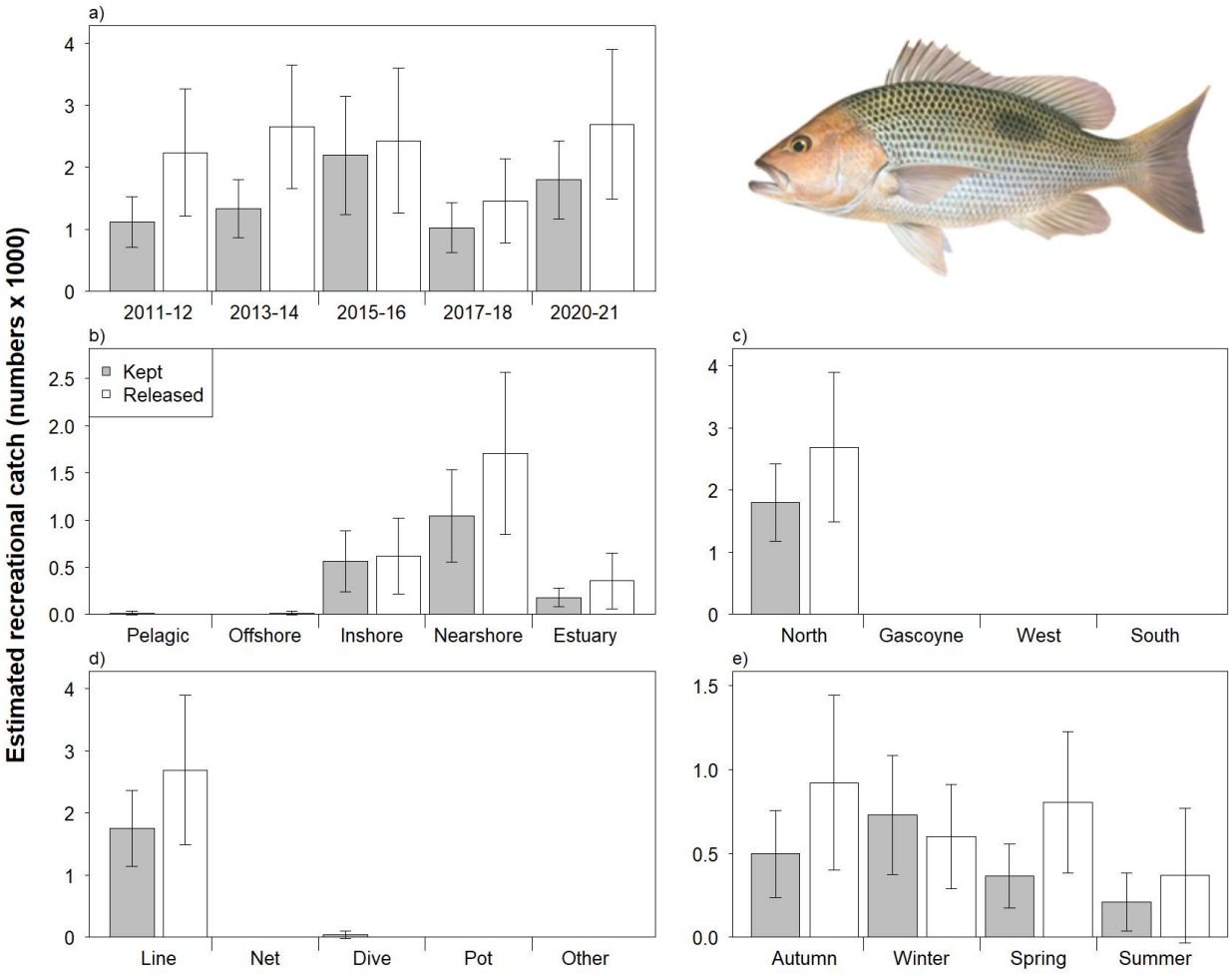


Figure 76. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Golden Snapper in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.25 Mangrove Jack (*Lutjanus argentimaculatus*)

Mangrove Jack is an indicator species in the North Coast bioregion. Most boat-based recreational catches of Mangrove Jack occurred in the North Coast, with some catches in the Gascoyne Coast and West Coast (Figure 77c). Similar proportions of the catch were kept and released (48% released; Table 5, Figure 77a) with most releases attributed to 'under size' or 'too many' (Table 6). Catches were taken predominantly from nearshore and estuarine habitats (Figure 77b). Most catches were taken by line fishing Figure 77d). Mangrove Jack were harvested throughout the year, with higher catches in autumn, winter and spring (Figure 77e). The kept and released catches of Mangrove Jack in 2020/21 were similar to previous surveys (Figure 77a).

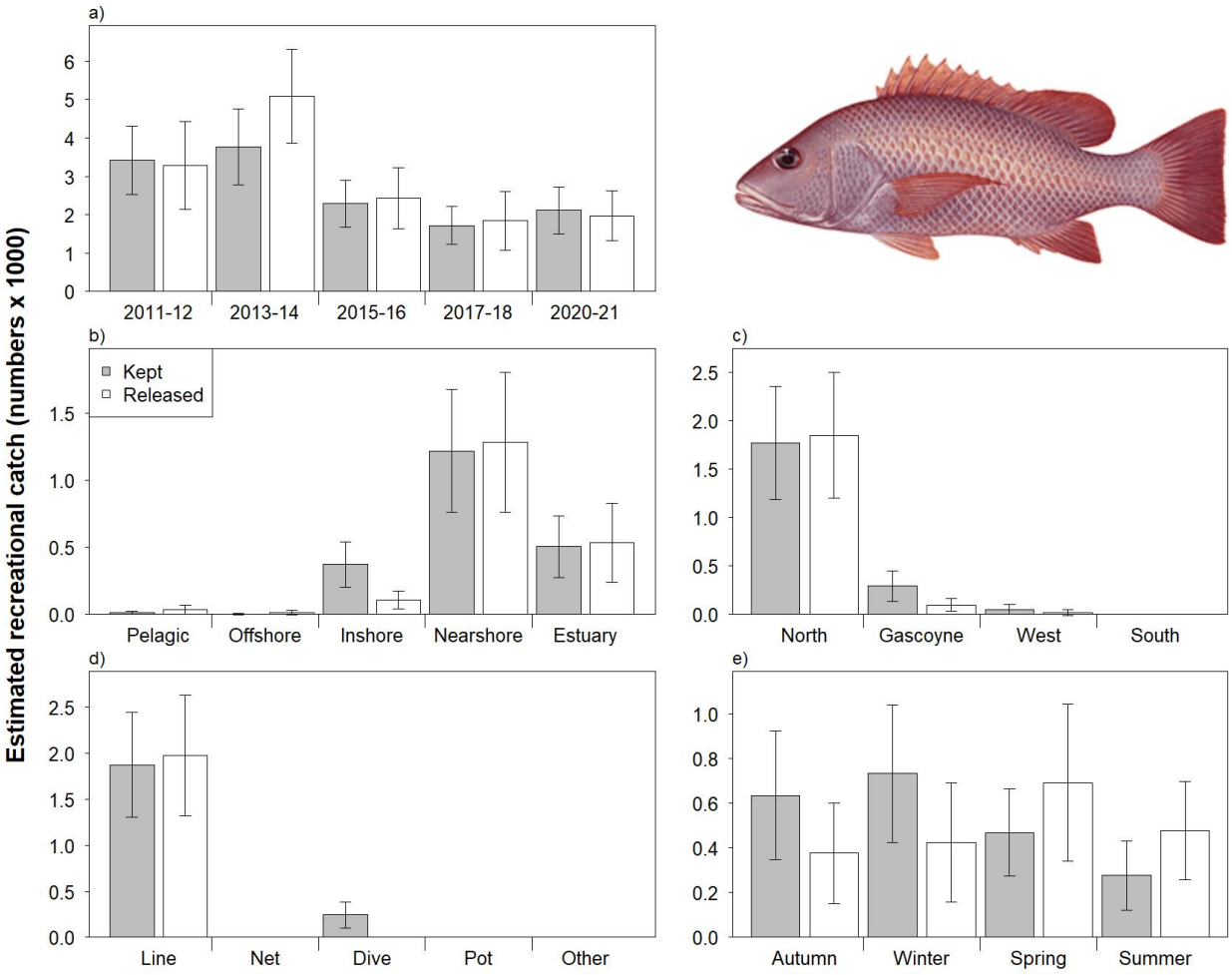


Figure 77. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Mangrove Jack in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.26 Moses' Snapper (*Lutjanus russellii*)

Most boat-based recreational catches of Moses' Snapper occurred in the North Coast, with some catches in the Gascoyne Coast and West Coast (Figure 78c). Similar proportions of the catch were kept and released (50% released; Table 5, Figure 78a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore, inshore demersal and estuarine habitats (Figure 78b). Most catches were taken by line fishing Figure 78d). Moses' Snapper were harvested throughout the year, with higher catches in autumn and winter (Figure 78e). The kept and released catches of Moses' Snapper in 2020/21 were similar to previous surveys (Figure 78a).

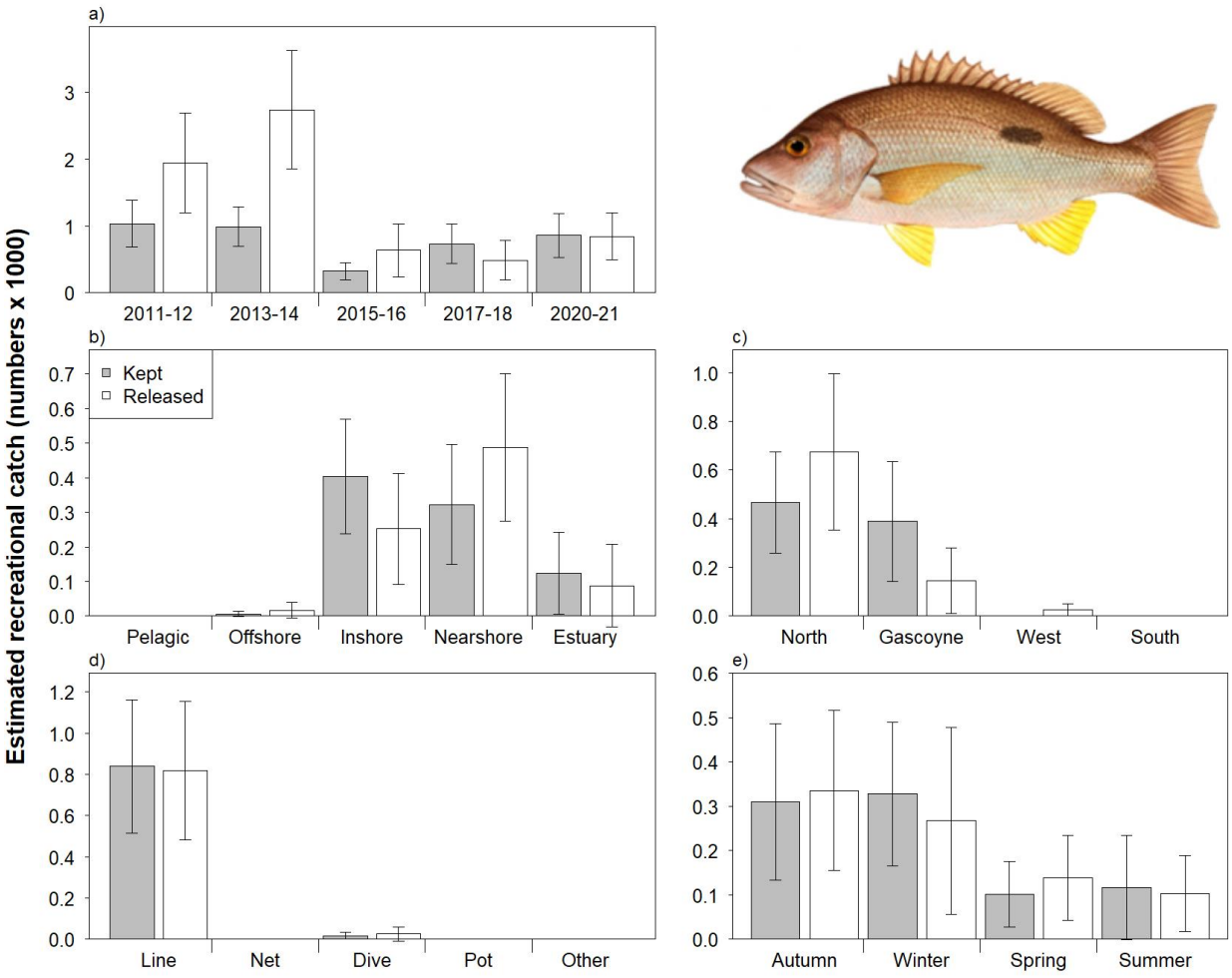


Figure 78. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Moses' Snapper in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.27 Red Emperor (*Lutjanus sebae*)

Red Emperor is an indicator species in the North Coast and Gascoyne Coast bioregions. Most boat-based recreational catches of Red Emperor occurred in the North Coast and Gascoyne Coast, with some catches in the West Coast (Figure 79c). Similar proportions of the catch were kept and released (46% released; Table 5, Figure 79a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 79b). Most catches were taken by line fishing (Figure 79d). Red Emperor were harvested throughout the year, with higher catches in winter (Figure 79e). The kept and released catches of Red Emperor in 2020/21 were similar to previous surveys (Figure 79a).

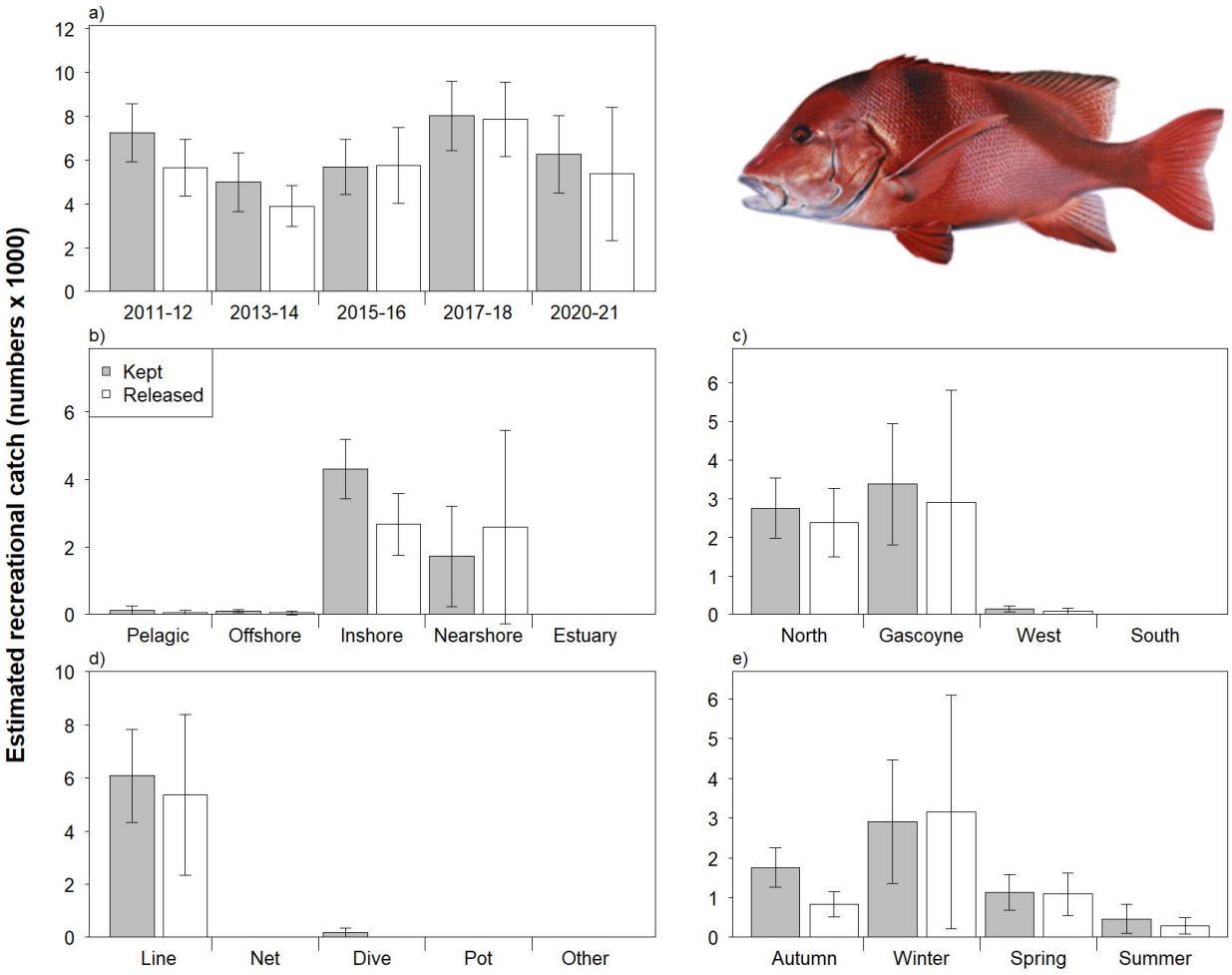


Figure 79. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Red Emperor in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.28 Saddletail Snapper (*Lutjanus malabaricus*)

Most boat-based recreational catches of Saddletail Snapper occurred in the North Coast, with some catches in the Gascoyne Coast (Figure 80c). The majority of catches were kept (30% released; Table 5, Figure 80a) with most releases attributed to ‘under size’ or ‘too many’ (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 80b). All catches were taken by line fishing Figure 80d). Saddletail Snapper were harvested throughout the year, with similar catches in each season (Figure 80e). The kept and released catches of Saddletail Snapper in 2020/21 were similar to previous surveys (Figure 80a).

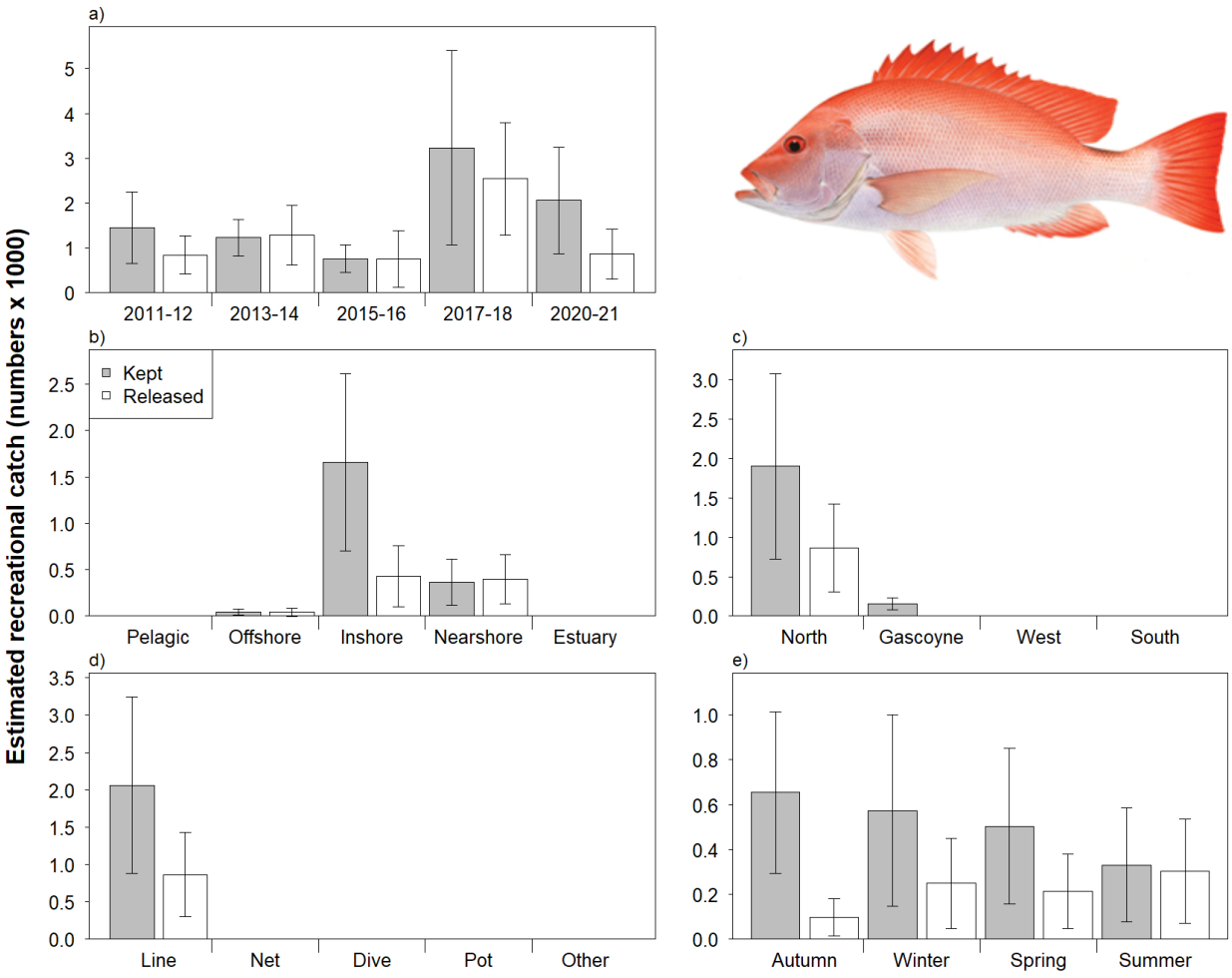


Figure 80. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Saddletail Snapper in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.29 Stripey Snapper (*Lutjanus carponotatus*)

Most boat-based recreational catches of Stripey Snapper occurred in the North Coast, with some catches in the Gascoyne Coast (Figure 81c). The majority of catches were released (67%; Table 5, Figure 81a) and mostly attributed to 'under size' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 81b). Most catches were taken by line fishing (Figure 81d). Stripey Snapper were harvested throughout the year, with higher catches in autumn and winter (Figure 81e). The kept and released catches of Stripey Snapper in 2020/21 were similar to previous surveys, except the released catch in 2020/21 was lower compared with 2011/12 (Figure 81a).

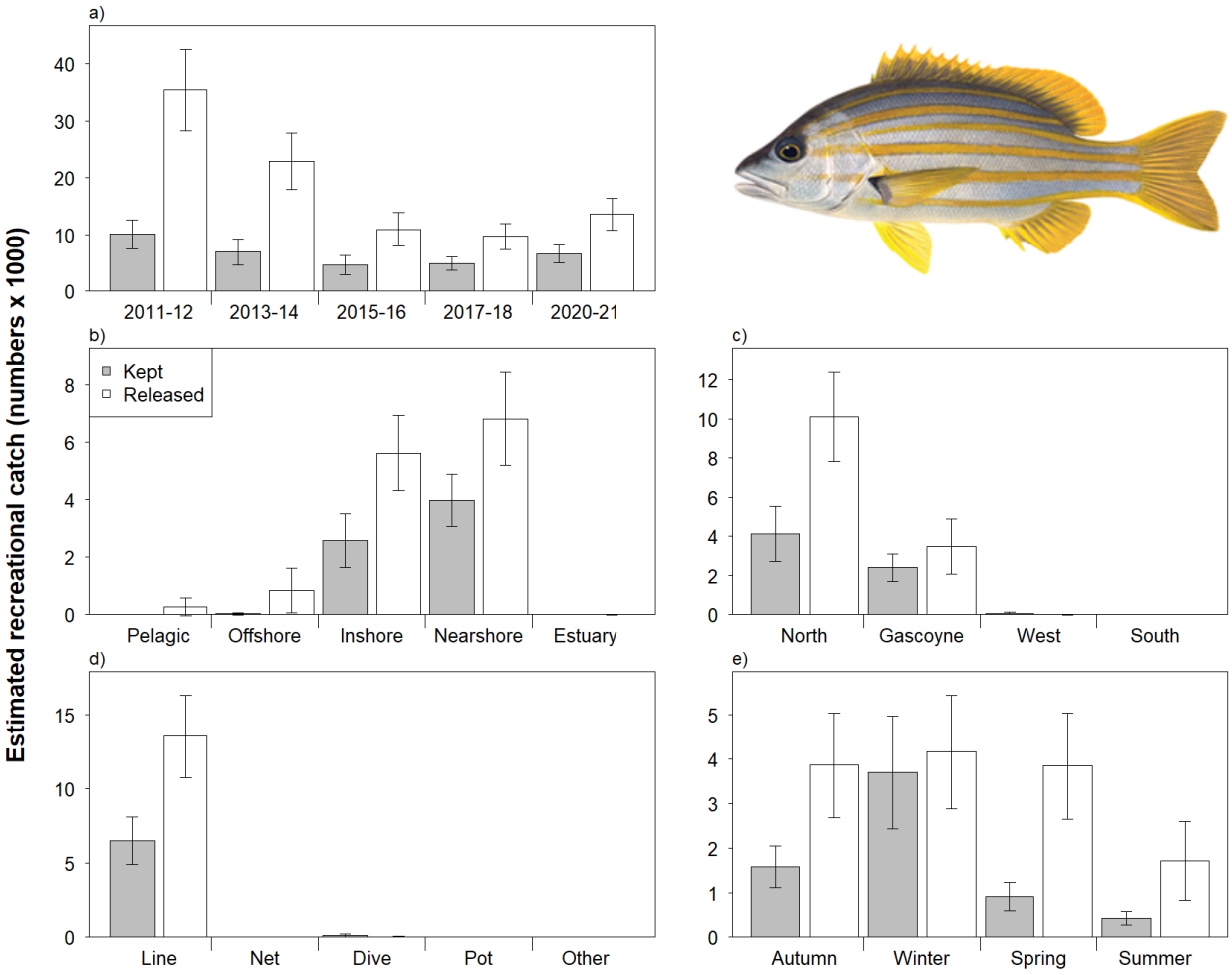


Figure 81. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Stripey Snapper in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.30 Baldchin Groper (*Choerodon rubescens*)

Baldchin Groper is an indicator species in the West Coast bioregion. Most boat-based recreational catches of Baldchin Groper occurred in the West Coast, with some catches in the Gascoyne Coast (Figure 82c). The majority of catches were kept (35% released; Table 5, Figure 82a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 82b). Most catches were taken by line fishing (Figure 82d). Baldchin Groper were harvested throughout the year, with higher catches in summer and autumn (Figure 82e). The kept and released catches of Baldchin Groper in 2020/21 were similar to previous surveys, except the kept catch in 2020/21 was higher compared with 2013/14 (Figure 82a).

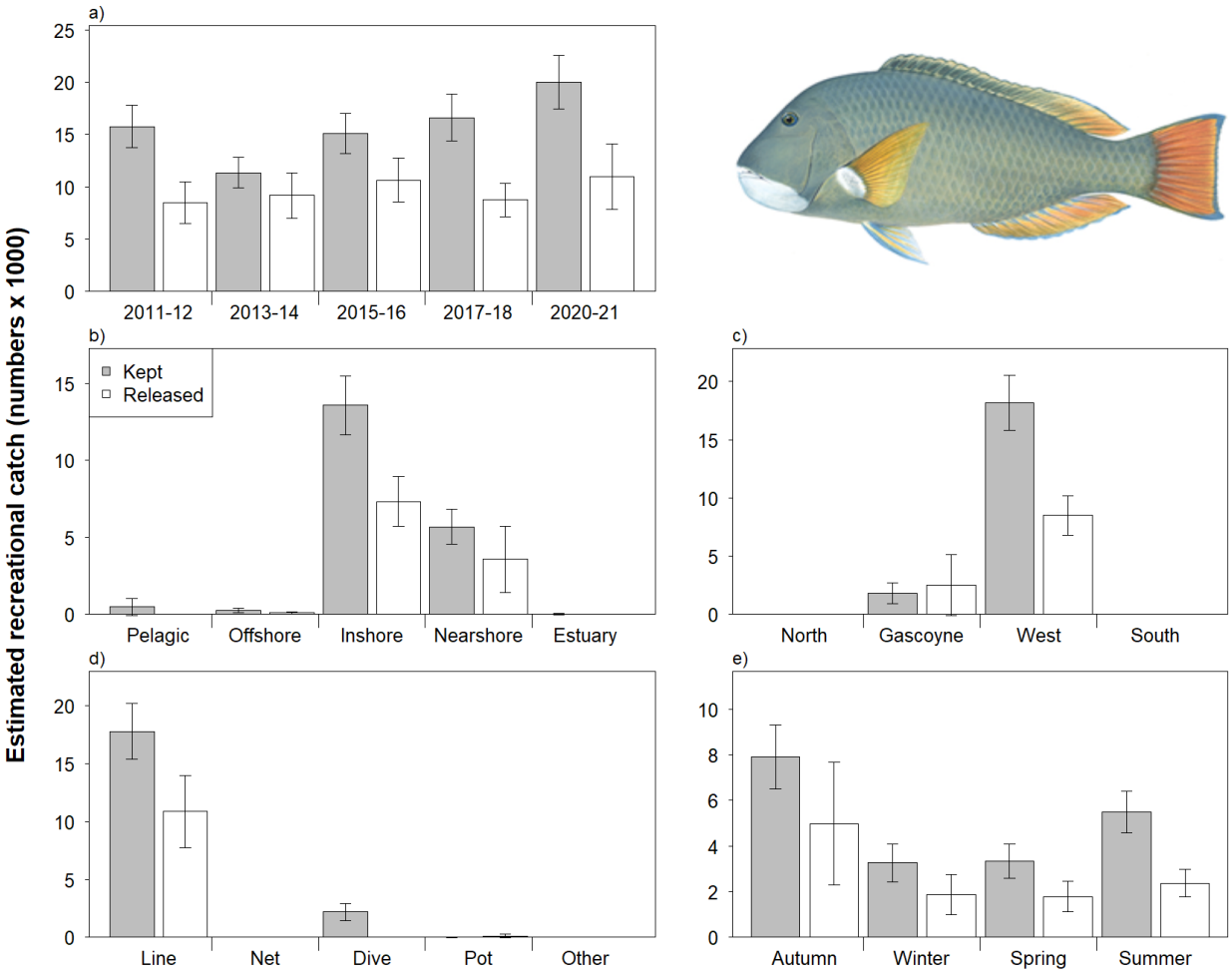


Figure 82. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Baldchin Groper in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.31 Blackspot Tuskfish (*Choerodon schoenleinii*)

Most boat-based recreational catches of Blackspot Tuskfish occurred in the North Coast, with some catches in the Gascoyne Coast (Figure 83c). The majority of catches were released (62%; Table 5, Figure 83a) and mostly attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 83b). Most catches were taken by line fishing (Figure 83d). Blackspot Tuskfish were harvested throughout the year, with higher catches in autumn, winter and spring (Figure 83e). The kept and released catches of Blackspot Tuskfish in 2020/21 were similar to previous surveys (Figure 83a).

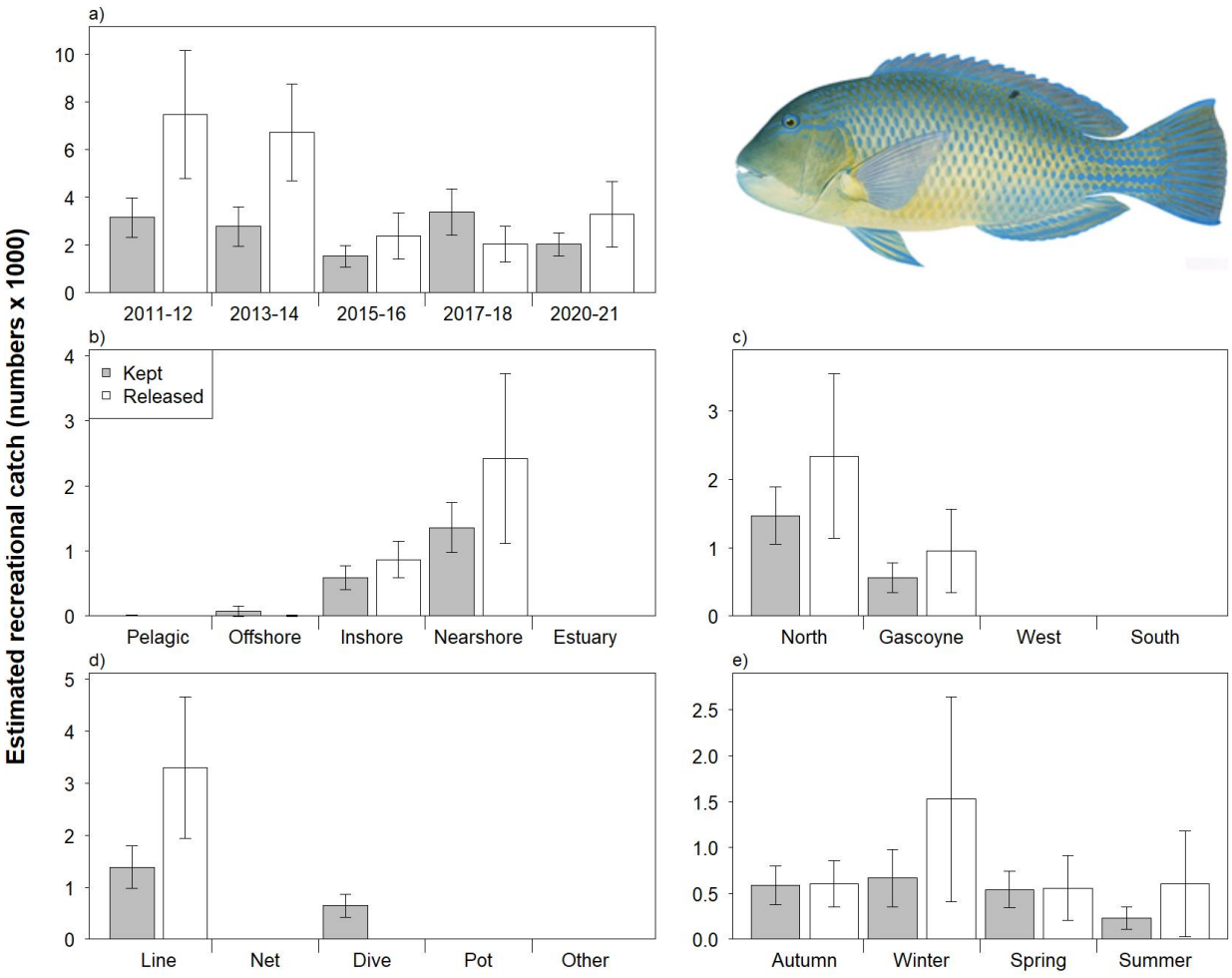


Figure 83. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Blackspot Tuskfish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.32 Blue Tuskfish (*Choerodon cyanodus*)

Most boat-based recreational catches of Blue Tuskfish occurred in the North Coast, with some catches in the Gascoyne Coast (Figure 84c). Similar proportions of the catch were kept and released (63% released; Table 5, Figure 84a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 84b). Most catches were taken by line fishing (Figure 84d). Blue Tuskfish were harvested throughout the year, with higher catches in autumn, winter, and spring (Figure 84e). The kept and released catches of Blue Tuskfish in 2020/21 were similar to previous surveys (Figure 84a).

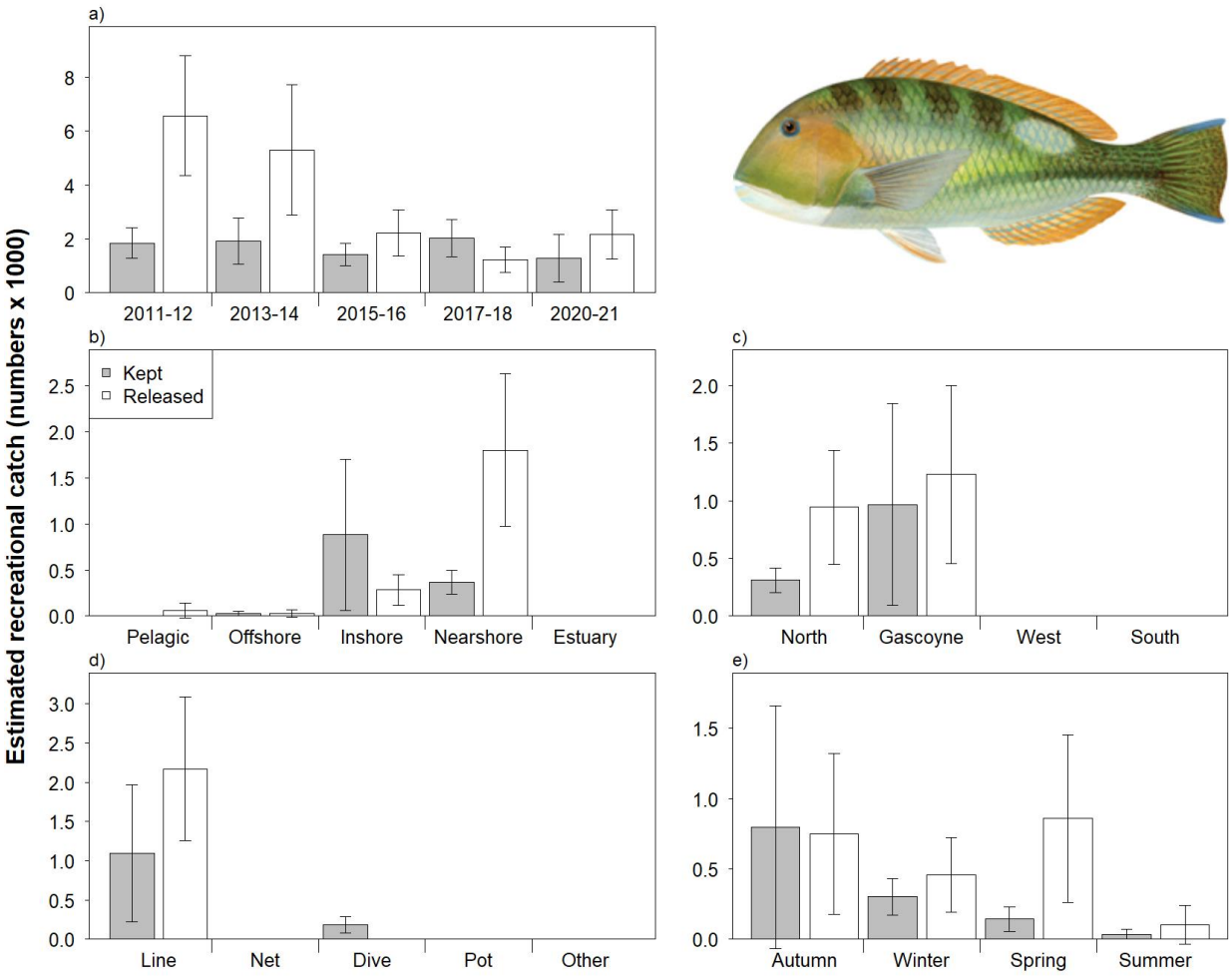


Figure 84. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Blue Tuskfish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.3.33 Foxfish (*Bodianus frenchii*)

Most boat-based recreational catches of Foxfish occurred in the West Coast, with some catches in the South Coast (Figure 85c). The majority of catches were kept (35% released; Table 5, Figure 85a) with most releases attributed to 'too many' or 'other' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 85b). Most catches were taken by line fishing (Figure 85d). Foxfish were harvested throughout the year, with higher catches in spring and summer (Figure 85e). The kept and released catches of Foxfish in 2020/21 were similar to previous surveys (Figure 85a).

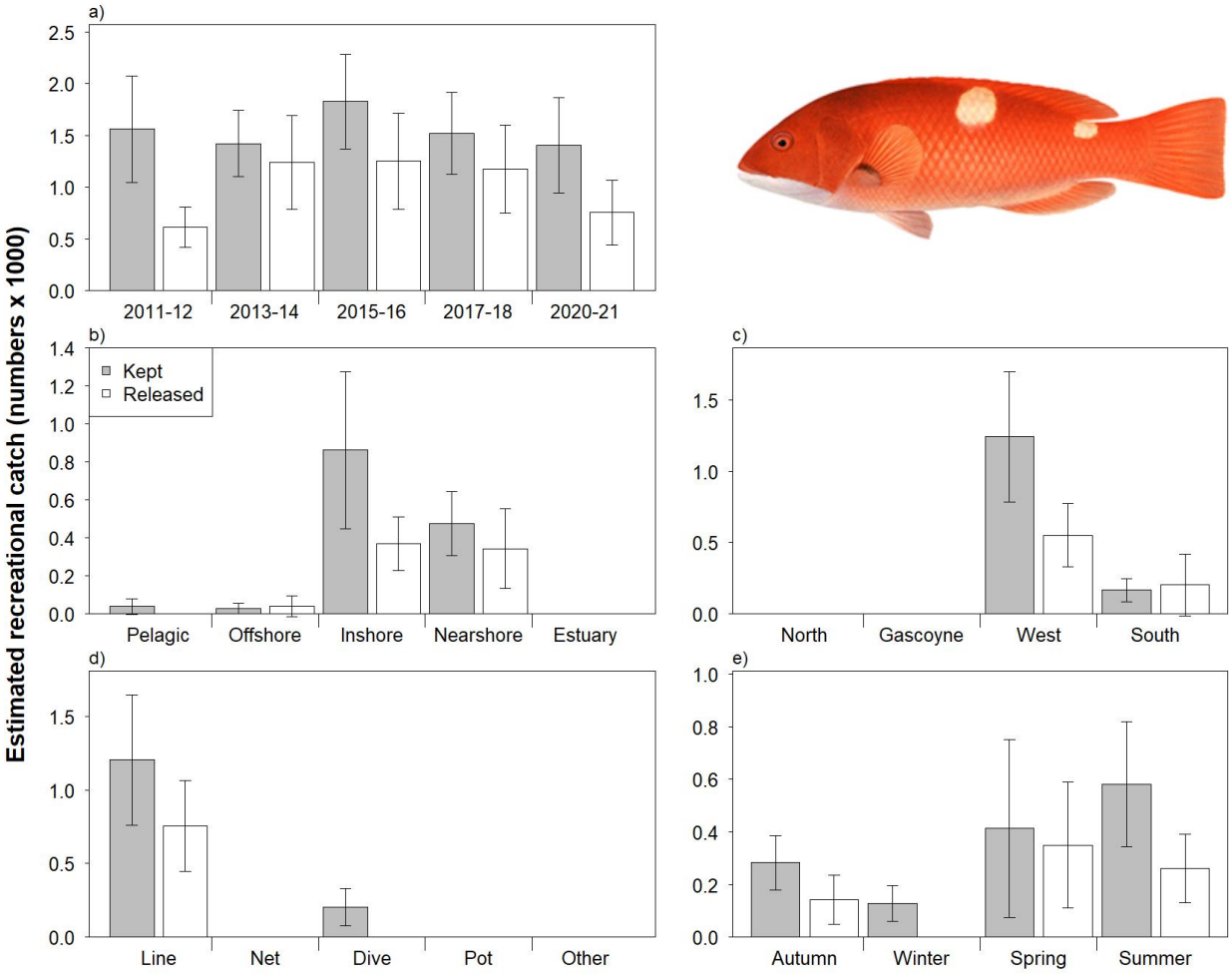


Figure 85. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Foxfish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.4 Offshore Demersal

6.4.1 Eightbar Grouper (*Hyporthodus* cf *octofasciatus*)

Eightbar Grouper is an indicator species in the North Coast, Gascoyne Coast, West Coast bioregions. Most boat-based recreational catches of Eightbar Grouper occurred in the West Coast and Gascoyne Coast, with some catches in the North Coast and South Coast (Figure 86c). The majority of catches were kept (20% released; Table 5, Figure 86a) with most releases attributed to 'too many' or 'too small' (Table 6). Catches were taken predominantly from offshore demersal and inshore demersal habitats (Figure 86b). All catches were taken by line fishing (Figure 86d). Eightbar Grouper were harvested throughout the year, with higher catches in autumn and winter (Figure 86e). The kept and released catches of Eightbar Grouper in 2020/21 were similar to previous surveys; however, catches for this species have low sample sizes and high uncertainty in some years (Figure 86a).

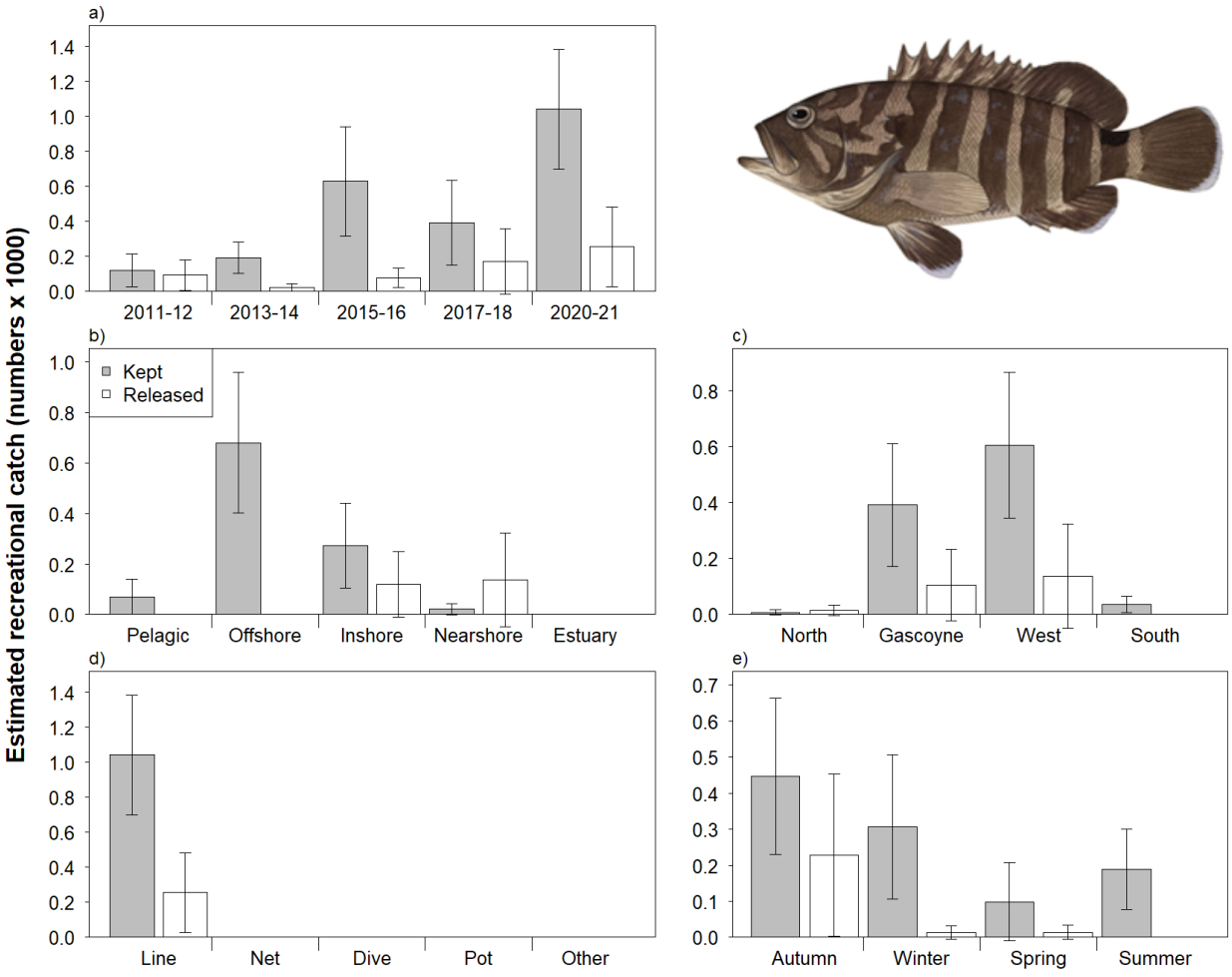


Figure 86. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Eightbar Grouper in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.4.2 Hapuku (*Polyprion oxygeneios*)

Hapuku is an indicator species in the West Coast and South Coast bioregions. Most boat-based recreational catches of Hapuku occurred in the South Coast, with some catches in the West Coast (Figure 87c). The majority of catches were kept (2% released; Table 5, Figure 87a). Catches were taken predominantly from offshore demersal and inshore demersal habitats (Figure 87b). All catches were taken by line fishing (Figure 87d). Hapuku were harvested in spring, summer and autumn, with higher catches in autumn (Figure 87e). The kept and released catches of Hapuku in 2020/21 were similar to previous surveys; however, catches for this species have low sample sizes and high uncertainty (Figure 87a).

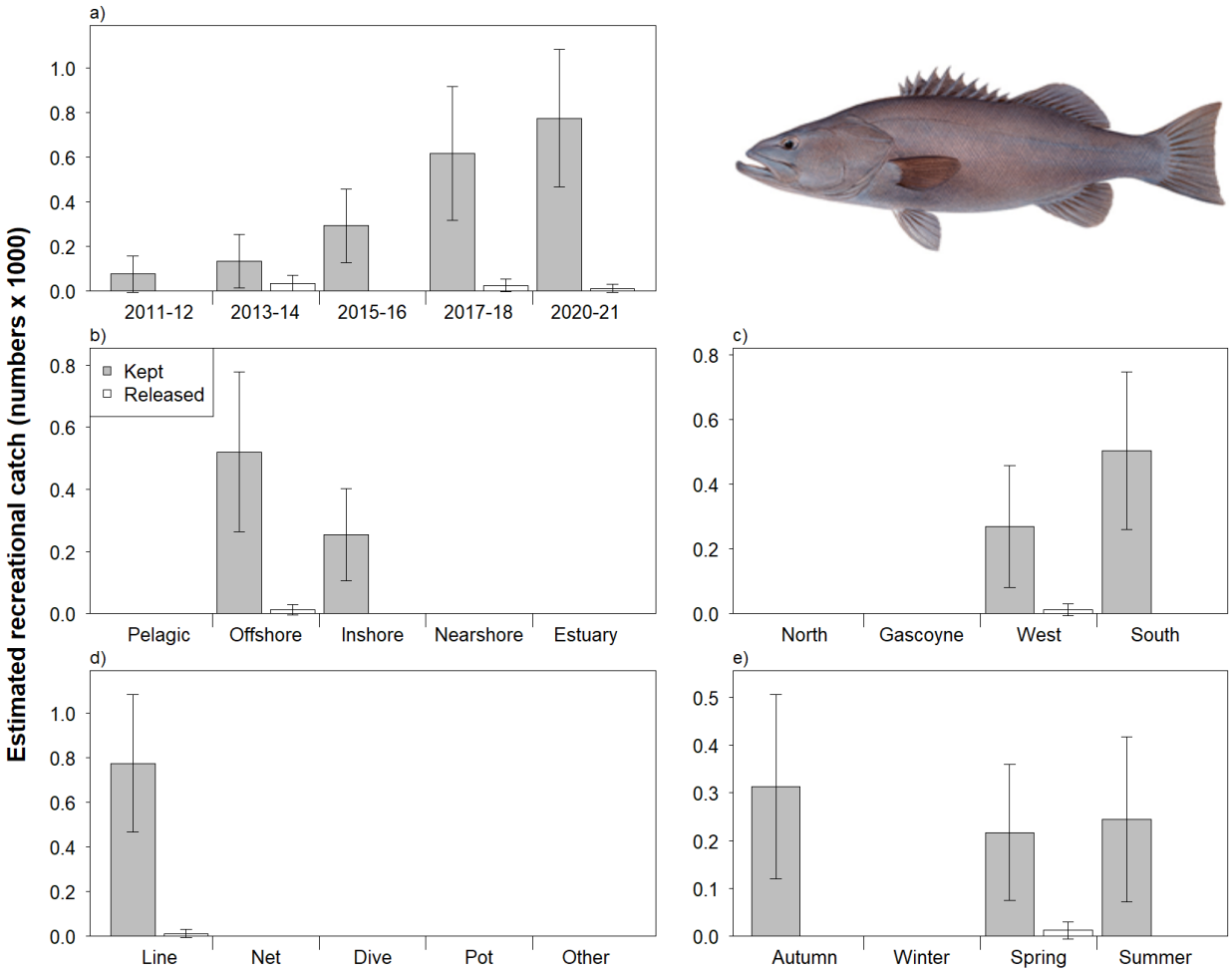


Figure 87. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Hapuku in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.4.3 Ruby Snapper (*Etelis boweni*)

Ruby Snapper is an indicator species in the North Coast and Gascoyne Coast bioregions. Most boat-based recreational catches of Ruby Snapper occurred in the Gascoyne Coast, with some catches in the North Coast and West Coast (Figure 88c). The majority of catches were kept (10% released; Table 5, Figure 88a). Catches were taken predominantly from offshore demersal and inshore demersal habitats (Figure 88b). All catches were taken by line fishing (Figure 88d). Ruby Snapper were harvested throughout the year, with similar catches in each season (Figure 88e). The kept and released catches of Ruby Snapper in 2020/21 were similar to previous surveys; however, catches for this species have low sample sizes and high uncertainty (Figure 88a).

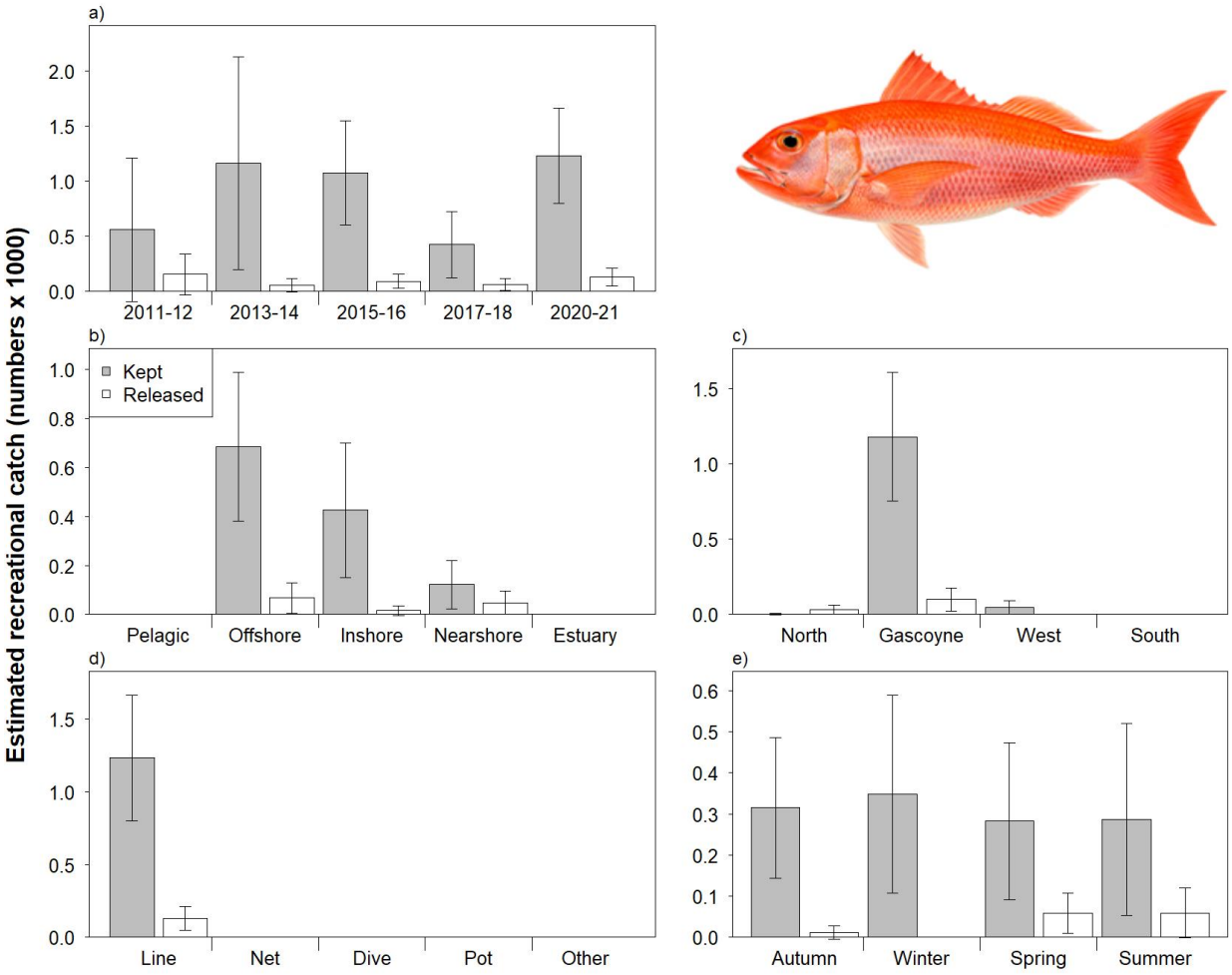


Figure 88. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Ruby Snapper in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.5 Small Pelagic

6.5.1 Blue Mackerel (*Scomber australasicus*)

Most boat-based recreational catches of Blue Mackerel occurred in the West Coast, with some catches in the South Coast (Figure 89c). The majority of catches were kept (35% released; Table 5, Figure 89a). Catches were taken predominantly from nearshore habitat (Figure 89b). All catches were taken by line fishing (Figure 89d). Blue Mackerel were harvested throughout the year, with higher catches in autumn and winter (Figure 89e). The kept and released catches of Blue Mackerel in 2020/21 were similar to previous surveys; however, catches for this species have low sample sizes and high uncertainty in some years (Figure 89a).

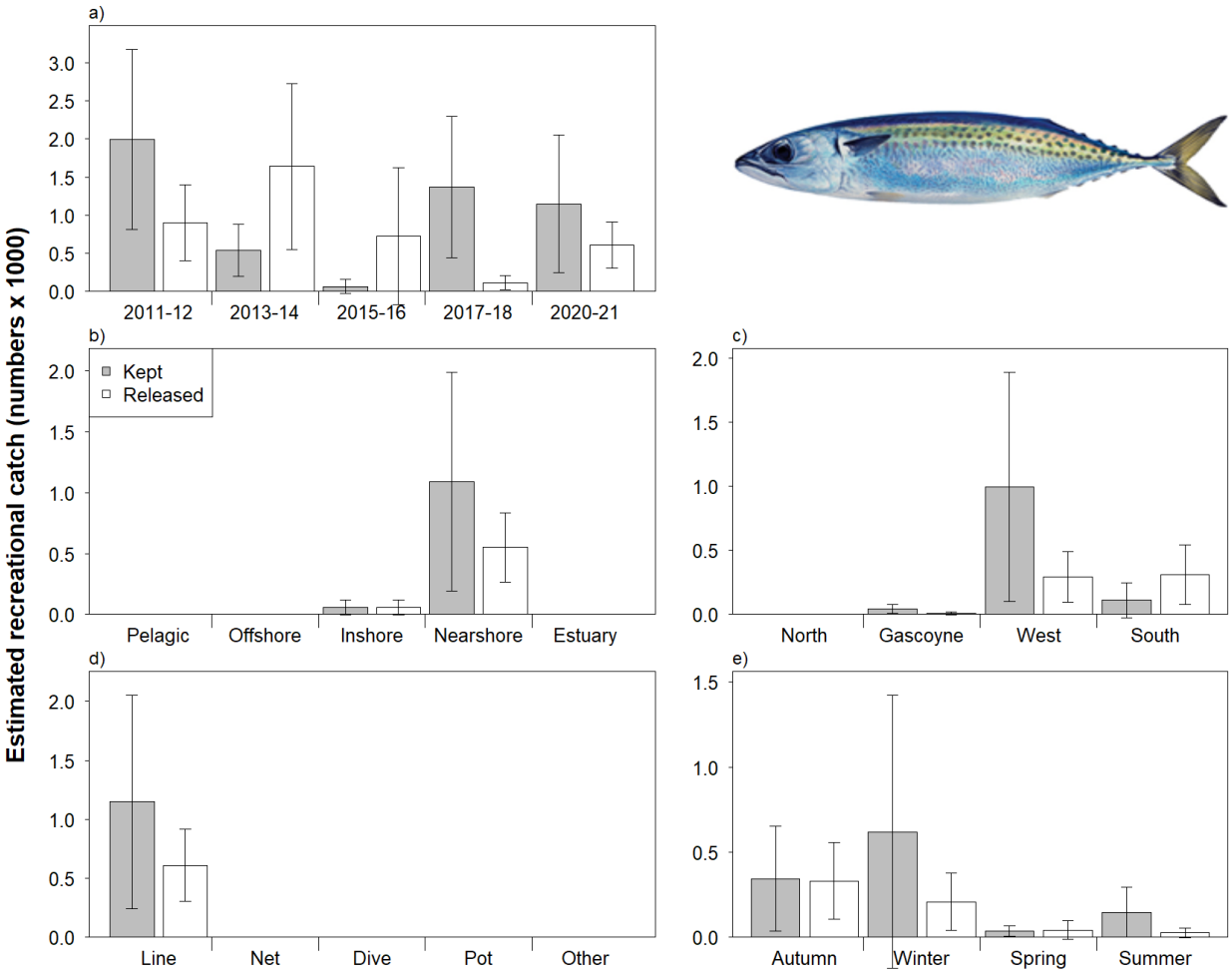


Figure 89. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Yellowtail Scad in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.5.2 Yellowtail Scad (*Trachurus novaezelandiae*)

Most boat-based recreational catches of Yellowtail Scad occurred in the West Coast and South Coast (Figure 90c). The majority of catches were released (81%; Table 5, Figure 90a) with most releases attributed to 'too many' (Table 6). Catches were taken predominantly from nearshore habitat (Figure 90b). All catches were taken by line fishing (Figure 90d). Yellowtail Scad were harvested throughout the year, with higher catches in summer and autumn (Figure 90e). The kept and released catches of Yellowtail Scad in 2020/21 were similar with to previous surveys; however, catches for this species have low sample sizes and high uncertainty Figure 90a).

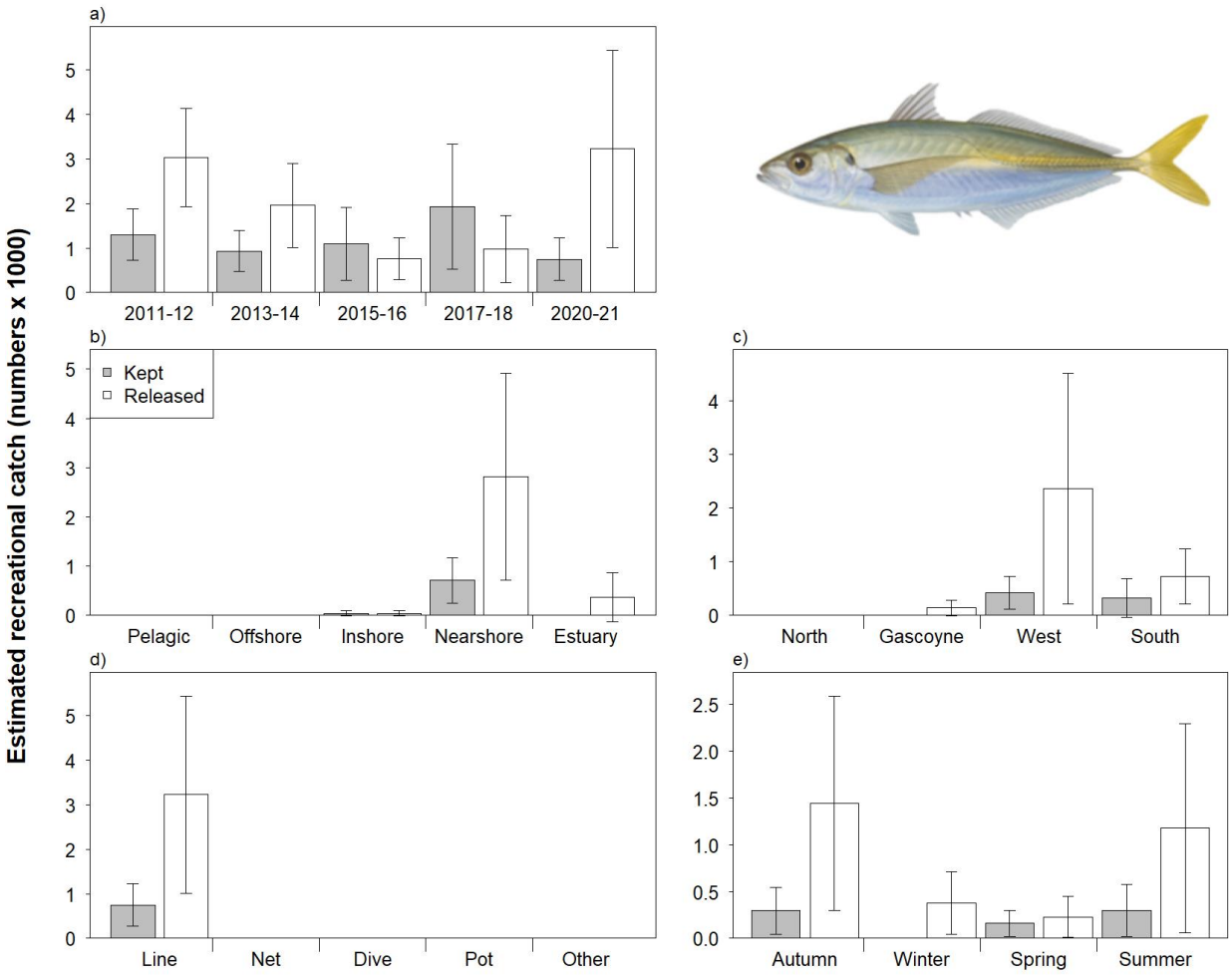


Figure 90. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Yellowtail Scad in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.6 Large Pelagic

6.6.1 Billfish (Family Istiophoridae)

Billfish include Black Marlin (*Makaira indica*), Blue Marlin (*M. nigricans*), Striped Marlin (*Tetrapturus audax*) and Sailfish (*Istiophorus platypterus*). Most boat-based recreational catches of Billfish occurred in the North Coast and Gascoyne Coast, with some catches in the West Coast (Figure 91c). The majority of catches were released (97%; Table 5, Figure 91a) with most releases attributed to 'catch and release' (Table 6). Catches were taken predominantly from inshore demersal and pelagic habitats (Figure 91b). All catches were taken by line fishing (Figure 91d). Billfish were harvested throughout the year, with higher catches in winter (Figure 91e). The kept and released catches of Billfish in 2020/21 were similar to previous surveys; however, catches for species in this taxon have high uncertainty (Figure 91a).

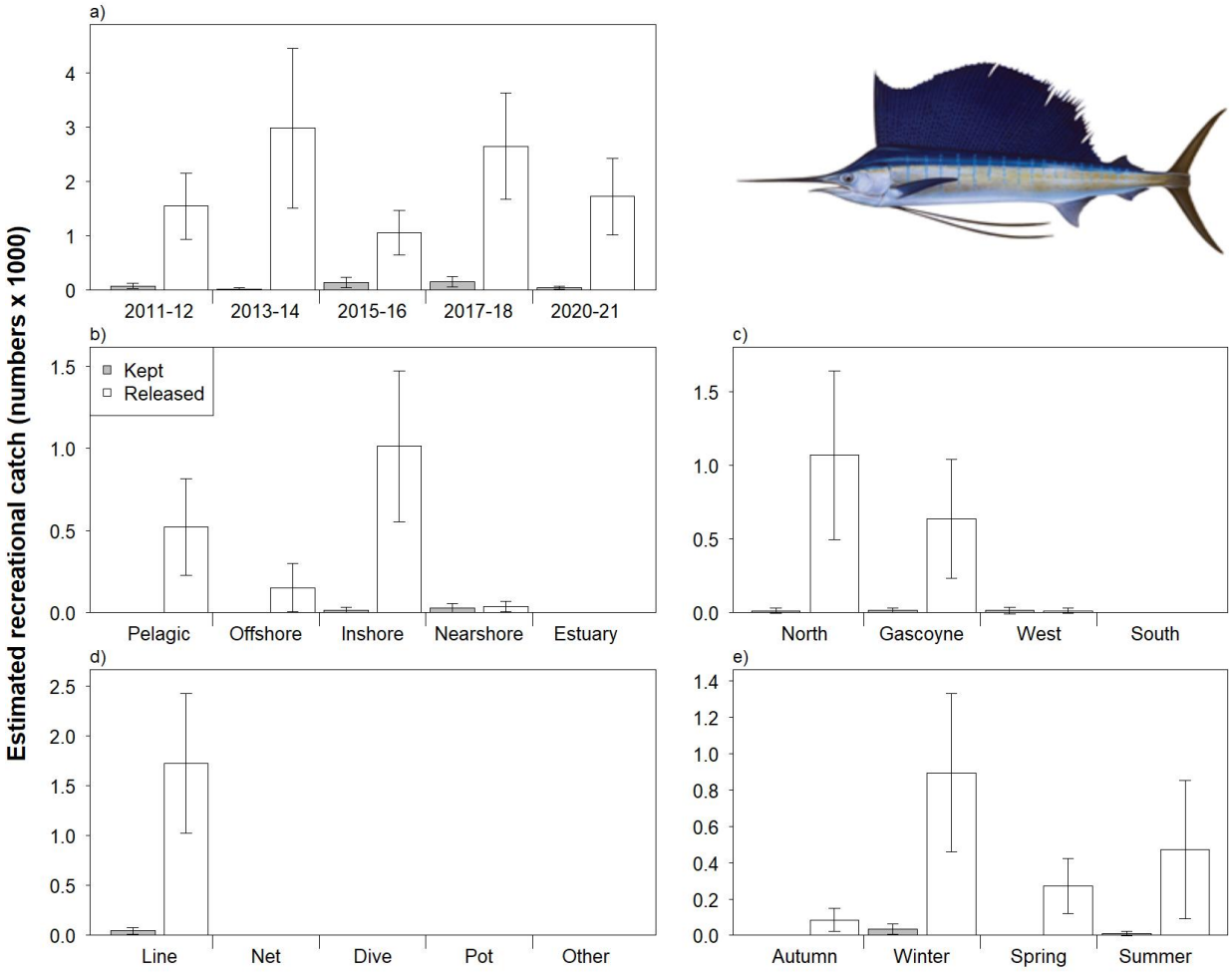


Figure 91. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Billfish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.6.2 Cobia (*Rachycentron canadum*)

Most boat-based recreational catches of Cobia occurred in the North Coast and Gascoyne Coast, with some catches in the West Coast (Figure 92c). The majority of catches were kept (37% released; Table 5, Figure 92a) with most releases attributed to 'too many' (Table 6). Catches were taken predominantly from inshore demersal habitat (Figure 92b). Most catches were taken by line fishing (Figure 92d). Cobia were harvested throughout the year, with higher catches in autumn and winter (Figure 92e). The kept and released catches of Cobia were similar to previous surveys (Figure 92a).

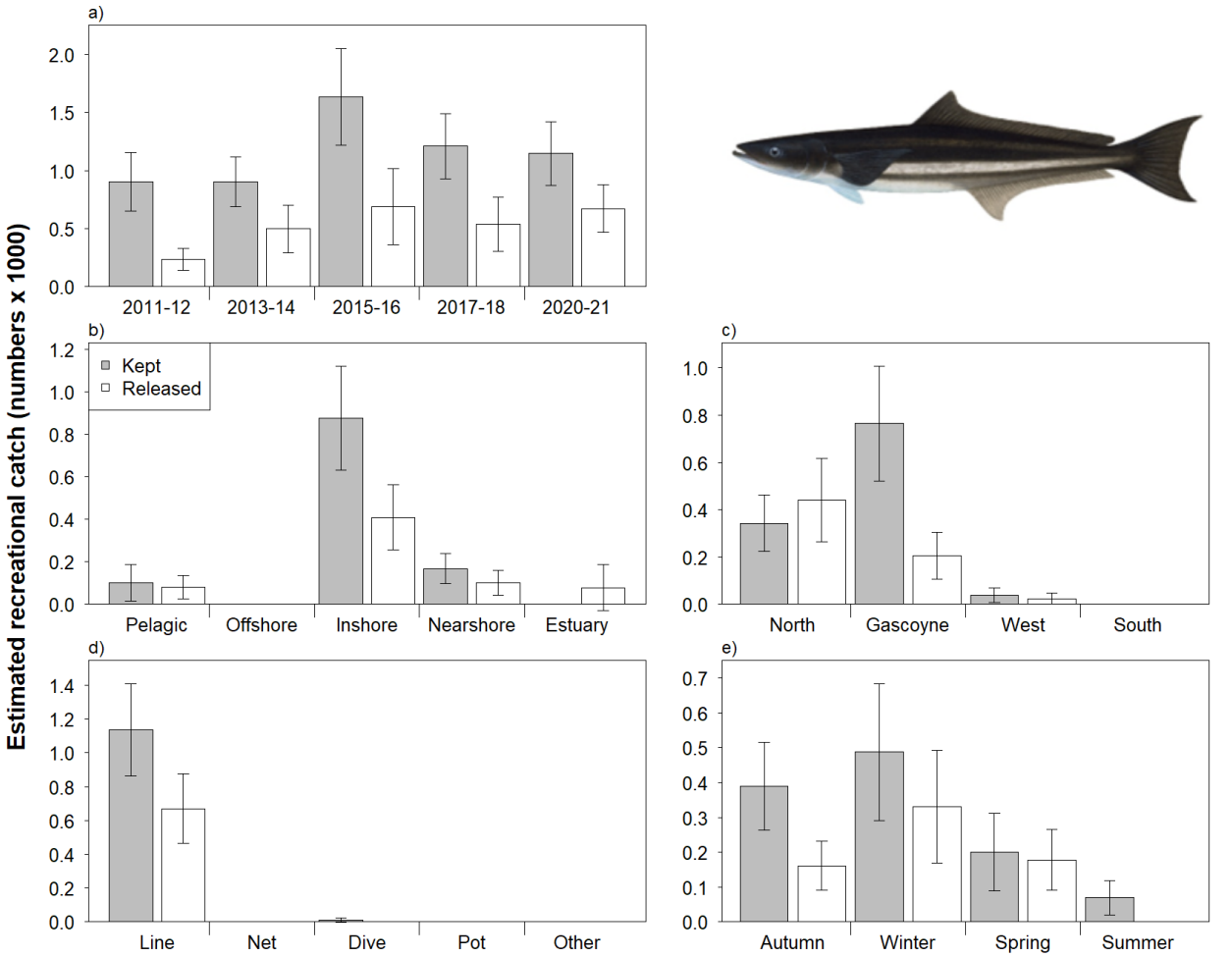


Figure 92. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Cobia in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.6.3 Grey Mackerel (*Scomberomorus semifasciatus*)

Grey Mackerel is an indicator species in the North Coast and Gascoyne Coast bioregions. Most boat-based recreational catches of Grey Mackerel occurred in the North Coast and Gascoyne Coast (Figure 93c). Similar proportions of the catch were kept and released (56% released; Table 5, Figure 93a) with most releases attributed to 'under size' and 'catch and release' (Table 6). Most catches were taken by line fishing (Figure 93d). Grey Mackerel were harvested throughout the year, with higher catches in autumn and winter (Figure 93e). The kept and released catches of Grey Mackerel in 2020/21 was similar to 2017/18, however, catches for this species have low sample sizes and high uncertainty (Figure 93a).

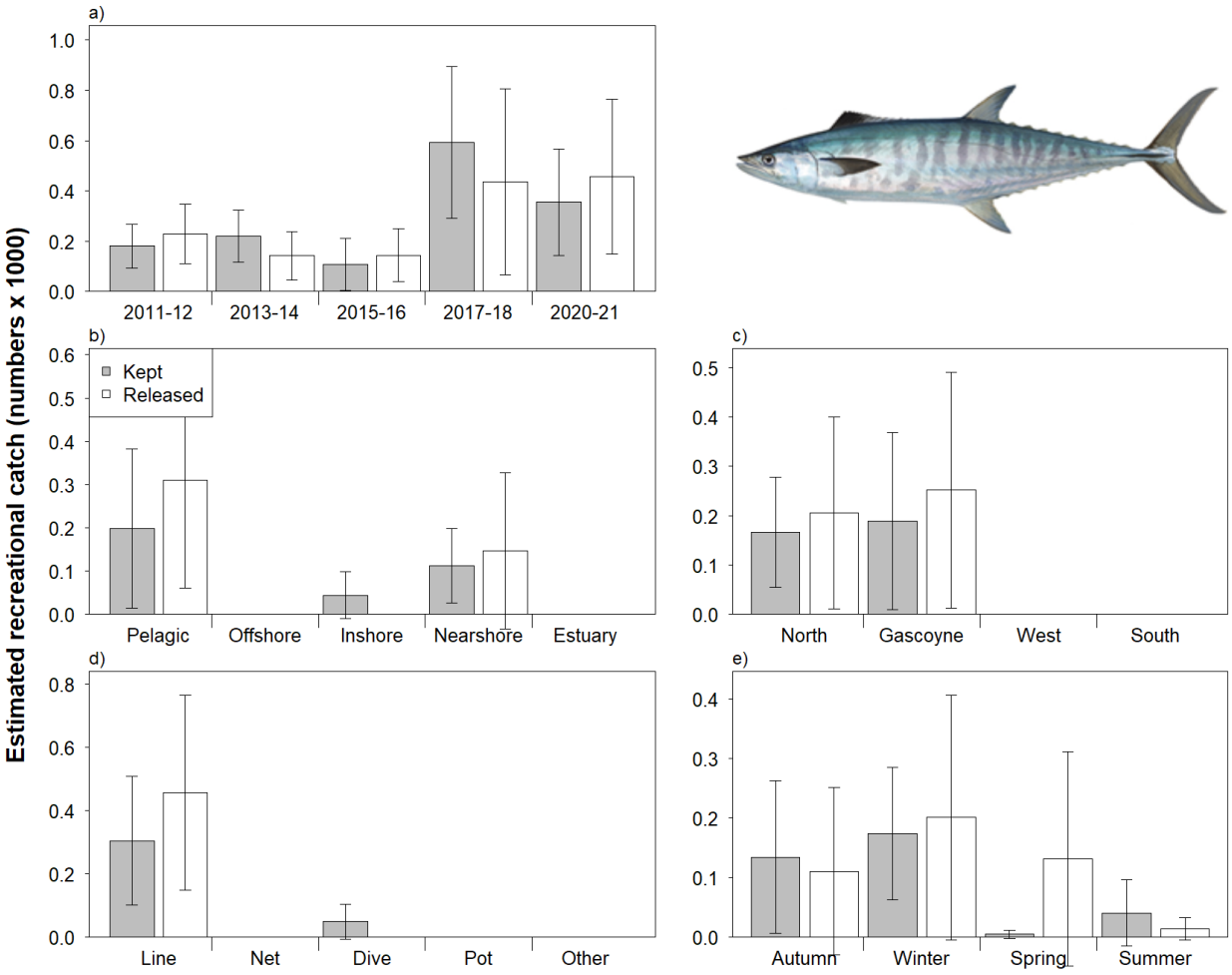


Figure 93. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Grey Mackerel in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.6.4 School Mackerel (*Scomberomorus queenslandicus*)

Most boat-based recreational catches of School Mackerel occurred in the North Coast and Gascoyne Coast, with some catches in the West Coast (Figure 94c). The majority of catches were kept (40% released; Table 5, Figure 94a) with most releases attributed to 'under size' and 'too many' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitat (Figure 94b). Most catches were taken by line fishing (Figure 94d). School Mackerel were harvested throughout the year, with higher catches in winter (Figure 94e). The kept and released catches of School Mackerel in 2020/21 were similar to previous surveys (Figure 94a).

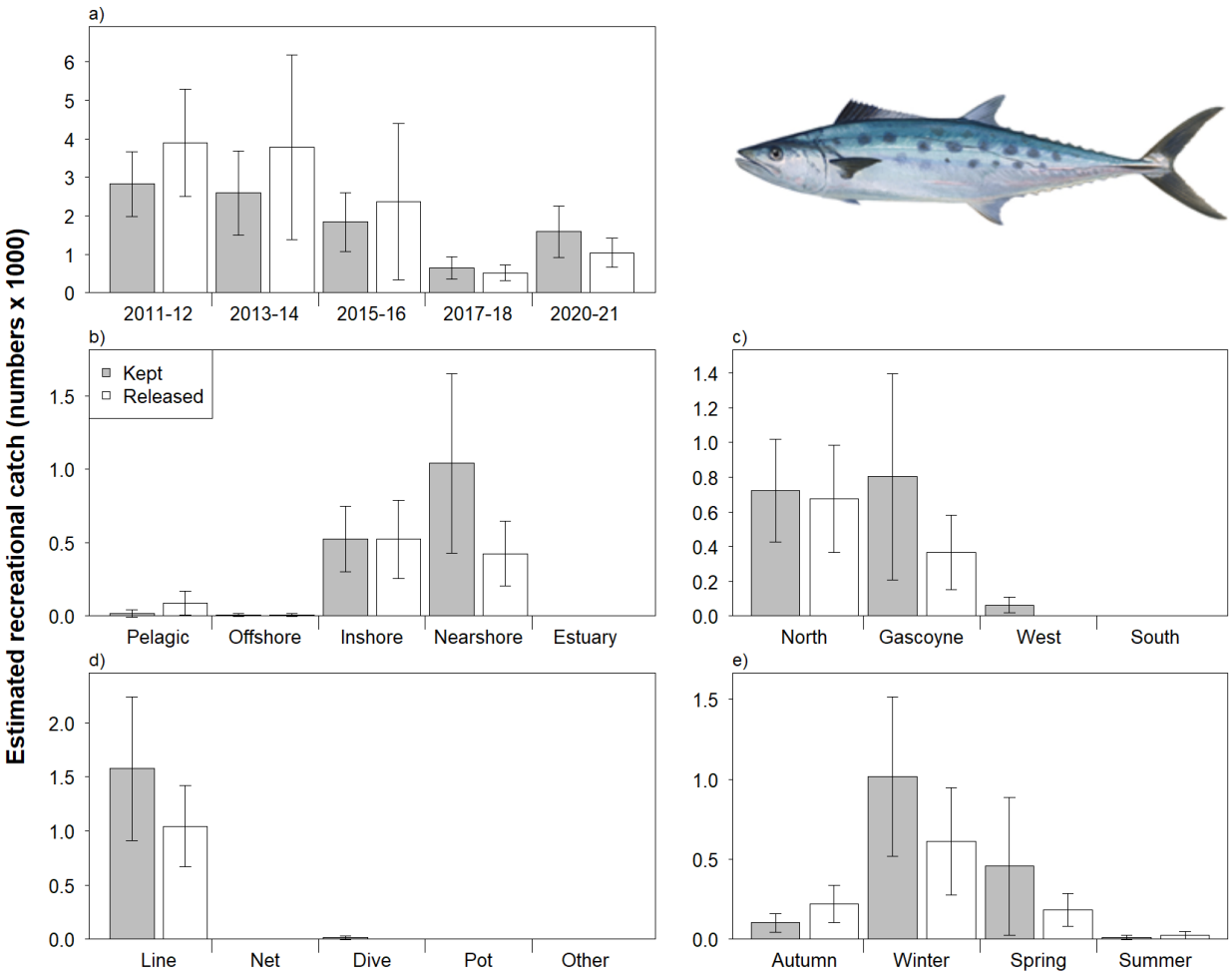


Figure 94. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of School Mackerel in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.6.5 Shark Mackerel (*Grammatorcynus bicarinatus*)

Most boat-based recreational catches of Shark Mackerel occurred in the North Coast and Gascoyne Coast, with some catches in the West Coast (Figure 95c). The majority of catches were released (79%; Table 5, Figure 95a) and mostly attributed to 'too many', 'under size' or 'other' (Table 6). Catches were taken predominantly from inshore demersal, nearshore and pelagic habitats (Figure 95b). Most catches were taken by line fishing (Figure 95d). Shark Mackerel were harvested throughout the year, with lower catches in summer (Figure 95e). The kept and released catches of Shark Mackerel in 2020/21 were similar to previous surveys (Figure 95a).

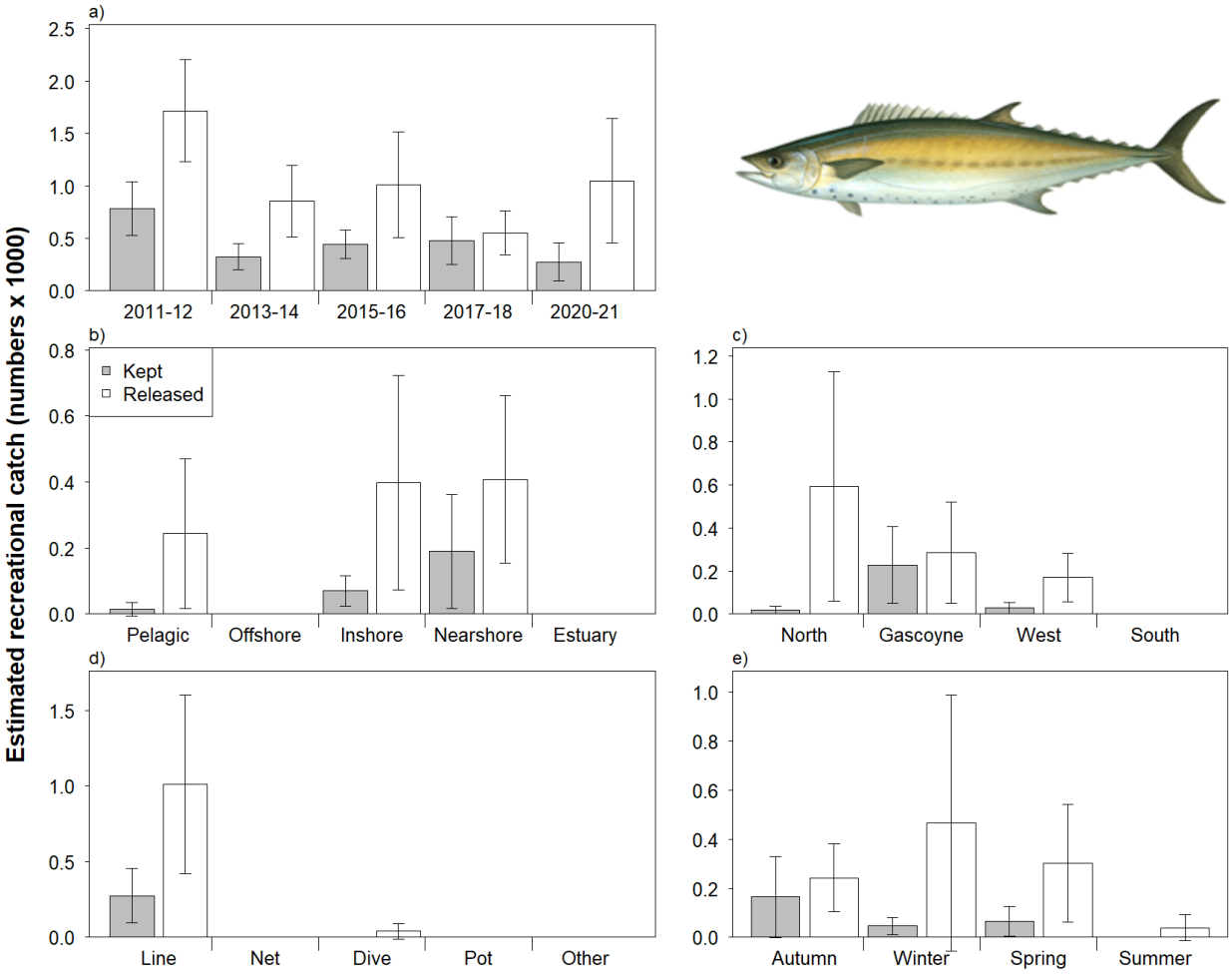


Figure 95. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Shark Mackerel in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.6.6 Spanish Mackerel (*Scomberomorus commerson*)

Spanish Mackerel is an indicator species in the North Coast and Gascoyne Coast bioregions. Most boat-based recreational catches of Spanish Mackerel occurred in the Gascoyne Coast and North Coast, with some catches in the West Coast (Figure 96c). The majority of catches were kept (41% released; Table 5, Figure 96a) with most releases attributed to 'under size' or 'other' (Table 6). Catches were taken from inshore demersal, nearshore and pelagic habitats (Figure 96b). Most catches were taken by line fishing (Figure 96d). Spanish Mackerel were harvested throughout the year, with lower catches in summer (Figure 96e). The kept and released catches of Spanish Mackerel in 2020/21 were similar to the previous two surveys (Figure 96a).

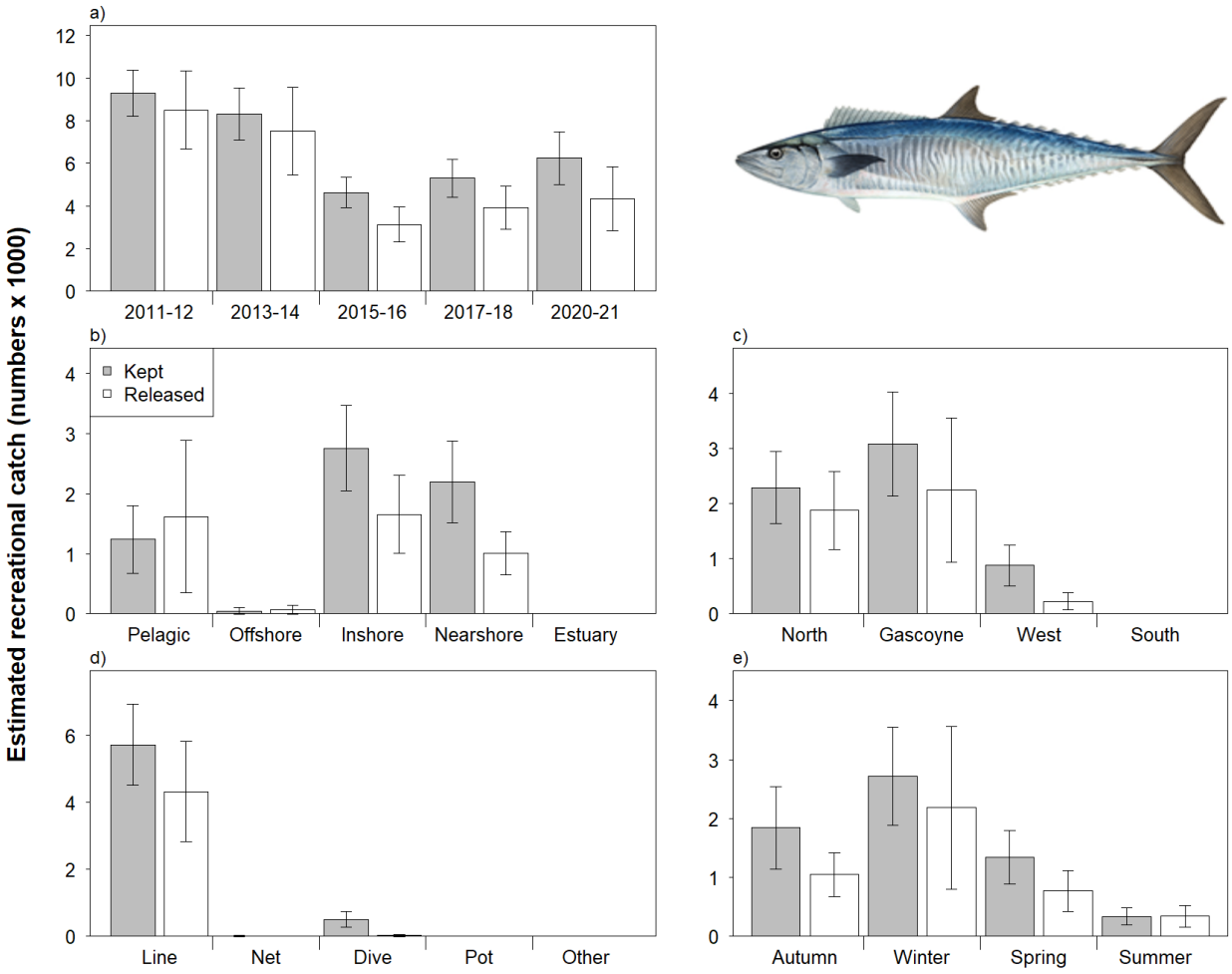


Figure 96. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Spanish Mackerel in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.6.7 Samsonfish (*Seriola hippos*)

Samsonfish is an indicator species in the West Coast bioregion. Most boat-based recreational catches of Samsonfish occurred in the West Coast, with some catches in the South Coast (Figure 97c). The majority of catches were released (84%; Table 5, Figure 97a) and mostly attributed to 'too many' or 'other' (Table 6). Catches were taken from inshore demersal and nearshore habitats (Figure 97b). Most catches were taken by line fishing (Figure 97d). Samsonfish were harvested throughout the year, with lower catches in summer (Figure 97e). The kept catch of Samsonfish in 2020/21 was lower compared with 2011/12 and 2013/14, while the released catch in 2020/21 was similar to previous surveys (Figure 97a).

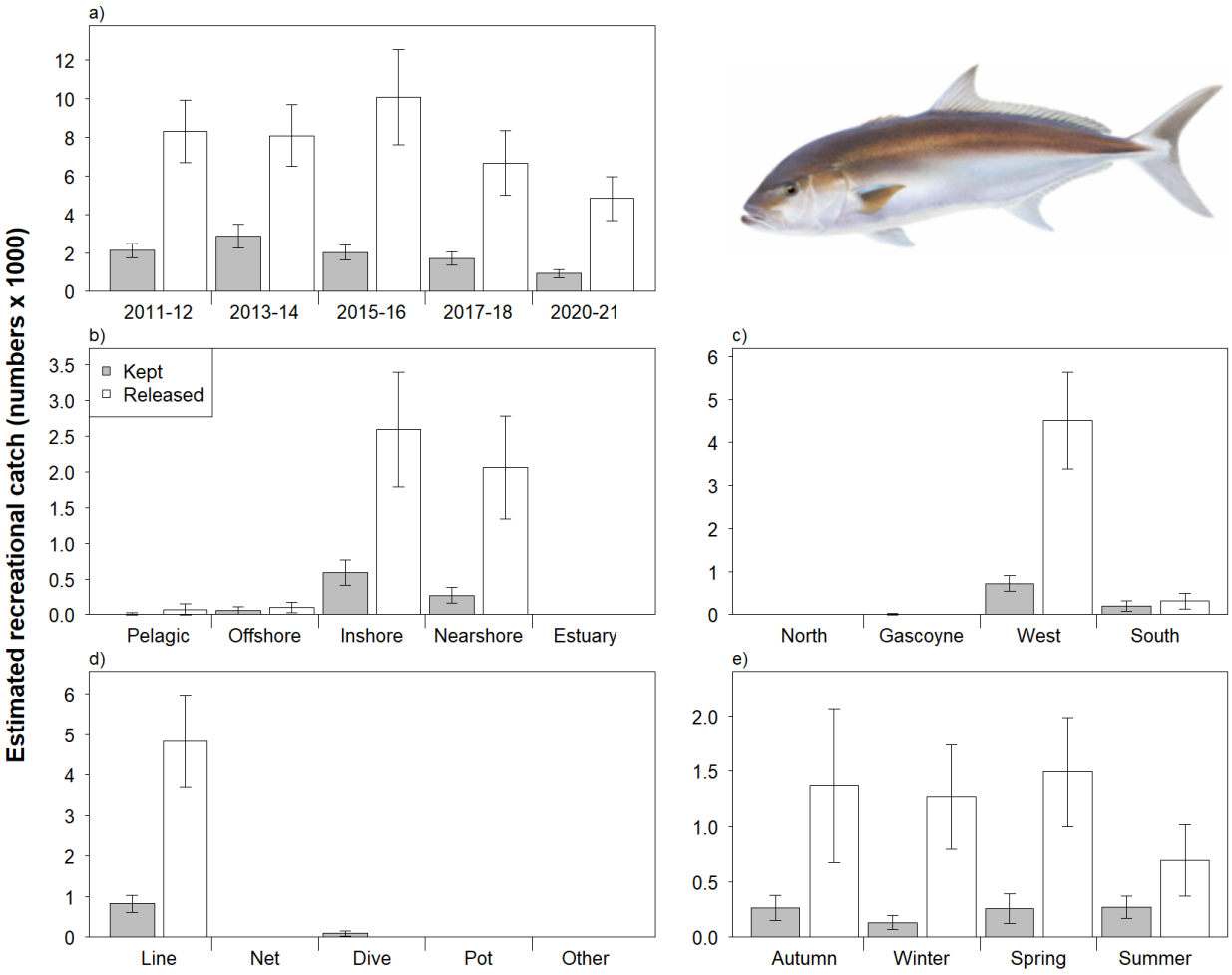


Figure 97. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Samsonfish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.6.8 Yellowtail Kingfish (*Seriola lalandi*)

Most boat-based recreational catches of Yellowtail Kingfish occurred in the West Coast, with some catches in the Gascoyne Coast and South Coast (Figure 98c). The majority of catches were kept (31% released; Table 5, Figure 98a) with most releases attributed to 'too small', 'too many' or 'catch and release' (Table 6). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 98b). Most catches were taken by line fishing, with some by diving (Figure 98d). Yellowtail Kingfish were harvested throughout the year, with higher catches in summer (Figure 98e). The kept and released catches of Yellowtail Kingfish in 2020/21 were similar to previous surveys (Figure 98a).

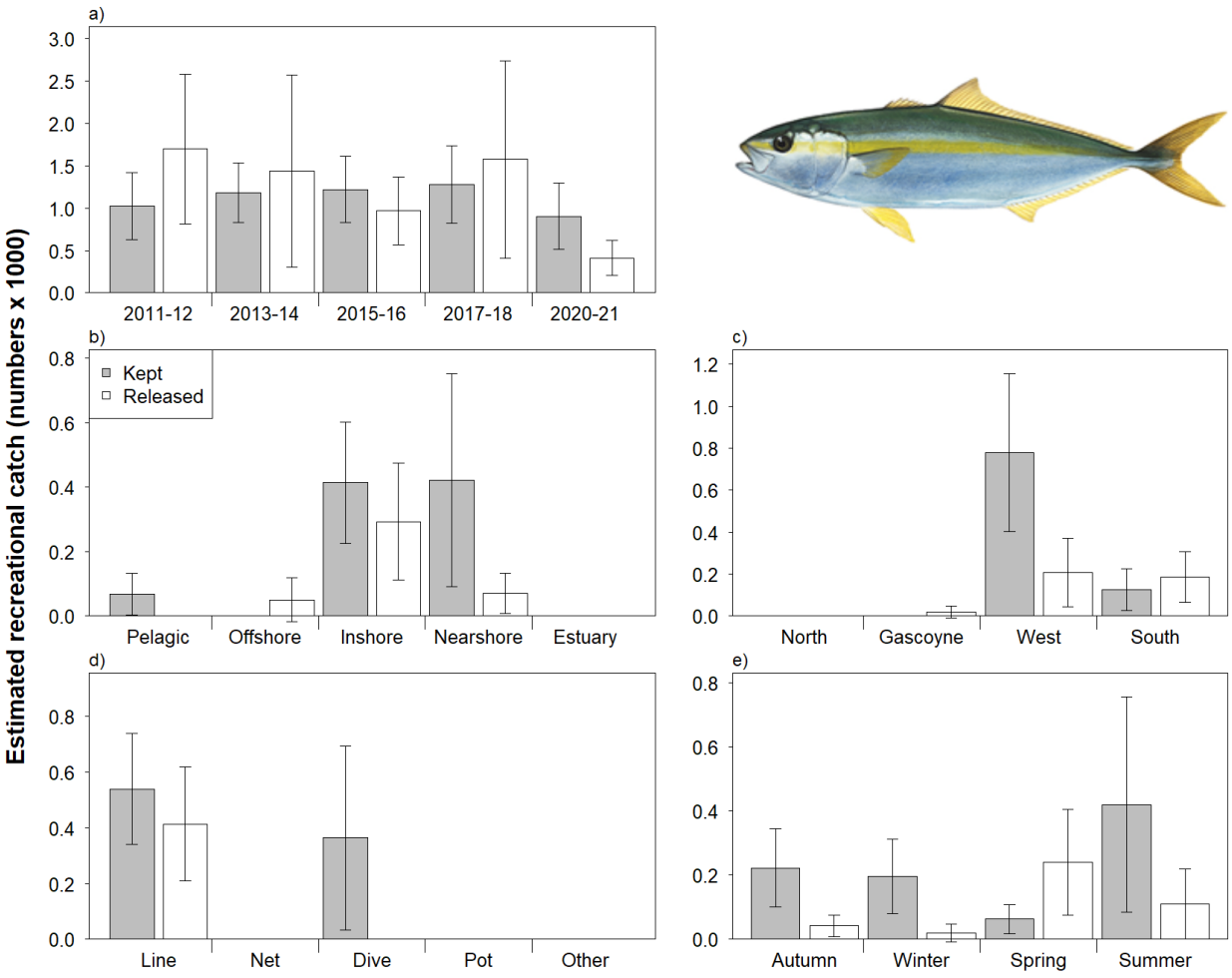


Figure 98. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Yellowtail Kingfish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.6.9 Mackerel Tuna (*Euthynnus affinis*)

Most boat-based recreational catches of Mackerel Tuna occurred in the North Coast, with some catches in the Gascoyne Coast and West Coast (Figure 99c). The majority of catches were released (84%; Table 5, Figure 99a) and mostly attributed to 'catch and release', 'too many' or 'other' (Table 6). Catches were taken predominantly from inshore demersal, nearshore and pelagic habitats (Figure 99b). All catches were taken by line fishing (Figure 99d). Mackerel Tuna were harvested throughout the year, with lower catches in summer (Figure 99e). The kept and released catches of Mackerel Tuna in 2020/21 were similar to previous surveys (Figure 99a).

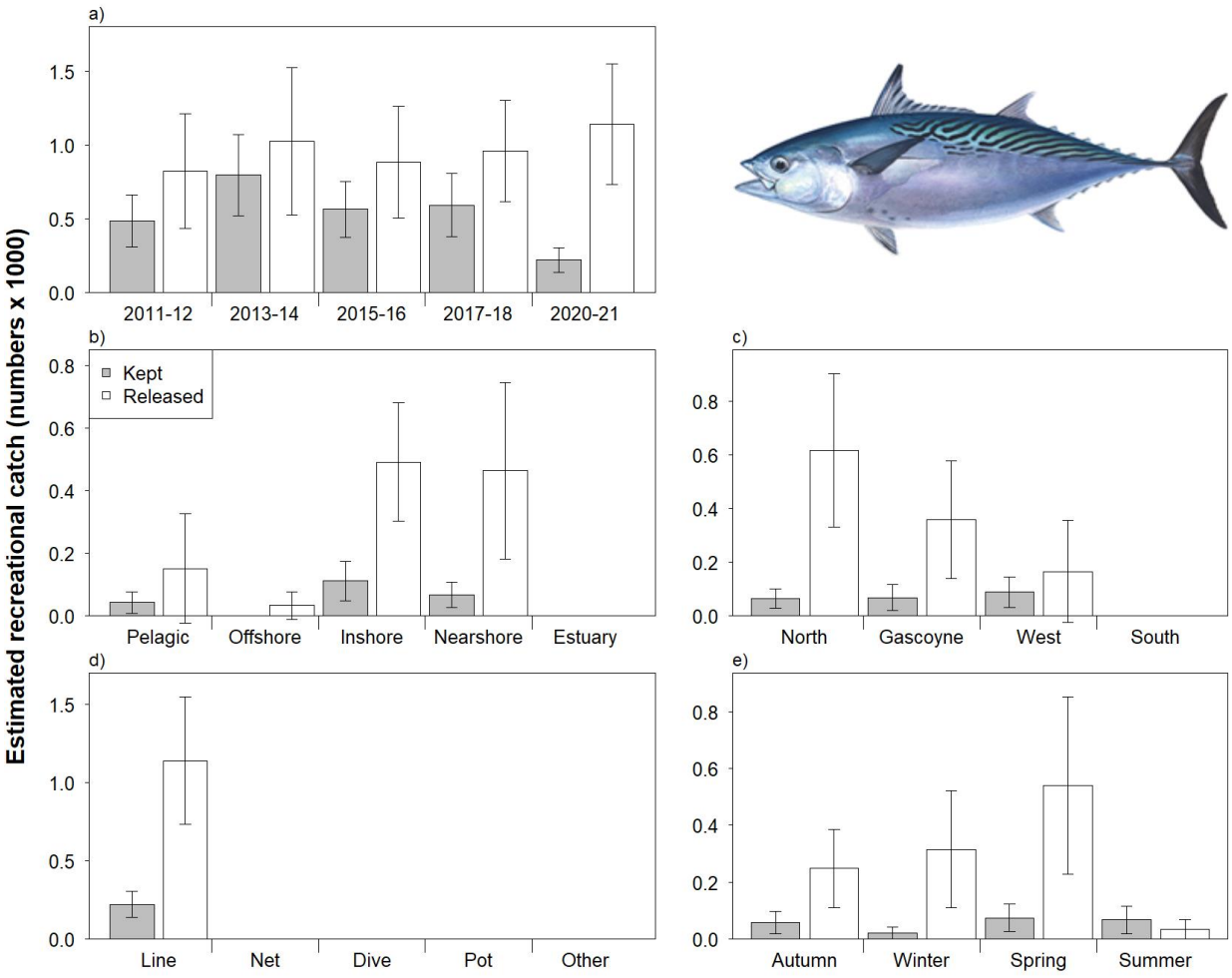


Figure 99. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Mackerel Tuna in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.6.10 Southern Bluefin Tuna (*Thunnus maccoyii*)

Most boat-based recreational catches of Southern Bluefin Tuna occurred in the West Coast, followed by the South Coast, North Coast and Gascoyne Coast (Figure 100c). The majority of catches were kept (20% released; Table 5, Figure 100a) with most releases attributed to 'too many' (Table 6). Catches were taken predominantly from inshore demersal, nearshore and pelagic habitats (Figure 100b). All catches were taken by line fishing (Figure 100d). Southern Bluefin Tuna were harvested throughout the year, with lower catches in winter (Figure 100e). The kept and released catches of Southern Bluefin Tuna in 2020/21 were similar to the previous two surveys (Figure 100a).

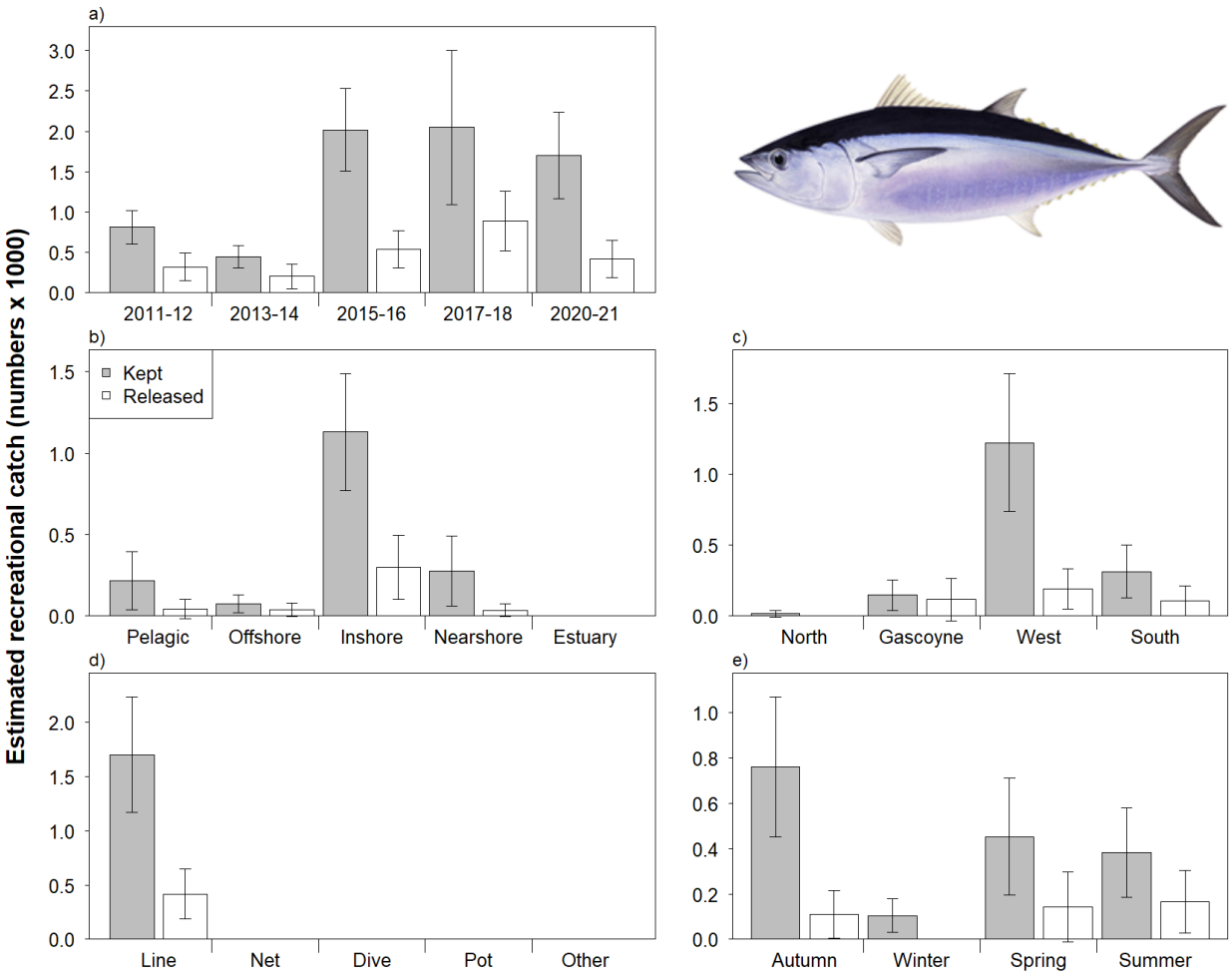


Figure 100. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Southern Bluefin Tuna in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.6.11 Yellowfin Tuna (*Thunnus albacares*)

Most boat-based recreational catches of Yellowfin Tuna occurred in the West Coast, followed by the Gascoyne Coast and North Coast (Figure 101c). The majority of catches were kept (47% released; Table 5, Figure 101a) with most releases attributed to 'catch and release' (Table 6). Catches were taken predominantly from inshore demersal and pelagic habitats (Figure 101b). Most catches were taken by line fishing Figure 101d). Yellowfin Tuna were harvested throughout the year, with lower catches in spring (Figure 101e). The kept and released catches of Yellowfin Tuna in 2020/21 were similar to previous surveys (Figure 101a).

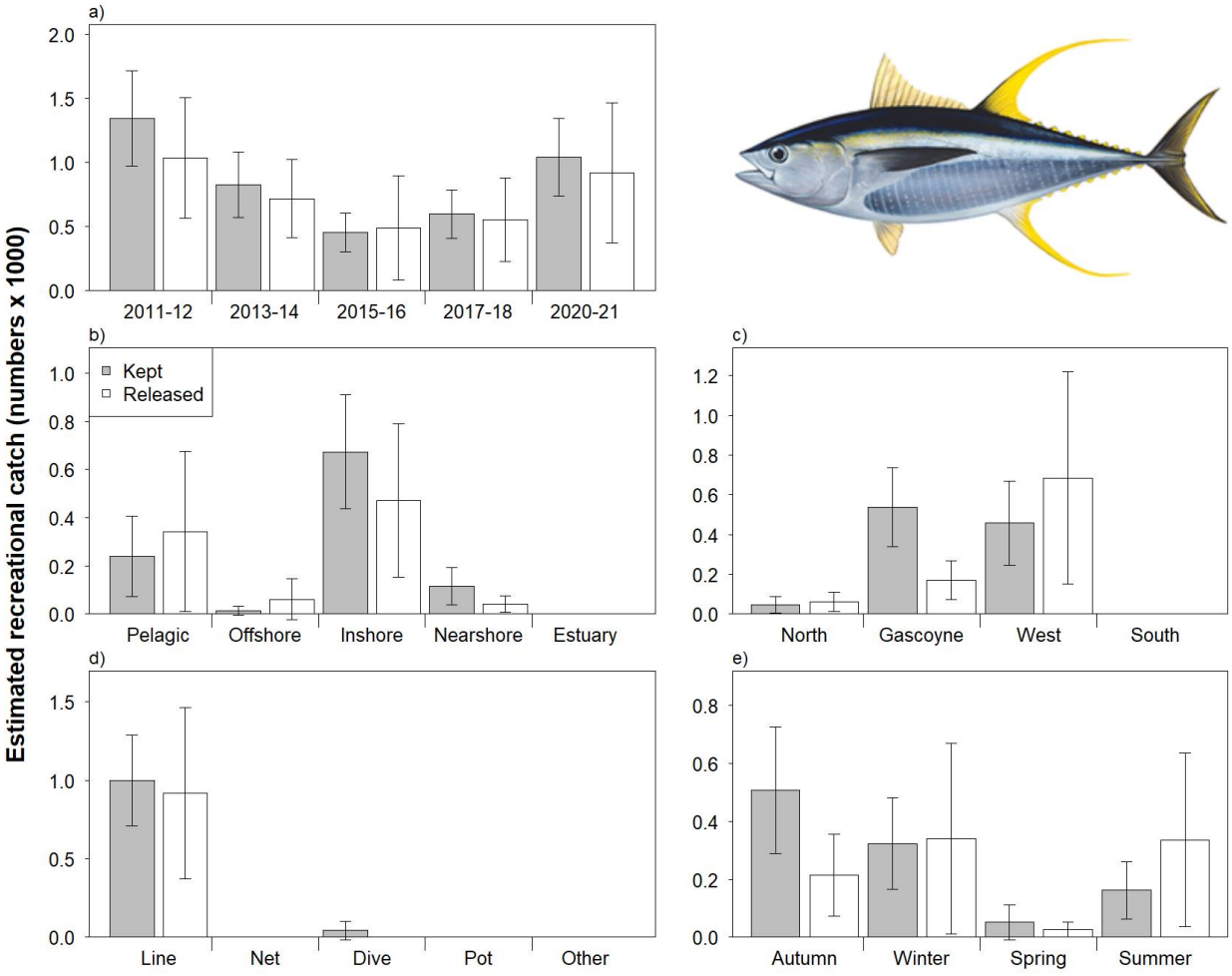


Figure 101. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Yellowfin Tuna in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.7 Sharks

6.7.1 Gummy Sharks (*Mustelus antarcticus* and *M. stevensi*)

Gummy Sharks includes Gummy Shark (*Mustelus antarcticus*), which occurs nearshore to about 80m from the South Coast to Geraldton, and Western Spotted Gummy Shark (*M. stevensi*), which occurs at depths of 120–400m from Shark Bay to the Kimberley (Last and Stevens 2009). Most boat-based recreational catches of Gummy Sharks occurred in the West Coast (Figure 102c). The majority of catches were kept (32% released; Table 5, Figure 102a) with most releases attributed to 'too many' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 102b). All catches were taken by line fishing (Figure 102d). Gummy Sharks were harvested throughout the year, with higher catches in summer and autumn (Figure 102e). The kept and released catches of Gummy Sharks in 2020/21 were similar to previous surveys (Figure 102a).

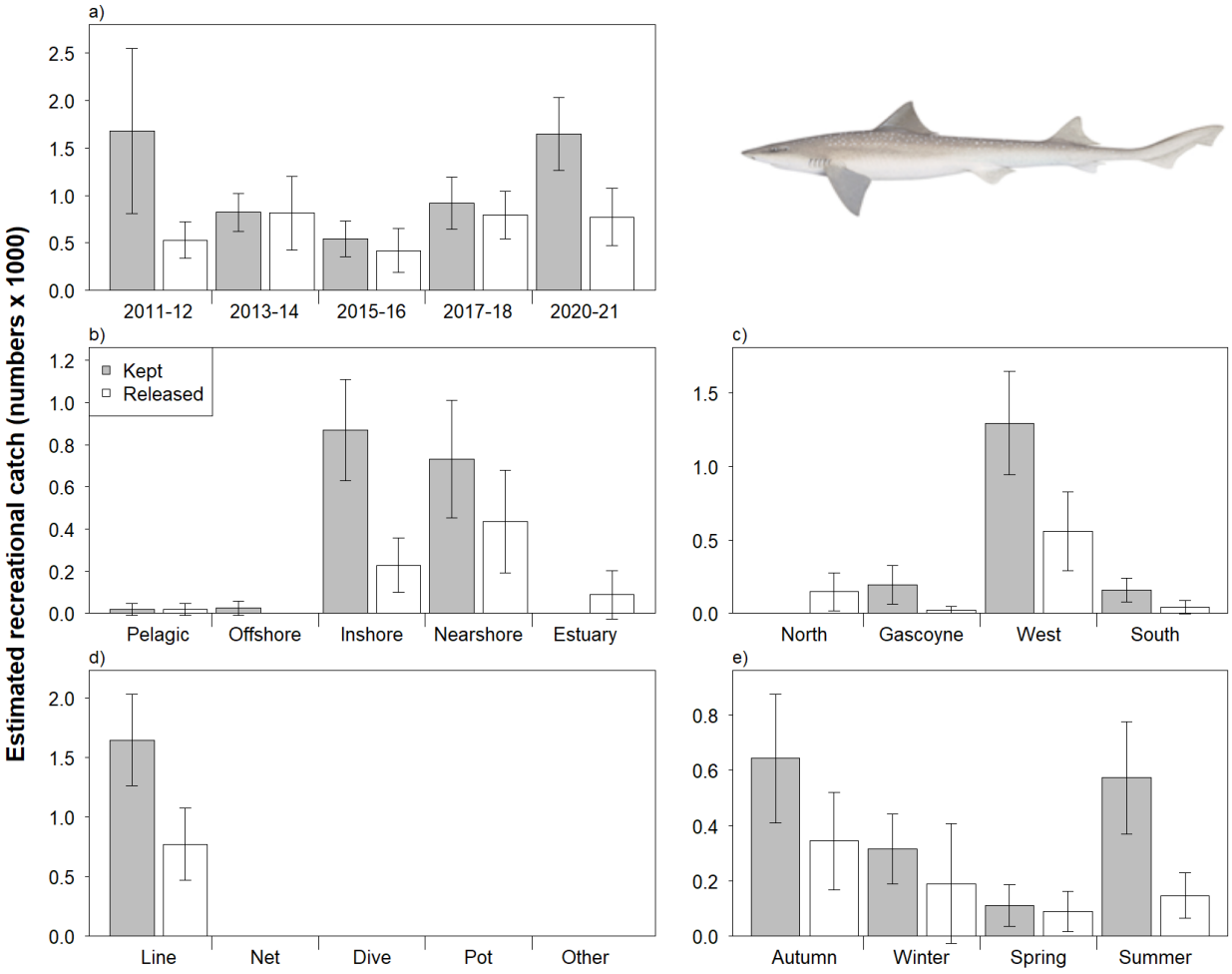


Figure 102. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Gummy Sharks in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.7.2 Port Jackson Shark (*Heterodontus portusjacksoni*)

Most boat-based recreational catches of Port Jackson Shark occurred in the West Coast, with some catches in the South Coast (Figure 103c). Almost all catches were released (98%; Table 5, Figure 103a) and mostly attributed to 'too many' (Table 6). Catches were taken from nearshore and inshore demersal habitats (Figure 103b). Most catches were taken by line fishing (Figure 103d). Port Jackson Shark were harvested throughout the year, with higher catches in autumn and winter (Figure 103e). The kept and released catches of Port Jackson Shark in 2020/21 were similar to previous surveys (Figure 103a).

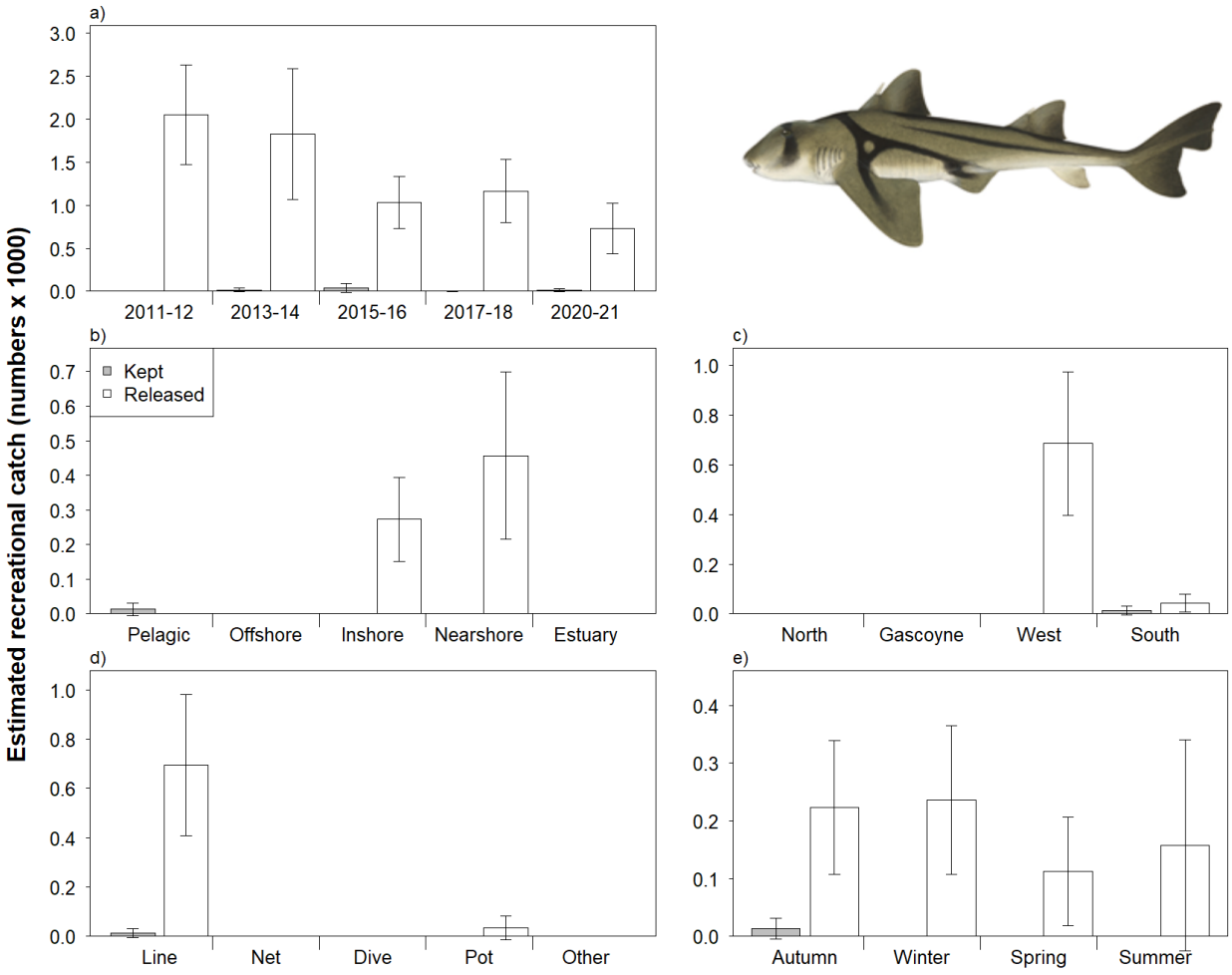


Figure 103. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Port Jackson Shark in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.7.3 Whaler Sharks (Family Carcharhinidae)

Whaler Sharks are a statewide indicator species. Whaler Sharks (Family Carcharhinidae) include Blacktip Reef Shark (*Carcharhinus melanopterus*), Bronze Whaler (*Carcharhinus brachyurus*), Dusky Whaler (*Carcharhinus obscurus*), Lemon Shark (*Negaprion acutidens*), Sandbar Shark (*Carcharhinus plumbeus*), Tiger Shark (*Galeocerdo cuvier*), Whitetip Reef Shark (*Triaenodon obesus*) and Other Whaler Sharks (Carcharhinidae – undifferentiated). Most boat-based recreational catches occurred in the North Coast, with some catches in the Gascoyne Coast and West Coast (Figure 104c). The majority of catches were released (93%; Table 5, Figure 104a) and mostly attributed to 'too many' (Table 6). Catches were mostly taken from inshore demersal and nearshore habitats (Figure 104d). All catches were taken by line fishing (Figure 104d). Catches occurred throughout the year, with higher catches in summer, autumn and winter (Figure 104e). The kept and released catches of Whaler Sharks in 2020/21 were similar to previous surveys (Figure 104a).

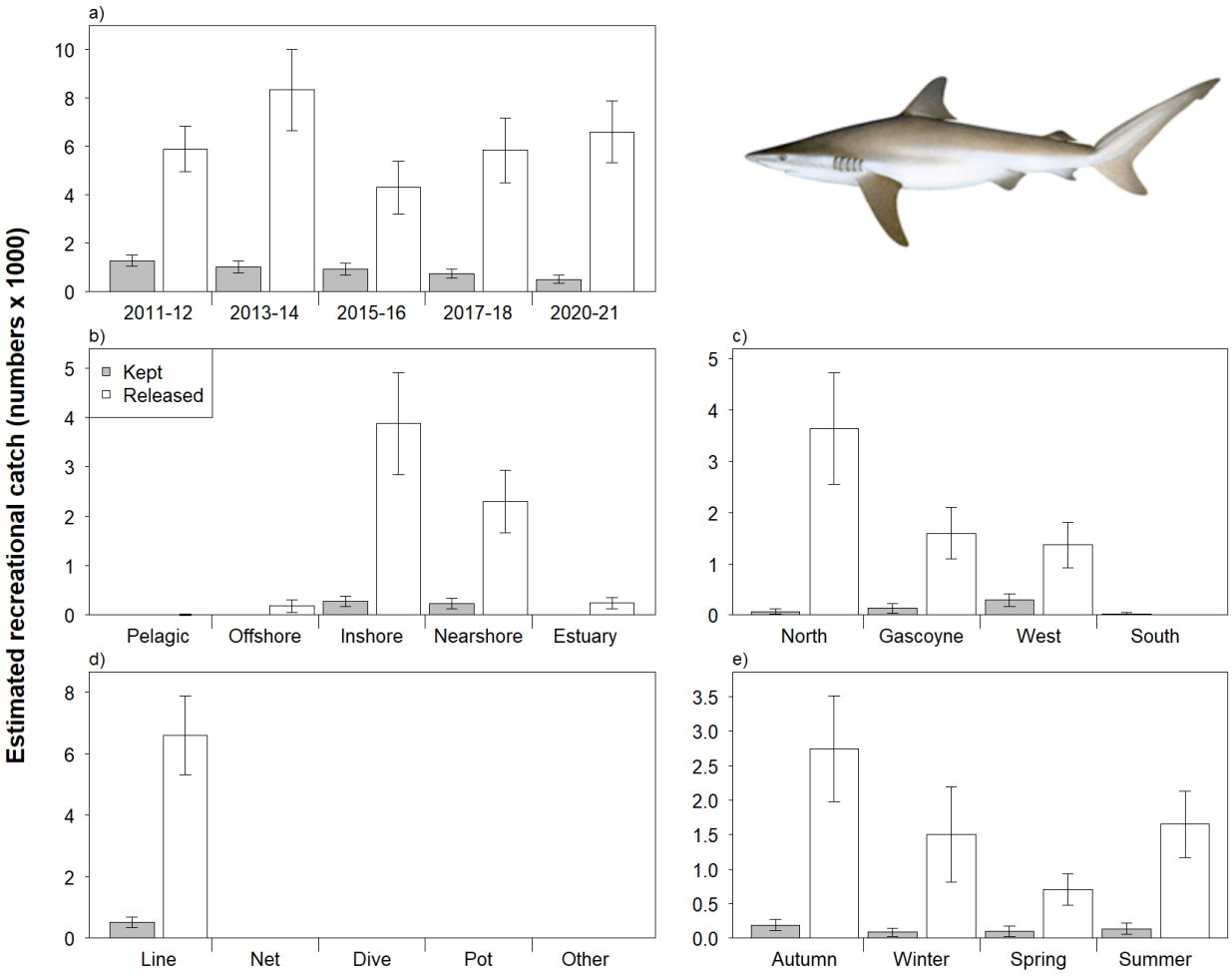


Figure 104. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Whaler Sharks in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.7.4 Wobbegong (Family Orectolobidae)

Most boat-based recreational catches of Wobbegong occurred in the West Coast, with some catches in the Gascoyne Coast and South Coast (Figure 105c). The majority of catches were released (84%; Table 5, Figure 105a). Catches were taken predominantly from inshore demersal and nearshore habitats (Figure 105b). Most catches were taken by line fishing with some catches from potting (Figure 105d). Wobbegong were harvested throughout the year, with higher catches spring, summer and autumn (Figure 105e). The kept and released catches of Wobbegong in 2020/21 were similar to previous surveys, however, catches for this species have high uncertainty (Figure 105a).

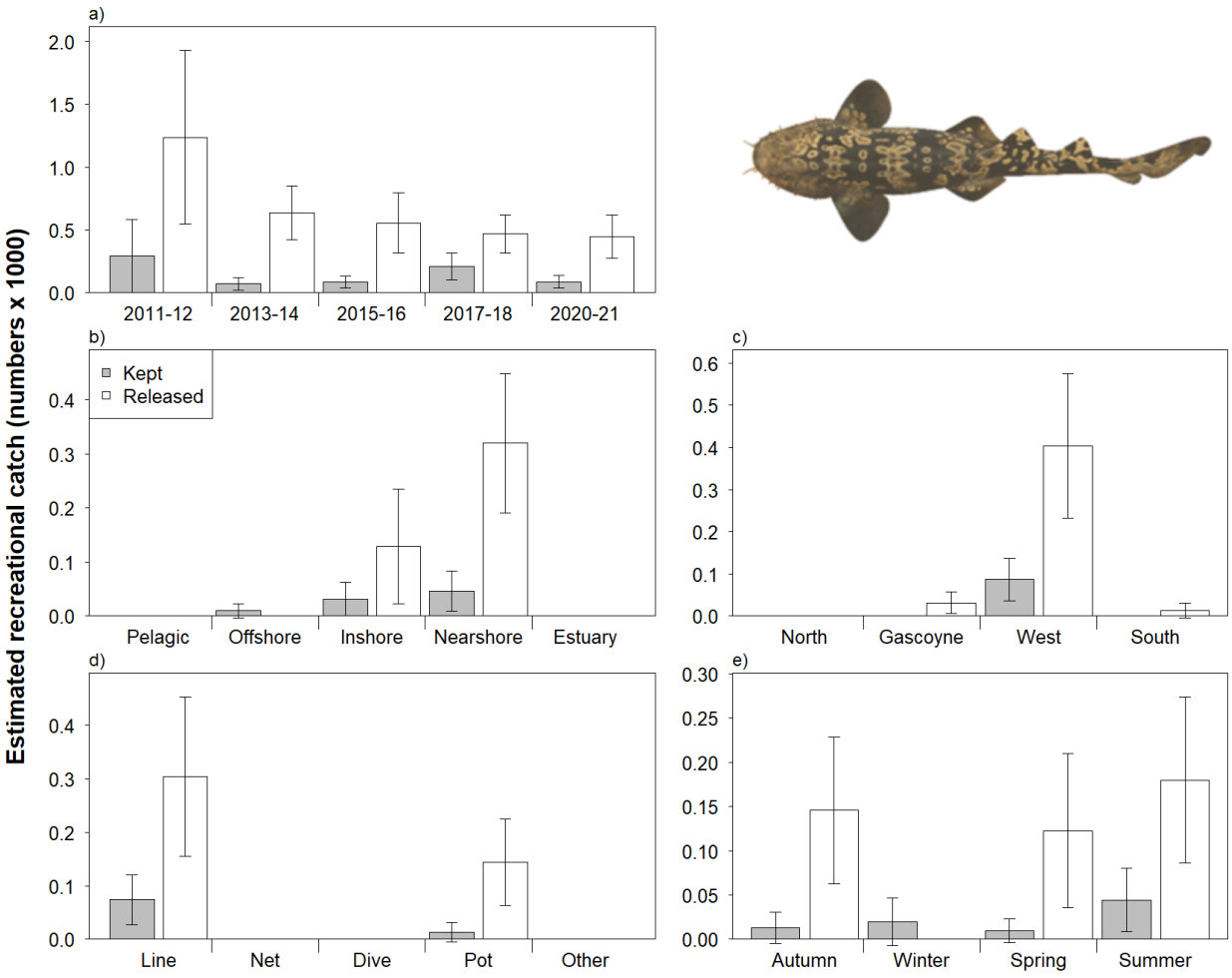


Figure 105. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Wobbegong in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.8 Crustaceans

6.8.1 Western Rock Lobster (*Panulirus cygnus*)

Catch data from this survey does not account for catches from fishers that only have a Rock Lobster licence. Approximately 40% of Rock Lobster licence holders do not have a RBFL; therefore, these results underestimate the catch of Western Rock Lobster. Most boat-based recreational catches occurred in the West Coast (Figure 106c). The majority of catches were kept (28% released; Table 5, Figure 106a) with most releases attributed to 'under size' and 'over limit' (Table 6). Catches were taken predominantly from nearshore habitat (Figure 106b). Most catches were taken by potting (90%), followed by diving (8%) (Figure 106d). Rock Lobster were harvested throughout the year, with higher catches in summer (68%), followed by spring (20%) (Figure 106e). The kept catch in 2020/21 was higher compared with 2011/12, 2013/14 and 2015/16, and the released catch in 2020/21 was higher compared with 2011/12 (Figure 106a).

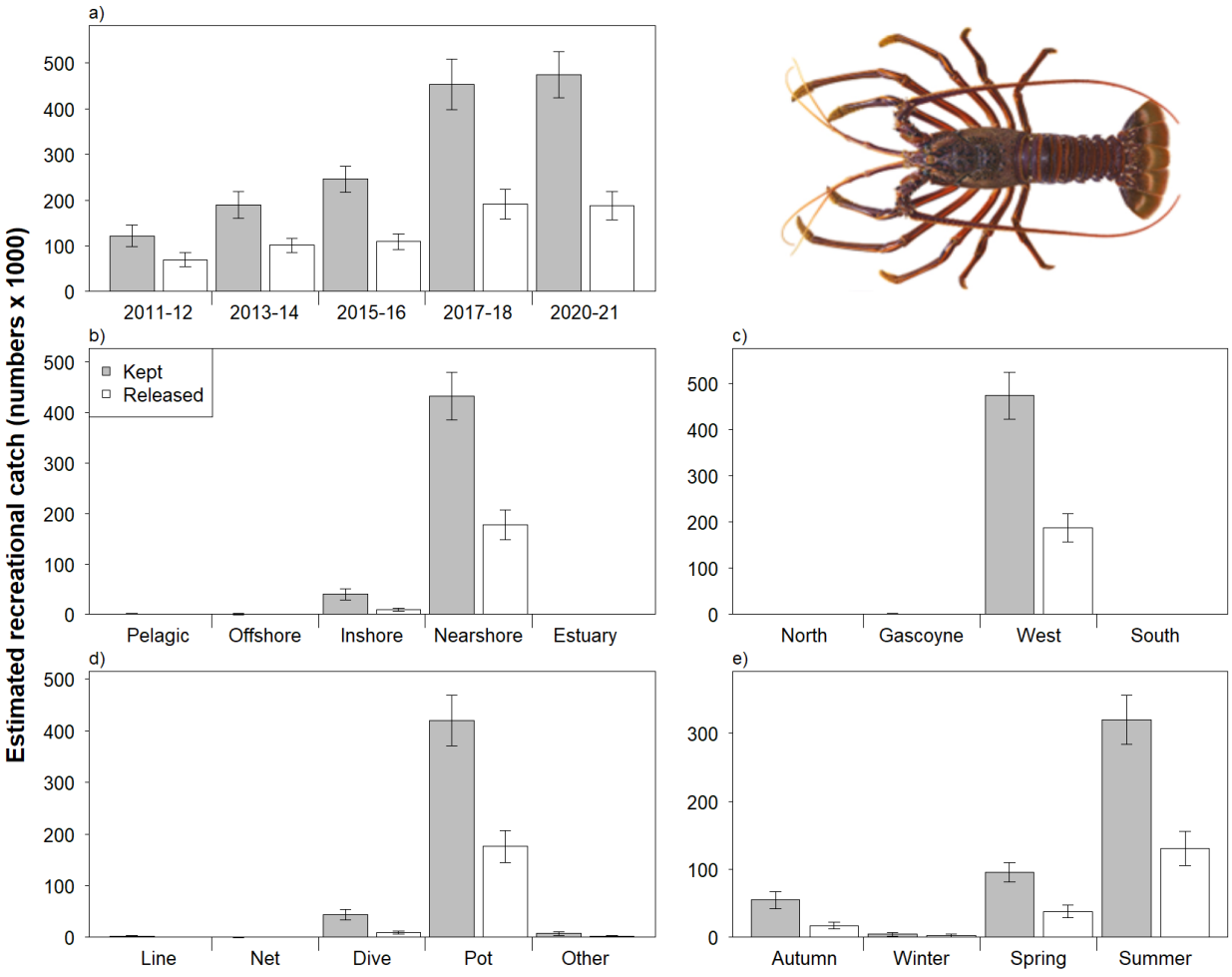


Figure 106. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Western Rock Lobster in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.8.2 Blue Swimmer Crab (*Portunus armatus*)

Blue Swimmer Crab, previously known as *Portunus pelagicus*, but now classified as *Portunus armatus*, is harvested statewide. Most boat-based recreational catches of Blue Swimmer Crab occurred in the West Coast (96%), with some catches in the North Coast (1%) and Gascoyne Coast (3%, Figure 107c). The majority of catches were kept (65% released; Table 5, Figure 107a) with most releases attributed to 'under size' (Table 6). Catches were taken predominantly from nearshore and estuarine habitats (Figure 107b). Most catches were taken by pots (88%, including drop nets) (Figure 107d). Blue Swimmer Crab were harvested throughout the year, with higher catches in summer (65%), followed by autumn (22%) and spring (9%) (Figure 107e). The kept and released catches of Blue Swimmer Crab in 2020/21 were similar to previous surveys, except the kept catch was lower compared with 2011/12 (Figure 107a).

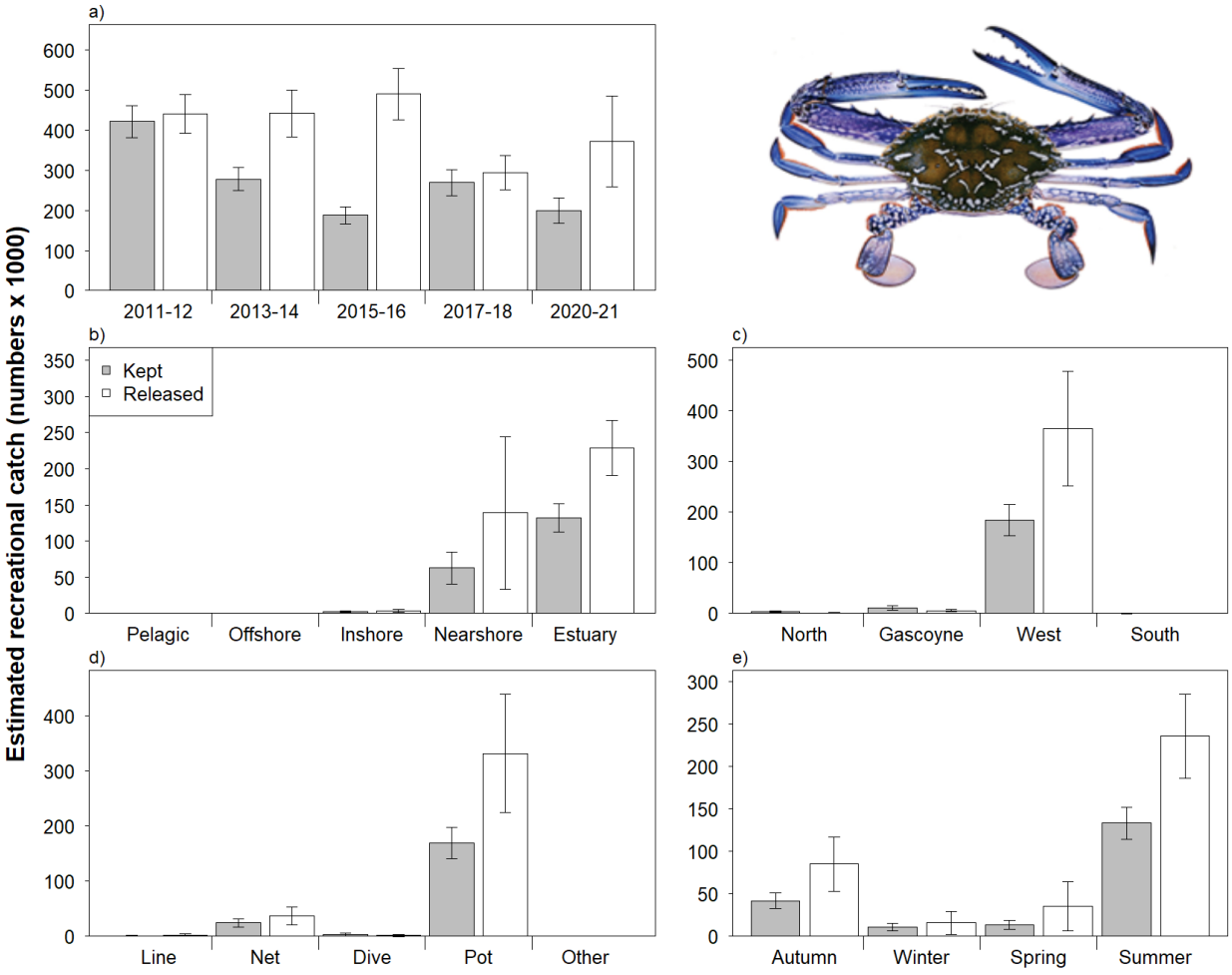


Figure 107. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Blue Swimmer Crab in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.8.3 Mud Crab (*Scylla olivacea* and *S. serrata*)

Mud Crabs include Brown Mud Crab (*Scylla olivacea*) and Green Mud Crab (*S. serrata*). Most boat-based recreational catches of Mud Crab occurred in the North Coast (91%), with some catches in the Gascoyne Coast (8%) and West Coast (1%; Figure 108c). These proportions were comparable with previous surveys. Similar proportions of the catch were kept and released (49% released for Brown Mud Crab and 40% for Green Mud Crab; Table 5, Figure 108a) with most releases attributed to 'under size', noting the difference in noting the difference in minimum legal size of 120 mm carapace width for Brown Mud Crab and 150 mm for Green Mud Crab. (Table 6). Catches were taken predominantly from nearshore and estuarine habitats (Figure 108b). Most catches were taken by pots (Figure 108d). Mud Crab were harvested throughout the year, with higher catches in winter (43%), followed by spring (20%), autumn (21%) and summer (16%; Figure 108e). The kept and released catches of Mud Crab in 2020/21 were similar to previous surveys (Figure 108a).

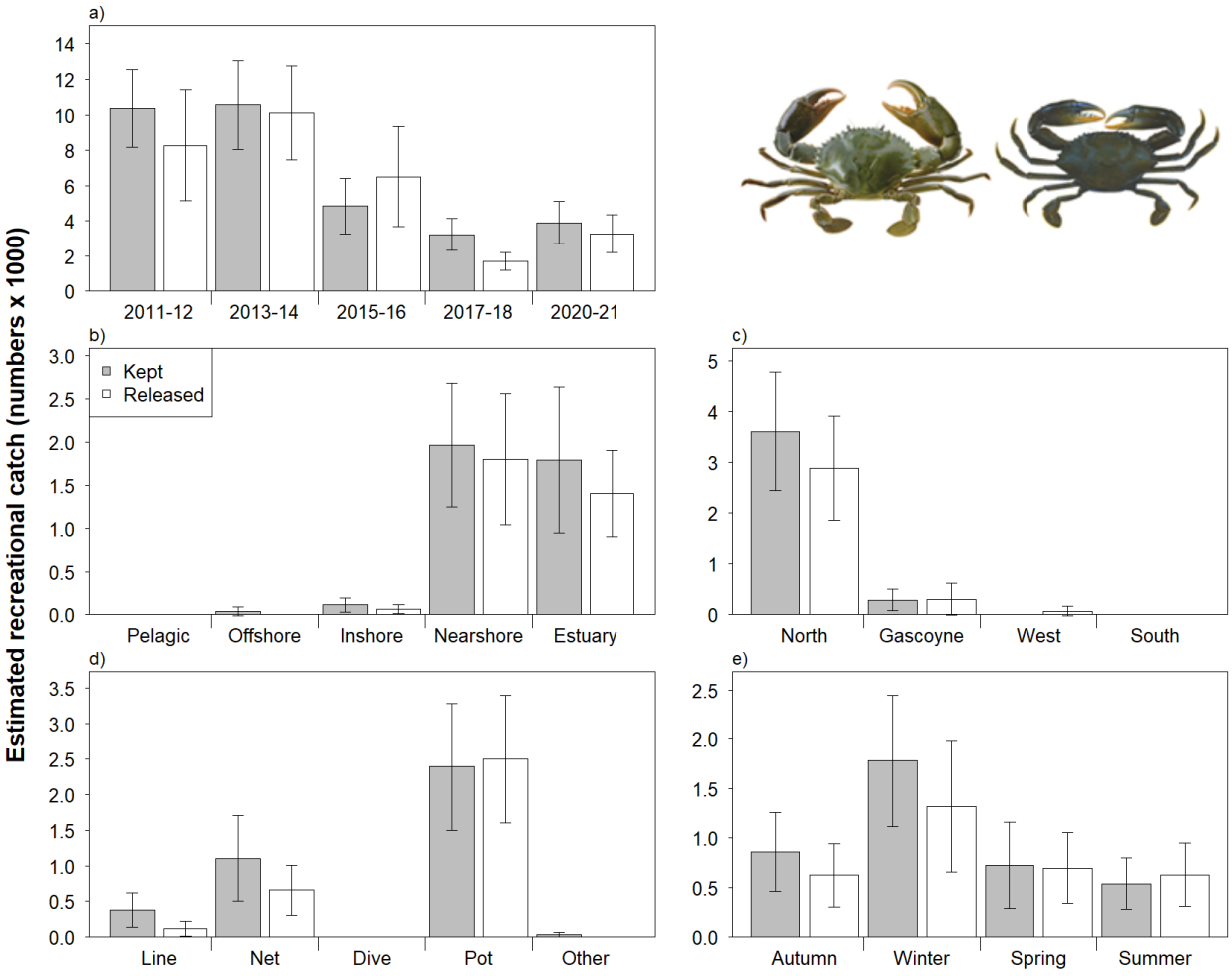


Figure 108. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Mud Crab in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.9 Molluscs

6.9.1 Abalone (*Haliotis* spp.)

Abalone includes Roe's Abalone (*Haliotis roei*), Greenlip Abalone (*H. laevigata*) and Brownlip Abalone (*H. conicopora*). Most boat-based recreational catches of Abalone occurred in the West Coast, with some catches in the South Coast (Figure 109c). Almost all catches were kept (1% released; Table 5, Figure 109a). All catches were taken from nearshore habitat (Figure 109b). Most catches were taken by diving (81%) and other (19%, including wading) (Figure 109d). Abalone were harvested predominantly in summer (89%), which reflects the open season for Roe's abalone in the West Coast. (Figure 109e). The kept and released catches of Abalone in 2020/21 were similar with previous surveys, except the kept catch in 2020/21 was higher compared with 2013/14 (Figure 109a). However, catches for this species have low sample sizes and high uncertainty and do not include catches from shore-based recreational fishing.

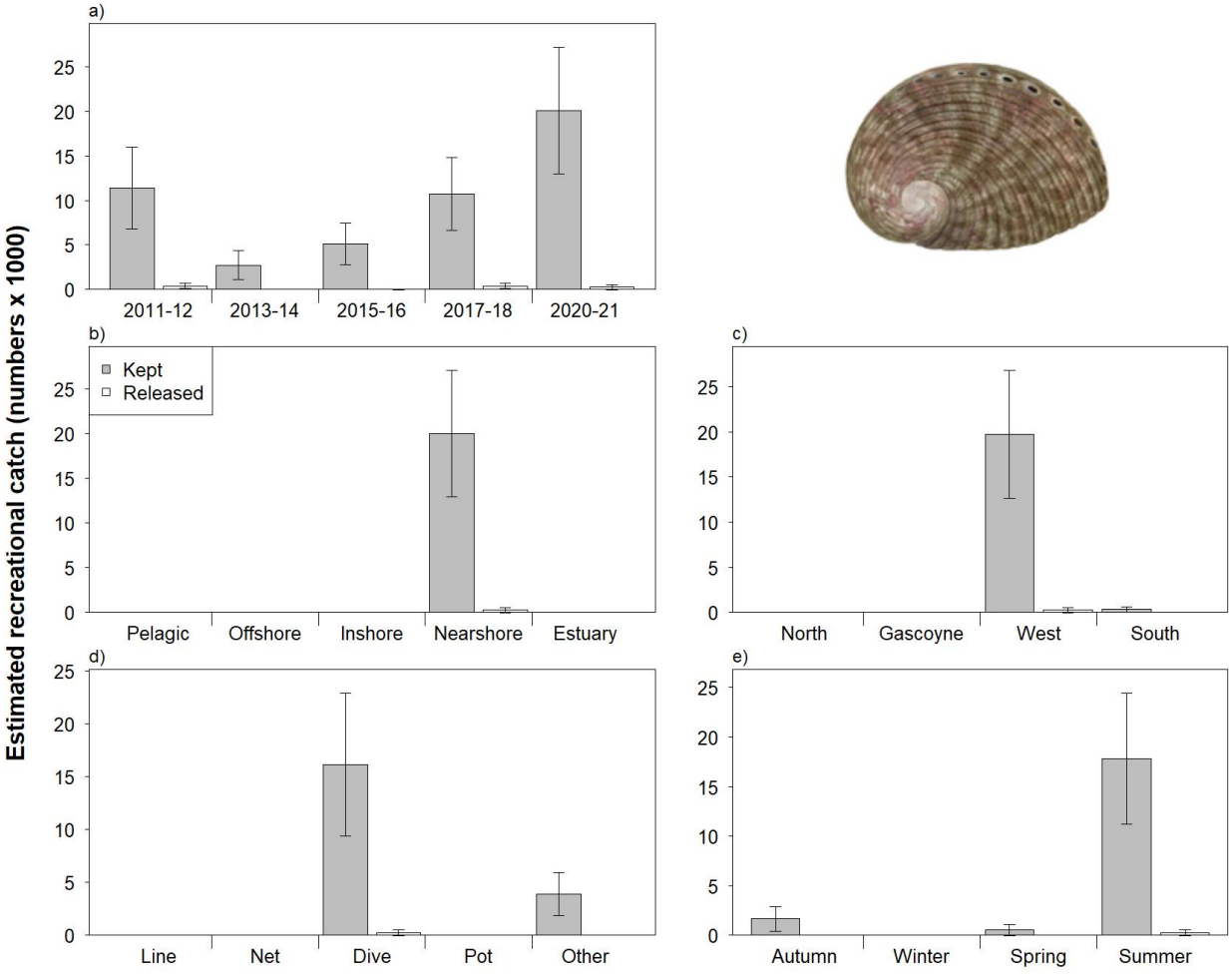


Figure 109. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Abalone in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.10 Cephalopods

6.10.1 Cuttlefish (Order Sepiidae)

Most boat-based recreational catches of Cuttlefish occurred in the West Coast, with some catches in the South Coast (Figure 110c). The majority of catches were kept (29% released; Table 5, Figure 110a) with most releases attributed to 'too many' (Table 6). Catches were taken predominantly from nearshore and inshore demersal habitats (Figure 110b). Most catches were taken by line fishing (Figure 110d). Cuttlefish were harvested throughout the year, with higher catches in autumn, winter and spring (Figure 110e). The kept and released catches of Cuttlefish in 2020/21 were similar to previous surveys (Figure 110a).

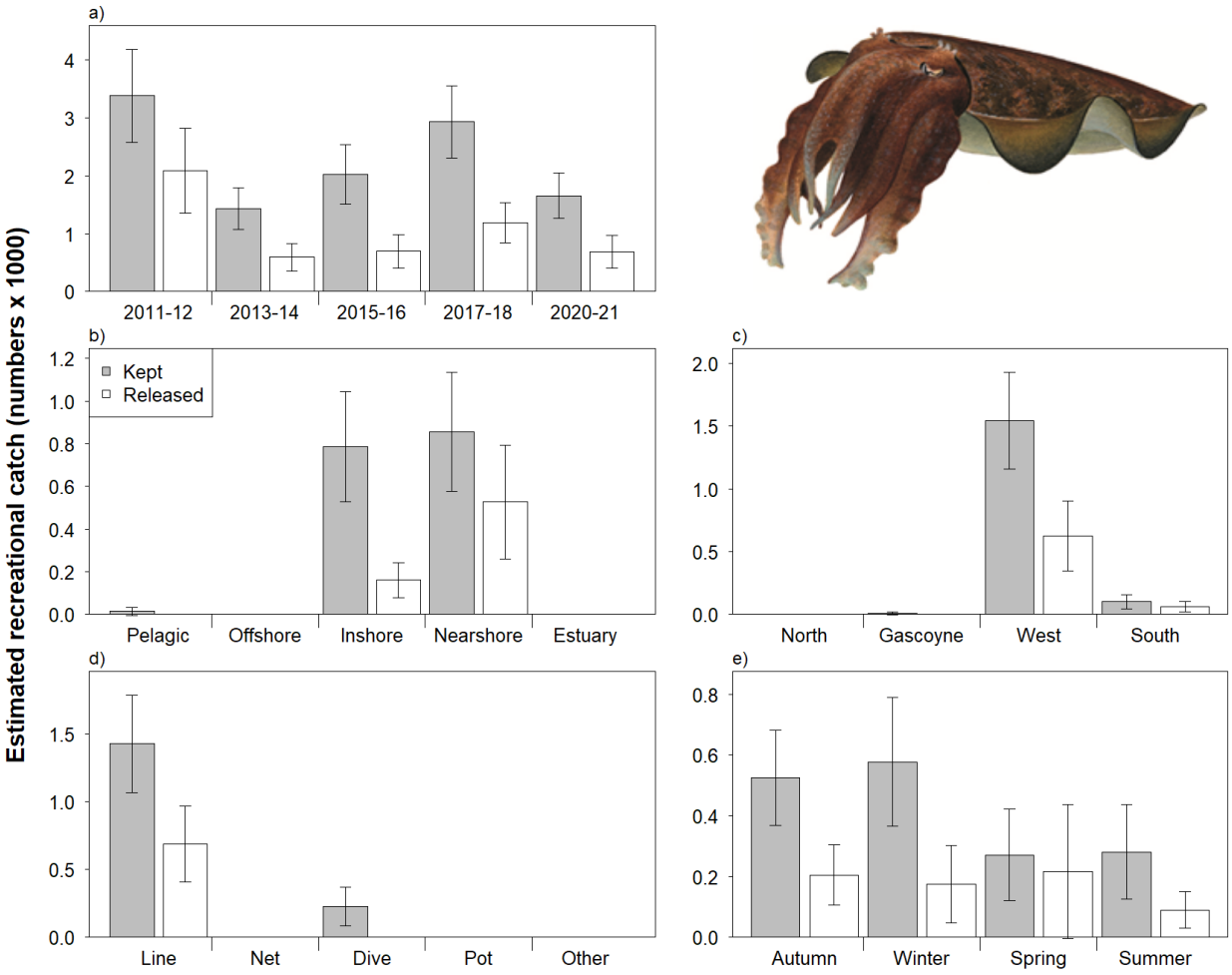


Figure 110. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Cuttlefish in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.10.2 Octopus (Order Octopodidae)

Most boat-based recreational catches of Octopus occurred in the West Coast (Figure 111c). The majority of catches were kept (12% released; Table 5, Figure 111a) with most releases attributed to 'too many' (Table 6). Catches were taken predominantly from nearshore and estuarine habitats (Figure 111b). Most catches were taken by diving, followed by potting and line fishing (Figure 111d). Octopus were harvested throughout the year, with higher catches in autumn (Figure 111e). The kept and released catches of Octopus in 2020/21 were similar to previous surveys (Figure 111a, Table 5).

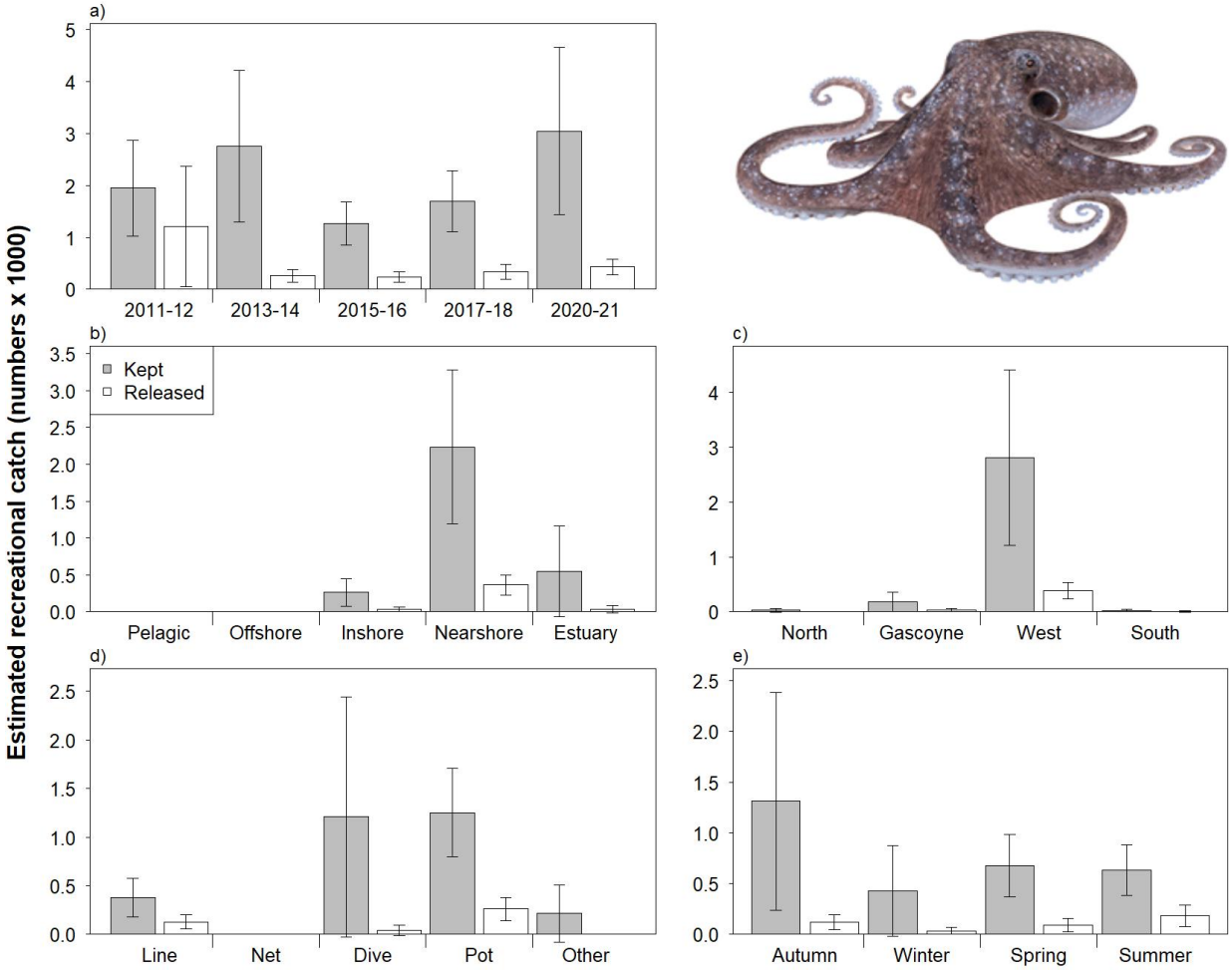


Figure 111. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Octopus in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

6.10.3 Squid (Order Teuthoidea)

Most boat-based recreational catches of Squid occurred in the West Coast, with some catches in the Gascoyne Coast, South Coast and North Coast (Figure 112c). The majority of catches were kept (5% released; Table 5, Figure 112a) with releases attributed to 'too small' or 'too many' (Table 6). Catches were taken predominantly from nearshore habitat (Figure 112b). All catches were taken by line fishing (Figure 112d). Squid were harvested throughout the year, with higher catches in spring and autumn (Figure 112e). The kept and released catches of Squid in 2020/21 were similar to previous surveys (Figure 112a).

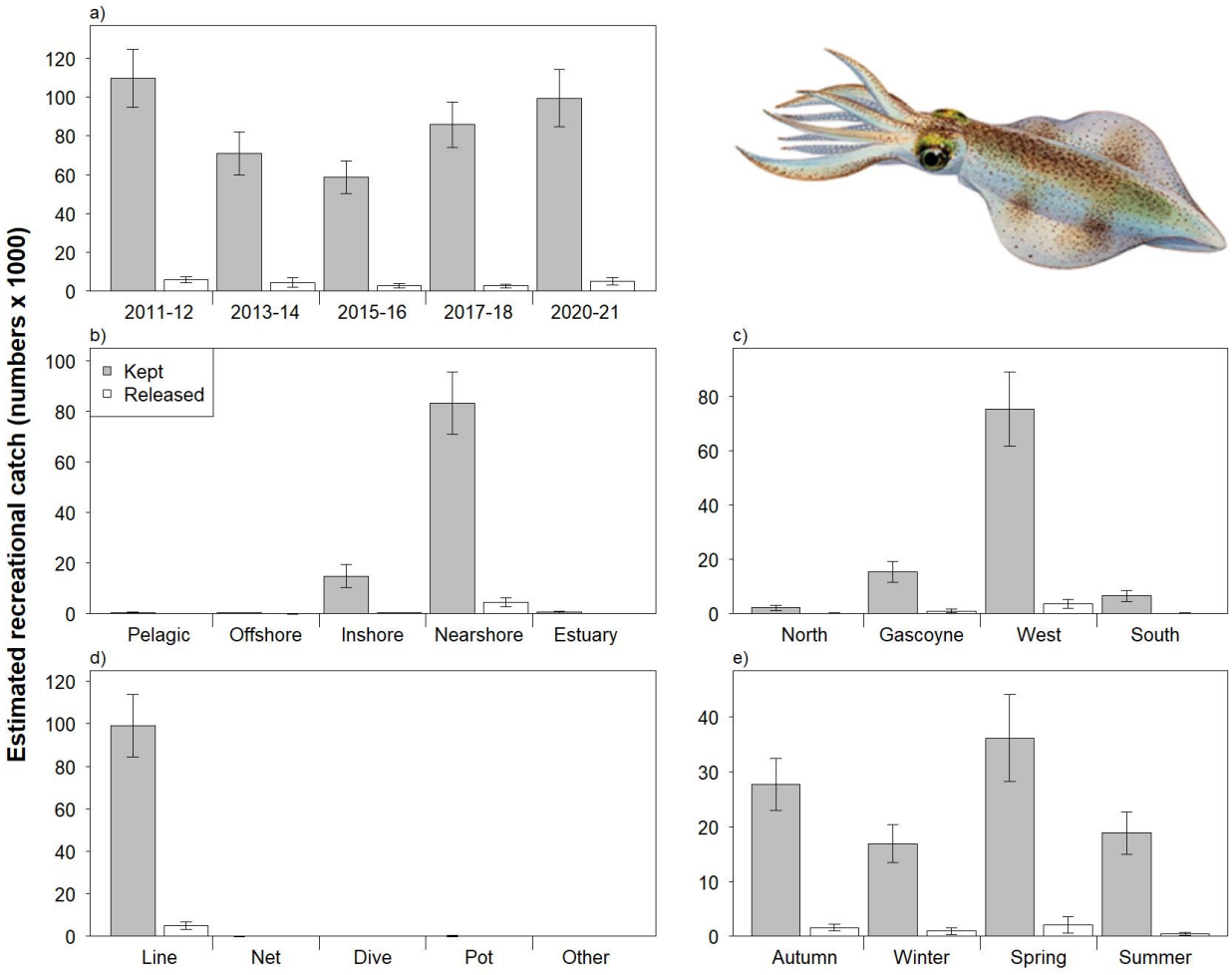


Figure 112. Boat-based kept (grey bars) and released (white bars) recreational catch (numbers x 1000 ± SE) of Squid in Western Australia during 2020/21: a) compared with 4 previous surveys; b) catch by habitat; c) catch by bioregion; d) catch by method; and e) catch by season.

7 Catch by Bioregion

This section presents boat-based recreational fishing catch by bioregion for the 12 months from September 2020 to August 2021. Catch is presented for annual catch (total, kept and released, by number) and proportions released (% released) for all species in each bioregion: North Coast (Table 7), Gascoyne Coast (Table 8), West Coast (Table 9) and South Coast (Table 10).

Kept and released catches by bioregion and zone (presented in Chapter 8) for key demersal species are also presented to provide comparable information across the five surveys (Figures 114–117).

7.1 North Coast

A total of 143 species/taxa were reported in the North Coast in 2020/21, which represented 5.5% of the statewide total catch (by numbers). The most common finfish species were Grass Emperor (12% of the bioregion total catch), Stripey Snapper (8%), Mullet (4%), Barramundi (3%), Golden Snapper (3%), Red Emperor (3%), Spangled Emperor (3%), Giant Sea Catfish (3%), Spanish Mackerel (3%), Coral Trout (3%), Blackspot Tuskfish (2%), Goldspotted Rockcod (2%), Mangrove Jack (2%), Golden Trevally (2%), Chinaman Rockcod (2%), Blue Threadfin (2%), Blackspotted Rockcod (2%), Rankin Cod (2%) and Saddletail Snapper (2%). The most common invertebrate species were Mud Crab (4%), Blue Swimmer Crab (3%) and Squid (1%). These 22 species/taxa accounted for 72% of the total catch (by numbers) in the North Coast in 2020/21.

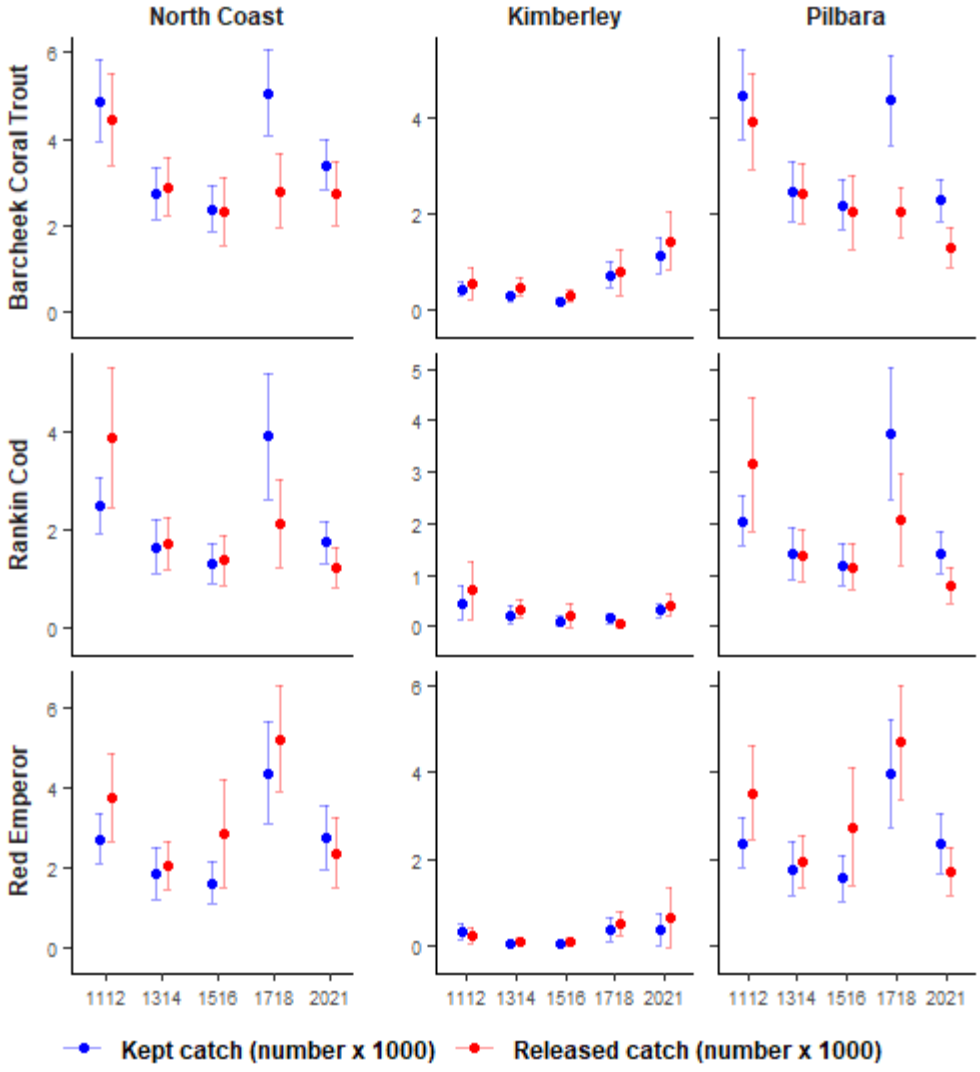


Figure 113. Recreational catch (kept and released by number, ±SE) for key demersal species in the North Coast bioregion of Western Australia from 2011/12 to 2020/21.

7.2 Gascoyne Coast

A total of 154 species/taxa were reported in the Gascoyne Coast in 2020/21, which represented 9.1% of the statewide total catch (by numbers). The most common finfish species were Grass Emperor (13% of the bioregion total catch), Chinaman Rockcod (11%), Pink Snapper (10%), Redthroat Emperor (7%), Spangled Emperor (5%), Western Butterfish (4%), Stripey Snapper (2%), Red Emperor (2%), Spanish Mackerel (2%) and Baldchin groper (2%). The most common invertebrate species were Blue Swimmer Crab (7%) and Squid (6%). These 12 species/taxa accounted for 71% of the total catch (by numbers) in the Gascoyne Coast in 2020/21.

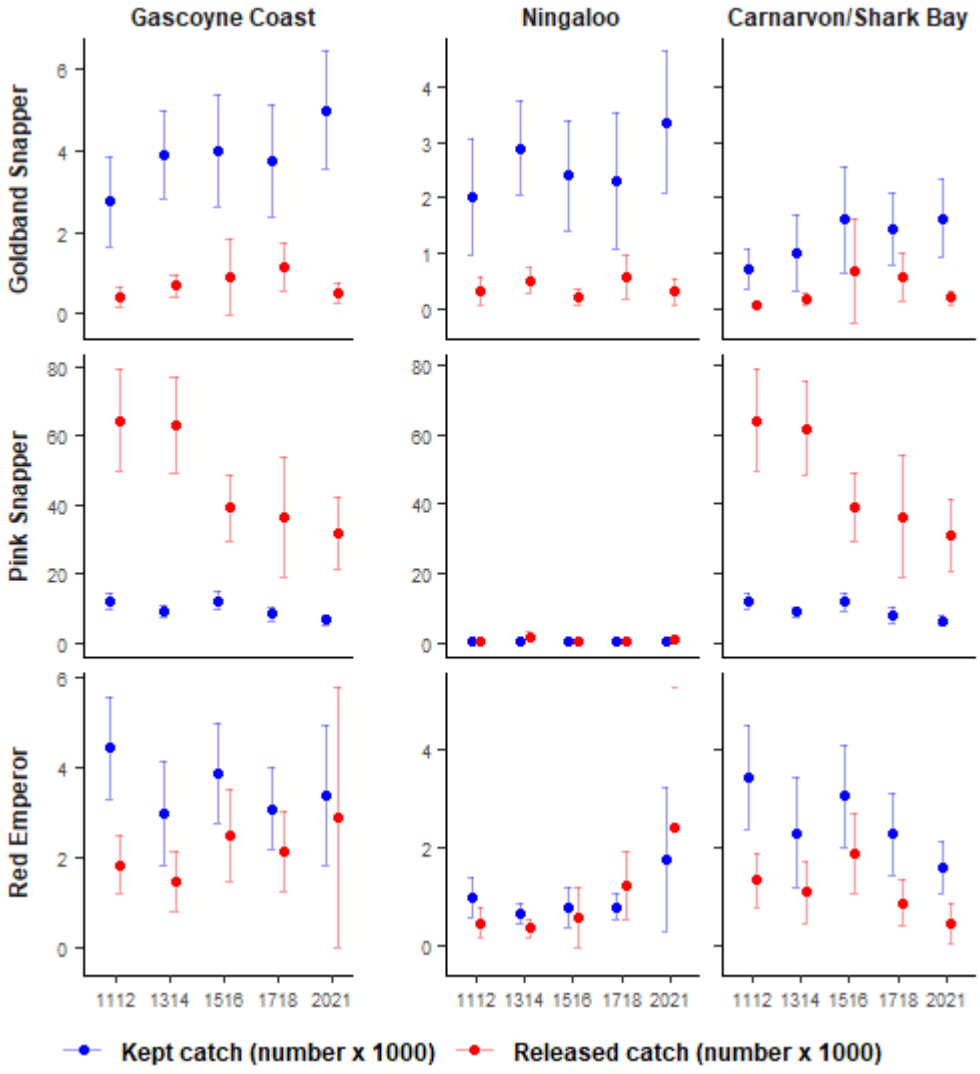


Figure 114. Recreational catch (kept and released by number, ±SE) for key demersal species in the Gascoyne Coast bioregion of Western Australia from 2011/12 to 2020/21.

7.3 West Coast

A total of 161 species/taxa were reported in the West Coast in 2020/21, which represented 78.0% of the statewide total catch (by numbers). The most common finfish species were School Whiting (14% of the bioregion total catch), Australian Herring (8%), Pink Snapper (3%), Silver Trevally (2%) and King George Whiting (2%). The most common invertebrate species were Western Rock Lobster (26%), Blue Swimmer Crab (20%) and Squid (4%). These eight species/taxa accounted for 79% of the total catch (by numbers) in the West Coast in 2020/21.

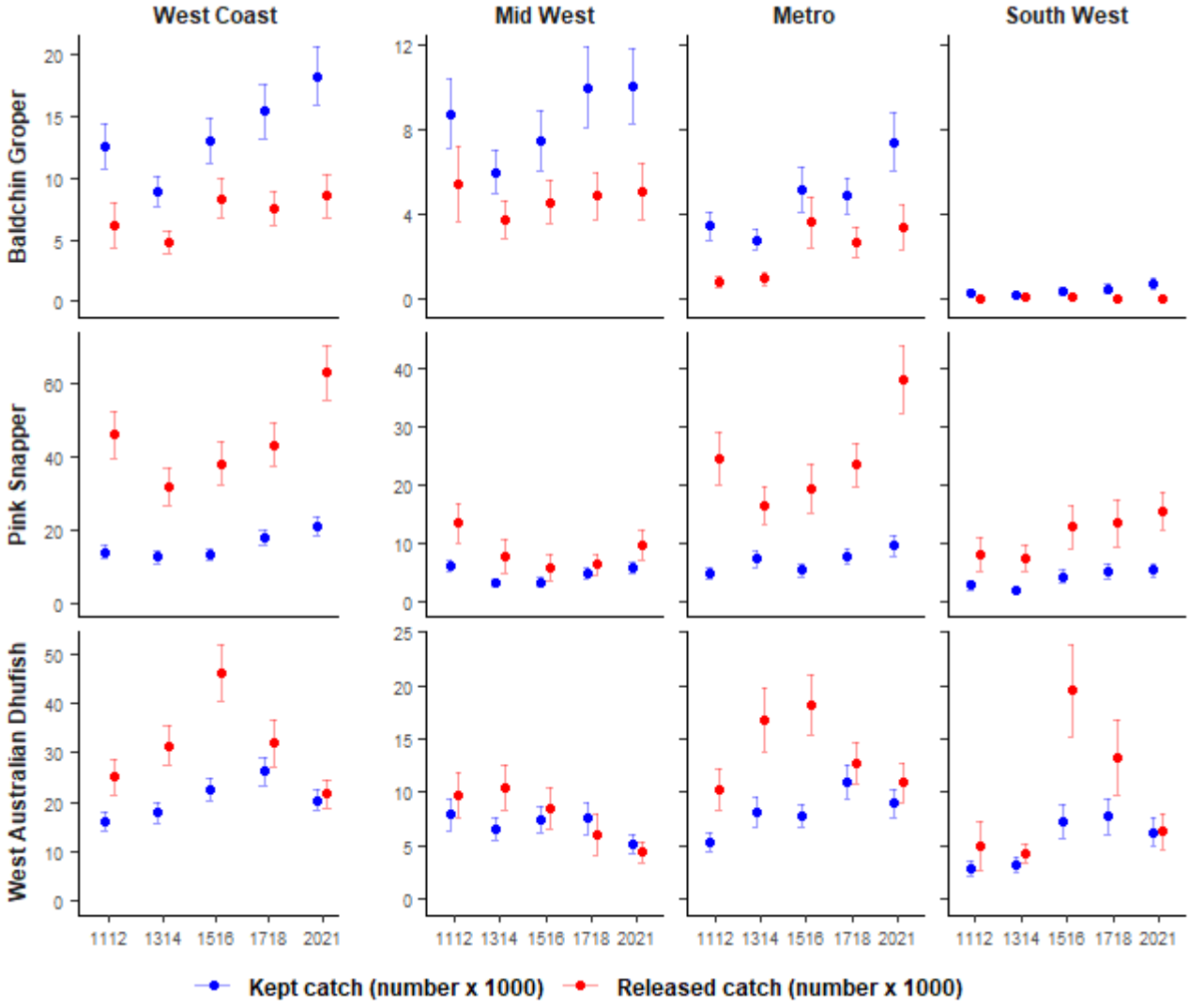


Figure 115. Recreational catch (kept and released by number, ±SE) for key demersal species in the West Coast bioregion of Western Australia from 2011/12 to 2020/21.

7.4 South Coast

A total of 92 species/taxa were reported in the South Coast in 2020/21, which represented 7.3% of the statewide total catch (by numbers). The most common finfish species were King George Whiting (22% of the bioregion total catch), Australian Herring (15%), School Whiting (10%), Black Bream (9%), Pink Snapper (5%), Bight Redfish (3%), Silver Trevally (3%), Sea Trumpeter (3%) and Breaksea Cod (3%). The most common invertebrate species were Squid (3%). These 10 species/taxa accounted for 76% of the total catch (by numbers) in the South Coast in 2020/21.

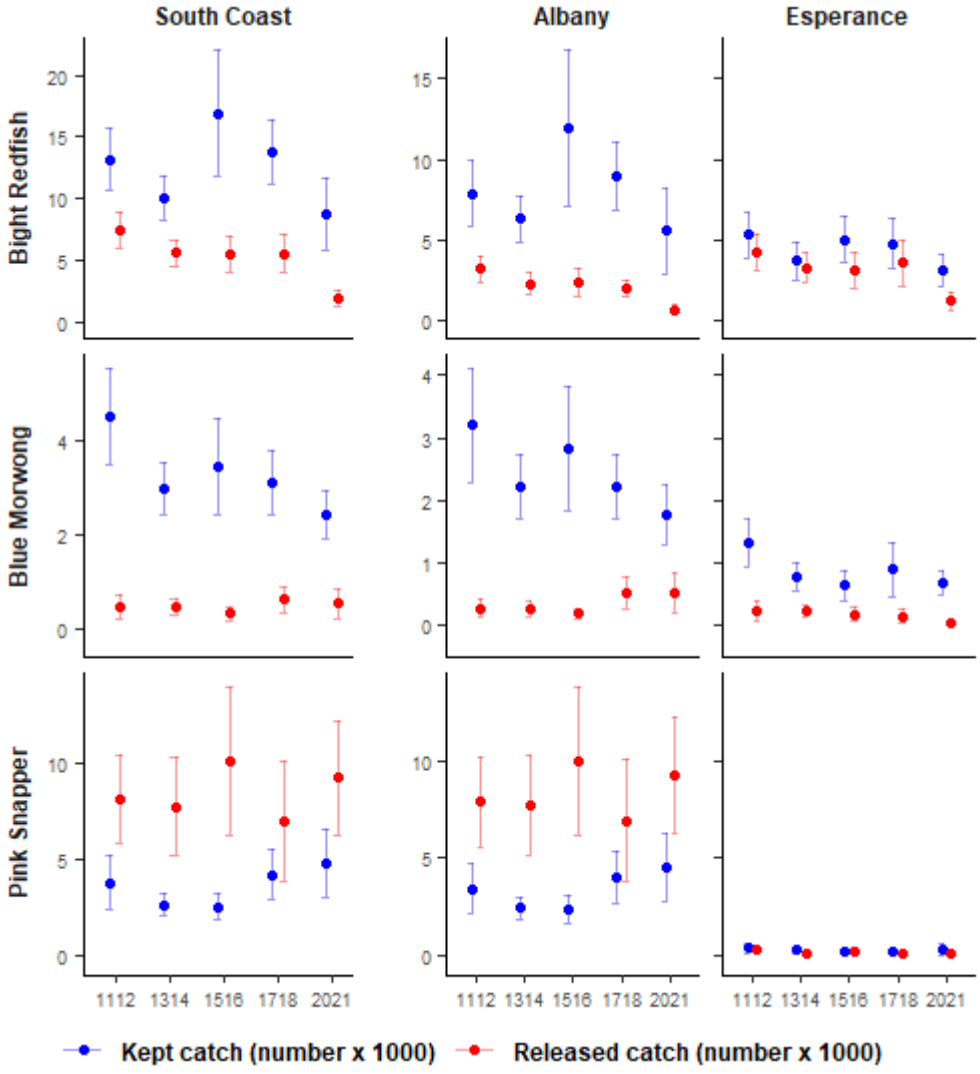


Figure 116. Recreational catch (kept and released by number, ±SE) for key demersal species in the South Coast bioregion of Western Australia from 2011/12 to 2020/21.

Table 7. Annual catch (total, kept and released numbers) and proportion released in the North Coast bioregion during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); values in italics indicate <30 respondents recorded catches of the species).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Cephalopods	Octopus	Octopodidae - undifferentiated	***29***	***38***	0	0	***29***	***38***	0%
	Squid	Order Teuthoidea - undifferentiated	***2,184***	***874***	***195***	***193***	*2,379*	*938*	8%
Lobster	Painted Rock Lobster	*Panulirus versicolor*	***273***	***208***	***14***	***19***	***287***	***212***	5%
	Ornate Rock Lobster	*Panulirus ornatus*	***150***	***122***	0	0	***150***	***122***	0%
Crab	Blue Swimmer Crab	*Portunus armatus*	***3,525***	***1,553***	***1,253***	***667***	***4,778***	***2,136***	26%
	Green Mud Crab	*Scylla serrata*	***1,694***	***819***	*893*	*349*	***2,588***	***1,116***	35%
	Brown Mud Crab	*Scylla olivacea*	1,918	749	**2,002**	**930**	**3,920**	**1,611**	51%
Sharks	Blacktip Reef Shark	*Carcharhinus melanopterus*	***47***	***42***	2,222	788	2,269	791	98%
	Dusky Whaler	*Carcharhinus obscurus*	***20***	***27***	***500***	***330***	***520***	***331***	96%
	Lemon Shark	*Negaprion acutidens*	0	0	***19***	***20***	***19***	***20***	100%
	Sandbar Shark	*Carcharhinus plumbeus*	0	0	***172***	***130***	***172***	***130***	100%
	Tiger Shark	*Galeocerdo cuvier*	0	0	***50***	***33***	***50***	***33***	100%
	Whitetip Reef Shark	*Triaenodon obesus*	0	0	***309***	***189***	***309***	***189***	100%
	Whaler Sharks	Carcharhinidae - undifferentiated	0	0	***370***	***265***	***370***	***265***	100%
	Hammerhead Sharks	Sphyrnidae - undifferentiated	0	0	***14***	***19***	***14***	***19***	100%
	Western Spotted Gummy Shark	*Mustelus stevensi*	0	0	***147***	***127***	***147***	***127***	100%
	Sharks	Sharks - undifferentiated	***23***	***24***	*1,418*	*499*	*1,441*	*500*	98%
Rays	Sawfish	Pristidae - undifferentiated	0	0	***98***	***55***	***98***	***55***	100%
	Western Shovelnose Ray	*Aptychotrema vincentiana*	0	0	***25***	***23***	***25***	***23***	100%
	Rays	Order Rajiformes - undifferentiated	0	0	***57***	***44***	***57***	***44***	100%
Billfish	Black Marlin	*Makaira indica*	0	0	***55***	***38***	***55***	***38***	100%
	Blue Marlin	*Makaira nigricans*	0	0	***46***	***47***	***46***	***47***	100%
	Sailfish	*Istiophorus platypterus*	***15***	***19***	***968***	***550***	***983***	***551***	99%
Bonito	Bonito	*Sarda australis & Cybiosarda elegans*	***22***	***21***	***14***	***19***	***36***	***39***	40%
Breams	Northwest Black Bream	*Acanthopagrus palmaris*	***123***	***86***	***1,100***	***570***	***1,223***	***581***	90%
	Western Yellowfin Bream	*Acanthopagrus morrisoni*	***199***	***153***	***839***	***423***	***1,038***	***478***	81%
	Breams	Sparidae - undifferentiated	***147***	***189***	***32***	***30***	***179***	***191***	18%
Catfish	Eeltail Catfish	Plotosidae - undifferentiated	***67***	***66***	***623***	***311***	***690***	***341***	90%
	Giant Sea Catfish	*Netuma thalassina*	**123**	**168**	3,822	1,002	3,945	1,016	97%
	Silver Cobbler	*Neoarius midgleyi*	***80***	***75***	***844***	***556***	***924***	***572***	91%
	Forktail Catfishes	Ariidae - undifferentiated	0	0	***1,522***	***659***	***1,522***	***659***	100%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Cobia	Cobia	*Rachycentron canadum*	343	119	441	176	784	260	56%
Cods	Barramundi Cod	*Chromileptes altivelis*	***40***	***28***	***5***	***7***	***45***	***31***	11%
	Blackspotted Rockcod	*Epinephelus malabaricus*	**665**	**296**	2,623	738	3,288	840	80%
	Blacktip Rockcod	*Epinephelus fasciatus*	0	0	***94***	***59***	***94***	***59***	100%
	Chinaman Rockcod	*Epinephelus rivulatus*	**1,981**	**1,248**	**1,299**	**1,131**	**3,280**	**2,098**	40%
	Eightbar Grouper	*Hyporthodus cf octofasciatus*	***7***	***9***	***14***	***19***	***21***	***28***	67%
	Frostback Rockcod	*Epinephelus bilobatus*	***26***	***26***	***154***	***135***	***180***	***147***	85%
	Goldspotted Rockcod	*Epinephelus coioides*	874	327	2,652	965	3,525	1,159	75%
	Potato Rockcod	*Epinephelus tukula*	0	0	***35***	***48***	***35***	***48***	100%
	Queensland Groper	*Epinephelus lanceolatus*	0	0	***9***	***8***	***9***	***8***	100%
	Rankin Cod	*Epinephelus multinotatus*	1,726	435	1,217	405	2,943	719	41%
	Tomato Rockcod	*Cephalopholis sonnerati*	***92***	***60***	***96***	***56***	***189***	***91***	51%
	Yellowspotted Rockcod	*Epinephelus areolatus*	***587***	***484***	***644***	***270***	***1,232***	***571***	52%
	Temperate Basses & Rockcods	Percichthyidae, Serranidae - undifferentiated	***55***	***51***	***614***	***420***	***669***	***460***	92%
Coral Trout	Barcheek Coral Trout	*Plectropomus maculatus*	1,405	386	**1,125**	**496**	2,530	774	44%
	Common Coral Trout	*Plectropomus leopardus*	1,936	440	1,600	535	3,536	848	45%
	Yellowedge Coronation Trout	*Variola louti*	***58***	***48***	0	0	***58***	***48***	0%
Emperors	Bluespotted Emperor	*Lethrinus punctulatus*	***312***	***175***	***444***	***325***	***756***	***467***	59%
	Grass Emperor	*Lethrinus laticaudis*	5,971	2,281	**15,270**	**6,487**	21,241	8,371	72%
	Longnose Emperor	*Lethrinus olivaceus*	***252***	***140***	***26***	***18***	***279***	***143***	9%
	Redspot Emperor	*Lethrinus lentjan*	***15***	***19***	***104***	***100***	***119***	***111***	88%
	Redthroat Emperor	*Lethrinus miniatus*	***925***	***560***	***815***	***453***	***1,740***	***823***	47%
	Robinson's Seabream	*Gymnocranius grandoculis*	***17***	***23***	***92***	***123***	***109***	***125***	85%
	Spangled Emperor	*Lethrinus nebulosus*	1,594	493	3,197	1,106	4,791	1,402	67%
	Yellowtail Emperor	*Lethrinus atkinsoni*	0	0	***182***	***145***	***182***	***145***	100%
	Emperors	Lethrinidae - undifferentiated	***12***	***15***	***23***	***30***	***35***	***45***	67%
Flatheads	Northern Sand Flathead	*Platycephalus endrachtensis*	***39***	***37***	***36***	***32***	***74***	***62***	48%
	Yellowtail Flathead	*Platycephalus westraliae*	***34***	***33***	0	0	***34***	***33***	0%
	Flatheads	Platycephalidae - undifferentiated	***105***	***77***	***8***	***10***	***113***	***79***	7%
Giant Perch	Barramundi	*Lates calcarifer*	1,450	440	**5,282**	**2,159**	6,732	2,467	78%
Grunter Breams	Barred Javelin	*Pomadasys kaakan*	***232***	***113***	***482***	***246***	***713***	***308***	68%
	Blotched Javelin	*Pomadasys maculatus*	***69***	***63***	***100***	***75***	***169***	***103***	59%
	Grunter Bream	Haemulidae - undifferentiated	0	0	***409***	***496***	***409***	***496***	100%
	Painted Sweetlips	*Diagramma labiosum*	***223***	***240***	***237***	***133***	***460***	***278***	51%
Grunters	Western Sooty Grunter	*Hephaestus jenkinsi*	***87***	***70***	***245***	***253***	***333***	***263***	74%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Halfbeaks	Three-by-two Garfish	*Hemiramphus robustus*	***216***	***296***	***20***	***27***	***236***	***297***	8%
	Garfish	Hemiramphidae - undifferentiated	***74***	***94***	0	0	***74***	***94***	0%
	Longtom	Belonidae - undifferentiated	***10***	***12***	***39***	***38***	***49***	***40***	81%
Herrings	Herrings & Ilishas	Clupeidae, Pristigasteridae - undifferentiated	***728***	***714***	***314***	***402***	***1,042***	***908***	30%
Jewfish	Black Jewfish	*Protonibea diacanthus*	*179*	*64*	***276***	***164***	***455***	***206***	61%
King Snapper	Goldband Snapper	*Pristipomoides multidens*	***233***	***121***	***83***	***98***	***317***	***170***	26%
	Rosy Snapper	*Pristipomoides filamentosus*	***5***	***7***	***64***	***85***	***69***	***85***	93%
	Sharptooth Snapper	*Pristipomoides typus*	0	0	***150***	***197***	***150***	***197***	100%
Lizardfish	Lizardfishes & Grinners	Bathysauridae, Synodontidae - undifferentiated	0	0	***409***	***404***	***409***	***404***	100%
Mackerels	Grey Mackerel	*Scomberomorus semifasciatus*	***166***	***112***	***206***	***194***	***372***	***286***	55%
	School Mackerel	*Scomberomorus queenslandicus*	***723***	***293***	***676***	***308***	*1,399*	*533*	48%
	Shark Mackerel	*Grammatorcynus bicarinatus*	***19***	***18***	***594***	***531***	***613***	***532***	97%
	Spanish Mackerel	*Scomberomorus commerson*	2,289	653	1,873	709	4,162	1,291	45%
	Spotted Mackerel	*Scomberomorus munroi*	***48***	***46***	0	0	***48***	***46***	0%
	Wahoo	*Acanthocybium solandri*	***6***	***8***	0	0	***6***	***8***	0%
	Mackerels	*Scombridae spp. (tribes Scomberomorini & Scombrini)*	0	0	***13***	***12***	***13***	***12***	100%
Mahi Mahi	Mahi Mahi	*Coryphaena spp.*	0	0	***4***	***5***	***4***	***5***	100%
Mullets	Bluetail Mullet	*Valamugil buchanani*	***1,757***	***2,250***	***1,838***	***2,354***	***3,594***	***4,604***	51%
	Diamondscale Mullet	*Liza vaigiensis*	***238***	***306***	***15***	***19***	***253***	***307***	6%
	Greenback Mullet	*Liza subviridis*	0	0	***147***	***189***	***147***	***189***	100%
	Sea Mullet	*Mugil cephalus*	***708***	***442***	***650***	***618***	***1,357***	***792***	48%
	Mullets	Mugilidae - undifferentiated	***999***	***596***	0	0	***999***	***596***	0%
Pearl Perch	Northern Pearl Perch	*Glaucosoma buergeri*	***64***	***52***	***123***	***100***	***187***	***124***	66%
Pikes	Great Barracuda	*Sphyraena barracuda*	***53***	***42***	***212***	***112***	***265***	***139***	80%
	Yellowtail Barracuda	*Sphyraena obtusata*	***14***	***19***	***146***	***85***	***160***	***87***	91%
Pufferfish	Leatherjackets	Monacanthidae - undifferentiated	***13***	***18***	***80***	***53***	***93***	***56***	86%
	Silver Toadfish	*Lagocephalus sceleratus*	0	0	***150***	***105***	***150***	***105***	100%
	Toadfish	Tetraodontidae - undifferentiated	0	0	***69***	***62***	***69***	***62***	100%
Threadfins	Blue Threadfin	*Eleutheronema tetradactylum*	1,961	599	1,286	504	3,247	855	40%
	King Threadfin	*Polydactylus macrochir*	1,092	360	**1,439**	**919**	**2,531**	**1,031**	57%
Threadfin Breams	Rosy Threadfin Bream	*Nemipterus furcosus*	***25***	***34***	***20***	***27***	***45***	***43***	44%
Queenfish	Queenfish	*Scomberoides spp.*	**418**	**236**	612	203	1,030	334	59%
Trevallies	Amberjack	*Seriola dumerili*	0	0	***61***	***84***	***61***	***84***	100%
	Bludger Trevally	*Carangoides gymnostethus*	***41***	***52***	***1,154***	***480***	***1,194***	***491***	97%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Giant Trevally	*Caranx ignobilis*	**238**	**122**	**1,856**	**798**	**2,093**	**841**	89%
	Golden Trevally	*Gnathanodon speciosus*	**698**	**386**	3,165	1,104	3,863	1,222	82%
	Turrum	*Carangoides fulvoguttatus*	0	0	***75***	***59***	***75***	***59***	100%
	Trevallies	Carangidae - undifferentiated	***53***	***44***	***696***	***598***	***749***	***601***	93%
Tripletail	Tripletail	*Lobotes surinamensis*	***81***	***65***	***5***	***7***	***86***	***70***	6%
Tropical Snappers	Brownstripe Snapper	*Lutjanus vitta*	***273***	***294***	***87***	***86***	***360***	***339***	24%
	Chinamanfish	*Symphorus nematophorus*	***311***	***204***	***177***	***111***	***488***	***233***	36%
	Crimson Snapper	*Lutjanus erythropterus*	964	326	**1,349**	**847**	**2,313**	**1,044**	58%
	Darktail Snapper	*Lutjanus lemniscatus*	***243***	***155***	***288***	***141***	***531***	***272***	54%
	Flame Snapper	*Etelis coruscans*	***45***	***61***	***103***	***101***	***148***	***147***	70%
	Red Emperor	*Lutjanus sebae*	2,752	784	2,372	885	5,124	1,533	46%
	Saddletail Snapper	*Lutjanus malabaricus*	***1,903***	***1,170***	***865***	***556***	***2,768***	***1,697***	31%
	Stripey Snapper	*Lutjanus carponotatus*	4,128	1,388	10,092	2,270	14,219	3,072	71%
	Moses' Snapper	*Lutjanus russellii*	***467***	***206***	***675***	***318***	***1,142***	***461***	59%
	Mangrove Jack	*Lutjanus argentimaculatus*	1,771	575	1,852	643	3,623	1,140	51%
	Golden Snapper	*Lutjanus johnii*	1,798	619	**2,692**	**1,186**	4,490	1,721	60%
	Tropical Snappers	*Lutjanus spp.*	***121***	***130***	***241***	***180***	***362***	***230***	67%
	Maori Snapper	*Lutjanus rivulatus*	***35***	***31***	0	0	***35***	***31***	0%
	Ruby Snapper	*Etelis boweni*	***4***	***5***	***31***	***29***	***35***	***32***	88%
Tunas	Mackerel Tuna	*Euthynnus affinis*	***65***	***36***	***617***	***285***	***682***	***288***	90%
	Skipjack Tuna	*Katsuwonus pelamis*	0	0	***86***	***70***	***86***	***70***	100%
	Southern Bluefin Tuna	*Thunnus maccoyii*	***16***	***22***	0	0	***16***	***22***	0%
	Longtail Tuna	*Thunnus tonggol*	***151***	***95***	***36***	***25***	***188***	***98***	19%
	Yellowfin Tuna	*Thunnus albacares*	***46***	***41***	***62***	***47***	***108***	***83***	57%
	Tunas	*Scombridae spp. (tribes Sardini & Thunnini)*	0	0	***57***	***75***	***57***	***75***	100%
	Dogtooth Tuna	*Gymnosarda unicolor*	***45***	***44***	0	0	***45***	***44***	0%
Whitings	Western Trumpeter Whiting	*Sillago burrus*	0	0	***59***	***75***	***59***	***75***	100%
	Goldenline Whiting	*Sillago analis*	***503***	***421***	***43***	***37***	***546***	***430***	8%
Wrasses	Blackspot Tuskfish	*Choerodon schoenleinii*	1,470	417	**2,342**	**1,201**	3,812	1,325	61%
	Blue Tuskfish	*Choerodon cyanodus*	311	104	**944**	**491**	**1,256**	**529**	75%
	Bluebarred Parrotfish	*Scarus ghobban* spp. complex	0	0	***88***	***96***	***88***	***96***	100%
	Bluespotted Tuskfish	*Choerodon cauteroma*	***54***	***42***	***118***	***97***	***172***	***114***	69%
	Sunburnt Pigfish	*Bodianus solatus*	***48***	***55***	0	0	***48***	***55***	0%
	Purple Tuskfish	*Choerodon cephalotes*	***78***	***107***	***10***	***13***	***88***	***108***	11%
	Parrotfish	Scaridae - undifferentiated	0	0	***86***	***112***	***86***	***112***	100%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Tuskfish	*Choerodon spp.*	***14***	***19***	***34***	***32***	***49***	***37***	71%
	Wrasses	Labridae - undifferentiated	0	0	***113***	***105***	***113***	***105***	100%
Crab	Sand Crab	*Ovalipes spp.*	0	0	***181***	***193***	***181***	***193***	100%
Eels	Eels	Order Anguilliformes - undifferentiated	0	0	***36***	***28***	***36***	***28***	100%
Tarpons	Tarpon	*Megalops cyprinoides*	***95***	***125***	***18***	***18***	***113***	***126***	16%
Opahs	Batfish	Ephippidae, Drepaneidae - undifferentiated	0	0	***73***	***63***	***73***	***63***	100%
Archerfish	Archerfish	Toxotidae - undifferentiated	***41***	***56***	0	0	***41***	***56***	0%
Butterfish	Butterfish	Stromateidae - undifferentiated	***39***	***54***	***69***	***61***	***108***	***98***	64%

Table 8. Annual catch (total, kept and released numbers) and proportion released in the Gascoyne Coast bioregion during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); values in italics indicate <30 respondents recorded catches of the species).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Cephalopods	Cuttlefish	*Sepia spp.*	***10***	***13***	0	0	***10***	***13***	0%
	Octopus	Octopodidae - undifferentiated	***185***	***175***	***29***	***27***	***214***	***177***	14%
	Squid	Order Teuthoidea - undifferentiated	15,377	3,872	**1,066**	**655**	16,443	4,147	6%
Lobster	Western Rock Lobster	*Panulirus cygnus*	***1,156***	***611***	***316***	***278***	***1,472***	***813***	21%
	Painted Rock Lobster	*Panulirus versicolor*	***67***	***49***	0	0	***67***	***49***	0%
	Ornate Rock Lobster	*Panulirus ornatus*	***44***	***39***	0	0	***44***	***39***	0%
Crab	Blue Swimmer Crab	*Portunus armatus*	10,921	3,959	5,793	2,188	16,714	5,979	35%
	Green Mud Crab	*Scylla serrata*	***91***	***84***	***245***	***300***	***336***	***358***	73%
	Brown Mud Crab	*Scylla olivacea*	***202***	***198***	***61***	***84***	***264***	***256***	23%
Sharks	Blacktip Reef Shark	*Carcharhinus melanopterus*	***55***	***55***	***560***	***322***	***615***	***326***	91%
	Dusky Whaler	*Carcharhinus obscurus*	***33***	***32***	***407***	***206***	***440***	***208***	93%
	Sandbar Shark	*Carcharhinus plumbeus*	0	0	***45***	***40***	***45***	***40***	100%
	Tiger Shark	*Galeocerdo cuvier*	0	0	***83***	***51***	***83***	***51***	100%
	Whitetip Reef Shark	*Triaenodon obesus*	***10***	***14***	***78***	***79***	***88***	***80***	88%
	Whaler Sharks	Carcharhinidae - undifferentiated	***33***	***45***	***423***	***274***	***456***	***292***	93%
	Hammerhead Sharks	Sphyrnidae - undifferentiated	0	0	***18***	***18***	***18***	***18***	100%
	Western Spotted Gummy Shark	*Mustelus stevensi*	***194***	***131***	***23***	***23***	***217***	***143***	11%
	Greynurse Shark	*Carcharias taurus*	***11***	***15***	***97***	***107***	***108***	***122***	90%
	Wobbegong	Orectolobidae - undifferentiated	0	0	***32***	***26***	***32***	***26***	100%
	Sharks	Sharks - undifferentiated	***73***	***50***	*817*	*287*	*890*	*312*	92%
Rays	Western Shovelnose Ray	*Aptychotrema vincentiana*	0	0	***93***	***102***	***93***	***102***	100%
	Rays	Order Rajiformes - undifferentiated	0	0	***15***	***19***	***15***	***19***	100%
Billfish	Black Marlin	*Makaira indica*	***6***	***8***	***259***	***135***	***265***	***138***	98%
	Blue Marlin	*Makaira nigricans*	***10***	***13***	***129***	***110***	***139***	***111***	93%
	Sailfish	*Istiophorus platypterus*	0	0	***220***	***236***	***220***	***236***	100%
	Striped Marlin	*Tetrapturus audax*	0	0	***32***	***26***	***32***	***26***	100%
Bonito	Bonito	*Sarda australis & Cybiosarda elegans*	***4***	***5***	0	0	***4***	***5***	0%
Breams	Frypan Bream	*Argyrops notialis*	***481***	***285***	***156***	***137***	***637***	***338***	24%
	Northwest Black Bream	*Acanthopagrus palmaris*	***16***	***22***	***91***	***116***	***107***	***118***	85%
	Pink Snapper	*Chrysophrys auratus*	6,447	1,604	31,756	10,604	38,203	11,297	83%
	Tarwhine	*Rhabdosargus sarba*	***118***	***161***	***45***	***31***	***163***	***164***	28%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Western Yellowfin Bream	*Acanthopagrus morrisoni*	***416***	***427***	***779***	***480***	***1,195***	***800***	65%
	Breams	Sparidae - undifferentiated	0	0	***172***	***115***	***172***	***115***	100%
Catfish	Eeltail Catfish	Plotosidae - undifferentiated	0	0	***124***	***139***	***124***	***139***	100%
	Forktail Catfishes	Ariidae - undifferentiated	***79***	***107***	***1,055***	***767***	***1,134***	***777***	93%
Cobia	Cobia	*Rachycentron canadum*	764	242	**205**	**99**	970	267	21%
Cods	Blackspotted Rockcod	*Epinephelus malabaricus*	**1,555**	**1,148**	**765**	**585**	**2,320**	**1,710**	33%
	Blacktip Rockcod	*Epinephelus fasciatus*	***71***	***90***	0	0	***71***	***90***	0%
	Breaksea Cod	*Epinephelides armatus*	***202***	***160***	0	0	***202***	***160***	0%
	Chinaman Rockcod	*Epinephelus rivulatus*	12,977	5,187	15,249	5,369	28,225	9,618	54%
	Eightbar Grouper	*Hyporthodus cf octofasciatus*	***392***	***219***	***105***	***127***	***497***	***253***	21%
	Frostback Rockcod	*Epinephelus bilobatus*	***44***	***52***	***105***	***111***	***149***	***123***	70%
	Goldspotted Rockcod	*Epinephelus coioides*	1,845	704	**2,246**	**963**	4,090	1,410	55%
	Potato Rockcod	*Epinephelus tukula*	0	0	***11***	***14***	***11***	***14***	100%
	Rankin Cod	*Epinephelus multinotatus*	2,636	608	**449**	**181**	3,084	682	15%
	Tomato Rockcod	*Cephalopholis sonnerati*	***318***	***128***	***44***	***41***	*362*	*134*	12%
	Yellowspotted Rockcod	*Epinephelus areolatus*	**664**	**280**	**610**	**482**	**1,274**	**559**	48%
	Temperate Basses & Rockcods	Percichthyidae, Serranidae - undifferentiated	***25***	***26***	***833***	***632***	***858***	***632***	97%
Coral Trout	Barcheek Coral Trout	*Plectropomus maculatus*	*400*	*158*	***126***	***84***	*526*	*187*	24%
	Common Coral Trout	*Plectropomus leopardus*	558	171	**599**	**338**	1,158	396	52%
	Yellowedge Coronation Trout	*Variola louti*	***220***	***101***	***247***	***160***	***468***	***200***	53%
Emperors	Bluespotted Emperor	*Lethrinus punctulatus*	***373***	***236***	***1,464***	***1,413***	***1,838***	***1,454***	80%
	Grass Emperor	*Lethrinus laticaudis*	13,768	3,829	22,879	7,762	36,646	10,623	62%
	Longnose Emperor	*Lethrinus olivaceus*	***101***	***68***	***345***	***432***	***446***	***472***	77%
	Redthroat Emperor	*Lethrinus miniatus*	7,736	2,269	**11,713**	**5,070**	19,449	6,632	60%
	Robinson's Seabream	*Gymnocranius grandoculis*	1,978	618	**412**	**413**	2,390	805	17%
	Spangled Emperor	*Lethrinus nebulosus*	6,008	1,305	8,984	2,825	14,992	3,620	60%
	Yellowtail Emperor	*Lethrinus atkinsoni*	***23***	***29***	***844***	***967***	***867***	***973***	97%
	Emperors	Lethrinidae - undifferentiated	0	0	***26***	***24***	***26***	***24***	100%
Flatheads	Northern Sand Flathead	*Platycephalus endrachtensis*	***73***	***57***	***206***	***234***	***279***	***278***	74%
	Yellowtail Flathead	*Platycephalus westraliae*	***112***	***72***	***23***	***18***	***135***	***74***	17%
	Flatheads	Platycephalidae - undifferentiated	***20***	***28***	***134***	***90***	***155***	***109***	87%
Flatfish	Smalltooth Flounder	*Pseudorhombus jenynsii*	***20***	***27***	0	0	***20***	***27***	0%
	Flounders	*Bothidae, Psettodidae & Pleuronectidae*	***10***	***14***	***16***	***22***	***26***	***26***	61%
Giant Perch	Sand Bass	*Psammoperca waigiensis*	0	0	***60***	***49***	***60***	***49***	100%
Grunter Breams	Barred Javelin	*Pomadasys kaakan*	***38***	***52***	***164***	***161***	***202***	***205***	81%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Blotched Javelin	*Pomadasys maculatus*	0	0	***53***	***72***	***53***	***72***	100%
	Grunter Bream	Haemulidae - undifferentiated	***18***	***24***	***18***	***24***	***35***	***34***	50%
	Painted Sweetlips	*Diagramma labiosum*	***1,260***	***636***	***660***	***347***	***1,920***	***918***	34%
Grunters	Striped Grunter	Terapontidae - undifferentiated	***256***	***349***	***534***	***445***	***789***	***566***	68%
Halfbeaks	Three-by-two Garfish	*Hemiramphus robustus*	***981***	***1,240***	0	0	***981***	***1,240***	0%
	Garfish	Hemiramphidae - undifferentiated	***176***	***240***	0	0	***176***	***240***	0%
	Longtom	Belonidae - undifferentiated	***26***	***28***	***119***	***73***	***145***	***95***	82%
Jewfish	Black Jewfish	*Protonibea diacanthus*	***8***	***11***	0	0	***8***	***11***	0%
	Mulloway	*Argyrosomus japonicus*	***236***	***146***	***514***	***417***	***750***	***451***	69%
King Snapper	Goldband Snapper	*Pristipomoides multidens*	4,593	1,436	**276**	**159**	4,870	1,485	6%
	Rosy Snapper	*Pristipomoides filamentosus*	***314***	***189***	***196***	***202***	***510***	***328***	38%
	Sharptooth Snapper	*Pristipomoides typus*	***79***	***108***	***39***	***54***	***118***	***120***	33%
Lizardfish	Lizardfishes & Grinners	Bathysauridae, Synodontidae - undifferentiated	***26***	***36***	***438***	***473***	***464***	***477***	94%
	Sergeant Baker	*Latropiscis purpurissatus*	0	0	***231***	***203***	***231***	***203***	100%
Mackerels	Blue Mackerel	*Scomber australasicus*	***42***	***34***	***8***	***10***	***50***	***39***	16%
	Grey Mackerel	*Scomberomorus semifasciatus*	***189***	***178***	***252***	***238***	***440***	***381***	57%
	School Mackerel	*Scomberomorus queenslandicus*	***803***	***592***	***367***	***213***	***1,169***	***752***	31%
	Shark Mackerel	*Grammatorcynus bicarinatus*	***228***	***177***	***286***	***235***	***514***	***295***	56%
	Spanish Mackerel	*Scomberomorus commerson*	3,075	943	**2,242**	**1,306**	5,317	1,915	42%
	Spotted Mackerel	*Scomberomorus munroi*	***122***	***72***	***101***	***79***	***223***	***107***	45%
	Wahoo	*Acanthocybium solandri*	***92***	***49***	***128***	***89***	***220***	***115***	58%
	Mackerels	*Scombridae spp. (tribes Scomberomorini & Scombrini)*	0	0	***22***	***30***	***22***	***30***	100%
Mahi Mahi	Mahi Mahi	*Coryphaena spp.*	***81***	***45***	***18***	***24***	***99***	***63***	18%
Mullets	Sea Mullet	*Mugil cephalus*	***947***	***1,157***	0	0	***947***	***1,157***	0%
	Mullets	Mugilidae - undifferentiated	***223***	***214***	0	0	***223***	***214***	0%
Pearl Perch	Northern Pearl Perch	*Glaucosoma buergeri*	***787***	***338***	***48***	***42***	***834***	***349***	6%
Pikes	Great Barracuda	*Sphyraena barracuda*	***9***	***12***	***266***	***127***	***275***	***128***	97%
	Yellowtail Barracuda	*Sphyraena obtusata*	***541***	***395***	***78***	***71***	***618***	***408***	13%
Pufferfish	Leatherjackets	Monacanthidae - undifferentiated	***85***	***62***	***630***	***304***	***715***	***326***	88%
	Silver Toadfish	*Lagocephalus sceleratus*	0	0	***354***	***159***	***354***	***159***	100%
	Weeping Toadfish	*Torquigener pleurogramma*	0	0	***39***	***41***	***39***	***41***	100%
	Toadfish	Tetraodontidae - undifferentiated	0	0	***295***	***120***	***295***	***120***	100%
Tailor	Tailor	*Pomatomus saltatrix*	***188***	***162***	***60***	***61***	***249***	***186***	24%
Threadfin Breams	Rosy Threadfin Bream	*Nemipterus furcosus*	***18***	***25***	***281***	***297***	***299***	***298***	94%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Western Butterfish	*Pentapodus vitta*	***6,389***	***6,993***	***2,405***	***1,131***	***8,794***	***7,108***	27%
Queenfish	Queenfish	*Scomberoides spp.*	***251***	***284***	***497***	***573***	***748***	***850***	66%
Trevallies	Amberjack	*Seriola dumerili*	***31***	***30***	***118***	***161***	***149***	***164***	79%
	Bludger Trevally	*Carangoides gymnostethus*	***71***	***46***	***293***	***177***	***364***	***186***	80%
	Common Dart	*Trachinotus botla*	0	0	***28***	***30***	***28***	***30***	100%
	Giant Trevally	*Caranx ignobilis*	***32***	***27***	***1,032***	***967***	***1,064***	***967***	97%
	Golden Trevally	*Gnathanodon speciosus*	554	181	**2,084**	**1,464**	**2,638**	**1,522**	79%
	Rainbow Runner	*Elagatis bipinnulata*	***20***	***28***	0	0	***20***	***28***	0%
	Samsonfish	*Seriola hippos*	***11***	***15***	0	0	***11***	***15***	0%
	Silver Trevallies	*Pseudocaranx georgianus* spp. complex	***49***	***39***	***218***	***151***	***266***	***156***	82%
	Turrum	*Carangoides fulvoguttatus*	***20***	***27***	***13***	***18***	***33***	***32***	40%
	Yellowtail Kingfish	*Seriola lalandi*	0	0	***20***	***27***	***20***	***27***	100%
	Yellowtail Scad	*Trachurus novaezelandiae*	0	0	***141***	***144***	***141***	***144***	100%
	Trevallies	Carangidae - undifferentiated	0	0	***993***	***1,132***	***993***	***1,132***	100%
Tripletail	Tripletail	*Lobotes surinamensis*	***22***	***31***	0	0	***22***	***31***	0%
Tropical Snappers	Brownstripe Snapper	*Lutjanus vitta*	***91***	***99***	***8***	***10***	***98***	***99***	8%
	Chinamanfish	*Symphorus nematophorus*	***299***	***250***	***18***	***24***	***316***	***251***	6%
	Crimson Snapper	*Lutjanus erythropterus*	***94***	***83***	0	0	***94***	***83***	0%
	Darktail Snapper	*Lutjanus lemniscatus*	***21***	***16***	0	0	***21***	***16***	0%
	Flame Snapper	*Etelis coruscans*	***162***	***162***	0	0	***162***	***162***	0%
	Red Emperor	*Lutjanus sebae*	**3,375**	**1,563**	**2,905**	**2,883**	**6,280**	**4,381**	46%
	Saddletail Snapper	*Lutjanus malabaricus*	***158***	***77***	0	0	***158***	***77***	0%
	Stripey Snapper	*Lutjanus carponotatus*	2,403	709	**3,474**	**1,403**	5,876	1,908	59%
	Moses' Snapper	*Lutjanus russellii*	***389***	***247***	***145***	***135***	***534***	***345***	27%
	Mangrove Jack	*Lutjanus argentimaculatus*	***292***	***155***	***99***	***64***	***392***	***169***	25%
	Tropical Snappers	*Lutjanus spp.*	***15***	***20***	0	0	***15***	***20***	0%
	Ruby Snapper	*Etelis boweni*	*1,182*	*428*	***99***	***75***	*1,281*	*452*	8%
Tunas	Mackerel Tuna	*Euthynnus affinis*	***69***	***48***	***359***	***219***	***428***	***228***	84%
	Skipjack Tuna	*Katsuwonus pelamis*	***27***	***26***	***73***	***64***	***99***	***69***	73%
	Southern Bluefin Tuna	*Thunnus maccoyii*	***148***	***107***	***117***	***150***	***265***	***184***	44%
	Longtail Tuna	*Thunnus tonggol*	***47***	***29***	***57***	***40***	***103***	***61***	55%
	Yellowfin Tuna	*Thunnus albacares*	*539*	*199*	***171***	***96***	*709*	*238*	24%
	Tunas	*Scombridae spp. (tribes Sardini & Thunnini)*	***31***	***30***	***44***	***30***	***75***	***49***	58%
Whitings	Western Trumpeter Whiting	*Sillago burrus*	***996***	***1,361***	***684***	***574***	***1,680***	***1,477***	41%
	Yellowfin Whiting	*Sillago schomburgkii*	***2,060***	***1,236***	***750***	***595***	***2,810***	***1,649***	27%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Goldenline Whiting	*Sillago analis*	0	0	***59***	***81***	***59***	***81***	100%
	Western School Whiting	*Sillago vittata*	***255***	***176***	***52***	***47***	***306***	***186***	17%
Wrasses	Baldchin Groper	*Choerodon rubescens*	**1,823**	**882**	**2,494**	**2,608**	**4,317**	**3,420**	58%
	Blackspot Tuskfish	*Choerodon schoenleinii*	562	213	**953**	**609**	**1,515**	**691**	63%
	Blue Tuskfish	*Choerodon cyanodus*	***967***	***872***	***1,227***	***768***	***2,194***	***1,244***	56%
	Bluebarred Parrotfish	*Scarus ghobban* spp. complex	***20***	***27***	***84***	***86***	***104***	***90***	81%
	Bluespotted Tuskfish	*Choerodon cauteroma*	***298***	***293***	***1,189***	***777***	***1,487***	***852***	80%
	Brownspotted Wrasse	*Notolabrus parilus*	***241***	***329***	***665***	***737***	***905***	***1,063***	73%
	Sunburnt Pigfish	*Bodianus solatus*	***256***	***130***	***6***	***6***	***262***	***131***	2%
	Purple Tuskfish	*Choerodon cephalotes*	0	0	***15***	***19***	***15***	***19***	100%
	Western King Wrasse	*Coris auricularis*	***49***	***52***	***395***	***281***	***444***	***285***	89%
	Parrotfish	Scaridae - undifferentiated	***18***	***19***	***63***	***86***	***81***	***88***	78%
	Tuskfish	*Choerodon spp.*	***13***	***18***	***118***	***161***	***131***	***162***	90%
	Wrasses	Labridae - undifferentiated	0	0	***111***	***98***	***111***	***98***	100%
Crab	Sand Crab	*Ovalipes spp.*	***122***	***157***	0	0	***122***	***157***	0%
Prawns	Prawns	Penaeidae - undifferentiated	***263***	***327***	0	0	***263***	***327***	0%
Eels	Eels	Order Anguilliformes - undifferentiated	0	0	***42***	***40***	***42***	***40***	100%
Butterfish	Butterfish	Stromateidae - undifferentiated	0	0	***653***	***728***	***653***	***728***	100%
Dories	Dories	Zeidae - undifferentiated	0	0	***27***	***37***	***27***	***37***	100%

Table 9. Annual catch (total, kept and released numbers) and proportion released in the West Coast bioregion during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); values in italics indicate <30 respondents recorded catches of the species).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Abalone	Roe's Abalone	*Haliotis roei*	*18,276*	*6,657*	***225***	***271***	*18,501*	*6,699*	1%
	Greenlip Abalone	*Haliotis laevigata*	***794***	***899***	***44***	***60***	***838***	***959***	5%
	Brownlip Abalone	*Haliotis conicopora*	***640***	***607***	0	0	***640***	***607***	0%
Cephalopods	Cuttlefish	*Sepia spp.*	1,543	383	**626**	**276**	2,169	476	29%
	Octopus	Octopodidae - undifferentiated	**2,810**	**1,597**	391	147	**3,201**	**1,612**	12%
	Squid	Order Teuthoidea - undifferentiated	75,256	13,649	**3,608**	**1,649**	78,863	13,998	5%
Lobster	Western Rock Lobster	*Panulirus cygnus*	473,175	50,209	187,937	30,714	661,112	73,555	28%
	Southern Rock Lobster	*Jasus edwardsii*	***488***	***271***	***182***	***147***	***670***	***381***	27%
Crab	Blue Swimmer Crab	*Portunus armatus*	184,319	30,299	365,035	113,209	549,354	139,710	66%
	Green Mud Crab	*Scylla serrata*	0	0	***68***	***93***	***68***	***93***	100%
Sharks	Bronze Whaler	*Carcharhinus brachyurus*	***185***	***109***	*836*	*308*	*1,021*	*336*	82%
	Dusky Whaler	*Carcharhinus obscurus*	***33***	***32***	***252***	***207***	***285***	***213***	89%
	Sandbar Shark	*Carcharhinus plumbeus*	***27***	***26***	***198***	***147***	***225***	***150***	88%
	Tiger Shark	*Galeocerdo cuvier*	0	0	***15***	***21***	***15***	***21***	100%
	Whaler Sharks	Carcharhinidae - undifferentiated	***47***	***38***	***68***	***47***	***115***	***73***	59%
	Hammerhead Sharks	Sphyrnidae - undifferentiated	***34***	***47***	***172***	***125***	***206***	***134***	83%
	Gummy Shark	*Mustelus antarcticus*	1,293	351	**560**	**267**	1,853	455	30%
	Whiskery Shark	*Furgaleus macki*	***125***	***66***	***258***	***114***	*383*	*134*	67%
	Port Jackson Shark	*Heterodontus portusjacksoni*	0	0	***686***	***288***	***686***	***288***	100%
	Greynurse Shark	*Carcharias taurus*	0	0	***118***	***161***	***118***	***161***	100%
	Wobbegong	Orectolobidae - undifferentiated	***87***	***50***	***404***	***170***	*491*	*186*	82%
	Sawsharks	*Pristiophorus spp.*	***22***	***30***	0	0	***22***	***30***	0%
	Sharks	Sharks - undifferentiated	**124**	**78**	2,329	882	2,453	887	95%
Rays	Western Shovelnose Ray	*Aptychotrema vincentiana*	**20**	**27**	894	301	913	303	98%
	Rays	Order Rajiformes - undifferentiated	0	0	3,239	1,009	3,239	1,009	100%
Billfish	Blue Marlin	*Makaira nigricans*	***15***	***21***	***13***	***18***	***28***	***27***	46%
Bonito	Bonito	*Sarda australis & Cybiosarda elegans*	***146***	***125***	0	0	***146***	***125***	0%
	Oriental Bonito	*Sarda orientalis*	***118***	***76***	0	0	***118***	***76***	0%
Breams	Black Bream	*Acanthopagrus butcheri*	**5,185**	**3,746**	36,866	13,948	42,051	16,234	88%
	Pink Snapper	*Chrysophrys auratus*	20,956	2,476	63,046	7,348	84,002	9,150	75%
	Tarwhine	*Rhabdosargus sarba*	**1,466**	**632**	**6,027**	**3,689**	**7,493**	**3,936**	80%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Breams	Sparidae - undifferentiated	***199***	***152***	***342***	***467***	***541***	***491***	63%
Catfish	Forktail Catfishes	Ariidae - undifferentiated	0	0	***237***	***291***	***237***	***291***	100%
Cobia	Cobia	*Rachycentron canadum*	***39***	***31***	***24***	***24***	***63***	***47***	38%
Cods	Blackspotted Rockcod	*Epinephelus malabaricus*	***219***	***111***	***1,803***	***865***	***2,022***	***886***	89%
	Blacktip Rockcod	*Epinephelus fasciatus*	***20***	***28***	***153***	***171***	***173***	***174***	88%
	Breaksea Cod	*Epinephelides armatus*	9,785	1,155	6,929	1,245	16,714	2,055	41%
	Chinaman Rockcod	*Epinephelus rivulatus*	898	345	**3,309**	**1,964**	**4,207**	**2,009**	79%
	Eightbar Grouper	*Hyporthodus cf octofasciatus*	***606***	***260***	***136***	***187***	***743***	***320***	18%
	Goldspotted Rockcod	*Epinephelus coioides*	***296***	***151***	***1,166***	***683***	***1,462***	***699***	80%
	Harlequin Fish	*Othos dentex*	1,183	289	**324**	**160**	1,507	339	22%
	Queensland Groper	*Epinephelus lanceolatus*	***18***	***24***	0	0	***18***	***24***	0%
	Rankin Cod	*Epinephelus multinotatus*	***231***	***143***	***182***	***114***	***413***	***190***	44%
	Tomato Rockcod	*Cephalopholis sonnerati*	***58***	***57***	***126***	***94***	***183***	***111***	69%
	Temperate Basses & Rockcods	Percichthyidae, Serranidae - undifferentiated	***337***	***260***	***1,379***	***917***	***1,716***	***1,054***	80%
Coral Trout	Common Coral Trout	*Plectropomus leopardus*	*592*	*234*	***268***	***261***	***860***	***396***	31%
	Yellowedge Coronation Trout	*Variola louti*	***20***	***28***	***15***	***20***	***35***	***34***	42%
Emperors	Grass Emperor	*Lethrinus laticaudis*	***172***	***75***	***197***	***105***	*369*	*137*	53%
	Redthroat Emperor	*Lethrinus miniatus*	872	283	**1,769**	**947**	**2,641**	**1,096**	67%
	Robinson's Seabream	*Gymnocranius grandoculis*	***13***	***18***	***79***	***107***	***92***	***109***	86%
	Spangled Emperor	*Lethrinus nebulosus*	***516***	***332***	***196***	***98***	***712***	***379***	27%
	Yellowtail Emperor	*Lethrinus atkinsoni*	***22***	***30***	0	0	***22***	***30***	0%
Flatheads	Southern Bluespotted Flathead	*Platycephalus speculator*	2,074	633	9,349	2,986	11,423	3,342	82%
	Yellowtail Flathead	*Platycephalus westraliae*	1,365	542	7,617	2,970	8,982	3,138	85%
	Flatheads	Platycephalidae - undifferentiated	**904**	**433**	**7,826**	**3,862**	**8,730**	**4,123**	90%
Flatfish	Smalltooth Flounder	*Pseudorhombus jenynsii*	***230***	***109***	***235***	***124***	***465***	***188***	50%
	Flounders	*Bothidae, Psettodidae & Pleuronectidae*	***371***	***149***	***167***	***137***	*538*	*202*	31%
Giant Perch	Sand Bass	*Psammoperca waigiensis*	***93***	***109***	***82***	***112***	***175***	***156***	47%
Goatfish	Bluespotted Goatfish	*Upeneichthys vlamingii*	**804**	**412**	**1,599**	**717**	2,403	843	67%
Grunter Breams	Painted Sweetlips	*Diagramma labiosum*	***410***	***190***	***586***	***550***	***996***	***717***	59%
Grunters	Sea Trumpeter	*Pelsartia humeralis*	**586**	**401**	11,353	3,432	11,939	3,483	95%
	Western Striped Grunter	*Pelates octolineatus*	***288***	***341***	***3,166***	***1,443***	***3,454***	***1,482***	92%
	Striped Grunter	Terapontidae - undifferentiated	0	0	***306***	***339***	***306***	***339***	100%
Gurnards	Bighead Gurnard Perch	*Neosebastes pandus*	**392**	**346**	**1,878**	**797**	**2,270**	**911**	83%
	Gurnard Perch	Neosebastidae - undifferentiated	**121**	**81**	**1,315**	**614**	**1,436**	**620**	92%
Halfbeaks	Southern Garfish	*Hyporhamphus melanochir*	***616***	***477***	***512***	***325***	***1,128***	***577***	45%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Three-by-two Garfish	*Hemiramphus robustus*	***237***	***158***	0	0	***237***	***158***	0%
	Garfish	Hemiramphidae - undifferentiated	***451***	***616***	***42***	***57***	***493***	***619***	8%
	Longtom	Belonidae - undifferentiated	***41***	***56***	***21***	***29***	***62***	***63***	34%
Herrings	Australian Sardine	*Sardinops sagax*	***102***	***140***	0	0	***102***	***140***	0%
	Herrings & Ilishas	Clupeidae, Pristigasteridae - undifferentiated	***4,378***	***5,380***	***375***	***346***	***4,753***	***5,673***	8%
Jewfish	Mulloway	*Argyrosomus japonicus*	***115***	***72***	***90***	***74***	***205***	***106***	44%
Lizardfish	Sergeant Baker	*Latropiscis purpurissatus*	964	277	2,239	552	3,202	651	70%
Mackerels	Blue Mackerel	*Scomber australasicus*	***996***	***891***	***292***	***198***	***1,287***	***990***	23%
	School Mackerel	*Scomberomorus queenslandicus*	***64***	***46***	0	0	***64***	***46***	0%
	Shark Mackerel	*Grammatorcynus bicarinatus*	***28***	***27***	***170***	***112***	***197***	***129***	86%
	Spanish Mackerel	*Scomberomorus commerson*	**878**	**369**	**229**	**150**	1,106	426	21%
	Spotted Mackerel	*Scomberomorus munroi*	***5***	***7***	***70***	***87***	***75***	***87***	93%
	Wahoo	*Acanthocybium solandri*	***41***	***56***	***42***	***58***	***83***	***80***	51%
	Mackerels	*Scombridae spp. (tribes Scomberomorini & Scombrini)*	***82***	***112***	0	0	***82***	***112***	0%
Mahi Mahi	Mahi Mahi	*Coryphaena spp.*	***380***	***242***	***117***	***120***	***497***	***275***	24%
Morwongs	Blue Morwong	*Nemadactylus valenciennesi*	1,460	345	**583**	**290**	2,043	503	29%
	Dusky Morwong	*Dactylophora nigricans*	0	0	***30***	***41***	***30***	***41***	100%
	Morwongs	Cheilodactylidae - undifferentiated	***18***	***24***	***10***	***14***	***28***	***28***	37%
Mullets	Sea Mullet	*Mugil cephalus*	***39***	***54***	***39***	***54***	***79***	***76***	50%
	Yelloweye Mullet	*Aldrichetta forsteri*	0	0	***34***	***47***	***34***	***47***	100%
	Mullets	Mugilidae - undifferentiated	***1,976***	***1,731***	0	0	***1,976***	***1,731***	0%
Pearl Perch	West Australian Dhufish	*Glaucosoma hebraicum*	20,368	2,129	21,602	2,729	41,970	4,513	51%
Pikes	Pike	Sphyraenidae - undifferentiated	***1,914***	***1,475***	***335***	***223***	***2,249***	***1,515***	15%
	Snook	*Sphyraena novaehollandiae*	**2,771**	**1,737**	**1,774**	**825**	**4,545**	**2,148**	39%
Pufferfish	Horseshoe Leatherjacket	*Meuschenia hippocrepis*	***284***	***174***	***204***	***104***	***488***	***203***	42%
	Sixspine Leatherjacket	*Meuschenia freycineti*	***133***	***88***	***301***	***223***	***434***	***240***	69%
	Leatherjackets	Monacanthidae - undifferentiated	***259***	***121***	***985***	***562***	***1,243***	***599***	79%
	Silver Toadfish	*Lagocephalus sceleratus*	0	0	***373***	***197***	***373***	***197***	100%
	Weeping Toadfish	*Torquigener pleurogramma*	0	0	6,083	1,896	6,083	1,896	100%
	Toadfish	Tetraodontidae - undifferentiated	0	0	15,479	4,421	15,479	4,421	100%
Redfish	Bight Redfish	*Centroberyx gerrardi*	812	226	**931**	**471**	1,743	535	53%
	Swallowtail	*Centroberyx lineatus*	***215***	***145***	***79***	***76***	***294***	***195***	27%
	Yelloweye Redfish	*Centroberyx australis*	0	0	***102***	***84***	***102***	***84***	100%
Salmon Herrings	Australian Herring	*Arripis georgianus*	128,105	31,071	29,052	7,585	157,156	34,362	18%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Western Australian Salmon	*Arripis truttaceus*	***139***	***93***	***1,987***	***1,400***	***2,126***	***1,403***	93%
Sweeps	Banded Sweep	*Scorpis georgiana*	***152***	***92***	***439***	***204***	*591*	*224*	74%
	Sea Sweep	*Scorpis aequipinnis*	***436***	***179***	***508***	***336***	***944***	***385***	54%
	Silver Drummer	*Kyphosus sydneyanus*	***57***	***59***	***41***	***56***	***98***	***81***	42%
Tailor	Tailor	*Pomatomus saltatrix*	**8,595**	**4,313**	5,022	1,912	13,617	5,431	37%
Threadfin Breams	Western Butterfish	*Pentapodus vitta*	**2,543**	**1,841**	23,683	6,497	26,226	6,929	90%
Trevalla	Blue-eye Trevalla	*Hyperoglyphe antarctica*	***202***	***174***	0	0	***202***	***174***	0%
Trevallies	Amberjack	*Seriola dumerili*	***37***	***35***	***217***	***157***	***254***	***167***	85%
	Giant Trevally	*Caranx ignobilis*	***66***	***91***	0	0	***66***	***91***	0%
	Golden Trevally	*Gnathanodon speciosus*	0	0	***79***	***108***	***79***	***108***	100%
	Samsonfish	*Seriola hippos*	720	179	4,510	1,119	5,230	1,151	86%
	Silver Trevallies	*Pseudocaranx georgianus* spp. complex	32,272	9,440	15,468	3,296	47,740	10,721	32%
	Yellowtail Kingfish	*Seriola lalandi*	***778***	***376***	***208***	***162***	***986***	***455***	21%
	Yellowtail Scad	*Trachurus novaezelandiae*	***421***	***306***	***2,359***	***2,142***	***2,780***	***2,178***	85%
	Trevallies	Carangidae - undifferentiated	0	0	***266***	***363***	***266***	***363***	100%
Tripletail	Tripletail	*Lobotes surinamensis*	0	0	***131***	***162***	***131***	***162***	100%
Tropical Snappers	Chinamanfish	*Symphorus nematophorus*	***32***	***43***	***11***	***14***	***42***	***58***	25%
	Darktail Snapper	*Lutjanus lemniscatus*	***13***	***18***	0	0	***13***	***18***	0%
	Flame Snapper	*Etelis coruscans*	***20***	***27***	0	0	***20***	***27***	0%
	Red Emperor	*Lutjanus sebae*	***136***	***76***	***86***	***86***	***222***	***149***	39%
	Stripey Snapper	*Lutjanus carponotatus*	***69***	***61***	***15***	***20***	***84***	***64***	17%
	Moses' Snapper	*Lutjanus russellii*	0	0	***25***	***25***	***25***	***25***	100%
	Mangrove Jack	*Lutjanus argentimaculatus*	***52***	***51***	***21***	***29***	***73***	***59***	29%
	Tropical Snappers	*Lutjanus spp.*	0	0	***73***	***77***	***73***	***77***	100%
	Ruby Snapper	*Etelis boweni*	***46***	***45***	0	0	***46***	***45***	0%
Western Blue Devil	Western Blue Devil	*Paraplesiops sinclairi*	0	0	***85***	***69***	***85***	***69***	100%
Tunas	Mackerel Tuna	*Euthynnus affinis*	***89***	***56***	***166***	***189***	***254***	***200***	65%
	Skipjack Tuna	*Katsuwonus pelamis*	682	234	**1,319**	**792**	**2,001**	**842**	66%
	Southern Bluefin Tuna	*Thunnus maccoyii*	*1,222*	*486*	***191***	***142***	*1,413*	*551*	14%
	Longtail Tuna	*Thunnus tonggol*	***220***	***143***	***245***	***283***	***465***	***363***	53%
	Yellowfin Tuna	*Thunnus albacares*	***458***	***212***	***685***	***533***	***1,143***	***646***	60%
	Tunas	*Scombridae spp. (tribes Sardini & Thunnini)*	***85***	***82***	***57***	***60***	***142***	***129***	40%
Whitings	King George Whiting	*Sillaginodes punctatus*	30,434	5,605	12,869	4,918	43,303	9,546	30%
	Western Trumpeter Whiting	*Sillago burrus*	***705***	***675***	***3,302***	***1,553***	***4,006***	***1,693***	82%
	Yellowfin Whiting	*Sillago schomburgkii*	36,852	10,794	6,711	2,580	43,562	12,424	15%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
	Southern School Whiting	*Sillago bassensis*	95,430	18,223	21,233	5,492	116,663	22,424	18%
	Western School Whiting	*Sillago vittata*	110,493	32,254	**24,430**	**11,195**	134,923	41,507	18%
	Whitings	Sillaginidae - undifferentiated	***2,223***	***2,046***	***319***	***234***	***2,541***	***2,164***	13%
Wrasses	Baldchin Groper	*Choerodon rubescens*	18,175	2,344	8,506	1,701	26,681	3,647	32%
	Bluebarred Parrotfish	*Scarus ghobban* spp. complex	***412***	***290***	***603***	***523***	***1,015***	***752***	59%
	Brownspotted Wrasse	*Notolabrus parilus*	**1,563**	**632**	15,542	2,988	17,105	3,141	91%
	Foxfish	*Bodianus frenchii*	1,240	454	552	219	1,792	530	31%
	Southern Maori Wrasse	*Ophthalmolepis lineolatus*	**1,621**	**911**	6,708	2,604	8,328	2,889	81%
	Western Blue Groper	*Achoerodus gouldii*	***190***	***134***	***173***	***167***	***363***	***266***	48%
	Western King Wrasse	*Coris auricularis*	7,691	2,191	28,046	4,392	35,738	5,528	78%
	Parrotfish	Scaridae - undifferentiated	***463***	***373***	***1,122***	***585***	***1,585***	***798***	71%
	Tuskfish	*Choerodon spp.*	***30***	***29***	0	0	***30***	***29***	0%
	Wrasses	Labridae - undifferentiated	**622**	**366**	**3,884**	**1,694**	4,506	1,760	86%
Wreckfish	Bass Groper	*Polyprion americanus*	***81***	***51***	0	0	***81***	***51***	0%
	Hapuku	*Polyprion oxygeneios*	***270***	***188***	***13***	***18***	***283***	***196***	5%
Crab	Sand Crab	*Ovalipes spp.*	0	0	***56***	***78***	***56***	***78***	100%
Freshwater crayfish	Marron	*Cherax cainii*	***463***	***503***	***113***	***155***	***576***	***570***	20%
Prawns	Prawns	Penaeidae - undifferentiated	***7,254***	***5,156***	0	0	***7,254***	***5,156***	0%
Eels	Conger Eel	Congridae, Colocongridae - undifferentiated	0	0	***41***	***56***	***41***	***56***	100%
	Eels	Order Anguilliformes - undifferentiated	0	0	***187***	***83***	***187***	***83***	100%
Morid Cods	Morid Cod	Moridae - undifferentiated	***115***	***157***	***92***	***126***	***207***	***283***	44%
Opahs	Batfish	Ephippidae, Drepaneidae - undifferentiated	0	0	***22***	***30***	***22***	***30***	100%
Boarfish	Boarfish	Pentacerotidae - undifferentiated	***87***	***63***	0	0	***87***	***63***	0%
Butterfish	Butterfish	Stromateidae - undifferentiated	***263***	***221***	***3,231***	***2,166***	***3,494***	***2,209***	92%
Freshwater Perch	Redfin	*Perca fluviatilis*	***624***	***678***	0	0	***624***	***678***	0%
Knifejaw	Knifejaw	*Oplegnathus woodwardi*	***25***	***28***	***137***	***163***	***162***	***165***	85%

Table 10. Annual catch (total, kept and released numbers) and proportion released in the South Coast bioregion during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); values in italics indicate <30 respondents recorded catches of the species).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Abalone	Greenlip Abalone	*Haliotis laevigata*	***319***	***321***	0	0	***319***	***321***	0%
	Brownlip Abalone	*Haliotis conicopora*	***11***	***15***	0	0	***11***	***15***	0%
Cephalopods	Cuttlefish	*Sepia spp.*	***103***	***56***	***63***	***43***	***166***	***72***	38%
	Octopus	Octopodidae - undifferentiated	***25***	***24***	***10***	***13***	***34***	***27***	29%
	Squid	Order Teuthoidea - undifferentiated	6,560	1,983	**232**	**152**	6,792	2,051	3%
Crab	Blue Swimmer Crab	*Portunus armatus*	***394***	***486***	0	0	***394***	***486***	0%
Sharks	Bronze Whaler	*Carcharhinus brachyurus*	***27***	***26***	0	0	***27***	***26***	0%
	Hammerhead Sharks	Sphyrnidae - undifferentiated	***9***	***12***	0	0	***9***	***12***	0%
	Gummy Shark	*Mustelus antarcticus*	***159***	***79***	***43***	***43***	***201***	***105***	21%
	Whiskery Shark	*Furgaleus macki*	***3***	***4***	***103***	***114***	***106***	***114***	97%
	Port Jackson Shark	*Heterodontus portusjacksoni*	***13***	***18***	***43***	***35***	***57***	***40***	76%
	Wobbegong	Orectolobidae - undifferentiated	0	0	***13***	***18***	***13***	***18***	100%
	Sharks	Sharks - undifferentiated	***143***	***182***	***511***	***362***	***654***	***406***	78%
Rays	Western Shovelnose Ray	*Aptychotrema vincentiana*	0	0	***50***	***40***	***50***	***40***	100%
	Rays	Order Rajiformes - undifferentiated	0	0	***167***	***98***	***167***	***98***	100%
Barracouta	Barracouta	*Thyrsites atun*	***15***	***20***	0	0	***15***	***20***	0%
Bonito	Bonito	*Sarda australis & Cybiosarda elegans*	***82***	***77***	***44***	***43***	***126***	***117***	35%
	Oriental Bonito	*Sarda orientalis*	***104***	***95***	***86***	***72***	***190***	***139***	45%
Breams	Black Bream	*Acanthopagrus butcheri*	**5,443**	**2,555**	**14,005**	**7,284**	**19,448**	**9,334**	72%
	Pink Snapper	*Chrysophrys auratus*	4,794	1,778	9,269	2,974	14,063	4,230	66%
	Tarwhine	*Rhabdosargus sarba*	***1,134***	***778***	***1,827***	***1,035***	***2,961***	***1,465***	62%
	Breams	Sparidae - undifferentiated	***98***	***134***	***200***	***209***	***298***	***288***	67%
Cods	Breaksea Cod	*Epinephelides armatus*	4,369	952	1,359	494	5,728	1,244	24%
	Eightbar Grouper	*Hyporthodus cf octofasciatus*	***37***	***29***	0	0	***37***	***29***	0%
	Harlequin Fish	*Othos dentex*	604	177	**78**	**69**	683	207	11%
	Temperate Basses & Rockcods	Percichthyidae, Serranidae - undifferentiated	***87***	***69***	***1,225***	***520***	***1,313***	***528***	93%
Flatheads	Southern Bluespotted Flathead	*Platycephalus speculator*	1,412	472	514	203	1,926	555	27%
	Flatheads	Platycephalidae - undifferentiated	***269***	***149***	***349***	***234***	***619***	***343***	56%
Flatfish	Smalltooth Flounder	*Pseudorhombus jenynsii*	***32***	***31***	***37***	***39***	***70***	***50***	54%
	Flounders	*Bothidae, Psettodidae & Pleuronectidae*	***47***	***49***	0	0	***47***	***49***	0%
Goatfish	Bluespotted Goatfish	*Upeneichthys vlamingii*	***14***	***15***	***521***	***261***	***535***	***261***	97%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Grunters	Sea Trumpeter	*Pelsartia humeralis*	***537***	***673***	***5,760***	***3,022***	***6,297***	***3,608***	91%
	Western Striped Grunter	*Pelates octolineatus*	0	0	***995***	***966***	***995***	***966***	100%
Gurnards	Bighead Gurnard Perch	*Neosebastes pandus*	***92***	***83***	***153***	***106***	***245***	***134***	63%
	Gurnard Perch	Neosebastidae - undifferentiated	***95***	***113***	***162***	***114***	***257***	***183***	63%
Halfbeaks	Southern Garfish	*Hyporhamphus melanochir*	***728***	***602***	***77***	***84***	***805***	***672***	10%
	Garfish	Hemiramphidae - undifferentiated	***18***	***24***	0	0	***18***	***24***	0%
Herrings	Australian Sardine	*Sardinops sagax*	***41***	***56***	0	0	***41***	***56***	0%
	Herrings & Ilishas	Clupeidae, Pristigasteridae - undifferentiated	***360***	***281***	***13***	***18***	***374***	***283***	4%
Lizardfish	Sergeant Baker	*Latropiscis purpurissatus*	**306**	**123**	968	368	1,274	394	76%
Mackerels	Blue Mackerel	*Scomber australasicus*	***112***	***136***	***311***	***231***	***423***	***276***	74%
	Mackerels	*Scombridae spp. (tribes Scomberomorini & Scombrini)*	0	0	***54***	***52***	***54***	***52***	100%
Morwongs	Blue Morwong	*Nemadactylus valenciennesi*	2,418	522	**547**	**313**	2,965	710	18%
	Dusky Morwong	*Dactylophora nigricans*	0	0	***4***	***5***	***4***	***5***	100%
	Morwongs	Cheilodactylidae - undifferentiated	0	0	***134***	***182***	***134***	***182***	100%
Mullets	Sea Mullet	*Mugil cephalus*	***23***	***31***	0	0	***23***	***31***	0%
	Yelloweye Mullet	*Aldrichetta forsteri*	***39***	***54***	***66***	***65***	***105***	***84***	63%
	Mullets	Mugilidae - undifferentiated	***21***	***29***	0	0	***21***	***29***	0%
Pearl Perch	West Australian Dhufish	*Glaucosoma hebraicum*	1,227	335	**313**	**159**	1,540	441	20%
Pikes	Pike	Sphyraenidae - undifferentiated	0	0	***14***	***19***	***14***	***19***	100%
	Snook	*Sphyraena novaehollandiae*	***699***	***351***	***291***	***212***	***990***	***479***	29%
Pufferfish	Horseshoe Leatherjacket	*Meuschenia hippocrepis*	***120***	***77***	***360***	***197***	***480***	***213***	75%
	Sixspine Leatherjacket	*Meuschenia freycineti*	***37***	***29***	***468***	***322***	***505***	***323***	93%
	Leatherjackets	Monacanthidae - undifferentiated	***30***	***27***	***2,009***	***2,127***	***2,040***	***2,128***	99%
	Silver Toadfish	*Lagocephalus sceleratus*	0	0	***20***	***28***	***20***	***28***	100%
	Weeping Toadfish	*Torquigener pleurogramma*	0	0	***39***	***54***	***39***	***54***	100%
	Toadfish	Tetraodontidae - undifferentiated	0	0	***171***	***170***	***171***	***170***	100%
Redfish	Bight Redfish	*Centroberyx gerrardi*	8,174	2,861	**1,369**	**582**	9,544	3,175	14%
	Swallowtail	*Centroberyx lineatus*	**450**	**196**	**359**	**162**	808	322	44%
	Yelloweye Redfish	*Centroberyx australis*	***73***	***96***	***122***	***161***	***196***	***257***	62%
Salmon Herrings	Australian Herring	*Arripis georgianus*	22,152	5,081	10,898	3,141	33,049	7,047	33%
	Western Australian Salmon	*Arripis truttaceus*	***1,515***	***645***	***1,614***	***693***	*3,130*	*1,173*	52%
Sweeps	Banded Sweep	*Scorpis georgiana*	***14***	***11***	***493***	***583***	***507***	***583***	97%
	Sea Sweep	*Scorpis aequipinnis*	***302***	***156***	***261***	***158***	*563*	*222*	46%
	Silver Drummer	*Kyphosus sydneyanus*	***7***	***9***	***145***	***124***	***152***	***124***	96%

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Tailor	Tailor	*Pomatomus saltatrix*	***93***	***87***	***278***	***289***	***371***	***308***	75%
Threadfin Breams	Western Butterfish	*Pentapodus vitta*	***13***	***18***	***414***	***545***	***428***	***546***	97%
Trevalla	Blue-eye Trevalla	*Hyperoglyphe antarctica*	***175***	***129***	0	0	***175***	***129***	0%
Trevallies	Samsonfish	*Seriola hippos*	***195***	***125***	***316***	***180***	***511***	***237***	62%
	Silver Trevallies	*Pseudocaranx georgianus* spp. complex	2,384	768	4,719	1,784	7,102	2,177	66%
	Yellowtail Kingfish	*Seriola lalandi*	***125***	***99***	***185***	***120***	***310***	***163***	60%
	Yellowtail Scad	*Trachurus novaezelandiae*	***330***	***357***	***725***	***512***	***1,055***	***624***	69%
Western Blue Devil	Western Blue Devil	*Paraplesiops sinclairi*	***31***	***32***	***74***	***72***	***105***	***78***	70%
Tunas	Skipjack Tuna	*Katsuwonus pelamis*	***68***	***47***	***198***	***204***	***266***	***226***	74%
	Southern Bluefin Tuna	*Thunnus maccoyii*	***314***	***184***	***110***	***105***	***424***	***225***	26%
	Tunas	*Scombridae spp. (tribes Sardini & Thunnini)*	***27***	***22***	0	0	***27***	***22***	0%
Whitings	King George Whiting	*Sillaginodes punctatus*	36,761	10,048	11,572	3,627	48,333	12,558	24%
	Yellowfin Whiting	*Sillago schomburgkii*	***5,101***	***2,347***	***875***	***512***	***5,975***	***2,744***	15%
	Southern School Whiting	*Sillago bassensis*	10,635	3,924	**5,155**	**2,445**	15,790	6,102	33%
	Whitings	Sillaginidae - undifferentiated	***20***	***27***	***161***	***127***	***180***	***130***	89%
Wrasses	Brownspotted Wrasse	*Notolabrus parilus*	**648**	**781**	4,466	1,461	5,113	1,822	87%
	Foxfish	*Bodianus frenchii*	***167***	***79***	***204***	***217***	***371***	***231***	55%
	Southern Maori Wrasse	*Ophthalmolepis lineolatus*	***85***	***88***	***904***	***473***	***990***	***532***	91%
	Western Blue Groper	*Achoerodus gouldii*	***257***	***105***	***11***	***10***	***268***	***108***	4%
	Western King Wrasse	*Coris auricularis*	**251**	**160**	**4,154**	**2,296**	**4,405**	**2,314**	94%
	Wrasses	Labridae - undifferentiated	***13***	***18***	***412***	***434***	***425***	***436***	97%
Wreckfish	Bass Groper	*Polyprion americanus*	***36***	***41***	0	0	***36***	***41***	0%
	Hapuku	*Polyprion oxygeneios*	***504***	***242***	0	0	***504***	***242***	0%
Prawns	Prawns	Penaeidae - undifferentiated	***668***	***920***	0	0	***668***	***920***	0%
Freshwater Perch	Redfin	*Perca fluviatilis*	***1,893***	***2,584***	0	0	***1,893***	***2,584***	0%
Knifejaw	Knifejaw	*Oplegnathus woodwardi*	0	0	***1,142***	***1,508***	***1,142***	***1,508***	100%
Dories	Dories	Zeidae - undifferentiated	0	0	***7***	***10***	***7***	***10***	100%

8 Catch by Zones within Bioregions

This section presents boat-based recreational harvest for the 12 months from September 2020 to August 2021. Catch is presented for annual catch (total, kept and released, by number) and proportions released (% released) for zones in each bioregion (Figure 117): Kimberley (Table 11) and Pilbara (Table 12) zones in the North Coast; Ningaloo (Table 13) and Carnarvon/Shark Bay (Table 14) zones in the Gascoyne Coast; Mid West (Table 15), Metro (Table 16) and South West (Table 17) zones in the West Coast; and the Albany (Table 18) and Esperance (Table 19) zones in the South Coast.

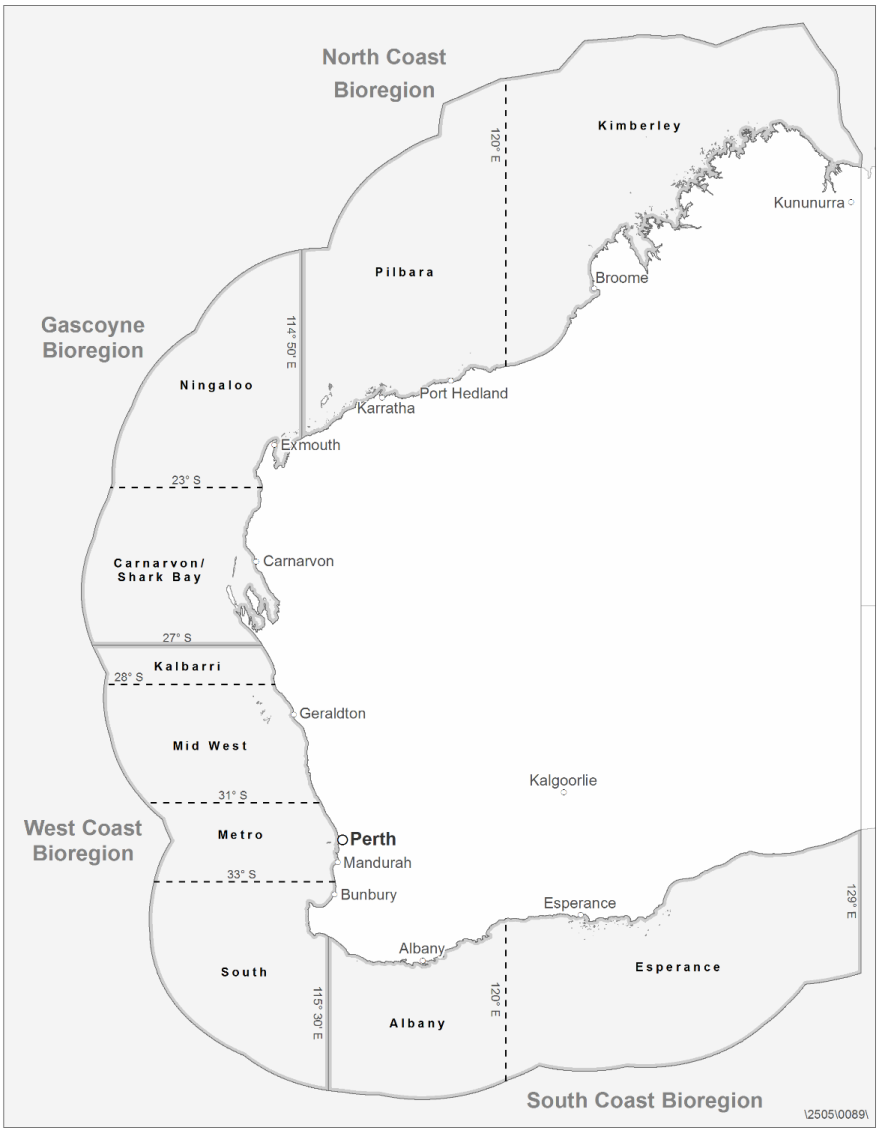


Figure 117. Map of reporting areas in Western Australia, including four bioregions (solid lines) and ten zones within bioregions (dotted lines).

8.1 Kimberley

A total of 124 species/taxa were reported in the Kimberley zone in 2020/21, which represented 2.8% of the statewide total catch (by numbers). Catches for species where the sample size and relative standard error was acceptable are given in Table 11. The most common finfish species were Stripey Snapper (10% of the zone total catch), Grass Emperor (10%), Mullet (7%), Barramundi (5%), Golden Snapper (5%), Giant Sea Catfish (4%), Goldspotted Rockcod (3%), Mangrove Jack (3%), Blue Threadfin (3%), Blackspotted Rockcod (3%), Coral Trout (3%), Spanish Mackerel (2%), Golden Trevally (2%), Blacktip Reef Shark (2%) and Blackspot Tuskfish (2%). The most common invertebrate species were Mud Crab (5%) and Blue Swimmer Crab (2%). These 17 species/taxa accounted for 71% of the total catch (by numbers) in the Kimberley zone in 2020/21.

8.2 Pilbara

A total of 127 species/taxa were reported in the Pilbara zone in 2020/21, which represented 2.7% of the statewide total catch (by numbers). Catches for species where the sample size and relative standard error was acceptable are given in Table 12. The most common finfish species were Grass Emperor (14% of the zone total catch), Stripey Snapper (5%), Coral Trout (4%), Spangled Emperor (4%), Red Emperor (4%), Chinaman Rockcod (4%), Blackspot Tuskfish (3%), Saddletail Snapper (3%), Spanish Mackerel (3%), Rankin Cod (3%), Golden Trevally (2%), Giant Trevally (2%), Mangrove Jack (2%) and Goldspotted Rockcod (2%). The most common invertebrate species were Blue Swimmer Crab (7%), Squid (3%) and Mud Crab (2%). These 14 species/taxa accounted for 70% of the total catch (by numbers) in the Pilbara zone in 2020/21.

8.3 Ningaloo

A total of 132 species/taxa were reported in the Ningaloo zone in 2020/21, which represented 3.2% of the statewide total catch (by numbers). Catches for species where the sample size and relative standard error was acceptable are given in Table 13. The most common finfish species were Chinaman Rockcod (23% of the zone total catch), Spangled Emperor (10%), Redthroat Emperor (9%), Grass Emperor (4%), Red Emperor (3%), Golden Trevally (3%), Stripey Snapper (3%), Spanish Mackerel (2%), Goldband Snapper (2%), Queenfish (2%), Giant Trevally (2%) and Goldspotted Rockcod (2%). The most common invertebrate species were Squid (8%) and Blue Swimmer Crab (2%). These 14 species/taxa accounted for 75% of the total catch (by numbers) in the Ningaloo zone in 2020/21.

8.4 Carnarvon/Shark Bay

A total of 133 species/taxa were reported in the Carnarvon/Shark Bay zone in 2020/21, which represented 5.9% of the statewide total catch (by numbers). Catches for species where the sample size and relative standard error was acceptable are given in Table 14.

The most common finfish species were Grass Emperor (17% of the zone total catch), Pink Snapper (16%), Western Butterfish (6%), Redthroat Emperor (5%), Chinaman Rockcod (5%), Spangled Emperor (3%), Baldchin Groper (2%), Stripey Snapper (2%) and School Whiting (2%). The most common invertebrate species were Blue Swimmer Crab (10%) and Squid (6%). These 11 species/taxa accounted for 74% of the total catch (by numbers) in the Carnarvon/Shark Bay zone in 2020/21.

8.5 Mid West

A total of 106 species/taxa were reported in the Mid West zone (including the Kalbarri zone) in 2020/21, which represented 8.9% of the statewide total catch (by numbers). Catches for species where the sample size and relative standard error was acceptable are given in Table 15. The most common finfish species were Baldchin Groper (6% of the zone total catch), School Whiting (6%), Pink Snapper (5%), West Australian Dhufish (3%) and Australian Herring (2%). The most common invertebrate species was Western Rock Lobster (61%) and Squid (2%). These seven species/taxa accounted for 85% of the total catch (by numbers) in the Mid West zone in 2020/21.

8.6 Metropolitan

A total of 139 species/taxa were reported in the Metropolitan zone in 2020/21, which represented 52.0% of the statewide total catch (by numbers). Catches for species where the sample size and relative standard error was acceptable are given in Table 16. The most common finfish species were School Whiting (17% of the zone total catch), Australian Herring (6%), Pink Snapper (3%), Silver Trevally (2%), Western Butterfish (2%) and Western King Wrasse (2%). The most common invertebrate species were Western Rock Lobster (26%), Blue Swimmer Crab (20%) and Squid (4%). These nine species/taxa accounted for 82% of the total catch (by numbers) in the Metropolitan zone in 2020/21.

8.7 South West

A total of 102 species/taxa were reported in the South West zone in 2020/21, which represented 17.1% of the statewide total catch (by numbers). Catches for species where the sample size and relative standard error was acceptable are given in Table 17. The most common finfish species were Australian Herring (17% of the zone total catch), School Whiting (8%), King George Whiting (6%), Black Bream (4%), Pink Snapper (4%), Silver Trevally (3%), West Australian Dhufish (2%) and Western King Wrasse (2%). The most common invertebrate species were Blue Swimmer Crab (28%), Western Rock Lobster (8%) and Squid (5%). These 11 species/taxa accounted for 87% of the total catch (by numbers) in the South West zone in 2020/21.

8.8 Albany

A total of 90 species/taxa were reported in the Albany zone in 2020/21, which represented 6.7% of the statewide total catch (by numbers). Catches for species where the sample

size and relative standard error was acceptable are given in Table 18. The most common finfish species were King George Whiting (25% of the zone total catch), Australian Herring (15%), School Whiting (10%), Black Bream (9%), Pink Snapper (6%), Silver Trevally (3%), Sea Trumpeter (3%), Bight Redfish (2%), Western King Wrasse (2%), Brownspotted Wrasse (2%), Breaksea Cod (2%) and Tarwhine (2%). The most common invertebrate species was Squid (3%). These 13 species/taxa accounted for 84% of the total catch (by numbers) in the Albany zone in 2020/21.

8.9 Esperance

A total of 56 species/taxa were reported in the Esperance zone in 2020/21, which represented 0.7% of the statewide total catch (by numbers). Catches for species where the sample size and relative standard error was acceptable are given in Table 19. The most common finfish species were Australian Herring (22% of the zone total catch), Bight Redfish (16%), Breaksea Cod (9%), School Whiting (8%), Brownspotted Wrasse (7%), Blue Morwong (4%), Snook (3%), Southern Maori Wrasse (3%), Silver Trevally (3%), Western King Wrasse (2%), Harlequin Fish (2%), Pink Snapper (2%) and Black Bream (2%). The most common invertebrate species was Squid (3%). These 14 species/taxa accounted for 86% of the total catch (by numbers) in the Esperance zone in 2020/21.

Table 11. Annual catch (total, kept and released numbers) and proportion released in the Kimberley zone of the North Coast during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); only species where >30 respondents recorded catches of the species are reported).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Catfish	Giant Sea Catfish	*Netuma thalassina*	**123**	**168**	2,989	889	3,112	905	96%
Cods	Blackspotted Rockcod	*Epinephelus malabaricus*	**526**	**285**	1,577	539	2,104	657	75%
	Goldspotted Rockcod	*Epinephelus coioides*	**531**	**295**	1,869	703	2,400	909	78%
Coral Trout	Common Coral Trout	*Plectropomus leopardus*	**665**	**290**	**777**	**374**	**1,442**	**629**	54%
Emperors	Grass Emperor	*Lethrinus laticaudis*	**2,875**	**2,077**	**5,701**	**4,606**	**8,576**	**6,662**	66%
Giant Perch	Barramundi	*Lates calcarifer*	1,203	334	**4,399**	**1,853**	5,602	1,972	79%
Mackerels	Spanish Mackerel	*Scomberomorus commerson*	**924**	**522**	**1,006**	**630**	**1,929**	**1,133**	52%
Threadfins	Blue Threadfin	*Eleutheronema tetradactylum*	1,392	450	**984**	**432**	2,376	683	41%
	King Threadfin	*Polydactylus macrochir*	899	292	**287**	**147**	1,185	349	24%
Trevallies	Golden Trevally	*Gnathanodon speciosus*	**411**	**222**	**2,119**	**1,031**	**2,529**	**1,107**	84%
Tropical Snappers	Stripey Snapper	*Lutjanus carponotatus*	3,458	1,357	5,317	1,508	8,776	2,505	61%
	Golden Snapper	*Lutjanus johnii*	1,671	602	**2,515**	**1,135**	4,186	1,655	60%
Wrasses	Blackspot Tuskfish	*Choerodon schoenleinii*	**808**	**358**	**760**	**313**	1,568	567	48%

Table 12. Annual catch (total, kept and released numbers) and proportion released in the Pilbara zone of the North Coast during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); only species where >30 respondents recorded catches of the species are reported).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Cods	Rankin Cod	*Epinephelus multinotatus*	1,420	413	**806**	**347**	2,226	643	36%
Coral Trout	Barcheek Coral Trout	*Plectropomus maculatus*	977	309	466	157	1,443	379	32%
	Common Coral Trout	*Plectropomus leopardus*	1,271	318	**823**	**381**	2,094	547	39%
Emperors	Grass Emperor	*Lethrinus laticaudis*	3,096	941	**9,569**	**4,559**	12,665	5,058	76%
	Spangled Emperor	*Lethrinus nebulosus*	1,381	484	**2,623**	**1,070**	4,004	1,360	66%
Mackerels	Spanish Mackerel	*Scomberomorus commerson*	1,365	379	867	316	2,233	600	39%
Trevallies	Golden Trevally	*Gnathanodon speciosus*	**287**	**187**	1,047	393	1,334	449	78%
Tropical Snappers	Red Emperor	*Lutjanus sebae*	2,364	689	1,724	563	4,088	1,116	42%
	Stripey Snapper	*Lutjanus carponotatus*	**669**	**286**	4,774	1,686	5,444	1,758	88%
	Mangrove Jack	*Lutjanus argentimaculatus*	582	228	**738**	**362**	1,320	480	56%
Wrasses	Blackspot Tuskfish	*Choerodon schoenleinii*	662	213	**1,582**	**1,157**	**2,244**	**1,195**	70%

Table 13. Annual catch (total, kept and released numbers) and proportion released in the Ningaloo zone of the Gascoyne Coast during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); only species where >30 respondents recorded catches of the species are reported).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Cephalopods	Squid	Order Teuthoidea - undifferentiated	6,824	1,870	**403**	**232**	7,228	1,920	6%
Cods	Chinaman Rockcod	*Epinephelus rivulatus*	**10,748**	**5,063**	**9,597**	**3,897**	**20,345**	**8,517**	47%
	Rankin Cod	*Epinephelus multinotatus*	724	217	**164**	**123**	888	278	18%
Emperors	Grass Emperor	*Lethrinus laticaudis*	**2,168**	**1,353**	**2,573**	**1,327**	**4,741**	**2,586**	54%
	Redthroat Emperor	*Lethrinus miniatus*	4,038	1,495	**6,691**	**2,916**	10,729	3,922	62%
	Spangled Emperor	*Lethrinus nebulosus*	3,194	852	6,526	2,543	9,721	2,998	67%
King Snapper	Goldband Snapper	*Pristipomoides multidens*	3,181	1,262	**114**	**98**	3,295	1,292	3%
Mackerels	Spanish Mackerel	*Scomberomorus commerson*	1,684	629	**922**	**376**	2,606	877	35%
Tropical Snappers	Red Emperor	*Lutjanus sebae*	**1,783**	**1,470**	**2,433**	**2,850**	**4,216**	**4,311**	58%

Table 14. Annual catch (total, kept and released numbers) and proportion released in the Carnarvon/Shark Bay zone of the Gascoyne Coast during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); only species where >30 respondents recorded catches of the species are reported).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Cephalopods	Squid	Order Teuthoidea - undifferentiated	8,553	3,265	**662**	**581**	9,215	3,522	7%
Crab	Blue Swimmer Crab	*Portunus armatus*	9,463	3,715	5,363	2,137	14,826	5,699	36%
Breams	Pink Snapper	*Chrysophrys auratus*	6,269	1,595	30,957	10,573	37,226	11,261	83%
Cobia	Cobia	*Rachycentron canadum*	550	210	**181**	**93**	730	235	25%
Cods	Goldspotted Rockcod	*Epinephelus coioides*	**1,299**	**600**	**1,052**	**564**	2,351	924	45%
	Rankin Cod	*Epinephelus multinotatus*	1,911	557	**285**	**132**	2,196	612	13%
Emperors	Grass Emperor	*Lethrinus laticaudis*	11,600	3,574	20,305	7,616	31,905	10,266	64%
	Redthroat Emperor	*Lethrinus miniatus*	**3,698**	**1,666**	**5,021**	**3,079**	**8,719**	**4,332**	58%
	Spangled Emperor	*Lethrinus nebulosus*	2,814	986	**2,457**	**1,223**	5,271	2,022	47%
Mackerels	Spanish Mackerel	*Scomberomorus commerson*	**1,391**	**695**	**1,320**	**1,250**	**2,711**	**1,694**	49%
Tropical Snappers	Red Emperor	*Lutjanus sebae*	1,591	526	**472**	**417**	2,064	755	23%
	Stripey Snapper	*Lutjanus carponotatus*	1,268	408	**2,106**	**1,081**	3,374	1,276	62%
Wrasses	Baldchin Groper	*Choerodon rubescens*	**1,635**	**874**	**2,337**	**2,603**	**3,972**	**3,412**	59%

Table 15. Annual catch (total, kept and released numbers) and proportion released in the Mid West zone (including Kalbarri) of the West Coast during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); only species where >30 respondents recorded catches of the species are reported).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Lobster	Western Rock Lobster	*Panulirus cygnus*	103,804	23,819	68,126	20,929	171,930	40,729	40%
Breams	Pink Snapper	*Chrysophrys auratus*	5,886	1,029	9,628	2,507	15,515	3,223	62%
Cods	Breaksea Cod	*Epinephelides armatus*	1,007	297	1,097	382	2,103	581	52%
Emperors	Redthroat Emperor	*Lethrinus miniatus*	872	283	**1,756**	**947**	**2,628**	**1,096**	67%
Pearl Perch	West Australian Dhufish	*Glaucosoma hebraicum*	5,094	898	4,390	952	9,483	1,720	46%
Wrasses	Baldchin Groper	*Choerodon rubescens*	10,063	1,819	5,088	1,308	15,151	2,790	34%

Table 16. Annual catch (total, kept and released numbers) and proportion released in the Metropolitan zone of the West Coast during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); only species where >30 respondents recorded catches of the species are reported).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Cephalopods	Cuttlefish	*Sepia spp.*	1,045	328	**586**	**273**	1,631	430	36%
	Octopus	Octopodidae - undifferentiated	**2,110**	**1,557**	**277**	**130**	**2,388**	**1,569**	12%
	Squid	Order Teuthoidea - undifferentiated	49,703	8,432	**3,012**	**1,620**	52,715	8,923	6%
Lobster	Western Rock Lobster	*Panulirus cygnus*	339,420	40,581	112,279	21,512	451,699	56,463	25%
Crab	Blue Swimmer Crab	*Portunus armatus*	127,043	17,797	232,597	38,748	359,640	54,268	65%
Sharks	Gummy Shark	*Mustelus antarcticus*	958	322	**350**	**232**	1,308	400	27%
Rays	Rays	Order Rajiformes - undifferentiated	0	0	**2,286**	**950**	**2,286**	**950**	100%
Breams	Pink Snapper	*Chrysophrys auratus*	9,653	1,802	37,890	5,842	47,543	7,103	80%
Cods	Breaksea Cod	*Epinephelides armatus*	6,938	971	5,087	1,136	12,024	1,801	42%
	Harlequin Fish	*Othos dentex*	876	255	**99**	**71**	975	276	10%
Flatheads	Southern Bluespotted Flathead	*Platycephalus speculator*	1,711	597	7,430	2,588	9,142	2,984	81%
	Yellowtail Flathead	*Platycephalus westraliae*	**1,234**	**529**	**6,960**	**2,873**	8,193	3,018	85%
	Flatheads	Platycephalidae - undifferentiated	**801**	**426**	**6,311**	**3,706**	**7,112**	**3,971**	89%
Grunters	Sea Trumpeter	*Pelsartia humeralis*	**586**	**401**	8,355	3,037	8,941	3,095	93%
Lizardfish	Sergeant Baker	*Latropiscis purpurissatus*	728	245	1,517	422	2,245	524	68%
Morwongs	Blue Morwong	*Nemadactylus valenciennesi*	833	241	**441**	**278**	1,274	422	35%
Pearl Perch	West Australian Dhufish	*Glaucosoma hebraicum*	9,007	1,320	10,896	1,887	19,902	2,920	55%
Pufferfish	Weeping Toadfish	*Torquigener pleurogramma*	0	0	5,948	1,887	5,948	1,887	100%
	Toadfish	Tetraodontidae - undifferentiated	0	0	13,236	4,176	13,236	4,176	100%
Salmon Herrings	Australian Herring	*Arripis georgianus*	67,697	14,093	16,318	5,871	84,014	16,076	19%
Tailor	Tailor	*Pomatomus saltatrix*	**5,855**	**4,053**	2,414	822	**8,268**	**4,626**	29%
Threadfin Breams	Western Butterfish	*Pentapodus vitta*	**2,142**	**1,812**	22,183	6,416	24,326	6,836	91%
Trevallies	Samsonfish	*Seriola hippos*	365	124	2,506	903	2,871	922	87%
	Silver Trevallies	*Pseudocaranx georgianus* spp. complex	22,747	8,053	11,138	2,803	33,885	9,108	33%
Whitings	King George Whiting	*Sillaginodes punctatus*	16,198	3,107	2,485	819	18,683	3,545	13%
	Yellowfin Whiting	*Sillago schomburgkii*	30,689	10,170	**5,364**	**2,497**	36,052	11,797	15%
	Southern School Whiting	*Sillago bassensis*	78,030	16,562	14,576	4,515	92,606	20,234	16%
	Western School Whiting	*Sillago vittata*	95,318	31,219	**21,025**	**10,940**	116,343	40,373	18%
Wrasses	Baldchin Groper	*Choerodon rubescens*	7,409	1,386	3,380	1,037	10,789	2,217	31%
	Brownspotted Wrasse	*Notolabrus parilus*	**1,118**	**576**	11,100	2,459	12,217	2,571	91%
	Foxfish	*Bodianus frenchii*	617	204	**515**	**216**	1,132	338	46%
	Western King Wrasse	*Coris auricularis*	4,517	1,613	19,873	3,739	24,389	4,622	81%

Table 17. Annual catch (total, kept and released numbers) and proportion released in the South West zone of the West Coast during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); only species where >30 respondents recorded catches of the species are reported).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Cephalopods	Squid	Order Teuthoidea - undifferentiated	**20,903**	**10,496**	**498**	**272**	**21,401**	**10,542**	2%
Lobster	Western Rock Lobster	*Panulirus cygnus*	**29,950**	**16,842**	**7,532**	**6,342**	**37,482**	**22,975**	20%
Crab	Blue Swimmer Crab	*Portunus armatus*	**57,227**	**24,197**	**132,428**	**106,244**	**189,655**	**128,442**	70%
Breams	Pink Snapper	*Chrysophrys auratus*	5,416	1,153	15,528	3,227	20,944	4,072	74%
Cods	Breaksea Cod	*Epinephelides armatus*	1,840	483	**745**	**308**	2,586	694	29%
Pearl Perch	West Australian Dhufish	*Glaucosoma hebraicum*	6,268	1,305	6,317	1,629	12,584	2,788	50%
Salmon Herrings	Australian Herring	*Arripis georgianus*	**57,453**	**27,515**	11,967	4,710	**69,421**	**30,135**	17%
Trevallies	Silver Trevallies	*Pseudocaranx georgianus* spp. complex	**8,644**	**4,845**	**4,045**	**1,716**	**12,689**	**5,564**	32%
Whitings	King George Whiting	*Sillaginodes punctatus*	14,035	4,581	**10,384**	**4,847**	24,419	8,778	43%
Wrasses	Western King Wrasse	*Coris auricularis*	**2,068**	**1,073**	6,189	1,903	8,256	2,287	75%

Table 18. Annual catch (total, kept and released numbers) and proportion released in the Albany zone of the South Coast during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); only species where >30 respondents recorded catches of the species are reported).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Cephalopods	Squid	Order Teuthoidea - undifferentiated	6,092	1,958	**193**	**145**	6,285	2,026	3%
Breams	Black Bream	*Acanthopagrus butcheri*	**5,339**	**2,552**	**13,813**	**7,279**	**19,152**	**9,326**	72%
	Pink Snapper	*Chrysophrys auratus*	4,524	1,723	9,223	2,972	13,748	4,205	67%
Cods	Breaksea Cod	*Epinephelides armatus*	2,886	808	**1,079**	**482**	3,966	1,087	27%
Flatheads	Southern Bluespotted Flathead	*Platycephalus speculator*	1,355	468	470	172	1,825	541	26%
Morwongs	Blue Morwong	*Nemadactylus valenciennesi*	1,764	485	**507**	**311**	2,270	660	22%
Pearl Perch	West Australian Dhufish	*Glaucosoma hebraicum*	1,221	335	**313**	**158**	1,534	441	20%
Redfish	Bight Redfish	*Centroberyx gerrardi*	**5,254**	**2,667**	**412**	**257**	**5,667**	**2,876**	7%
Salmon Herrings	Australian Herring	*Arripis georgianus*	19,619	5,008	9,288	2,924	28,907	6,868	32%
Trevallies	Silver Trevallies	*Pseudocaranx georgianus* spp. complex	2,163	754	4,430	1,771	6,593	2,150	67%
Whitings	King George Whiting	*Sillaginodes punctatus*	36,753	10,045	11,572	3,626	48,325	12,554	24%
	Southern School Whiting	*Sillago bassensis*	**9,576**	**3,855**	**4,919**	**2,439**	**14,495**	**6,039**	34%

Table 19. Annual catch (total, kept and released numbers) and proportion released in the Esperance zone of the South Coast during 2020/21 (se is standard error; values in bold indicate relative standard error >40% (i.e. se >40% of estimate); only species where >30 respondents recorded catches of the species are reported).

Reporting Group	Common Name	Scientific Name	Kept	se	Released	se	Total	se	% Rel
Cods	Breaksea Cod	*Epinephelides armatus*	1,483	482	279	108	1,762	548	16%
Morwongs	Blue Morwong	*Nemadactylus valenciennesi*	655	193	**40**	**24**	695	200	6%
Redfish	Bight Redfish	*Centroberyx gerrardi*	2,920	1,009	**957**	**522**	3,877	1,327	25%
Salmon Herrings	Australian Herring	*Arripis georgianus*	2,533	845	**1,609**	**1,146**	4,143	1,566	39%

9 Harvest Weights

This section presents harvest (kept catch, by weight) for the 12 months from September 2020 to August 2021 for species assemblages (or suites) within each resource aligned with fisheries management in Western Australia. Harvest is provided for the: top 10 nearshore and estuarine scalefish species (or species groupings) in each bioregion (Table 20); top 15 demersal scalefish species in the North Coast and Gascoyne Coast and top 10 species in the South Coast (Table 21); dominant 15 scalefish species for the West Coast Demersal Scalefish Resource (Table 22); top 15 pelagic scalefish species in the North Coast (Table 23); and crab resources in each Bioregion (Table 24).

The boat–based recreational catch (by number) are converted to harvest (by weight) according to average weights for key species, obtained from Boat Ramp Surveys (Appendix 1) or Tour Operator Returns (Charter Logbooks). Estimates of average weights are influenced by sample design, management, and biological/environmental factors. Sources of information and assumptions associated with average weights can therefore introduce bias for some species, and average weights may be refined and adjusted over time.

The harvest from boat–based recreational fishing does not include catches from charter–boats. In addition, harvests for nearshore and estuarine species will be underestimated, particularly those species with high proportions of shore–based recreational fishing effort. An overview of the information required for stock status reporting of major recreational fisheries, based on harvest estimates and 95% confidence intervals during 2020/21 is provided in Table 25.

Recreational harvests provide comparable information across the five surveys, such as those presented for key demersal species in Figure 118.

9.1 Nearshore and Estuarine Resources

The harvest ranges for the top 10 nearshore and estuarine species in the North Coast (representing 80% of the resource kept catch by numbers) were steady at 18 t (95% CI 12–23) in 2020/21 compared with 15 t (95% CI 9–20) in 2017/18, 21 t (95% CI 12–30) in 2015/16, 19 t (95% CI 12–26) in 2013/14 and 21 t (95% CI 11–32) in 2011/12 (Table 20). The top 10 nearshore and estuarine species in the North Coast ranked by harvest were: Barramundi (33% of the top 10 resource kept catch by weight), King Threadfin (29%), Blue Threadfin (13%), Golden Trevally (10%), Chinaman Rockcod (5%), Giant Trevally (5%), Black Jewfish (3%), Mullets (2%), Trevallies (1%) and Garfish (<0.5%). Harvest ranges in 2020/21 were steady compared with previous years for all species.

The harvest ranges for the top 10 nearshore and estuarine species in the Gascoyne Coast (representing 89% of the resource kept catch by numbers) were steady at 10 t (95% CI 5–15) in 2020/21 compared with 7 t (95% CI 4–10) in 2017/18, 6 t (95% CI 3–9) in 2015/16, 10 t (95% CI 3–17) in 2013/14 and 8 t (95% CI 4–12) in 2011/12. The top 10 nearshore and estuarine species in the Gascoyne Coast ranked by harvest were:

Chinaman Rockcod (57% of the top 10 resource kept catch by weight), Golden Trevally (13%), Western Butterfish (10%), Mulloway (9%), School Whiting (4%), Western Yellow fin Bream (2%), Garfish (2%), Giant Trevally (1%), Mullets (1%) and Silver Trevally (<0.5%). Harvest ranges in 2020/21 were steady compared with previous years for all species.

The harvest ranges for the top 10 nearshore and estuarine species in the West Coast (representing 95% of the resource kept catch by numbers) were steady at 78 t (95% CI 62–94) in 2020/21 compared with 53 t (95% CI 44–62) in 2017/18, 56 t (95% CI 46–67) in 2015/16, 67 t (95% CI 57–77) in 2013/14 and 106 t (95% CI 88–123) in 2011/12. The top 10 nearshore and estuarine species in the West Coast ranked by harvest were: School Whiting (34% of the top 10 resource kept catch by weight), Australian Herring (22%), Silver Trevally (21%), King George Whiting (10%), Tailor (7%), Western King Wrasse (3%), Black Bream (2%), Western Butterfish (<0.5%), Mullets (<0.5%) and Garfish (<0.5%). The harvest range for Garfish in the West Coast was steady at 0.2 t (95% CI 0.0–0.4) in 2020/21 compared with 0.1 t (95% CI 0.0–0.3) in 2017/18, 0.2 t (95% CI 0.0–0.5) in 2015/16 and 0.2 t (95% CI 0.0–0.4) in 2013/14, but lower than 2.7 t (95% CI 1.5–3.9) in 2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all other species.

The harvest ranges for the top 10 nearshore and estuarine species in the South Coast (representing 97% of the resource kept catch by numbers) were steady at 24 t (95% CI 17–31) in 2020/21 compared with 13 t (95% CI 8–18) in 2017/18, 17 t (95% CI 11–22) in 2015/16 and 29 t (95% CI 20–39) in 2013/14, but lower than 46 t (95% CI 33–59) in 2011/12. The top 10 nearshore and estuarine species in the South Coast ranked by harvest were: King George Whiting (38% of the top 10 resource kept catch by weight), Western Australian Salmon (22%), Australian Herring (12%), School Whiting (8%), Black Bream (7%), Silver Trevally (5%), Southern Bluespotted Flathead (3%), Tarwhine (3%), Snook (2%) and Garfish (<0.5%). The harvest range for Silver Trevally in the South Coast was steady at 1 t (95% CI 0–2) in 2020/21 compared with 1 t (95% CI 0–2) in 2017/18, 2 t (95% CI 1–4) in 2015/16 and 3 t (95% CI 1–4) in 2013/14, but lower than 5 t (95% CI 3–7) in 2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all other species.

Table 20. (Annual catch (kept numbers), average weight and harvest for the top 10 nearshore and estuarine scalefish species during 2020/21 (values in bold indicate relative standard error >40%; values in italics indicate <30 diarists recorded catches of the species).

Bioregion	Species	Estimated catch (kept by number)	Average weight (kg)	Source	Estimated harvest (tonnes)	Standard Error
North	Barramundi	1,450	4.005	C	5.807	1.762
	King Threadfin	1,092	4.733	C	5.168	1.704
	Blue Threadfin	1,961	1.162	A	2.279	0.696
	Golden Trevally	698	2.439	A	1.702	0.941
	Chinaman Rockcod	1,981	0.443	A	0.878	0.553
	Giant Trevally	238	3.409	C	0.811	0.416
	Black Jewfish	179	3.158	C	0.565	0.202
	Mullets	***3,702***	0.126	C	0.414	0.297
	Trevallies	94	1.103	C	0.154	0.131
	Garfish	***290***		G	0.052	0.055
	TOTAL	11,685			17.830	2.829
Gascoyne	Chinaman Rockcod	12,977	0.443	A	5.749	2.298
	Golden Trevally	554	2.439	A	1.351	0.441
	Western Butterfish	***6,389***	0.162	A	1.035	1.133
	Mulloway	***236***	3.868	C	0.913	0.565
	School Whiting	***2,315***		G	0.379	0.213
	Western Yellowfin Bream	***416***	0.514	A	0.214	0.219
	Garfish	***1,157***		G	0.205	0.221
	Giant Trevally	***32***	3.409	C	0.109	0.092
	Mullets	***1,170***	0.126	C	0.077	0.066
	Silver Trevally	***49***	0.511	A	0.025	0.020
	TOTAL	25,295			10.057	2.689
West	School Whiting	242,775		G	26.424	4.070
	Australian Herring	128,105	0.136	B	17.422	4.226
	Silver Trevally	32,272	0.511	A	16.491	4.824
	King George Whiting	30,434	0.250	A	7.609	1.401
	Tailor	8,595	0.592	A	5.088	2.553
	Western King Wrasse	7,691	0.308	S	2.369	0.675
	Black Bream	5,185	0.298	A	1.545	1.116
	Western Butterfish	2,543	0.162	A	0.412	0.298
	Mullets	***2,015***	0.126	C	0.251	0.218
	Garfish	***1,304***		G	0.190	0.132
	TOTAL	460,919			77.801	8.248
South	King George Whiting	36,761	0.250	A	9.190	2.512
	Western Australian Salmon	***1,515***	3.501	A	5.304	2.258
	Australian Herring	22,152	0.133	S	2.946	0.676
	School Whiting	15,736		G	1.909	0.555
	Black Bream	5,443	0.298	A	1.622	0.761
	Silver Trevally	2,384	0.511	A	1.218	0.392
	Southern Bluespotted Flathead	1,412	0.571	A	0.806	0.270
	Tarwhine	***1,134***	0.667	C	0.756	0.519
	Snook	***699***	0.719	A	0.503	0.252
	Garfish	***746***		G	0.076	0.060
	TOTAL	87,982			24.330	3.649

[B] annual bioregion average weight from boat ramp surveys in 2020/21, [S] annual statewide average weight from boat ramp surveys in 2020/21, [A] accrued ('running') statewide average weight from boat ramp surveys from 2011/12 to 2020/21, [G] statewide average weight from statewide boat ramp surveys for individual species within the species group, [C] unpublished Tour Operator Returns

9.2 Demersal Resources

The harvest ranges for the top 15 demersal species in the North Coast (representing 86% of the resource kept catch by numbers) were steady at 52 t (95% CI 41–63) in 2020/21 compared with 70 t (95% CI 54–86) in 2017/18, 37 t (95% CI 29–45) in 2015/16 and 50 t (95% CI 39–61) in 2013/14, but lower than 76 t (95% CI 64–89) in 2011/12 (Table 25). The top 10 demersal species in the North Coast ranked by harvest were: Coral Trout (17% of the top 15 resource kept catch by weight), Red Emperor (16%), Grass Emperor (15%), Rankin Cod (13%), Blackspot Tuskfish (8%), Saddletail Snapper (7%), Spangled Emperor (6%), Stripey Snapper (5%), Golden Snapper (5%), Crimson Snapper (3%), Mangrove Jack (3%), Redthroat Emperor (2%), Goldband Snapper (1%), Brownstripe Snapper (<0.5%) and Bluespotted Emperor (<0.5%). The harvest range for Spangled Emperor in the North Coast was steady at 3 t (95% CI 1–5) in 2020/21 compared with 3 t (95% CI 1–5) in 2017/18, 3 t (95% CI 1–6) in 2015/16 and 6 t (95% CI 1–10) in 2013/14, but lower than 14 t (95% CI 9–19) in 2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all other species.

The harvest ranges for the top 15 demersal species in the Gascoyne Coast (representing 79% of the resource kept catch by numbers) were steady at 93 t (95% CI 74–112) in 2020/21 compared with 86 t (95% CI 69–103) in 2017/18, 100 t (95% CI 80–120) in 2015/16 and 94 t (95% CI 76–112) in 2013/14, but lower than 143 t (95% CI 120–166) in 2011/12 (Table 21). The top 15 demersal species in the Gascoyne Coast ranked by harvest were: Grass Emperor (19% of the top 15 resource kept catch by weight), Pink Snapper (17%), Spangled Emperor (13%), Red Emperor (11%), Goldband Snapper (11%), Rankin Cod (11%), Redthroat Emperor (8%), Baldchin Groper (4%), Coral Trout (3%), Stripey Snapper (2%), Saddletail Snapper (<0.5%), Mangrove Jack (<0.5%), Bluespotted Emperor (<0.5%), Crimson Snapper (<0.5%) and Brownstripe Snapper (0.1%). The harvest range for Spangled Emperor in the Gascoyne Coast was steady at 12 t (95% CI 7–17) in 2020/21 compared with 12 t (95% CI 6–18) in 2017/18, 12 t (95% CI 7–18) in 2015/16 and 16 t (95% CI 9–24) in 2013/14, but lower than 35 t (95% CI 21–49) in 2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all other species.

Harvest ranges for the top 10 demersal species in the South Coast (representing 96% of the resource kept catch by numbers) were steady at 47 t (95% CI 34–60) in 2020/21 compared with 62 t (95% CI 49–75) in 2017/18, 55 t (95% CI 40–69) in 2015/16, 37 t (95% CI 30–45) in 2013/14 and 58 t (95% CI 44–73) in 2011/12 (Table 21). The top 10 demersal species in the South Coast ranked by harvest were: Pink Snapper (25% of the top 10 resource kept catch by weight), Bight Redfish (23%), Blue Morwong (15%), West Australian Dhufish (14%), Hapuku (10%), Breaksea Cod (10%), Harlequin Fish (2%), Sea Sweep (0.9%), Sergeant Baker (0.5%) and Foxfish (<0.5%). Harvest ranges in 2020/21 were steady compared with previous years for all species.

Table 21. Annual catch (kept numbers), average weight and harvest for the top 10 or 15 demersal scalefish species during 2020/21 (excluding West Coast, refer to Table 23) (values in bold indicate relative standard error >40%; values in italics indicate <30 diarists recorded catches of the species).

Bioregion	Species	Estimated catch (kept by number)	Average weight (kg)	Source	Estimated harvest (tonnes)	Standard Error
North	Barcheek Coral Trout	3,399	2.296	A	8.613	1.493
	Red Emperor	2,752	3.112	A	8.564	2.440
	Grass Emperor	5,971	1.295	A	7.732	2.954
	Rankin Cod	1,726	3.850	A	6.645	1.675
	Blackspot Tuskfish	1,470	2.803	A	4.120	1.169
	Saddletail Snapper	***1,903***	1.801	A	3.427	2.107
	Spangled Emperor	1,594	1.946	A	3.102	0.959
	Stripey Snapper	4,128	0.605	A	2.497	0.840
	Golden Snapper	1,798	1.327	C	2.386	0.821
	Crimson Snapper	964	1.635	C	1.576	0.533
	Mangrove Jack	1,771	0.836	A	1.481	0.481
	Redthroat Emperor	***925***	1.022	A	0.945	0.572
	Goldband Snapper	***238***	2.058	A	0.489	0.249
	Brownstripe Snapper	***273***	0.842	C	0.230	0.248
	Bluespotted Emperor	***312***	0.582	A	0.182	0.102
	TOTAL	29,224			51.989	5.366
Gascoyne	Grass Emperor	13,768	1.295	A	17.830	4.959
	Pink Snapper	6,447	2.429	S	15.660	3.896
	Spangled Emperor	6,008	1.946	A	11.692	2.540
	Red Emperor	**3,375**	3.112	A	10.503	4.864
	Goldband Snapper	4,986	2.058	A	10.171	2.982
	Rankin Cod	2,636	3.850	A	10.149	2.341
	Redthroat Emperor	7,736	1.022	A	7.906	2.319
	Baldchin Groper	**1,823**	2.115	S	3.856	1.865
	Barcheek Coral Trout	1,178	2.296	A	2.882	0.624
	Stripey Snapper	2,403	0.605	A	1.454	0.429
	Saddletail Snapper	***158***	1.801	A	0.285	0.139
	Mangrove Jack	***292***	0.836	A	0.244	0.130
	Bluespotted Emperor	***373***	0.582	A	0.217	0.137
	Crimson Snapper	***94***	1.635	C	0.154	0.136
	Brownstripe Snapper	***91***	0.842	C	0.077	0.083
	TOTAL	51,368			93.080	9.683
South	Pink Snapper	4,794	2.429	S	11.645	4.319
	Bight Redfish	8,697	1.273	A	10.613	3.643
	Blue Morwong	2,418	2.854	A	6.901	1.490
	West Australian Dhufish	1,227	5.300	S	6.503	1.776
	Hapuku	***504***	9.497	C	4.786	2.298
	Breaksea Cod	4,369	1.046	S	4.570	0.996
	Harlequin Fish	604	1.401	A	0.846	0.248
	Sea Sweep	***302***	1.332	A	0.402	0.208
	Sergeant Baker	**306**	0.747	A	0.229	0.092
	Foxfish	***167***	0.808	A	0.135	0.064
	TOTAL	23,388			46.630	6.610

[S] annual statewide average weight from boat ramp surveys in 2020/21, [A] accrued ('running') statewide average weight from boat ramp surveys from 2011/12 to 2020/21, [G] statewide average weight from statewide boat ramp surveys for individual species within the species group, [C] unpublished Tour Operator Returns

The harvest ranges for the top 15 demersal species in the in the West Coast (representing 93% of the resource kept catch by numbers) were steady at 228 t (95% CI 200–256) in 2020/21 compared with 234 t (95% CI 203–266) in 2017/18 and 208 t (95% CI 181–235) in 2015/16, but higher than 152 t (95% CI 132–173) in 2013/14 and 162 t (95% CI 141–184) in 2011/12 (Table 22). The top 15 demersal species in the West Coast ranked by harvest were: West Australian Dhufish (47% of the top 15 resource kept catch by weight), Pink Snapper (23%), Baldchin Groper (17%), Breaksea Cod (4%), Blue Morwong (2%), Blue-eye Trevalla (1%), Eightbar Grouper (1%), Hapuku (1%), Bass Groper (1.0%), Emperors (1%), Bight Redfish (0.5%), Foxfish (<0.5%), Sergeant Baker (<0.5%), Sea Sweep (<0.5%) and Ruby Snapper (0.1%).

The harvest range for West Australian Dhufish was steady at 108 t (95% CI 85–130) in 2020/21 compared with 127 t (95% CI 100–153) in 2017/18, 113 t (95% CI 89–136) in 2015/16, 82 t (95% CI 64–100) in 2013/14 and 78 t (95% CI 60–97) in 2011/12. The harvest range for Pink Snapper was steady at 52 t (95% CI 40–64) in 2020/21 compared with 48 t (95% CI 37–60) in 2017/18, 36 t (95% CI 27–45) in 2015/16 and 32 t (95% CI 25–40) in 2011/12, but higher than 30 t (95% CI 22–38) in 2013/14. The harvest range for Baldchin Groper was steady at 38 t (95% CI 29–48) in 2020/21 compared with 32 t (95% CI 23–41) in 2017/18, 32 t (95% CI 23–40) in 2015/16 and 29 t (95% CI 21–37) in 2011/12, but higher than 20 t (95% CI 15–26) in 2013/14. Harvest ranges in 2020/21 were steady compared with previous years for all other species.

Table 22. Annual catch (kept numbers), average weight and harvest for the dominant 15 species in the West Coast Demersal Scalefish Fishery during 2020/21 (values in bold indicate relative standard error >40%; values in italics indicate <30 diarists recorded catches of the species).

Bioregion	Species	Estimated catch (kept by number)	Average weight (kg)	Source	Estimated harvest (tonnes)	Standard Error
West	West Australian Dhufish	20,368	5.279	B	107.523	11.239
	Pink Snapper	20,956	2.479	B	51.950	6.138
	Baldchin Groper	18,175	2.103	B	38.222	4.929
	Breaksea Cod	9,785	0.988	B	9.668	1.141
	Blue Morwong	1,460	2.854	A	4.167	0.985
	Blue-eye Trevalla	***202***	14.599	C	2.949	2.540
	Eightbar Grouper	***606***	4.767	C	2.889	1.239
	Hapuku	***270***	9.497	C	2.564	1.785
	Bass Groper	***81***	28.087	C	2.275	1.432
	Emperors	1,595		G	2.149	0.715
	Bight Redfish	1,027	1.273	A	1.112	0.292
	Foxfish	1,240	0.808	A	1.002	0.367
	Sergeant Baker	964	0.747	A	0.720	0.207
	Sea Sweep	***436***	1.332	A	0.581	0.238
	Ruby Snapper	***46***	5.550	A	0.255	0.250
	TOTAL	77,211			228.026	14.307

[B] annual bioregion average weight from boat ramp surveys in 2020/21, [A] accrued ('running') statewide average weight from boat ramp surveys from 2011/12 to 2020/21, [G] statewide average weight from statewide boat ramp surveys for individual species within the species group, [C] unpublished Tour Operator Returns

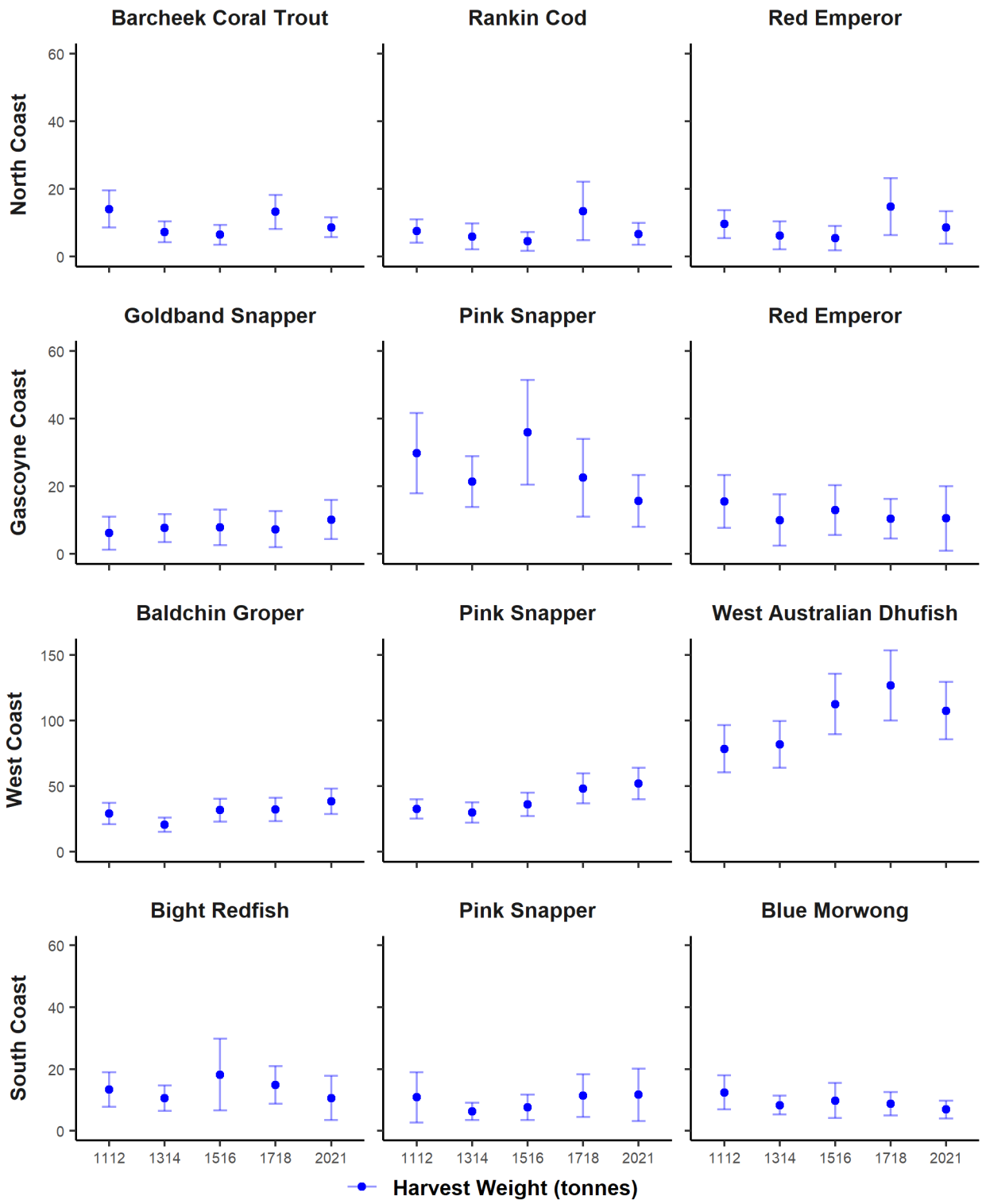


Figure 118. Recreational harvest (kept catch multiplied by average weight, ±95%CI) for key demersal species in four marine bioregions of Western Australia from 2011/12 to 2020/21.

9.3 Pelagic Resources

The statewide top 15 pelagic scalefish species (or species groupings) in 2020/21 represented 99% of the resource kept catch by numbers (Table 23). The harvest range for the top 15 pelagic species was steady at 114 t (95% CI 89–138) in 2020/21 compared with 112 t (95% CI 91–133) in 2017/18, 119 t (95% CI 100–139) in 2015/16 and 152 t (95% CI 126–178) in 2013/14, but lower than 186 t (95% CI 160–212) in 2011/12 (Table 25). The top 15 pelagic species in 2020/21 were represented by Spanish Mackerel (50% of the top 15 pelagic resources kept catch by weight), Yellowfin Tuna (9%), Cobia (7%), Samsonfish (6%), Southern Bluefin Tuna (5%), Yellowtail Kingfish (5%), Skipjack Tuna (4%), Tunas (3%), School Mackerel (3%), Mackerels (3%), Grey Mackerel (2%), Shark Mackerel (1%), Mahi Mahi (<1%), Mackerel Tuna (<1%) and Spotted Mackerel (<0.5%).

The harvest range for Spanish Mackerel was steady at 56 t (95% CI 35–78) in 2020/21 compared with 49 t (95% CI 33–64) in 2017/18 and 43 t (95% CI 30–56) in 2015/16, 78 t (95% CI 56–100) in 2013/14 and 89 t (95% CI 69–109) in 2011/12. The harvest range for Grey Mackerel were steady at 1–3 t, noting high uncertainty due to low sample sizes and high relative standard error >40%. The harvest range for Samsonfish was steady at 7 t (95% CI 4–10) in 2020/21 compared with 13 t (95% CI 8–18) in 2017/18 and 15 t (95% CI 10–21) in 2015/16, but lower than 22 t (95% CI 13–31) in 2013/14 and 17 t (95% CI 12–23) in 2011/12. Harvest ranges of non-indicator pelagic species in 2020/21 compared with previous years were steady for all other species.

Table 23. Annual catch (kept numbers), average weight and harvest for the top 15 statewide pelagic scalefish species during 2020/21 (values in bold indicate relative standard error >40%; values in italics indicate <30 diarists recorded catches of the species).

Bioregion	Species	Estimated catch (kept by number)	Average weight (kg)	Source	Estimated harvest (tonnes)	Standard Error
Statewide	Spanish Mackerel	6,241	9.026	C	56.331	11.048
	Yellowfin Tuna	1,043	10.012	C	10.443	3.014
	Cobia	1,146	6.948	C	7.962	1.883
	Samsonfish	926	7.360	C	6.815	1.612
	Southern Bluefin Tuna	1,700	3.641	C	6.190	1.933
	Yellowtail Kingfish	903	6.028	C	5.443	2.345
	Skipjack Tuna	777	5.971	C	4.639	1.433
	Tunas	606	6.850	C	3.867	1.268
	School Mackerel	1,589	2.000	C	3.178	1.324
	Mackerels	***221***	7.997	C	2.438	1.314
	Grey Mackerel	***355***	5.561	C	1.974	1.173
	Shark Mackerel	275	5.931	C	1.631	1.068
	Mahi Mahi	***461***	2.250	C	1.037	0.553
	Mackerel Tuna	223	4.329	C	0.965	0.355
	Spotted Mackerel	***175***	2.190	C	0.383	0.188
	TOTAL	16,641			113.296	12.516

[C] unpublished Tour Operator Returns

9.4 Crab Resources

Mud Crab in the North Coast (3,612 kept by number; Table 24) represents 91% of the statewide catch (Table 5). Catches for Mud Crab in all bioregions had low sample sizes (< 30) and catches in the Gascoyne Coast (Table 7) and West Coast (Table 8) had high relative standard error (>40%). Harvest ranges for Mud Crab in the North Coast were steady at 3.0 t (95% CI 1.0–4.9) in 2020/21 compared with 2.3 t (95% CI 1.1–3.6) in 2017/18, 2.4 t (95% CI 1.0–3.8) in 2015/16, 7.2 t (95% CI 4.0–10.4) in 2013/14 and 7.1 t (95% CI 4.1–10.2) in 2011/12 (Table 25).

Blue Swimmer Crab in the West Coast (184,319 kept by number; Table 24) represents 96% of the statewide catch (Table 5). Harvest ranges for Blue Swimmer Crab in the West Coast were steady at 43 t (95% CI 29–57) in 2020/21 compared with 59 t (95% CI 45–72) in 2017/18, 41 t (95% CI 32–51) in 2015/16 and 64 t (95% CI 50–78) in 2013/14, but lower than 85 t (95% CI 69–101) in 2011/12 (Table 25).

Harvest ranges for Blue Swimmer Crab were otherwise steady across surveys: in the North Coast at 0.8 t (95% CI 0.1–1.5) in 2020/21 compared with 1.7 t (95% CI 0.2–3.2) in 2017/18, 1.7 t (95% CI 0.4–2.9) in 2015/16, 3.9 t (95% CI 1.1–6.6) in 2013/14 and 3.7 t (95% CI 0.6–6.7) in 2011/12; in the Gascoyne Coast at 2.6 t (95% CI 0.7–4.4) in 2020/21 compared with 5.1 t (95% CI 0.0–11.2) in 2017/18, 1.2 t (95% CI 0.1–2.4) in 2015/16, 2.3 t (95% CI 0.0–4.9) in 2013/14 and 4.5 t (95% CI 0.0–10.6) in 2011/12; and in the South Coast at 0.1 t (95% CI 0.0–0.3) in 2020/21 compared with 0.1 t (95% CI 0.0–0.2) in 2017/18 and 0.5 t (95% CI 0.0–1.0) in 2015/16, but lower than 2.3 t (95% CI 0.8–3.8) in 2013/14 and 2.9 t (95% CI 0.7–5.1) in 2011/12.

Table 24. Annual catch (kept numbers), average weight and harvest for crab resources during 2020/21 (values in bold indicate relative standard error >40%; values in italics indicate <30 diarists recorded catches of the species).

Bioregion	Species	Estimated catch (kept by number)	Average weight (kg)	Source	Estimated harvest (tonnes)	Standard Error
North	Green Mud Crab	***1,694***	1.061	C	1.797	0.869
	Brown Mud Crab	1,918	0.603	C	1.157	0.452
	TOTAL	3,612			2.954	0.979
North	Blue Swimmer Crab	***3,525***	0.235	S	0.828	0.365
Gascoyne	Blue Swimmer Crab	10,921	0.235	S	2.566	0.930
West	Blue Swimmer Crab	184,319	0.235	S	43.315	7.120
South	Blue Swimmer Crab	***394***	0.235	S	0.093	0.114

[S] annual statewide average weight from boat ramp surveys in 2020/21, [C] unpublished Tour Operator Returns

9.5 Summary

The recreational harvest from boat–based recreational fishing presented in this chapter will be used alongside information provided in Commercial Logbooks and Tour Operator Returns to assess the status of fisheries resources. Harvest ranges (Table 25) are important when a considerable portion of the total catch is attributable to the recreational sector, and therefore, the recreational harvests for these species are included in stock assessments and required for resource allocation.

Table 25. Information required for stock status reporting of major recreational fisheries based on boat-based recreational harvest (excluding charter-boat recreational fishing).

Resource	Year	Number of species/taxa	Proportion of kept catch (by number)	Estimated harvest (by number)	Standard Error	Estimated harvest (tonnes)	Standard Error	Estimated harvest (tonnes, 95% CI)
North Coast Bioregion								
North Coast Nearshore and Estuarine	1112	10	74	11,881	2,406	21.150	5.388	11-32
	1314	10	76	9,684	1,655	18.834	3.471	12-26
	1516	9	80	8,517	1,634	21.032	4.545	12-30
	1718	10	82	6,391	1,061	14.524	2.917	9-20
	2021	10	80	11,685	2,866	17.830	2.829	12-23
North Coast Demersal Scalefish	1112	15	85	46,642	4,702	76.409	6.546	64-89
	1314	15	80	30,204	3,833	50.292	5.702	39-61
	1516	15	83	21,543	2,614	36.752	3.985	29-45
	1718	14	85	33,533	3,873	69.986	8.332	54-86
	2021	15	86	29,224	3,366	51.989	5.366	41-63
North Coast Mud Crab	1112	2	100	8,844	1,785	7.149	1.555	4-10
	1314	2	100	8,525	1,974	7.227	1.641	4-10
	1516	2	100	3,208	992	2.397	0.692	1-4
	1718	2	100	2,976	794	2.339	0.635	1-4
	2021	2	100	3,612	1,110	2.954	0.979	1-5
North Coast Blue Swimmer Crab	1112	1	100	16,064	6,753	3.679	1.546	1-7
	1314	1	100	14,806	5,357	3.864	1.398	1-7
	1516	1	100	6,933	2,723	1.650	0.648	0-3
	1718	1	100	6,818	3,123	1.664	0.762	0-3
	2021	1	100	3,525	1,553	0.828	0.365	0-2
North Coast Cephalopods	1112	1	100	2,727	1,557	1.481	0.846	0-3
	1314	3	100	3,947	1,490	1.972	0.742	1-3
	1516	1	100	2,904	1,131	1.429	0.557	0-3
	1718	2	100	3,234	1,991	1.672	1.022	0-4
	2021	2	100	2,213	875	1.077	0.424	0-2
Gascoyne Coast Bioregion								
Gascoyne Coast Nearshore and Estuarine	1112	10	77	12,925	4,159	7.877	2.095	4-12
	1314	10	84	12,555	3,384	10.213	3.587	3-17
	1516	10	90	11,291	3,453	5.885	1.616	3-9
	1718	10	93	13,950	3,460	7.097	1.685	4-10
	2021	10	89	25,295	8,977	10.057	2.689	5-15
Gascoyne Coast Demersal Scalefish	1112	15	84	72,833	5,965	143.153	11.870	120-166
	1314	15	79	50,364	5,320	94.002	9.023	76-112
	1516	15	85	44,457	4,297	99.597	10.201	80-120
	1718	15	85	42,564	4,422	86.017	8.919	69-103

Resource	Year	Number of species/taxa	Proportion of kept catch (by number)	Estimated harvest (by number)	Standard Error	Estimated harvest (tonnes)	Standard Error	Estimated harvest (tonnes, 95% CI)
	2021	15	79	51,368	5,519	93.080	9.683	74-112
Gascoyne Coast Mud Crab	1112	2	100	389	298	0.327	0.290	0-1
	1314	2	100	555	347	0.404	0.239	0-1
	1516	2	100	52	44	0.037	0.032	0-0
	1718	2	100	208	147	0.147	0.100	0-0
	2021	2	100	293	215	0.219	0.148	0-1
Gascoyne Coast Blue Swimmer Crab	1112	1	100	19,564	13,683	4.480	3.133	0-11
	1314	1	100	8,764	5,025	2.287	1.311	0-5
	1516	1	100	5,248	2,412	1.249	0.574	0-2
	1718	1	100	20,853	12,710	5.088	3.101	0-11
	2021	1	100	10,921	3,959	2.566	0.931	1-4
Gascoyne Coast Cephalopods	1112	3	100	9,818	4,233	5.338	2.299	1-10
	1314	2	100	6,260	2,072	3.113	1.030	1-5
	1516	2	100	6,211	2,000	3.079	0.985	1-5
	1718	3	100	11,244	5,048	5.816	2.598	1-11
	2021	3	100	15,572	3,876	7.571	1.878	4-11
West Coast Bioregion								
West Coast Nearshore and Estuarine	1112	10	90	581,468	45,471	105.902	8.930	88-123
	1314	10	95	416,228	38,234	66.597	5.121	57-77
	1516	10	94	316,994	35,817	56.321	5.312	46-67
	1718	10	94	322,759	32,671	52.846	4.505	44-62
	2021	10	95	460,919	51,179	77.801	8.248	62-94
West Coast Demersal Scalefish	1112	13	89	60,778	3,458	162.369	11.030	141-184
	1314	14	92	57,508	3,343	152.447	10.504	132-173
	1516	15	93	69,220	3,848	208.241	13.744	181-235
	1718	14	90	77,319	4,477	234.126	16.133	203-266
	2021	15	93	77,211	4,282	228.026	14.307	200-256
West Coast Mud Crab	1112	2	100	1,132	724	0.935	0.625	0-2
	1314	2	100	1,483	797	1.373	0.740	0-3
	1516	2	100	1,583	1,132	1.694	1.243	0-4
	1718	1	100	49	68	0.053	0.071	0-0
	2021	1	0	0	0	0.000	0.000	0-0
West Coast Blue Swimmer Crab	1112	1	100	372,925	35,726	85.400	8.181	69-101
	1314	1	100	245,395	27,272	64.048	7.118	50-78
	1516	1	100	173,184	20,460	41.218	4.869	32-51
	1718	1	100	240,997	28,621	58.803	6.984	45-72
	2021	1	100	184,319	30,299	43.315	7.120	29-57
West Coast Cephalopods	1112	3	100	87,090	13,402	45.997	7.277	32-60
	1314	3	100	54,934	10,548	27.265	5.288	17-38

Resource	Year	Number of species/taxa	Proportion of kept catch (by number)	Estimated harvest (by number)	Standard Error	Estimated harvest (tonnes)	Standard Error	Estimated harvest (tonnes, 95% CI)
	1516	3	100	48,261	7,854	23.060	3.861	15-31
	1718	3	100	67,506	9,741	33.521	4.990	24-43
	2021	3	100	79,609	13,747	38.385	6.700	25-52
South Coast Bioregion								
South Coast Nearshore and Estuarine	1112	10	95	155,039	23,694	46.212	6.576	33-59
	1314	10	95	116,203	20,477	29.007	4.850	20-39
	1516	10	95	63,526	10,737	16.703	2.856	11-22
	1718	10	95	54,119	12,380	13.173	2.530	8-18
	2021	10	97	87,982	12,511	24.330	3.649	17-31
South Coast Demersal Scalefish	1112	10	96	36,651	4,183	58.377	7.367	44-73
	1314	10	98	24,730	2,329	37.498	3.579	30-45
	1516	10	98	34,642	5,637	54.511	7.633	40-69
	1718	10	97	34,311	3,381	61.770	6.510	49-75
	2021	10	96	23,388	3,581	46.630	6.610	34-60
South Coast Blue Swimmer Crab	1112	1	100	12,759	4,948	2.922	1.133	1-5
	1314	1	100	8,679	2,903	2.265	0.758	1-4
	1516	1	100	2,109	1,071	0.502	0.255	0-1
	1718	1	100	310	207	0.076	0.055	0-0
	2021	1	100	394	486	0.093	0.114	0-0
South Coast Cephalopods	1112	3	100	15,287	4,644	8.048	2.516	3-13
	1314	3	100	10,086	2,801	4.886	1.391	2-8
	1516	3	100	4,531	1,401	2.166	0.688	1-4
	1718	3	100	8,483	2,938	4.211	1.506	1-7
	2021	3	100	6,688	1,984	3.192	0.960	1-5
Statewide								
Statewide Pelagic	1112	15	95	26,180	1,877	185.157	13.341	159-211
	1314	15	97	21,344	1,912	151.379	13.394	125-178
	1516	15	98	17,773	1,521	118.446	9.938	99-138
	1718	15	98	16,060	1,594	111.414	10.696	90-132
	2021	15	99	16,641	1,688	113.296	12.516	89-138

10 Summary and Future Research

10.1 Overview

This report presents participation, effort and catch from boat-based recreational fishing surveys conducted in 2011/12, 2013/14, 2015/16, 2017/18 and 2020/21 (Figure 119). Although recreational fishing in Western Australia occurs from boats and the shore across a range of marine and freshwater habitats, boat-based recreational fishing accounted for 43% of recreational fishing effort and 46% of the recreational harvest in 2000/01, with both boat- and shore-based recreational fishing occurring almost entirely in marine waters (Henry and Lyle 2003).

On average, 130,000 recreational fishers purchase a Recreational Boat Fishing Licence (RBFL) each year (DPIRD 2022) with 50% of licence holders residing in the Perth metropolitan area. Trends in participation (by recall for the previous 12 months) by residence, age, gender, avidity and bioregion fished varied were generally consistent with Screening and Benchmark Surveys conducted from 2011 to 2018. The spatial coverage of the resident population influences the distribution of boat-based recreational fishing effort. Consequently, boat-based recreational fishing effort in 2020/21 was highest in the West Coast (73%) with the remainder in the North Coast (8%), Gascoyne Coast (13%) and South Coast (6%).

At a statewide level, most boat-based recreational fishing effort (boat days) occurred in coastal nearshore (62%), inshore demersal (25%) and estuarine habitats (10%), and the remainder in pelagic (2%), offshore demersal (1%) and freshwater (<1%). Shore-based recreational fishing was not included in this report; therefore, recreational fishing effort would be underestimated for nearshore, estuarine and freshwater habitats. However, patterns in boat-based recreational fishing effort in this report were consistent with previous surveys, including the National Recreational Fishing Survey in 2000/01, where most boat-based recreational fishing effort occurred in coastal waters (from the shoreline to 5km; 66%), followed by estuarine (19%), then offshore (>5km from the coast; 11%) (Henry and Lyle 2003).

Recreational fishers use a variety of fishing methods. At a statewide level, most boat-based recreational fishing effort was line fishing (59%), followed by potting (35%), diving (4%), nets (1%) and other (1%). In 2000/01, line fishing accounted for 77% of recreational fishing effort, followed by potting methods (16%) (Henry and Lyle 2003). Distinct seasonal patterns of boat-based recreational fishing effort occur with autumn, winter and spring, the most active seasons in the North Coast and Gascoyne Coast, and spring, summer and autumn the most active seasons in the West Coast and South Coast.

Boat-based recreational fishing effort in Western Australia was consistent across the five surveys in terms of the proportions of effort by habitat and method. Annual statewide fishing effort at 431,175 boat days (95% CI 389,416–472,934) in 2020/21 was similar to 403,039 (95% CI 364,975–441,104) in 2017/18, 357,265 (95% CI 324,709–389,821) in 2015/16, 362,746 (95% CI 331,479–394,013) in 2013/14 and 445,820 (95% CI 408,304–

483,335) in 2011/12. For all bioregions, the number of boat days and fishing hours in 2020/21 were similar to previous years. Furthermore, for all zones, the number of boat days and fishing hours in 2020/21 were similar to previous years, with one exception. The number of boat days and fishing hours in the Metro zone of the West Coast bioregion was higher in 2020/21 compared with 2013/14.

Boat-based recreational fishing effort has been impacted by the COVID-19 global pandemic, particularly with travel restrictions, and social and physical distancing measures implement in Western Australia. These measures were shown to have an impact on the first six months of the pandemic (March to August 2020) where a lower proportion of metropolitan fishers were active compared with regional fishers and, of those who were active, their effort was lower than before the pandemic (Ryan et al. 2021). The information collected in 2020/21 will contribute to understanding the impact of the next phase of COVID-19 (September 2020 to August 2021) on recreational fishing. During this phase there were fewer travel restrictions, however, high rainfall and cyclones in the North Coast and Gascoyne Coast in autumn 2021 are likely to have restricted opportunities for recreational fishing. For example, Cyclone Seroja (3-12 April 2021) required evacuation of tourists from regional towns in April 2021.

At a statewide level, boat-based recreational fishing catches were generally consistent across the five surveys. At a resource level, comparisons can be made for the aggregated harvest (kept catch by weight) and the harvest range (95% confidence intervals of the kept catch by weight) of the top 10 or 15 species in each resource.

The harvest ranges for the top 10 nearshore and estuarine species in the North Coast (representing 80% of the resource kept catch by numbers) were steady at 18 t (95% CI 12–23) in 2020/21 compared with 15 t (95% CI 9–20) in 2017/18, 21 t (95% CI 12–30) in 2015/16, 19 t (95% CI 12–26) in 2013/14 and 21 t (95% CI 11–32) in 2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all species (Barramundi, King Threadfin, Blue Threadfin, Golden Trevally, Chinaman Rockcod, Giant Trevally, Black Jewfish, Mullets, Trevallies and Garfish).

The harvest ranges for the top 10 nearshore and estuarine species in the Gascoyne Coast (representing 89% of the resource kept catch by numbers) were steady at 10 t (95% CI 5–15) in 2020/21 compared with 7 t (95% CI 4–10) in 2017/18, 6 t (95% CI 3–9) in 2015/16, 10 t (95% CI 3–17) in 2013/14 and 8 t (95% CI 4–12) in 2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all species (Chinaman Rockcod, Golden Trevally, Western Butterfish, Mulloway, School Whiting, Western Yellowfin Bream, Garfish, Giant Trevally, Mullets and Silver Trevally).

The harvest ranges for the top 10 nearshore and estuarine species in the West Coast (representing 95% of the resource kept catch by numbers) were steady at 78 t (95% CI 62–94) in 2020/21 compared with 53 t (95% CI 44–62) in 2017/18, 56 t (95% CI 46–67) in 2015/16, 67 t (95% CI 57–77) in 2013/14 and 106 t (95% CI 88–123) in 2011/12. The harvest range for Garfish in the West Coast was steady at 0.2 t (95% CI 0.0–0.4) in 2020/21 compared with 0.1 t (95% CI 0.0–0.3) in 2017/18, 0.2 t (95% CI 0.0–0.5) in 2015/16 and 0.2 t (95% CI 0.0–0.4) in 2013/14, but lower than 2.7 t (95% CI 1.5–3.9) in

2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all other species (School Whiting, Australian Herring, Silver Trevally, King George Whiting, Tailor, Western King Wrasse, Black Bream, Western Butterfish and Mullets).

The harvest ranges for the top 10 nearshore and estuarine species in the South Coast (representing 97% of the resource kept catch by numbers) were steady at 24 t (95% CI 17–31) in 2020/21 compared with 13 t (95% CI 8–18) in 2017/18, 17 t (95% CI 11–22) in 2015/16 and 29 t (95% CI 20–39) in 2013/14, but lower than 46 t (95% CI 33–59) in 2011/12. The harvest range for Silver Trevally in the South Coast was steady at 1 t (95% CI 0–2) in 2020/21 compared with 1 t (95% CI 0–2) in 2017/18, 2 t (95% CI 1–4) in 2015/16 and 3 t (95% CI 1–4) in 2013/14, but lower than 5 t (95% CI 3–7) in 2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all other species (King George Whiting, Western Australian Salmon, Australian Herring, School Whiting, Black Bream, Southern Bluespotted Flathead, Tarwhine, Snook and Garfish).

The harvest ranges for the top 15 demersal species in the North Coast (representing 86% of the resource kept catch by numbers) were steady at 52 t (95% CI 41–63) in 2020/21 compared with 70 t (95% CI 54–86) in 2017/18, 37 t (95% CI 29–45) in 2015/16 and 50 t (95% CI 39–61) in 2013/14, but lower than 76 t (95% CI 64–89) in 2011/12. The harvest range for Spangled Emperor in the North Coast was steady at 3 t (95% CI 1–5) in 2020/21 compared with 3 t (95% CI 1–5) in 2017/18, 3 t (95% CI 1–6) in 2015/16 and 6 t (95% CI 1–10) in 2013/14, but lower than 14 t (95% CI 9–19) in 2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all other species (Coral Trout, Red Emperor, Grass Emperor, Rankin Cod, Blackspot Tuskfish, Saddletail Snapper, Stripey Snapper, Golden Snapper, Crimson Snapper, Mangrove Jack, Redthroat Emperor, Goldband Snapper, Brownstripe Snapper and Bluespotted Emperor).

The harvest ranges for the top 10 demersal species in the Gascoyne Coast (representing 79% of the resource kept catch by numbers) were steady at 93 t (95% CI 74–112) in 2020/21 compared with 86 t (95% CI 69–103) in 2017/18, 100 t (95% CI 80–120) in 2015/16 and 94 t (95% CI 76–112) in 2013/14, but lower than 143 t (95% CI 120–166) in 2011/12. The harvest range for Spangled Emperor in the Gascoyne Coast was steady at 12 t (95% CI 7–17) in 2020/21 compared with 12 t (95% CI 6–18) in 2017/18, 12 t (95% CI 7–18) in 2015/16 and 16 t (95% CI 9–24) in 2013/14, but lower than 35 t (95% CI 21–49) in 2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all other species (Grass Emperor, Pink Snapper, Red Emperor, Goldband Snapper, Rankin Cod, Redthroat Emperor, Baldchin Groper, Coral Trout, Stripey Snapper, Saddletail Snapper, Mangrove Jack, Bluespotted Emperor, Crimson Snapper and Brownstripe Snapper).

The harvest ranges for the top 15 demersal species in the in the West Coast (representing 93% of the resource kept catch by numbers) were steady at 228 t (95% CI 200–256) in 2020/21 compared with 234 t (95% CI 203–266) in 2017/18 and 208 t (95% CI 181–235) in 2015/16, but higher than 152 t (95% CI 132–173) in 2013/14 and 162 t (95% CI 141–184) in 2011/12. The harvest range for West Australian Dhufish was steady at 108 t (95% CI 85–130) in 2020/21 compared with 127 t (95% CI 100–153) in 2017/18, 113 t (95% CI

89–136) in 2015/16, 82 t (95% CI 64–100) in 2013/14 and 78 t (95% CI 60–97) in 2011/12. The harvest range for Pink Snapper was steady at 52 t (95% CI 40–64) in 2020/21 compared with 48 t (95% CI 37–60) in 2017/18, 36 t (95% CI 27–45) in 2015/16 and 32 t (95% CI 25–40) in 2011/12, but higher than 30 t (95% CI 22–38) in 2013/14. The harvest range for Baldchin Groper was steady at 38 t (95% CI 29–48) in 2020/21 compared with 32 t (95% CI 23–41) in 2017/18, 32 t (95% CI 23–40) in 2015/16 and 29 t (95% CI 21–37) in 2011/12, but higher than 20 t (95% CI 15–26) in 2013/14. Harvest ranges in 2020/21 were steady compared with previous years for all other species (Breaksea Cod, Blue Morwong, Blue-eye Trevalla, Eightbar Grouper, Hapuku, Bass Groper, Emperors, Bight Redfish, Foxfish, Sergeant Baker, Sea Sweep and Ruby Snapper).

Harvest ranges for the top 10 demersal species in the South Coast (representing 96% of the resource kept catch by numbers) were steady at 47 t (95% CI 34–60) in 2020/21 compared with 62 t (95% CI 49–75) in 2017/18, 55 t (95% CI 40–69) in 2015/16, 37 t (95% CI 30–45) in 2013/14 and 58 t (95% CI 44–73) in 2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all species (Pink Snapper, Bight Redfish, Blue Morwong, West Australian Dhufish, Hapuku, Breaksea Cod, Harlequin Fish, Sea Sweep, Sergeant Baker and Foxfish).

Harvest ranges for the top 15 pelagic species (or species groupings, representing 99% of the resource kept catch by numbers) were steady at 114 t (95% CI 89–138) in 2020/21 compared with 112 t (95% CI 91–133) in 2017/18, 119 t (95% CI 100–139) in 2015/16 and 152 t (95% CI 126–178) in 2013/14, but lower than 186 t (95% CI 160–212) in 2011/12. The harvest range for Spanish Mackerel was steady at 56 t (95% CI 35–78) in 2020/21 compared with 49 t (95% CI 33–64) in 2017/18 and 43 t (95% CI 30–56) in 2015/16, 78 t (95% CI 56–100) in 2013/14 and 89 t (95% CI 69–109) in 2011/12. The harvest range for Samsonfish was steady at 7 t (95% CI 4–10) in 2020/21 compared with 13 t (95% CI 8–18) in 2017/18 and 15 t (95% CI 10–21) in 2015/16, but lower than 22 t (95% CI 13–31) in 2013/14 and 17 t (95% CI 12–23) in 2011/12. Harvest ranges in 2020/21 were steady compared with previous years for all other species (Yellowfin Tuna, Cobia, Southern Bluefin Tuna, Yellowtail Kingfish, Skipjack Tuna, Other Tuna, School Mackerel, Mackerels, Grey Mackerel, Shark Mackerel, Mahi Mahi, Mackerel Tuna and Spotted Mackerel).

Harvest ranges for Mud Crab in the North Coast (representing 91% of the statewide catch in 2020/21) were steady at 3.0 t (95% CI 1.0–4.9) in 2020/21 compared with 2.3 t (95% CI 1.1–3.6) in 2017/18, 2.4 t (95% CI 1.0–3.8) in 2015/16, 7.2 t (95% CI 4.0–10.4) in 2013/14 and 7.1 t (95% CI 4.1–10.2) in 2011/12.

Harvest ranges for Blue Swimmer Crab in the West Coast (representing 96% of the statewide catch in 2020/21) were steady at 43 t (95% CI 29–57) in 2020/21 compared with 59 t (95% CI 45–72) in 2017/18, 41 t (95% CI 32–51) in 2015/16 and 64 t (95% CI 50–78) in 2013/14, but lower than 85 t (95% CI 69–101) in 2011/12.

10.2 Small Area Estimation

The highest precision is achieved for key species at annual and statewide levels, however, estimates with lower precision may be available at finer temporal (monthly) and spatial (zone or management unit) scales.

The precision achieved for any estimate is generally dependent on the sample size and the level of variability in the data. Consequently, low accuracy and precision can occur for species caught rarely or infrequently from recreational fishing, or when disaggregating data to smaller spatial and temporal scales. The ability to improve precision in these situations depends on the ability to increase the sample size. Therefore, there is a recognised trade-off between survey costs and precision, which often requires balancing the need for desired precision with the available funding before commencing surveys.

There is potential to provide estimates of boat-based recreational fishing effort and catch at spatial and temporal scales smaller than currently reported. This approach would assist in reviewing the impact possession limit changes implemented in July. This is also useful for small-scale recreational fisheries, such as the Blue Swimmer Crab fisheries that are assessed and managed at estuary-level geographical scales. Preliminary research in this area has provided a proof of concept for block- and location-based approaches using data from the survey (Lynch et al., 2020; Smallwood and Ryan, 2022; Taylor et al., 2021). Successful estimates of fishing effort and total catch have been made for some small spatial areas and temporal periods with recommendations for future reporting. These recommendations highlight the importance of maintaining confidentiality for fishers when sample sizes become reduced. Estimates for small-scale resources (i.e. crab) and management areas (i.e. marine protected areas) from the five surveys will be reported separately.

10.3 Improving Accuracy and Precision of Estimates

Corroboration of estimates from recreational fishing surveys is important, as is understanding any biases which may affect the accuracy and precision of estimates. These analyses will build confidence in estimates and is especially important where survey data informs management decisions. The corroboration of estimates of fishing effort and total catch between the Phone Diary Survey and other concurrent survey methods (i.e. on-site access point surveys, remote camera surveys) have been conducted for a number of fisheries (Lai et al., 2019; Lai et al., 2021; Taylor et al., 2021). These corroborations identified some biases associated with the different survey methods, and also those metrics which provided comparable results. The understanding developed from these analyses benefits ongoing monitoring of recreational fisheries and additional corroborations will be undertaken incorporating data from this latest survey.

The Boat Ramp Survey, an additional component of the integrated survey, is primarily used to assist in converting catch (by number) to harvest (by weight) for various resources reported in Chapter 9, and also to develop length-weight equations for a number of recreationally caught species (Smallwood et al. 2018). Tour Operator Returns are an

alternative data source that are also used for this purpose for some species. Research has been completed investigating how transitioning from a probability-based to restricted spatio-temporal sampling design has impacted on the collection of weight measurements for this report (Smallwood and Ryan, 2020). Following on from this initial work, the relationship between average weight data collected during the Boat Ramp Surveys, Tour Operator Returns and citizen science programs has been investigated using model-based approaches (Crisafulli et al., 2022). Approaches for design-based methods to account for complex survey design issues has also been completed (Desfosses et al., 2022). This, and other, research into average weight will continue to inform how this information is applied across a number of fisheries resources.

Remote Camera Surveys assist with corroborating and validating estimated effort from the Phone Diary Survey and are used to identify boating activity patterns that inform other recreational fishing surveys. Data from these surveys have also contributed to publications relating to boat-based recreational fishing in Shark Bay (Taylor et al., 2021), the Perth Metropolitan area (Lai et al. 2021) and shore-based recreational fishing in Peel Harvey Estuary (Desfosses et al., 2021; Taylor et al., 2018). Data on vessel retrievals from Remote Camera Surveys for the same time-period as the five surveys will be reported separately.

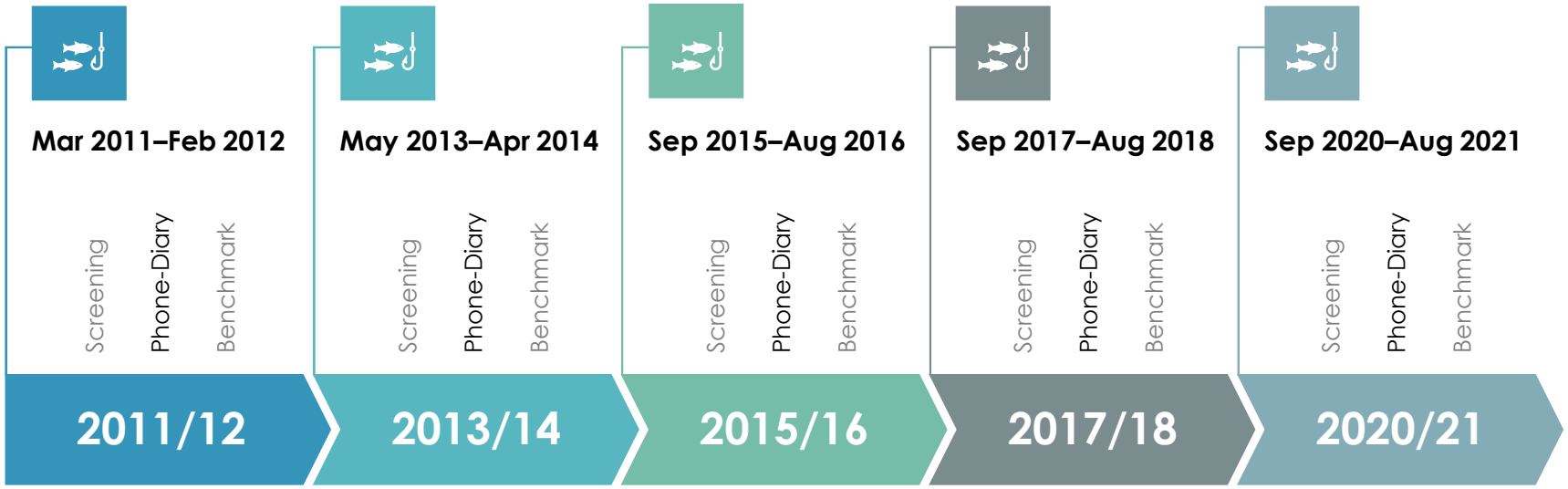
10.4 Social and economic dimensions

Wash-Up and Attitudinal Surveys completed at the end of every Phone Diary Survey are designed to assess opinions and attitudes for a range of fisheries related issues. In previous surveys, these data have enabled insights into a range of issues of management importance. For example, evaluating the effectiveness of harvest tags in Shark Bay (Jackson et al., 2016) and assessing the occurrence and attitudes to shark depredation (Coulson et al., 2022, Ryan et al., 2019).

Additional research into the perception of recreational fishers to topical issues such as climate change (Ryan et al., 2022) and marine parks (Hastings and Ryan, 2017) has also been completed. The findings from this research not only contributes to the scientific literature but also provides a baseline to inform policy changes and demonstrates how differences in perceptions occurs between recreational fishers and the general community, as well as other fishing sectors (i.e., commercial, charter). Furthermore, analysis of data from RBFL holders and DPIRD Fisheries and Marine Officers were also able to provide insight into changes into recreational fisher behaviour due to the COVID-19 pandemic (Ryan et al. 2021).

Social and economic information collected from earlier surveys have been used to describe the economic contributions from recreational fishing (McLeod and Lindner 2018). Options for economic modelling with respect to marine spatial planning have also been explored using these data (Navarro et al 2020, 2021). Social and economic data collected from the five surveys will be reported separately.

Figure 119. Summary of boat-based recreational fishing surveys from 2011 to 2021.



10.5 Future directions

A Research Partnership between DPIRD (formerly Department of Fisheries) and Edith Cowan University has provided opportunities for postgraduate research to explore integration of spatial and temporal data obtained from recreational fishing surveys. As patterns in recreational fishing can change, the survey design needs to be flexible enough to accommodate these changes. A critical element of the Research Partnership is utilising expertise across several related disciplines (experimental design, survey sampling, data mining, spatial and temporal statistics) to allow further development and implementation of changes to the surveys if warranted.

Most recently, a number of research projects have used statistical and modelling methods to investigate spatial and temporal patterns of recreational fishing activity. These studies have used data from all components of the integrated survey. For example, data from the Phone Diary Survey provided a basis to analyse spatial patterns using geostatistical estimators (Aidoo et al. 2015, 2016, 2022; Burchert 2022). Other projects have focused on building efficiencies into the analysis of recreational boating activity using remote camera data by addressing issues around the imputation of missing data and trade-offs between reading cost and accuracy (Afrifa-Yamoah et al. 2020a, 2020b, 2021). Other research projects undertaken as part of this Research Partnership, although completed using recreational fishing data collected outside of this survey, have nonetheless contributed to the scientific literature and can be applied to these data in the future. For example, catch rate standardisation of shore-based fishers (Tate et al. 2020).

Moving beyond this current survey, the Research Partnership will continue to provide support for several avenues of research. This will include: evaluating approaches to multi-modal data collection; developing approaches for adjustment of survey weights using calibration and post-stratification to estimate recreational catch and; automation and machine learning of camera monitoring data. Research has also commenced on developing methods for catch reconstructions for the recreational harvest of sharks (Braccini et al. 2021), and key nearshore and demersal species in the West Coast bioregion (Lai et al. 2022). This work will continue to be expanded to other fisheries resources.

The Recreational Boat Fishing Licence (RBFL) was implemented in 2010 and uptake of licences numbers varies annually. Understanding any consequences that may occur due to changes in annual patterns of RBFL usage is critical when considering survey design and analysis, including behavioural adjustments of fishers. It is likely that some survey components will need to be modified to address any bias, and in some cases, it may be necessary to apply emerging techniques in survey design to further improve the accuracy and precision of estimates. This could include adjustment of weighting factors to account for avidity bias and non-intending fishing, subsequently estimates (and their uncertainty) may be revised on this basis.

Changes in the magnitude of catches over time only provide an indication of the number kept and released from recreational fishing between surveys and does not provide an indication of factors influencing any changes in the resource abundance. Effort and catches reported from recreational fishers varies in accordance with the

nature of the fishery (from both biological and human dimensions), spatial and temporal scales of the resource and fishing activity, and how these collectively respond to management actions. For example, access to the resource can vary over time through fish availability, legal size and bag limits, fisher mobility or fishing technology. Comparing effort and catch from recreational fishing has similar constraints to those required for evaluating changes in commercial catch where differences can result from changes in both fish abundance and catchability. Catchability can vary with changes in fish behaviour and movement patterns, which vary by species, age and environmental factors, or changes in fishing practices, such as changes in targeted effort, time spent fishing and distance travelled to fishing location. Comparing catches from recreational fishing also requires consideration of release rates and the potential for change in fisher behaviour (e.g. species targeting or substitution).

Most importantly, evaluating time series of recreational catch requires consideration of the associated uncertainty. For the integrated surveys, the desired outcome was to achieve estimates for indicator species at statewide and bioregion levels with a precision suitable to inform stock assessments and fisheries management. It should not be expected that similar precision will be achieved for less common species, or any species at small spatial scales, although the survey design and sample size have allowed this to occur for some species. For example, the sample size and relative standard error achieved for indicator species in the Mid West, Metropolitan and South West zones have provided representative and precise estimates for spatial assessment of the West Coast Demersal Scalefish Resource (Fairclough et al. 2021).

Catch estimates generated using the integrated survey for other specialised, licensed fisheries (i.e. Rock Lobster, Abalone, Freshwater Angling, Marron and Netting) will only be informed by fishers that hold a RBF licence. As the integrated survey uses the RBF licence as a sampling frame, this survey will only capture data for these additional fisheries when a fisher holds multiple licence types (i.e. RL licence in addition to a RBF). If a fisher holds only a specialised licence (without a RBF licence), then their catch will not be recorded in the survey. Estimates for species that require a specialised licence may therefore have small sample sizes and high relative standard error (such as occurs for abalone) and not reflect the catch for the fishery. Additional surveys for these other licensed fisheries are therefore required to provide complete estimates of participation, effort and catch. Annual phone-recall surveys have been used to meet this need for additional data and provide input into statutory reporting (i.e. State of the Fisheries) and resource allocation (i.e. Rock Lobster, Roe's Abalone) (Hancock and Caputi 2006, Newman et al., 2021, Smallwood et al., 2021). Additional phone-recall surveys are also being implemented to address knowledge gaps for species where data are not routinely captured using existing survey methods (i.e. Greenlip and Brownlip Abalone in the South Coast bioregion).

While this report compares estimates from five boat-based recreational fishing surveys, additional catches from charter-boat recreational fishing (reported in Tour Operator Returns) are used to determine the total catch from the recreational sector. Specific performance indicators, reference levels and catch tolerances will be reported

separately, and these will be used to provide trends in total catch to assist in developing, monitoring and refining management arrangements.

10.6 Conclusions

Recreational fishers are numerous, diverse and diffuse. They use numerous access points and platforms for fishing, including boats launched from harbours, marinas, beaches and private docks. Their divergent nature ranges from avid to infrequent fishers and different survey methods will encounter avid and infrequent fishers in different relative proportions. This means there is no single survey method that can be used to provide accurate and precise estimates of effort and catch for all recreational fisheries. Consequently, surveys of recreational fishing have customised designs, which reflect the specific objectives of the survey, the spatial and temporal scope to be covered, the nature of the recreational fishery, and the constraints on resources available to conduct the survey. The integrated survey of boat-based recreational fishers continues to meet its objectives of providing estimates of participation, fishing effort and total catch at broad spatial and temporal scales to inform management.

The Department will continue to work proactively in conjunction with its research partners and stakeholders to ensure that information needs are being met to inform the sustainable management of fishery resources. Survey methods will be reviewed, and novel methods explored, to ensure ongoing, accurate and precise estimates of recreational fishing activity.

11 Acknowledgements

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Appendix 1. Statewide and bioregion estimates of average weight of key species from Boat Ramp Surveys in 2021.

Av wt is the average weight (measured in grams); n is the number of weight measurements recorded; se is standard error; values in bold indicate < 10 recorded weights of the species.

Reporting Group	Common Name	Scientific Name	Statewide			North Coast			Gascoyne Coast			West Coast			South Coast		
			n	av wt	se	n	av wt	se	n	av wt	se	n	av wt	se	n	av wt	se
Gastropod	Greenlip Abalone	*Haliotis laevigata*	10	522	23							10	522	23			
	Roe's Abalone	*Haliotis roei*	25	111	5							25	111	5			
Cephalopods	Northern Calamari	*Sepioteuthis lessoniana*	10	469	114				10	469	114						
	Squid	Order Teuthoidea - undifferentiated	10	393	25				**6**	**394**	**22**	**4**	**392**	**58**			
Lobster	Western Rock Lobster	*Panulirus cygnus*	1,249	638	10				**1**	**1,109**		1,248	638	10			
Crab	Blue Swimmer Crab	*Portunus armatus*	938	235	2							931	233	2	**7**	**560**	**63**
	Brown Mud Crab	*Scylla olivacea*	110	679	14	110	679	14									
Bonito	Oriental Bonito	*Sarda orientalis*	36	1,993	49							**9**	**1,966**	**129**	27	2,002	51
Bream	Frypan Bream	*Argyrops spinifer*	50	763	26				50	763	26						
	Pink Snapper	*Chrysophrys auratus*	290	2,429	83				37	1,866	156	229	2,479	94	24	2,820	360
Cobia	Cobia	*Rachycentron canadum*	73	7,853	354	**2**	**10,916**	**4,613**	70	7,727	349	**1**	**10,571**				
Cod	Birdwire Rockcod	*Epinephelus merra*	12	1,031	203				12	1,031	203						
	Breaksea Cod	*Epinephelides armatus*	347	1,046	27							196	988	30	151	1,122	47
	Chinaman Rockcod	*Epinephelus rivulatus*	69	418	17				67	422	18	**2**	**302**	**81**			
	Eightbar Grouper	*Hyporthodus octofasciatus*	22	8,636	1,620				17	11,107	1,666	**5**	**237**	**58**			
	Frostback Rockcod	*Epinephelus bilobatus*	19	1,003	81	**2**	**575**	**216**	17	1,053	80						
	Goldspotted Rockcod	*Epinephelus coioides*	29	2,256	492	**7**	**2,950**	**485**	12	1,391	598	10	2,807	1,176			
	Harlequin Fish	*Othos dentex*	44	1,324	97							16	1,161	94	28	1,418	142
	Rankin Cod	*Epinephelus multinotatus*	74	4,556	398	14	1,319	85	60	5,312	436						
	Tomato Rockcod	*Cephalopholis sonnerati*	63	1,389	62				63	1,389	62						
	Yellowspotted Rockcod	*Epinephelus areolatus*	84	860	67	**7**	**2,130**	**418**	77	745	45						
Coral Trout	Barcheek Coral Trout	*Plectropomus maculatus*	29	2,008	203	26	1,807	154	**3**	**3,752**	**1,146**						
	Common Coral Trout	*Plectropomus leopardus*	20	2,850	329	**1**	**1,015**		**9**	**3,999**	**438**	10	2,000	232			
	Yellowedge Coronation Trout	*Variola louti*	37	2,104	155				37	2,104	155						
Emperor	Drab Emperor	*Lethrinus ravus*	14	708	141				14	708	141						
	Grass Emperor	*Lethrinus laticaudis*	88	1,615	83	77	1,723	80	**5**	**1,147**	**574**	**6**	**619**	**18**			
	Redthroat Emperor	*Lethrinus miniatus*	208	1,094	57				183	1,060	63	25	1,344	97			
	Robinson's Seabream	*Gymnocranius grandoculis*	140	1,473	59				140	1,473	59						
	Spangled Emperor	*Lethrinus nebulosus*	360	1,893	46	**1**	**2,392**		355	1,885	46	**4**	**2,469**	**370**			
	Spotcheek Emperor	*Lethrinus rubrioperculatus*	57	524	12				57	524	12						

Reporting Group	Common Name	Scientific Name	Statewide			North Coast			Gascoyne Coast			West Coast			South Coast		
			n	av wt	se	n	av wt	se	n	av wt	se	n	av wt	se	n	av wt	se
	Yellowtail Emperor	*Lethrinus atkinsoni*	29	457	17				29	457	17						
Flathead	Southern Bluespotted Flathead	*Platycephalus speculator*	89	576	39							54	673	57	35	426	31
Goatfish	Bluespotted Goatfish	*Upeneichthys vlamingii*	21	223	44							**8**	**291**	**113**	13	181	17
Grunter	Western Striped Grunter	*Pelates octolineatus*	35	127	10							32	129	10	**3**	**103**	**16**
Grunter Bream	Goldspotted Sweetlips	*Plectorhinchus flavomaculatus*	20	1,258	121				**4**	**812**	**192**	16	1,369	131			
	Painted Sweetlips	*Diagramma labiosum*	29	2,623	199	**3**	**2,022**	**350**	23	2,677	223	**3**	**2,810**	**897**			
Hapuku	Hapuku	*Polyprion oxygeneios*	13	7,016	896							**3**	**10,404**	**2,311**	10	6,000	734
Javelinfish	Barred Javelin	*Pomadasys kaakan*	30	784	62	27	760	67	**3**	**1,000**	**50**						
Mackerel	Bigeye Tuna	*Thunnus obesus*	19	5,133	512				17	5,018	568				**2**	**6,110**	**130**
	Blue Mackerel	*Scomber australasicus*	60	331	18							50	376	15	10	102	14
	Spanish Mackerel	*Scomberomorus commerson*	82	7,314	364	**8**	**6,767**	**510**	65	7,276	416	**9**	**8,077**	**1,389**			
	Wahoo	*Acanthocybium solandri*	12	8,296	1,022				12	8,296	1,022						
Mahi Mahi	Mahi Mahi	*Coryphaena spp.*	49	4,160	311				26	5,773	324	23	2,336	171			
Morwong	Blue Morwong	*Nemadactylus valenciennesi*	97	2,953	155							23	3,055	278	74	2,921	184
Pearl Perch	Northern Pearl Perch	*Glaucosoma buergeri*	56	1,828	82				56	1,828	82						
	West Australian Dhufish	*Glaucosoma hebraicum*	383	5,300	148							366	5,279	154	17	5,766	418
Pigfish	Sunburnt Pigfish	*Bodianus solatus*	37	973	63				37	973	63						
Pike	Snook	*Sphyraena novaehollandiae*	22	1,143	125							**6**	**942**	**313**	16	1,218	128
Redfish	Bight Redfish	*Centroberyx gerrardi*	195	1,383	40							13	1,360	141	182	1,385	41
	Swallowtail	*Centroberyx lineatus*	28	364	14							**5**	**378**	**36**	23	360	16
Salmon & Herring	Australian Herring	*Arripis georgianus*	1,105	133	1							735	136	2	370	127	2
	Western Australian Salmon	*Arripis truttaceus*	27	2,113	409							**3**	**128**	**9**	24	2,361	434
Sergeant Baker	Sergeant Baker	*Latropiscis purpurissatus*	20	820	83							18	796	62	**2**	**1,032**	**812**
Snappers (King)	Goldband Snapper	*Pristipomoides multidens*	213	2,135	72	**1**	**1,252**		212	2,139	72						
	Rosy Snapper	*Pristipomoides filamentosus*	84	1,998	112				84	1,998	112						
	Sharptooth Snapper	*Pristipomoides typus*	141	1,592	53				141	1,592	53						
Snappers (Tropical)	Brownstripe Snapper	*Lutjanus vitta*	17	550	54	**3**	**311**	**138**	14	602	52						
	Chinamanfish	*Symphorus nematophorus*	13	3,899	603	11	3,156	370	**2**	**7,991**	**1,041**						
	Crimson Snapper	*Lutjanus erythropterus*	26	1,573	243	14	757	119	12	2,526	343						
	Darktail Snapper	*Lutjanus lemniscatus*	10	1,490	233	**2**	**466**	**16**	**8**	**1,746**	**202**						
	Flame Snapper	*Etelis coruscans*	10	1,802	137				10	1,802	137						
	Golden Snapper	*Lutjanus johnii*	15	1,247	164	15	1,247	164									
	Mangrove Jack	*Lutjanus argentimaculatus*	12	1,225	266	**3**	**597**	**143**	**9**	**1,434**	**326**						
	Moses' Snapper	*Lutjanus russellii*	21	742	46	**6**	**712**	**20**	15	754	64						

Reporting Group	Common Name	Scientific Name	Statewide			North Coast			Gascoyne Coast			West Coast			South Coast		
			n	av wt	se	n	av wt	se	n	av wt	se	n	av wt	se	n	av wt	se
	Red Emperor	*Lutjanus sebae*	248	2,928	106	**2**	**2,284**	**988**	246	2,934	107						
	Ruby Snapper	*Etelis carbunculus*	62	4,830	425				62	4,830	425						
	Saddletail Snapper	*Lutjanus malabaricus*	36	2,464	299	15	2,392	542	21	2,516	348						
	Stripey Snapper	*Lutjanus carponotatus*	105	621	16	76	591	15	29	698	43						
Stonefish	Western Red Scorpionfish	*Scorpaena sumptuosa*	16	547	44							16	547	44			
Sweep	Banded Sweep	*Scorpis georgiana*	11	1,465	97							**3**	**1,135**	**163**	**8**	**1,589**	**88**
	Sea Sweep	*Scorpis aequipinnis*	42	1,382	110							18	1,519	228	24	1,280	90
Tailor	Tailor	*Pomatomus saltatrix*	26	486	54							26	486	54			
Threadfin	Blue Threadfin	*Eleutheronema tetradactylum*	146	1,131	47	146	1,131	47									
	King Threadfin	*Polydactylus macrochir*	119	2,806	90	119	2,806	90									
Threadfin Bream	Western Butterfish	*Pentapodus vitta*	105	141	7							105	141	7			
Trevally	Golden Trevally	*Gnathanodon speciosus*	33	3,114	502	17	2,268	377	15	4,191	962	**1**	**1,334**				
	Malabar Trevally	*Carangoides malabaricus*	19	801	88	19	801	88									
	Samsonfish	*Seriola hippos*	35	7,653	1,103							26	6,619	1,269	**9**	**10,639**	**2,015**
	Silver Trevally	*Pseudocaranx georgianus* spp. complex	456	488	12							360	495	13	96	460	33
	Turrum	*Carangoides fulvoguttatus*	11	1,919	428				11	1,919	428						
	Yellowtail Kingfish	*Seriola lalandi*	13	5,495	669							**8**	**5,804**	**1,000**	**5**	**5,001**	**769**
	Yellowtail Scad	*Trachurus novaezelandiae*	37	82	4							18	92	5	19	73	3
Tripletail	Tripletail	*Lobotes surinamensis*	17	1,447	96	17	1,447	96									
Tuna	Skipjack Tuna	*Katsuwonus pelamis*	30	4,016	252				12	3,430	266	16	4,556	385	**2**	**3,214**	**288**
	Southern Bluefin Tuna	*Thunnus maccoyii*	78	3,492	187							21	2,150	357	57	3,987	181
	Yellowfin Tuna	*Thunnus albacares*	52	5,931	354				50	5,816	316	**2**	**8,804**	**5,924**			
Tuskfish & Wrasse	Baldchin Groper	*Choerodon rubescens*	403	2,115	42				16	2,398	268	387	2,103	42			
	Blackspot Tuskfish	*Choerodon schoenleinii*	38	2,672	251	32	2,356	163	**6**	**4,353**	**1,186**						
	Brownspotted Wrasse	*Notolabrus parilus*	103	436	20							83	412	20	20	537	50
	Foxfish	*Bodianus frenchii*	50	753	39				**2**	**1,060**	**9**	40	651	26	**8**	**1,186**	**104**
	Southern Maori Wrasse	*Ophthalmolepis lineolatus*	33	268	14							25	263	17	**8**	**284**	**26**
	Western King Wrasse	*Coris auricularis*	154	308	12							144	294	11	10	522	36
Whiting	King George Whiting	*Sillaginodes punctatus*	831	246	7							145	528	25	686	186	2
	Southern School Whiting	*Sillago bassensis*	1,658	102	1							1,450	103	1	208	101	3
	Western School Whiting	*Sillago vittata*	17	124	10							17	124	10			
	Whitings	Sillaginidae - undifferentiated	32	115	6							25	103	4	**7**	**158**	**15**