

AUSTRALIAN SALMONS (2018)

Arripis trutta, *Arripis truttaceus*



John Stewart: Department of Primary Industries, New South Wales, **Anthony Fowler:** South Australian Research and Development Institute, **Corey Green:** Victorian Fisheries Authority, **Jeremy Lyle:** Institute for Marine and Antarctic Studies, University of Tasmania, **Kim Smith:** Department of Primary Industries and Regional Development, Western Australia, **Bradley Moore:** Institute for Marine and Antarctic Studies, University of Tasmania

STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Western Australia, Victoria, South Australia	Western Australia	LCF, MSF NZRLF SZRLF LCF, NZRLF, OF, PPBWPF, SCEMF, SCEMF SCSMF SWCBNF SWCSMF WL (NC, GC, WC) WL (SC), SCSMF, SWCBNF, SWCSMF, SZRLF, WL (NC GC WC), WL (SC)	Sustainable	Catch, catch rates, age and size composition, fishing mortality
New South Wales, Victoria, Tasmania	Eastern Australia	CIF, GLF, N/A, OF, OHF, SF	Sustainable	Age and size composition, catch, effort, catch rates, fishing mortality

N/A Not Applicable (NSW), OHF Ocean Hauling Fishery (NSW), LCF Lakes and Coorong Fishery (SA), NZRLF Northern Zone Rock Lobster Fishery (SA), SZRLF Southern Zone Rock Lobster Fishery (SA), SF Scalefish Fishery (TAS), CIF Corner Inlet Fishery (VIC), GLF Gippsland Lakes Fishery (VIC), OF Ocean Fishery (VIC), PPBWPF Port Phillip Bay and Western Port Bay Fishery (VIC), SCEMF South Coast Estuarine Managed Fishery (WA), SCSMF South Coast Salmon Managed Fishery (WA), SWCBNF South West Coast Beach Net Fishery (Order) (WA), SWCSMF South West Coast Salmon Managed Fishery (WA), WL (SC) Open Access in the South Coast (WA), WL (NC || GC || WC) Open Access in the North Coast, Gascoyne Coast and West Coast Bioregions (WA), MSF || NZRLF || SZRLF || LCF Marine Scale Fishery (including Northern & Southern Zone Rock Lobster Fishery and Lakes and Coorong Fishery) (SA), SCEMF || SCSMF || SWCBNF || SWCSMF || WL (NC, GC, WC) || WL (SC) Various Fisheries combined due to 3 boat rule (WA)

STOCK STRUCTURE

There are two species of Australian Salmon: Western Australian Salmon (*Arripis truttaceus*) and Eastern Australian Salmon (*A. trutta*). Each species represents a single biological stock

[MacDonald, 1983]. The Western Australian Salmon biological stock is distributed from Kalbarri in Western Australia southwards to South Australia, Victoria and the west coast of Tasmania. The Eastern Australian Salmon biological stock is distributed from southern Queensland down the east coast of Australia to western Victoria and Tasmania. Both species have spawning areas that allow eggs and larvae to be dispersed by the prevailing currents—southwards and then eastwards by the Leeuwin Current (Western Australia Salmon) and southwards by the East Australian Current (Eastern Australia Salmon). The fish then grow and mature in higher latitude waters before moving back towards their spawning areas which occur at the northern (up-current) parts of their distributions.

Here, assessment of stock status is presented at the biological stock level—Western Australia and Eastern Australia.

STOCK STATUS

Eastern Australia

This cross-jurisdictional biological stock has components in New South Wales, Victoria and Tasmania. Each jurisdiction assesses the part of the biological stock that occurs in its waters. The status presented here for the entire biological stock has been established using evidence from all jurisdictions.

In New South Wales, commercial landings are influenced largely by market demands. Annual landings have varied substantially since the mid-1990s in response to these demands. Catch rates (median catch per day hauling) have increased steadily during the past decade and are at historically high levels. The size and age compositions of Eastern Australia Salmon in commercial landings have remained similar since the late-1970s, noting that the most recent sampling was done during 2008–09 [Stewart et al. 2011]. The above evidence indicates that the biomass of this part of the stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Eastern Australia Salmon in northern New South Wales are lightly fished commercially as fishing in this area is restricted to servicing the commercial bait market with an annual catch limit of 224 t in place. Estimates of overall fishing mortality were similar to estimates of natural mortality during 2008–09 [Stewart et al. 2011] and recent landings have declined. The above evidence indicates that the current level of fishing pressure is unlikely to cause this part of the stock to become recruitment impaired.

In Victoria, Australian Salmon are taken in the Ocean Fishery, Gippsland Lakes Fishery and Corner Inlet Fishery. Total commercial landings have varied between 210 and 745 t annually, with a peak in 2007 and 2012. The annual catch in 2017 was relatively low (321 t) compared with 2012 (around 730 t). Catch is also taken in the Ocean Purse Seine Fishery but not stated due to confidentiality. The most recent assessment of the Victorian component of this stock indicates that since 2007 catch per unit effort has been sustained well above the reference limit [VFA 2017, Stewart et al. 2011]. The above evidence indicates that the biomass of this part of the stock is unlikely to be depleted and that recruitment is unlikely to be impaired. The above evidence also indicates that the current level of fishing mortality is unlikely to cause this part of the stock to become recruitment impaired.

For the Tasmanian part of the biological stock, the most recent assessment investigated catch and effort (but not biomass) up to the end of June 2017 [Moore et al. 2018]. There are two distinct sectors in the commercial fishery: a small number of large vessels specifically equipped to capture and store large quantities of Eastern Australia Salmon, and a large number of smaller vessels which target the species on an opportunistic basis or take them as byproduct, usually in small quantities. Typically, the majority of the landings (more than 85 per cent) have been caught by the large vessel sector using beach seine methods. However, during the last four years, catch and effort for this sector has been at historically low levels, reflecting shifts in targeting species and low market demand for Eastern Australia Salmon rather than changes in abundance. In the 2017 fishing year the total catch of Australian Salmon in Tasmanian State

waters was 18.9 t [Moore et al. 2018]. The current level of commercial and recreational fishing pressure in Tasmania is well below historical levels. The above evidence indicates that the biomass of this part of the stock is unlikely to be depleted and that recruitment is unlikely to be impaired. The above evidence also indicates that the current level of fishing mortality is unlikely to cause this part of the stock to become recruitment impaired.

On the basis of the evidence provided above, the entire Eastern Australia biological stock is classified as a **sustainable stock**.

Western Australia

This cross-jurisdictional biological stock has components in Western Australia, South Australia and Victoria. The status presented here for the entire biological stock has been established using evidence from all jurisdictions.

Historically, the majority of commercial landings of this species were taken in Western Australia. In Western Australia, the commercial catch from the 1940s until the mid-2000s followed a stable trend, averaging 2 000 tonnes (t) per year (range 1 000–4 000 t per year). In the late 2000s, catch and effort declined sharply, as a result of weak market demand and low wholesale prices. Annual commercial catches in Western Australia since 2010 have been less than 400 t per year, reflecting the ongoing low level of targeting. The recreational catch is believed to be lower than the commercial catch, although the current catch level is uncertain due to lack of information about shore-based recreational fishing.

In South Australia, the commercial fishery has involved both a general hauling net and a specialist purse seine net component that involved fewer fishers. From 1984 to 2003, the annual commercial catches fluctuated around 600 t per year, with the higher proportion taken with purse seine nets [Steer et al. 2018]. From 2004 to 2013, catches declined as several key purse seiners exited the fishery. However, since 2014, catches have again increased as purse seine activity has been reactivated. Overall, since 2002, commercial effort has declined reflecting decreases for both major gear types. The catch rates for both major gear types have been characteristically variable, with those of the purse seiners generally considerably higher, with the recent years the highest yet recorded. Salmon is an iconic recreational fishery species in South Australia and is targeted with rod and line. The State-wide recreational survey in 2013–14 estimated that 220 332 Salmon were captured, of which 148 361 fish were harvested [Giri and Hall 2015]. The estimated total recreational harvest weight was 56.2 t, which was approximately 48 per cent of the State's total catch in 2013–14.

In Victoria, Western Australia Salmon are taken in the Ocean Fishery, and Port Phillip and Western Port Bay Fishery. Total commercial landings are very low compared with those in other states and compared with the total quantity of Eastern Australia Salmon landed in Victoria. Combined catch from these fisheries was around 12.5 t in 2014; however, this declined to around 800 kg in 2017 largely due to the phasing out of commercial netting in Port Phillip Bay. Since 2016, 34 of the 43 licences have been bought out by the Victorian Government. The low commercial landings of this species relative to the catches taken by other jurisdictions indicate that the current level of fishing pressure by the Victorian fishery is low.

The breeding component of this stock resides exclusively in Western Australia, with only immature/nonbreeding fish occurring in South Australia and Victoria [Cappo et al. 2000]. The most recent assessment is based on catch and catch rate data from each jurisdiction and current (2012–15) age composition data from Western Australia. Analyses based on catch curves, a per recruit model, an equilibrium age structured model and a stock reduction model (*Catch-MSY*) indicate that the current rate of fishing mortality ($F = 0.25\text{--}28 \text{ y}^{-1}$) in Western Australia is relatively low (less than natural mortality, $M = 0.40 \text{ y}^{-1}$) and biomass is well above the limit level of 20 per cent, and likely to be around the target level of 40 per cent [Wise and Molony 2018]. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that

recruitment is unlikely to be impaired.

Low levels of fishing effort are currently directed towards Western Australia Salmon across all jurisdictions. The current level of fishing mortality in each jurisdiction is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the entire Western Australia biological stock is classified as a **sustainable stock**.

BIOLOGY

Australian Salmon biology [Kailola et al. 1993, Stewart et al. 2011]

Species	Longevity / Maximum Size	Maturity (50 per cent)
AUSTRALIAN SALMONS	Western Australia Salmon 12 years, 850 mm FL Eastern Australia Salmon 12 years, 810 mm FL	Western Australia Salmon 3–5 years, 600–650 mm FL Eastern Australia Salmon 2–4 years, 300–400 mm FL

DISTRIBUTION



Distribution of reported commercial catch of Australian Salmon

TABLES

Commercial Catch Methods	New South Wales	South Australia	Tasmania	Victoria	Western Australia
Beach Seine					✓
Dropline					✓
Gillnet			✓		✓
Hand Line, Hand Reel or Powered Reels			✓		✓
Haul Seine	✓		✓		✓
Hook and Line				✓	
Mesh Net			✓		

Net				✓	
Purse Seine	✓	✓			
Seine Nets	✓	✓			
Trolling			✓		✓
Unspecified	✓	✓	✓		✓

Fishing methods					
	New South Wales	South Australia	Tasmania	Victoria	Western Australia
Charter					
Handline	✓				
Hook and Line				✓	
Commercial					
Beach Seine					✓
Gillnet			✓		✓
Hand Line, Hand Reel or Powered Reels			✓		✓
Haul Seine	✓				✓
Hook and Line				✓	
Net				✓	
Purse Seine	✓	✓			
Seine Nets	✓	✓			
Trolling					✓
Unspecified	✓	✓	✓		✓
Indigenous					
Handline	✓				
Recreational					
Gillnet			✓		
Hand held- Implements				✓	
Handline	✓	✓	✓		✓
Hook and Line				✓	
Net				✓	
Spearfishing				✓	

Management Methods					
	New South Wales	South Australia	Tasmania	Victoria	Western Australia
Charter					
Bag limits	✓			✓	
Gear restrictions	✓			✓	
Licence	✓			✓	

Marine park closures	✓				
Possession limit	✓			✓	
Size limit				✓	
Spatial closures	✓			✓	
Commercial					
Bag limits	✓				
Catch limits		✓			
Effort limits				✓	
Gear restrictions	✓	✓	✓	✓	✓
Licence				✓	
Limited entry	✓	✓	✓	✓	✓
Marine park closures	✓				
Size limit		✓	✓	✓	
Spatial closures	✓		✓	✓	
Spatial zoning					✓
Vessel restrictions	✓				
Indigenous					
Bag limits	✓		✓		
Customary fishing permits				✓	
Gear restrictions			✓		
Native Title	✓				
Possession limit			✓		
Section 37 (1d)(3)(9), Aboriginal cultural fishing authority	✓				
Size limit			✓		
Recreational					
Bag limits	✓	✓	✓	✓	✓
Gear restrictions	✓	✓	✓	✓	
Licence	✓		✓	✓	
Licence (Recreational Fishing from Boat)					✓

STATUS OF AUSTRALIAN FISH STOCKS REPORT
AUSTRALIAN SALMONS (2018)

License)					
Marine park closures	✓				
Possession limit	✓		✓	✓	✓
Size limit		✓	✓	✓	✓
Spatial closures	✓			✓	

Active Vessels	New South Wales	South Australia	Tasmania	Victoria	Western Australia
	49 Fishing Business in EGF, 18 Fishing Business in OHF, 7 Fishing Business in OTF, 17 Fishing Business in OTLF,	6 Licences in LCF, 74 Licences in MSF, 2 Licences in NZRLF, 2 Licences in SZRLF,	33 Vessels in SF,	17 Licence Holders in CIF, 10 Licence Holders in GLF, 15 Licence Holders in OF, 1 Licence Holders in OPSF, 2 Licence Holders in PPBWPF,	18 in SCEMF, 4 in SCSMF, &3 in SWCBNF, 3 in SWCSMF, &3 in WL (SC), 8 in Charter, &3 in WL (NC GC WC),

EGF Estuary General Fishery(NSW)

OHF Ocean Hauling Fishery(NSW)

OTF Ocean Trawl Fishery(NSW)

OTLF Ocean Trap and Line Fishery(NSW)

LCF Lakes and Coorong Fishey (SA)

MSF Marine Scalefish Fishery(SA)

NZRLF Northern Zone Rock Lobster Fishery(SA)

SZRLF Southern Zone Rock Lobster Fishery(SA)

SF Scalefish Fishery(TAS)

CIF Corner Inlet Fishery(VIC)

GLF Gippsland Lakes Fishery(VIC)

OF Ocean Fishery(VIC)

OPSF Ocean Purse Seine Fishery(VIC)

PPBWPF Port Phillip Bay and Western Port Bay Fishery (VIC)

SCEMF South Coast Estuarine Managed Fishery(WA)

SCSMF South Coast Salmon Managed Fishery(WA)

SWCBNF South West Coast Beach Net Fishery (Order)(WA)

SWCSMF South West Coast Salmon Managed Fishery(WA)

WL (SC) Open Access in the South Coast(WA)

Charter Tour Operator(WA)

WL (NC || GC || WC) Open Access in the North Coast, Gascoyne Coast and West Coast Bioregions(WA)

Catch	New South Wales	South Australia	Tasmania	Victoria	Western Australia
Commercial	5.712t in N/A.	374.947t in MSF	18.9109t in SF.	14.1716t in CIF.	154.191t in

	749.868t in OHF,	NZRLF SZRLF LCF,		5.51194t in GLF, 0.6905t in OF,	SCEMF SCSMF SWCBNF SWCSMF WL (NC, GC, WC) WL (SC),
Indigenous	Unknown	Unknown	Unknown	Unknown (No catch under permit)	Unknown
Recreational	182 t (in 2013–14)	61 t (in 2013–14)	63.7 t (in 2012–13)	Unknown	3 t (in 2015–16)

N/A Not Applicable (NSW), OHF Ocean Hauling Fishery (NSW), LCF Lakes and Coorong Fishery (SA), NZRLF Northern Zone Rock Lobster Fishery (SA), SZRLF Southern Zone Rock Lobster Fishery (SA), SF Scalefish Fishery (TAS), CIF Corner Inlet Fishery (VIC), GLF Gippsland Lakes Fishery (VIC), OF Ocean Fishery (VIC), PPBWPF Port Phillip Bay and Western Port Bay Fishery (VIC), SCEMF South Coast Estuarine Managed Fishery (WA), SCSMF South Coast Salmon Managed Fishery (WA), SWCBNF South West Coast Beach Net Fishery (Order) (WA), SWCSMF South West Coast Salmon Managed Fishery (WA), WL (SC) Open Access in the South Coast (WA), WL (NC || GC || WC) Open Access in the North Coast, Gascoyne Coast and West Coast Bioregions (WA), MSF || NZRLF || SZRLF || LCF Marine Scale Fishery (including Northern & Southern Zone Rock Lobster Fishery and Lakes and Coorong Fishery) (SA), SCEMF || SCSMF || SWCBNF || SWCSMF || WL (NC, GC, WC) || WL (SC) Various Fisheries combined due to 3 boat rule (WA),

Western Australia – Recreational (Catch) Boat-based recreational catch estimated in 2015–16 [Ryan et al. 2017]; shore-based catch not estimated.

New South Wales – Recreational (Catch) West et al. [2015] estimate of 73 535 fish retained by New South Wales residents with the average weight retained being approximately 2.5 kg [New South Wales Department of Primary Industries Unpublished data].

New South Wales – Indigenous (Management Methods) (a) Aboriginal Cultural Fishing Interim Access Arrangement—allows an Indigenous fisher in New South Wales to take in excess of a recreational bag limit in certain circumstances; for example, if they are doing so to provide fish to other community members who cannot harvest for themselves; (b) The Aboriginal cultural fishing authority is the authority that Indigenous persons can apply to take catches outside the recreational limits under the *Fisheries Management Act 1994* (NSW), Section 37 (1d)(3)(9), Aboriginal cultural fishing authority; and (c) In cases where the *Native Title Act 1993* (Cth) applies fishing activity can be undertaken by the person holding native title in line with S.211 of that Act, which provides for fishing activities for the purpose of satisfying their personal, domestic or non-commercial communal needs. In managing the resource where native title has been formally recognised, the native title holders are engaged with to ensure their native title rights are respected and inform management of the State's fisheries resources.

Victoria – Indigenous (Management Methods) In Victoria, regulations for managing recreational fishing may not apply to fishing activities by Indigenous people. Victorian traditional owners may have rights under the Commonwealth's *Native Title Act 1993* to hunt, fish, gather and conduct other cultural activities for their personal, domestic or non-commercial communal needs without the need to obtain a licence. Traditional Owners that have agreements under the *Traditional Owner Settlement Act 2010* (Vic) may also be authorised to fish without the requirement to hold a recreational fishing licence. Outside of these arrangements, Indigenous Victorians can apply for permits under the *Fisheries Act 1995* (Vic) that authorise fishing for specific Indigenous cultural ceremonies or events (for example, different catch and size limits or equipment). There were no Indigenous permits granted in 2017 and hence no Indigenous catch recorded.

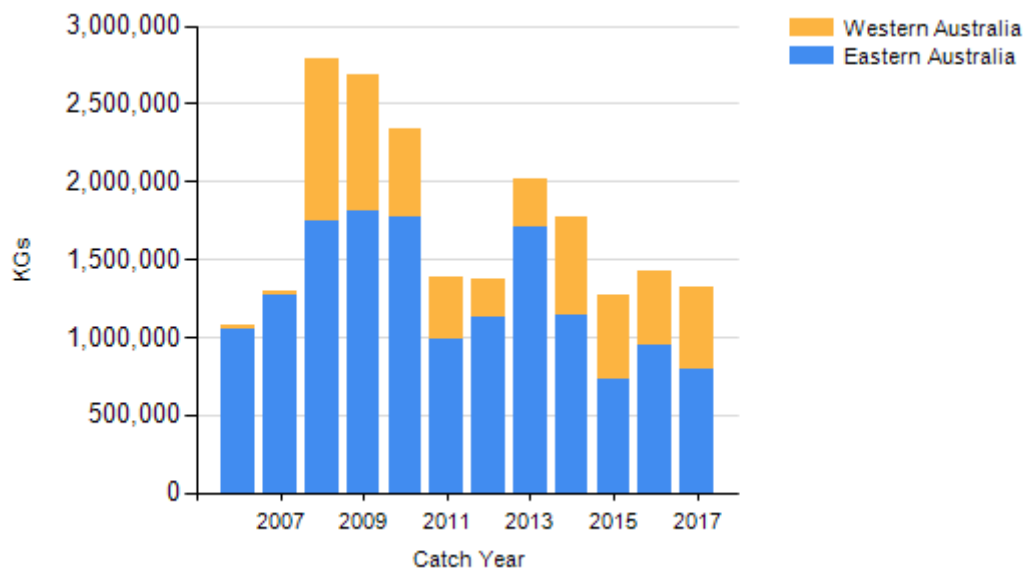
Tasmania – Commercial (Catch) Catches reported for the Tasmanian Scalefish Fishery are for the period 1 July to 30 June the following year. The most recent assessment available is for 2016–17.

Tasmania – Recreational (Management Methods) In Tasmania, a recreational licence is required for fishers using dropline or longline gear, along with nets, such as gillnet or beach seine. A minimum size limit of 200 mm total length is in place for Australian Salmon in Tasmanian waters. A bag limit of 15 individuals and a possession limit of 30 individuals is in place for recreational fishers.

Tasmania – Indigenous (Management Methods) In Tasmania, Indigenous persons engaged in aboriginal fishing activities in marine waters are exempt from holding recreational fishing licences, but must comply with all other fisheries rules as if they were licensed. Additionally, recreational bag and possession limits also apply. If using pots, rings, set lines or gillnets, Indigenous fishers must obtain a unique identifying code (UIC). The policy document Recognition of Aboriginal Fishing Activities for issuing a UIC to a person for Aboriginal Fishing activity explains the steps to take in making an application for a UIC.

Tasmania – Indigenous Subject to the defence that applies under Section 211 of the *Native Title Act 1993* (Cth), and the exemption from a requirement to hold a Victorian recreational fishing licence, the non-commercial take by Indigenous fishers is covered by the same arrangements as that for recreational fishing.

CATCH CHART



Commercial catch of Australian Salmon - note confidential catch not shown (The stock 'Western Australia' comprises three jurisdictions. The stock 'Eastern Australia' comprises three jurisdictions.)

EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

ENVIRONMENTAL EFFECTS on AUSTRALIAN SALMONS

References	
11	Cappo M, Walters and CJ, Lenanton RJ 2000, Estimation of rates of migration, exploitation and survival using tag recovery data for western Australian "salmon" (<i>Arripis truttaceus</i> : Arripidae: Percoidae). Fisheries Research, 44: 207–217.
12	Giri, K and Hall, K 2015, South Australian recreational fishing survey 2013–14. Fisheries Victoria internal report series no. 62, Victorian Government, Department of Economic Development, Jobs, Transport and Resources, Melbourne.
13	Kailola, PM, Williams, MJ, Stewart, PC, Reichelt, RE, McNee, A and Grieve, C 1993, Australian fisheries resources, Bureau of Resource Sciences and the Fisheries Research and Development Corporation, Canberra.
14	MacDonald, CM 1983, Population, taxonomic and evolutionary studies on marine fishes of the genus <i>Arripis</i> (Perciformes: Arripidae). Bulletin of Marine Science, 33(3): 780–780.
15	Moore, BR, Lyle, JM and Hartman, K 2018, Tasmanian Scalefish Fishery 2016/17, Institute for Marine and Antarctic Studies, Hobart.
16	Ryan, KL, Hall, NG, Lai, EK, Smallwood, CB, Taylor, SM and Wise, BS 2015, State-wide survey of boat-based recreational fishing in Western Australia 2013–14. Fisheries research report no. 268, Department of Fisheries, Western Australia, Perth.

STATUS OF AUSTRALIAN FISH STOCKS REPORT
AUSTRALIAN SALMONS (2018)

17	Steer MA, Fowler AJ, McGarvey R, Feenstra J, Westlake EL, Matthews D, Drew M, Rogers PJ and Earl J 2018, Assessment of the South Australian Marine Scalefish Fishery in 2016. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2017/000427-1. SARDI Research Report Series No. 974. Pp 250.
18	Stewart, J, Hughes, JM, McAllister, J, Lyle, J and MacDonald, M 2011, Australian salmon (<i>Arripis trutta</i>): population structure, reproduction, diet and composition of commercial and recreational catches, Fisheries Final Report Series 129, Industry and Investment New South Wales, Sydney.
19	Victorian Fisheries Authority 2017, Review of key Victorian fish stocks—2017. Victorian Fisheries Authority Science Report Series No. 1.
20	West, LD, Stark, KE, Murphy, JJ, Lyle, JM and Ochwada-Doyle, FA 2015, Survey of recreational fishing in New South Wales and the ACT, 2013–14, Fisheries Final Report Series 149, NSW Department of Primary Industries, Sydney.
21	Wise, BS and Molony, BW (Eds). 2018, Australian Herring and West Australian Salmon Scientific Workshop Report, October 2017. Fisheries Research Report No. 289 Department of Primary Industries and Regional Development, Western Australia. 158pp.