Western King Prawn (2023)

Melicertus latisulcatus

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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Western Australia	Exmouth Gulf Prawn Managed Fishery	Sustainable	Survey catch rates, size composition, catch, catch rates
Western Australia	North Coast Prawn Managed Fisheries	Sustainable	Catch
Western Australia	Shark Bay Prawn Managed Fishery	Sustainable	Survey catch rates, size composition, catch, CPUE, Biomass dynamics model
Western Australia	South West Trawl Managed Fishery	Sustainable	Catch
Queensland	East Coast Otter Trawl Fishery	Sustainable	Catch, nominal catch rates, effort, ecological risk assessment
South Australia	Gulf St. Vincent Prawn Fishery	Sustainable	Survey and commercial catch rates
South Australia	Spencer Gulf Prawn Fishery	Sustainable	Survey catch rates

South Australia	West Coast Prawn Fishery	Depleting	Survey and commercial catch rates

STOCK STRUCTURE

Western King Prawn is distributed throughout the Indo-West Pacific [Grey et al. 1983]. In South Australia, one study of the genetic structure of Western King Prawn found no differences between the three fisheries [Carrick 2003]; however, each fishery functions as an independent population at time scales relevant to management, with distinct adult and juvenile habitats and independent variations in recruitment and abundance. No research has been conducted into Western King Prawn biological stock structure in Western Australia or Queensland. Hence, status in each state is reported at the management unit level.

Here, assessment of stock status is presented at the management unit level—Exmouth Gulf Prawn Managed Fishery, North Coast Prawn Managed Fisheries, Shark Bay Prawn Managed Fishery, South West Trawl Managed Fishery (Western Australia); East Coast Otter Trawl Fishery (Queensland); Gulf St. Vincent Prawn Fishery, Spencer Gulf Prawn Fishery, and West Coast Prawn Fishery (South Australia).

STOCK STATUS

East Coast Otter Trawl Fishery

Long-term (1998–2022) nominal catch rates for Western King Prawns range from 31.0–76.8 kg per day with a 45.22 kg per day average. At 45.18 kg per day, the nominal catch rate for 2021–22 was at the long-term average. In 2013, an ecological risk assessment (ERA) for the East Coast Otter Trawl Fishery (Queensland) found that Western King Prawns were at low risk of becoming recruitment overfished within the Great Barrier Reef Marine Park (GBRMP) [Pears et al. 2012]. This is in part driven by the biology of the species, which exhibits protracted spawning behaviour, and because a large proportion (41%) of the spatial distribution of the stock is afforded protection from, and biomass (51%) is not directly exposed to, trawl fishing through permanent closures within the GBRMP [Pitcher et al. 2007]. These closures remain in place and provisions governing their use have not been the subject of significant amendments since the last Status of Australian Fish Stocks assessment. The above evidence indicates that the biomass of this management unit is unlikely to be depleted and that recruitment is unlikely to be impaired.

The annual average catch and fishing effort for Western King Prawns between 2002–03 and 2012–13 was 159 t and 3,935 days. Due to a number of factors including long-term reduction in the trawl crustacean (predominantly prawn) catch following expansion of GBRMP no-fishing zones in 2004 (Fletcher at al. 2015], subsequent structural adjustment of the Queensland East Coast Trawl fleet, as well as adverse weather and economic conditions [Larcombe et al. 2016], the 2012–13 catch and effort were lower at 141 t and 2,785 days. In 2021–22, catch and effort were lower still at 94 t and 1,974 days. However, in view of low trawl fishing mortality estimated to be 5% of natural mortality [Pitcher et al. 2007] and long-term (69%) decline in fishing effort between 2005 and 2021-22, it is unlikely that the risk of this species being recruitment overfished is increasing. The above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the East Coast Otter Trawl Fishery (Queensland) management unit is classified as a **sustainable stock**.

Exmouth Gulf Prawn Managed Fishery

Assessments of Western King Prawns in Exmouth Gulf are based on a combination of fishery-independent and fishery-dependent catch rates, where fishery-independent surveys provide recruitment indices and fishery-dependent data provide spawning stock indices. Fishery-independent sampling during the spawning season has been undertaken since 2016 and will be used in combination with the fishery dependent data when a sufficient time series is available. Analysis of the recruitment and spawning stock indices from the 1970s to 1990s provide no clear evidence of a stock-recruitment relationship for Western King Prawns [Caputi et al. 1998], with no indication of reduced recruitment in relation to spawning stock sizes over this period. There is some evidence that elevated summer temperatures since 2011 are contributing to lower than average recruitment levels [Caputi et al. 2014b], in response to which conservative harvesting strategies have been introduced, resulting in reduced annual landings.

Fishery-independent recruitment surveys have been undertaken in March and April each year since 1985 to assess prawn abundance and size structure. They are also used to make annual catch predictions [Caputi et al. 2014a] and for management decisions such as the spatial-temporal opening of fishing areas [Kangas et al. 2015a; DPIRD 2021]. In 2022, the Western King Prawn fishery-independent survey mean recruitment index was 37.7 kg/hr, well above the target of ≥ 30 kg/hr [DPIRD 2021]. The commercial spawning stock catch rate index in August–September in key Western King Prawn fishing grounds provides a long-term dataset of spawning stock abundance. For 2022, the mean commercial catch rate was 34.3 kg/hr, above the target (≥ 25 kg/hr) [DPIRD 2021]. The fishery-independent spawning survey in 2022 indicated a mean catch rate of 34.7 kg/hr in August and 25.8 kg/hr in September, with an average over that period (30.2 kg/hr) similar to the commercial catch rate index.

Catch and catch rate levels from 2001 to 2016 are now used as the basis for calculating a catch tolerance range (100–450 t) and a mean catch rate range (8–16 kg/hr). This methodology has changed from that used in the past to account for likely negative impacts of increased water temperatures on Western King Prawn recruitment in recent years [Caputi et al. 2014 a, b], and also reduced effort from fleet reductions, and greater focus towards targeting of larger more valuable prawns (rather than maximising total overall catch). The commercial catch for 2022 of 218 t was within the target range, as was the mean commercial catch rate (9.5 kg/hr).

The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the Exmouth Gulf Prawn Managed Fishery (Western Australia) management unit is classified as a **sustainable stock**.

Gulf St. Vincent Prawn Fishery

Management arrangements for the Gulf St. Vincent Prawn Fishery have evolved since the fishery's inception in 1967 and the fishery has gone through a number of cycles characterised by increasing catches, subsequent declines in recruitment and fishery performance, and resulting closure periods (1991–92 to 1992–93 and 2012–13 to 2013–14). The latest management plan for the fishery was implemented in July 2022 and provides the decision rules for classifying stock status relative to limit, trigger and target reference points defined for two

performance indicators relating to relative stock biomass [PIRSA 2022]. The performance indicators are: 1) standardised annual commercial catch per unit effort (CPUE); and 2) standardised fishery-independent survey (FIS) CPUE estimated from surveys undertaken in March and April or May. Each performance indicator is evaluated against limit and trigger reference points specified in the harvest strategy and used in combination to determine stock status (PIRSA 2022).

The most recent stock assessment report was completed in 2022 [McLeay and Hooper 2022] and used data to the end of the 2021–22 season (1 November 2021–31 July 2022). In 2021–22, the total commercial catch of Western King Prawn in the Gulf St. Vincent Prawn Fishery was 138.5 t obtained from 298 vessel-nights that comprised 96% of the Total Allowable Commercial Effort of 312 vessel-nights for 2021–22 and 22 vessel-nights carried over from the 2019–20 season.

In 2021–22, standardised annual commercial CPUE was 805 kg per vessel-night, which was 9% above the target reference point defined for this performance indicator (738 kg per vessel-night). From 2013–14 to 2018–19, estimates of standardised FIS CPUE remained above the target reference point (22.2 kg per trawl-shot). In 2020–21, standardised FIS CPUE decreased to below target, and in 2021–22 was 21.0 kg per trawl-shot, which is 13.5% above the trigger reference point defined for this performance indicator (18.5 kg per trawl-shot) [PIRSA 2022]. The FIS Recruitment Index (FRI) was 1,178 recruits/hr in 2021–22, the highest estimate on record.

The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the Gulf St. Vincent Prawn Fishery management unit is classified as a **sustainable stock**.

North Coast Prawn Managed Fisheries

The North Coast Prawn Managed Fisheries (Western Australia) management unit is made up of four separate multispecies prawn fisheries (the Onslow, Nickol Bay, Broome and Kimberley Prawn Managed Fisheries) but is reported as one unit due to minimal catches. Western King Prawn forms a very minor part of total prawn landings in these fisheries and in some years no Western King Prawns are landed in any of these four fisheries [Newman et al. 2023]. The total commercial catch for 2022 was less than 1 t. Only in the Broome Prawn Managed Fishery are Western King Prawns a key target species, but costs and logistics of fishing in this remote fishery have meant that only one or two out of the five licensed boats have fished since 2008. Prior to 2008, between 1,200 and 4,200 trawl hours were recorded annually with mean catch rates ranging from 14 to 43 kg/hr. Since 2008, 30–275 hours of trawling have been conducted annually for a similar mean catch rate range. In 2022, there was no recorded effort in Broome. Elevated water temperatures since 2011 in these North Coast Prawn Managed Fisheries may be contributing to lower than average recruitment levels [Caputi et al. 2014b].

The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the North Coast Prawn Managed Fisheries (Western Australia) management unit is classified as a **sustainable stock**.

Shark Bay Prawn Managed Fishery

The assessment approach for Western King Prawns in the Shark Bay Prawn Managed Fishery is primarily based on monitoring of fishery-independent survey indices of recruitment (March–April) and spawning stock levels (June–August) relative to reference points specified in terms of survey catch rates for these two periods [DPIRD 2022]. Additional data such as commercial catch, effort, grade categories, and environmental data are also incorporated into a weight-of-evidence assessment.

There is no significant correlation between spawning stock and recruitment indices derived from fishery-independent surveys for the Western King Prawn since 2000 [Kangas et al. 2015b; Caputi et al. 2021], however there is a positive relationship between water temperature and recruitment [Caputi et al. 2016]. Fishery-independent recruitment surveys have indicated that the mean size of recruiting Western King Prawns began declining in 2013 and has remained relatively low. The cause of this decline in size is being investigated as part of FRDC project 2019-015, with the possible impacts of the environmental changes post heatwave event (2010–11) and the long-term winter cooling trend being examined, as well as potential fishing effects. In 2022, the size composition of recruiting Western King Prawns increased slightly from the previous two years, but not to sizes observed prior to 2012.

There is no evidence of a declining trend in recruitment in fishery-independent survey indices since 2000, although in the last six years the higher peaks in recruitment have been absent. The annual recruitment target reference level was reviewed in 2022 and has increased from above 25 to greater than 70 kg/hr [DPIRD 2022]. In 2022, the annual recruitment index (46.5 kg/hr) fell below the revised target reference level but was well above the limit reference level (10 kg/hr). Most of the annual recruitment variability appears to be driven by environmental factors (e.g., water temperature, [Caputi et al. 2015, 2016]). The fishery-independent recruitment survey in 2022 provided a catch prediction [Caputi et al. 2014a] of between 570 and 855 t., with the 2022 catch of 503 t falling below the lower end of this range. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

The introduction of seasonal, moon, and area-closures in the early 1990s has limited the overall fishing effort, providing protection for the breeding stock of Western King Prawns [Kangas et al. 2015b]. In 2022, the mean spawning stock survey index was 16.4 kg/hr, which is below the target reference level (25 kg/hr).

Historical catches from 1989–98, when recruitment was not affected by fishing effort, were used as the basis for calculating target total catch ranges for this stock of 950–1,450 t, and a target mean catch rate of 21 kg/hr (range of 16 to 29 kg/hr) [Newman et al. 2023]. The total commercial Western King Prawn landings in 2022 was 503 t, which is the lowest recorded in over 40 years, and below the target catch range. The overall mean commercial catch rate of 18.0 kg/hr was the third lowest reported in over 40 years, reflecting a decrease in recruitment abundance compared to 2021 [Newman et al. 2023; Kangas et al. 2015b].

As the 2022 recruitment and spawning indices were below the target level (but

above the limit), various management strategies were implemented during the season following the guidelines of the harvest strategy. As the spawning index has been under the threshold for three consecutive years, further effort reductions and early spatial closures have been set for the 2023 season, including a reduction in the allowable headrope length. The management measures implemented in response to the decline in biomass have reduced effort and are expected to allow stock abundance to increase, with early evidence of this seen during the 2023 season. The above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the stock of Western King Prawns in the Shark Bay Prawn Managed Fishery (Western Australia) management unit is classified as a **sustainable stock.**

South West Trawl Managed Fishery

The South West Trawl Managed Fishery (Western Australia) (SWTMF) management unit is a comparatively small, low-activity fishery, in which annual effort has been related to either the abundance of Western King Prawns or Ballot 's Saucer Scallops (*Ylistrum balloti*), the latter being highly variable in abundance due to sporadic recruitment. One to four vessels have operated in the fishery since 2005, and they have only covered approximately 1–3% of the allowable fishery area [Newman et al. 2023]. Between 2005 and 2013, an average of 168 boat days was recorded annually, with a catch range of Western King Prawn of 3–14 t, compared to 490 boat days and a catch range of 9–37 t on average over the previous 10 years (1995–2004). Effort since 2013 has been very low, and only one boat fished in the SWTMF in 2022 for a total of 12 boat days. No Western King Prawns were caught in this fishery in 2022. The level of fishing pressure is unlikely to adversely impact the spawning biomass of Western King Prawn.

The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the South West Trawl Managed Fishery (Western Australia) management unit is classified as a **sustainable stock.**

Spencer Gulf Prawn Fishery

The primary indicator for biomass and fishing mortality in Spencer Gulf is the weighted average catch rate of adult prawns (defined as 20 or fewer prawns per pound), obtained during fishery-independent surveys conducted yearly in November, March, and April [PIRSA 2020]. This index of relative biomass is evaluated against limit and trigger reference points of 60.3 and 86.2 kg per hour, respectively, where the trigger reference point is considered to be the minimum catch rate at which future recruitment to the fishery will be adequate (that is, the level that delineates a stock status classification of 'sustainable' from 'depleting').

The most recent advice on stock status [Heldt and Hooper, 2023] concluded that the fishery was sustainable in 2021-22. In 2021-22, the weighted average catch rate was 104.7kg per hour for adult prawns which was above the trigger reference point. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Fishery-independent surveys and fishery-dependent data have demonstrated a long history of stable recruitment and commercial catch (Heldt and Hooper, 2023). The above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the Spencer Gulf Prawn Fishery management unit is classified as a **sustainable stock**.

West Coast Prawn Fishery

The West Coast Prawn Fishery (South Australia) harvests the Western King Prawn from an oceanic stock that shows large fluctuations in recruitment, thought to be environmentally driven [Carrick and Ostendorf 2005; Carrick 2008], and consequently has experienced large fluctuations in commercial catch. The harvest strategy for the West Coast Prawn Fishery includes defined performance indicators and associated reference levels (PIRSA 2022). The primary performance indicator is the average of (1) nominal commercial CPUE from at least three months of commercial fishing between March and September and, (2) average fishery-independent survey CPUE measured from the March and June surveys undertaken in Venus Bay. Average catch rate is considered to be a reliable proxy for biomass and fishing mortality because: (1) the fishery-independent sampling design has remained relatively consistent since inception in 2002 and, (2) there is contrast in the data as they span the most recent low catch period from 2002 to 2007 and the relatively higher levels from 2012 to 2018.

The fishery was recently classified as depleted (2022) and depleting (2020 and 2021; Noell 2022) with total annual catches (31–68 tonnes) well below the 10-year average (108 ± 34 t). Annual catches were low in 2023 (31 t) partly because the fishery was closed (Nov 2022–May 2023), with recent survey results in June 2023 enabling the fishery to re-open (SARDI unpublished; PIRSA 2022). The most recent stock status, completed in 2023 [SARDI unpublished], reported an average CPUE of 41.8 kg per hour, which was above the limit but below the trigger reference points of 36 and 54 kg/hr, respectively. Under the harvest strategy, the fishery is classified as depleting at this average catch rate. Long-term reductions in the average catch rate occurred from approximately 70 kg per hour (2012–2018) to 40 (2022–2023) kg per hour.

The above evidence indicates that the biomass of this stock is not yet depleted and recruitment is not yet impaired. Furthermore, the above evidence indicates that the current level of fishing mortality is likely to cause the stock to become recruitment impaired.

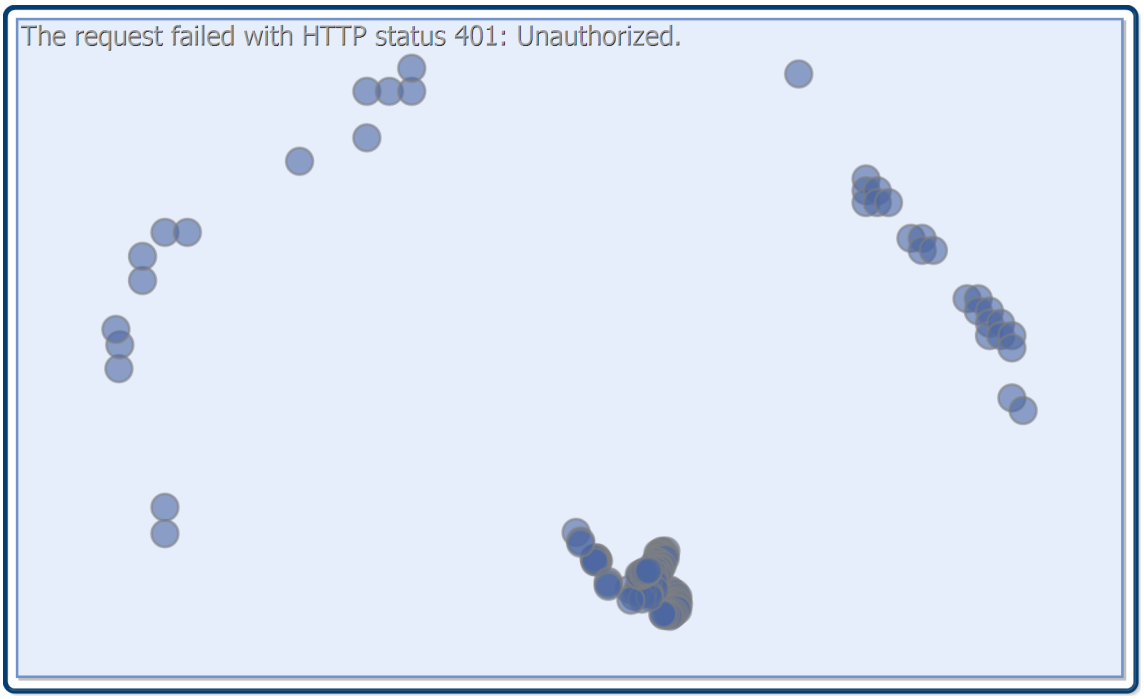
On the basis of the evidence provided above, the West Coast Prawn Fishery (South Australia) management unit is classified as a **depleting stock**.

BIOLOGY

Western King Prawn biology [Kangas et al. 2015 a,b; Penn 1980; Noell and Hooper 2019]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Western King Prawn	2–3 years, maximum 4 years South Australia: males 46 mm CL, females 57 mm CL Western Australia: males 45 mm CL, females 60 mm CL	6–7 months, 25 mm CL

DISTRIBUTION



Distribution of reported commercial catch of Western King Prawn

TABLES

Fishing methods			
	Queensland	South Australia	Western Australia
Commercial			
Otter Trawl	✓	✓	✓
Recreational			
Dip Net			✓
Diving			✓
Hand collection			✓
Unspecified			✓

Management Methods			
	Queensland	South Australia	Western Australia
Commercial			
By-catch reduction devices	✓		
Catch limits		✓	

Effort limits		✓	✓
Effort limits (individual transferable effort)	✓		
Gear restrictions	✓		
Harvest Strategy	✓		
Limited entry	✓	✓	✓
Processing restrictions	✓		
Seasonal or spatial closures	✓		
Spatial closures		✓	✓
Vessel restrictions	✓	✓	✓
Recreational			
Bag limits			✓
Charter licensing			✓
Gear restrictions			✓
Limited entry			✓
Passenger restrictions			✓
Recreational fishing licence			✓
Spatial zoning			✓

Catch			
	Queensland	**South Australia**	**Western Australia**
Commercial	79.0875 t	1511 t	744.684 t
Indigenous	Unknown	Unknown	Unknown
Recreational	0t	0t	Unknown

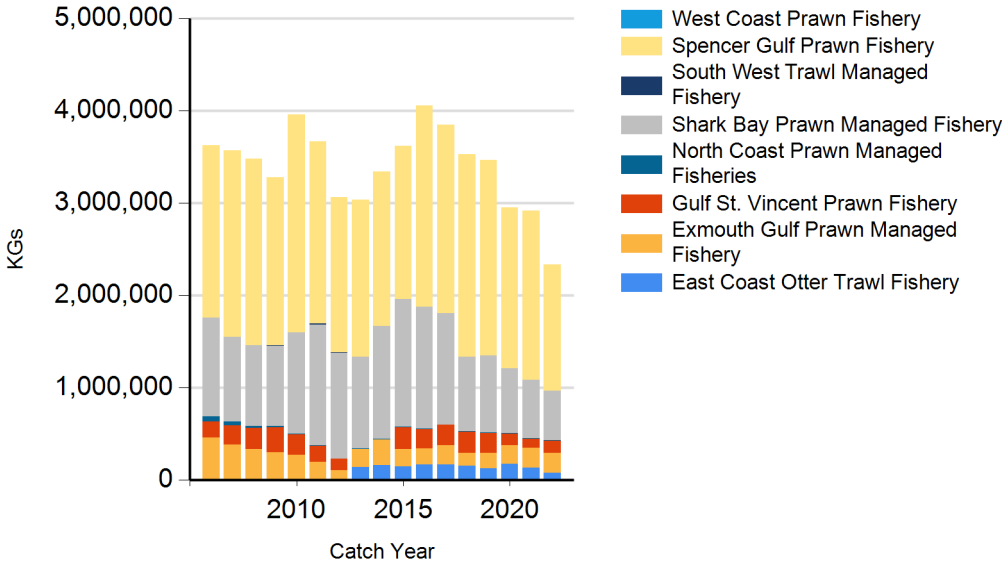
Queensland – Indigenous (management methods). For more information see: Traditional fishing | Department of Agriculture and Fisheries, Queensland (daf.qld.gov.au) https://www.daf.qld.gov.au/business-priorities/fisheries/traditional-fishing .

Queensland – Commercial (Catch). Queensland commercial and charter data are sourced from the commercial fisheries logbook program. Further information available through the Queensland Fisheries Summary Report: Queensland fisheries summary report | Department of Agriculture and Fisheries, Queensland (daf.qld.gov.au)

Queensland – Commercial (Management Methods). Harvest strategies are available at:

Harvest strategies | Department of Agriculture and Fisheries, Queensland (daf.qld.gov.au)

CATCH CHART



Commercial catch of Western King Prawn - note confidential catch not shown

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