Algal bloom wildlife post-mortem report

Government of South Australia
Department for Environment and Water

Species – Pied cormorant

Date collected – 18 July 2025

Location – Nepean Bay, Kangaroo Island

History relating to the animal

One fresh male pied cormorant (*Phalacrocorax varius*) was submitted to the laboratory following reports of cormorant deaths along Nepean Bay, Brown Beach and Ironstone Creek, Kangaroo Island. This bird was among 7 found dead but the only fresh body present. Four live, healthy cormorants were seen in the same area.

Examination

The animal was already dead and so could not be examined prior to death.

Necropsy

The necropsy (looking at the whole body) revealed the bird was in very poor body condition with atrophy (wasting) of muscle over the pectoral (breast) bone. There was pale yellow to white pinpoint areas of inflammation/infection over the outside of the liver and deeper in the tissue as well as in the tissue of both kidneys. Nematodes (round worms) were present in the gastrointestinal tract (gut) and are a normal finding in wild cormorants.

Tissues were collected to test for avian influenza and Newcastle disease, and for histopathology (looking at tissues under the microscope for more detailed information). Testing for brevetoxins and other algal biotoxins, a possibility due to the algal bloom, was requested. Samples were collected for other testing that might be indicated after these tests were performed.

Histopathology

Samples from every major body system were examined under the microscope. All organs appeared normal (including the presence of the nematodes) except for the kidney and liver.

In the kidney, there were ova (eggs) of a parasite (fluke worm) that was an incidental finding and has previously been found in cormorants.

In the liver there was a bacterial infection that was causing tissue necrosis (tissue death).

The diagnosis from the histopathology was that the chronic (long term) hepatitis (liver infection/inflammation) contributed to the death of this bird.

Culture

Following the histopathology findings, which suggested a possible infection, the liver was cultured to try to identify bacteria. There was no bacterial growth after 48 hours, and anaerobes

Algal bloom wildlife post-mortem report

(those bacteria that do not need an oxygenated environment), including *Salmonella* species, *Listeria* species and *Yersina* species, were not isolated.

Brevetoxins

Brevetoxin 3 was found in the liver (0.02 mg/kg).

Other algal biotoxins

Results were below reporting limits or the sample was insufficient for testing.

Avian influenza

Results were negative.

Newcastle disease

Results were negative.

Summary

Seven pied cormorants were found dead along Nepean Bay, Brown Beach and Ironstone Creek, Kangaroo Island. Of these, one bird was sent for testing. An additional four live and healthy cormorants were observed in the same area.

Laboratory examination (necropsy and histopathology) found gastrointestinal parasites and bacterial hepatitis (liver infection) may have contributed to chronic weight loss and illness.

Testing for avian influenza and Newcastle disease was negative.

Brevetoxins were detected in the bird's liver. The levels detected are consistent with those found in marine birds overseas that were reported to have been exposed to harmful algal blooms.

It cannot be determined whether the brevetoxin presence in the cormorant was a direct contributor to its death or a non-lethal co-morbidity given the poor condition of the bird at death. Pied cormorants primarily feed on fish. It is considered that the most significant exposure of the cormorant to brevetoxins is likely to have been via its consumption of fish organs containing brevetoxins.

Outlook

PATH RESULTS: PIRSA, CORMORANTS (Av) [redacted]

From [redacted]
Date Wed 13/08/2025 5:00 PM
To [redacted]

[redacted]

Tested on 19/07/25
Reported on 13/08/25 17:30
Referred on 18/07/25 **by:**

[redacted]

[redacted]

Owner:
[redacted]

Animal/s:
Avian
CORMORANTS
DOB: N/A

Collected: 18/07/25 11:30 **Subm.No:** [redacted] **Lab No.:** [redacted]

Samples tested as received All Tests Complete

SUMMARY DIAGNOSIS
Bacterial hepatitis
Renal trematodiasis (Renicola sp.)

SUMMARY COMMENTS
Bacterial hepatitis contributed to weight loss and morbidity for this bird. Differential diagnoses include E. coli, Pseudomonas sp. Pasteurella sp. etc. The animal had a moderate burden of renal trematodes. This may have also contributed to morbidity.

[redacted]

Specialist Veterinary Anatomic Pathologist
[redacted]

[redacted]

[redacted]

[redacted]

Tested on 19/07/25
Reported on 13/08/25 17:30
Referred on 18/07/25 **by:**
[redacted]

Owner:
[redacted]

Animal/s:
Avian
CORMORANTS
DOB: N/A

Collected: 18/07/25 11:30 **Subm.No:** [redacted] **Lab No.:** [redacted]

Samples tested as received All Tests Complete

HISTOPATHOLOGY FROM NECROPSY

REF: 2025/V HI 1311
CLINICAL HISTORY
Please refer to the clinical history on the request form and the email sent with the request form. A brief summary of the clinical history;

4 x calls to the EAD hotline over the past 24 hours reported cormorant deaths along the Nepean Bay, Brown Beach and ironstone creek. This bird was among 7 dead birds found. This bird was still fresh. For healthy live cormorants were seen.

MACROSCOPY
Slides A-D contain liver, spleen, heart, lung, kidney, brain, oesophagus, proventriculus, ventriculus, duodenum, jejunum, pancreas, ileum, ceacum.

MICROSCOPY
Liver: Multifocally the hepatic acinar parenchyma is effaced and replaced by multiple granulomas. The granulomas contain central lytic necrosis surrounded by moderate to large numbers of heterophils, lymphocytes, macrophages surrounded by fibrous capsule. Within the necrotic debris there are colonies of short bacteria. (Moderate, multifocal, chronic, necrotising pyogranulomatous hepatitis with intralesional short bacteria)

Kidney: Multifocally collecting ducts are effaced and replaced by multiple cross sections of trematodes. The trematodes are approximately 300 to 400 micron in diameter with smooth integument, spongy parenchyma, alimentary tract lined by monolayer of columnar epithelial cells and gravid uteri with abundant oval ova with single operculum. Other collecting ducts are expanded by abundant ova and necrotic debris. (Renal trematodiasis; Renicola sp.)

Oesophagus: There multiple cross sections of nematode's. Nematode is are

approximately 30 to 50 in diameter with a smooth cuticle, platymyarian musculature, lateral cords, pseudocoelom and alimentary tract lined by monolayer of epithelial cells.

There is mild autolysis of the brain, spleen and alimentary sections, aside from the oesophagus.

[redacted]

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Reported on 13/08/25 17:30
Referred on 18/07/25 **by:**
[redacted]

[redacted]

Owner:
[redacted]

Animal/s:
Avian
CORMORANTS
DOB: N/A

Collected: 18/07/25 11:30 **Subm.No:** [redacted] **Lab No.:** [redacted]

Samples tested as received All Tests Complete

Those tissues not described appear normal.

DIAGNOSIS
Liver: Moderate, multifocal, chronic bacterial hepatitis
Kidney: Renal trematodiasis (Renicola sp.)

COMMENTS
Bacterial hepatitis contributed to morbidity for this cormorant.

Renal Renicola sp. infection are often incidental findings in cormorants but the moderate burden in this burden probably contributed to morbidity.

[redacted]
Specialist Veterinary Anatomic Pathologist
[redacted]

[redacted]

[redacted]

Tested on 19/07/25
Reported on 13/08/25 17:30
Referred on 18/07/25 **by:**

[redacted]

[redacted]

Owner:
[redacted]

Animal/s:
Avian
CORMORANTS
DOB: N/A

Collected: 18/07/25 11:30 **Subm.No:** [redacted] **Lab No.:** [redacted]

Samples tested as received All Tests Complete

NECROPSY REPORT
This report replaces the previous report sent on 19/7/2025

CLINICAL HISTORY
Please refer to the clinical history on the request form and the email sent with the request form. A brief summary of the clinical history;

4 x calls to the EAD hotline over the past 24 hours reported cormorant deaths along the Napean Bay, Brown Beach and ironstone creek. This bird was among 7 dead birds found. This bird was still fresh. For healthy live cormorants were seen.

SAMPLES SUBMITTED
One dead adult male cormorant, Phalacrocorax sp.

NECROPSY FINDINGS
The bird is in very poor body condition and weighs 800 g. There is marked atrophy of the pectoral muscles. Over the serosa of the liver and extending into the hepatic parenchyma are abundant fine pale yellow to pale white pinpoint foci.

There are abundant ascarid is approximately 20 to 30 mm long (Anisakis sp., Contracaecum species) in the proventriculus. Intestines contain pasty brown ingesta.

There are fine pinpoint foci in the renal parenchyma of both kidneys.

GROSS SUMMARY
Probable necrotising hepatitis
Possible necrotizing interstitial nephritis

SAMPLES COLLECTED & TESTING
Formalin fixed tissues will be processed for histopathology and cloacal

and tracheal swabs (in VTM) will be tested for AI and NDV by PCR as you requested.

Fresh liver and kidney are stored if microbiological culture is required.

Liver, kidney, spleen, heart, lung, brain are stored frozen for one month if Dept Environment and Water SA require biotoxin / brevetoxin testing.

[redacted]

Tested on 19/07/25
Reported on 13/08/25 17:30
Referred on 18/07/25 **by:**

[redacted]

[redacted]

Owner:
[redacted]

Animal/s:
Avian
CORMORANTS
DOB: N/A

Collected: 18/07/25 11:30 **Subm.No:** [redacted] **Lab No.:** [redacted]

Samples tested as received All Tests Complete

COMMENTS
Based on gross findings a bacterial hepatitis likely contributed to morbidity for this bird. Histopathology is pending. Microbiology is recommended on the liver and kidney. Please contact the laboratory within the next 1-2 working days if microbiology is required.

[redacted]
Specialist Veterinary Anatomic Pathologist
[redacted]

[redacted]

MOLECULAR DIAGNOSTICS

NEWCASTLE DISEASE VIRUS RNA PCR (REAL TIME REVERSE TRANSCRIPTASE)

Specimen type: Tracheal & cloacal swabs in VTM Number of specimens: 1

SPECIMEN ID	F Gene	M Gene	L Gene
POOL	Not detected	Not detected	Not detected

ID: Cormorant

Validated by [redacted] Laboratory Scientist.

[redacted]

Tested on 19/07/25
Reported on 13/08/25 17:30
Referred on 18/07/25 **by:**

[redacted]

[redacted]

Owner:
[redacted]

Animal/s:
Avian
CORMORANTS
DOB: N/A

Collected: 18/07/25 11:30 **Subm.No:** [redacted] **Lab No.:** [redacted]

Samples tested as received All Tests Complete

CASE MANAGEMENT DETAILS

Case Managed by:
Case Management Requested by: [redacted]
Case Management Requested on: 18/07/25

Case Details: Dead cormorant find at Browns beach KI.

Number of samples 7

MOLECULAR DIAGNOSTICS

INFLUENZA A RNA PCR (REAL TIME REVERSE TRANSCRIPTASE)

Specimen type: Tracheal & cloacal swabs in VTM

SPECIMEN ID	Type A	H5	H7
POOL	Not detected		

ID: Cormorant

Validated by [redacted] Laboratory Scientist.

Outlook

PATH RESULTS: PIRSA, CORMORANTS (Av) [redacted]

From [redacted]
Date Wed 13/08/2025 5:00 PM
To [redacted]

[redacted]

Report Addressee:
DEW - MARINE
[redacted]

Tested on 08/08/25
Reported on 13/08/25 17:30
Referred on 18/07/25 **by:**
[redacted]

Owner:
PIRSA

Animal/s:
Avian
CORMORANTS
DOB: N/A

Collected: 18/07/25 11:30 **Subm.No:** [redacted] **Lab No.:** [redacted]

Samples tested as received All Tests Complete

MICROBIOLOGY

SPECIMEN: Liver
ANIMAL ID:Cormorant

MICROSCOPY
No bacteria seen.
A small number of leucocytes.

CULTURE
1. No growth aerobically or anaerobically after 48 hours incubation.

COMMENT: No Salmonella sp., Listeria sp. or Yersinia sp. isolated.

_____Final Report_____

11/08/25

Validated by [redacted] Laboratory Scientist.

Tasmanian Government

ANALYTICAL SERVICES TASMANIA

18 St Johns Avenue New Town 7008 TAS
03 6165 3300
enquiries@ast.tas.gov.au
www.analyticalservices.tas.gov.au

Submission Number: [redacted]
Report Number:
Issue Date: 28/08/2025
Status: Final

CERTIFICATE OF ANALYSIS

Customer: [redacted]
Address:
Contact:

Submission Description: [redacted]Cormorant - Napean Bay
Sample Received Date: 22/08/2025
Contract Number: [redacted]
Client Order Number:
Program/Quote Reference: [redacted] - Brevitoxin, lipophilic toxin and paralytic shellfish toxins

Sample(s) analysed as received. Sampling date and time data supplied by the client. The document shall not be reproduced except in full.
Additional information relating to this submission can be found in the sample receipt notification.
This report supersedes any previous reports with this submission number.
Many tests specify a holding time which gives the recommended timeframe by which a sample should be preserved/extracted and/or analysed after the sample is taken.
Holding time information can be found on the AST website https://analyticalservices.tas.gov.au/our-services/containers-samples-and-submissions .
Whilst every effort is made to analyse samples within these timeframes, situations can occur where this is not possible.
Where a test has been conducted outside the recommended sample holding time this should be taken into account when interpreting results.

The results in this report were authorised by:

Name	*Position*
[redacted]	**Chemist**

Test Information:

Method ID	*Test Description*	*Date Commenced:*
3411	Lipophilic Toxins in Shellfish by LC-MS/MS	27-08-2025
3411A	Brevetoxins in Biota by LC-MS/MS	27-08-2025
3416	PST in Biota by LC-MS/MS (Boundy Method)	27-08-2025

Sample Comments

Sample Number: 338783

IS - Insufficient Sample. Sample not submitted.

IS- Insufficient Sample

* NATA accreditation does not cover this result

Chemistry Test Results (Biota - Food)

		Sample Description	Cormorant - Brain	Cormorant - Kidney	Cormorant - Liver	Cormorant - Lung
		Sampled Date/ Time	18/07/25 0:00	18/07/25 0:00	18/07/25 0:00	18/07/25 0:00
Method ID	Analyte	Units	338782	338783	338784	338785
3411	AZA1	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	AZA2	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	AZA3	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	Domoic Acid	mg/kg WMB	<0.05	*IS*	<0.05	<0.05
	DTX1 Free	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	DTX1 Total	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	DTX2 Free	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	DTX2 Total	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	GYM	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	Homo-YTX	mg/kg WMB	<0.02	*IS*	<0.02	<0.02
	OA Free	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	OA Total	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	PnTx-G	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	PTX2	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	SPX1	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
	Total DST	OA eq. mg/kg	<0.01	*IS*	<0.01	<0.01
	YTX	mg/kg WMB	<0.01	*IS*	<0.01	<0.01
3411A	Brevetoxin 2	mg/kg WMB	<0.01*	*IS*	<0.01*	<0.01*
	Brevetoxin 3	mg/kg WMB	<0.01*	*IS*	0.02*	<0.01*
3416	C1	STX.2HCl eq. mg/kg	<0.01	*IS*	<0.01	<0.01
	C2	STX.2HCl eq. mg/kg	<0.02	*IS*	<0.02	<0.02
	C3	STX.2HCl eq. mg/kg	<0.02	*IS*	<0.02	<0.02
	C4	STX.2HCl eq. mg/kg	<0.02	*IS*	<0.02	<0.02
	dcGTX1	STX.2HCl eq. mg/kg	<0.02*	*IS*	<0.02*	<0.02*
	dcGTX2	STX.2HCl eq. mg/kg	<0.02	*IS*	<0.02	<0.02
	dcGTX3	STX.2HCl eq. mg/kg	<0.02	*IS*	<0.02	<0.02
	dcGTX4	STX.2HCl eq. mg/kg	<0.02*	*IS*	<0.02*	<0.02*
	dcNEO	STX.2HCl eq. mg/kg	<0.02	*IS*	<0.02	<0.02

IS- Insufficient Sample

* NATA accreditation does not cover this result

Chemistry Test Results (Biota - Food)

		Sample Description	Cormorant - Brain	Cormorant - Kidney	Cormorant - Liver	Cormorant - Lung
		Sampled Date/ Time	18/07/25 0:00	18/07/25 0:00	18/07/25 0:00	18/07/25 0:00
Method ID	Analyte	Units	338782	338783	338784	338785
3416	dcSTX	STX.2HCl eq. mg/kg	<0.01	*IS*	<0.01	<0.01
	doSTX	STX.2HCl eq. mg/kg	<0.01*	*IS*	<0.01*	<0.01*
	GTX1	STX.2HCl eq. mg/kg	<0.01	*IS*	<0.01	<0.01
	GTX2	STX.2HCl eq. mg/kg	<0.01	*IS*	<0.01	<0.01
	GTX3	STX.2HCl eq. mg/kg	<0.01	*IS*	<0.01	<0.01
	GTX4	STX.2HCl eq. mg/kg	<0.01	*IS*	<0.01	<0.01
	GTX5	STX.2HCl eq. mg/kg	<0.02	*IS*	<0.02	<0.02
	GTX6	STX.2HCl eq. mg/kg	<0.02	*IS*	<0.02	<0.02
	NEO	STX.2HCl eq. mg/kg	<0.02	*IS*	<0.02	<0.02
	STX	STX.2HCl eq. mg/kg	<0.01	*IS*	<0.01	<0.01
	Total PST	STX.2HCl eq. mg/kg	<0.10	*IS*	<0.10	<0.10

IS- Insufficient Sample

* NATA accreditation does not cover this result

Outlook

PATH RESULTS: CORMORANTS, [redacted]

[redacted]

Date Fri 19/09/2025 4:00 PM

[redacted]

[redacted]

Tested on 19/07/25
Reported on 19/09/25 16:30
Referred on 18/07/25 **by:**

[redacted]

[redacted]

Owner:
CORMORANTS

Animal/s:
Wild Birds

DOB: N/A

Collected: 18/07/25 11:30 **Subm.No:** [redacted] **Lab No.:** [redacted]

Samples tested as received All Tests Complete

SUMMARY DIAGNOSIS
Bacterial hepatitis
Renal trematodiasis (Renicola sp.)

SUMMARY COMMENTS
Bacterial hepatitis contributed to weight loss and morbidity for this bird. Differential diagnoses include E. coli, Pseudomonas sp. Pasteurella sp. etc. The animal had a moderate burden of renal trematodes. This may have also contributed to morbidity.

ADDITIONAL COMMENTS 19/9/2025
Brevetoxin 3 is detected at 0.02mg / kg WMB in the liver of this bird (please refer to the Analytical Services Tasmania report number and related [redacted]). This likely reflects ingestion of fish, which were carrying the toxin. The significance of this brevetoxin detection (i.e. did it contribute to the death of the bird) could be interpreted in conjunction with any detection of Karenia sp. algal bloom in the ocean waters around where the bird was found dead, at the time of its death. Because there are no clinical signs recorded for this bird before it was found dead, whether the brevetoxin contributed to morbidity / death for this bird cannot be confirmed.

Additional comments:

As little as 4.8 ng PbTx-3 eq./g, brevetoxin, was detected by high performance liquid chromatography in the livers from stranded brown pelicans exposed to Karenia brevis blooms along the central west coast of Florida, USA (Fauquier et al 2013). Fauquier and co-authors assessed that brevetoxin exposure was the probable cause of stranding in birds if they presented debilitated with detectable premortem or post mortem brevetoxin levels and had clinical neurological signs or stranded during the Karenia brevis bloom on the central west coast of Florida. Many of the affected birds on necropsy had chronic weight loss. There were no specific histopathological changes related to brevetoxicosis.

Fauquier, D.A., Flewelling, L.J., Maucher, J.M., Keller, M., Kinsel, M.J., Johnson, C.K., Henry, M., Gannon, J.G., Ramsdell, J.S. and Landsberg, J.H., 2013. Brevetoxicosis in seabirds naturally exposed to Karenia brevis blooms along the central west coast of Florida. Journal of wildlife diseases, 49(2), pp.246-260.

[redacted]

Tested on 19/07/25
Reported on 19/09/25 16:30
Referred on 18/07/25 **by:**

[redacted]

[redacted]

Owner:
CORMORANTS

Animal/s:
Wild Birds

DOB: N/A

Collected: 18/07/25 11:30 **Subm.No:** [redacted] **Lab No.:** [redacted]

Samples tested as received All Tests Complete

[redacted]
Specialist Veterinary Anatomic Pathologist
[redacted]

Validated by [redacted].