

Algal bloom wildlife post-mortem report



Government
of South Australia

Department for
Environment and Water

Species – Flesh-footed shearwater

Date collected – 12 March 2026

Location – Goolwa Beach

History relating to the animal

An adult flesh-footed shearwater (*Ardenna carneipes*) was found dead at Goolwa Beach on 12 March 2026.

Clinical examination

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

Necropsy

The necropsy (looking at the whole body) revealed that the bird was in poor body condition. The bird had atrophy (wasting) of pectoral muscles (chest muscles used for flight) and weighed 500 g. There were mild post-mortem autolytic changes (decomposition after death). The lungs were distended (expanded) with foamy fluid (pulmonary oedema). There was no ingesta (food material) in the gut.

There was a small twig 30 mm long, 1 mm across, with a sharp end embedded in the mesentery (fold of the peritoneum which attaches internal abdominal organs to the wall of the abdomen) of the coelomic cavity (space containing digestive tract and other organs). The twig was surrounded by fibrosis (scarring) and mesenteric tissue. The right caudal (lower) air sacs (bird lung anatomy) adjacent to the twig were intact.

Tissues were collected for histopathology (looking at tissues under the microscope for more detailed information), and testing for avian influenza, Newcastle disease, and brevetoxins and other algal biotoxins (a possibility due to the algal bloom).

Histopathology

Samples from every major body system were examined under the microscope. There was mild autolysis (decomposition after death) of the gut. There were no significant findings (no evidence of disease processes).

Virology

Polymerase chain reaction (PCR) testing for avian influenza and Newcastle disease was negative.

Brevetoxins

No samples were above the limits of reporting.

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Other algal biotoxins

No samples were above the limits of reporting.

Summary

An adult flesh-footed shearwater (*Ardenna carneipes*) was found dead. Laboratory examination found the bird had long-term weight loss and pulmonary oedema (fluid in the lungs). The bird had a twig that had penetrated the abdominal wall and lodged in the coelomic cavity (space containing digestive tract and other organs). The twig had disrupted the lower air sacs (bird lung anatomy) on the right side. These air sacs had healed and were inflated at necropsy. No other organs in the coelomic cavity appeared affected by the twig, and there was scarring around the twig, but no signs of active inflammation within the coelomic cavity. This twig was therefore an incidental finding, and is unlikely to have been the cause or illness or death in this bird.

The cause of weight loss, pulmonary oedema and death could not be determined. It is suspected that poor nutrition contributed to the animals' weakened condition, possibly due to reduced food availability in the environment, although this could not be confirmed. Testing for avian influenza and Newcastle disease was negative. Brevetoxins and other algal biotoxins were also not detected.

PATH RESULTS: SHEARWATER FLESHFOOT, (Wi)

From
Date Fri 13/03/2026 4:00 PM
To

Report Addressee:

Tested on 12/03/26
Reported on 13/03/26 16:30
Referred on 12/03/26 by:

Owner:
SHEARWATER FLESHFOOT
GOOLWA BEACH 5214

Animal/s:
Wild Birds
DOB: N/A

Collected: 12/03/26 16:00 Subm.No.: Lab No.:

Samples tested as received

NECROPSY REPORT
ADDITIONAL FINDINGS 13/3/2026

CLINICAL HISTORY

This is a summary of the clinical history from the request form. Please refer to the request form for the full clinical history.
12 dead birds were collected from Goolwa Beach on 12/3/2026. The birds included 9 x cormorants, 1 penguin, 2 unidentified species.
Approximately half the birds were on the beach for up to 5 days and the other 5 washed up today.

SAMPLES SUBMITTED

1 x dead flesh footed shearwater (Adrenna Carneipes)

NECROPSY FINDINGS

The bird is in poor body condition (there is atrophy of the pectoral muscles) and weighs 500g. There are mild post mortem autolytic changes. The lungs are distended with foamy fluid (pulmonary oedema). There is no ingesta in the alimentary tract.

There is a small twig 30mm long, 1mm across, with a sharp end embedded

in the mesentery of the coelomic cavity. The twig is surrounded by fibrosis and mesenteric tissue. The right caudal air sacs adjacent to the twig are intact.

GROSS SUMMARY

Chronic weight loss
Pulmonary oedema

SAMPLES COLLECTED & TESTING

Formalin fixed tissues will be processed for histopathology.

Cloacal and tracheal swabs in VT will be tested by AI and NDV PCR.

A quote will be requested from Analytical Services Tasmania for biotoxin and brevetoxin testing on liver, heart, lung, kidney, brain.

Fresh liver, lung, heart, kidney, brain are stored.

COMMENTS

Chronic weight loss contributed to morbidity. The cause of death is not

[REDACTED]

Report Addressee:

[REDACTED]

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Owner:
SHEARWATER FLESHFOOT

Animal/s:
Wild Birds

GOOLWA BEACH 5214

DOB: N/A

Collected: 12/03/26 16:00

Subm.No: [REDACTED]

Lab No.: [REDACTED]

Samples tested as received

determined based on gross findings. Could decreased feed abundance related to the variable Karenia sp. bloom be a contributing factor to the animal's weight loss ?

The pulmonary oedema may be an agonal process. However exposure to algal toxins has been reported to cause pulmonary oedema in sea birds (Armstrong et al 1978). Biotoxin and brevetoxin testing will help clarify if the birds were exposed to these toxins.

Armstrong, I.H., J.C. Coulson, P. Hawkey, and M.J. Hudson.
1978. Further mass seabird deaths from paralytic
shellfish poisoning. British Birds 71:58-68.

13/3/2026

The twig is an incidental finding. The small twig probably entered the coelomic cavity through a penetrating wound in the abdominal wall which healed over. The small twig only disrupted the abdominal air sacs on the right side. These air sacs had healed and were inflated at necropsy. No other organs in the coelomic cavity appeared affected by the twig. There is no extensive inflammation within the coelomic cavity associated with the twig.

[REDACTED]

Specialist Veterinary Anatomic Pathologist

[REDACTED]

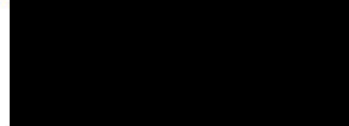
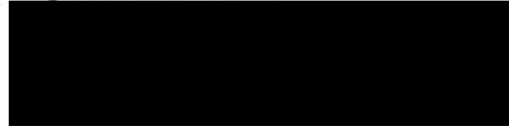
Validated by [REDACTED]

OFFICIAL



Tested on 12/03/26
Reported on 13/03/26 16:30
Referred on 12/03/26 by:

Report Addressee:



Owner:
SHEARWATER FLESHFOOT

Animal/s:
Wild Birds

GOOLWA BEACH 5214

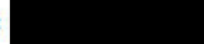
DOB: N/A

Collected: 12/03/26 16:00

Subm.No:



Lab No.:



Samples tested as received

MOLECULAR DIAGNOSTICS

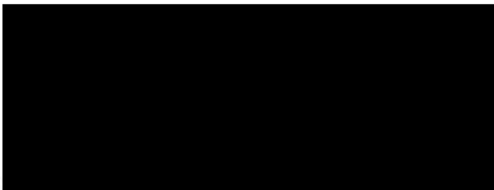
INFLUENZA A RNA PCR (REAL TIME REVERSE TRANSCRIPTASE)

Specimen type: Aggregated cloacal & tracheal swabs in VTM

SPECIMEN ID	Type A	H5	H7
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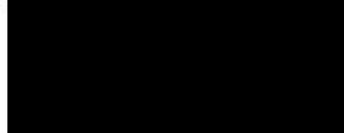
BIRD	Not detected		
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Validated by Laboratory Scientist.



Tested on 12/03/26
Reported on 13/03/26 16:30
Referred on 12/03/26 by:

Report Addressee:



Owner:
SHEARWATER FLESHFOOT

Animal/s:
Wild Birds

GOOLWA BEACH 5214

DOB: N/A

Collected: 12/03/26 16:00

Subm.No:



Lab No.:



Samples tested as received

MOLECULAR DIAGNOSTICS

NEWCASTLE DISEASE VIRUS RNA PCR (REAL TIME REVERSE TRANSCRIPTASE)

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

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

Validated by  Laboratory Scientist.

OFFICIAL

PATH RESULTS: SHEARWATER FLESHFOOT, (Wi) [REDACTED]

From [REDACTED]

Date Fri 20/03/2026 4:30 PM

To [REDACTED]

[REDACTED]

Tested on 12/03/26
Reported on 20/03/26 17:00
Referred on 12/03/26 **by:** [REDACTED]

[REDACTED]

Owner:
SHEARWATER FLESHFOOT

GOOLWA BEACH 5214

Animal/s:
Wild Birds

DOB: N/A

Collected: 12/03/26 16:00 **Subm.No:** [REDACTED] **Lab No.:** [REDACTED]

Samples tested as received

HISTOPATHOLOGY

REF: [REDACTED]

CLINICAL HISTORY

This is a summary of the clinical history from the request form. Please refer to the request form for the full clinical history. 12 dead birds were collected from Goolwa Beach on 12/3/2026. The birds included 9 x cormorants, 1 penguin, 2 unidentified species. Approximately half the birds were on the beach for up to 5 days and the other 5 washed up today.

MACROSCOPY

One pot received labelled [REDACTED] and organs listed below
A = liver + muscle + spleen + heart + kidney + lung
B = proventriculus, ventriculus, duodenum, pancreas, jejunum, ileum, caecum
C - E = brain
Ed

MICROSCOPY

There is mild autolysis of the alimentary sections. Aside from this artefact there are no significant findings.

All other tissues are unremarkable.

DIAGNOSIS

Unremarkable histopathological findings

COMMENTS

There are no histopathological findings to explain the cause of chronic weight loss.

[REDACTED]

Specialist Veterinary Anatomic Pathologist

[REDACTED]

Validated by

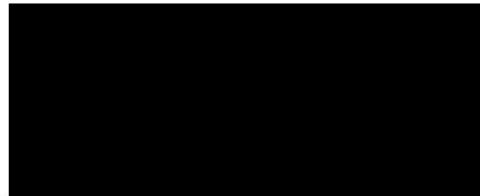
[REDACTED]

PATH RESULTS: SHEARWATER FLESHFOOT, (Wi) [REDACTED]

From [REDACTED]

Date Fri 20/03/2026 5:00 PM

To [REDACTED]



Report Addressee:



Tested on 12/03/26
Reported on 20/03/26 17:30
Referred on 12/03/26 by:



Owner:
SHEARWATER FLESHFOOT

GOOLWA BEACH 5214

Animal/s:
Wild Birds

DOB: N/A

Collected: 12/03/26 16:00

Subm.No: [REDACTED]

Lab No.: [REDACTED]

Samples tested as received

CORRECTED REPORT 20/3/2026
The typographical error is corrected

SUMMARY DIAGNOSIS
No diagnosis is concluded

SUMMARY COMMENTS
The cause of chronic weight loss and death are not determined based on laboratory findings to date. Avian influenza and Newcastle disease viruses are excluded based on the negative PCR results.

As you have requested samples will be sent for biotoxin testing.



Specialist Veterinary Anatomic Pathologist



Validated by [REDACTED]

OFFICIAL

CERTIFICATE OF ANALYSIS

Customer:

Address:

Contact:

Submission Description:

Sample Received Date:

Contract Number:

Client Order Number:

Program/Quote Reference:

Avian

30/04/2026

Biotxin and Brevotoxins

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

Section Head - Organic
Chemistry

Test Information:

Method ID

Test Description

Date Commenced:

3411	Lipophilic Toxins in Shellfish by LC-MS/MS
3411A	Brevetoxins in Shellfish by LC-MS/MS
3416	PST in Biota by LC-MS/MS (Boundy Method)

18-05-2026
15-05-2026
18-05-2026

Chemistry Test Results (Biota - Food)		Sample Description	LIVER	HEART	KIDNEY	LUNG	BRAIN
		Sampled Date/ Time	12/03/26 0:00	12/03/26 0:00	12/03/26 0:00	12/03/26 0:00	12/03/26 0:00
Method ID	Analyte	Units	465174	465175	465176	465177	465178
3411	AZA1	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	AZA2	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	AZA3	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	Domoic Acid	mg/kg WMB	<0.05*	<0.05*	<0.05*	<0.05*	<0.05*
	DTX1 Free	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	DTX1 Total	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	DTX2 Free	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	DTX2 Total	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	GYM	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	Homo-YTX	mg/kg WMB	<0.02*	<0.02*	<0.02*	<0.02*	<0.02*
	OA Free	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	OA Total	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	PnTx-G	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	PTX2	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	SPX1	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	Total DST	OA eq. mg/kg	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
	YTX	mg/kg WMB	<0.01*	<0.01*	<0.01*	<0.01*	<0.01*
3411A	Brevetoxin 1	mg/kg WMB	<0.10*	<0.10*	<0.10*	<0.10*	<0.10*
	Brevetoxin 2	mg/kg WMB	<0.02*	<0.02*	<0.02*	<0.02*	<0.02*
	Brevetoxin 3	mg/kg WMB	<0.02*	<0.02*	<0.02*	<0.02*	<0.02*
3416	C1	STX.2HCl eq. mg/kg	<0.01*	<0.01*	<0.01*	<0.01*	*IS*
	C2	STX.2HCl eq. mg/kg	<0.02*	<0.02*	<0.02*	<0.02*	*IS*
	C3	STX.2HCl eq. mg/kg	<0.02*	<0.02*	<0.02*	<0.02*	*IS*
	C4	STX.2HCl eq. mg/kg	<0.02*	<0.02*	<0.02*	<0.02*	*IS*
	dcGTX1	STX.2HCl eq. mg/kg	<0.02*	<0.02*	<0.02*	<0.02*	*IS*
	dcGTX2	STX.2HCl eq. mg/kg	<0.02*	<0.02*	<0.02*	<0.02*	*IS*
	dcGTX3	STX.2HCl eq. mg/kg	<0.02*	<0.02*	<0.02*	<0.02*	*IS*

IS- Insufficient Sample

* NATA accreditation does not cover this result

Chemistry Test Results (Biota - Food)			LIVER	HEART	KIDNEY	LUNG	BRAIN
Sample Description							
Sampled Date/ Time			12/03/26 0:00	12/03/26 0:00	12/03/26 0:00	12/03/26 0:00	12/03/26 0:00
Method ID	Analyte	Units	465174	465175	465176	465177	465178
3416	dcGTX4	STX.2HCl eq. mg/kg	<0.02*	<0.02*	<0.02*	<0.02*	*IS*
	dcNEO	STX.2HCl eq. mg/kg	<0.02*	<0.02*	<0.02*	<0.02*	*IS*
	dcSTX	STX.2HCl eq. mg/kg	<0.01*	<0.01*	<0.01*	<0.01*	*IS*
	doSTX	STX.2HCl eq. mg/kg	<0.01*	<0.01*	<0.01*	<0.01*	*IS*
	GTX1	STX.2HCl eq. mg/kg	<0.01*	<0.01*	<0.01*	<0.01*	*IS*
	GTX2	STX.2HCl eq. mg/kg	<0.01*	<0.01*	<0.01*	<0.01*	*IS*
	GTX3	STX.2HCl eq. mg/kg	<0.01*	<0.01*	<0.01*	<0.01*	*IS*
	GTX4	STX.2HCl eq. mg/kg	<0.01*	<0.01*	<0.01*	<0.01*	*IS*
	GTX5	STX.2HCl eq. mg/kg	<0.02*	<0.02*	<0.02*	<0.02*	*IS*
	GTX6	STX.2HCl eq. mg/kg	<0.02*	<0.02*	<0.02*	<0.02*	*IS*
	NEO	STX.2HCl eq. mg/kg	<0.02*	<0.02*	<0.02*	<0.02*	*IS*
	STX	STX.2HCl eq. mg/kg	<0.01*	<0.01*	<0.01*	<0.01*	*IS*
	Total PST	STX.2HCl eq. mg/kg	<0.10*	<0.10*	<0.10*	<0.10*	*IS*

IS- Insufficient Sample

* NATA accreditation does not cover this result