

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #1907</b>
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Date first observed entangled (date seen prior without gear)		16 Aug 1990 (15 Oct 1989)			
Sex	Female	Birth year	1989	Age at entanglement	1

Case study ID	CCS	NMFS	GEAR ID
Gear sample collected?	Yes	Gear type	Gillnet

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to entanglement detection?		No			
Reproductive after entanglement detection?		No			
Entanglement severity		Severe			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	None	None	None	None	High
Duration of time carrying gear		Minimum 189 days, maximum 493 days			
Disentangled?		No			
Status		Dead in 1991			
Number of prior entanglement interactions		0			

Entanglement configuration	Gillnet gear tightly wrapped around fluke with buoys attached.
Anchoring point(s)	Flukes
Gear configuration confidence	High
Remaining questions	None
Comments	Animal migrated from the Bay of Fundy to the coast of Florida between September and February. In very poor condition and was found dead from a vessel strike with gear still attached. Gear retrieved but not available for analysis.



20 Aug 1990 NEA

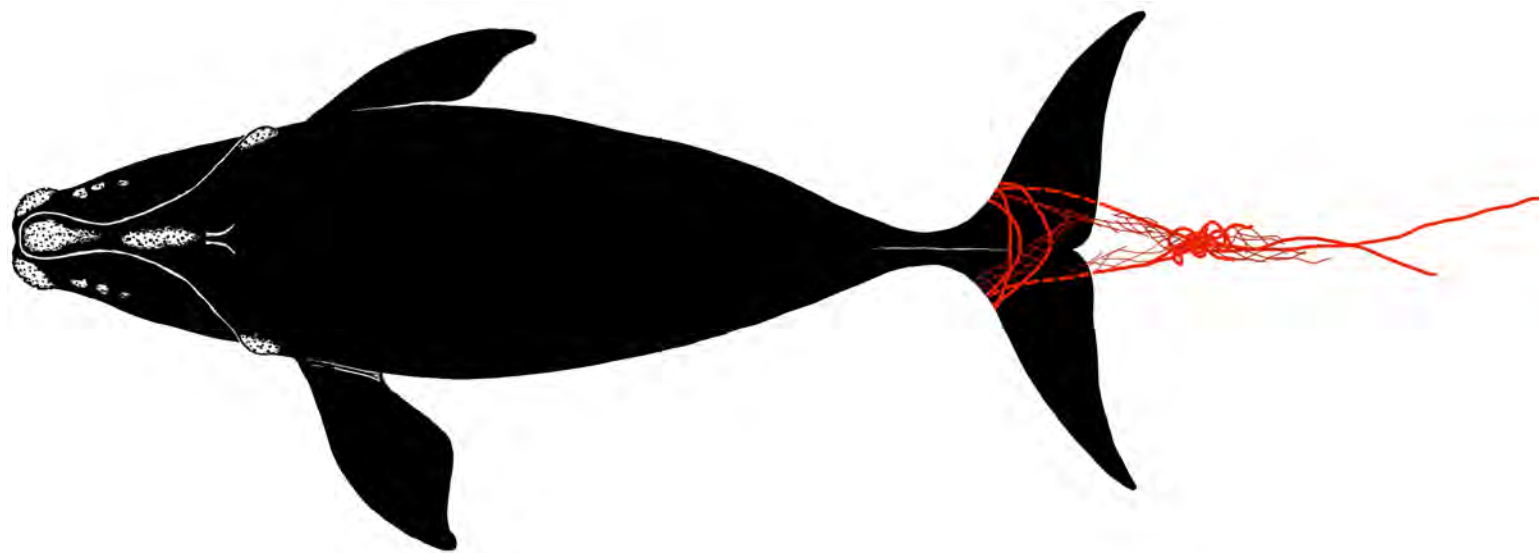


20 Aug 1990 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2233</b>
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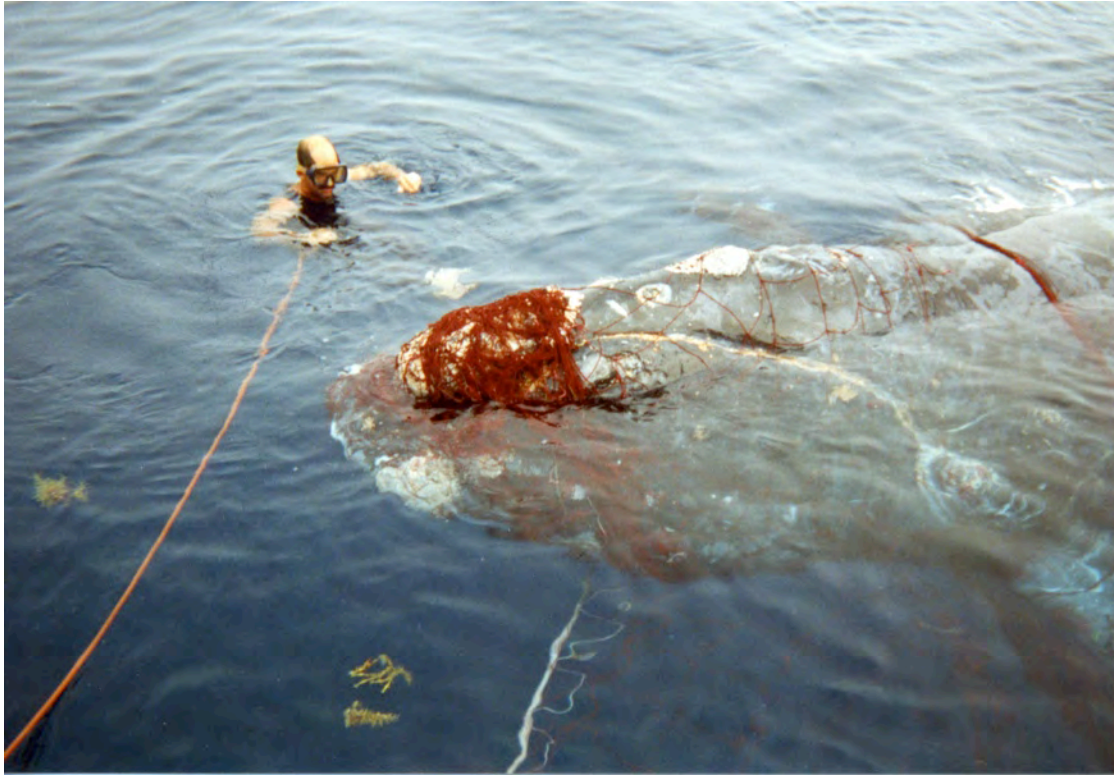
Date first observed entangled (date seen prior without gear)	09 Jul 1993 (26 Sep 1992)		
Sex	Female	Birth year	1992
		Age at entanglement	1

Case study ID	CCS	NMFS	GEAR ID
Gear sample collected?	Yes	Gear type	US swordfish drift gillnet and unk lobster.



Reproductive prior to entanglement detection?	No				
Reproductive after entanglement detection?	No				
Entanglement severity		Severe			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Medium	Medium	Medium	High	High
Duration of time carrying gear	Minimum 29 days, maximum 314				
Disentangled?	Yes, 2 times				
Status	Presumed dead - last sighted in 1993				
Number of prior entanglement interactions	0				

Entanglement configuration	Whale was entangled around the head and tail (not drawn) in a swordfish gillnet and partially disentangled on 9 July. Pre-existing gear was also seen on tail stock. Whale seen free swimming on 7 Aug 1993 with line and netting wrapped tightly around leading edges of both flukes and leading to a tangled mass of line. An assessment of the gear removed indicated both swordfish driftnet and lobster gear involved.
Anchoring point(s)	Mouth, body, flipper and tail
Gear configuration confidence	Reasonable
Remaining questions	Length of trailing line unknown
Comments	Whale was in very poor condition at the time of disentanglement.



09 July 1993 NMFS



09 Jul 1993 NMFS

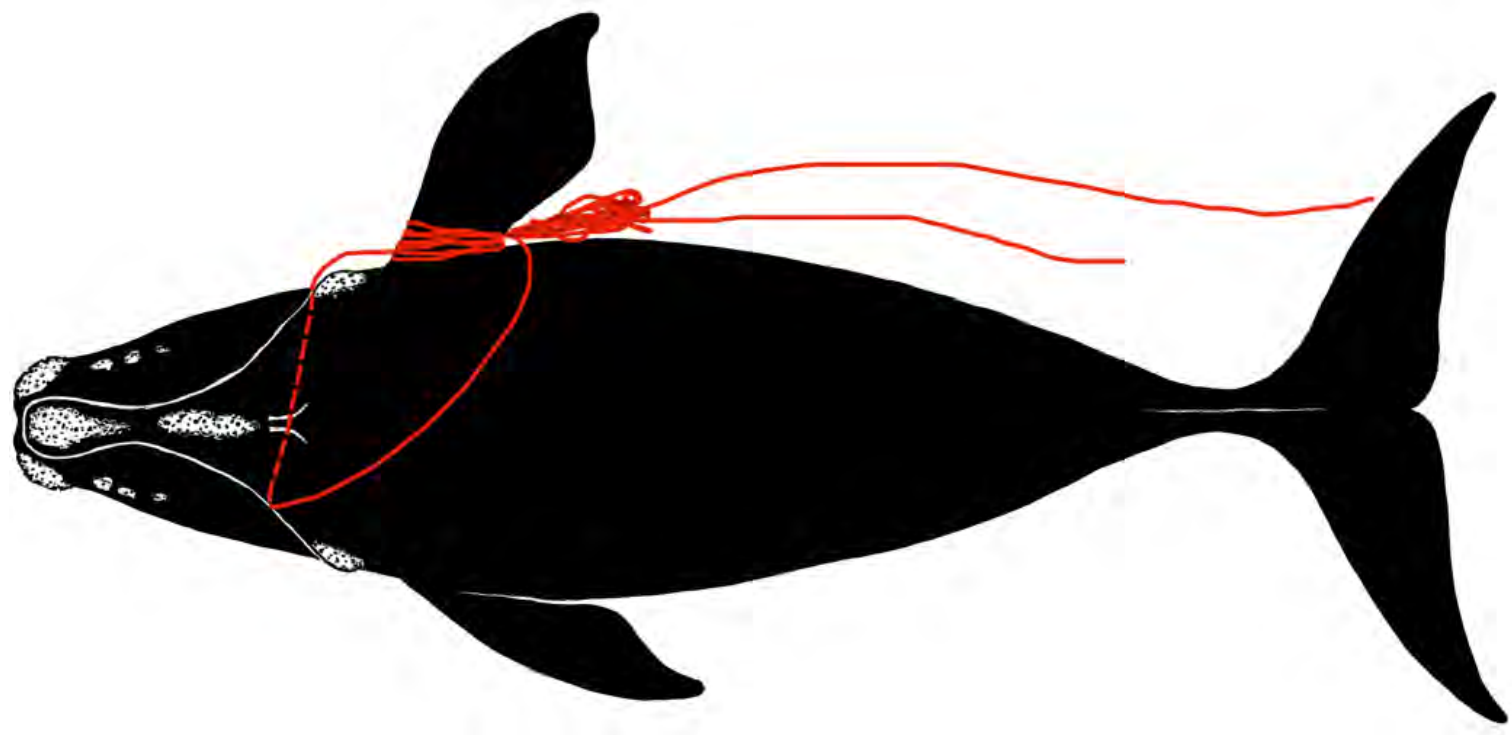


22 Aug 1993 Okeanos

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2366</b>
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Date first observed entangled (date seen prior without gear)		21 Dec 1993 (22 Aug 1993)	
Sex	Male	Birth year	1993
		Age at entanglement	0

Case study ID	CCS	NMFS	GEAR ID
			J071795 a-d
Gear sample collected?	Yes	Gear type	Offshore lobster



Reproductive prior to/after entanglement detection?					
Entanglement injury severity		Severe			
Entanglement configuration risk		High			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	Low	High	Low	None
Duration of time carrying gear		Minimum 573 days, maximum 693 days			
Disentangled?		No			
Status		Dead 17 Jul 1995			
Number of prior entanglement interactions		0			

Entanglement configuration	Whale free-swimming; line through mouth leading to many tight wraps of the right flipper
Anchoring point(s)	Mouthline, flipper
Gear configuration confidence	Moderate
Remaining questions	Length of trailing line unknown
Comments	Whale seen alive but full extent of entanglement was not understood; gear was removed from carcass.

Polymer Type	PP	PP	PP	Polypro/PET	
Gear Component	Groundline (floating)				
Rope Diameter (inches)	3/8 (0.366)	3/8 (0.354)	3/8 (0.358)	1/4 (0.283)	
Breaking Strength (lbs)	Tested	1 215	974	1 538	983
	New	2 430	2 430	2 430	1 200

This case study was developed under NOAA Award # NA09NMF4520413 to the Consortium for Wildlife Bycatch Reduction, administered at the New England Aquarium, Boston, MA, USA (available at [www.bycatch.org](http://www.bycatch.org)). See: Knowlton, A.R., J. Robbins, S. Landry, H.A. McKenna, S.D. Kraus, T. B. Werner. 2015. Effects of fishing rope strength on the severity of large whale entanglements. Conservation Biology DOI: 10.1111/cobi.12590



26 Sep 1994 NEA



17 Jul 1995 NEA



17 Jul 1995 NEA



17 Jul 1995 NEA

## DATA SHEET

### FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

**SPECIMEN ID NO.**

**J071795**

**NMFS NO.**

**E (no analysis)**

**Gear Description:**

Black (a), green (b) and blue (c) are  $\frac{3}{8}$  inch PP mono and there were long lengths of each. Specimen (d) was  $\frac{1}{4}$  inch black PP laid in parallel with PET and had a wooden handle in an eye on one end.



Rope description:

Black (a), green (b) and blue (c) lines are  $\frac{3}{8}$  inch PP mono. The blue specimen has a red (faded) marker yarn in one strand. All show signs of use, faded colors and some surface abrasion. The black specimen (a) is severely and permanently kinked, and there is a cut strand which is visible bottom center in the photo. All have 4 rope yarns per strand.

A

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,215 lbs (T)	2,430 lbs	Fair



J071795-a Note kinks and cut at bottom of photo.

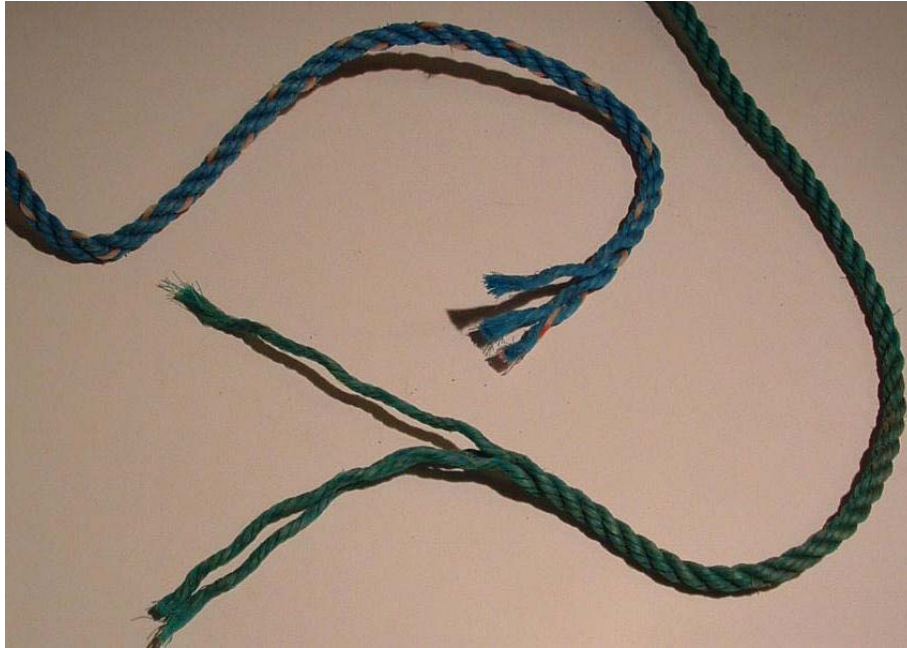
B

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
974 lbs (T)	2,430 lbs	Poor

C

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,538 lbs (T)	2,430 lbs	Fair





J071795-b-c

Specimen (d) is  $\frac{1}{4}$  black PP laid in parallel with PET. The line displays moderate surface abrasion. It is severely and permanently kinked. The cut strand is visible in the photo.

D

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
983 lbs (T)	1,900 lbs	Poor



<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #1903</b>
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Date first observed entangled (date seen prior without gear)		13 Jul 1994 (7 Jan 1994)			
Sex	Male	Birth year	1989	Age at entanglement	5

Case study ID	CCS	NMFS	GEAR ID
Gear sample collected?	No	Gear type	

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to entanglement detection?					
Reproductive after entanglement detection?					
Entanglement severity		Severe			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Unknown	Medium	Unknown	Unknown	High
Duration of time carrying gear		Minimum 1 day, maximum 186 days			
Disentangled?		No			
Status		Dead			
Number of prior entanglement interactions		1			

Entanglement configuration	Very decomposed carcass with entanglement wounds on head and body and rope at tail stock.
Anchoring point(s)	Flukes
Gear configuration confidence	Low
Remaining questions	Unsure how gear was wrapped because of decomposition
Comments	Entanglement appears to have originated at the mouth.



13 Jul 1994 Opportunistic



13 Jul 1994 Opportunistic

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2320</b>
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Date first observed entangled (date seen prior without gear)		24 Aug 1994 (15 Feb 1993)			
Sex	Female	Birth year	Unknown	Age at entanglement	2+

Case study ID	CCS	NMFS	GEAR ID
Gear sample collected?	No	Gear type	Gillnet

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to entanglement detection?		No			
Reproductive after entanglement detection?		Yes			
Entanglement severity		Minor			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	Unknown	None	None	Low
Duration of time carrying gear		Minimum 380 days, maximum 934 days			
Disentangled?		No			
Status		Alive until seen dead in 2015 unknown cause			
Number of prior entanglement interactions		2			

Entanglement configuration	Single line with monofilament netting evident exiting left mouth and along left flank. No gear trailing.
Anchoring point(s)	Mouth
Gear configuration confidence	High
Remaining questions	None
Comments	Line eventually shed after at least one year.



19 Aug 1995 NEA



19 Aug 1995 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #1247</b>
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Date first observed entangled (date seen prior without gear)		21 Sep 1994 (25 Sep 1992)			
Sex	Male	Birth year	1982	Age at entanglement	12

Case study ID	CCS	NMFS	GEAR ID
Gear sample collected?	No	Gear type	

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to entanglement detection?					
Reproductive after entanglement detection?					
Entanglement severity		Severe			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	None	Unknown	None	High
Duration of time carrying gear		Minimum 330 days, maximum 1055 days			
Disentangled?		No			
Status		Presumed dead - Last sighted in 1995			
Number of prior entanglement interactions		1			

Entanglement configuration	Multiple wraps of rope with buoy attached wound tightly around the peduncle cutting into the tissue.
Anchoring point(s)	Flukes
Gear configuration confidence	Low
Remaining questions	Unsure how much gear was trailing.
Comments	Entanglement appears to have originated at the mouth.



21 Sep 1994 NEA



22 Sep 1994 NEA

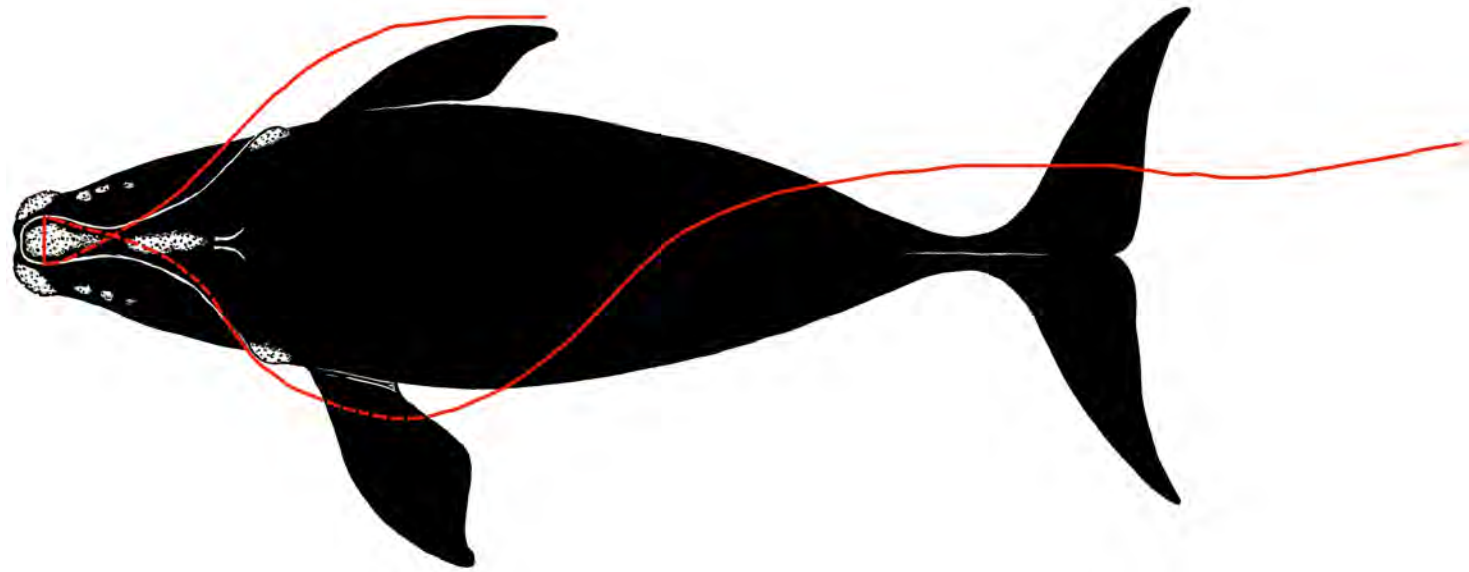


17 Aug 1995 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg # 2151</b>
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Date first observed entangled (date seen prior without gear)		17 Nov 1994 (09 Aug 1994)	
Sex	Unknown	Birth year	1991
		Age at entanglement	3

Case study ID	CCS	NMFS	GEAR ID
			J111694
Gear sample collected?	Yes	Gear type	



Reproductive prior to/after entanglement detection?					
Entanglement injury severity		Severe			
Entanglement configuration risk		High			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	High	High	Unknown	Low	Medium
Duration of time carrying gear		Minimum 1 day, maximum 99 days			
Disentangled?		No			
Status		Presumed dead - Last sighted in 1994			
Number of prior entanglement interactions		None			

Entanglement configuration	Whale free-swimming; continuous length of line wrapped over front of rostrum and exiting both sides of mouth; line on left side trails 20-30 feet aft of flukes.
Anchoring point(s)	Mouth
Gear configuration confidence	Reasonable
Remaining questions	Length of line trailing from right mouth.
Comments	In poor condition, not seen again.

Polymer type		PP/PET
Gear component		
Rope diameter (inches)		5/16 (0.312)
Breaking strength (lbs)	Tested	874
	New	1900

This case study was developed under NOAA Award # NA09NMF4520413 to the Consortium for Wildlife Bycatch Reduction, administered at the New England Aquarium, Boston, MA, USA (available at [www.bycatch.org](http://www.bycatch.org)). See: Knowlton, A.R., J. Robbins, S. Landry, H.A. McKenna, S.D. Kraus, T. B. Werner. 2015. Effects of fishing rope strength on the severity of large whale entanglements. Conservation Biology DOI: 10.1111/cobi.12590





17 Nov 1994 NEA



17 Nov 1994 NEA



17 Nov 1994 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #1506</b>
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Date first observed entangled (date seen prior without gear)		02 Aug 1995 (25 Aug 1994)			
Sex	Male	Birth year	1985	Age at entanglement	10

Case study ID	CCS	NMFS	GEAR ID
Gear sample collected?	No	Gear type	

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to entanglement detection?					
Reproductive after entanglement detection?		Yes			
Entanglement severity		Moderate			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Moderate	Low	Unknown	None	Low
Duration of time carrying gear		Minimum 8 days, maximum 352 days			
Disentangled?		No			
Status		Alive - Last sighted in 2022			
Number of prior entanglement interactions		0			

Entanglement configuration	Short length of rope exiting out of right side of mouth. No gear trailing.
Anchoring point(s)	Mouth
Gear configuration confidence	High
Remaining questions	
Comments	Gear shed within 2 weeks of initial sighting with gear.



02 Aug 1995 LM



10 Aug 1995 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2110</b>
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Date first observed entangled (date seen prior without gear)		16 Sep 1995 (08 Sep 1995)			
Sex	Male	Birth year	1991	Age at entanglement	4

Case study ID	CCS	NMFS	GEAR ID
Gear sample collected?	Yes	Gear type	Canadian gillnet

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to entanglement detection?					
Reproductive after entanglement detection?					
Entanglement severity		Minor			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	Low	Unknown	None	Low
Duration of time carrying gear		Minimum 1 day, maximum 7 days			
Disentangled?		Yes			
Status		Alive until 2008 when new severe entgl injury			
Number of prior entanglement interactions		1			

Entanglement configuration	Single line through mouth and trailing ~ 700 feet to a high-flyer.
Anchoring point(s)	Mouth
Gear configuration confidence	High
Remaining questions	Gear picked up same day it was set in Bay of Fundy according to fisherman.
Comments	Gear not available for analysis.



16 Sep 1995 NEA



16 Sep 1995 NEA



16 Sep 1995 NEA



16 Sep 1995 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #1707</b>
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Date first observed entangled (date seen prior without gear)		06 Jan 1996 (03 Oct 1995)			
Sex	Female	Birth year	1987	Age at entanglement	9

Case study ID	CCS	NMFS	GEAR ID
Gear sample collected?	No	Gear type	

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to entanglement detection?		No			
Reproductive after entanglement detection?		Yes			
Entanglement severity		Moderate			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Unknown	Low	Unknown	Medium	Low
Duration of time carrying gear		Minimum 10 days, maximum 306 days			
Disentangled?		No			
Status		Presumed dead - Last sighted in 1998			
Number of prior entanglement interactions		1			

Entanglement configuration	Rope wrapped at mid body and trailing ~ 200 feet behind whale.
Anchoring point(s)	Body.
Gear configuration confidence	Low
Remaining questions	Unsure if mouth and/or flippers involved.
Comments	Gear was shed when sighted 7 months later. She had a calf ~11 months after first entanglement sighting indicating she was likely pregnant when she first became entangled. She developed lesions on the head region when with her calf, was sighted only once one year later and then disappeared.



06 Aug 1996 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2220</b>
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Date first observed entangled (date seen prior without gear)		09 Mar 1996 (03 Oct 1995)			
Sex	Male	Birth year	Unknown	Age at entanglement	5+

Case study ID	CCS	NMFS	GEAR ID
		E96-2	J030996
Gear sample collected?	Yes	Gear type	Canada lobster

Photographs inadequate to determine complete entanglement configuration - no drawing available

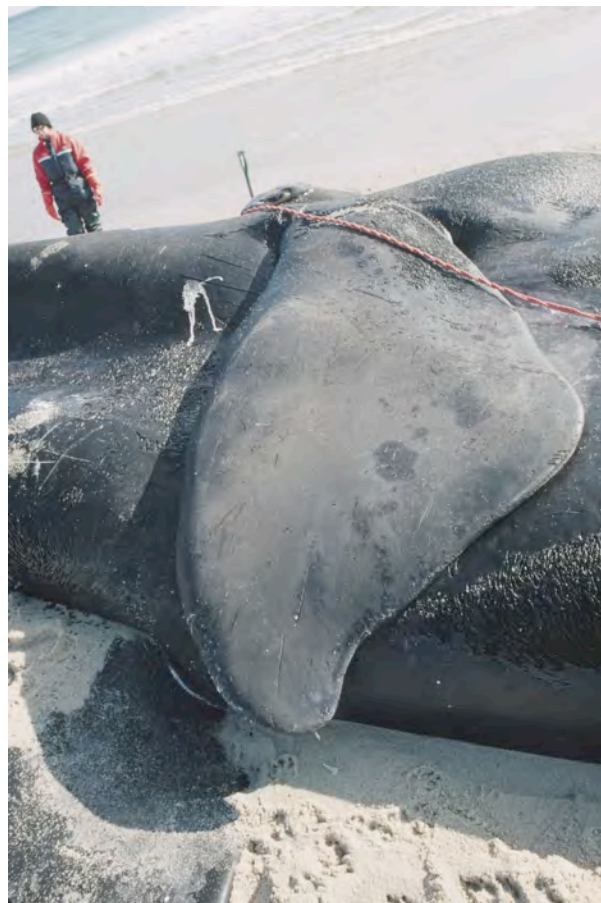
Reproductive prior to/after entanglement detection?					
Entanglement injury severity		Severe			
Entanglement configuration risk		High			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Medium	High	Medium	Unknown	Medium
Duration of time carrying gear		Minimum 85 days, maximum 115			
Disentangled?		No			
Status		Dead in 1996			
Number of prior entanglement interactions		1			

Entanglement configuration	Single line extended both sides of the mouth and also was loosely wrapped around tail with a single lobster pot attached. Gear traced back to Bay of Fundy.	
Anchoring point(s)	Mouth and tail	
Gear configuration confidence	High	
Remaining questions		
Comments	A 3 meter gash on the back and broken skull indicates the animal was likely killed by ship strike.	
Polymer type	PP	
Gear component	Vertical	
Rope diameter (inches)	3/8 (0.346)	
Breaking strength (lbs)	Tested	1 442
	New	2 430





10 Mar 1996



10 Mar 1996



10 Mar 1996



10 Mar 1996

## DATA SHEET

### FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

**SPECIMEN ID NO.**

**J030996**

**NMFS NO.**

**E96-2**

**Gear Description:**

A tangle of lines inside the bent trap. Included were a length of  $\frac{3}{8}$  inch orange PP 3-strand with a green marker yarn (a), a piece of  $\frac{7}{16}$  inch black PP with a green marker yarn (b) with a tensile break at one end. The orange PP 3-strand was the only specimen taken and photographed; the others were just measured at the site.



Rope description:

J030996-a: The  $\frac{3}{8}$  inch orange PP 3-strand had a green marker yarn in one strand and 4 rope yarns per strand. The retrieved line segment was in good condition. However the part in the trap was moderately damaged.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,442 lbs (T)	2,430 lbs	Good



$\frac{3}{8}$  inch orange PP 3-strand with green marker yarn- good condition.

J030996-b: A  $\frac{5}{16}$  inch PP/PET 3-strand with black PP rope yarns in parallel with the white PET rope yarns. Another example of 'Easy Haul'.

Sample not tested.

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #1505</b>
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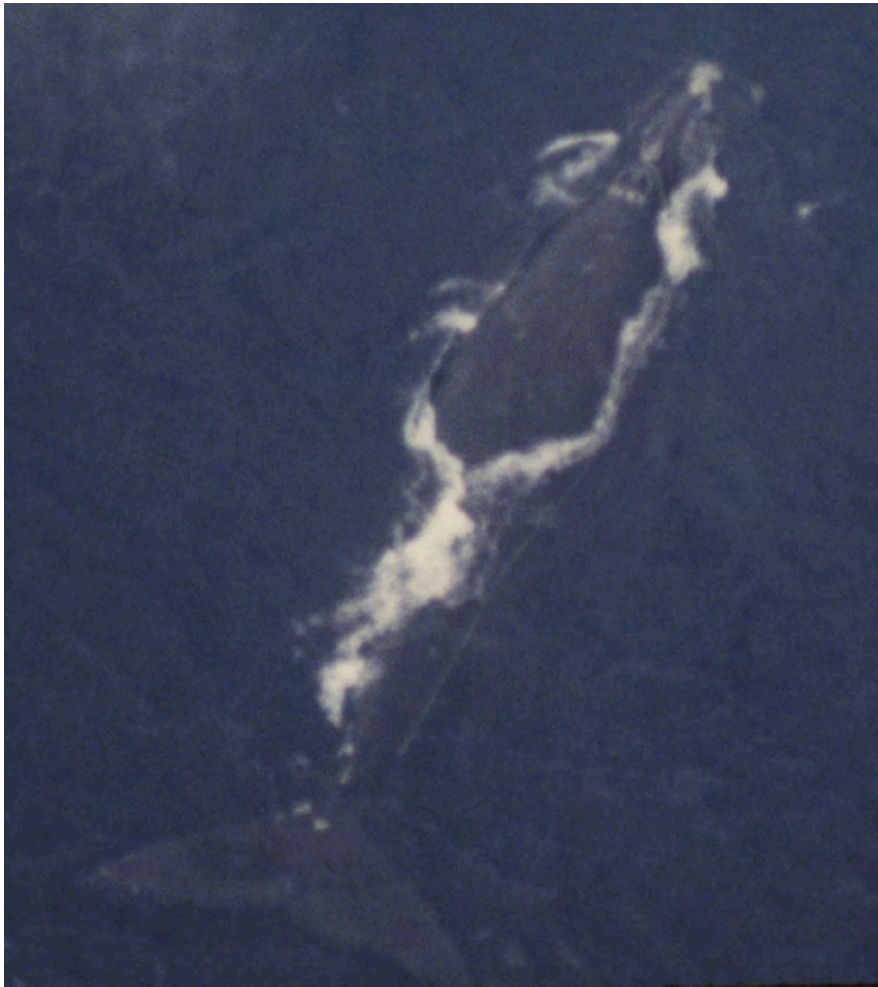
Date first observed entangled (date seen prior without gear)		12 Apr 1997 (24 Feb 1997)			
Sex	Male	Birth year	1985	Age at entanglement	12

Case study ID	PCCS	NMFS	GEAR ID
Gear sample collected?	No	Gear type	

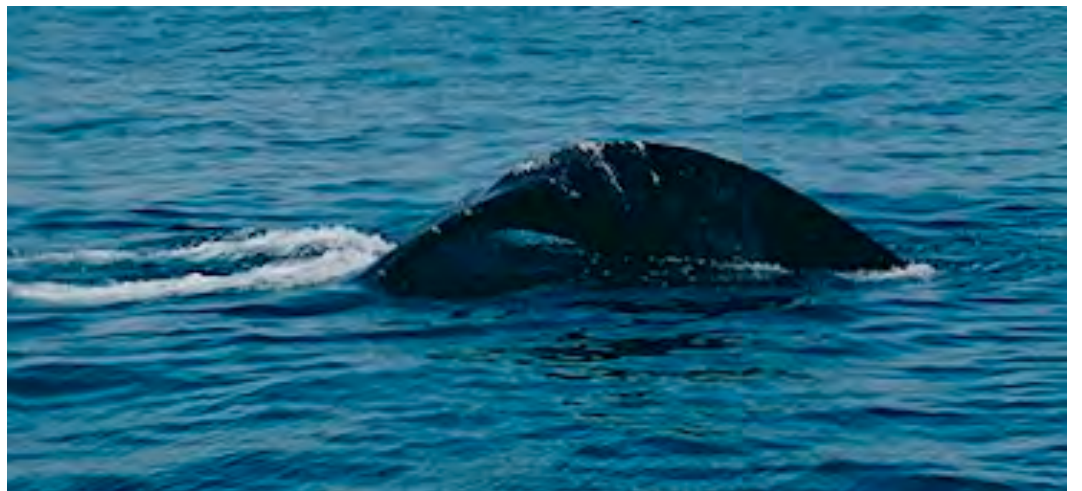
Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to entanglement detection?					
Reproductive after entanglement detection?					
Entanglement severity		Moderate			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	Medium	Unknown	None	Low
Duration of time carrying gear		Minimum 1 day, maximum 360 days			
Disentangled?		No			
Status		Presumed dead - Last sighted in 1999			
Number of prior entanglement interactions		4			

Entanglement configuration	Single rope anchored at mouth and/or flipper and trailing along body to just forward of the flukes. One line also visible over aft part of head.
Anchoring point(s)	Mouth and/or right flipper
Gear configuration confidence	Low
Remaining questions	Anchoring points and configuration of gear at head.
Comments	Gear was shed four months after initial sighting. Animal in very poor condition at last sighting two years after entanglement. Cause of decline uncertain.



1997 Apr 12 NEA

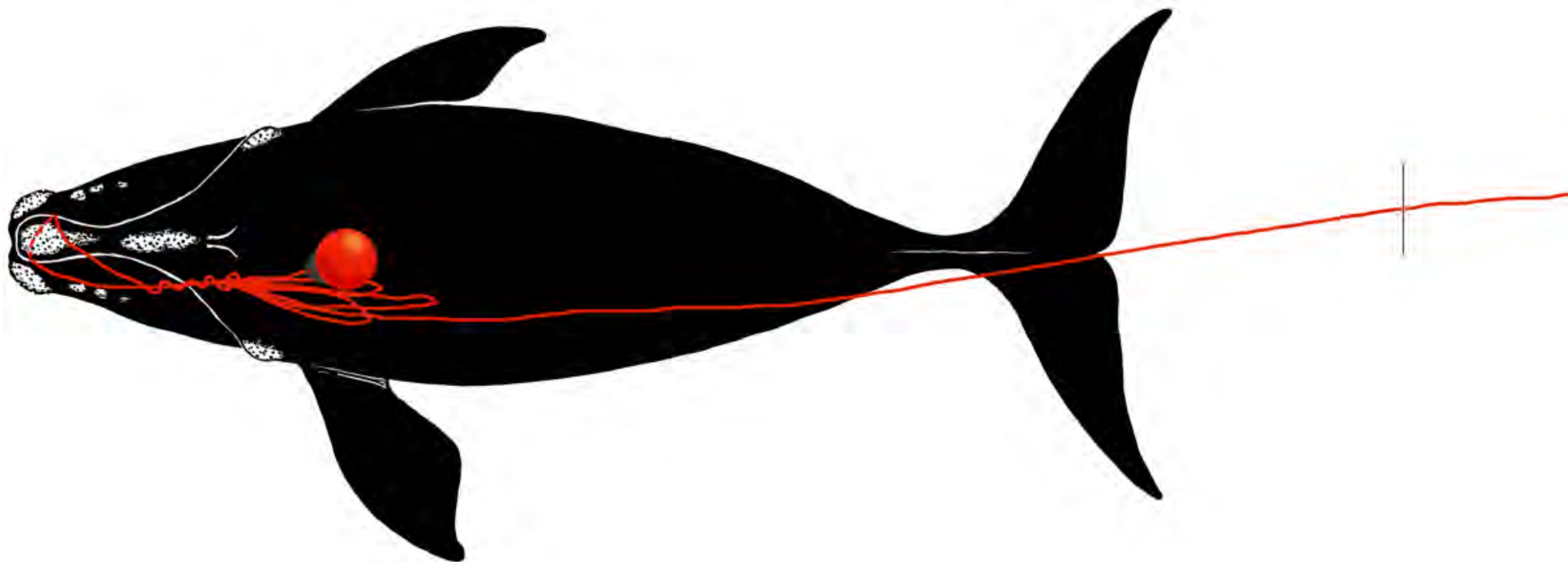


1997 Aug 26 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #1971</b>
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Date first observed entangled (date seen prior without gear)		24 Jun 1997 (20 Aug 1996)	
Sex	Male	Birth year	1989
		Age at entanglement	8

Case study ID	PCCS	NMFS	GEAR ID
		E9-97	J062497 a-c
Gear sample collected?	Yes	Gear type	Lobster offshore



Reproductive prior to/after entanglement detection?					
Entanglement injury severity		Moderate			
Entanglement configuration risk		High			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Medium	Medium	None	Medium	Medium
Duration of time carrying gear		Minimum 22 days, maximum 346 days			
Disentangled?		Yes - 24 Jun 1997			
Status		Alive - Last sighted in 2019			
Number of prior entanglement interactions		1			

Entanglement configuration	Whale free swimming; line caught around forward part of upper jaw leading to a triangle of line and balloon buoy; line trailing to ~60feet.
Anchoring point(s)	Mouth
Gear configuration confidence	High
Remaining questions	None
Comments	Disentanglement was extremely difficult with whale towing fishing vessel in reverse and defending itself with head and flukes.

Polymer type	PP/PET	PP/PE	PP
Gear component	Vertical	Vertical	Surface sys
Rope diameter (inches)	1/2 (0.512)	9/16 (0.575)	9/16 (0.551)
Breaking strength (lbs)	Tested	3 648	4 381
	New	4 500	4 590



24 Jun 1997 PCCS



24 Jun 1997 PCCS



24 Jun 1997 PCCS



24 Jun 1997 PCCS



03 Aug 1997 NEA

## DATA SHEET

### FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

**SPECIMEN ID NO.**

**J062497**

**NMFS NO.**

**E9-97**

**Gear Description:**

Buoy application, perhaps offshore.

Buoy gear set. Under buoy line (a) is relatively short and soft, and is spliced into a long soft orange PP line (b). Line (c) was also lone, had a hard lay and was part of the set. Line (a) is moderately negative (sp gr 1.01), line (b) is floating (sp gr 0.92) and line (c) is very negative with a sp gr of about 1.3.

All lines are relatively large compared to most in this study.



**Rope description:**

J062497-a: This is a 1/2 inch 3-strand PP/PET combo line. The lay is moderately soft. It has a small gold marker yarn in one strand. There are 6 rope yarns per strand. It has moderate wear.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
3,648 lbs (T)	4,500 lbs	Good



J062497-b: This is a  $\frac{9}{16}$  inch 3-strand orange PP with a green marker yarn. There are 14 rope yarns and a center yarn per strand. It has a soft lay. The condition is fair.

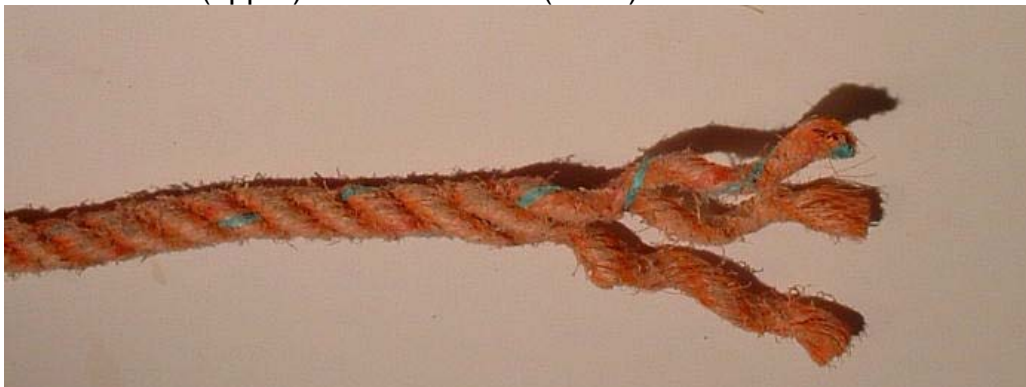
Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,580 lbs (T)	5,000 lbs	Poor

J062497-c: This is a  $\frac{9}{16}$  inch 3-strand PP/PET combo line dominated by heavier PET. It has small red and black marker yarns. It has a hard lay and 8 rope yarns per strand.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
4,381 lbs (T)	4,590 lbs	Good



J062497-a (upper) and J062497-c (lower)



J062497-b

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #1705</b>
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Date first observed entangled (date seen prior without gear)		01 Jul 1997 (27 Sep 1996)			
Sex	Female	Birth year	1987	Age at entanglement	10

Case study ID	PCCS	NMFS	GEAR ID
		E15-97	
Gear sample collected?	No	Gear type	Gillnet

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to entanglement detection?		Yes			
Reproductive after entanglement detection?		Yes			
Entanglement severity		Minor			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	None	Unknown	None	Low
Duration of time carrying gear		Minimum 67 days, maximum 955 days			
Disentangled?		No			
Status		Presumed dead - last sighted in 2013			
Number of prior entanglement interactions		3			

Entanglement configuration	Single line exiting right mouth ending at right flank with a cluster of small black gillnet float buoys visible.
Anchoring point(s)	Mouth
Gear configuration confidence	High
Remaining questions	None
Comments	Gear eventually shed.



06 Sep 1997 NEA

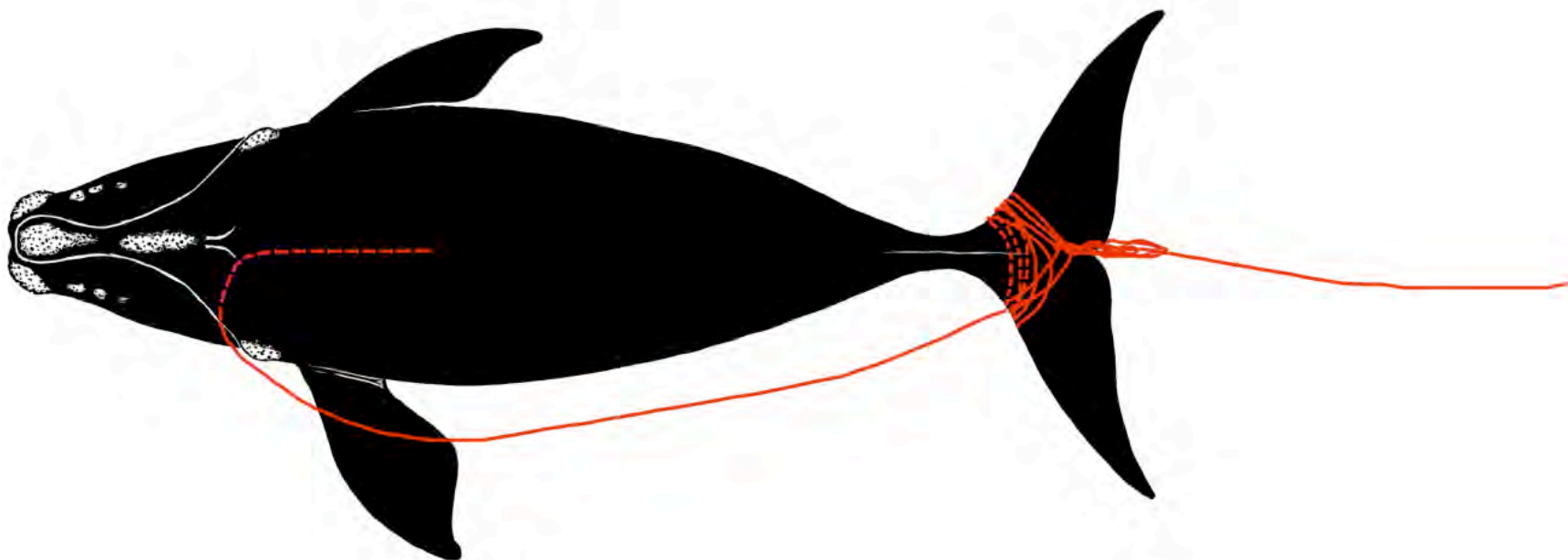


06 Sep 1997 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2212</b>
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Date first observed entangled (date seen prior without gear)		23 Aug 1997 (16 Aug 1996)	
Sex	Male	Birth year	1992
		Age at entanglement	5

Case study ID	PCCS	NMFS	GEAR ID
		E20-98	J072498 a-b
Gear sample collected?	Yes	Gear type	



Reproductive prior to/after entanglement detection?					
Entanglement injury severity		Severe			
Entanglement configuration risk		High			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	None	Unknown	None	High
Duration of time carrying gear		Minimum 335 days, maximum 705 days			
Disentangled?		Yes - partially 24 Jul 1998			
Status		Presumed dead - Last sighted in 1998			
Number of prior entanglement interactions		3			

Entanglement configuration	Whale free swimming with multiple wraps of the tailstock; tangle of line aft of the flukes trailing no greater than half a body length. At subsequent sightings line determined to be in mouth and down gullet.
Anchoring point(s)	Flukes
Gear configuration confidence	Moderate
Remaining questions	
Comments	Whale in very poor condition at time of disentanglement.

Polymer type		PP	PP
Gear component			
Rope diameter (inches)		5/16 (0.339)	5/16 (0.339)
Breaking strength (lbs)	Tested	680	644
	New	1 700	1 700



29 Aug 1997 NEA



4 Sep 1997 NEA



12 Sep 1998 PCCS

## DATA SHEET

### FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

**SPECIMEN ID NO.**

**J072498**

**NMFS NO.**

**E20-98**

**Gear Description:**

Orange PP 3-strand knotted to black PP 3-strand. Black line in poor condition with knots, kinks, and brittleness in the fibers. The black line shows a tensile failure at one end. Both lines are  $\frac{5}{16}$  inch and relatively long.



Rope description:

J072498-a  $\frac{5}{16}$  inch orange 3-strand PP. Laid relatively hard and in poor condition. There are 9 rope yarns plus a center yarn. The filaments are brittle.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
680 lbs (A)	1,700 lbs	Poor



J072498-b  $\frac{5}{16}$  inch black 3-strand PP. Laid relatively hard and in poor condition with permanent kinks knots and abrasion. Line displays tensile failure in center and lower right in photo.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
644 lbs (T)	1,700 lbs	Poor



<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2557</b>
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Date first observed entangled (date seen prior without gear)		29 Aug 1997 (08 Feb 1996)			
Sex	Female	Birth year	1995	Age at entanglement	2+

Case study ID	PCCS	NMFS	GEAR ID
Gear sample collected?	No	Gear type	

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to entanglement detection?		No			
Reproductive after entanglement detection?		No			
Entanglement severity		Severe			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	None	High	Low	Medium
Duration of time carrying gear		Minimum 21 days, maximum 588			
Disentangled?		No			
Status		Presumed dead - Last sighted in 1997			
Number of prior entanglement interactions		0			

Entanglement configuration	Two lines exiting right mouth and then crisscrossed over back. One line appears to go to left flipper which appears white under water. The other line goes under left side of body further aft.
Anchoring point(s)	Mouth, flipper
Gear configuration confidence	Low
Remaining questions	Level of flipper involvement, trailing line.
Comments	Animal in poor condition when first sighted entangled, seen for three days over the course of one month and not seen again.





29 Aug 1997 ECE



19 Sep 1997 NEA



19 Sep 1997 NEA



19 Sep 1997 NEA



19 Sep 1997 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2027</b>
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Date first observed entangled (date seen prior without gear)		12 Sep 1997 (26 Aug 1997)			
Sex	Male	Birth year	1990	Age at entanglement	7

Case study ID	PCCS	NMFS	GEAR ID
		E24-97	J091297
Gear sample collected?	Yes	Gear type	Canada gillnet (prob)

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to/after entanglement detection?					
Entanglement injury severity		Low			
Entanglement configuration risk		High			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	Low	Low	None	Low
Duration of time carrying gear		Minimum 1 day, maximum 16 days.			
Disentangled?		Yes			
Status		Alive - Last sighted in 2022			
Number of prior entanglement interactions		2			

Entanglement configuration	Two lines exiting right mouth and loosely draped over back, trailing around 500 feet.	
Anchoring point(s)	Mouth	
Gear configuration confidence	High	
Remaining questions	None	
Comments	Entanglement was reported by a fishing vessel. Gear was likely gillnet gear picked up same day as gillnetting was occurring to NE and whale was traveling fast to WSW. No lobster fishing in Bay of Fundy that time of year.	
Polymer type	Polysteel	
Gear component	Gillnet	
Rope diameter (inches)	7/16 (0.413)	
Breaking strength (lbs)	Tested	3 363
	New	4 100



12 Sep 1997 NEA



12 Sep 1997 NEA



12 Sep 1997 NEA

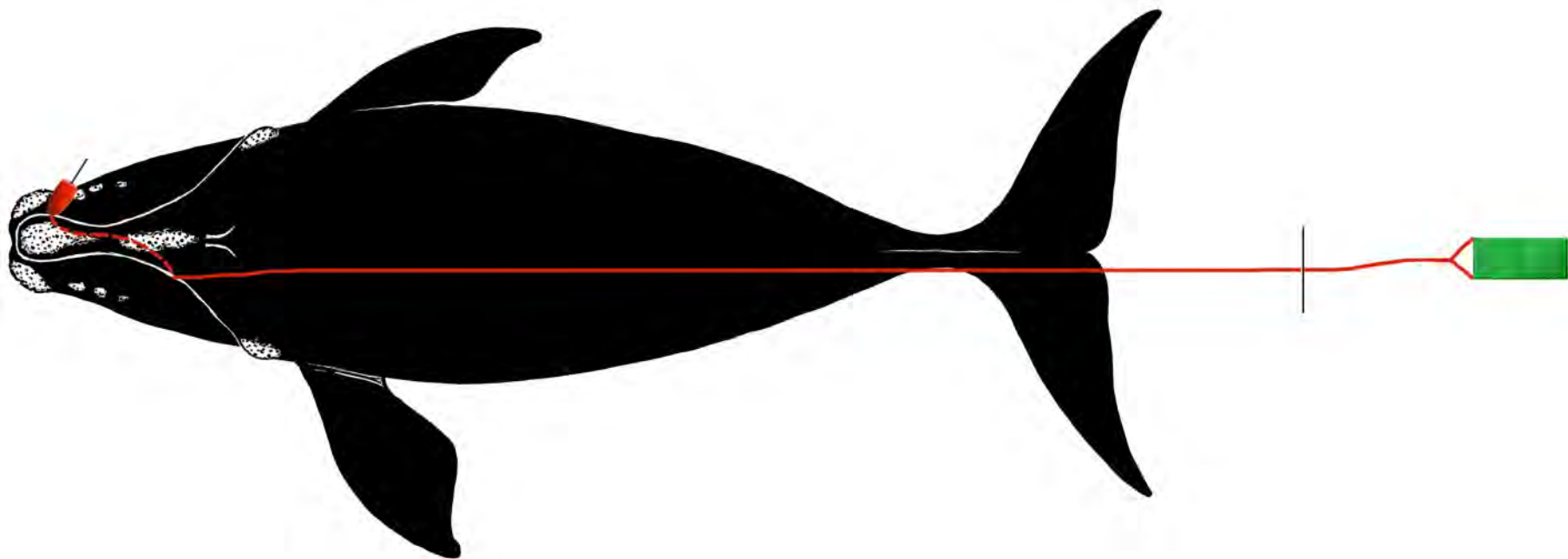


12 Sep 1997 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2212</b>
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Date first observed entangled (date seen prior without gear)		12 Sep 1998 (20 Aug 1998)	
Sex	Male	Birth year	1992
		Age at entanglement	6

Case study ID	PCCS	NMFS	GEAR ID
		E36-98	J091298 a-b
Gear sample collected?	Yes	Gear type	Lobster



Reproductive prior to/after entanglement detection?					
Entanglement injury severity			Minor		
Entanglement configuration risk					
High					
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	Low	Unknown	Unknown	Unknown
Duration of time carrying gear		Minimum 1 day, maximum 24 days			
Disentangled?		Yes - partially 12 Sep 1998			
Status		Presumed dead - Last sighted in 1998			
Number of prior entanglement interactions		4			

Entanglement configuration	Whale free swimming; dragging single pot/surface system from mouth; buoy jammed in mouthline; length of line caught in mouth and down throat from previous entanglement.
Anchoring point(s)	Mouth
Gear configuration confidence	High
Remaining questions	None
Comments	Whale dragged its gear into a number of other gear sets as it blundered through Provincetown Harbor; line down throat could not be seen on this date, but was seen at its third entanglement on 14 Sept 1997 (not illustrated).

Polymer type	PP	PP/PET
Gear component	Vertical	Vertical
Rope diameter (inches)	5/16 (0.339)	3/8 (0.374)
Breaking strength (lbs)	Tested	1 615
	New	1 700
		2 600



12 Sep 1998 PCCS



12 Sep 1998 PCCS



12 Sep 1998 PCCS

# DATA SHEET

## FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

**SPECIMEN ID NO.**

**J091298**

**NMFS NO.**

**E36.98**

Gear Description:

A 3 foot trap, end line and surface buoy.



Rope description:

J091298-a  $\frac{5}{16}$  inch 3-strand black PP floating line with green marker yarn.

Moderate wear.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,615 lbs (T)	1,700 lbs	Good



J091298-b  $\frac{3}{8}$  inch 3-strand PP/PET 'Easy Haul' sinking line. Black PP rope yarns in parallel with white PET yarns. Sinking line with a specific gravity Of 1.100.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,692 lbs (T)	2,600 lbs	Very good



<b>Species</b>		<b>Right Whale</b>		<b>Whale ID</b>		<b>Eg #2212</b>	
Date first observed entangled (date seen prior without gear)		14 Sep 1998 (12 Sep 1998)					
Sex	Male	Birth year	1992	Age at entanglement	6		

Case study ID	PCCS	NMFS	GEAR ID
		E38-98	J091498
Gear sample collected?	Yes	Gear type	US northeast lobster

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to/after entanglement detection?						
Entanglement injury severity		Minor				
Entanglement configuration risk		High				
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes	
	Low	Low	Unknown	Unknown	Unknown	
Duration of time carrying gear		Minimum 1 day, maximum 2 days				
Disentangled?		Yes - partially 14 Sep 1998				
Status		Presumed dead - Last sighted in 1998				
Number of prior entanglement interactions		4				

Entanglement configuration	Whale free swimming; single line through mouth and over top of head. It had just been disentangled from lobster gear on 12 Sept 1998.				
Anchoring point(s)	Mouth				
Gear configuration confidence	High				
Remaining questions	None				
Comments	Line down throat observed and determined to be from first entanglement in August 1997 (first detected on 24 July 1998)				

Polymer type	PP	PP	PP/PET	PP/PET	PP/PET
Gear component	Vertical				
Rope diameter (inches)	9/16 (0.559)	3/8 (0.354)	3/8 (0.394)	7/16 (0.457)	5/16 (0.335)
Breaking strength (lbs)	Tested	3 532	1 420	1 784	2 100
	New	4 590	2 430	2 600	3 600





PCCS 14 Sep 1998



PCCS 14 Sep 1998

## DATA SHEET

### FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

**SPECIMEN ID NO.**

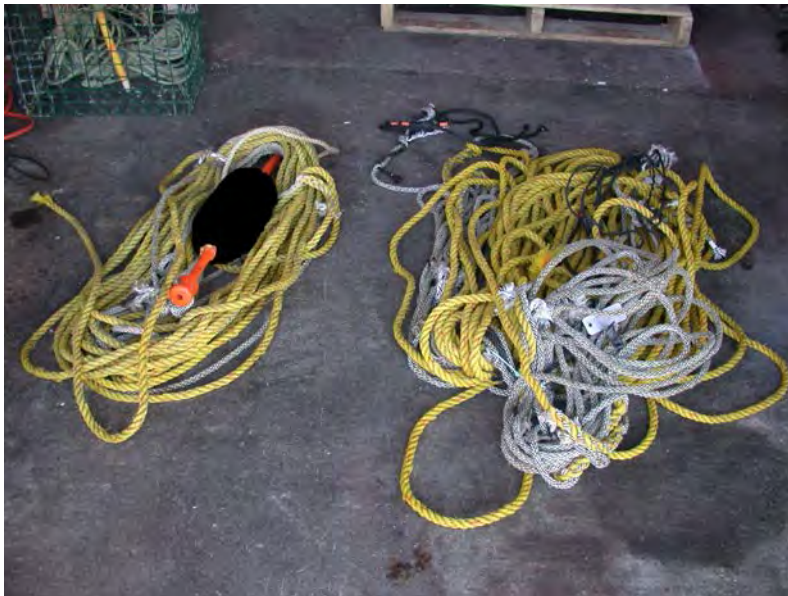
**J 091498**

**NMFS NO.**

**E38-98**

**Gear Description:**

The gear consisted of two large sets with four total pieces. Item (a) was long while the others were relatively short. Item (c) was joined to (a) by a T splice (in the left side of the third figure). The lines were part of trap gear.





Items (a) yellow, (b) black and (c). speckled grey. Note splices.  
Knots may have been made post recovery.

Rope Descriptions:

J091498-a

$\frac{9}{16}$  Yellow PP monofilament 3-strand. Discolored and random broken filaments may indicate UV degradation. This was a very long length and apparently made up most of the set.



Rope (a)

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
3,532 (T)	4,590 lbs	Good

J091498-b

$\frac{3}{8}$  Black PP monofilament 3-strand, Appeared in good condition. Only a short segment present. This may have been used to make secondary attachments.



Rope (b)

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,420 (T)	2,430 lbs	Good

J091498-c

$\frac{3}{8}$  3-Strand construction. In each strand there are 3 rope yarns of black PP monofilament are twisted in parallel with 3 PET multifilament rope yarns. This line has a Tee splice into specimen (a), the yellow PP. Refer to the photo. This rope design is seen frequently and known as “Easy Haul”



Rope (c). Known in trade as “Easy Haul)

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,784 (T)	2,600 lbs	Good

J091498-d

$\frac{9}{16}$  3-Strand construction. Each of 4 rope yarns has PET wrapped around PP, the fifth strand is all green monofilament. The rope has moderate surface abrasion.



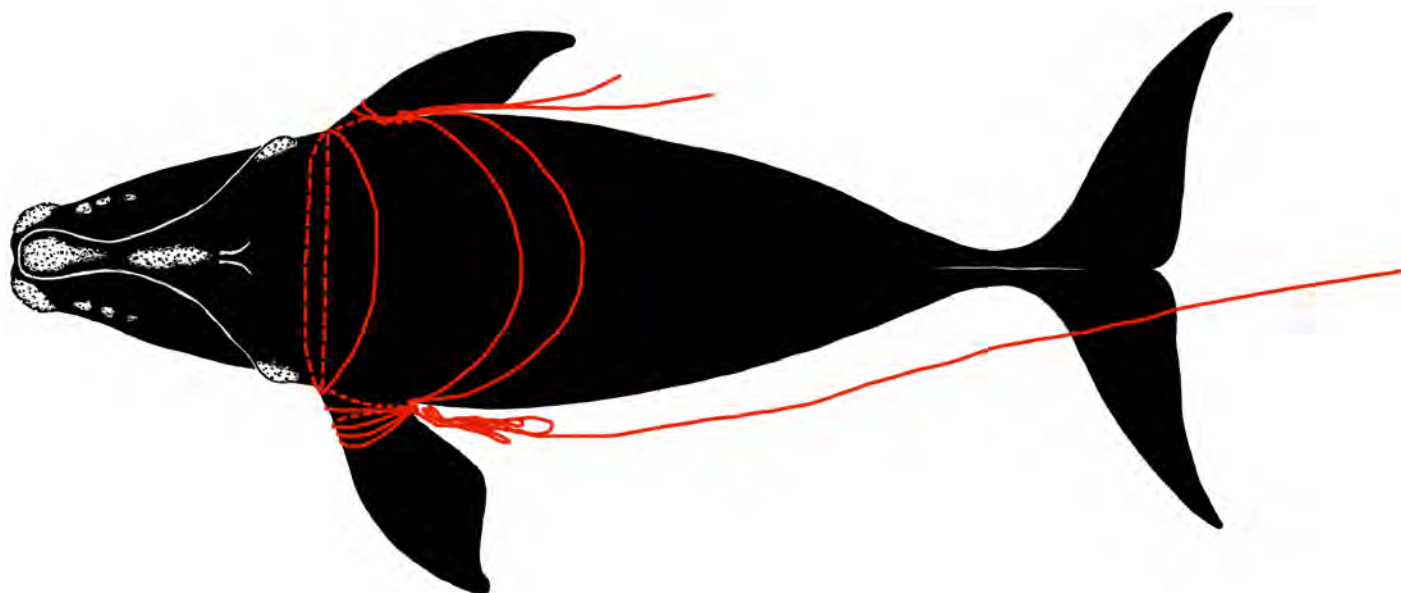
Rope (d)

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
2,160 (A)	3,600 lbs	Fair

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2030</b>
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Date first observed entangled (date seen prior without gear)		10 May 1999 (11 Sep 1997)			
Sex	Female	Birth year	Unknown	Age at entanglement	9+

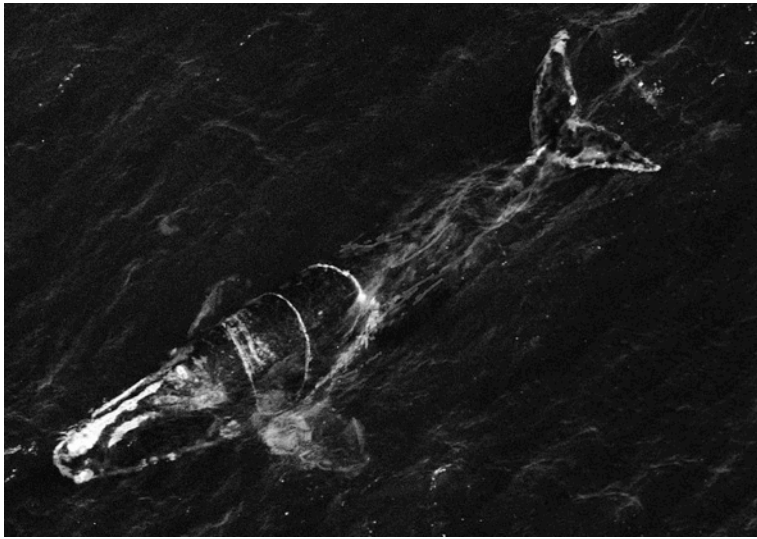
Case study ID	PCCS	NMFS	GEAR ID
	WR-1999-03	E4-99	J051099 a-b
Gear sample collected?	Yes	Gear type	Sink gillnet



Reproductive prior to/after entanglement detection?		No/No			
Entanglement injury severity		Severe			
Entanglement configuration risk		High			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	None	None	High	High	Medium
Duration of time carrying gear		Minimum 163 days, maximum 768 days			
Disentangled?		No			
Status		Dead - 20 Oct 1999			
Number of prior entanglement interactions		4			

Entanglement configuration	Whale free-swimming; chest and back wraps stretched between flippers, each with multiple wraps; very little trailing line.
Anchoring point(s)	Flippers, body
Gear configuration confidence	High
Remaining questions	None
Comments	Multiple disentanglement attempts were unsuccessful; tail harness was tried but failed.

Polymer type		PP	PP/PET
Gear component		Gillnet anchor system	Gillnet anchor system
Rope diameter (inches)		1/2 (0.469)	9/16 (0.571)
Breaking strength (lbs)	Tested	2 757	5 440
	New	3 780	6 800



10 May 1994 NMFS



4 Sep 1999 NEA



4 Sep 1999 NEA



21 Oct 1999 NEA



21 Oct 1999 NEA

# DATA SHEET

## FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

**SPECIMEN ID NO.**

**J051099**

**NMFS NO.**

**E4-99**

**Gear Description:**

Note on gear indicated use with gill net operation. As seen in photo, the separate segment on the left has been unlaid and one end indicates a tensile break.

The gear consisted of a large length of the 3-strand polypropylene rope described below and a segment of  $\frac{5}{8}$  inch combo rope too short to analyze.



Gear set possibly associated with gill netting.

**Rope description:**

J051099-b: Short segment of  $\frac{5}{8}$  inch combo rope

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
5,440 lbs (A)	6,800 lbs	Good



Rope description:

J051099-a: 1/2 inch 3-Strand, yellow PP monofilament with one blue rope yarn in one strand.

There are 7 rope yarns per strand including marker. Little wear, some broken filaments along length. Some of the line was in better condition as seen in the lower photo.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
2,757 lbs (T)	3,780 lbs	Fair



<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #1158</b>
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Date first observed entangled (date seen prior without gear)		19 May 1999 (03 Mar 1999)			
Sex	Female	Birth year	Unknown	Age at entanglement	19+

Case study ID	PCCS	NMFS	GEAR ID
	WR-1999-05	E6-99	
Gear sample collected?	Yes	Gear type	

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to entanglement detection?		Yes/No			
Reproductive after entanglement detection?		No			
Entanglement severity		Moderate			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	None	None	Medium	None	Low
Duration of time carrying gear		Minimum 131 days, maximum 206 days			
Disentangled?		Yes - 27 Sep 1999			
Status		Alive - Last sighted in 2022			
Number of prior entanglement interactions		3			

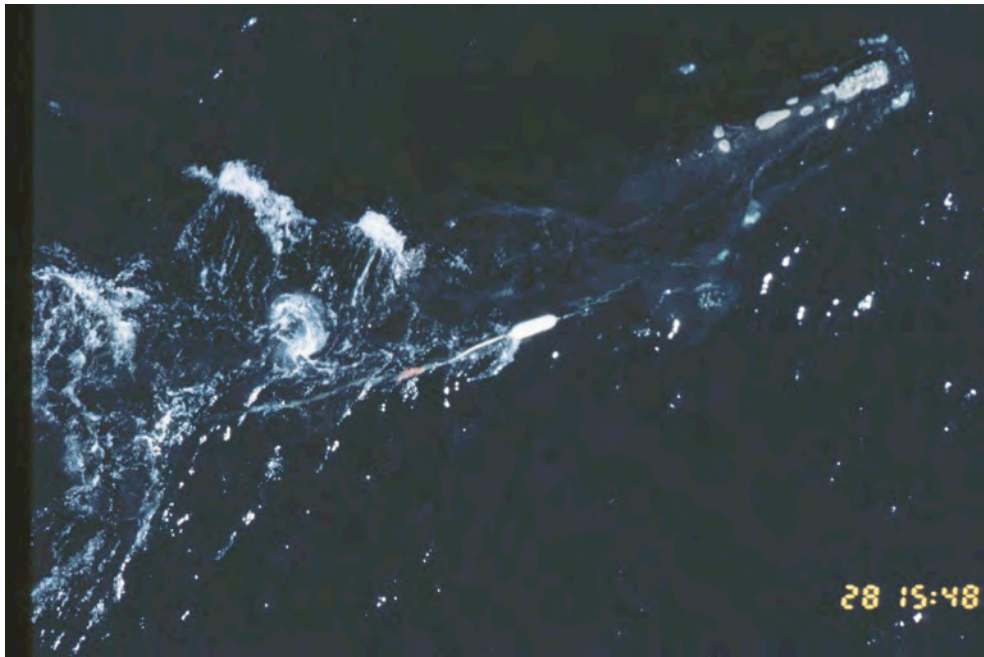
Entanglement configuration	Rope wrapped on right flipper with high flyer attached just aft of flipper. Less than one body length of rope trailing.
Anchoring point(s)	Flipper
Gear configuration confidence	High
Remaining questions	
Comments	Only highflyer retrieved. No rope available for analysis.



23 May 1999 PCCS



05 Aug 1999 NEA



28 May 1999 NMFS

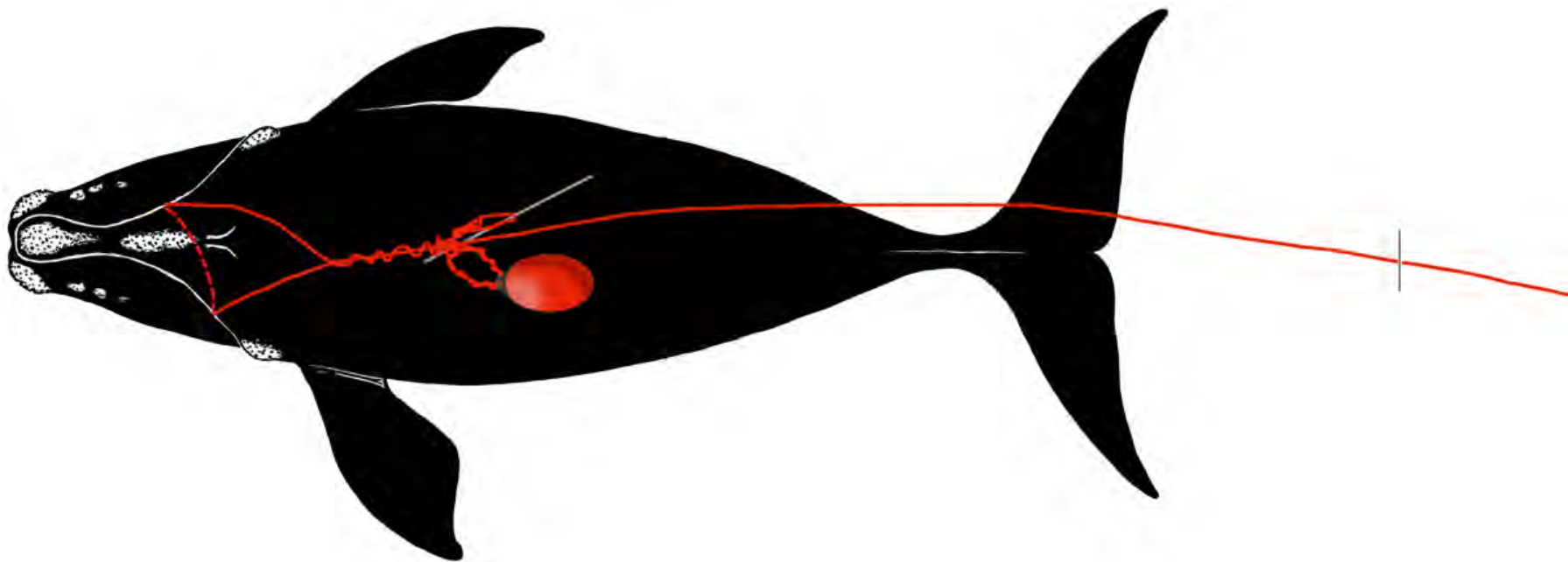


11 Aug 1999 NEA

<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2753</b>
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Date first observed entangled (date seen prior without gear)		05 Jun 1999 (03 Sep 1998)	
Sex	Female	Birth year	1997
		Age at entanglement	2

Case study ID	PCCS	NMFS	GEAR ID
	WR-1999-06	E7-99	J060599
Gear sample collected?	Yes	Gear type	



Reproductive prior to/after entanglement detection?		No/Yes			
Entanglement injury severity		Minor			
Entanglement configuration risk		High			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	None	Unknown	Low	Low
Duration of time carrying gear		Minimum 1 day, maximum 289 days			
Disentangled?		Yes - 5 Jun 1999			
Status		Alive - Last sighted in 2022			
Number of prior entanglement interactions		1			

Entanglement configuration	Whale free-swimming; bridle of line caught in mouth leading to tangle of line and buoys on back; line trailing ~300 feet.
Anchoring point(s)	Mouth
Gear configuration confidence	High
Remaining questions	None
Comments	Whale was discovered and disentangled during training session in Bay of Fundy.

Polymer Type	PP/PET	
Gear Component	Vertical line	
Rope Diameter (inches)	5/16 (0.323)	
Breaking Strength (lbs)	Tested	1 854
	New	1 900

This case study was developed under NOAA Award # NA09NMF4520413 to the Consortium for Wildlife Bycatch Reduction, administered at the New England Aquarium, Boston, MA, USA (available at [www.bycatch.org](http://www.bycatch.org)). See: Knowlton, A.R., J. Robbins, S. Landry, H.A. McKenna, S.D. Kraus, T. B. Werner. 2015. Effects of fishing rope strength on the severity of large whale entanglements. Conservation Biology DOI: 10.1111/cobi.12590



05 Jun 1999 ECE



05 Jun 1999 ECE



05 Jun 1999 ECE



05 Jun 1999 ECE



05 Jun 1999 ECE

# DATA SHEET

## FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

**SPECIMEN ID NO.**

**J060599**

**NMFS NO.**

**E7-99**

**Gear Description:**

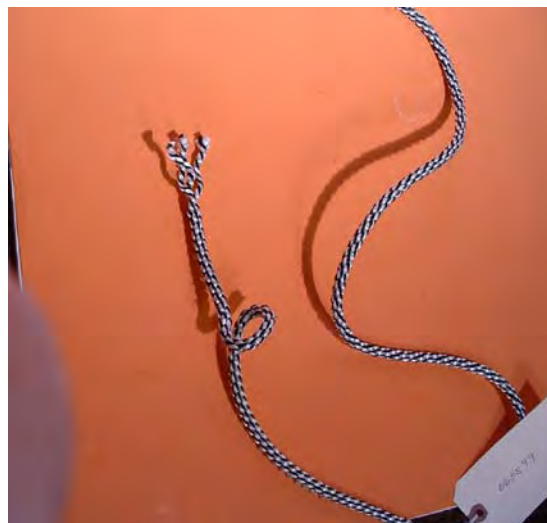
Coil of 'Easy Haul' PP/PET sinking line as seen below



**Rope description:**

J060599  $\frac{5}{16}$  inch 3-strand PP/PET sinking line. Typical black PP and white PET in parallel. Specific gravity 1.152. Good condition.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,854 lbs (T)	1,900 lbs	Very good



<b>Species</b>	<b>Right Whale</b>	<b>Whale ID</b>	<b>Eg #2710</b>
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Date first observed entangled (date seen prior without gear)		21 Jul 1999 (19 Jun 1999)			
Sex	Female	Birth year	1997	Age at entanglement	2

Case study ID	PCCS	NMFS	GEAR ID
	WR-1999-11	E16-99	J072199
Gear sample collected?	Yes	Gear type	Lobster

Photographs inadequate to determine complete entanglement configuration - no drawing available

Reproductive prior to/after entanglement detection?		No/Yes			
Entanglement severity		Moderate			
Entanglement configuration risk		High			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	Low	Medium	Low	Medium
Duration of time carrying gear		Minimum 55 days, maximum 389 days			
Disentangled?		Yes			
Status		Presumed dead - last sighted in 2014			
Number of prior entanglement interactions		1			

Entanglement configuration	Rope through mouth and crisscrossing over blowholes and body. May wrap both flippers. Trailing ~ 20 feet behind flukes.
Anchoring point(s)	Mouth, flipper(s)
Gear configuration confidence	Low
Remaining questions	Extent of flipper involvement.
Comments	Gear pulled off by telemetry buoy attached to trailing gear.

Polymer type	PP	
Gear component		
Rope diameter (inches)	1/2 (0.472)	
Breaking strength (lbs)	Tested	3 339
	New	3 780



02 Aug 1999 NEA



02 Aug 1999 NEA



03 Aug 1999 NEA



## DATA SHEET

### FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

**SPECIMEN ID NO.**

**J072199**

**NMFS NO.**

**E16-99**

**Gear Description:**

Considerable tangling of the gear set but untangled rope was in very good condition,

Noted by NMFS as Canadian pot gear.



j072199

Rope description:

$\frac{1}{2}$  dia 3-stand red polypropylene monofilament with 13 rope yarns per strand.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
3,339 lbs (T)	3,780 lbs	Very good

