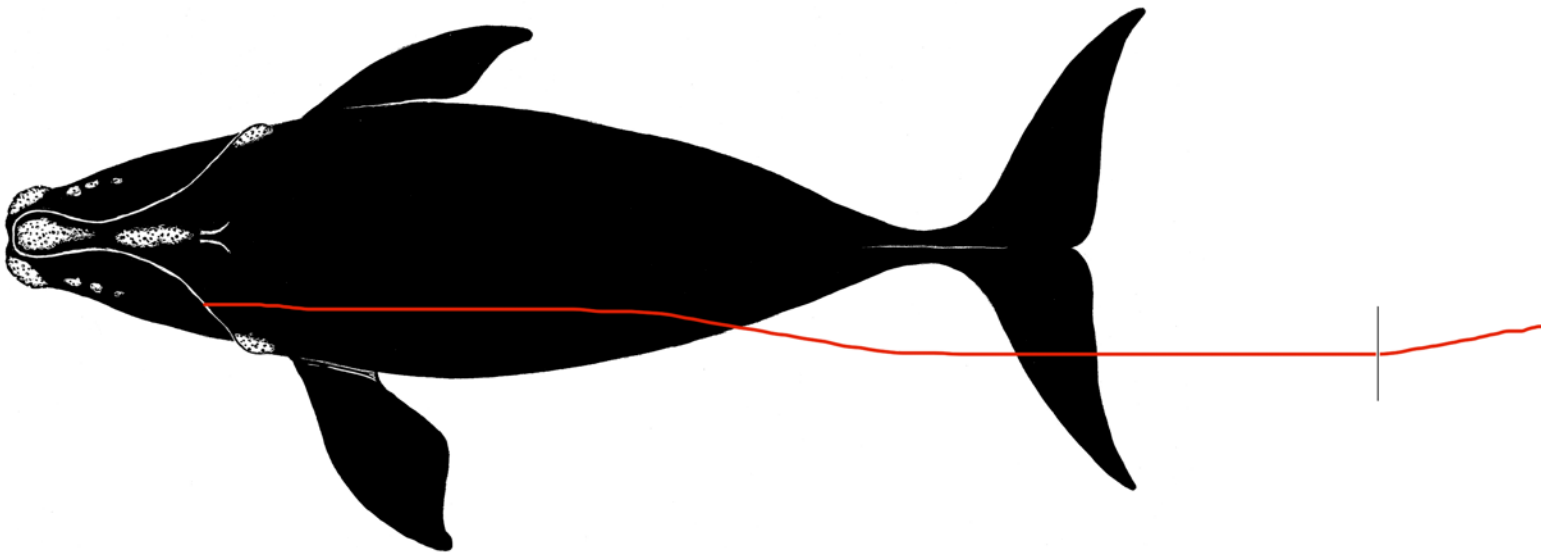


Species	Right Whale	Whale ID	Eg #2240
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Date first observed entangled (date seen prior without gear)			14 Jan 2003 (01 Sep 2002)		
Sex	Female	Birth year	Unknown	Age at entanglement	12+

Case study ID	PCCS WR-2003-01	NMFS E01-03	GEAR ID
Gear sample collected?	No	Gear type	



Reproductive prior to entanglement detection?			Yes		
Reproductive after entanglement detection?			No		
Entanglement severity			Severe		
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Medium	Low	Unknown	None	High
Duration of time carrying gear		Minimum 1 day, maximum 254 days			
Disentangled?		No			
Status		Presumed dead - Last sighted in 2005			
Number of prior entanglement interactions		3			

Entanglement configuration	Line caught in mouthline and trailing ~ 50 feet aft of flukes.
Anchoring point(s)	Mouthline
Gear configuration confidence	Low
Remaining questions	Whereabouts of second bitter end.
Comments	The second bitter end may be trapped by a knot in the baleen; unseen but exiting the mouthline or ingested. Gear shed by next sighting in May 2003 but animal seen in poor condition by August 2003 and remained in poor condition through 2005 when last seen.



14 Jan 2003 FWRI



14 Jan 2003 FWRI



15 May 2003 NEFSC



14 Jan 2003 FWRI

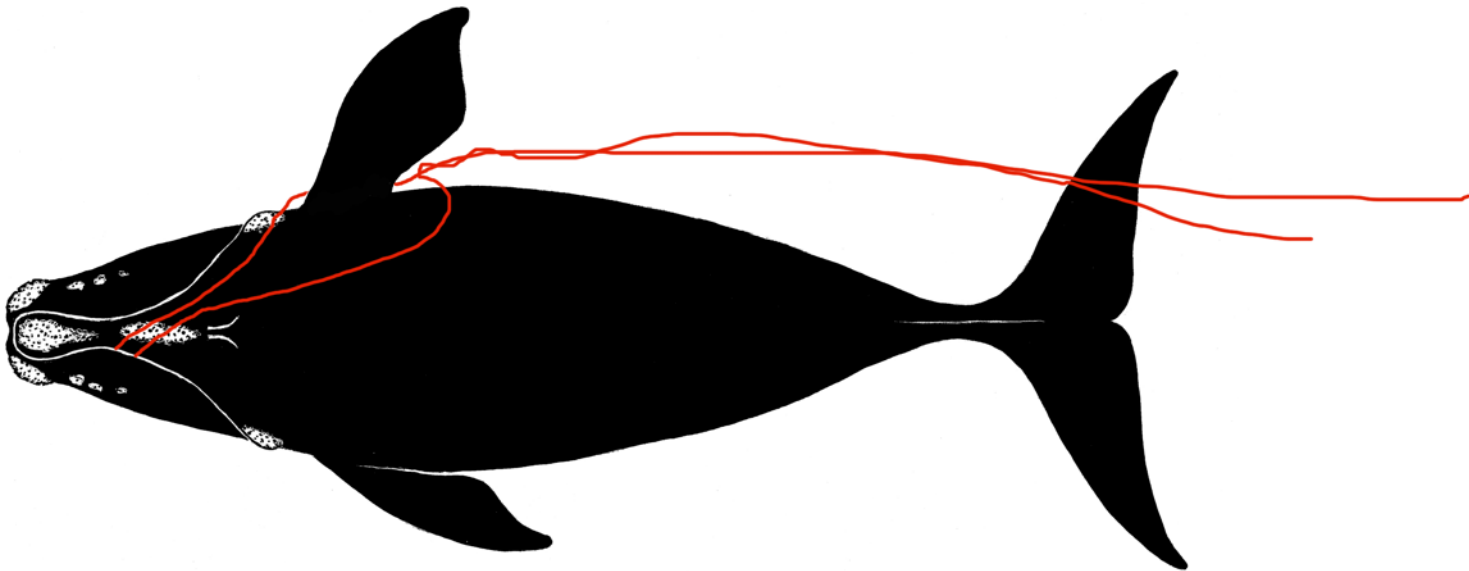


5 Mar 2004 PCCS

Species	Right Whale	Whale ID	Eg #1430
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Date first observed entangled (date seen prior without gear)			20 May 2003 (01 Aug 2002)		
Sex	Female	Birth year	Unknown	Age at entanglement	20+

Case study ID	PCCS	NMFS	GEAR ID
	WR-2003-04	E05-03	
Gear sample collected?	No	Gear type	



Reproductive prior to entanglement detection?		Yes			
Reproductive after entanglement detection?		No			
Entanglement severity		Severe			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	Low	High	None	Medium
Duration of time carrying gear		Minimum 18 days, maximum 309			
Disentangled?		No			
Status		Presumed dead - Last sighted in 2003			
Number of prior entanglement interactions		2			

Entanglement configuration	Continuous piece of line caught in baleen of left mouth folds around right flipper and trails unknown distance aft of flukes.
Anchoring point(s)	Mouthline
Gear configuration confidence	High
Remaining questions	There is the possibility that line wrapped right flipper. Flipper is white.
Comments	Whale has not been seen since entanglement year



20 May 2003 NEFSC



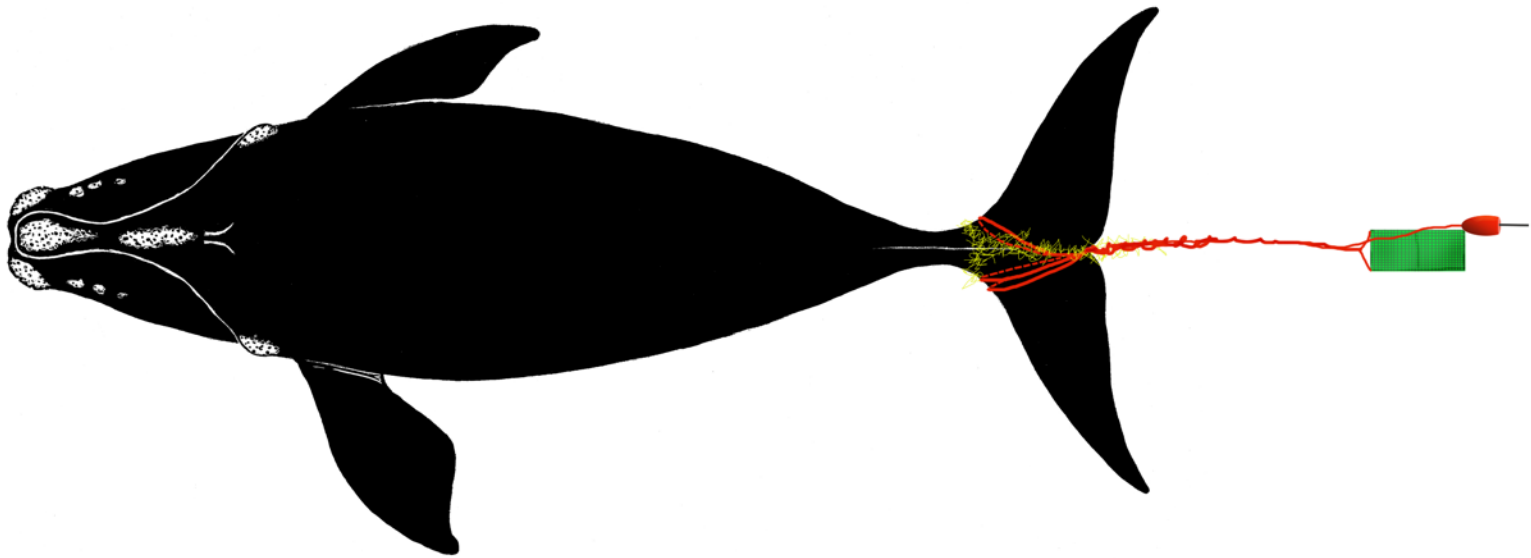
07 Jun 2003 NEFSC



07 Jun 2003 NEFSC

Species		Right Whale		Whale ID		Eg #3392	
Date first observed entangled (date seen prior without gear)		9 Jul 2003 (Unknown)					
Sex	Male	Birth year	Unknown	Age at entanglement	1+		

Case study ID	PCCS	NMFS	GEAR ID
	WR-2003-12	E15-03	J070903
Gear sample collected?	Yes	Gear type	Lobster and unknown



Reproductive prior to/after entanglement detection?					
Entanglement injury severity			Moderate		
Entanglement configuration risk			High		
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	None	None	Unknown	None	Medium
Duration of time carrying gear		Minimum 1 day, maximum unknown			
Disentangled?		Yes - 09 Jul 2003			
Status		Alive - Last sighted in 2014			
Number of prior entanglement interactions		0			

Entanglement configuration	Single pot and buoy line wrapped around both fluke blades; heavy gauge monofilament netting wrapping tailstock.
Anchoring point(s)	Fluke
Gear configuration confidence	High
Remaining questions	None
Comments	Considered potentially lethal due to constricting wraps of line around flukes.

Polymer type		PP/PET
Gear component		Vertical
Rope diameter (inches)		3/8 (0.394)
Breaking strength (lbs)	Tested	1 717
	New	2 600



09 Jul 2003 CWR



09 Jul 2003 CWR



09 Jul 2003 CWR

DATA SHEET

FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

SPECIMEN ID NO.

J070903

NMFS NO.

E15-03

Gear Description:

Long length of 'Easy Haul' attached to a lobster buoy. The line is in excellent condition



Rope description:

A $\frac{3}{8}$ inch 3-strand PP/PET line with 3 white PET rope yarns and 3 black PP mono rope yarns per strand (trade name 'Easy Haul'). The line is an oversized $\frac{3}{8}$ inch. It is a sinking line, SpGr 1.135,

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,717 lbs (T)	2,600 lbs	Very good

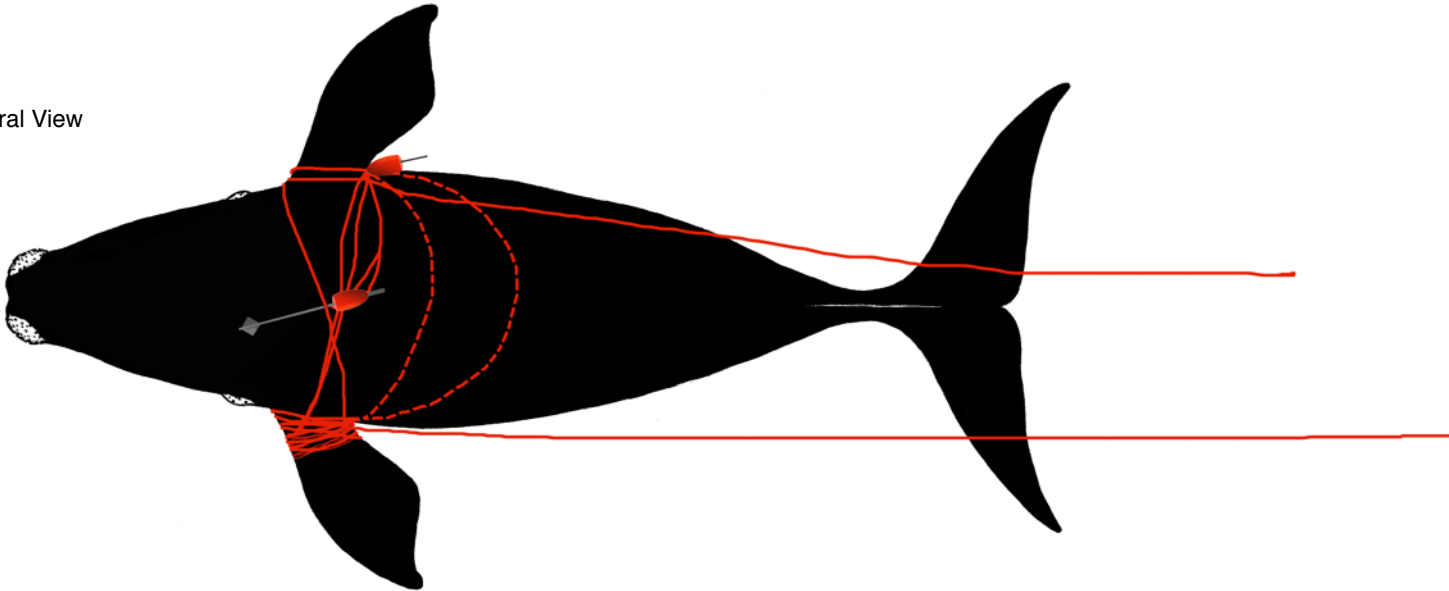


J070903 PP/PET combo ('Easy Haul')

Species		Right Whale		Whale ID		Eg #3346		
Date first observed entangled (date seen prior without gear)		17 Mar 2004 (30 Jan 2004)						
Sex	Male	Birth year		2003		Age at entanglement		1

Case study ID	PCCS	NMFS	GEAR ID
	WR-2004-02	E02-04	J031704
Gear sample collected?	Yes	Gear type	Lobster

Ventral View



Reproductive prior to/after entanglement detection?						
Entanglement injury serverity		Severe				
Entanglement configuration risk		High				
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes	
	None	None	High	Low	Medium	
Duration of time carrying gear		Minimum 2 569 days, maximum 2 615				
Disentangled?		Yes - partial, 19 Mar 2004				
Status		Alive - Last sighted in 2015				
Number of prior entanglement interactions		1				

Entanglement configuration	Whale has extensive wraps of line at right flipper with lines extending along chest to less wraps at left flipper; two lines wrap over the bac anchored by flipper wraps; line trails to 15ft and 30ft behind flukes; buoy(s) and highflier pinned to chest.
Anchoring point(s)	Flippers, body
Gear configuration confidence	High
Remaining questions	None
Comments	Body wraps resolved through disentanglement; as of 2014, wraps at right flipper persist.

Polymer type		Polypro/PET	
Gear component		Vertical	
Rope diameter (inches)		3/8 (0.406)	
Breaking strength (lbs)	Tested	1 597	
	New	2 600	



17 Mar 2004 WT



19 Mar 2004 WT



15 Feb 2008 FWRI

DATA SHEET

FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

SPECIMEN ID NO.

J031704

NMFS NO.

E02-04

Gear Description:

The gear consisted of a two types of sinking line but only one length was analyzed. One end of this line showed evidence of a tensile break.



Rope description:

$\frac{3}{8}$ inch 3-Strand PP/PET blend. Two rope yarns with mono filament polypropylene wrapped with multifilament polyester. The third strand has two rope yarns the same as above and one rope yarn all green polypropylene monofilament. The line has considerable surface abrasion that is uniform along its length.

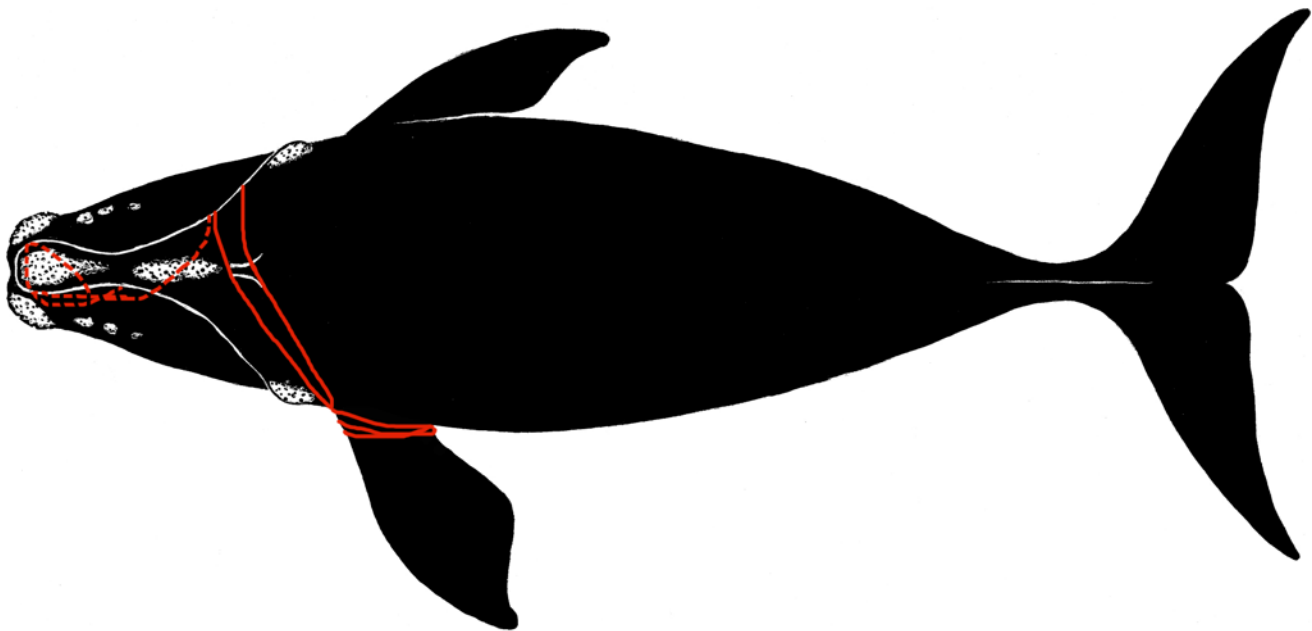
Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,597 lbs (T)	2,600 lbs	Poor



J031704 $\frac{3}{8}$ 3-Strand PP/PET blend. Note uniform surface abrasion.

Species		Right Whale		Whale ID		Eg #2301	
Date first observed entangled (date seen prior without gear)		06 Sep 2004 (18 Sep 2003)					
Sex	Female	Birth year	1993	Age at entanglement	11		

Case study ID	PCCS	NMFS		GEAR ID
	WR-2001-21	E20-04		J090604 a-c
Gear sample collected?	Yes	Gear type	Unknown	



Reproductive prior to/after entanglement detection?			Yes/No		
Entanglement injury severity			Severe		
Entanglement configuration risk			High		
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	None	High	High	Medium	Medium
Duration of time carrying gear		Minimum 93 days, maximum 530 days			
Disentangled?		No			
Status		Dead 03 Mar 2005			
Number of prior entanglement interactions		3			

Entanglement configuration	Line wrapping over head from right mouthline to left flipper wraps; line essentially cleated from baleen on right to flipper on left.
Anchoring point(s)	Mouthline, flipper
Gear configuration confidence	Moderate
Remaining questions	The extent of wrapping at left flipper unknown; bitter ends cannot be accounted for and unclear if any line was trailing.
Comments	Extensive weaving of line through baleen was documented at necropsy.

Polymer type		PP	PP/PET	PP/PET
Gear component				
Rope diameter (inches)		3/8 (0.394)	1/2 (0.472)	7/16 (0.425)
Breaking strength (lbs)	Tested	486	900	700
	New	2 430	4 500	3 500

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).
 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



06 Sep 2004 NEA



06 Sep 2004 NEA



04 Mar 2005 WHOI



04 Mar 2005 WHOI



04 Mar 2005 WHOI



04 Mar 2005 WHOI

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 unlaidd 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.

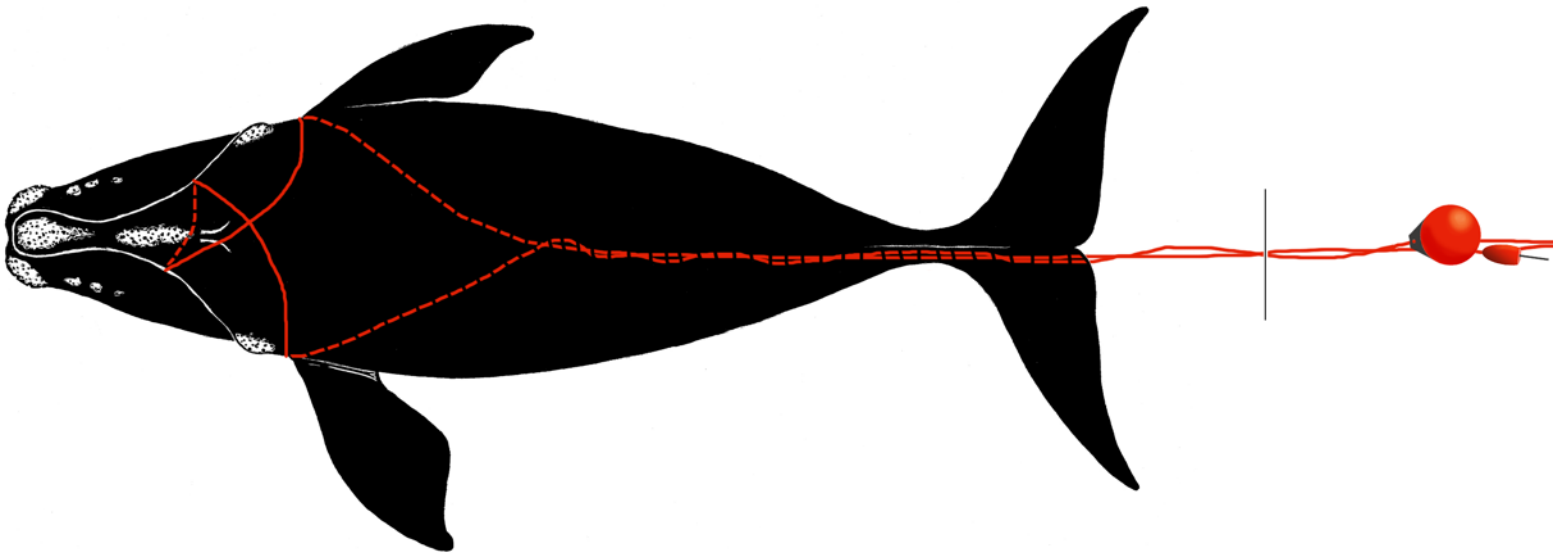
There are 7 rope yarns per strand including marker. Little wear, some broken filaments along length. Some of the line was in better condition as seen in the lower photo.

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



Species		Right Whale		Whale ID		Eg #3314	
Date first observed entangled (date seen prior without gear)		06 Dec 2004 (24 Sep 2004)					
Sex	Female	Birth year	2003	Age at entanglement		2	

Case study ID	PCCS	NMFS	GEAR ID
	WR-2004-19	E26-04	J120604 a-c
Gear sample collected?	Yes	Gear type	Lobster



Reproductive prior to/after entanglement detection?		No/ No				
Entanglement injury severity		Moderate				
Entanglement configuration risk		High				
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes	
	Medium	Medium	Unknown	Medium	Medium	
Duration of time carrying gear		Minimum 9 days, maximum 96 days				
Disentangled?		Yes - 31 Dec 2004				
Status		Alive - Last sighted in 2014				
Number of prior entanglement interactions		1				

Entanglement configuration	Line through mouth with both halves crossing over head and down to forward insertion of flippers; line twists together beneath the whale and trails over ~400ft to balloon float and bullet buoy.
Anchoring point(s)	Mouthline
Gear configuration confidence	High
Remaining questions	None
Comments	Entanglement remarkably symmetrical

Polymer Type		Polysteel	Polysteel	PP/PET/Lead
Gear Component		Vertical	Vertical	Vertical
Rope Diameter (inches)		7/16 (0.413)	3/8 (0.374)	3/8 (0.394)
Breaking Strength (lbs)	Tested	2 431	2 592	2 000
	New	4 100	3 400	2 000



21 Dec 2004-WT



21 Dec 2004-WT



30 Dec 2004-WT

DATA SHEET

FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

SPECIMEN ID NO.

J120604

NMFS NO.

E26-04

Gear Description:

Identified as lobster end line buoy mooring. Contained 3 lines, 2 Polysteel 3-strand and one lead line (very short length present)



Rope descriptions:

J120604-a $\frac{7}{16}$ inch white Polysteel 3-strand with one blue marker yarn in one strand. 10 rope yarns per strand. Float rope.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
2,431 lbs (T)	4,100 lbs	Good



J120604-a

J120604-b $\frac{3}{8}$ inch pale blue Polysteel 3-strand with one orange marker yarn in one strand. 11 rope yarns per strand. Float rope.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
2,592 lbs (T)	3,400 lbs	Good



J120604-b

J040901-c $\frac{3}{8}$ inch diameter 12 strand braided leadline with braid over a 0.21 diameter core containing lead wire. Braid consisted of 4 strands black mono polypropylene, 4 strands green mono polypropylene and 4 strands of white multi polyester. This was tucked into the end line at intervals to keep it from floating at the surface.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
2,000 lbs (T)	2,000 lbs	Very good

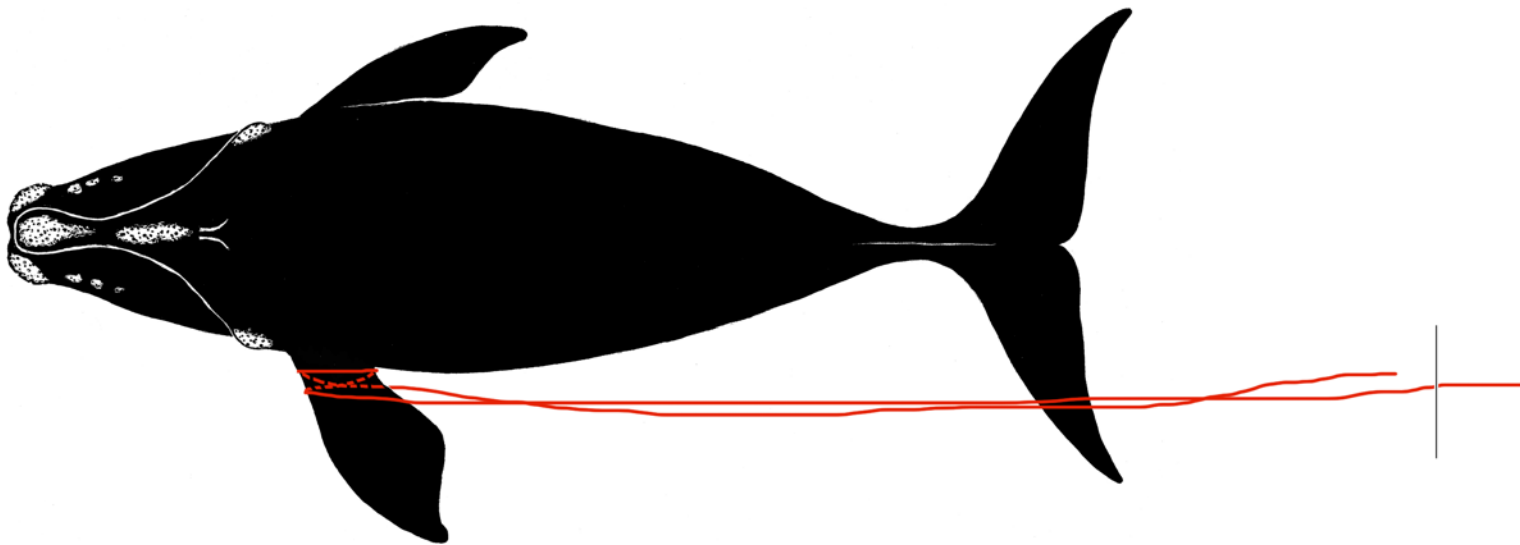


J120604-c

Species	Right Whale	Whale ID	Eg #1167
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Date first observed entangled (date seen prior without gear)			08 Jun 2005 (27 Sep 2004)		
Sex	Male	Birth year	Unknown	Age at entanglement	25+

Case study ID	PCCS	NMFS	GEAR ID
	WR-2005-4	E07-05	
Gear sample collected?	No	Gear type	



Reproductive prior to entanglement detection?					
Reproductive after entanglement detection?					
Entanglement severity					
Severe					
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Unknown	None	High	None	Low
Duration of time carrying gear		Minimum 1 day, maximum 267 days			
Disentangled?		No			
Status		Alive - Last sighted in 2015			
Number of prior entanglement interactions		4			

Entanglement configuration	Line appears to wrap left flipper and tail ~ 200 feet aft of flukes.
Anchoring point(s)	Flipper
Gear configuration confidence	Low
Remaining questions	Attachment point cannot be verified.
Comments	The whale eventually shed the gear on it's own; based on scarring post-entanglement it seems plausible that at some point during the entanglement line was in the mouthline leading to the wraps at the left flipper. Severe wound on left flipper remains unhealed in 2011.



08 Jun 2005 NEA



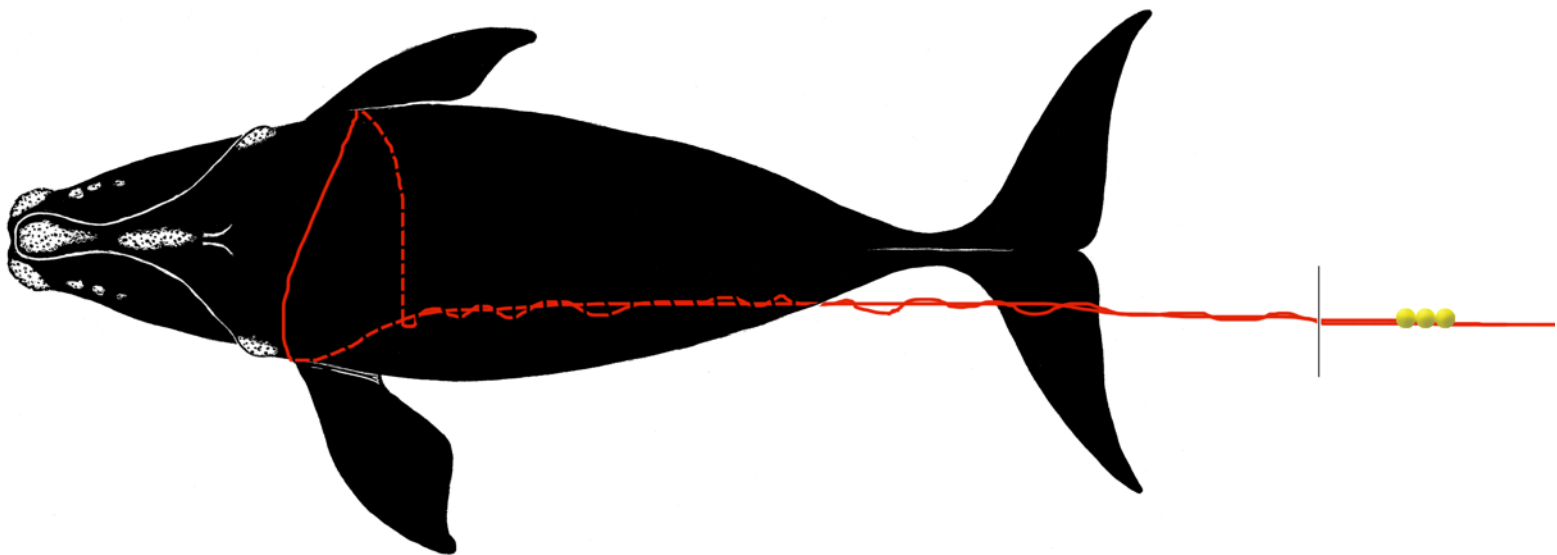
19 Sep 2011 NEA



19 Sep 2011 NEA

Species		Right Whale		Whale ID		Eg #3445	
Date first observed entangled (date seen prior without gear)		03 Dec 2005 (19 Aug 2005)					
Sex	Female	Birth year	2004		Age at entanglement	2	

Case study ID	PCCS	NMFS	GEAR ID
	WR-2005-18	E25-05	J120305
Gear sample collected?	Yes	Gear type	Unknown



Reproductive prior to/after entanglement detection?			No/ No		
Entanglement injury severity			Moderate		
Entanglement configuration risk			High		
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	None	None	Medium	Medium	Low
Duration of time carrying gear		Minimum 9 days, maximum 296 days			
Disentangled?		Yes - Partial, 12 Dec 2005			
Status		Presumed dead - last sighted in 2006			
Number of prior entanglement interactions		2			

Entanglement configuration	Line wrapping body at area of flippers; line twisted beneath leading to line trailing 400ft aft of the flukes; three hard buoys on trailing line.
Anchoring point(s)	Body
Gear configuration confidence	Moderate
Remaining questions	Could not verify that flippers were not wrapped though this seems unlikely.
Comments	Whale was disentangled and two gear samples collected; one of which was likely caught by original entanglement for a short amount of time.

Polymer type		Polysteel	Polysteel	PP
Gear component		Vertical	Vertical	Vertical
Rope diameter (inches)		7/16 (0.433)	5/16 (0.339)	3/8 (0.362)
Breaking strength (lbs)	Tested	3 234	2 000	1 383
	New	4 100	2 500	2 430



03 Dec 2005 WT



12 Dec 2005 NOAA

DATA SHEET

FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

SPECIMEN ID NO.

J120305

NMFS NO.

E25-05

Gear Description:

It appears that this was part of a fixed fishery gear set. It consisted of several pieces of different types of line spliced together. The photo shows part of the gear. Three lines were analyzed, the others were too short.



Rope description:

J120305-a This is a $\frac{7}{16}$ inch 3-strand polysteel line, light blue and with moderate surface wear.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
3,234 lbs (T)	4,100 lbs	Good



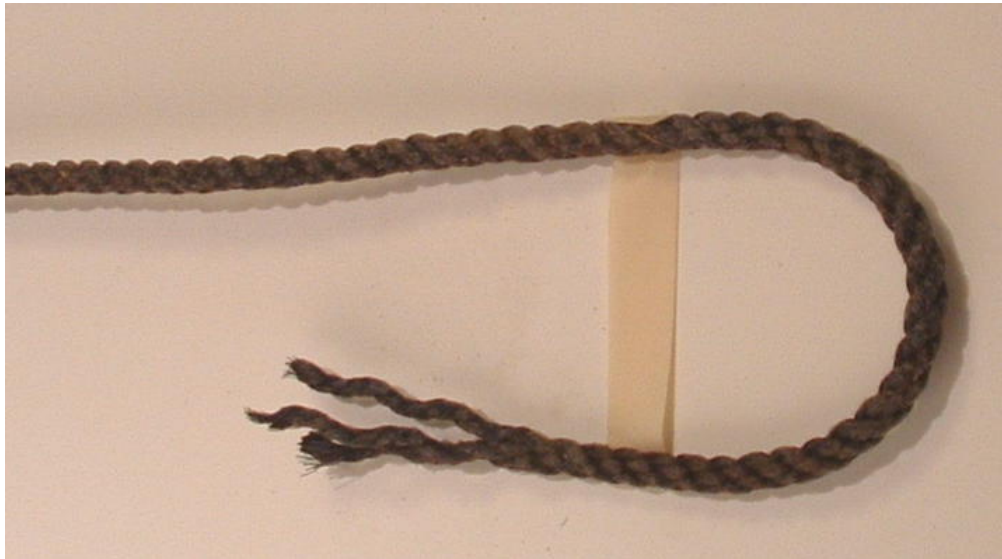
J120305-b This is a $\frac{5}{16}$ inch 3-strand polysteel line, light blue and with moderate surface wear.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
2,000 lbs (T)	2,500 lbs	Good



J120305-c This is a $\frac{3}{8}$ inch 3-strand black mono PP line, with severe wear.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,383 lbs (T)	2,430 lbs	Poor



Species		Right Whale		Whale ID		Eg #1403		
Date first observed entangled (date seen prior without gear)		17 Sep 2006 (24 May 2006)						
Sex	Male	Birth year		1984		Age at entanglement		22

Case study ID	PCCS	NMFS		GEAR ID
	WR-2006-26			
Gear sample collected?	No	Gear type		

No drawing available

Reproductive prior to entanglement detection?					
Reproductive after entanglement detection?					
Entanglement severity			Severe		
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	None	High	Low	None	High
Duration of time carrying gear		Minimum 1 day, maximum 316 days			
Disentangled?		No			
Status		Alive - Last sighted in 2016			
Number of prior entanglement interactions		1			

Entanglement configuration	Line tightly wrapped over aft part of rostrum.
Anchoring point(s)	Mouth
Gear configuration confidence	Low
Remaining questions	Uncertain if there was any trailing line.
Comments	Photos not acquired of the rope on head but was reported by a researcher. Fluke photos at that sighting were later linked to this animal and a major wound from rope was evident on head. Gear has been shed.



17 Sep 2006 NEA



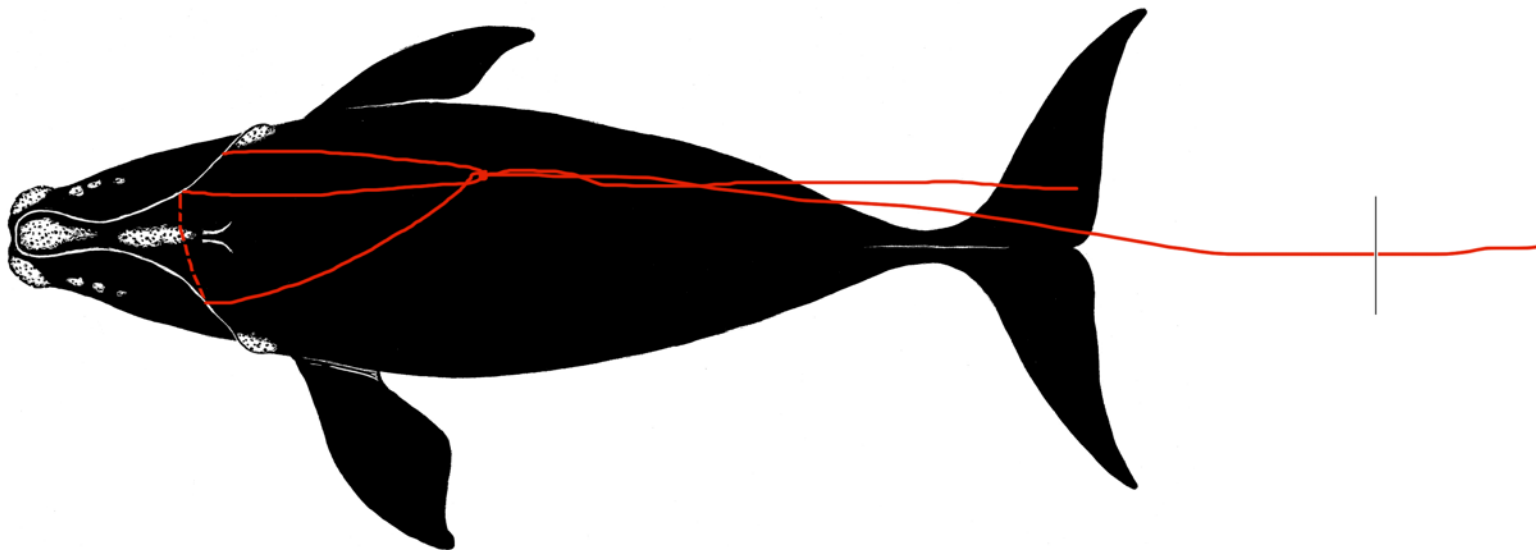
03 May 2007 PCCS



03 May 2007 PCCS

Species		Right Whale		Whale ID		Eg #3610		
Date first observed entangled (date seen prior without gear)		27 Sep 2006 (15 Feb 2006)						
Sex	Male	Birth year		Unknown		Age at entanglement		1+

Case study ID	PCCS	NMFS		GEAR ID
	WR-2006-28	E32-06		J092706
Gear sample collected?	Yes	Gear type	Longline	



Reproductive prior to/after entanglement detection?					
Entanglement injury severity			Moderate		
Entanglement configuration risk			High		
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	Low	Medium	Medium	Low
Duration of time carrying gear		Minimum 119 days, maximum 433 days			
Disentangled?		Yes - 24 Jan 2007			
Status		Alive - Last sighted in 2012			
Number of prior entanglement interactions		1			

Entanglement configuration	Thin line with hooks through mouth and loosely twisted into loop over right shoulder; line trailing ~100 feet aft of flukes
Anchoring point(s)	Mouthline
Gear configuration confidence	High
Remaining questions	None
Comments	Gear was later shed

Polymer type	PP
Gear component	Vertical
Rope diameter (inches)	5/16 (0.327)
Breaking strength (lbs)	Tested 1 292
	New 1 700



27 Sep 2006 NEA



28 Sep 2006 NEA



28 Sep 2006 NEA



15 Jan 2007 NEA

DATA SHEET

FORENSIC ANALYSIS OF ROPES WHALE ENTANGLEMENT PROJECT

SPECIMEN ID NO.

J092706

NMFS NO.

E32-06

Gear Description:

Appears to have been used as longline, branch lines confirm this. See second photo.

The two floating lines were spliced together.

No specimen taken of the blue-green line.

Rope description:

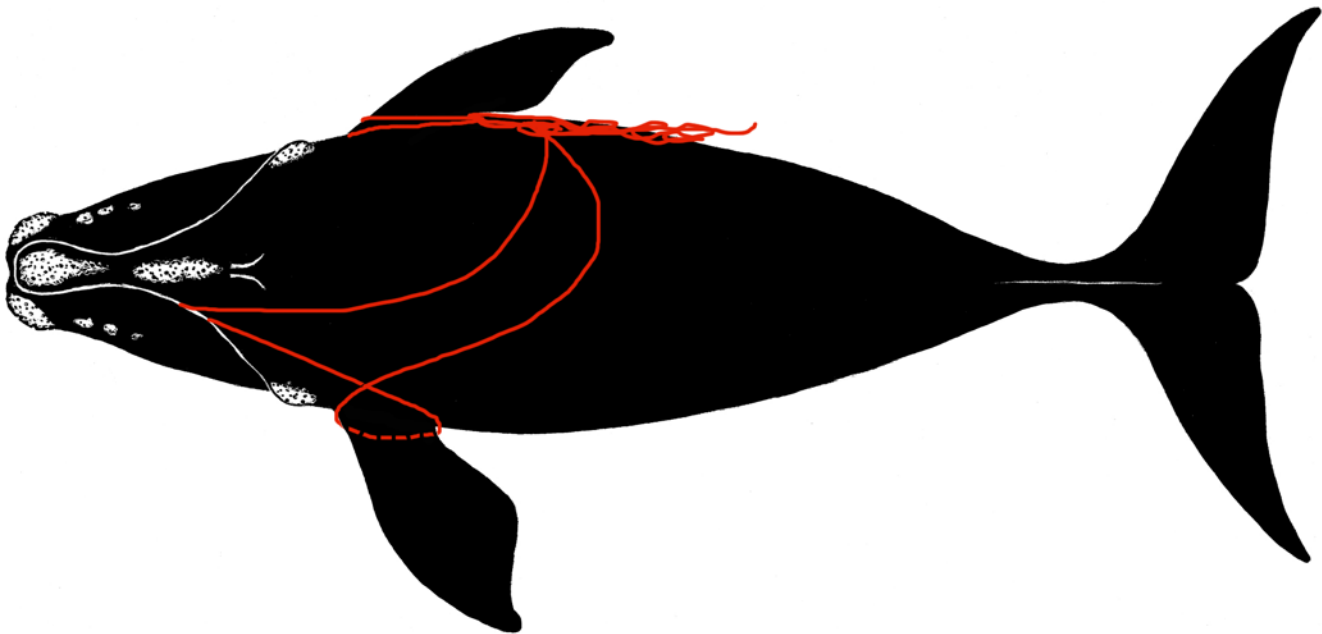
$\frac{5}{16}$ inch 3-Strand PP for both, one red, one green. There are 11 rope yarns per strand. Line is very hard and shows considerable surface wear; all crowns are rubbed away.

Tested (T) or adjusted (A) strength	Typical new strength	Rope condition
1,292 lbs (T)	1,700 lbs	Good



Species		Right Whale		Whale ID	Eg # 2029
Date first observed entangled (date seen prior without gear)		09 Mar 2007 (28 Sep 2006)			
Sex	Female	Birth year	1990	Age at entanglement	17

Case study ID	PCCS	NMFS		GEAR ID
	WR-2007-02			
Gear sample collected?	No	Gear type		



Reproductive prior to entanglement detection?		Yes			
Reproductive after entanglement detection?		Yes			
Entanglement severity		Severe			
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	Low	High	Low	Medium
Duration of time carrying gear		Minimum 193 days, maximum 610 days			
Disentangled?		Yes - 18 Sep 2007			
Status		Alive - Last sighted in 2016			
Number of prior entanglement interactions		5			

Entanglement configuration	Line likely wrapping both flippers over the back with line also caught in baleen at left mouth, leading to tangle of line along right flank.
Anchoring point(s)	Mouthline, flippers
Gear configuration confidence	Reasonable
Remaining questions	Nature of wraps at flippers difficult to discern
Comments	Cut was made to one of lines over back, remaining gear was later shed.



9 Mar 2007 NEFSC



9 Mar 2007 NEFSC



21 Mar 2007 PCCS



21 Mar 2007 PCCS



9 Mar 2007 NEFSC



18 Sept 2007 NEA

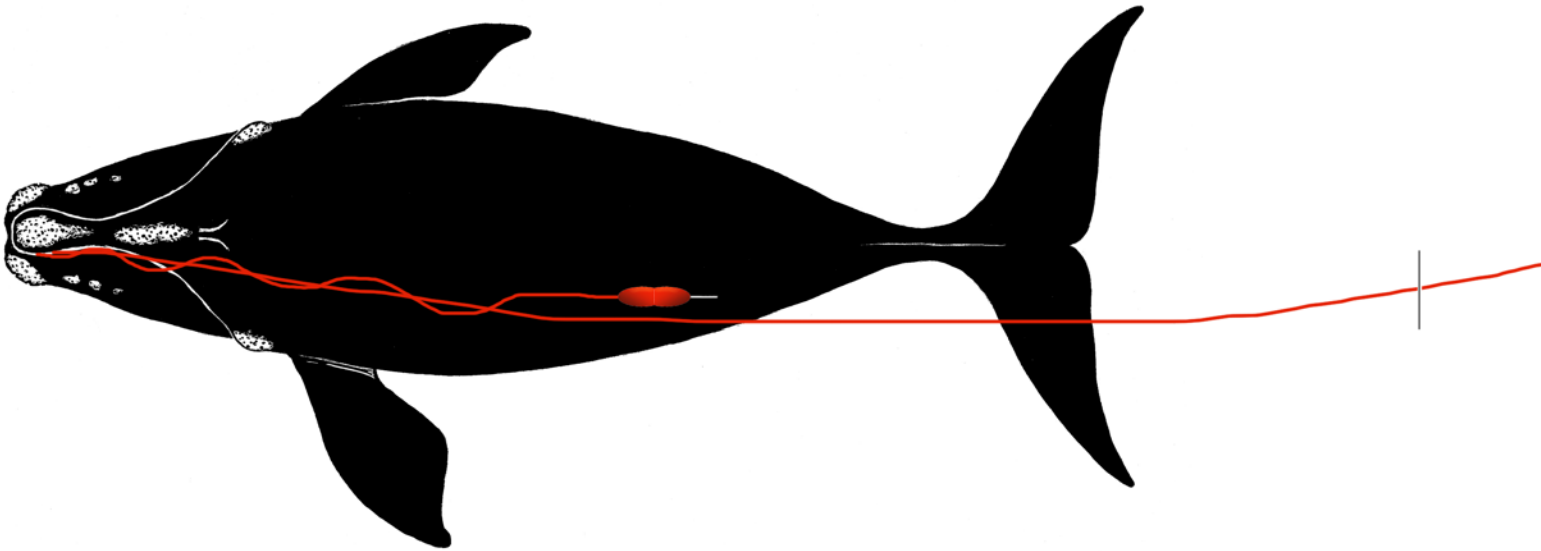


02 Feb 2011 FWRI

Species	Right Whale	Whale ID	Eg #3260
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Date first observed entangled (date seen prior without gear)			08 May 2007 (11 Apr 2007)		
Sex	Female	Birth year	Unknown	Age at entanglement	6+

Case study ID	PCCS WR-2007-05	NMFS	GEAR ID
Gear sample collected?	No	Gear type	



Reproductive prior to entanglement detection?			No		
Reproductive after entanglement detection?			Yes		
Entanglement severity			Minor		
Wound severity	Mouth	Head/ Rostrum	Flippers	Body	Flukes
	Low	Low	None	None	None
Duration of time carrying gear		Minimum 48 days, maximum 192 days			
Disentangled?		No			
Status		Alive - Last sighted in 2016			
Number of prior entanglement interactions		1			

Entanglement configuration	Line and bullet buoy caught in baleen far forward along mouthline. Gear trailing to ~ 60 feet behind flukes.
Anchoring point(s)	Mouthline
Gear configuration confidence	High
Remaining questions	
Comments	Gear shed



08 May 2007 NEFSC



29 May 2007 NEFSC



25 June 2007 NEFSC