SHORT-BEAKED COMMON DOLPHIN (*Delphinus delphis delphis*):
Western North Atlantic Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The short-beaked common dolphin (*Delphinus delphis delphis*) may be one of the most widely distributed species of cetaceans, as it is found world-wide in temperate and subtropical seas. In the North Atlantic, short-beaked common dolphins are commonly found along the shoreline of Massachusetts in mass-stranding events (Bogomolni et al. 2010; Sharp et al. 2014), as well as found over the continental shelf between the 100-m and 2000-m isobaths and over prominent underwater topography and east to the mid-Atlantic Ridge (29˚W) (Doksaeter *et al.* 2008; Waring *et al.* 2008) and are associated with Gulf Stream features (CETAP 1982; Selzer and Payne 1988; Waring *et al.* 1992; Hamazaki 2002).. The species is less common south of Cape Hatteras, although schools have been reported as far south as the Georgia/South Carolina border (32º N) (Jefferson *et al.* 2009). They have seasonal movements where they are found from Cape Hatteras northeast to Georges Bank (35˚ to 42˚N) during mid-January to May (Hain *et al.* 1981; CETAP 1982; Payne *et al.* 1984). Short-beaked common dolphins move onto Georges Bank, Gulf of Maine, and the Scotian Shelf from mid-summer to autumn. Selzer and Payne (1988) reported very large aggregations (greater than 3,000 animals) on Georges Bank in autumn. Short-beaked common dolphins were occasionally found in the Gulf of Maine (Selzer and Payne 1988), more often in the last few years (Figure 1). Migration onto the Scotian Shelf and continental shelf off Newfoundland occurs during summer and autumn when water temperatures exceed 11ºC (Sergeant *et al.* 1970; Gowans and Whitehead 1995).

Figure 1. *Distribution of common dolphin sightings from NEFSC and SEFSC shipboard and aerial surveys during the summers of 1998, 1999, 2002, 2004, 2006, 2007, 2010 and 2011 and DFO's 2007 TNASS survey. Isobaths are the 100-m, 1000-m and 4000-m depth contours.*

Westgate (2005) tested the proposed one-population-stock model using a molecular analysis of mitochondrial DNA (mtDNA), as well as a morphometric analysis of cranial specimens. Both genetic analysis and skull morphometrics failed to provide evidence ($p > 0.05$) of more than a single population in the western North Atlantic, supporting the proposed one-stock model. However, when western and eastern North Atlantic short-beaked common dolphin mtDNA and skull morphology were compared, both the cranial and mtDNA results showed evidence of restricted gene flow ($p < 0.05$) indicating that these two areas are not panmictic. Cranial specimens from the two sides of the North Atlantic differed primarily in elements associated with the rostrum. These results suggest that short-beaked common dolphins in the western North Atlantic are composed of a single panmictic group whereas gene flow between the western and eastern North Atlantic is limited (Westgate 2005, 2007).

POPULATION SIZE

The current best abundance estimate for short-beaked common dolphins off the U.S. or Canadian Atlantic coast is 173,486 (CV=0.55). This is the estimate derived from the Canadian Trans-North Atlantic Sighting Survey (TNASS) in July–August 2007 and is considered best because it covered more of the short-beaked common dolphin
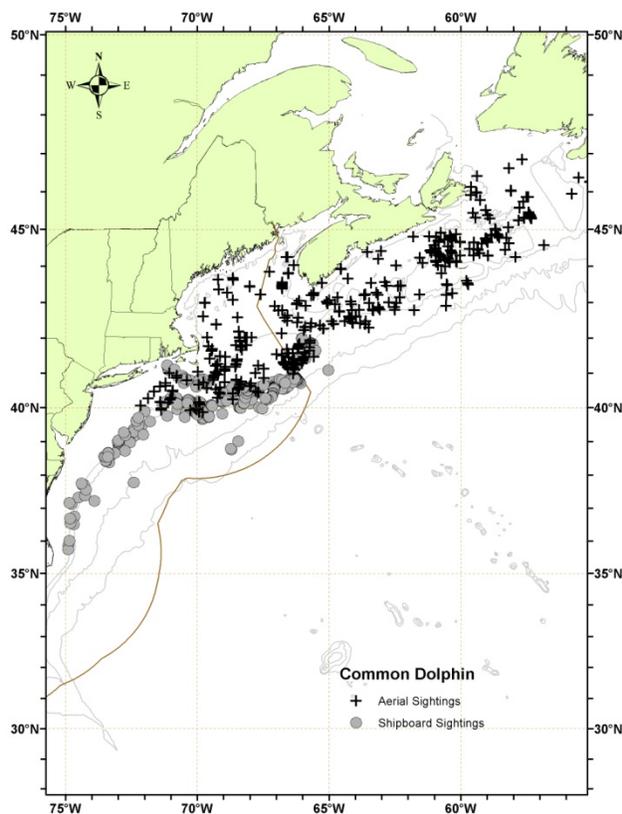
range than the other surveys.

Earlier estimates

Please see Appendix IV for a summary of abundance estimates, including earlier estimates and survey descriptions. As recommended in the GAMMS II Workshop Report (Wade and Angliss 1997), estimates older than eight years are deemed unreliable to determine a current PBR.

Recent surveys and abundance estimates

An abundance estimate of 173,486 (CV=0.55) short-beaked common dolphins was generated from the TNASS in July–August 2007 (Lawson and Gosselin 2009). This aerial survey covered waters from northern Labrador to the Scotian Shelf, providing full coverage of the Atlantic Canadian coast. The abundance estimates from this survey have been corrected for perception and availability bias, when possible. In general this involved correcting for perception bias using mark-recapture distance sampling (MRDS), and correcting for availability bias using dive/surface times, as reported in the literature, and the Laake (1997) analysis method (Lawson and Gosselin in 2011).

An abundance estimate of 67,191 (CV=0.29) short-beaked common dolphins was generated from a shipboard and aerial survey conducted during June–August 2011 (Palka 2012). The aerial portion that contributed to the estimate covered 5,313 km of tracklines that were over waters north of New Jersey from the coastline to the 100-m depth contour through the U.S. and Canadian Gulf of Maine and up to and including the lower Bay of Fundy. The shipboard portion covered 3,107 km of tracklines between central Virginia and Massachusetts in waters deeper than the 100-m depth contour out to beyond the U.S. EEZ. Both sighting platforms used a double-platform data-collection procedure, which allows estimation of abundance corrected for perception bias of the detected species (Laake and Borchers 2004). Estimation of the abundance was based on the independent-observer approach assuming point independence (Laake and Borchers 2004) and calculated using the MRDS option in the computer program Distance (version 6.0, release 2, Thomas *et al.* 2009).

An abundance estimate of 2,993 (CV=0.87) short-beaked common dolphins was generated from a shipboard survey conducted concurrently (June–August 2011) in waters between central Virginia and central Florida. This shipboard survey included shelf-break and inner continental slope waters deeper than the 50-m depth contour within the U.S. EEZ. The survey employed a double-platform visual team procedure searching with 25×150 "bigeye" binoculars. A total of 4,445 km of tracklines was surveyed, yielding 290 cetacean sightings. The majority of sightings occurred along the continental shelf break with generally lower sighting rates over the continental slope. Estimation of the abundance was based on the independent-observer approach assuming point independence (Laake and Borchers 2004) and calculated using the mark-recapture distance sampling option in the computer program Distance (version 6.0, release 2, Thomas *et al.* 2009).

Table 1. Summary of recent abundance estimates for western North Atlantic short-beaked common dolphin (*Delphinus delphis delphis*) by month, year, and area covered during each abundance survey, and resulting abundance estimate (N_{best}) and coefficient of variation (CV).

Month/Year	Area	N_{best}	CV
July-Aug 2007	N. Labrador to Scotian Shelf	173,486	0.55
Jul-Aug 2011	Central Virginia to lower Bay of Fundy	67,191	0.29
Jun-Aug 2011	Central Florida to Central Virginia	2,993	0.87
Jun-Aug 2011	Central Florida to lower Bay of Fundy (COMBINED)	70,184	0.28

Minimum Population Estimate

The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normally distributed best abundance estimate. This is equivalent to the 20th percentile of the log-normal distribution as specified by Wade and Angliss (1997). The best estimate of abundance for short-beaked common dolphins is 173,486 animals (CV=0.55) derived from the 2007 TNASS survey. The minimum population estimate for the western North Atlantic short-beaked common dolphin is 112,531.

Current Population Trend

A trend analysis has not been conducted for this stock. The statistical power to detect a trend in abundance for this stock is poor due to the relatively imprecise abundance estimates and long survey interval. For example, the power to detect a precipitous decline in abundance (i.e., 50% decrease in 15 years) with estimates of low precision (e.g., CV > 0.30) remains below 80% (alpha = 0.30) unless surveys are conducted on an annual basis (Taylor *et al.* 2007).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. Life history parameter information that could be used to estimate net productivity are there is a peak in parturition during July and August with an average birth day of 28 July. Gestation lasts about 11.7 months and lactation lasts at least a year. Given these results western North Atlantic female short-beaked common dolphins are likely on a 2-3 year calving interval. Females become sexually mature earlier (8.3 years and 200 cm) than males (9.5 years and 215 cm) as males continue to increase in size and mass. There is significant sexual dimorphism present with males being on average about 9% larger in body length (Westgate 2005; Westgate and Read 2007).

For purposes of this assessment, the maximum net productivity rate was assumed to be 0.04. This value is based on theoretical modeling showing that cetacean populations may not grow at rates much greater than 4% given the constraints of their reproductive life history (Barlow *et al.* 1995).

POTENTIAL BIOLOGICAL REMOVAL

Potential Biological Removal (PBR) is the product of minimum population size, one-half the maximum productivity rate, and a recovery factor (MMPA Sec. 3. 16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size is 112,531 animals. The maximum productivity rate is 0.04, the default value for cetaceans. The recovery factor is 0.5, the default value for stocks of unknown status and the CV of the average mortality estimate is less than 0.3 (Wade and Angliss 1997). PBR for the western North Atlantic stock of short-beaked common dolphin is 1,125.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Total annual estimated average fishery-related mortality or serious injury to this stock during 2009–2013 was 363 (CV=0.11) short-beaked common dolphins.

Fishery information

Detailed fishery information is reported in Appendix III.

Earlier Interactions

Historically, US fishery interactions have been documented with short-beaked common dolphins in the northeast and mid-Atlantic gillnet fisheries, northeast and mid-Atlantic bottom trawl fisheries, northeast and mid-Atlantic mid-water trawl fishery, and the pelagic longline fishery. See Appendix V for more information on historical takes.

Northeast Sink Gillnet

In 1990, an observer program was started by NMFS to investigate marine mammal takes in the northeast sink gillnet fishery (Appendix III). Short-beaked common dolphin bycatch in the northern Gulf of Maine occurs primarily from June to September, while in the southern Gulf of Maine, bycatch occurs from January to May and September to December. See Table 2 for bycatch estimates and observed mortality and serious injury for the current 5-year period, and Appendix V for historical bycatch information.

A study of the effects of two different hanging ratios in the bottom-set monkfish gillnet fishery on the bycatch of cetaceans and pinnipeds was conducted by NEFSC in 2009 and 2010 with 100% observer coverage. Commercial fishing vessels from Massachusetts and New Jersey were used for the study, which took place south of the Harbor Porpoise Take Reduction Team Cape Cod South Management Area (south of 40° 40´N) in February–April. Researchers purposely picked an area of historically high bycatch rates in order to have a chance of finding a significant difference. Eight research strings of fourteen nets each were fished and 159 hauls were completed during the course of the 2009–2010 study. Results showed that while a 0.33 mesh performed better at catching commercially important finfish than a 0.50 mesh, there was no statistical difference in cetacean or pinniped bycatch rates between the two hanging ratios. One short-beaked common dolphin was caught in this study south of New England in 72 hauls during 2009 and one animal was caught in 72 hauls during the 2010 experiment in the mid-

Atlantic (A.I.S., Inc. 2010). These 2 takes are included in the observed interactions and added to the total estimates in Table 2, although these animals and the fishing effort from this experiment were not included in the estimation of the bycatch rate that was expanded to the rest of the fishing effort.

Mid-Atlantic Gillnet

 Short-beaked common dolphins were taken in observed trips during most years; see Table 2 for bycatch estimates and observed mortality and serious injury for the current 5-year period, and Appendix V for historical bycatch information.

 A study of the effects of tie-downs and bycatch rates of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in both control and experimental gillnet gear operating in Statistical Area 612 (off New York and New Jersey) between 14 November and 18 December 2010 had 100% observer coverage. This experimental fishery captured 6 short-beaked common dolphins and 3 unidentified dolphins (unidentified due to lack of photos) during this time period (Fox *et al.* 2011). These 6 takes are included in the observed interactions and added to the total estimates, though these interactions and their associated fishing effort were not included in bycatch rate calculations that was expanded to the rest of the fishery (Table 2).

Northeast Bottom Trawl

 This fishery is active in New England waters in all seasons. Revised serious injury guidelines were applied for this period (Waring *et al.* 2014; 2015; Wenzel *et al*. 2015). See Table 2 for bycatch estimates and observed mortality and serious injury for the current 5-year period, and Appendix V for historical bycatch information.

Mid-Atlantic Bottom Trawl

 Revised serious injury guidelines were applied for this period (Waring *et al*. 2014, 2015; Wenzel *et al*. 2015). See Table 2 for bycatch estimates and observed mortality and serious injury for the current 5-year period, and Appendix V for historical bycatch information.

Northeast Mid-water Trawl Fishery (Including Pair Trawl)

 A short-beaked common dolphin mortality was observed in this fishery in 2010, and another in 2012 (Table 2). An expanded bycatch estimate has not been calculated so the minimum raw count is reported.

Pelagic Longline

 In only 2009, a short-beaked common dolphin mortality was observed in the pelagic longline fishery in the mid-Atlantic Bight fishing area (Garrison and Stokes 2010). See Table 2 for bycatch estimates and observed mortality and serious injury for the current 5-year period, and Appendix V for historical bycatch information.

Table 2. Summary of the incidental serious injury and mortality of North Atlantic short-beaked common dolphins (*Delphinus delphis delphis*) by commercial fishery including the years sampled, the type of data used, the annual observer coverage, the serious injuries and mortalities recorded by on-board observers, the estimated annual serious injury and mortality, the combined serious injury and mortality estimate, the estimated CV of the annual combined serious injury and mortality and the mean annual serious injury and mortality estimate (CV in parentheses).

Fishery	Years	Data Type [a]	Observer Coverage [b]	Observed Serious Injury [e]	Observed Mortality	Estimated Serious Injury	Estimated Mortality	Estimated Combined Mortality	Estimated CVs	Mean Annual Combined Mortality
Northeast Sink Gillnet [d]	09-13	Obs. Data, Trip Logbook, Allocated Dealer Data	.04, .17, .19, .15, .11	0, 0, 0, 0, 0	3, 4, 6, 6, 5	0, 0, 0, 0, 0	43, 69, 49, 95, 104	43, 69, 49, 95, 104	.77, .81, .71, .40, .46	70 (.26)

Fishery	Years	Data Type	Observer Coverage							Total
Mid-Atlantic Gillnet[d]	09-13	Obs. Data, Trip Logbook, Allocated Dealer Data	.03, .04, .02, .02, .03	0, 0, 0, 0, 0	0, 10, 3, 1, 2	0, 0, 0, 0, 0	0, 30, 29, 15, 62	0, 30, 29, 15, 62	0, .48, .53, .93, .67	27(.36)
Northeast Mid-water Trawl - Including Pair Trawl	09-13	Obs. Data Trip Logbook	.42, .54, .41, .45, .37	0, 0, 0, 0, 0	0, 1, 0, 1, 0	0, 0, 0, 0, 0	0, na, 0, na, 0	0, 1, 0, 1, 0	0, 1, 0, 1, 0	0.4
Northeast Bottom Trawl[c]	09-13	Obs. Data Trip Logbook	.09, .16, .26, .17, .15	0, 2, 0, 0, 0	5, 29, 22, 10, 4	1, 3, 2, 0, 0	23, 111, 70, 40, 17	24, 114, 72, 40, 17	.60, .32, .37, .54, .54	53.4 (.21)
Mid-Atlantic Bottom Trawl[c]	09-13	Obs. Data Trip Logbook	.05, .06, .08, .05, .06	0, 0, 1, 1, 0	12, 2, 29, 32, 24	5, 1, 8, 7, 0	162, 20, 263, 316, 269	167, 21, 271, 323, 269	.46, .96, .25, .26, .29	210.2 (.17)
Pelagic Longline	09-13	Obs. Data Logbook	.10, .08, .09, .07, .09	0, 0, 0, 0, 0	1, 0, 0, 0	0, 0, 0, 0, 0	8.5, 0, 0, 0	8.5, 0, 0, 0	1.0, 0, 0, 0	1.7 (1.0)
TOTAL										363 (.11)

a. Observer data (Obs. Data), used to measure bycatch rates, are collected within the Northeast Fisheries Observer Program and At-sea Monitoring Program. NEFSC collects landings data (unallocated Dealer Data or Allocated Dealer Data) which are used as a measure of total landings and mandatory Vessel Trip Reports (VTR) (Trip Logbook) are used to determine the spatial distribution of landings and fishing effort.
b. Observer coverage is defined as the ratio of observed to total metric tons of fish landed for the gillnet fisheries ,.and the ratio of observed to total trips for bottom trawl and Mid-Atlantic mid-water trawl (including pair trawl) fisheries. Beginning in May 2010 total observer coverage reported for bottom trawl and gillnet gear includes samples collected from the at-sea monitoring program in addition to traditional observer coverage through the Northeast Fisheries Observer Program (NEFOP).
c. Fishery related bycatch rates for years 2009–2013 were estimated using an annual stratified ratio-estimator.
d. One short-beaked common dolphin was incidentally caught in 2009 in the northeast gillnet fishery and one in 2010 in the mid-Atlantic gillnet fishery as part of a NEFSC hanging ratio study to examine the impact of gillnet hanging ratio on harbor porpoise bycatch. Six short-beaked common dolphins were caught in a study of the effects of tie-downs on Atlantic Sturgeon bycatch rates conducted in the mid-Atlantic gillnet fishery in 2010. All research takes are included in the observed interactions and added to the total estimates, though these interactions and their associated fishing effort were not included in bycatch rate calculations that was expanded to the rest of the fishery.
e. Serious injuries were evaluated for the 2009–2013 period using new guidelines and include both at-sea monitor and traditional observer data (Waring *et al.* 2014 ; 2015; Wenzel *et al.* 2015)

CANADA

Between January 1993 and December 1994, 36 Spanish deep-water trawlers, covering 74 fishing trips (4,726 fishing days and 14,211 sets), were observed in NAFO Fishing Area 3 (off the Grand Banks) (Lens 1997). A total of 47 incidental catches was recorded, which included one short-beaked common dolphin. The incidental mortality rate for short-beaked common dolphins was 0.007/set. One short-beaked common dolphin was reported as a bycatch mortality in Canadian bottom otter trawl fishing on Georges Bank in 2012 (pers. comm. Marine Animal Response Society, Nova Scotia).

Other Mortality

From 2009 to 2013, 712 short-beaked common dolphins were reported stranded between Maine and Florida (Table 3). The total includes mass-stranded short-beaked common dolphins in Massachusetts during 2009 (a total of

26 in 6 events), 2010 (a total of 30 in 8 events), 2011 (a total of 30 animals in 5 events), 2012 (23 group stranding events), and 2013 (a total of 9 in 3 events), one mass stranding in North Carolina in 2011 (4 animals), and 2 mass strandings in Virginia in 2013 (a total of 6 in 2 events). Five animals in 2009, 11 animals in 2010, 15 animals in 2011, 71 animals in 2012, and 13 in 2013 were released or last sighted alive. In 2009, six short-beaked common dolphins had indications of human interaction, 3 of which were classified as fishery interactions. In 2010, 7 animals were classified as human interactions, 2 of which were fishery interactions (all Massachusetts mass-stranded animals) and 2 of which (Rhode Island) involved animals last sighted free-swimming. In 2011, 3 animals were classified as having human interactions, 2 of which were fishery interactions (one of these was satellite-tagged and released). Twelve human interaction cases were reported in 2012 (7 in Massachusetts, 3 in New York and 2 in New Jersey), 6 of which (2 in Massachusetts, 2 in New York and 1 in New Jersey) were classified as fisheries interactions. In 2013, 10 cases were classified as human interaction, 4 of which were fishery interactions. In an analysis of mortality causes of stranded marine mammals on Cape Cod and southeastern Massachusetts between 2000 and 2006, Bogomolni (2010) reported that 61% of stranded short-beaked common dolphins were involved in mass-stranding events, and 37% of all the short-beaked common dolphin stranding mortalities were disease-related.

The Marine Animal Response Society of Nova Scotia reported one short-beaked common dolphin stranded in 2009, one (released alive) in 2010, 2 (one a fisheries interaction) in 2011, and 0 in 2012 and 2013 (Tonya Wimmer, pers. comm.).

Table 3. Short-beaked common dolphin (*Delphinus delphis delphis*) reported strandings along the U.S. Atlantic coast, 2009–2013.

STATE	2009	2010	2011	2012	2013	TOTALS
Maine	0	1	0	2	0	3
Massachusetts[a]	53	71	64	221	48	457
Rhode Island[c]	6	7	5	6	6	30
Connecticut	0	1	0	0	0	1
New York [b, c]	7	9	17	13	24	70
New Jersey[c]	6	14	9	14	19	62
Delaware[c]	4	0	1	1	3	9
Maryland	2	0	1	1	3	7
Virginia[a,c]	2	5	9	4	13	33
North Carolina[a, c]	7	6	18	0	9	40
TOTALS	87	114	124	262	125	712

a. Massachusetts mass strandings (2009 - 2,3,3,4,6,8; 2010 - 2,2,3,3,3,4,5,8; 2011-3,3,4,7,13; 2012 - 23 group events ranging from 2 to 22 animals each, 2013 - 4, 3 2). North Carolina mass stranding of 4 animals in 2011. Two mass strandings in Virginia in April 2013 - a group of 4 and a group of 2.

b. Twenty (12 dead, 8 rescued; one of the mortalities classified as human interaction) animals involved in a mass stranding in Suffolk county in 2007. Seven animals involved in 2 mass stranding events in March 2009 (six euthanized, 1 died at site, 2 had signs of fishery interation). In addition, in 2008 3 animals were relocated from the Nansemond River. Three animals (one released alive) involved in mass stranding in NJ in 2012.

c. Six human interaction cases in 2009 (2 Massachusetts, 3 Rhode Island, 1 New York), 3 of which were classified as fishery interactions (2 in Rhode Island and one in Massachusetts). Seven HI cases in 2010 (4 mortalities in MA, 2 released alive in RI, and 1 mortality in New Jersey), 2 of which (Massachusetts) were classified as fishery interactions. Three HI cases in 2011, all in Massachusetts, 2 of which were classified as fishery interactions (but one of those fishery interaction animals was released alive). Twelve HI cases in 2012 (7 in Massachusetts, 3 in New York and 2 in New Jersey), 6 of which (2 in Massachusetts, 2 in New York and 1 in New

Jersey) were classified as fisheries interactions. Ten records with indications of human interactions in 2013 (3 in New York, 1 in Rhode Island and 6 in Massachusetts), 4 of which (1 in Massachusetts and 3 in New York) were classified as fishery interactions.

Stranding data probably underestimate the extent of fishery-related mortality and serious injury because all of the marine mammals that die or are seriously injured may not wash ashore, nor will all of those that do wash ashore necessarily show signs of entanglement or other fishery interaction. Finally, the level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of fishery interaction. However a recently published human interaction manual (Barco and Moore 2013) and case criteria for human interaction determinations (Moore *at al.* 2013) should help with this.

STATUS OF STOCK

Short-beaked common dolphins are not listed as threatened or endangered under the Endangered Species Act, and the Western North Atlantic stock is not considered strategic under the Marine Mammal Protection Act. The 2009–2013 average annual human-related mortality does not exceed PBR. The total U.S. fishery-related mortality and serious injury for this stock is not less than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate. The status of short-beaked common dolphins, relative to OSP, in the U.S. Atlantic EEZ is unknown. Population trends for this species have not been investigated.

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