

**Monitoring Endangered Right Whales
in Coastal Waters of Northeast Florida
by a Volunteer-Based Citizens Network**

2022–23 Season

Annual Report to:

Volunteers, Colleagues, Collaborators, and Sponsors

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Preface

Our understanding of the right whale population is changing. For two decades the estimated population grew at an annual rate of 2 to 2.5%. By the year 2010, the estimated population size had nearly doubled. Then, during the period 2015 to 2019, a dramatic increase in mortalities was reported, resulting in a downward trajectory for the population estimates. At the annual meeting of the North Atlantic Right Whale Consortium, 24–25 October 2023, the estimate for the year ending December 31, 2022 was given as 356 (+7/-10). In the keynote address, Scott Kraus, Consortium President, described that when additional data are incorporated, the trajectory could be flat. If indeed, births exceed mortalities in the coming years, we can cautiously look for the estimates to increase, possibly suggesting a rebound. Might we speculate that natural biological variability, the resilience of the whales, and human efforts have contributed?

1.0 Introduction

The Marineland Right Whale Project was initiated in 2001 and completed its 23rd field season in March 2023. It is one of about a dozen programs and organizations extending from Canada to Florida dedicated to the science and conservation of the North Atlantic right whale, *Eubalaena glacialis*. After wide concern about a decreasing population since 2015, our 2021 report described a slowly increasing trend in the 1) number of sightings by the Marineland group, and 2) annual calf production. For the 2022 season, neither the number of MRWP sightings nor the overall calf production was as high as in the 2021 season (the increase did not continue).

As we entered the 2023 season, we hoped for the best—a strong calf count with perhaps an increase. In the 2023 season (defined as November 2022 through April 2023), 11 calves were born (a 12th calf died within days of birth). The hoped-for increase (which we might take as evidence of a rebound) did not materialize. On the other hand, there were bright spots. Female catalog #1204, > 41 years of age, had her 10th calf, with only a four-year interval between this and her previous calf. At the other end of the spectrum, female #4340, 10 years of age, had her first calf. First-time mothers are recorded with enthusiasm, as evidence of additional reproductive females being brought into the population. A sobering note, however, is that the average calving interval was 7.8 years—a number that continues to be greater than the 3.5 year interval recorded during better times.

For the 2023 season, the effects of the COVID-19 pandemic were diminished, and a mostly normal program took place. As in the several previous years, the efforts of the 175+ volunteers were enhanced by the use of unmanned aerial systems (UASs), more commonly referred to as drones. The education and outreach component included mentoring of Kyriaki (Kiki) Gavriil, Byram Hills High School, Armonk NY, in the Authentic Science Research Program.

2.0 Methods

2.1 Overview

During the course of 23 seasons, the volunteer sighting network has evolved, and refinements and innovation have been incorporated. In its present form, a number of interrelated components have proven essential to success:

- Dedicated survey teams
 - * Mobile
 - * Stationary (Community/Condo)
- Opportunistic sightings
- Right Whale Hotline
- Response teams
- Drone photos and videos
- Timely and effective communication with volunteers and collaborators
- Education and outreach
- Collaboration
- Data processing, analyses, synthesis, and presentation

The volunteer handbook, which provides essential information on right whale biology and survey protocols, is posted on the website: www.aswh.org.

2.2 Study Area and Sectors

The study area, monitored with a combination of a shore-based sighting network and the complementary drone flights, is in the near-shore waters of northeastern Florida between Ponte Vedra Beach (latitude 30°10'N) and Canaveral Seashore (28°56'N), within 5 nautical miles (nmi) of the coast (Figure 1). This ~70nmi section is subdivided into seven sectors, each ~10 nmi in latitudinal extent. The shore-based monitoring extends south to Ponce Inlet (29°04'N), while some opportunistic monitoring extends farther south to Canaveral Seashore. (Note, in 2023, an additional sector was added to the north end of our monitoring area to include Ponte Vedra Beach.)

2.3 Sighting Protocols

Sightings, photo documentation, and data collection are based on interrelated sources and responses. The initial sightings are made almost exclusively from the shore. The response, extended observations, and photographs may be from the shore, or air (drone), or a combination. Throughout, there are standardized search effort and data collection protocols. This includes

photo documentation and photo-identification, which are essential to monitoring and data collection. The results are optimized through communication, collaboration, and by utilizing multiple platforms.

2.4 Shore-Based Lookouts

As described, the study area is divided into seven sectors. A shore-based volunteer sighting network works with experienced scientists. The volunteer sighting network includes two components: 1) scheduled, and 2) opportunistic observers. The scheduled observers, typically teams of two to four volunteers, are of two types: a) mobile and b) stationary. The mobile teams meet at 0800 hr at a designated point and travel by vehicle to a series of lookout stations where a 15-minute search is conducted at each. At the end of the series (typically five stations per team), they reverse the search and end back at the starting point.

The stationary teams (typically based in shore-front condos or housing communities) maintain lookouts from dune walkovers, or the balconies of shorefront buildings. In both cases, most watches are concluded by 1200 hr.

The opportunistic observers are residents and/or workers who have been provided information and the sighting-report hotline number; they report sightings made during the course of normal recreation or work. Opportunistic observers include, for example, the Volusia County Beach Patrol. (Wallet-size phone cards are widely distributed.)

The 175+ member volunteer sighting network and its several components provides effective coverage of our ~ 70 nmi section of coastal habitat.

2.5 Response Teams

A central location (the office in Marineland) is manned during daylight hours and is linked to the central call-in hotline maintained by the Marine Resources Council. When a sighting is reported, a response team that includes experienced scientists and volunteers is deployed. The response team carries portable GPS units (Garmin 12XL or similar) and digital cameras with long lenses (*e.g.*, Canon EOS 60D with a Canon EF 600-mm image-stabilized f 4.0 telephoto lens fitted with either a 1.5 or 2.0 Canon telextender). On many occasions, the response includes a drone and drone operator.

Standardized protocols are followed for data collection. Bearings are measured using binoculars with built-in compasses (*e.g.*, Nikon OceanPro 7X50 Model #7441). Ranges are

estimated visually by experienced observers based on calibration and training trials. Data and sighting sheets are standardized and reviewed for quality control. Whenever possible, whale locations are recorded by the GPS function of the drone; otherwise they are estimated from shore.

2.6 Unmanned Aerial Systems (UASs)

Since the 2016 season, drones (unmanned aerial systems or UASs) replaced the airplane that we flew from 2007 through 2017. The MRWP currently has three drones, two DJI Phantom 3 Pros, and a DJI Phantom Pro 4 v.2. In addition, four volunteers operate a DJI Phantom Pro 4 v.2, a DJI Phantom 3, and a DJI Mavic 2 Pro. With a total of five drones and five operators, the plan is that for any given sighting event, at least two will be available. All drones are registered with the Federal Aviation Administration (FAA). As we are considered to be a commercial operation (*e.g.*, includes scientific research) under CFR 14, Part 107, three of our operators have an FAA Remote Pilot Certificate. Four of our operators are listed in our NOAA/NMFS research permit, #26562.

Because of the proximity of several coastal airports to our study area, we have applied for, and received, FAA airspace waivers for Northeast Florida Regional (SGJ), Flagler (FIN), and Ormond (OMN) airports. (This waiver provides for operations within five nautical miles of the airport). In addition, we have the AirMap app on our mobile phones to utilize the Low Altitude Authorization Capability (LAANC) and provide for operation within five nmi of Daytona Beach International (DAB). In the future, we will apply for authorization for New Smyrna Beach (EVB). The Canaveral Seashore National Park is closed to drone operations, making this section of the coast unavailable.

The protocol for drone use in the course of our work is as follows: When a sighting is reported, a response team is deployed. This will typically include one or more drone operators. An assessment will be made as to weather and sea state conditions, as well as the distance from shore to the whale(s)—*i.e.*, is it reasonably within range? This will determine our response options. If warranted, a drone will be deployed to first obtain high-quality identification photos and second, to record video that will contribute to behavioral studies. As detailed in our NOAA/NMFS permit, operators and assistants wear vests identifying them to the public as researchers. In many cases, images will be sent to members of Florida's Fish and Wildlife Conservation Commission (FWC) Team for assessment in decisions about darting and boat/aircraft deployment. Likewise, if conditions or distance preclude a drone launch, this information will be relayed so that FWC has the option of deploying their aircraft for photo-ID.

2.7 Monitoring for Human-impacted Individuals

In the field and during photo archiving and analysis, particular attention is paid to noting and documenting human-impacted individuals. Impacts or potential impacts include ship/boat collisions, fishing gear entanglement, and harassment by boaters, paddle boarders/surfers, and jet skiers

Data and photo documentation are submitted to NOAA law enforcement, the Whale-Vessel-Interaction database maintained by FWC, as well as the database and photo catalog maintained by the New England Aquarium, Boston, Massachusetts.

2.8 Phone Notification System

The phone notification system, which was implemented several years ago, has proven to be a success. The system was temporarily discontinued in 2020–21 due to the pandemic to avoid groups gathering at a sighting location. The volunteers were advised and were understanding. When the system is operating, we contract with One Call Now, an automated telephone messaging service, to facilitate fast, efficient, and complete notification of survey team members during whale sightings. After importing the team members' names and contact numbers, One Call Now allows us to create a voice message and deliver it to certain sectors, or, to the entire list, within 20 minutes. Volunteers either answer the call live and hear the message, or, the service leaves a voice mail. Having the opportunity to see right whales is a high-priority goal, both as a reward for the volunteers' assistance, and, to help new volunteers establish their right-whale sight image for better detection/species identification during surveys and follows. An additional function of the phone network is to advise volunteers on weather conditions and changes to the survey schedule.

2.9 Sea-Surface-Temperature (SST)

Sea-surface temperature (SST) satellite images are received daily from the Naval Oceanographic Office, Stennis Space Center, Mississippi. The images are based on Advanced Very High Resolution Radiometer (AVHRR) reflective measurements interpolated, averaged, and analyzed within a 10 km (~5 nmi) grid. The SST value is ground-truthed with drifting buoys. The error estimate for the images with reference to the buoys is described as ± 0.5 degrees. In parallel, for a nearshore fine-grain measurement, we use the SAUF1 National Data Buoy Station at the end of the St. Augustine Pier. Data are posted on the National Data Buoy Center website (Station SAUF1-St. Augustine, Florida), and are available for download.

2.10 Outreach and Education

Engaging citizens and community is an important part of our core mission. Training and orientation sessions are given to volunteers and potential volunteers prior to and at the beginning of the season. As the season progresses, updates with information and results are scheduled. We also give public talks, and respond to media requests, both print and television. We also partner with other organizations, *e.g.*, the Marineland Dolphin Adventure in Marineland, Florida and Blue Ocean Society, in Portsmouth, New Hampshire.

An additional item, new for the season, was added to the outreach and education component. We mentored Kiriaki Gavriil, Byram Hills H.S., Armonk, New York, in her Authentic Science Research Program.

2.11 Data and Photo Analysis, and Submission

As is the custom, the right whale data and photos are submitted to the database and photo catalog maintained by the New England Aquarium. The humpback whale data and photos are submitted to FWC, and subsequently to the Center for Coastal Studies, Provincetown, Massachusetts.

3.0 Results

3.1 Sighting Effort

Cautions resulting from the COVID-19 pandemic were diminished this season, and lookouts and monitoring continued. The shore-based dedicated lookouts were active from Wednesday, 4 January through Sunday, 12 March 2023. The network included ~ 175 volunteers monitoring a 70-nautical mile section of coastline from Ponte Vedra Beach to New Smyrna Beach. Conservatively estimated, 3,000 hours of volunteer sighting effort took place.

3.2 Right Whale Sightings 2022-23

3.2.1 Overall Sighting Summary

In the 2022-23 SEUS season, the Marineland Right Whale Project and our partner organization, the Marine Resources Council, received and responded to 27 right whale sightings (Table 1, Figure 1), and 4 humpback whale sightings (Table 1). The first sighting of the season in

our shared monitoring territory was mother-calf (MC) *Pilgrim*, Catalog #4340, off Canaveral Seashore on 30 December 2022.

An additional plot variant, based on Google Earth, shows the verified sightings by the MRWP during the 2022-23 season (Figure 2). The first and most frequent sighting in the MRWP area was *Archipelago*, #3370, with her third calf (Figure 3). We had eight sightings of this pair within five consecutive days, 8 through 12 January.

Beyond that, we sighted a number of single right whales. On 10 January, Team 1N (the northernmost team) sighted a yearling, the 2022 calf of #3430. It was also seen on 11 January off Beverly Beach. On 31 January, another yearling, the 2022 calf of #2753, was sighted by Team 3 at their first stop, at 8:05 a.m. on a Tuesday morning. Finally, a boater reported a sighting off St. Augustine on the morning of 2 February. This individual has been identified as another yearling, the 2022 calf of #1245. As the day progressed, another single, provisionally identified as #4980, a 4-year-old male, was seen off Marineland, and late in the day, off Flagler Beach.

No groups of ≥ 3 were sighted in our area this season.

This season included a number of beach-cast animals. On 26 January, Team 1N discovered an ocean sunfish, *Mola mola*, off Ponte Vedra. On 11 January, a dead beached female killer whale, *Orcinus orca*, came ashore at Jungle Hut Road. And, late in the season, on Friday, 24 March, a 16-ft long female Gervais' beaked whale, *Mesoplodon europaeus*, beached at South Flagler Beach. Both the killer whale and the beaked whale were recovered by stranding specialists from Hubbs SeaWorld.

3.2.2 UAS Assisted Sightings

The use of shore-launched drones considerably enhanced the efficacy of the shore-based sighting network. The Marineland Right Whale Project had 11 days with successful drone flights, 8 January through 2 February. Similarly, our partners, the Marine Resources Council team, had 5 days with successful drone flights.

3.2.3 Human Impacts

The Marineland Right Whale Project recorded one instance of human impacts in the 2023 season. On 10 January, two paddle boarders approached MC #3370 off Daytona Beach. We documented the event, and alerted the Beach Patrol who responded immediately. Afterwards we met with the Beach Patrol and wrote a follow-up letter.

Our partners, the Marine Resources Council, obtained video of boater harassment on MC pair #4340, *Pilgrim*, on 2 January off Sebastian Inlet.

3.3 Sea Surface Temperature

As has been our practice for more than a decade, daily sea-surface temperature plots were obtained from NAVOCEANO, Stennis Space Center, Mississippi. Water temperature data were also downloaded from the NOAA National Data Buoy Center monitoring site on the St. Augustine pier. Analyses are underway.

3.4 Collaboration with the Florida Fish and Wildlife Conservation Commission Team

We collaborate and communicate with other groups on a near-daily basis. This includes the Florida Fish and Wildlife Conservation Commission team. This collaboration includes several components, among them the genetic sampling of calves. The collaboration took place on two occasions ([Table 1](#)).

3.5 Professional meetings and participation

The MRWP provided summary information for a presentation at the Southeast U.S. right whale implementation team (SEIT) meeting on 10 May 2023.

We attended the annual meeting of the North Atlantic Right Whale Consortium, 24-26 October 2023, in Halifax, Nova Scotia.

3.6 Training and Public Outreach

As the constraints surrounding the COVID-19 pandemic diminished, we were able to return to our usual three volunteer sessions: a season opener and training, a mid-season review, and a season-end summary and review ([Table 2](#)).

As with gatherings, our public presentations were mostly resumed this year. Likewise, with appropriate precautions, we gave a number of talks ([Table 2](#)). We continued to support the right whale display at the Flagler Beach Museum.

Sharing images, videos, and results with our volunteers is central to the program. To this end, we prepared a summary video for the 2023 season, *2023 Volunteer Teams* (runtime 5 minutes). This is on the YouTube channel of the Marineland Right Whale Project.

Over the course of the season, we worked with student video productions (Flagler College, University of North Florida) and local TV stations (First Coast News).

As described in our previous Final report (27 December 2022), we participated in the Florida showing of the right whale documentary, *Last of the Right Whales*. In 2023, this has been edited into a PBS NOVA program, trimmed in length to 53 minutes, and renamed “*Saving the Right Whale*.” The DVD is available from PBS/Store and, for PBS Passport members, by streaming. In Canada, it was trimmed to 43 minutes and appeared on CBC television’s *The Nature of Things* and is available to stream for free in Canada via *CBC Gem*.

New for us this year, on 1 June 2022, we entered into an agreement with sophomore Kyriaki Gavriil and her faculty advisor, Megan Salomone, Byram Hills H.S., Armonk, NY, for mentoring in the Authentic Science Research Program. Email and phone call exchanges followed. The project focus is: *Behavior and sociality in whales and their conservation implications*. Kiki worked with us during 18–24 February 2023 at our field site. With the assistance of FWC staff, we arranged for her to visit the survey aircraft and the FWC field station. The review and interactions continued, and on Wednesday, 7 June, Dr. Hain attended the science symposium and poster session at Byram Hills H.S. (Figure 4). The interaction and coaching is ongoing. A paper has been prepared, and was submitted in November. In the spring of 2024, Kiki will participate in the Regeneron Westchester Science and Engineering Fair.

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3.7 Disposition of Data

The submission of data and photographs to the Right Whale Catalog at the New England Aquarium, Boston, Massachusetts, took place on 3 April 2023. Digital archiving of data, images, videos, and reports is continuing. Our intentionally redundant backup system consists of two multi-Terabyte external hard drives.

4.0 Discussion and Conclusions

The Marineland Right Whale Project continues to be a valuable contributor to right whale science and conservation. The experienced volunteers provide resources, skills, dedication, and experience.

One of the important products of the program is the submission of photographs and data to the Right Whale Catalog (rwcatalog.neaq.org), the collective database and archive maintained by the New England Aquarium, Boston, Massachusetts. During the 23 years of the program, the number of sightings, and the corresponding photo/data submission has varied widely (Figure 5). The number of sightings by the MRWP ranged from 63 in 2010 down to 0 in 2017 and 2018. The overall mean was 23, with a median of 12.

The waters of the SEUS are the principal (but not the only) calving grounds for the North Atlantic right whale. (For example, one of the 2023 mothers, #4340, *Pilgrim*, was apparently born in Cape Cod Bay in January 2013—one of several births reported from outside the SEUS calving grounds.) Regarding the SEUS, in the 23 years of the MRWP to date, 67 mother-calf right whales have been recorded. The majority have only been seen once, in a single year. On the other hand, 30% were seen multiple times per year and in multiple years.

Similarly, 98 individual whales were observed participating in surface-active groups (SAGs). The majority were only sighted in a single year; 12 were sighted in SAGs in several years. Here, all options seemed to occur: Catalog #3460, seen in SAGS in four years, is a male; #3725, is a non-calving female; and #4040, *Chimineia*, turned out to be a calving female in a subsequent year.

Finally, another useful indicator of the status and recovery of the right whale population is the annual calving reports (Figure 6). Variability occurred during decades of monitoring. Strong calving took place in the 2000 to 2011 period. A general decline followed. All involved look to a rebound in the coming season.

Modeling of the right whale population size may provide the “proof in the pudding” (Figure 7). The estimate for the most current year to which the modeling applies is 2022. Here, the population trajectory shows a leveling, with the speculation that as additional data are considered, the trend line may indeed return to an upward slant. On both counts, as the 2024 calving season begins, we hope for a population increase and rebound.

Two final thoughts:

- * Our collective efforts are aimed at the co-existence of whales and humans.
- * While we study whale behavior, we recognize that it isn't whale behavior that we can/wish to change. Instead, we wish to apply what we've learned about whales, so as to encourage changes in human behavior—leading us back to successful co-existence.

Acknowledgments

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Format here Table 1. Sighting summary 2022-2023 season for the Volunteer Sighting Network, collaborative reports of the Marineland Right Whale Project, the Marine Resources Council, and the Florida Fish and Wildlife Research Institute.

Date	Day	Time	Location	Lat	Long	Species/ Class	Hdg	Pager #	Notes (Who sighted, etc.)	Verified?/ Photos?	Provisional ID
30 Dec	Fri	16:49	Canaveral Nat. Seashore	28 51.5	80 46.5	M/C	S	VSN001 MRC	Julie Albert Joel Cohen	Yes-still photos only	#4340/Pilgrim
02 Jan	Mon	09:41	Mlb. Bch; Sebastian Inlet	27 54.1	80 28.1	M/C	S	VSN002 MRC	Julie Albert Joel Cohen; FWC team biopsied	photos/ drone & public	#4340/Pilgrim
02 Jan	Mon	11:02	Ossabaw Isl., Georgia	31 44.3	80 46.8	1 AD	Unk.	VSN003 MRC	Citizen sighting		
02 Jan	Mon	13:40	Vero Beach	27 50.1	80 24.0	M/C	S	RSRCH003; updated position	Tom, Katie, Angie(?) ; harassment	Yes	#4340/Pilgrim (darted calf)/TV interview
04 Jan	Wed	09:46	Jensen Beach	27 17.5	80 12.7	M/C	S	VSN004 MRC	Julie Albert Joel Cohen		#4340/Pilgrim
04 Jan	Wed	17:16 (1616 ?)	Jensen Bch (update)	27 12.9	80 10.4	M/C	S	VSN005 MRC	Steve Burton HBOI	Yes	#4340/Pilgrim
07 Jan	Sat		St. Augustine pier			HUWH		N/R	Team 1, Beth Taylor, Nancy Hill	N	Brief sighting ventral fluke
08 Jan	Sat	18:05	Hobe Sound	27 03.3	80 06.4	M/C	NONE	VSN006 MRC	Julie Albert Joel Cohen		#4340/Pilgrim

08 Jan	Sun	09:01	Crescent Beach	29 46.6	81 15.0	M/C	None	VSN007 MLD	Public report to FWC; T1 verified, SLE drone; direct FWC vessel to dart calf	Yes	#3370 Archipelago
08 Jan	Sun		Salt Run						Cindy Alyea called	Y	Dead <i>Kogia</i> , pygmy sperm whale
09 Jan	Mon	09:30	Flagler Beach	29 29.4	81 07.7	M/C	S	VSN008 MLD	Sara drone, Jack Dewhurst drone	No	#3370 Archipelago
09 Jan	Mon	14:40	Flagler Beach	29 26.9	81 06.5	M/C	S	VSN009 MLD	Updated location		#3370 Archipelago
09 Jan	Mon	16:40	Flagler Beach	29 25.9	81 06.1	M/C	S	VSN010 MLD	Dale & Peach	Yes, final location	#3370 Archipelago
10 Jan	Tues	09:57	Daytona Beach	29 13.1	80 59.4	M/C	S	VSN011 MLD	SLE, drone	Y	#3370 Archipelago
10 Jan	Tues	11:54	Ponte Vedra	30 05.9	81 10.0	SING	STA	FLWS018	Team 1N, FWC also, FWC darted late in day		Yearling, 2022 calf of #3430
11 Jan	Wed	06:30	Jungle Hut	29 36.0	81 10.5	Orca			Sara, Rick & Jan Watkins, others	Y	Stranded <i>Orcinus orca</i>
11 Jan	Wed	11:37	Ormond-by-the-Sea	29 20.0	81 02.8	M/C	N	VSN012 MLD	Jim, Trish, Joyce	Y	#3370 Archipelago
11 Jan	Wed	11:43	Beverly Beach	29 31.7	81 08.7	SING	S	VSN013 MLD	SLE	Y	Yearling, 2022 calf of #3430

11 Jan	Wed	18:01	Juno Beach	26 53.4	80 02.6	M/C	NONE	VSN014 FWC	Julie/Joel there, FWC verified 1 st ; spoke to 5 drone pilots incl. Jim Abernethy	Yes, drone; spoke to 5 other pilots incl Jim Abernethy	#4340 Pilgrim
12 Jan	Thurs	08:54	Ocean Hammock	29 36.1	81 10.3	M/C	N	VSN015 MLD	SLE drone	Y	#3370 Archipelago
12 Jan	Thurs	14:10	Surf Club	29 39.0	81 11.3	M/C	N	VSN016 MLD	SLE	Y	#3370 Archipelago
17 Jan	Thurs	11:35	Wabasso/ Vero Beach	27 45.8	80 23.7	M/C	NONE	VSN017 MRC	Julie Albert Joel Cohen	Yes, drone	#4340 Pilgrim
17 Jan	Tues	16:35	Wabasso/ Disney Vero	27 45.6	80 23.5	M/C	NONE	VSN018 MRC	J&J (USCGAux talk?)	YES?	(Likely) Pilgrim No photos?
17 Jan	Tues	17:48	Nautilus condo,	29 25.9	81 05.6	SING		Not paged	Dale & Peach	N	No ID
18 Jan	Wed	09:21	CNS/NSB Playalinda	29 00.3	80 52.3	1 AD	S	VSN019 MRC		Never?	Possible 2022 calf of #3430; yearling?
18 Jan	Wed	17:09	Indian River Shores	27 44.7	80 23.1	M/C	NONE	VSN020 MRC	??	??	??
18 Jan	Wed	15:15	CNS Playalinda	28 40.2	80 38.3	1 AD	S	VSN021 MRC	Julie Albert Joel Cohen	Never found?	
19 Jan	Thurs	08:15	Vero Bch	27 41.0	80 21.7	M/C	NONE	VSN022 MRC	Celeste/Joe		Prob Pilgrim
21 Jan	Sat		Indialantic				N	Not paged	Julie Albert Joel Cohen	Never found; STPS photos	

23 Jan	Mon	10:30	CNS Merrit Island side	28 41.9	80 39.7	M/C report	S	VSN023 MRC	Julie Albert Joel Cohen	Never found	
26 Jan	Thur	08:23	Ponte Vedra	30 04.6	81 20.1	Ocean sunfish			Team 1N	Beached	Ocean sunfish <i>Mola mola</i>
31 Jan	Tues	09:40	Ormond Beach	29 24.6	81 05.1	SING	S	VSN024 MLD	SLE drone	Y	Yearling, 2022 calf of #2753
2 Feb	Thur	09:14	St. Augustine inlet	29 54.1	81 15.3	SING	S		Mike Alyea relays call from boater		
2 Feb	Thur	10:45	Crescent Beach	29 47.5	81 13.7	SING	S	FLWS042	relay to FWC (FLWS042), 12:05 and again at 13:57	Y, video	Yearling, 2022 calf of #1245
02 Feb	Thurs	13:30	Marineland /St. Aug	29 39.9	81 12.2	1 AD	S	VSN025 MLD	At 17:40. off Flagler Beach	Y	Provisional, #4980, 4 yr-old male
03 Feb	Fri	16:55	Fernandina/ Amelia Isl.	30 39.5	81 25.8	1 AD	NONE	VSN026 MRC	??	??	??
04 Feb	Sat	15:00	Melbourne Beach	27 49.4	80 25.4	1 AD	S	VSN027 MRC	J&J, Celeste, Steve Mc.	N	
17 Feb	Fri	18:00	St. Augustine	29 51.3	81 15.6	SING	UNK	OTHER175	No response	video on Facebook	UNK
21 Feb	Tues	15:55	Ponte Vedra Beach	30 13.5	81 22.2	HUWH, SING	SE	VSN028 MLD	Public call to FWC; Shea Lox verified	N	Humpback
5 Mar	Tues	10:05	Ponte Vedra Beach, GTM	30 04.4	81 20.0	HUWH, SING	SE	VSN029 MLD	T1N Wende & Samara	Y	Humpback

5 Mar	Sun	18:42	Ponte Vedra Beach	29 58.1	81 18.2	HUWH, SING	NONE	VSN030 MLD	public report to FWC; Shea & Curt Lox verify	Y	Humpback
6 Mar	Mon	18:20	outside of St. Aug inlet	29 54.9	81 15.1	HUWH, SING	NONE	VSN031 MRC	FWC lieutenant on a boat, sent photos & video to Julie	Y	Humpback
24 Mar	Fri	14:00	Flagler Beach S						Gamble Rogers volunteer, relay Stephanie York, Hubbs SeaWorld respond	Y	Gervais' beaked whale, <i>Mesoplodon europaeus</i>

Table 2. Presentations to groups and organizations, 2023 season

A: Volunteer Recruitment/Training/Informational

Date	Presenter	Detail
3 Jan	Jim Hain, Sara Ellis	Season Opener event, Whitney Lab, Marineland, FL, 125 attendees.
11 Feb	Jim Hain, Sara Ellis	Mid-season event, Whitney Lab, Marineland, FL, 80 attendees.
18 Mar	Jim Hain, Sara Ellis	End-of-season event, Whitney Lab, Marineland, FL, 103 attendees.

B: Public Education/Outreach

Date	Presenter	Detail
24 Jan	Jeannie Cardany	“The Green Team” Bartram Springs Middle School
26 Jan	Terran McGinnis	“All about Right Whales”, Ocean Art Gallery, Ormond Beach
4 Feb	Sara Ellis	Gamble Rogers State Park, 30 attendees.
6 Feb	Jack Dewhurst	South Wood Elementary School, St. Johns County, “Drones and Whales”, 6 groups of 30-40 students in each group.
16 Feb	Terran McGinnis	St. Augustine Ocean & Racquet Club, 30 attendees.
16 Feb	Sara Ellis	Porto Fino Social Room, Hammock Dunes, 24 attendees.
18 Feb	Terran McGinnis, Sara Ellis	Beach Walk, Marine mammals of northeast Florida, Lifelong Learning Institute, Flagler College
7 Mar	Kim Jacomo, Shea Lox	Interview, First Coast News
~ 23 Mar	Kim Jacomo, Shea Lox	Contribute material for GTM newsletter article
22 Mar	Sara Ellis	Interview, Suzie Mabry, UNF film group
22 Mar	Sara Ellis	Webex webinar meeting, Bank of America employee environmental group, 88 participants.

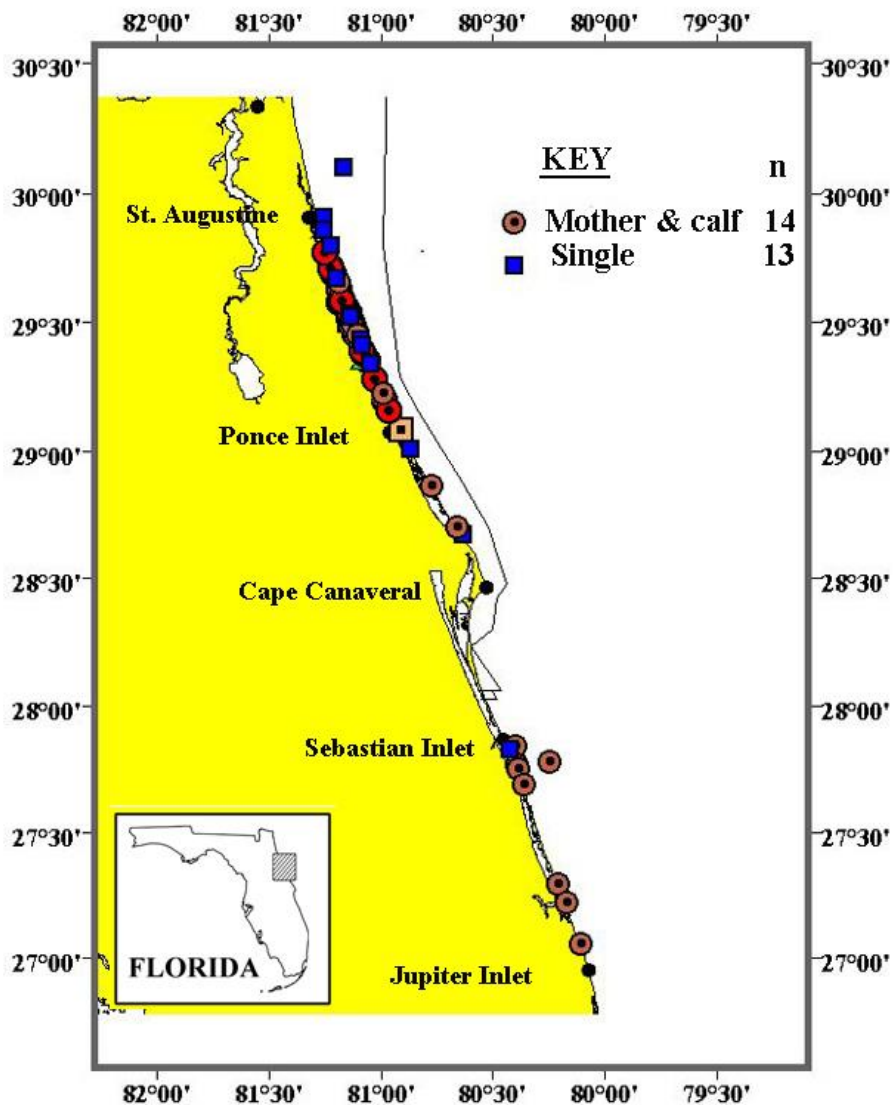


Figure 1. Verified right whale sightings during the 2022–23 SEUS season by the volunteer sighting network, through the combined efforts of the Marine Resources Council and the Marineland Right Whale Project. The boundary of the right whale critical habitat is shown seaward of the coastline.

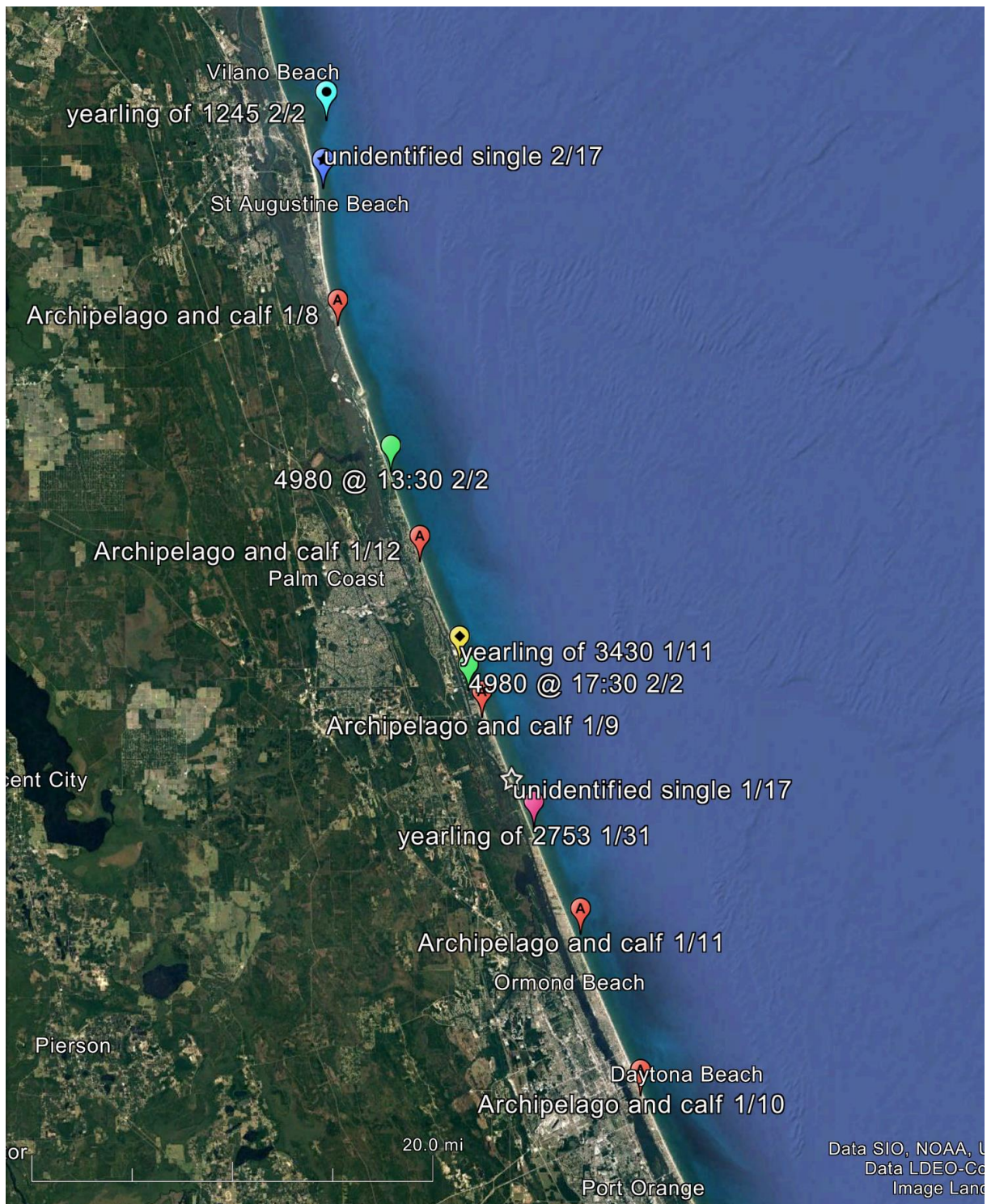


Figure 2. Identified sightings of right whales in the MRWP study area during the 2023 season.



Figure 3. Female #3370, *Archipelago*, with her 3rd calf. Drone image at 10:50 a.m. off Ocean Hammock, Palm Coast, on 12 January 2023. NOAA/NMFS research permit #26562. Drone operator and photo: Sara Ellis.



Figure 4. As part of our 2023 education and outreach component, we mentored Kyriaki (Kiki) Gavriil from Byram Hills H.S., Armonk, NY. She worked with us at the Marineland Right Whale Project field station, 18–24 February 2023. She worked along-side staff and volunteers. On 7 June 2023, Dr. Hain attended the school’s science symposium and provided feedback. Exchanges and reviews are ongoing.

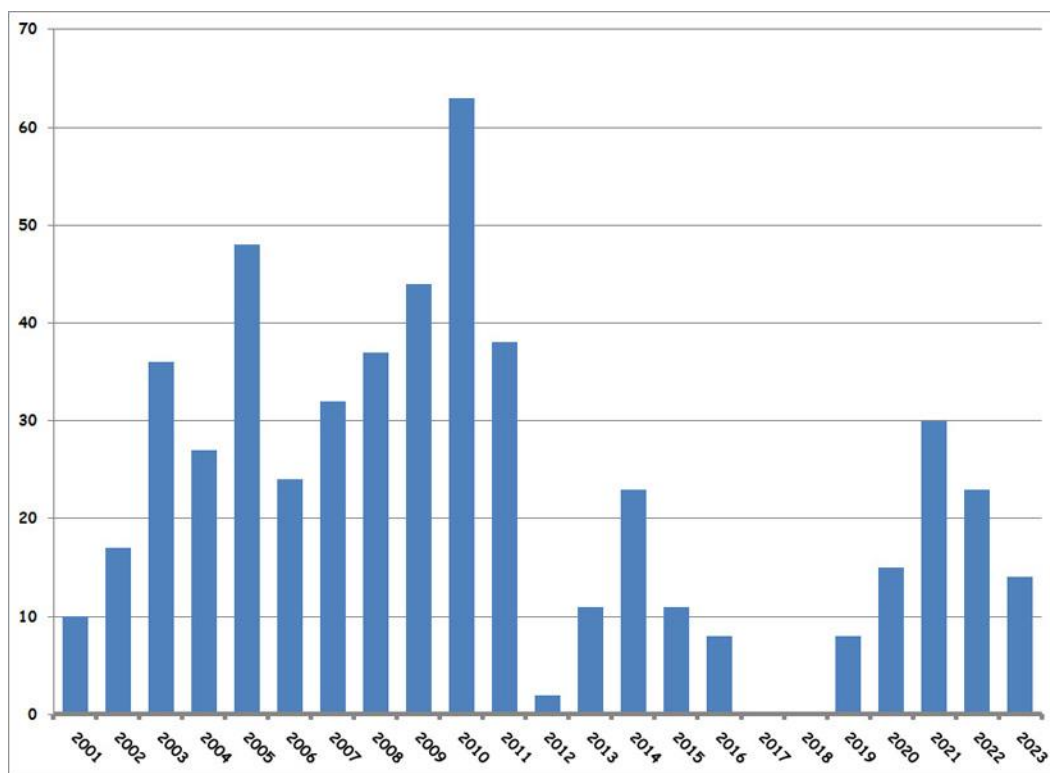


Figure 5. Verified right whale sightings by the Marineland Right Whale Project, 2001 through 2023.

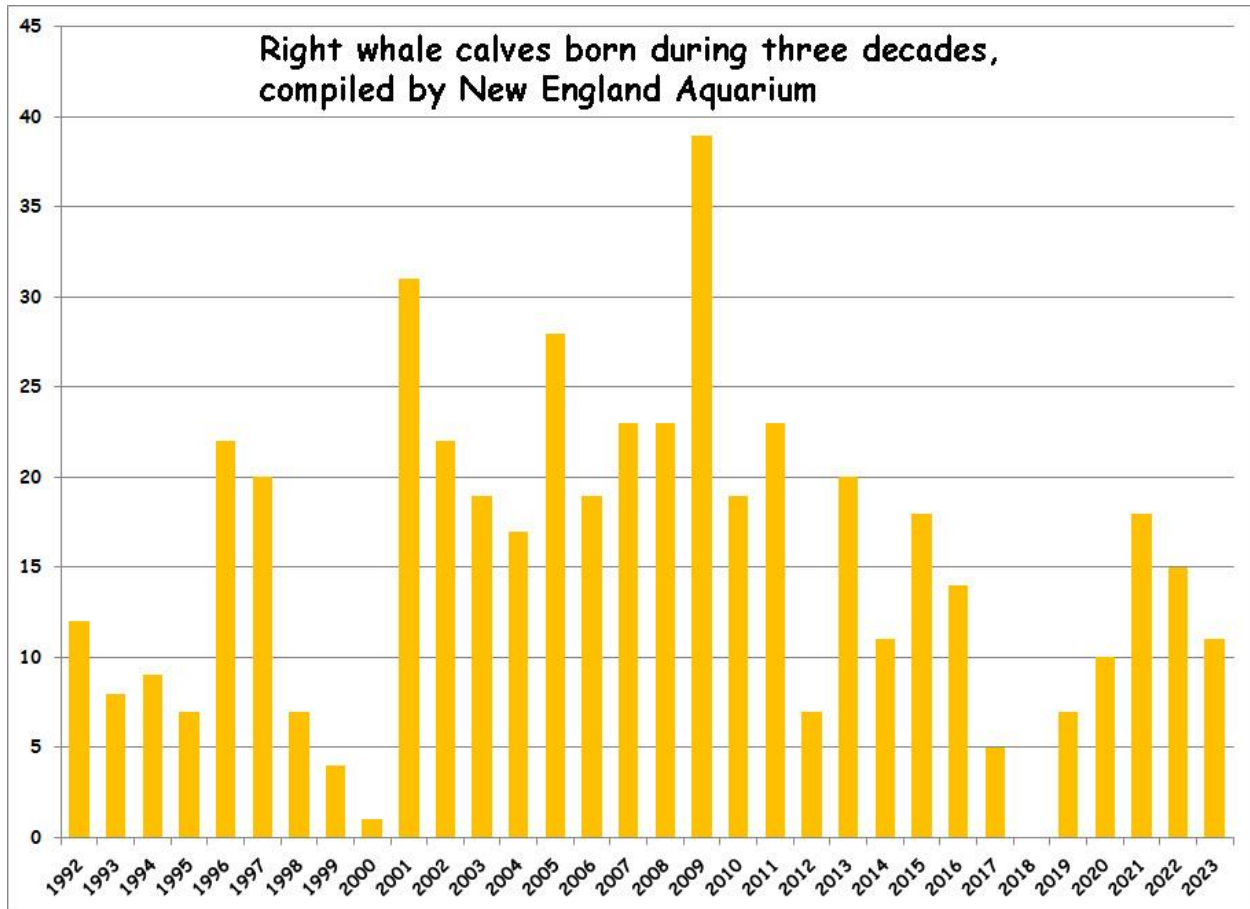


Figure 6. Right whale calf births during three decades. Large variability occurs throughout. In three years, from 2019 to 2021, there was a hint of a rebound. However, in the two following years, a decline took place. We look to the 2023-24 season for increased calf production.

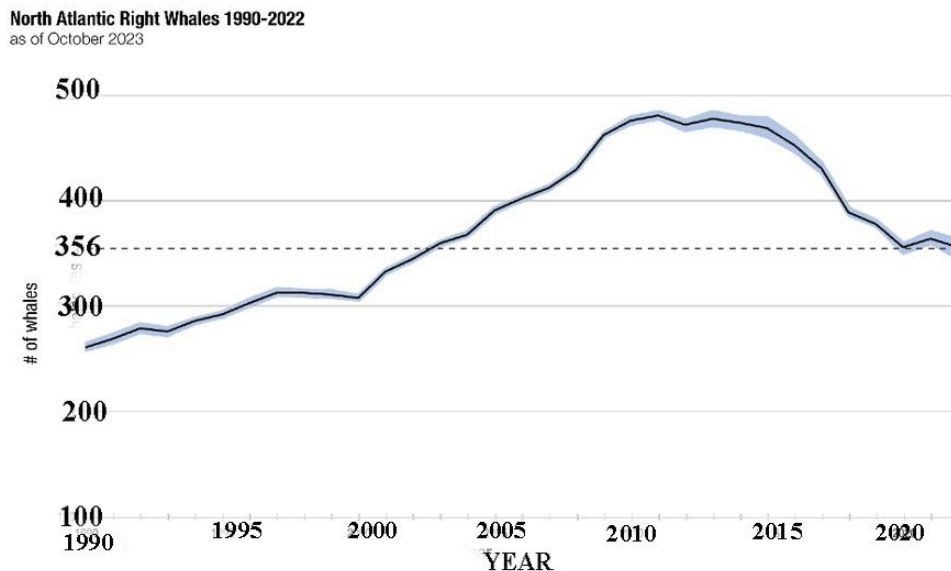


Figure 7. Assessments of the North Atlantic right whale population 1990-2022 based on data from the North Atlantic Right Whale Catalog as of September 22, 2023. The estimate for 2022 of 356 (+7/- 10) shows a modest decrease from the previous year. The solid black line is the current best population estimate while the blue area represents the range of uncertainty.

For nearly two decades the estimated population increased at a rate of 2 to 2.5%. Then during the period 2015 to 2019, there was a dramatic increase in mortalities, resulting in a decreasing trendline for the estimates.

A cautionary caveat is that the most recent estimate, 2022 in this case, is typically revised upward as additional data come into the analyses (*e.g.* the 2021 estimate initially was 340, which, with additional data and further analyses, increased to 364 the following year). It is not unreasonable to speculate a similar occurrence for the 2022 year. As Scott Kraus, New England Aquarium, reported at the North Atlantic Right Whale Consortium Meeting on 24 October 2023, the trajectory could be flat and the decline halted.

The resilience of the whales, natural working of biological systems, and the mitigation efforts of the humans who share the ocean may all be at play here.

The population modeling is currently attributed to:

Linden, Daniel W., 2023. Population size estimation of North Atlantic right whales from 1990–2022. NOAA Technical Memorandum NMFS-NE-314. Northeast Fisheries Science Center, Woods Hole, Massachusetts. 13 pp.