

Nurdle Patrol Year 4 Final Report (June 1, 2023 – May 31, 2024)

PI: Katie Swanson

June 14, 2024

Administration:

Contract Activity

- The Nurdle Patrol Expansion, Education, and Outreach was approved for funding for Year 4 on June 1, 2023.
- The Subaward Agreement No. 3 UTA20-000902 between The University of Texas at Austin and Texas A&M University-Corpus Christi (TAMU-CC) was fully funded for year four for the amount of \$37,269.00 to further enhance the website for usability and the ongoing maintenance of the phone app to help promote the awareness and education of Nurdle Patrol.
- Jace Tunnell moved to TAMU-CC in early August 2023, and Katie Swanson took over as PI on the project. A second subaward agreement between UTMSI and TAMU-CC for Jace Tunnell to continue working on expanding the Nurdle Patrol project was finalized on October 4th, 2023.

Risks and Impacts: None

Project Tasks:

Hire full-time staff to organize annual meetings, training, travel, manage website and develop promotional materials about Nurdle patrol.

Tracy Weatherall was hired during the first quarter of year one on July 1, 2020. Her contract was renewed on June 1, 2021 for year two, June 1, 2022 for year three and June 1, 2023 for year four.

Host the Texas Plastic Pollution Symposium (TPPS)

The 6th Annual Texas Plastic Pollution Symposium was a huge success again this year! It took place at TAMU-CC on March 21st, 2024. The planning committee met monthly beginning in October 2023 leading up to the event in March 2024. On Wednesday, March 20th, there was a social gathering with heavy hors d'oeuvres at the Executive Surf Club in downtown Corpus Christi, Tx. On Thursday March 21st, check-in began at 8:00AM and the symposium started at 9:00AM. Attendees received a cotton "Swag Bag" filled with a TPPS t-shirt, Nurdle Patrol mug, and other swag provided by the sponsors. A light continental breakfast was provided in the morning, box lunches in the afternoon and Rice Krispy treats and brownies were available during the afternoon break. Aarthi Ananthanarayanan, Director of Ocean Conservancy's Climate and Plastics Initiative, was the keynote speaker and Dr. Huy Vu, Environmental Protection Agency Region 6 Trash-Free Waters Coordinator, was the invited speaker. One hundred seventy people attended in-person and 40 attended virtually. There were 17 oral and 23 poster presentations.

Student Scholarships

As an incentive to attract students to attend the annual TPPS in-person and present their research, we offered a \$500 stipend to cover costs for travel and expenses again this year. Thirty-one students submitted abstracts, in which 8 were oral presentations and 22 were poster presentations. Eleven of these students traveled over 50 miles to attend and present their research and received the \$500 stipend. Additionally, student presentation awards were sponsored again this year by the Coastal Bend Bays & Estuaries Program. They gave \$300 for oral presentations (\$150 1st place, \$100 2nd place, \$50 3rd place) and \$200 for poster presentations (\$100 1st place, \$75 2nd place, \$25 3rd place).

Create Starter and Teacher Kits

The Nurdle Patrol Starter Kit was created during the first year of Nurdle Patrol (2020) for organizations to start-up their own Nurdle Patrol Citizen Science Project or to incorporate nurdle surveys into their existing monitoring program. The kits were designed to supply organizations with resources needed to conduct surveys, talk to their volunteers about nurdles, and provide a foundation for a successful monitoring program (Figure 1). As of May 31, 2024, 436 partners have received the starter kits.

The Nurdle Patrol Teacher Kits were also developed during the first year of Nurdle Patrol. These kits were developed based on the many requests from teachers across the United States, wanting to teach their students about how plastics reach the ocean and what negative impacts plastics have on the environment. These kits include a curriculum about nurdles entering the ocean, what negative impacts they can have, and what solutions are out there to prevent nurdles from getting into the waterways. These interactive teacher kits include six jars of nurdles, an information card about how to conduct a nurdle survey, a presentation about nurdles, and articles describing the problem (Figure 1). An updated version of the teacher kit curriculum was completed during the third quarter of Year 2 which includes an All Level Nurdle Survey, a Nurdle Hurdle Race, K-5 curriculum that includes lesson plans for age specific children in K-1, 2-3, and 4-5, and Middle School and High School Chemistry curriculums. These lesson plans are now linked to our webpage. As of May 31, 2024, 2,083 teacher kits have been shipped to educators in the USA, Canada, Mexico, Puerto Rico, Costa Rica, Columbia, Cuba, UK, Spain, Africa, South Africa, Australia, Turkey, Italy, and Thailand. We estimate that each teacher would have 60 students, which means these kits could reach close to 124,980 students, making this an effective tool for educating students about plastics along the Gulf of Mexico and beyond.



Figure 1. Nurdle Patrol Startup Kit (left) and Teacher Nurdle Kit (right)

Plastic Free Life Kit

In January 2021, we initiated the Plastic Free Life Challenge. This friendly competition was designed as an incentive to encourage our partners and individuals to conduct as many nurdle surveys as possible each month. The group that conducts the most surveys wins a Plastic Free Life starter kit, containing 42 single-use plastic alternatives (Figure 2).



Figure 2. Plastic Free Life Starter Kit items.

Individual Kit

Individual Kits were created during the first quarter of Year 3 to give individual citizen scientists everything they need to conduct a nurdle patrol survey on a regular basis. The kit includes a cotton zippered pouch with a Nurdle Patrol information card, a glass vial to hold the collected nurdles, a sticker and magnet (Figure 3). As of May31, 2024 there have been 658 individual kits distributed to citizen scientists.



Figure 3. Nurdle Patrol Individual Kit.

Meet with organizations about Nurdle Patrol – Outreach

During the fourth quarter of Year 4, we acquired 26 new Nurdle Patrol partners and shipped 83 teacher kits (Figures 4-5; Table 1-4). Virtual and in-person presentations and meetings were given to promote Nurdle Patrol to new organizations, including the following since June 1, 2023:

- June 7– June 28, 2023 - Five Nurdle Patrol presentations were given to the Summer Science Sea Stars (Grades 3–4) and Tidal Waves (Grades 5-6) at UTMSI. Each participant received an individual kit and conducted simulated Nurdle Patrols.
- June 7, 2023 – Nurdle Patrol presentation to new partners in Portland, Maine. In-person presentation.
- June 13, 2023 – Nurdle Patrol presentation as invited speaker to the Texas Stormwater Conference held at the American Bank Center in Corpus Christi, Texas.
- July 11, 2023 – Nurdle Patrol presentation at the Bay Education Center in Rockport for lunch and learn seminar series.
- July 25, 2023 – Nurdle patrol presentation to Democratic Women of the Coastal Bend.
- August 1, 2023 – Nurdle patrol presentation to students in Ghana, Africa to create new partnerships across the globe.
- August 25, 2023 – Nurdle patrol presentation to the Friday Morning Group in Corpus Christi.
- September 6, 2023 – Nurdle patrol presentation in Washington, D.C. to the National Oceanic and Atmospheric Administration on Risks and Threats of nurdle spills.
- September 7, 2023 - Nurdle patrol presentation in Washington, D.C. to the National Oceanic and Atmospheric Administration on monitoring of nurdles.

- September 9, 2023 – Nurdle patrol presentation and Nurdle Patrol beach surveys with the Zachery Kolda Elementary School.
- September 13, 2023 – Nurdle patrol presentation to the Women’s International Shipping and Trade Association over Zoom.
- September 21, 2023 - Nurdle patrol presentation to the Texas General Land Office’s Clean Coast Texas group.
- October 18, 2023 – Nurdle patrol presentation to the United Way of Corpus Christi board meeting.
- October 31, 2023 - Nurdle patrol presentation and Nurdle Patrol beach surveys with Flour Bluff middle school’s Wetland Ambassador Program at North Padre Island beach. The group of 31 students found 600 Nurdles in 10 Minutes.



Photo by Jace Tunnell

- November 9, 2023 – Tracy Weatherall attended the STEAM (Science Technology Engineering Arts Mathematics) night at Kolda Elementary in Corpus Christi, Texas to assist our new nurdle patrol partner, Kolda Elementary-Coastal Cadet Club, inform students and their families about nurdles and the issues with marine debris and microplastics and their impact on the environment, animals and people.
- November 11, 2023 – Nurdle patrol presentation at the Corpus Christ Science Museum.
- December 4, 2023 – Nurdle patrol and environmental Issue of Plastics presentation for the Cub Scouts at the Windsor Park Elementary school.
- January 17, 2024 - Nurdle Patrol and Beachcombing the Gulf of Mexico presentation at HDR Engineering HQ.
- January 23, 2024 – Nurdle Patrol and Beachcombing the Gulf of Mexico presentation for the Flour Bluff Aquatic Science Class at Flour Bluff High School.

- February 8, 2024 – Beachcombing and Plastics presentation for Seashore Middle Academy Marine Science Class at Seashore Middle Academy.
- February 10, 2024 – Nurdle Patrol training at Mustang Island State Park for the Seashore Middle Academy Marine Science Class.
- February 12, 2024 – Nurdle Patrol and Beachcombing the Gulf of Mexico presentation at Del Mar CED.
- February 13, 2024 – Marine Debris and Nurdle Patrol in the Coastal Bend presentation at the Corpus Christi Science Museum.
- February 16, 2024 – Nurdle Patrol/Beachcombing and Public Engagement presentation for the Informal Science Education Association at the Texas State Aquarium.
- February 20, 2024 – Crowd Sourcing Plastic Pollution Data Throughout the United States and Beyond poster presentation at the GomCon GOMA meeting in Tampa, Florida.
- February 20, 2024 – Nurdle Patrol expansion throughout Mexico presentation at the GomCon GOMA meeting in Tampa, Florida.
- February 20, 2024 – Science Viral Videos presentation at the GomCon GOMA meeting in Tampa, Florida.
- February 21, 2021 – Nurdle Patrol and Beachcombing the Gulf of Mexico presentation at the GomCon GOMA meeting in Tampa, Florida.
- February 24, 2024 – Nurdle Patrol and Beachcombing the Gulf of Mexico presentation at the Whooping Crane Festival in Port Aransas, Texas.
- February 27, 2024 – Careers in Marine Science presentation at the Seashore Middle Academy.
- March 7, 2024 – Nurdle Patrol and Beachcombing presentation at Mireles Elementary School in Corpus Christi, Texas.
- March 21, 2024 – Nurdle Patrol Expansion throughout Mexico presentation at the 6th Annual Texas Plastic Pollution Symposium at TAMUCC.
- March 22, 2024 – Nurdle Patrol and Beachcombing presentation at Windsor Park Elementary School in Corpus Christi, Texas.
- April 9, 2024 – Nurdle Patrol Zoom presentation for a Boy Scout Troop in Austin, Texas.
- April 13, 2024 – Nurdle Patrol and Beachcombing booth at Earth Day Bay Day at Heritage Park in Corpus Christi, Texas.
- April 15, 2024 – Nurdle Policies Zoom presentation for a class at the University of Texas in Austin, Texas.
- April 16 – 17, 2024 – Nurdle Patrol training presentation at Mustang Island State Park in Corpus Christi, Texas.
- April 17, 2024 – Jace Tunnell participated in a Zoom panel of international experts discussing nurdle policy in the USA and abroad.
- April 21, 2024 – Marine debris, Nurdle Patrol and Beachcombing activity booth at Sandfest 2024 in Port Aransas, Texas.
- May 2, 2024 – Marine debris along the Texas Coast Zoom presentation to the San Antonio Bay Partnership.

- May 6, 2024 – Nurdle Patrol and Beachcombing the Gulf of Mexico presentation at Port Aransas Elementary School in Port Aransas, Texas.
- May 8, 2024 – Marine debris, Nurdle Patrol and Beachcombing presentation to the WOW (Way Out Weber) Democrat group in Corpus Christi, Texas.
- May 14, 2024 – Nurdle Patrol, marine debris and Beachcombing presentation to Rockport Middle School students at the Bay Education Center in Rockport, Texas.
- May 15, 2024 – Beachcombing, Nurdle Patrol in the Coastal Bend presentation to the Rotary Club of Southside Corpus Christi at the Corpus Christi Country Club.
- May 16, 2024 – Nurdle Patrol presentation to Zhanfei Liu’s class at UTMSI in Port Aransas, Texas.
- May 17, 2024 – Marine debris, Nurdle Patrol and Beachcombing activity booth at the SST Corpus Christi Elementary School in Corpus Christi, Texas.
- May 23, 2024 – Nurdle Patrol throughout Mexico Zoom presentation for the NOAA Marine Debris Program Workshop.

The Nurdle Patrol Facebook group is being utilized as a way to communicate with individual citizen scientists as well as new organizations about new efforts related to Nurdle Patrol. News stories, survey results, and other related material are also shared with the more than 3,000+ followers on the closed group Nurdle Patrol Facebook page. Also, the Nurdle Patrol Twitter account (public) was created to educate and inform the general public about plastic pollution and other science related topics. To date there are 996 followers.

Lisa Scobel, a graduate student studying Environmental Conservation from the University of Wisconsin-Madison, joined the Nurdle Patrol team in July 2023 as an intern and recruited 14 new partners along the Mississippi River’s 2,350 mile stretch as well as New York and Canada. In addition, she published 5 Nurdle Patrol related articles that are posted on the nurdlepatrol.org website at <https://nurdlepatrol.org/Forms/News/index.php>. Lisa started a position at the Galveston Bay Foundation in July 2022 as the Marine Debris Coordinator and is helping to spread the word and sample in the Houston/Galveston area about Nurdle Patrol.

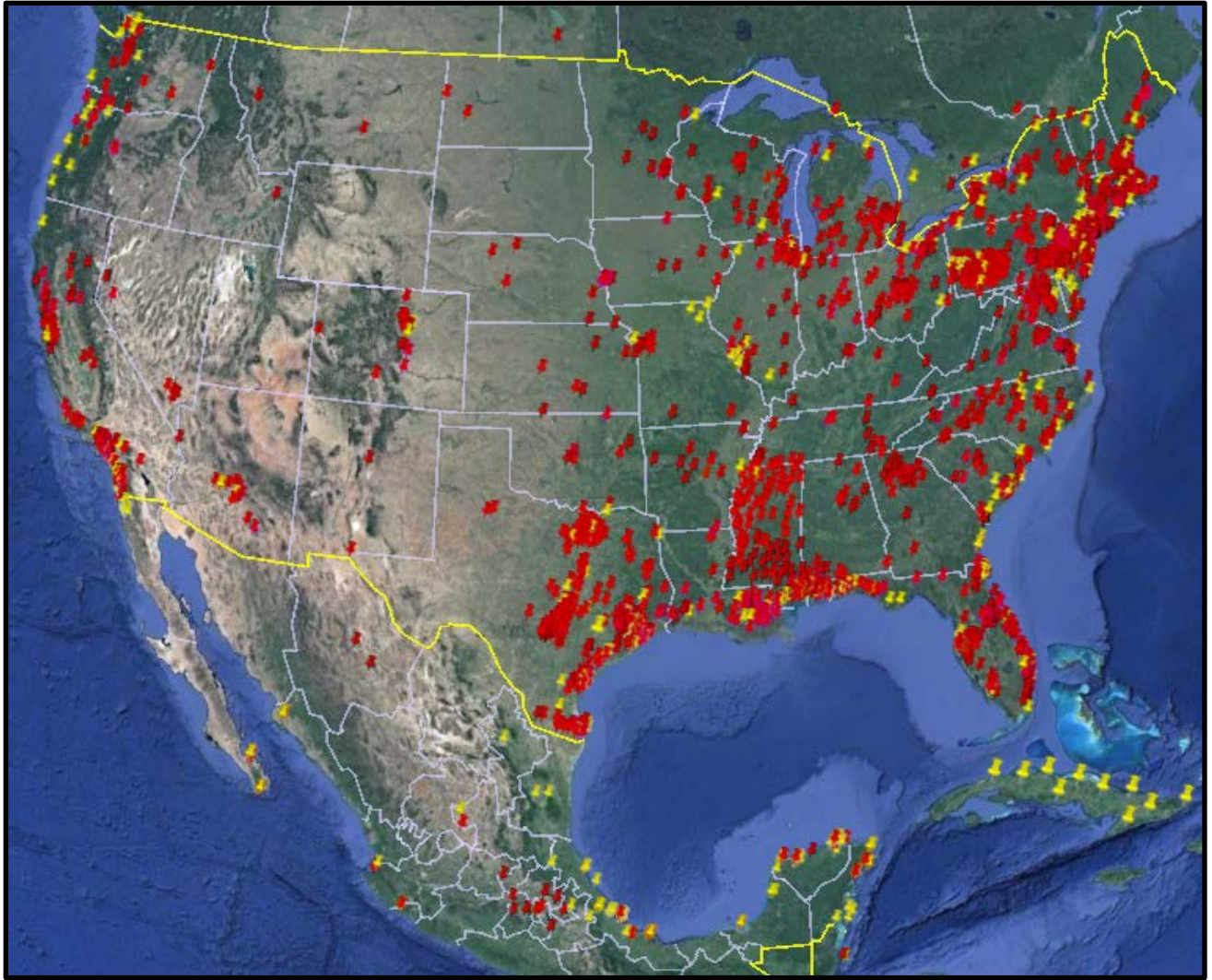


Figure 4. Nurdle Patrol Partners (yellow) and Teacher Kits (red) shipped in the continental United States, Canada, Cuba, Belize and Mexico.

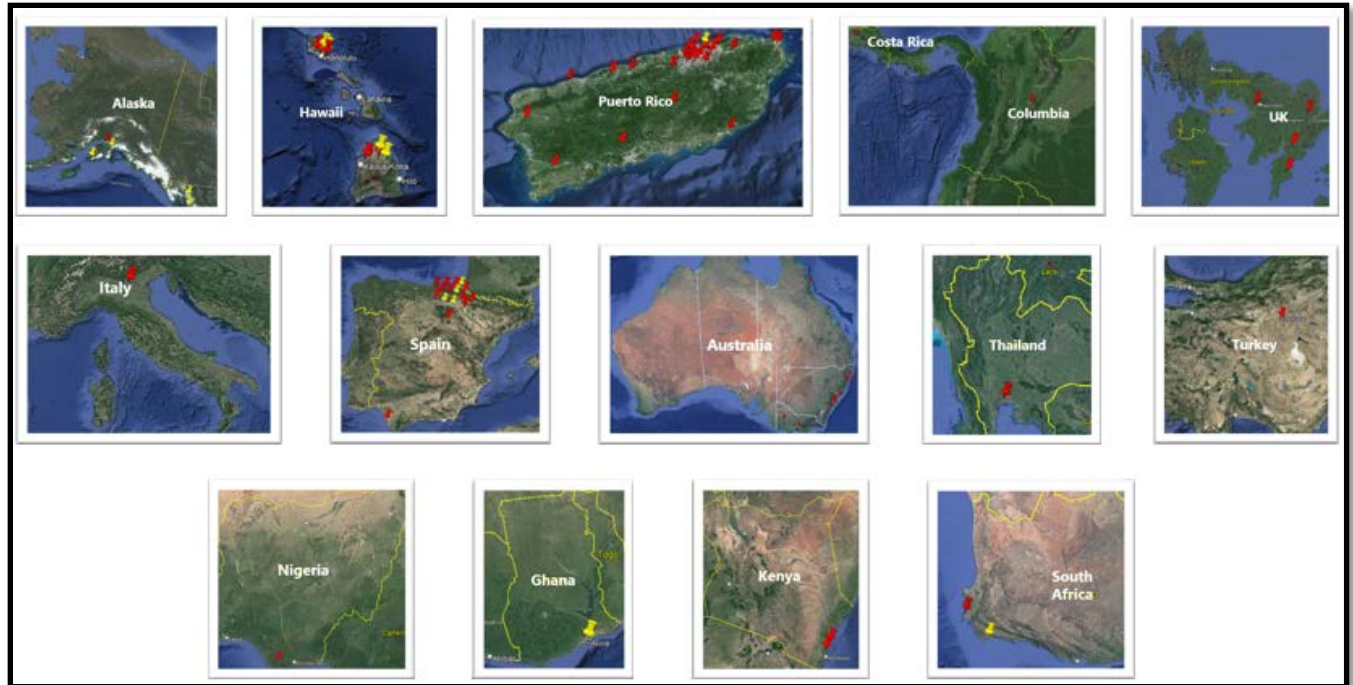


Figure 5. Nurdle Patrol Partners (yellow) and Teacher Kits (red) shipped to Alaska, Hawaii and worldwide.

Number	Partner	Group Type	State	Number	Partner	Group Type	State
1	Terra Science & Education	School	NY	40	Defenders of Wildlife	Nonprofit	NC
2	STEM Engagement	School	NY	41	Old Women Creek NERR	NERR	OH
3	Tampa Bay Estuary Program	NEP	FL	42	Deleware NERR	NERR	DE
4	Coastal Bend Bays & Estuaries Program	NEP	TX	43	ACE Basin NERR	NERR	SC
5	Weeks Bay NERR	NERR	AL	44	Angler Action Foundation	Nonprofit	FL
6	Rockport Fulton Middle school Ecology/Environmental Club	School	TX	45	Hudson River NERR	NERR	NY
7	Island RV Resort	Business	TX	46	Friends of the Kaw	Nonprofit	KS
8	Southernmost Homeschoolers	Homeschool	FL	47	Buffalo Niagara Waterkeeper	Waterkeeper	NY
9	Inland Ocean Coalition North Texas Chapter	Nonprofit	TX	48	Crystal Coast Waterkeeper	Waterkeeper	NC
10	Choctawhatchee Basin Alliance	Waterkeeper	FL	49	White Oak New Riverkeeper Alliance	Waterkeeper	NC
11	National Park Service - Padre Island National Seashore	Federal	TX	50	Sapelo Island NERR	NERR	GA
12	Friends of Padre	Nonprofit	TX	51	NY-NJ Baykeeper	Waterkeeper	NY
13	Universidad de Veracruzana - Sea & Reef Program	University	MX	52	South Slough NERR	NERR	OR
14	Rookery Bay NERR	NERR	FL	53	A Rocha USA	Business	FL
15	Surfrider Foundation - Texas Coastal Bend Chapter	Nonprofit	TX	54	Sustain 2 Remain	Nonprofit	TX
16	Galveston Bay Foundation	Nonprofit	TX	55	Missouri Confluence Waterkeeper	Waterkeeper	MO
17	Texas A&M University - Corpus Christi, Conrad Blucher Instit	University	TX	56	Great Bay NERR	NERR	NH
18	Texas Master Naturalist	Nonprofit	TX	57	Sea Grant - Mississippi-Alabama	Sea Grant	MS
19	The University of Texas, Rio Grande Valley	University	TX	58	Mississippi State University Extension	University	MS
20	Parley for the Oceans	Nonprofit	MX	59	Flour Bluff ISD	School	TX
21	11th Hour Racing	Nonprofit	TX	60	Corpus Christi Hooks	Business	TX
22	Monsignor McClancy Memorial HS	School	NY	61	Padilla Bay NERR	NERR	WA
23	Nicholls State University	University	LA	62	Kachemak Bay NERR	NERR	AK
24	Texans For Clean Water	Nonprofit	TX	63	Bayou City Waterkeeper	Waterkeeper	TX
25	Flyaway Paper Straws	Business	FL	64	Save Our Shores	Nonprofit	CA
26	Our Lady Academy	School	MS	65	Delaware Sea Grant	Sea Grant	DE
27	Saint Stanislaus	School	MS	66	Louisiana State University	University	LA
28	Shedd Aquarium	Aquarium	IL	67	Mountain Watershed Association - Youghiogheny Riverkeeper	Nonprofit	PA
29	Charleston Waterkeeper	Waterkeeper	SC	68	Florida Sea Grant - UF/IFAS Extension Pinellas County	Sea Grant	FL
30	South Padre Island Sessions	Business	TX	69	Narragansett Bay NERR	NERR	RI
31	Gulf Guardians	Nonprofit	TX	70	Barataria-Terrebonne National Estuary Program	NEP	LA
32	Sun of a Beach Cleanup	Nonprofit	FL	71	Sarasota Bay Estuary Program	Nonprofit	FL
33	Keep Bolivar Beautiful	Nonprofit	TX	72	He'eia National Estuarine Research Reserve	NERR	HI
34	University of Texas Marine Science Institute	University	TX	73	North Carolina Coastal Reserve and NERR	NERR	NC
35	Mission-Aransas NERR	Governmental	TX	74	North Inlet-Winyah Bay NERR	NERR	SC
36	Jacques Cousteau NERR	NERR	NJ	75	Wildlife Club	Nonprofit	FL
37	Wells Reserve at Laudholm	NERR	ME	76	Tillamook Estuaries Partnership	NEP	OR
38	Tijuana River NERR	NERR	CA	77	Chesapeake & Coastal Service, CBNERR	NERR	MD
39	Guana Tolomato Matanzas NERR	NERR	FL	78	Morro Bay National Estuary Program	NEP	CA

Table 1: Nurdle Patrol Partners who have received startup kits as of May 31, 2024.

Number	Partner	Group Type	State	Number	Partner	Group Type	State
79	Waterkeeper Alliance	Nonprofit	TX	117	Castal Brigade	Nonprofit	TX
80	Healthy Gulf	Nonprofit	LA	118	Northcoast Environmental Center	Nonprofit	CA
81	Texas Marine Mammal Stranding Network	Nonprofit	TX	119	Pascagoula River Audubon Center	Nonprofit	MS
82	Seaside Sustainability	Nonprofit	MA	120	Lower Mississippi River Foundation	Nonprofit	MS
83	Siera Club, Baton Rouge Group	Nonprofit	LA	121	Kipp Delta Public Schools	Public Schools	MS
84	The Gale Academy of Environmental Science and Technology	School	FL	122	Texas Parks and Wildlife Dept.	governmental	TX
85	Lake Worth Waterkeepers	Waterkeeper	FL	123	Illinois River Watch Network	Nonprofit	IL
86	Columbia Waterkeeper	Waterkeeper	OR	124	Ohio Sea Grant	governmental	OH
87	Cahaba Riverkeeper	Waterkeeper	AL	125	Harris County Precinct 2	governmental	TX
88	MTHS Eco Club	Nonprofit	WA	126	Great Lakes Aquarium	Business	MN
89	USM School of Humanities	University	MS	127	Thunder Bay NMS	governmental	MI
90	TAMUCC Green Team	University	TX	128	Upper Mississippi River NWFR	governmental	IL
91	Jean Lafitte National Historical Park ad Barataria Preserve	Nonprofit	LA	129	New York Sea Grant	Governmental	NY
92	O'ahu Waterkeeper	Waterkeeper	HI	130	Great Lakes Environmental Center, Inc.	Business	MI
93	Plastic Free Grants	Nonprofit	MS	131	Lake Huron Centre for Coastal Conservation	Nonprofit	Ontario
94	Chesapeake Bay NERR	NERR	VA	132	Stream Teams United	Nonprofit	MO
95	Friends of Lake Superior Reserve	NERR	WI	133	A Rocha USA	Nonprofit	WI
96	University of Michigan	University	MI	134	KEEP PEARLAND BEAUTIFUL	Nonprofit	TX
97	Save Our Seas Mountain Ocean Project	Nonprofit	TX	135	Wisconsin Sea Grant	Governmental	WI
98	Maryland Coastal Bays Program	Nonprofit	MD	136	Sierra Club of Missouri	Nonprofit	MO
99	University of Alaska Fairbanks	University	AK	137	Environmental Club and Aquatic Science	School Club	TX
100	University of Oregon's Charleston Marine Life Center	University	OR	138	A Greener Future	Nonprofit	Ontario
101	Shoreline Education for Awareness (SEA)	Nonprofit	OR	139	TPWD	Governmental	TX
102	MARYSMA Mar Y Sustentabilidad Para El Medio Ambiente	Eco-Tourism	MX	140	University of Houston-Clear Lake	University	TX
103	Apalachicola Nat'l Estuarine Research Reserve	NERR	FL	141	Calhoun County Extension Service	Governmental	TX
104	FWS Bandon Marsh National Wildlife Refuge	Governmental	OR	142	Boyscouts of America Troop 168	Boyscouts	TX
105	Mobile Baykeeper	Nonprofit	AL	143	Chesapeake Bay Reserve	Governmental	MD
106	Connecticut River Conservancy	Nonprofit	CT	144	Northern Ohio Surfrider Foundation	Nonprofit	OH
107	Dimock and Dimock Photography	Business	OR	145	Black River Audubon Society	Nonprofit	OH
108	Costa Cleanups	Nonprofit	TX	146	Eastern Shore Fly Fishers	Nonprofit	AL
109	Elizabeth Kratzig	Eco-tourism	FL	147	Presque Isle State Park	Governmental	PA
110	Elizabeth Kratzig	Travel	FL	148	Charleston County Public Library	Governmental	SC
111	Rio Grande Chapter of the Texas Master Naturalist	Nonprofit	TX	149	The Sustainability Institute, Environmental Conservation Corps	Nonprofit	SC
112	Mustang Island State Park	Governmental	TX	150	Hawaii Preparatory Academy	Private School	HI
113	Texas Retired Teachers Association	Nonprofit	TX	151	Marine Science Graduate Student Organization	University	TX
114	Sea Turtle Inc.	Nonprofit	TX	152	Riverside-Corona Resource Conservation District	Nonprofit	CA
115	Choctawhatchee Basin Alliance	Nonprofit	FL	153	The Community Environmental Health Lab at MDI Biological Laboratory	Laboratory	ME
116	Turtle Island Restoration Network	Nonprofit	TX	154	Washington State Community College	College	OH

Table 2: Nurdle Patrol Partners who have received startup kits as of May 31, 2024 (continued).

Number	Partner	Group Type	State	Number	Partner	Group Type	State
155	Centro de Investigación y de Estudios Avanzados del I.P.N. Mérida	University	MX	195	Urban Rivers	Nonprofit	IL
156	Sea Hero	Nonprofit	NJ	196	Girl Scout Troop 809	Nonprofit	FL
157	American Association of University Women.	Nonprofit	IL	197	North Carolina Coastal Federation	Nonprofit	NC
158	Casteel High School	High School	AZ	198	North Carolina Coastal Federation	Nonprofit	NC
159	NASA TX Space Grant Consortium UT Austin Center for Space Research	Governmental	TX	199	Kaizo Musto	School	Spain
160	Lower Brazos Riverwatch	Nonprofit	TX	200	Unity College Department of Animal Behavior	University	PA
161	Gulf of Mexico Youth Climate Summit	Nonprofit	TX	201	National Park Service	Governmental	WA
162	City by the Sea Museum	Nonprofit	TX	202	Colegio Congregacion Mita	University	PR
163	City by the Sea Museum	Nonprofit	TX	203	Crew 454	Scouts	TX
164	Northampton Oceanography	University	PA	204	Girl Scout Troop 28173	Girl Scouts	TX
165	Loggerhead Marinellife Center	Nonprofit	FL	205	The Modern Mortician	Business	WA
166	Lehigh Elementary Science club	School Club	PA	206	Sustainability is Sexy	Business	CA
167	NAHS Oceanography Club	High School	PA	207	Lucy Bekham High School	High School	SC
168	Bois d' Arc Chapter of Texas Master Naturalist	Governmental	TX	208	Squirrel Friends	Business	LA
169	River Arts Community Arts Center	Nonprofit	VT	209	Jerseyshoredetecting	Business	NJ
170	Ocean Knoll Elementary School	School Club	CA	210	Galveston Nurdle hunters	Nonprofit	TX
171	Center for Reservoir and Aquatic Systems Research, Baylor University	University	TX	211	Seaview learning	Elementary	MA
172	Fundación Pedro y Elena Hernández, AC	Nonprofit	MX	212	K.I.N.D (Kids In Nature Discovering)	Nonprofit	TX
173	Menos Plastico En Mahahual	Nonprofit	MX	213	Intermission - NAFI	Nonprofit	ME
174	CICESE (Center for Scientific Research and Higher Education)	University	MX	214	Vance Charter School Environmental Club	High School	NC
175	El Colegio de la Frontera Sur	College	MX	215	Marine beach cleanup	Nonprofit	RI
176	Instituto EPOMEX	University	MX	216	SCCPSS	School District	GA
177	Campamento Tortuguero Santander	Nonprofit	MX	217	Cascadia Daily News	Business	WA
178	Pensacola & Perdido Bays Estuary Program	Governmental	AL	218	Price Cathedral AME Zion Youth Group	Youth Group	NC
179	Three Rivers Waterkeeper	Nonprofit	PA	219	Katie Kate's Clean up	Business	FL
180	Moderna	Pharmaceutical	MA	220	The Bubbly Moon	Business	PA
181	Adventure Aquarium	Business	NJ	221	North Carolina Wesleyan University	University	NC
182	Prince William Sound Stewardship Foundation	Nonprofit	AK	222	Coastal Carolina University	University	SC
183	Scott Township Conservancy	Nonprofit	PA	223	Gamma Zeta Chapter of Industry Pharmacists Organization (IPhO)	Business	FL
184	Big Sewickley Creek Watershed Association	Nonprofit	PA	224	Pagan Academy	Private School	MS
185	NC State University- Environmental First Year Program	University	NC	225	JACKSON COUNTY SOIL & WATER CONSERVATION DISTRICT	Governmental	CA
186	North American Marine Environment Protection Association	Nonprofit	CT	226	Helix Charter High School	High School	MD
187	Manitowoc Public Library	Library	WI	227	SMCM Marine Science Program	High School	FL
188	HAR	Real Estate	PA	228	Riviera Revived	Business	MX
189	Hawaii Pacific University, Center for Marine Debris Research	University	HI	229	NOAA-Disaster Response Center	Governmental	AL
190	Audubon Texas Bird City Texas	Nonprofit	TX	230	Texas Master Naturalist Galveston Bay Chapter	Governmental	TX
191	toeswater	Nonprofit	IL	231	Universidad Nacional Autonoma de México	University	MX
192	Coast Episcopal School	Private School	MS	232	Fundacion Rescate Rapaz	Nonprofit	MX
193	Cimarron Middle School	Middle School	CO	233	Eco.oaland Tizimín	Nonprofit	MX
194	ClimbPDX	Nonprofit	OR	234-238	Cuba	Nonprofit	Cuba

Table 3: Nurdle Patrol Partners who have received startup kits as of May 31, 2024 (continued).

Number	Partner	Group Type	State	Number	Partner	Group Type	State
233	LL Corral	Business	FL	293	Chaminade College Preparatory	University	CA
240	StopUsingPlasticBags	Non Profit	FL	294	Polk County Recycling & Beautification	Non Profit	TX
241	Wright Charter	Private School	CA	295	Navarre Beach Marine Science Station	University	FL
242	The University of Oregon	University	Or	296	Girl Scouts of Greater Mississippi Troop 4661	Girl Scouts	MS
243	Douglas County Conservation District	Governmental	CO	297	Arniaton Tackle	Business	SAfrica
244	AmeriCorps	Governmental	NJ	298	Sol Margin Fishing & Conservation Foundation	Non Profit	FL
245	Houston Zoo	Non Profit	TX	299	Kailua Elementary (a NOAA Ocean Guardian School)	Elem. School	HI
246	PCHS Green Environmental Club	High School	MS	300	Gulf Breeze High School	High School	FL
247	Elk River Yacht Club	Business	MD	301	Sheridan Lion's Club	Non Profit	TX
248	Friendwood Junior High School National Junior Honors Society	Junior High	TX	302	Kent Island Beach Cleanups	Non Profit	MD
249	Sea Camp - TAMUG	Non Profit	TX	303	Helix Charter High School	High School	CA
250	Tobacco Cays Marine Station Concordia University Nebraska	Non Profit	Belize	304	Reciclemos y Ayudemos	Recycle Center	MX
251	Galli and Gannon ocean protection group	Non Profit	CA	305	Asociacion de Scouts de México, SEEONEE	Scouts	MX
252	Sulski Reefers- SIU Marine Bio Club	University	IL	306	Ecosociety MX	Non Profit	MX
253	Trash4Tokens	Non Profit	CA	307	Apisayaa	Business	MX
254	Instituto de Ciencias Marinas y Pesquerías	University	MX	308	Vida milenaria, campamento tortuguero	NGO	MX
255	Instituto de Ciencias Marinas y Pesquerías	University	MX	309	Bird & Nature	NGO	MX
256	Girl Scouts	Non Profit	TX	310	Instituto continental	University	MX
257	Abeona Academy	Private School	ME	311	Ocean Science Explorer	NGO	MX
258	Vassar Club of Texas	Non Profit	TX	312	Colegio de educación profesional técnica para el estado de Veracruz	College	MX
259	Charleston Charter School for Math and Science	Charter School	SC	313	TRASTORNA	Business	MX
260	Argosy Adventures	Influencer	TX	314	Colectivo Feniron	Business	MX
261	Southold Jr/Sr High School Environmental Club	Public School	NY	315	Naturaleza más nosotros	NGO	MX
262	Coalition of Community Organizations	Non Profit	TX	316	Iniciativa Vallarta	NGO	MX
263	Port of Houston Partners in Maritime Education	Business	TX	317	Campamento Tortuguero Las Barras	Non Profit	MX
264	4-H NaturalResources	Non Profit	TX	318	Grupo de guías turísticas Ecoave	Non Profit	MX
265	Antonio Ilastetxex	Non Profit	Spain	319	Campamento Tortuguero Barra del Tordo	Non Profit	MX
266	Elk County Catholic High School Pennsylvania Envirothon Teams	High School	PA	320	Campamento Tortuguero Rancho Nuevo CONANP	Non Profit	MX
267	Plastic Punch	Non Profit	Ghana	321	TRASTORNA	Business	MX
268	San Jacinto Girl Scouts Troop 132372	Girl Scouts	TX	322	Monkey Fish Veracruz	Business	MX
269	Zarautzpuntura	Business	Spain	323	Centro de Estudios Superiores de Veracruz, CESUVER	College	MX
270	Plays Platino Río Isgartos	Non Profit	MX	324	OCTOPLUS+	Business	MX
271	Moscu	Non Profit	MX	325-333	Instituto de Ciencias Marinas y Pesquerías	College	MX
272	Colordaz flora y fauna	Non Profit	MX	334	Lorena Violeta León Denis	Individual	MX
273	Universidad Autónoma de México, Instituto de Ciencias del Mar y Limn	University	MX	335	Jefatura Guardavidas Veracruz	Individual	MX
274-278	Cuba	Non Profit	Cuba	336	Greenbow	Business	MX
279-283	Instituto de Ciencias Marinas y Pesquerías	University	MX	337	Centro de Investigación Científica y de Educación Superior de Ensenada (CIC	College	MX
284	UC Climate Stewards	Non Profit	CA	338	CETYS Universidad	University	MX
285	Jawreqi	Influencer	Spain	339	Proyecto Fronterizo de Educación Ambiental A.C	College	MX
286	Freedom Boat Club	Non Profit	FL	340	Alteraciones al Ambiente por Actividad del Hombre (ALTERAAH)	NGO	MX
287	Buffalo Maritime Center	Non Profit	NY	341	Grupo Baja de la Climate Science Alliance	NGO	MX
288	Glaszroots	Non Profit	LA	342	Arroyo Vivo, Modelo de remediación y reciclaje inclusivo en distritotec e Iniciativa Campana-Alatamira	NGO	MX
289	UGA Marine Extension and Georgia Sea Grant	Governmental	GA	343	José hoil	Individual	MX
290	Marine Biology Class (BIOL-3311) Fall 2023	High School	TX	344	Kilómetro Uno	NGO	MX
291	Friends of the San Juans	Non Profit	WA	345	Limpimos Yucatán Fundación GMA	NGO	MX
292	Coastal Cadet Club	Non Profit	TX				

Table 4: Nurdle Patrol Partners who have received startup kits as of May 31, 2024 (continued).

Number	Partner	Group Type	State	Number	Partner	Group Type	State
346	Texas Children in Nature Network, TCINN	Non Profit	Tx	379	CIDIR, Sinaloa	Governmental	MX
347	Pershing Middle School	Jr. High	Tx	380	Los Arrecifes, Campamento Tortuguero	NGO	MX
348	Girl Scouts Troop 4645 SU 603	Girl Scouts	Ms	381	El Salado, Campamento Tortuguero	NGO	MX
349	Murioa Academy	Private School	Tx	382	Capulteolt, Campamento Tortuguero	NGO	MX
350	Environmental Justice Association	Non Profit	Tx	383	Punta Puntilla, Campamento Tortuguero	NGO	MX
351	Cheatham fire	Business	Tx	384	Agus Dulce, Campamento Tortuguero	NGO	MX
352	Millennium High School	High School	AZ	385	AMCOSK AC	Business	MX
353	St. John's School	Private School	Tx	386	Campamento Tortuguero Las Barras	NGO	MX
354	Parley mexico Parley for the Oceans	Non Profit	MX	387	CREMA UABCS	University	MX
355	Facultad de nutrición, Universidad Veracruzana	University	MX	388	Arrecife Alacranes	National Park	MX
356	Facultad de Medicina Región Veracruz, Universidad Veracruzana	University	MX	389	CASA	Business	Spain
357	Grupo Ambiental Profauna A.C	NGO	MX	390	Parker Beach Patrol	Group	TX
358	Somos Más Decididos A.C.	NGO	MX	391	Anna Simmons	University	OR
359	Colegio de ingenieros de solidaridad DGD	College	MX	392	Ivington Middle School	Middle School	NY
360	CVICTM Centro Veracruzano de Investigación y Conservación de la Tortu	NGO	MX	393	Laguna Ocean Foundation	Non Profit	CA
361	Tortugario Manzanillo	NGO	MX	394	Oystercatchers Searchers	Group	MD
362	Guardería ambiental Cabo Pulmo, Parque Nacional Cabo Pulmo	National Park	MX	395	Coastal Crusaders Florida	Non Profit	FL
363	ASUPMATOMA AC, Campamento Tortuguero	NGO	MX	396	Beaver County Marcellus Awareness Community (BCMCA)	Non Profit	PA
364	Campamento Morro Ayuta, Campamento Tortuguero	NGO	MX	397	Girl Scouts	Girl Scouts	TX
365	UABC	University	MX	398	TPWD Caddo Lake State Park	Governmental	TX
366	Campamento Tortuguero Lechuguillas y PNSAV	NGO	MX	399	Georgetown Conservation Commission	Non Profit	NH
367	Ayuntamiento de Solidaridad	NGO	MX	400	Surfrider Foundation Conservation Commission	Non Profit	VA
368	Reserva de la Biosfera Los Tuxtlas	Reserva	MX	401	Surfrider Foundation Club	Non Profit	VA
369	Peña Hermosa, Campamento Tortuguero	NGO	MX	402	Neeq Naps First year scientific group (seminar group)	Science Group	TX
370	Zapotitlán, Campamento Tortuguero	NGO	MX	403	Somers/Herman/Wigg Family	Group	MO
371	Biodiversidad y Cultura Ambiental	NGO	MX	404	Osprey Tours	Business	MX
372	CONANP/PNSAV	National Park	MX	405	El Centro de Protección y Conservación de la Tortuga Marina "ECOMAR-UAB	Non Profit	MX
373	Campamento tortuguero Bahía de Chacahua	NGO	MX	406	Facultad Ecología Marina	Non Profit	MX
374	Campamento CONANP	National Park	MX	407	Kahal Bajasur Bioturismo	Business	MX
375	Kanan Áak	NGO	MX	408	Gym shark	Business	MX
376	Osprey Tours	Business	MX	409	Holtan	Business	MX
377	NGO	NGO	MX	410	Colectivo Manglares	Non Profit	MX
378	Área de Protección de Flora y Fauna Laguna de Términos -CONANP	Governmental	MX				

Table 5: Nurdle Patrol Partners who have received startup kits as of May 31, 2024.

411	Surfrider Foundation North Shore MN	Non Profit	MN	424	Facultad de Ecología Marina UAGro	University	MX
412	Northern Ohio Chapter Surfrider Foundation	Non Profit	OH	425	GROBIOS AC	NGO	MX
413	Salish Surf Beach Crew	Non Profit	OR	426	Parque Estatal Estero el Salado	Reserve	MX
414	The Honeycomb Project	Non Profit	IL	427	Dirección de ecología y medios ambiente	Governmental	MX
415	Maverick Fishing Club	LLC	TX	428	Niños y Crías A.C.	NGO	MX
416	Marine Conservation Network	Non Profit	CA	429	Playa Norte	Volunteers	MX
417	Interact Club- Westchester Academy for International Studies	Charter School	TX	430	Isla del Carmen	Volunteers	MX
418	Environment Georgia	Non Profit	GA	431	Isla Matamoros	Volunteers	MX
419	Grays Harbor Surfrider	Non Profit	WA	432	Chenkan	Volunteers	MX
420	Community Resource Center of Stanwood-Camano	Non Profit	WA	433	Sabancuy	Volunteers	MX
421	The Community Nook Inc.	Non Profit	FL	434	Chacahito/Xicalango	Volunteers	MX
422	Girl Scout Troop 979	Girl Scouts	TX	435	Voluntario Rio Lagartos y Coloradas	Reserve	MX
423	The Science Exchange	Non Profit	MX	436	Shark Gym	Business	MX

Table 6: Nurdle Patrol Partners who have received startup kits as of May 31, 2024.

Phone App Maintenance and update website

A contract was signed with TAMU-CC Conrad Blucher Institute (CBI) in July 2023. The work by CBI includes improvement to the phone app for Nurdle Patrol by adding all data onto a map, as well as updates to the Nurdle Patrol website (www.NurdlePatrol.org). Both versions of the original phone app, Android, and iOS, were released in May 2021.

For the first quarter of Year 4, they hired a graduate student to continue the development of the Nurdle Patrol website and mobile apps. The team focused on the technical transfer for the student. The student was able to set up and work on upgrading the software libraries for Nurdle iOS app and Nurdle Android app. The newer iOS version (1.3.5) is in the testing phase.

During the second quarter, the development team completed the technical transfer process for the new research assistant and updated the point of contact (located at the bottom of the nurdlepatrol.org website) with the new email address (Jace.Tunnell@tamucc.edu). They also worked on developing a basic concept for the nurdle interactive animation for the website (Figure 6).

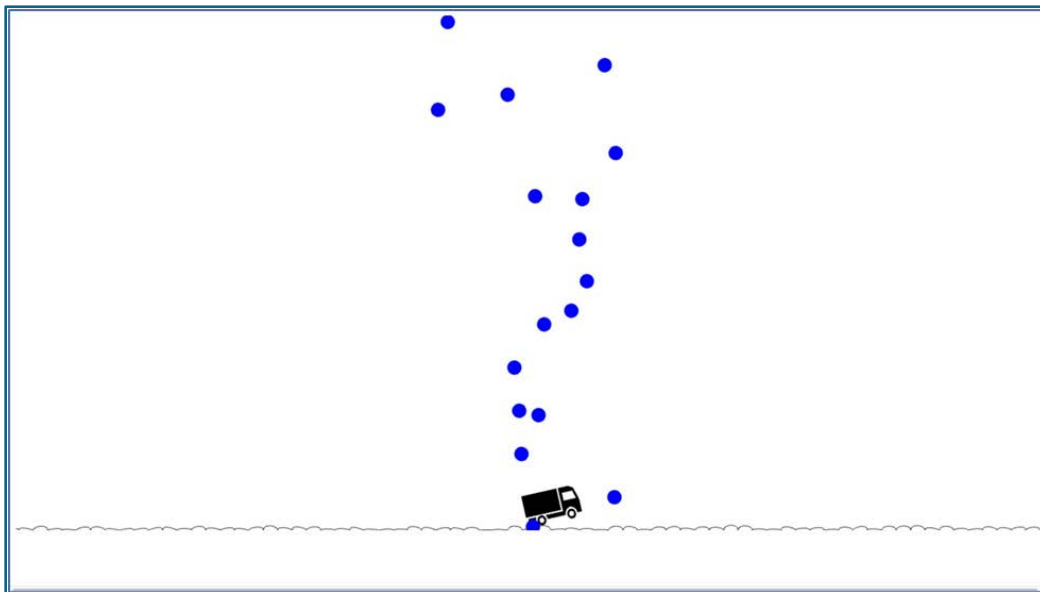


Figure 6. First prototype of the Nurdle interactive animation

During the third quarter of Year 4, the development team made progress on the nurdle interactive animation. The team asked volunteers to play the game and gathered feedback. There were several changes made to the animation following this feedback (Figure 7):

- Added colors and various sizes for the nurdles.
- Added more realistic graphics for the vehicle (trucks and ships).
- Shorten time to complete the animation.
- Added environmental health bar as additional game-over condition.
- Adjusted the way nurdles moving speed.

- Added counts to nurdle collected and nurdle uncollected.

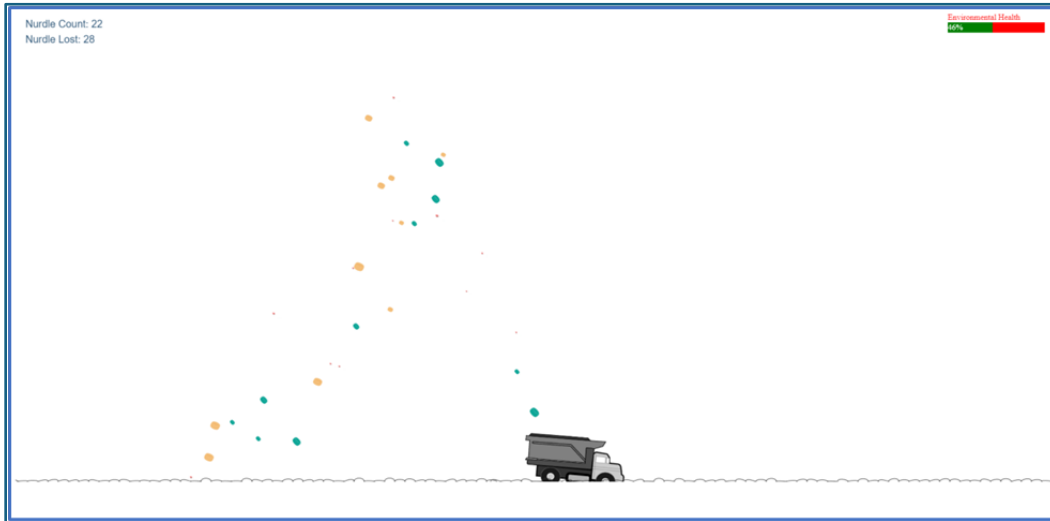


Figure 7. Nurdle interactive animation as of March 6, 2024.

During the fourth and final quarter of Year 4, the development team continued to enhance the functionality and user experience of Nurdle Patrol homepage and completed the deliverables in both data visualization and interactive animation.

Data Visualization Enhancements:

The team added an additional bar chart that displays the top US States and countries based on the highest number of nurdles collected over the past 30 days. They also added another set of bar charts to highlight the US and countries with the highest number of reports submitted in the past 30 days. These new charts are located on the Nurdle Patrol website's home page.

These new data visualization widgets were designed to encourage competitive spirit among the citizen scientists and regions, promoting more active participation in our data collection efforts (Figure 8).

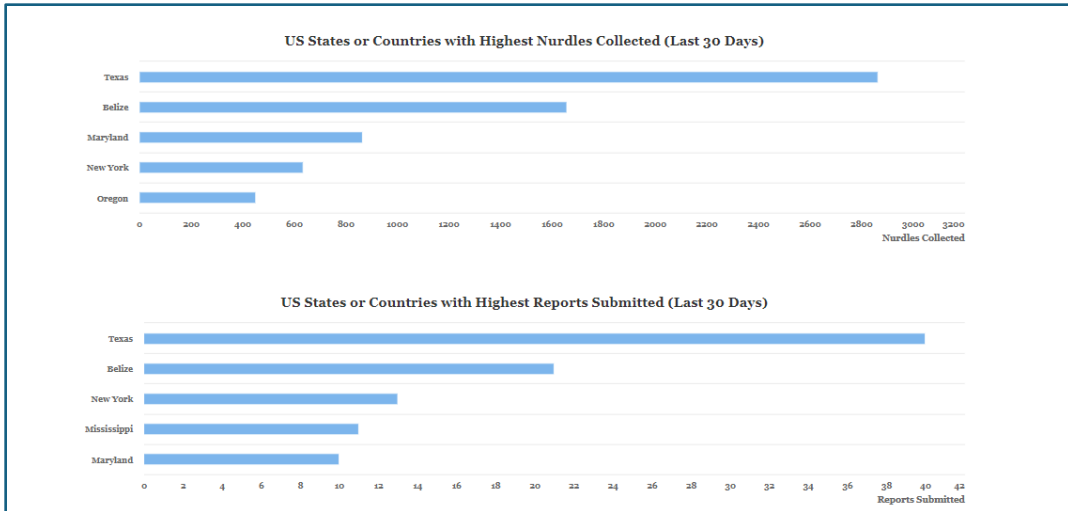


Figure 8. New bar charts on the Nurdle Patrol home page.

Animation Development:

1. Enhancements to Nurdle Animation Scenarios:

Truck Scenario: The design team added detailed backgrounds to the truck animation scenario, which enhanced the visual appeal and realism of the environment where the nurdles are transported (Figure 9).

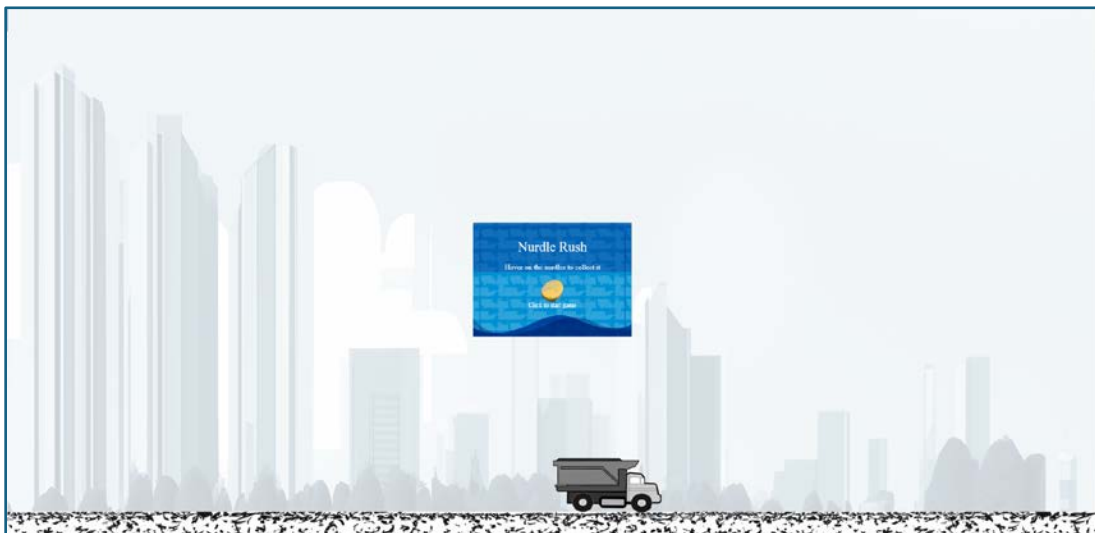


Figure 9. Nurdle Rush – Truck.

Ship Scenario Completion: The ship case scenario was added recently featuring animations that depict the accidental spillage of nurdles into marine environments (Figure 10).

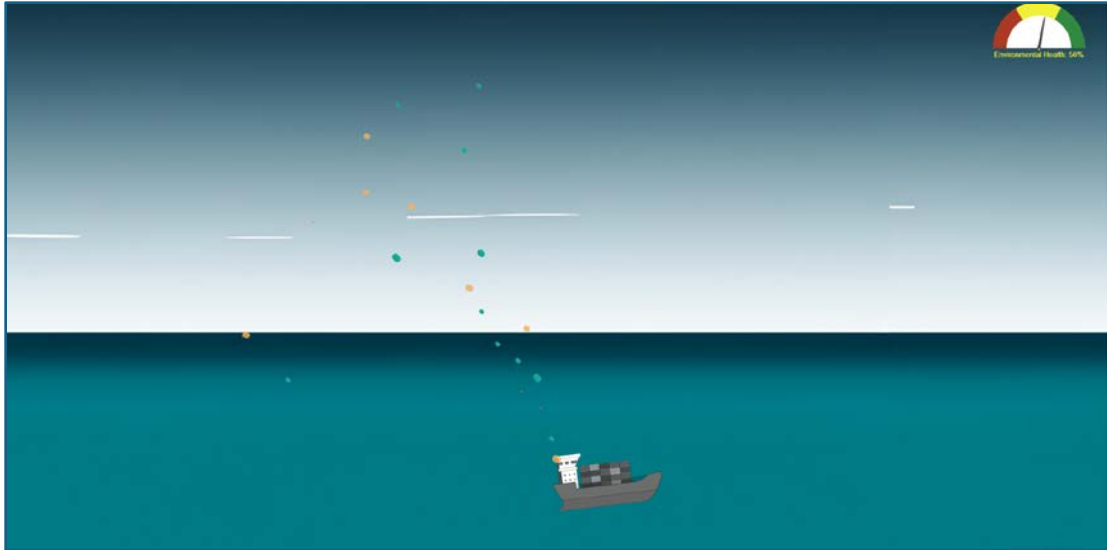


Figure 10. Nurdle Rush – Ship.

2. Interactive Game Development and Testing:

The design team conducted a demonstration of their animated game to stakeholders and selected users to gather initial feedback. The insights obtained were invaluable and led to several bug fixes and enhancements. Notably, the team adjusted the game's difficulty to provide a more challenging and engaging experience for players. This involved refining the game mechanics and interaction patterns to ensure a smooth and enjoyable user experience on both personal computers and mobile devices. The Nurdle Animation, also known as Nurdle Rush can be accessed from the website menu bar (Figure 11) or the QR code that links to <https://nurdlepatrol.org/nurdlerush> (Figure 12).

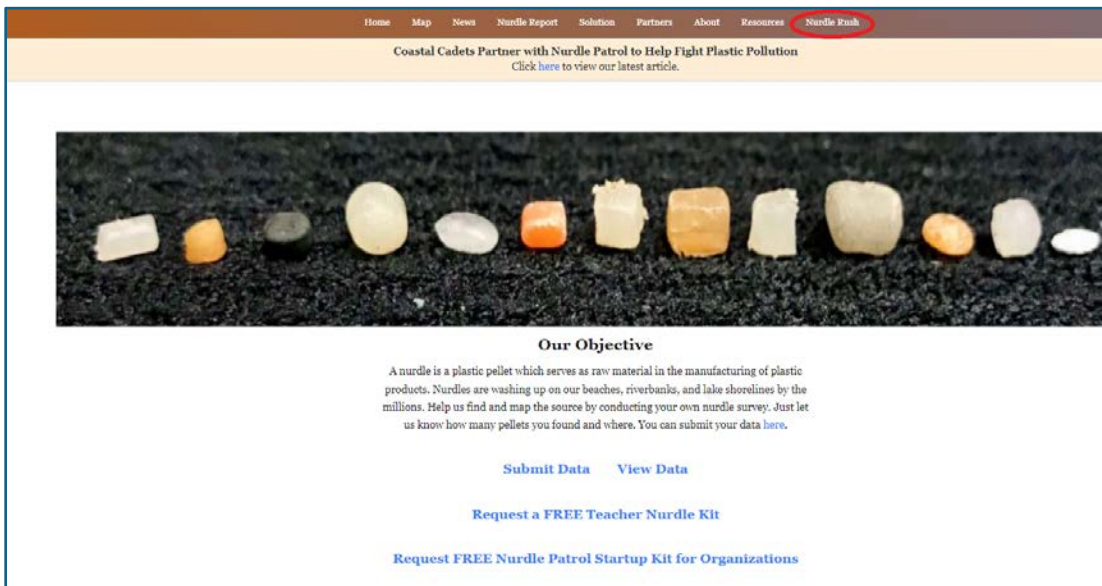


Figure 11. Nurdle Rush menu option on Nurdle Patrol website.



Figure 12. Nurdle Rush QR Code.

Develop Educational and promotional videos

Videos produced from Year 1 funding (2020) have been placed on the YouTube Channel that the Mission-Aransas Reserve maintains, as well as posting to various social media platforms, and added to the NurdlePatrol.org website. For Year 2 (2021) funding, a four-part video series featuring Diane Wilson was produced and completed. The videos were shown at the Nurdle Patrol Film Festival on September 10, 2022. For Year 3 (2022) a documentary of Nurdle Patrol’s work in Mexico was produced and completed in April 2023.

Public Awareness

The Nurdle Patrol rack card continues to be printed and describes how to conduct a Nurdle Survey on the front side and on the back side it has more detailed information including where to look for nurdles, what nurdles are, and a QR Code link to NurdlePatrol.org where a training video can be found. We created this card in English and Spanish (Figures 13 & 14).



Figure 13. Nurdle Patrol outreach flyer front and back.



Figure 14. Spanish version of the Nurdle Patrol outreach flyer front and back.

The billboard campaign was created during the first year (2020) of Nurdle Patrol and was a huge success and has been extended into the third year with one near the Formosa Plastics Plant in Point Comfort, Tx (site 355751) in February 2022 and will remain at this site until February 2025 (Figure 15).



Figure 15. Nurdle Patrol billboard campaign.

Nurdle Patrol is proud to have a permanent outreach installation at the Texas State Aquarium (Figure 16). The Texas State Aquarium reached out to us in the summer of 2021 to request video footage, images of nurdles, and text on the impact of plastics in the environment. From the information we sent, the aquarium was able to create an exhibit with a video that plays continuously, and a poster display educating folks on what nurdles are, how they get into the environment, and solutions for reducing plastics getting into the ocean.

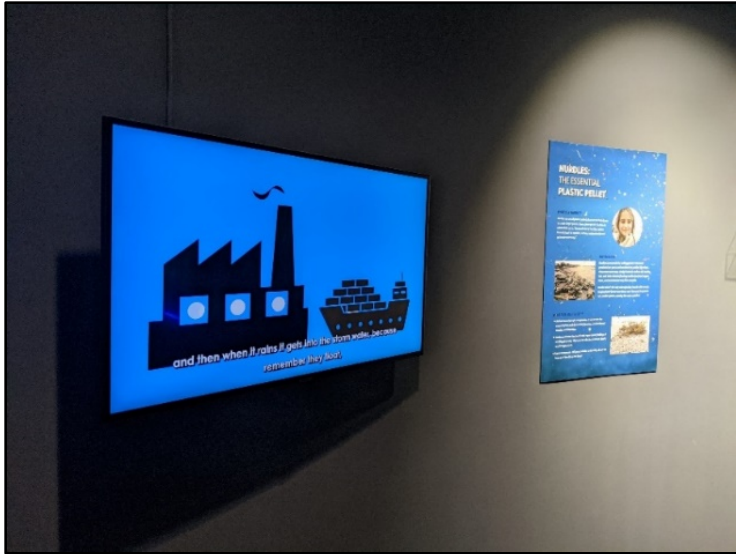


Figure 16. Nurdle Patrol outreach installation at the Texas State Aquarium.

Summary

A total of 4,296 surveys were conducted during the Year 4 and 179,340 nurdles were removed from the beaches, riverbanks, and lake shorelines across the United States, Mexico and additional countries worldwide. Nurdlepatrol.org acquired 120 new partners and shipped 315 teacher kits to educators in the USA, Canada, Mexico, Puerto Rico, Costa Rica, Columbia, UK, Spain, Africa, Australia, Turkey, Italy, Spain and Thailand. One hundred and sixty-seven individual kits were handed out during Year 4 (Table 7).

Y4	Number of Surveys	Nurdles Removed	New Partners	Teacher Kits	Individual Kits
Q1	1,543	28,466	46	148	96
Q2	1,033	114,360	43	53	0
Q3	546	5,565	5	31	25
Q4	1,174	30,949	26	83	46
Total	4,296	179,340	120	315	167

Table 7: Year 4 Progress Report Summary.

Obstacles

Currently there are no obstacles.