Kids on the Beach Education Program

Project Reporting Period: October 2024 – September 2025

Conway Middle School 8th grade students and teachers, Padilla Bay staff, Samish DNR staff, and volunteers.

This project has been made possible through a variety of funding sources and collaborative efforts, including but not limited to support through an interlocal agreement between Skagit Marine Resources Committee and Padilla Bay National Estuarine Research Reserve. Recognition for other partners and funding sources are provided below.

1. Abstract

The Kids on the Beach (KOTB) program is designed to increase marine science literacy and appreciation for the value of coastal ecosystems for Skagit County public school students through real, relevant, local field and classroom learning experiences. Students are provided with a variety of learning experiences focused on marine ecology, conservation and research that occur in multiple settings (i.e. intertidal habitats, formal classrooms, and informal learning environments). KOTB is intended to be useful to teachers and easily integrated into existing classroom curricula and other ongoing school programs to further expand science literacy and awareness.

The 2024-2025 KOTB program moves forward with the long-term goal of establishing a widely available, high-quality, and sustainable partnership between the Skagit MRC, Skagit County schools, and the Padilla Bay National Estuarine Research Reserve (PBNERR). This program is important to the MRC as it helps build awareness of coastal issues and ecosystems and their value to health and community in Skagit County, and providing positive educational experiences to improve science literacy and understanding of issues relevant to Skagit County. The program builds on partnerships important to the SMRC including the Samish Indian Nation, Swinomish Indian Tribal Community, Fidalgo Bay Aquatic Reserve, and Salish Sea Stewards, among others.

An ultimate outcome of KOTB is that students will have increased marine and science literacy, and move forward into the world with the knowledge and confidence to pursue marine and environmental science related careers and be conscientious and environmentally aware individuals that value the health and quality of natural ecosystems and waters of the Salish Sea.

Teachers and students from four schools in Skagit County worked with educators and content experts at PBNERR to conduct research in the nearshore environment, gather scientific data in the field, analyze the data in the classroom, and present results to teachers and peers. During the 2024-25 project year, 258 students from Conway, Concrete, and Evergreen and Allen Elementary schools participated in the KOTB program. The learning experiences for these students were made possible by 45 volunteers contributing 208 hours of service, along with PBNERR staff who contributed 137 hours of in-kind support – demonstrating the true community-based and collaborative nature of the KOTB program.

2. Project Goals

The primary goal of the KOTB program is to increase the accessibility of marine science and environmental education opportunities for elementary and high school students in Skagit County. The program provides students with the unique opportunity to participate in hands-on ecological, restoration, and conservation research experiences at the PBNERR. KOTB is intended to be useful to teachers and easily integrated into existing classroom curricula and other ongoing school programs to further expand science literacy and awareness. We seek to increase the number of students pursuing education and careers in marine science, help create an informed, conscientious, scientifically literate, and environmentally aware constituency in Skagit County and beyond that value the health and quality of natural ecosystems of the Salish Sea and, in turn, is aligned with priorities of the MRC and NWS.

The broad goals of the project are listed below. The specific and more measurable tasks, activities and outcomes that support achieving these goals are reported further along in the report as part of the Methods/Actions section.

- Provide middle school students (6^{th}- 8^{th} grades) with a variety of hands-on authentic marine conservation research and experiment-based classroom and field activities in the beach environment, where students get to be marine scientists for the week to help improve marine science literacy, as well as a chance to practice science in an authentic context.

    - Over the past year Padilla Bay staff have expanded participation of schools representing lower grades (i.e. Allen Elementary), prioritizing schools in less advantaged communities, and including high-school students in the program.
- Provide place-based and authentic learning experiences for both students and teachers to learn about estuarine ecology, data collection and analyses, and communicating results of investigations to peers and other audiences.
- Create a fun and relevant learning experience that sets students up for success in future learning and helps teachers add an important, real-world element to their curricula.
- Leverage and build on partnerships important to SMRC, including engagement with and participation by Samish Indian Nation, Swinomish Indian Tribal Community, Fidalgo Bay Aquatic Reserve, Salish Sea Stewards, and other community-based groups interested in environmental education and stewardship.

3. Project Engagement

The KOTB program provides an excellent opportunity to engage with numerous community groups, partners and organizations. There are three primary partners worthy of specific mention that PBNERR staff have engaged with to deliver the KOTB program. These include the Samish Indian Nation, SMRC Salish Sea Stewards and Forage Fish Program volunteers, and Skagit County Public Schools.

- Engagement with Samish Indian Nation is critical for participation of Conway schools. They invite students and teachers, along with PBNERR staff, to visit the beaches at the Fidalgo Bay Resort annually to conduct forage fish surveys. Staff from the Samish DNR assist with the fish seine portion of the field trip. The Conway KOTB field day is also supported by volunteers from the MRC Forage Fish program, who guide students in the collection and identification of forage fish eggs at the Fidalgo Bay Resort.
- The MRC Salish Sea Stewards program is an important indirect partner in delivering the KOTB program. The majority of volunteers that assist with KOTB programs are Salish Sea Steward graduates, and the knowledge and experience they bring provides an enriching opportunity for the students (and the volunteers). The WAVE newsletter (another Salish Sea Stewards product) is an additional valuable resource that helps recruit volunteers.
- Skagit County Schools are a key participant in the KOTB program, and it would not be as successful without the passionate teachers that eagerly participate. The students are the most important community with which we engage, as they are the ones that are the ones doing the learning, sharing experiences with peers and volunteers, collecting data, making sense of their data, and then disseminating it to their classmates. PBNERR staff foster this relationship and seek to provide ongoing support and adapt the KOTB program to meet their changing needs.

It is worth highlighting that the KOTB program could not exist without the substantial engagement and in-kind (i.e. unfunded) participation of the Padilla Bay Reserve. The materials and resources for the program are housed at PBNERR and the Breazeale Interpretive center and public beach access at the Reserve are featured prominently in program delivery. Multiple PBNERR staff support Annie England (program lead), including PBNERR scientific staff who provide technical assistance, content expertise, and best practices for data collection. PBNERR education staff provide direct assistance to the program through preparation for school visits and assisting on field days. PBNERR staff from other sectors often step in to fill gaps when there are not enough volunteers.

3.1. Partners/Organizations

Below is a list of the organizations we partnered with to carry out the KOTB program, and their respective role and contribution

Partner Organization	Role
Samish Indian Nation	Assist with surveys, beach seines, allow use of Fidalgo Bay Resort, etc.
Salish Sea Stewards	Volunteer Recruitment
Forage Fish Volunteers	Assist with surveys, identification, student management.
Padilla Bay Reserve	Staff assist with the program, even non-education staff. Publish articles about KOTB.
Skagit Valley Herald	Publicity
Skagit County Schools (Concrete, Allen, Evergreen, Conway)	Engage with the program, give their time and resources towards participation.

3.2. Participants

An impressive total of 258 students participated in the KOTB program during the 2024-2025 school year. Their participation was made possible by the guidance and coordination of KOTB program lead Annie England, further supported by approximately 45 volunteers filling 52 four-hour shifts, and ten PBNERR staff contributing their time at no expense to the project. We recorded a total of 208 volunteer hours, which corresponds to $8,674 of in-kind support when the Washington State Volunteer hourly value of $41.70 is considered. PBNERR staff contributed 137 hours of their time contributed as in-kind support of the project and demonstrates the true collaborative nature of the program.

Below is a summary table of the events involving students, volunteers and PBNERR staff.

Dates	School	# of students	Effort of volunteers and in-kind PBNERR staff support	Comments
October 11-18, 2024	Conway	40 8th grade students	21 volunteers contributed 84 hours to program implementation; 2 PBNERR staff contributed 10 hours to program implementation	Students participated in the forage fish component of the KOTB program, which included a classroom visit, field day at the Fidalgo Bay Resort, and an additional follow up classroom visit
April 22-23, 2025	Concrete High School	90 9th-12th grade students	11 volunteers contributed 60 hours to program implementation; 6 PBNERR staff contributed 30	Students participated in the KOTB program, which included a classroom visit, two field days at the Padilla Bay Reserve, and an

			hours to program implementation	additional follow up classroom visit.
May 5-9, 2025	Evergreen Elementary	86 6th grade students	7 volunteers, contributed 32 hours to program implementation; 8 PBNERR staff contributed 40 hours to program implementation	Groups of 4-5 students worked together to collect data in three quadrats along transects. They collected data on species abundance and diversity at three different restoration areas at Bayview State Park, then compared the health of the three different restoration areas based on their data.
May 19-23, 2025	Allen Elementary	42 5th grade students	7 volunteers, contributed 32 hours to program implementation; 5 PBNERR staff contributed 25 hours to program implementation	Groups of 4-5 students worked together to collect data in three quadrats along transects. They collected data on species abundance and diversity at three different restoration areas at Bayview State Park, then compared the health of the three different restoration areas based on their data.

3.3. Communities involved

Kids on the Beach and the associated outcomes is made possible by the assistance of multiple communities and organizations, including the MRC Forage Fish Program, the MRC resources such as the Salish Sea Stewards and WAVE newsletter, Samish Indian Nation Department of Natural Resources and Fidalgo Bay Resort, Skagit Valley Herald, Padilla Bay Reserve, and of course the various Skagit Public Schools that participate. The schools included Allen Elementary School, Evergreen Elementary School, Conway Middle School, and Concrete High School.

4. Project Methods/Actions

Implementation of the KOTB program generally follows the local academic school year. Recruitment of participating teachers occurs in the spring and summer for involvement in the following school year. Below is a generalized timeline for activities that are conducted throughout the year for the KOTB program. A more detailed example curriculum with comprehensive materials for Sedro Woolley is included in Appendix A.

Month	***Tasks***
June	• Distribute KOTB survey and evaluation to teacher (for those who participated in the previous school year KOTB program) • Reach out to returning schools to confirm participation the following fall; recruit new participating schools as needed or opportunity arise.

July	• Make improvements to the program content based on experience, evaluation, and teacher survey.
August	• Make improvements to the program content based on experience, evaluation, and teacher survey.
September	• Contact Conway Middle School Teacher to confirm schedule for KOTB Forage Fish in the fall. • Contact Spring KOTB teachers to schedule their participation, work with Padilla Bay Educators to align calendars, check tides to ensure the tides work for the window of time that students are visiting • Recruit volunteers, via email and the WAVE • Contact Fidalgo Bay Resort to request/confirm field day for Conway • Contact Samish DNR to request/confirm assistance on field day
October	• Confirm the schedule the week before for Conway Middle School (in case there are last minute changes related to bus availability). • Send out detailed schedule for field day to teachers, volunteers, and PBNERR staff that are assisting with the program • Train volunteers supporting the KOTB program • Gather supplies and print materials • Implement KOTB program with school(s) participating in the fall • Send “thank you” emails to volunteers and partnering organizations
November	• Evaluate, revise and improve content and program delivery to best serve students and teacher needs
December	• Evaluate, revise and improve content and program delivery to best serve students and teacher needs
January	• Evaluate, revise and improve content and program delivery to best serve students and teacher needs
February	• Meet with teachers participating in the spring program. Discuss and finalize improvements to content and program delivery to best serve students and teacher needs • Finalize schedule with teachers • Present to the Salish Sea Stewards to recruit for KOTB volunteers
March	• Continue working on content and program delivery for ongoing alignment with teacher and student needs. • Recruit volunteers, via email and the WAVE • Update schedule with any last-minute changes • Contact Skagit Valley Herald to cover one of the KOTB days
April	• Continue to recruit volunteers • Send schedule to volunteers • Train volunteers • Gather supplies and print materials • Send reminder email to Skagit Valley Herald • Implement KOTB for 1-2 of the schools
May	• Continue to recruit volunteers • Send schedule to volunteers

	• Train volunteers • Gather supplies and print materials • Implement KOTB for 1-2 of the schools
June	• Create survey and evaluation, send to teachers • Contact schools (i.e. Conway Middle School) to confirm their participation the following fall.

Specific project tasks and outcomes:

- Maintain communications with SMRC Project lead and SMRC Coordinator and work directly with the SMRC Project Lead during program development.
    - *Shifts/edits*: At the beginning of the 2023-2025 biennium, SMRC member and PBNERR Director (Jude Apple) took on the role of MRC Project Lead for the KOTB program. At the time this seemed a logical and efficient pathway and was agreed upon by the SMRC, as the Director was already involved in the KOTB program through supervision of PBNERR education staff and helping develop the KOTB scope of work. It was noted, however, that this arrangement could be perceived as a conflict of interest. The SMRC has identified a new MRC member to serve as the project lead moving forward in the next biennium.
- Contact and enlist at least three (3) schools in Skagit County to engage teachers and students in the spring and/or fall program each year.
    - *Shifts/edits:* PBNERR staff exceeded this goal by recruiting and delivering the KOTB program to four Skagit County schools (Conway Middle School, Concrete High School, Evergreen Elementary, and Allen Elementary) during this annual reporting period. The program engaged an impressive 258 students in place-based environmental education experiences during the final project year.
- Work with schools and SMRC to identify potential new classroom, field and/or virtual activities, as needed.
    - *Shifts/edits:* Program staff worked with the SMRC and used information gathered from program surveys to curate curricula and successful activities for students in this program. Activities such as the forage fish component of KOTB, mudflat explorations of species abundance and diversity at Bayview State Park, and bird species analysis continued to be implemented during this reporting period.
- Develop a plan and schedule for implementation of classroom visits and student field studies, revise curriculum as needed, and share the KOTB program plan, schedule and educational activities with SMRC. This includes in person or virtual classroom visits before and after each field study for content exploration, scaffolding for the broader learning objectives related to the field experience, and providing students and teachers with assistance on data analysis and report preparation
    - *Shifts/edits:* Program staff contributed upwards of 30 hours a week during KOTB implementation to classroom visits, travel, preparation, and field visits by classes.
- Recruit the help of volunteers for each participating school that facilitates student engagement in authentic marine science inquiry to address a relevant question.
    - *Shifts/edits:* In addition to program development and implementation, PBNERR staff recruited and retained a large number of volunteers for the KOTB program. Volunteer engagement and contribution have been integral to program implementation, with many volunteers returning to contribute time to multiple program days. Volunteers contributed an impressive total of 208 hours during this reporting period.

- Encourage teachers and students to make video recordings of formal presentations to share with other classes or present in-person at a research symposium that will be shared with SMRC.
    - *Shifts/edits:* A final research symposium had been included as a mandatory part of previous KOTB program implementations. This has become an optional component, as it requires interest, capacity and participation of teachers that are not always available with the partnering schools. That being said, there are some teachers who prioritize this and make it available for sharing with the SMRC.
- Develop and implement an annual evaluation for KOTB participants. Review feedback from previous years to help modify the KOTB program to better respond to teachers' needs and capacity to engage.
    - *Shifts/edits:* Padilla Bay staff created, disseminated, and analyzed survey results for the KOTB program to gather information on program and curriculum improvements.
- Coordinate with local media representatives to have at least two (2) articles published over the funding period highlighting the KOTB Program. Media platforms could include, but not be limited to, local newspapers, electronic newsletters, or other news and social media platforms.
    - *Shifts/edits:* The Skagit Valley Herald published an article featuring KOTB in the first year of the two year program titled "Kids reach into the mud with beach science program. Another article was published in the Spring 2025 Padilla Bay Newsletter titled, "Kids get their hands muddy learning about nearshore organisms" which featured accomplishments of the KOTB program. The newsletter is distributed to approximately 700 recipients. Staffing changes
- Produce a final report each year that evaluates the results of the program and recommendations for moving forward.
    - *Shifts/edits:* This report serves as the annual final report on the KOTB program for the reporting period of October 2024-2025, encapsulating program results and recommendations for future implementation.

5. Results

Students and teachers learn estuarine ecology, are trained on data collection protocols, collect authentic data themselves, they create graphs with their data, and then synthesize what they learn in a presentation they give to their fellow classmates. For many students, it is their first time at a beach. Additionally, for most of the students it will be their first time creating a graph of data they collected themselves—for the elementary groups it is often their first time creating a graph period.

5.1. Data Summary

A survey is distributed annually to teachers participating in the KOTB program. Results from the 2024-2025 Kids on the Beach Survey are summarized below, including question prompts and the response(s).

Question 1: What aspects of Kids on the Beach program were a good fit for your students?

- The classroom launch lessons were highly engaging and prepared students well for a fantastic day on the beach collecting data.
- I think it works really well to have the classroom lessons before the field trip. Students are able to engage more and be better prepared for their learning during the field trip. Also, the pace of the field trip is excellent, and the quick paced survey of Crab molts was PERFECT for keeping students engaged and making them excited about what they were seeing. I think breaking them into groups with an adult volunteer works really well.
- very science-based, showing students how to collect and interpret data, also showing them the amazing beach that is just minutes from their school (many had never been there before)

Question 2: What aspects of Kids on the Beach program were a poor fit for your students?

- The program is really excellent and is always a highlight for my students. The place that is the biggest challenge is the section with the interpretive display and library, during the interpretive center rotations. Our group was divided into 3 groups who rotated through a plankton investigation in the lab, the aquarium, and the library/interpretive center. I saw students getting squirrelly and acting out, mostly because they were disengaged. I think making some sort of scavenger hunt for this section would help students be engaged and minimize unwanted behaviors. I was worried they were going to damage the displays, because high school students don't always know their own strength. It would also be really neat to have students somehow engage with the upland forest habitat section of the reserve as well.
- None to mention!

Question 3: How can we make the program more relevant to the grade level you teach?

- I think that you do great with this! Maybe bringing in some larger environmental issues such as microplastics?
- I think it is great as-is

Question 4: How can we make the program more accessible to all students?

- See comment above about creating some activity to help students engage with the interpretive displays.
- nothing comes to mind

Question 5: What other educational materials/resources would you like from Padilla Bay Reserve? What would be helpful for teachers and students in Skagit County?

- I think it would be great to draw some connections between plastic pollution and plastic waste would be great. Also they really enjoyed the bird portion of the field trip, so that could be something to build up on, especially given the decline in bird populations in marine ecosystems.
- we used some of the pre-teaching resources prior to our Kids on the Beach week, these were helpful

5.2.Outcomes

We met or exceeded the proposed goals. We maintained communications with the SMRC lead and MRC coordinator and kept them informed of program development through progress reports and other relevant correspondence. A primary goal of the project was to recruit and host three schools, and we were able to extend that engagement to a fourth school during the project implementation. We worked with these schools to identify needs and adjust activities accordingly. We developed and scheduled multiple, week-long Kids on the Beach events. As part of implementation, we recruited volunteers that provided 208 hours of service for the KOTB program. Students created presentations and presented what they learned to their peers, although this year none of the teachers participated in making video recordings of these presentations. This was due, in part, to shifting rules related to recording and making publicly available student images, likenesses, and presentations. We have continued to collect responses from teachers to help evaluate the program, and promote awareness of the program through social media and newsletter coverage of the Kids on the Beach field days. Finally, the program continues to expand science literacy and environmental awareness among students and teachers in Skagit County and beyond. This has been accomplished through hands-on experiences and engaging in science and engineering practices by collecting data, making sense of their data, and presenting their results to their peers. Through their experiences at Padilla Bay, the students will in turn share the experience with their families and the

broader community who come back to Padilla Bay for additional learning experiences. As evidenced by numerous adult visitors who came to the Reserve as children, we expect that the experiences students have with Kids on the Beach will last a lifetime and contribute toward a greater awareness of the value of coastal ecosystems and an ongoing relationship with the Reserve, the Padilla Bay ecosystem, and the natural and human communities that live here.

5.3. Outputs

A summary of the outputs (including products and participants) follows.

- 4 participating schools
- 5 teachers representing these schools
- 7 grade ranges represented (grades 5th, 6th, 8th, 9th, 10th, 11th, and 12th)
- 12 classes of students comprising 258 students
- 45 volunteers contributing 208 hours, equivalent to $8,674 of in-kind support
- 2 bays (Fidalgo and Padilla) investigated as part of ecological surveys
- 6 different investigations conducted in Padilla and Fidalgo bays, including: bird surveys, crab molt surveys, plankton investigations, embryological stage development investigation, fish seine, and mudflat Investigation.
- 3 new investigations with revised protocols and data sheets were created and conducted, including the bird survey, crab molt survey, and plankton investigation.
- 1 European Green Crab found (!!)
- 1 newsletter article about Kids on the Beach

5.4. Results in context

The qualitative data collected from the survey distributed to teachers shows that teachers believe the KOTB program is “highly engaging,” and “very science based”. These sentiments represent the exact kind of outcomes we hope to see in our participants. Additionally, many of the teachers have participated in the program for several years, indicating their loyalty and value they place in the program.

A broader outcome of Kids on the Beach is that students improve in their marine and ecological literacy after participating in the program. This will hopefully translate to more students entering marine and environmental science careers, and also generating a cohort of well-informed young citizens. They leave the program with first-hand understanding of what collecting and analyzing their own data looks like, and the ability to think analytically about the world around them. Student participation has continued to be high, with 258 students participating this year. Volunteer participation also remains high with 45 volunteers contributing 208 hours to program field days.

6. Project Highlights, Innovations & Stories

This year when going into Concrete, one of the students asked, “Why do we even need scientists, haven’t we already figured everything out?”. KOTB program lead Annie England fielded the question and replied that we have actually not figured everything out and ongoing research and data collection is needed to continue advancing science. She shared that we were, in fact, going to be a part of one of the latest and important research efforts at Padilla Bay – namely conducting molt searches to test for the presence of European green crab in Padilla and Fidalgo Bays. This is an emergent topic and the first time it has been done as part of Kids on the Beach. Annie helped convey the value of this work to the student and that the molt search they conducted is super important for early detection of European green crab and preventing the spread in Salish Sea waters.

Another highlight came when one of the Padilla Bay educators overheard two students talking, where one said "They [classmates] said this was going to be boring, but this is awesome! I’m not going to listen to

them anymore". This was shared during the program with Allen Elementary, where many of the students had never even been to the beach despite living in Skagit County. The students were pleasantly surprised by how interested they were in the field experience.

A few lessons learned from this year's Kids on the Beach program include:

- One of the most important outcomes of this program is an increase in marine and environmental science literacy for students. The gain in awareness of marine organisms, understanding of the functioning and value of marine ecosystems, and the practical experience of collecting and making sense of data helps prepare them to participate in the world with the eye of a scientist.
- The newly piloted crab molt search went very well when it was implemented with high school students from Concrete. It was not only fun, but very successful in that they found many more crab molts than we expected. We will continue to include this in future iterations of KOTB.
- The revised bird survey was also piloted with Concrete high school students. It required them to slow down and calmly make observations, which is a valuable skill as a budding naturalist, ecologist, or scientist. We will include this bird survey component as we move forward.

7. Next Steps

We now have several years of KOTB implementation under our belts, with multiple versions and numerous investigations to choose from. We will continue to revise investigations to improve the ability to meet student and teacher learning goals, as well as develop new investigations as opportunity and expertise allows. The program lead (Annie England) will continue to choose investigations and tailor the program to provide the most engaging experience we can for students.

We will continue to seek and advocate for additional funding and expand the program to reach more schools and their communities. We currently bring in additional funds from other sources (e.g. Padilla Bay Foundation) to provide busing support for schools where transportation is a challenge.

We will work to make the program more accessible, including English language learners and students with a broader range of learning needs (e.g. neurodivergent students). Our experience this year with Allen Elementary provided a valuable opportunity to work with, accommodate, and better understand the needs of students for whom English is not the primary language spoken at home. We have also worked with consultants from the University of Washington Autism Center, who have provided guidance and recommendations on learning strategies that help make a wider range of learners more comfortable with our programs at Padilla Bay, including KOTB.

Images

Conway Middle School 8th grade students

Conway Middle School 8th grade students and teachers, Padilla Bay staff, Samish DNR staff, and volunteers.

Photographs from Concrete High Schools's 9-12th graders during their field trip(s) on April 22-23, 2025.

Photographs from Sedro Woolley May 2025.

Photograph from Allen Elementary May 2025.

Appendix A

Example of Kids on the Beach curriculum and materials (from the Sedro-Woolley program)

5E Lesson Plan Template

General Information

Lesson Title: Kids on the Beach

Subject(s): Science

Grade/Level/Setting: 6th Grade 3 classes of 25 students

Prerequisite Skills/Prior Knowledge:
Students will have familiarity with different ecosystems, and food webs that comprise them.

Place:	Classroom	Classroom	Field Trip	Field Trip	Field trip??	Classroom
Day:	March 25	March 28	March 29	March 30	March 31	April 1
Connecting:	Virtual	In Person	In-Person/ Bayview	In-Person/ Bayview	In-Person/ Bayview	In-Person
1st class time:	11:30-12:30	11:30-12:30	11:30-2:30			11:30-12:30
2nd class time:	12:40-1:40	12:40-1:40		11:30-2:30		12:40-1:40
3rd class time:	2:30-3:30	2:30-3:30			11:30-2:30	2:30-3:30
Event:	-Intro and virtual Aquarium Tour	-Fish Bingo -Practice collecting data	- Beach Seine -collect data on Fish Counts	- Beach Seine -collect data on Fish Counts	- Beach Seine -collect data on Fish Counts	-Interpret data -Make graphs -Start working on Presentations

Standards and Objectives

State/National Academic Standard(s): NGSS

MS-LS2-4. **Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.** [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]

Learning Objective(s):
Identify what students will accomplish by the end of the lesson; needs to align with the state or Common Core State Standards; and needs to be measurable (condition, behavior, and criterion).

After participating in Kids on the Beach, students will be able to communicate that ecosystem health affects fish abundance. The lesson's objectives will be met if 75% or more of students create presentations that summarize their findings and share results from their data analysis.

Materials	**Technology**
DAY 1: -Computer	DAY 1: The instructor and students will be using

-Zoom (if connecting remote) -PowerPoint Presentation -Whiteboard and/or digital whiteboard -Dry erase markers -Color pencils -Data sheets -Fish and Mudflat ID sheets -Photariums -Tray DAY 2: -Whistle -Fish Seine Net - Four Medium Photariums -Five digital Cameras -Fish ID Sheet -8 Staff/volunteers -Data Sheets -3 trays -6 clipboards -Mudflat ID sheet -three tubs for putting fish in -three bucket for when students are done with the fish -three quadrats (1/2 meter) -three meter tapes DAY 3: -Computer -Zoom -Google Sheets DAY 4: -Computer -Presentation software or site (Prezi)	computers to connect via zoom; and the instructor will need their PowerPoint presentation. DAY 2: Four digital Cameras for students to document fish caught in the fish seine. The instructor will use one camera to document the field day. DAY 3: The instructor and students will use computers to connect via zoom. The instructor and students will be using Google sheets to create graphs from their data. DAY 4: The students will use computers to create a final presentation showcasing what they have learned.
Language Demands *Specific ways that **academic language** (vocabulary, functions, discourse, syntax) is used by students to participate in learning tasks through reading, writing, listening, and/or speaking to demonstrate their understanding.*	
Language Function: Students will predict which habitat will support more fish, then they will collect data to analyze the health of the two habitats, and then they will interpret the data.	
Vocabulary: ecosystems, habitat, food-web, food-chain, fish abundance, health, predator, prey, seining net	

Discourse and/or Syntax:
Discourse: Students will be supported by the instructor by helping them understand how scientist collect data and interpret data to understand the natural world.

Syntax: The instructor will help students organize their data by helping students interpret data symbols, and guide students to graph their data.

Planned Language Supports:
The instructor will use images to help reinforce vocabulary. This imagery will help students connect to prior knowledge and will give them context clues to help them better understand the meaning of the words.

Instructional Strategies and Learning Tasks

	Activity Description/Teacher	**Student Actions**
Day 1: Engage Aquarium Quick Dip	1. (15 sec) Show slide 1, say "My name is _____ and I am a scientist and teacher at the Padilla Bay Reserve. And I'm excited to work with you all this week!"	1. Students listen
	2. (15 sec) Show slide 2 and ask students, "Raise your hand if you've been to the Padilla Bay Reserve"	2. Students raise hands if they've been to the reserve.
	3. (15 sec) Show slide 3 and tell students "Before we go to much further please take a look at your virtual aquarium tour sheet, you will need to fill it out while I present. The Padilla Bay Reserve is a place where scientists, environmental stewards, and educators learn from the Padilla Bay Estuary and share that knowledge with others."	3. Students listen
	4. (2 min) Show slide 4, ask "What is an estuary" Give students 30 seconds to think, then 1 minute to pair and share.	4. Students think (30 sec), and then pair and share (1 min)
	5. (2 min) Give students a few minutes to share out, and correct misconceptions by saying an estuary is a place where water from the land meets water from the ocean and is partially surrounded by land	5. Students share out
	6. (15 sec) Show slide 5 and say "Padilla Bay estuary is located in the heart of the Salish Sea, which is an even bigger estuary. You can see in this map how the estuary connects out to the Pacific Ocean where it gets its salt water and how there are numerous rivers that input fresh water into the estuary"	6. Students listen
	7. (15 sec) Show slide 6 and say "This is where	7. Students listen

	Sedro-Woolley is in relation to Padilla Bay" 8. (2 min)Show slide 7, ask "Why is Padilla Bay Important" Give students 30 seconds to think, then 1 minute to pair and share. 9. (2 min) Give students a few minutes to share out. 10. (15 sec) Tell students "You've done a wonderful job brainstorming. One of the reasons why I think Padilla Bay is important is because of all the animals and plants that call Padilla Bay home. Now let's take a look in the aquarium and see if we can find some of the animals you might know and maybe some animals that you've never even heard of before." 11. (30 min) Give students a virtual aquarium tour. Ask questions like "What do you notice, what do you wonder, what does this remind you of" 12. (1 min) Show slide 8, and tell students "As you can see Padilla Bay is home to a variety of animals, see if you can spot any in this drawing that you saw on the aquarium tour" 13. (1 min) Show slide 9, and say "These animals have to be really hardy because every 6 hours the tide comes in, and then every 6 hours the tide goes out. The tide comes in on a flood current, this is the place on the beach where eelgrass and seaweed accumulate—this is called the wrack line, or the high tide line. When the tide goes out on an ebb current it goes down to the low tide line, this point in time is called low tide." 14. (30 sec) Show slide 10 say "This is what Padilla Bay looks like during High tide every 6hrs. The eelgrass is like an underwater forest, where fish live and hide. It is really buoyant and float straight up when the water is up" 15. (1 min) Show slide 11 say "This is what Padilla Bay looks like during Low tide every 6 hours. What do you notice is different in this drawing then in the previous drawing? " Give students a minute to think and share their thoughts. 16. (1 min) Ask "How many low tides and how many high tides do we have every day in Padilla Bay?" Give students time to think and then let them share out. 17. (1 min) Show slide 12, say "All of these	8. Students think-pair-share 9. Students share 10. Students listen 11. Students listen 12. Students listen and look for animals they saw on the aquarium tour. 13. Students listen 14. Students listen 15.Students listen and then share out 16.Students guess

	animals are connected via food chains that then make up food webs, we'll get to learn more about this on Monday." (If there's time ask students to name food chains they know. Thank everyone for tuning in today, I'm excited to see you all next week!)	17. Students listen
Day 2/ Engage(made for an hour long class):	1. (5 min) Hand out Entry tickets, and say "Hi everyone, it's wonderful to meet you all in person. Please fill out these entry tickets as we wait for everyone to arrive. You will have 5 minutes to fill them out."	1. Students fill out entry tickets as they arrive
	2. (1 min) Have students bring up entry tickets and pass out student notebook. Tell students "write your name on the first page where it says Marine Research Scientist. You need to keep track of your notebooks, you will be using these throughout the week and will use them to make your final presentations."	2. Students listen and write their name on their student notebooks
	3. (15 sec) Show slide 1 and say: "As you learned yesterday, you are now a part of a program called kids on the beach, a program where kids get to explore the beach as scientists"	3. Studnets listen
	4. (15 sec) Show slide 2 and say: "You don't have to wear a white coat to be a scientist! The picture on the right is of students from Conway being scientists."	4. Students listen
	5. (30 sec) Show slide 3, and say "Flip to page 4 of your student notebooks, at the end of this program you will need to have completed your aquarium tour sheet, turned in your data sheets, made a graph, and turn in your student notebooks. To receive full credit all materials must be turned in and they must be complete, articulate, thorough and clear."	5. Students listen
	6. (15 sec) Show slide 4, say "Last Friday we went on a virtual aquarium tour, today we'll learn about the Salish Sea ecosystem, Wednesday-Thursday each day one class will be going on a field trip, and Friday we'll create graphs of the data you collect."	6. students listen
	7. (15 sec) Show slide 5 and tell students "I work at the Padilla Bay Reserve, a place where scientists, environmental stewards, and educators learn from the Padilla Bay Estuary and share that knowledge with others."	7. Students listen

		8. (15 sec) Show slide 6 and say “although I work at Padilla Bay Reserve, we’re going to be conducting our research and collecting our data at Bayview State Park, just down the road from Padilla Bay.”	8. Students listen
		9. (15 sec) show slide 7 and say “Padilla Bay is an estuary, located in the heart of an even bigger estuary—The Salish Sea”	9. Students listen
		10. (15 sec) Show slide 8, say “If you remember from yesterday an estuary is a place where water from the land meets water from the ocean and is partially surrounded by land.”	10. Students listen
		11. (15 sec) Show slide 9 and say “This is where Sedro-Woolley is in relation to Padilla Bay. You all are just up the river from Padilla Bay. The water that rains on Sedro-Woolley eventually washes down into Padilla Bay through the Skagit River.”	11. Students listen
		12. (15 sec) Show slide 10 and say “Yesterday we learned estuaries are important because there home/habitat to a lot of living things. Padilla Bay is home to a complex ecosystems with a biodiverse group of animals and their habitats. These animals make a lot of connections—these are called food chains and food webs.”	12. Students listen
		13. (30 sec) Show slide 11 and say “We get to explore these connections tomorrow by exploring the mudflats to take a look at animals and their habitats.”	13. Students listen
		14. (5 min) Show slide 12 and say “We will also conduct a fish seine. We will collect data from our fish seine, by counting the species and number of fish we collect” Show seine net. Show the lead and buoy lines. Draw a picture on the whiteboard how we will be using the seining net to collect fish.	14.Students listen and come up and touch the net
		15.(15 sec) Show slide 13, then hide it, and say “We’re now going to play a game of Fish bingo. It’s just like normal bingo but with fish. We’re going to play this game so that we become more familiar with the different fish species. This will help us be better at identifying fish on our field day.”	15. Students get their own bingo sheets
		16. (1 minute) Hand out bingo sheets, and say **“**I’m not going to tell you the name of the fish right away, I will show you a video first and you	16. Students listen

	will have to try and guess what it is. Sometimes there will be more than one fish in a video! You can go across, down and diagonal! Whoever gets all for and calls bingo first wins! Prior to playing send out bingo sheets to students. Do you have any questions?"	
	17. (1 min) Answer questions	17. Students ask question
	18. (10 min) Play the Game! Use this Random Sequence Generator before you start to help you choose each link randomly. Some of the videos give away what the fish is by the title—that's ok, they will be 'freebies'. Select the videos according to the random sequence generator.	18.Students play game
	19. When a student says bingo check they answers.	19. A winner is called
	20. If you wish to play again have students switch their bingo sheets with their neighbor.	20. Students switch bingo sheets with their neighbor
	21. (15 sec) Show slide 14, say "This week we will explore the ecosystem health of Padilla Bay. Please flip to page 3 of your student notebooks, we will be going over a few key terms that will be important for us to know"	21. Students listen and flip to page 3
	22. (7 min) show students slides 15-20 answering any questions they might have.	22. Students listen and fill out their student notebooks
	23. (2 min) Show slide 21 and tell students, "Which image do you think shows a healthier ecosystem? Why? Think to yourself for 30 seconds, then share with your neighbor."	23. Students think (30 sec), and then pair and share (1 min)
	23. (2 min) have students share out.	23. Students share out
	24. (15 sec) Show slide 22, tell students "A complex ecosystem is a healthy ecosystem, a healthy ecosystem is often full of biodiversity and abundance."	24. Students listen
	25. (2 min) Show slide 23, say "If we catch a lot of fish, with a high rate of biodiversity (meaning there are many different types of species) what would that say about the Padilla Bay Estuary's health? (Padilla Bay Estuary being an ecosystem) Think to yourself for 30 seconds, then share with your neighbor."	25. Students think (30 sec), and then pair and share (1 min)
	26. (2 min) have students share out	26. Students share out
	27. (1 min) Show slide 24, remind students "It's always colder down at the beach. Layering is very important, you'll probably want a sweatshirt and a coat. Also, make sure you wear boots or an old pair of shoes you don't mind getting dirty. Padilla Bay is really muddy; you might even want to bring a pair of extra clothes	27. Students listen

	and shoes in case you fall in the mud." 28. Questions? If there's time at the end hand out the fish ID sheets for students to take a look at. Ask students, "Have you ever seen any of these fish before? If so where?" draw on the board where you might find these fish.	28. Students ask questions
Day 2/Explore:	**ALL STUDENTS:** 1. Greet everyone as they come off the bus, say "Welcome everyone, please come under the covered area. You will first eat your lunches. Please be finished and cleaned up by 11:45pm (depending on if their late). Feel free to use the restrooms (point to restrooms)." 2. When everyone is cleaned up and under the covered area blow your whistle and say "Welcome everyone, my name is _____. Today we are joined by wonderful volunteers and staff that will help us explore the estuary. LET EVERYONE INTRODUCE THEMSELVES. Today as scientist we will investigate the health of the Padilla Bay Estuary by collecting data. We ask that you handle everything with care and stay on task. I have a whistle and will blow when I need your attention, or if you're off task. Please be quiet when I blow the whistle. In a minute I will divide you into two groups, Group A and Group B. Group A gets to seine for the first hour, and Group B gets to investigate the mudflat for the first hour. Then we will switch. I will be overseeing the Beach Seine, and _____ will be over seeing the Mudflat Investigation. Please hold your questions until we are down at the beach. When I say go, which is not yet, you will break into the two groups-Group A head over to the right, and Group B head over to left. Once you're in your bigger groups you will break into your smaller groups based on your name tags. In your smaller groups find the adult with the corresponding group number that will work with your group. GO" **Group A**	1.Students come off bus 2. Students listen, then divide into Group A and B. They will then divide into the three subgroups, labeled group 1, 2 or 3 and find their corresponding volunteer.

	Beach Seine Portion: 1. Say " I'm so happy everyone is here today, we're going to want to get started soon, (if needed say- please no talking while I'm talking), the sooner I'm done with instructions the sooner we'll go down to the beach. As you can see your adult leader has your materials. Each person in your group has been assigned a task, one person will be the photographer–this task requires you to keep your hands clean while you take pictures of the fish, one person will be the scribe–they write the data on the data sheet, one person will hold the ID sheet–they will take charge of identifying the fish, and one person will hold the photarium–they will hold the photarium up for the photographer to take a photo and will be in charge of putting the fish into the bucket of water once it gets its photo taken. Your lead will keep hold of your materials until it's time for you to break out into your roles." 2. Whistle and wait for everyone's attention, say "Ok, now it's time for us to walk down to the beach" 3. Walk down as a group to the seining net. 4. Once at the net whistle, and say "In the next few minutes we're going to be conducting a beach seine. Mark Olson will row this boat out (point to boat) and Charlie? Savanna? will set the net. The net is in the blue tub on the boat. As you can see there is a rope attached to the net, this will help us pull the net in. After they set the net and row the boat to shore we will grab the rope at the other end of the net. It's very important that we have an even number of people on either side of the net so that we pull it in at the same time. It's not like tug of war, we want each side to pull evenly so the net stays in a nice arch catching fish as we pull it closer to shore. Once we get the net in ____ and ___ will grab the net and put it on the shore. Once the net is on the beach you will need to get back into your groups. You will need to get your hands wet before you can touch the fish, dry hands can hurt the fish. Make sure as you're collecting the fish you do not kneel or stand on the net, this can damage the net or hurt fish that are hiding. Collect the fish as fast as you can while being careful not to hurt the fish. You will place the	1.Students listen 2. Students listen 3. Students walk down 4. Students listen

		fish in the tubs. It is not a competition, so please do not try to collect more fish than your neighbor. We are all working collaboratively to collect the fish. Once we have gotten all of the fish we will start collecting data. Feel free to remind your friends of the rules, please say nicely something like “Please do not kneel on the net, remember you could hurt the net or the fish””	
		5. Direct students to either side of the net, and narrate what the net setters are doing. Once they have come back to shore say “Ok now we’re going to pull the net in. It’s very important we pull at the same time. In order to do that we have colored tape that helps guide us. If I say red we want to make sure both teams are at the red line. Ok let’s start pulling in and it will make more sense as we go.”	5.Students go to either side of the net
		6. Pull net in, making sure students are pulling at the same rate.	
		7. Once the net is close to being pulled in say, “___ and ___ will now grab the net. Make sure your hands are wet and your tub is ready. We will want to get the fish into the tub as fast as you can gently do it. Remember—fish are fragile and we need to handle them with care. Make sure as you’re collecting the fish you do not kneel or stand on the net, this can damage the net or hurt fish that might be there that you can’t see because of the mud.”	7. Students listen
		8. Pull the net in	
		9. Once the net is pulled in have the kids start collecting fish, and putting them in their buckets. Help students and remind them of the rules.	8.Students pull net in 9. Students start putting fish in their buckets
		10. Right before they are finished collecting all their fish, take the photographers up to clean of their hands. Have the photographers wash their hands and dry them.	10. Have photographers clean their hands
		11. Once photographers are back blow the whistle, say “Now it’s time for you to break up into your groups and respective roles. Your leader has instructions on collecting data. Follow the instructions carefully. If you have any questions feel free to call me over”	11. Students break up into their roles and start collecting data.
		12. Make sure students are on task and assist students if they have any questions.	12. Students will ask questions if they have them.
		13. After an hour has past and/or students seem done with collecting data blow your whistle and	13. Students will give their equipment,

		say “Now it’s time for us to switch gears. You all will be transitioning to explore the mudflat. When I say go, which is not yet, give your equipment, except for your clipboard and data sheet, to your adult leader. You will leave this set of equipment here for the Group B students. Then when I say go, so not yet, release your animals back into the water by pouring out the water into the estuary. Once you are done get back together in your groups. You will be working with another leader to explore the mudflats.”	except for their data sheet, to their adult leader. Then will release their fish.
		14. Now direct students to their new location on the beach and direct their leader to their new set of equipment.	14. Students will find their new adult leader.
		<u>Mudflat Portion:</u> 1.Say “I’m so happy everyone is here today, we’re going to want to get started soon, (if needed-so please no talking while I’m talking) the sooner I’m done with instructions the sooner you’ll get to explore the beach. Your group leader has your new materials and roles. Remember, one person will hold the quadrat, one person will be the scribe–they will write the data on the data sheet, one person will hold the ID sheet–they will take charge of identifying the animals, and the meter tape-they will lay out the tape along the beach.”	1.Students listen
		2. Blow whistle if you need their attention and say “Today we are going to explore the mudflats. Your leader has your data collection instructions. Be sure to follow the instructions carefully to collect your data. Feel free to call me over anytime if you have any questions.”	2.Students get quiet and listen
		3. Make sure students are on task and assist students if they have any questions.	3.Students start collecting data
		4. After an hour has past and/or students seem done with collecting data blow your whistle and say “That’s a wrap students. Now it’s time for us to clean up. When I say go, which is not yet, give your equipment to your adult leader, except for your data sheet, you will give me your data sheet. You will then come stand by me and wait until I have every group’s data sheets. GO”	4. Students will listen then will give their adult leader their equipment and give the lead teacher their data sheets
		5. Once you have all the groups and data sheets, blow your whistle and say “Now were going to walk up to the hoses as a group. Two adults will	5. Students listen

	be up there and you will want to make two lines behind these adults. The adult will hose of your shoes and hands. Please do not use the other faucet, it takes the pressure away from the other two hoses and makes the process of cleaning up go a lot slower." 6. Walk as a group, have students get in two lines and wash their hands and shoes.	6. Students get into two lines and wash their hands and shoes.
	Group B <u>Mudflat Portion:</u> 1. Say "I'm so happy everyone is here today, we're going to want to get started soon, (if needed say "please no talking while I'm talking") the sooner I'm done with instructions the sooner we'll go down to the beach. Each volunteer has your materials and roles. Remember, one person will hold the quadrat, one person will be the scribe–you will write the data on the data sheet, one person will hold the ID sheet–you will take charge of identifying the animals, and one person will hold the meter tape-you will lay out the tape along the beach and measure out where we're collecting data. I will give you 1 minute to decide your roles, then I will blow my whistle and give you further instructions!"	1.Students listen, then decide roles
	2. Blow whistle and say "Today we are going to explore the mudflats. Your volunteer has the instructions. Be sure to follow the instructions carefully to collect your data. Feel free to call me over anytime if you have any questions."	2.Students listen
	3. Make sure students are on task and assist students if they have any questions.	3.Students start collecting data
	4. After an hour has past and/or students seem done with collecting data blow your whistle and say "Now it's time for us to switch gears. You all will be transitioning to the beach seine portion. When I say go, which is not yet, give your equipment, except for your clipboard and data sheet, to your group leader. Your adult leader will leave your equipment here for Group A to use. You will be using the clipboard and data sheet for the second portion of exploration today. GO "	4. Students listen, then they give group leaders your equipment and they keep their clipboards and data sheets.
	5. Wait for students to give their equipment to their group leader, then blow whistle and say	5. Students, in their groups, look for their new group leader.

	"you will be working in a different section of the beach. Walk with your group leader to the Beach seine area and get your new set of equipment" 6. Now direct students walk over to a different part of the beach.	
	<u>Beach Seine Portion:</u> 1. Say "I'm so happy everyone is here today, we're going to want to get started soon, (if needed- please no talking while I'm talking), the sooner I'm done with instructions the sooner we'll go down to the beach. Each volunteer has your materials and instructions. Remember, one person will be the photographer–this task requires you to keep your hands clean, one person will be the scribe–they write the data on the data sheet, one person will hold the ID sheet–they will take charge of identifying the fish, and one person will hold the photarium–they will hold the photarium up for the photographer to take a photo and will be in charge of putting the fish into the bucket of water once it gets its photo taken. In the next few minutes we're going to be conducting a beach seine. Mark Olson will row this boat out (point to boat) and ____ will set the net that's currently in the blue tub on the boat. As you can see there is a rope attached to the net, this will help us pull the net in. After they set the net and row the boat to shore we will grab the rope at the other end of the net. It's very important that we have an even number of people on either side of the net and to pull it in at the same time. It's not like tug of war, we want each side to pull evenly so the net stays in a nice arch catching fish as we pull it closer to shore. Once we get the net in ____ and ___ will grab the net and put it on the shore. While we pull the net in you will need to get your hands wet before you can touch the fish, dry hands can hurt the fish. Make sure as you're collecting the fish you do not kneel or stand on the net, this can damage the net or hurt fish that might be there that you can't see because of the mud. Collect the fish as fast as you can carefully. Once we have gotten all of the fish we will start collecting data. Feel free to remind your friends of the rules, please say nicely something like "Please do not kneel on	6. Help students find their new group leader. 1.Students listen then decides roles

		the net, remember you could hurt the net or the fish””	
		2. Direct students to either side of the net, and narrate what the net setters are doing. Once they have come back to shore say “Ok now we’re going to pull the net in. It’s very important we pull at the same time. In order to do that we have colored tape that helps guide us. If I say red we want to make sure both teams are at the red line. Ok let’s start pulling in and it will make more sense as we go.”	2.Students move to either side of the net and listen.
		3. Pull net in, making sure students are pulling at the same rate.	
		4. Once the net is close to being pulled in say, “___ and ___ will now grab the net. It’s now time for you to get back into your groups. Make sure your hands are wet and the tubs are ready. We will want to get the fish into the tub as fast as you can gently do it. Remember—fish are fragile and we need to handle them with care. Make sure as you’re collecting the fish you do not kneel or stand on the net, this can damage the net or hurt fish that might be there that you can’t see because of the mud.”	3.Students pull net at the same time 4.Students listen
		5. Pull the net in	
		6. Once the net is pulled in have the kids start collecting fish, and putting them in their buckets. Help students and remind them of the rules.	5. Students watch as two adults pick up the net and pull it in.
		7. Right before they are finished collecting all their fish, take the photographers up to clean of their hands. Have the photographers wash their hands and dry them.	6.Students put fish in their buckets 7. Photographers clean their hands
		8. Once photographers are back blow the whistle, say “Now it’s time for you to break up into your groups and respective roles. You can collect your respective materials for your tasks. Your group leader has the instructions for collecting data. Follow the instructions carefully. If you have any questions feel free to call me over”	8. Students break up into their role and collect their materials.
		9. Make sure students are on task and assist students if they have any questions.	
		10. After an hour has past and/or students seem done with collecting data blow your whistle and say “That’s a wrap students. Now it’s time for us to clean up. When I say go, which is not yet, give your equipment to your adult leader, except for your data sheet, you will give me your data	9. Students collect data 10. Students five data sheet/clipboard to mudflat leader and give their equipment to their group leader.

	sheet. You will then come stand by me and wait until I have every group's data sheets. GO" 11. Once you have all the groups and data sheets, blow your whistle and say "Now were going to walk up to the hoses as a group. Two adults will be up there and you will want to make two lines behind these adults. The adult will hose off your shoes and hands. Please do not use the other faucet, it takes the pressure away from the other two hoses and makes the process of cleaning up go a lot slower." 12. Walk as a group, have students get in two lines and wash their hands and shoes. **ALL STUDENTS:** 1. Once students are done cleaning up say "Thanks for collecting data today! Friday I'll bring your data sheets into the classroom for us to make since of the data. See you 'all Friday!"	11. Students walk up to the hoses as a group. 12. Students wash off 1.Students get on buses and leave
Explain:	1. Greet Students and show slide one. Say, "Today we're going to make sense of the data we collected during our field trip." 2. Ask students, "What was the coolest animal you found yesterday? And why? Think about it for 30 seconds (give students 30 seconds), now share it with your neighbor" 3.After a minute goes by ask students "would anyone like to share with the whole class what you thought was the coolest animal you found yesterday" Write down student answers 4. Say "Let's take a vote on which animal we think is the coolest. Please only vote once. When I call on the animal you think is the coolest raise your hand" Go through the animals and have kids raise their hands and write on the whiteboard—make a table. 5. Tell students "did you know that we just collected data, just like we did yesterday. In fact we're going to practice making a graph with this data. After we practice making a graph as a whole class, you will make graphs in your groups so pay close attention." 6. Pull up Google sheets, and have students pull up google sheets, have students copy what you do, show students how to use it, put data in and create a bar graph and a pie graph." Answer any	1.Students listen 2.Student think, pair, and share 3.Students share 4. Students raise their hand for the animals they think are the coolest. 5. Students listen 6. Students watch how you make a graph and they copy what you do to make the exact same graph.

	questions students might have. 7. Ask students "which graph would you want to use? And why? Think about this for 30 sec, then share what you think with your neighbor." 8. "Would anyone like to share what they think?" 9. Clarify misconceptions and show slides of what graph to use with what content. 10. Say "Today you will be making two graphs, one to represent the beach seine and one to represent the mudflat safari. We will first create the graph for the beach seine portion. For the beach seine portion we are going to combine data for each seine, we will combine data for group A, and we will combine data for group B. You will only need to make one graph representing the beach seine you participated in." Gather and combine data for both groups and write it on two separate google sheets. Tell students they will use one of these data sets to create their graphs. 11. Say, now it's time for you all to get into your groups and make your beach seine graphs. Let students work off of the data sets you have already created in sheets. Walk around the room and help students. 12. When students are finished with their beach seine data, say "Now it's time for you to make a graph of your mudflat safari data. Each group will use only the data they collected down at the beach. If you have any questions, raise your hand and I'll come over and help. Now you can get started" 13. Give students time to make their graphs, walk around the room and help students.	7. Students think-pair-share 8.Students share out with the whole class 9.Students listen 10. Students get into their groups and start making graphs.
Elaborate:	1. When students are done creating their graphs, ask students "Why did we collect data from a beach seine and mudflat exploration? Think about this then share it with your group." 2. Say, "Does anyone want to share out why they think we collected data on a beach seine and mudflat exploration?" 3. Invite alternate ideas, correct misconceptions (the reason is something along the lines of: We collected data on species abundance and biodiversity to assess the health of different eelgrass habitats around Padilla Bay)	1. Students think-pair-share 2. Students share out

	4. Have students share their two graphs of the beach seine at the different locations. 5. Ask students, “Based on the Beach Seine data, which eelgrass habitat is healthier (more biodiverse and abundant). Think about this and share what you think with your neighbor.” 6. Ask students, “Would anyone like to share what they think? Please indicate how that data supports your claim.” 7. Invite alternate ideas, correct misconceptions. 8. Have each group share their graphs of the different mudflat exploration locations. Project their graphs on the large screen. 9. Ask students, “Based on the Mudflat exploration data, which mudflat/eelgrass habitat is healthier (more biodiverse and abundant). Think about this and share what you think with your neighbor.” 10. Ask students, “Would anyone like to share what they think? Please indicate how that data supports your claim.” 11. Invite alternate ideas, correct misconceptions.	
Evaluate:	1. Tell students they will work in their groups to create a final project to create a google slide presentation, using their data, to explain to their friends and families the importance of eelgrass and mudflat habitat. 2. Show students the rubric-walk them through what they need to do. 3. Let students work on their projects.	

Differentiated Instruction *Consider how to accommodate for the needs of each type of student. Be sure that you provide content- specific accommodations that help to meet a variety of learning needs.*

Gifted and Talented:

ELL: Offer Glossary of terms

Students with Other Special Needs:

Assessment

Formative

Each day students will receive ‘entry tickets’ these are a set of 3-5 questions that assess student’s comprehension of the material.

Day 1 Entry Ticket:

1. Which way does energy flow in a food web (circle a or b)A) from prey to predator B) from predator to prey

2. Define:

A) Biodiversity

B) Habitat

C) Ecosystem

3. How might ecosystem health affect biodiversity?

Day 2 Entry Ticket:

1. What animal do you hope to find tomorrow (must be one of the estuary animals you learned about yesterday), why?

2. Define:

A) Habitat

B) Biodiversity

C) Ecosystem

3. What do animals need to thrive (be healthy)?

Day 4 Entry Ticket:

1.What was your favorite plant or animal you found yesterday? Why?

2.Was your site biodiverse? Why or why not?

3.Do you have any questions related to what we did this week? (Please write them down)

Summative

Their summative assessment will be a group project. They will create a group presentation of what they learn, including a graph of the data they collected. If all students can complete create a presentation that includes a graph, then it will be considered successful. The goal will be to have more than 75% of students create a presentation that receives B or higher, based on the rubric.

Kids on the Beach Rubric:

0 = missing 1 = present, but poorly developed, lacking detail
2 = present and complete, but lacking clarity, thoroughness, or detail
3 = complete, articulate, thorough, and clear

Your group turned in your data sheet	0	1	2	3
You turned in a graph based on your data	0	1	2	3

You turned in your Student Notebook	0	1	2	3
Total out of 9 possible points:				

Student Notebook:

Kids on the Beach

Marine Research Scientist: _____

Schedule

DAY 1 May 5th

Introduction to Padilla Bay and prepare for field day

DAY 2 May 6th and 8th

Field day, Scientists collect data for mudflat research

DAY 3 May 9th

Make sense of your data

DAY 1 Background information

Ecology background information

1. Which way does energy flow in a food web? (Circle one)

a. predator to prey

b. prey to predator

2. What is biodiversity?

3. What is a habitat?

4. What is an ecosystem?

DAY 2 Field Day

North side

West side

South side

Mudflat Investigation Datasheet

Beach Name:		**Location:**	

Scientists:	

Date:		**Time:**		**Tide Height:**	

Air Temp:		**Water Temp:**		**Weather:**	

Circle all that apply:

Vegetation Type:	Eelgrass Seaweed
Water Type:	Fresh Salt Estuarine (mixture of fresh and saltwater)
Habitat Health:	Natural Fully Restored Partially Restored Disturbed/Armored

Notes:	Substrate (in inches): (circle percentage)	
	Mud: (<0.0025)	0 0-25 25-50 50-75 75-100
	Sand: (0.0025-0.079)	0 0-25 25-50 50-75 75-100
	Gravel: (0.079-2.5)	0 0-25 25-50 50-75 75-100
	Cobble: (2.5-10.1)	0 0-25 25-50 50-75 75-100

Species:				
Catch Tally:				
Total:				

DAY 3 Make sense of the data and double check you did everything!

Kids on the Beach Rubric:

0 = missing 1 = present, but poorly developed, lacking detail
2 = present and complete, but lacking clarity, thoroughness, or detail
3 = complete, articulate, thorough, and clear

Your group turned in your data sheet	0	1	2	3
You turned in a graph based on your data	0	1	2	3
You turned in your Student Notebook	0	1	2	3
Total out of 9 possible points:				

Field Day Schedule:

Who?	When?	Where?	What?
Volunteers	9am-9:45 am	Padilla Bay Interpretive Center Theater	Volunteer training on how to guide students in collecting data. Volunteers will be assigned to groups and their corresponding materials.
Volunteers	9:45am-9:55am	Bayview State Park	Head down to Bayview State Park, Annie will point out sample locations, wait for students to arrive
Students and Volunteers	9:55am-10:10am	Bayview State Park	Annie will greet students and show them where to meet (likely under covered area), students use restrooms if needed
Students and Volunteers	10:10am-10:20am	Bayview State Park	Annie will go over the day's logistics, point out locations, and then have students find their adult leader.
Students and Volunteers	10:20am-10:25am	Bayview State Park	Volunteers will introduce themselves to students, students will get their name tags and groups will walk down to their transect locations.
Students and Volunteers	10:25am-11:25am	Bayview State Park	Volunteers lead students in data collection. If students finish early, they can explore the beach. Please make sure students do not distract other groups or walk in other groups transects.
Students and Volunteers	11:25am-11:40am	Bayview State Park	Clean Up- all equipment and boots need to be hosed off up at the hoses. Volunteers need to make sure to grab data sheets from the students to give to Annie.
Students and Volunteers	11:40am-12:10pm	Bayview State Park	Students eat lunch. Volunteers assist packing up equipment to head back to the Interpretive Center. Volunteers have the option to leave after helping unpacking equipment at the Interpretive Center or Volunteers can stay to assist/watch the rest of the

			program. The microscope room and plankton microscope will need to be set up at this time.
Students	12:10pm-12:20pm	Padilla Bay Interpretive Center-meet outside of restroom area	Students head back to Reserve/ Use Restrooms/Greeted by Annie
Students	12:20pm-12:30pm	Padilla Bay Interpretive Center Theater	Annie will explain rooms and rotations
Students	12:30pm-1:25pm	Padilla Bay Interpretive Center	Rotate through rooms (around 15 or minutes per rooms- one of the rooms will be the microscope room where students will collect data on plankton)
Students	1:25-1:30	Padilla Bay Interpretive Center Theater	Restrooms and load buses

Instructions for volunteers:

Data Collection Guide

Each group will be labeled one of the following N1, N2, N3, W1, W2, W3, S1, S2, or S3. N groups will be working on the Northside of the state park.

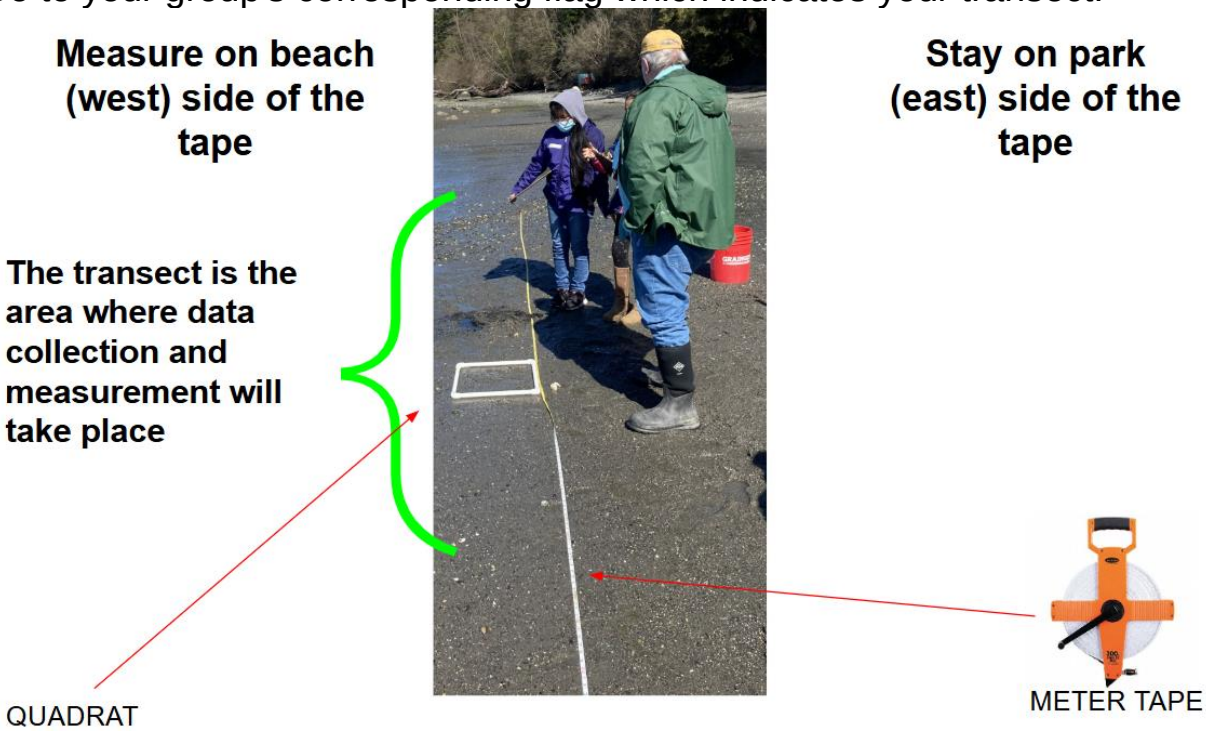
W groups will be working on the West side of the state park. S groups will be working on the South side of the state park. There will be a corresponding flag with your group's number to indicate your group's transect (area to collect data).

Observation Datasheet:

1. Go to your group's corresponding flag.
2. Figure out roles. They should be labelled on their name tags.
3. Start filling out the first page of the data sheet.
4. Use a thermometer to check the air and water temperature. Use the tide chart to determine the tide height and if the tide is going out.
5. Guess the wind direction. Fill out the rest of the Observation sheet. Ask volunteer or call other staff over if you need assistance.

Mudflat Investigation:

1. Go to your group's corresponding flag which indicates your transect.



2. The meter tape holder will hook the end (lowest number) of the meter tape on the flag (they may need someone to hold the end) and stretch out the meter tape to 20 meters across the transect toward the south, staying to the park (east) side of the tape. Please make

sure your tape holder does not step on the beach (west) side of the tape since this is where you will be collecting your data.

3. The meter tape holder will find the correct distance where the quadrat should be placed and will place the quadrat on the beach side of the meter tape, so that one corner of the meter tape is at the distance indicated and one of the parallel corners is at an increasing distance. There will be three randomly generated numbers at the top of each quadrat that will indicate the distances where the data will be collected. Each group will collect data on three quadrats along their transect.
4. The ID sheet holder will identify one plant or animal at a time within the quadrat. Students will identify and collect data on things on top of and under rocks (depending on the size of the rock). If there is a rock in the quadrat smaller than a basketball, students can pick it up and see what's underneath. If the rock is bigger than a basketball students must leave the rock and count around and on top of it. If a rock is moved it should be placed on the side of the quadrat, then moved back after all the data is collected.
5. The scribe will write down the species and make a tally mark underneath in the catch tally section to indicate each number of that species that is in the quadrat.
6. After each plant and animal is recorded, the species identifier will move several feet away from the quadrat, on the northwest beach side of the meter tape, closer to the water.
7. Repeat until all surface plants and animals are recorded.
8. Have the shoveler dig one hole in the middle of the quadrat (please remove the quadrat first).
9. All the students except the scribe can get their hands dirty and look for anything that might be living in the mud.
10. The ID sheet holder will identify each plant or animal.
11. The scribe will write down the species and make a tally mark underneath in the catch tally section to indicate each number of that species that is in the quadrat.
12. The hole needs to be filled in before moving on to count the next quadrat.
13. When students are finished, they can explore the beach. Please do not disturb the other groups while they are finishing collecting their data. Please do not walk in or around their transects.

Please do not walk into other groups' research areas or distract other groups that are still working.

ID Guide: