

COUNTY: Skagit

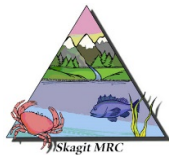
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TASK NUMBER: 6.4 Kids on the Beach Year 2 Final Report

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**Final Report for**  
**INTERLOCAL COOPERATIVE AGREEMENT BETWEEN**  
**WASHINGTON STATE DEPARTMENT OF ECOLOGY AND SKAGIT COUNTY**

**Project Title:** Implementing Skagit MRC programs to support volunteer training and middle school environmental education at Padilla Bay NERR.

**Project Lead:** Dr. Jude Apple, Director (Padilla Bay NERR)

**Project Co-Leads:** Susan Wood, Education Coordinator (Padilla Bay NERR)  
Annie England, Education Specialist (Padilla Bay NERR)  
Sara Brostrom, CTP Coordinator (Padilla Bay NERR)

**Agreement#** Skagit Co. Contract #C20190432; Ecology Agreement #C20200217

**Contract Term:** 10/1/19 – 10/10/21

**Reporting period:** Final Report

**Overview**

This final report provides an overview of implementation of two MRC programs at Padilla Bay: the Salish Sea Stewards (SSS) and the Kids on the Beach (KOTB) Programs.

As described in the original scope of work (written prior to the COVID pandemic), each of these above programs entailed substantial in-person and on-site site activities with Padilla Bay staff, students, and volunteers. As a result of restrictions related to the COVID-19 pandemic, we were unable to implement the programs as originally planned. However, we have made ongoing adaptations to meet (and in some cases exceed) deliverables as we transition to online and virtual training and learning experiences.

Implementing SSS and KOTB programs during an unanticipated pandemic created a unique set of challenges, requiring rapid and ongoing adaptation and flexibility of Padilla Bay staff to meet the ever changing needs of teachers, students, volunteers, and also adjust to state-level protocols. The ability to be responsive to these ever changing conditions and make deviations from the original agreement with the Skagit MRC regarding program delivery could not have been possible without their ongoing support and trust. We are immensely grateful for the freedom make midstream adjustments to implementation of SSS and KOTB and have these decisions be met with support and approval.

The following pages include:

**Kids on the Beach Final Project Report:** including summary of spring/summer 2021 activities, list of participating schools, summary of educational activities, links to student presentations, lessons learned, recommendations, photos, and media coverage.

**Salish Sea Stewards Annual Report:** including training agenda, Salish Sea Stewards participant roster and demographics, summary of total volunteer hours for different projects, examples of media coverage, select photographs, summary of results from program evaluation, lessons learned, and recommendations to improve the program moving forward.

## Kids on the Beach (KOTB) Final Progress Report

### **1. Summary of final activities (spring/summer 2021)**

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Since the last progress report we have completed visits to the four schools participating in the spring 2021 KOTB season from Concrete (8<sup>th</sup> grade), Sedro Woolley (6<sup>th</sup> grade), Conway (8<sup>th</sup> grader), and La Connor (7<sup>th</sup> and 8<sup>th</sup> grade). The school program in La Connor included participants in the KOTB program, as well as students participating in the “*Between Two Worlds*” indigenous and environmental education collaborative learning program with Swinomish and Padilla Bay.

The KOTB program has gone over well this spring. Annie England (KOTB lead educator) has been visiting students on site at their schools, as well as engaging with students participating remotely from home during classroom visits. Annie brought forage fish eggs into the classroom (collected by Pete Haase) and students were very engaged and excited to see eggs in different developmental stages. The Concrete science teacher Sacha Buller reported that her students were very eager for in-person, real-life experiences after a year of virtual learning. Due to COVID restrictions, we were unable to host a final research symposium this year, but many students created final presentations to report their findings. A group of 8<sup>th</sup> graders from Conway Middle School working with Ron Haywood developed and posted a group presentation using the Prezi platform (more details below).

### **2. List of participating schools**

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Below is a list of the schools that participated in the 2020-2021 Kids on the Beach program, including teacher name, grade level, and approximate number of students served.

<b>School</b>	<b>Teacher</b>	<b>Grade(s)</b>	<b>Students (2020)</b>	<b>Students (2021)</b>
Evergreen Elem (Sedro Woolley)	Charlie Huddleston	5 <sup>th</sup> /6 <sup>th</sup>	87	75
Evergreen Elem (Sedro Woolley)	Kathryn Peck	6 <sup>th</sup>	82	
La Conner Middle School	Ari Landworth	7 <sup>th</sup>	30	
La Conner High School	Jennifer Willup	9 <sup>th</sup>		14
Concrete Middle School	Sacha Buller	7 <sup>th</sup> & 8 <sup>th</sup>	27	60
Forest Park Christian (Everett)	Lucille Nelson	6 <sup>th</sup> -8 <sup>th</sup>	11	
West Sound Academy (Poulsbo)	Karen Mattick	6 <sup>th</sup> /7 <sup>th</sup>	19	
Endeavour Elementary (Mukilteo)	Al Harris	5 <sup>th</sup>	24	
Endeavour Elementary (Mukilteo)	Roxanne Geving	5 <sup>th</sup>	24	
Endeavour Elementary (Mukilteo)	Ken Napier	5 <sup>th</sup>	24	
Blaine Elementary School	Amy Keiper	Elementary	175	
Presidents Elem (Arlington)	Karin Stringer	2 <sup>nd</sup>	84	
Conway Middle School	Ron Haywood	8 <sup>th</sup>		55

### **3. Educational activities developed for KOTB program implementation**

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The most dramatic aspect of the implementation of the Kids on the Beach program was pivoting to an almost completely virtual program early in 2020. As a result of school closures, classroom days were not possible and could not take place as in-person learning activities. These were moved to a virtual

platform and new virtual content was developed that included video presentations, take home activities, and field studies students did at home.

### **KOTB 2020**

The first year of the project focused on entirely virtual experiences, engaging a large number of students across a wider range of schools than typical for the Kids on the Beach Program. While this represented a broader reach of the program (see table above), in year two of the project we prioritized returning to the original KOTB model of more in-depth, high quality engagement with students and science learning. In late 2020 through 2021 we focused on developing virtual learning experiences that included virtual field trips

In 2020, as a surrogate for visits to the Padilla Bay mudflats, Annie England (lead educator) created a marine investigation activity, based on real field data of *Batillaria* mud snails that the students did at home. Annie created virtual synchronous remote activities, as well as virtual asynchronous remote activities for those students who lacked internet access.

Examples of 2020 program materials are included at the end of this section and can also be accessed at the links below:

- [Elementary School Kids on the Beach 2020](#)
- [Middle School Kids on the Beach 2020](#)

### **KOTB 2021**

The most recent development in program revisions is a hybrid of in-person classroom visits. In 2021 elementary students participated in a fish seine program, and middle school/high school students participated in a forage fish program. The programs combined virtual synchronous programs in the classroom, as well as a visit from Annie to facilitate the in-class field day. The field day was modified to take place in the classroom since students were unable to go on a field trip.

For the elementary students, they watched two fish seines and record data on those fish seines. They recorded fish species and abundance at the two fish seine locations. They looked at fish seines from two locations to compare and make predictions about ecosystem health based on fish diversity and abundance data they collected from the seines.

For middle school and high school students, Annie brought in forage fish eggs to each of the classes. Students were able to look at forage fish egg samples under the microscope and collected data on the fish egg's embryological development. Students also made comparisons and predictions about ecosystem health based on the forage fish egg samples. Each forage fish egg sample was collected from different sites that were in different stages of restoration at Fidalgo Bay.

An examples of 2021 program materials (i.e. the Forage Fish Student notebook) is included at the end of this section. The Google Drive materials, including resources for Battilaria, Fish Seines, and Forage Fish activities can be accessed at the link below:

[Kids on the Beach 2021 Materials](#)

## **Kids on the Beach 2020 Elementary Program (links and content)**

### **Overview**

Kids on the Beach is a hands-on program that has students doing real science as they investigate the nearshore marine environment! Over the course of four days you will explore Padilla Bay and the non-native *Batillaria* snail. This program is designed to be done in four 30 min daily units.

### **Day 1/Unit 1: Introduction to Padilla Bay's Food Web**

**Instructions:** Watch the video and follow along in your student notebook.

**Video:** [Day 1 Annie.mp4](#)

**Student Notebooks (Scientific Journal):** [Elementary Day 1 Student Notebook](#)

### **Day 2/Unit 2: Introduction to the *Batillaria* snail**

**Instructions:** Watch the video and try your hand at collecting data!

**Video:** [Day 2 Interview with scientist Roger Fuller.mp4](#)

**Worksheet:** [Elementary Day 2 Practice Collecting Data Worksheet](#)

### **Day 3/Unit 3: Introduction to the *Batillaria* snail Investigation with Madi McKay**

**Instructions:** Watch the video and fill in the worksheet while you watch!

**Video:** [Day 3 Madi.mp4](#)

**Worksheet:** [Elementary Day 3 Worksheet](#)

### **Day 4/Unit 4: Investigation Activity**

**Instructions:** Follow Madi and Roger along to investigate the *Batillaria* snail!

**Investigation:** [Elementary Day 4 Scientific Investigation](#)

**This Project was made possible by generous and enthusiastic support from:**



## **Kids on the Beach 2020 Middle School Program (links and content)**

### **Overview**

Kids on the Beach is a hands-on program that has students doing real science as they investigate the nearshore marine environment! Over the course of four days you will explore Padilla Bay and the non-native *Batillaria* snail. This program is designed to be done in four 30 min daily units.

### **Day 1/Unit 1: Introduction to Padilla Bay's Food Web**

**Instructions:** Watch the video and follow along in your student notebook.

**Video:** [Day 1 Annie.mp4](#)

**Student Notebooks (Scientific Journal):** [Middle School Day 1 Student Notebook](#)

### **Day 2/Unit 2: Introduction to the *Batillaria* snail**

**Instructions:** Watch the video and try your hand at collecting data!

**Video:** [Day 2 Interview with scientist Roger Fuller.mp4](#)

**Worksheet:** [Middle School Day 2 Practice Collecting Data Worksheet](#)

### **Day 3/Unit 3: Introduction to the *Batillaria* snail Investigation with Madi McKay**

**Instructions:** Watch the video and fill in the worksheet while you watch!

**Video:** [Day 3 Madi.mp4](#)

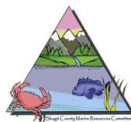
**Worksheet:** [Middle School Day 3 Worksheet](#)

### **Day 4/Unit 4: Investigation Activity**

**Instructions:** Follow Madi and Roger along to investigate the *Batillaria* snail!

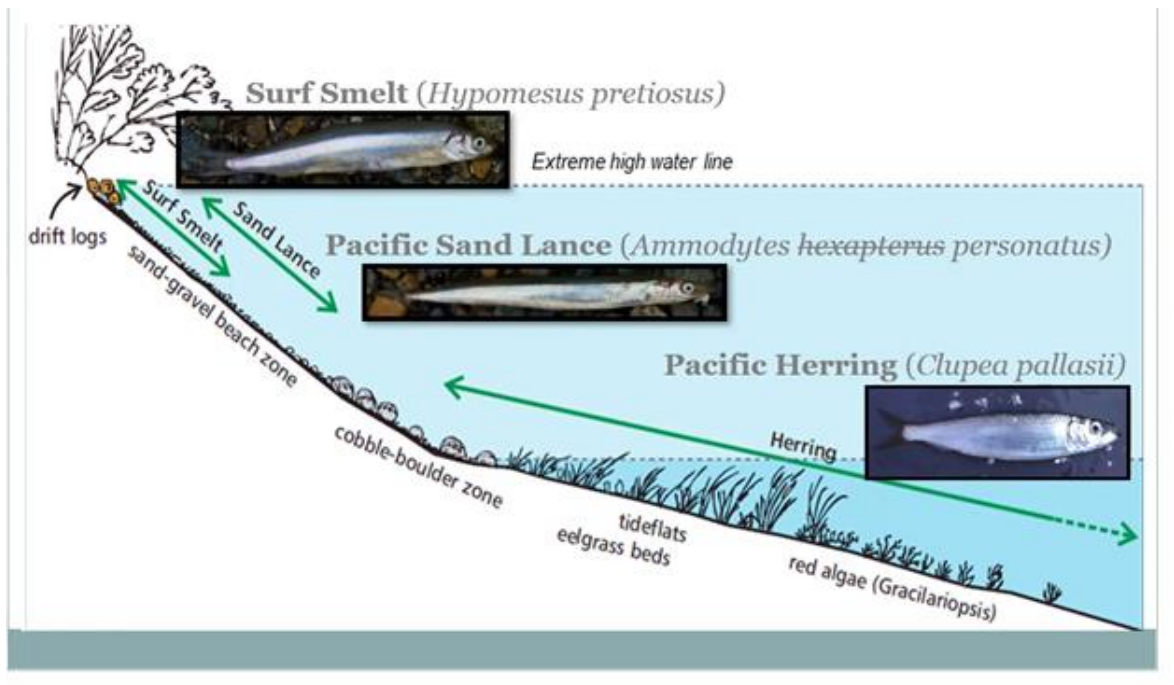
**Investigation:** [Middle School Day 4 Scientific Investigation](#)

**This Project was made possible by generous and enthusiastic support from:**



# Kids on the Beach 2021

## Forage Fish Student Notebook

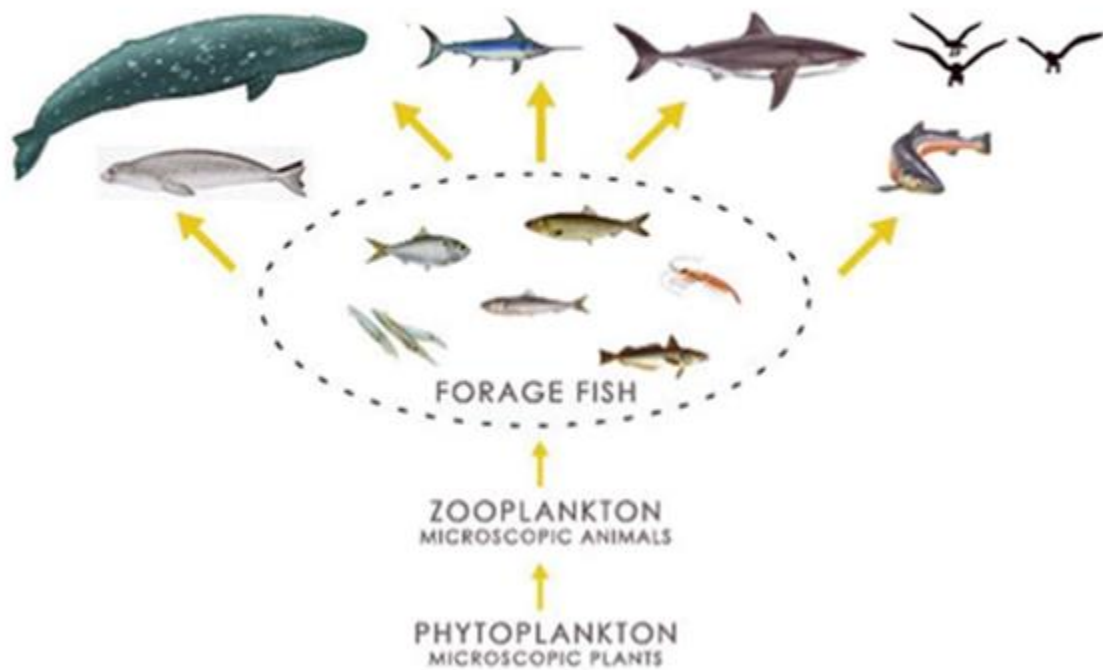


Please watch the following videos:

1. [Forage Fish Background](#)
2. [Why Forage Fish are Important](#)
3. [Taking Forage Fish Egg Samples](#)
4. [Graphing Forage Fish Egg Data](#)

## Ecology background information

### Forage Fish: The Vital Link of the Ocean Food Web

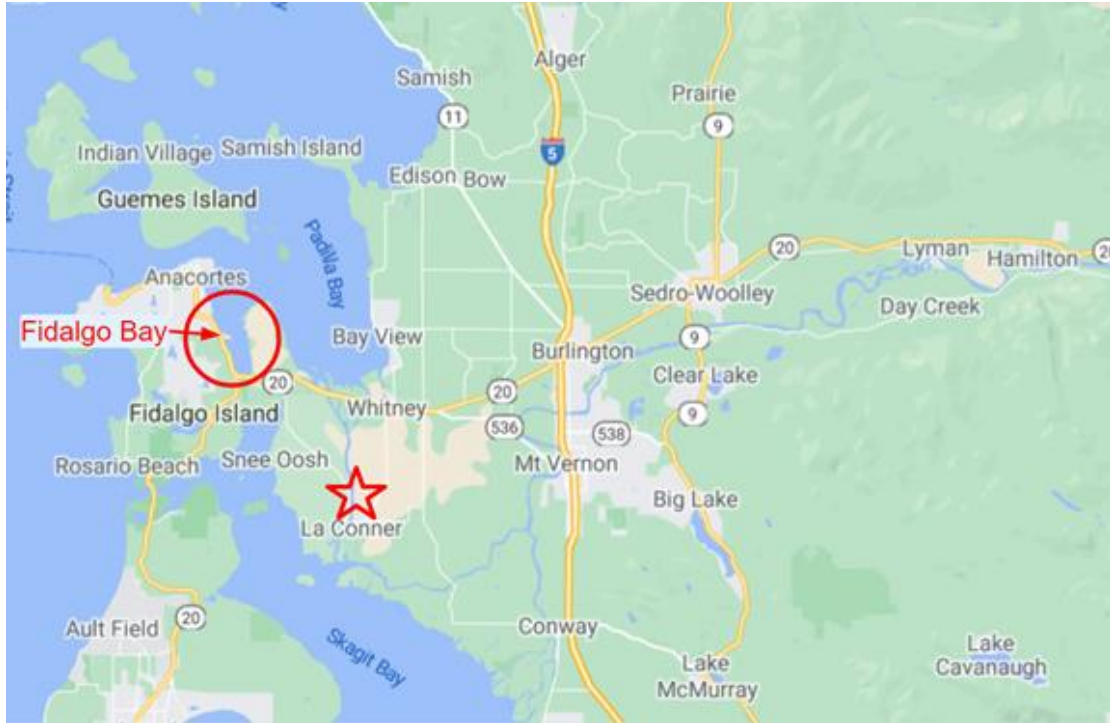


**Biodiversity:** variety of species in an ecosystem

**Habitat:** an area with the food, water, shelter and place for young that an organism needs to live.

**Ecosystem:** all the living (biotic) and non-living (abiotic) things in a given area.





Forage Fish Egg samples are taken from each of these sites below:



TWO-WEEK  
SUMMER  
INCUBATION  
TIME LINE

**WDFW SURF SMELT EMBRYOLOGICAL-STAGE CATEGORIES**

1-5  
Hours



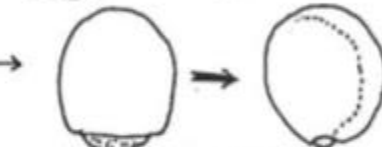
"1-cell-morula": Very fresh eggs, 1-cell to roughly 30-cells

6-12  
Hours



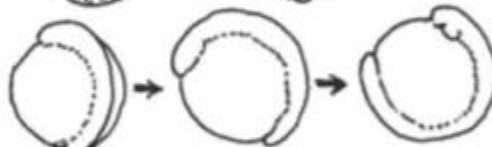
"Blastula": granular-caps through start of gastrulation

14-20  
Hours



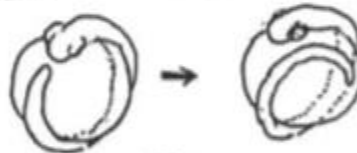
"Gastrula": yolk-plug stage through start of neurulation

1-2  
Days



"One-half-coil": distinct notochord axis to 1/2 coil embryo

3-5  
Days



"One-coil": nose nearly to tail tip to 1-1/4 coil, more or less, eyes white

6-7  
Days



"One and one-half-coil": more or less, preserved eyes gray

10  
Days



"One and one-half-coils": to 2+ cell, preserved eye black to slightly metallic.

13-14  
Days



"Late-eyed": preserved eyes metallic, ventral gut spots are "dashes", "tight fit" in shell, includes loose larvae hatched during preservation.



"DEAD": opaque-white/without discernable embryos/ fungus-covered eggs/ collapsed egg-shells/ empty egg-shells

### Forage Fish Spawn Sample Analysis (see ID sheets for guidance)

Sample Location:  
Fidalgo Bay West

Month	Day	Year
8	15	2020

Page \_\_\_ of \_\_\_

Beach Number	Sample Number	Species	1 cell to Morula	Blastula	Gastrula	1/2-1 cell	1 cell	1 1/2 cell	>1 1/2 cell	Late eyed	Dead	# Eggs	% Dead	Est # broods	Comments
1	-	Surf smelt	0	0	0	0	1	4	4	14	90	113	80	2	
2	-	Surf smelt	0	0	0	0	0	0	2	58	55	115	48	1	
3	-	Surf smelt	0	0	0	1	0	0	0	1	100	102	98	2	
4	-	Surf smelt	0	0	0	0	0	0	0	0	106	106	100	-	
5	-	Surf smelt	0	18	0	0	0	0	1	20	87	126	70	2	

Print names here: \_\_\_\_\_ Organization: \_\_\_\_\_ Reviewer: \_\_\_\_\_

## Graphing Project:

Graphs are an important tool to communicate science. Graphs are a way to breathe life into data, and present data in a way that people can understand.

You need to make a graph of the forage fish egg abundance at the different embryological (developmental) stages. Make sure to choose just one site to make your graph.

You also need to write one paragraph about why the graph you made is an important tool to communicate forage fish health. What information is it communicating? The paragraph must be three to five sentences long.

**Video Presentation Rubric:** 0 = missing 1 = present, but incorrect info 2 = present and complete, but incorrect spelling or detail 3 = complete, articulate, spelled correctly, thorough, and clear

<b>Your Name is included</b>	0	1	2	3
<b>Graph has a title</b>	0	1	2	3
<b>Graph has a y axis (vertical) label</b>	0	1	2	3
<b>Graph has a x axis (horizontal) label</b>	0	1	2	3
<b>Graph has all the embryological stages</b>	0	1	2	3
<b>One paragraph 3-5 sentences long about why the graph you made is an important tool to communicate forage fish health.</b>	0	1	2	3
<b>Total out of 18 possible points:</b>				

#### 4. Student Symposium and presentations

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Coordinating and hosting an on-site research symposium was not feasible given COVID restrictions, teacher preferences, and teacher/student technology support. Participating teachers indicated that a research symposium for all students to give final presentations would be unrealistic and not fit into their learning objectives and needs.

However, many students generated virtual presentations based on their experience with the Kids on the Beach Forage Fish activities. A group of 8<sup>th</sup> graders from Ron Haywood's Conway Middle School class put together a presentation on forage fish using Prezi <https://prezi.com/view/RYhIWJzxtgtYBplmDyl/>.



A student from Conway Middle School gives a video presentation on the importance of forage fish.

#### 5. Lessons learned and recommendations

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The biggest lesson learned during the 2020-2021 implementation of the KOTB program is that the ability to adapt and be flexible to teacher's needs is essential. We now have a variety of materials for at-home and in-classroom learning in all their various forms. We adapted the program not only in the way we reached students, but also the amount of time given to lessons and activities. Ideally students would have 3 hours in the field to collect data on their field day. Since they were unable to go on field trips this past year, their field time was significantly shorter. Instead of a 3-hour field trip, they had one regular class period for the simulated field experience. Most classes were about 50 minutes long, but one class was only 30 minutes long. We were unable to go into the same depth a regular field trip can provide.

Our lessons learned from the 2020-2021 implementation of Kids on the Beach is also informed by input from teachers who participated in the program. Responses to an evaluation sent to all the participating teachers is included below and provides important feedback for future implementation of the program. Additional insight from Annie England (lead educator) are also embedded in the teacher feedback (blue italic text).

Results from 2021 Teacher Survey (comments from Annie England in blue italics)

**Question 1: What aspects of the remote and in-person Kids on the Beach program were a good fit for your students? (Please be specific)**

Answer 1: They seemed to really enjoy the bingo game and visual aspects of KOB.

Answer 2: The in-person aspect was great, our students got a chance to have hands-on experiences to learn how microscopes work. All of our students also got a chance to learn how to make graphs, with really great directions from the KOTB staff!

Answer 3: The first Zoom lesson provided a great overview of forage fish habitat. I think this was very useful for students in engaging with the forage fish egg exercise. They also liked the hands-on activity of collecting data on the forage fish eggs. The handouts and lab instruction did a great job of supporting students in make sense of the forage fish observations.

**Question 2: What aspects of the remote and in-person Kids on the Beach program were a poor fit for your students? (Please be specific)**

Answer 1: Of course it would have been nice to actually get on the beach, but that wasn't in the cards. More movement would be nice. More scaffolding on graphing a data input. And maybe more background on why the research matters to them.

*We will make sure more graphing scaffolding is built in. We will also add in more background and a follow up of why the research matters— we are thinking of making these things in the form of resources the teacher can use before and after their lesson.*

Answer 2: Mostly just the fact that some of the lessons were virtual makes it difficult to hype the students to get excited to do their homework.

Answer 3: The video format did not work well over Zoom. Kids are impatient with lagging or glitching videos, so they didn't have access to the information. This probably distracted students from engaging in the information. Also, some more sense-making of student forage fish observations would have deepened student learning and connection between their lab observations and overall forage fish populations. That being said, some of these limitations were likely due to COVID restrictions.

*Unfortunately, the videos for the students working at home ended up glitching and we didn't have to time to re-film. We will make sure to provide more time to film and check with the teachers beforehand to make sure the video works smoothly on their end. This group is from Concrete, and they have the worst internet connection of all the classes that participated in the spring program.*

*We agree that more sense-making of forage fish observations would have deepened understanding. This was built into the original program, and*

*was something we did with Conway Middle School. Concrete only had 30 minute classes, compared to the 60 minutes originally planned and that we had with other schools. We will revise what was cut out and make sure they have more time to draw connections between their lab observations and overall forage fish populations. We might also make materials that can be used before and after the lesson to deepen understanding.*

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

Answer 1: The higher up love to see the specific NGSS it connects to. Publishing final reports in different ways.

*We can do this, and will do this for the KOTB program next year.*

Answer 2: It was pretty relevant to their grade (9-12) levels

Answer 3: This year had many limitations on them, but finding ways to increase student discussion or interaction during the first lesson. Middle schoolers learn best when they are actively engaged in the learning.

*This was hard to accomplish remotely over zoom. We originally had more student discussion and interactions built into the first lesson but decided to pivot to direct instruction (mostly the teacher talking). We do not prefer direct instruction, but when students were asked to discuss with one another they said nothing. Their videos were off and they remained muted. If we need to teach remotely next year we will ask the teacher for advice and see if there's ways to get them to engage remotely. We will definitely put this back into the lessons if we are teaching in person.*

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

Answer 1: Spanish/ELL versions of docs, scaffolded data entry, use of scientific materials, field studies

*We will check with teachers beforehand to see if there are any ELL students and if there is someone at the school who can provide translations. If there isn't some at the school to translate, we could use some of our funds to hire someone to translate materials into Spanish (this is the largest ELL community in our area).*

Answer 2: Having staff come into the classroom really helps for COVID regulations, but also for schools that might not have the ability to travel to Padilla Bay.

Answer 3: It would be so great to get my students on the beach looking for forage fish eggs and assess habitat quality in the field on the beach.

*Yes, we hope this happens next year!*

**Question 5: What educational materials/resources would you like Padilla Bay Reserve to create for teachers and students?**

Answer 1: Padilla bay should make its own portable kit to go with KOB before or after. The kit should have supplies for teachers to lead basic field science lessons. Keep them short and sweet not a sprawling long term once. They should include transect PVC, magnifying glasses, a microscope, net, etc. 3d models of fish would be cool and the underwater footage was great, more of that.

*This could be very cool, and we will follow up with this teacher to clarify their concept. We like what they're thinking.*

Answer 2: It would be great to have kits like what we did in class to implement independently.

*This comment is from a teacher from the Swinomish Between Two Worlds program, and their intention is eventually be self-sufficient. We will also follow up with this teacher to clarify their concept.*

Answer 3: Field trips :). I realize this wasn't possible this year, but it would be very meaningful and important to the sense-making of the students understanding forage fish and their habitats.

*Agreed, field trips are very important!*

## **6. Photos and media coverage**

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Two articles focused on the Kids on the Beach Program appeared in local newspapers during the project, including "Marine science education program undergoes changes" on June 1, 2020 in the *Skagit Valley Herald* and "Students dive into marine ecosystem lesson" on June 9, 2021 in *La Connor Weekly News* (article text follows).



# Education Focus: Marine science education program undergoes changes

By KIMBERLY CAUVEL @Kimberly\_SVH June 1, 2020\

[https://www.goskagit.com/news/education-focus-marine-science-education-program-undergoes-changes/article\\_f2231b70-3a99-59d3-b542-32a885af5576.html](https://www.goskagit.com/news/education-focus-marine-science-education-program-undergoes-changes/article_f2231b70-3a99-59d3-b542-32a885af5576.html)

This spring, about 150 Skagit County students were expected to descend onto the mudflats of Padilla Bay to help document the presence of the spiral-shelled snail that dots the beach at low tide through the Kids on the Beach Program.

With students sent home in March for their safety amid the COVID-19 pandemic, that didn't happen.

"I was really looking forward to having my students have the experience of collecting field data, learning and working with scientists ... on the beach," said Concrete science teacher Sacha Buller, whose class planned to participate for the first time. "I have students who are fascinated with marine biology from watching nature documentaries on Netflix, but have only been to the beach a few times in their lives."



Nonnative mudsnails are seen last September during a survey at Padilla Bay near Bay View.

While the pandemic took beach trips off the table, about 300 students from the region are studying the nonnative snail using new remote-friendly curriculum developed by the Padilla Bay National Estuarine Research Reserve's education specialist Annie England.

**Hot on the trail of the *Batillaria* mud snail!**  
 Featured scientists: Madison Uchida and Roger Fuller  
 Padilla Bay National Estuarine Research Reserve

**Where can we find *Batillaria* mud snails?**  
 Padilla Bay is located in the heart of the Salish Sea, and it holds more than 8,000 acres of wetlands—the second largest on North America's Pacific Coast. Estuaries are vital as a nursery for juvenile salmon, crabs, and herring. It also provides critical habitat for waterfowl and marine birds.  
 When traveling to Padilla Bay the mud snails may not be the first thing you notice, but once you've noticed them—you won't stop. Currently there are up to 5 billion snails in Padilla Bay!

**Experimental design:**  
 Matt and Roger set up an experiment to measure the population and distribution of *Batillaria* on the mud flats. They start by looking at 4 different plots (sites) at increasing distance from the shore. At each plot they record the number of *Batillaria* found and the length of the snails in each section of a quadrat. Then they calculate the mean number and the mean lengths of the total quadrat. This is done by adding up the four sections and dividing it by four. Below are the results:

Plot	Mean length of <i>Batillaria</i>	Mean No. of <i>Batillaria</i>	Distance from shore (m)
1	27.85	109.5	100
2	25.225	120	75
3	23.325	110.75	50
4	21.425	101.5	25

This screen capture shows an online discussion about nonnative mudsnails in Padilla Bay.

Students from Everett, Friday Harbor and Mukilteo are now participating, though England said the majority — about 230 — are fifth through eighth graders from Concrete, La Conner and Sedro-Woolley.

Buller said she was excited to offer a science-focused field trip this spring to help keep students in her seventh and eighth grade class focused on their studies. Using Google Classroom to connect her students with the Kids on the Beach program content has been a welcome backup plan.

“It is very hard to get our students engaged, especially as we near the end of the school year,” Buller said. “I’ve been lucky in having fantastic environmental educators supporting my distance learning in my environmental science class.”

England, with the help of lead batillaria researcher Roger Fuller and others at the reserve, developed digital and print versions of the Kids on the Beach curriculum for at-home study, to ensure students without internet capability could still participate.

That curriculum had to come together fast after schools — and Padilla Bay National Estuarine Research Reserve facilities — closed in mid-March, not long before field trips were set to begin in April.

“There’s no way we’re going to be able to bring kids onto the beach in person. We’re going to adjust and adapt,” reserve Research Coordinator Jude Apple said during an April 9 Skagit Marine Resources Committee meeting, when the team was grappling with how to keep the program alive.

A month later, the program was nearly ready for student use.

“That’s really great to see how you have pivoted ... well done,” Northwest Straits Commission Marine Program Manager Dana Oster said after a presentation by England during a May 7 Skagit Marine Resources Committee meeting.

The curriculum explains the Padilla Bay food web and how the nonnative mudsnails fit into it.

It also relates the science to the students’ lives. Fun fact: The millions of mudsnails living in the bay could fill 340 school buses, according to the curriculum.

The Kids on the Beach program is sponsored by the Skagit Marine Resources Committee, Northwest Straits Commission and Shell Puget Sound Refinery. The program has been growing and transforming since its start, as a study of forage fish on a Fidalgo Bay beach, during the 2017-2018 school year.

This is the first year the program was hosted by the Padilla Bay reserve with a focus on the nonnative snail species.

Students and volunteers look forward to the field excursions, usually the focus of the program.

“It has been a challenge due to COVID-19. A lot of the intentions, a lot of time planning for volunteers of course has had to shift,” said Pete Haase, Skagit Marine Resources Committee volunteer and founder of the Kids on the Beach Program. “We have a lot of disappointed volunteers, but schools are thankful for the opportunity.”

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<https://laconnerweeklynews.com/Content/School/School-News/Article/Students-dive-into-marine-ecosystem-lesson/31/491/5145>

## Students dive into marine ecosystem lesson

[Bill Reynolds](#), News Editor

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A La Conner High School student group was to have taken a science field trip to the beach last Tuesday on what would have been a perfect warm and sunny outing.

But, as has been the case for more than a year, COVID-19 protocols forced a change in plans.

Thankfully, due to the adaptability of La Conner school district and the Padilla Bay National Estuarine Research Reserve staffs, students in the Between Two Worlds Indigenous Science class could still enjoy the beach life.

Padilla Bay's Annie English and Madi McKay brought forage fish eggs to the La Conner classroom for students to view through microscopes – either in-person or virtually – for them to record data related to an integral part of the Pacific Northwest marine food web.

“They’re really important,” English said of forage fish such as surf smelt, Pacific herring and Pacific sand lance. “They are a vital link. The sand lance is 80% of the Chinook salmon diet and Chinook salmon are 80% of the adult orca whale diet.”

The La Conner students studied preserved eggs collected at low tide from Fidalgo Bay in late April. The microscopes allowed them to recognize various embryological stages.

“The eggs are super small,” English said. “It’s really hard to see them with the naked eye.”

The original plan was for the teens to do their work in the field – or, rather, at the shoreline – as part of “Kids on the Beach,” a project supported by a handful of environmental and corporate partners.

“This program’s mission,” said England, an educator at the Reserve, in Bay View, “is to get kids on the beach and doing science. Unfortunately, due to the pandemic, we weren’t able to get the kids on the beach (this year), but we’ve been able to bring the beach to the students.”

England has worked in concert with Skagit County public school teachers, including Jennifer Willup, lead instructor of La Conner High School’s Between Two Worlds program, which connects modern science with traditional cultural values.

The class began in 2019 as an afterschool enrichment opportunity and this year was added to the daily schedule. COVID-19, which forced distance learning fall semester, modified how Willup presented material.

“It’s almost been like a second pilot year,” she said.

A third generation educator and La Conner alum, Willup told the Weekly News that the next step for her students on their present assignment is to chart the forage fish data.

“They’ll do graphing exercises,” she said, “essentially producing an Excel sheet and that way they can see when the eggs were spawned and tie it back to habitat.”

The eggs were variously collected from a natural beach, a re-armored beach and three beaches in which fish habitat was enhanced, Willup and England said.

McKay led the initial 45-minute microscope activity for those students who logged in remotely.

English, who majored in Studio Art and Environmental Policy while at Western Washington University, said the graphing component is a key part of the lesson.

“Graphs are an important tool to communicate science,” she told the students. “Graphs are a way to breathe life into data and present data in a way that people can understand.”

Each student has also been assigned to write a paragraph explaining what specific information their graphs are communicating.

In addition, the forage fish study has increased student familiarity with three vital vocabulary terms: biodiversity, habitat and ecosystem.

The most emphasized word, though, has been “fun.” Especially as students have focused on and recognized embryonic shapes under their microscopes.

“It’s pretty fun,” England agreed, “when you can see a fish inside the egg.”