

Hudson River National Estuarine Research Reserve K-12 Estuary Education Needs Assessment 2012

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Hudson River National Estuarine Research Reserve Needs Assessment 2012

The Hudson River National Estuarine Research Reserve (HRNERR) is one of 28 nationwide National Research Reserve sites, dedicated to estuary education, research, and stewardship. The Hudson River Research Reserve wishes to conduct a needs assessment of K-12 teachers to determine what types of education and professional development is desired in Dutchess and Ulster Counties.

The National Estuarine Research Reserve system specified required questions and required data. Required questions were questions that had to be included verbatim in a survey of the target audience. Required data was information that must be reported in this document but the Reserve had discretion on how to phrase the questions or gather the data. Using these required questions, the educational team created a twenty-four question survey. This survey was sent to fifteen local teachers. These teachers were asked to recruit another teacher to fill out the survey. In total 30 surveys were sent via email and 21 were returned for a response rate of seventy percent (70%). We primarily target middle and high school audiences because of the high number of non profits in the Hudson Valley that work with elementary schools. A \$100 honorarium was offered to participants as an incentive to complete the survey. The Market Analysis results of 2012 was used to form some of the optional questions in the survey. The following report discusses the responses by survey question or group of questions.

Background of Respondents. Questions 1-5

Ninety-five percent of our respondents report they teach in a public school. The majority of our respondents (81%) reported they teach in Dutchess County while the other nineteen percent reported they teach in Ulster County. Seventy-nine percent of respondents reported to teach at the high school level (9-12) while the remaining twenty-one percent taught in the middle school level (6-8). The chart below indicated the approximate ethnic diversity in the classes of teachers we surveyed.

Race	<10%	10%-20%	21%-41%	41%-60%	61%-80%	80%-100%
White	0%	10%	0%	0%	20%	88%
Black/ African American	80%	10%	0%	10%	0%	0%
Hispanic/ Latino	100%	0%	0%	0%	0%	0%
Asian	100%	0%	0%	0%	0%	0%

Race	<10%	10%-20%	21%-41%	41%-60%	61%-80%	80%-100%
Native Hawaiian	0%	0%	0%	0%	0%	0%

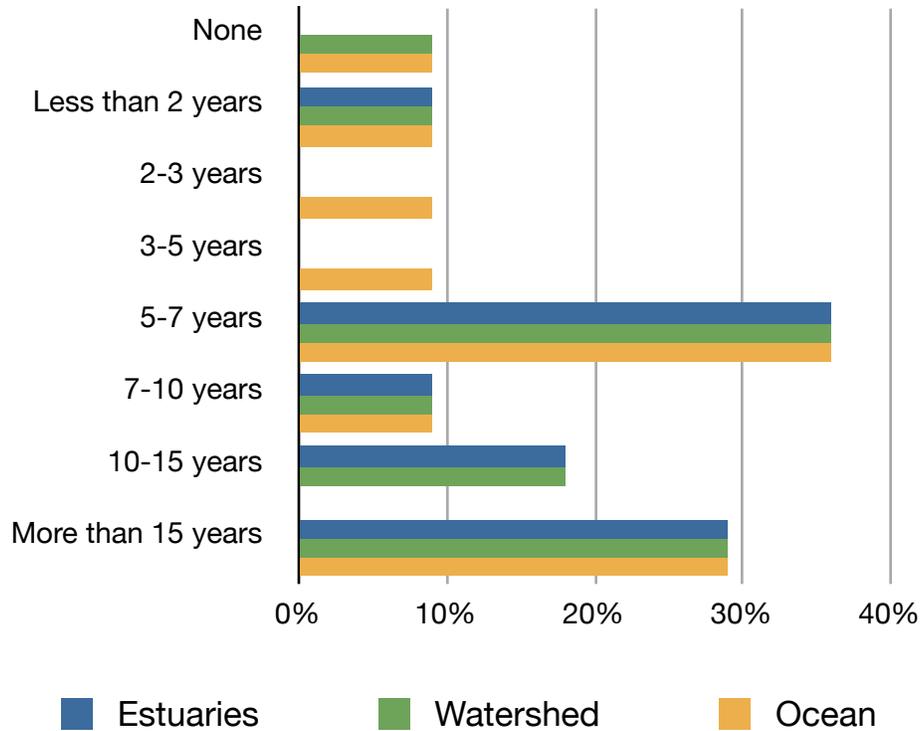
6) Think about your plans for your class for the entire year. How much emphasis did you or will you give each of the following?

	Little or no emphasis	Moderate emphasis	Heavy emphasis	N/A
Outdoor experiential activities	50%	18%	18%	9%
Lab or Field Work/data collection	0%	30%	76%	0%
Stewardship projects or activities	45%	45%	9%	0%
Data analysis, statistics, and probability	9%	51%	40%	0%
Scientific inquiry skills	0%	36%	64%	0%

We notice that a heavy emphasis is placed on lab or field work and data collection. Also a large number reported a heavy emphasis on scientific inquiry skills. Moderate emphasis is placed on the analysis of data, statistics and probability as well as stewardship projects or activities. Scientific inquiry skills were also well represented in the moderate emphasis category. Outdoor experiential activities and stewardship headlined the little or no emphasis category. It should be noted however that many respondents indicated they would like to have done more outdoor activities in the comments section for this question. In several phone interviews, teachers mentioned that data collection and analysis is part of nearly every unit in their respective curriculum. This helps to explain the heavy emphasis in this area. We were surprised to see the heavy emphasis on data by our respondents. It is a nice surprise however as this is a niche area well suited to address, especially given NERRS inherent collaboration between education and research.

(Note: Some percentages do not add up to 100% as teachers indicated varying levels of emphasis for individual classes.)

7) How many years have you been teaching estuary, watershed and ocean related topics?



	None	Less than 2 years	2-3 years	3-5 years	5-7 years	7-10 years	10-15 years	More than 15 years
Estuaries	0%	9%	0%	0%	36%	9%	18%	29%
Watershed	9%	9%	0%	0%	36%	9%	18%	29%
Ocean	9%	9%	9%	9%	36%	9%	0%	29%

The majority of respondents have been teaching estuary, watershed or ocean related topics for more than ten years (47%). The next biggest majority was five to ten years. (45%). These results are partly due to our targeting of experienced teachers for this needs assessment.

8) How many class or activity periods of estuary, watershed, and/or ocean instruction do your students receive in a typical school year?

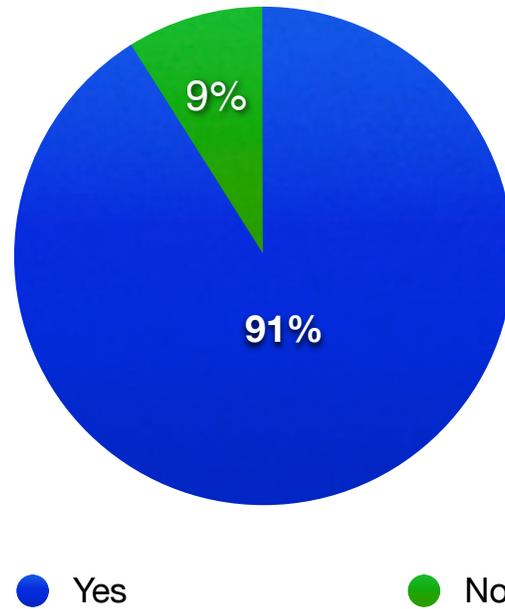
	None	A portion of one class	One to two classes per year	3 to 5 classes per year	6–15 classes per year	More than 15 classes per year
Estuaries	0%	9%	0%	55%	36%	9%
Watershed	18%	0%	18%	36%	36%	0%
Ocean	9%	9%	18%	27%	36%	9%

This was a question asked in our follow up phone interviews. We asked what a estuary education lesson looked like in their respective classrooms. The answers primarily were how estuaries (which was not required in 95% of the curriculums) related to their other required topics. One respondent spoke about teaching a lesson on watersheds and including the Hudson River watershed specifically. This teacher spoke highly of the Hudson River eel project and how that increased his students knowledge of estuaries, ocean currents, tributaries and watersheds. Biodiversity as it related to estuaries was also mentioned. Teachers mentioned “Snapshot Day” at Norrie Point Environmental Center as the most useful and informative day on estuary education during a given year. These results also indicate that the majority of our respondents were individuals who had worked with us in the past.

**9) Which topics would you like to see developed into educational materials?
Please select up to five choices.**

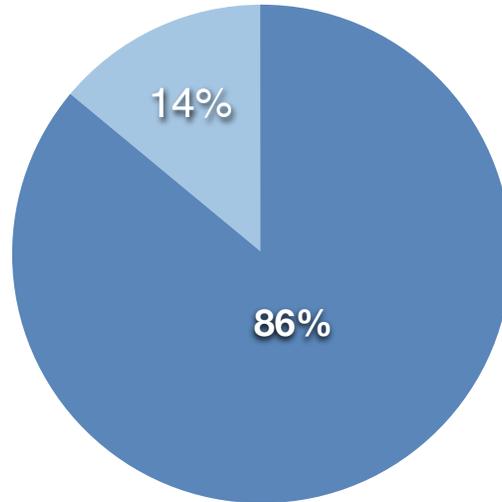
Data collection and environmental decision making where the two most popular choices. In follow up phone interviews, participants indicated they wanted more accessibility to data, whether that was from the nearby Cary Institute or another source, so they could teach students and inform them how environmental decisions are made. Many cited the growing concern of climate change/sea level rise and wanted data on that topic so students could better understand the issue. Climate change/sea level rise, invasive species and human impacts on estuaries were also popular choices. It is possible that estuary related materials are already produced in mass, as opposed to data collection and environmental decision making. This is an area the reserve should focus on improving, especially given in-house resources like SWMP and local collaboration on real-time monitoring.

10) Do you currently cover climate change? If yes give an example of how you covered it.



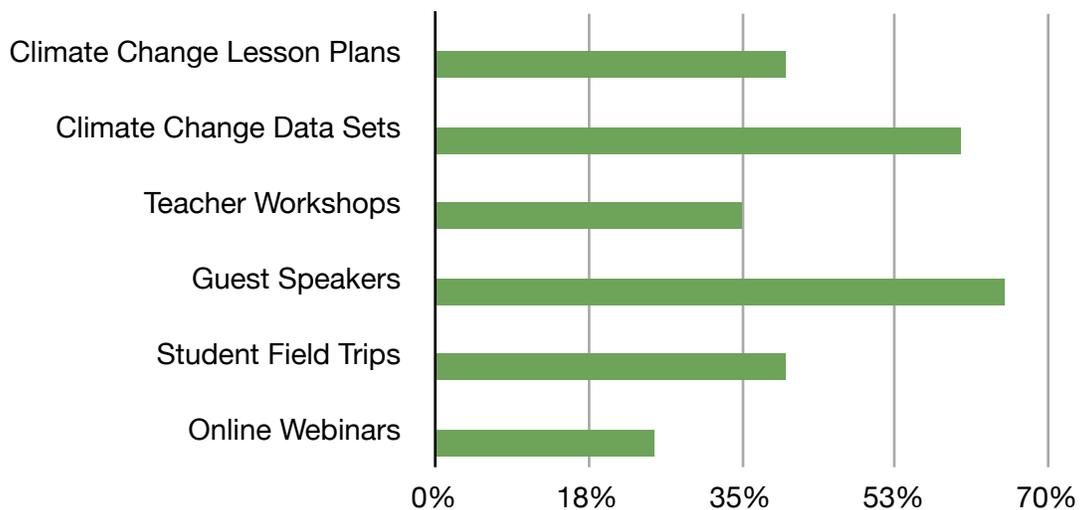
Currently climate change is covered by ninety-one percent of our participants. In the comments section, participants noted that climate change is grouped in with topics relating to the greenhouse effect, renewable energy, global warming and geological effects of glaciers in the Hudson Valley. Purely climate change lessons are rare. Also mentioned was the spread of invasive species, sea level rise, ozone depletion and evolution. During one of the follow up phone interviews, a participant mentioned how the recent weather events of Hurricane Irene and Super Storm Sandy have sparked lively debates in classrooms about climate change and helped to raise awareness and understanding of the issues and implications of climate change.

11) Do you want to incorporate more topics about climate change in your classroom? Why or Why not? If you do, what topics related to climate change would you like to include?



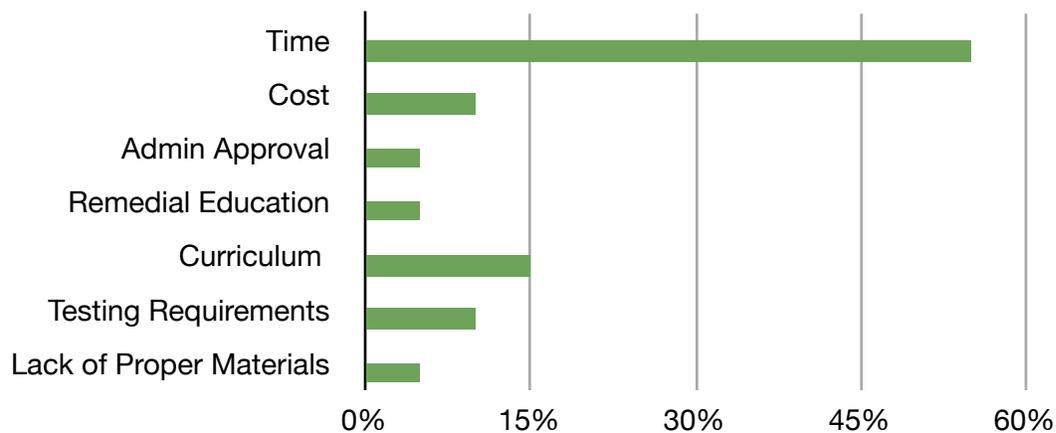
Only fourteen percent of participants said they did not want to incorporate more climate change. Curriculum demands and the need for more concrete data were the reasons cited for that. The other eighty-six percent of respondents expressed a desire to add more climate change education.

12) What resources would be most useful for you to teach about climate change? Please select up to three options.



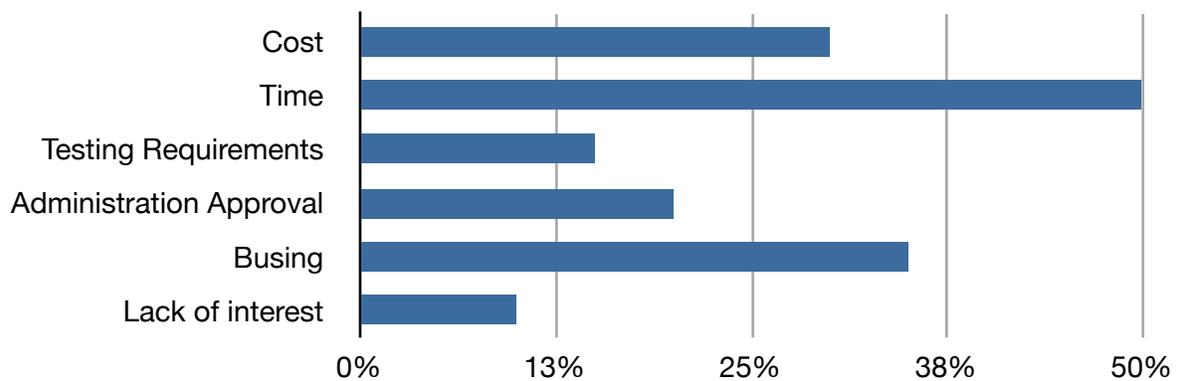
In this graph we can see that teachers desire to have more concrete data as it relates to climate change. We saw this earlier in the survey as to what types of educational materials should be developed. Guest speakers was the highest reported. This was interesting to note as it could be interpreted that teachers feel they need more information, or are not the best authority to speak on the topic. During one of the phone interviews a teacher said that “Estuary Live 2009” Youtube videos are a great way to have guest speakers come into the classroom without actually coming into the classroom. TED talks were also mentioned as a good resource. Responses for teacher workshops were only moderate. This may be linked to the concerns about time expressed in other responses, given the fact that teacher workshops can be a significant commitment of time.

13) What are the biggest barriers to teaching more about the Hudson River, estuaries, and related topics?



As we can see in the graph above, time is the biggest barrier to teaching more about the Hudson River. Curriculum demands, cost of field trips and testing requirements were the next biggest barriers, but far less significant than time. One teacher noted that due to lack of science education at lower levels, more time was being spent on the basics and remedial education as opposed to fulfilling the curriculum and teaching more about the Hudson River. Several teachers also indicated if educational materials were developed to link the Hudson River to required topics in the curriculum, they would be able to teach more effectively about the local environment. Developing educational materials to fill this need would be prudent. Time continues to be the main detractor. The reserve should focus resources on diversifying tools to cut down on time and use more web based education as opposed to more time in the field. We have already started to expand our distance learning options, and these programs should continue to be a tool or option for teachers to explore.

14) What are biggest barriers to out of school field trips? Check up to three.



Much like the barriers to teaching more about the Hudson River, time is the biggest barrier to out of school field trips. The reserve should focus on to the point, direct education. Cost and busing were also large barriers, and likely related to each other. One participant noted that the administration would now only allow field trips within twenty miles of their school. Making more grants available to help fund field trips should be explored as an option in the future.

15) There is a National Estuarine Research Reserve headquartered at Norrie Point in Staatsburg called the Hudson River research Reserve which is one of 28 Reserves around the country protected for the purposes of education, research, water-quality monitoring and coastal stewardship. Were you aware that your state has a National Estuarine Research Reserve?

Yes.

No.

a. **If “yes”, have you ever used any of their educational services or products?**

Yes

No

b. **If yes, which services or products?**

If no, why not? _____

100% of respondents indicated they were familiar with Norrie Point Environmental Center and had utilized their services. Field trips to Norrie Point and distance learning were the most popular choices of educational services utilized. One participant noted a Youtube series produced by Norrie Point as a resource as well.

(Please note that many of the remaining questions are narrative in form. Because of this, percentage of responses are difficult to calculate.)

16) Do you want to incorporate more outdoor education with your students? Why or Why not? If so, what type of support or assistance would help you most?

Ninety-one percent of respondents answered yes to this question and one omitted the question. The most popular answer for what assistance was needed was funding. A participant noted that due to the cost of the bus drive, insurance and the substitute teachers, extra costs were often a deal breaker for field trips. Coordination of visits, administration approval, time and motivated students were also popular choices. One teacher, during a phone interview, did note that when students were able to collect their own data during outdoor education, they understood the material better and enjoyed learning more than if they had received the data from a third party. Another teacher noted in their survey “I would LOVE to, but unfortunately we don’t have too much time to fit it in... the lack of support from administration and fellow teachers is discouraging.” Another teacher responded “We are overloaded on curriculum already and always pressed for time.”

17) What would an ideal outdoor education field trip look like to you? Please be as detailed as possible.

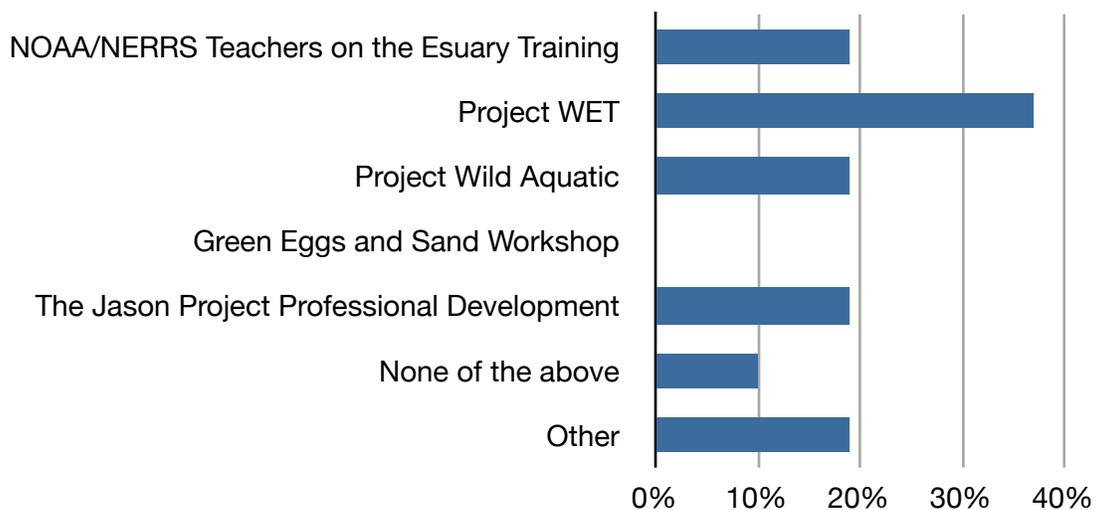
“One in which students leave with a new found respect for the environment and the organisms that depends on it.” “Incorporating measurements (volume, mass, length...), scientific method and classification would be great.” Data collection is a common theme among ideal field trips. Eighty-nine percent of respondents mentioned some form of data collection in their responses. Seining fish in the river and learning how to use a dichotomous to identify them is also very popular. “Students seining in the river, getting dirty, then using a dichotomous key to identify what they caught.” Many teachers noted that just getting the kids out of the classroom, getting their hands dirty, and doing something that “didn’t taste or smell like school” was vitally important to a successful field trip. One teacher was particularly adamant about outdoor field trips being important. He states “...I firmly believe that outdoor education is the only way students can put their local resources into proper context..... gives students a positive experience they can relate to long after the actual lesson or field trip has taken place” Twenty percent of surveys mentioned canoe trips at either Norrie Point or in Tivoli Bays as successful and ideal field trips. Data collection and experiential were the biggest buzz words in this question.

18) In the last three years, how many hours of professional development training in science have you obtained related to estuaries, watersheds and the ocean?

	None	Less than 8 hrs	8-16 hrs (1-2 days)	16-24 hrs (2-3 days)	24-32 hrs (3-4 days)	32-40 hrs (4-5 days)	More than 40 hours
Estuaries	30%	20%	15%	15%	10%	5%	5%
Watershed	25%	20%	25%	15%	10%	5%	0%
Ocean	30%	30%	20%	5%	0%	5%	0%

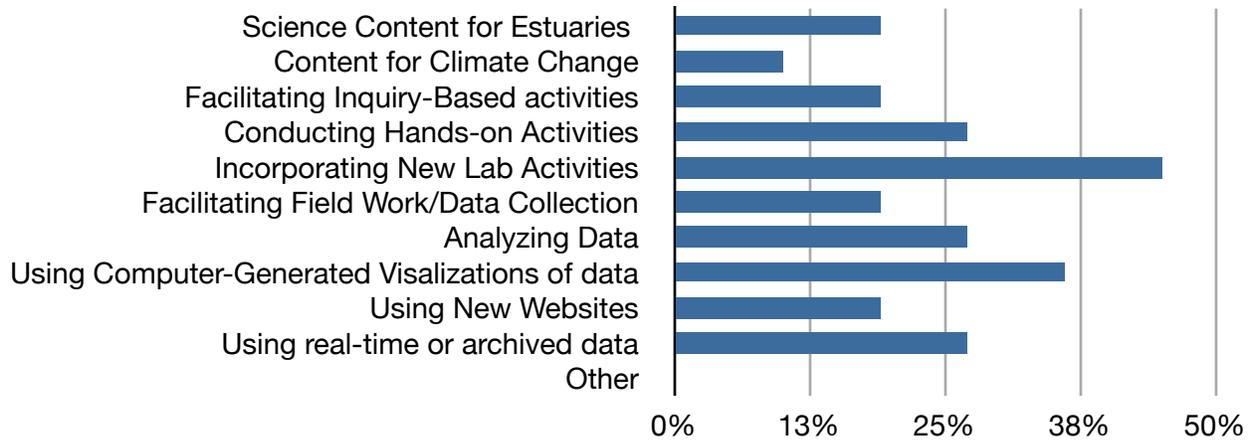
The majority of our participants have not attended much development training in the past three years. Those that have were limited to one to four days of development training. Only 20% of respondents reported going to more than four days of training. Many respondents noted they would be interested in receiving more professional development training during phone interviews and in comments. One phone interview spoke at length about the importance of professional development and was currently working with Cary IES to develop such programs. The market analysis showed appropriate professional development wasn't extensively offered in the region. Professional development may be a need that the Research Reserve can help meet, especially given the Reserve-wide focus on TOTE (Teachers on the Estuary).

19) Which professional teacher development trainings have you taken to supplement your estuary/watershed/ocean education? Check all that apply.



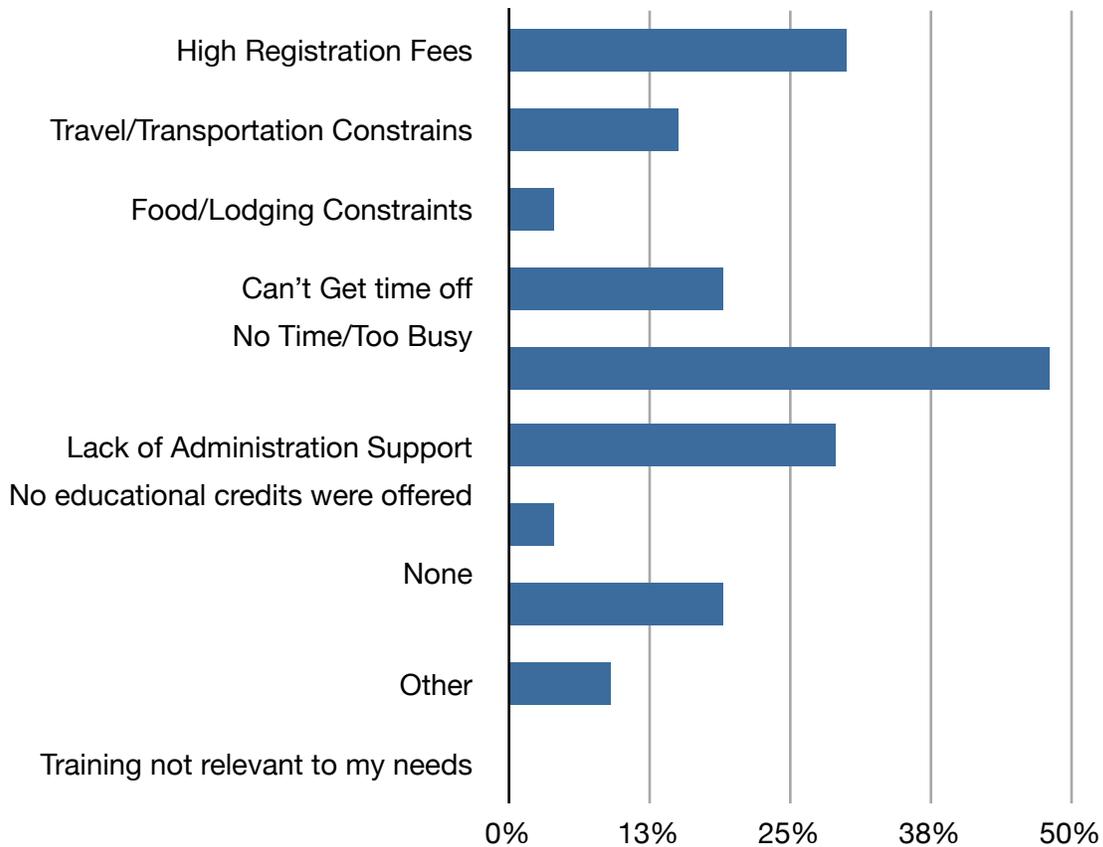
The graph above shows that Project WET was the most attended at 37%. NOAA/NEERS Teachers on the Estuary Training along with The Jason Project Professional Development and Project Wild Aquatic were the next highest at 19%. The Green Eggs and Sand Workshop had zero participants among our survey takers, in part because horseshoe crabs simply aren't present in the mid-Hudson region.

20) What type of professional development training do you need? Check all that apply.



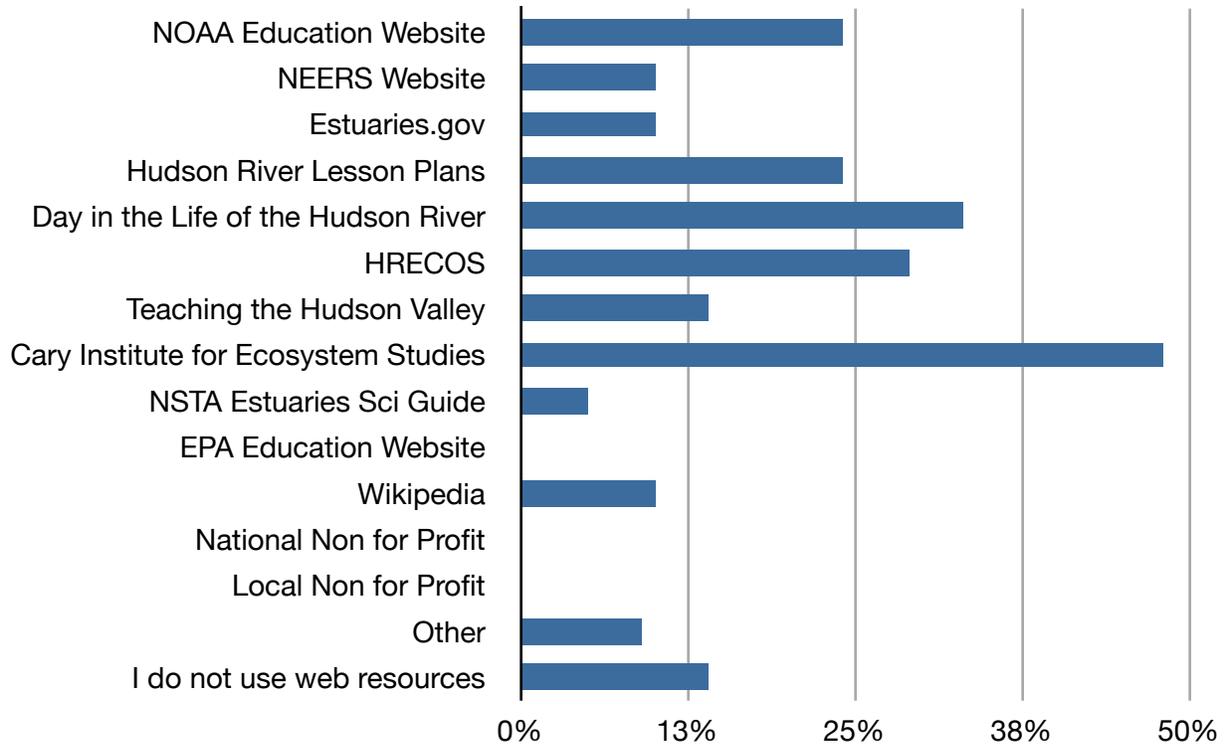
Incorporating new lab activities was the number one professional development as forty-five percent of respondents indicated they had a need for training. Using computer-generated visualizations of data , using real or archived data, and conducting hands on activities were also highly ranked. During several of the phone interviews, interviewees mentioned their desire for more training in data interoperation as well.

21) What factors prevent you from attending professional teacher development?
Please check the three that most commonly occur.



As we can see above, time is once again a contributing factor to a lack of professional development. High registration fees also a big concern among our participants. Lack of administrative support is also a problem. The reserve needs to find ways to make attending professional development trainings more convenient, cost effective and find ways to get more administrative support. Perhaps pre and post analysis of students test scores after a teacher attends a professional development course. This would encourage more teachers to attend and allow administration to see results from these trainings.

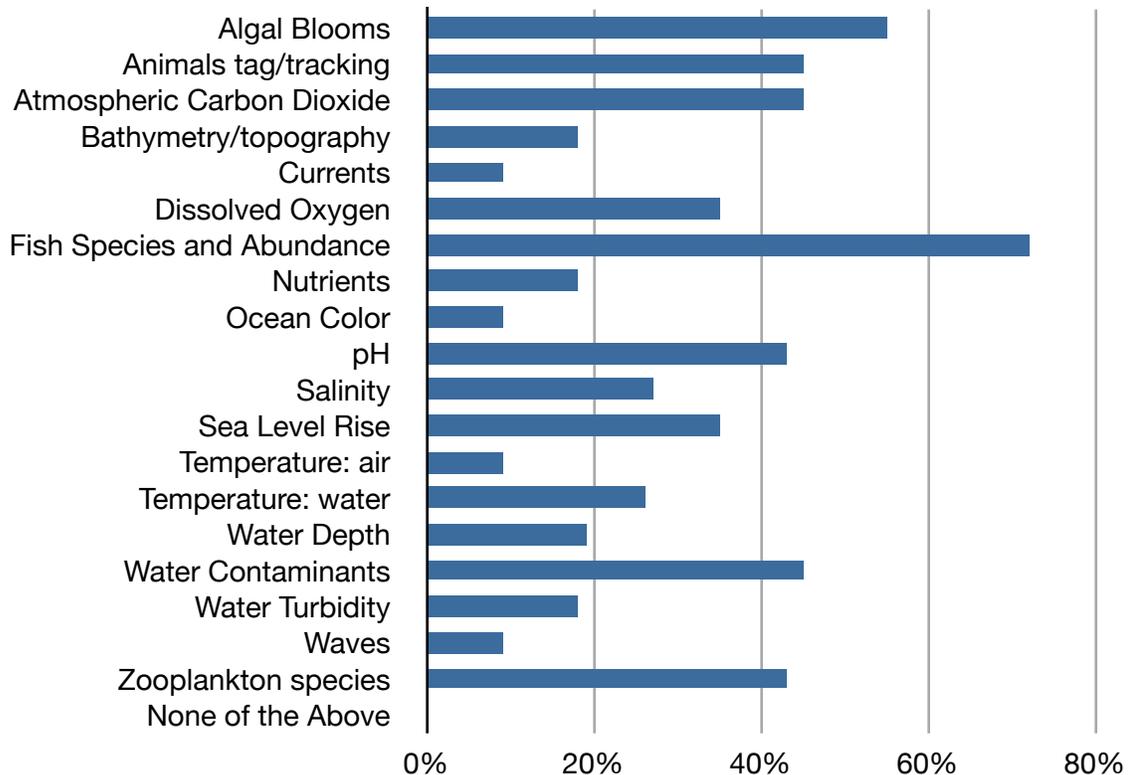
22) From which web resources do you currently obtain estuary, watersheds, and ocean information for use in your classroom? Check all that apply.



The Cary institute is well represented in this data set. In follow up phone interviews, several participants mentioned the Cary Institute as a resource for data. Day in the Life of the Hudson River was also well represented and many participants mentioned their students had participated in this event. One teacher mentioned that the data from the “Day in the Life of the Hudson River” was used often afterwards because the students actually saw where the data came from and could understand and appreciate it better. The Hudson River Research Reserve has many field trips take place at their location at Norrie Point besides “Day in the Life”. The reserve could publish the data from each field trip that teachers could access at any time to utilize in their classrooms. This could include seining data, turbidity, water temperature ect. The reserve could also create information about how to better utilize different data sites like HRECOS or the NOAA Education Website.

23) Which of the following real-time/archived data sets would you need synthesized into age-appropriate learning materials and visualizations for your teaching? Check all that apply.

*Note: We're defining real-time data streams as data that you can access as the data are being collected by scientific instruments, or shortly thereafter, to study current conditions or events. Archived data are defined as older data that are still important and necessary for future reference, but are stored and indexed so that they can be easily located and retrieved.



Fish species and abundance was the most selected response. This may be in part because of the charismatic nature of fish and live animals, and it also may be due to the focus in the mid-Hudson region placed on fish, such as the popularity of the sturgeon logo seen on bridges, and the success of the eel project. The popularity of “algal blooms” as a data set is a complete mystery, and needs to be followed up. Biodiversity in the Hudson River estuary is an important topic. That may be where this interest is coming from. Algal Blooms, Animal tag/tracing, water contaminants, pH and zooplankton species were among the next tier of choices. The research reserve could implement a system of data from their educational programs at Norrie Point, to be shared electronically. We notice that animals, zoo plankton and water pollution, pH are all around 40%. It is apparent that animals and the health of the river are vitally important to teachers and their students.

24) Is there anything else you would like to tell us or ask us?

Most did not respond to this question, but for those who did the most popular response here was “Thank you!”.

Summary:

Time and data collection, understanding and interpretation are the two areas most needed for the Hudson Valley education. Many teachers noted that they felt more accessibility to data would help them in their classrooms. Whether that be their own collection with their students (which seemed to be preferred) or from the Cary Institute for example, more accessibility to data should be addressed. Guest speakers were also mentioned in several surveys. To make these more accessible, a “Youtube” series or perhaps a collection of “TED Talks” to teach about climate change, how to interpret data, and how environmental decisions are made would be prudent to implement in the future. If the Reserve can find ways to make data more accessible, and easy to use and interpret, we could fulfill a huge need in Hudson Valley education. Accessible datasets are also a priority within the overall SWMP program, so there are both “bottom-up” and “top-down” goals to achieve here. We also have the advantage of several data-rich students filed programs, including Day in the Life of the Hudson, and the citizen-sceince Eel Project. These programs and others can be used as a wellspring of data sets and classroom activities.

In several of our questions, teachers indicated in one way or another that popular topics include fish and other organisms. As we develop learning tools that include climate change messages, these responses make it clear that we should look at the effects of climate change on biological systems as topics that both interest students and have real consequences in our estuary.

One of the most important goals of this needs assessment is to help us shape future TOTE (Teachers on the Estuary) programs. Our earlier market analysis suggested that more professional development training is needed in the Hudson Valley. However, this needs assessment suggests that many teachers simply do not have the time to attend development training. Working with other local not for profits, such as the Cary Institute for Ecosystem Studies, to find a way to make these trainings both cost effective, efficient and convenient to attend could help to increase attendance and utilization of this important resource. This may include internet or distance learning components, bringing the workshop into the classroom or school district whenever possible, and streamlining goals and topics to best get at teacher needs.

Hudson River National Estuarine Research Reserve Needs Assessment 2012-2013

For some questions the following definitions may be helpful:

Estuary: An estuary is a semi-enclosed coastal body of water where fresh and salt water meet and mix.

Watershed: An area of land where all the water drains to a common place.

Ocean: Related to a system of open-ocean habitats, characterized by exposure to wave action, tidal fluctuations and ocean currents.

1) Please provide the following:

Your Name:

School:

Town or School District:

County you teach in:

Phone number:

Email address:

2) In what educational setting do you teach?

- Public school
- Private school
- Other:

3) What grade level do you teach?

- K-5
- 6-8
- 9-12
- College
- Other (Please Specify)_____

4) What class or classes do you teach?

5) Approximately what percentage of your students identify with the following ethnic groups?

White	_____
Black or African American	_____
Hispanic/Latino	_____
Native American	_____
Asian	_____
Native Hawaiian	_____

6) Think about your plans for your class for the entire year. How much emphasis did you or will you give each of the following?

	Little or no emphasis	Moderate emphasis	Heavy emphasis	N/A
Outdoor experiential activities				
Lab or Field Work/ data collection				
Stewardship projects or activities				
Data analysis, statistics, and probability				
Scientific inquiry skills				

Add comments if you would like to:

7) How many years have you been teaching estuary, watershed and ocean related topics?

	None	Less than 2 years	2-3 years	3-5 years	5-7 years	7-10 years	10-15 years	More than 15 years
Estuaries								
Watershed								
Ocean								

8) How many class or activity periods of estuary, watershed, and/or ocean instruction do your students receive in a typical school year?

	None	A portion of one class	One to two classes per year	3 to 5 classes per year	6-15 classes per year	More than 15 classes per year
Estuaries						
Watershed						
Ocean						

9) Which topics would you like to see developed into educational materials? Please select up to five choices.

- | | |
|--|--|
| <input type="checkbox"/> Estuaries (general info) | <input type="checkbox"/> Scientific research |
| <input type="checkbox"/> Ecology | <input type="checkbox"/> Data collection, analysis, and presentation |
| <input type="checkbox"/> Physical aspects of estuaries like tides and currents | <input type="checkbox"/> Citizen science/ stewardship |
| <input type="checkbox"/> Human impacts on estuaries and rivers | <input type="checkbox"/> Environmental decision-making |
| <input type="checkbox"/> Climate change or sea level rise | <input type="checkbox"/> Biodiversity |
| <input type="checkbox"/> Cultural heritage | <input type="checkbox"/> Invasive species |
| <input type="checkbox"/> Water Cycle and Watersheds | <input type="checkbox"/> Fish and fisheries |
| <input type="checkbox"/> Water Quality | <input type="checkbox"/> Other: |
| <input type="checkbox"/> Adaptations of animals and plants | <input type="checkbox"/> Other: |
| <input type="checkbox"/> Habitat protection | <input type="checkbox"/> Other: |

comments:

10) Do you currently cover climate change? If yes give an example of how you covered it.

11) Do you want to incorporate more topics about climate change in your classroom? Why or Why not? If you do, what topics related to climate change would you like to include?

12) What resources would be most useful for you to teach about climate change? Please select up to three options

- None: I don't plan to incorporate this topic
- None: I plan to incorporate this topic, but do not require additional materials
- Climate Change lesson plans
- Student Field Trips
- Climate change data
- Online Webinars
- Guest Speakers in classroom
- Teacher Workshops
- Other _____
- Other _____

comments:

13) What are the biggest barriers to teaching more about the Hudson River, estuaries, and related topics?

14) What are biggest barriers to out of school field trips? Check up to three.

- Cost
- Time
- Testing requirements
- Administration Approval
- Busing/Transportation constraints
- Lack of interest by teachers or students
- Other:
- Other:

15) There is a National Estuarine Research Reserve headquartered at Norrie Point in Staatsburg called the Hudson River research Reserve which is one of 28 Reserves around the country protected for the purposes of education, research, water-quality monitoring and coastal stewardship. Were you aware that your state has a National Estuarine Research Reserve?

- Yes.
- No.
 - a. If "yes", have you ever used any of their educational services or products?
 - Yes
 - No
 - b. If yes, which services or products? _____
If no, why not? _____

16) Do you want to incorporate more outdoor education with your students? Why or Why not? If so, what type of support or assistance would help you most?

17) What would an ideal outdoor education field trip look like to you? Please be as detailed as possible.

18) In the last three years, how many hours of professional development training in science have you obtained related to estuaries, watersheds and the ocean?

	None	Less than 8 hrs	8-16 hrs (1-2 days)	16-24 hrs (2-3 days)	24-32 hrs (3-4 days)	32-40 hrs (4-5 days)	More than 40 hours
Estuaries							
Watershed							
Ocean							

19) Which professional teacher development trainings have you taken to supplement your estuary/watershed/ocean education? Check all that apply.

- NOAA/NERRS Teachers on the Estuary Training
- Project WET
- Project Wild Aquatic
- Green Eggs and Sand Workshop
- The Jason Project Professional Development
- None of the above
- Other, please specify:

20) What type of professional development training do you need? Check all that apply.

- Science content for estuaries, watersheds, and oceans
- Content for climate change causes, effects, and solutions
- Facilitating inquiry-based activities
- Conducting hands-on activities
- Incorporating new lab activities
- Facilitating field work/data collection
- Analyzing data
- Using computer-generated visualizations of data
- Using new websites
- Using real-time or archived data from monitoring sites
- Other, please specify _____

21) What factors prevent you from attending professional teacher development? Please check the three that most commonly occur.

- High registration fees
- Travel/ transportation constraints
- Food/lodging constraints
- Can't get time off
- No time/too busy
- Lack of administration support
- Training is not relevant to my needs
- No educational credits were offered
- Other:

Comments:

22) From which web resources do you currently obtain estuary, watersheds, and ocean information for use in your classroom? Check all that apply.

- NOAA's Education Website - <http://www.education.noaa.gov>
- National Estuarine Research Reserve System's Website - <http://nerres.noaa.gov>
- National Estuarine Research Reserve System's, Education Website - <http://www.estuaries.gov>
- Estuary Program's Hudson River Lesson Plans- <http://www.dec.ny.gov/education/25386.html>
- Day in the Life of the Hudson River- <http://www.ldeo.columbia.edu/edu/k12/snapshotday/>
- HRECOS- <http://www.hrecos.org/joomla/>
- Teaching the Hudson Valley- <http://www.teachingthehudsonvalley.org/>
- Cary Institute for Ecosystem Studies- <http://www.caryinstitute.org/educators>
- NSTA Estuaries Sci Guide - <http://sciguides.nsta.org>
- EPA Education Website - <http://www.epa.gov/enviroed/>
- Wikipedia - <http://wikipedia.org>
- National non-profit. Which one(s)? _____
- Local non-profit. Which ones(s)? _____
- Other _____
- I do not use web resources.

23) Which of the following real-time/archived data sets would you need synthesized into age-appropriate learning materials and visualizations for your teaching? Check all that apply.

*Note: We're defining real-time data streams as data that you can access as the data are being collected by scientific instruments, or shortly thereafter, to study current conditions or events. Archived data are defined as older data that are still important and necessary for future reference, but are stored and indexed so that they can be easily located and retrieved.

- algal blooms
- animal tag/tracking
- atmospheric carbon dioxide
- bathymetry/topography
- currents
- dissolved oxygen (DO)
- fish species & abundance
- nutrients
- ocean color
- pH
- salinity
- sea level rise
- temperature: air
- temperature: water
- water depth
- water contaminants
- water turbidity (clarity/
cloudiness)
- waves
- zooplankton species
- None of the above
- Other, please specify:

comments:

24) Is there anything else you would like to tell us or ask us?

Everyone at the Hudson River Research Reserve thanks you for your time and effort.