

Keene Stream Team: Stewardship, Streams and Stories

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Introduction

When we're told by policy-makers today that environmental issues need to take a back seat to economic or political realities, Walton (Izaak) reminds us that bold visionaries not only can but should put the environment front and center during tough times.¹

To strive for the purity of water, the clarity of air, and the wise stewardship of the land and its resources; to know the beauty and understanding of nature and the value of wildlife, woodlands, and open space; to the preservation of this heritage and to man's sharing in it. I pledge myself as a member of the Izaak Walton League of America.²

Global warming and climate change are undeniably shifting our perceptions of our planet and its health. As clearly evidenced by current headlines and political posturing, these perceptions are widely varied among adults and often not evidence based. Scientists are scrambling to bring reality to the general population with almost daily revelations of global signposts. Whether or not today's adults are absorbing the immediacy of the problems, educators are ever at the ready to create change from the ground up. Educators need to continuously monitor the extensive body of information and collaborate with other professionals to determine best practices for sensitizing our students. Raising our children to be stewards of the planet is essential to slow the environmental shifts that are due to the ignorance of previous generations. A classroom in Alaska may be able to observe these changes by simply looking out of their school windows but most schools are not located in extreme regions. The challenge is to bring the global crisis to the back door of as many schools and students as possible.

Participating in the Delaware Teachers Institute "Organisms-Adaptations for Survival in Aquatic Environments" Seminar provided the opportunity for educator collaboration. Water is the universal theme of global climate change whether it be the melting of the ice caps or the systemic effects of ingesting chemicals that have made their way into food supplies for humans and other lifeforms. Water touches us all on a daily basis. Water is therefore the ideal vehicle to deliver our critical message of conservation. Freshwater rivers, streams and creeks are to be found even in urban settings. They offer hands on opportunities for students to experience planet health through the lens of stream health.

It is unfortunate that so much money and effort continues to be funneled into testing when other programs that would create well-rounded students lose funding. The state used to send the schools on field trips to local preservation sites to participate in environmental learning. There were two separate trips that we took to study stream health

by counting insect larvae. Unfortunately, the expense of those trips are prohibitive to most individual classes. At the same time, those trips took our students to other areas disconnected from their local community. The solution to both of these problems is to look for a local resource, a local waterway. Down the hill behind our playground is a small stream that runs through a wooded area that lies between the school property and a few of our feeder neighborhoods. This stream habitat will become the focal point of this unit through the Stream Adoption program in conjunction with Delaware Nature Society.

Demographics

I teach second grade at Keene Elementary school in the Christina School District. Christina has historically been the largest district and is actually spread out between the City of Wilmington and Suburban Newark. Currently there is a movement to either transfer the city schools to another district or to create an independent city district. Aside from the drastic changes that will create for our employees, it will be interesting to see how such a change will impact our district's identity and philosophy.

Our school is considered a Title 1 school and has over 70% of our students receiving free or reduced lunch. The majority of our students come from non-traditional households. Many of our families are single parent or even another relative (grandparents, aunt or uncle, older sibling). It is not unusual for a family to have transportation and technology issues. We also have a large population of English Language Learners from a variety of cultures: Asian, Hispanic, Middle Eastern and the Caribbean. Despite all of these challenges, Keene is a close-knit family.

Last year we suffered the loss of our Principal of 14 years, Bea Speir, which was very difficult for our community. Ms. Speir had a very strong student centered vision for our school and engendered the same in her staff. In the wake of such loss, the school has worked to maintain its cohesion. We were fortunate to have some continuity from the transition of our Assistant Principal to Principal

Just as we felt we were regaining our momentum, our district failed to pass a very important referendum (twice) which resulted in the loss of about 100 positions throughout the district. Our school was hit particularly hard and lost over 25% of our teaching staff. We have dropped from 6 classrooms each for grades 1-4, down to 4 classrooms each. This translates to average class sizes of 30 or more. Those figures are daunting in the best of scenarios but with the varied and significant needs of our general population, they become overwhelming. These new issues require some creative logistics. Strong classroom management and engaging instruction is a daily push.

Using a Project-based approach to content helps keep the students vested in their own learning. We may have sufficient numbers to qualify for an additional teaching unit but that creates new problems as students are forced to adjust to routine changes. We have

also had different movement within the building between grade levels/teams in the last few years that will affect the expansion of the unit beyond a single classroom.

Geographics

Location

William B. Keene Elementary School is located in a region known as Pencader Hundred in New Castle County, Delaware. The school address is technically “Newark, Delaware” but our location is far from the bustling college town of that name. Despite the school’s proximity to some of its feeder neighborhoods, it is located between a major highway, a strip of woods, and our targeted stream, which prohibits walkers. Incidentally, this ease of access issue mirrors access issues that many students face in utilizing available green spaces. This corridor of the highway has a very transient population and many of our students come and go throughout the K-5 grade span of the school.

Neighbors

In the last year we have had multiple homicides in the neighborhoods immediately adjacent to the school, including one near a bus stop as students were being dropped off. It is not unusual for us to experience security lockdowns due to other local crimes including bank and pharmacy robberies. Our location is also next to the Troop Two State Police Barracks that is a mixed blessing. We have the benefit of quick security response but proximity to the comings and goings of criminals. These issues clearly impact the school, and local, community in outdoor activities.

We are very fortunate in our other two neighboring resources. One of which is the Glasgow YMCA, and the other is Glasgow Regional Park. The YMCA has multiple programs and also runs the Before and Aftercare program at our school. They have both indoor and outdoor swimming pools and a large amount of outdoor green space for various activities. There are pavilions with tables for gathering, as well, one of which is directly adjacent to our school parking lot.

With more than 250 dedicated acres, Glasgow Park has plenty of green space, an almost 3-mile paved trail, gravel trails, a skate park, large and small bark parks, tennis courts, basketball courts, playgrounds, pavilions, activity and information stations, and even a sledding hill.³ They host a variety of community events throughout the year and even have a farmers’ market in the summer and fall. There are important buildings located there: a historic farmhouse, barn, and outbuildings that are currently being restored for additional event usage. It is exciting that the most recent addition to the park’s offerings (November 2015) is a new catch and release pond that was stocked by the county with Large Mouth Bass, Bluegill, and Channel Catfish.⁴

Rationale

While there is much talk of change that is coming to our Science curriculum, at this time the second grade science units are Soils, Bridges, and Life Cycles. Even if they change our units of study, the concepts covered in my stream unit are cross-curricular in nature and will therefore remain relevant. I would be starting with just my class but would like to eventually expand to our whole grade level. Expanding to other grade levels would eventually work as well because most of the Science units at each grade level could be tied in. Our school currently has a garden that is cared for by each grade-level handling a different aspect so I believe a similar approach would work for the stream adoption. While the stream behind the school is the primary waterway that we will study, there will be additional waterways studied that flow through and around Glasgow Park that are an integral part of the region's history. It is essential to build stewardship for our current environment by grounding it in local history, helping students see the "bigger picture" and build understanding of long-term interactions between human activity and the environment.

Program Background

There are multiple organizations using citizen gathered data to profile stream health. The National Geological Service, the Environmental Protection Agency and even our local Delaware Nature Society rely on volunteers from the community to collect much of their field data. All of the data are compiled and analyzed for trends and so forth but what I found was that often the data was a few (or more) years old. One organization's website that seems to be updated much more frequently is the Walton League website. They have extensive programs and initiated the "Save our Streams" program which has been widely adopted. Their curriculum guide was updated in 2015.⁵

Izaak Walton League

In 1922 a group of Midwestern anglers formed a conservation group and named it after Izaak Walton the author of *The Compleat Angler*, a 17th century environmental handbook. The group's focus was on conserving water and land resources. It took a community based approach to monitoring local resources and providing education and training opportunities. The model has since been adopted by many agencies to promote community involvement in conservation. The Walton League has been instrumental in most of the conservation legislation of the past 90 plus years.⁶ There are several articles available from the League's website detailing this history that are informative for the educator, and can even be adapted in some form for the students.⁷ The history of these landmark environmental wins is fascinating yet frustrating. So many of the issues we are still fighting today, just in another form. The writing has been on the wall for so long yet we treat each symptom like it is a newly discovered illness.

Rather than rail against the fates, The Walton League continues to stay politically active and more importantly, socially active. Their community-based chapters focus not just on conservation but also on sustainable use of resources. Some of the chapters have outdoor education and safety programs for children and adults. There are even League scholarships available for students pursuing college degrees in Natural Resources. The League has also published a 5-year Strategic Plan (2014-2019) outlining their mission.⁸

The Izaak Walton League website has a webinar series under their youth program information. These three webinars address the importance of connecting youth to the outdoors. The first part of the series talks about the need to re-connect children to the outdoors and the factors that have combined to create our society's current lack of that engagement. Citing issues such as access, parental safety concerns, liability, over scheduling, and electronics usage, the webinar seeks to explain rather than blame; from there it goes onto identify the whys and how's of combating the current dearth of nature exposure. The main presenter is Ken Finch who is president of Green Hearts: Institute for Nature in Childhood. Unfortunately, there is not a current website for his institute but there is a Facebook page as well as links to other articles and interviews. In a variety of these presentations, Ken Finch shares the importance of childhood experiences in shaping adult conservation values. The experiences that seem to have the most positive, lasting effects are those that are authentic, frequent, and either guided by a mentor or child directed. These experiences need to allow children to connect to nature emotionally before intellectually. While today's children have way more factual knowledge about nature, it is the experiential knowledge that has severely declined and must be restored.⁹

While *The Compleat Angler* and Walton were inspirational in the League's creation, it is important to note that the author also received criticism due to some of his descriptions of killing methods. He describes, in great detail, various ways of catching and preparing other creatures for the purpose of bait. The most disconcerting of the accounts is the hunting down and killing of an otter family because they feed on the same fish that the main character, Piscator, seeks to catch.¹⁰ Oddly enough, he asks to keep one of the pups to tame and train to catch fish. Although Piscator professes a hatred of the otters and wishes many more to be killed, he does so in the misguided belief that they are damaging to the streams and fish. He even goes so far as to refer to fishing during spawning season "like taking the dam on the nest when she hatches her young" as a sin against nature, meanwhile failing to see the parallel of the preceding slaughter of the otter mom and her pups. Piscator firmly states his belief that if not kept in check, otters and fishing during spawning season would cause the destruction of all rivers. His closing comments on the enemies of fish is that he would leave them to fight amongst themselves, since he loves to "kill nothing but fish."¹¹ This scenario starkly illustrates one of the problems facing conservation efforts throughout history, when the value of one aspect of the environment is sacrificed for another. It should serve as a reminder to keep balance in our stewardship efforts.

Punctuated Equilibrium

“We will not fight to save what we do not love.”¹²

This powerful quote from the webinar is from Stephen Jay Gould, an American paleontologist, evolutionary biologist, and historian of science. Gould was instrumental in developing the theory of “Punctuated Equilibrium.”¹³ In seminar, our leader Jack Bartley had explained that punctuated equilibrium is rapid evolution that often takes place due to an ecological crisis. These bursts of evolution contrast with longer time frames of relatively slow, steady evolution characterized by Darwin’s theory.¹⁴ Though separated by centuries, much like Walton, Gould wrote and presented extensively on topics of Natural History striving to make his theories accessible to the mainstream.¹⁵ We need to think of the push to re-connect children to nature as an ecological crisis. It isn’t about wanting or expecting instantaneous change, but more about frontloading the change. Growing up my mother always had us double the first dose of an antibiotic when we were sick, to give it that extra push. We need to double our efforts to provide children with these engaging, emotional natural experiences.

Regional Background

The Christina River is the primary river of New Castle County. The Christina originates just over the line in Pennsylvania, then moves through Cecil County, Maryland, before crossing into Delaware just west of Newark. From Newark, the river moves across the county, eventually flowing into the Delaware River. It has had multiple variations of its name from the many groups that have worked the river: Native Americans, Swedish, Dutch, British and Quakers. It wasn’t until 1937 that it was officially named the Christina.¹⁶

Pencader Hundred

Waterways

“Pencader” is Welsh for “highest seat” and refers to the establishment of Baptist meeting houses throughout the 30,000-acre Welsh Tract that was granted by William Penn to David Evans, William Davis, and William Willis in 1701 within the northwest portion of the lower three counties of Pennsylvania (i.e. Delaware). “Hundred” refers to a territorial subdivision decreed by Anglo-Saxon law and borrowed, possibly, by the European immigrants from Frank kings prior to 595 A.D.¹⁷

The portion of the Christina (an approximate 7 miles) and the tributaries that are the focus of this unit are those in an area known as Pencader Hundred. The tributaries Muddy Run and Belltown Run converge prior to entering the Christina. Both of these waterways have been used to create the millponds Sunset Lake and Beck’s Pond, respectively.

The larger of the two tributaries, Muddy Run, connects to Sunset Lake. Even though these waters run directly behind Glasgow Park, the Lake does not really have public access. One end of the lake portion is surrounded by the industrial park that was formerly a DuPont site and now is home to Siemens Healthcare Systems. The other end of Sunset Lake is the home of The Newark Anglers Fishing Club and is restricted to club member use only. Part of the unit will be to contact both of these entities to request access to the lake and to become partners with the school for monitoring water health.

The stream behind our school is part of Belltown Run which is in the Christina River Watershed. Once it crosses under Route 40 it winds its way along the edge of Glasgow Park, through Belltown Woods and west to Becks pond before meeting up with Muddy Run. Shortly after these two waterways converge, they spill into the Christina.

The Christina, itself, is slightly North of these two tributaries and at times runs parallel to them before their intersection. Just above the Cooch's bridge portion of the river is a region that was historically referred to as Purgatory Swamp. The name was supposedly given by the British after soldiers seeking to prevent American soldiers from meeting up with Washington's Army got bogged down in the marshy area instead. It is also referenced in diary accounts of the Battle of Cooch's Bridge, the only Revolutionary battle fought on Delaware soil. For a time, the road leading south of Newark was even known as Purgatory Road.¹⁸

Land and Industry

Located in the Northwest portion of Pencader Hundred is Iron Hill. Its proximity to the Christina River was essential in the early usages of that waterway. Early on, as the hill was mined for its iron ore, the river provided the power for smelting operations. These forges however did not seem to be profitable and were repeatedly sold prior to being abandoned. Instead, the primary usage of resources from Iron Hill became the use of timber to create charcoal to run the local iron works while they did exist, and then the nearby successful Principio Forge in Cecil County, Maryland. The amount of wood required for that use is staggering. A typical large blast furnace of that time, one yielding two tons of iron daily, consumed the charcoal from one acre of woodland. A wooded area of 240 acres yielding 5,000 to 6,000 cords was necessary to feed a furnace kept in blast for a year. The process of cutting the wood then turning it into charcoal was also long and arduous, requiring many laborers. George Washington was said to have utilized the elevation of the Hill to survey the movement of the British troops under the command of General Howe that could only have been possible with little woods remaining at the summit. It is a testament to the recovering power of nature that Iron Hill is so thickly wooded today.¹⁹

Sawmills and gristmills were the most successful industries on this portion of the Christina. Near the Cooch's Bridge portion of the Christina was a gristmill site known as

Dayett Mills. The original mills owned by the Cooch's were destroyed by the British during their brief occupation of the region. A few more mills were erected further along the stream but the existing Dayett Mill was actually still operating as recently as the 1980's.²⁰ In the past we took field trips to Dayett Mill but it has struggled to maintain the program. The Delaware Nature Society is currently in charge of coordinating educational programs for the Mill. Located adjacent to the property is the Pencader Heritage Museum. The Museum is run by the Pencader Heritage Area Association. Staffed by volunteers, the PHAA as it is known is responsible for gathering and cataloguing a wealth of historic information.

Unit Overview

The unit will be cross-curricular research and skill building. They will research the history of the region and local waterways. Students will have to study the information on identifying macro invertebrates prior to conducting that portion of the data collection. They will go out to the stream and collect data that will in turn be disaggregated and analyzed. The data can be displayed using data tables and graphs. We will do our own analysis of the data and it will also be submitted to Delaware Nature Society through a recently available App. At a minimum, we will be conducting the stream monitoring activities quarterly. Students will be responsible for developing questions to "Ask the Experts" as an exchange between the classroom and the scientists. They will use their findings to determine how their own playground activities may be impacting the stream behind the school, and what they could do to preserve, or improve, the water quality for the organisms living there. Their findings will also be grounds for persuasive writing pieces to local agencies. The unit would be a Project-Based Learning experience around the idea of the interconnection of species, their life cycles, land use, and how the health of Aquatic environments are a barometer for the environment overall. Accordingly, I am presenting activities for each of the major subject areas. The unit would take place throughout the year in keeping with the nature of stream monitoring. A Unit Journal is recommended for students to record their learning.

Activities

Reading

Lesson 1- Stewardship: Establishing focus of the unit (2-3 sessions)

Read aloud excerpts from *The Compleat Angler*. I recommend a reprint of one of the earlier editions with a preface by Richard Le Gallienne that only has two main characters rather than three, as it is a bit easier to follow (available on Amazon).²¹ Then read excerpts from the history and mission statement of The Izaak Walton League.²² Share with students the timeline of these two sources. These readings should probably be broken up so as not to overwhelm the students due to their complexity.

Essential Questions:

1. What is the message or focus of the fiction and non-fiction texts?
2. How does the focus of the two texts compare and contrast?
3. How do these ideas connect to us in present times?

EQ 1) Have students utilize Turn and Talk with an Elbow Buddy prior to sharing their partner's thoughts with the class. This is the best gauge of whether or not the students have grasped the intended lesson content prior to proceeding with a written response to the reading.

EQ 2) Utilize a Unit Journal for recording their written response to the lesson. Have students complete a compare/contrast graphic organizer. I tend to use I-chart organizers but a Venn diagram would work equally.

EQ 3) Students share their responses in small groups to come up with their ideas about how these two texts are connected to us currently. They will then collaboratively record the group's ideas onto a small poster (9x18) prior to sharing with the whole group. Posters can then be displayed throughout Unit. An additional activity would be to have the student groups create conservation posters.

Social Studies/Non-fiction Writing

Lesson 2 – Local Lands and Legends: Fact or Fiction (Multiple Sessions)

Our District recently adopted a writing curriculum, *Explorations in Nonfiction Writing*. It includes a strategy known as “R.A.N.” which stands for Reading and Analyzing Nonfiction. The authors reimagined the standard KWL chart and came up with a new graphic organizer called the R.A.N. Chart.²³ This is the third year I have used this chart in my classroom for a variety of topics. I often use it in conjunction with Social Studies and Science content. One of the major distinctions of this graphic organizer is its categorization of “What we think we know” details, into either “Confirmed”, or “Misconception” so students can recognize when they have made adjustments to their schema. Finally, the strategy has students identify “New Learning” and “New Questions” which is a crucial component of a Project-based approach.²⁴ As has definitely been the case with my own research for this unit, when students think about how the new information impacts their understanding it sparks the desire to know more. The resulting chain reaction engages students in ownership of and direction for their own learning, a key component in developing life-long learners.

There are a variety of local history resources to be shared with the students. In addition to their highly informative website, The Pencader Heritage Association Museum has a

plethora of material that they can make available to the students. Not only do they have print materials, they also have digitized recordings of local oral history, and videos available. We will be utilizing as many of these materials as possible. A trip to the museum or hosting a guest speaker from there is also planned for the information gathering aspects of this portion of the Unit. Which subtopics we research will in large be determined by each group of students, either as a whole or in small groups. If students choose to research different subtopics, then I will use Jigsaw activities to bring the information back to the group as a whole. The R.A.N. chart will be on large chart paper and posted for the duration of the Unit. These charts are used to organize our learning in progress. Conducting more research, and updating the chart and maps, is ongoing.

Essential Questions:

1. What is our current schema for our surrounding area (Pencader Hundred)?
2. How does our new learning confirm or refute aspects of our previous schema?
3. What new questions does this information create?

EQ 1) Define Pencader Hundred and utilize the smartboard to display a map of the region in both standard and satellite views. Record students' schema for the region on the "What We Think We Know" portion of the R.A.N. chart.

EQ 2) Read aloud *A History of the Iron Hill Area of Newark, Delaware* which was published through the Greater Newark Chamber of Congress and printed by the Graphic Art Students of Newark High in 1973. Using this particular text shows additional local ties and will also be a reason for another section of the Unit. Have students record their thoughts in their Unit journal. Revisit the R.A.N. chart and record findings in appropriate categories.

EQ 3) Students may work individually, partnered, or small group to determine new questions and desired research topics. Add this new information to the R.A.N. chart. Notations can be added to maps to indicate important locations relating to their research.

Science

Lesson 3 – Stewardship through Stream Monitoring (Multiple Sessions)

Remind students of the mission of the Izaak Walton League, explain that they will be participating in a Stream Monitoring program. Our program is with the Delaware Nature Society. Prior to introducing the program specifics, use the same maps from the Social Studies lesson, indicate the location of the nearby waterways and watershed. Referencing the historical use of those waterways and its impact at the time, have students discuss what they think has an impact on those waterways today. The Stream Monitoring

program is much like many similar ones across the country. The stream behind the school, Belltown Run, is immediately accessible for our monitoring activities but we will be expanding to Muddy Run and Sunset Lake as soon as possible. Muddy Run is actually accessible by foot through Glasgow Park but would be weather and chaperone contingent. Sunset Lake would require bus transportation. We will begin with Delaware Nature Society's Level 1 Stream Adoption. There are three portions to this level:

Stream Adopters can measure for:

- **Visual Survey:** Watch for signs of visible pollution including litter, water discoloration, discharging pipe
- **Water Chemistry:** Measure chemical parameters including temperature, pH, nitrate, oxygen
- **Macroinvertebrates:** Survey the aquatic insects, worms, and crustaceans that indicate the health of the water.

Stream Watch participants may complete any, or all measures, as all information collected is valuable.²⁵

In the initial implementation of the program I plan to have my students complete the first and third measures. Financing permitting, I would have Delaware Nature Society come out and present their instructional program, *Stream Investigation Classroom Outreach*. If able to do so I would then have the students monitor Water Chemistry, as well.

Essential Questions:

1. What do we notice about the condition of the Riparian and Stream Habitats?
2. How do the Riparian and Stream Habitats change throughout the year?
3. What indicators are present to determine stream health?

EQ 1) The immediate physical surroundings of the waterways are considered to be "Riparian Habitat". Surveying this area as well as the stream is the first measure of the program. Plan on a minimum of four surveys throughout the school year, but given the enthusiasm of the children it will probably be much more.

EQ 2) Students will record their survey observations including drawings or diagrams, in their Unit Journal. Changes should be noted and discussed in small, then whole, group. Questions that arise that cannot be answered by the teacher may be deferred to scientists through the Delaware Nature Society's website.

EQ 3) Define macroinvertebrates and their role in stream health. Utilize one of the identifying charts provided by Delaware Nature Society.²⁶ Conduct physical and visual searches for the macroinvertebrates and record that data. The compiled data leads into the Mathematical portion of the Unit.

Math

Lesson 4 – Quantifying and Qualifying Data (Multiple Sessions)

Data collection and analysis is an integral part of all mathematical curriculum. By nature, children begin surveying and collecting information in their earliest years. The data generated by the stream watch are used for environmental education, identifying areas of concern, and tracking how well different practices to protect and improve the rivers, streams, and bays are working.²⁷ There is actually a map of the area that specifies a collection site just up the road from our school, unfortunately the data available for this site is from 2010.²⁸ Even so, it will be interesting to compare our “Nearby” data. Not only will the students be collecting the data but that same data will be uploaded to the Delaware Department of Natural Resources and Environmental Control (DNREC) and the US Geological Survey.

Essential Questions:

1. How can we best record our data collection?
2. How does our data change over time?
3. How does our data compare to findings from other collection sites and times?
4. How can we share our data with larger agencies?

EQ 1) Develop with students a data collection table for recording quantitative findings from their surveys. Once data are compiled, begin a class graph to indicate any patterns or trends. This data collection should be done for each independent survey session but then compared across sessions. Students will be learning the proper format for both of these graphics.

EQ 2) Using their tables and graphs, have students discuss trends or patterns, and infer possible causes. Thoughts should be recorded in Unit Journal.

EQ 3) Share the data from nearby collection sites. Have students compare and contrast the data conducting the same analysis as they did for their own data.

EQ 4) Teach how to upload student findings to the Delaware Nature Society website.

Writing

Lesson 5 – Support and Sharing (Multiple Sessions)

This last section is comprised of a “during unit” activity and a “culminating” one. It is important from an early point in the Unit for the students to begin a letter writing campaign. The sharing of the Izaak Walton mission is a starting point for them to

consider who in the community could be their partners in stewardship. In keeping with this goal, the Izaak Walton League has information for reaching out to community businesses and even grant writing.²⁹ As mentioned previously, there are several local organizations already identified for contact, Siemens Corporation, Newark Anglers' Association, and the Pencader Heritage Area Association. There are many other possible contacts. Because there is no Izaak Walton League Chapter here in Delaware I have contacted them regarding the process of starting one.

Essential Questions:

1. How can we engage local organizations in our stewardship efforts?
2. How can we raise financial support for our Unit activities and stewardship?
3. How can we share our Unit experiences with others?

EQ 1) Teach students format of a formal business letter. Identify local organizations to contact and have students write letters explaining their stewardship efforts and requesting partnership in accessing and utilizing resources. Be sure give concrete reasons and examples.

EQ 2) Have students write letters to local agencies requesting contributions to financially support Unit activities such as field trips and guest speakers. Be specific about needs rather than requesting general monetary support.

EQ 3) Invite local organizations to participate in Unit activities whenever possible. Publish activities, findings and experiences in places that are accessible to the general public. Some suggested places are Classroom and School websites, local newspapers, other community buildings, events, or print materials.

There are multiple student publishing companies that allow students to create their own hardback books. As previously promised, there is a tie-in with the local Chamber of Commerce history book used in the Social Studies portion of the Unit and the culminating activity. There is an upper grade language arts activity that has students take a chapter book and turn it into a picture book following the storyline closely as possible. This process involves distilling the content to its essential meaning, sorting the wheat from the chafe. As a culminating activity students will go through a similar process to create a picture book for our local history and their stewardship activities. The cost of publishing is usually passed on to each student but would be another good activity for which to request funding. Another avenue to raise funds for this type of project could be through donorschoose.org. We will approach local libraries and museums, the Pencader Heritage Area Association and other community organizations requesting that they carry a copy. Scholastic books have sometimes even included student published books in their book fair offerings.

Appendix A

Common Core State Standards ELA-Literacy Informational Text

RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.

RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

RI.2.6 Identify the main purpose of a text, including what the author wants to answer, explain, or describe

RI.2.8 Describe how reasons support specific points the author makes in a text.

RI.2.9 Compare and contrast the most important points presented by two texts on the same topic.

Common Core State Standards ELA-Writing

W.2.2 Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.

W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.

W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).

Common Core State Standards ELA-Speaking and Listening

SL.2.1 Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups. a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). b. Build on others' talk in conversations by linking their comments to the remarks of others. c. Ask for clarification and further explanation as needed about the topics and texts under discussion.

SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

SL.2.3 Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.

Delaware State Social Studies Standards

History Standard Two: Students will gather, examine, and analyze historical data.

K-3: students will use artifacts and documents to gather information about the past.

History Standard Three: Students will interpret historical data.

K-3: students will understand that historical accounts are constructed by drawing logical inferences from artifacts and documents.

History Standard Four: Students will develop historical knowledge of major events and phenomena in world, United States, and Delaware history.

K-3: students will develop an awareness of major events and people in United States and Delaware history.

--Who lives here and how did they get here? (immigrants, demographics, ethnic and religious groups)

--Important people in our past

--Different kinds of communities in Delaware and the United States

Geography Standard Two: Students will develop a knowledge of the ways humans modify and respond to the natural environment.

K-3: students will distinguish different types of climate and landforms and explain why they occur.

Geography Standard Three: Students will develop an understand of the diversity of human culture and the unique nature of places.

K-3: students will identify types of human settlement, connections between settlements, and the types of activities found in each.

Next Generation Science Standards

2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats.

Common Core State Standards Math

MD 2.10 Represent and interpret data using picture and bar graphs.

¹ Professor Marjorie Swann, Editor of *The Compleat Angler*, 2014

² Izaak Walton League Member Pledge

³ Glasgow Park Trail Guide, March 2013

⁴ Friends of Glasgow Park Facebook Page, 2015

⁵ Izaak Walton League of America, About Us Website

⁶ Izaak Walton League of America, About Us, History-Mission

⁷ Izaak Walton League of America, Publications

⁸ Izaak Walton League of America, About Us

⁹ Izaak Walton League of America, Get Involved, Youth in the Outdoors Webinars

¹⁰ Professor Marjorie Swann, Editor of *The Compleat Angler*, 2014, Introduction, xx-xxi

¹¹ Izaak Walton, *The Compleat Angler*, 44-46

¹² Izaak Walton League of America, Youth in the Outdoors Webinars, Part One

¹³ Encyclopedia of World Biographies, Stephen Jay Gould, notablebiographies.com, Advameg, Inc 2015

¹⁴ John Bartley, "*Organisms – Adaptations for Survival in Aquatic Environments*", DTI Cycle #5

¹⁵ Encyclopedia of World Biographies, Stephen Jay Gould, notablebiographies.com, Advameg, Inc 2015

¹⁶ William Francis, "Introduction" *Along the Christina River (Images of America)*, 7-8

¹⁷ Keith Craig, "Pencader Heritage Area Association: Preserving Newark's Rich History", *In the News-Newark Life Magazine* Spring/Summer 2007

¹⁸ James Richardson Owens and James Owens, *A History of the Iron Hill Area Newark, Delaware*, 1-2

¹⁹ Judith Pfeiffer and Robert C. Barnes, "The Fate of the Forests", *A Guide to the History and Heritage of Pencader Hundred*

²⁰ David H. Pragoff, "Cooch-Dayett Mills: Discovering Delaware History Through Partnerships", *Bloggng Delaware History*

²¹ Izaak Walton, Richard Le Gallienne (Preface), *The Compleat Angler, 1897*, Reprinted 2009

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- ²² Izaak Walton League of America, About Us, History-Mission
²³ Tony Stead and Linda Hoyt, R.A.N. Chart, *Explorations in Nonfiction Writing*, Resources, 295-7
²⁴ Tony Stead and Linda Hoyt, R.A.N. Strategy, *Explorations in Nonfiction Writing*, Resources 297-305
²⁵ Delaware Nature Society, Stream Adoption, Get Involved
²⁶ Delaware Nature Society, Macroinvertebrates, Stream Watch Resource Sheets and Data
²⁷ Delaware Nature Society, Become a Technical Stream Monitor, Stream Watch,
²⁸ Delaware Nature Society, Christina Site CR6, Watershed Data
²⁹ Izaak Walton League of America, Get Help from IWLA, Get Involved

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of the first edition is a little less complicated than later versions. The language is a bit more student friendly. Preface by Richard Le Gallienne

Curriculum Unit Title

Keene Stream Team: Stewardship, Streams, and Stories

Author

Jennifer L. Frasher

KEY LEARNING, ENDURING UNDERSTANDING, ETC.

Students will develop working knowledge and become stewards of their local resources by: participating in collaborative conversations with diverse partners on these topics and texts with peers and adults in small and larger groups; recounting or describing key ideas or details from field experiences; telling a story or recounting an experience with appropriate facts and relevant, descriptive details, orally and in writing..

ESSENTIAL QUESTION(S) for the UNIT

What is the importance of local history?
How can I become a steward of my local resources?
How can I engage other parties to contribute financially, and otherwise, in local resources by becoming vested partners?
How can I share my stories and stewardship with others?

READING - ESSENTIAL QUESTIONS

What is the focus of the fiction and non-fiction texts?
How does the focus of the two texts compare and contrast?
How do these ideas connect to us in present times?

VOCABULARY A

Stewardship, Compare, Contrast, possibly clarification of old English terms to present day.

SOCIAL STUDIES - ESSENTIAL QUESTIONS

What is our current schema for our surrounding area (Pencader Hundred)?
How does our new learning confirm or refute aspects of our previous schema?
What new questions does this information create?

VOCABULARY B

Misconception, Confirm, Pencader, Hundred, Schema, Resources

SCIENCE - ESSENTIAL QUESTIONS

What do we notice about the condition of the Riparian and Stream Habitats?
How do the Riparian and Stream Habitats change throughout the year?
What indicators are present to determine stream health?

VOCABULARY C

Habitat, Riparian, Macroinvertebrate

MATH - ESSENTIAL QUESTIONS

How can we best record our data collection?
How does our data change over time?
How does our data compare to findings from other collection sites and times?
How can we share our data with larger agencies?

VOCABULARY D

Data, Collection, Survey, Agency

ESSENTIAL QUESTIONS

How can we engage local organizations in our stewardship efforts?
How can we raise financial support for our Unit activities and stewardship?
How can we share our Unit experiences with others?

VOCABULARY E

Sponsor, Financial, Partnership, Fundraising, Grant

ADDITIONAL INFORMATION/MATERIAL/TEXT/FILM/RESOURCES

Walton, Izaak, and Richard Le Gallienne. *The Compleat Angler, Or The Contemplative Man's Recreation*. Reprint of the First ed. Seven Treasures Publications, 2009., Owen, James Richardson, and James Owen. *A History of the Iron Hill Area Newark, Delaware*. Newark, Delaware: Greater Newark Chamber of Commerce, 1973., Other resources through local museums, R.A.N. Chart (Utilize own local resources for adaptation)