The Curriculum:

Water is one of the most important resources in our daily lives - without it we cannot live. In fact, this is true for every form of life on our planet. Water is the basis for all civilizations and cultures, and has been honored in nearly every form of ritual and celebration. Water has also been inspirational in the music world. It has taken center stage for musical numbers in virtually every style and during every age. The Sinfonia's program highlights some of these masterpieces, and integrates the music into the concept of water's importance to life.

Following are individual state mandated science benchmarks that can be supported by the enclosed activities, all of which are geared for grades K-6, and the relationships to the music content of this program. Several of the music works also help to support other standards -Dvorak for literature, Handel, Mendelssohn and Still for geography, and science- but to keep this curriculum manageable, those are not included. And finally, there are additional classroom activities listed at the end of this guide that augment the effectiveness of this program.

Kindergarten benchmark: 3.3.2.1 Monitor daily and seasonal changes in weather and summarize the changes.

Activity: Create a daily calendar, and note different changes in the weather. Is the day sunny, cloudy, hot, cold, wet or dry? When does it rain – when the sun is out and no clouds are in the sky, or when the sky is cloudy and you can't see the sky? How would the children use music to describe these different variations - ie pretty music for nice sunny days, fast and loud music for storms, etc.

Project WET Activity Suggestion: *The Thunderstorm* (page 196 in WET 1.0 Guide or page 209 in new WET 2.0 Guide) Students simulate the sounds of a thunderstorm through physical activity.

Music relationship: Storm scene from Beethoven's Sixth Symphony. Listen for the loud rolling sounds – thunder; the hard attacks in the strings and percussion – thunder claps; and the quiet and calming sounds of the clarinet at the end, which signifies the aftermath of the storm, and the sun appearing.

Grade I benchmark: 1.4.2.1.1 Recognize that animals need space, water, food, shelter and air

Activity: Start a discussion of what is living and what is non-living, and their needs for survival. For instance, are rocks alive or not? If alive, what do they need to stay alive, and if they (or what ever is chosen is) are not alive, why not? Then compare to animals – let's say a duckling…

Project WET Activity Suggestion: *The Life Box* (page 76 in WET 1.0 Guide or page 69 in new WET 2.0 Guide) Students create life boxes that contain the four necessities for living things: water, soil, sunlight, air.)

Music relationship: *The Ugly Duckling.* All of the ducklings started out as eggs – they needed the mother to sit on them and keep a constant temperature so they can hatch. As ducklings, they

needed to learn how to swim to survive. When the hunter captured Grezango, he almost became a Sunday dinner – food for the hunter's family. When he grew up, he became a swan, and lived on the water.

Grade II benchmark: 2.2.1.2.1 Observe, record and recognize that water can be a solid or a liquid and can change from one state to another.

Activity: Put water in a paper cup and place it in a freezer. What happens? Take the frozen water, and lay it on a cafeteria tray (with sides), and watch it melt. A variation on this activity is to create different frozen layers of ice. First put a small layer of water in a cup and freeze it. Next place the same amount of water that has been colored with food coloring on top of the "iced" water, and put the cup back in the freezer. Do this several times, each time with a different food coloring, so that you have a multi layered ice cup. Put the frozen ice on a cafeteria tray, and notice the way the ice melts. Which section of the ice melts first? What does this tell us (ice melts from the outside layers to the core).

Another activity is to partially freeze water, and put objects in the water, first before it freezes, then when it is only partly frozen, and see how it is more difficult to move the object. Why?
Music relationship: *The Ugly Duckling.* The duckling (Grezango) was frozen into the pond, and could not move or run away from danger, thereby making it easy for the hunter to catch him.

Grade III benchmark: 3.4.3.2.1 Give examples of likenesses between adults and offspring in plants and animals that can be inherited or acquired.

Resources:
http://mlbean.byu.edu/Portals/26/docs/Animal%20Scramble%20babies%20and%20adult.pdf

Activity: Take/assembly pictures of young birds, and older birds of similar and different species, and take/assemble pictures of young and old dogs, cats or other animals. Ask the children to match up which young animals go with their older counterparts. And then question if young dogs can be matched to older birds, etc.

Music relationship: *The Ugly Duckling.* When Grezango hatched, did he look like the other ducklings? Could he really have been related to the mother and the other ducklings?

Grade IV benchmark: 4.3.4.1.1 Describe how the methods people utilize to obtain and use water in their homes and communities can affect water supply and quality.

Activity: Use the *Water, Water Everywhere* kit in the Engineering is Elementary activities to create a water clarification/cleaning system [this can also be used for a grade VI activity].

Suggestion: *Water Ways: A Minnesota Water Primer and Project WET Companion* book that's available in paper or online. The Water at Home section on pp 71-73 is a perfect match for this benchmark and often really helpful information for teachers. There are activity starter ideas and walking field trip ideas at the end of each chapter as well.

Music relationship: *The Ugly Duckling.* If the water is not safe, Grezango and the other ducks could not live in the ponds.

Benchmark 4.1.2.2.1 Identify and investigates a design solution and describe how it was used to solve an everyday problem.

Activity: Study the need and creation of the Panama Canal, and explain how it affected everyday life in Panama and around the world.

Music relationship: William Grant Still's arrangement of the *Mejorana y Socavon* from the *Danzas de Panama.*

Grade V benchmark: 5.2.2.1.3 Demonstrate that a greater force on an object can produce a greater change in motion.

Activity: Create a "lake" or river [put water in a big baking pan with sides] and let the water sit, so that it is still. Then take an electric fan, set it on low, and let it blow across the water. Notice the waves. Then put the fan on high, and notice that the waves are larger.

Next, create a lightweight boat made out of a paper [http://www.wikihow.com/Make-a-Paper-Boat] or [http://www.highhopes.com/maverickboats.html], or [http://www.allparenting.com/my-family/articles/962169/how-to-make-a-paper-boat-craft].

Place the boat on the still water. Then put the fan on low blowing on the water (not the boat). Notice what happens to the water and the boat. Next put the fan on high (again, blowing on the water). Now what happens to the boat? Why???

Benchmark 5.3.1.2.2: Explain how slow processes, such as water erosion, and rapid processes such as landslides and volcanic eruptions, form features of the Earth's surface.

Activity: Study the pictures and history of Fingal's cave, and determine how it developed into what it is today. Pictures can be found at

[http://www.google.com/search?q=fingal's+cave&hl=en&client=safari&rls=en&prmd=imvns&tbm=isch&tbo=u&source=univ&sa=X&ei=wP4oUOHXLuHUygHTvIGYCA&ved=0CEkQsAQ&biw=1406&bih=925] Will!1894-

Music relationship: Mendelssohn's Fingal's Cave – note the musical depiction of a storm scene – the loud fast ferocious section.

Grade VI benchmark: 6.1.2.1.1 Identify a common engineered system and evaluate its impact on the daily life of humans

Activity: Study the need and creation of the Panama Canal, and explain how it affected everyday life in Panama and around the world.

Music relationship: William Grant Still's arrangement of the *Mejorana y Socavon* from the *Danzas de Panama.*

Grade VII benchmark: 7.1.1.2.3 Generate a scientific conclusion from an investigation, clearly distinguishing between results (evidence) and conclusions (explanation).

Activity: Create a water filtration system, and put in different colors of water (use food coloring), and then different types of contaminants. First, create an hypothesi as to what will happen to the water and why. Investigate the process, and see/determine how the water changes. Even though the water may be clear, do not drink it. There still may be contimanants.

Music relationship: Clean and drinkable water is necessary for the sustainance of life. So in a real sense, much of the music from this program, indirectly relates to this activity. For the Handel *Hornpipe,* if the sea was too dirty, the boats could not go out to fish, and people would not have work or food to eat. Beethoven's Sixth Symphony is all about nature, and as the thunderstorm scene's music ends, Beethoven created a musical picture of calm and purity (the storm brings fresh water to the forest). In *The Ugly Duckling,* Grezango and the other ducks and swans needed clean water to live in.

Grade VIII benchmark: 8.1.3.3.1 Explain how scientific laws and engineering principles, as well as economic, political, social, and ethical expectations, must be taken into account in designing engineering solutions or conducting scientific investigations.

Activity: Study the history and politics of building the Panama Canal, and extend those studies to when the Canal was turned over from the US control to Panama.

Music relationship: William Grant Still's arrangement of the *Mejorana y Socavon* from the *Danzas de Panama.*

Background Information and Additional suggested projects to be chosen at Teacher's discression:

Water: Where is it?
This study can begin with the axiom, "All there is, is all there is." The amount of water on our planet is constant, and it is simply recycled over and over. Just because the number of people and the need for water is increasing, does not mean that more water is or can be created (source: Earth•Works Groups *50 Simple Things You Can Do To Save The Earth*, copyright 1989). In fact, although the amount of water on Earth is constant, much of it is unavailable for daily uses because it's saltwater in the oceans, frozen in ice caps and glaciers, too deep or expensive to pump from underground, too polluted to use and unevenly distributed throughout the world. Even though water is a renewable resource, for practical purposes it acts like a non-renewable resource. Impacts on water plus a larger global population means less clean water available to use.

We live in the state of Minnesota, the city of St. Paul/Minneapolis and the Mississippi Watershed. A watershed is an area of land drained by a river and its tributaries to a common water body like a larger river, lake, wetland or ocean. Our school is located in the "*Mississippi Watershed Management Organization's* District."

Minnesota Sinfonia Music in the Schools 2016 -2017
Water – One of Our Most Precious Resource

Water travels both above and below ground through our community and watershed as it flows to the Gulf of Mexico. It goes through forests, farmlands, and cities providing drinking water to plants, animals and ourselves, but it also picks up contaminants that are carried and deposited along the way. These contaminants are also known as non-point source pollution and make up approximately 86% of Minnesota's water pollution, threatening the health and wellbeing of all living things.

Before we talk about the various sources of water, we need to emphasize just how important water is to us in our daily lives.
The human body is approximately 65% water. Water helps our bodies transport nutrients, remove waste, regulate our temperature, lubricates organs/bones/joints, helps builds hormones and enzymes. Milk is 95% water. An orange is 85% water. Bread is 30% water. A steak is 73% water. An elephant is 70% water. People can only live 3-5 days without water and need about 2.5 quarts of water a day! (source: World Book's Young Scientist).

Project WET Activity Suggestion: *Aqua Bodies* (page 63 in WET 1.0 Guide or page 45 in new WET 2.0 Guide) Students demonstrate how much of their bodies are composed of water, where water is found within their bodies, and the functions of water in their bodies.

Project WET Activity Suggestion: *Aqua Notes* (page 66 in WET 1.0 Guide or page 51 in new WET 2.0 Guide) While singing simple, fun songs about water in the body, students gain an appreciation for the many ways they need water.

We need to rely on fresh water sources
Of the 3% of the water left on earth that is fresh (translates into drinkable), most of it (66%) is in the form of the polar ice caps and glaciers. Because of cost and practicality, this water is not available for everyday use. Consequently, the remaining little bit of water we use comes from rain, snow, lakes, rivers, 90% of which is underground (source: *50 Simple Things You Can Do To Save The Earth*)

Project WET Activity Suggestion: *A Drop in the Bucket* (page 238 in WET 1.0 Guide or page 257 in new WET 2.0 Guide) Students estimate the percentage of fresh water available for human use.

Activity: Fill a five-gallon container with water. Remove 1 cup - this represents the amount of water in the ice caps. Next, remove 1 tablespoon that represents the amount of ground water. Remove 1 teaspoon - this represents the amount in the lakes. Remove 1 more teaspoon - this represents the amount in rivers. Remove a tiny pinch - this represents what is in the atmosphere - the rain and snow. The remaining water represents the oceans (source: DNR).

Most of the earth's water is in the ocean (97% - source World Book's *Young Scientist)*, and is not drinkable because of the salt content.

Activity: Fill a container with fresh tap water, and add 3-4 teaspoons of salt (which makes it similar to the ocean water). See how many children enjoy drinking it.

Salt water can be made into fresh water, but it is very expensive. It takes a lot of energy to remove the salt from the water, and the salt corrodes (destroys) the machinery, so the machinery has to be repaired and/or replaced quite frequently.

The Water Cycle
Most of the fresh water we see is in the form of lakes, rivers, wetlands, snow and rain. The students should learn about the water cycle, and how water in oceans, lakes and rivers, evaporates from the sun's heat, rises, is moved about in the cooling air, and eventually becomes so dense (as it cools), that it falls back to earth either as rain, or if it is cold enough, sleet or snow.

Experiment: Create a water cycle - how does it work?
1. Put 2 cupfuls of water in a jar. 2. Cover the jar with a plastic wrap, and fasten it with a rubber band. 3. Place the jar in a sunny place. 4. Observe the jar every hour during the day. 5. Place an ice cube on the plastic wrap. 6. Observe the jar until the ice cube melts.

Questions: What did you observe in step 4? Step 6? How is this model like the water cycle? (source: Addison-Wesley Publishing House *Science* copyright 1983).

Project WET Activity Suggestion: *The Incredible Journey* (page 161 in WET 1.0 Guide or page 155 in new WET 2.0 Guide) Students roll giant dice and move through a mini water cycle as drops of water to learn how water moves around the Earth.

How Much Water Pollution?
When scientists talk of water pollution, they often talk in parts per million or parts per billion. How many drops of pollutants can be found in a million drops of water? To children (and even adults), this measurement may seem inconsequential. To change this perception, try this with your students.

Activity: Take six small glass jars. In the first, add nine teaspoons of water, and one teaspoon of dark food coloring. We have created a glass with the measurement equivalent of one part per ten. In the next glass, put nine new teaspoons of water and add one teaspoon from the first glass. We have now created a glass with one part per hundred. In the third glass, place nine teaspoons of water, and add one teaspoon from the second glass. We have now created a glass with one part per thousand. Continue in this fashion (the fourth glass will be 1 part per 10,000; the 5th glass will be 1 part per 100,000 and the 6th glass will be 1 part per million). Have the children note that the color changes in the glasses. How far along can they still notice the color changes? Stress that this experiment is only visual, and that chemicals and other dangerous substances are much smaller and cannot be seen by the human eye.

This is a link to a list of the chemical pollutants in our water:
http://water.epa.gov/drink/contaminants/index.cfm

Project WET Activity Suggestion: *Reaching your Limits* (page 344 in WET 1.0 Guide or page 371 in new WET 2.0 Guide) By playing a game of limbo, students gain a better understanding of the effort involved in meeting drinking water quality standards.

Water purification
How is the water we drink purified? Create your own filtering system

Experiment: Cut off the bottom of a 1/2 gallon plastic milk container. Push some absorbent cotton into the neck opening. Turn the bottle upside down so that the neck drains into a glass jar. Fill the bottle first with an inch of small pebbles, then an inch of gravel, then another inch of sand. Pour one cup of water into a different container, and then mix in two tablespoons of dirt. Stir well, and then pour this mixture into the filter bottle that you created. Watch the water/dirt mixture as it pours through the sand, pebbles, etc. What happens when the water finally drains into the glass jar? **Even though this water may look clean, do not drink it - remember the parts per million experiment above**. (source: *Young Scientist*).

Water is far too important to waste. What can we do as individuals to lower our personal water waste and pollution? The students should be encouraged to discover on their own (with your direction) what the pollution problems and solutions are, and to think of ways to improve their own water conservation. You can help them by starting the list with the following:

• When brushing your teeth, first wet the toothbrush, then turn off the water while you brush - turn the water back on, only as you need it.
• Use a water-saving shower head.
• Throw waste products into garbage bins so that they do not end up on the ground and then into our lakes, rivers and oceans
• Recycle paper products, etc.
All of the source materials used for this guide are geared for elementary school age children.

Other resources include:
• Water Water Everywhere published by the city of Minneapolis (2005), tel. 612 661 4999
• 50 Simple Things Kids Can Do To Save The Earth (copyright 1990)
• Ecology and Pollution (copyright 1973 by Children's Press)
• Our Endangered Planet Groundwater (Hoff and Rodgers, Lerner Pub)
• Going Green A Kid's Handbook to Saving the Planet (Elkington, Hailes Hill and Makower, Viking Press)
• Science in Action Water, Water! (Johnston published by Gareth Stevens, Milwaukee)
• The Magic School Bus (Cole published by Scholastics)
• Berenstain Bears Don't Pollute (Berenstains published by Random House)
Web site addresses:
http://ga.water.usgs.gov.edu U.S. Geological Survey's (USGS) Water Science for Schools web site
www.epa.gov/owow/nps/kids EPA kids' site
www.kidsface.org/ Kids for a Clean Environment
www.projectwet.org Water education for educators and young people ages 5-18
www.ci.phoenix.az.us/WATER/watermen.html Water info for kids
Google "water information for kids"
Google "water pollution"