

WELCOME!

Effective Training: Useful
Methodology from the
Earth to Sky Partnership

*National Interpreters Workshop Denver, CO
November 2014*

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National Interpreters Workshop: A Self Assessment of Knowledge and Skills

Please assess your knowledge or ability to apply the learning goals identified below using the following legend:

- 1 = Knowledge or ability to apply is non existent
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PRIOR TO SESSION					Workshop Session, November 2014 Knowledge/Skills	FOLLOWING SESSION				
1	2	3	4	5	LEARNING GOALS	1	2	3	4	5
					Knowledge of reflection in the learning process					
					Ability to apply best practices of professional development (PD)					
					Knowledge of best practices in PD design					
					Knowledge of "authentic" work time					
					Ability to apply the 40/60 rule in PD design					

Earth to Sky Partnership

*connecting the wonders of science
with the power of place*



What is “Earth to Sky?”

- ✦ Unique Inter-Agency Partnership
- ✦ Professional Development for Informal and Environmental Educators
- ✦ Community of Practice

<http://www.earthtosky.org>

Earth to Sky Partners

*ETS began in 2004 with NPS and NASA; USFWS joined in 2008
NOAA in 2013*



Connecting the Wonders of Science with the Power of Place



The connection between NASA's big picture, global perspective and place-based experiences provides powerful opportunities for meaningful learning.

ETS is the Only Interagency Partnership addressing Informal Educators and Climate Change

USFWS and NPS *place*

- 330 MILLION visits per year
- Access to and expertise with diverse audiences
- Powerful linkage to meaningful stories; tangible connections to human experiences
- Expert, effective educators (interpretation methodology)
- Very high approval rating (96% of visitors)
- Staff time and training center resources

NASA | NOAA *science*

- Global view that helps provide context for site-specific information
- Concrete, highly respected, relevant science
- Incredible visual resources; Office of Communications products
- Wide array of educational products and programs
- Scientists, education and communication staff
- Staff position at NASA

Conduct Professional Development Nurture a Community of Practice

✧ Purpose

- Train educators
- Foster collaborative work (scientists & educators)
- Enrich the experiences of visitors

✧ Activities:

- Five Day Face-to-Face Course
- Regionally focused blended learning
- E-Course
- Webinars
- Conference Presentations and Workshops

✧ Primary Audience:

- Informal/Environmental Educators
- Education/Outreach Specialists
- Public Affairs Specialists



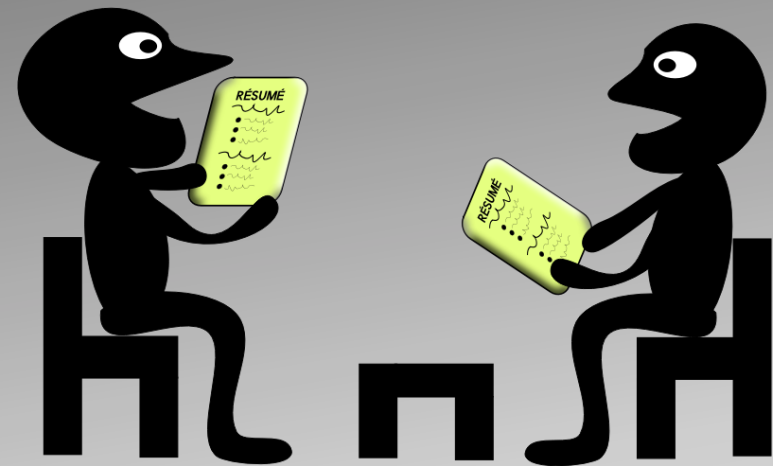
- Website <http://www.earthtosky.org>
- Listserv (500 members)
- Facebook Group
<https://www.facebook.com/groups/274560916051139/>

Session Agenda

- Ice Breaker
- Experience in the Room
- Results from Successful Training
- Your Task!
- Using Best Practices from ETS
- Reflection Time
- The Authentic Task Illustrated
- Feedback

Ice Breaker

1. Where are you from? (or where do you work?)
2. What was your favorite training ever, and the main reason why
3. Who is the audience for the training you expect to give within the next year?



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Evaluation Metrics

Over 4 million visitors to National Parks and Wildlife Refuges Reached

2004-2013 Earth to Sky

- Conducted 6 week-long courses
- Hosted 75 NASA scientist presenters
- Presented 100 NASA science sessions
- Trained Educators:
 - ✧ 135 participants in week-long face to face courses
 - ✧ 35 participants in one and two day workshops at professional conferences
 - ✧ Over 535 educators via distance learning and sessions at conferences, in a variety of subjects, including climate science, and best practices in science communication
- Shared the ETS training model internally and externally so others can replicate similar efforts.



Alumni become Trainers



Jr. Ranger Day Camp at Rock Creek; demonstrated at ETS IV by Ranger Ron Harvey

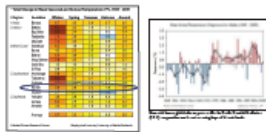
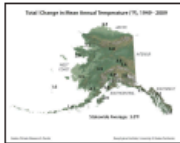
Connecting the Wonders of Science with the Power of Place

Changing Landscapes

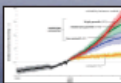
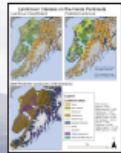
What the future holds for the Kenai and its residents



Global Temperatures on the rise:
Alaska temperature records show an increase of 3-5°
over the past 60 years.



What does this mean to the land?
A warmer, drier Kenai means the plant and animal communities are under new pressure. Insects like spruce bark beetles, species of moose and other species adapted to warmer temperatures, and the loss of habitat types.



Shrinking Lakes

Causing wetlands to disappear

Scientists have calculated a 60% decrease in available water on the Kenai National Wildlife Refuge.

This means there is less moisture to feed the muskrats, beaver ponds and predators allowing woody plants to crowd out their drying wetlands.

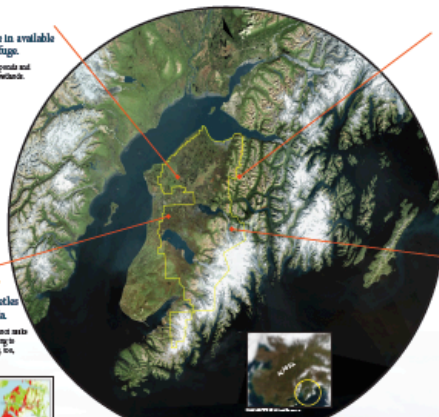


Forest Dynamics

Shifting beetle and fire frequency

Warmer summers allow Spruce Bark Beetles to reproduce rapidly across the Peninsula.

Through increased tree mortality, White and Silver spruce cannot compete as well as they once did, leading to an increased fire risk. Wildlife regimes are changing too, with more changing species with wildfire burning as a result.



Kenai Peninsula in Southcentral Alaska
CAVETS AT image a view map of Alaska

Rising Treeline

Alpine species feeling the pinch

Treelines on the Peninsula is rising as spruce and hemlock grow into previously unforested mountain terrain.

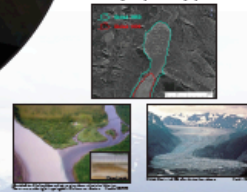
These changes are threatening us with the Old-Sung and Snow-Birds that live in cold-alpine habitat.



Glacial Retreat

Shrinking ice age remnants

The accelerated glacial melt is lowering and removing the available plants and food sources for developing habitats by decreasing the depth that wildlife penetrates into the water.



Predictive Models offer a choice:



The Kenai Peninsula might see up to a new landscape shift over the next century in the worst case scenario. Peninsula biomass could see a 50% change. The Forest Forest could become grassland and within the present day Alaska Wildlife or California Forest the future of the future security.

What you can do:

On The Refuge

Protect the land from Invasives:

Non-native plants and animals can harm the Peninsula by taking over the land. Invasive plants and animals can spread throughout the Peninsula. You can help control the invasion by not bringing in plants and animals from other areas and helping your vehicle clean when you return Alaska.

Don't Cut Down Trees for Campfires:

Long-term carbon dioxide in major forests can be damaged and provide critical habitat on the Refuge. Help your great-grandchildren's future by not cutting down trees for campfires. Instead, use a camp stove or a reducing campfire to the Denali State Lake Camp System.

At Your Home

Conserve energy:

Turn off lights, use efficient bulbs, unplug power cords when not in use and drive less. All these activities reduce the amount of greenhouse gases released to the atmosphere.

Plant natives:

Planting native plant species in your yard and garden.

These native plants will give you a great habitat in your yard and garden.

Encourage others to do the same!

Talk to your family, friends and neighbors about these activities.





Changing Landscapes of the Kenai NW Refuge

A GPM-Earth to Sky Collaborative Effort



Kenai NWR, in southcentral Alaska is 2 million acres of diverse habitats supporting over 1000 species of flora and fauna.



Supported by the GPM mission:
<http://pmm.nasa.gov/GPM>

- **Status (3/24/14):** *In progress with expected date of completion: Winter 2014*
- **Product:** interpretive program
- **Audience:** Families, general public visiting Refuge
- **Thematic Statement:** Climate changes are visible on the Kenai Peninsula in southcentral Alaska. Citizen science observations of weather, seasonal change will contribute to hands-on exploration of weather and climate by visitors to the Kenai National Wildlife Refuge.
- **Measurable Objectives:** 100 visitors will participate in weather monitoring interpretive programs in 2015.
- **Technique:** citizen science investigation
- **Brief Description:** Newly installed weather station at the Refuge Visitor Center supports citizen science investigations into weather and climate. Guided walks will incorporate these observations to further explain climatic change and impacts to the ecosystem.
- **Timeline to Complete:** Delays in new Visitor Center construction have pushed the completion date to this winter, but the weather station is installed and data collection software/process is being piloted this summer.
- **NASA Resources Used:** www.gpm.nasa.gov, climate.nasa.gov

For more Information: Leah Eskelin, 907-260-2811, leah_eskelin@fws.gov



Expansion of “Adopt-a-Phenology Plot” project in Great Smoky Mountains National Park

A GPM-Earth to Sky Collaborative Effort



Two students collect tree circumference data while monitoring trees during a field trip.



Two volunteers learn how to monitor tree phenology

- **Status** (3/24/14): **complete** but the project is on-going since it is long-term monitoring
- **Product:** support materials for an on-going citizen science project involving students and community volunteers
- **Audience:** middle & high school students, adults
- **Thematic Statement:** Monitoring phenology is a way to notice subtle changes in our ecosystem due to climate change.
- **Measurable Objectives:** 2,000 students, teachers and volunteers will participate in phenology monitoring in the Smokies in 2013.
- **Technique:** citizen science monitoring of tree phenology, weather measurements in plots & fog monitors
- **Brief Description:** GRSM will expand its phenology monitoring sites in the park used in curriculum based education and “Adopt-a-Phenology Plot” programs. This will include support materials for the new plots and weather monitoring equipment.
- **Timeline to Complete:** Project was completed during the summer of 2013 – materials purchased, 6 new sites set up and equipment distributed to volunteers.
- **NASA Resources Used:** Climate change website, scientist expertise, Earth to Sky website, Landsat images

Supported by the GPM mission:
<http://pmm.nasa.gov/GPM>

For more Information: [Susan Sachs, susan_sachs@nps.gov](mailto:susan_sachs@nps.gov)



Expansion of “Adopt-a-Phenology Plot” project in Great Smoky Mountains National Park.

A GPM-Earth to Sky Collaborative Effort



Two girls measure a salamander during a phenology field trip.



Students collect terrestrial invertebrates as part of a phenology monitoring field trip.

- **Measurable Objective(s)** We had 3,000 students participate in phenology monitoring programs in 2013 and have 86 volunteers who have adopted phenology plots to monitor.
- **Evidence of Achieving Objectives:** Statistics for our school programs and volunteer training workshops.
- **Evidence of Impact on Audience:** We evaluate each education program for its impacts on students via a teacher questionnaire. We consistently receive high ratings for our phenology programs which include trees, salamanders and terrestrial invertebrates.
- **Unintended impacts:** The phenology monitoring project for students and community volunteers has been very popular with other educators who are struggling to connect people directly with climate change in areas where impacts are subtle. We have been interviewed by several national news outlets and have been part of two NPS videos on how to connect the public with the issue of climate change.
- **Anecdotes (stories) about impact on individuals:** We see a light bulb go off for many people (both young and old) when they understand that earlier springs mean more than just flowers blooming but it impacts the entire ecosystem. This may mean that some species lose their synchronicity with one another and that can create layers of impacts.
- **Spinoffs, partnerships, other impacts:** This project is still growing. This summer we are starting a spin-off project with Montreat College to offer 6 one-week phenology monitoring science camps in the park for high school students. Monitoring will occur along the Appalachian Trail in the Smokies and is part of the National Phenology Networks AT Seasons monitoring study.

Limiting Impacts of Climate Change

National Park Service
U.S. Department of the Interior

If I Could Change the World...

We already have, but...

There is little scientific doubt that most of the temperature increases since the mid 20th century are due to greenhouse gases produced by human activities. Shifting climate now will diminish the risks associated with climate change and reduce the likelihood of catastrophic and far more expensive consequences.

...We CAN make a difference. Look at the possibilities!

In the park...

1. Upgrade energy systems to use renewable energy sources.
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At home...

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A way to make environmental problems appear to be less daunting is to relate them to our community and convey their relevance to our daily lives - as they unquestionably are relevant. - Gayford Nelson (former Wisconsin Governor and U.S. Senator)

Climate Change in National Parks

National Park Service
U.S. Department of the Interior

U.S. Fish & Wildlife Service

Alaska's Changing Climate
Arctic National Wildlife Refuge

An Extreme Environment

The Arctic has a complex climate characterized by little sunlight in winter, long summer days, strong winds, low temperatures, and little rainfall. Ice—present as snow, ice sheets, glaciers, sea ice, and permafrost—is a prominent feature and is sensitive to small temperature increases.

The climate throughout the Arctic varies widely from place to place, across the seasons, and from year to year. As a result, there are a number of regional arctic climates, each supporting specific combinations of animals and plants.

Evidence of a Warming Climate

Increasing temperatures, melting glaciers, reduced surface area and thickness of sea ice, thawing permafrost, and rising sea level are all indications of warming throughout the Arctic. Available data from Alaska and western Canada indicate that winter temperatures in this area have increased as much as 5 to 7°F in the past 50 years.

Although the amounts of snow and rain are hard to assess in cold, windy environments, it appears that precipitation has increased across the Arctic by about 3% over the past 100 years, with much of the increase occurring as rain-on-snow during the winter. Snow-covered areas have decreased by about 10% over the past 30 years, with the most significant decreases occurring in April and May. Permafrost temperatures in boreholes within the Arctic Refuge were up to 5°F warmer in 2004 than they were in 1955.

A Wild and Vulnerable Place

The Arctic Refuge contains undisturbed lands ranging north to south across five different ecological zones: lagoons, beaches, and salt marshes in coastal

Monitoring Climate Changes and Impacts

Refuge researchers, along with other agencies and scientists, are studying the

impacts of global climate change within the Arctic Refuge. Some early findings from these ongoing studies include:

- Sea ice has thinned and decreased in extent. Shorefast ice tends to form later in fall. In September 2007, the extent and concentration of sea ice in the Arctic Ocean was significantly less than ever previously recorded. Although total area of ice was slightly greater in September 2008, volume of ice continued to decline because of thinning.
- Coastal erosion within the Refuge east of Kaktovik averaged 1.6 feet per year between 1945 and 2001, based on repeat aerial photography. This is less than the rates of up to 8 feet per year measured by the same methods in areas east and west outside of the Refuge.
- Pregnant polar bears increasingly select land over sea ice for denning, possibly because of deteriorating sea-ice conditions.
- Polar bears have drowned in unusually large expanses of open water, and have been found dead in emaciated condition.
- Recent incidents of cannibalism among polar bears may be due to the nutritional stresses related to longer ice-free seasons.

For example, shorebirds and waterfowl use river deltas, barrier islands, lagoons, and other coastal areas for nesting and staging. These areas are vulnerable to the predicted effects of climate change such as flooding as a consequence of rising sea levels, and increased storm surges resulting from increases in both storminess and open water. A variety of research projects are being undertaken to help determine additional climate-change effects on Refuge wildlife species and their habitats.

A hermit polar bear with her cub with the Arctic Slope. The polar bear was fed on bread in May of 1980 due to a lack of sea ice habitat.

One of four new exhibit panels at Apostle Islands National Lakeshore Visitor Center.

450,000 of these brochures have been distributed in parks around the US.

Flyer on climate change impacts at Arctic National Wildlife Refuge.



Personal Interpretation
explains effects of climate
change in Refuges and Parks

Arrange for Change

CHANGE has made some a century's worth of nature. National Park Service has been an extraordinary part of our nation's history.

Climate Change is Happening

Recent trends and large-scale observations of melting have increased the risk of global climate change. The National Park Service is working to help visitors understand the science of climate change and the impact of human activities on the environment.

Changes Disrupt Park Use

Human activities are changing the way we use parks. The National Park Service is working to help visitors understand the science of climate change and the impact of human activities on the environment.

There is Much We Can Do

There are many things we can do to help reduce our carbon footprint. The National Park Service is working to help visitors understand the science of climate change and the impact of human activities on the environment.

The National Park Service is already working to respond to these changes. How will you arrange for change?

We are at this moment participating in one of the very greatest leaps of the human spirit to a knowledge not only of outside nature but also of our own deep inward mystery.
- Joseph Campbell (1904-1987)

Traveling exhibits showcased at
National Parks and training venues
throughout the US.



WebRanger Climate Change Activity *Investigating Global Connections* for grade school level. 4,900 registered WebRangers have completed this activity. Two more under development.

www.webrangers.us/activities/climate



Outdoor Exhibit at Crissy Field, Golden Gate NRA - depicts predicted sea level rise, received front page coverage in San Francisco Chronicle. Duplicate exhibits under development.

Improving Science Communication



<http://www.youtube.com/watch?v=uStoBFtjy8U>

2nd version (animated) <http://geeked.gsfc.nasa.gov/?cat=170>

Dr. Peter Griffith, founding director of NASA's Carbon Cycle & Ecosystems Office

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Best Practices for Effective Professional Development* ~ A Planning Tool ~

Your commitment to these principles will help you create training opportunities that promote change or growth, reach clear outcomes, and help people develop new relationships.

1. Establish and share clear outcomes

What are the goals and objectives of your training session?

List the ways you will help participants to know where they are within the training process

2. Design and list activities you will use to engage all participants

How will you provide for varied learning styles? How will you ensure that all participants are involved in learning?

3. Model effective learning processes and environments: Make sure participants are learning by being engaged in the process (model good interpretive technique if you are teaching interpretation)

4. Establish clear roles

- List who is involved in the training/workshop/task and their primary role(s)

- State the task you wish your participants to accomplish

- What method(s) will you use to remind participants of their responsibility for achieving the task as appropriate/needed

Earth to Sky Contacts:

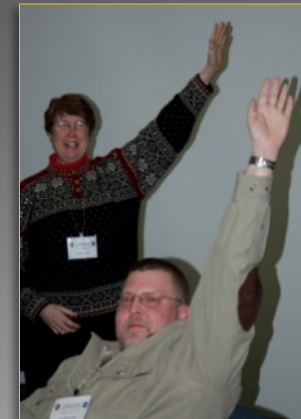
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Use Best Practices for Professional Development

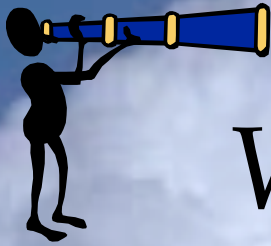
1. Establish & share clear expectations
2. Design activities to engage all participants
3. Model effective learning processes
4. Establish clear roles
5. Have participants take responsibility
6. Connect with participant's own work
7. Provide time to do "authentic" work
8. Encourage participants to share
9. Provide ample time for reflection
10. Provide guidance and support
11. Provide opportunities for continued learning
12. Incorporate evaluation throughout



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Time to Think!



What did I just *see*?



What did I *learn*?



...What am I *thinking*?

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Elements of the Authentic Task Approach

- *Clarify Your Task*
- *Identify Criteria for Success*
- *Use data to make decisions and track your work*
- *Identify Relevant Resources*
- *Scheduling Activities*
- *Take Time to Reflect*
- *Develop an Implementation Plan*

key features:

- *guided facilitation*
- *protected time*
- *a resource rich environment*
- *continuous reflection*



Authentic Task Approach Characteristics
http://www.wested.org/online_pubs/1-9818.oid.pdf

<i>Less emphasis on...</i>	<i>MORE emphasis on...</i>	Course Features
Conference planner/funder needs	Participants' needs	Participants define beforehand what they will work on in the context of their own work
Pre-determined general topic with the hope that everyone "gets what they need"	Content sessions determined by specific participant tasks	Course planners analyze tasks to determine specific concurrent and general sessions
"Sit and get" presentations	Active engagement and learning while doing	Team time to work on tasks and develop strategies for implementation at work site
Looking for answers and solutions from others	Discovering and creating solutions with others	Reflective partners (structured opportunities for participants to provide feedback to one another) Appointment cards (structure to provide participants with opportunities to schedule time with resource experts)
National and state perspectives	Local context, challenges and critical issues	Teams clarify tasks and define criteria for success
Generic understanding of existing knowledge	Application of existing knowledge	Development of Action Plans Providing adequate time to reflect
Concerns about Information (how much, what level, etc)	Concerns about how to use the information and skills learned	Creating a product that focuses on implementation at work site
Shallow treatment of a lot of information	Intensive study of information that focuses on specific tasks	Customized course design Resource-rich environment (materials and subject matter experts)

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Many Thanks!



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Course Structure Builds Expertise and Community

Leaders

- course coordinators
- develop courses
- select coaches and participants
- pair coaches with presenters

Participants

- learn from presenters, coaches and each other
- provide feedback
- participate in longitudinal evaluation

Coaches

alumni with leadership qualities

- coach presenters
- mentor participants
- advise course coordinators (before, during and after course)

Presenters

- learn better communication technique from coaches
- provide expertise to participants during and after the course
- a few have partnered with course alumni



Face-to-Face Course Structure

- NASA Scientists provide science content
- Alumni Informal/Environmental Educators coach science presenters and participants
- NASA Education and Outreach staff provide NASA education and communication materials
- Visit to NASA Goddard Space Flight Center (MD)

