GK 12 Global Watershed

Information Workshop for Teachers

March 17, 2010

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What is Global Watershed program?

- Michigan Tech PhD students (GK12 fellows) will be awarded two-year fellowships to work with middle and high school teachers to create lesson plans and activities that transfer their research on watershed science topics to teacher and students.

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More information

- GK12 Fellows will teach, under the supervision of their partner teacher, water topics from existing lesson plans and lesson plans they develop.
- GK12 fellows will be prepared to teach in the middle or high school classroom through a specially designed education course at Michigan Tech.

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How is the program funded?

- This program is funded for a five-year period, by the Graduate Fellows Grant Program (GK12) of the National Science Foundation to Michigan Technological University.

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What are benefits to teachers?

- Teachers and students will be engaged in research on the scientific aspects of water issues, covering a broad range of content standards and school improvement goals.
- GK12 fellows will develop lesson plans and activities that can become a permanent part of the school curriculum.
- Fellows will act as a resource to teachers throughout their two-year school assignment.

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What are benefits to teachers?

- Participating teachers will be paid a $4,500 stipend per year.
- Teachers will earn professional development credits.
- No additional expenses will be borne by the schools. Up to $1,000 will be available to Fellows and teachers to cover supplies, field trips, etc.

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What are the requirements of participating teachers?

- Candidate teachers will attend an evening informational workshop on March 17, 2010.
- Interested teachers will complete a short application for the program and teachers will be selected to participate in the program by a committee composed of representatives of the school community and Michigan Tech faculty.
- Each teacher will commit to mentor a GK12 Fellow for two academic years.

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What are the requirements of participating teachers?

- Selected teachers will attend a four day summer workshop designed to prepare teachers and GK-12 Fellows for their upcoming work and to pair teachers and GK-12 Fellows with similar interests.

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2010 Summer Workshop

- June 21-24, 2010
- Copper Country ISD Conference Room A
- 9:00am- 4:00pm each day
- Teachers and fellows will teach each other about their work in the watershed science and learn how to design learning experiences that incorporate inquiry, formative assessment and American Indian perspectives.

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Example application of Fellow's research project to K-12 instruction

- Coaster brook trout (CBT) are a unique life history variant of the brook trout species that have existed in Lake Superior for thousands of years.
- Currently, only a few populations of CBT remain in the Lake Superior basin.
- The decline of the CBT is associated with over-fishing and habitat degradation.
- To support conservation efforts and rehabilitation efforts along the southern shore of Lake Superior, researchers are characterizing the habitat conditions associated with naturally reproducing CBT populations.

Groundwater-Surface Water Interactions and Coaster Brook Trout Spawning Habitat

- Several studies have shown a connection between groundwater seepage and brook trout spawning habitat.
- This research project focuses on quantifying groundwater seepage in the river at sites that both support and do not support a naturally reproducing population of CBT.
- The research includes installing networks of monitoring wells equipped with vertically stratified temperature sensors into these sites and inverting the temperature data to estimate groundwater seepage as a function of time and space.

Research and Classroom Topics	**General Principles**	**Sample Activities**
Life history of the CBT (4-8 classroom days)	• Ecosystems • Evolution • Genetics • Aquatic biology • Physiology • Experimental design • Data analysis	• Lectures • Readings • Exercise: How does a CBT decide it's time to spawn? • Exercise: How does a CBT sense its environment? • Exercise: How do we determine if the CBT is a distinct species? • Field trip: Observing fish spawning behavior • Field trip: Observing instrumentation used in genetic analyses

Research and Classroom Topics	General Principles	Sample Activities
Decline and renewal of the CBT (4-8 classroom days)	• Impacts of humans on ecosystems • Ecosystem management and restoration • Experimental design • Data analysis	• Lectures • Readings • Exercise: How would we choose a site for reintroducing CBT? • Exercise: How do we set fishing catch limits for CBT? • Exercise: Debate on a local natural resource extraction conflict • Field trip: Observing operations of a fish hatchery • Field trip: Observing methods for counting fish populations

Research and Classroom Topics	General Principles	Sample Activities
Influence of groundwater seepage on CBT spawning (4-8 classroom days)	• Hydrologic cycle • Ecohydrology • Stream hydrology • Physics of heat transfer • Experimental design • Data analysis	• Lectures • Readings • Exercise: How do we measure streamflows? • Exercise: How and why do streamflows vary over a year and from year to year? • Exercise: Why is groundwater seepage important for stream ecology? • Exercise: What do variations in temperature underneath a streambed tell us about groundwater seepage? • Exercise: How do we design an instrument for detecting temperatures underneath a streambed? • Field trip: Measuring streamflows • Field trip: Collecting data from a seepage well network

For more information, contact

- Alex Mayer, Center for Water and Society

  asmayer@mtu.edu, 487-3372

- Shawn Oppliger, Western UP Center for Science, Math and Environmental Education

  shawn@copperisd.org 482-0331

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Questions?