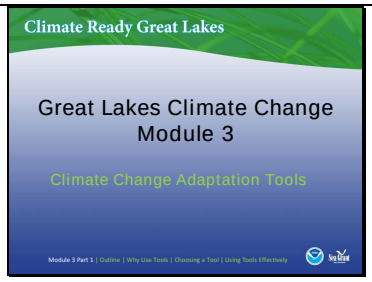
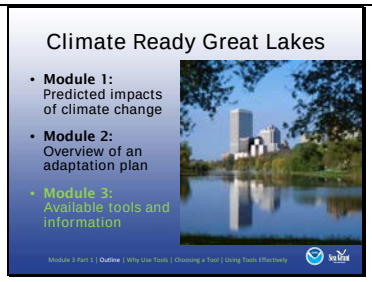
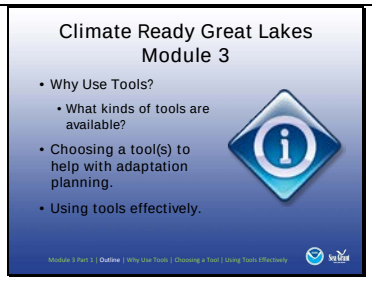
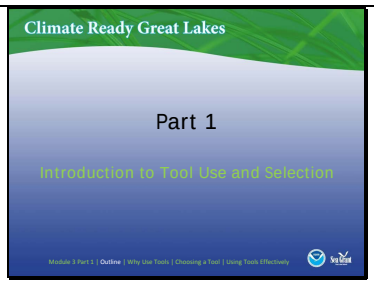
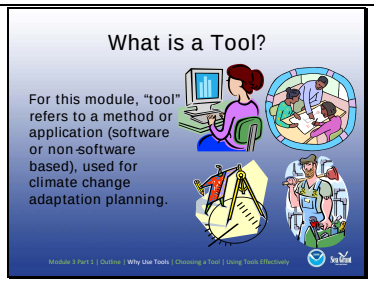
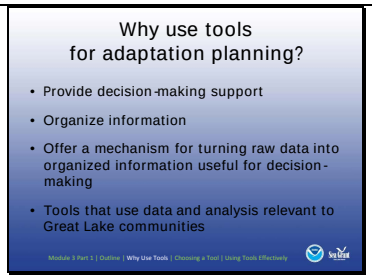
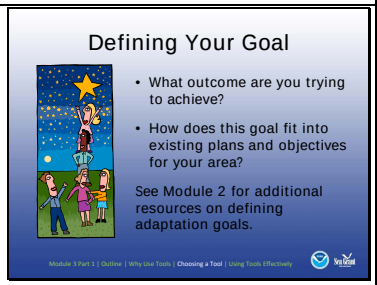
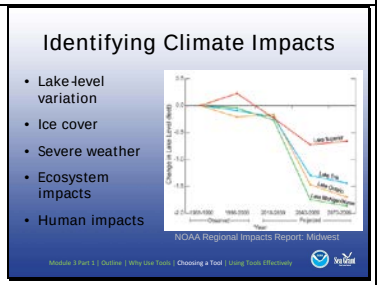
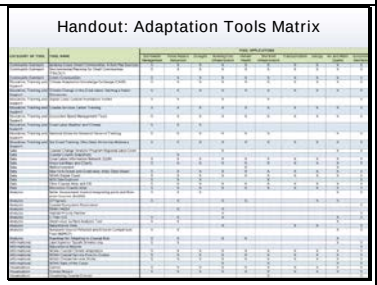
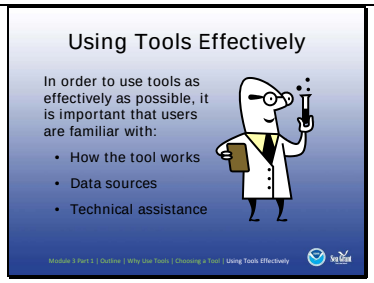
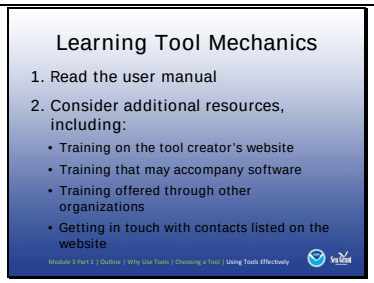
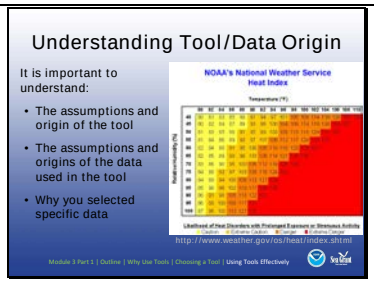
Slide 1		
Slide 2		
Slide 3		Climate Ready Great Lakes is a series of three related—but stand alone—modules designed to assist Great Lakes coastal communities in preparing for possible effects of climate change. Module 1 introduces participants to predicted climate change impacts in the Great Lakes region. Module 2 guides participants through creating an adaptation plan, and this module—Module 3—helps participants effectively use tools in the adaptation planning process.
Slide 4		This module highlights tools that are available for climate change adaptation planning. • Some tools are specifically made for the Great Lakes region, while others can be modified to fit the region. • The tools vary in terms of complexity and required resources. • Most are software tools—but some are web- and process-based. This module is broken into two parts: Part 1 will introduce you to effective tool use and selection. Part 2 will introduce you to the various types of tools that are available to help communities with adaptation planning.

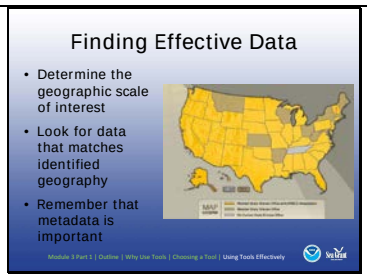
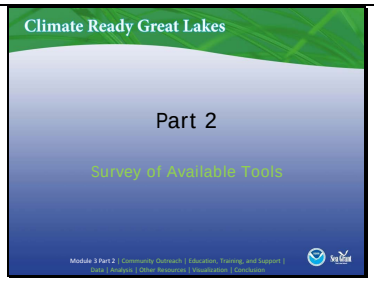
Slide 5		Tools are an important resource for adaptation planning. Part 1 teaches how to select tools appropriate for your needs and how to effectively use tools and related resources.
Slide 6		First, it is important to clarify what we mean by the word "tool." In this module, "tool" can indicate any of the following: • Method-based tools outline a process for users to follow in order to achieve a goal—or carry out an analysis (among other applications). • Software-based tools require users to download or install software in order to run the tool on a computer. • Non-software-based tools are tools that do not fit either category. These are non-method tools that are computer based or non-computer based. So for example, this category could be applied to a computer database that offers users information on climate change tools. **Note:** This module tends to emphasize computer- and technology-based tools from each category; however, it is important to realize that tools can also be non-computer based (such as survey methods outlined in a book). Source citation: Ecosystem-Based Management Tools. 2010. "Ecosystem-Based Management Tool Inventory."
Slide 7		Tools are important in adaptation planning, because they can • Provide guidance and support for decision maker • Help to organize ideas for planning and to get adaptation plans started • Help turn raw data into organized information useful for decision-making. Unfortunately, adaptation planning is often limited by available tools—but new tools are often under development. This module does not provide a comprehensive review of all tools. Instead, this module is intended as a method to (1) introduce users to tool use in climate change adaptation planning and (2) serve as a starting point for locating tools for adaptation planning. This module

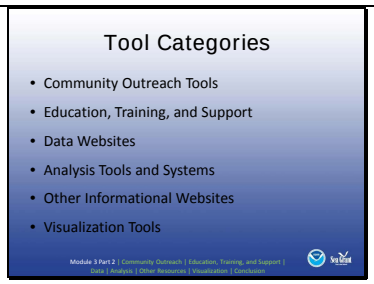
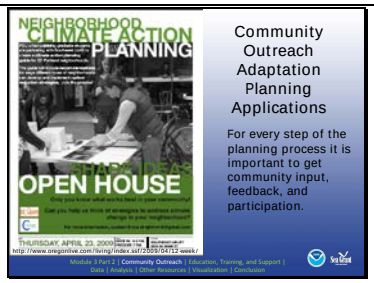
		focuses particularly on tools relevant—and available—to Great Lakes coastal cities. Source citation: National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resource Management. "Adapting to Climate Change: A Planning Guide for State Coastal Managers." http://coastalmanagement.noaa.gov/climate/adaptation.html (accessed December 28, 2010)
Slide 8		Now that we have gone over the importance of tools, we will outline how to choose a tool that fits the needs of your community. Choosing an appropriate tool can be challenging. Some tools address specific climate impact challenges, while others may not meet exact specifications. Consider the following questions when choosing a tool: • What is the goal you are trying to achieve? • Which climate change impacts are you trying to adapt to? • What resources do you have available? For example, personnel, financial assistance, or technical expertise. • How does the project fit into larger planning goals in your community? • Where are help resources (such as expert consultation)?
Slide 9		The most important step in choosing an appropriate tool is clearly outlining the purpose of your project. It is important to clearly define your goal and objectives in order to select the most effective tool. Before starting your project, it is also important to do some research and find out what current plans and projects exist in your area.
Slide 10		To pick a tool, it is important to identify which climate impact(s) you are adapting to. There are a variety of anticipated impacts in the Great Lakes region, and each adaptation planning project should identify both desirable and undesirable impacts for planning purposes. Later, we will discuss how to match the impact with the tool. Image citation: National Oceanic and Atmospheric Administration. 2009. "Global Climate Change Impacts in the United States: Midwest." http://www.globalchange.gov/images/cir/pdf/midwest.pdf

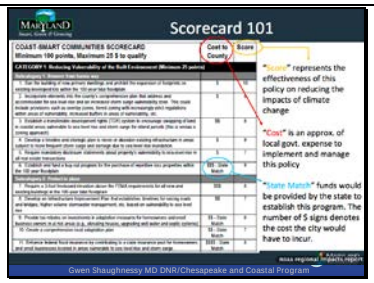
Slide 11		• Learn from what others have done. It is important to review case studies and best practices, when available. Your state climatologist is one resource who may be able to help identify best practices and tools. There will be more information in the "Education, Training, and Support" section of this module. • Research possible funding opportunities. What funders are interested in your project? Consider federal, state, and local funders. • Consider internal and external partnerships to help with funding and staffing needs. • Find existing data, if possible. Several data websites are listed in this module to assist you in finding available data, and hopefully those will meet your needs. If not, ask for help. Collecting data on your own can be quite expensive. When it comes to selecting a tool, the bottom line may be finding a tool that fits the resources you have available. Each tool has its own requirements, but keep in mind that some tools have extensive requirements for technological expertise, funding, and staffing. If the tool you are considering is technologically advanced or requires the use of GIS, know that you may need to hire a staff member or outsource part of the project. Source citation: National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resource Management. 2010. *Adapting to Climate Change: A Planning Guide for State Coastal Managers*. http://coastalmanagement.noaa.gov/climate/adaptation.html
Slide 12		Next, refer to the spreadsheet handout **Adaptation Tools Matrix.** (*Have participants look at the handout.*) Use this spreadsheet to cross-reference climate impacts with various tools. The tool categories were selected by experts to be the most useful in climate adaptation in the Great Lakes. Categories include analysis, community outreach, data, forecast models, training, and visualization. You may want to select several tools from different categories to reach your objectives. Different tools can be particularly useful at different points in the process. For example, CanVis (a visualization tool) is useful for every type of climate impact and is particularly helpful for engaging stakeholders. The tool description handout describes each tool in more detail. (*Distribute the handout.*)

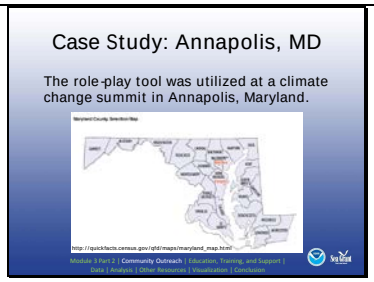
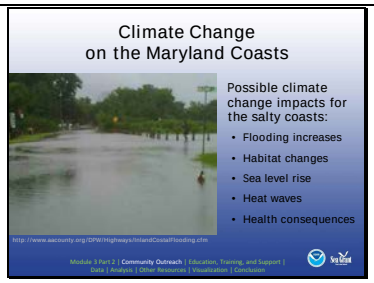
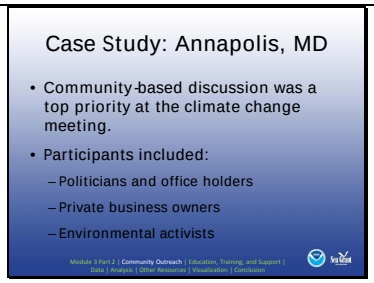
Slide 13		In the tool description handout, the information for each tool includes a link, description, keywords, cost, training/time requirements, and other notes. The training and time requirements indicate formal training and time to learn the tool. Some tools may require tinkering and time to become familiar with the interface. (*Take a moment and go over process of selecting a tool.)*
Slide 14		When you are using a new tool, sometimes it can be difficult to know where to start. It is important to break down the process, so that you are using the tool the way it was meant to be used. In the following slides, we break down the process of using a tool effectively into three steps: • Knowing the mechanics behind how a tools works • Understanding where data sources exist • Using available resources for technical support/assistance
Slide 15		Reading the accompanying user manual is always a good first step in learning (1) how a tool works and (2) how to best operate the tool. However, there are plenty of resources outside of a user manual that you can utilize in order to better understand tool mechanics: • Look on the tool provider's website to see if they offer in-person or online training. • Perform an online search to see if any other organizations (besides the developer) provide trainings (for example, EBM tools). • Get in touch with the contacts listed on the tool provider's website. Often, they can suggest additional trainings, offer advice on how to use the tool, or answer questions about the tool.
Slide 16		When it comes to using tools, it is important to be aware of what assumptions the tool relies on and where the data in the tool came from. When you are generating output, it will be important to explain to others where this output came from. Read the user manual to get familiar with the tool's assumptions and the origins of the data and the tool itself—or ask the contacts listed on the tool provider's website. This type of information may not be available for every tool, but it is important to

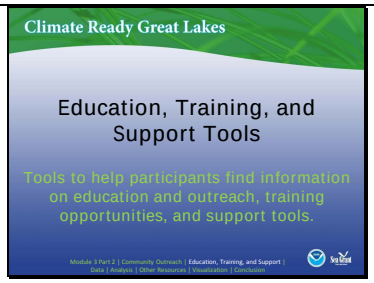
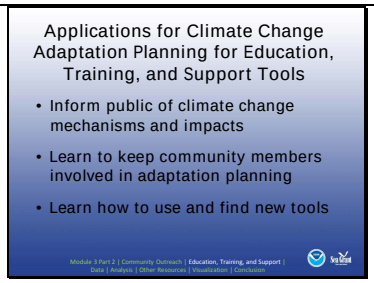
		try to research this information. Similarly, if you're using your own data in the tool, you should be ready to explain to others where the data came from, the date it was produced, and other important details. Image citation: NOAA's National Weather Service, Office of Climate, Water, and Weather services. "Heat: A Major Killer." http://www.weather.gov/os/heat/index.shtml (accessed December 21, 2010)
Slide 17		Technical professionals are some of the best resources available to help you effectively use tools. These experts are often the contacts listed on tool provider's websites. They are extremely knowledgeable about the tool, and they may be able to refer you to training opportunities, help you with problems that you encounter in your use of the tool, and provide other references to assist you with your project. These types of contacts are usually only experts on a specific tool, but there are other types of contacts that can assist you in using tools more broadly. For example, state/regional climatologists may not be able to help you with the technical specifics of a tool, but they can act as an expert resource for the overall project. They can help you: • Find data that is appropriate for your tool or project • Determine whether or not your project will be a feasible one • Identify potential future partners and resources • Direct you to work and projects that are similar to your own Please see the Climate Adaptation Tools handout for a list of state and regional climatologists and their office websites (pages 3-19 and 3-20). Source citation: Indiana State Climate Office, Purdue University. "ICLIMATE.ORG." http://www.stateclimate.org/ (accessed December 21, 2010) Image citation: Indiana State Climate Office, Purdue University. "ICLIMATE.ORG." http://iclimate.org/ (accessed December 21, 2010)

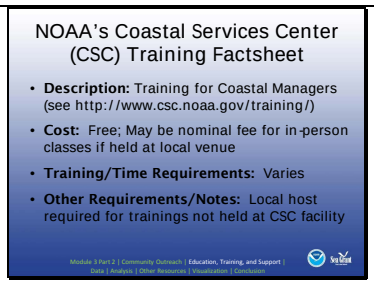
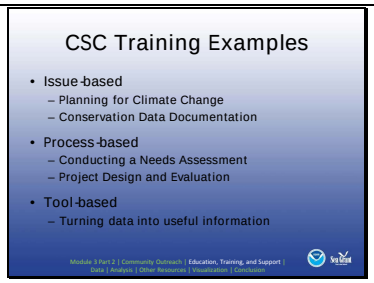
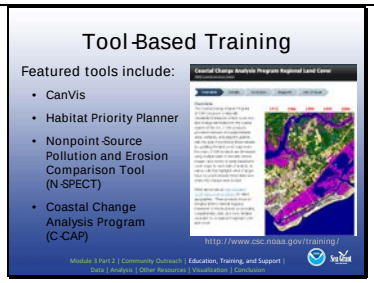
Slide 18		As was mentioned previously, some tools require users to generate their own data. This can range from providing your own data on climate change predictions (for a image creating program) to uploading your own shapefiles (for a GIS platform). If you need to find your own data, first define the geographic scale of interest for your project (that is, regional, state, or local). Once you've determined the scale, then you should find data that fits this scope to ensure that the output is as specific to your area as possible. Local data provides the most specific information for community decision-making purposes. Also, remember that metadata (that is, data about the data) is important; you will need to convey information on the data background to the viewers. Examples of metadata include the data source, method by which the data was obtained, and the caveats associated with datasets. If there is a report or a visual display accompanying your output, be sure to specify the origin of the data in your materials. In the context of climate data, it's important to look not only at recent patterns, but also to consider long timeframes of historical data. Understanding past climate is the first step in predicting how climate will change in the future. Image citation: American Association of State Climatologists. "AASC." http://www.stateclimate.org/ (accessed December 21, 2010)
Slide 19		Part 2 of this module focuses on showcasing examples of tools that are available to assist communities in adaptation planning efforts.

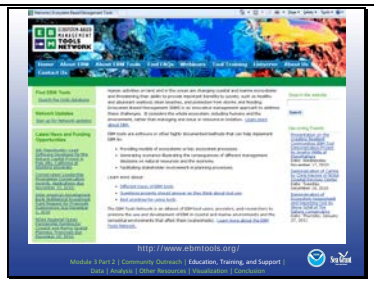
Slide 20		In this module, tools are divided into six main categories based on their structure and the types of services they provide. For each category, we will first explain how the category can be applied to adaptation planning in general, and then give an example of a tool that fits in that category. Next, the specific adaptation planning applications for each tool will be discussed, and case studies will presented where available. To learn more about each category of tools (including example tools within each category), please see the supplementary tool description handout. Source citation: Laurentian Great Lakes Basin Climate Change Adaptation, Needs Assessment Synthesis. July 2010. (Mini-grant needs assessment.)
Slide 21		Community Outreach tools can assist decision makers communicate with citizens as well as decision makers in both the public and private sector.
Slide 22		While community outreach tools are applicable in various stages of climate change adaptation planning, they are especially important at the beginning of the planning process (that is, Part 1, Step 1 for participants who have taken Module 2). Community outreach tools can be used to get the public involved in the climate change adaptation planning process, inform them of climate and planning issues, and acquaint them with the complexities of climate change adaptation. Image citation: The Oregonian. "OregonLive.com." http://www.oregonlive.com/living/index.ssf/2009/04/12-week/ (accessed December 21, 2010)
Slide 23		An example of a community outreach tool is a role-play exercise called "Building Coast-Smart Communities." Image citation: Maryland Department of Natural Resources, Consensus Building Institute, MIT-USGS. 2009. "Building Coast-Smart Communities: A Role Play Exercise." http://maryland.coastsmart.org/ (accessed November 15, 2010)

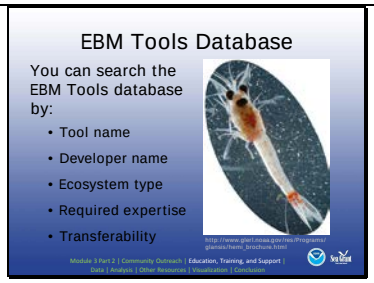
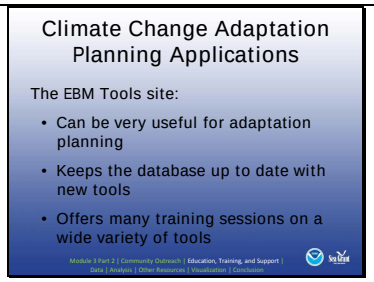
Slide 24		This tool is a half-day, role-play exercise that helps initiate community-based discussions about (1) climate change adaptation options and (2) the challenges associated with climate change (mainly focused on policy). There is no cost for the workshop; however, participants would need to commit to a half-day workshop and extensive advanced workshop preparation may be required. Materials are available free of charge on this website http://maryland.coastsmart.org/?page_id=114.
Slide 25		This exercise was specifically made for Maryland; however, it can be adapted for Great Lakes communities, because climate change adaptation recommendations specific to the Great Lakes can be incorporated into the role play. The idea is to first make community members aware of existing policy recommendations, and then have them discuss climate change issues and policies from different perspectives. Participants can learn about the complexity of climate change issues and begin to understand how policies may be made through negotiations. Image citation: Maryland Department of Natural Resources, Chesapeake & Coastal Program.
Slide 26		So, how does the role-play exercise work? The exercise is framed as a game, where the goal is to score 100 points—while keeping costs under 25. Each possible policy choice has a cost and a score, which are basically the costs and benefits of each policy. Participants negotiate over which strategies to select, and they must have 8 of 9 committee members approve the final recommendations in order for the proposal to pass. Each participant chooses a character in an advisory board (ranging from a County Commissioner to a member of the Residents Association to a Real Estate Development Association President), and the they make decisions and arguments based on this perspective. Image citation: Gwen Shaughnessy. Maryland Department of Natural Resources, Chesapeake & Coastal Program.

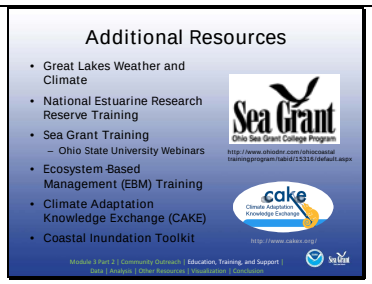
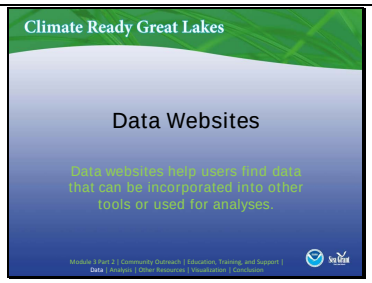
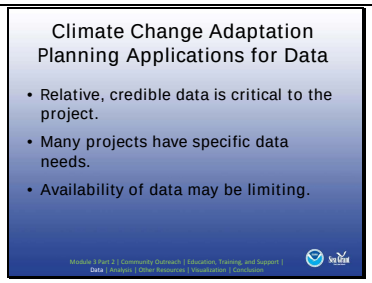
Slide 27		This exercise can be incorporated at various stages of the planning process, but may be best applied at the beginning of the planning process (when the framework is still being established). This exercise can help to encourage participants to become more involved in the climate change adaptation planning and implementation process. For example, involving stakeholders in the exercise will give them an opportunity to voice their opinions and a better understanding of the complexity of the planning process (such as complications from various viewpoints).
Slide 28		In a case study from the Coast Smart website, the role-play exercise was used at a climate change summit that took place in Annapolis, Maryland. Source citation: Maryland Department of Natural Resources, Consensus Building Institute, MIT-USGS. 2009. "Building Coast-Smart Communities: A Role Play Exercise." http://maryland.coastsmart.org/ (accessed November 15, 2010) Image citation: US Census Bureau. "Maryland County Selection Map." http://quickfacts.census.gov/qfd/maps/maryland_map.html (accessed December 21, 2010)
Slide 29		The climate change issues discussed at the summit were slightly different than the anticipated climate change impacts in the Great Lakes. For the salty coasts, anticipated impacts include flooding increases, habitat changes, sea level rise, heat waves, and human health consequences. Source citation: Maryland Commission on Climate Change. 2008. "Comprehensive Assessment of Climate Change Impacts in Maryland." *Climate Action Plan*. http://www.mde.state.md.us/assets/document/Air/ClimateChange/Chapter2.pdf (accessed December 21, 2010) Image citation: Anne Arundel County, MD, Citizens Information Center. "Coastal flooding, Bay St (Venice on the Bay)." http://www.aacounty.org/DPW/Highways/InlandCostalFlooding.cfm (accessed December 21, 2010)
Slide 30		In order to address these anticipated climate change impacts from a number of different viewpoints, a wide variety of participants attended the summit, including "mayors, county commissioners, environmentalists, business leaders, and Maryland state officials." This meeting was held to facilitate community-based discussion on climate change issues facing Maryland coastal communities. Feedback from participants in the role-play exercise was very positive. Participants felt that the interactive role play was a great way to become familiar with

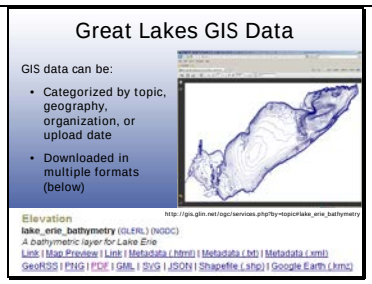
		different stakeholder perspectives related to climate change adaptation. Source citation: Maryland Department of Natural Resources, Consensus Building Institute, MIT-USGS. 2009. "Building Coast-Smart Communities: A Role Play Exercise." http://maryland.coastsmart.org/ (accessed November 15, 2010)
Slide 31		If you are interested in other community outreach tools, please see the Community Outreach section of the handout for more information. Image citations: • Environmental Protection Agency. "Green Communities." http://www.epa.gov/greenkit/basicinformation.htm (accessed December 21, 2010) • Environmental Protection Agency. 1994. "Environmental Planning for Small Communities: A Guide for Local Decision-Makers." http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=30004O2Y.PDF (accessed May 2012)
Slide 32		The tools in the education, training, and support category help participants find information on education and outreach tools, training opportunities, and support tools.
Slide 33		Education, support, and training tools have a variety of applications for climate change adaptation planning. Some tools in this category can be used to inform the public of climate change mechanisms and climate change impacts. Other tools can be used to find additional training or opportunities (such as learning about new tools or finding a tool that fits your needs). Education, outreach, and training should occur early and often in the adaptation planning process. These tools can be especially helpful for determining strategies for adaptation (Module 2 Part 2) in order to find a tool that fits your targeted climate impact.
Slide 34		An example of such a tool is the NOAA Coastal Services Center website, which directs users to various training sessions. Image citation: NOAA Coastal Services Center. "Training." http://www.csc.noaa.gov/training/ (accessed December 21, 2010)

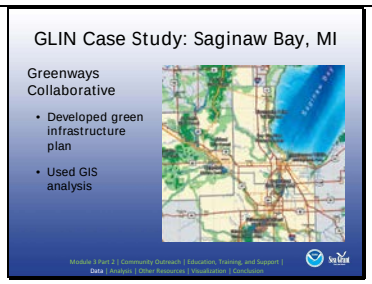
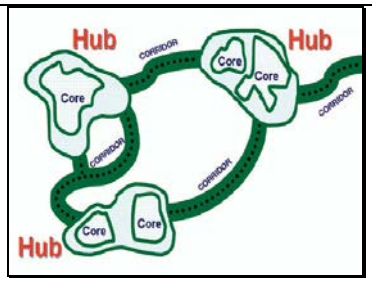
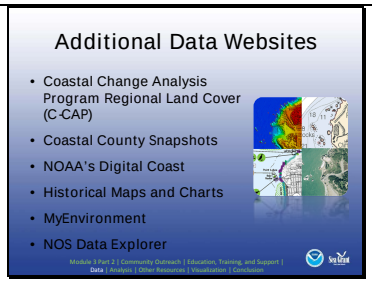
Slide 35		The CSC website directs users to web-based and in-person training resources that address a variety of topics, many of which have applicability to climate change and adaptation planning. The website helps users find a number of online and in-person modules targeted towards coastal managers. The information is free, but a nominal fee may be charged for in-person classes if held at local venue. Time requirements vary depending on the training module. Some in-person classes may be limited to coastal management professionals only, and a local host may be required for trainings not held at a CSC facility.
Slide 36		CSC divides training into three main categories: issue-based trainings, process-based trainings, and tool-based trainings. For example, issue-based topics include "Planning for Climate Change" and "Conservation Data Documentation" and process-based topics include "Conducting a Needs Assessment" and "Project Design and Evaluation." Source citation: NOAA Coastal Services Center. "Training." http://www.csc.noaa.gov/training/ (accessed December 21, 2010)
Slide 37		The CSC website offers a wide variety of tool-based training that addresses a multitude of climate change impacts. Featured tools include CanVis, Habitat Priority Planner, and Community Risk and Vulnerability Assessment tool. CanVis: CanVis is a visualization program used to "see" potential impacts from coastal development or sea level rise. Users can download background pictures and insert the objects (hotel, house, marina, or other objects) of their choosing. The software is used by municipalities to brainstorm new ideas and policies, undertake project planning, and make presentations. Habitat Priority Planner: This tool aids in making decisions about habitat conservation, restoration, and land use planning. The Habitat Priority Planner takes away much of the subjective nature of the process by providing a means of obtaining critical habitat analyses that are consistent, repeatable, and transparent. The program allows users to easily test various ideas and "what if" scenarios on

		the fly, making it the perfect tool to use in a group setting. N-SPECT: Use the Nonpoint-Source Pollution and Erosion Comparison Tool (N-SPECT) to investigate potential water quality impacts from development, other land uses, and climate change. N-SPECT was designed to be broadly applicable, but the tool operates most accurately in medium-to-large watersheds having moderate topographic relief. C-CAP: The Coastal Change Analysis Program (C-CAP) produces a nationally standardized database of land cover and land change information for the coastal regions of the U.S. C-CAP products provide inventories of coastal intertidal areas, wetlands, and adjacent uplands with the goal of monitoring these habitats by updating the land cover maps every five years. Image citation: NOAA Coastal Services Center. "Overview - CCAP Regional Land Cover - Digital Coast." http://www.csc.noaa.gov/digitalcoast/data/ccapregional/ (accessed November 8, 2010)
Slide 38		Training can be useful for climate change adaptation, because decision makers can take advantages of classes that help them learn more about unfamiliar tools, various topics (such as managing coastal areas, zoning, local policies, and climate change), and how to communicate with the public. Depending on the content, the training may not necessarily fit into a particular part of the planning process.
Slide 39		A second tool in this category is the Ecosystem-Based Management Tool Network. Image citation: Ecosystem-Based Management Tools Network. "Ecosystem-Based Management Tools Network." http://www.ebmtools.org/ (accessed December 21, 2010)

Slide 40		Ecosystem-Based Management (EBM) Tools is a website that links people to a wide variety of tools and toolkits. Users can search the database for a tool that fits specific requirements. The database and website are free to search, and there are no training requirements to learn how to use the website.
Slide 41		EBM Tools offers their own training classes on specific tools, and also directs visitors to tool training opportunities that are offered through other organizations. Additionally, EBM Tools offers monthly demonstrations of tools featured on the website. If you look under the webinars tab on the main website, you can also sign up to receive email alerts of upcoming webinars. Source citation: Ecosystem-Based Management Tools Network. "Ecosystem-Based Management Tools Network." http://www.ebmtools.org/ (accessed December 21, 2010)
Slide 42		The EBM Tools database allows you to search for tools that fit your needs. You can find tools that relate to various climate change impacts (such as ecosystem resiliency and stormwater management). EBM Tools can also help you find a tool that fits your project's limitations (such as available tool expertise) and the geographic location of the project. Additionally, you can search for tools that apply to a specific ecosystem type. Source citation: Ecosystem-Based Management Tools Network. "Ecosystem-Based Management Tools Network." http://www.ebmtools.org/ (accessed December 21, 2010) Image citation: NOAA Great Lakes Aquatic Nonindigenous Information System. "Hemimysis anomala Brochure. Great Lake New Invader: Bloody Red Shrimp (Hemimysis anomala)." http://www.glerl.noaa.gov/res/Programs/glansis/hemi_brochure.html (accessed December 21, 2010)
Slide 43		Climate change adaptation planning requires a flexible approach, which means that your plan and your tools may need some tweaking from time to time. EBM Tools is an excellent way to find tools that best fit your specific needs—or to find contact information for professionals who may be able to help you. Also, EBM Tools is a great way to learn how to use those new tools effectively, because they offer numerous training sessions. While this website doesn't necessarily fit into a specific step of the planning process, it can be used throughout the process to find the tools and training that you need.

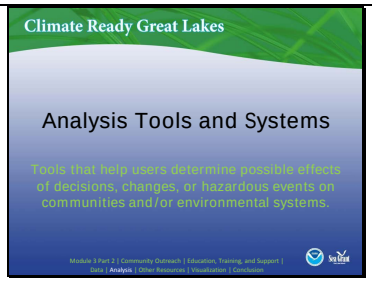
Slide 44		Refer to the handout on additional training tools. Image citations: • Ohio.gov. "Ohio Coastal Training Program." http://www.ohiodnr.com/ohiocoastaltrainingprogram/tabid/15316/default.aspx (accessed December 21, 2010) • Climate Adaptation Knowledge Exchange. "Climate Adaptation Knowledge Exchange (CAKE)." http://www.cakex.org/ (accessed December 21, 2010)
Slide 45		Data websites help users find data that can be incorporated into other tools or used for analyses.
Slide 46		Finding appropriate data for an adaptation project is crucial. Many adaptation planning tools require additional data that is specific to a city, locality, or region. Land-use data, population, and air quality are examples of the types of data available. The availability of data may limit the user's ability to successfully implement a tool. ***(So, this tool likely fits into Part 2: Strategies for Adaptation, because the data from the website can be used for various adaptation strategy tools.)***
Slide 47		The Great Lakes Information Network (GLIN) provides maps and GIS data specific to the Great Lakes, and these resources can be downloaded directly from the website. Image citation: great-lakes.net. "Great Lakes Information Network." http://gis.glin.net/ (accessed November 1, 2010)
Slide 48		The GLIN website offers free, spatial data that is specific to the Great Lakes. GIS skills (or a background in information systems) may be necessary to use some of the data. The GLIN website features include access to: • Great Lakes GIS data • Interactive map explorer • Map gallery that offers downloadable maps of the region • Other information about the region's environment, economy, tourism, and education Source citation: great-lakes.net. "Great Lakes Information Network." http://gis.glin.net/ (accessed November 1, 2010)

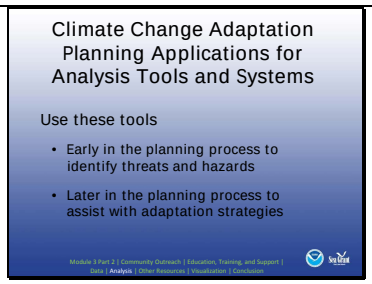
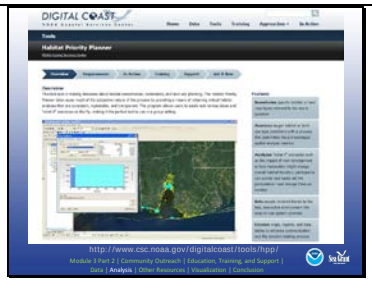
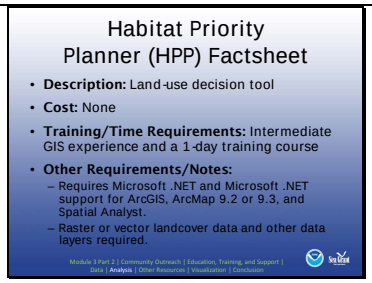
Slide 49		The GLIN website offers GIS data in multiple formats, including shapefiles, PDFs, and PNGs. On the bottom of the slide, you can see the various data formats and metadata that are available with each data layer. This example shows the files that are associated with the lake_erie_bathymetry layer on the website, and the photo shows what the PDF version of the layer looks like. Image citation: great-lakes.net. "Great Lakes Information Network." http://gis.glin.net/map_explorer.php?lake=erie (accessed November 1, 2010)
Slide 50		**NOTE: You may want to try to connect to map explorer. It is not easy and one may have to create a login. Suggest you just discuss the use of the map gallery, next slide.** Map Explorer offers interactive maps for all of the Great Lakes, as well as Lake St. Clair. You start by choosing a background from various maps and images, and then you add overlays (such as TIGER census datasets and political boundaries) on top of the background map. Image citation: great-lakes.net. "Great Lakes Information Network."
Slide 51		The GLIN Map Gallery contains various maps and satellite images of areas in the Great Lakes. The images are free and available for use by the public (as long as proper citation is provided) Image citation: great-lakes.net. "Great Lakes Information Network."
Slide 52		GLIN provides reliable, trusted data specific to the Great Lakes, which can be used in GIS and other software tools for climate change adaptation planning. Obtaining good data is important for future analysis and decision making.

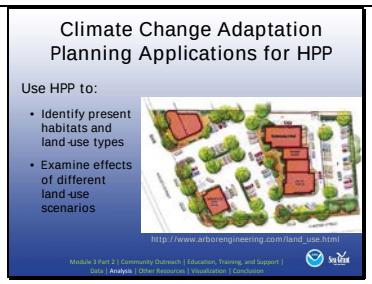
Slide 53		The Saginaw Bay Greenways Collaborative is an example of a case study that used GIS to support a comprehensive green infrastructure plan. This study used GIS to analyze spatial information in order to identify the ecological strengths and weaknesses of an area. GIS suitability models were created to identify the most important parcels based on a set of criteria. For example, one criteria for a parcel might be that 250 acres of interior natural cover were required. Source citation: The Conservation Fund. 2005. "Saginaw Bay Greenways Collaborative, Michigan."
Slide 54		*Hubs* were specified as natural areas containing at least one core area greater than 300 feet across. The collaborative then used GIS to create the least-cost path analysis to identify corridors between hubs. The preliminary plan was created as a GIS map that could be shared with stakeholders and the public for comment and revisions. Source and image citation: The Conservation Fund. 2005. "Saginaw Bay Greenways Collaborative, Michigan."
Slide 55		Some other data websites that provide information specific to the Great Lakes include NOAA's Digital Coast, Historical Maps and Charts, MyEnvironment, and the NOS Data Explorer. More information is available in the handout. Image citations: • C-CAP (http://www.csc.noaa.gov/digitalcoast/data/ccapregional/) (accessed May 2012) - The Coastal Change Analysis Program (C-CAP) produces a nationally standardized database of land cover and land change information for the coastal regions of the U.S. C-CAP products provide inventories of coastal intertidal areas, wetlands, and adjacent uplands with the goal of monitoring these habitats by updating the land cover maps every five years. • Coastal County Snapshots (http://www.csc.noaa.gov/digitalcoast/tools/snapshots/) (accessed May 2012) - Coastal County Snapshots turn complex data into easy-to-understand stories, complete with charts and graphs. Users select a coastal county of interest

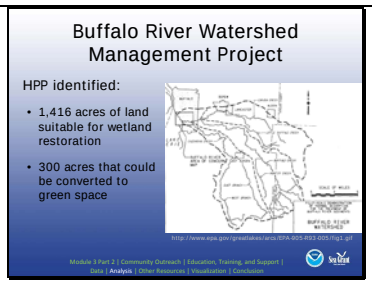
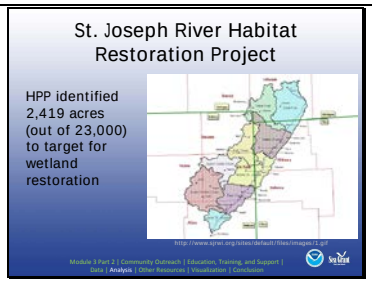
		and the website does the rest, providing information that can help communities become more resilient to coastal hazards. Local officials can use the snapshots as a planning tool to assess their county's resilience to flooding and understand the benefits provided by natural resources. The handouts generated by the snapshots can be a helpful educational tool when working with governing bodies and citizen groups. • NOAA Historical Maps and Charts (http://historicalcharts.noaa.gov/about.html) (accessed May 2012) - Covers the land and waters of the United States of America, including territories and possessions (past and present). The images are free to download, and may be used for commercial or educational purposes. Although not required, we encourage users to cite "NOAA's Historical Map & Chart Collection" when using the image(s). Today's Office of Coast Survey traces its charting efforts back to 1807, when President Thomas Jefferson founded the Survey of the Coast. To celebrate and preserve this long history, NOAA started assembling the collection in 1995 as a data rescue effort. NOAA continues to preserve charts and maps produced by NOAA's Coast Survey and its predecessors, especially the U.S. Coast and Geodetic Survey and the U.S. Lake Survey (previously under the Department of War). The collection also covers many areas that most people may not realize were once a part of early Coast Survey history. As the first federal scientific agency, the U.S. Coast and Geodetic Survey (as the agency was known from 1878 to 1970) produced land sketches, Civil War battle maps, and aeronautical charting from the 1930s to the 1950s. • "My Environment." Environmental Protection Agency. (http://www.epa.gov/myenvironment/) (accessed May 2012) - MyEnvironment provides immediate access to a cross-section of environmental data for any geographical location in the U.S. View maps of EPA and partner data

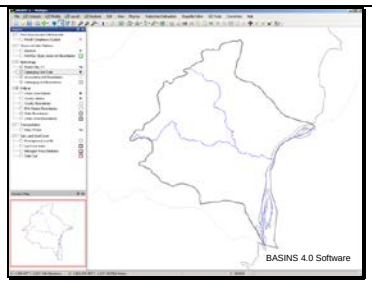
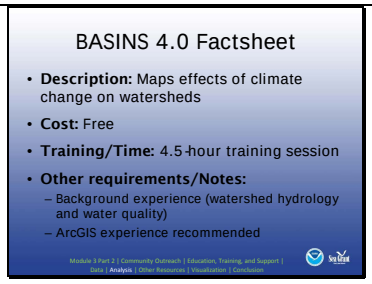
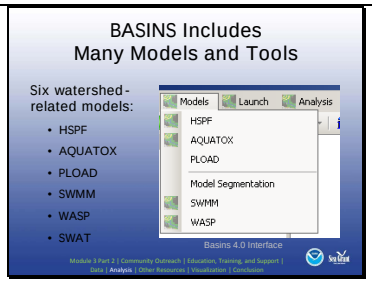
		specific to your area of interest. Information on Air, Water, Land, Community, Health and Energy can be visualized on map, downloaded and printed.
		
		• National Ocean Service. "NOS Data Explorer." (http://oceanservice.noaa.gov/dataexplorer/) (accessed May 2012) - The National Ocean Service (NOS) **Data Explorer Geoportal** application provides centralized access to distributed NOS geospatial data, tools, applications and services. This Web mapping application allows users to search and access geospatial data via the NOS master catalog of FGDC metadata. Examples of key NOS geospatial data available via this site include:
		  • NOAA Nautical Charts, bathymetry, and shoreline data;
		  • Coastal Change and Analysis data (LiDAR and IfSAR data), remotely sensed imagery and aerial photography;
		  • Benthic habitat maps, National Marine Sanctuaries Boundaries and protected areas data;
		  • Environmental Sensitivity Index maps that provide critical information for oil spill responders and other emergency response needs;
		  • Geodetic control benchmarks, coastal and marine observational data including real time tides and currents data for marine navigation and much more.

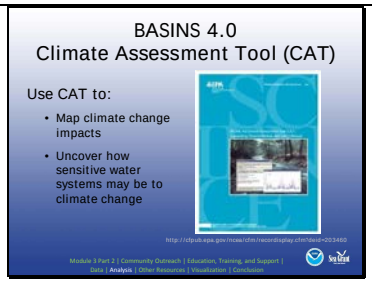
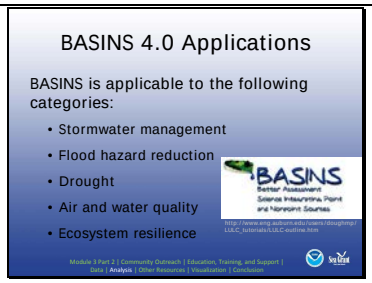
Slide 56		Analysis tools and systems help determine possible effects of decisions, changes, or hazardous events on communities and/or environmental systems.

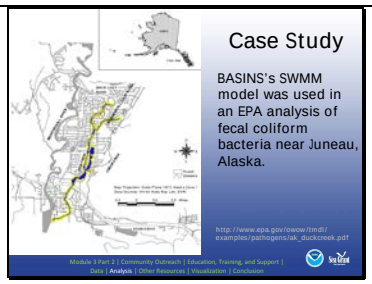
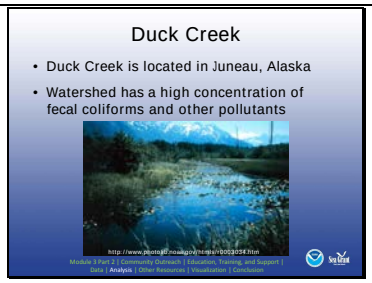
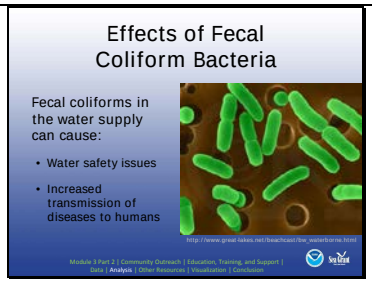
Slide 57		Analysis tools and systems encompass a wide range of tools, which means that tools in this category can be used at different parts of the adaptation planning process. • Some of the tools may be used earlier in the process to identify threats and hazards and assess vulnerabilities and opportunities (as described in Part 1 of Module 2). • Many of the tools can be used later in the process, when decision makers are looking for tools to assist them with adaptation strategies (as described in Part 2 of Module 2).
Slide 58		One analysis system tool that can be used in the climate change adaptation planning process is the Habitat Priority Planner, which can be downloaded from the NOAA Digital Coast website. Image citation: NOAA Coastal Services Center Digital Coast. "Habitat Priority Planner." http://www.csc.noaa.gov/digitalcoast/tools/hpp/ (accessed December 21, 2010)
Slide 59		Habitat Priority Planner (HPP) is a NOAA Coastal Services Center tool that can be downloaded free of charge from the Coastal Services Center website. This tool offers decision makers a way to incorporate habitat restoration into decisions about how to best use land. HPP does require that users are experienced with using ArcGIS (so that they can find correct data and use the software) and they must have ArcGIS 9.2 or higher installed on their computer. NOAA Coastal Services Center offers a 1-day training session to help users acquire the knowledge they need to use the tool successfully. A small fee is charged for participation; contact NOAA Coastal Services Center for more information. Source citation: NOAA Coastal Services Center Digital Coast. "Habitat Priority Planner." http://www.csc.noaa.gov/digitalcoast/tools/hpp/ (accessed December 21, 2010)

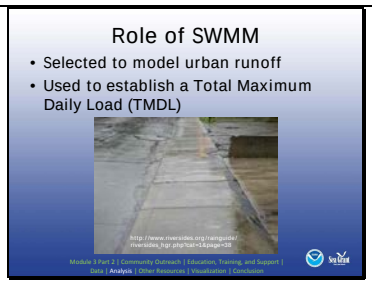
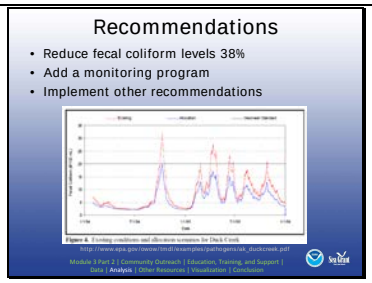
Slide 60		HPP can be used to identify areas that are best-suited for a specific purpose: • You can use this software to examine what may happen to local habitats under various development scenarios. • Additionally, if you give HPP certain conditions and requirements, it can help you find areas that fit those requirements (e.g., chose best areas for potential restoration projects). The software also includes various output formats (such as maps, tables, and reports) to help display and interpret results. Image citation: Arbor Engineering. "Land Use Planning." http://www.arborengineering.com/land_use.html (accessed December 21, 2010)
Slide 61		In a case study from the HPP website, two sections of watersheds in the Great Lakes region were chosen for habitat restoration projects as part of the Great Lakes Regional Collaboration Project. The Buffalo River watershed section is located in New York, while the section of St. Joseph River drainage basin is located in Indiana. In both projects, HPP was used to perform a crucial analysis of areas that were suitable for habitat restoration. Specific qualifications were entered into the system and areas that fit those requirements were selected. Source citation: NOAA Coastal Services Center Digital Coast. "Advancing Restoration in the Great Lakes Region." http://www.csc.noaa.gov/digitalcoast/action/advancerestoration.html (accessed December 21, 2010) Image citation: Environmental Protection Agency. "Della Park Bio-Engineered Project, an example of habitat restoration in the Clinton River AOC." http://www.glc.org/raptest/clintriv.html (accessed December 21, 2010)
Slide 62		Based on some background on the Buffalo River watershed, the portion of the Buffalo River that was used in this project was located in New York state. This water system has many environmental concerns related to the quality of the water, pollution, and habitat degradation—all of which are likely to be exacerbated by climate change. Source citation: Buffalo/Niagara River Keeper. "Issues Affecting the AOC." http://bnriverkeeper.org/programs/buffalo-river-remedial-action-plan/issues-affecting-the-aoc/ (accessed December 21, 2010) Image citation: Buffalo/Niagara River Keeper. "Contaminated Sediments." http://bnriverkeeper.org/programs/buffalo-river-remedial-action-plan/issues-affecting-the-aoc/ (accessed December 21, 2010)

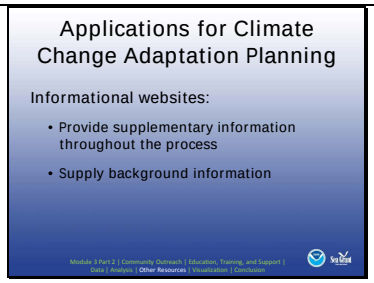
Slide 63		Given the contamination, water quality, and habitat degradation issues facing the Buffalo River watershed, the goals of the project were focused on wetland restoration and pollution reduction from non-point sources. The HPP software was used to identify areas that were suitable for conversion to (1) wetlands and (2) green space. The software was able to identify 1,416 acres that met the conditions for suitable for wetland restoration, and 300 acres that met the conditions for suitable for conversion to green space. Source citation: NOAA Coastal Services Center Digital Coast. "Advancing Restoration in the Great Lakes Region." http://www.csc.noaa.gov/digitalcoast/action/advancerestoration.html (accessed December 21, 2010) Image citation: Environmental Protection Agency. "Buffalo River Watershed." http://www.epa.gov/greatlakes/arcs/EPA-905-R93-005/fig1.gif (accessed December 21, 2010)
Slide 64		The other restoration project in this case study took place in the St. Joseph watershed, which is located in Indiana. This watershed faces many issues that arise from the high concentration of agricultural activities in the area. For this study, the particular issues of concern were high concentrations of herbicides and other agriculture runoff in the hydrology system. Source citation: NOAA Coastal Services Center Digital Coast. "Advancing Restoration in the Great Lakes Region." http://www.csc.noaa.gov/digitalcoast/action/advancerestoration.html (accessed December 21, 2010) Image citation: NOAA Ocean Service Education. "Return Nonpoint Source Pollution: Agricultural Operations." http://oceanservice.noaa.gov/education/kits/pollution/media/supp_pol06a.html (accessed December 21, 2010)
Slide 65		The main focus of this project was to identify areas that could be returned to wetlands in order to help buffer against agricultural runoff. Out of 23,000 acres considered, the HPP software identified around 2,500 acres that fit the wetland conversion requirements. Source citation: NOAA Coastal Services Center Digital Coast. "Advancing Restoration in the Great Lakes Region." http://www.csc.noaa.gov/digitalcoast/action/advancerestoration.html (accessed December 21, 2010) Image Citation: St. Joseph River Watershed Initiative. "St. Joseph River Watershed." http://www.sjrwi.org/sites/default/files/images/1.gif (accessed December 21, 2010)

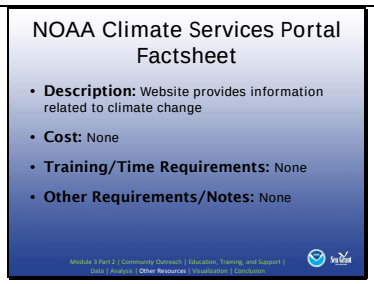
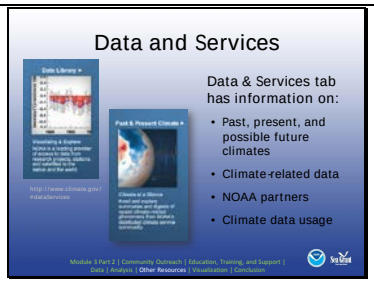
Slide 66		This is a picture of a watershed in Detroit, Michigan, in the BASINS 4.0 software. BASINS is the second analysis system that we would like to showcase, because of its applicability to adaptation planning. Image citation: Environmental Protection Agency. *Better Assessment Science Integrating Point & Non-point Sources (BASINS)*. Computer software, version 4.0 (April 12, 2007). http://water.epa.gov/scitech/datait/models/basins/b3webdwn.cfm (accessed December 21, 2010)
Slide 67		The Environmental Protection Agency's BASINS 4.0 allows users to explore possible effects of climate change on watersheds and water quality. The software can be downloaded for free and there is a 4.5-hour training session offered through the EPA. (There are also PowerPoint lectures and exercises available on EPA website.) Having experience with ArcGIS will make using this tool easier, but you do not need ArcGIS software on your computer. (BASINS is an open-source GIS tool that can be run independently of ArcGIS).
Slide 68		BASINS has six watershed-related models available in the software. Each model runs by itself, but is also interlinked with the other models. • HSPF is a watershed model. • AQUATOX is a model that simulates interactions between pollutants and biotic life within an aquatic system. • PLOAD is used to determine the amount of pollutants a watershed is carrying. • SWMM is the Storm Water Management Model, which shows how precipitation and various pollutants can move through and effect stormwater systems. • WASP is a Water Quality Analysis Simulation program, which can be used to model water quality in watersheds. • The SWAT model simulates (a) the cycling of nutrients and (b) how cycling substances (such as pesticides, nutrients, erosion and sediment materials, and bacteria) move through hydrologic systems. Source citations: • **HSPF:** Environmental Protection Agency. 2009. *BASINS 4.0 Climate Assessment Tool (CAT): Supporting Documentation and User's Manual (Final Report).* U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/088F. • **AQUATOX:** Environmental Protection Agency. "AQUATOX—Linking water quality and aquatic life." http://water.epa.gov/scitech/datait/models/aquatox/index.cfm (accessed

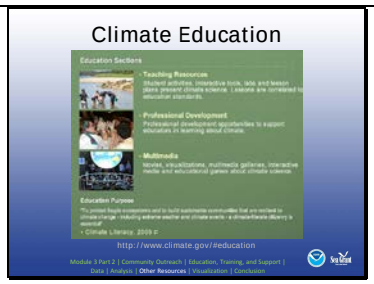
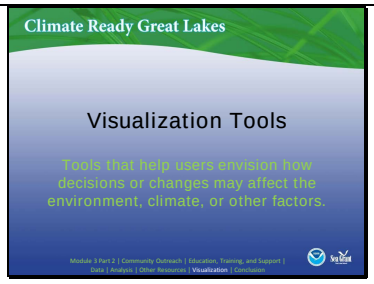
		December 22, 2010) • **PLOAD:** Environmental Protection Agency. 2001. *PLOAD version 3.0 An ArcView GIS Tool to Calculate Nonpoint Sources of Pollution in Watershed and Stormwater Projects*. http://water.epa.gov/scitech/datait/models/basins/upload/2002_05_10_BASINS_b3docs_PLOAD_v3.pdf • **SWMM:** Environmental Protection Agency. 1995. *SWMM Windows Interface User's Manual.* http://water.epa.gov/scitech/datait/models/upload/1999_11_03_models_swmmmanual.pdf (accessed December 22, 2010) • **SWAT:** Environmental Protection Agency. 2001. *Better Assessment Science Integrating point and Nonpoint Sources Version 3.0 User's Manual*. http://water.epa.gov/scitech/datait/models/basins/upload/2009_04_03_BASINS_b3docs_usermanual.pdf (accessed December 23, 2010) Image citation: Environmental Protection Agency. *Better Assessment Science Integrating Point & Non-point Sources (BASINS)*. Computer software, version 4.0 (April 12, 2007). http://water.epa.gov/scitech/datait/models/basins/b3webdwn.cfm (accessed December 21, 2010)
Slide 69		One feature of the BASINS 4.0 analysis system that could be very useful for climate change adaptation planning is the Climate Assessment Tool (CAT). This tool allows users to examine possible effects of climate change on watersheds, including the water quality in the watersheds. The CAT model is linked with the HSPF watershed model, so that pollutants in watersheds can be modeled. Source citation: Environmental Protection Agency. May 2009. *BASINS 4.0 Climate Assessment Tool (CAT): Supporting Documentation and User's Manual*. http://water.epa.gov/scitech/datait/models/basins/upload/BASINS-CAT_USER_MANUAL_FINAL.PDF (accessed December 21, 2010) Image citation: Environmental Protection Agency. *BASINS 4.0 Climate Assessment Tool (CAT): Supporting Documentation and User's Manual (Final Report).* http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=203460 (accessed December 23, 2010)
Slide 70		BASINS is most likely to fit into the planning process later on, when decision makers are looking for strategies for adaptation. (Part II: Strategies for adaptation) It fits a wide range of impact areas including: Stormwater Management, Flood Hazard Reduction, Drought, Air and Water Quality, and Ecosystem Resilience. Since climate change is likely to cause increased events of extreme precipitation, and other effects on hydrologic systems, this tool can be a valuable resource for climate change adaptation planning. Image Citation: "Land Use/Land Cover and other data (EPA's BASINS 3.0)." Auburn University. Web. 23 Dec. 2010. <http://www.eng.auburn.edu/users/doughmp/LULC_tutorials/LULC-outline.htm>.

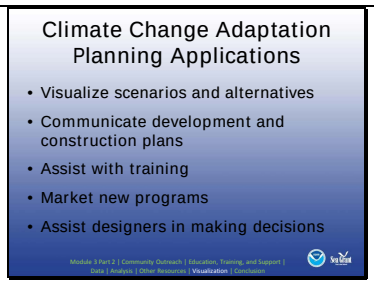
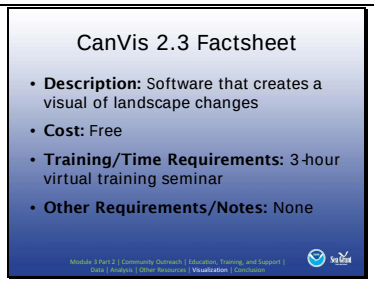
Slide 71		The SWMM model from BASINS 4.0 was used by the EPA in an analysis of fecal coliform bacteria in the Duck Creek watershed near Juneau, Alaska. This case study is just one example of the many climate change adaptation planning applications of the BASINS 4.0 analysis system. Source citation: Environmental Protection Agency. 2000. *Total Maximum Daily Load (TMDL) for Fecal Coliform Bacteria in the Waters of Duck Creek in Mendenhall Valley, Alaska.* http://www.epa.gov/owow/tmdl/examples/pathogens/ak_duckcreek.pdf (accessed December 23, 2010) Image citation: Environmental Protection Agency. 2000. *Total Maximum Daily Load (TMDL) for Fecal Coliform Bacteria in the Waters of Duck Creek in Mendenhall Valley, Alaska.* http://www.epa.gov/owow/tmdl/examples/pathogens/ak_duckcreek.pdf (accessed December 23, 2010)
Slide 72		The Duck Creek Watershed is located in Juneau, Alaska, and has a high percentage of urban lands. Due to the high concentration of fecal coliforms and other pollutants in its waters, Duck Creek was put on the EPA's 1998 303(d) list of impaired waters in Alaska. Most of this bacteria can be traced to wastes from the urban areas and animals (mostly pets but also some wildlife). Often, stormwater and sewage system overflows lead to this type of problem. Climate change is likely to aggravate this issue, because increased events of extreme precipitation are expected for the Great Lakes region—which would in turn cause more incidences of combined stormwater and sewage system overflows. Source citation: Environmental Protection Agency. 2000. *Total Maximum Daily Load (TMDL) for Fecal Coliform Bacteria in the Waters of Duck Creek in Mendenhall Valley, Alaska.* http://www.epa.gov/owow/tmdl/examples/pathogens/ak_duckcreek.pdf (accessed December 23, 2010) Image citation: NOAA Photo Library: NOAA Auk Bay Lab, K. Koski, 1999. "A Pond on Duck Creek." http://www.photolib.noaa.gov/htmls/r0003034.htm (accessed December 23, 2010)
Slide 73		High concentrations of fecal coliforms cause water safety issues and consequences to human health. The bacteria can cause increased incidence "gastrointestinal, respiratory, eye, ear, nose, throat, and skin diseases".Source citation: Environmental Protection Agency. 2000. *Total Maximum Daily Load (TMDL) for Fecal Coliform Bacteria in the Waters of Duck Creek in Mendenhall Valley, Alaska.* http://www.epa.gov/owow/tmdl/examples/pathogens/ak_duckcreek.pdf (accessed December 23, 2010) Image citation: Great Lakes Beach Coast, Great Lakes Information Network. "E. Coli and Other Waterborne Pathogens." http://www.great-lakes.net/beachcast/bw_waterborne.html (accessed December 23, 2010)

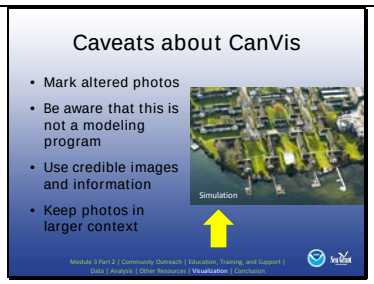
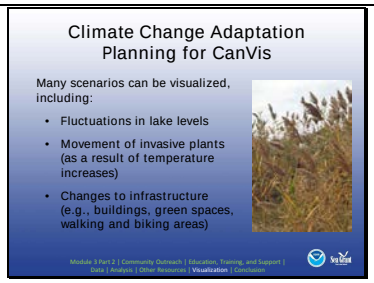
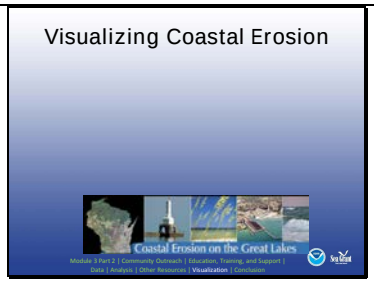
Slide 74		For this case, the EPA selected the SWMM model, because it can be used to (1) simulate urban runoff and (2) show the type and quantity of pollutants that are likely to be carried in the runoff. The SWMM model was used to establish a Total Maximum Daily Load (TMDL) for fecal coliform bacteria in the Duck Creek watershed. According to the EPA, TMDL is "a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards." So, SWMM was used to determine the maximum amount of fecal coliform bacteria that the watershed could manage. To do this, the model was first used to estimate the present concentration of fecal coliform bacteria in the Duck Creek, and then was used to determine an appropriate level of fecal coliform bacteria that could be safely assimilated by Duck Creek in order to meet water quality and safety standards. Source citations: • Environmental Protection Agency. September 2008. "National Pollutant Discharge Elimination System (NPDES)". http://cfpub.epa.gov/npdes/stormwater/tmdl.cfm • Environmental Protection Agency. 2000. *Total Maximum Daily Load (TMDL) for Fecal Coliform Bacteria in the Waters of Duck Creek in Mendenhall Valley, Alaska.* http://www.epa.gov/owow/tmdl/examples/pathogens/ak_duckcreek.pdf (accessed December 23, 2010) Image citation: RiverSides. 2009. "Urban Runoff." *Toronto Homeowner's Guide to Rainfall*. http://www.riversides.org/rainguide/riversides_hgr.php?cat=1&page=38 (accessed December 23, 2010)
Slide 75		The study found that there needed to be a 38% reduction in fecal coliform levels in order for the levels to be returned to acceptable concentrations. As one step in reaching this goal, the EPA also suggested that a monitoring program be formed in order to record the levels of fecal coliform in the watershed and monitor changes—hopefully, improvements—in water quality. The report also made several other recommendations to improve the water quality in Duck Creek: • Increase public participation and education in order to raise awareness about water quality issues in the watershed. • Continue existing efforts and local plans to improve conditions in the watershed and to improve fish habitat.

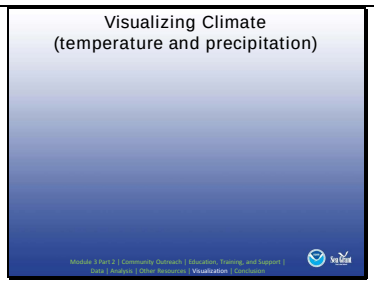
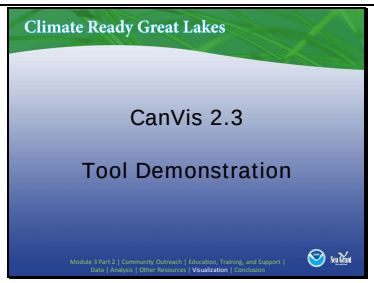
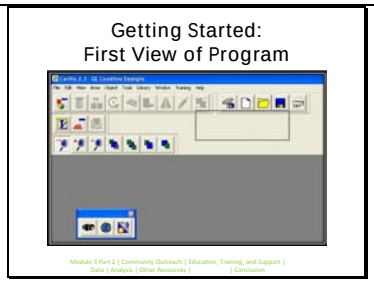
		• Develop a flow allocation to improve fish habitat and water quality. • Create a stormwater management plan. Check out the EPA website (http://water.epa.gov/scitech/datait/models/basins/bsnsdocs.cfm#hspf) for more examples of BASINS applications, including Great Lakes examples. Image citation: Environmental Protection Agency. 2000. *Total Maximum Daily Load (TMDL) for Fecal Coliform Bacteria in the Waters of Duck Creek in Mendenhall Valley, Alaska.* http://www.epa.gov/owow/tmdl/examples/pathogens/ak_duckcreek.pdf (accessed December 23, 2010)
Slide 76		If you're interested in learning more about available Analysis Tools and Systems, check out your handout for a more detailed description of the tools on this slide. Image citations: • United States Forestry Service. "i-Tree." http://www.itreetools.org/ (accessed December 23, 2010) • NatureServe. "NatureServe: A Network Connection Science with Conservation." http://www.natureserve.org/ (accessed December 23, 2010)
Slide 77		The fifth category of tools is called "Other Informational Websites," which are websites that provide additional information on climate change and climate change adaptation planning topics.
Slide 78		This group of tools and websites helps address specific climate change adaptation planning needs that are not addressed in the other tool categories. There is a wide range of resources that include information on topics such as hydrology, climate change, and endangered species. This category does not necessarily fit into a specific step of climate change adaption planning; rather, these resources are meant to provide supplemental information and support throughout the whole process.
Slide 79		NOAA Climate Services Portal is one example of an informational website that can be useful for adaptation planning. Image citation: NOAA Climate Services. "NOAA Climate Services." http://www.climate.gov/#climateWatch (accessed December 23, 2010)

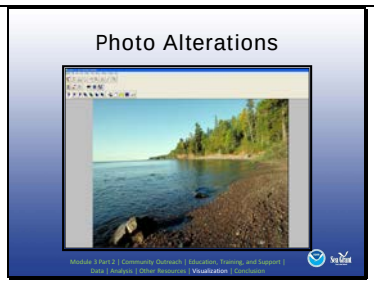
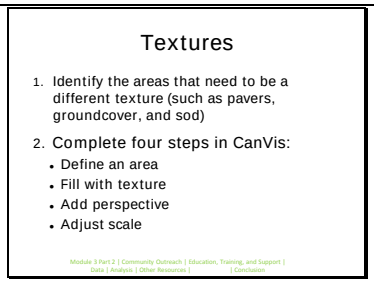
Slide 80		This website offers climate information—ranging from data and services to educational materials and information. It is free to use and does not have any training requirements.
Slide 81		The NOAA Climate Services Portal has four main informational tabs on the website. The first tab is for the ClimateWatch magazine, and users can browse articles, videos, and images related to the magazine. The second tab links users to a wide range of data and services, including information on: • Past, present, and anticipated future climates • Climate-related data and examples on how to use climate data • NOAA partners, including regional and state climate experts The next two tabs are discussed on the following slides. Source citation: NOAA Climate Services. "Data & Services." http://www.climate.gov/#dataServices (accessed December 23, 2010) Image citation: NOAA Climate Services. "Data & Services." http://www.climate.gov/#dataServices (accessed December 23, 2010)
Slide 82		The third tab is called "Understanding Climate," and it directs users to information and resources related to climate change. There are links to assessment reports on the climate and climate factsheets. This portion of the website also provides more information on the six NOAA climate service regions. Source citation: NOAA Climate Services. "Understanding Climate." http://www.climate.gov/#understandingClimate (accessed December 23, 2010) Image citation: NOAA Climate Services. "Understanding Climate." http://www.climate.gov/#understandingClimate (accessed December 23, 2010)

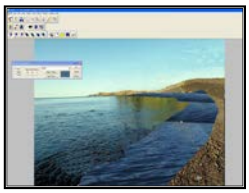
Slide 83		The final tab directs users to valuable educational materials related to climate change. Various resources are available for teachers to use in the classroom, and there is also information on professional development for educators. There is also a resource that provides multimedia educational resources. Source citation: NOAA Climate Services. "Education." http://www.climate.gov/#education (accessed December 23, 2010) Image citation: NOAA Climate Services. "Education." http://www.climate.gov/#education (accessed December 23, 2010)
Slide 84		So, how can the NOAA Climate Services Portal be useful for climate change adaptation planning? The website can be used to find educational materials on climate change, which can be used to educate the public to gain support for climate change adaptation planning. Also, decision makers can use the website in order to (1) learn more about climate change and (2) get in touch with people who can act as resources in the climate change adaptation planning process. This tool does not necessarily fit into a specific part of adaptation planning process—instead, it is best utilized as an informational resource and community outreach tool throughout the process.
Slide 85		If you are interested in finding additional informational websites, please see the handout for a list websites that can be useful for climate change adaptation planning. Image citations: • Environmental Protection Agency, NOAA, and Minnesota's Lake Superior Coastal Program. "Lake Superior Duluth Streams.org." http://www.lakesuperiorstreams.org/ • National Ocean Service. "NOAA State of the Coast." http://oceanservice.noaa.gov/websites/retiredsites/supp_sotc_retired.html (accessed December 23, 2010
Slide 86		Visualization tools help users envision how decisions or changes may affect the environment, climate, or other factors.

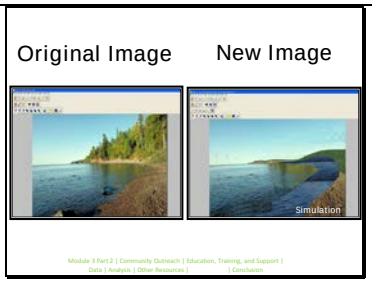
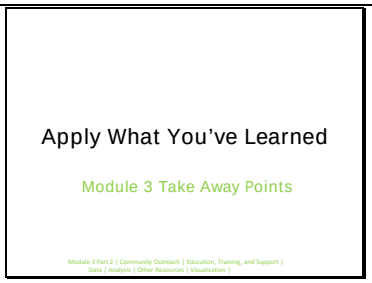
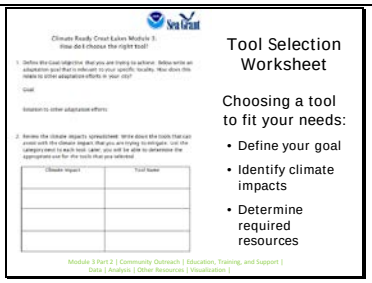
Slide 87		Visualization tools represent data graphically and can make the information easier to understand. This is key in adaption planning, because it allows information to be shared with the public, internal partners, and external partners. This capability can be valuable at any point in the planning process when communication is essential. Applications include assisting with image editing to present alternatives and receive feedback, communicating plans, providing construction aid to contractors, assisting with training, marketing new programs, and assisting designers in making decisions. Citation: USDA National Agroforestry Center. http://www.unl.edu/nac/simulation/examples.htm (accessed December 28, 2010)
Slide 88		A screen shot of the CanVis program's interface; the photo was selected from the CanVis image library.
Slide 89		CanVis is a NOAA Digital Coast software program that creates a visual display of landscape changes. Images help users determine potential impacts of a project. The cost is free, and it requires a three-hour virtual training seminar. Training is conducted via WebEx, which requires internet, phone, and WebEx software.
Slide 90		CanVis can help users visualize different development scenarios. In this example, different shoreline development scenarios in Seattle, Washington, are displayed. CanVis is intuitive, visual, and lends itself to users who have little experience with planning software. Users can upload their own photos, and training and help videos are free and easy to understand. Image citation: NOAA Coastal Services Center

Slide 91		CanVis is a visualization software that allows you to alter photos; insert the word "Simulation" into the corner of the image to make sure that viewers know when photos have been altered. CanVis is not a modeling program; use images based off of information generated from reliable models, reports, or experts. A one-shot photograph may manipulate the perception of the area, so be sure to put the photo in context—especially when using certain angles. Image citation: NOAA Coastal Services Center
Slide 92		CanVis helps to visualize many possible Great Lakes climate change scenarios. For example, the software can show fluctuations in lake levels, movement of invasive plants, addition of off-shore wind turbines, and infrastructure changes. These specific impacts are explained further in Module 1. Image citation: National Park Service. "Plants." http://www.nps.gov/gate/naturescience/plants.htm (accessed on December 28, 2010)
Slide 93		In this example, CanVis was used to alter a photo of Wendy Park in Cleveland, Ohio. The photo simulations show two different scenarios of possible locations for off-shore wind turbines.
Slide 94		CanVis software can be easily accessed/downloaded from NOAA's Digital Coast web site. Image citation: Coastal Services Center. "CanVis." http://www.csc.noaa.gov/digitalcoast/tools/canvis/ (accessed December 28, 2010)
Slide 95		Here is another available visualization tool that can be applied to Great Lakes areas. If you are interested in learning more about this option, please see the handout. Image citations: University of Wisconsin. "Coastal Erosion on the Great Lakes," http://www.geography.wisc.edu/coastal/ (accessed December 28, 2010)

Slide 96		Here is another available visualization tool that can be applied to Great Lakes areas. If you are interested in learning more about this option, please see the handout. Image citations: The Nature Conservancy. "Climate Wizard." http://www.climatewizard.org/ (accessed December 28, 2010)
Slide 97		The following slides are an example of the application of CanVis to Great Lakes Coastal communities. By the end of these slides, you will be familiar with the basic functions of CanVis and possible applications to adaptation planning. To demonstrate the tool, we will walk training participants through a series of CanVis screenshots that depict actual use of the tool. We are using a hypothetical example to illustrate three separate events that could occur in the Great Lakes. This demonstration—which is only for learning purposes—uses a strip of the Lake Superior shoreline. The slides illustrate the inclusion of off-shore wind turbines, fluctuations in shoreline water level, and clearing trees for development.
Slide 98		This slide shows the CanVis interface. Toolbars allow you to design and create a scene.
Slide 99		You can use a photo from the CanVis library or import a photo of your own. In this case, we downloaded a photo from EPA's Great Lakes image library. Image citation: Environmental Protection Agency, Great Lakes National Program Office. Image Collection. "North Shore beach of Lake Superior, Lake Superior, Minnesota." Minnesota Extension Service, Dave Hansen, Sep. 1992. http://www.epa.gov/greatlakes/image/

Slide 100		You can add new objects to the photo, and you can also remove objects already in the photo. For this tutorial, the rocks in the foreground are removed along with the trees in the upper right corner.
Slide 101		The clone tool can be used to copy one area of the photo and paste it over another area. For example, you would use this tool to cover objects with existing groundcover. Here, the rocks in the foreground were “removed” from the image by copying a water image and then pasting it over the rocks.
Slide 102		The Define Area tool is another way to cover objects in the background photo. In this example, the tool was used to specify a square area of the sky, which was then copied over the trees in the upper right corner to remove them from the picture.
Slide 103		Next, you can identify the areas in the photo that need to be a different texture. These include things like pavers, groundcover, and sod.
Slide 104		The software allows you to define the dimensions of an area to cover. Once an area is selected, the area will turn grey.

Slide 105		The texture library allows you to select from a number of different textures: water, brick and stucco, pavers, ground and groundcover, roofing and siding, and stone.
Slide 106	Perspective and Scale  Module 3 Part 2 | Community Outreach | Education, Training, and Support | Data | Analysis | Other Resources | | Conclusion	Perspective and scale can be altered to make the newly textured area look like it is going off into the distance.
Slide 107	Adding Objects Module 3 Part 2 | Community Outreach | Education, Training, and Support | Data | Analysis | Other Resources | | Conclusion	• CanVis' object library includes many categories of objects: agricultural, desert and drought, drawing aids, flowers, grass and groundcover, groupings, hardscapes, people, shrubs, trees, vehicles, vines and climbers, wetland plants, and Wildlife. • Objects can be rotated, flipped, and altered. Additional CanVis objects are available for download, including alternative energy, boats, coastal vegetation, houses, parks and urban areas, satellite and aerial, symbols, transportation, and walls and buffers. The Integration and Application Network has over 2,000 coastal objects available for download. Additional objects can be downloaded from http://www.csc.noaa.gov/digitalcoast/tools/canvis/download.html.
Slide 108		This finished product is an example of what the software is capable of doing. Again, precise modeling and scale will be needed for accurate reflections of climate impacts.

Slide 109		At left, the original image. At right, the finished product created in CanVis.
Slide 110		The information presented in this module should help you get started on choosing and using tools for your own community's adaptation plan.
Slide 111		With the information that you've learned in this module, you should now be equipped to (1) start choosing appropriate tools for your community and (2) find resources and information that can help you use the tools effectively. This module also highlighted key climate change adaptation tools available to Great Lakes' communities; some of those tools may be directly applicable to your community's needs and available resources. See the handout for more details on the various climate change adaptation planning tools; use the contacts listed there to find out more information. Remember that there are two other modules available to help your community adapt to climate change. Module 1 can help you learn more about anticipated climate change impacts, and Module 2 can help you learn to develop an adaptation plan for your community. Image citation: Environmental Protection Agency. "Visualizing the Great Lakes." http://www.epa.gov/greatlakes/image/vbig/8.jpg (accessed December 23, 2010)
Slide 112		Now that you've completed the Module 3 training, you can use this worksheet to apply this knowledge to climate change adaptation planning to your area.