Source Water Protection: An Overview

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HELPING TO ENSURE SAFE AND RELIABLE DRINKING WATER

Office of Drinking Water

Mission:

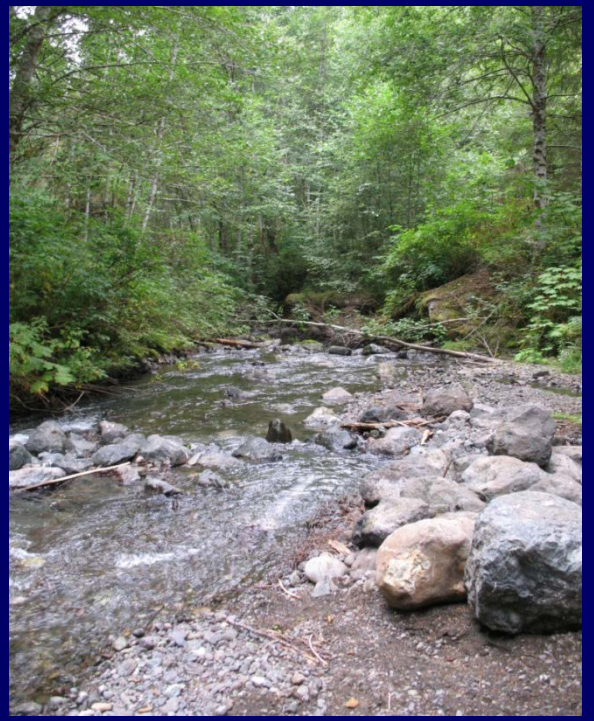
To protect the health of the people of Washington State by ensuring safe and reliable drinking water.

Objectives

- Describe the benefits of source water protection.
- Describe the potential threats to source water.
- Identify the necessary elements of a source water protection program.

What is Source Water Protection?

- Practices to prevent contamination of groundwater and surface water that are used or potentially used as sources of drinking water.
- Protection measures form the first barrier to drinking water protection.



S. Fork of the Little River

Source Water Protection

- Planning process that emphasizes protection of:
  - Wellhead
  - Aquifer
  - Surface water
  - Watershed
- Prevents loss of drinking water quality ***and*** quantity.
- Focuses on prevention because of cost and difficulty to replace source.

What are the Benefits of Source Water Protection?

- Public health protection
- Reducing emergencies
- Economic benefits
- Environmental benefits
- Public confidence

Public Health Protection

- Reduced risked to public health from both acute and chronic aliments.
- Threats include microbial contaminants, metals, volatile organic contaminants, synthetic organic contaminants, and pesticides. These can cause:
  - Stomach or gastrointestinal illness.
  - Cancer.
  - Organ, nervous system, and blood damage.
  - Death.

Preventing Emergencies

- Knowing the risks can help prepare for, mitigate, or potentially avoid an emergency.
- A good source water protection (SWP) program contains an emergency response plan and contingency plan.

Cost of Contamination

- Abandoning existing source
- Higher future capital and operational costs
- Water and land contamination remediation
- Increased monitoring
- Additional treatment
- Engineering and legal expenses
- Finding and developing a new source
- Providing emergency replacement water

Cost of Contamination (cont.)

- Lost revenue
- Loss of economic development
- Loss of consumer confidence
- Health care cost associated with contamination-related illnesses
- Loss of productivity and wages within the community
- Public relations—customer information

Environmental Benefits

- **Watershed protection provides:**
  - **Ecosystem benefits.**
  - **Improved habitat for fish and wildlife.**
- **Watersheds can be managed to allow for recreational activities.**
  - **Enhanced quality of life.**

Public Confidence

- Better aesthetic water quality.
- Meeting customers expectations.
- Improving communication and cooperation among stakeholders.
- Demonstrates to the public your commitment to having a safe and reliable source of high quality water.

Who Ultimately Protects the Source?

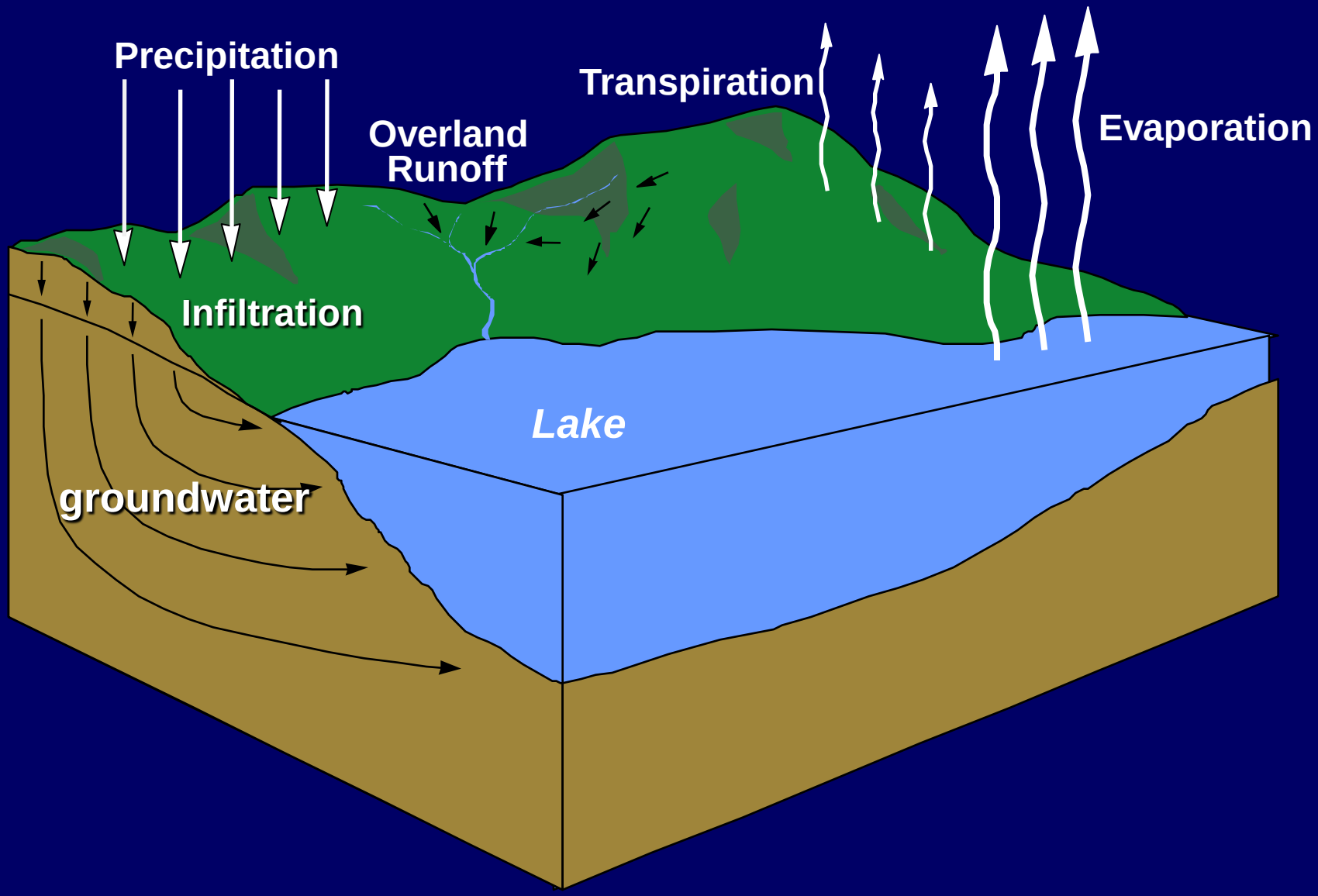
- The Feds?
- The State?
- The County?
- The Community?
- The Purveyor?

Successful and effective source water protection is implemented at the community level.

Vulnerability and Sensitivity of Drinking Water Sources

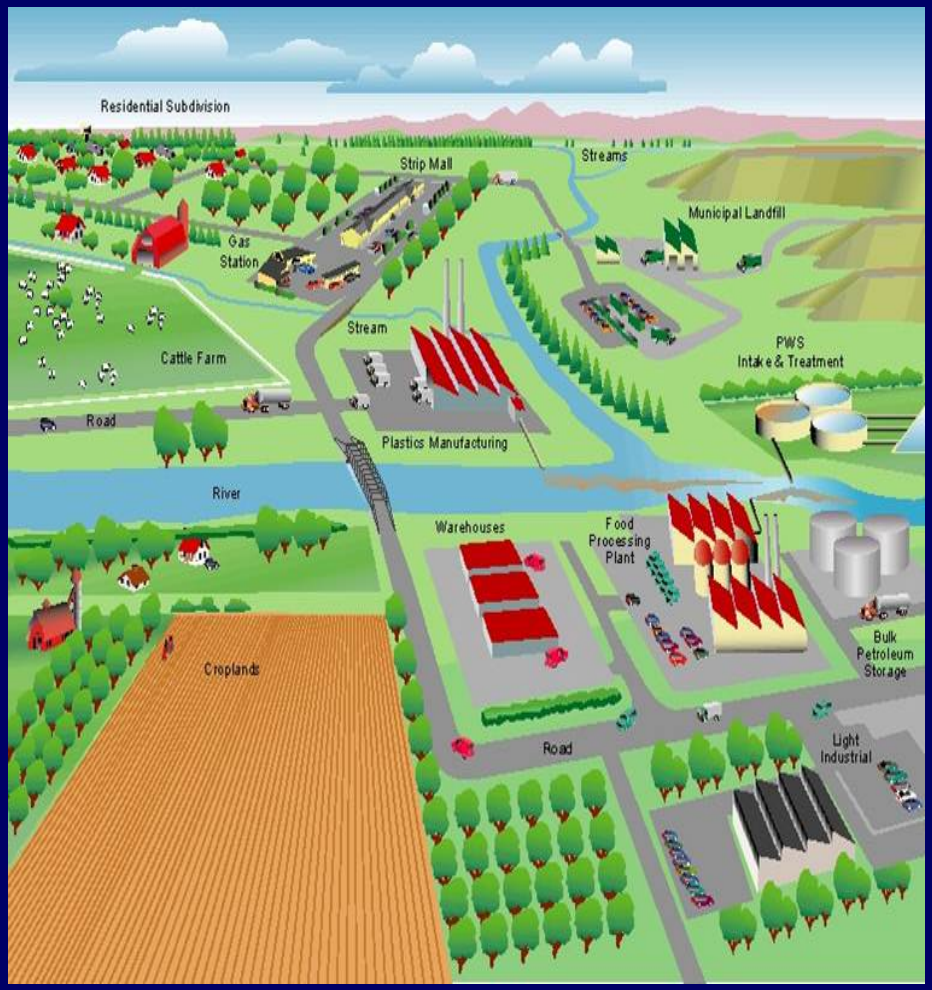
- Surface water
  - Runoff
  - Groundwater infiltration
- Groundwater
  - Infiltration from the surface
  - Infiltration from sub-surface sources
  - Naturally occurring substances

The Hydrologic Cycle



Potential Sources of Contamination

- Industrial and commercial activities
- Animal feeding operations
- Agriculture
- Improper forest practices
- Septic systems
- Underground storage tanks
- Landfills and surface impoundments
- Stormwater runoff



Best Management Practices

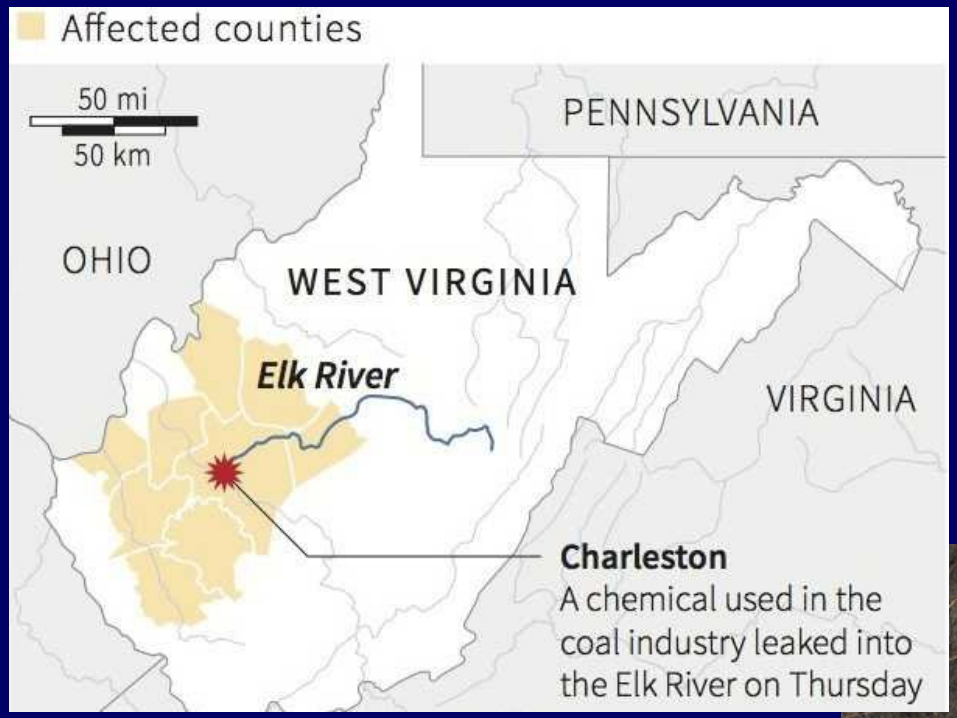
- **Agricultural:**
  - Grazing zones
  - Stream buffers
  - Integrated pest management
- **Industrial:**
  - Analyze processes to identify opportunities for reducing chemicals and wastes
  - Improved waste storage and collection
  - Spill containment

Contamination is Expensive

- A community may spend millions of dollars responding to contamination.
- Responding to contamination is about 200 times more costly than prevention.

Case Study: Elk River Spill, January 2014

- 10,000 gallons of crude Methylcyclohexanemethanol (MCHM) leaked into the Elk River 1.5 miles upstream of the West Virginia American Water Intake.
- 300,000 customers, 6-9 day “do not drink” order.
- The system had to replace all treatment plant filter—cost $1.2 million.


Affected counties
50 mi
50 km
PENNSYLVANIA
OHIO
WEST VIRGINIA
Elk River
VIRGINIA
Charleston
A chemical used in the coal industry leaked into the Elk River on Thursday

Economic Rationale

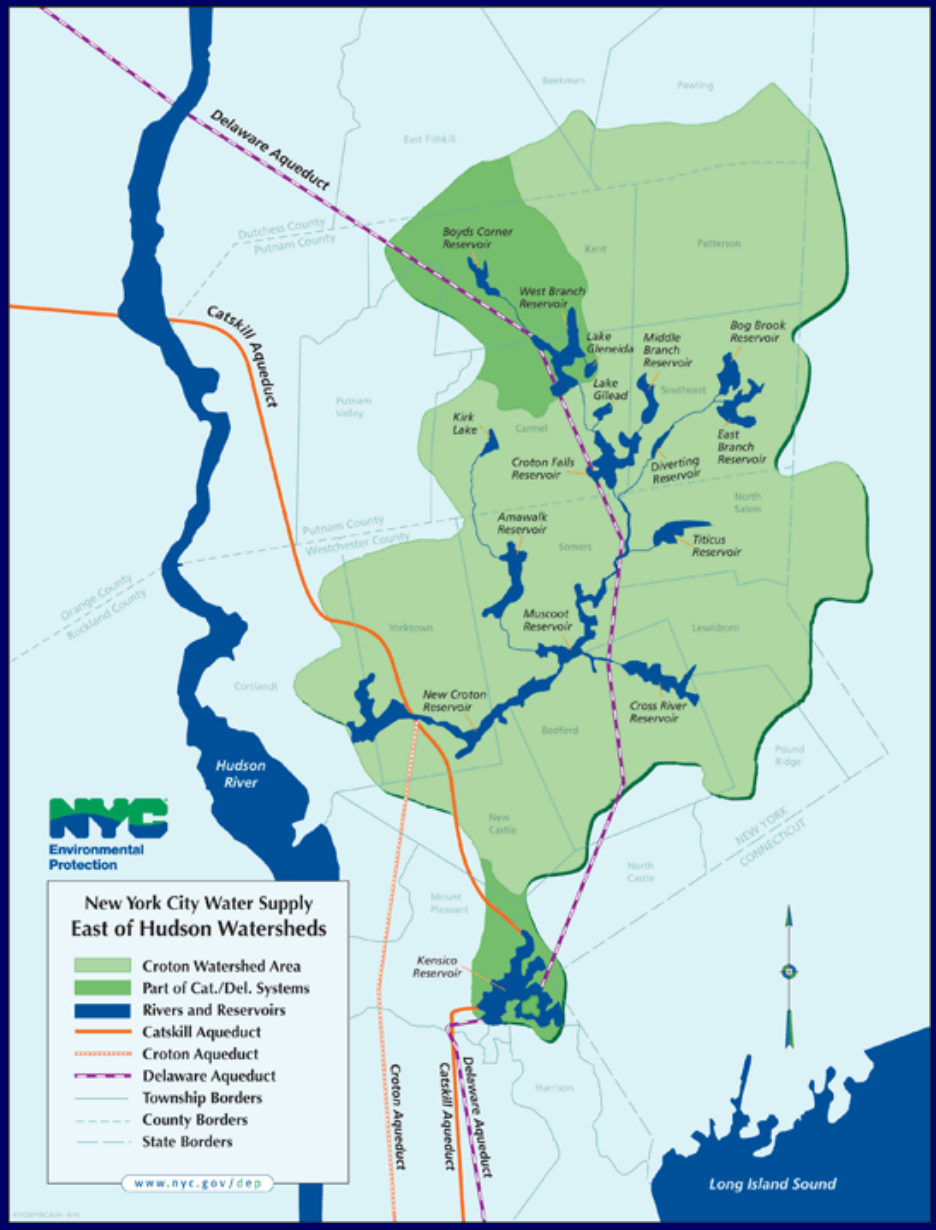
- Reduced capital costs.
- Reduced variable treatment costs.
- Reduced dredging and other maintenance costs.

Case Study: New York City

- Provides 1.2 billion gallons daily to nine million residents.
- Source is 19 surface water reservoirs and tributaries.
- Protection through partnerships:
  - New York State agencies
  - Upstate communities
  - U.S. EPA and other federal agencies
  - New York State Department of Environmental Conservation
  - Members of the environmental community

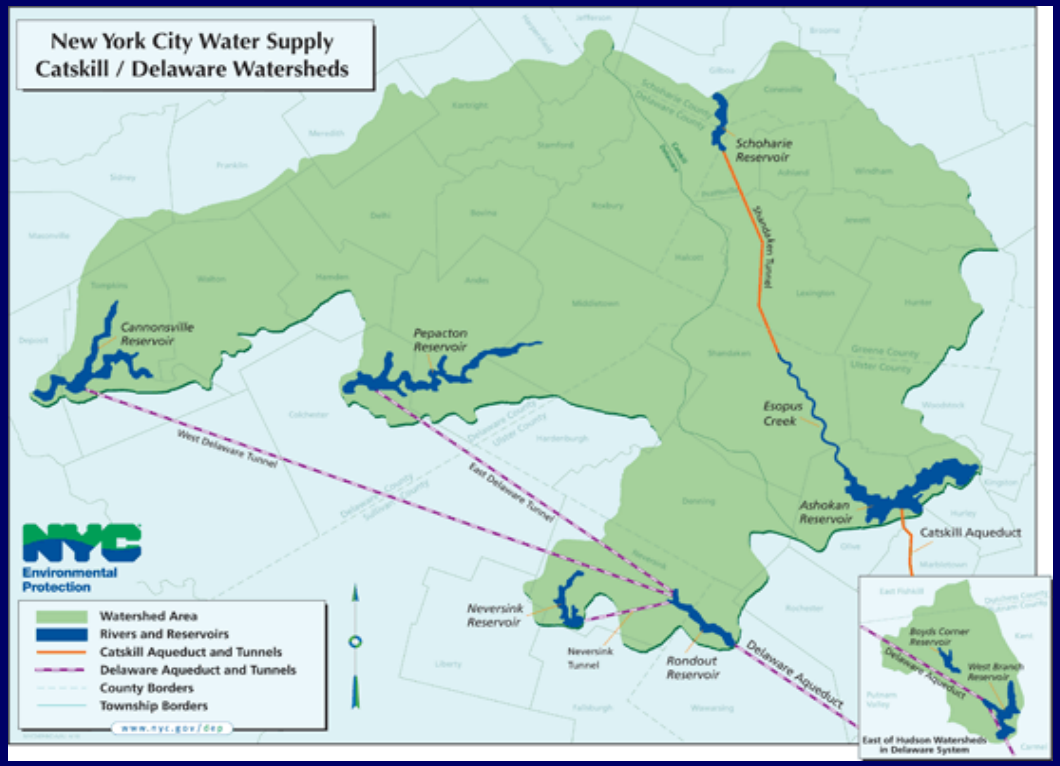
Invested $10 million in watershed protection program.

- Own or have easements on 200,000 acres of watershed.
- Avoided building a $8-10 billion filtration plant, with $1 million in annual operating costs.



Other Benefits of Watershed Protection

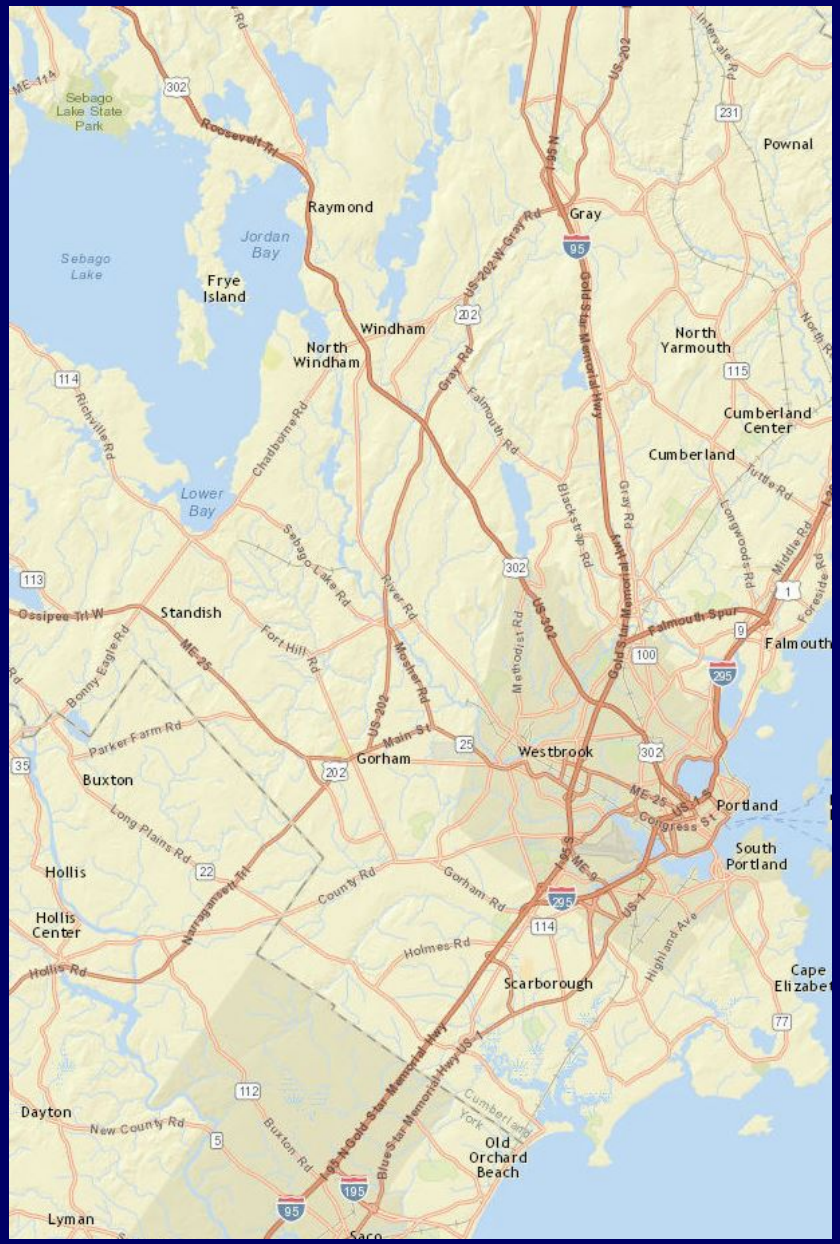
- **Recreational activities:** 120,000 acres are open through permits for recreational activities that include: hunting, fishing, hiking, trapping and non motorized boating on some reservoirs.
- **Agricultural activities.**
- **Forest practice—In line with the watershed forest management plan.**



Case Study: Portland, Maine

The watershed is located about nine miles north of the city.

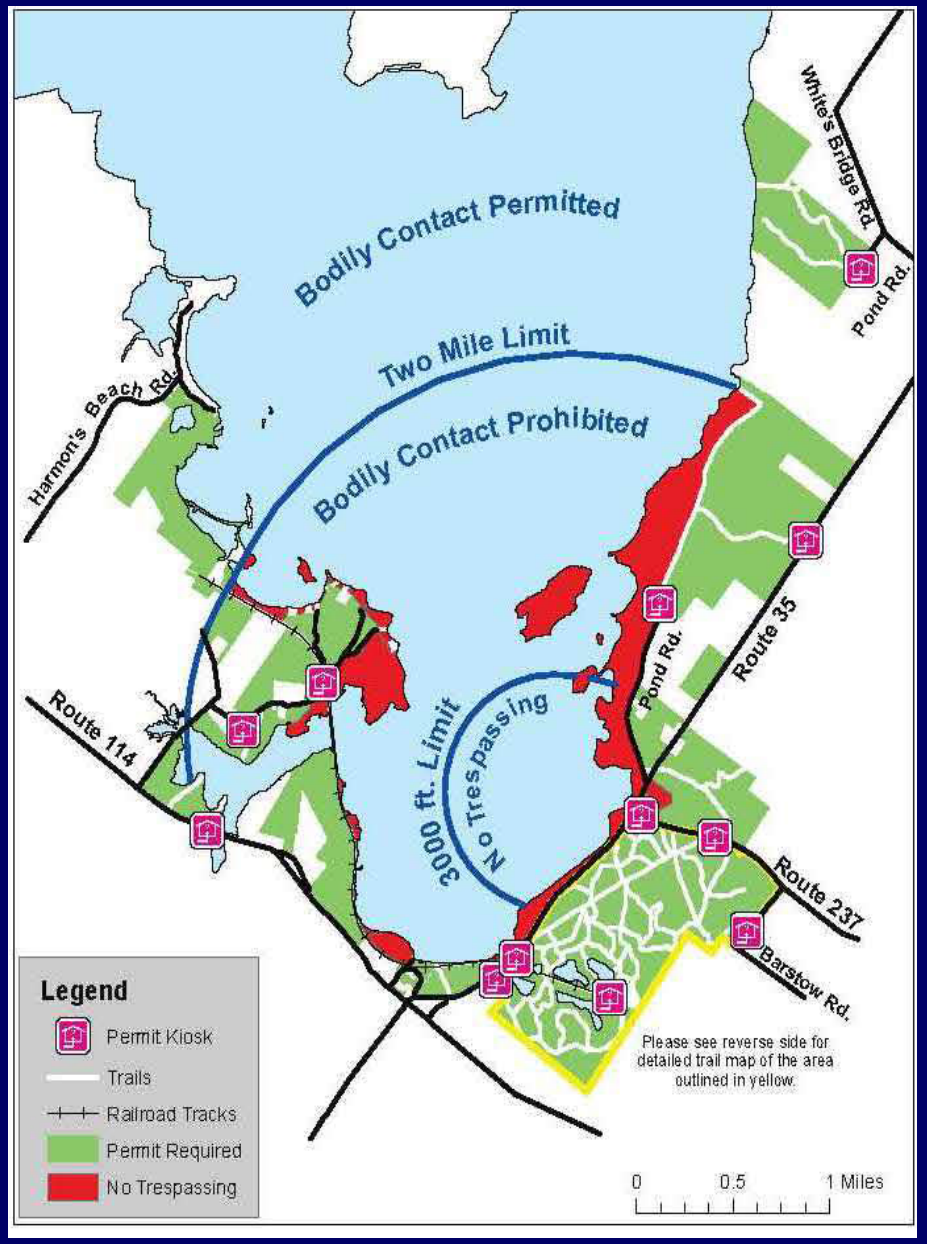
- It is 361 square miles and about 81.5 percent is undeveloped vegetated area.
- 1913 state law recognized lake as drinking water supply.



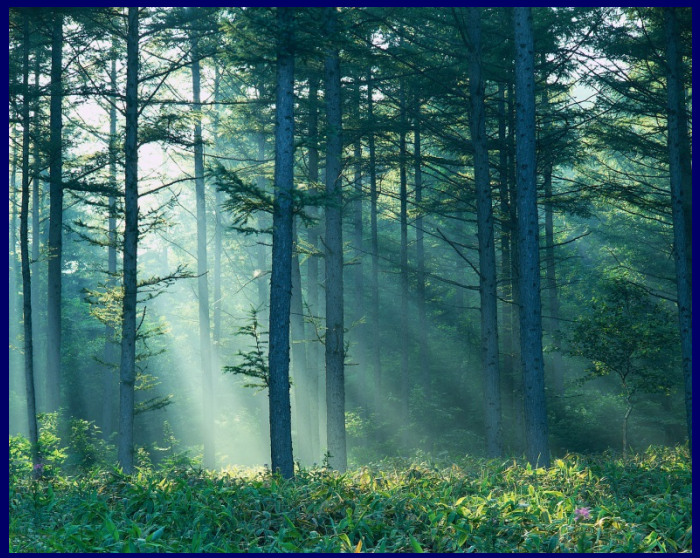
Protection includes: No Bodily Contact and No Trespassing limits.

- Strict enforcement allows the water district to maintain filtration avoidance.
- Public access is allowed on 1,700 acres of the 2,500 acres of district controlled watershed.

Water district saved customers $20-50 million dollars of infrastructures cost.



Scientific Rationale



- Using best management practices can result in:
  - Healthy forests that are effective at improving water quality.
- Poorly managed roads can increase turbidity levels in surface water. (Cornish 2001)
  - Properly managed stream buffers can prevent sediment delivery to streams.

Approaches to Source Water Protection

- Land acquisition
- Conservation easements
- Collaborative management
- Watershed planning
- Regulations

American Water Works Association Standards for Source Water Protection

AWWA Standard G300
Optimizing Utility Operations

Vision

- Guides the development and implementation of the source water protection (SWP) program.
  - It's the utilities statement of commitment to SWP.
  - Helps to align resources and priorities.
- Stakeholders need to be involved in the vision process.

Bolder Creek Impoundment

Stakeholders

- Can include the following:
  - Other water users and suppliers
  - Government officials
  - Important commercial, industrial, and agricultural interests
  - Environmental and citizen groups
  - Landowners
  - The public

Stakeholder Involvement

- Brings diverse stakeholders together to help each understand the benefits and impacts of the proposed program.
- Jointly identify opportunities and alternatives.
- Develop a compromise that improves the watershed conditions in an affordable manner.

Source Water Characterization

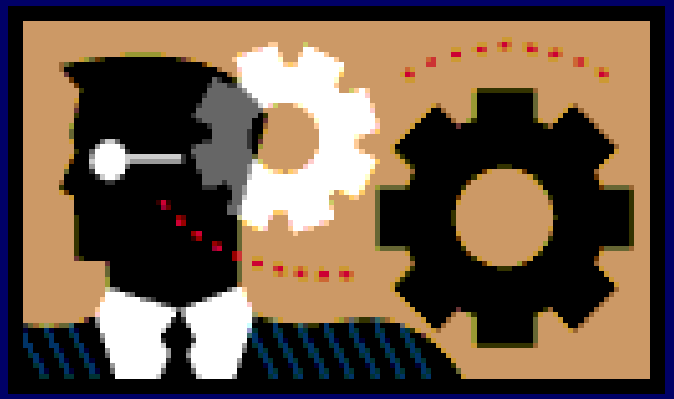
- **Data Gathering**
  - Geographical and geological information
  - Landscape information
  - Water quality and quantity
  - Potential contamination sources
  - Landownership and land use activities
  - Risk assessment (source susceptibility)

Program Goals

- Brings diverse stakeholders together to develop goals.
- Should address issues identified in the characterization.
- Can be either broad or specific.

Action Plan

- Identifies pathways to achieving the goals.
- Identifies activities or actions that will mitigate an existing or future threat to source water.
- Needs to identify specific timelines and priorities.
- A plan for how you will evaluate the program.



Implementation

- Is core to the program.
- No protection is achieved without action.
- Adaptive management may be needed to respond to barriers.
- Stick to the timelines established in the action plan.

Evaluation and Revision

- This is a living document.
- Schedule periodic reviews.
- Evaluate if this program is meeting the vision and goals of the program.
- Revise the plan if things change.

Other Tools

- Public education
- Environmentally responsible land management
- Financial incentives
- Emergency response planning

Public Education

- Knowledge is powerful.
  - Individuals may not understand the impact their actions have.
- Target messages.
  - Use appropriate messages for different audiences.

Responsible Land Management

- Encourage activities that reduce threats to drinking water.
  - Landscaping with native plants.
  - Proper crop rotation and animal grazing can reduce the need for pesticides and fertilizers.
  - Integrated pest management program.

Financial Assistance

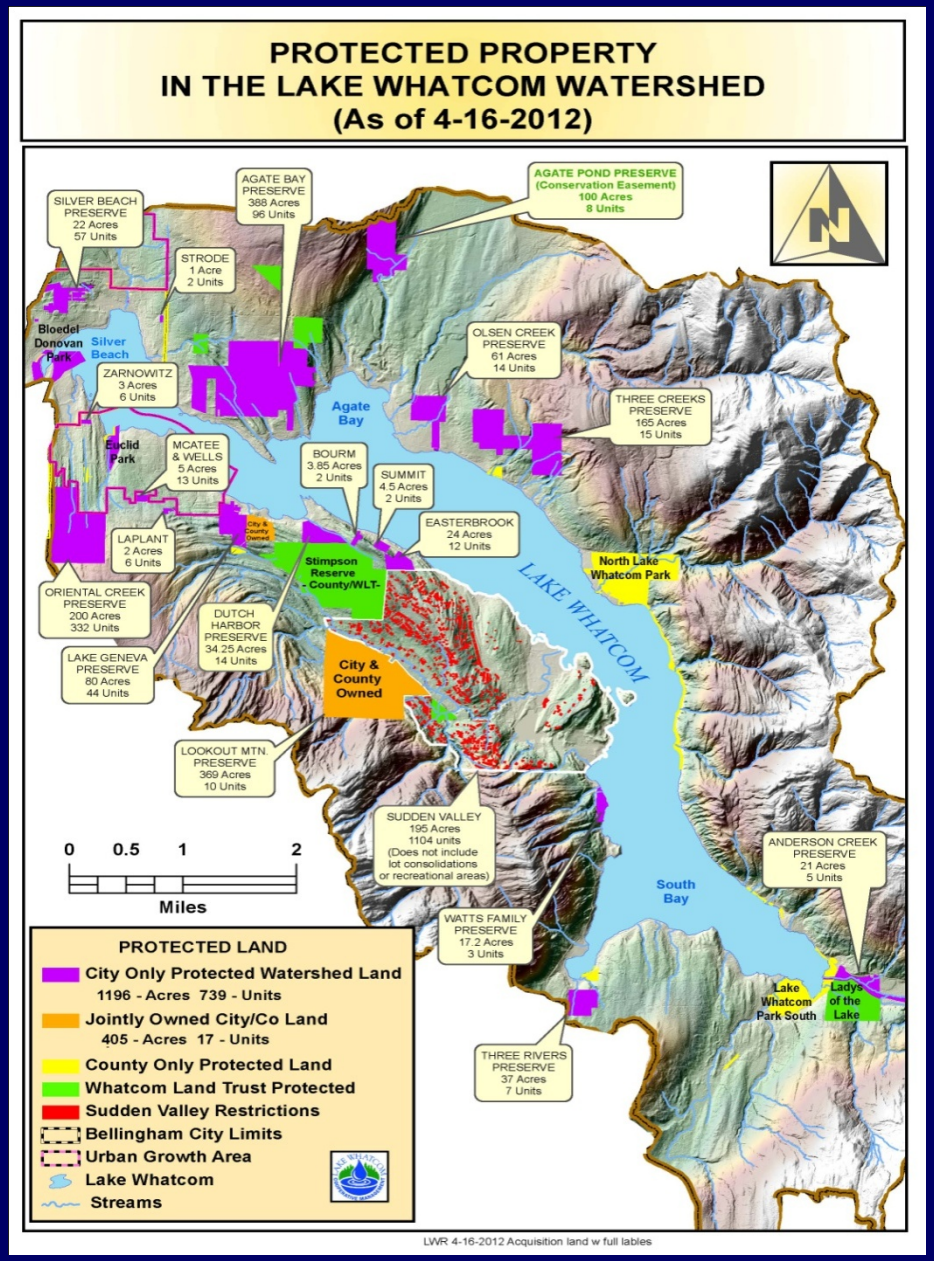
- USDA may provide incentives for some agricultural measures.
  - Local Conservation District
- Office of Drinking Water's has source water protection grants.

Emergency Response Planning

- Anything that threatens your source is a potential emergency.
- Source water protection includes an emergency plan that:
  - Emphasizes prevention.
  - Identifies main threats.
  - Details response procedures.
  - Determines replacement options (contingencies).
  - Great tools are available on our website at www.doh.wa.gov/drinkingwater

Bellingham Source Water Protection

- Surface water watershed.
- Source water protection program emphasizes:
  - Land acquisition—protection.
  - Landowner agreements.
  - Surveillance.
  - Education.
- Funded with $12 per month fee.



Bellingham

- 30,000 acre watershed
- 1,600 protected acres
- Focus land acquisition around surface water

Bellingham Source Water Protection

- Landowner agreements
  - DNR agreement = Lake Whatcom Landscape Plan (complements acquisition program).
  - Enhanced forest practices to ensure protection.
    - Logging
    - Road building
    - Aerial spraying of pesticides/herbicides
  - Informal agreements with other landowners.
  - Considering formalizing agreements in line with DNR Landscape Plan.

Monitoring

- Restoration contractor inspects properties and reports monthly.
- Field and survey staff help inspect.
- Adjacent property owners keep eye out.

Education

- Emphasizes stewardship and personal responsibility of watershed residents.
- Couple of staff.
- Lake Stewards Program.
- Various issue-specific campaigns.
  - Phosphorous reduction
  - Boat-related pollution
  - Stormwater

Regulatory Context

- Clean Water Act 1972
- Clean Water Act 1987 Amendment
  – water quality
- Safe Drinking Water Act 1974
- Safe Drinking Water Act 1986 Amendment
  – Wellhead Protection Program
- Safe Drinking Water Act 1996 amendments
  – Source Water Assessment Program (SWAP)

Regulatory Context (cont.)

- State Water Quality Standards
  - WAC 173-200
- State drinking water regulations require:
  - Surface and groundwater under the influence of surface water (GWI) systems (WAC 246-290-135 and 246-290-668)

Questions?

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HEALTHIER WASHINGTON