

Source Water Assessments

&

Wellhead Protection



# Source Water Assessments

1,668 Source Water Assessments for the wells, springs, lakes, rivers, and streams in Alaska that serve as sources of drinking water for 1,427 public drinking water systems were completed by DWPP staff and contractors from June, 2000 to June 30, 2004.

# Alaska's Sources of Public Drinking Water

## Class 'A' sources (758):

- 615 wells
- 6 springs
- 135 lakes, rivers, & streams
- 2 Rain Catchments

Staff: 529

Contractors: 235

# Alaska's Sources of Public Drinking Water

## Class 'B' sources (910):

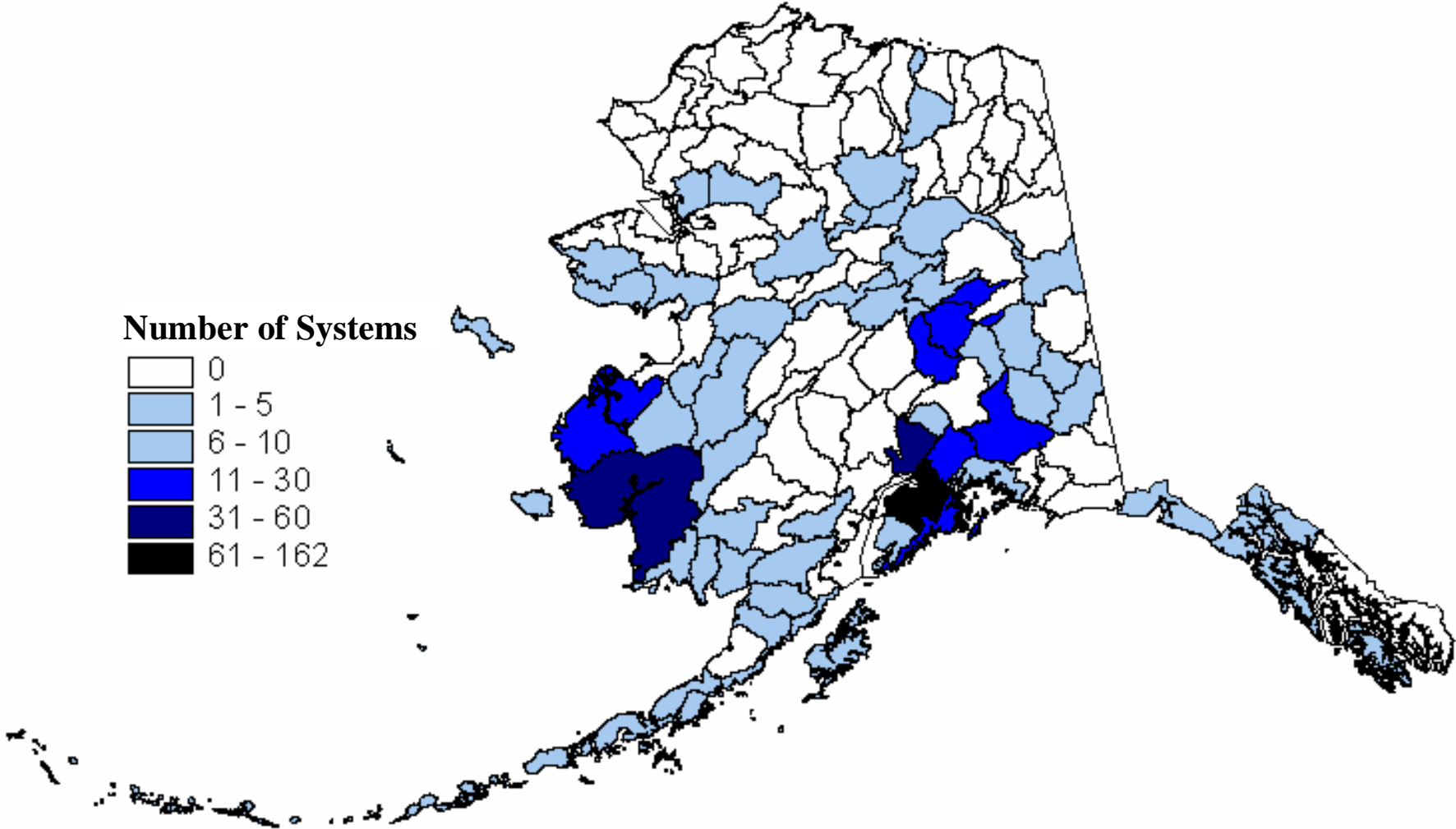
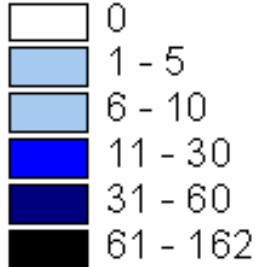
- 861 wells
- 4 springs
- 40 lakes, rivers, & streams
- 5 Rain Catchments

Staff: 159

Contractors: 745

# Distribution of community & nontransient/noncommunity public water systems in Alaska using groundwater

Number of Systems



# Step 1 - Determine the area of potential impact?

wells

springs

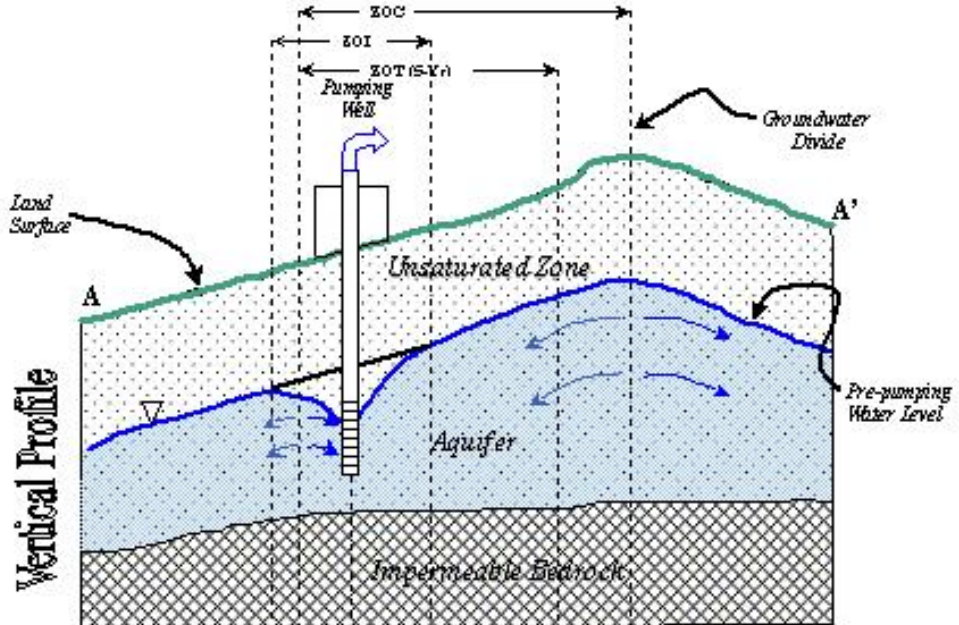
lakes, reservoirs, ponds

ivers, streams

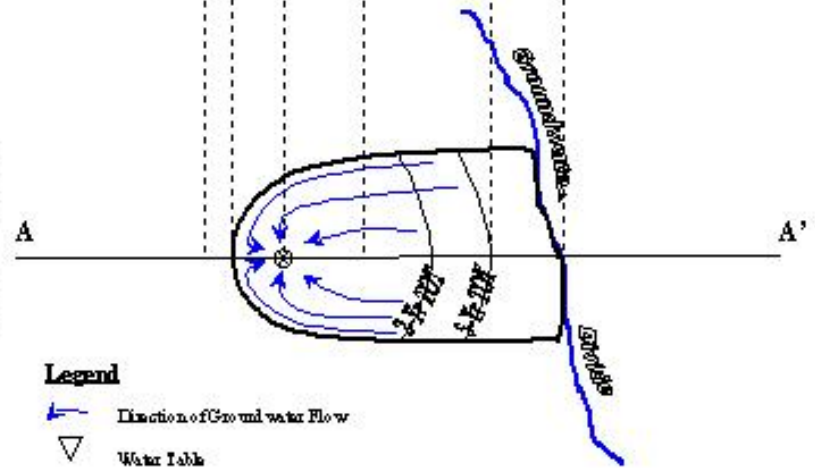


*Takes into account:*

- *Pumping rate*
- *Groundwater gradient*
- *Hydraulic conductivity*
- *Saturated thickness of the aquifer*



**Vertical Profile**



**Plan View**

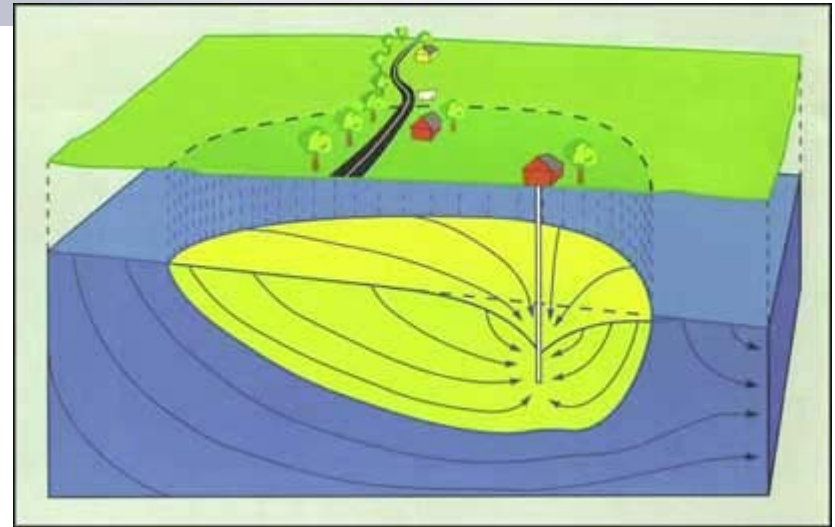
**Legend**

- Direction of Groundwater Flow
- Water Table
- ZOC Zone of Contribution
- ZOI Zone of Interest
- ZOT Zone of Travel
- TOT Time of Travel
- ZOI Zone of Influence

*Assumes:*

- *Uniform flow*
- *Uniform aquifer thickness*
- *Homogeneous/ Isotropic Conditions*

# Wells



**Zone A Protection Area** = This zone corresponds to a travel time to the well ranging from a few days to several months.

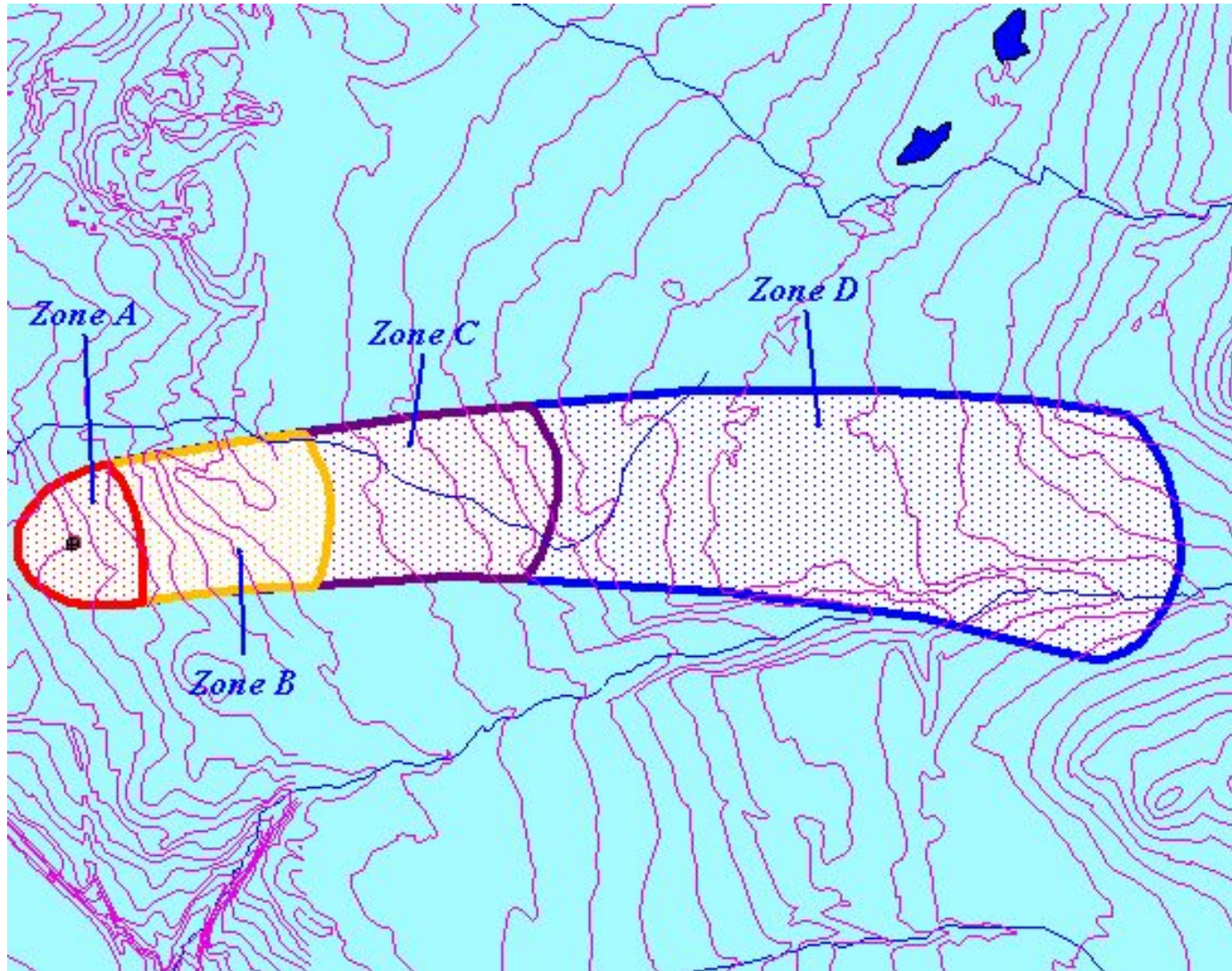
**Zone B Protection Area** = This zone corresponds to a travel time to the well ranging from several months to 2 years.

**Zone C Protection Area** = This zone corresponds to a travel time to the well ranging from 2 years to 5 years.

**Zone D Protection Area** = This zone corresponds to a travel time to the well ranging from 5 years to 10 years.



# *Drinking Water Protection Area Zones for Wells*



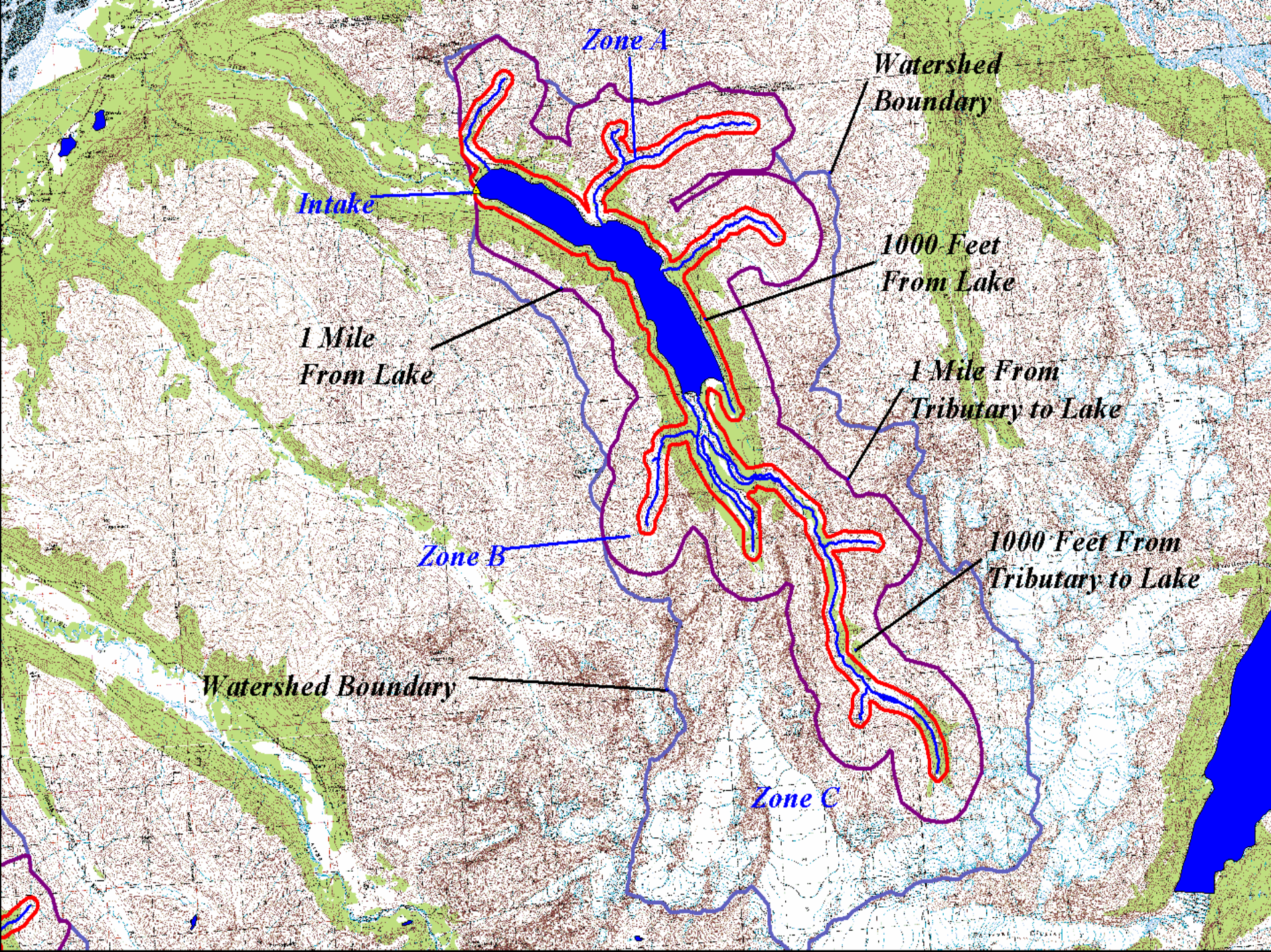
# Surface Water Sources

- Delineation is the same for Class A and Class B PWS
- From the intake, areas extend “uphill/upstream” of the intake

**Zone A Protection Area** = from the surface water body’s shore to a distance 1000 feet from the shore.

**Zone B Protection Area** = from the outer boundary of Zone A to a distance 1 mile from the shore (1000 feet – 1 mile).

**Zone C Protection Area** = from the outer boundary of Zone B to the boundary of the immediate watershed.



*Zone A*

*Watershed Boundary*

*Intake*

*1000 Feet From Lake*

*1 Mile From Lake*

*1 Mile From Tributary to Lake*

*Zone B*

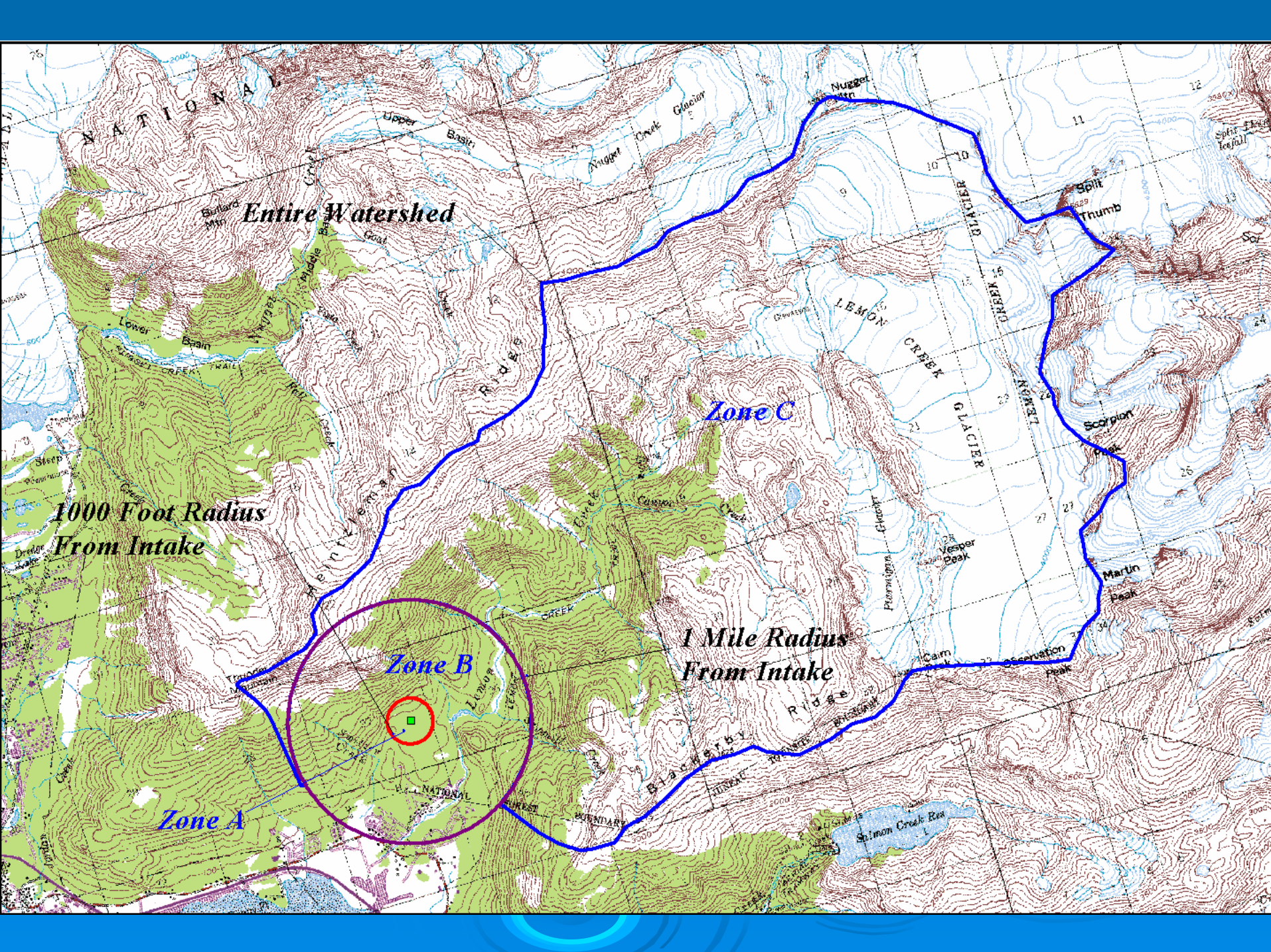
*1000 Feet From Tributary to Lake*

*Watershed Boundary*

*Zone C*

# Natural Springs

- Delineation is the same for Class A and Class B PWS.
- From the spring outlet, areas extend “uphill”.
- **Zone A Protection Area** = area from the outlet radially uphill to distance equal to 1000 feet from the outlet.
- **Zone B Protection Area** = from the outer boundary of Zone A to a distance of 1 mile from the outlet.
- **Zone C Protection Area** = from the outer boundary of Zone B to the watershed boundary (this area may extend beyond the immediate watershed boundary depending of hydrogeologic conditions).



*Entire Watershed*

*1000 Foot Radius From Intake*

*Zone C*

*Zone B*

*1 Mile Radius From Intake*

*Zone A*

NATIONAL

LEMON CREEK

Blanchard Ridge

Simon Creek Reservoir

Upper Basin

Lower Basin

NATIONAL FOREST BOUNDARY

Vesper Peak

Martin Peak

Nugget Creek

Split Thumb

Scorpion

Cam Observation Peak

Simon Creek Reservoir

*Additional Drinking Water Protection Areas for Wells on  
Floodplains or in Close Hydrologic Connection with  
Surface Water Bodies*

**Zone E Protection Area** = from the surface water body's shore to a distance 1000 feet from the shore.

**Zone F Protection Area** = from the outer boundary of Zone E to a distance 1 mile from the shore (1000 feet – 1 mile).

**Zone G Protection Area** = from the outer boundary of Zone F to the boundary of the immediate watershed.



Step 2 - Identify existing and potential sources of contaminants.

DWPP Contaminant Source Database

Local survey (Class A PWS Owners/Operators)

# **Range of contaminant sources:**

**agricultural**

**some residential**

**commercial**

**transportation facilities/structures**

**wastewater & storm water disposal**

**landfills, dumps + ...**





**storage tanks**

**green areas**

**industrial**

**resource extraction (mines, logging, etc.)**

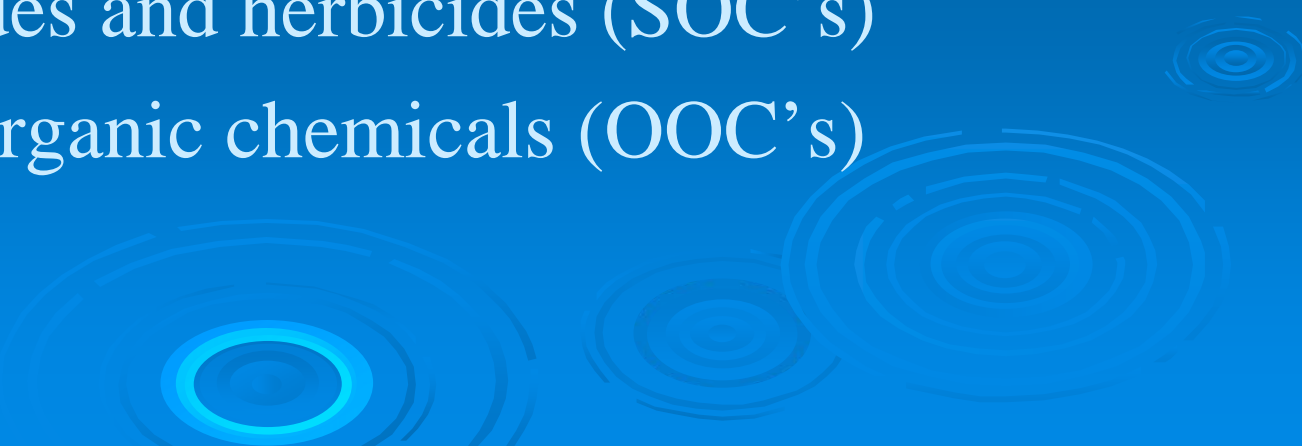
**some military activities**

**wells/boreholes**

**natural (background contamination)**



## *Sort Inventory of Contaminant Sources by Drinking water-regulated contaminants:*

- Bacteria, viruses, protozoa
  - Nitrates/nitrites
  - Heavy metals, etc.
  - Volatile organic chemicals (VOC's)
  - Pesticides and herbicides (SOC's)
  - Other organic chemicals (OOC's)
- 

Rank identified contaminant risks (within categories):

very high ('industrial strength')

high

medium

low



# Step 3 - Vulnerability of the drinking water source to contamination?

*hydrologic susceptibility*

+ *contaminant risks*

➔ *vulnerability*



# ***What Do Source Water Assessment mean to PWS Owners and the Communities?***

- **The Source Water Assessment is a TOOL to be used by the public water system, community, local, state, and federal governments, and the general public to protect the source of drinking water.**
- **This is the first stage of awareness and planning... understanding what the potential or existing threats are to the source of drinking water.**



# ALASKA'S

# Wellhead Protection Program

