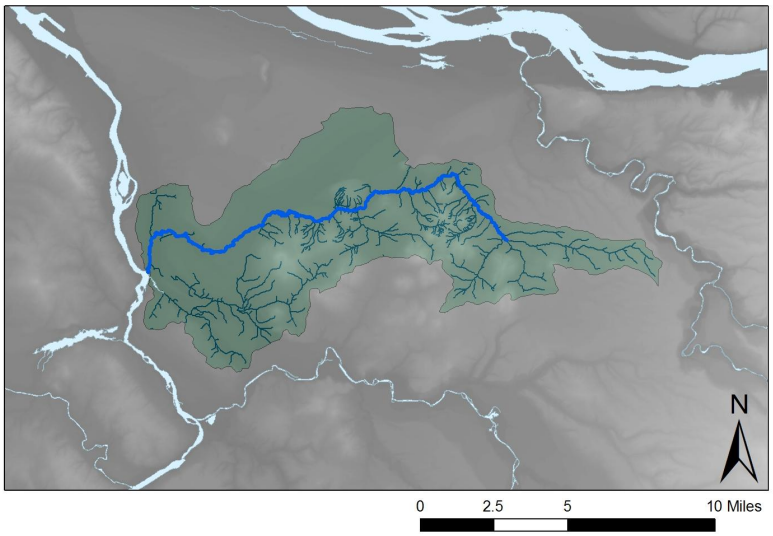
Using GIS to determine locations to reduce runoff within the Johnson creek watershed.

Integrating Habitat
Replacing impermeable with Permeable Surface

Jay Hersh

Johnson Creek Watershed



Source: RLIS

Tacoma Street Light Rail Station

- New MAX orange Line to Oak Grove
- Features
  - 50% Permeable Surface (we can do better)
  - Integrating habitat
  - Not just a stop but a destination
  - Celebrate Johnson creek

Stream Facts

- 26 miles long
- 15 miles of the creek were rock lined to reduce the effects of floods.
- Historically 10s of thousands of salmon spawned in the creek. In 2002 17 salmon were counted
- In the 1970s the creek sustained no life

Potential for other restoration

- This Project is one step in the direction of reducing runoff and pollution as well as integrating habitat
- It is not going to restore Johnson creek
- Projects like this can spearhead other similar projects

How do we locate Potential restoration sites.

- Non-point source pollution is the big issue.
- Using GIS
  - Spatial Analysis
- Looking at problem areas
  - Low permeability high runoff

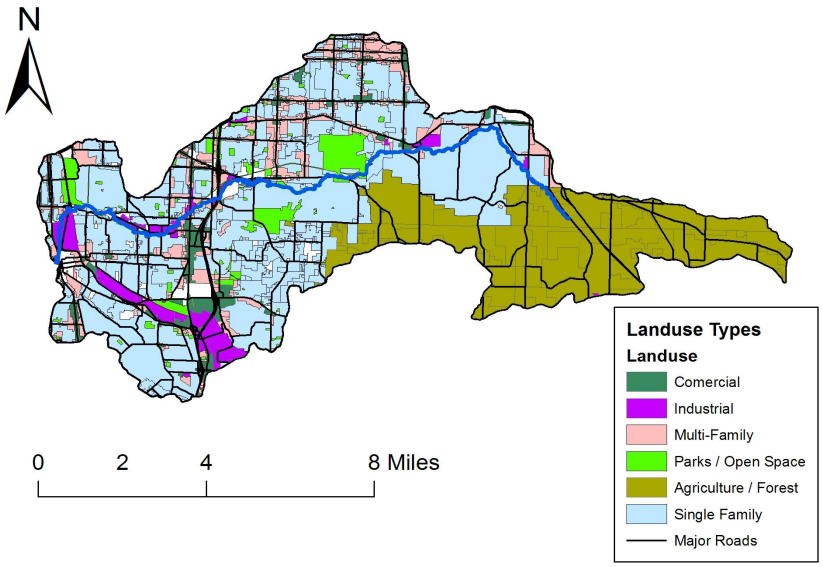
The Goal

- Look at the potential for other similar projects within the watershed.
- Improve and create habitat
- Improve water quality by reducing non-point source pollution

Solution to the Problem

- Look at areas within basin with high runoff, for potential mitigation.
  - Known solutions
  - Easy solutions

Landuse Within Johnson Creek Watershed



Source: RLIS, May 2010

Potential Hotspots for Mitigation

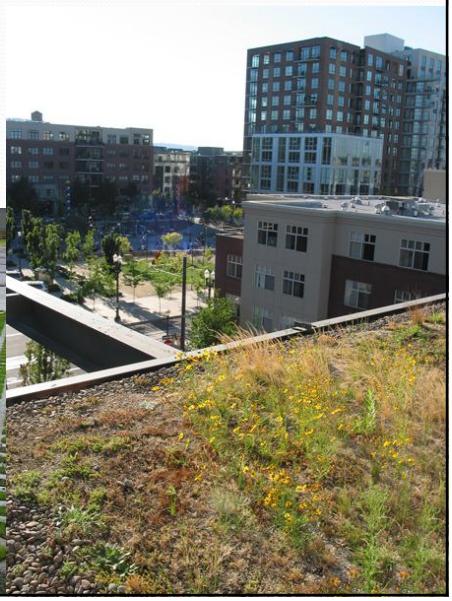
- Street Crossings
  - Solution: Bioswales, Rain Gardens
- Industrial / Commercial Areas
  - Solution: Ecoroofs bioswales

Rain Garden

Bioswale

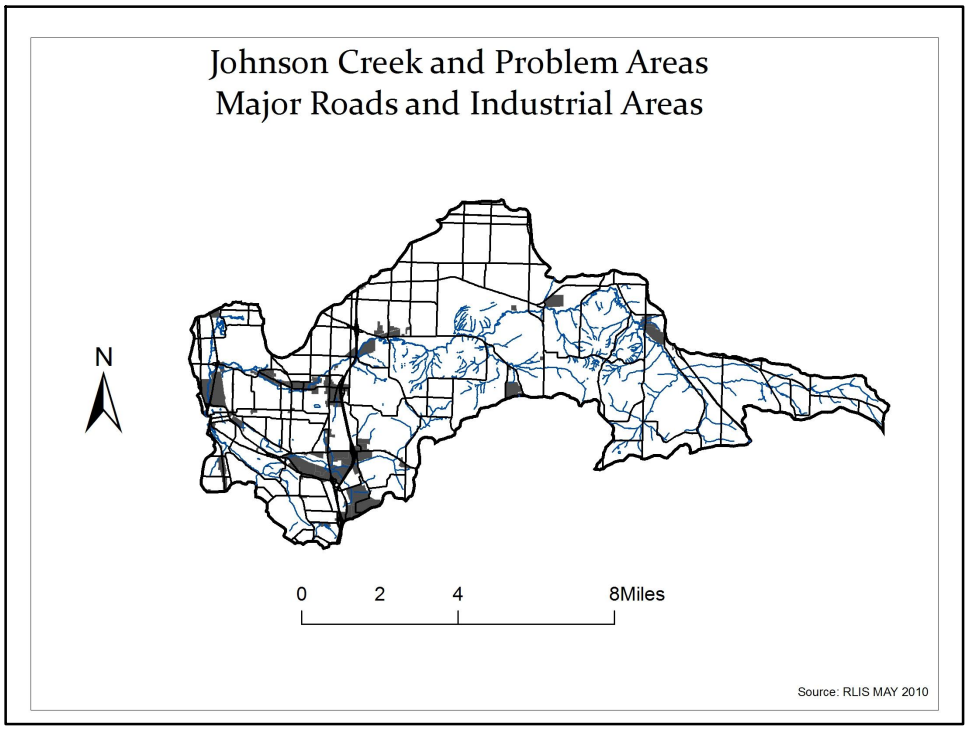
More Solutions

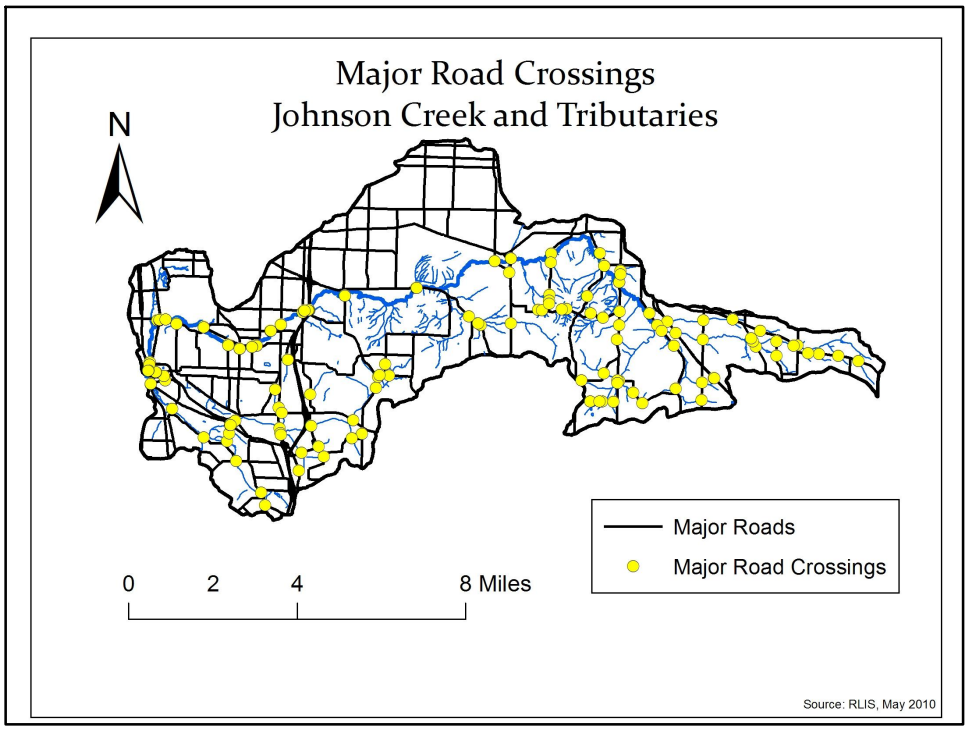
- Ecoroof
- Permeable Pavers

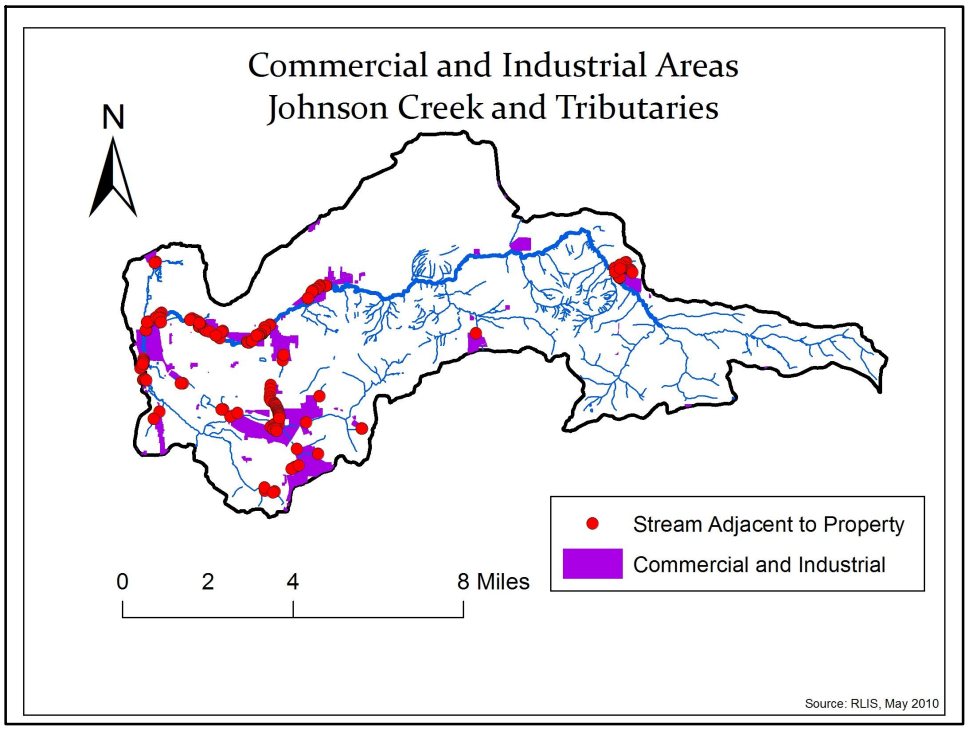


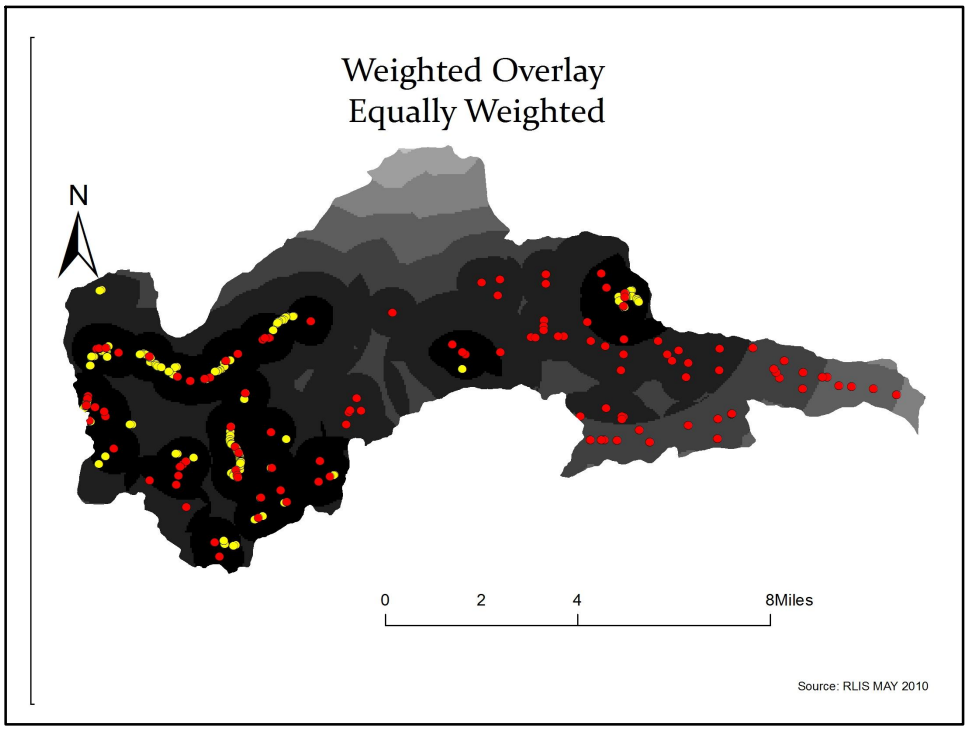
Locating these Areas using GIS Methods:

- RLIS Data Used
  - Land Use
  - Streams
  - Arterial Roads
  - Watersheds
- Spatial Analysis Tools
  - Intersect to locate points where streams crossed impervious surfaces
- Spatial Analyst
  - Distance
  - Weighted Overlay


Johnson Creek and Problem Areas
Major Roads and Industrial Areas
N
0
2
4
8Miles
Source: RLIS MAY 2010


Major Road Crossings
Johnson Creek and Tributaries
N
0
2
4
8 Miles
Major Roads
Major Road Crossings
Source: RLIS, May 2010

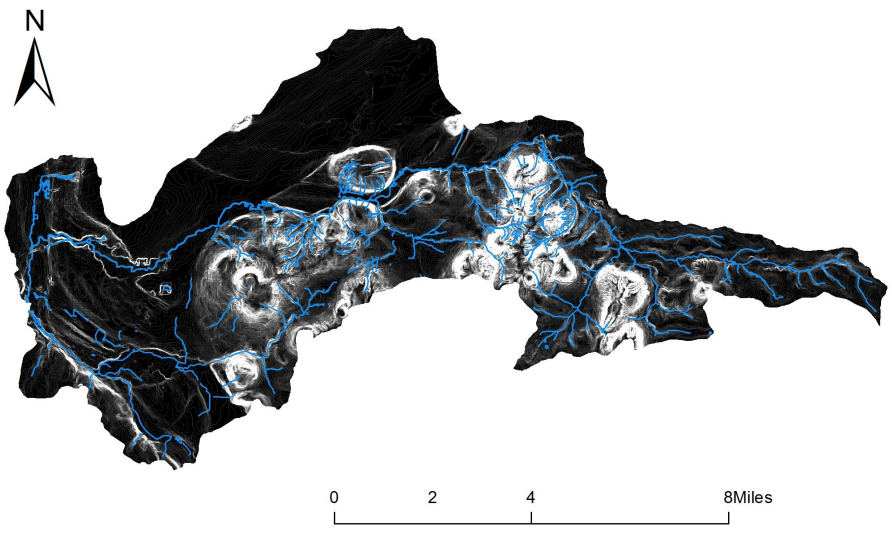

Commercial and Industrial Areas
Johnson Creek and Tributaries
N
Stream Adjacent to Property
Commercial and Industrial
0
2
4
8 Miles
Source: RLIS, May 2010


Weighted Overlay
Equally Weighted
N
0
2
4
8Miles
Source: RLIS MAY 2010

Results

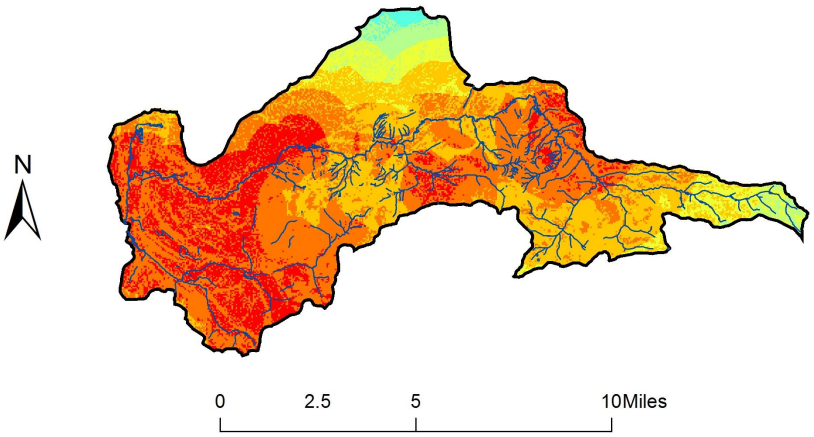
- Many areas
- To locate a single one would be a daunting task
- Add a variable

Calculated Slope From Hillshade



Source: RLIS MAY 2010

Weighted Overlay of Street Crossings, Adjacent Industrial / Commercial Sites, and Slope.



Source: RLIS MAY 2010

Applicability Of GIS

- Identify areas in need of mitigation
- Looking at historical data, many urban streams have been diverted into sewers

Think Big!

- Oak Grove Station
  - Clackamas Urban Green
- Tryon Creek Headwaters Project
  - Environmental Services