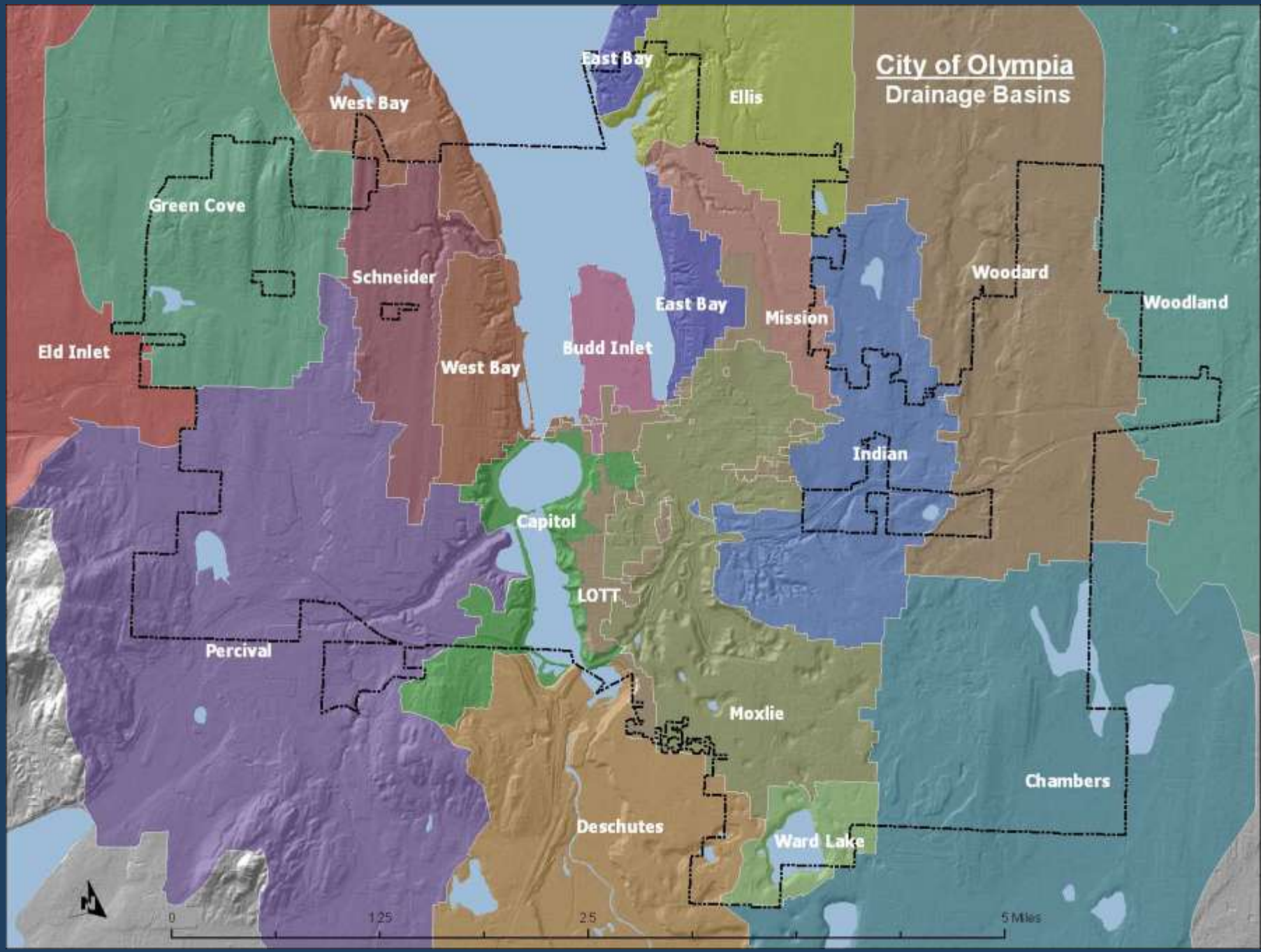
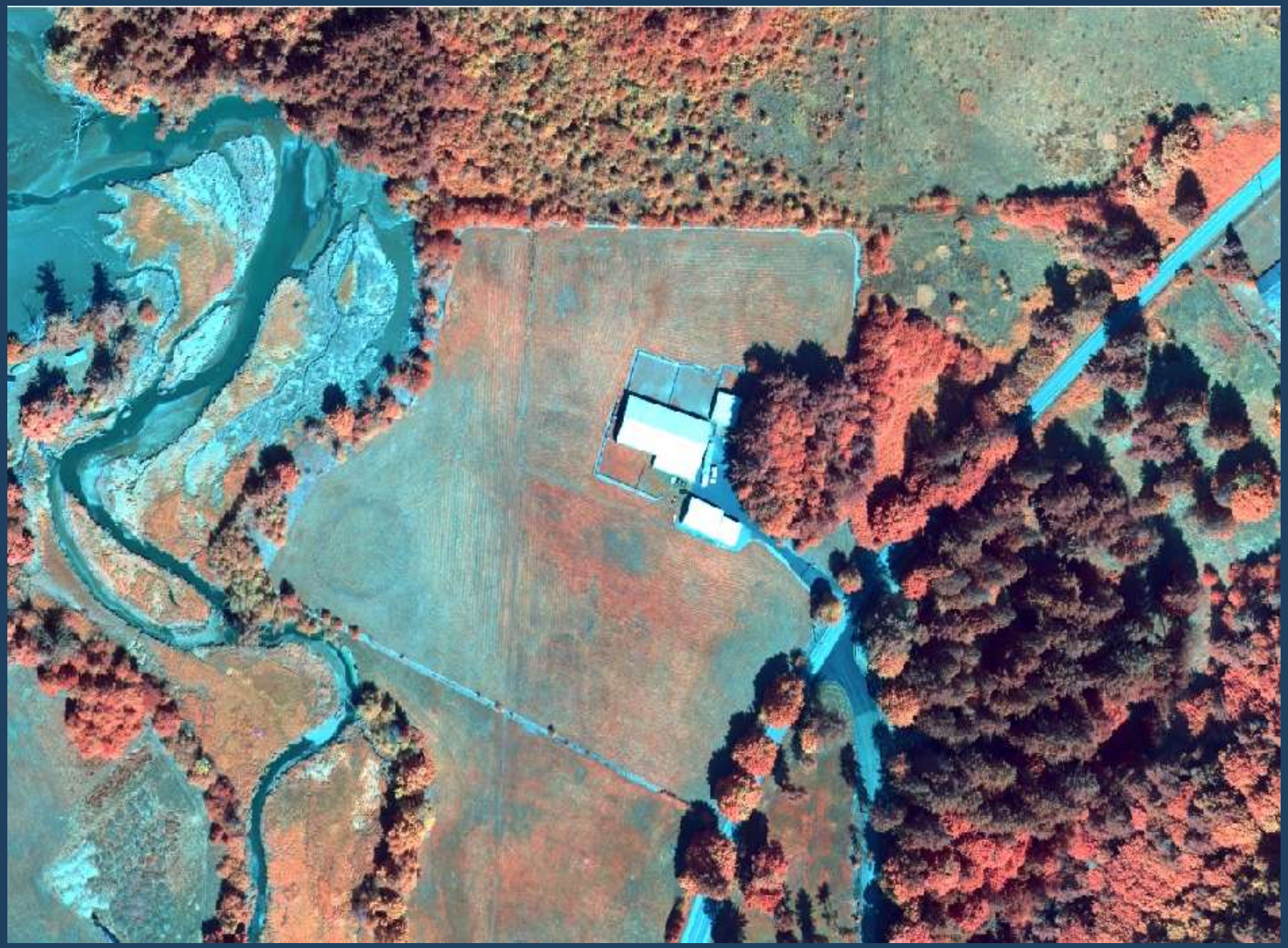
Trees & Water Quality

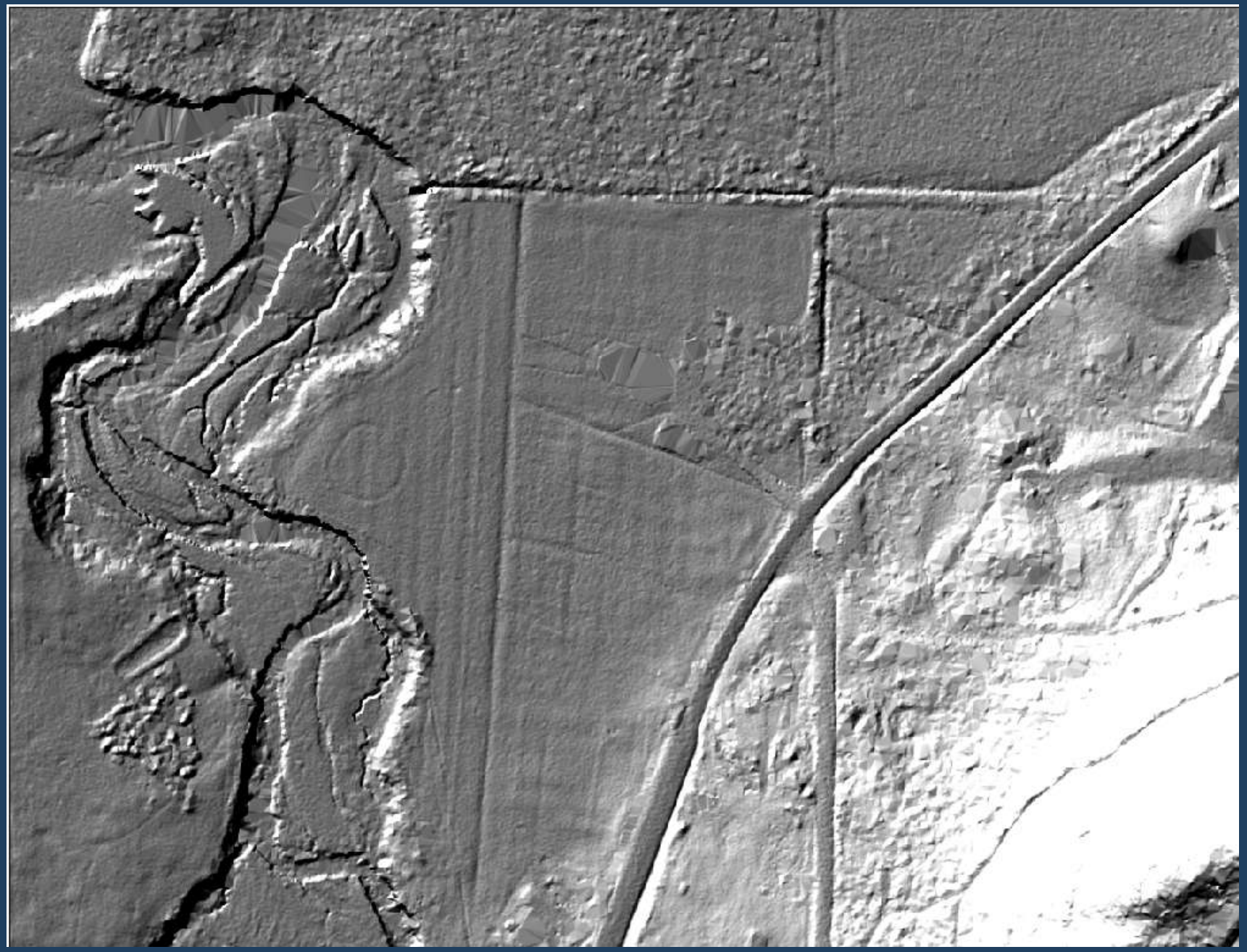
Public Works Water Resources

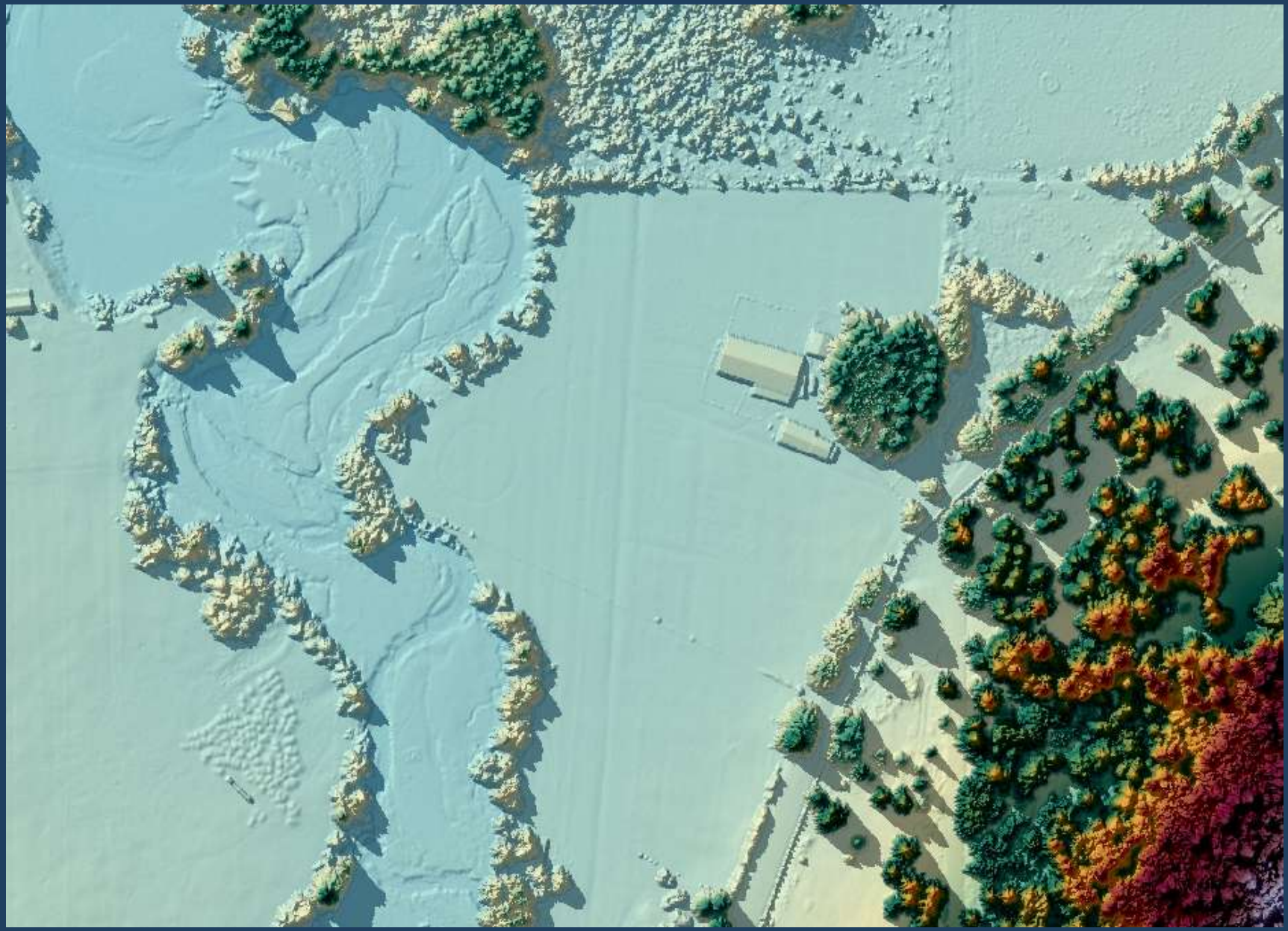
October 2010

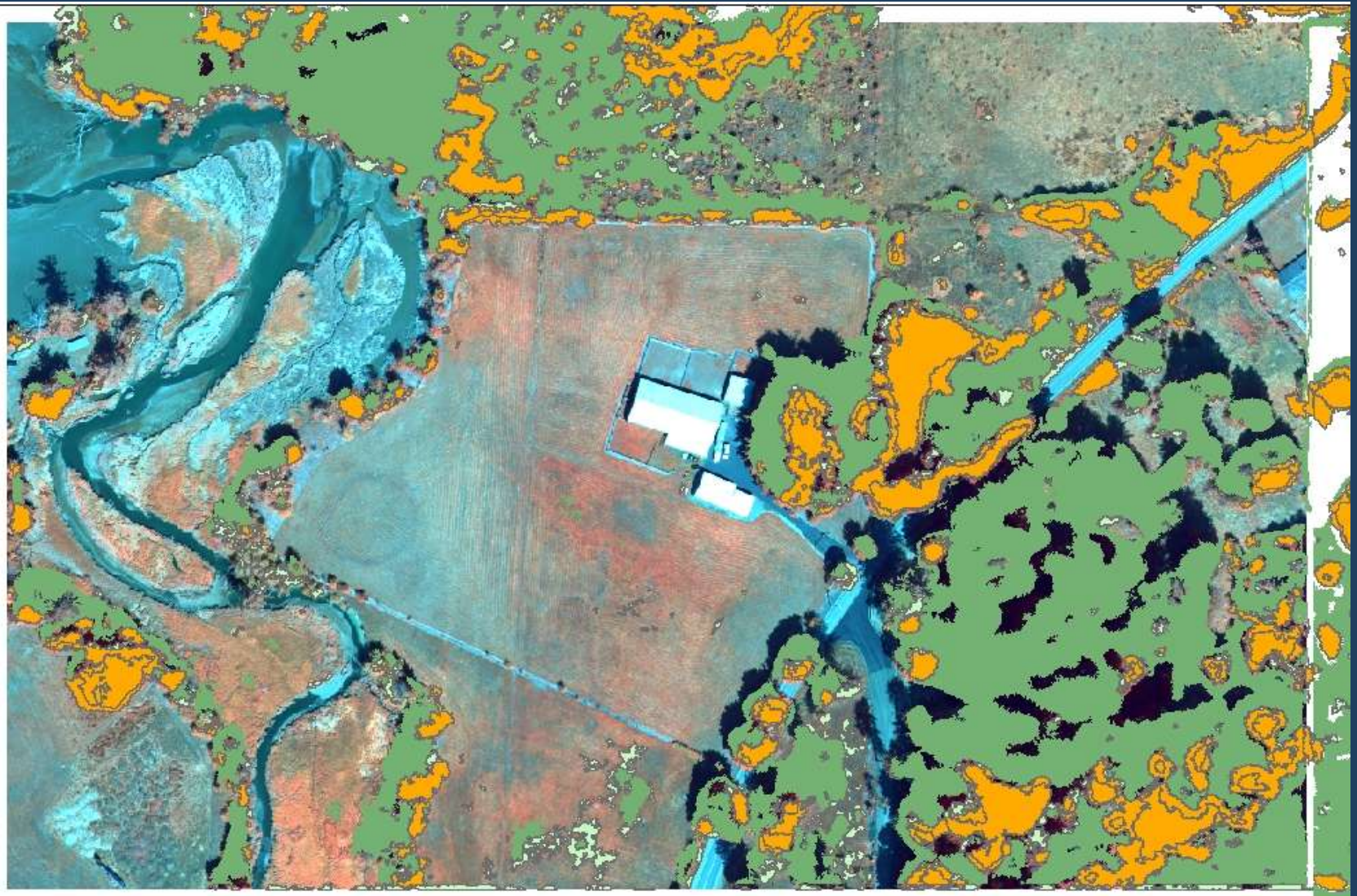

City of Olympia
Drainage Basins
East Bay
Ellis
West Bay
Green Cove
Schneider
East Bay
Mission
Woodard
Woodland
Eld Inlet
West Bay
Budd Inlet
Indian
Capitol
LOTT
Percival
Moxlie
Chambers
Deschutes
Ward Lake
0
1.25
2.5
5 Miles

New Tools







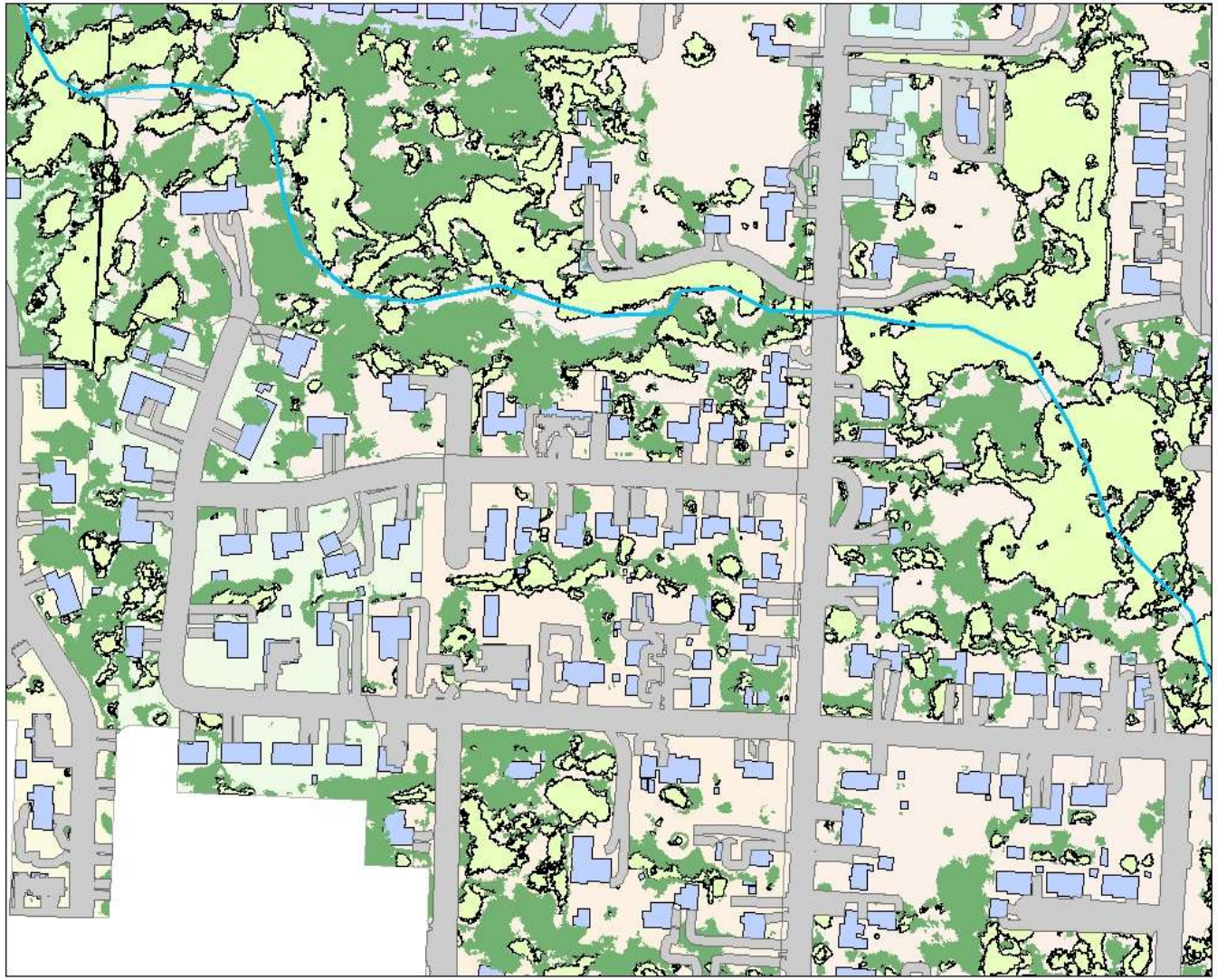


Raster Imagery Converted to Vector (Polygon) Coverage

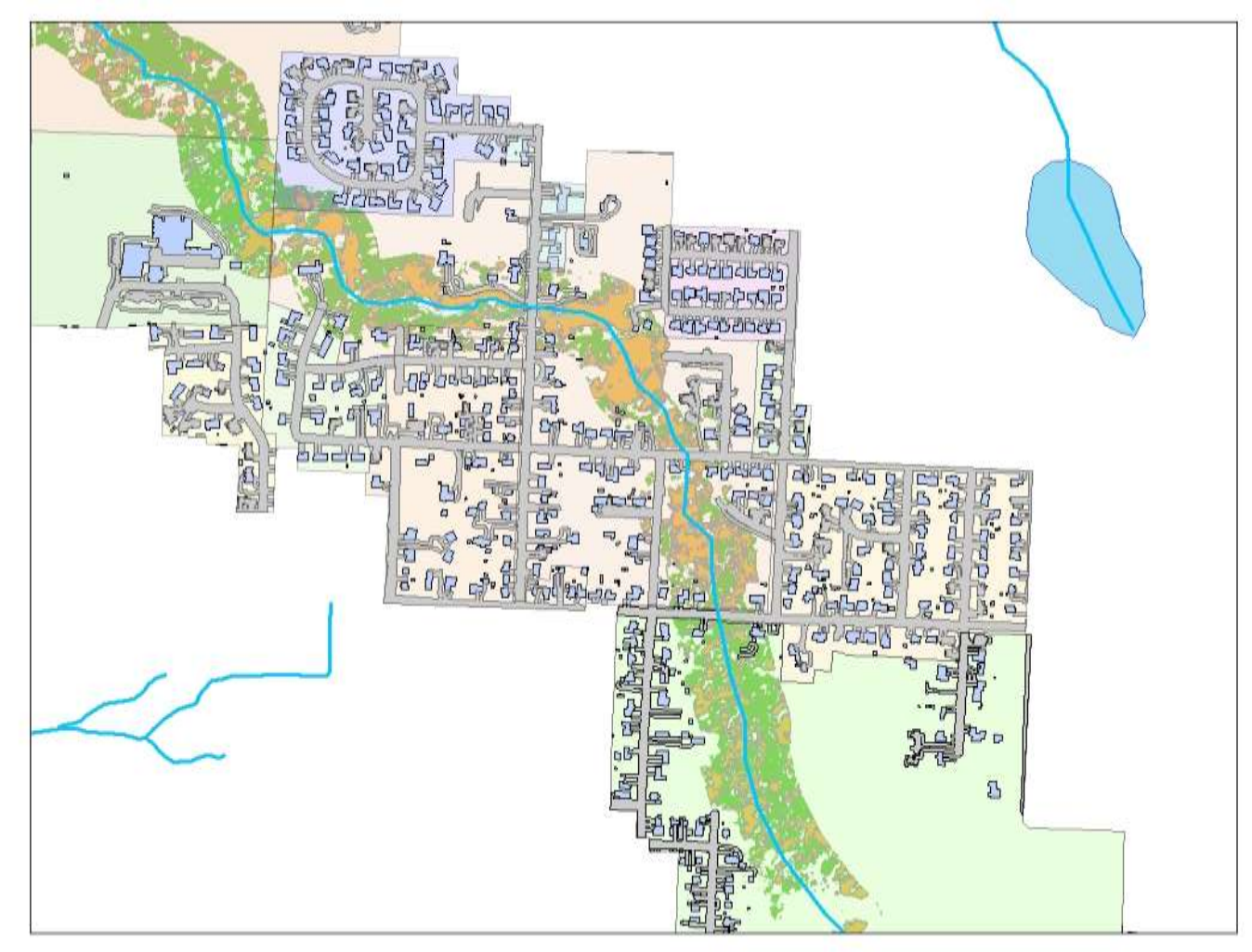
Characterizing the Basins

- Water quality (conventional parameters, other studies)
- Macroinvertebrates (species, abundance)
- Tree canopy (total, conifer, and deciduous)
- Impervious surfaces (roads, roofs, parking lots)
- Riparian traits (200-foot buffer)
- Stormwater treatment (presence of facilities)
- Onsite sewage systems (locations, density)

Tree Cover



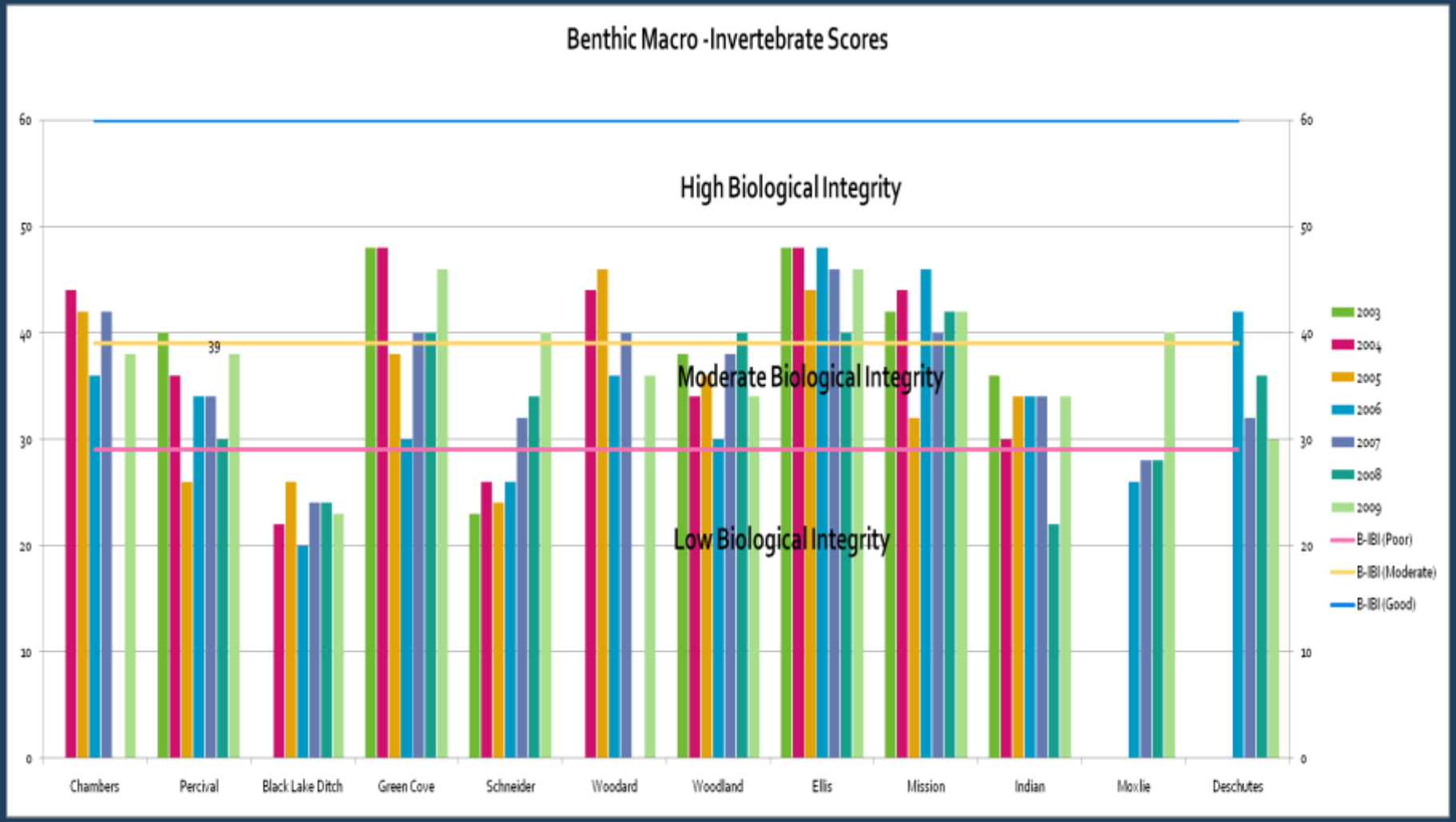
Riparian Analysis



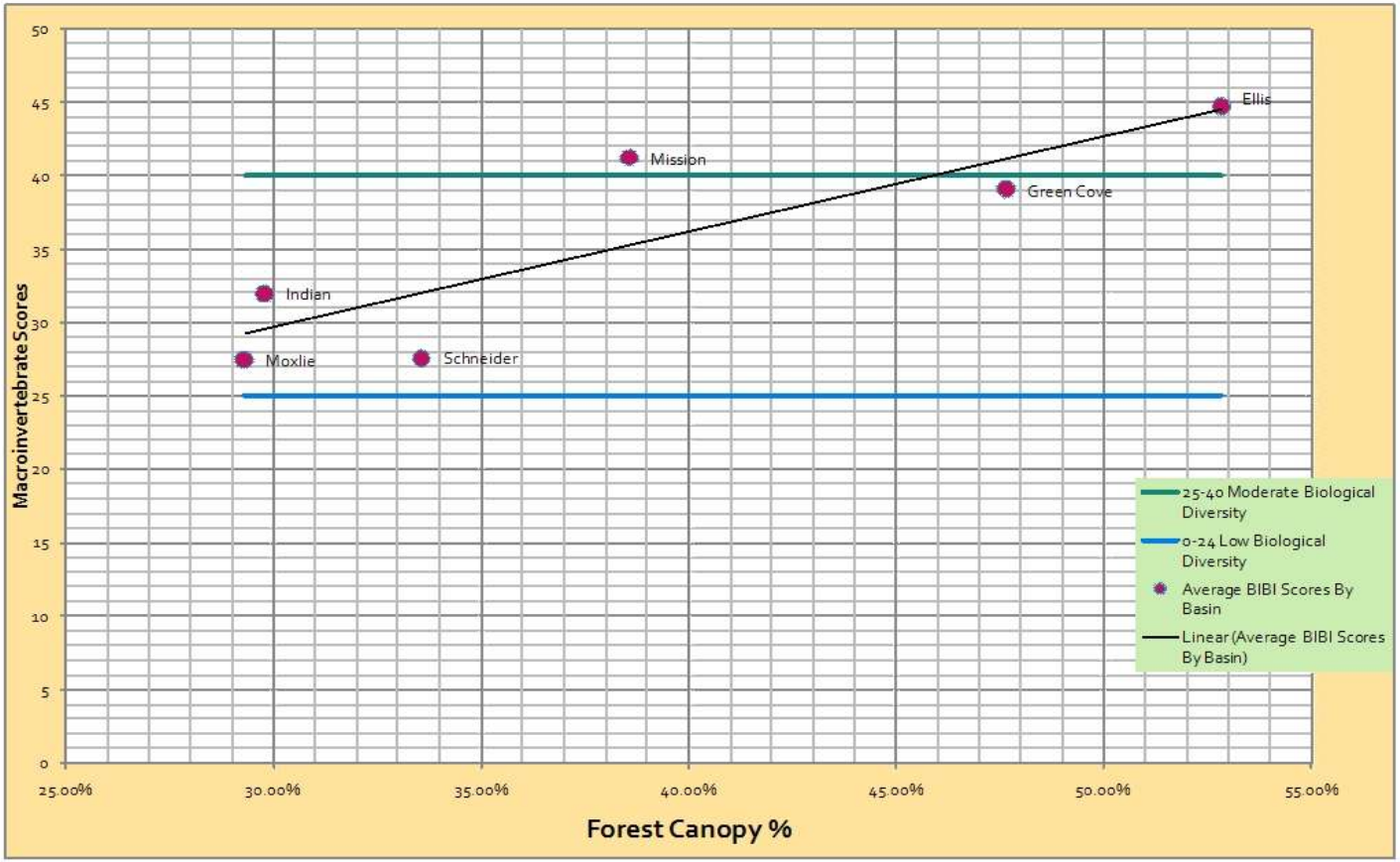
LAND COVER ANALYSIS - INITIAL RESULTS

Basin	Impervious Surfaces			Canopy Coverage		
	Asphalt & Concrete (%)	Roof Area (%)	Total Impervious (%)	Deciduous (%)	Conifer (%)	Total Canopy (%)
Ellis	6%	1%	7%	28%	25%	53%
Green Cove	9%	4%	13%	25%	23%	48%
Mission	19%	9%	28%	18%	20%	39%
Schneider	23%	12%	35%	15%	19%	34%
Indian	23%	8%	31%	15%	15%	30%
Moxlie	28%	10%	38%	12%	18%	29%

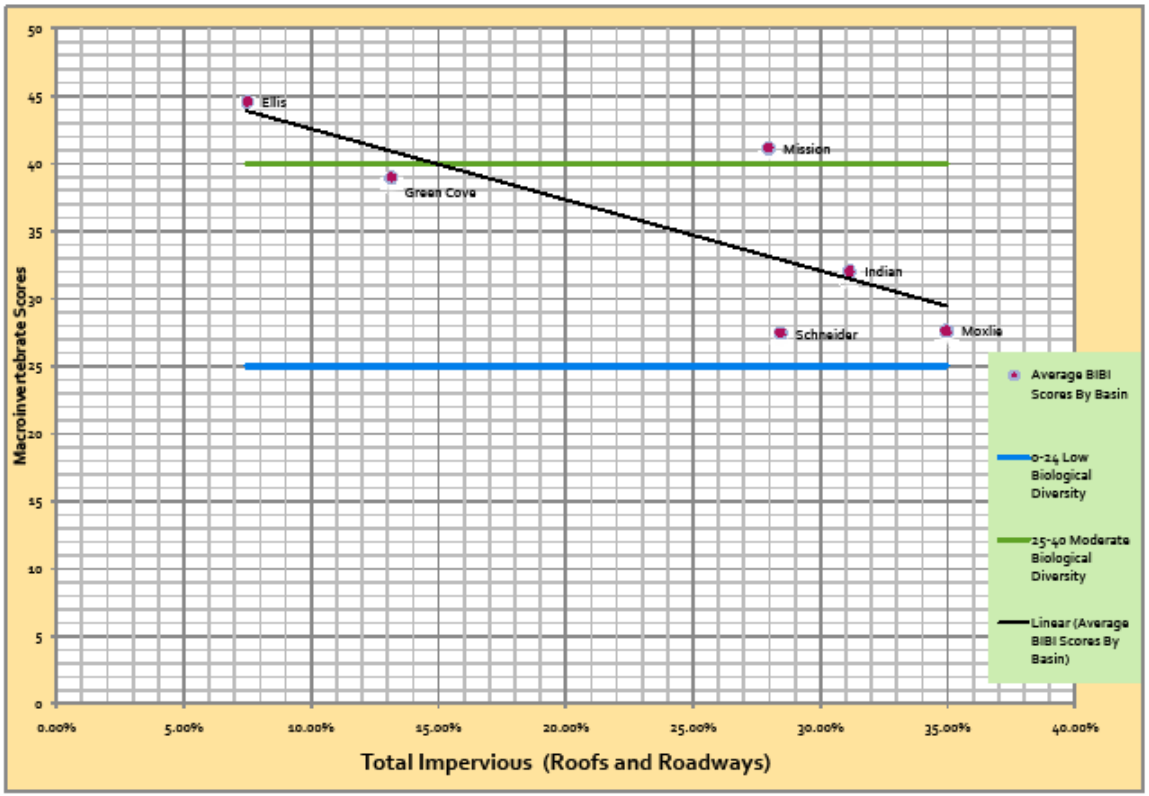
Biological Health



Average Macro Invertebrate Scores Relative to % Forest Canopy by Basin

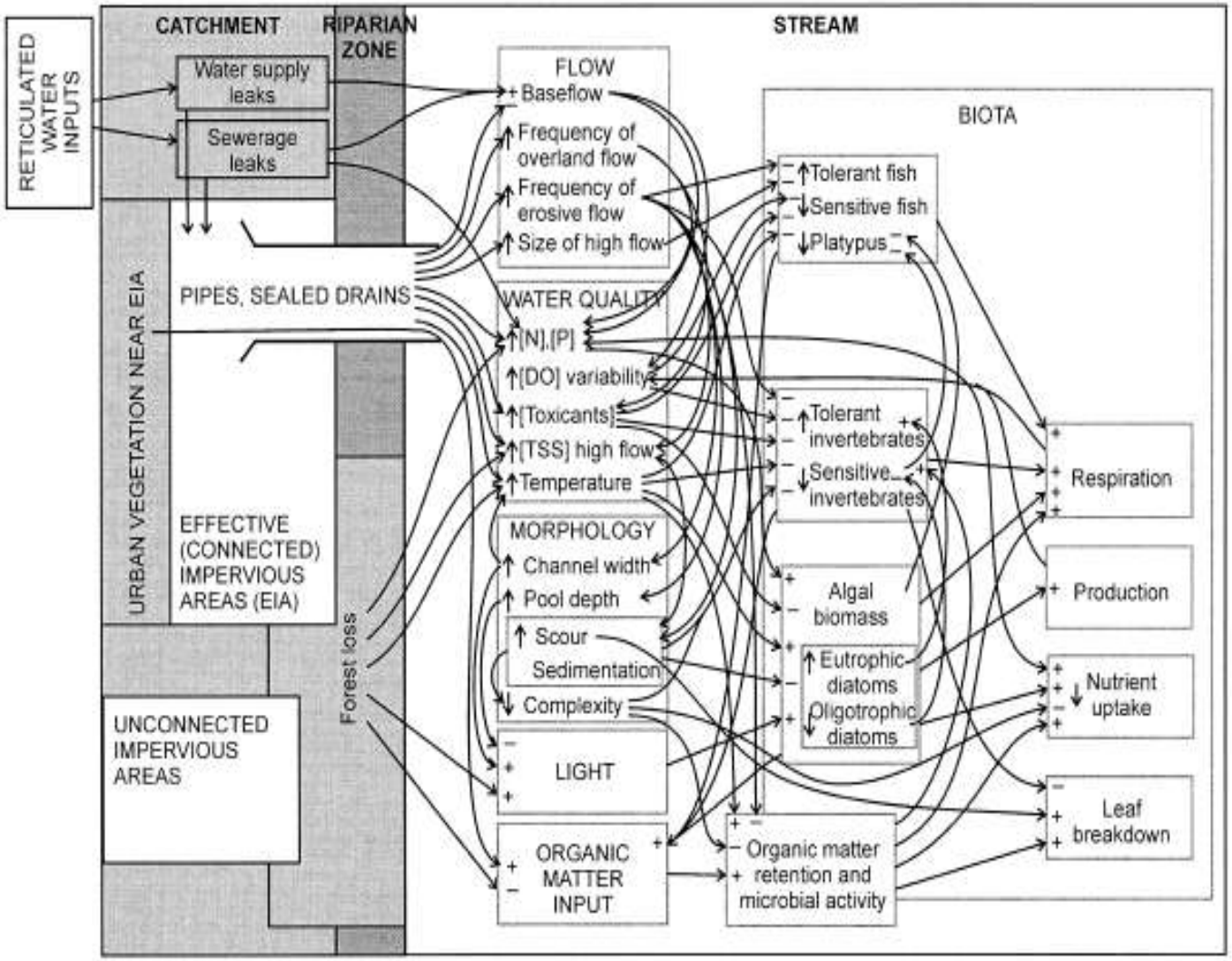


Average Macro Invertebrate Scores Relative to % Impervious Surface by Basin



Biological Health Findings

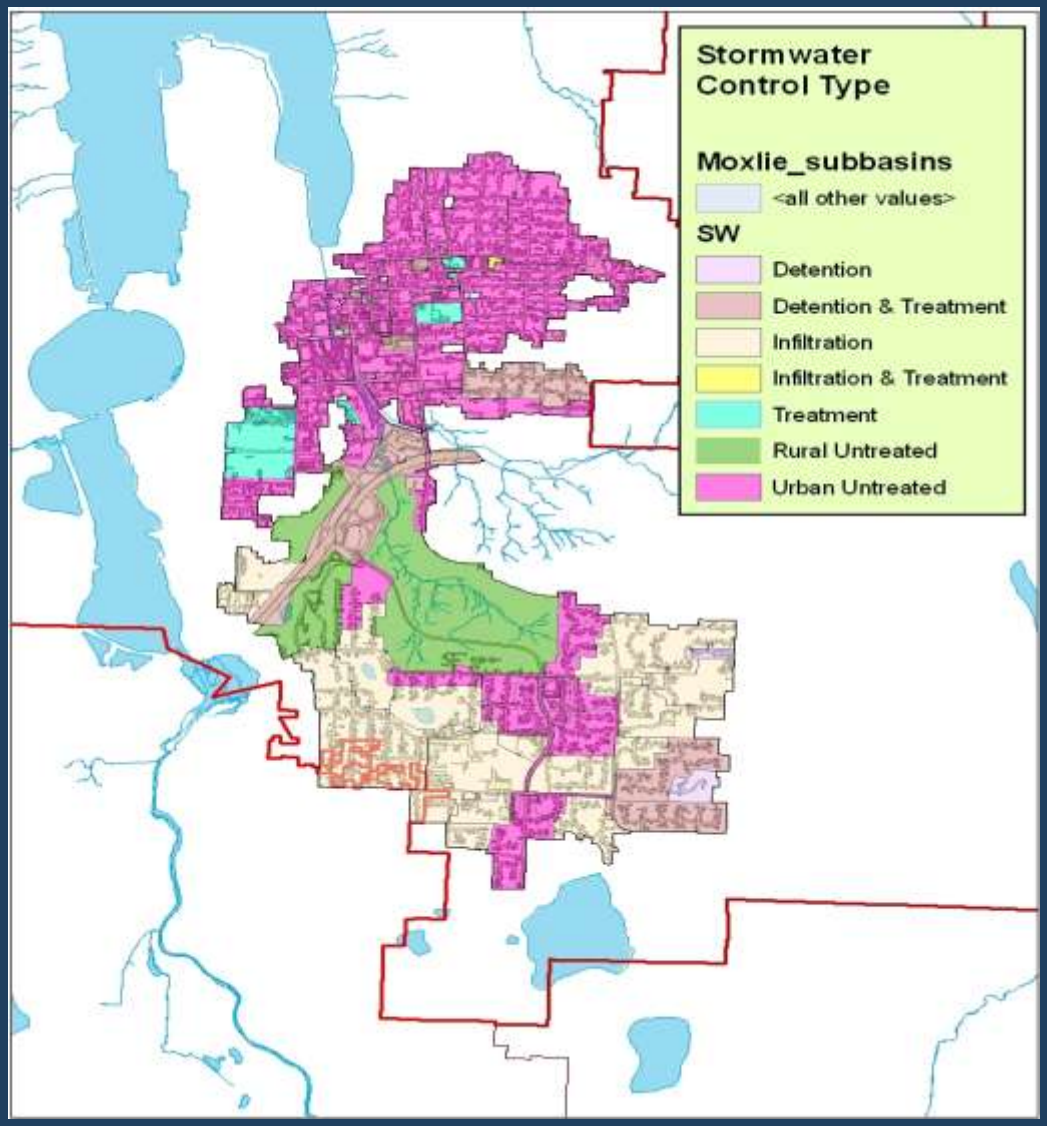
- Ranges from low to moderate biological integrity
  - Relatively consistent results since 2003
  - Potential improvement...Schneider Creek
- Strong correlation between biological health, tree coverage, and impervious surface
  - Indicators of urbanization
  - Healthiest streams outside the urban core
- Possible relationship with areas of untreated impervious


RETICULATED WATER INPUTS
CATCHMENT
RIPARIAN ZONE
STREAM
Water supply leaks
Sewerage leaks
PIPES, SEALED DRAINS
URBAN VEGETATION NEAR EIA
EFFECTIVE (CONNECTED) IMPERVIOUS AREAS (EIA)
UNCONNECTED IMPERVIOUS AREAS
Forest loss
FLOW
Baseflow
Frequency of overland flow
Frequency of erosive flow
Size of high flow
WATER QUALITY
[N],[P]
[DO] variability
[Toxicants]
[TSS] high flow
Temperature
MORPHOLOGY
Channel width
Pool depth
Scour
Sedimentation
Complexity
LIGHT
ORGANIC MATTER INPUT
BIOTA
Tolerant fish
Sensitive fish
Platypus
Tolerant invertebrates
Sensitive invertebrates
Algal biomass
Eutrophic diatoms
Oligotrophic diatoms
Organic matter retention and microbial activity
Respiration
Production
Nutrient uptake
Leaf breakdown

Stormwater Management

- Flow Control
- Source Control
- Treatment

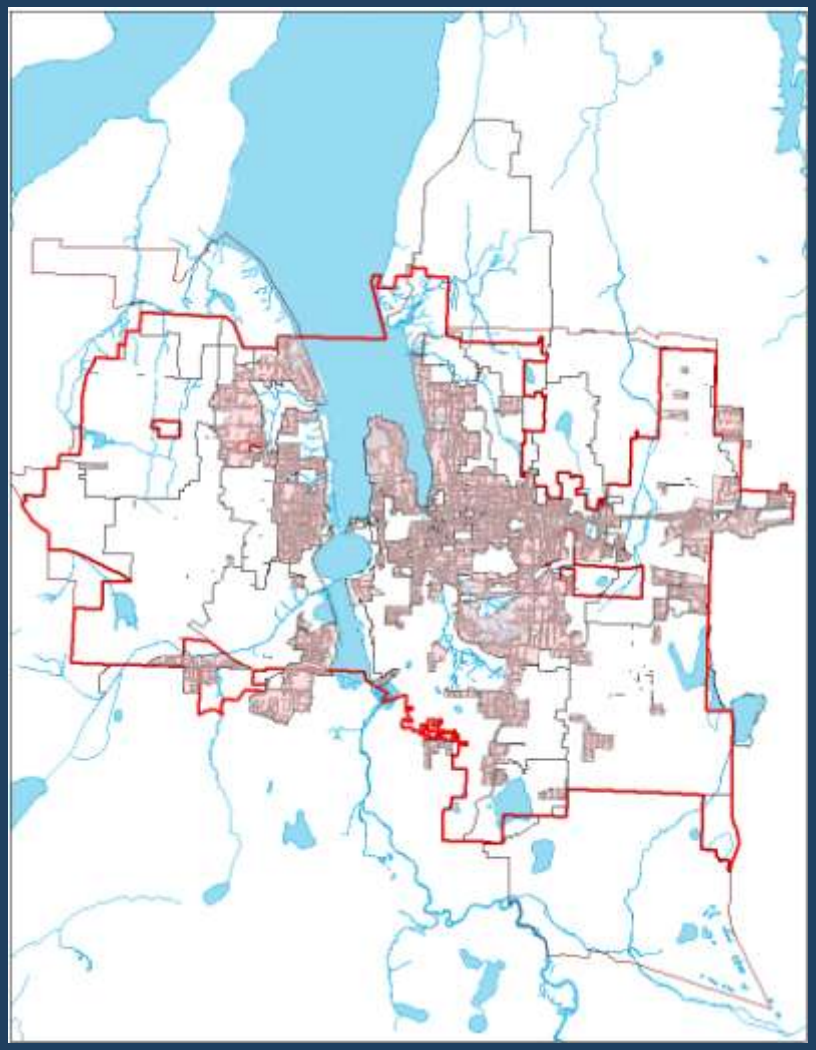
Stormwater Treatment



TE AVE NW
TH AVE E
H AVE SW
CAPITOL WAY N
UNIO
WILSON ST NE
EDIS
WILSON ST SE

Untreated Impervious Surfaces

BASIN	Urban Untreated Impervious area
Moxlie	257
Indian	194
West Bay	182
East Bay	110
Woodard	101
Capitol	79
Schneider	51
Mission	33
Percival	22
Chambers	16
Black Lake	13
Green Cove	2
Ellis	0



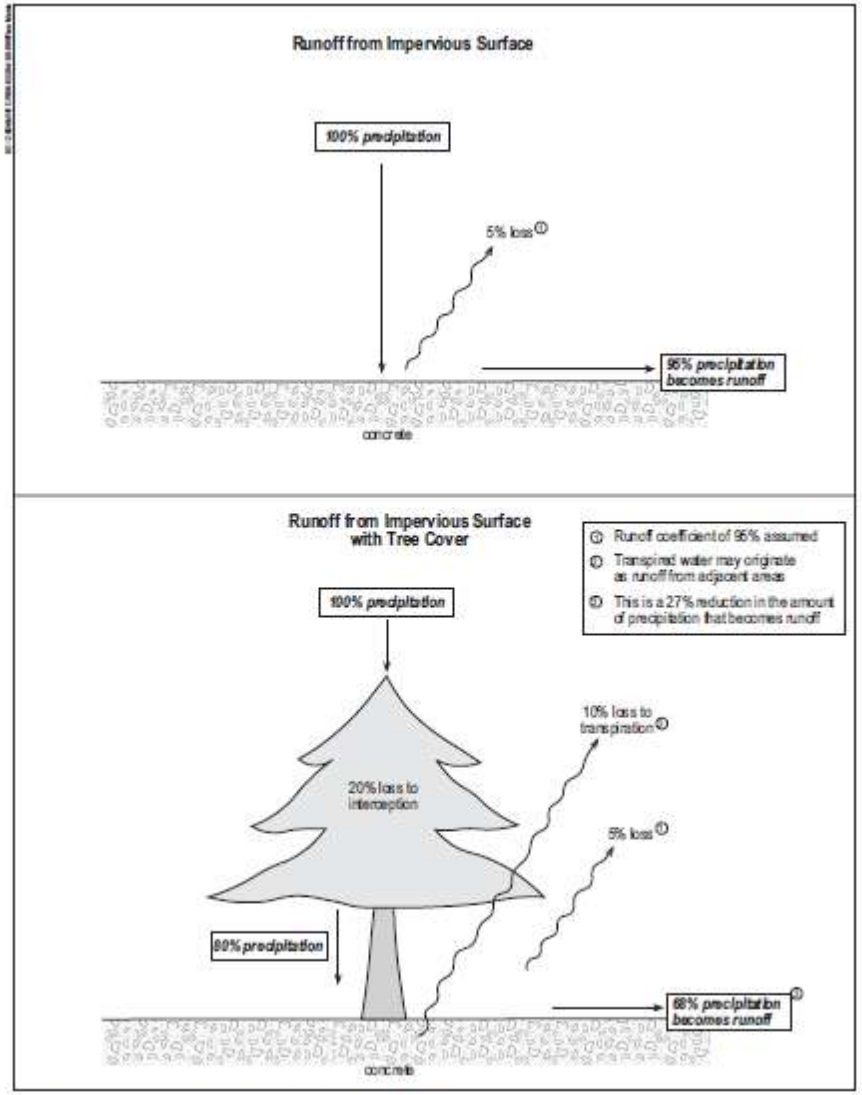


Figure 4. Conifer over an impervious surface.

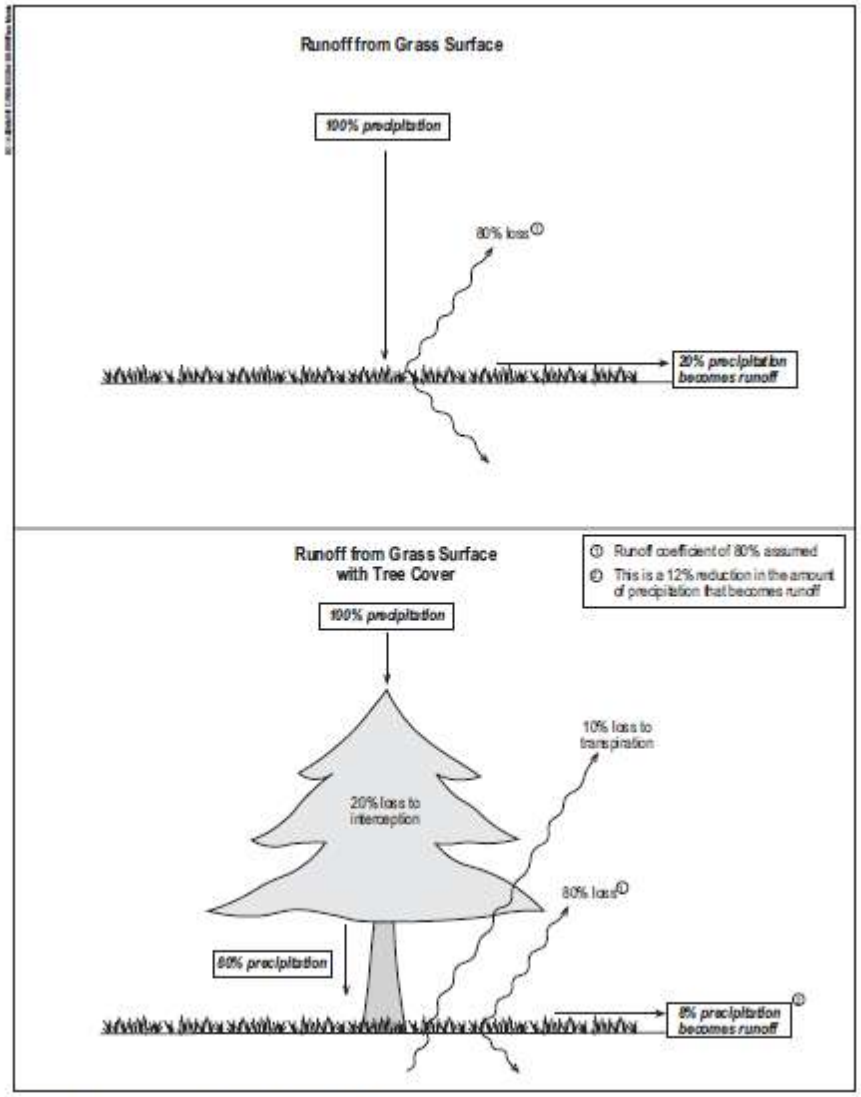


Figure 5. Conifer over a grass surface.

Summary of the Finding

Tree Canopy is important because:

- It reduces runoff (flow control)
- It improves riparian health
-