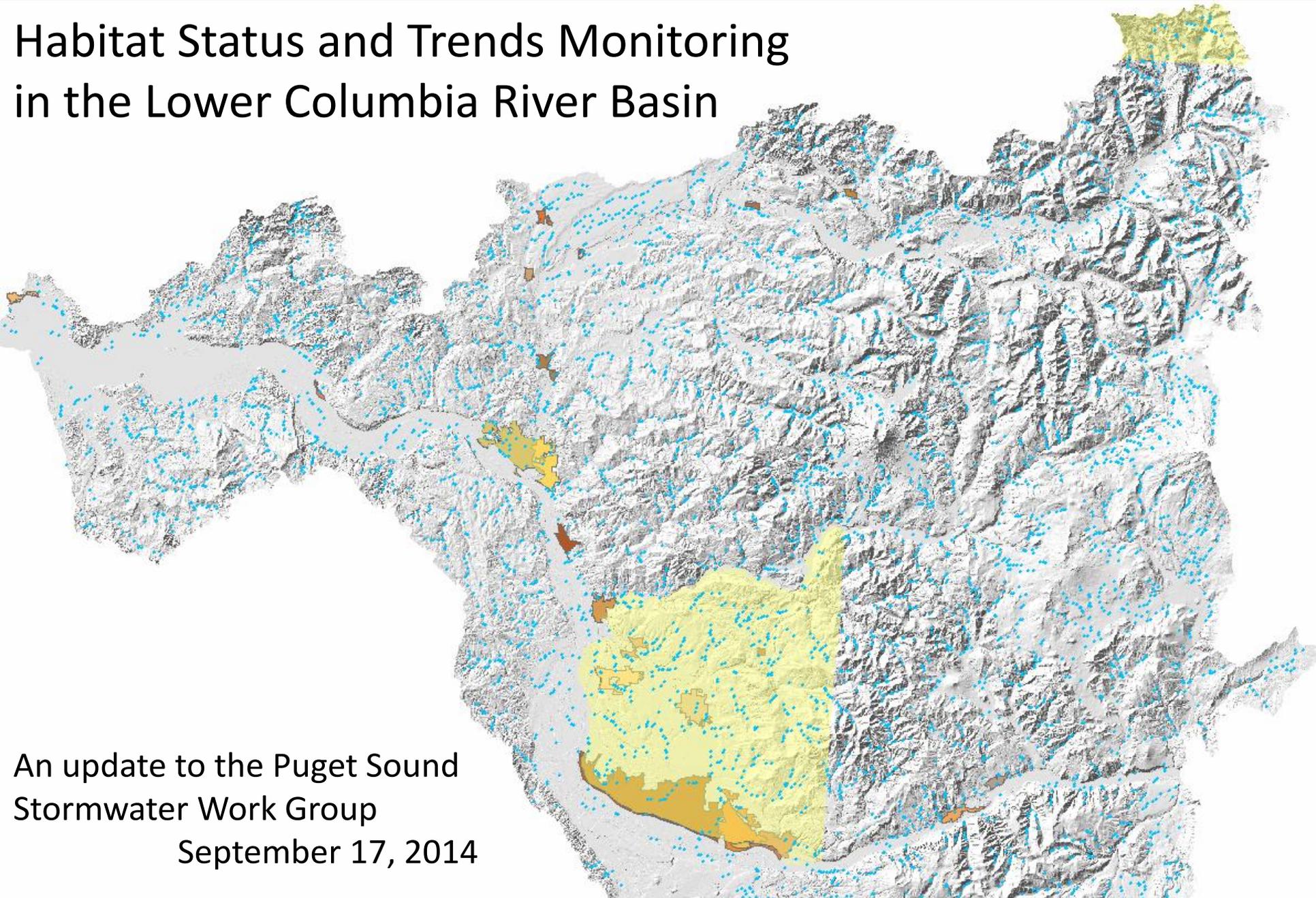
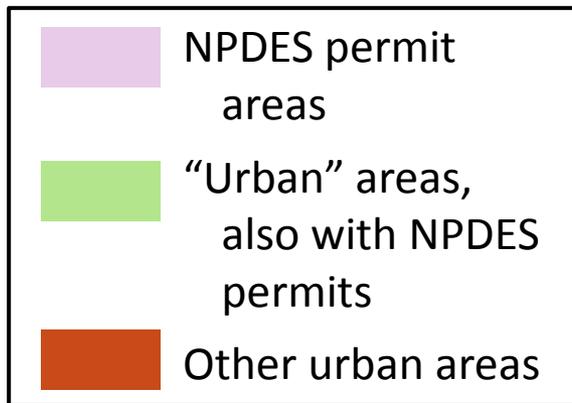


Habitat Status and Trends Monitoring in the Lower Columbia River Basin

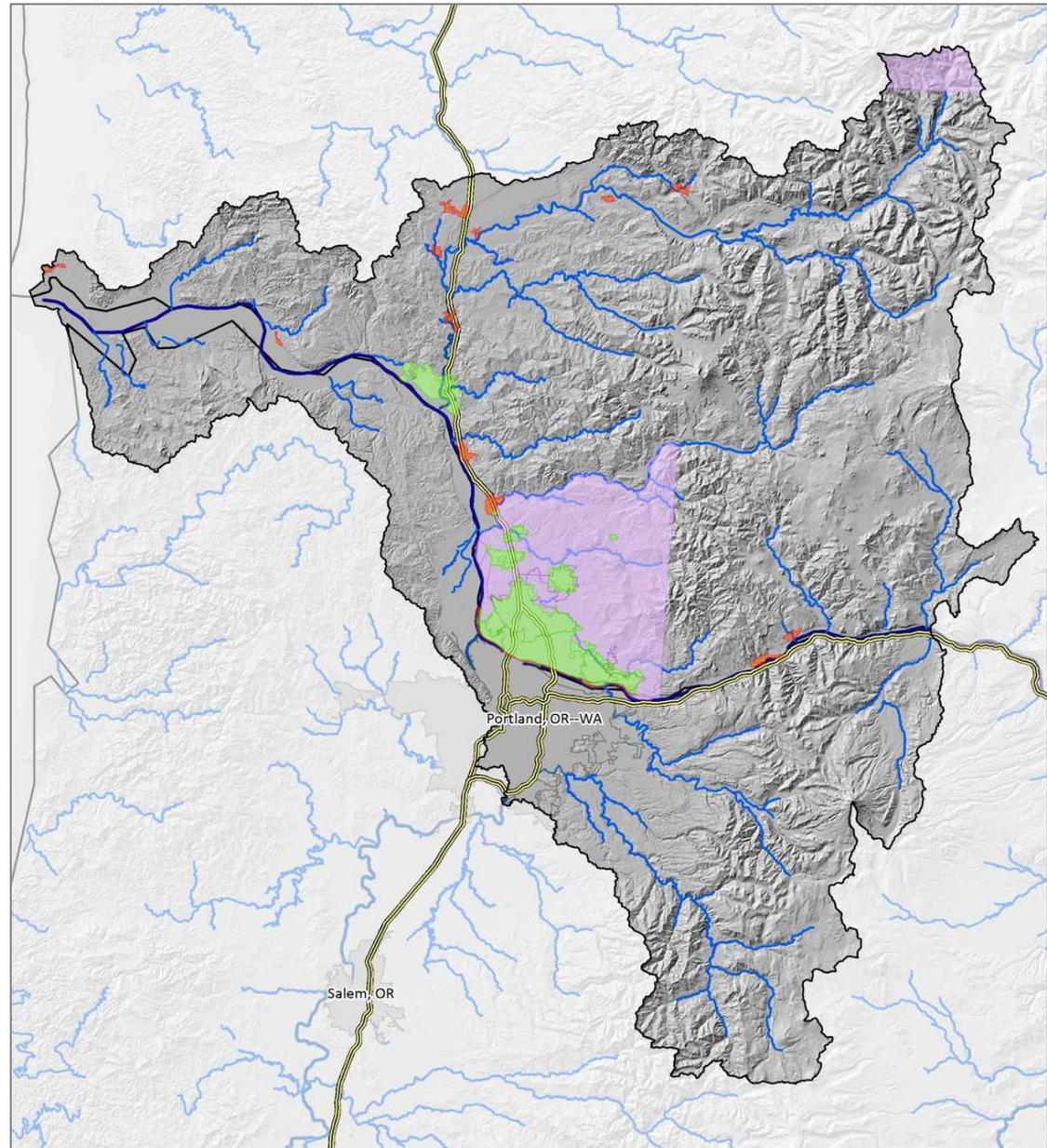


An update to the Puget Sound
Stormwater Work Group
September 17, 2014

Comparison of regions within by Urban Growth Areas and NPDES permit areas



Goal: a nested stormwater sampling design under a salmon recovery monitoring umbrella



Nested Permit-Related Questions

- What are the S&T of **water quality and stream flow** in surface waters draining subwatersheds primarily within the jurisdiction of NPDES stormwater permittees?
- What are the S&T of **water quality and stream flow** in surface waters affected by stormwater discharges first developed under requirements of 2013 MS4 permit?
- What are the S&T of in-stream **biological health** and riparian **habitat** conditions within the jurisdiction of NPDES stormwater permittees?
- Do in-stream **biological health** and **habitat** conditions correlate to changes in abundance, productivity, spatial structure, and diversity of the natural-origin fish?

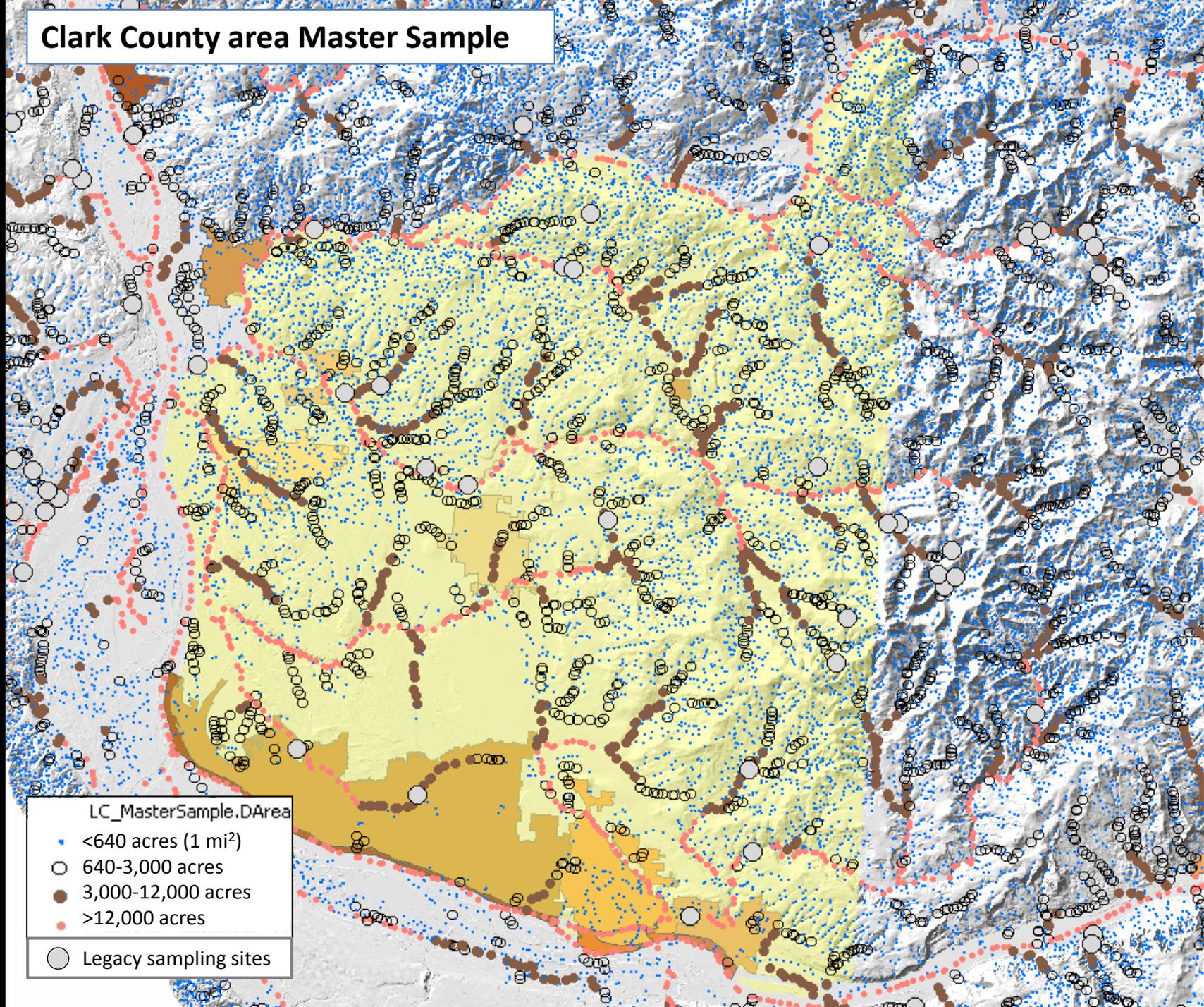
Strata for Nested Stormwater Questions

Qa/Qx Monitoring Strata:

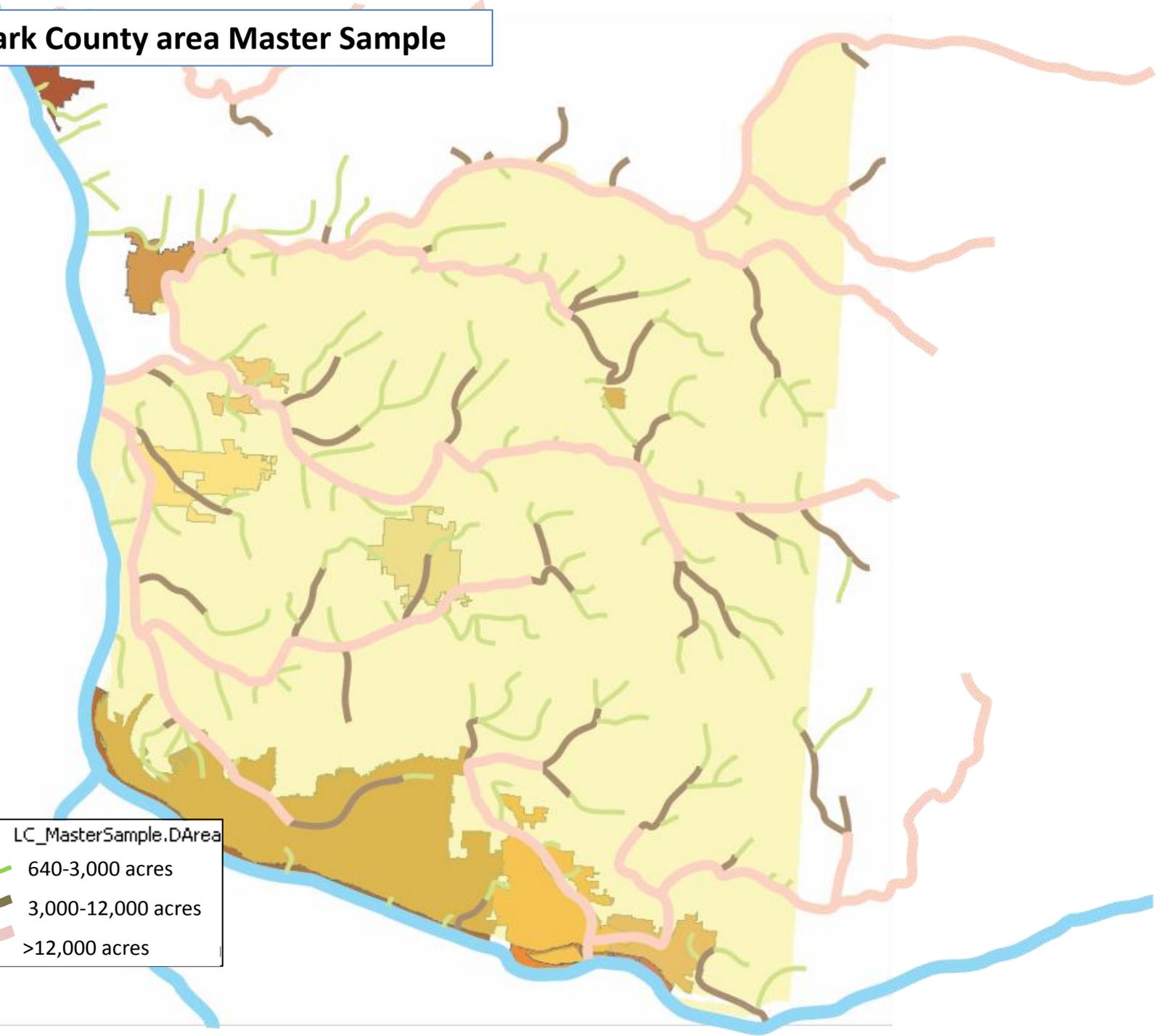
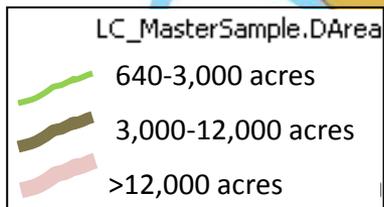
- Inside/outside the jurisdiction of an NPDES stormwater permittee
- Recovery Plan (Coast/Cascade/Gorge or East and West Cascade)
- Predominant landcover (forested, cleared, agricultural, urban)
- Drainage area : 640-12,000 acres (~1-20 square miles); compare to 3,000-20,000 acres (~5-20 square miles)

1. How many sites are there in the Lower Columbia Region, in total? **Many**
2. How do those sites apportion between NPDES and non-NPDES areas? **Most are outside**
3. How many of the sites within NPDES areas are within “urban” areas (i.e., not in eastern Clark County)? **~two dozen in urban areas, 2x as many outside**
4. How do these numbers compare with likely/feasible costs for NPDES permittees? **TBD but likely feasible**

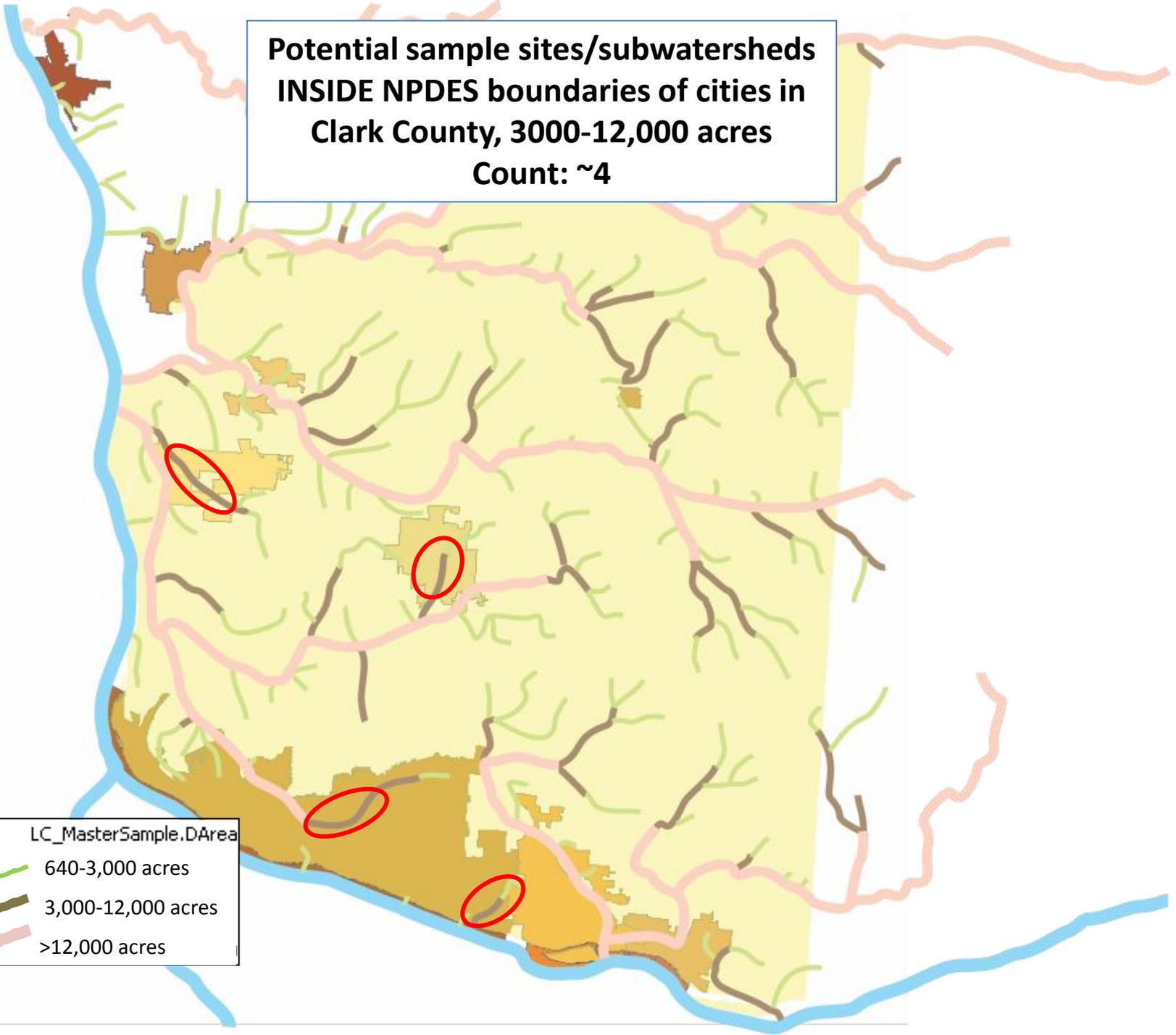
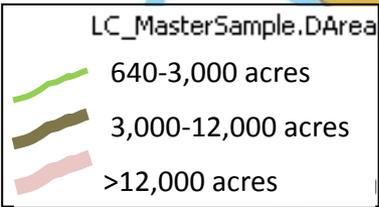
Clark County area Master Sample



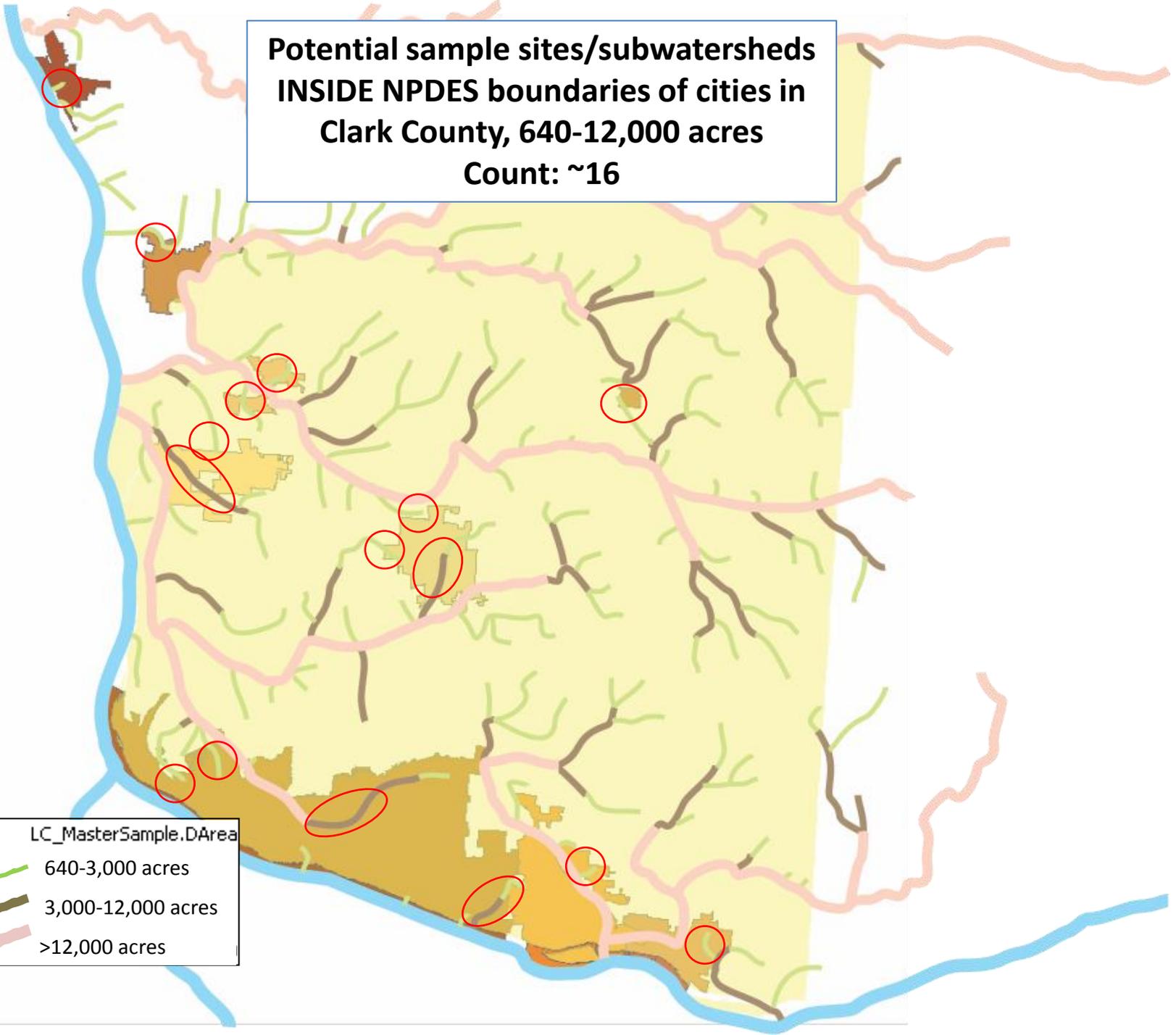
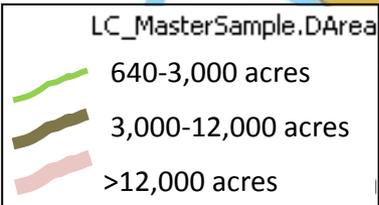
Clark County area Master Sample



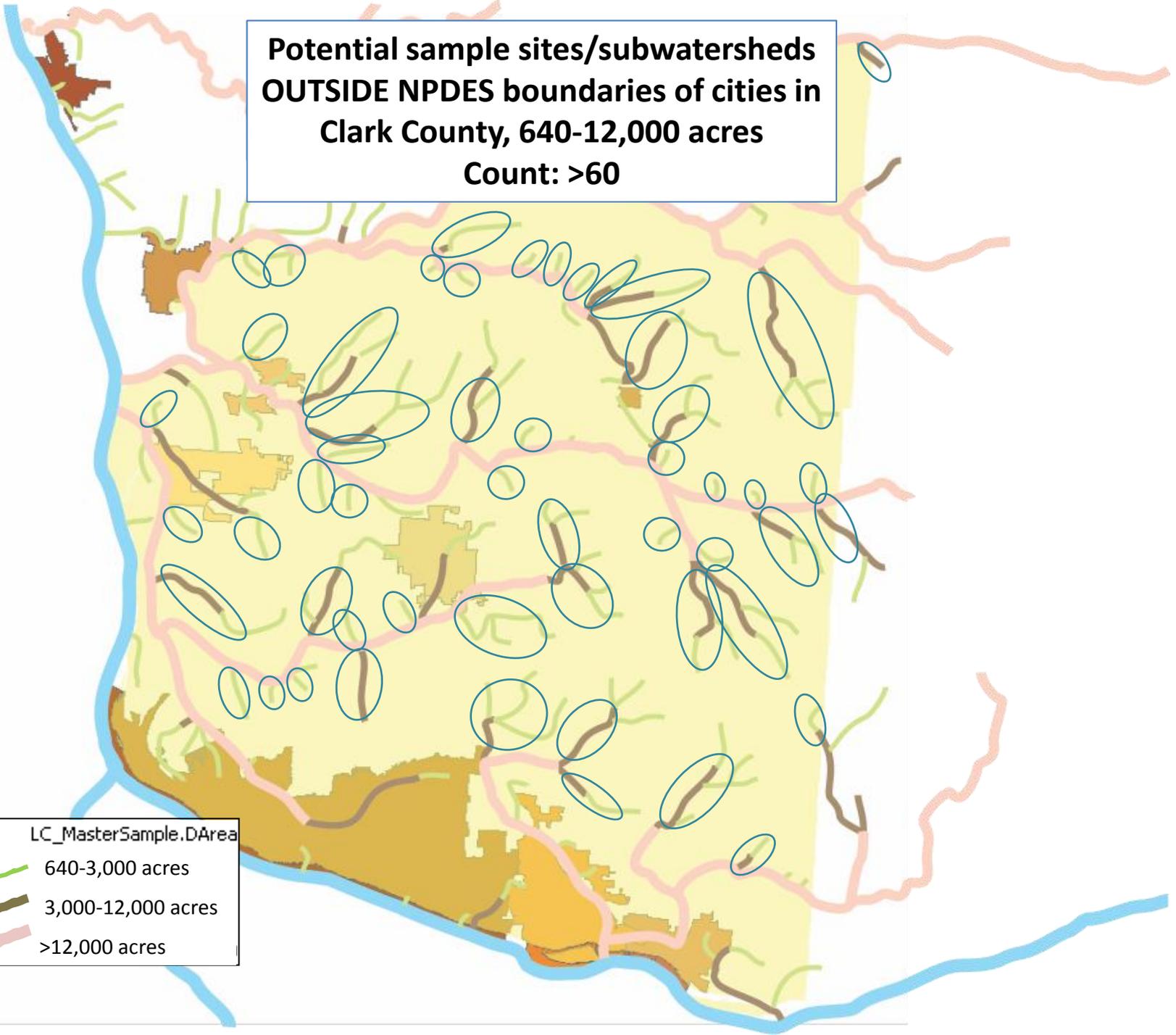
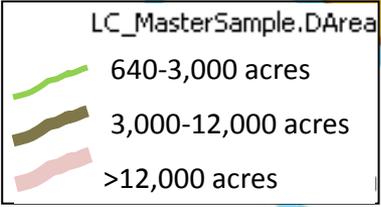
**Potential sample sites/subwatersheds
INSIDE NPDES boundaries of cities in
Clark County, 3000-12,000 acres
Count: ~4**



**Potential sample sites/subwatersheds
INSIDE NPDES boundaries of cities in
Clark County, 640-12,000 acres
Count: ~16**



**Potential sample sites/subwatersheds
OUTSIDE NPDES boundaries of cities in
Clark County, 640-12,000 acres
Count: >60**



Recommended priority metrics at water quality monitoring sites:

Water quality/quantity metrics sampled, monitoring population, and sampling frequency at forested land use/class and other sites.

Metric Category	Metric Sub Category	Monitoring Frequency Required at Most Sites ¹	Monitoring Frequency in Forested Land Use/Land Class ^{1,2}	Field Collection Group	Notes regarding continuous and/or composited flow-weighted sampling
Macro-invertebrates	Macro-invertebrate Index [†]	Once per year	Once per year	Benthic Sample	N/A
Conventional Parameters	Water Temperature* (continuous)	Hourly	Hourly	Continuous data logger	Already continuous ^{3,4}
Conventional Parameters	Dissolved Oxygen (continuous)*	Hourly	Hourly	Continuous data logger	Already continuous ^{3,4}
Metals - In Sediments	Total Zinc	Once per 5 years based on permit cycle; possibly 3-yr rotation based on hydro cycle	Once per 5 years based on permit cycle; possibly 3-yr rotation based on hydro cycle	Sediment Set	N/A
Metals - In Sediments	Total Copper	Once per 5 years based on permit cycle; possibly 3-yr rotation based on hydro cycle	Once per 5 years based on permit cycle; possibly 3-yr rotation based on hydro cycle	Sediment Set	N/A
Metals - In Sediments	Lead	Once per 5 years based on permit cycle; possibly 3-yr rotation based on hydro cycle	Once per 5 years based on permit cycle; possibly 3-yr rotation based on hydro cycle	Sediment Set	N/A