



Stewardship

Stewardship means doing what I can to conserve what does not belong to me alone, holding in trust that which exists before, during, and after my time, caring for, to the best of my ability, what is beyond and greater than myself.

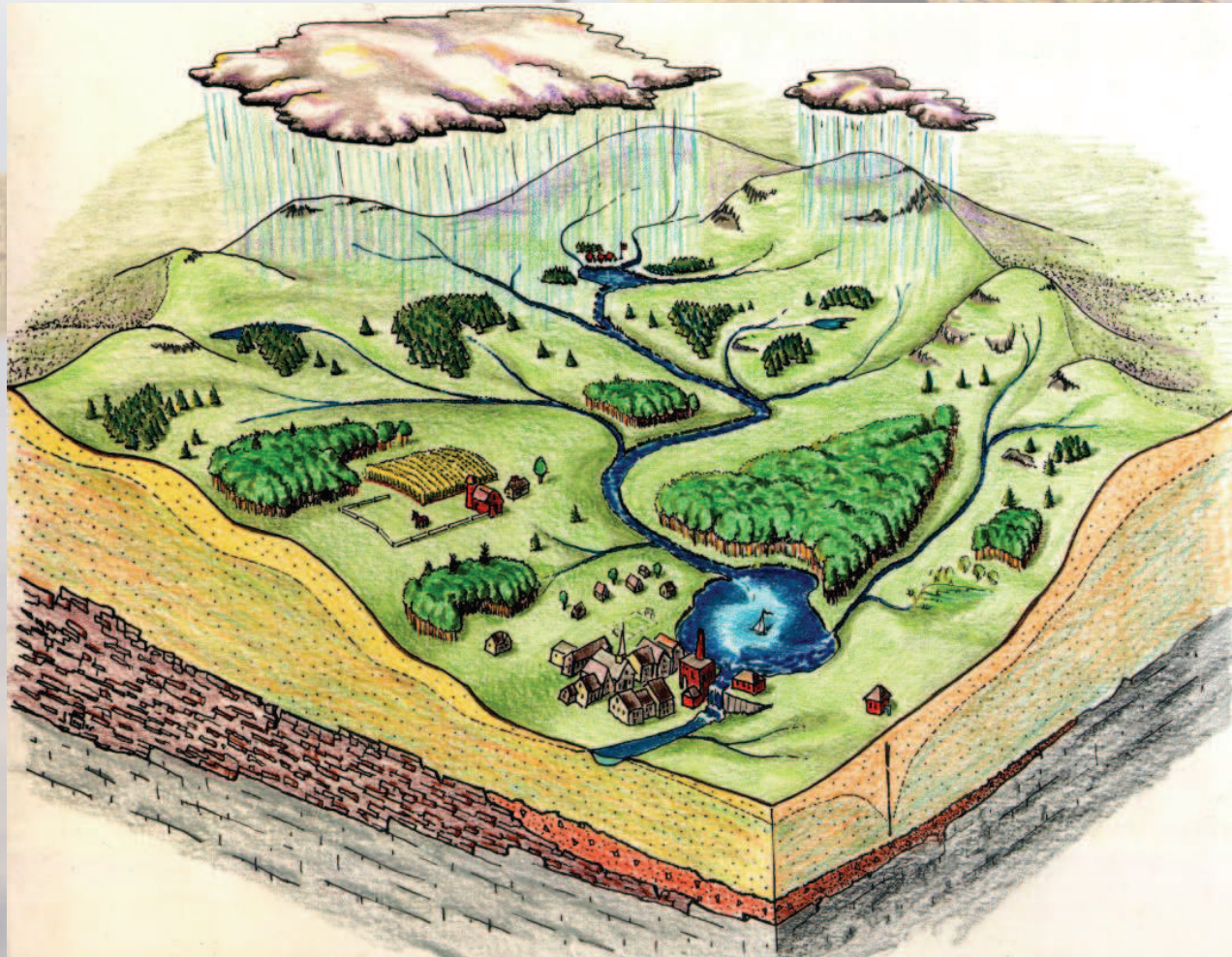
OBJECTIVES

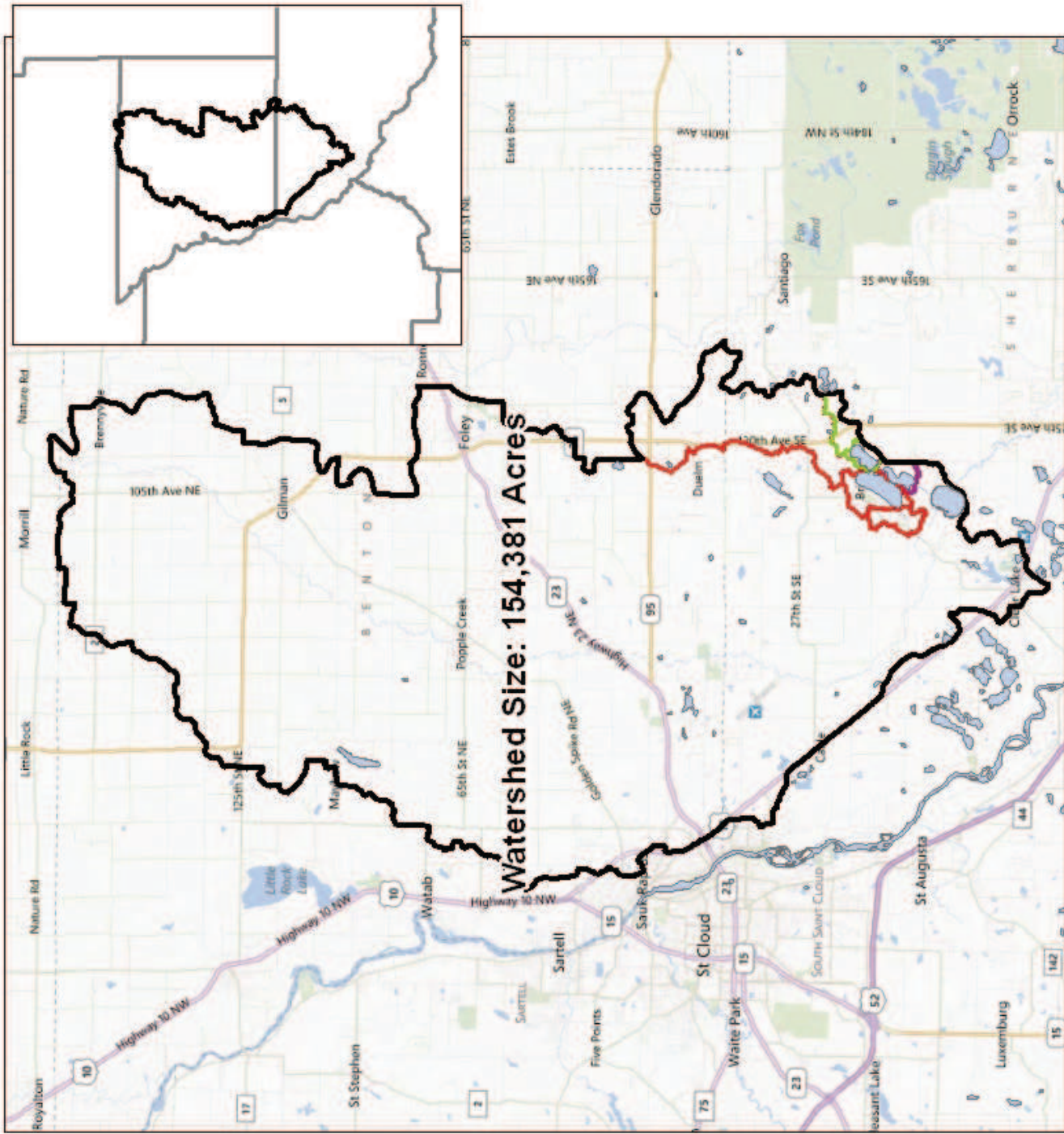
- Understand the cumulative consequences of residential development on water quality
- Gain knowledge of practices to stop or reverse human impacts
- Expand on shoreline buffer process



Everyone Lives in a Watershed

**A watershed is an area of land that drains to a lake or river.
Runoff carries sediment and pollutants to our lakes and streams.**







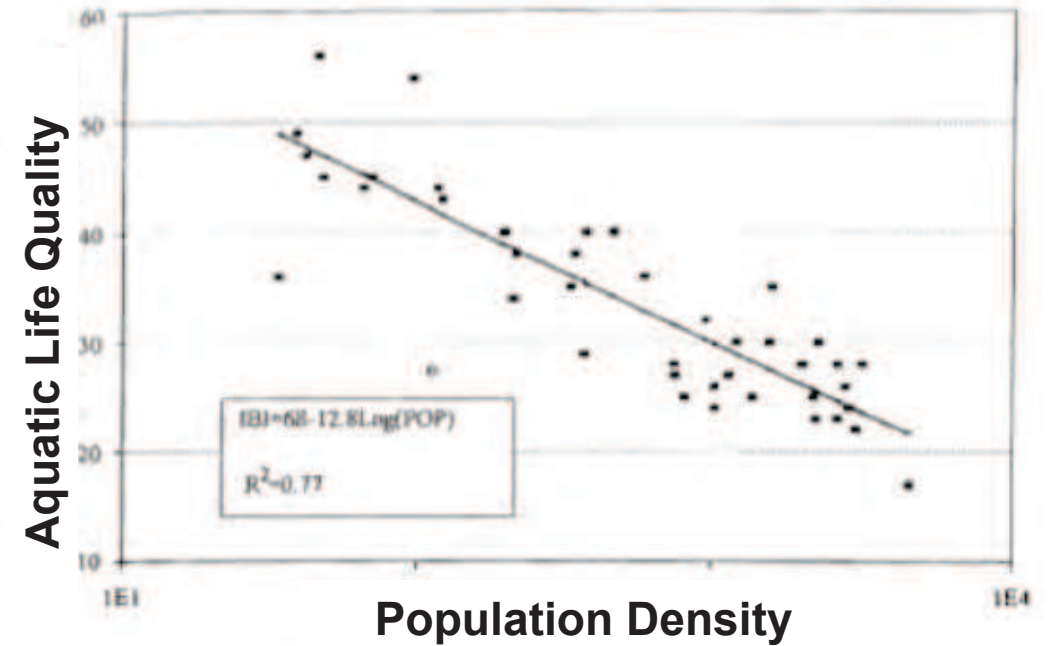
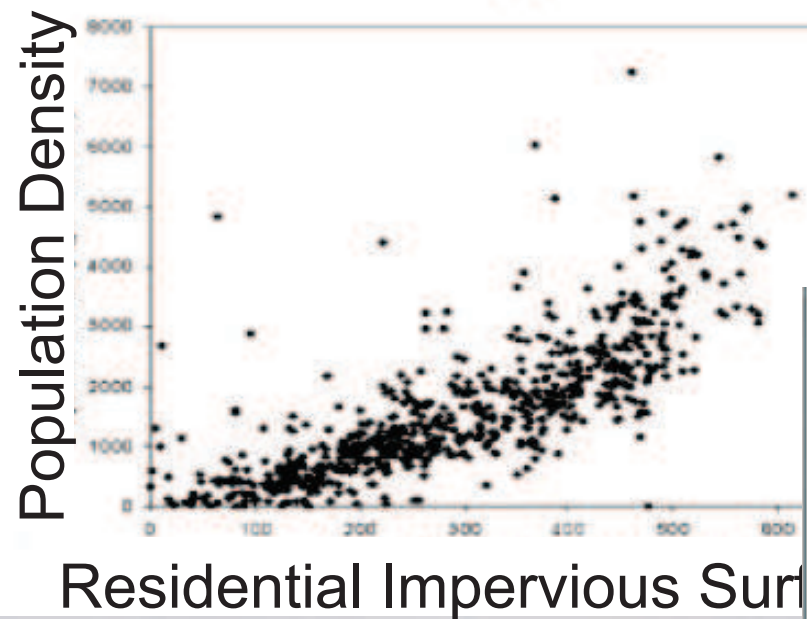
IMPERVIOUS SURFACE

A surface that does not permit the absorption of fluids

Such as: Rooftops, walkways, patios, driveways, parking lots, lawns

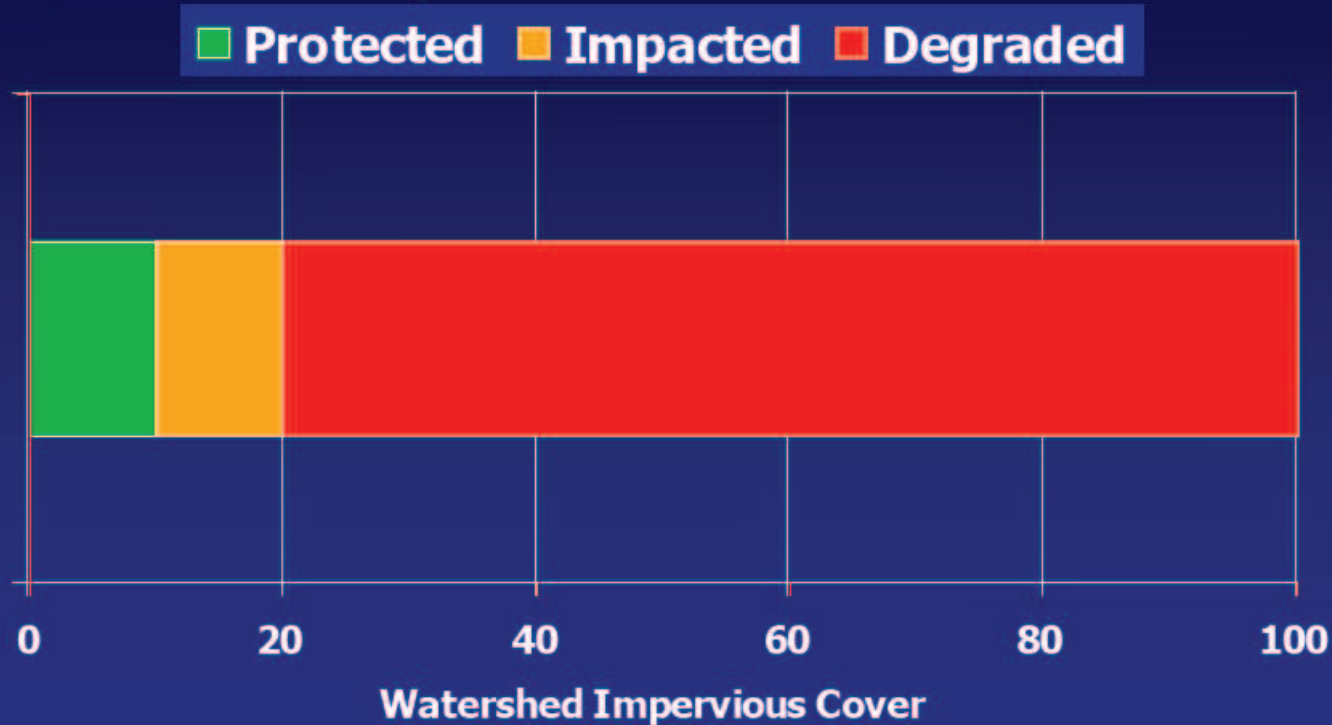
- Eliminate rainwater infiltration and groundwater recharge (increases runoff)

POPULATION V.S. IMPERVIOUS SURFACE

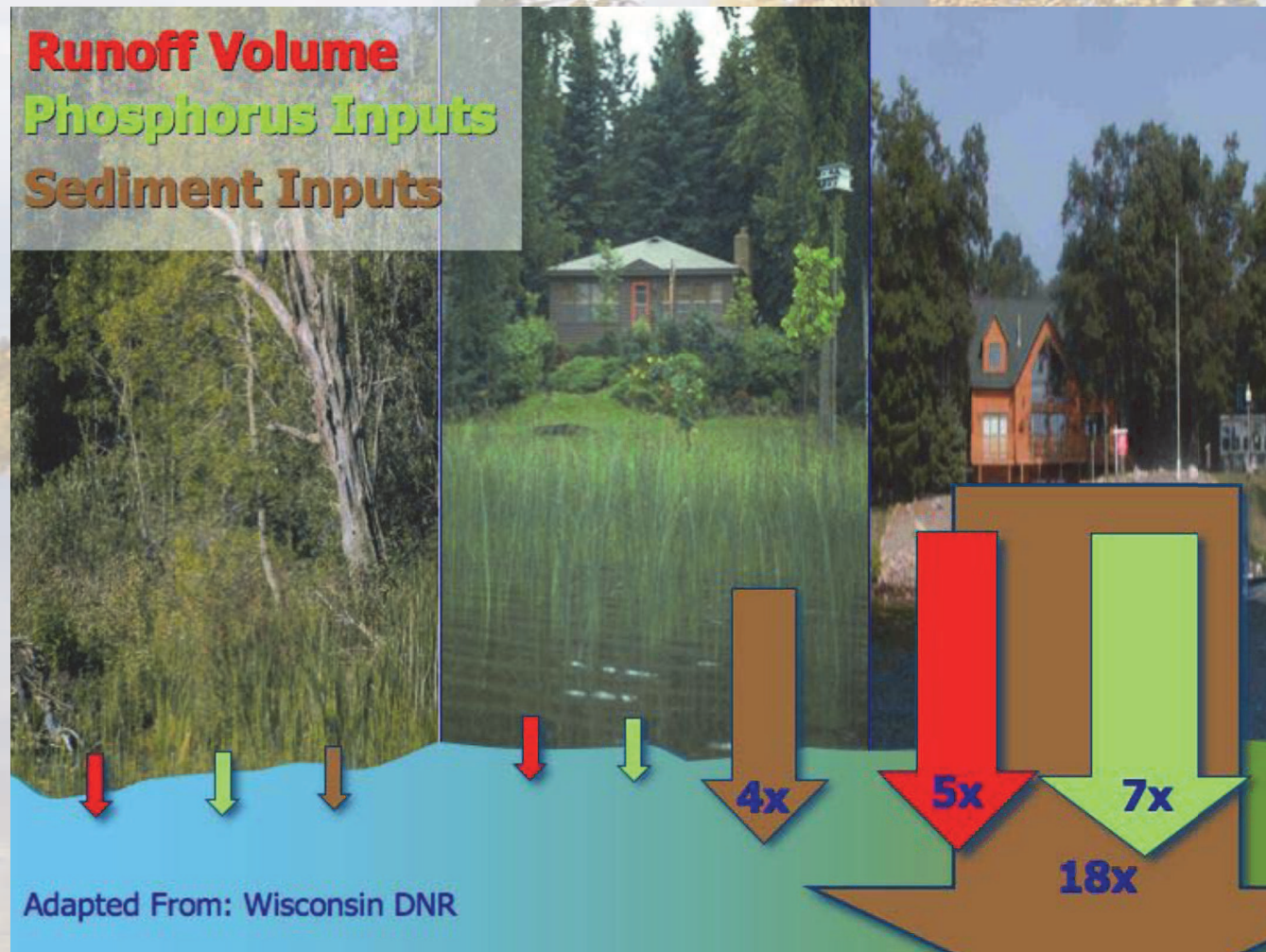


Level at which significant impact is Observed:
Impervious Surface Coverage: 10-20%
Housing Density: > 1 unit/acre

Cumulative Impacts of Impervious Cover



Natural vs. Developed Land Use



7 X more Phosphorus after Development

CALCULATING IMPERVIOUS SURFACE



Parcel: 1.1 Acres
Impervious: .36 Acres
32% Impervious

Use Beacon Website

<http://beacon.schneidercorp.com/>



Image from the Metropolitan Design Center Image Bank.
© Regents of the University of Minnesota. All rights reserved. Used with permission.



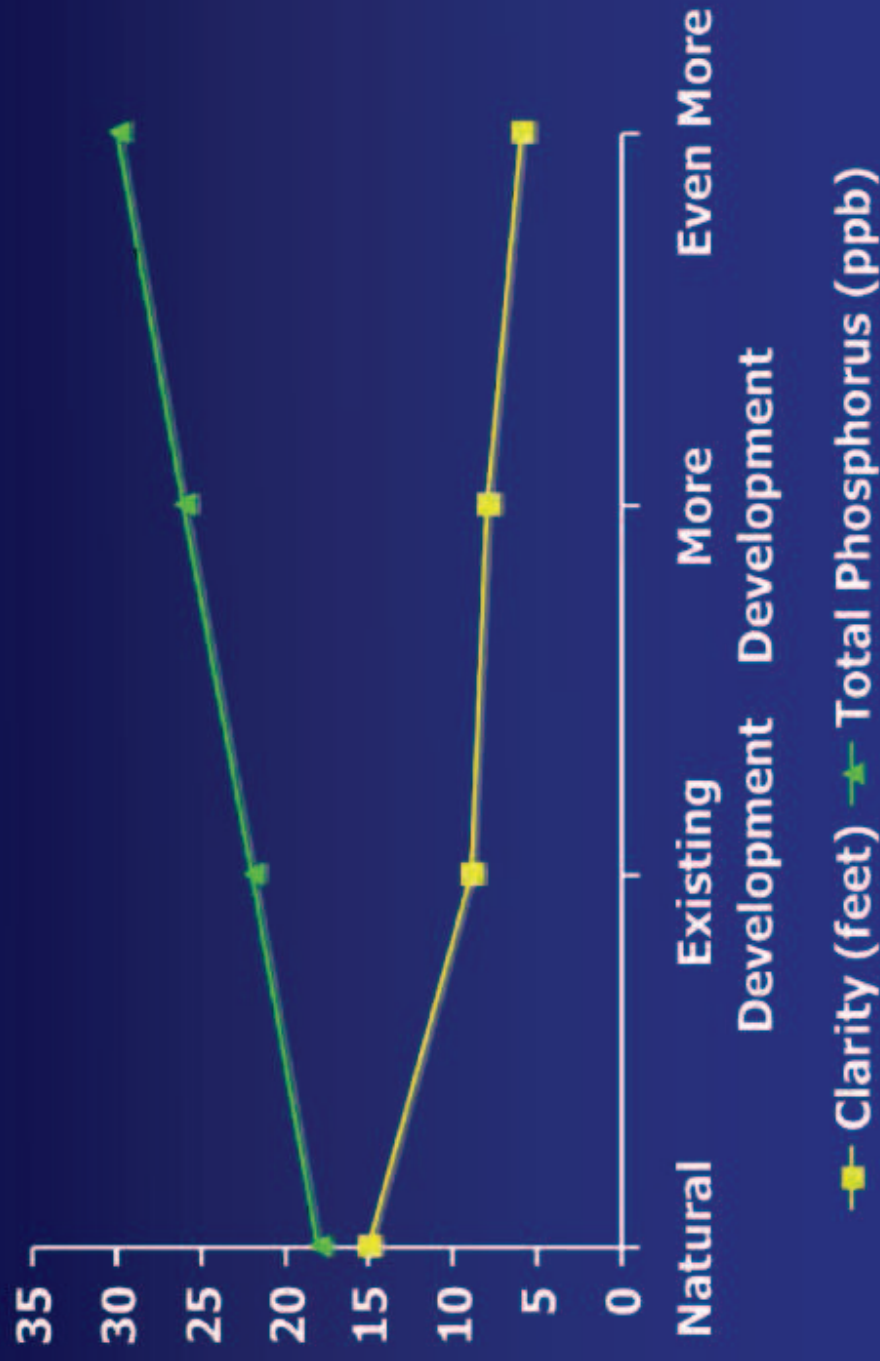








Build-out Predictions



Leaking/Failing Septic Systems

- Excess nutrients
 - nitrogen and phosphorus

Standard septic systems are designed to remove pathogens NOT nutrients



Impacts of Motorized Watercraft on Lakes



Effective Mixing Depth

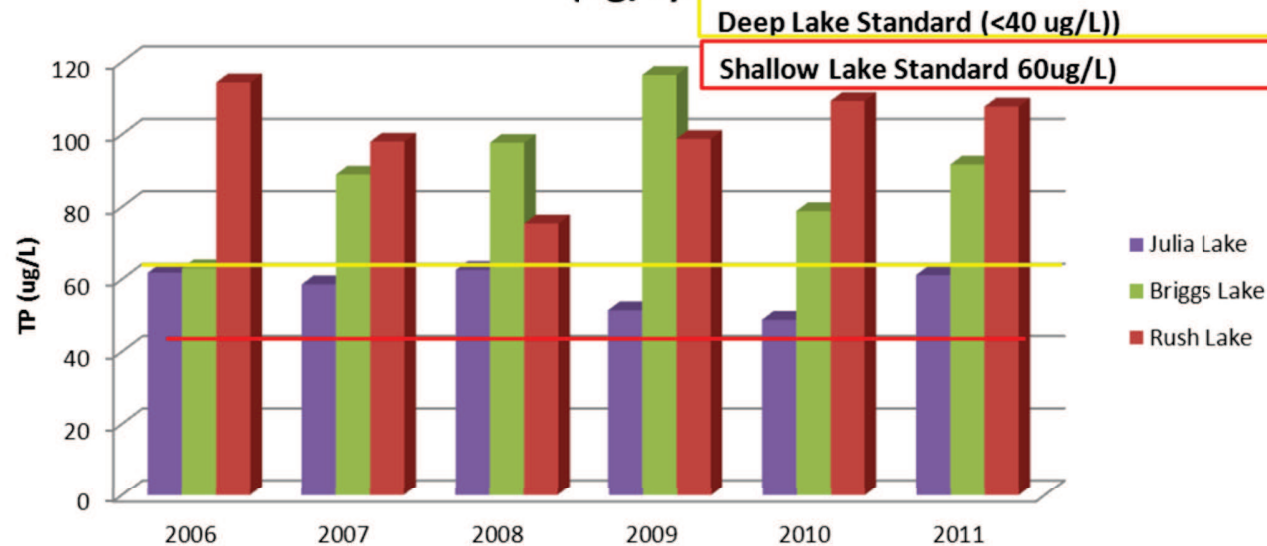
<i>Horse-power</i>	<i>Mixing Depth (feet)</i>
10	6
28	10
50	15
100	18

MN State Impaired Waters:

- Julia Lake
- Briggs Lake
- Rush Lake
- Big Elk Lake

TOO MUCH NUTRIENTS

Summer Growing Season Average TP: Briggs Chain
(ug/L)



Phosphorus Pollution increases with % Impervious Cover

