

Phosphorus Limits and Implementation in Michigan



Michigan Department of Environmental Quality

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(minimal modifications made on 9/21/11)

Phosphorus: Limiting Nutrient

- Phosphorus controls plant/algal growth
- Elevated levels cause macrophyte/algal community shifts leading to secondary water quality responses
- Secondary stressor/response relationships:
 - Depletes dissolved oxygen
 - Reduces recreational value
 - Impairs fish and macroinvertebrates



TP in NPDES

- Total phosphorus (TP) must be regulated in some NPDES permits to ensure water quality
- Many NPDES permits have included TP limits/monitoring requirements since the 1980s



Statutory Authority

- Legal authority is established in Part 31 of Michigan's Water Quality Standards, R323.1060
- Rule 60(1) establishes minimum treatability standard for TP of 1.0 mg/l
- Rule 60(2) prevents TP levels in ambient water from stimulating growth of plants, fungi and bacteria which are or may become injurious



Limit Development

- ~ 1500 NPDES permits (non-storm water) are effective in Michigan
- ~667 permits contain some type of TP control
- 353 permits contain numeric TP Limits (concentration and/or load)



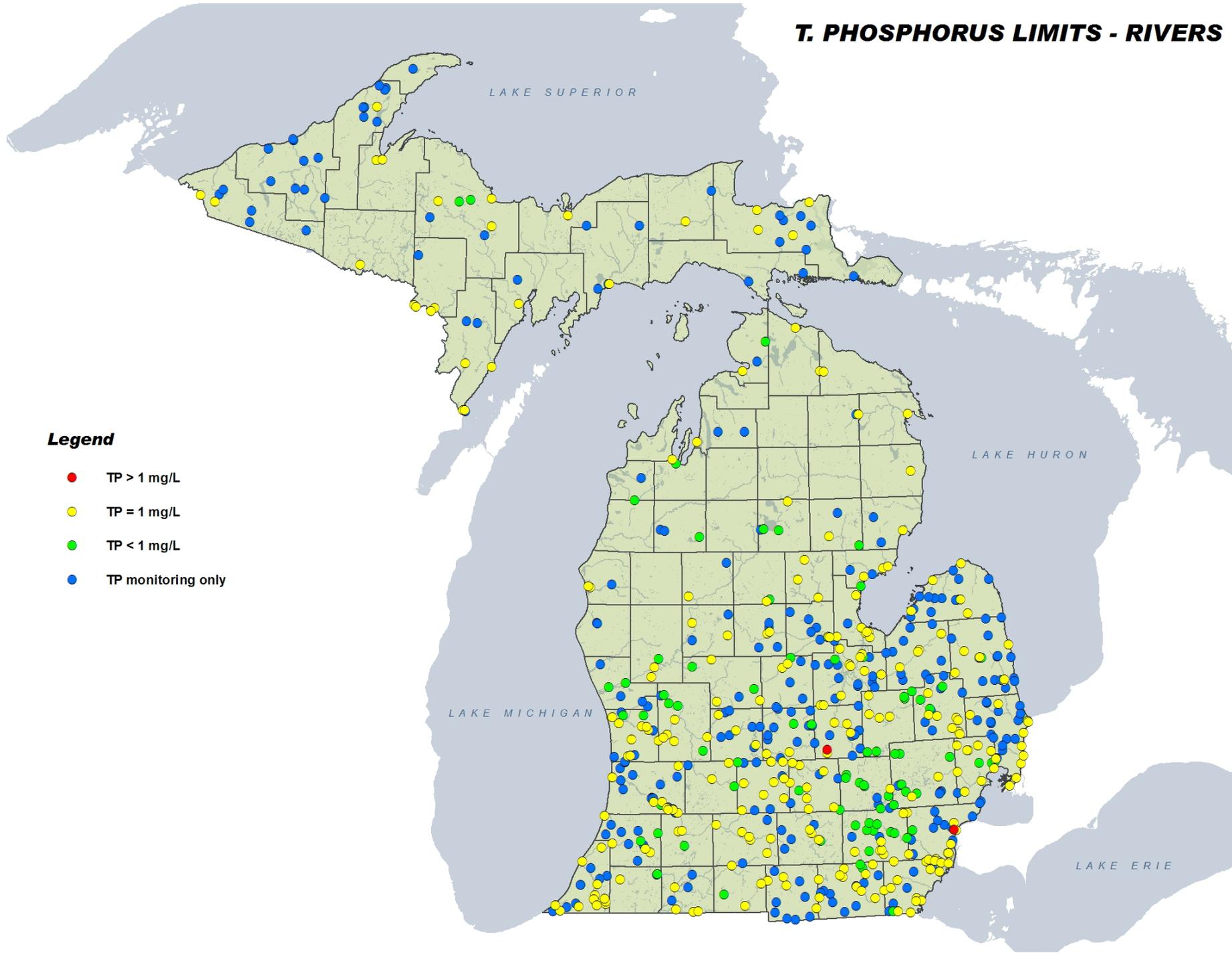
Categories of TP Limits

1. Minimum TP Treatability Based Limits
 - 1.0 mg/l
 - Used for existing point sources, unless more protection needed
2. TP Limits for Point Sources to TMDL Waters
 - <1.0 mg/l
 - Site-specific TP criteria inherent component of TMDL
3. TP Limits for Point Sources to Non-TMDL Waters
 - <1.0 mg/l
 - Site-specific TP criteria derived as part of permit development process
4. Special TP Limits to Ensure Adequate WWTP Performance
 - >1.0 mg/l
 - Smurfit-Stone & Menominee Paper (BOD treatment)

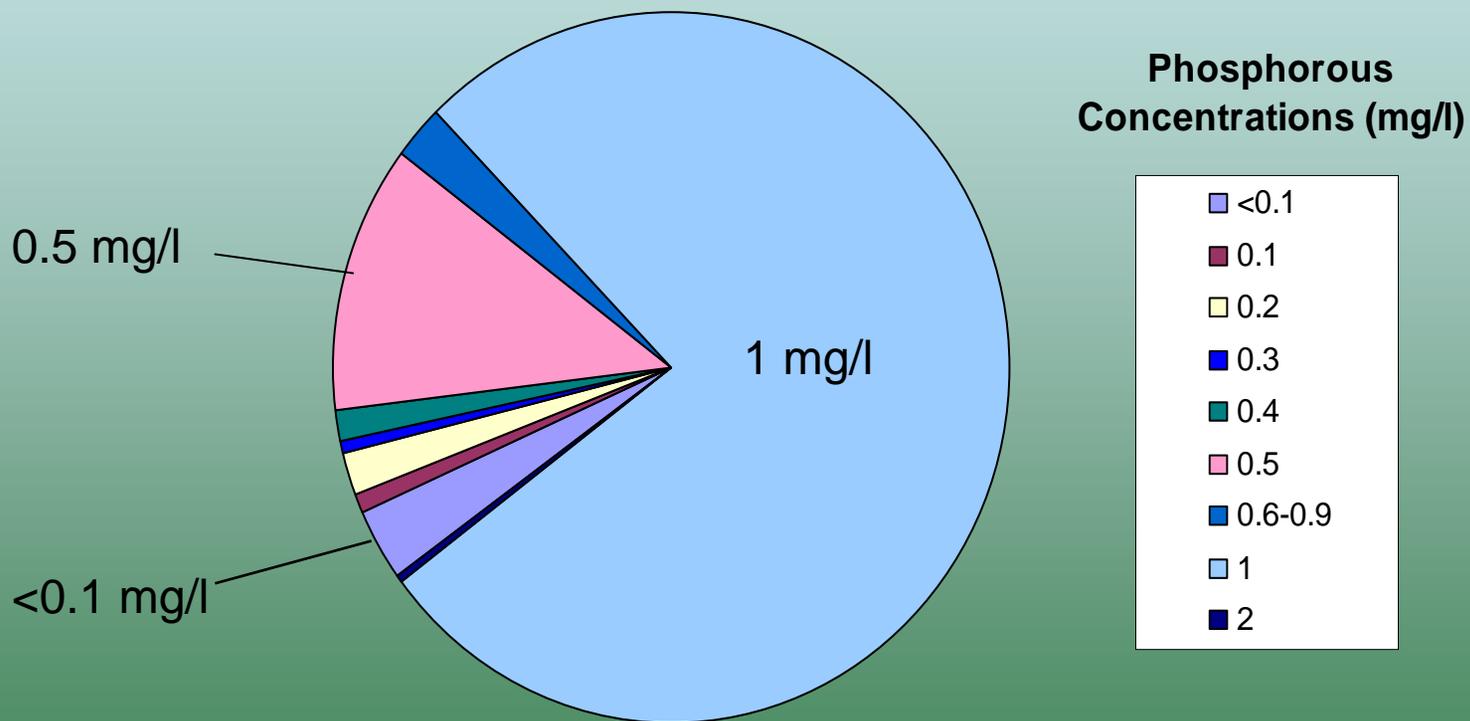
T. PHOSPHORUS LIMITS - RIVERS

Legend

- TP > 1 mg/L
- TP = 1 mg/L
- TP < 1 mg/L
- TP monitoring only



NPDES TP Limits



TP Limit Development

- TP Limits <1.0 mg/l are developed:
 - Site specific basis
 - State-of-the-art science
 - Best professional judgment
- Limits are derived by MDEQ, SWAS, Aquatic Biologists with contractor support, if needed
- Similar to how toxic pollutant WQBELs were derived prior to Rule 57 upgrade and GLI promulgation

Translation of Water Quality Goals to Limits

- Site-specific TP goals for rivers: 0.03 – 0.1 mg/l
- Site-specific TP goals for lakes/impoundments: 0.008 – 0.06 mg/l
- TP limits ensure TP goals are met in receiving water during 50% exceedance flow condition (summer)
- TP limits of 0.02 mg/l in some NPDES permits
- Variety of lake models are used to translate TP goals to TP load limits



Example: Thornton Farms

- Privately-owned WWTP
- Discharge to a drain in the Huron River TMDL
- Phosphorus limits 0.05 mg/l (May – Sept.), 1.0 (October – April)
- Installed a Dual-stage DynaSand Filter system
- Began discharging May 2006

