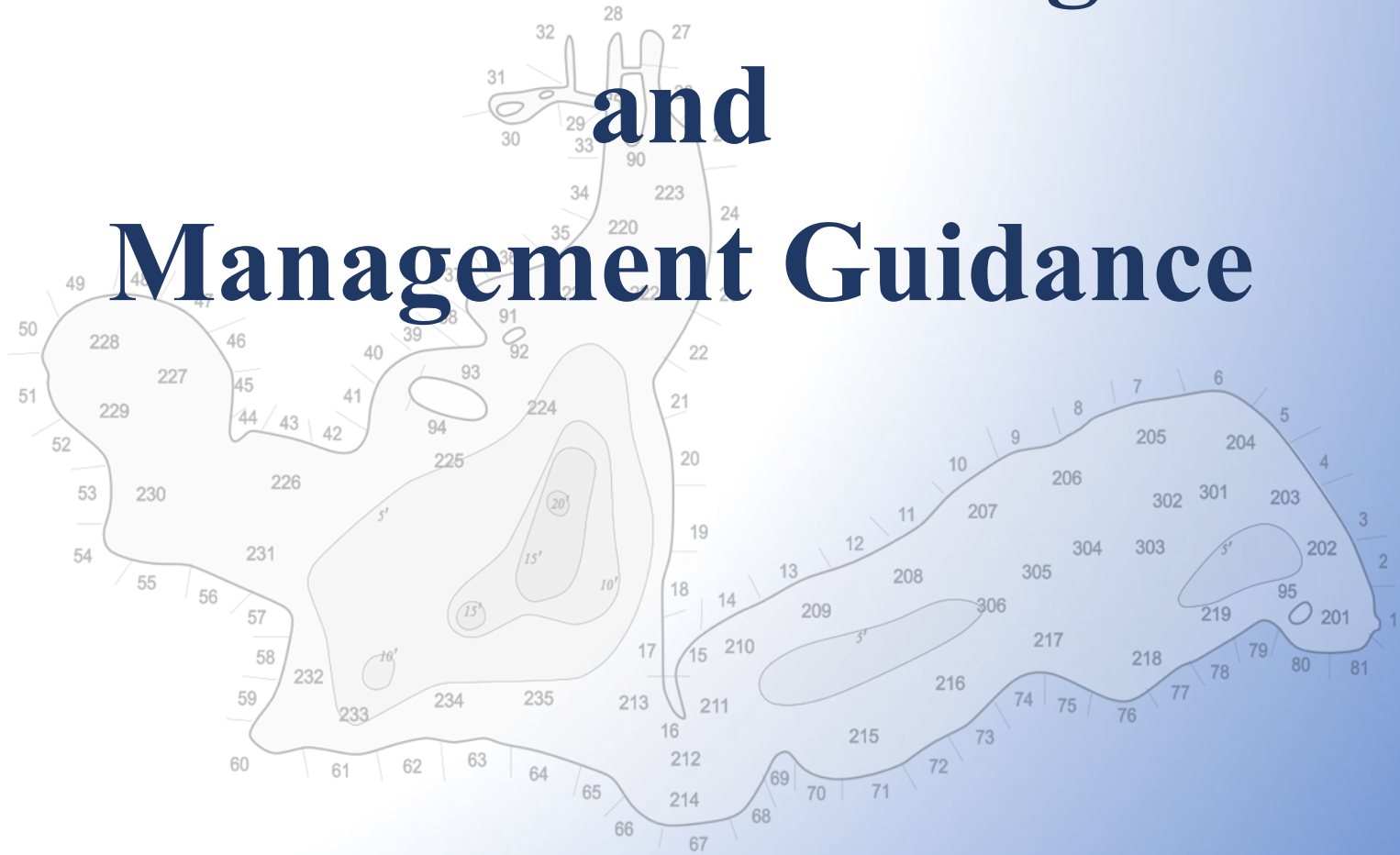


# Lake Monitoring

# and Management Guidance



G. Douglas Pullman, Ph.D.

Aquest Corp.

# Aquatic Vegetation Monitoring and Management Guidance

## Meaningful Monitoring

Weeds, Water Quality, Pollution, Sediment

## Management Team Approach

Administration,  
Resident Input,  
Management Guidance,  
Intervention Contractors  
(Herbicides, Harvesting, etc.)

## Outcome Focused Management

Problematic Prescriptives  
Did the Intervention Meet Expectations  
(Weeds gone? WQ Improvements? Pollution Concentrations Diminished?)

# Lake Management Monitoring and Guidance

Empirical Analysis of:

**“Whole Lake Health”**

**Trending Conditions**

**Dominance of Potentially Invasive Species**

**Changes in Critical Habitat Structure**

**Changes and Alterations in Perceived Nuisance Levels**

**Management Outcome Analysis**

# Lake Management Monitoring and Guidance

## Why?

- 1. Lakes are a Public Resource**
- 2. Understanding of Underlying Conditions**
- 3. Reveal Trending Conditions**
  - Dominance of Potentially Invasive Species**
  - Changes in Critical Habitat Structure**
  - Changes and Alterations in Perceived Nuisance Levels**
- 4. Management Outcome Analysis**
  - Proof of Benefit (Or Adiaphorous Intervention Outcomes)**
  - Technology Evaluations**
  - Regulatory Support**

## Aquatic Vegetation Monitoring



**Unit of Spacial Measure:**  
AVAS, AROS, Tier, Management Zone

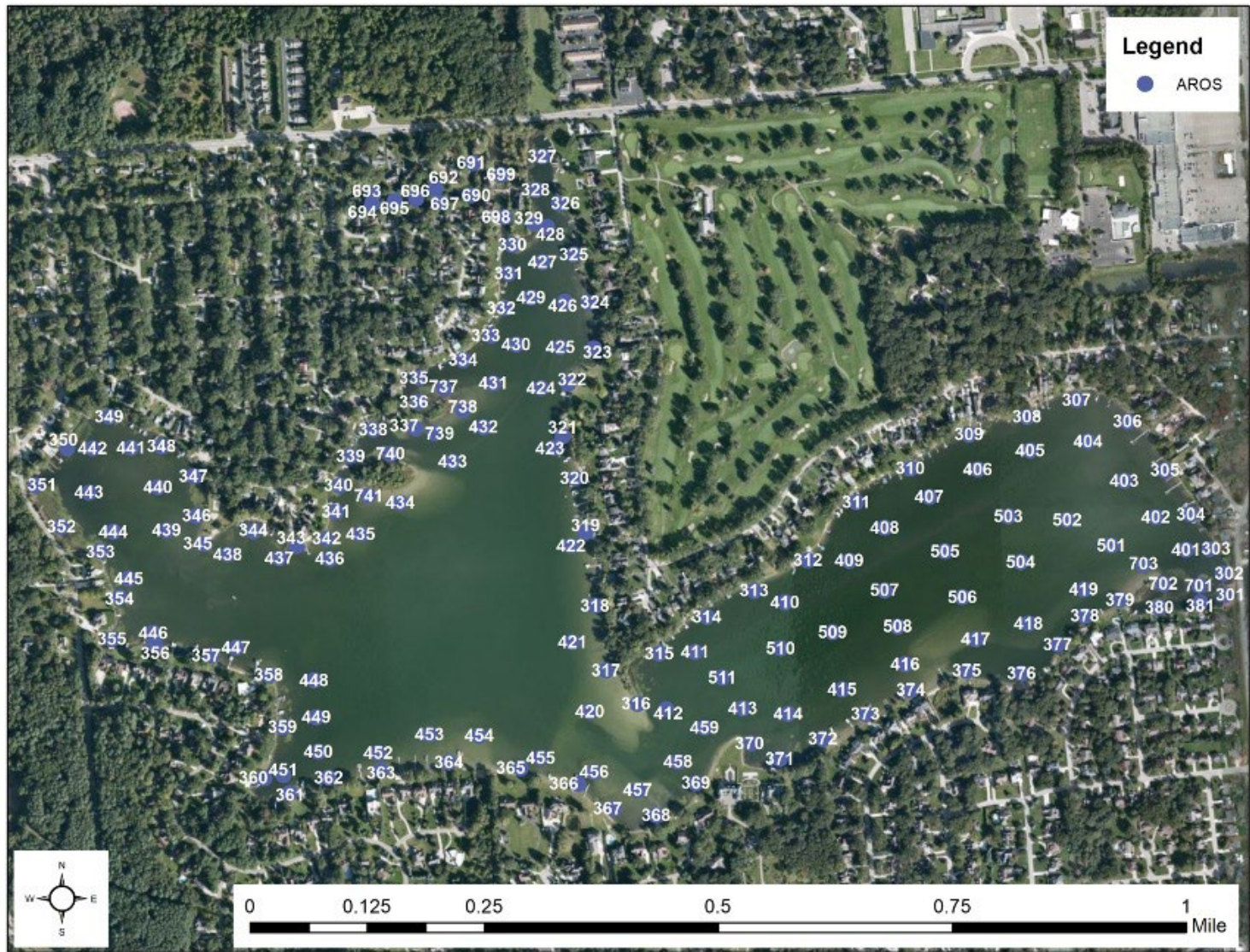
**Method of Observation:**  
Vegetation Sample and Processing,  
Surface Visual, Sonar, Underwater Camera  
Frodis, Rake (Style is Important - Species Dependent)



## Field Data Collection Strategy

Point Intercept (Waypoint), Transect, Polygon, Waypoint Meander





# Lake Monitoring

**Mapping Technologies**

**Hydroacoustics**

**Remote Sensing**



LakeScan™ Metric	Score Category	Useful in Describing Conditions For:	VS 3 June Survey	VS 5 August Survey	Goal
Species Richness	Biodiversity	Ecosystem Health	12	15	20
BioD 60 Index	Biodiversity	Ecosystem Health	52	53	50
MorphoD 26 Index	Structural Diversity	Fish Habitat	53	59	35
Vegetation Quality (Mean Weighted "C")	Nuisance Condition	Ecosystem Health	4.7	4.8	5

Year	Season Average Species Richness	Season Average BioD 60	Season Average MorphoD 26	Season Average Mean Weighted Veg. Quality
2022	14	52	59	3
2021	14	52	59	4
2020	15	53	59	4



# Lower Straits Lake

## History of Innovation

- 1988 Vegetation Community Monitoring for Lake Health Begins
- 1991 First Autumnal Fluridone (Sonar) Application Made to any Lake for Milfoil Control
- 1992 Recognition of Possible Watermilfoil Hybridity by MI DNR and Aquest
- 2003 Confirmation of Watermilfoil Hybridity (first of 3 MI lakes)
- 2006 Discovery of Starry Stonewort (part of only a dozen lakes)
- 2008 Development of Enhanced Methods for Starry Stonewort Control
- 2010 Development of Enhanced Methods to Control Increasingly Management Resistant Ebrid Watermilfoil (Aquest and U of M Researchers)
- 2021 Limited trial of a New Herbicide, ProcellaCOR, for Ebrid Watermilfoil Control
- 2022 Mechanical Harvesting Trial for Ebrid Watermilfoil and Curly Leaf Pondweed Management to Extend Recreation Season

# Aquatic Vegetation Monitoring and Management Guidance

## Desired Outcome Considerations

**Time, Efficiency, and Cost Effective**

**Reproducible Observations**

Time (Event) to Time (Event)

Person to Person Consistency

**Suitable for Meaningful Empirical Data Analysis**

Many Meaningful Metrics

**Provide Power of Empirical Comparison**

Time to Time - Person to Person - Season to Season - Lake to Lake - Space to

**Time, Efficiency, and Cost Effective**

**Map Production**

Treatment Waypoints, BioBase™, Public Presentation

**Suitable for Meaningful Empirical Data Analysis**

Many Meaningful Metrics

**Provide Power of Empirical Comparison**

Time to Time - Person to Person - Season to Season - Lake to Lake - Space to Space

