

BLOOM  OPTIX™

Real-Time HAB Monitoring via Artificial Intelligence  
Enhanced Digital Microscopy

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# 01 Current Monitoring Approaches



**Current monitoring heavily relies on civilian reporting or expensive equipment**



**Citizen reports can lead to inefficiency & false results**



**Sample collection and transport to labs introduces lag**



**Lab backlog & analysis times hinder response times even further**



**Lab analyses only provide a snapshot & are costly (\$30 - \$120 per sample)**

## 02 Advancements in Artificial Intelligence and Digital Microscopy

# AI-DRIVEN WATER ANALYSIS

## TRADITIONAL CELL COUNTING AND ID



# BLOOMOPTIX

*Automation produces near real-time results*



Up To 240x  
faster



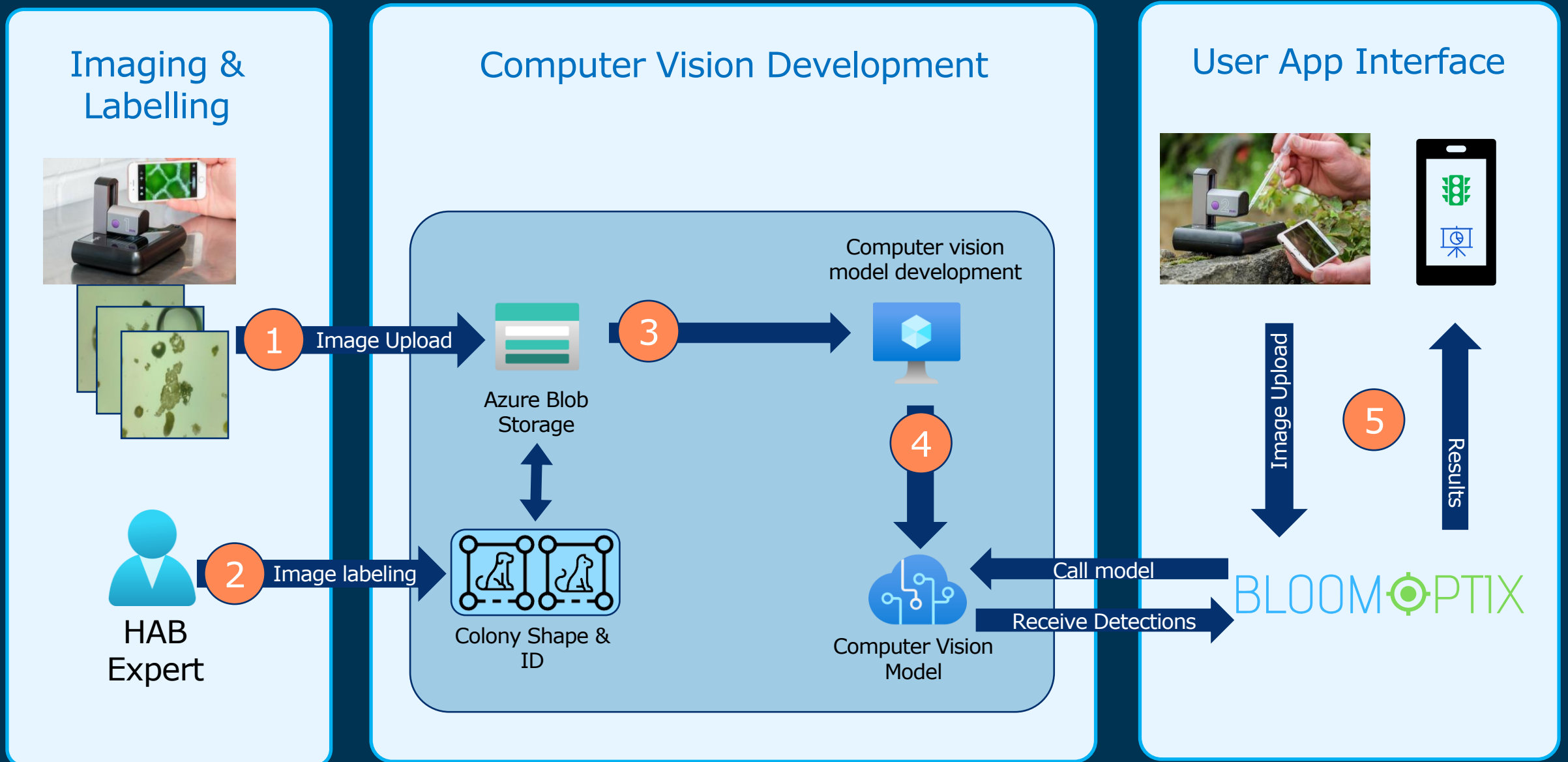
# Advancements in Field Microscopy

## iolight



- High Resolution
- Linked Wirelessly to Cellphone
- Highly Portable & Rugged
- Easy to Use
- Low Cost
- Used by Experts & Amateurs

# Idea: Computer Vision Implementation

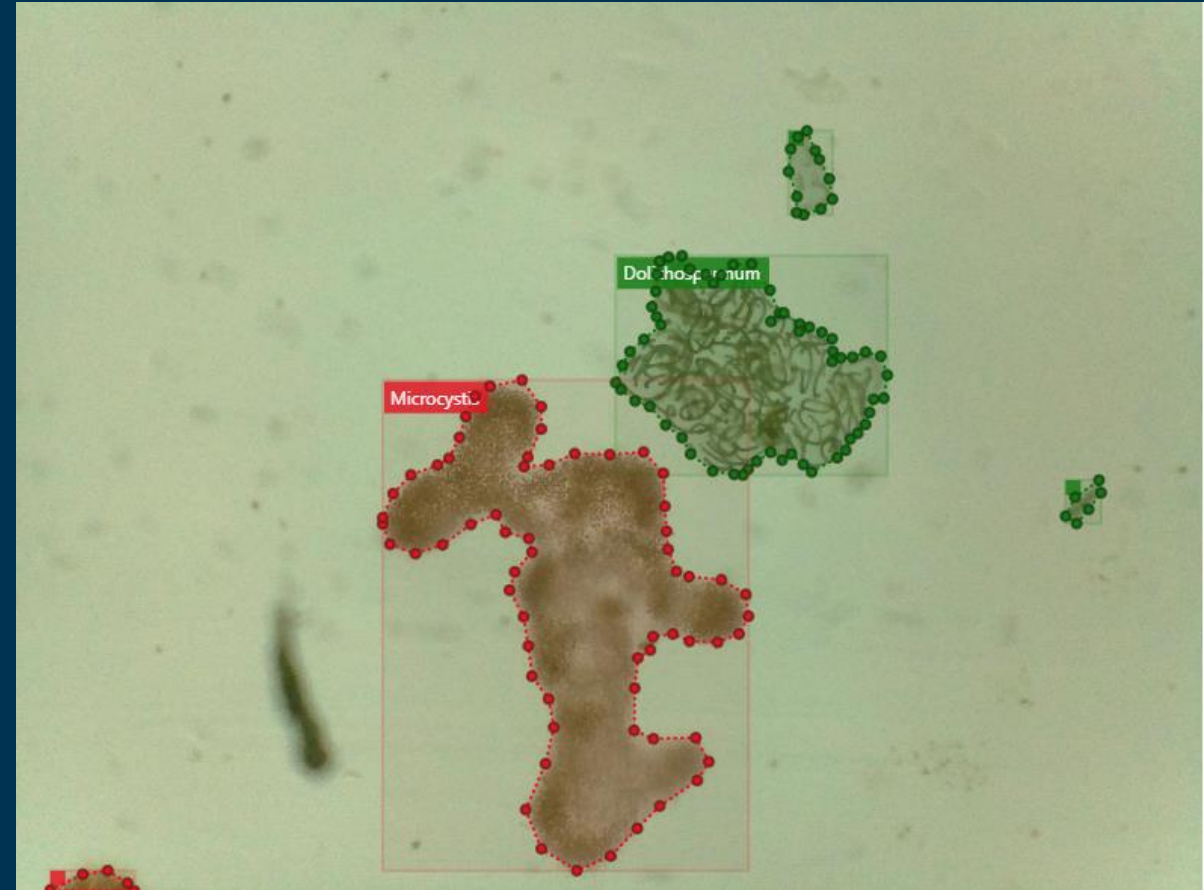
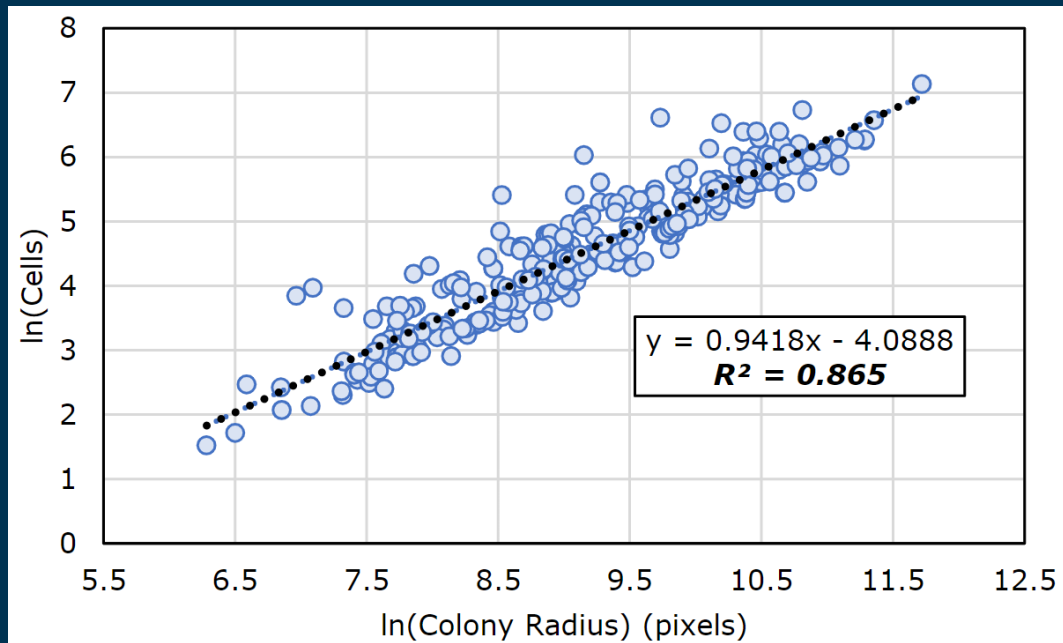




## 03 Phase 1: Cell Counting Model and Image Acquisition

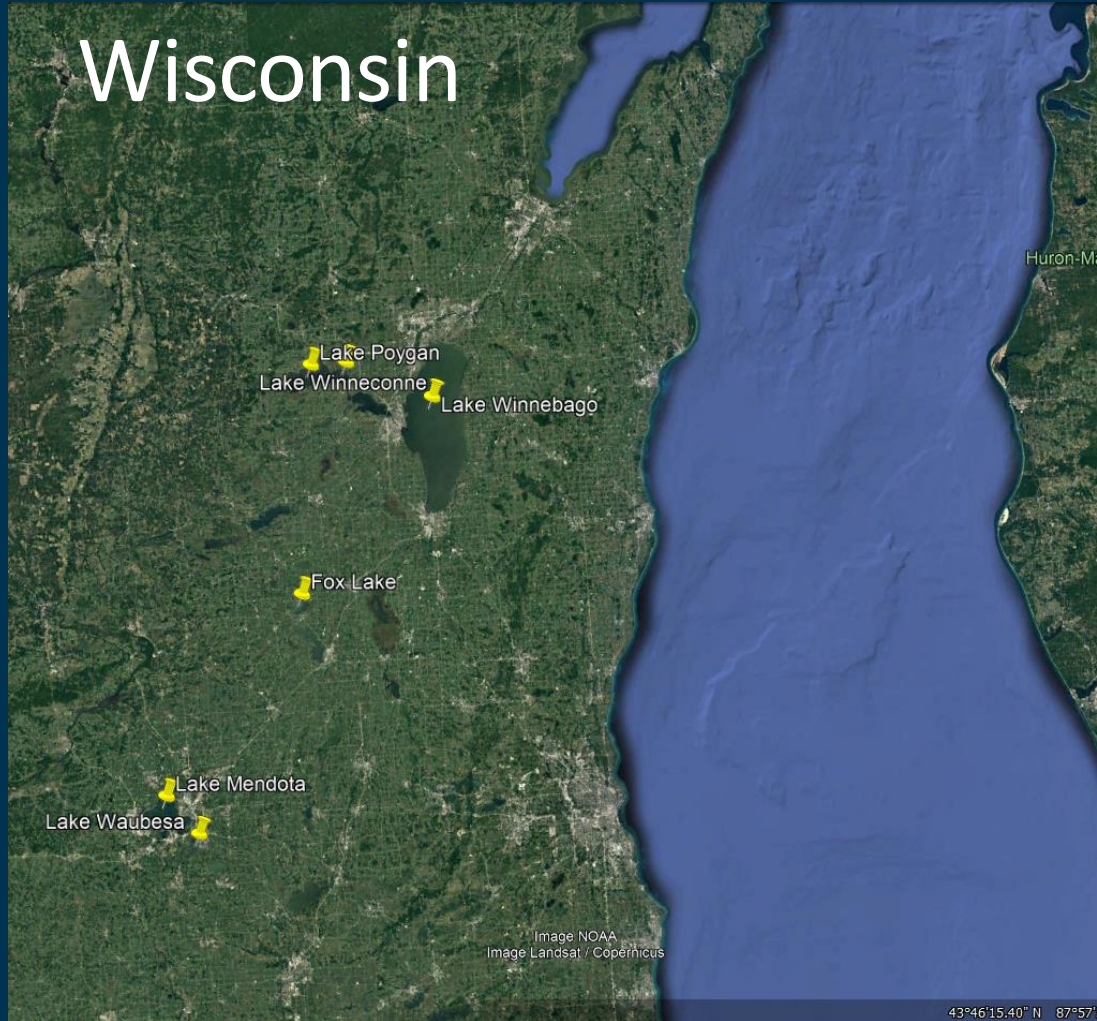
# Methods: Cell Counting Model

Model correlates manual cell counts and calculated colony volume





# Methods: Data Collection & Sampling





# Results: Phase 1 Findings

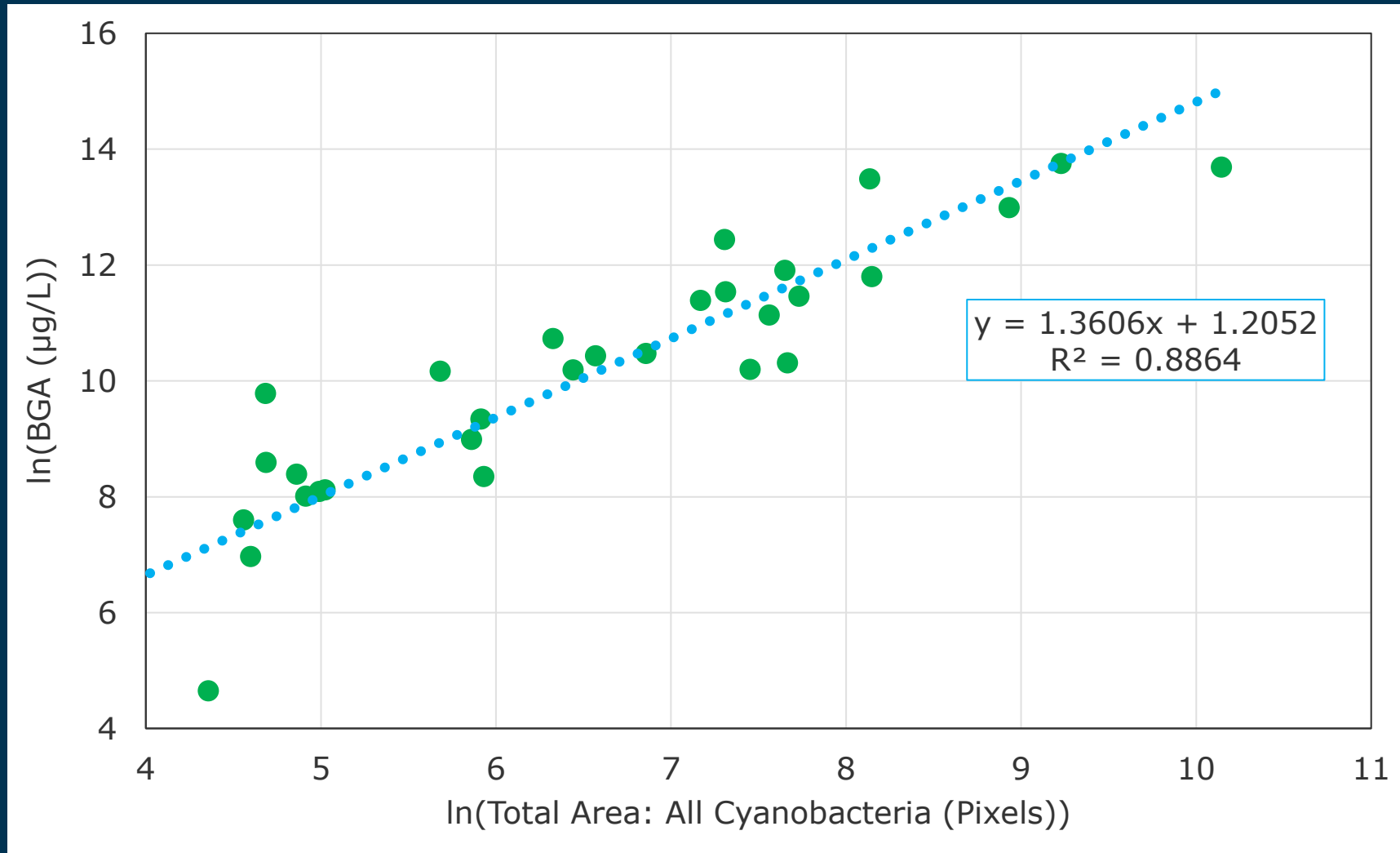
15,000 images collected

The platform is user friendly at all experience levels

Even with human intervention, result turnaround times were rapid (90 mins) and provided meaningful data to our volunteers



# Results: Fluoroprobe Comparison



## 04 Phase 2: Image Processing and AI Build

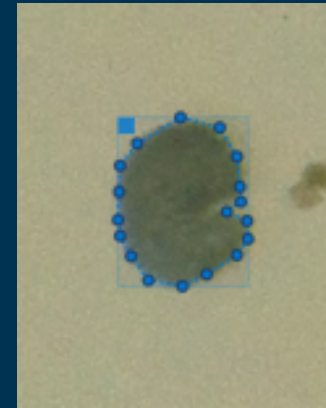


# Methods: Computer Vision Accuracy Testing

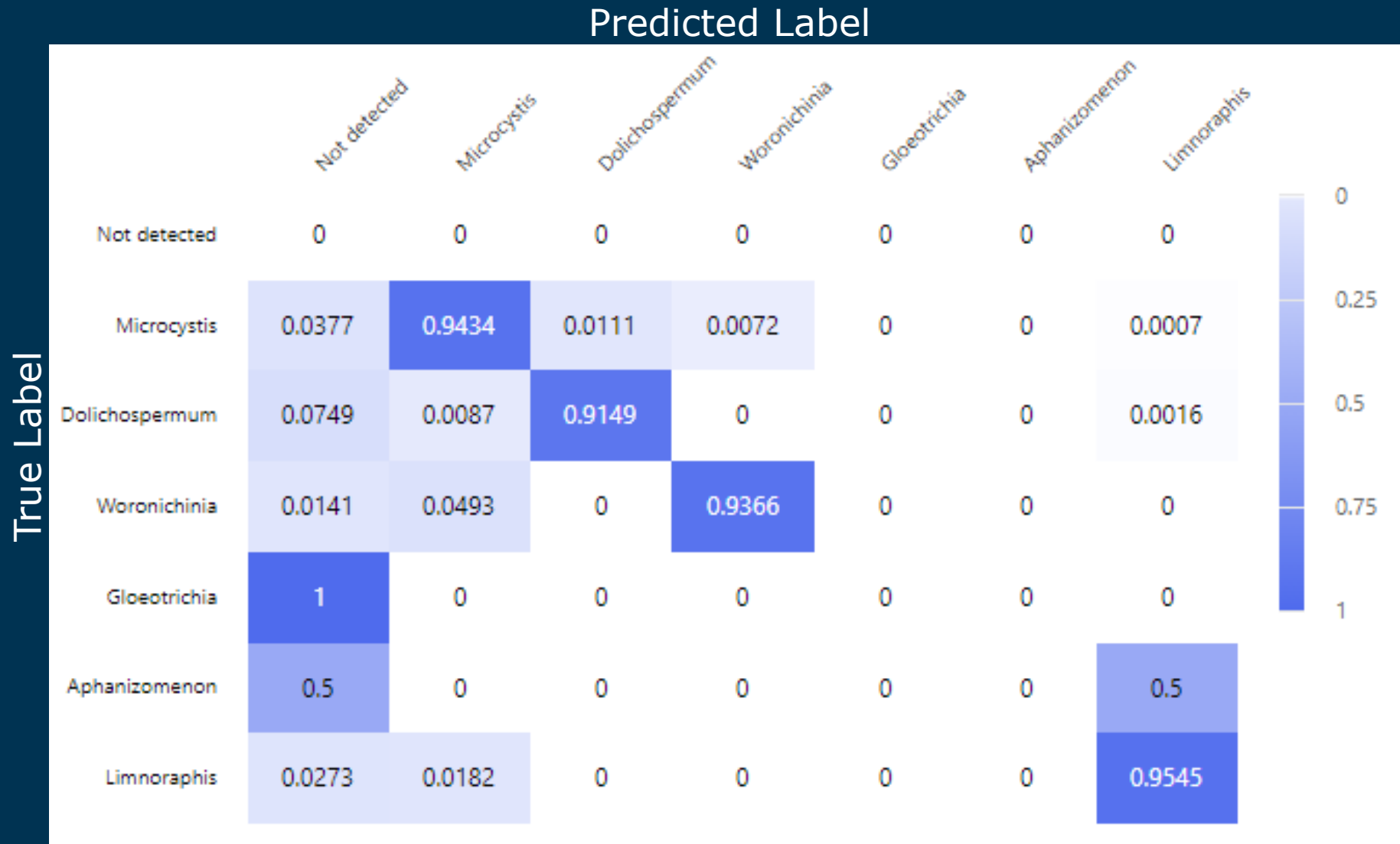
~5,000 images were manually labelled

Following labelling, a subset of 20% of those images were retained for validation testing

Computer Vision accuracy was tested against the manual labels of the subset, with human labels assumed to be "correct"



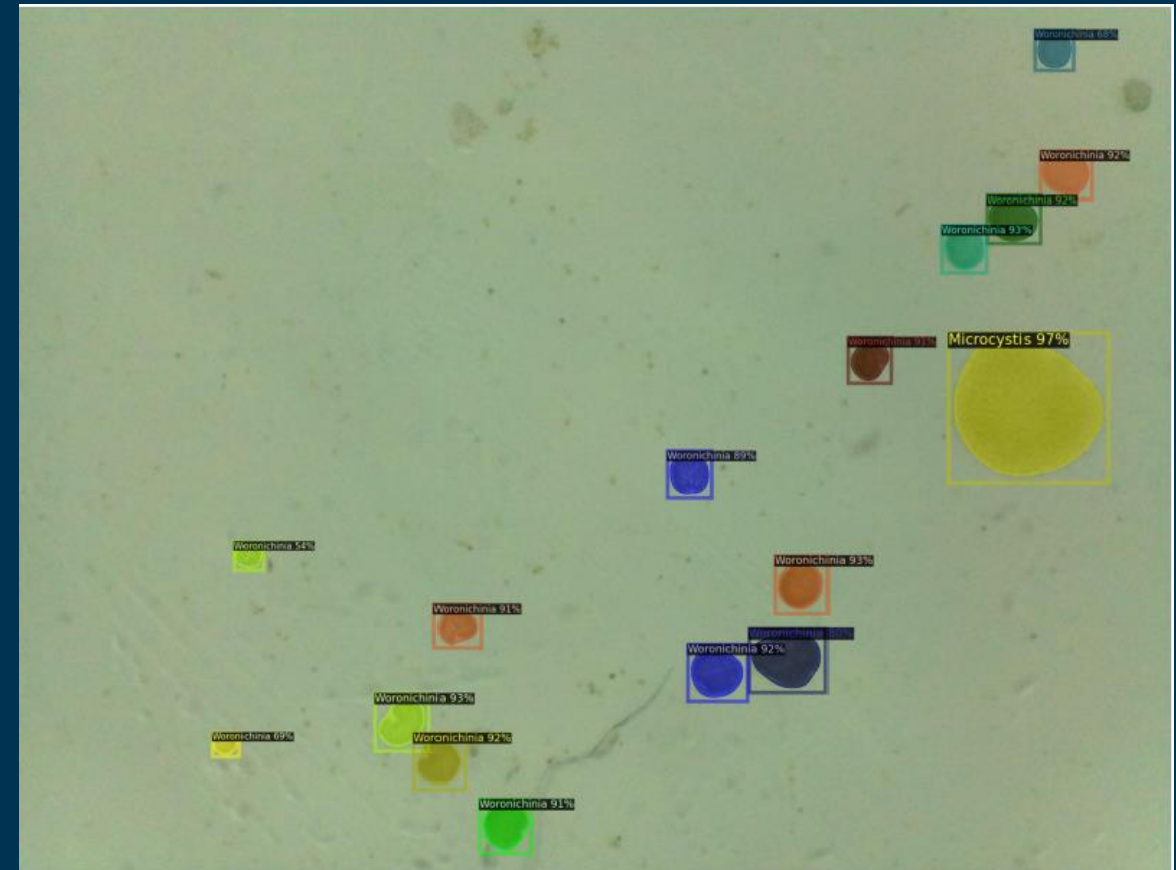
# Results: Computer Vision Accuracy Testing







# Results: Label Mismatch Example #2



# Conclusions: Phase 2 Findings

Application of AI produced cyanobacterial IDs with >90% accuracy

Accuracy of model can be greatly improved with further QA/QC steps and proper user training

Speed of analysis and repeatability is much greater than manual processing



## 05 Phase 3: Upcoming Validation Testing



# Phase 3: Upcoming Validation Testing

Scan QR code to participate!

## Objectives:

1. Fully validate accuracy of AI-based cyanobacterial ID & counts in as many lakes as possible
2. Compare AI-collected data to standard lab data
3. Deploy Beta version of App & AI in the hands of users
  - Geolocation
  - Weather
  - Secchi Depth
  - Custom measurement for users



# Acknowledgements:

## Funding



## Pilot Participants



Dr. Gregory Boyer

Dr. Stephen Shaw

Abby Webster

Danara Dormaeva


Sarah Helen Edwards

Sarita Cristina Perez

## 06 Questions & Discussion

Scan QR code to schedule a  
1-on-1 Meeting!!!

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