Next Phase Plan: Fishcluster Vision Prototype

1. Improved Training (More Epochs)

- Current issue: Some fish are not being detected reliably.

- Plan:

  - Retrain YOLOv5s with 100-300 epochs instead of the default ~50.

  - Use fish-specific datasets (tilapia, catfish) to improve bounding box accuracy.

   - Apply data augmentation (flips, brightness changes, murky water simulation) to make the model robust.

- Impact: Higher detection rate, fewer missed fish, more consistent size/weight estimates.

2. Nighttime / Total Darkness Scenario

- Challenge: Farmers want 24/7 monitoring, but standard cameras fail in darkness.

- Plan:

  - Integrate infrared (IR) cameras with IR illumination (invisible to fish, visible to sensor).

  - Explore low-light sensors or thermal imaging as alternatives.

  - Retrain or fine-tune the model on IR images to adapt to different visual patterns.

- Impact: Continuous monitoring at night without disturbing fish behavior.

3. Infrared Light for Fish Tracking

- Answer to CEO's question:

  - Yes, infrared light can be used with cameras for fish tracking.

  - IR illumination is invisible to fish, so it won't affect feeding or stress levels.

  - With an IR-sensitive camera, the detection pipeline can continue working at night.

- Next step: Collect IR footage of fish ponds and fine-tune the detection model on that data.

4. Integration & Product Thinking

- Feeder Logic: Use biomass estimates to adjust feed amounts automatically.

- Harvest Prediction: Track growth trends over time for better harvest planning.

- Financing: Provide data-driven insights for farmer loans and investment decisions.

5. Deliverables for Next Phase

- Retrained YOLOv5s weights (higher epochs, fish dataset).

- Sample IR footage + detection demo.

- Updated Technical Note with nighttime monitoring strategy.

- README update with 'Next Phase Plan' section.