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BUILDING A BETTER WORLD

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# **LSS Design Fundamentals**

# PROJECT SCOPE

- Tank volume
- Animal species
- Food load
- Site conditions
- View path

## **DESIGN CRITERIA**

- Water quality goals
- Type of treatment
- Equipment capacity
- Configuration

# LSS Engineer's Toolkit

- Education and training
- Extensive knowledge of systems
- Practical O&M experience
- Learn from each other (AALSO)
- But what are the industry standards?



#### **Reference Materials**



## **Modeling Software**





#### **Modeling Software**





# Ideals of an Aquatic Life Support Model

- Parameters tailored to our industry
  - #1 turbidity
- Account for all inputs/outputs
  - Feeding
  - Internal generation (excrement, microbrial blooms)
  - Maintenance activities (cleaning, backwashing)
  - Makeup water (flushing, backwash recovery)
  - Treatment efficiency
  - Circulation and mixing
- Dynamic

## **Concept of Temporal Cyclical Model**



#### **Calibrate with Real Data**



#### **Simulate Alternatives and Scenarios**



# **Benefits of Computer Modeling**

- Supports decision making
- Avoid "over" and "under" design
  - Capital and O&M costs
  - Carbon footprint
  - Space and other disciplines
- Troubleshoot existing systems
- Evaluate change in operations



## **Next steps**

- Calibrate with other exhibits and facilities
- Verify with hard data
- Improve user interface
- Publish findings



#### **Related research... Facility Surveys**





## **Related research... Pilot Studies**

- Membranes
- Membrane Bio-Reactors





# **Questions?**

