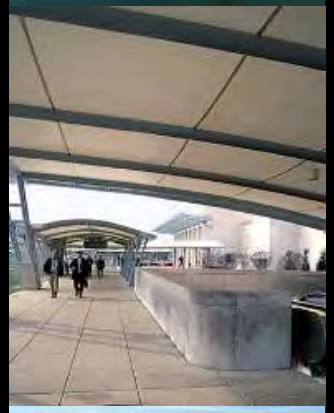
HDR's Senior Fisheries Biologist Tom Johnson inspects salmon eggs in vertical flow incubator in Coldwater Production Building

AQUATIC FACILITIES

TOM JOHNSON

HDR



HDR History

Founded in 1917
Employee Owned
Award Winning Design and Consulting
Offices Worldwide
120 Offices
5000 employees

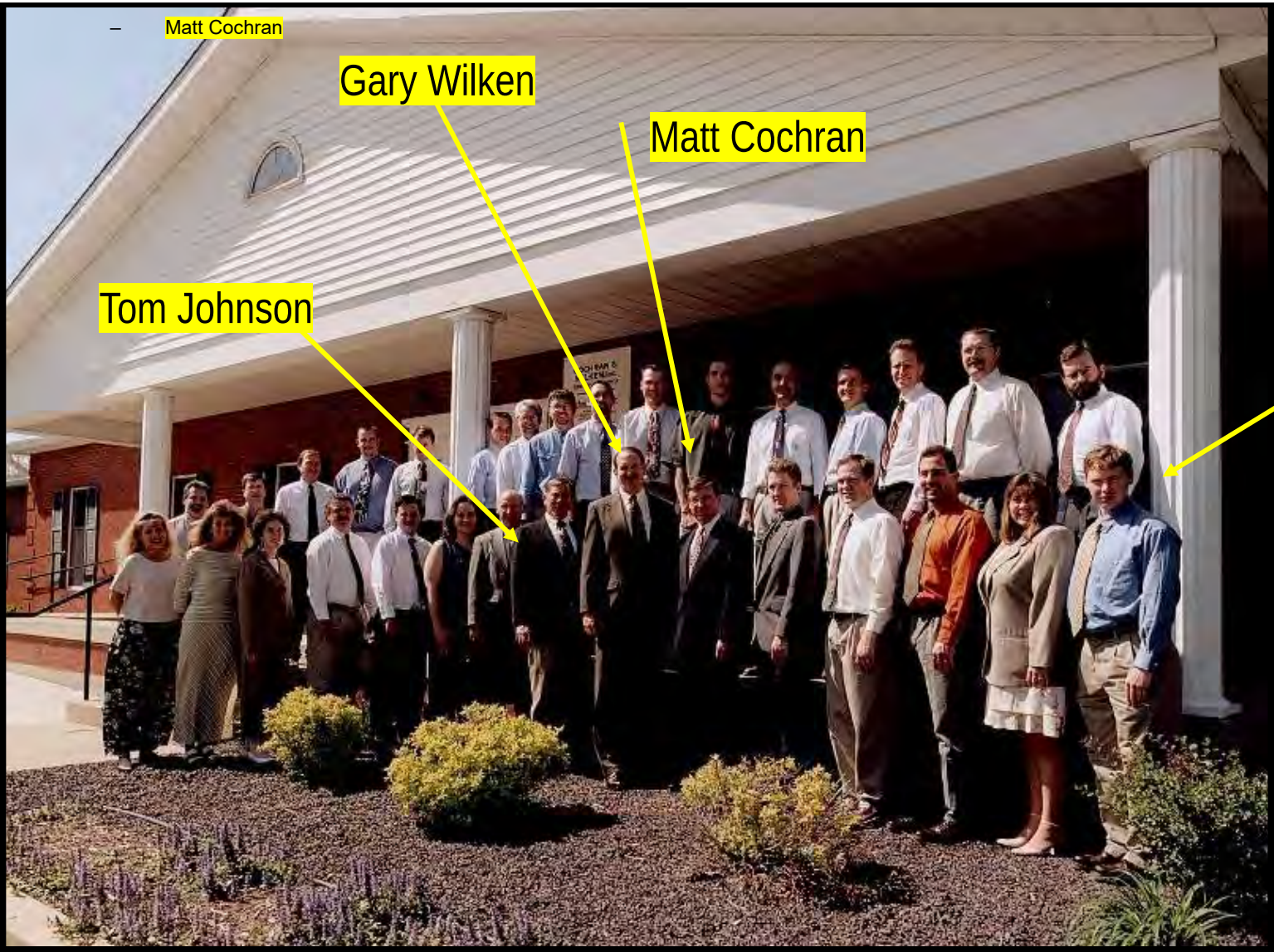
Omaha NE Corporate Headquarters

HDR Springfield Office

HDR Gig Harbor Office

Fisheries Design centers

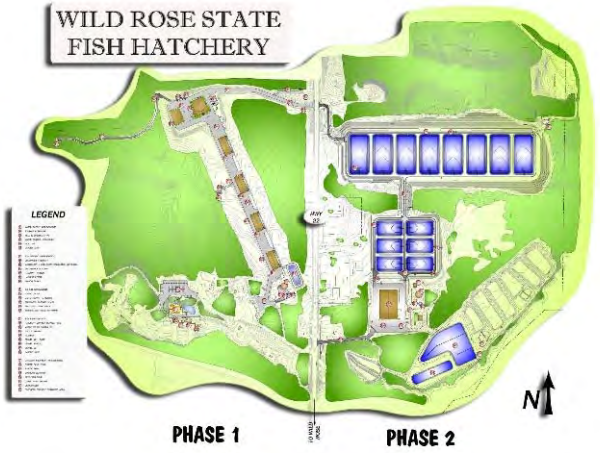
– Matt Cochran



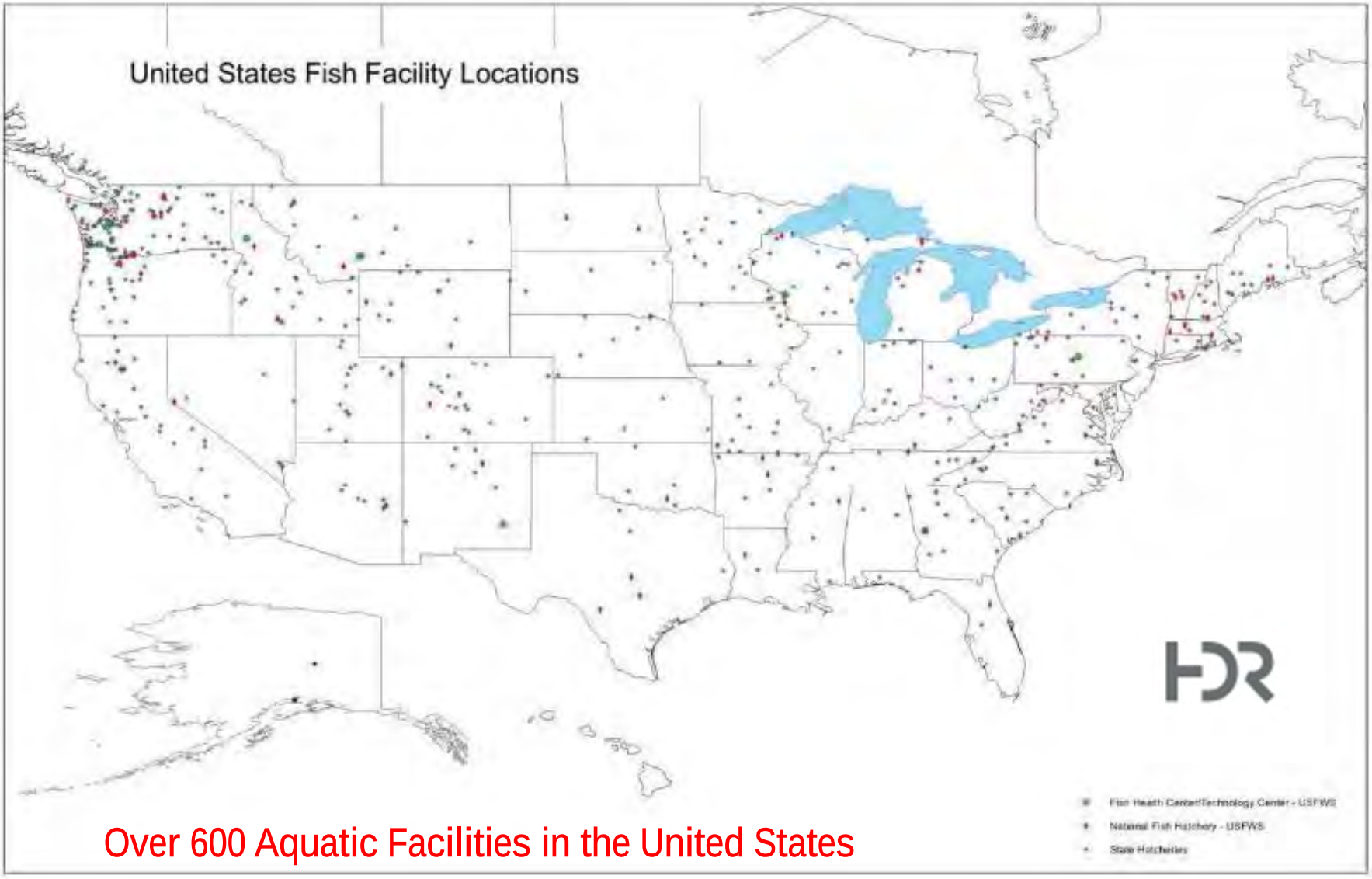
01 Design Challenges

02 Trends in Facility Design

03 Design and Construction Around the Country



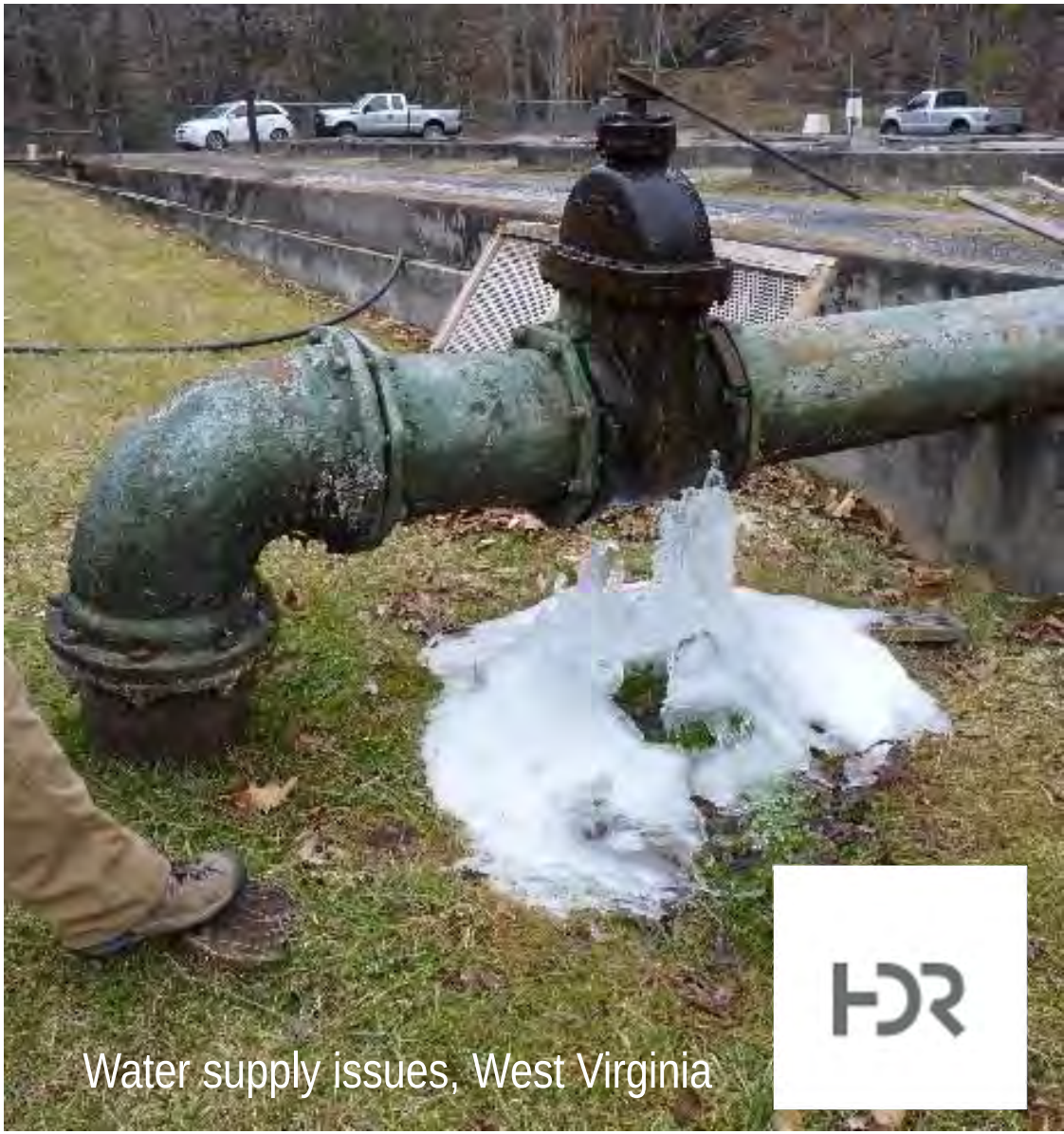
01 Design Challenges



Over 600 Aquatic Facilities in the United States

Most Facilities Require Upgrades and Repairs for:

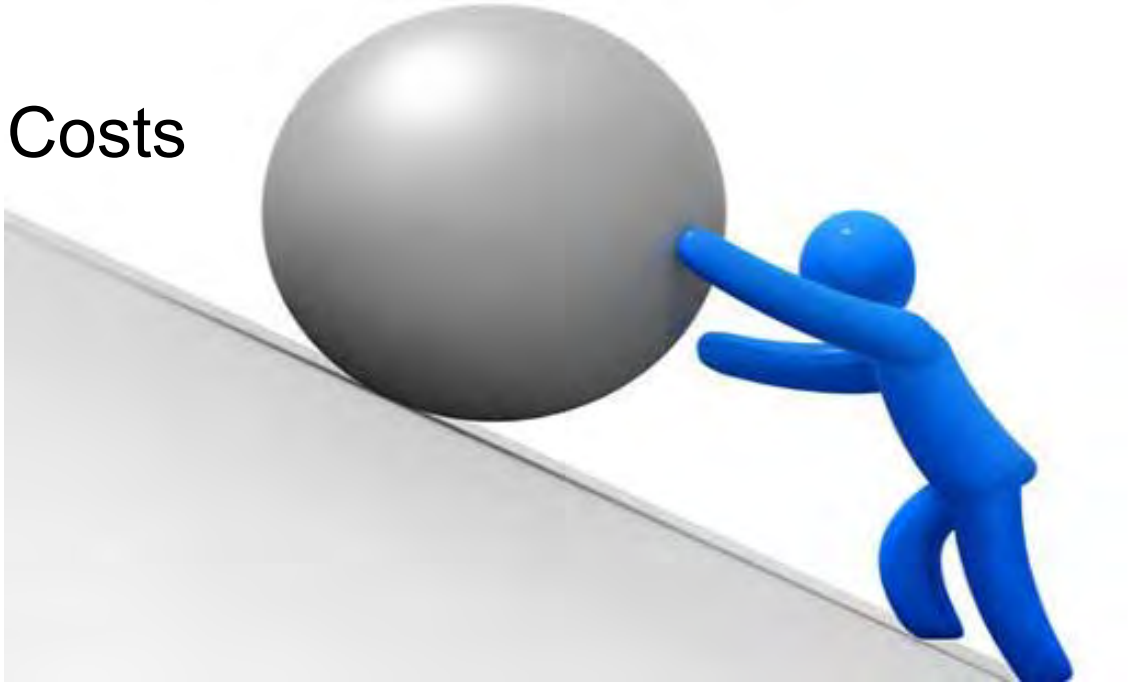
- **Aging Infrastructure**
- **New Technologies**
- **Improved Efficiencies**
- **Water Conservation**
- **Energy Efficeincy**



Water supply issues, West Virginia

Design and Construction Challenges

- Regulations and Codes
- Genetics and Isolation
- Increasing and Uncertain Costs
- Facility Complexities
- Biosecurity



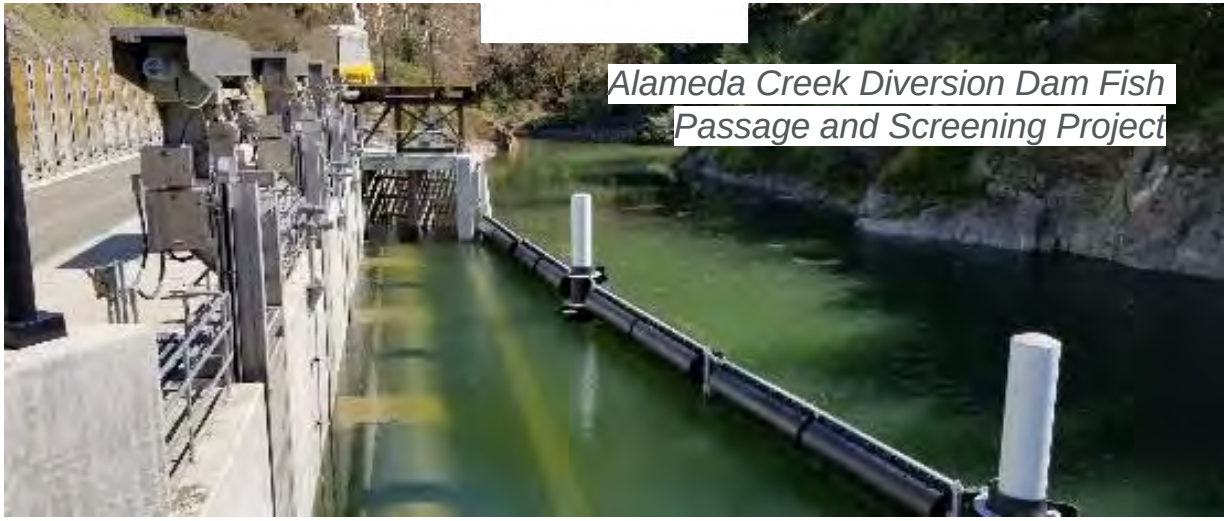
Fisheries Design Center

Wells Dam Hatchery Modernization, Washington

Thompson State Fish Hatchery, Michigan

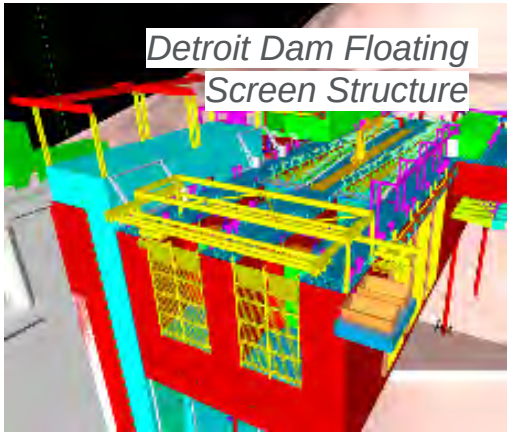
FISHERIES ECOHYDRAULICS

- Technical Fish Passage
- Fish Crossings
- Nature Like Fishways



Alameda Creek Diversion Dam Fish Passage and Screening Project

Quiota Creek Water Crossing Design



Detroit Dam Floating Screen Structure

Heuvelton NLF, Oswegatchie River, NY

FISHERIES AND AQUATIC SCIENCES

Aquatic BMI – Water Quality

Research

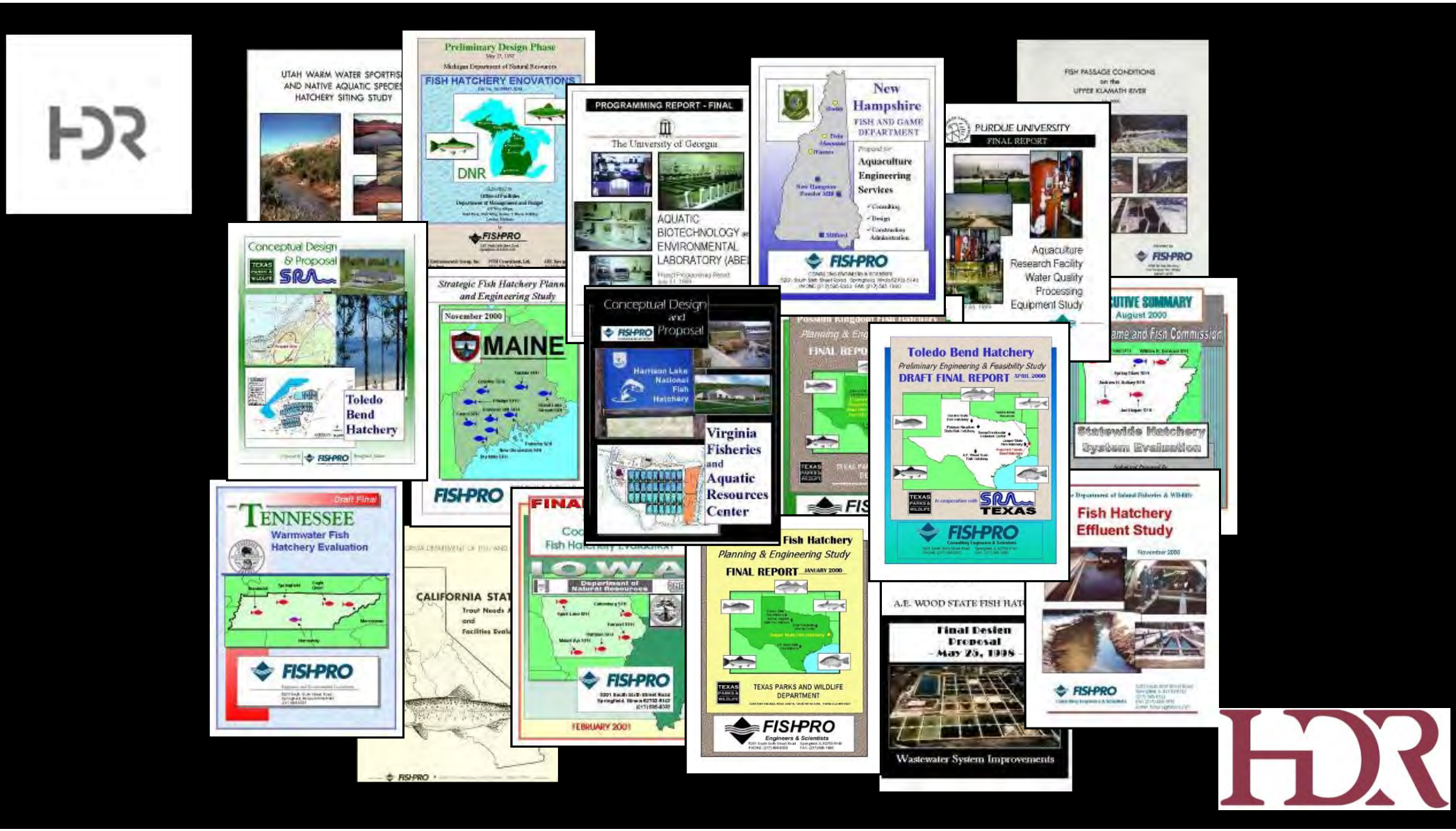
Fisheries Monitoring

02 Trends in Facility Design

Facility Evaluations (Studies)

- Establish a Record in Time for Condition & Needs
- Outline Needs and Ballpark Probable Costs $$$
- Provide a Roadmap for Funding $$$
- Build Consensus on necessary Improvement Items
- Establish Timeline for Improvements

McLaughlin Hatchery, Massachusetts

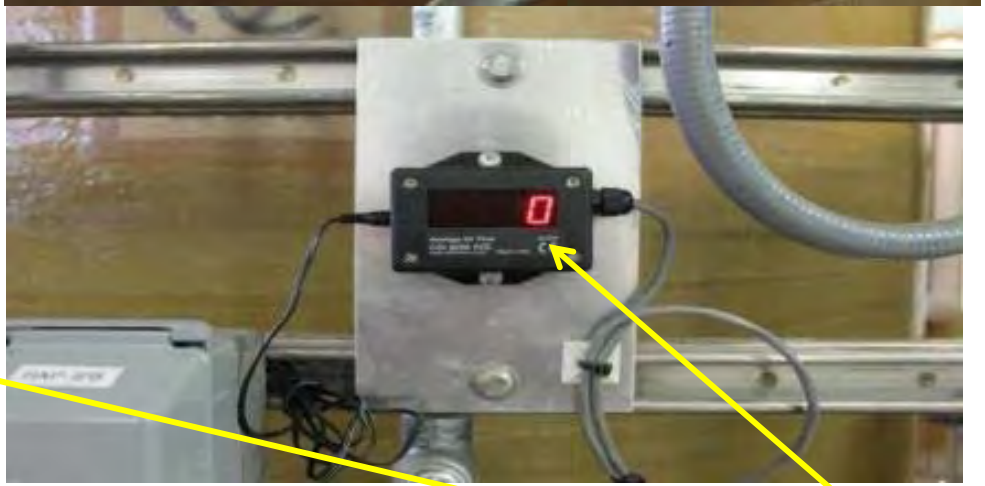

HDR
UTAH WARM WATER SPORTFIS
AND NATIVE AQUATIC SPECIES
HATCHERY SITING STUDY
Preliminary Design Phase
Michigan Department of Natural Resources
FISH HATCHERY ENOVATIONS
DNR
FISHPRO
PROGRAMMING REPORT - FINAL
The University of Georgia
AQUATIC
BIOTECHNOLOGY
ENVIRONMENTAL
LABORATORY (ABE
New
Hampshire
FISH AND GAME
DEPARTMENT
Aquaculture
Engineering
Services
FISHPRO
PURDUE UNIVERSITY
FINAL REPORT
Aquaculture
Research Facility
Water Quality
Processing
Equipment Study
FISH PASSAGE CONDITIONS
on the
UPPER KLAMATH RIVER
FISHPRO
Conceptual Design
& Proposal
SRA
Toledo
Bend
Hatchery
FISHPRO
Strategic Fish Hatchery Plann
and Engineering Study
November 2000
MAINE
FISHPRO
Conceptual Design
and
Proposal
FISHPRO
Harrison Lake
National
Fish
Hatchery
Virginia
Fisheries
and
Aquatic
Resources
Center
Toledo Bend Hatchery
Preliminary Engineering & Feasibility Study
DRAFT FINAL REPORT APRIL 2000
In cooperation with
SRA
TEXAS
FISHPRO
CUTIVE SUMMARY
August 2000
ame and Fish Commission
Statewide Hatchery
System Evaluation
Draft Final
TENNESSEE
Warmwater Fish
Hatchery Evaluation
FISHPRO
CALIFORNIA STAT
Trout Needs A
and
Facilities Evalu
FISHPRO
FINA
Coo
Fish Hatchery Evaluation
IOWA
Department of
Natural Resources
FISHPRO
FEBRUARY 2001
Fish Hatchery
Planning & Engineering Study
FINAL REPORT JANUARY 2000
TEXAS PARKS AND WILDLIFE
DEPARTMENT
FISHPRO
Engineers & Scientists
A.E. WOOD STATE FISH HAT
Final Design
Proposal
May 25, 1998
Wastewater System Improvements
Fish Hatchery
Effluent Study
November 2000
FISHPRO
HDR

RECIRCULATION & WATER REUSE

Why Recirculate Water?

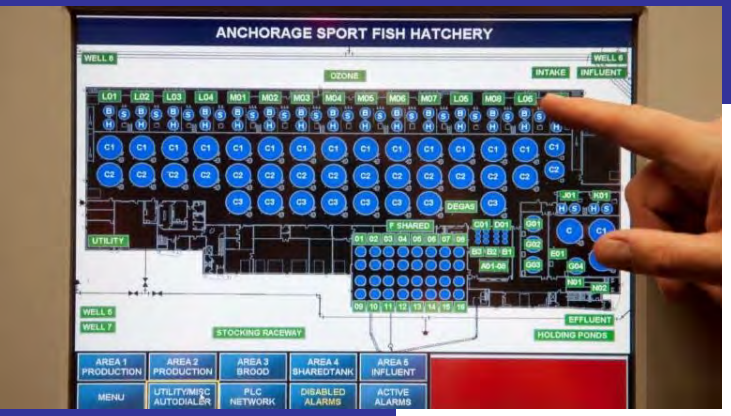
- Decrease source water demand-makeup only
- Decrease wastewater discharge volume
- Conserve heat or cold
- Improved Biosecurity
- Controlled Rearing Environment –per tank
- Excellent Water Quality with Proper RAS Treatment Components

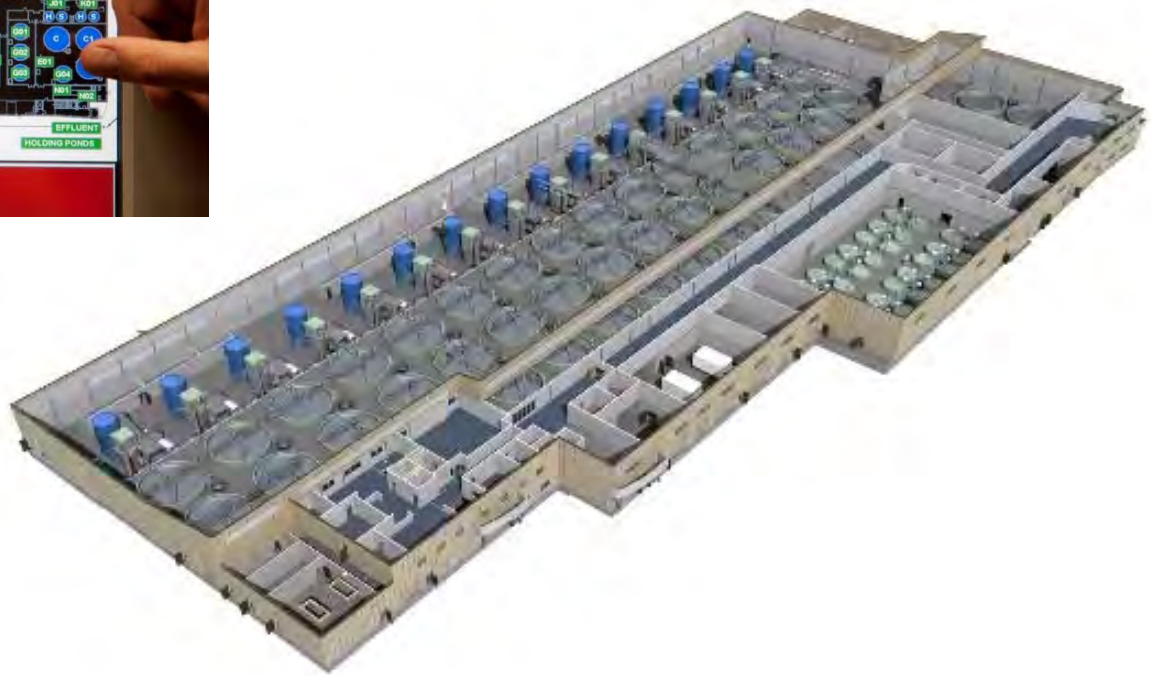
Issues Complex, Cost & Operational Expertice



Moving Bed Biofilter & WaterTech Media
Low Pressure Air Operated & Air Measurement

Process Automation and Controls





140,000 SF Anchorage SFH in Alaska – All RAS based with circular Tanks

Rick Schmudde


BF56


TransEnd
TRANSIENT SUPPRESSION SYSTEM
100
A
B
C
JOSLYN


EMCO
MAGFLO

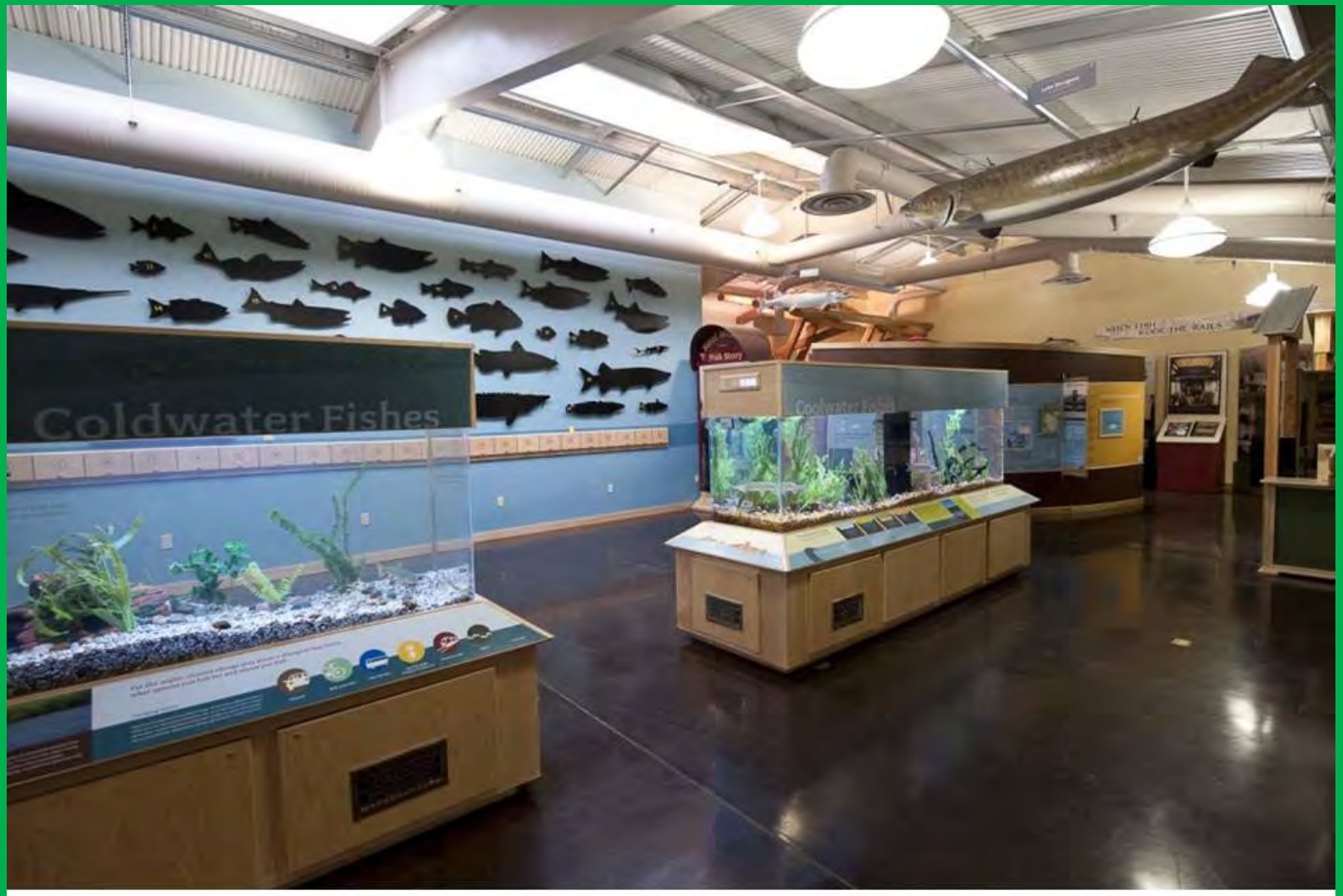

Allen-Bradley
CENTERLINE

Emergency Generator, transfer Switch & Controls in Electrical Room

Coolwater hatchery completed in Phase 2 of project: Coolwater Production Building, sludge storage, clarifier, microscreening building, and pond complex

Interior of 30,000 SF Coolwater Production Building completed during Phase 2 of project

Visitor Education & Experience

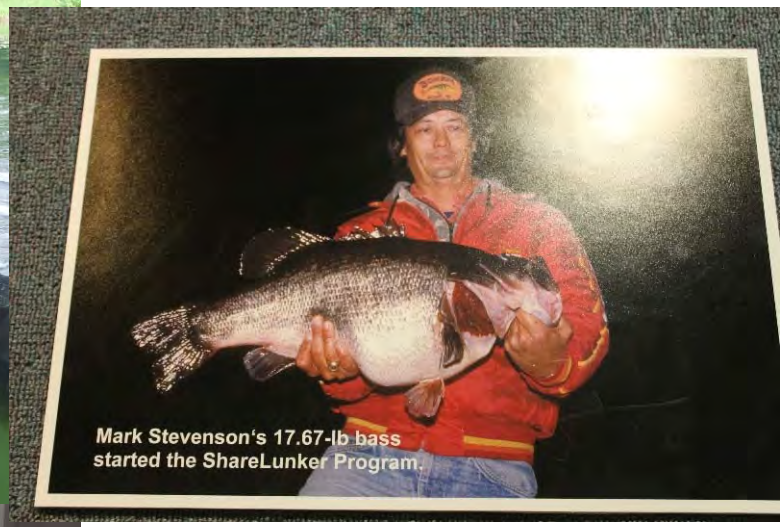


Visitor Center aquatic and fish displays

Texas Freshwater Fisheries Center
Visitor Center, Teaching Facility
Production Hatchery

Texas Sare-a-Lunker Program

TPWD Share –A –Lunker Genetics Program


Mark Stevenson's 17.67-lb bass
started the ShareLunker Program.

A.E. Wood SFH
TPWD
San Marcos TX

Before Renovation

One-Acre Lined Ponds

After Renovation

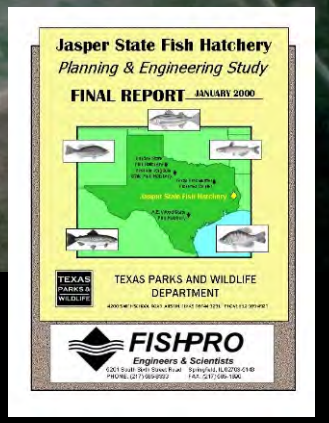
FishPro Design Experience for:
New East Texas TPWD Hatchery At Sam RayburnReservoir

Indoor Raceway Bass Spawning and Rearing

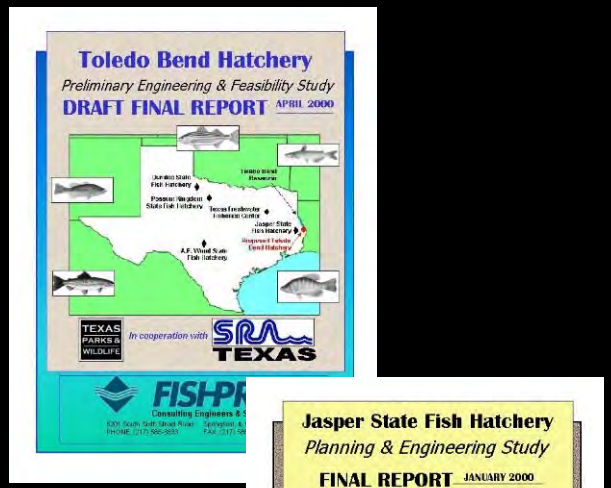
8,000 gpm Effluent Treatment Plant
3-Drum Microscreens 2-Traveling Bridge Filters

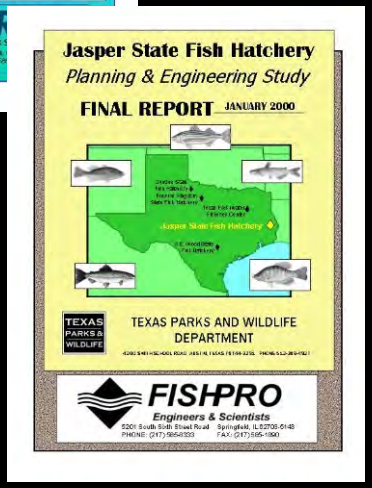
San Marcos River
Submerged River Intake
T&E Species Protection
Recreational Use
Water Quality Protection

A.E. Wood SFH
TPWD
San Marcos TX



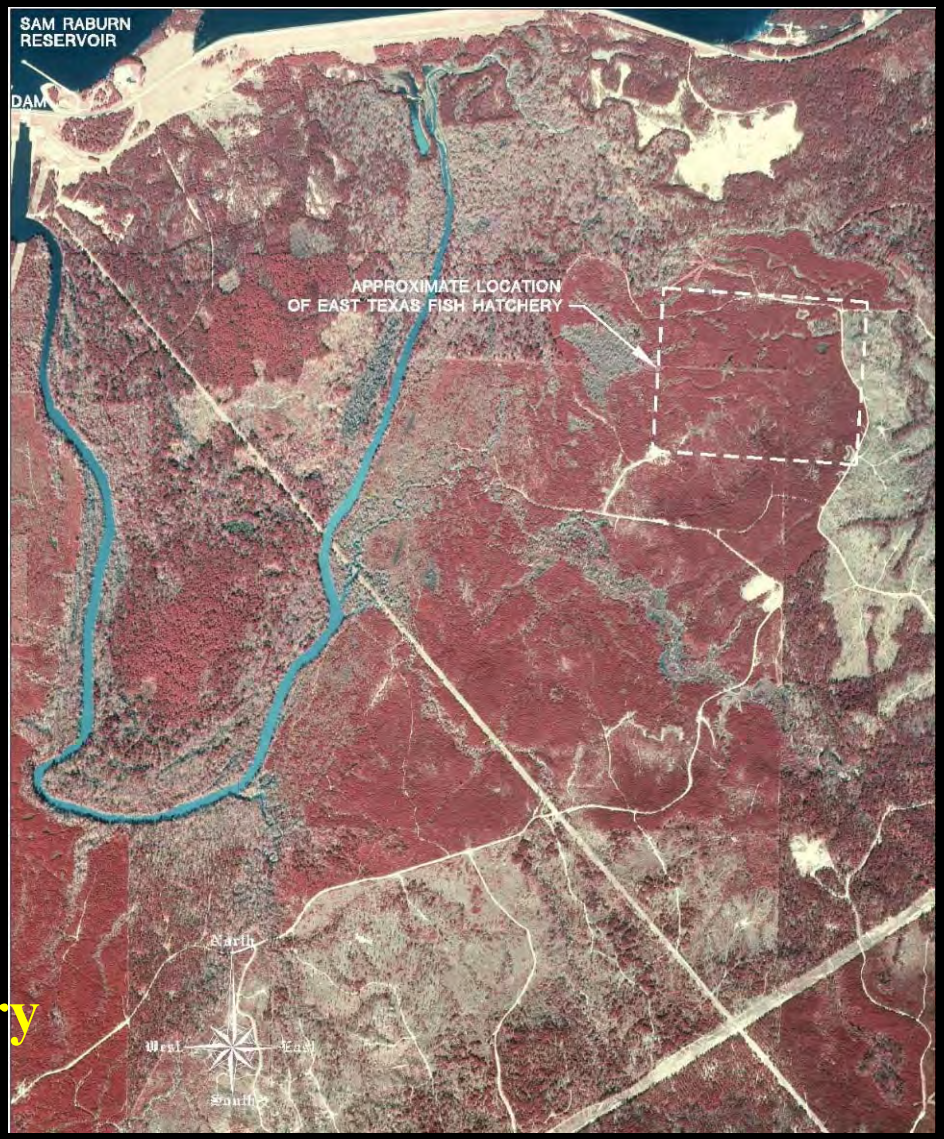
New East Texas TPWD Hatchery
At Sam Rayburn Reservoir



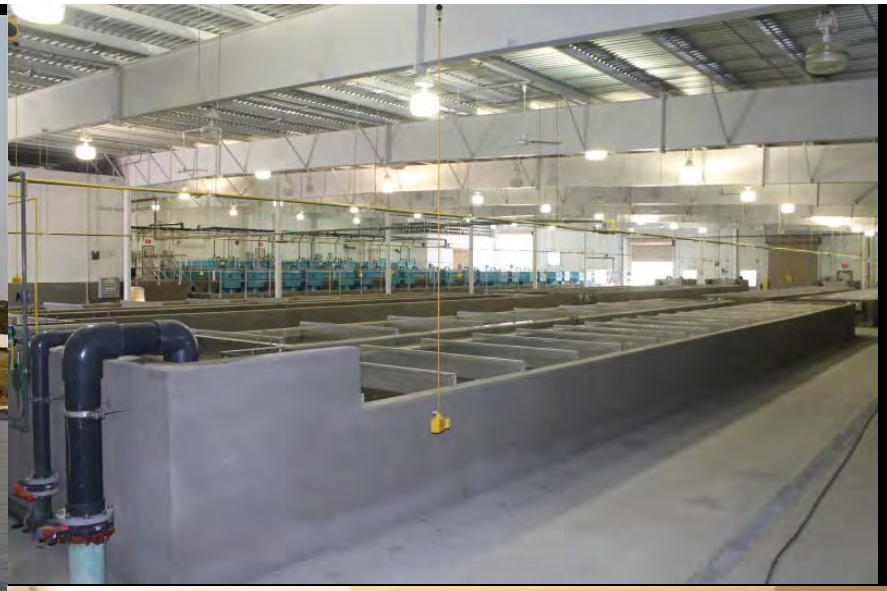


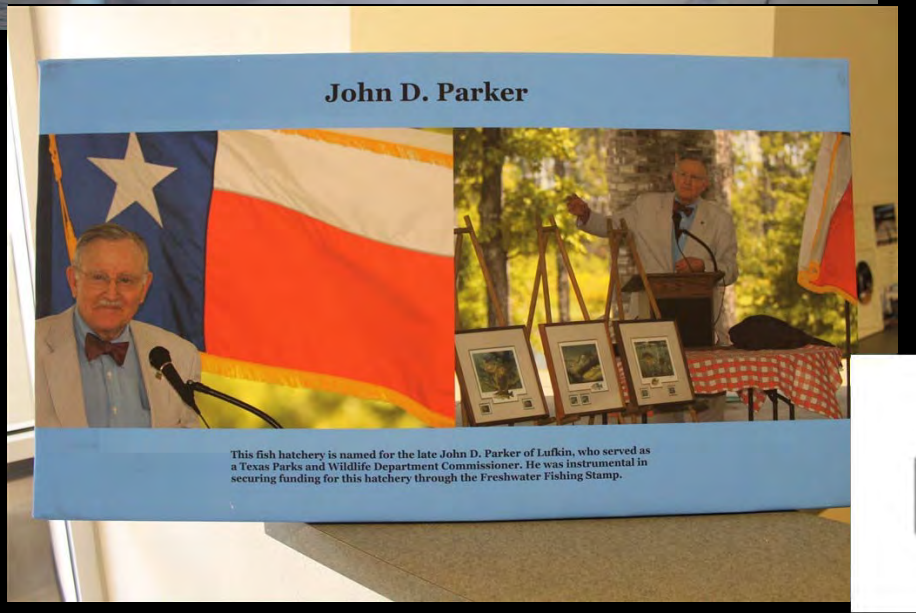
FishPro past A/E services to TPWD

New East Texas TPWD Hatchery At Sam Rayburn Reservoir




TPWD John D. Parker SFH
Legend
JD Parker SFH
JD Parker SFH
Google earth
© 2015 Google




John D. Parker
This fish hatchery is named for the late John D. Parker of Lufkin, who served as a Texas Parks and Wildlife Department Commissioner. He was instrumental in securing funding for this hatchery through the Freshwater Fishing Stamp.


FLORIDA BASS
CONSERVATION CENTER
at
RICHLOAM STATE
FISH HATCHERY
Cooperators:
FLORIDA DIVISION OF FORESTRY
U.S. FISH & WILDLIFE SERVICE
SPORT FISH RESTORATION
STATE WILDLIFE GRANTS PROGRAM
SUMTER COUNTY BOCC
VISITOR PARKING
VISITOR HOURS: MONDAY - FRIDAY 9:00 TO 3:00
FLORIDA BASS
CONSERVATION
CENTER

Indoor Recirculating Aquaculture Systems

LMB Intensive Rearing
Rick Stout Mgr.

Red Drum Stock Enhancement

RAS
Pilot Rearing
Phase 3

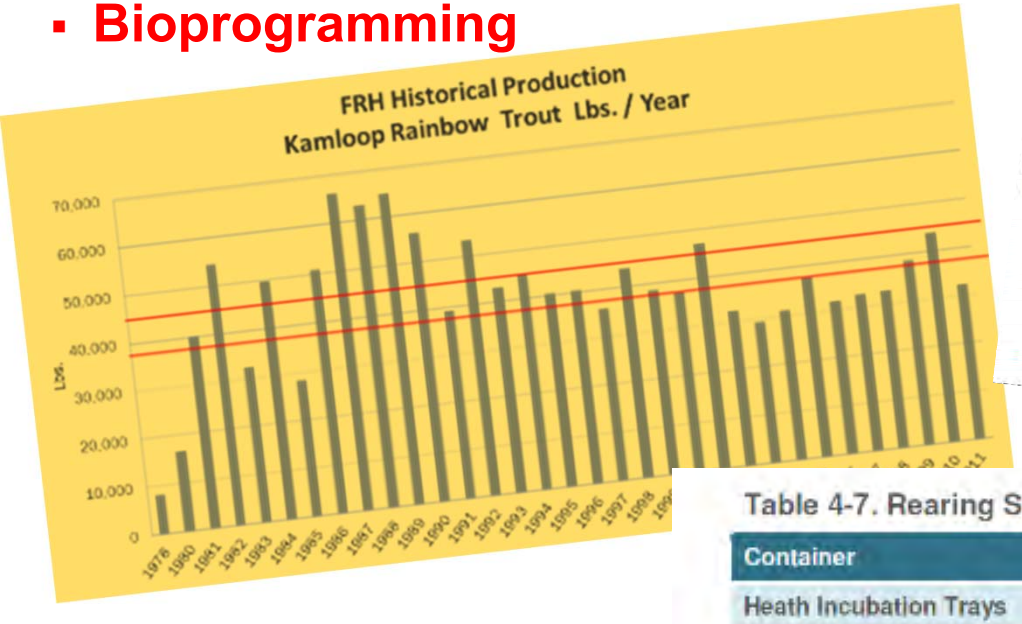
Phase 1 Red Drum

CWT Tagging Systems

Stock Enhancement –A Tool for Fish Management

PRODUCTION EVALUATION

- **Bioprogramming**



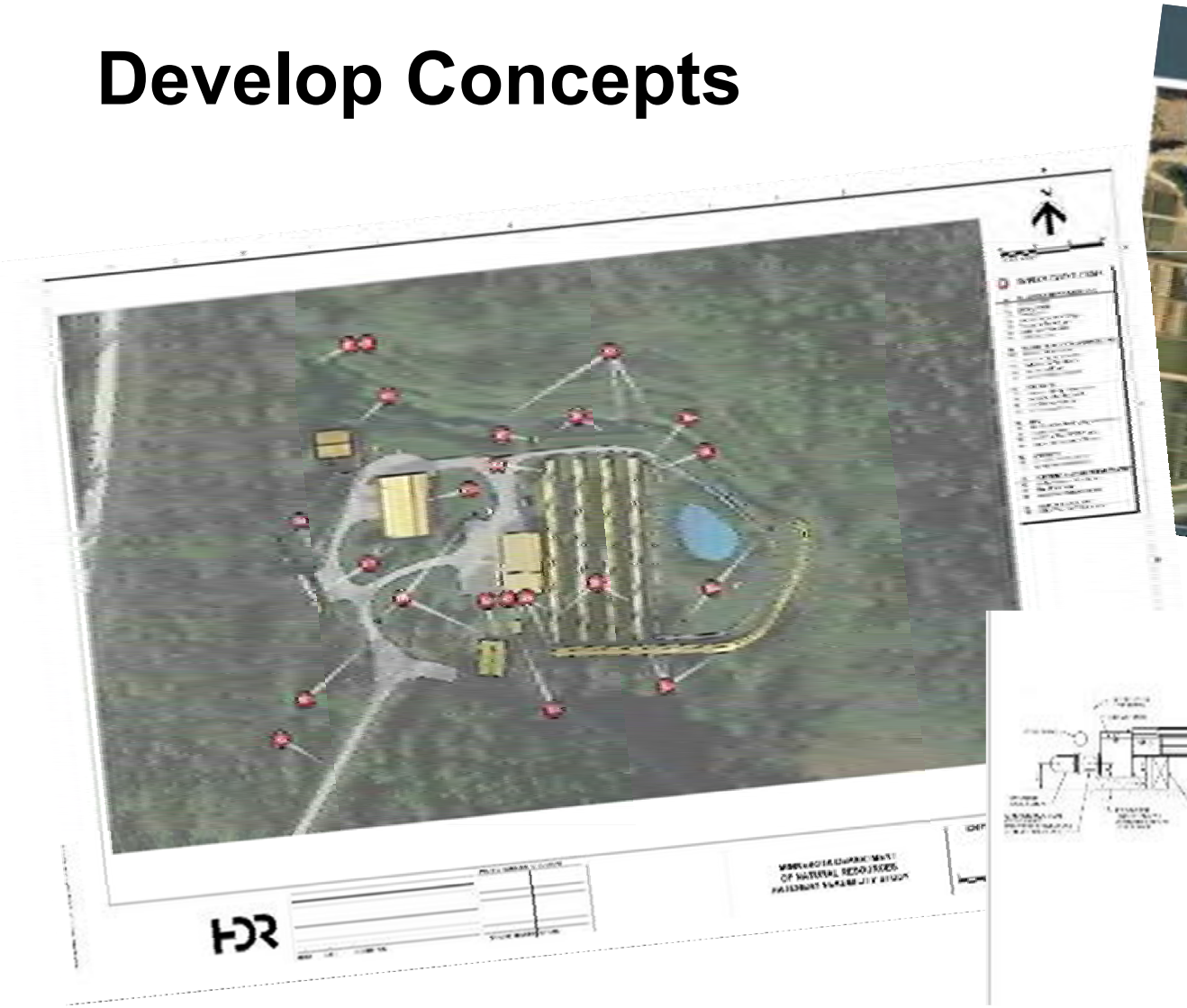
Steelhead Rainbow Trout Anticipated Production			10% Increase		50% Increase	
	Number	Pounds	Number	Pounds	Number	Pounds
Fingerlings (41 FPP)	250,000	5,435	275,000	6,707	375,000	9,146

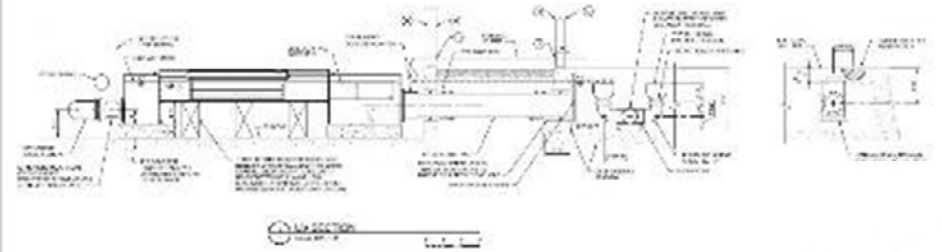
Artec Rainbow Trout Current Production			10% Increase		50% Increase	
	Number	Pounds	Number	Pounds	Number	Pounds
Yearlings (2.5 FPP)	23,100	11,550	25,410	10,164	34,650	13,860
Total of All	369,100	36,718	406,010	38,578	553,650	52,606

Table 4-7. Rearing Space Requirements for 36,000, 7-Inch RBT

Container	Number	
Heath Incubation Trays	5	
12-foot Start Troughs	2	
20–foot Rearing Troughs	6	
25-foot Circular Rearing Tanks	2	
Water Requirement	**Total Flow**	**Freshwater**
25-foot Circular Rearing Tanks	726	145

Develop Concepts





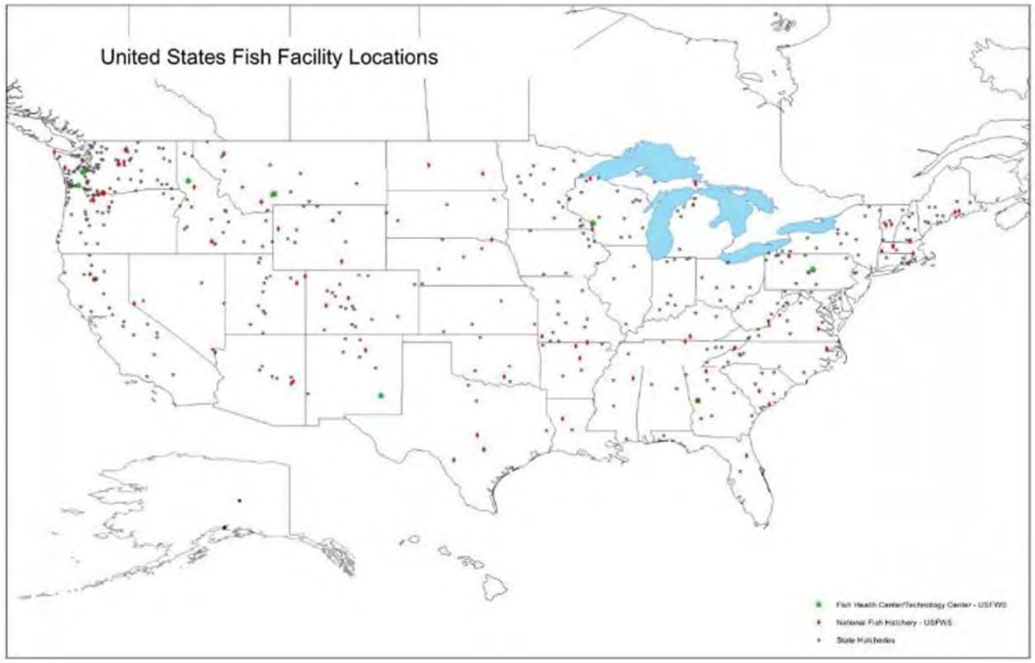
DEVELOP COST OPINIONS

- Utilize recently bid hatchery costs
- Consider regional factors
- Cost contingencies

Facility Improvements & Modernization Programs

Issues & Impacts

- Expensive – to Very Expensive $$$$$$
- Long Time Frames (often 5 to 15 - 20 years)
- Disruption to On-going Production
- Major Agency Funding Impacts (planning, engineering, construction, operation & long –term maintenance
- A Comprehensive, Credible System-wide Flexible Plan is needed to Guide, Direct & Fund the Improvements Program



03 Design and Construction Around the Country

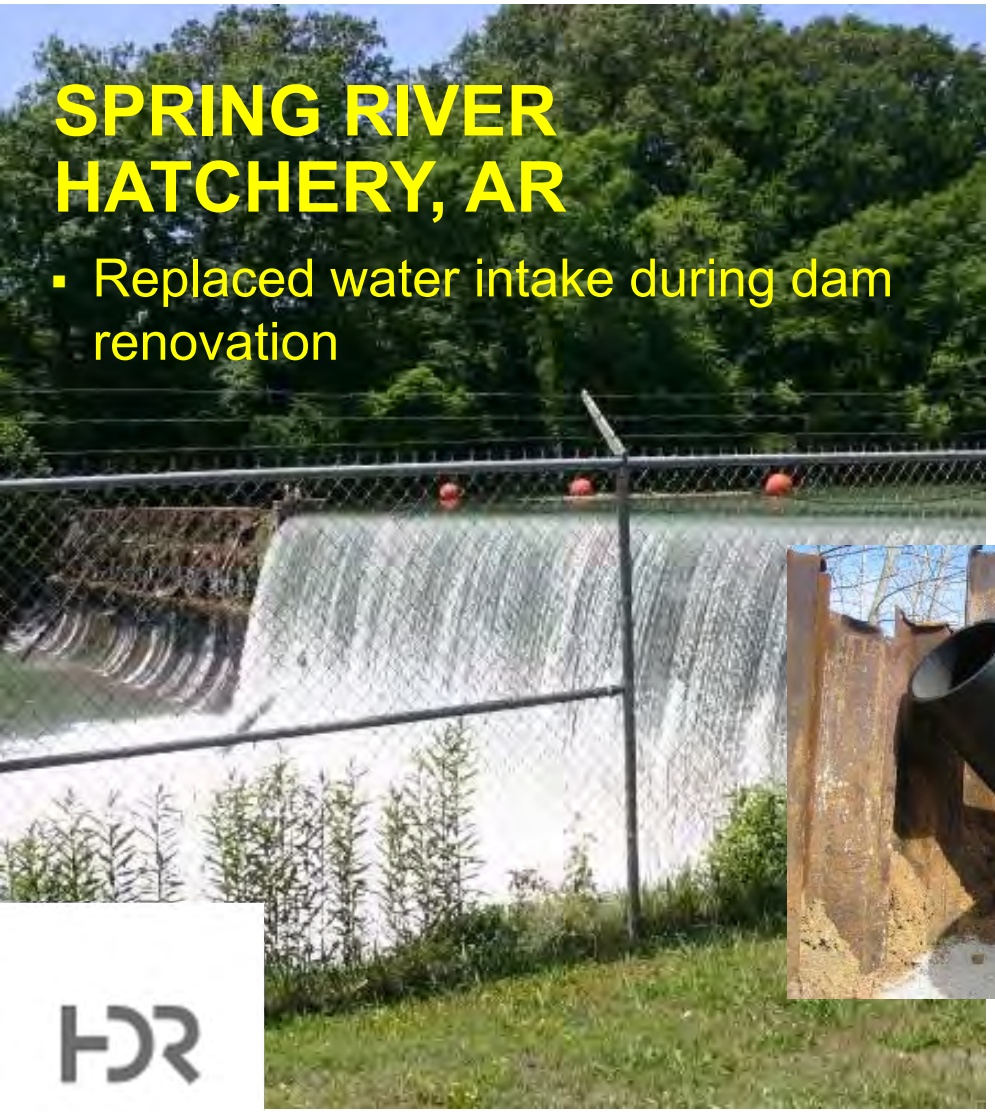
Casco Emergency Pipeline Replacement and UV Maine

Casco Emergency Pipeline Replacement and UV - Maine

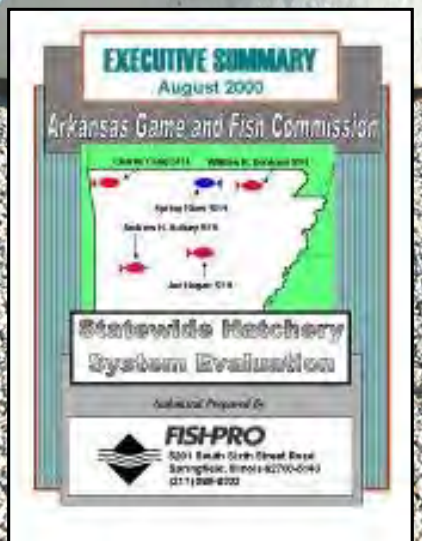
Grand Lake Stream New Deep Intake and UV - Maine

SPRING RIVER HATCHERY, AR

- Replaced water intake during dam renovation



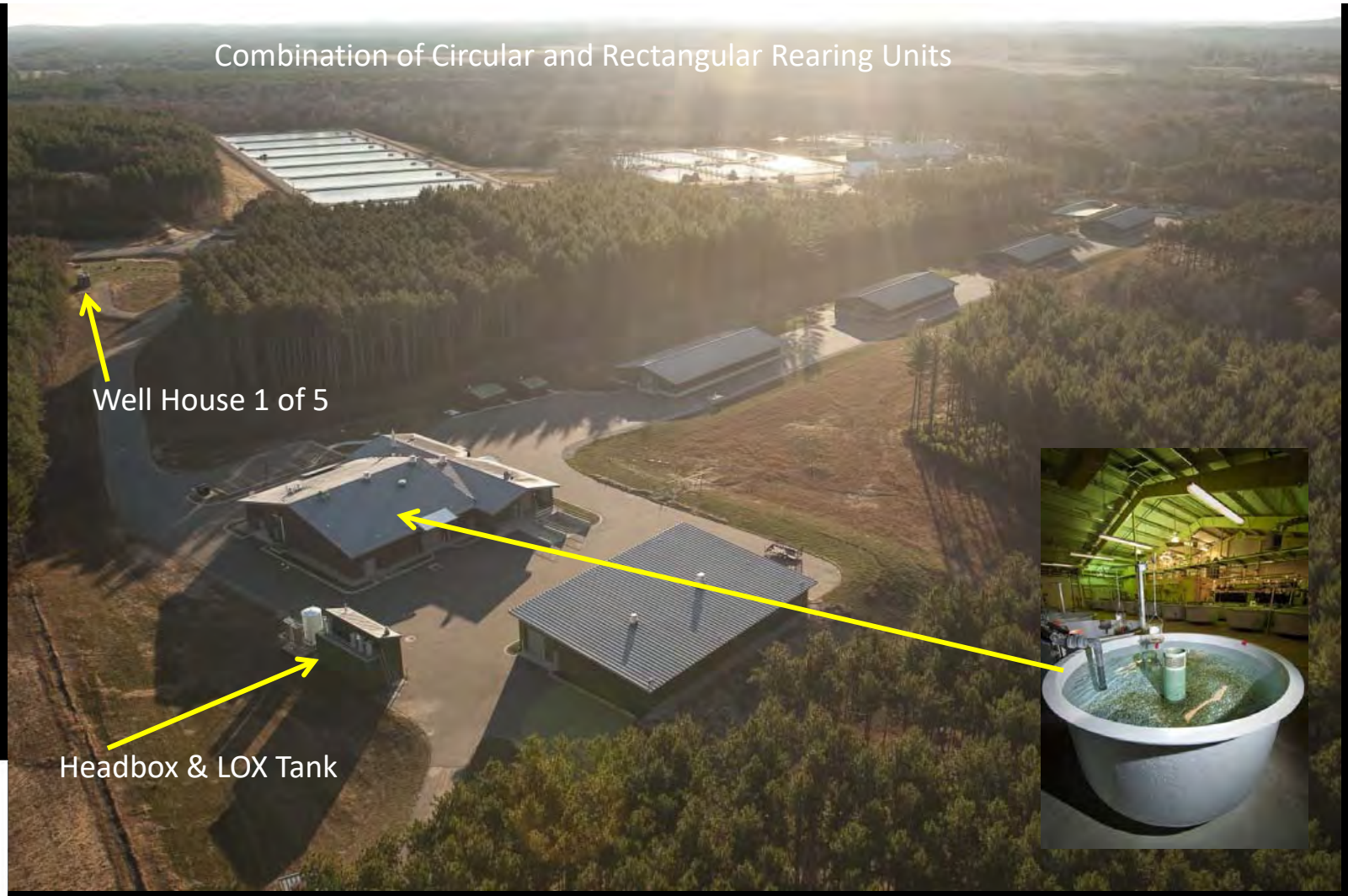
Upwelling Vertical Silos 50,000 gpm



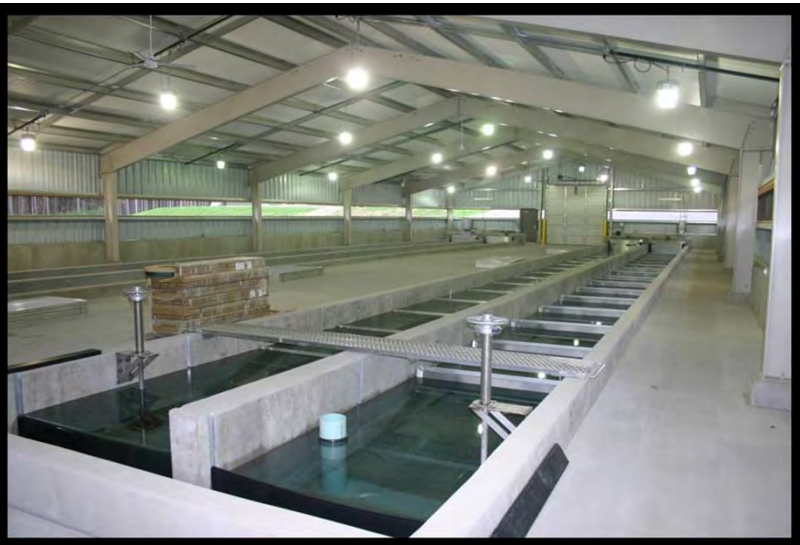
Spring River SFH Trout Silo Harvest
Pumped Out or Surface Netted

Bio-secure Egg Disinfection Room VHS epidemic in Great Lakes Region

Art Oehmcke SFH, Wisconsin – Biosecurity Addition – Traveling Screen



Coldwater Hatchery Complex (foreground) completed in Phase 1
and Coolwater Hatchery Complex (background) completed in Phase 2



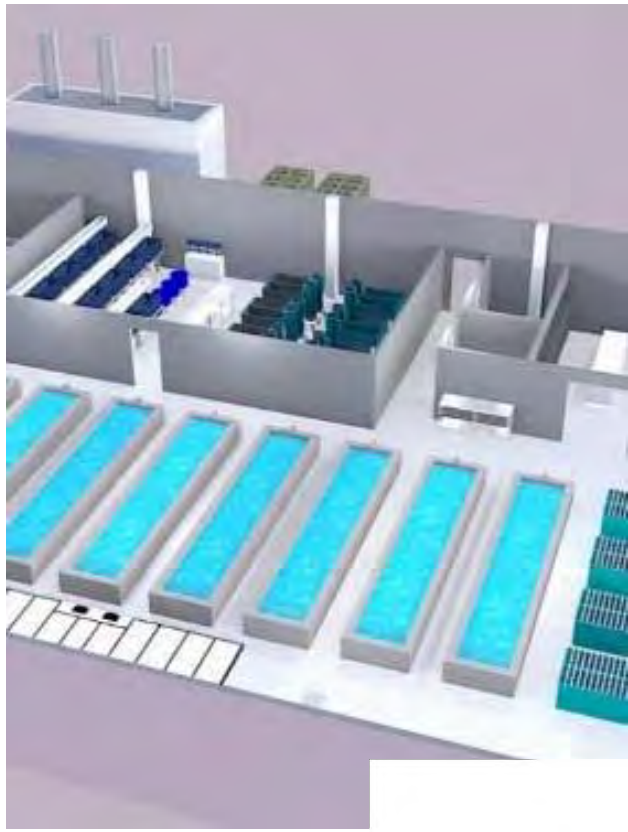
Covered Raceways with LHO Oxygen Mgt. Units and Solids Flow Baffles

50ft x 6ft Broodstock Raceways in Biosecure Bldg.

Coldwater Fish Hatchery Complex view to the north

Coolwater hatchery completed in Phase 2 of project: Coolwater Production Building, sludge storage, clarifier, microscreening building, and pond complex

Wells Modernization Project - Washington

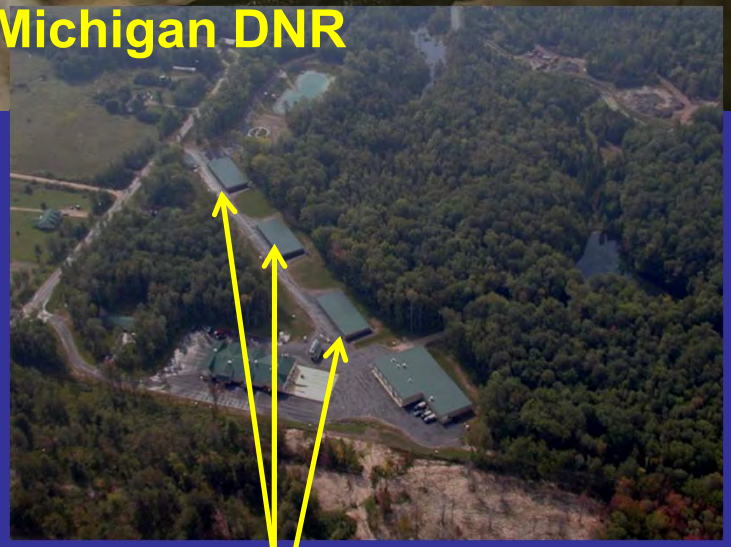


RICHMOND HILL STATE FISH HATCHERY

Recirculation and Chilled Water Incubation Georgia DNR striped bass facility

Moccasin Hatchery Emergency Recirculation

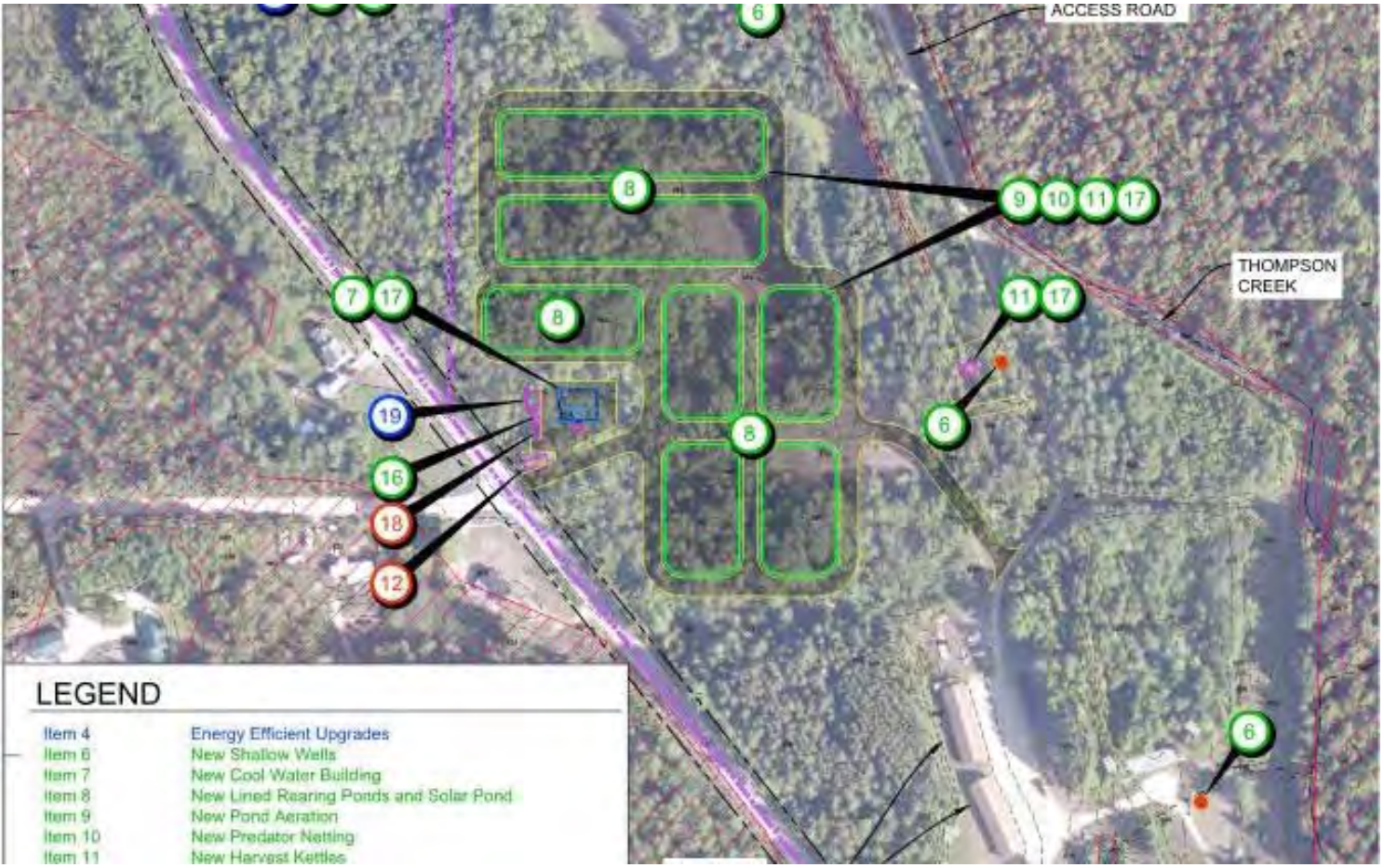
ODEN SFH Michigan DNR



Dissolved Oxygen Management & Covered Linear Raceway Option
Raceways have full by-pass water control & LHO's each series

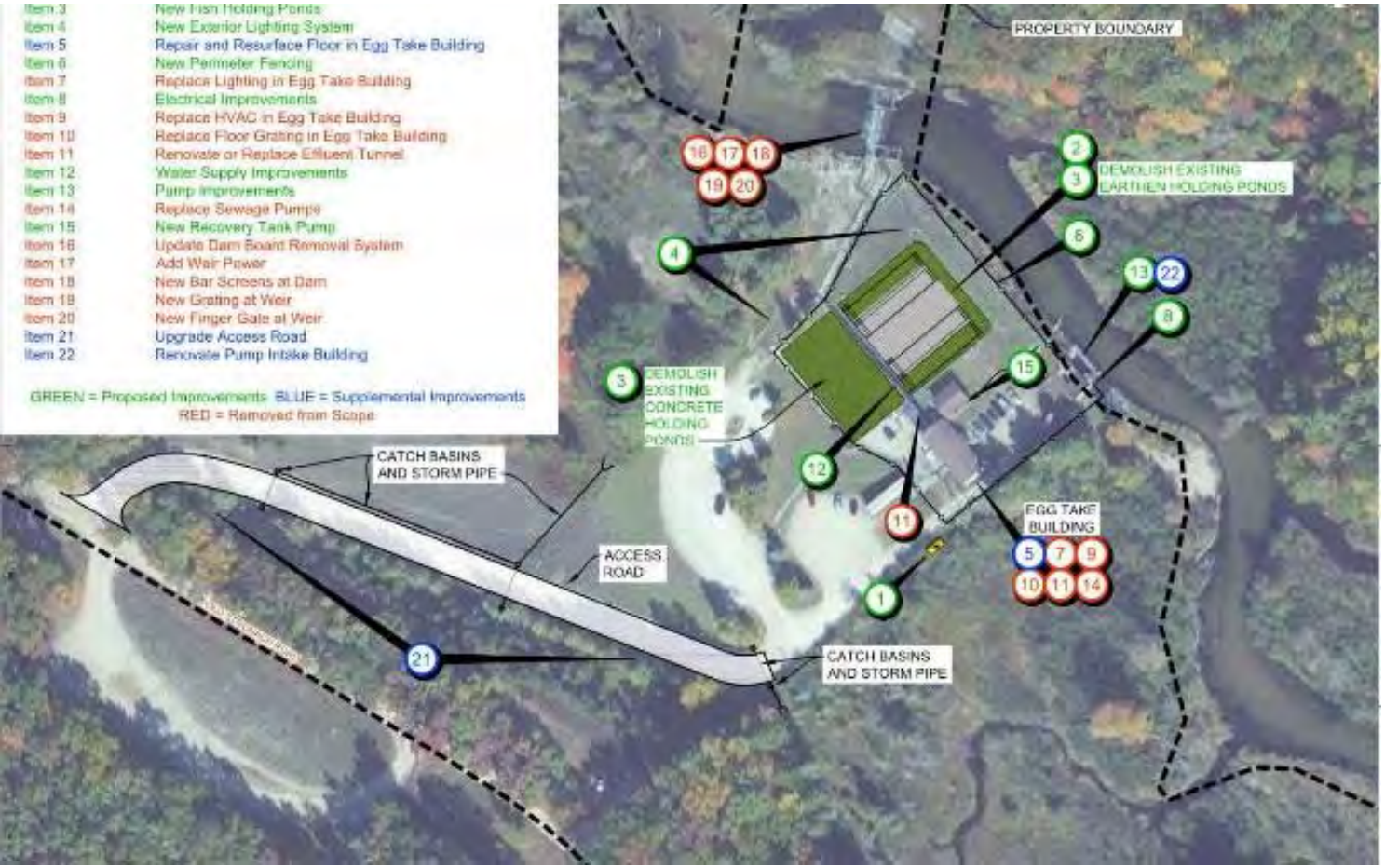
Platte River SFH Renovation Michigan DNR

Governor Tommy Thompson, Wisconsin – Pond Liners and Egg Prep



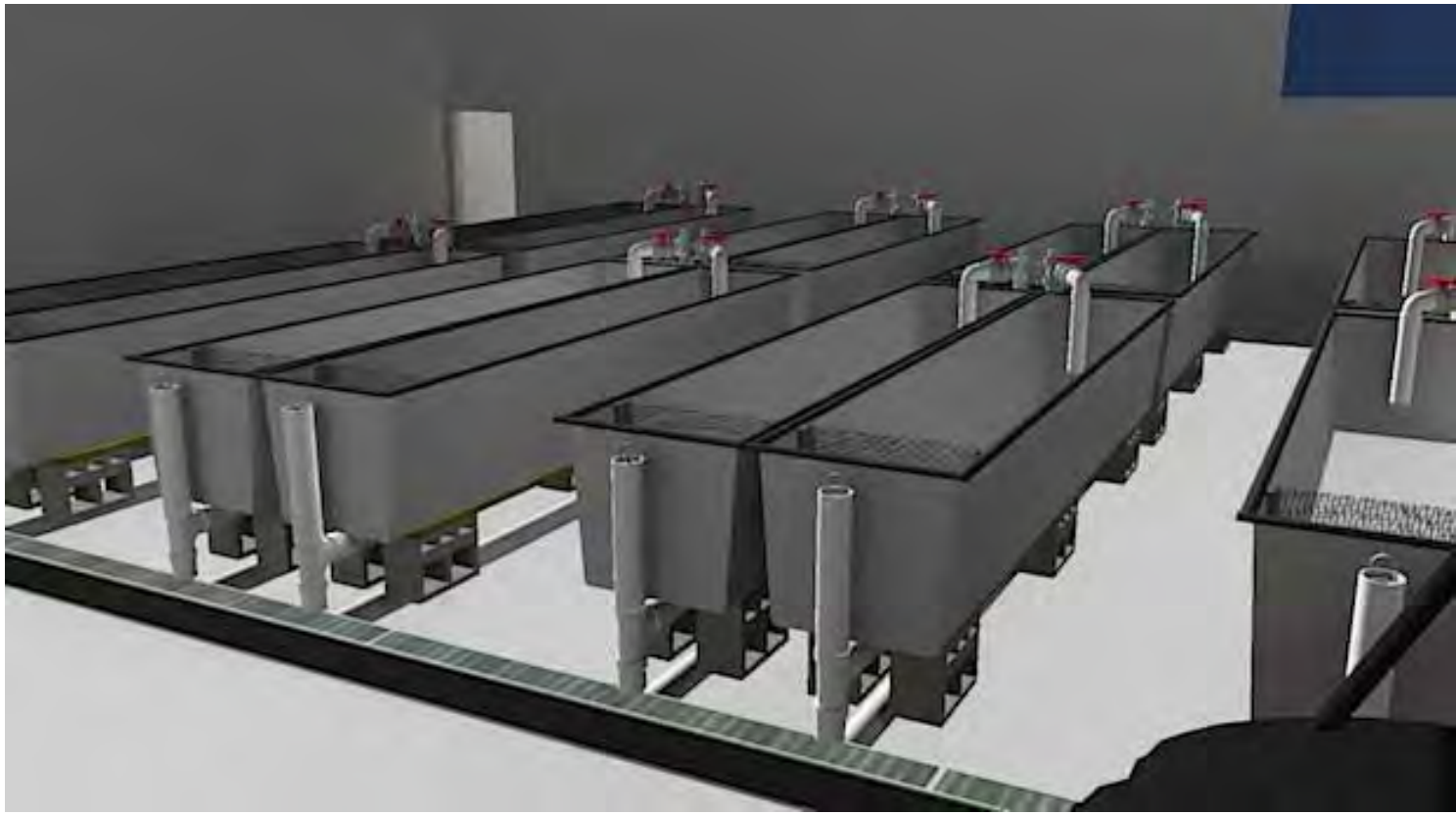
Michigan– Thompson State Fish Hatchery – Coolwater Expansion

Michigan– Thompson State Fish Hatchery – Coolwater Expansion



Michigan– Little Manistee Weir – Salmon and Steelhead Egg Collection

Michigan– Little Manistee Weir – Salmon and Steelhead Egg Collection



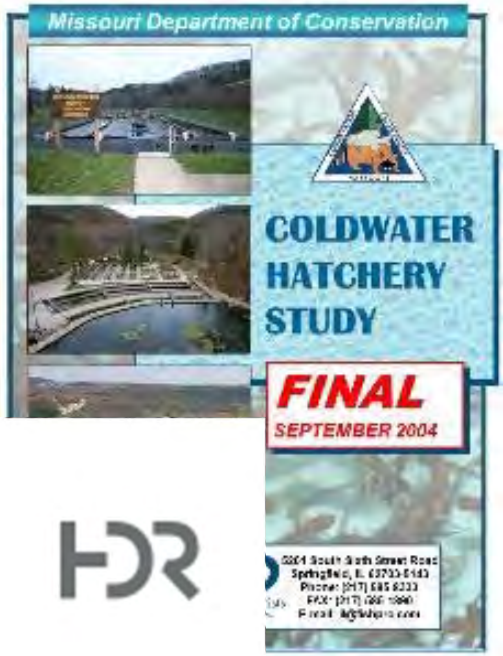
Lanesboro, Minnesota – Trout Building Replacement

Bennett Springs SFH

MontaukSFH

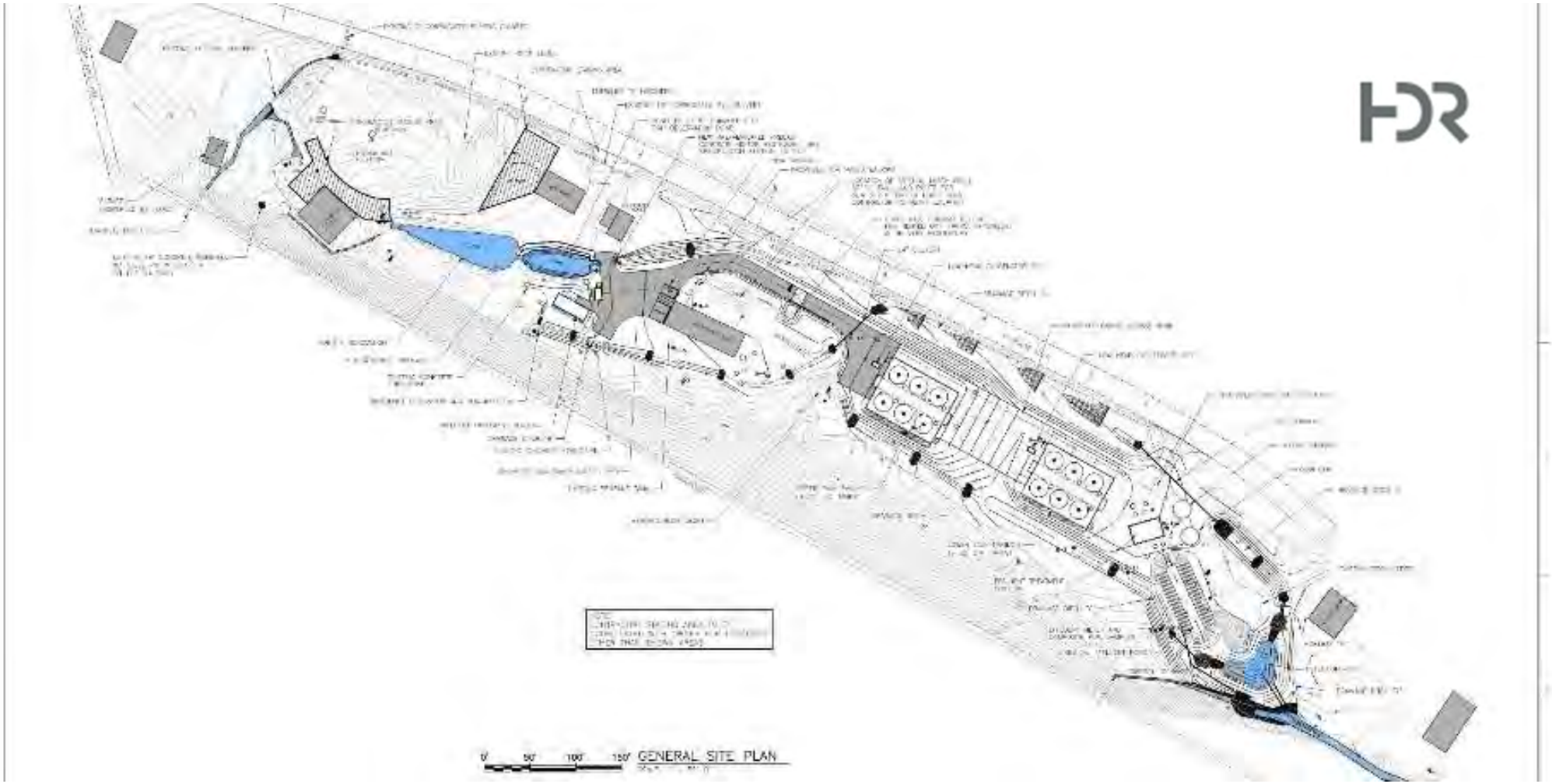

Missouri Statewide
Coldwater Hatchery Study


Roaring River SFH

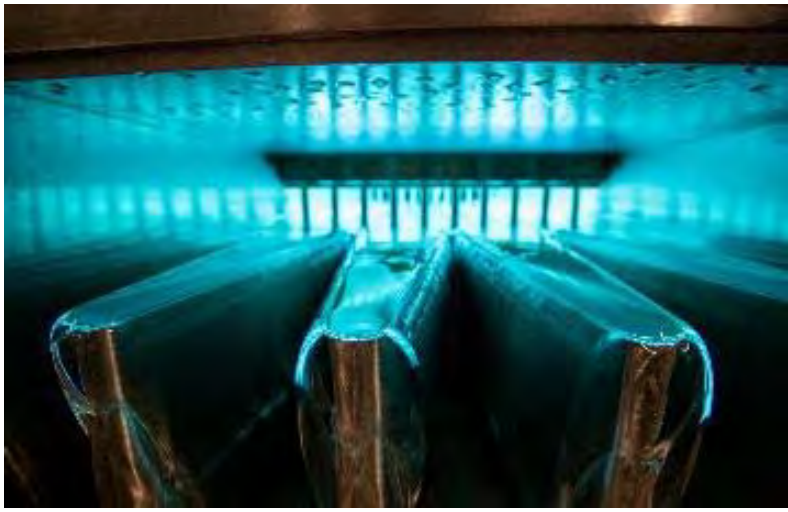


Missouri Oxygen Improvements

Shepherd of the Hills Fish Hatchery Expansion
Missouri DOC



Roxbury, Vermont Conceptual Site Layout



Roxbury State Fish Hatchery, Vermont

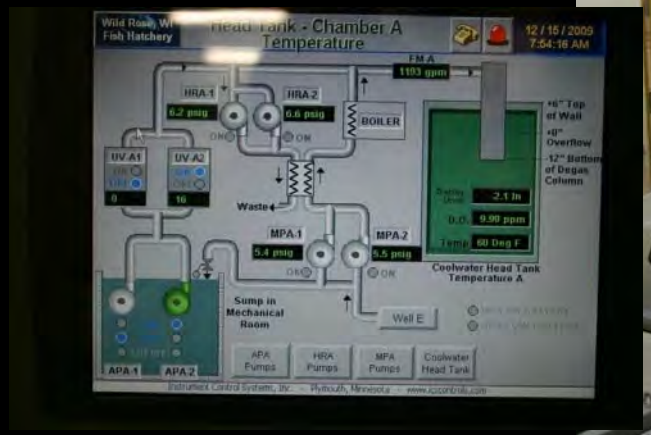
Wild Rose State Fish Hatchery Coldwater & Coolwater Facility with visitor Center

Fish Feeding System

Fish Feeder PCL Control Screens

Tank Fish Feeders –air operated

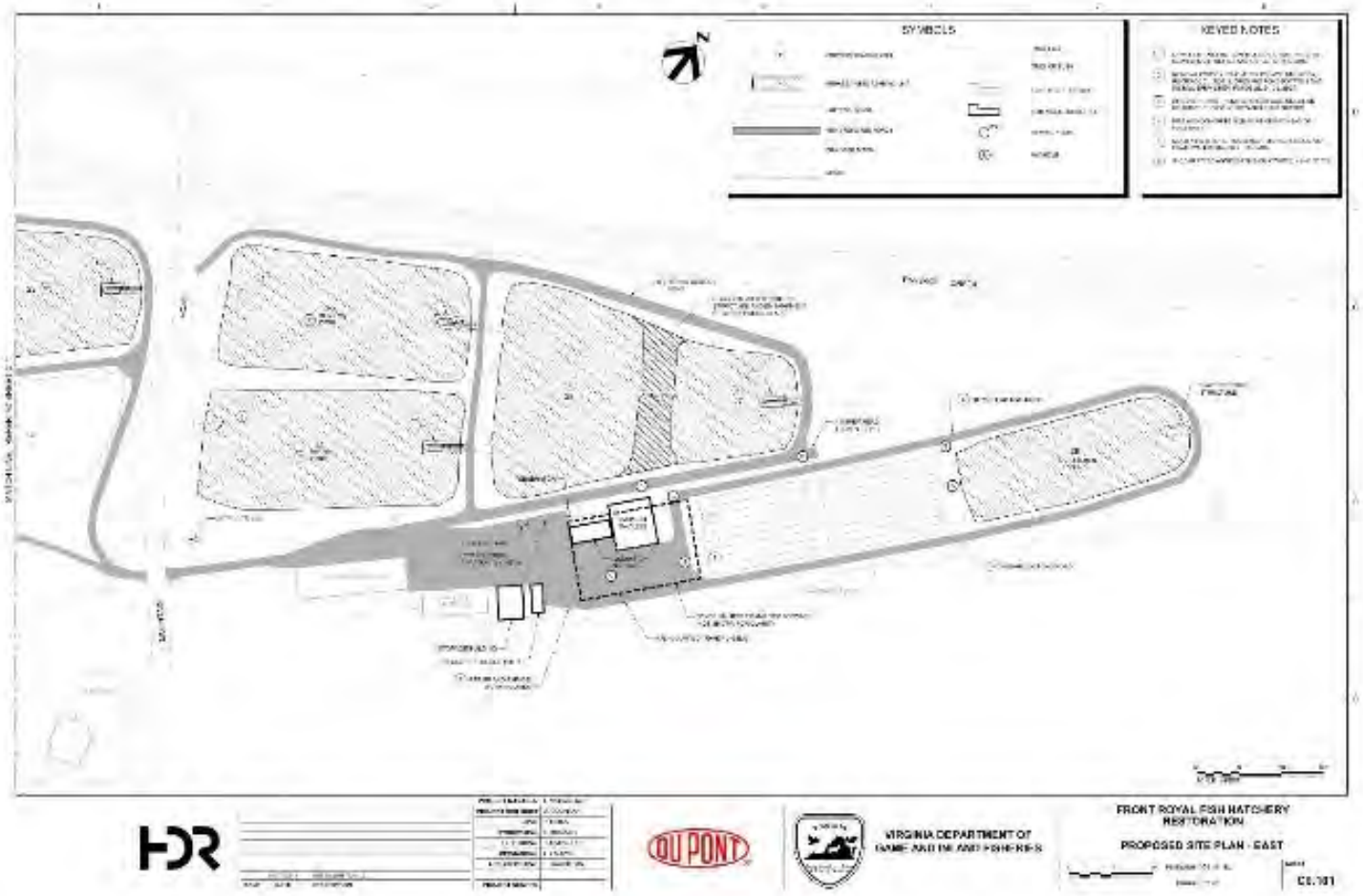
System Testing & Training



Instrumentation & Alarm

RAS Microscreens & Moving Bed Bioreactors

Apple Grove, West Virginia – Pond Liners



Front Royal, Virginia

Schramm Aquarium - Nebraska

Aquarium Renovation

FLUSH TO FISH

- Reclaiming water from waste treatment to raise fish
- Education and Outreach opportunities

AQUATIC RESEARCH AND WET LABS

- Auburn University


WS
Reservoir
Pond complex
Holding / Processing Bldg.
General Project Site Area

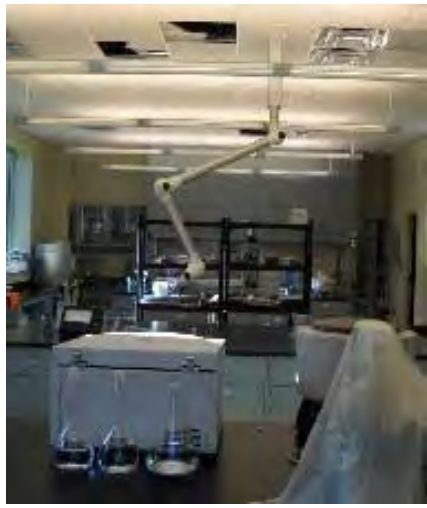

North Auburn
FISHERIES UNIT
Auburn University

AQUATIC RESOURCES MANAGEMENT CENTER

Auburn University, Alabama

SILVER

June 2012



AQUATIC RESEARCH AND WET LABS

- ABEL
- Aquatic Biotechnology Environmental Laboratory
- University of Georgia
- Zebrafish Genetic

-Toxicology Studies

Open Research Area
Water Filtration & Heating System.
Purdue University Aquaculture Research Building

T & E SPECIES REFUGIA

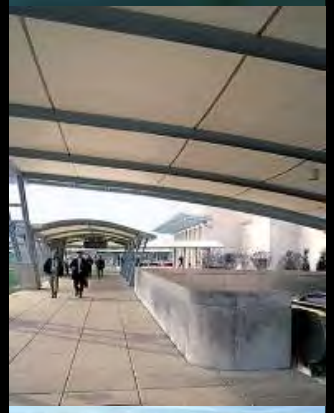
- Los Lunas Silver Minnow Project, NM

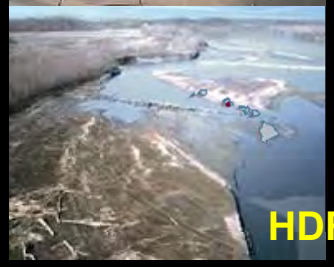
Cougar Fish Collector Floating Barge

Collection of Endangered Species for Propagation & Restoration

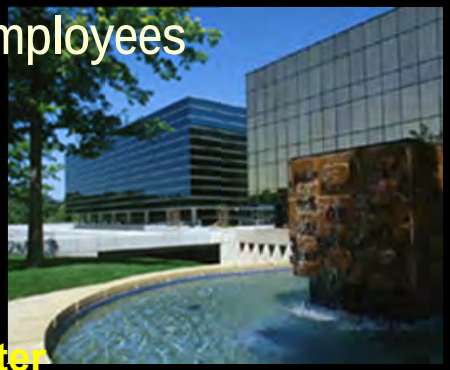
A succeesful project is a
TEAM EFFORT
Agency Staff,
Legislative Supporters,
Design Team
Construction Contractors
Fishing License Buyers

Questions ?





HDR History
Founded in 1917
Employee Owned
Award Winning Design and Consulting
Offices Worldwide
160 Offices
8,000 employees



HDR Springfield Office Fisheries Design Center

Omaha NE Corporate Headquarters

Take Kids Fishing –Pay It Forward

MENTORING – PASS ON EVERYTHING YOU KNOW

MATT COCHRAN –HDR Fisheries Director & Me cooking for HDR STAFF

Thank You
Association of Conservation Engineers

Thank You
Missouri Department of Conservation
For Hosting this 2021 Meeting