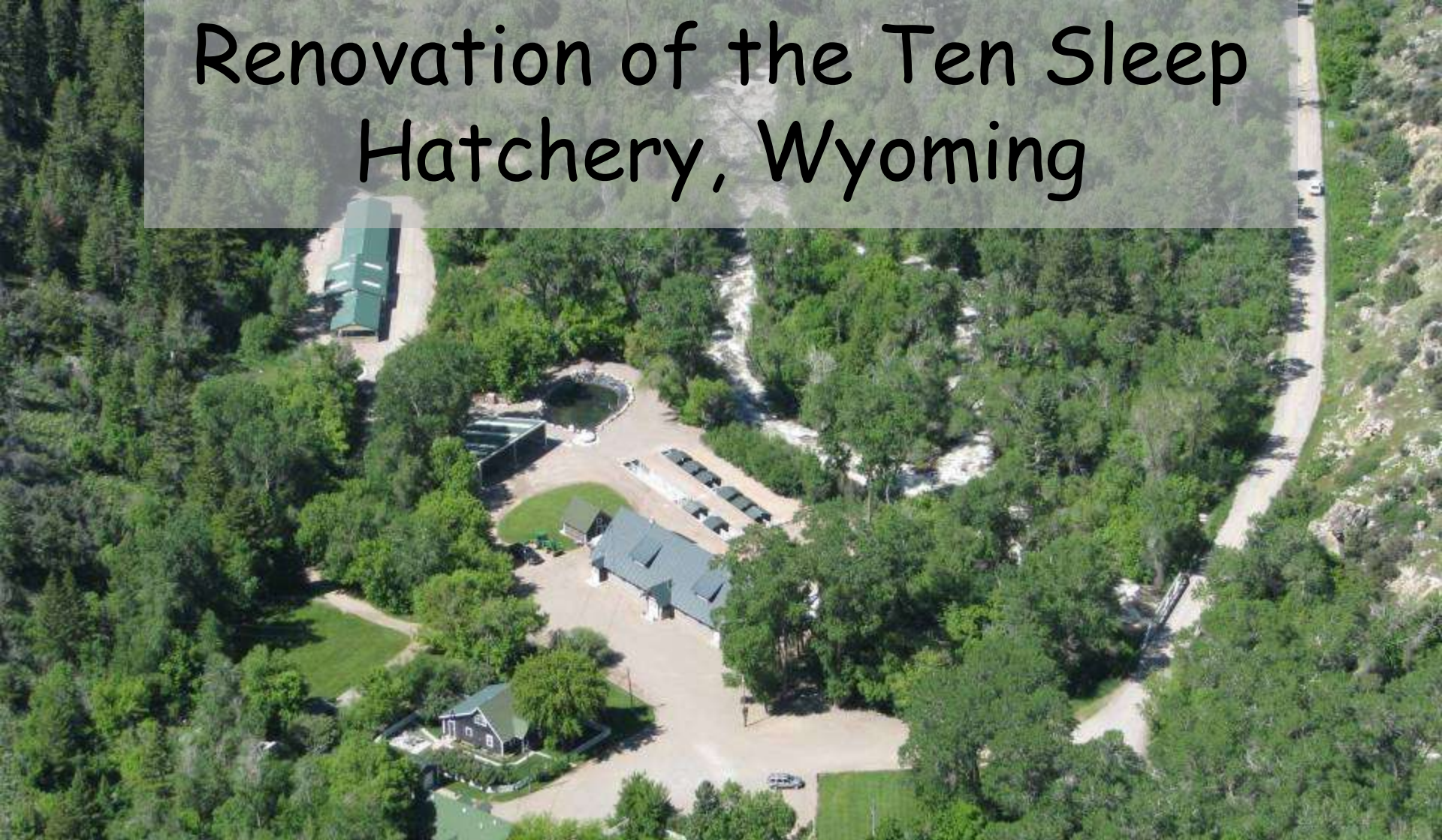


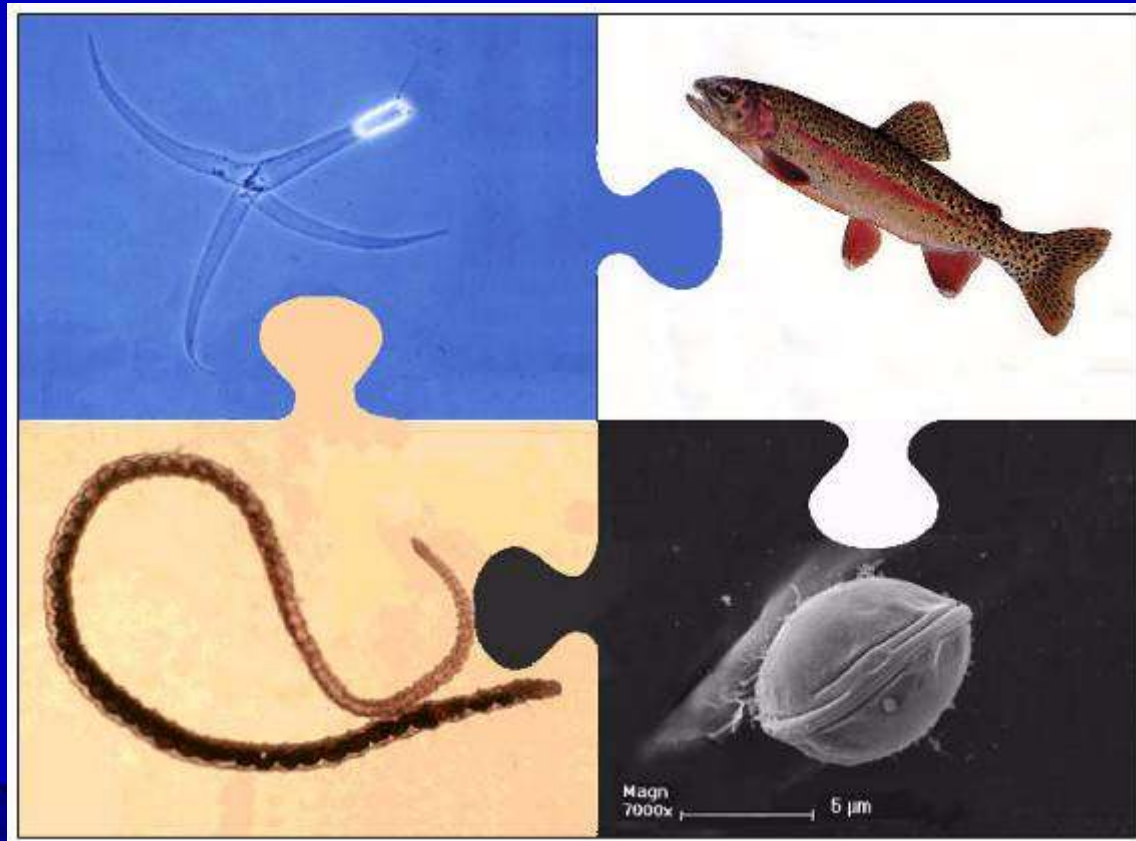
Renovation of the Ten Sleep Hatchery, Wyoming



Steve Sharon, Fish Culture Supervisor
Bart Burningham, Ten Sleep Hatchery Superintendent
2011 Northwest Fish Culture Conference, Victoria
Wednesday, December 7, 2011



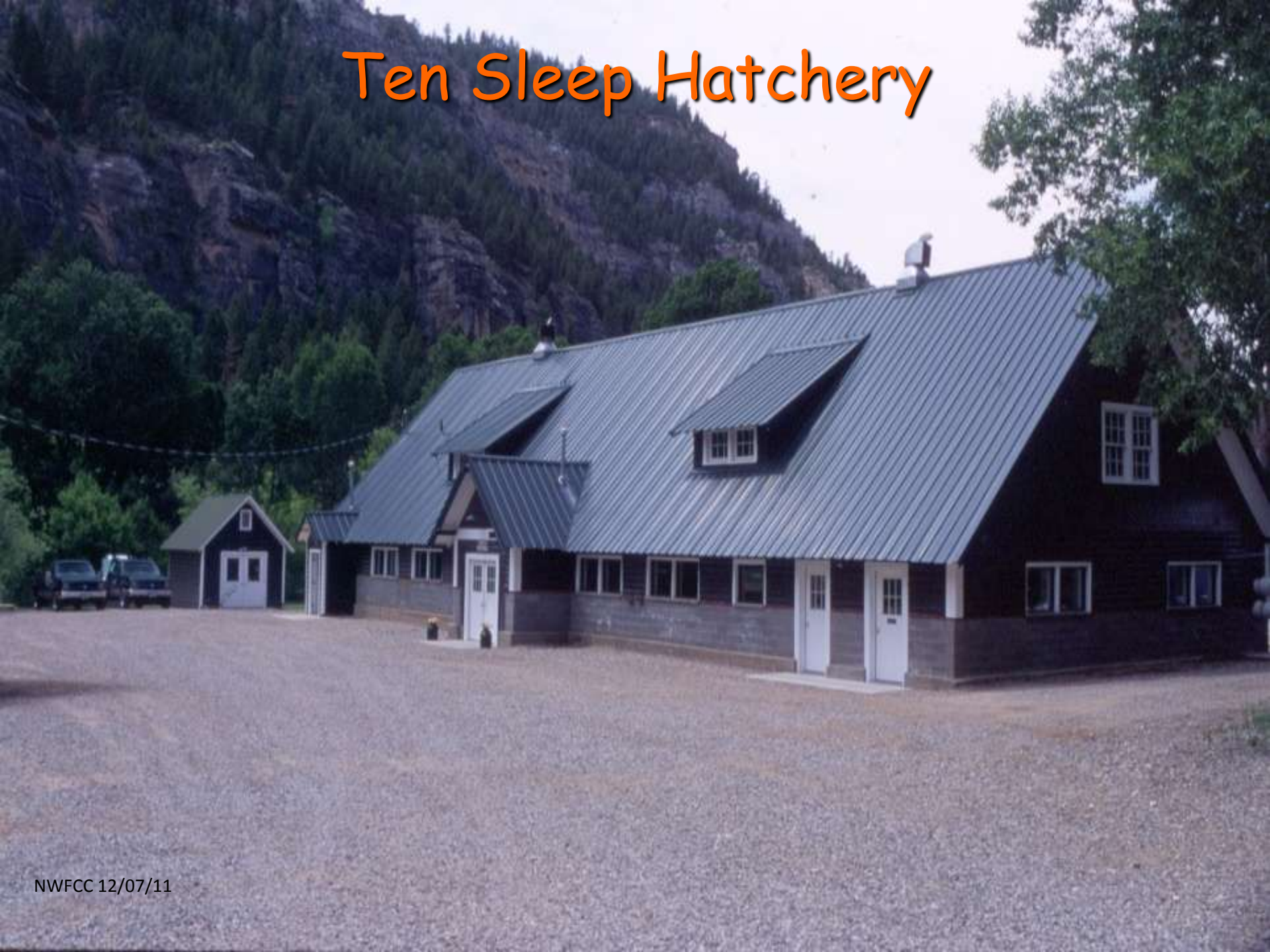
Quick Review of WD & WGF Hatcheries





Ten Sleep Hatchery

Ten Sleep Hatchery



Ten Sleep Incubator





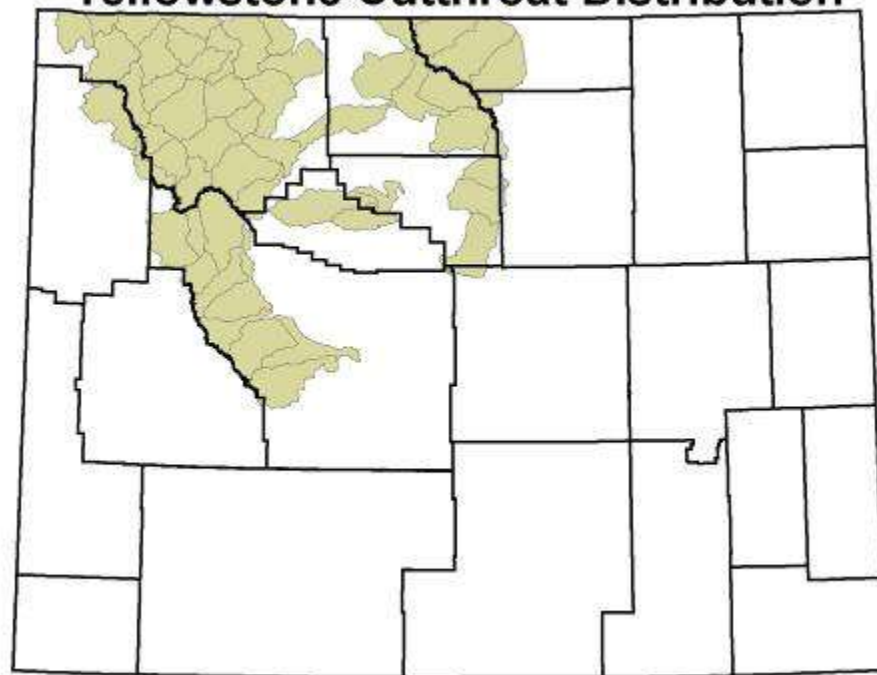
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Yellowstone Cutthroat Distribution





2008
BKT & SPK Infected with
M. c. Spores

Puzzling Situation

- Spring sources are contained with minimal exposure to surface water
- No turbidity or any direct indication of surface contamination
- Spring temperatures constant, do not vary a degree
- Infections (confirmed spores) occurred in late November, December.

Time to Take Action

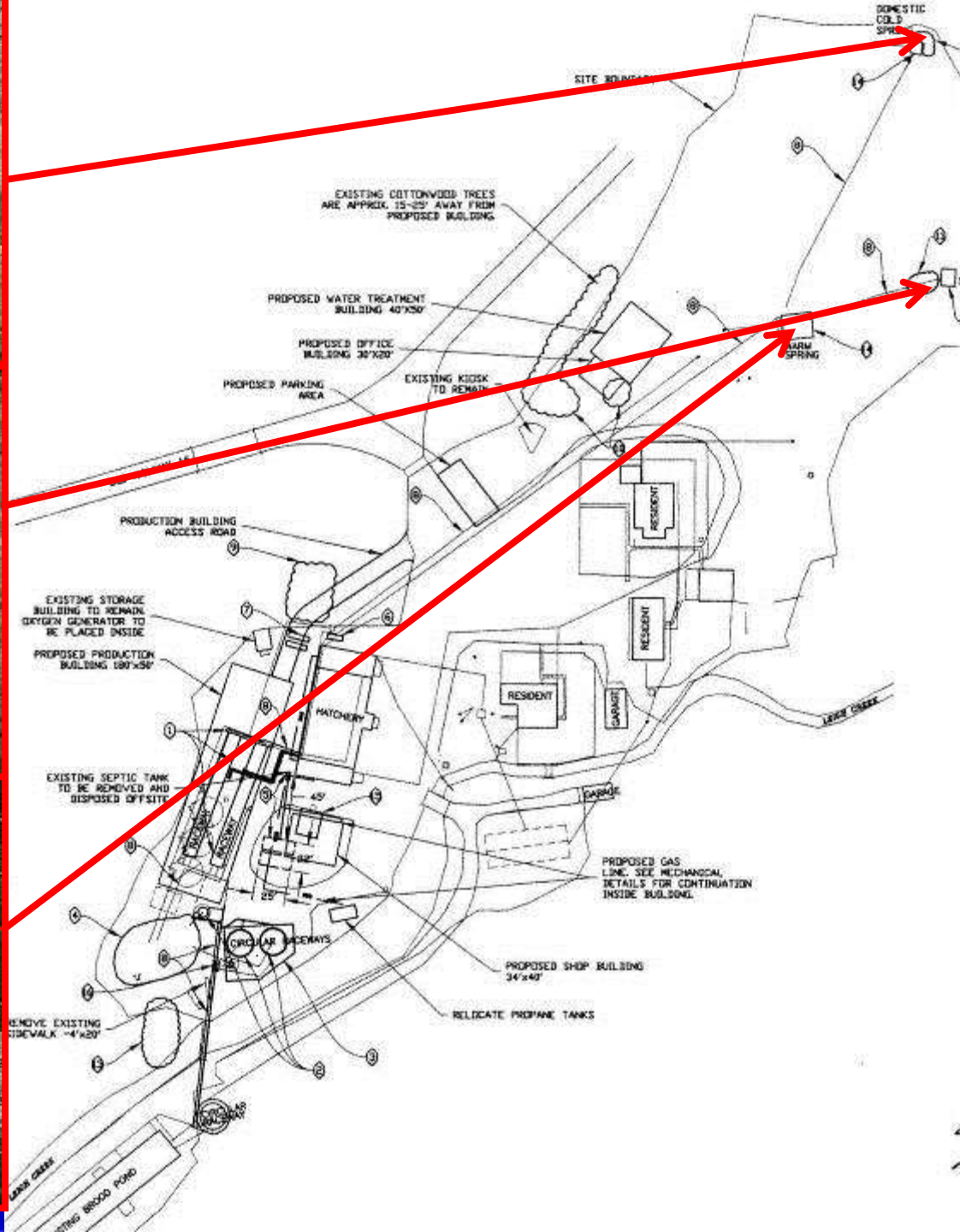
- Requested and Received \$4,517,000 from 2009 General Session of 60th Legislature
- Construction Started in July 2010, Completed in September 2011
- Focus of Renovation
 - Fully Contain & Treat Water Supplies
 - Renovate Hatchery Building Rearing Units
 - Develop & Enclose Outside Production



Cold Spring



Warm Spring



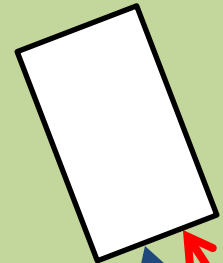
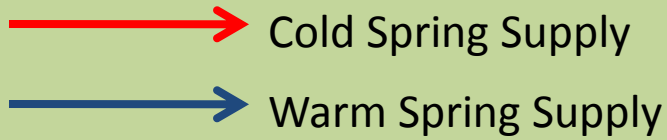
Spring Development

- Identified, Contained Each Source
- Combined Cold Springs
- Set Parameter French Drains to Remove Surface Contamination
- Construct Total Enclosures

New Production Building

Existing
Hatchery Building

New Water Treatment
Building





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Warm Spring Water Treatment

Pre-Treatment

- Total Gas = 112%
- Nitrogen = 129%
- Oxygen = 49%

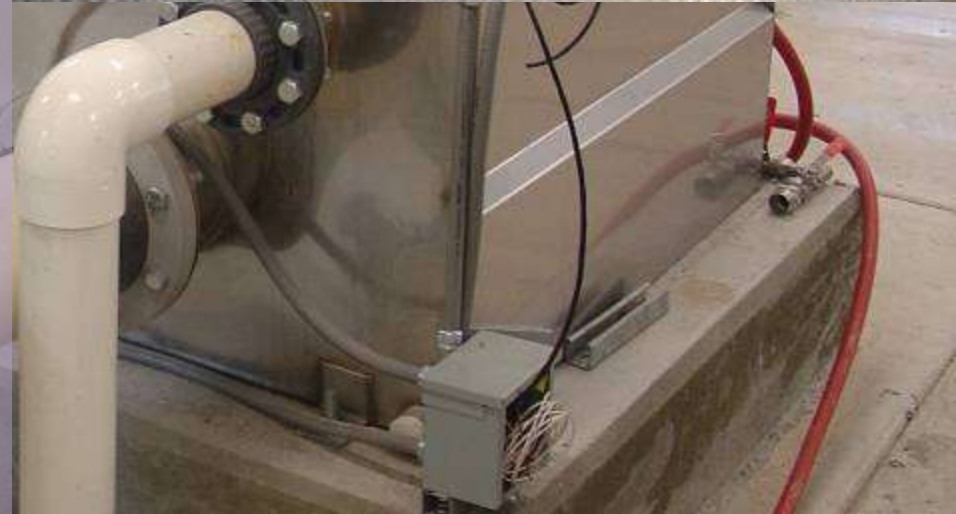
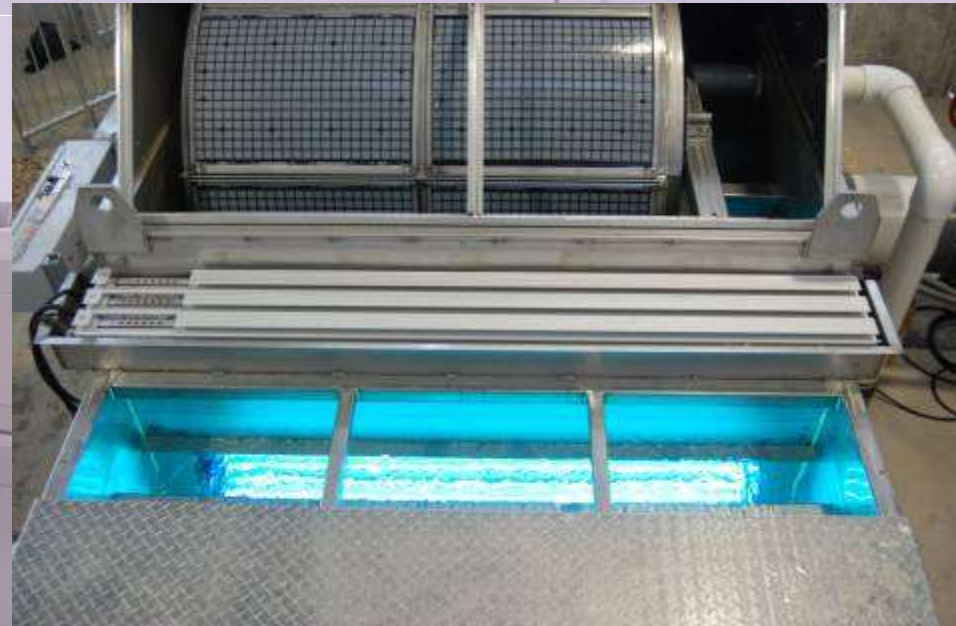
After Degassing

- Total Gas = 92%
- Nitrogen = 101%
- Oxygen = 53%



RFUV Duplex Disinfection

- One weir for RF & UV
- 50% flow through split to each unit
- Normal operation - Extended Exposure
- If RF or UV fails on one unit - Automatically transfers to other unit
- If both fail - Supply automatically bypasses small fish production.



RFUV Duplex Disinfection

Cold Spring Supply

Warm Spring Supply

Water Treatment/Mixing Vault

Cold Spring LHO

Warm Spring LHO

Cold Spring LHO

Warm Spring LHO

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After Degassing

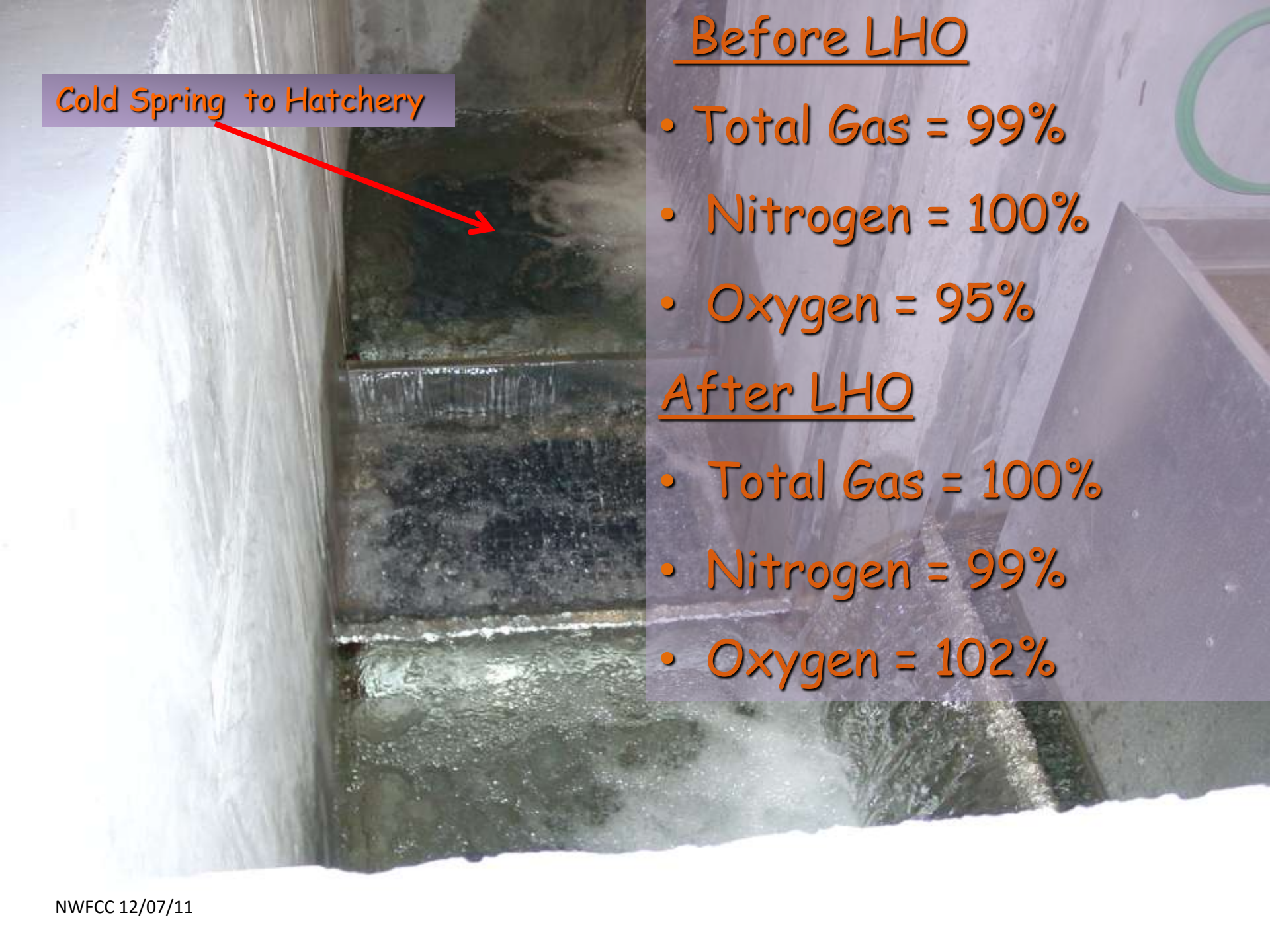
- Total Gas = 92%
- Nitrogen = 101%
- Oxygen = 53%

After LHO

- Total Gas = 97%
- Nitrogen = 96%
- Oxygen = 100%

Warm Spring to Hatchery





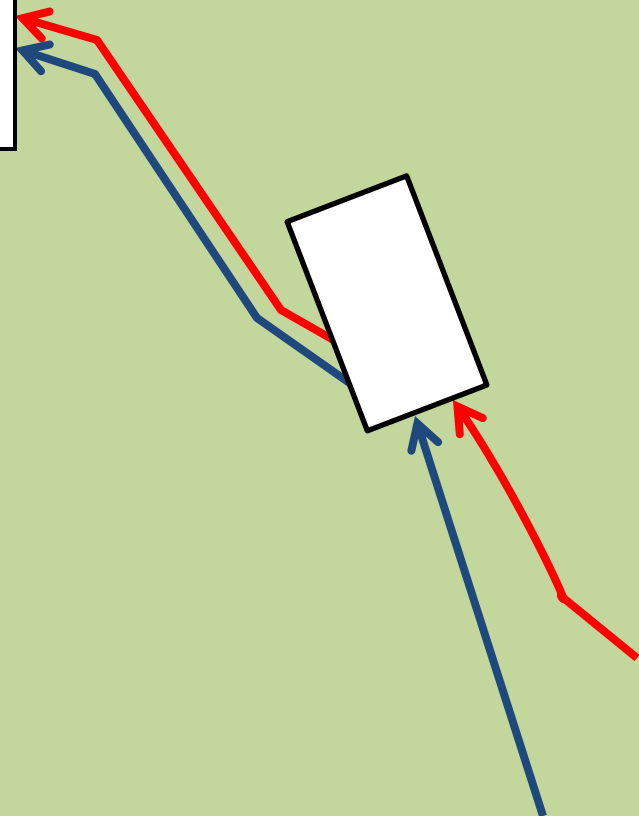
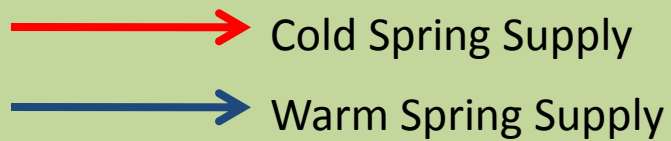
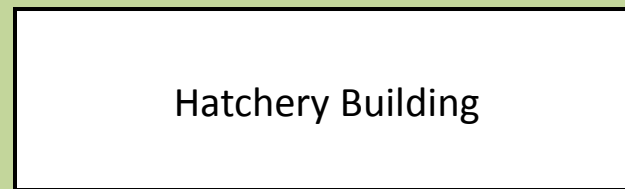
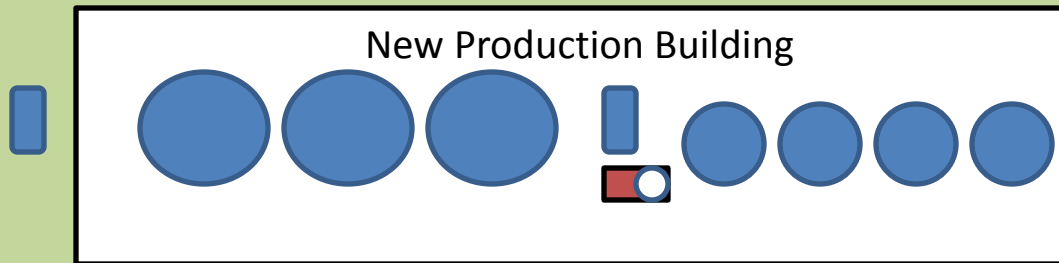
Cold Spring to Hatchery

Before LHO

- Total Gas = 99%
- Nitrogen = 100%
- Oxygen = 95%

After LHO

- Total Gas = 100%
- Nitrogen = 99%
- Oxygen = 102%



Old Hatchery Interior





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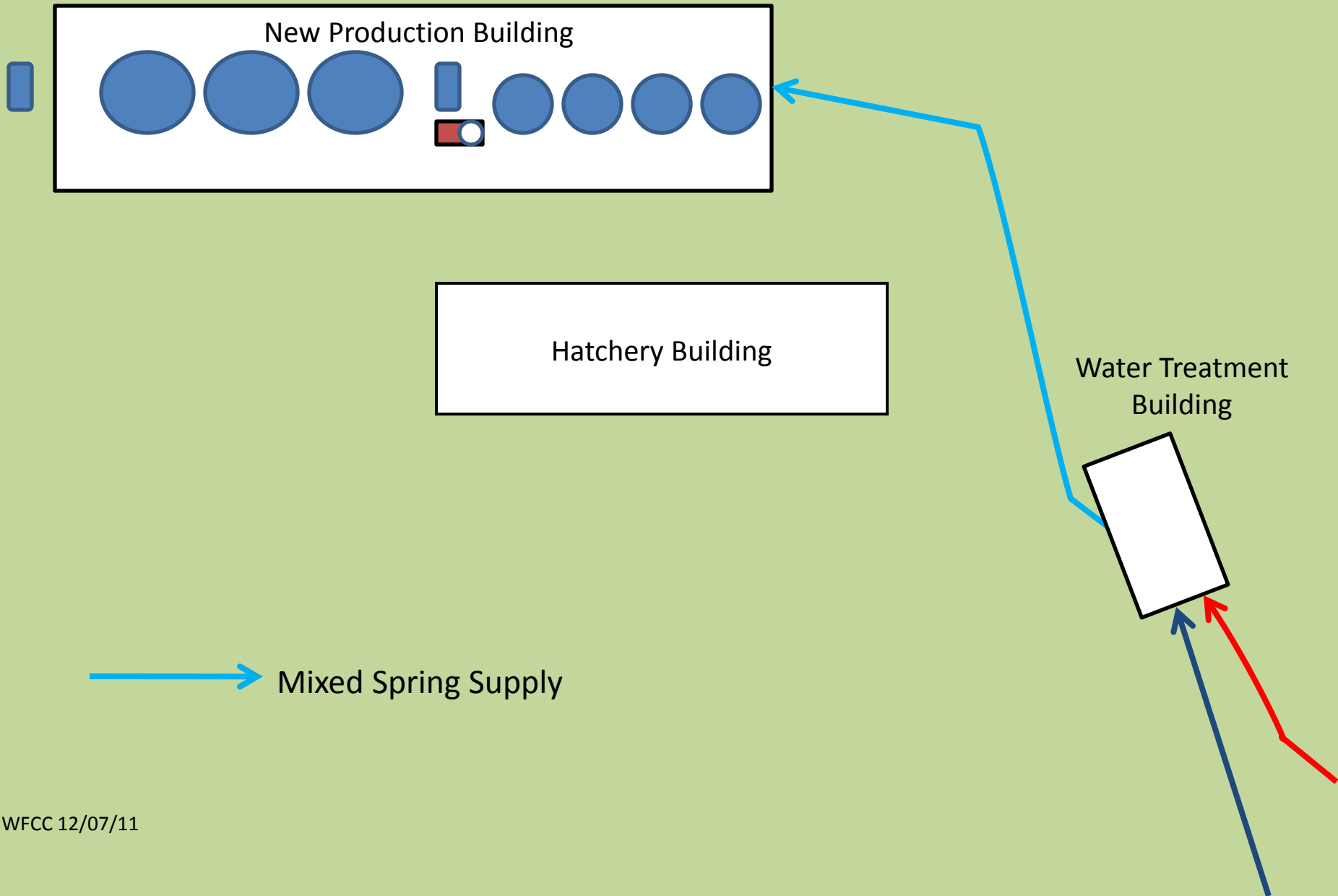
Cold Spring Supply

Warm Spring Supply

Upper Production Building Supply

Mixed Spring Supply





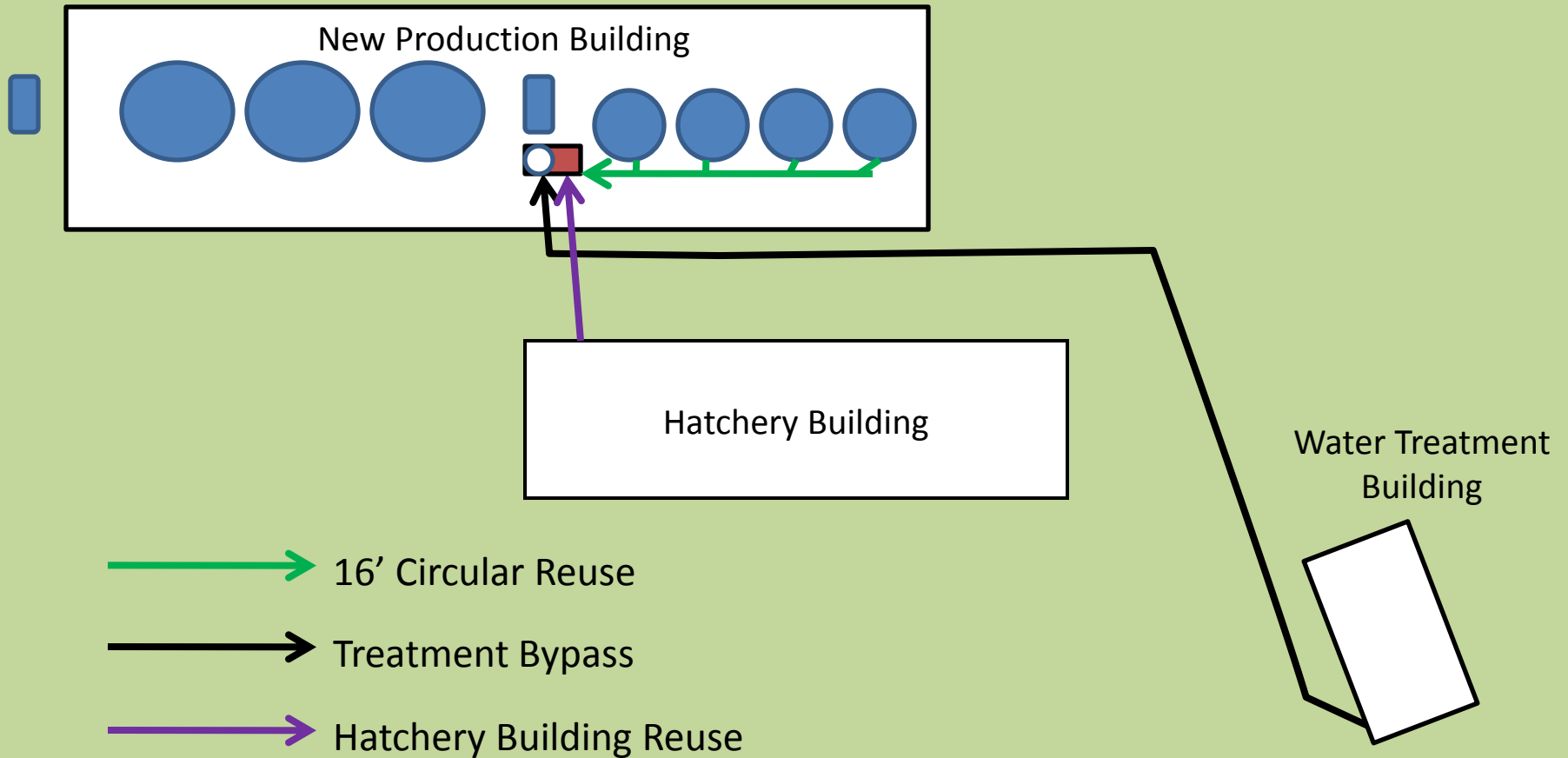


16'x5' Dual Drain Circulars





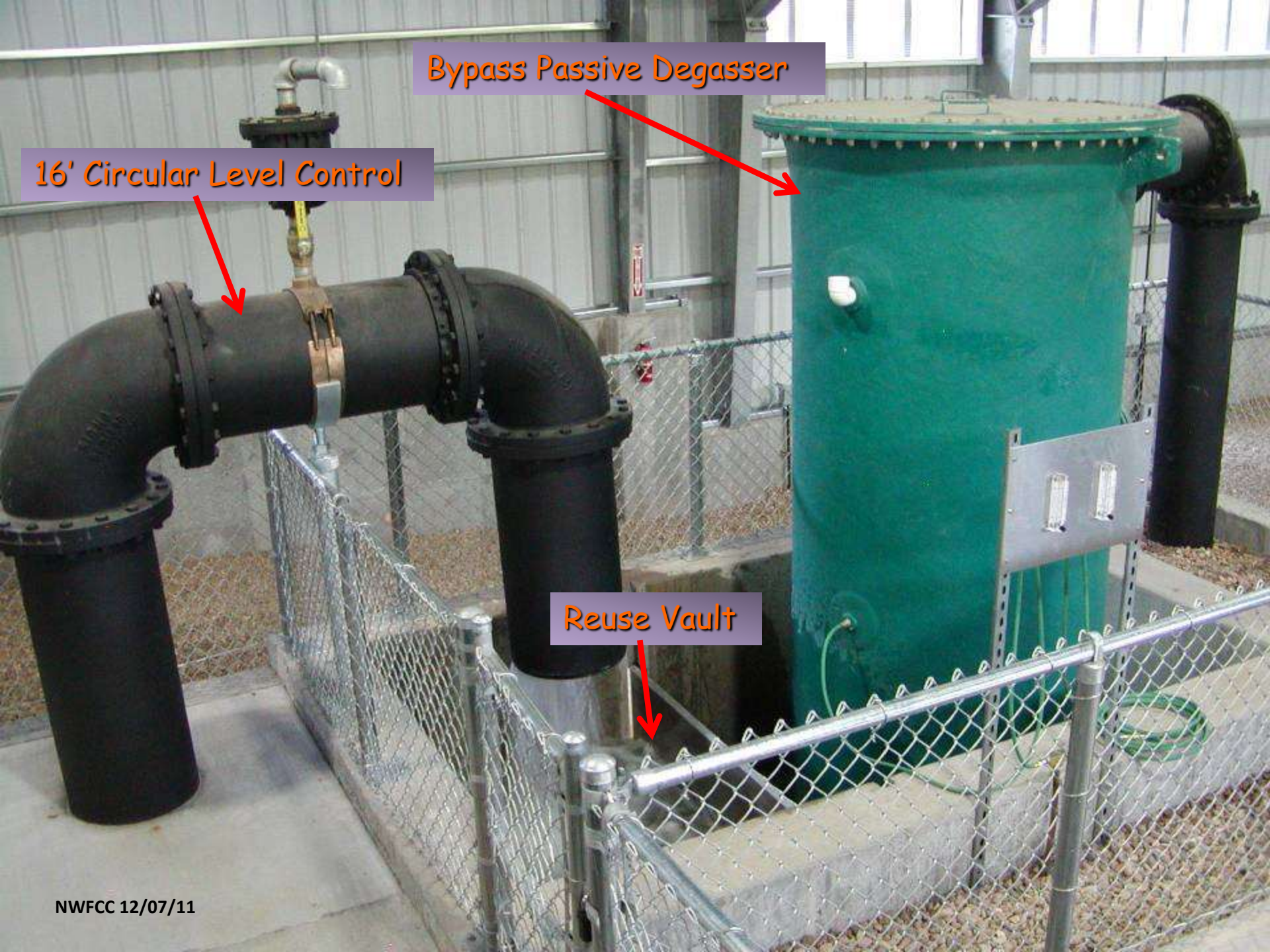




Bypass Passive Degasser

16' Circular Level Control

Reuse Vault



RFUV Treatment of Reuse/Bypass







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20' Circular Level Control

Brood RFUV & LHO Vault



So, What Did We Accomplish?

- Enclosed & Protected Spring Supplies
- Remove Saturated Nitrogen Gas Issue
- Improved Oxygen for All Rearing Units
- Disinfected Spring Supplies and Each Production Reuse
- Improved Water Quality to Brood Stock
- Ten Sleep will be Stocking Fish in 2012 if Fish Health Samples Clear

Acknowledgements

➤ Ten Sleep Hatchery Personnel

- Bart Burningham, Superintendent
- Brad Hughes, Assistant Superintendent
- Ben Milner, Fish Culturist

Time for Questions??

