

# **Anchorage Sport Fish Hatchery Update Anchorage, AK**

**Alaska Dept. of Fish & Game, Sport Fish Division  
Alaska Dept. of Transportation & Public Facilities**

**59<sup>th</sup> Annual Northwest Fish Culture Conference  
December 1, 2009**

**Presented by:**

**Mike McGowan, P.E.  
HDR Engineering, Inc.**



**&**

**KC Hosler, P.Eng.  
PR Aqua Supplies Ltd.**



# Anchorage Sport Fish Hatchery



# Acknowledgements

Jeff Milton, ADF&G, Sport Fish Division

Andrea Tesch, ADF&G, Sport Fish Division

Bob McFadden, ADF&G, Sport Fish Division

Elmendorf Fish Hatchery Staff

Fort Richardson Hatchery Staff

Dave Kemp, ADOT&PF

HDR Staff

PR Aqua Staff

Design Sub-Consultants

Kiewit Building Group Staff



# Current Situation

- Region II and III sport fish production currently provided by Ft. Richardson (1958) and Elmendorf (1976) State Fish Hatcheries.
- Both were dependant on excess heat from adjacent military power plants which ceased operation in 2005/2006.
- Current facility issues:
  - Limited Space, Water, Heat, and Biosecurity
  - Aging infrastructure
  - Inefficient in design requiring increased manpower and water resources
  - Unable to reach current production goals due to loss of heat
  - Limited public visitation or educational opportunities

# Pre-Development Plan and Schedule

- 2001 - the State initiated planning and development to ensure continuity and expansion of the hatchery program. This document was used to seek funding.
- 2002 - the State began piloting circular tanks and water recycle technologies to demonstrate impacts on water quality and fish health.
- 2004 - Feasibility study was completed to identify the options and costs associated with the construction of a new hatchery facility in the Anchorage Area (Region II) and one in Fairbanks (Region III).
- 2007 - Design began for the new Anchorage Sport Fish Hatchery.

# Project Development Production Bio-plan

- Annual # of Stocked Fish  
= 5,619,725
- Annual Production Biomass  
= 133,606 kg
- Six Species released at multiple life stages
- AC and RT captive brood

ADF&G Bio-plan Release Schedule

Species	Stock	Life Stage	Target Size (g)	Odd/ Even/ Every	First Release	Last Release	Production (# of fish)	Biomass (kg)
Arctic Char	Aleknagik Lake	Catchable	160	Odd	15-May	15-Jun	42,225	6,756
Sub Total							42,225	6,756
Arctic Grayling	Chena River	Catchable	120	Every	15-May	15-Jul	37,050	4,446
Sub Total							37,050	4,446
King Salmon	Any	Smolt	13	Every	15-May	1-Jul	1,050,000	13,650
	Crooked Creek	Smolt	13	Every	15-May	1-Jul	105,000	1,365
	Deception Creek	Smolt	13	Every	15-May	1-Jul	210,000	2,730
	Ninilchik River	Catchable	120	Every	23-Sep	7-Oct	-	-
		Smolt	13	Every	15-May	1-Jul	680,000	8,840
	Ship Creek	Catchable	120	Every	23-Sep	7-Oct	138,350	16,602
		Smolt	13	Every	15-May	1-Jul	525,000	6,825
Sub Total							2,708,350	50,012
Lake Trout	Summit Lake	Catchable	160	Even	15-May	15-Jun	42,225	6,756
Sub Total							42,225	6,756
Rainbow Trout	Swanson River	Fingerling	2	Every	15-Jun	1-Jul	809,500	1,619
		Catchable	120	Every	15-May	15-Aug	319,900	38,388
Sub Total							1,129,400	40,007
Silver Salmon	Bear Lake	Fingerling	2	Every	15-Jun	1-Jul	180,000	360
		Smolt	23	Every	15-May	1-Jul	480,000	11,040
	Jim Creek	Smolt	23	Every	15-May	1-Jul	120,000	2,760
	Ship Creek	Fingerling	2	Every	15-Jun	1-Jul	142,700	285
		Smolt	23	Every	15-May	1-Jul	480,000	11,040
	Ship Ck/Jim Ck	Smolt	23	Every	15-May	1-Jul	300,000	6,900
Sub Total							1,702,700	32,385
Total							5,661,950	140,362
Odd/Even Year							42,225	6,756
Annual Total							5,619,725	133,606



# Project Development

- Site Selection
- Design Development
  - Needs and Functional Relationships
  - Operational Considerations
  - Maintenance Considerations
- Concept Development
  - Efficient Use of Space/Biosecurity
  - Storage
- Budget

# Moving Forward



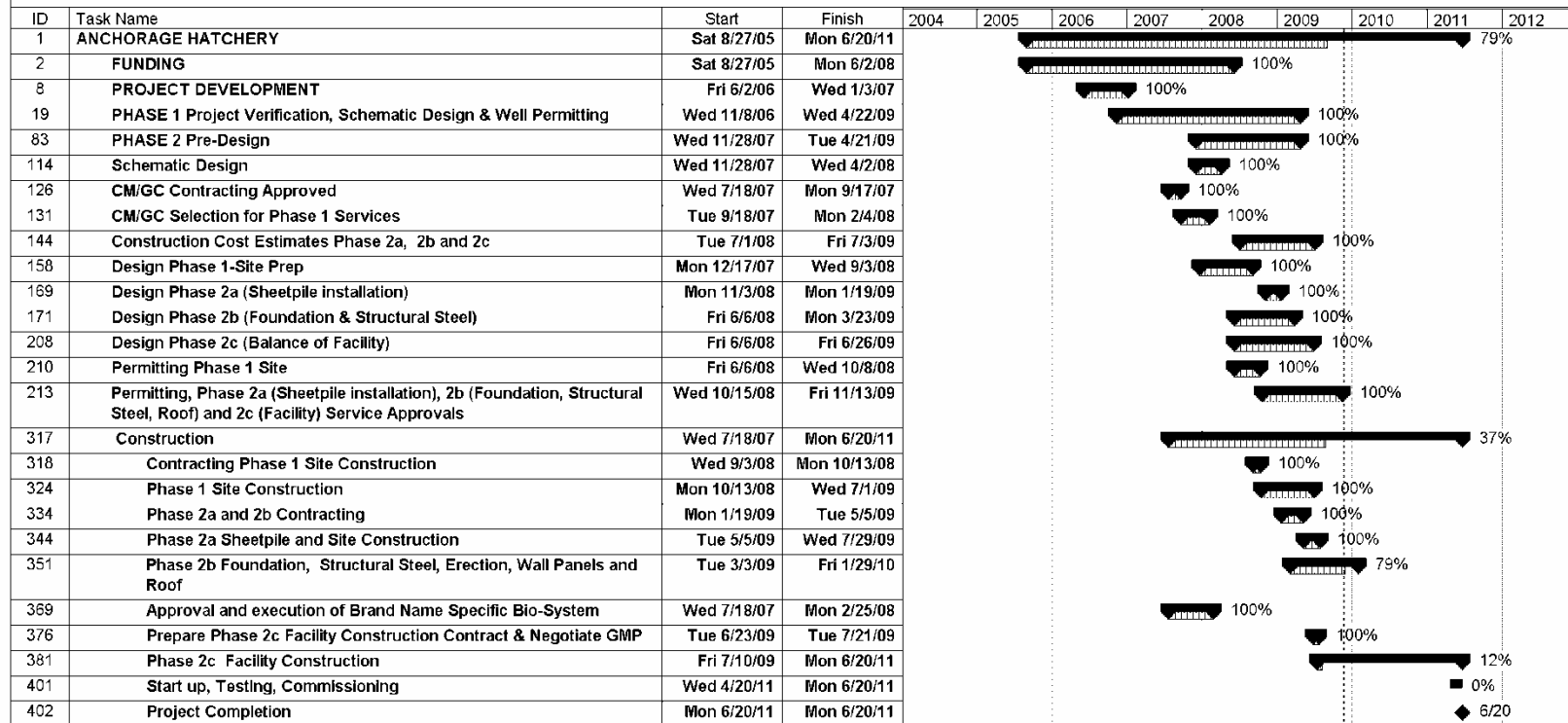


# Siting

- Siting considerations
  - Building Size
  - Existing Conditions
  - Hydraulics
  - Regulatory/Permitting
  - Environmental Considerations

# Schedule

## Anchorage Sport Fish Hatchery



Last Saved Date: Fri 11/13/09  
File Name: Schedule for Mike

Critical	=====	Baseline	=====
Critical Split	.....	Baseline Split	.....
Critical Progress	=====	Baseline Milestone	◇
Task	=====	Milestone	◆
Split	.....	Summary Progress	=====
Task Progress	=====	Summary	=====

Project Summary	=====
External Tasks	=====
External Milestone	◆
Deadline	↓

# Design Challenges and Solutions

- Challenges:
  - Maximize production given limited water resources
  - Minimize production costs through reduced energy consumption
- Solutions:
  - Design each culture module using circular culture tanks
  - Strategically apply water use strategies incorporating recycle technologies



# Design Challenges and Solutions cont'd

- Benefits of Recirculation:
  - Ability to control culture conditions
  - Decreased water consumption and effluent discharge
  - Decreased pumping and heating costs
  - Improved control of facility biosecurity
  - Increased culture densities
  - Improved growth rates

# Selecting Water Use Strategies

- Water quality criteria and tolerances vary by fish species and life stage.
- There is less motivation for water conservation and the use of recirculation in early rearing due to low flow rates.
- Rearing cycle length must be sufficient to culture and support a biofilter.
- Operational and mechanical complexity increases with increased level of water reuse.
- Tanks of one size to have common water use strategy and operating method to increase flexibility.

# Selected Water Use Strategies

Tank Size	Flow Through	Low Rate Partial Reuse (50-75%)	High Rate Partial Reuse (75-95%)	Recirculation with biofiltration (95%)
Incubation	X			
All <10 ft diameter tanks	X			
All 10 ft diameter tanks		X		
20-26 ft diameter tanks			X	
26 ft diameter tanks (brood)				X



# Facility Water Budget



# Design Challenges and Solutions

- Challenge:
  - Minimize design and operational complexity despite:
    - complex multi-species bio-plan
    - stock separation by species, stock, and life stage, year class
- Solution:
  - Comprehensive bio-programming process
    - Bio-plan and assumptions verification
    - Growth modeling and production timeline mapping
    - Tank selections
    - Facility scale optimization
    - Mass balance modeling

# Development of Rearing Strategies

- Bioplan and growth strategy simplifications
- Compromises made to reduce complexity and facility scale
- Multiple equal systems provides maximum flexibility
- Optimize facility scale by sharing tanks between stocks that are not reared concurrently.
- Manipulate rearing temperatures to create further opportunities to share tanks.



# Modular Approach

- Bio-plan: 18 different production groups
- Resulted in: 41 tank groupings required
- Modular design: 12 culture module designs  
6 tank sizes  
4 process designs

# Final Tank Selections

Tank Size	# of Tanks:
Incubation Stacks (8 trays per)	104
2' D x 1.5' H (0.16 m <sup>3</sup> )	15
5' D x 3' H tanks (1.4 m <sup>3</sup> )	12
10' D x 4' H tanks (8.2 m <sup>3</sup> )	33
16' D x 5' H tanks (25.6 m <sup>3</sup> )	4
20' D x 5' H tanks (40.1 m <sup>3</sup> )	2
26' D x 6.6 ft H tanks (91.7 m <sup>3</sup> )	39

# Design Challenges and Solutions

## Challenge:

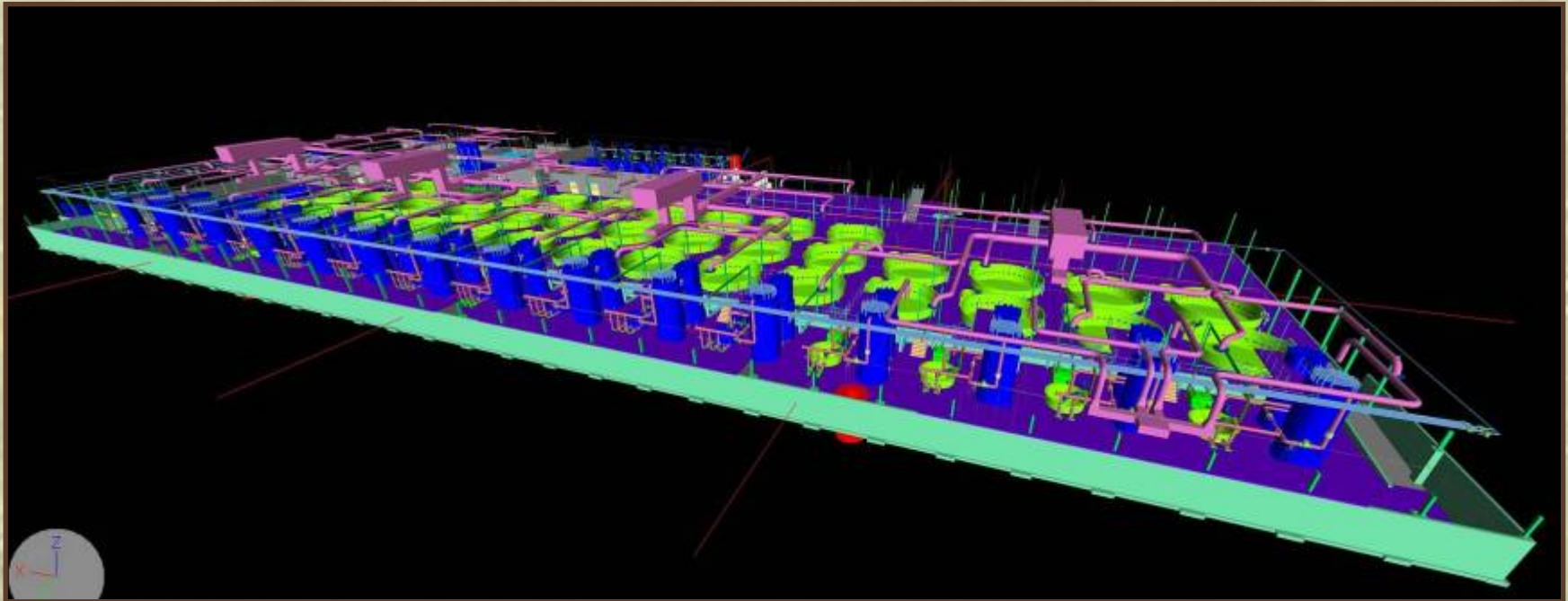
- Mechanical complexity and potential for conflicts between disciplines

## Solution:

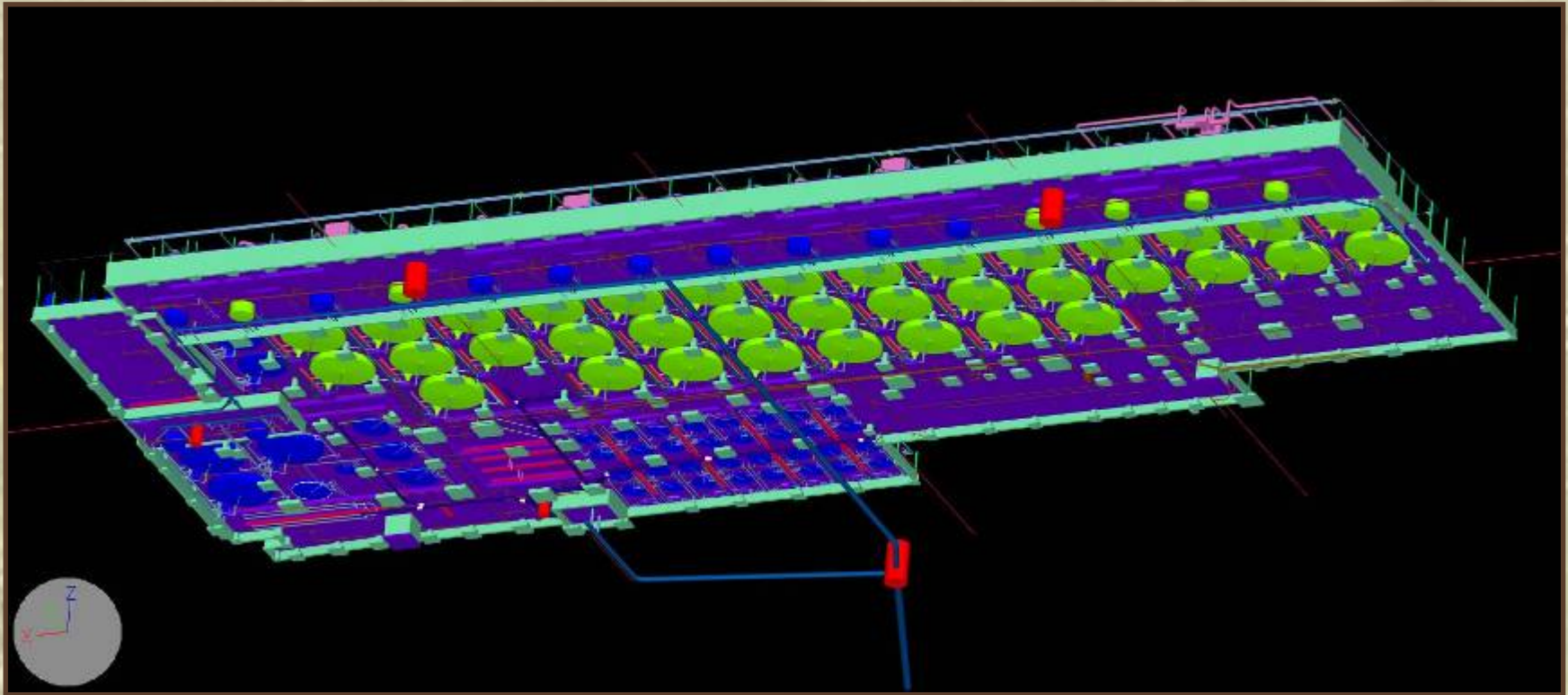
- 3D model for conflict identification and resolution



# Top View

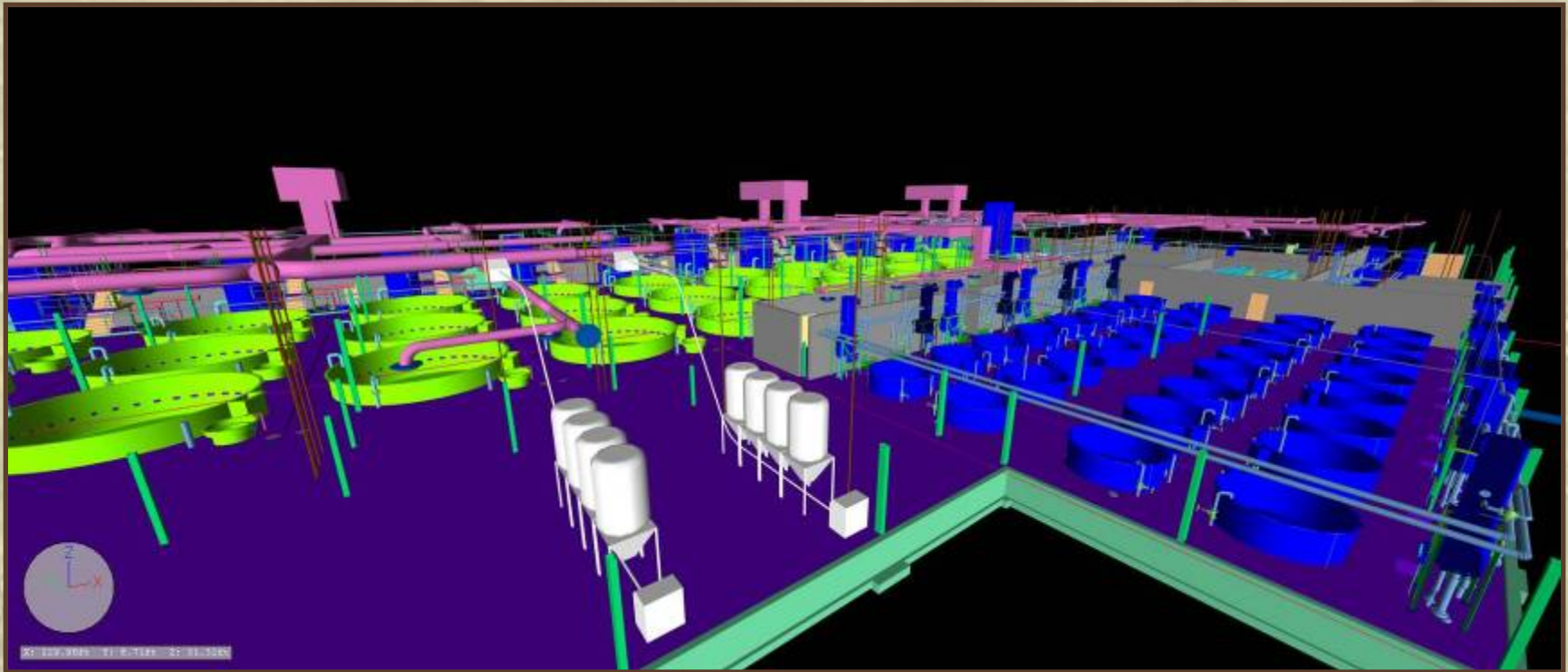


# Under Slab View





# Close Up





# Contract Method

- Pre-selection of aquaculture system provider
- CMGC addition
- Design Process
  - Team Building Exercise
  - Weekly Meetings
  - Joint Evaluation/Decision Making
  - Discipline Specific Meetings
  - Issue Resolution
- Project Reviews
- Cost Estimates- Periodic Updates
  - Independent
  - Reconciliation

# Construction Progress



May 28, 2009



Aug 19, 2009



Oct 17, 2009



Nov 14, 2009



# Look Forward

- Estimated substantial completion: June 2011





*Thank you...*

## Questions/Discussion

