Presents:

“The Evolution of Aquaculture Research Infrastructure At Boston Children’s Hospital”

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THE EVOLUTION OF THE RESEARCH ZEBRAFISH FACILITY

Christian Lawrence
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BOSTON CHILDREN’S HOSPITAL: HOME TO ONE OF THE LARGEST ZEBRAFISH RESEARCH PROGRAMS IN THE WORLD
Zebrafish Publications in PubMed 1990-2011

Zebrafish Racks at BCH 1993-2013
Addition of Fish Research Infrastructure at BCH (1993-present)

- First zebrafish facility set up at BCH, 1993
- 65 rack facility built in Enders Lobby, 1998
- 95 rack facility built in Karp 2, 2003
- Transplant room built in Enders SB, 2011
- 20 racks in Enders Lobby replaced, 2013
- 75 rack facility built in Enders SSB, 2014

TOTAL RACK COUNT
- 1993: 65
- 1998: 160
- 2003: 167
- 2011: 242
ENDERS - LOBBY LEVEL

• Completed in 1998

• Vendor: AQUARIENBAU-SCHWARZ

• Size: 65 racks

• Design objectives: maximize tank#, provide good source water, compartmentalize function, redundant systems
system 1  system 2  system 3  system 4  water production

dish washers(4)  sink
KARP 2

• Completed in 2003

• Vendor: AQUARIENBAU SCHWARZ

• Size: 95 racks

• Design objective: maximize tank #, provide good source water, compartmentalize function, redundant systems
dish washers (6)
THE GOOD
WATER SUPPLY EXCELLENT AND OVERSIZED
COMPARTMENTALIZED WORKSPACE
THE BAD
BIOFILTER CAPACITY LOW
SOLIDS REMOVAL EXTREMELY POOR
WORKFLOW IS CONSTRUCTED
MAINTENANCE DIFFICULT
SANITIZATION GROSSLY INEFFICIENT
LANDSCAPE CHANGES

Methods & technology improved

Science has expanded

We know (and worry about) more

And ostensibly, we’ve learned from past mistakes
ENDERS SSB

• Completed in 2013
• Design/Construction: Canon Design/Turner
• Vendor: AQUANEERING
• Size: 75 racks
• Design objective: solids removal, workflow, efficiency, better pathogen control
KARP 2 REPLACEMENT

• Ongoing

• Design/Construction: TRO JB/FC Caulfield

• Vendor: TECNIPLAST

• Size: 72 racks, 10 rack spawning system

• Design objective: solids removal, workflow, efficiency, isolation of systems, automation, embryo production — MUST SUPPORT THE SCIENCE
FISH FACILITY COMPLETE INSTALLATION

AQUATICS SYSTEM 1
AQUATICS SYSTEM 2
AQUATICS SYSTEM 3
AQUATICS SYSTEM 4
AQUATICS SYSTEM 5
AQUATICS SYSTEM 6

WASHER

ISOLATION ROOM LAYOUT
PHASE 2 WILL START 1 MONTH AFTER SUBSTANTIAL COMPLETION OF PHASE 1.
Temporary wall
Sentinel rack
Feeding robot
flow-through iSpawns
TAKEAWAYS

• Design to meet/exceed technology

• Consider fish, science, AND people

• Learn from mistakes

• Build in flexibility to adapt to change

• Future directions…..
If I could build a facility today, to accommodate tomorrow what would it look like?

Not very much like what I’ve got
TRENDS IN DESIGN

Centralization

Recirculation

Compartmentalism

Flow-through
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