

Hatcheries and Climate Change

California Golden Trout: Drought Rescue and Return

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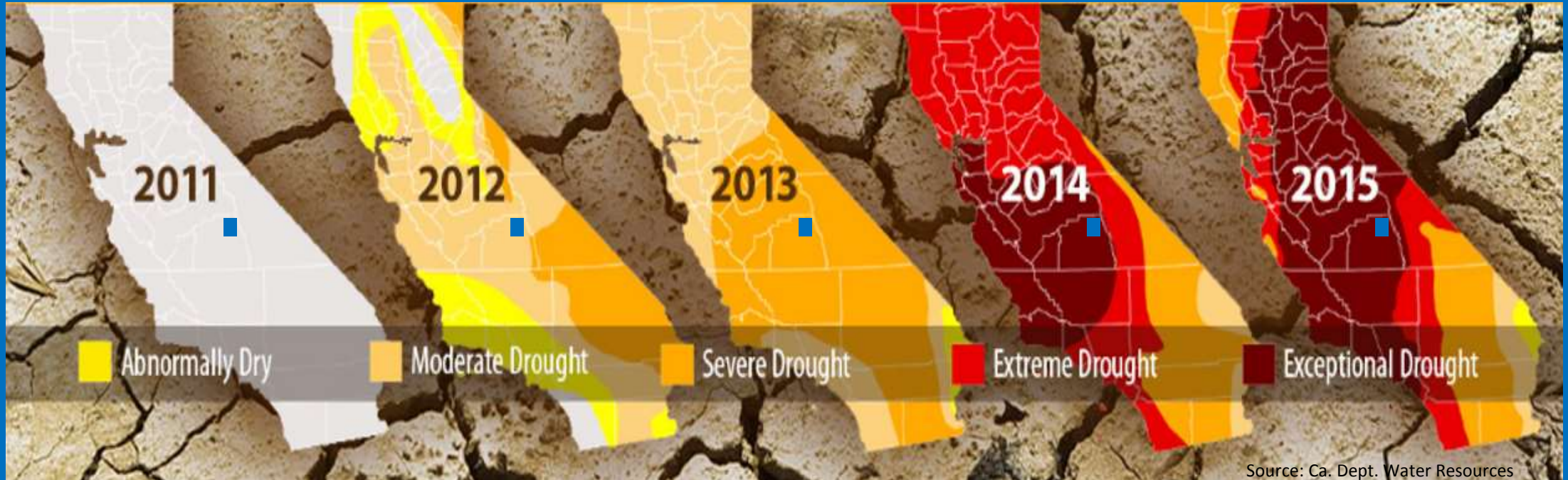
California Department of
Fish and Wildlife

Takes a “Village” to Rescue Fish

- Headquarters
 - Executive
 - Chuck Bonham
 - Kevin Hunting
 - Stafford Lehr
 - OCEO
 - Jordan Traverso
 - Steve Gonzalez
 - Travis VanZant
 - Eva Begley
 - HDQ Fisheries Branch
 - Kevin Shaffer
 - Roger Bloom
 - Dave Lentz
 - Jeff Weaver
 - Jeff Rodzen
 - Mark Clifford
 - Mark Adkison
 - Kevin Kwak
 - Keri Miles
- Regions
 - R1
 - Michael Dege
 - R2
 - Kevin Thomas
 - Jay Rowan
 - Dale Burkett
 - Doug Langley
 - Kevin Alberts
 - David Ford
 - William Hamby
 - R4
 - Julie Vance
 - Dean Marston
 - Brian Beal
 - Ken Johnson
 - Tracy Purpuro
 - Greg Kollenborn
 - Ed Michel
 - Andrew Kelley
 - Sean Belcher
 - Roger Neal
 - Thomas Gromis
 - Lori Werner
 - Tracy Sunamoto
 - Miriam Rodriguez
- Regions Continued
 - R5/6
 - Ignacio Ramos
 - Stephan Delongfield
 - Non-CDFW Partners
 - Horse Packers
 - Dennis Winchester
 - Craig London
 - Inyo National Forest
 - Forest Supervisor’s Office



California's Multi-year Drought

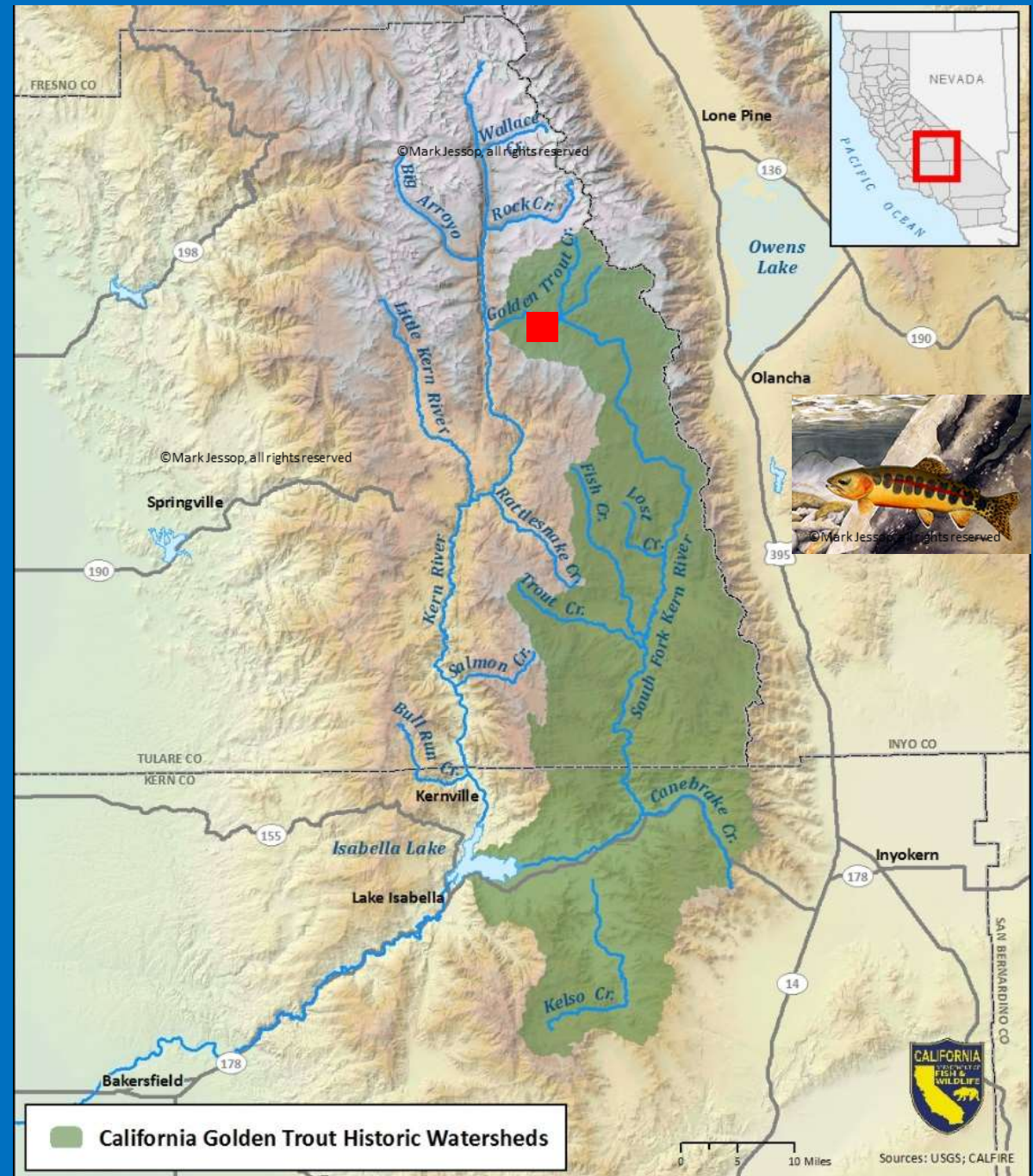


2014 Governor's Drought Proclamation

- Department of Fish and Wildlife will **evaluate and manage the changing impacts of drought on threatened and endangered species and species of special concern**, and develop contingency plans for state Wildlife Areas and Ecological Reserves to manage reduced water resources in the public interest.
- Department of Fish and Wildlife will work with the Fish and Game Commission, using the best available science, to **determine whether restricting fishing in certain areas will become necessary and prudent as drought conditions persist.**

California Golden Trout

- **Fast Facts:**
 - Indigenous to CA
 - State Fish
 - Highly Prized Game Fish
 - Species of Special Concern
- **Threats**
 - Rainbow Trout Genetic Introgression/Hybridization
 - Brown Trout Predation & Competition
 - Cattle Grazing
 - Drought



Why Golden Trout & Volcanic Creek Population

- State Fish...can't lose it
- Believed to be most pure form of CaGT
- Anglers concerned that proto-type would be lost
- We can't monitor all meta-populations so focused here



Volcanic Creek



CaGT Monitoring

2013 to 2016:

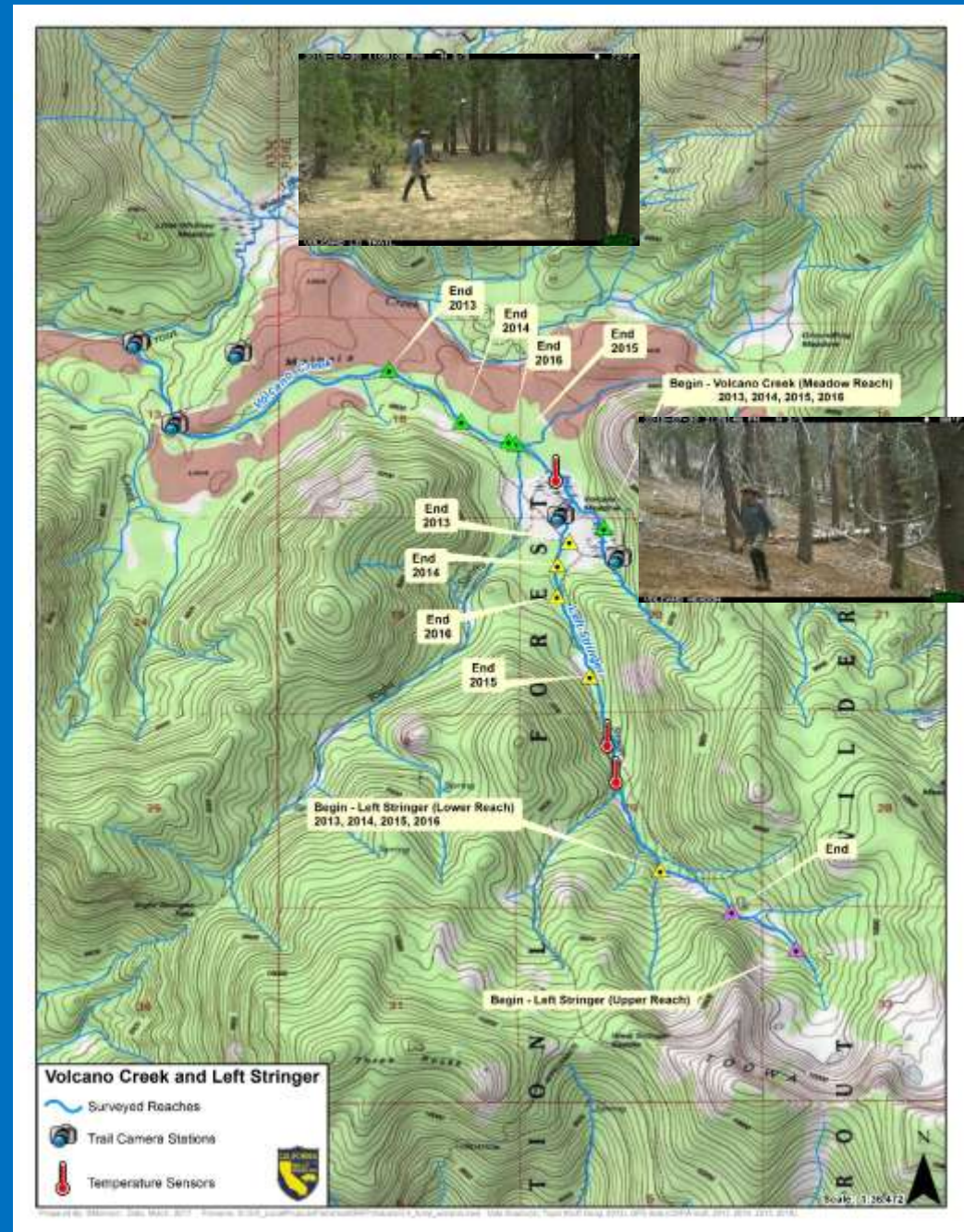
Wetted Habitat Length
Population Count (VES)
Water Temperature
Trail Cameras

Over this time:

Habitat down ~50%
Fish Abundance down ~90%

Loss due to:

Anchor Ice
Dessication/Predation



Dynamic Decision Making

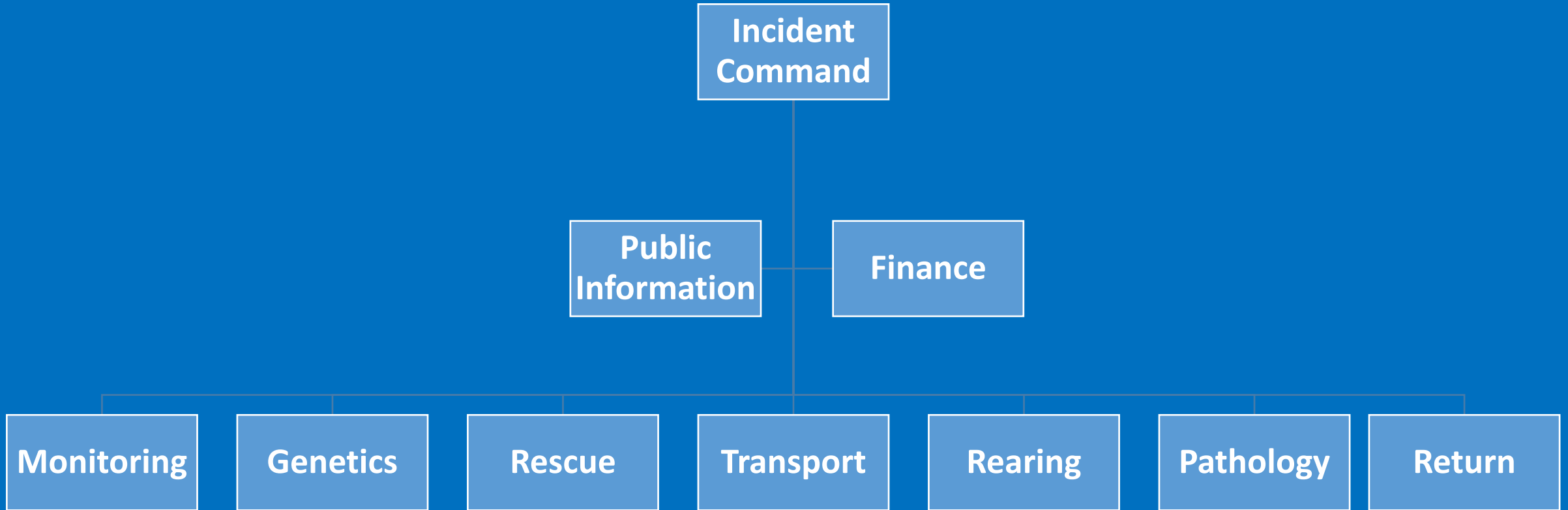
(Making Decisions Under Pressure aka: Nail Biting Time)



The Decision: Rescue

- **Effective Population Size too Small**
- **Habitat loss Substantial**
- **Threat of genetic bottlenecking (inbreeding depression vortex)**
- **Continuing Loss Threat (desiccation/winter kill)**
- **Uncertainty regarding drought continuance**
 - **hydraulic flow connectivity...fish recolonization?**

Planning: Incident Command System



The Rescue



- Goal - **45 CAGT** – 15 CAGT from each of the three reaches.
- **2"- 4" fish** so as not to impact the breeding adult population
- Collect additional genetics from 5 larger fish from each of the three reaches.
- Weights, lengths, PIT tagging and genetic collection from rescued CAGT were performed at the American River Hatchery.

Note grass filled creek...this is a large pool for this water

Rescue by the Numbers

52 CAGT Rescued



- 15 CAGT – Left Stringer Upper Reach
- 20 CAGT – Left Stringer Lower Reach
- 17 CAGT – Volcanic Creek
- Size class – 3" – 6", most 3.5" – 5.5"

Rescue Story in Pic's



Hatchery Translocation

American River Hatchery (ARH)

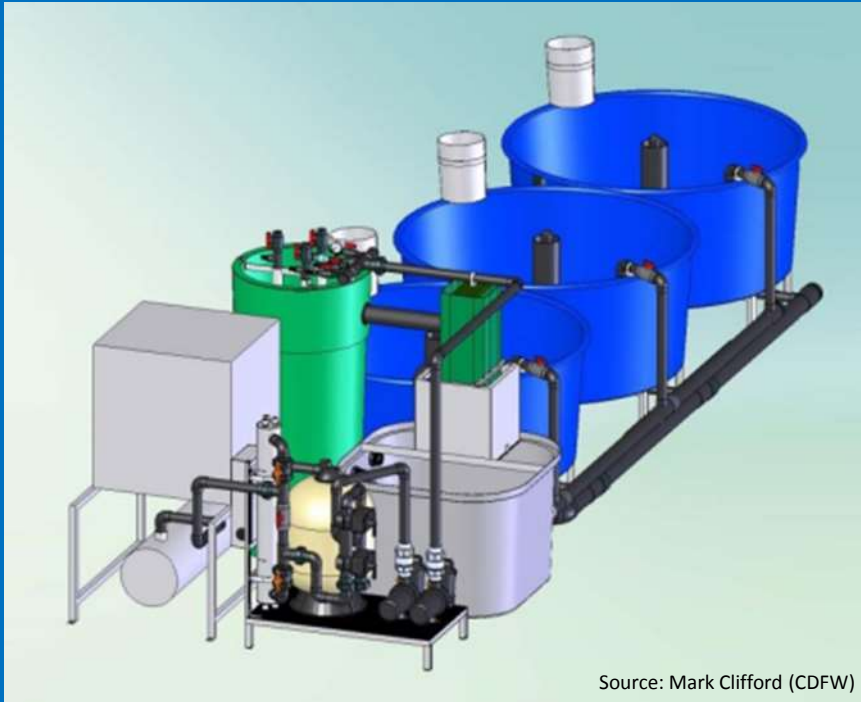


Over 24 hours from Field to Hatchery

Why Here?...Right Equipment & Proximity to Pathology

Drought Safe Haven

Recirculating Aquaculture System (RAS)



- Features:
- Biofilters
 - UV Light
 - Chillers

PIT Tagging

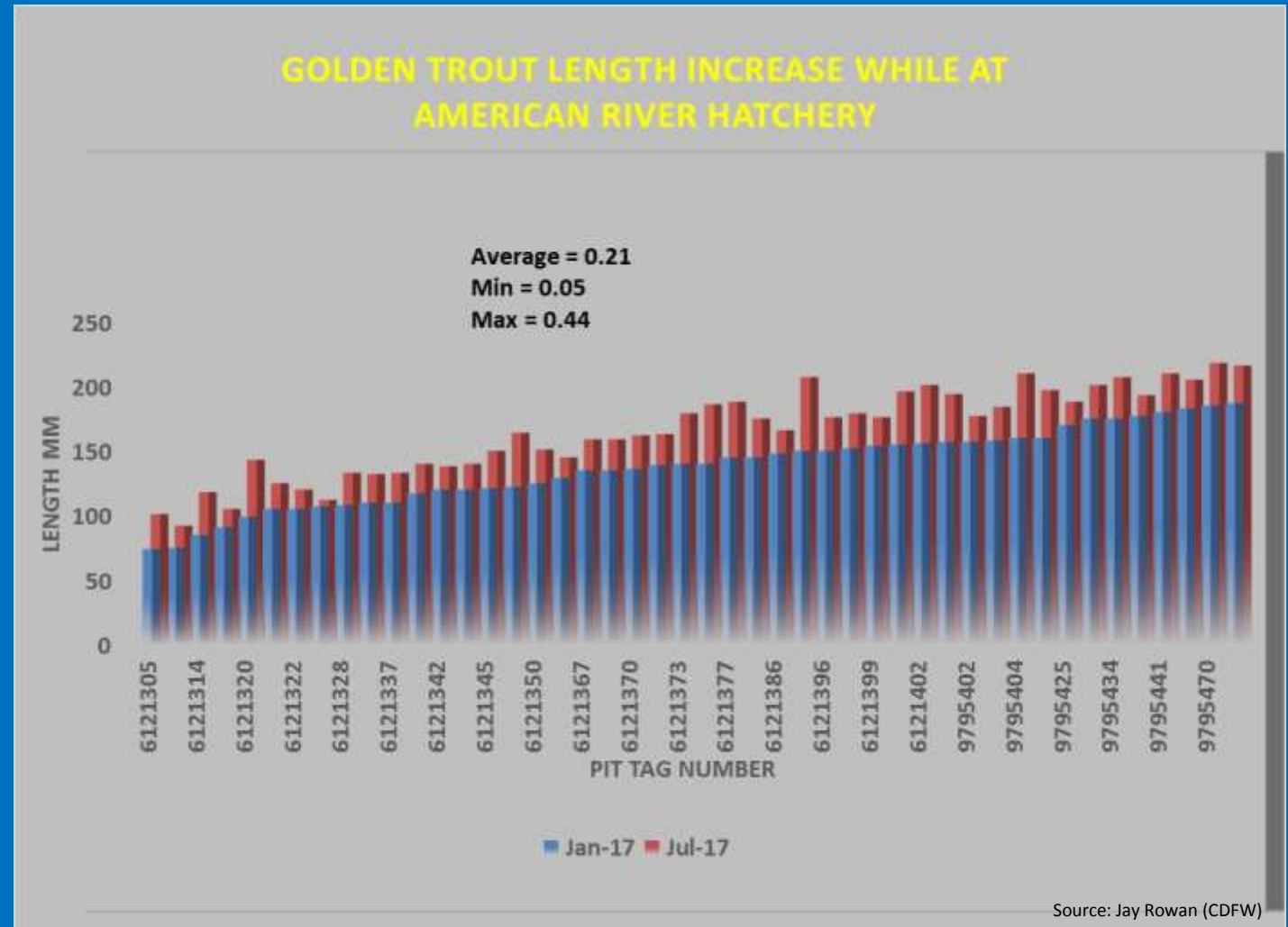


Phenotype Maintained in Captivity



Hatchery Challenges

- Water Temperature
 - Water temp's...natural is low 30's, hatchery best is mid-40's
- Feed
 - Diet...crickets/krill vs pellets
 - Goal: Maintenance not Satiation
- Health
 - Low Mortality
 - Good Condition



Wet Conditions Have Returned...Fish Can Go Home



The Return

(a short video by Steve Gonzalez)



Lessons Learned

- **Rescue:**

- Back-up personnel on site
- Ensure communication is adequate

- **Rearing:**

- Phenotype can be maintained at low elevation with proper husbandry and diet
- Fish growth can be controlled and still keep fish in good condition
- New Paradigm: Maintenance Diet

- **Decision Making**

- Information is King
- More information can change the decision made
 - Just how unique are these fish?
 - Frequency of flow connectivity?
 - Is the population going through a normal population fluctuation cycle?

- **“Take Home Message”**

- ID at risk species/locations and start intensive monitoring NOW

Q & A



Volcano Creek Visitor Use June 11th, 2014-September 15th, 2015				
	Total # of Hikers	# of Anglers	Total # of Riders	Pack Stock (#/Trip)
Upper Trail Camera	34	4	11	(4),(4),(6)
Lower Trail Camera*	6	2	26	(8),(11),(10)
Seen on Upper & Lower Trail Cameras	4	2	0	(0)

Volcano Creek Visitor Use September 15th, 2015-August 18th, 2016				
	Total # of Hikers	# of Anglers	Total # of Riders	Pack Stock (#/Trip)
Upper Trail Camera	26	7	2	(3)
Lower Trail Camera	21	3	19	(8),(9),(3)
Seen on Upper & Lower Trail Cameras	15	1	2	(3)