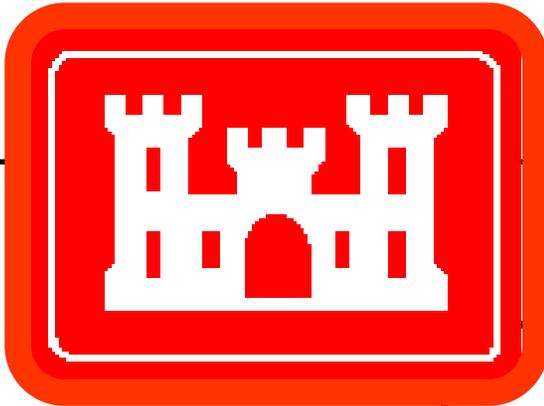




US Army Corps of Engineers



*Richard B. Russell*  
*Pumped Storage Operations*



# Pumped Storage Chronology

- Authorization 1979
- Designed & Awarded 10 Contracts 1984-87
- Federal Court Injunction Apr 88
- Clearance to Install Jan 89
- FSEIS & ROD Sep 91
- Consent Order f/ Env. Testing Apr. 92

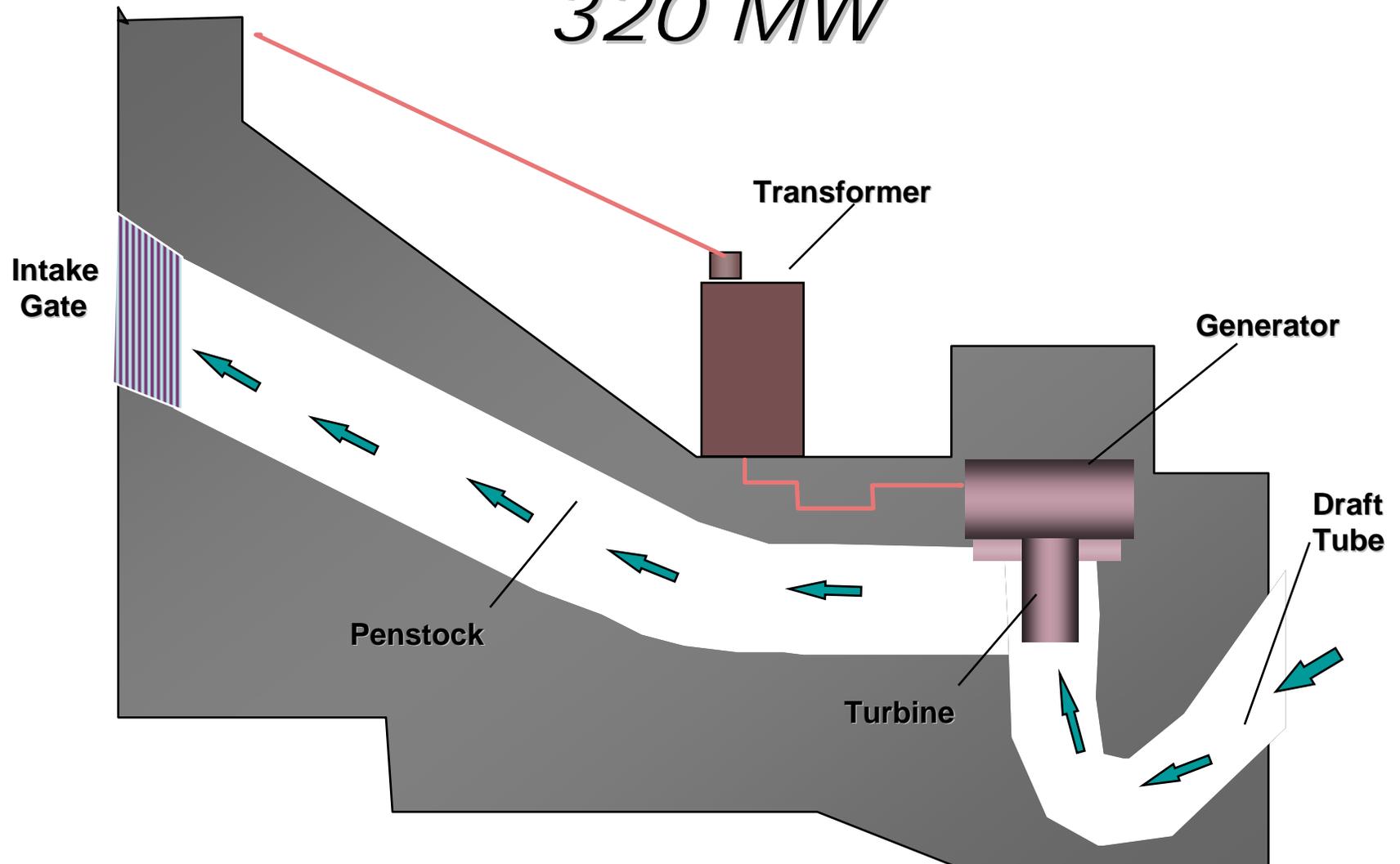


# Pumped Storage Chronology (cont.)

- Phase I (Mech./Elect.) 1992 & 93
- Phase II (Partial Plant) 1993 & 94
- Phase III (Full Plant) Apr-Oct 96
- Completed NEPA Mar 99
- Received Court Decision May 02
- Commercial Operation July 02



# *Pumped Storage Capacity 320 MW*





## *Pumped Storage Costs*

- Pumped Storage Facilities **\$92.4 M**
- Total Environmental Cost **\$45.5 M**

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**Total Pumped Storage Cost** **\$137.9M**  
*(22% of total project costs)*

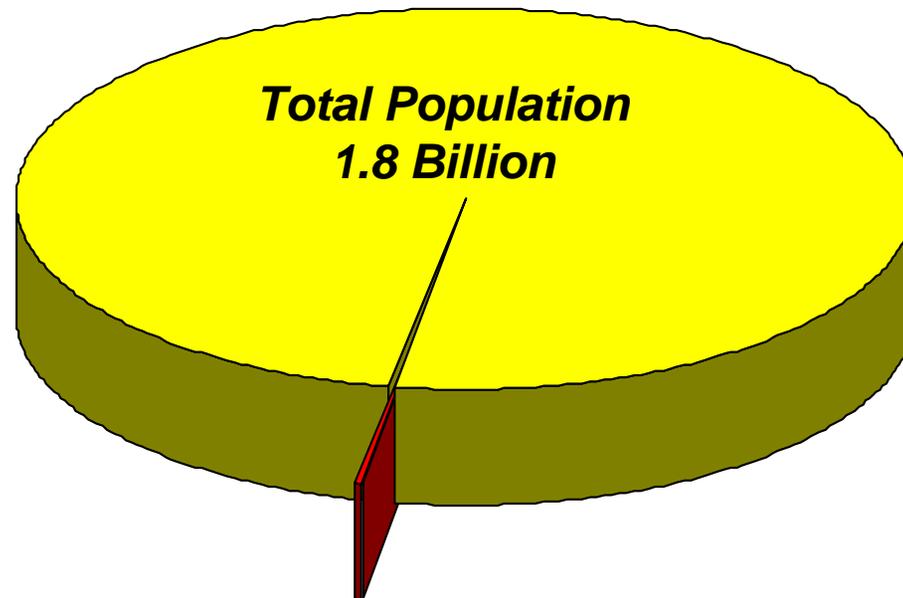


## *Pumped Storage Fishery Impacts*

- Entrainment < 1 % of the Fish in JST
- 98% of Entrainment = Forage Fish
- Summertime Tailrace Temperature Rise



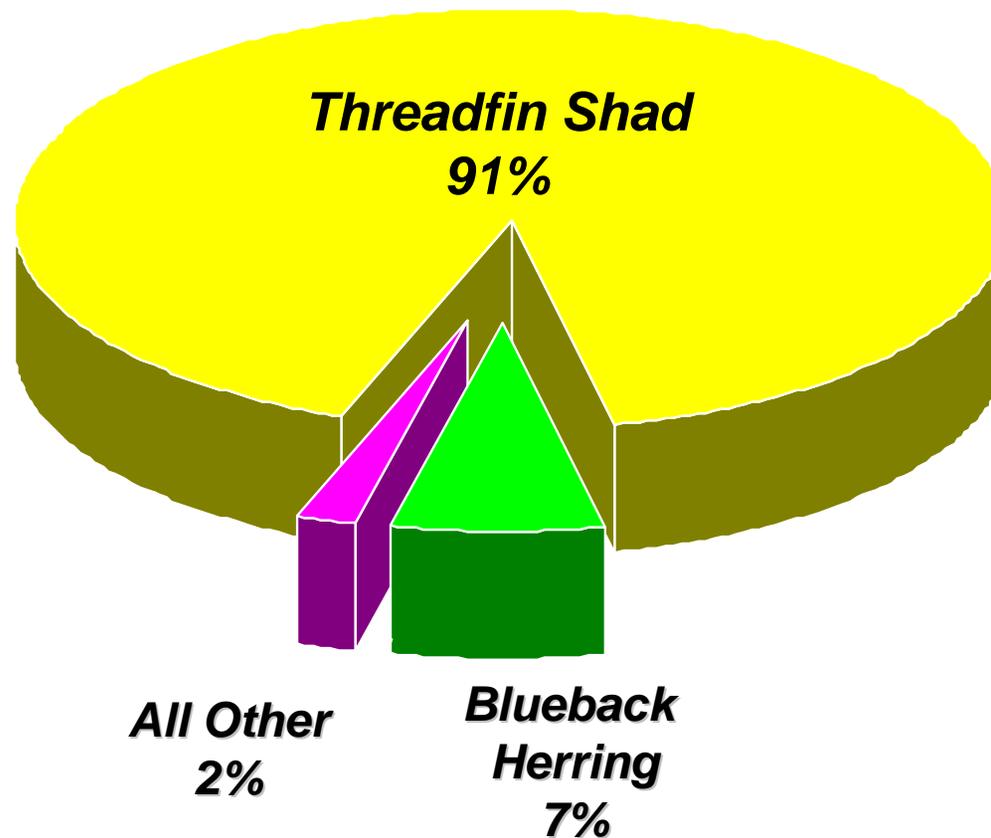
# *Annual Entrainment*



**Avg. Annual  
Entrainment  
7.27 Million (0.40%)**



## *Species Entrained During Pumpback Testing*

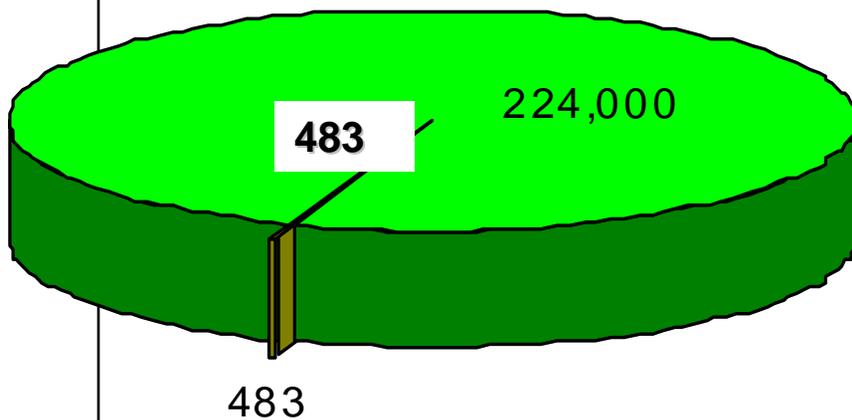




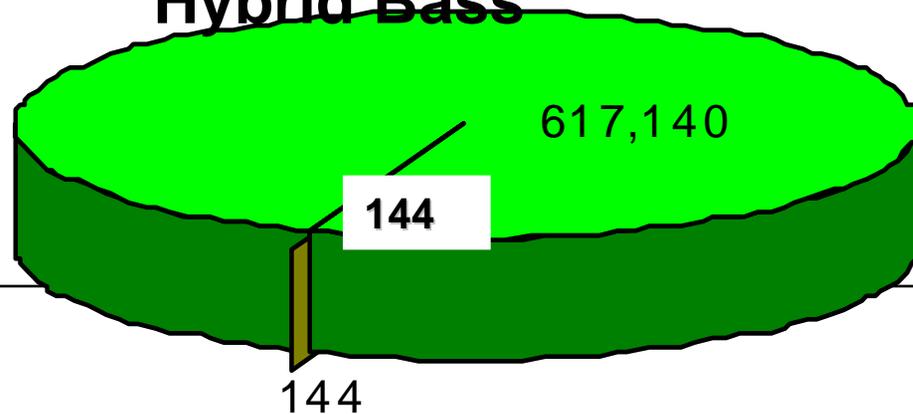
# Striped & Hybrid Bass Stocking Rates vs. Avg. Entrainment



## Striped Bass

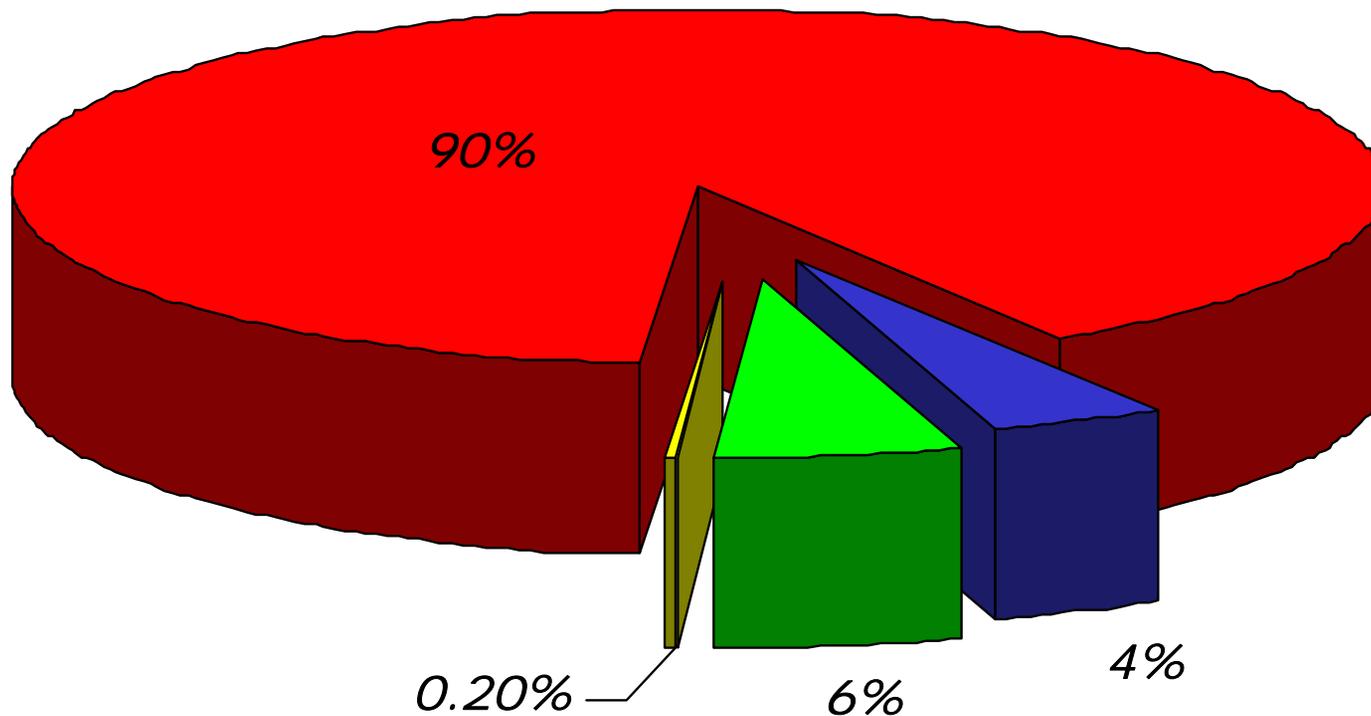
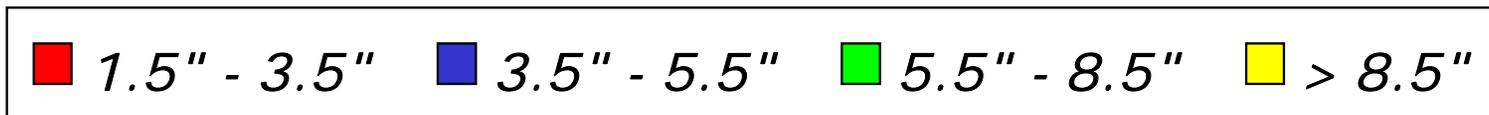


## Hybrid Bass



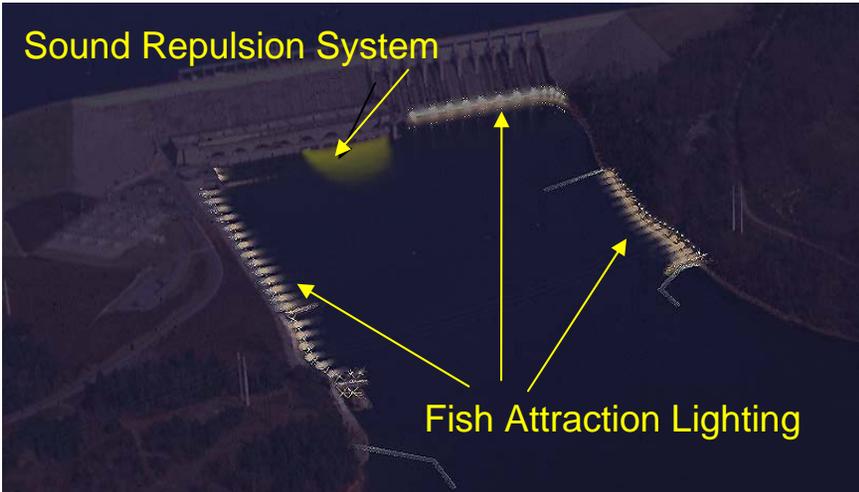


# Size Composition of Entrained Fish During Phase III





# *Permanent Fish Protection Systems*



Rock Groin Vortex Fix



Bar Rack  
Fish Screens



## *Operational Restrictions*

**NO DAYTIME PUMPING – PUMPING CAN ONLY OCCUR BETWEEN ONE HOUR AFTER SUNSET TO ONE HOUR BEFORE SUNRISE**

**RATIONALE – DAYTIME PUMP TESTS RESULTED IN VERY LARGE ENTRAINMENT RATES**



## **SPRINGTIME PUMP RESTRICTIONS**

**March:**- Limited to any one pump unit.

**April:** - No Pumping

**May:** - Limited to any one pump unit.

**RATIONALE – The majority of sportfish entrainment occurred during these months**



## **PRE-PUMP GENERATION REQUIREMENTS:**

**June, July, August, and September: Generate at least 6 unit hours within 12 hours of any pumping (at least 60 MW).**

**RATIONALE – Cool water in the tailrace disperses fish away from the pump units and limits the warming of the pump flows.**

**June, July, August, and September: Pumping will be restricted to two units until the JST O2 System is complete.**



## **SOUND AND LIGHTS**

- \* Sound and light systems shall be turned on one-hour prior to pumping.**
- \* If 1/3 of the lights or more are not functioning, all pumping shall cease until the situation is fixed.**
- \* The system shall be functional for all pumping operations. If the FDS is not functional over a particular unit, then that unit only shall not be used as a pump until the situation is fixed.**



## ***ENVIRONMENTAL MONITORING***

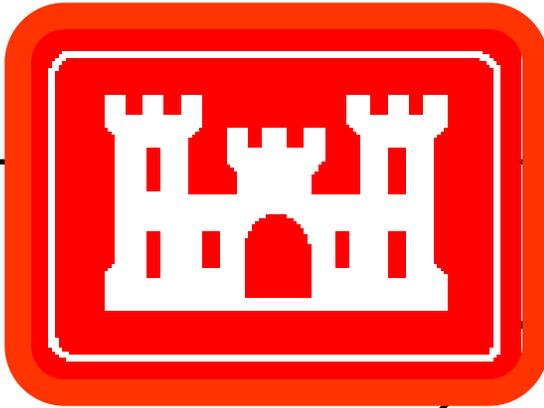
Monitor the first seven years of pumped storage commercial operation

At least five years of four-unit commercial pumped storage operation

- Creel Studies of RBR and JST Lakes
- Striped Bass Telemetry Study
- Fish Entrainment Estimates
- Water Quality Study



US Army Corps of Engineers



**Q's & A's**

**US Army Corps  
of Engineers**  
*Savannah District*

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