



Reservoir Release Improvements

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RRI Objectives

- Meet dissolved oxygen targets to protect aquatic habitats
- Maintain a wetted riverbed

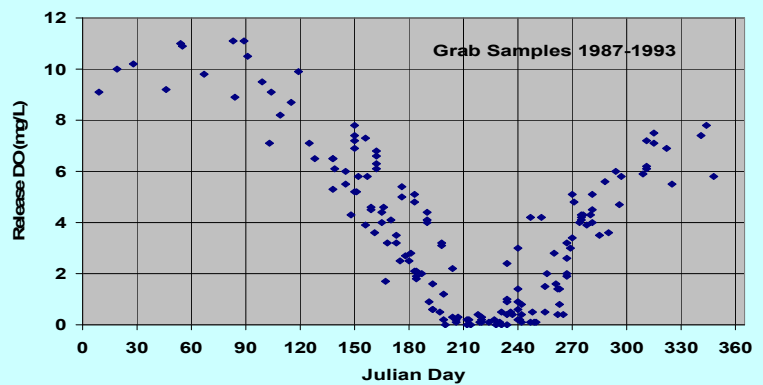
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Impoundment Impacts



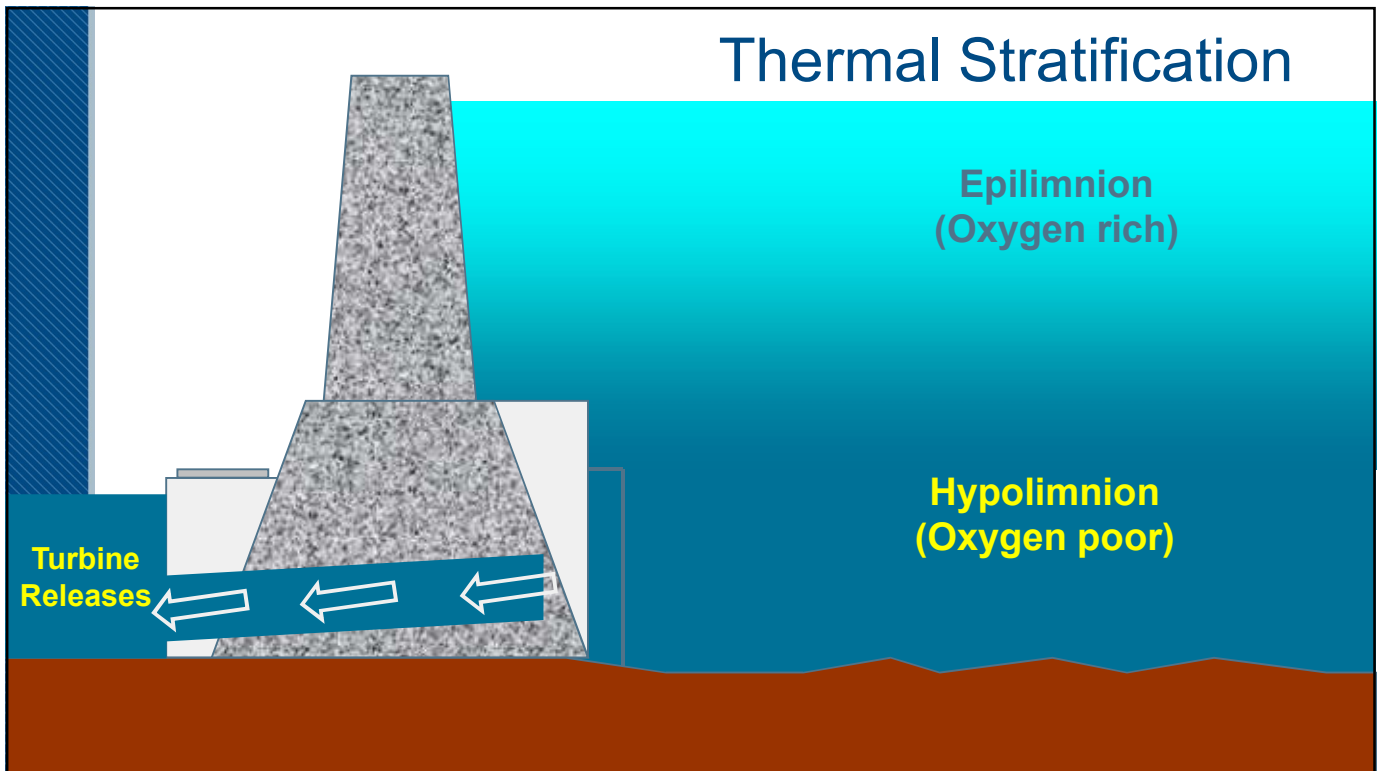
Dry river channels when turbines are not operating

Low dissolved oxygen in dam releases



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Thermal Stratification



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Minimum Flow Below Hydro Projects



- Turbine pulsing
- Small units
- Weirs
- Spilling

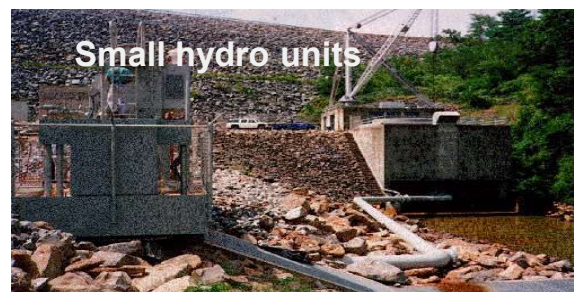


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Minimum Flow Technologies



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Current Aeration Systems

- Turbine Venting
- Surface-Water Mixers
- Oxygen-Injection
- Aeration Weirs
- Air Compressors

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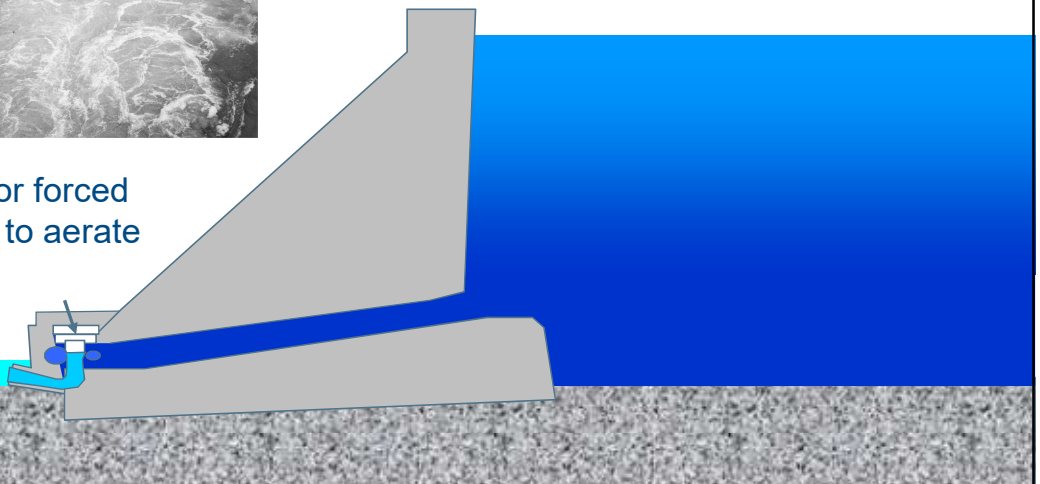


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Aeration Technologies: Turbine Venting



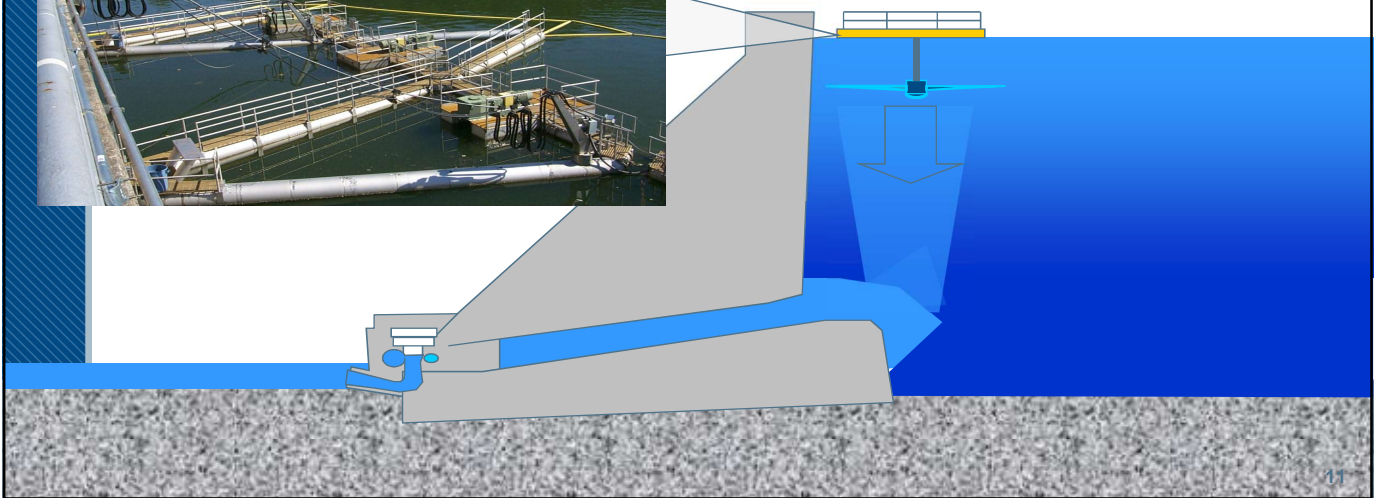
Air is drawn in or forced into the turbine to aerate the releases



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Aeration Technologies: Surface-Water Mixers

Impeller forces higher DO water at the surface down to the turbine intake, increasing the release DO



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Surface Water Mixer Impeller Replacement



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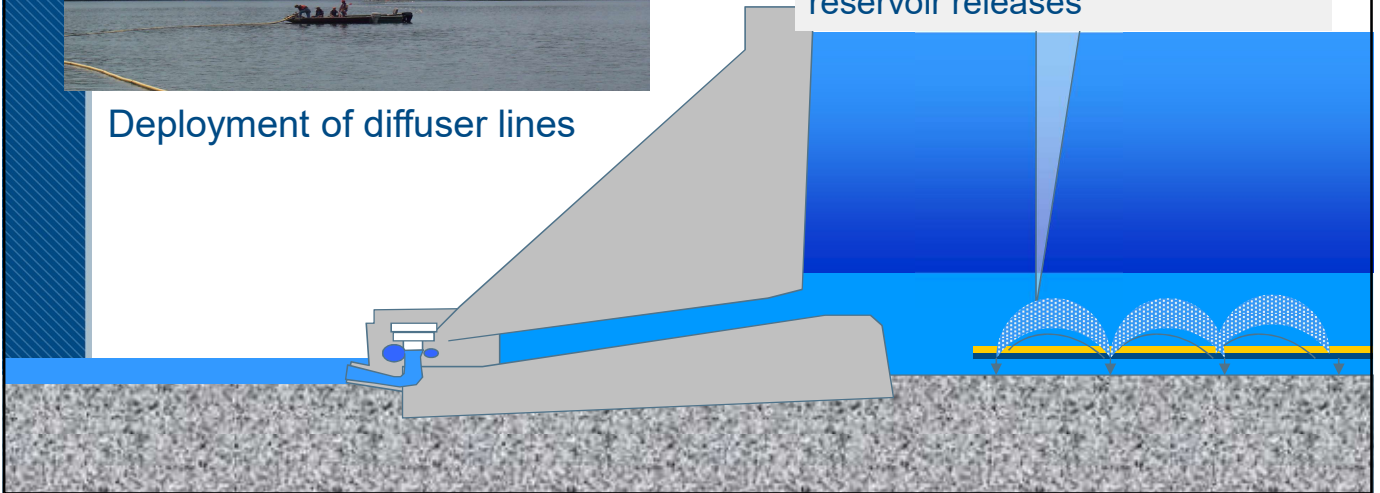
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Aeration Technologies: Oxygen Injection



Deployment of diffuser lines

Gaseous oxygen is forced to the bottom of the reservoir through pipes to add oxygen to the reservoir releases



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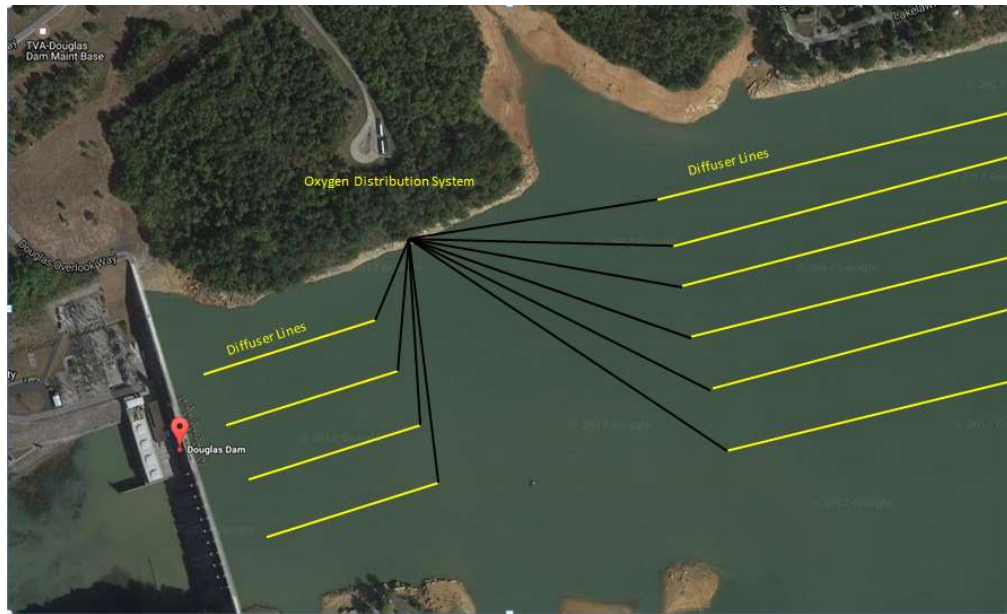
Douglas Oxygen Distribution System



| 12 TVA

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Douglas Diffuser Line Locations



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Generation 3 Diffuser Line

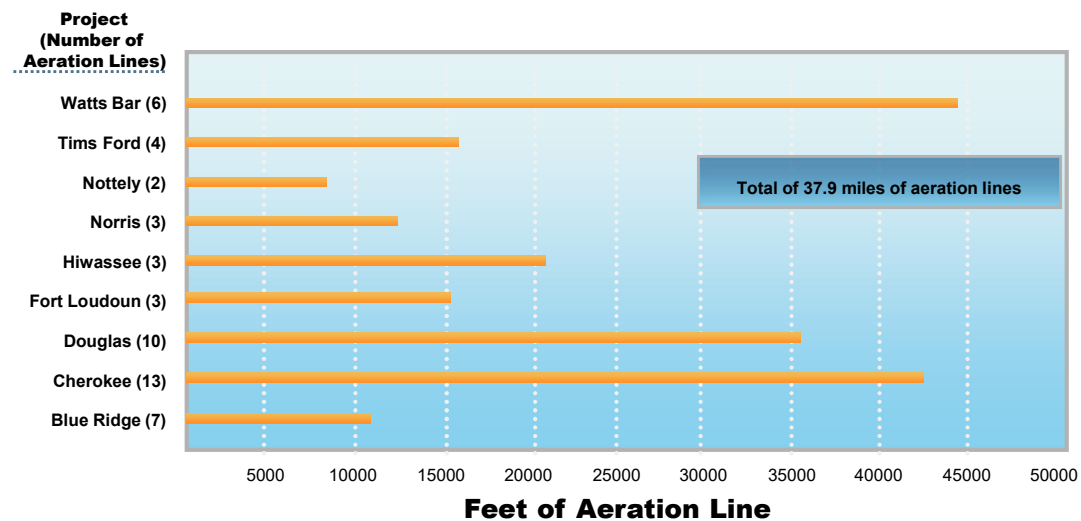


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Aeration Line Distribution



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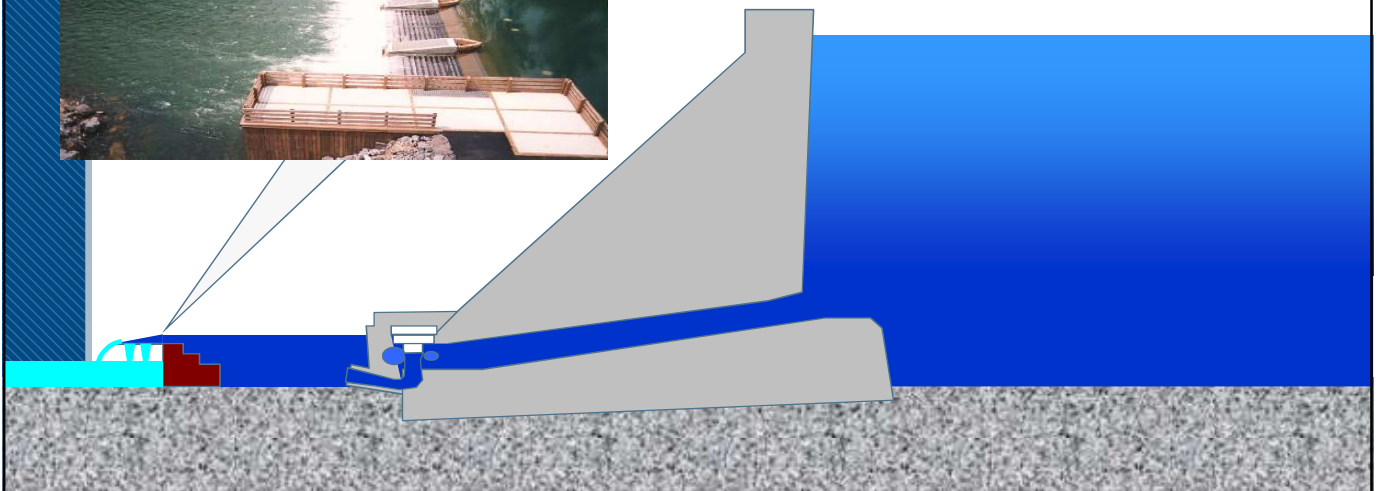


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Aeration Technologies: Weirs



Weirs are used to create artificial waterfalls downstream of the dam to aerate the reservoir releases



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Aeration Summary Screen



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Results

- Increased dissolved-oxygen concentrations in more than 300 miles of river downstream from TVA dams
- Improved water flows in 180 miles of river

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Outcomes

- Improvements in tailwater macro invertebrate and fish communities
- Mussel recovery in tailwaters
- Reintroduction of some threatened and endangered species



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