

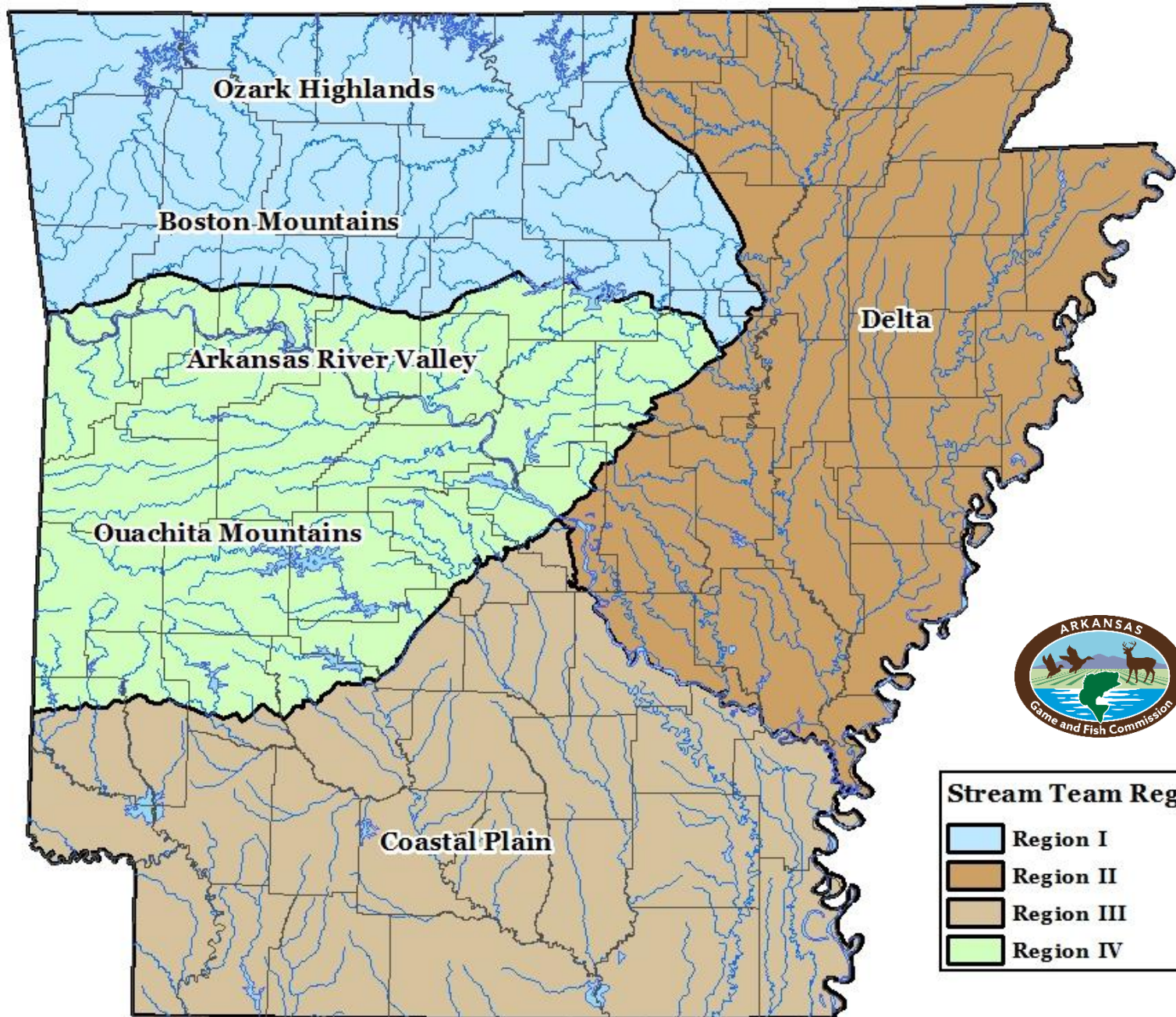


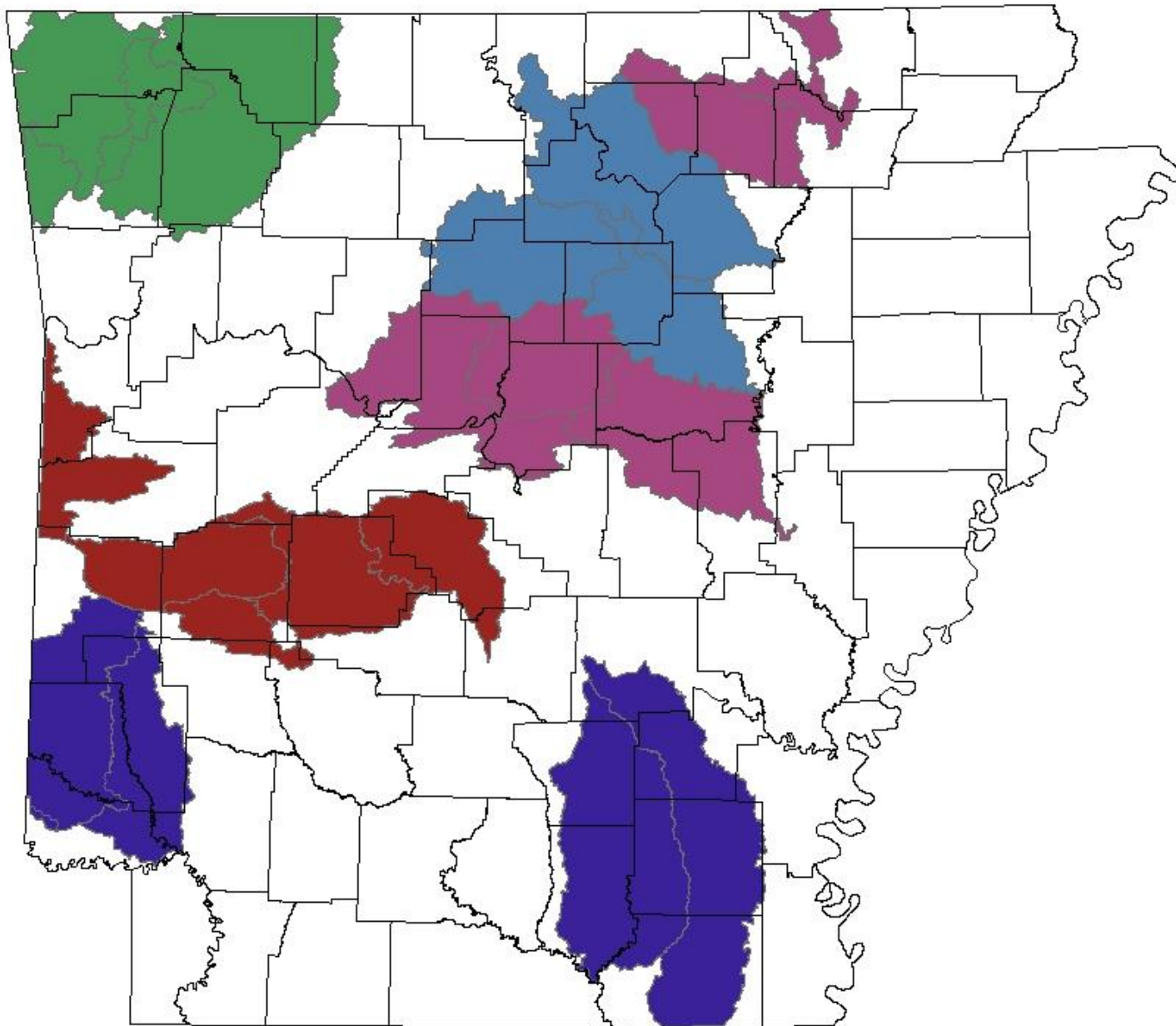
EXHIBIT C2

Success in Improving Water Quality and Fish Habitat through Streambank Stabilization, Restoration, and Conservation







Matthew Irvin
West Central Arkansas
Stream Habitat Coordinator

STREAM TEAM REGIONS OF ARKANSAS





Stream Habitat Coordinators

- | | | |
|--|--|---|
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STREAM HABITAT PROGRAM:

Goals for Streambank Stabilization and Restoration –

- Maintain fish and other aquatic organism passage at all flows.
- Maintain sediment transport capacity.
- Decrease velocity and near bank shear stress on streambanks.
- Grade control.
- Reduce streambank sloughing and sediment inputs from streambank.
- Aesthetics - natural looking.
- Provide shading to reduce water temperature.
- Protect infrastructure.
- Maintain a more natural diverse aquatic ecosystem.
- Create successful and diverse fishing opportunities.
- Create a safe environment for recreational floaters (i.e. kayaks, canoes, and tubes).
- Improve overall aquatic habitat.



Alum Fork Saline River - Buckhorn Ranch Project

Permits and Partners:

- Site visit, geomorphic survey, project design, written plan, cost estimate, and construction oversight – Arkansas Game & Fish Commission (AGFC).
- Cultural resources/archeological survey – Department of Arkansas Heritage, Arkansas Historic Preservation Program, and Flat Earth Archeology, LLC consultants.
- Mussel survey – U.S. Fish and Wildlife Service (USFWS) and AGFC.
- Section 404 Nationwide Permit No. 13 or 27 – U.S. Army Corps of Engineers
- 401 Water Quality Certification and Short Term Activity Authorization (STAA) – Arkansas Department Environmental Quality (ADEQ)
- Southeast Aquatic Resources Partnership (SARP)
- USFWS Partners for Fish and Wildlife Program
- USFWS Section 6 funds (Threatened and Endangered species conservation).
- Landowner – Brian Nalley
- Private Contractor for excavation work



Alum Fork Saline River - Buckhorn Ranch Project



[Conserving the Alum Fork of the Saline River](#)



Alum Fork Saline River - Buckhorn Ranch Project:

- 1,250' of streambank stabilization
- 8 rock vanes 80 feet long each
- 2,856 tons of boulder sized rock
- 1,060 containerized native plants
- \$20,981.38 – Landowner
- \$40,364.48 – Section 6 Funds
- \$25,000.00 – USFWS
- \$20,500.00 – SARP
- \$4,905.00 – AGFC
- \$111,750.86 Total
- \$90/linear foot for restoration
- 736 hours of manpower





This project spawned the formation of
The Saline River Watershed Alliance!

Currently working on an update to the 9 Element Watershed Management Plan with The Nature Conservancy. This plan helps identify impairments to the watershed and solutions for nutrient reduction.





Summer Interns – Investing in the Future through Mentoring.





Streambank Surveys



Mussel Surveys



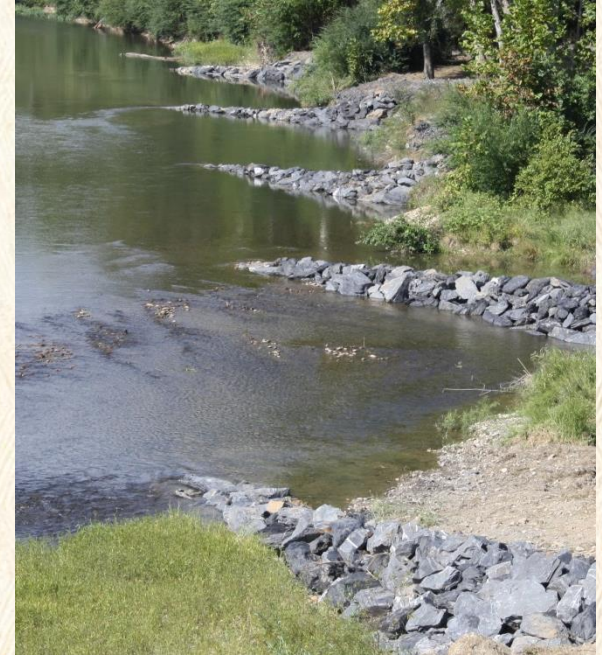
Other Proven Successes:

24 projects (over the course of 13 years) on the Caddo River totaling 11,301 feet of restoration (over 2 miles). **Reducing 472 dump truck loads of sediment from entering DeGray Lake each year.**



Structures and Restoration Techniques:

- Rock Vanes (a.k.a. J-Hooks)
- Stone Toe Protection
- Rip Rap
- Engineered Rock Riffles
- Cross-Vanes
- Bendway Weirs
- Toe Wood
- LFSTP (longitudinal filled stone toe protection)
- LPSTP (longitudinal peaked stone toe protection)
- Live Willow Stakes, Posts, and Wattles





Funding Sources

For Streambank Stabilization and Aquatic habitat Improvement



Stream Habitat Program





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Stream Habitat Coordinator**

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**Stream Habitat
Program**