

## Species Protective Measures for Water Intake or Water Withdrawal Projects

1. Limit approach velocity and screen pore size to minimize fish entrainment and impingement.
  - Include a screen with opening no larger than 3/16 inch for floating intake structures or 0.10 inch for submerged or buried intakes.
  - Limit the through screen approach velocity to 0.5 feet/second or less.

$$\text{Approach Velocity} = \frac{\text{Pump Velocity}}{\text{Screen Area}}$$

$$\text{Screen Area} = \frac{\text{Pump Velocity}}{\text{Approach Velocity}} = \frac{\frac{ft^3}{sec}}{0.5 \frac{ft}{sec}} = ft^2$$

2. Be designed to meet the demand of the withdrawal, yet minimize the overall disturbance from installation.
3. Be located in at least 3 feet of water.
4. Cease or reduce water withdrawal during critical periods including spawning and hatching to reduce the possibility of fish entering the intake.
  - Leopard Darter – Late February through mid-May
  - Yellowcheek Darter – May through June
5. Maintain stream bank stabilization to support equipment weight and traffic.

### Upper Little Red River Watershed Only

1. Restrict water withdrawal in the Middle Fork Little Red River watershed to periods when the U.S. Geological Survey stream gage at Shirley is above 7.0 feet to maintain minimum flow.
2. Restrict water withdrawal in the South Fork Little Red River and Archey Fork Little Red River watersheds to periods when the U.S. Geological Survey stream gage at Clinton is above 5.0 feet in the South Fork to maintain minimum flow.
3. Avoid water withdrawal from the Devils Fork Little Red River upstream of Raccoon Creek. This reach is commonly referred to as the Beech Fork Little Red River and Turkey Creek (or Fork).