

Adult and Juvenile Paddlefish in Floodplain Lakes Along the Lower White River, Arkansas

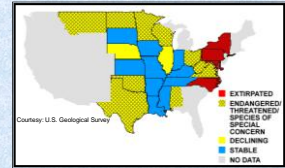
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Background

- Large-bodied, planktivorous, riverine species
- Long-lived, mature at 8-12 years, males spawn annually, females spawn every 2 to 5 years, over gravel bars with current
- Population decline due to habitat alterations and over-harvest
- Use main channel boarder, tail-water, navigation structure, and tributary confluence habitats



Study Area

White River National Wildlife Refuge



- 65,000 ha bottomland hardwood forests
- Over 300 natural floodplain lakes
- Flood pulse and ecological rhythm of system maintained
- Seasonal floods inundate floodplain

Floodplain Lakes



- Sixteen floodplain lakes sampled
- Sampled during connection (April-May 2004) in 8 lakes
- Sampled disconnection (June-July 2004 and June-July 2005) in 8 and 12 lakes, respectively
- Gears: boat electrofishing, experimental gill nets, large-mesh gill nets

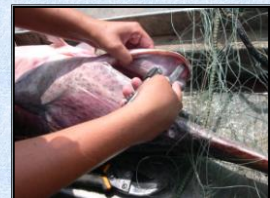
Sampling Methods

- Electrofishing-Six, 10-minute runs per lake (3 at 15 Hz and 3 at 60 Hz)
- Three experimental gill nets per lake- Five different mesh size panels, fished for 4 hours in morning
- Large-mesh gill nets-mesh sizes of 10, 15, or 20 cm, fished for 24 hours
 - Smaller lakes (< 4 ha) were fished with three nets, one of each size
 - Lakes greater than 4 ha, but less than 20 ha were fished with six nets
 - Lakes greater than 20 ha were fished with nine nets



Field and Lab Methods

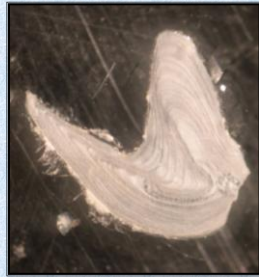
- Eye-fork length (mm)
- Live paddlefish were tagged with jaw tags and released
- Dentary bones were removed from dead paddlefish, cleaned, and sectioned
- Three sections were made from each bone (0.7, 0.8, and 0.9 mm)
- Sections were imaged and the clearest (most readable) was used for age determination and growth measurements



Age and Growth



Age 1+



Age 11+

Environmental Characteristics

Water Quality

- Temperature (26.4-30.2 °C)
- Dissolved oxygen (3.63-8.71 mg/l)
- Total dissolved solids (84-154 ppm)
- Secchi depth (42-83 cm)
- Conductivity (165-326 µS/cm)

Lake Morphometrics

- Average depth (0.6-3.2 m)
- Length/width ratio (12-36)
- Surface area (6.1-48.1 ha)
- Distance to river (30-4,592 m)

Environmental Characteristics

Hydrological Variables (5 year averages)

- Length of connection (56-319 days)
- Start date of connection (129-257 Julian day)
- Percent variation of start date of connection (66%-175%)
- Number of times connected within a year (2.2-3.0)
- Annual frequency of connection (80%-100%)
- Type of connection (overbank versus slough/bayou)

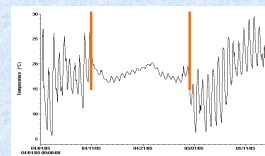
Connectivity



Historic Data For White River At St. Charles, AR
 Stream Name: White Longitude: -91.12500000
 Gage Zero: 129.95 Ft. Latitude: 34.37630000
 NGVD 1929
 Record High Stage :
 44.0 Ft. River Mile: 57.0
 Location of Gage: WR118 WHITE RIVER AT ST.
 CHARLES, AR.

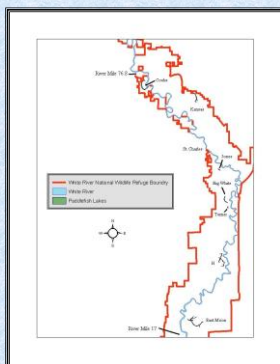
Data Represents 08:00 Values

Date / Time	Stage (Ft)
4/6/2005 8:00	23.69
4/9/2005 8:00	23.87
4/10/2005 8:00	24.01
4/11/2005 8:00	24.14
4/12/2005 8:00	24.52



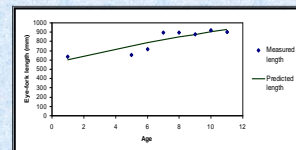
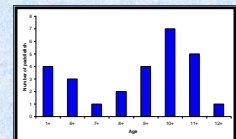
Results

- Forty-four paddlefish in seven lakes
- Only one fish observed during connection (Jones)
- Only two lakes had paddlefish collected during 2004 and 2005 disconnection sampling (Cooks and Kansas)



Results: Size and Growth

- Ranged in size from 348 mm to 1044 mm
- Ranged in age from 1 to 11 years
- $L_t = 1488.42 * [1 - e^{-0.047 * (t+9.986)}]$



Results: Regression

- CPUE from large mesh gill nets and environmental characteristics during disconnection
- Surface area ($r^2=0.52$) and dissolved oxygen ($r^2=0.23$) had a positive relationship with CPUE
- Percent variation in start date of connection ($r^2=0.49$) had a negative relationship with CPUE



Summary

- Length and age structure suggest that both adult and juvenile paddlefish are using floodplain lake habitat
- Highest abundance of paddlefish were found in larger lakes with less variable connection date
- Paddlefish risk the chance of becoming isolated in floodplain lakes for long periods of time
- Telemetry study needed to exam movement and use
- January 14, 2007 recapture of adult paddlefish tagged in lake on July 23, 2005
 - Tagging lake located over 4,500 m from White River
 - Paddlefish collected 57 km upstream of tagging lake

Acknowledgements

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Questions?

