EnviroFish: a HEC-compatible floodplain habitat model for mitigation or restoration scenarios.

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**Project Planning Problem**: Flood control projects = shifts floodplain inundation regime

**Restoration/Mitigation Objective**: Compare mitigation for each alternative plan

**Technical Problem**: Common methods (e.g. HGM, Acre for Acre) do not account for both habitat quantity & **quality**
Examples from Vicksburg & Memphis Flood Ctrl Projects

**Issue:** Floodplain spawning & rearing habitat
EnviroFish Solution: Integrate Fish Ecology, hydrology & hydraulics, and land use to produce annualized habitat units lost or mitigated.

Choose species of interest (PDT & Stakeholders)

Habitat Suitability Index (Field collect or lit)

Identify Habitats & Land use (GIS, aerial photos)

Hydrology & Hydraulics (HEC-RAS)

Flooded acres per habitat type gives habitat units

Annualization

Calculated Impact or Mitigation

EnviroFish Calculations Outputs
Proposed alternative mitigation plans:
A mix of levee & pump structures
and bottomland hardwood reforestation
But which alternative mixture?
Species/Habitat Trade-Off Example:
Drum/bottomland vs. Crappie/oxbow lake

Percent Abundance (x100)

- Buffalo
- Minnows
- Crappie
- Drum

Habitats:
- AG-FIELD
- FALLOW
- BLH
- OXBO
- SBT
Incremental Coast Analysis Example:
Compare construction alternatives

Weir Elevation (ft, NGVD)

HU's Gained

Cost per HU
What do you gain by using EnviroFish?

1) **Technical Accuracy to withstand CoE Review Process**
   Calculate *specific habitats mitigated* (i.e. spawning and rearing) not just *total flooded acres*

2) **Trade-off analysis**
   among recreational, exploitable, & TES

3) **Calculation of Habitat Units in Multiple Formats**
   - Annualization
   - Comparison of multiple alternative project plans
   - Land use specific HSI
Other Potential Locations/Applications?
If an HSI curve can be built for it, then EnviroFish will calculate it
(e.g. reptiles & amphibians, songbirds, waterfowl)
Other EnviroFish Features

- Can be used with HGM & HEP
- Focus on Special Status or T&E species
- 100 species in EnviroFish Database
- No geographic/watershed size limit
  - HSI’s can be made site-specific
- HEC hydraulic model compatible
Evaluation of Floodplains and Wetlands

Using GIS to Delineate Floodplain Habitats

Synoptic Field Studies
Biotic-Abiotic Interactions

- Geomorphology
- Hydraulics and Hydrology
- Sediment Yield and Transport
- Substrate and Cover
- Water Quality
- Aquatic fauna

Emphasize Spawning and Rearing
Standard Output

EnviroFish Output