# SUMMARY OF THE U.S. FISH AND WILDLIFE SERVICE'S CONTRIBUTION TO THE ACT AND ACF DRAFT ENVIRONMENTAL IMPACT STATEMENTS

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**Abstract.** The Service provided assessments for mainstem riverine communities, mainstem riparian wetlands, reservoir fisheries, protected species, and national wildlife refuges for inclusion in the Corps' DEISs for water allocation in the ACT and ACF River Basins. This presentation summarizes our methods and conclusions, and lists our principle concerns with the DEISs.

## GENERAL APPROACH

The U.S. Fish and Wildlife Service (Service) participated with other Federal agencies in the preparation of two Draft Environmental Impact Statements (DEISs) for water allocation in the Alabama-Coosa-Tallapoosa (ACT) and Apalachicola-Chattahoochee-Flint (ACF) River Basins. We provided our input to the lead Federal agency for the DEISs, the U.S. Army Corps of Engineers (Corps), through reports prepared under the authority of the Fish and Wildlife Coordination Act (U.S. Fish and Wildlife Service 1998a, 1998b). This presentation briefly summarizes the methods we applied in preparing these reports and the conclusions we reached, but does not reiterate any of the analyses, which are available in the DEISs (U.S. Army Corps of Engineers 1998a, 1998b).

Our approach grew directly from the environmental component of the ACT/ACF Comprehensive Water Management Study (Ziewitz 1998), in which the Service cooperated with several other State and Federal agencies to develop assessment methods for mainstem riverine biotic communities, mainstem riparian wetlands, and reservoir fisheries. These methods were designed to compare alternative water management scenarios given simulated 55-year time series of daily average discharge or daily average stage data. We used basic information about protected species in the two basins also taken from the Comprehensive Study. The only methodology we used that did not have its origins in the Comprehensive Study was the Indicators of Hydrologic Alteration (IHA) (Richter et al. 1996, Richter et al. 1997), which we applied to the assessment of riverine and estuarine impacts.

To deal with the situation of assessing water allocation formulas that the states were still negotiating, the Corps developed an evaluation framework intended to bracket the range of possibilities for the formulas. This framework is described elsewhere in these proceedings, but it basically established two major variables for the formulation of three no-action and nine action alternatives: minimum instream flow targets for reservoir operations and consumptive demands levels. Our efforts focused on interpreting the potential effects of river flow and reservoir stage conditions that were modeled for these 12 alternatives.

## METHODS AND CONCLUSIONS

### Mainstem Riverine Communities: Methods

**IHA/RVA.** We applied the IHA (Richter et al. 1996) to describe existing flow conditions at several mainstem river gage locations in both basins. The IHA consists of 33 biologically relevant hydrologic parameters that quantify the magnitude, frequency, duration, timing, and rate-of-change characteristics of a flow regime. For reaches with dams having substantial reservoir storage, we compared "pre-dam" and "post-dam" periods of record to describe the hydrologic alteration resulting from flow-regulation. These comparisons followed the Range of Variability Approach (RVA) of Richter et al. (1997). We also analyzed pre- and post-dam flow data analyzed for changes in the frequency and duration of low- and high-flow events that we hypothesized to be biologically significant in addition to the 33 IHA parameters.

**RCHARC.** We applied the Riverine Community Habitat and Restoration Concept (RCHARC) (Nestler et al. 1993, 1995) at six ACF sites and twelve ACT sites. The RCHARC methodology is based on the premise that native riverine communities evolved under the patterns of spatial and temporal variability in physical habitat that result from the long-term natural flow regimes of their basins. Physical

habitat, i.e., combinations of depth, velocity, and channel width, was quantified using standard hydrologic field methods and hydraulic simulation techniques. We represented natural flows using the 55-year unimpaired flows data sets synthesized by the Corps for each of the riverine study sites. We compared physical habitat conditions under the flow regimes of each of the alternatives to the unimpaired flow regime, computing seasonal indices of similarity. The development of the RCHARC indices is fully documented in Freeman et al. (1997).

**Mainstem Riverine Communities: Conclusions**

**IHA/RVA**. The pre- versus post-dam comparisons of gage records revealed substantial differences for several IHA parameters at all locations examined in both basins. The greatest differences were evident in the reaches immediately downstream of the upstream-most dams in the basins. An almost universally observed difference in regulated reaches was an increase in the annual number of low and high flow pulses with an accompanying decrease in the duration of such pulses. Based on observed changes over time in the aquatic fauna of the regulated reaches, we hypothesized that the loss of temporal habitat stability associated with this hydrologic alteration, and possibly other alterations, is biologically significant.

**RCHARC**. For flow-regulated sites, the RCHARC indices varied more between operational scenarios than between demand levels of the same operational scenario. Further, no one operational scenario proved best or worst for habitat conditions during the three seasonal periods defined for the RCHARC methodology. For example, in the ACF, the "Low Releases" alternatives tended to give the highest scores for the winter period, the High Releases for the spring, and the Moderate Releases for the summer/fall. In the year-round overall rankings, the Moderate Releases scored highest, and Existing Operations scored lowest.

**Mainstem Riparian Wetlands**

**Methods**. We used the data and methods developed under the Comprehensive Study's wetlands report (Davis 1997). Davis selected six ACT and six ACF sites to represent the floodplain forests of the two basins. Davis developed a performance measure for evaluating water management alternatives called Riparian Wetland Units (RWUs). RWUs are indices of potential change between a reference condition and a simulated alternative hydrologic condition. The reference condition is defined by a long-term record of river stages and a distribution of wetland acreage by elevation. The alternative condition is a flow regime that could occur under a hypothesized set of water demands and management rules, such as simulated for the DEISs' alternatives.

**Conclusions**. RWUs did not generally vary much for a given site between the DEISs' alternatives, indicating a comparable degree of hydrologic alteration in the range of river stages at which most of the wetlands acreage occurs. The highest indices, i.e., the least altered hydrology relative to the reference conditions, tended to be associated with the downstream-most unimpounded sites. In the ACF, the three High Releases alternatives came closest to replicating reference condition flow magnitude, frequency, and timing, relative to the wetlands acreage at the study sites.

**Reservoir Fisheries**

Our assessment of the impacts of potential changes in water management on the reservoirs of the ACT and ACF basins focused on sport fisheries. We cooperated with the Corps and their contractors, CH2MHill, to rank the impacts of the 12 DEIS alternatives for the five largest reservoirs in the ACF and the ten largest in the ACT. Based on products of the Comprehensive Study, the Service developed a methodology for assessing fisheries effects given 55-year data sets of daily reservoir elevations. CH2MHill applied the methodology to simulated reservoir levels for the 12 alternatives and prepared a report of the results (CH2MHill 1998). Both the methods and results of this effort are addressed elsewhere in this proceedings.

**Estuarine Communities**

**Methods**. The Service did not develop estuarine assessment tools as part of its involvement in the Comprehensive Study, since the State of Florida was already engaged in this. For the ACF DEIS, the National Oceanographic Atmospheric Administration prepared an assessment of impacts to oyster productivity in the bay, which is summarized elsewhere in these proceedings. We conducted a more general assessment of estuarine impacts by applying the State of Florida's findings under the Comprehensive Study, which concluded that both high and low ends of the river's natural flow regime were critical to the productivity and integrity of the estuary (Lewis 1997). We used the RVA methodology (Richter et al. 1997) to examine departures from natural intra- and inter-annual variability in flow regime features associated with the 12 DEIS alternatives. We used the synthesized unimpaired flows data set for the downstream-most river gage at Sumatra as the reference condition.

**Conclusions**. All 12 alternatives showed some degree of alteration for most of the 33 IHA parameters, and the

most common alteration was for a parameter to assume extreme high or low values in a greater percentage of years than was the case in the unimpaired flow regime. Generally, more variation in the flow parameters was evident between alternative reservoir operating modes than between the three demand levels simulated under the same operating mode. All of the alternatives showed relatively extreme degrees of alteration for eight of the IHA parameters, and varied substantially in their degree of alteration for another six parameters. For these latter parameters, in all cases, the most extreme hydrologic alterations were associated with the Existing Operations/no-action alternatives.

**Protected Species**

**Methods**. The Protected Species Report of the ACT/ACF Comprehensive Study identified 344 species with special status in the ACT and ACF Basins (Ziewitz et al. 1997). Many of these are associated with riverine habitats. We included information about the status, habitats, and distribution of these species in our Coordination Act Report.

**Conclusions**. The water allocation formulas may influence four types of actions that could affect rare or protected species found in the two basins: (1) further alteration of natural flow regimes by the operations of existing dams and reservoirs; (2) construction of new dams and reservoirs; (3) growth in demands for consumptive uses of water; and (4) water quality degradation. The agencies implementing or regulating these types of actions in compliance with the allocation formula would be responsible for determining the project-specific impacts on protected species, because impacts would depend on where and how the actions occur. The DEISs' action alternatives do not necessarily represent a set of actions that may occur or are likely to occur, because many of the operational and regulatory choices necessary for implementing an allocation formula were not incorporated to these alternatives (e.g., reservoir operations for hydropower and navigation). We included a discussion of each of the four general types of actions that may effect protected species as guidance for assessment efforts when those choices are faced.

**Eufaula National Wildlife Refuge (ENWR)**

**Methods**. ENWR is associated with W.F. George Reservoir on the Chattahoochee River. Habitat conditions are strongly influenced by reservoir levels, which typically fluctuate about 2.5 ft. annually. Refuge personnel recommended a seasonal pattern of reservoir levels that would best accommodate the needs of the refuge for providing wildlife habitat, controlling undesirable vegetation, and manipulating off-reservoir impoundments for waterfowl. These recommendations would have the reservoir operated more like an unregulated river of the region, with highest levels in the late winter/early spring, and lowest in the late summer. We compared the reservoir levels simulated for the 12 DEIS alternatives to this recommended pattern by computing average annual differences between the recommended daily levels and the simulated daily levels.

**Conclusions**. All of the alternatives, except the High Releases alternatives, followed a seasonal pattern of reservoir level manipulation that was in direct opposition to the pattern recommended by refuge personnel. Average annual differences were between about 2.1 ft and 2.8 ft in 80 percent of the years simulated. The seasonal pattern of reservoir levels for the High Releases scenarios was quite different from the other scenarios, because the annual fall drawdown for flood control was eliminated to store water for maintaining higher instream flow targets. Under High Releases, year round full pool elevations were maintained in all but a few years when storage was used to augment instream flows. During these years, drawdown on the reservoir was greater than in any of the other scenarios. The average annual difference between the High Releases scenarios and the recommended pattern of reservoir levels was also in the range of 2 to 3 feet in most years.

## SERVICE CONCERNS WITH THE DEISs

**Evaluation Framework**

Our principle concern with both DEISs is with the evaluation framework, which reduces the many complexities of the interstate water allocation issue to two dimensions: consumptive demands and minimum flows during droughts. In so doing, the DEISs fail to address a range of possibilities in several additional dimensions that the states and many stakeholders regard as important to the allocation decision. For example, the evaluation framework doesn't include an environmentally preferable alternative. Such an alternative would, to the extent practicable, attempt to serve various levels of consumptive water use and maintain water quality while also maintaining the range of natural intra- and inter-annual variation in flow magnitude, frequency, duration, timing, and rate-of-change throughout the basin. Without an alternative that makes this attempt, the DEISs do not put before the public an option that emphasizes the objective, which is included in both the ACT and ACF Compacts, of protecting the basins' water quality, ecology, and biodiversity.

**Underestimating Impacts**

We are further concerned that the DEISs may seriously underestimate the severity of impacts under a potential formula, which may set the stage for possible violation of national environmental standards and policies. This concern is greatest with respect to the representation of agricultural water demands in the Corps' hydrologic models, which apply a constant annual demand level in all years. The states' estimate that agricultural demands increase about 2.5 times during drought years, which would strongly affect flow conditions in the Flint and Apalachicola basins under growth projections for irrigation in the next 50 years.

**Definition of No Action**

Our third principle concern with the DEISs is the Corps' definition of existing reservoir operations as no-action. Current operations have changed substantially in the last 20 years without the environmental assessment and public review process as required by the National Environmental Policy Act.

## THE NEXT STEP

The Service recommends that the Corps revise portions of the DEISs, or prepare supplements to the DEISs, to evaluate the states' allocation formula proposals, reasonable variations upon these proposals, and at least one additional environmentally preferable alternative. We will continue to provide technical assistance to the Corps, and to the three states, in evaluating the fish and wildlife consequences of alternative means of allocating water in the two basins.

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