

existing systems such as the National Biological Information Infrastructure (NBII). Whichever system is used, it must allow easy access to data for appropriate baseline and impact assessments yet must be secure enough so that data utilization without permission can not occur.

As important as establishing a data clearinghouse is, it is just as important to understand how the data were collected and what the data mean. If different protocols for studies are used in the data collection phase, pooling across data sets may not be appropriate. This could result in the erroneous interpretation of results thus negatively impacting assessment efforts. As such, it is extremely important that monitoring efforts be standardized whenever possible. When the first SWG funds were allocated, LDWF worked collaboratively with academia, the USFWS, and the USGS to develop standardized protocols. These were consistent with the most current methodological practices and would allow for comparisons among sites within and outside of Louisiana. Further, if standardization is not possible, collection protocols for each data set must be documented to allow for appropriate interpretation or application and allowance of acknowledgement of weaknesses. There are a number of sources for standardized protocols including the USGS through its Status and Trends of Biological Resources Program (USGS 2005).

### **C. Biological Monitoring**

The primary goals of our biological monitoring are to guide the ongoing management of populations and habitats, and to detect long-term population changes in species. Monitoring was divided into 2 major categories: terrestrial and aquatic. Terrestrial monitoring/population estimation will be conducted on the ecoregional scale, and, in some instances, across ecoregions. For aquatic habitat monitoring, freshwater systems were divided into drainage basins while estuarine/marine systems follow the 7 coastal study areas (Fig. 2.12) as currently defined by the LDWF's Marine Fisheries Division. We also recognize that localized research and monitoring will provide critical data for species of restricted range and small populations. However, conceptually, the bigger long-term question that we want to address is whether we impacted the ecoregion and not one small specific site.

#### **1. Terrestrial Habitats and Species**

Identification of changes in habitat is critical to the assessment of the effectiveness of the CWCS for wildlife species. Currently the location and size of many of the LNHP habitat types are not explicitly identified spatially or quantitatively. Providing this information in both spatial and tabular format will be one of the first actions undertaken by LDWF, and SWG funds have already been allocated to begin this task. However, it is likely that even broader habitat categories will be used for determination of habitat status for some wildlife species with less specific habitat needs. From some faunal perspectives, the habitat type per se is probably less important than the structural composition of that habitat. Other sources of habitat data include the USFS Inventory and Analysis (FIA), the NRCS National Resources Inventory (NRI), and the Louisiana GAP analysis. In addition,

a number of state and federal agencies monitor programs designed for habitat enhancement and/or restoration. These include, but are not limited to, NRCS, FSA, USFWS, and LDAF, which have programs that encourage reforestation and forest management as well as native grass planting and wetland restoration. Habitat monitoring is an integral part of the CWCS because our underlying premise, as with most habitat programs, is like that of the film *Field of Dreams*—"build it and they will come".

### **Bird Monitoring**

In considering species issues, a number of different approaches for monitoring avian trends/densities for breeding birds were evaluated for the CWCS and 3 are presented in this initial draft because they provide a means of evaluating change at the landscape level. Additionally, we believe the 3 methods provide a mechanism to confirm apparent trends suggested by Breeding Bird Survey (BBS) data and fit well into population goal assessments for programs such as PIF. However, it should be recognized that the All Bird Monitoring Program protocols, which are not finalized as yet, might become the prominent avian monitoring program. Further, specific research projects on Louisiana's avian species of concern resulting from implementation of strategies and research needs listed within specific habitats will provide other indices as to their current status on more local scales.

#### **Bird Monitoring - Approach A.**

The current BBS design has approximately 4 routes per degree block in Louisiana for a total of 59 routes. These data, along with data collected throughout the United States, Canada and Mexico, are currently used to make inferences relative to the current status and trends of bird populations. Based on minimum point sampling provided by USGS guidance, this should be more than sufficient to identify trends within an ecoregion. However, from an avian perspective, BBS data for Louisiana often are only analyzed within 4 broad habitat strata: Coastal Prairie, Coastal Flatwoods, Upper Coastal Plain, and Mississippi River Alluvial Plain. One drawback with BBS routes is the expertise required to run the routes. As a consequence, limitations in personnel/volunteers frequently result in some routes not being run from year to year. Nonetheless, we believe this can provide a good index for breeding bird abundance trends within ecoregions or the 4 broad habitat strata. In addition, a concerted effort will be made to recruit enough people with sufficient proficiency in bird identification to run all BBS routes in Louisiana every year. One of the SWG projects was to provide monetary compensation to BBS volunteers to cover a portion of their expenses associated with running their routes.

#### **Bird Monitoring - Approach B.**

This approach would use a group of umbrella species to determine the status of species of concern. One advantage of this approach is that it does not require someone who has the expertise to identify all birds by song. As such, LDWF staff/volunteers could more easily be trained and all BBS routes would have a better chance of being run each

year. Additional routes could be added in the future to provide better estimates by ecoregion.

### **Bird Monitoring - Approach C.**

A more complicated approach could provide more quantitative estimates of impacts. This approach would involve developing density estimates for broad habitat types (pine sawtimber, pine poletimber, pine sapling/seedling, etc.--something that could be derived from the FIA data or GAP data) based on the various fixed and variable distance point counts that have been made across the state by different researchers/agencies. Mid-cycle data or net changes of other conservation practices in the state could be used for re-estimation. For example, a number of agencies have programs that contribute to positive habitat impacts. One such agency is the NRCS. Increases in acres of habitat x (such as longleaf pine) could be tracked over 5-year intervals and estimates of the expected impact could be projected based on fixed and variable distance point counts for that habitat type and its successional stage. Obtaining adequate data for this estimation may necessitate pooling across ecoregions. This should not be an unrealistic assumption from a bird perspective, particularly in light of BBS data analyses often conducted at only 4 broad strata for Louisiana. This evaluation provides an estimate independent of the BBS and can serve as a verification tool of trends exhibited in approaches A and B that use BBS protocol.

### **Other Bird Monitoring**

Not all birds lend themselves to detection with BBS-type surveys. Rookeries, bald eagles, and swallow-tailed kites will continue to be monitored by aerial and on-the-ground surveys. Additionally, monitoring programs for shore birds will be done through continued and expansion of counts using Program for Regional and International Shorebird Monitoring (PRISM) protocols. Colonial waterbirds will be monitored by air and on the ground via LDWF personnel and contractors. Some form of monitoring program must also be developed to track nocturnal bird species.

### **Amphibian, Reptile, and Small Mammal Monitoring**

Amphibian, reptile, and small mammal species are more problematic in their monitoring for a number of reasons including:

- the need to have access to private properties for many of the surveys
- non-random or limited distribution of many species of conservation concern
- relatively small population sizes of many species of conservation concern

However, there are several systems in place for the monitoring of amphibians and reptiles such as North American Amphibian Monitoring Program (NAAMP), Louisiana Amphibian Monitoring Program (LAMP) and PARC. We propose to recruit a group of volunteers across the state to implement a comprehensive amphibian monitoring program. Additionally, SWG projects as well as other sources provided estimates of

abundance (or at minimum presence/absence) for amphibian, reptiles, and small mammals on various habitats in Louisiana. Similar to that of breeding birds, density estimates are available for various broad habitat types. By tracking programs that add acres of a habitat, an estimate of its impact on the amphibian, reptiles, and small mammal communities can be made. Research projects directed towards specific species, whether funded through the SWG process or not, will continue to provide valuable data at a local scale for these faunal species of concern.

## **2. Aquatic Habitats and Species**

### **a. Freshwater**

Due to the diverse nature of the freshwater ecosystems and the lack of recent fish population data on the species of conservation concern listed in this strategy, the starting point of the monitoring efforts will focus around enumeration and identification of population structure and habitat types.

The initial monitoring efforts will focus on areas in southeast Louisiana in the Pearl, Mississippi, and Pontchartrain Basins. These basins represent habitat types for 77% of the listed species of conservation concern. Of all species listed, 40% occur only in these basins. New initiatives would focus on the Alabama shad and its reintroduction. Information needed on species occurrence within these basins include species trends and abundance with emphasis on several species of darters (channel, freckle and pearl). Since species occurrence has been documented for the shiners, monitoring the populations of the Blunt face and Bluenose shiners and the effects of habitat changes on their populations is essential. An established monitoring framework has been devised for the Gulf sturgeon and partnerships with MDWFP and USFWS have been established and will continue to aid in monitoring the recovery of this species.

Systems such as the Red, Mississippi, and Ouachita Basins serve as a major conduit for the inflow of invasive fish and mussel species into the waters of Louisiana. Monitoring efforts will be geared toward identifying trends in the current range and abundance of these species, particular the Asian carp and Zebra mussel, and what impact they are having on native species.

Due to the locks and dams on the Red River and the impoundment of the Sabine River at Toledo Bend, initial taxonomic surveys are needed to identify populations in these systems. Impoundments and the effects of navigational and flood control projects lead to habitat alterations and LDWF will partner with the COE to monitor their effect on species of conservation concern.

Coastal basins such as the Mermentau, Barataria, and Calcasieu offer unique and ever changing habitats. Coastal restoration projects such as Davis Pond and Caernarvon have been documented from a marine aspect but the impacts on freshwater species and habitats are relatively unknown. Long-term monitoring of these areas is essential. The effects of