Louisiana Black Bear
(*Ursus americanus luteolus*)

5-Year Review:
Summary and Evaluation

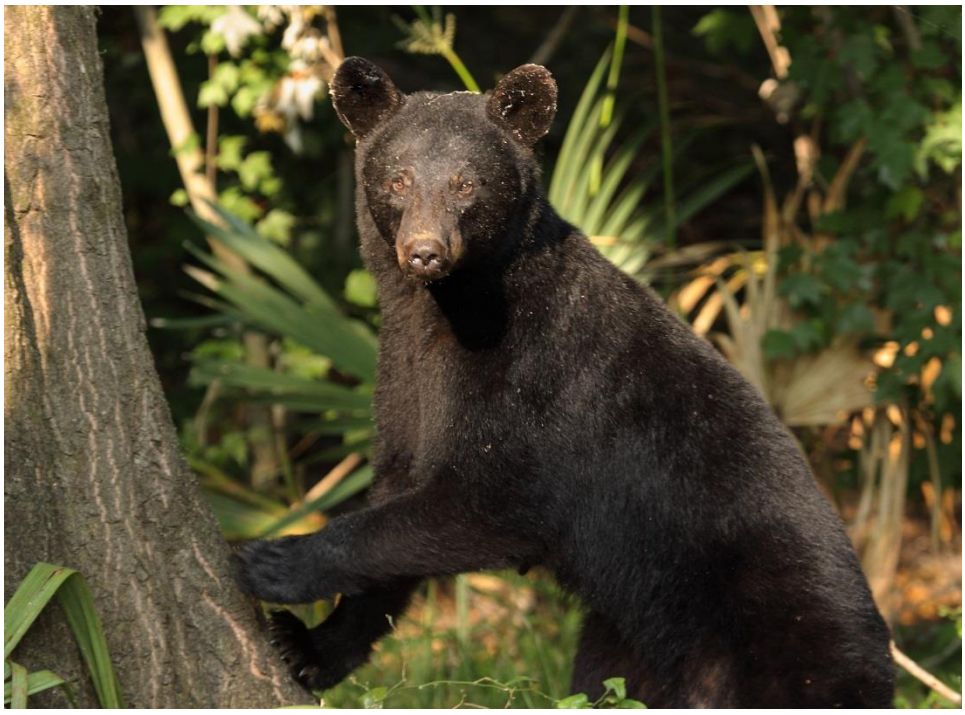

Photo: John Flores

U.S. Fish and Wildlife Service
Southeast Region
Louisiana Ecological Services Field Office
Lafayette, Louisiana

5-Year Review
Louisiana Black Bear (*Ursus americanus luteolus*)

I. GENERAL INFORMATION

A. Methodology used to complete the review: This review was conducted by the U.S. Fish and Wildlife Service's Louisiana Ecological Services Field Office. This is the first 5-year status review conducted for the Louisiana black bear. We announced this review in a *Federal Register* notice on August 2, 2007 (72 FR 42425) and opened a 60-day comment period. Comments were provided in the six public comment letters received in response to the notice. All recommendations resulting from this review are a result of thoroughly reviewing the best available information on the Louisiana black bear. Our sources of information for this 5-year review include the final rule listing this species under the Endangered Species Act, the final rule designating critical habitat, the Recovery Plan, peer reviewed scientific publications, unpublished survey and monitoring reports, augmented by comments from experts familiar with this species including researchers and state biologists. Individual comments and suggestions regarding the review were received from six peer reviewers outside the Service (see Appendix A). No part of this review was contracted to an outside party. Comments received were evaluated and incorporated as appropriate.

B. Reviewers

Lead Region: Southeast Region, Kelly Bibb, (404) 679-7132

Lead Field Office: Louisiana Ecological Services Field Office – Lafayette, LA Deborah Fuller, (337)291-3124

Cooperating Region: Southwest Region, Jennifer Smith-Castro, (505) 248-6663

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C. Background

1. **Federal Register Notice citation announcing initiation of this review:** August 2, 2007 (72 FR 42425)

2. **Species status:** Improving. There has been an increase in population numbers in the Tensas River Basin population (TRB) from a rough estimate of 49-50 bears (Nowak 1986) to 294 bears (Hooker 2010). The current estimated population of 59 bears (O'Connell and Clark 2013) in the Upper Atchafalaya

River Basin (UARB) and estimated population growth rate of 1.112 (compared to earlier rough estimates of 30 to 40 individuals (Nowak 1986) and 41 bears (Triant et al. 2004) indicates this population is increasing. The Lower Atchafalaya River Basin (LARB) population shows an increase (estimated population growth rate of 1.08) and an estimated population of 138 bears (Troxler 2013); a notable increase over Triant et al.'s (2004) estimated population of 77 bears. Range-wide, there is additional circumstantial evidence (e.g., increased sightings reports and increased geographic distribution of those sightings) that the overall population in Louisiana is now growing (Savoie 2007). A new breeding population exists in east-central Louisiana and an additional breeding population is forming in western Mississippi. Over 750,000 ac (303,500 ha) of habitat are currently protected within the Louisiana Black Bear Habitat Restoration Planning Areas (HRPA) (Table 4). This represents an increase of over 250,000 acres (101,172 ha) in conservation lands (lands that have been restored and/or protected) in the HRPA since listing (Table 6); much of that has been targeted to support existing breeding populations and/or to create movement corridors between those populations.

3. **Recovery achieved**: 4 (4 = 76%-100% recovery objectives achieved)

4. **Listing history**

   Original Listing
   FR notice: 57 FR 588
   Date listed: January 7, 1992
   Entity listed: sub-species
   Classification: threatened

5. **Associated rulemakings:**

   Similarity of appearance (included in the original listing)
   FR notice: 57 FR 594
   Date listed: January 7, 1992
   Entity listed: all other free-living bears (*U. americanus*) within the historic range of *U. a. luteolus*

   Classification: threatened due to similarity of appearance

   Critical Habitat Designation
   FR notice: 74 FR 10350
   Date designated: March 10, 2009

6. **Review History:**

   Final Recovery Plan-1995.

   Recovery Data Call: 2012, 2011, 2010, 2009, 2008, 2007, 2006, 2005, 2004, 2003, 2002, 2001, 2000

7. **Species' Recovery Priority Number at start of review (48 FR 43098):** 9. This number indicates a subspecies with a moderate degree of threat and a high recovery potential.

8. **Recovery Plan**
   Name of plan: Louisiana Black Bear Recovery Plan
   Date issued: September 27, 1995

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) policy

1. **Is the species under review listed as a DPS?**
   No.

2. **Is there relevant new information that would lead you to consider listing this species as a DPS in accordance with the 1996 policy?**
   No.

B. Recovery Criteria

1. **Does the species have a final, approved recovery plan containing objective, measurable criteria?**
   Yes

2. **Adequacy of recovery criteria.**

   a. **Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?**
      Yes. When complete, we will evaluate the results of ongoing population and movement studies for additional insight regarding the recovery criteria.

   b. **Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?**
      Yes.

3. **List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information**.

   The recovery plan goal is to sufficiently alleviate the threats to the Louisiana black bear metapopulation, and the habitat that supports it, so that the protection afforded by the Endangered Species Act is no longer warranted. Long-term protection is defined as having sufficient voluntary conservation agreements with private landowners and public land managers in the Tensas and Atchafalaya River Basins [in Louisiana] so that habitat degradation is unlikely

to occur over 100 years. The species would be considered for delisting when the following criteria are achieved (Note: The recovery plan identified these criteria as "preliminary and they could be revised based on new information".

3.1 At least two viable subpopulations, one each in the Tensas and Atchafalaya River Basins [Louisiana].

This recovery criterion is related to Factor E (*Other natural or man-made factors; Tasks 4.1-4.6*). Historically, the Louisiana black bear occurred in eastern Texas, southwestern Mississippi and all of Louisiana (Figure 1). Historic and continued destruction and fragmentation of Louisiana black bear habitat threatened the ability of the bear to survive as a population and also potentially affected the demographic integrity of the subsequently isolated populations. The recovery plan defines a viable subpopulation as one which has a 95 percent or better chance of persistence over 100 years, despite the foreseeable effects of four stochastic factors: demography, environment, genetics, and natural catastrophe (Schaffer 1981). The requirement for two viable populations was based on that fact that having multiple viable populations with exchange of individuals (see Criteria 2) increases the likelihood of achieving a long-term viable Louisiana black bear population. Today, the scientific state of knowledge regarding population viability not only allows us to assess progress toward meeting the recovery criteria but also allows us go beyond this simplistic approach and evaluate the Louisiana black bear population as a whole (i.e., metapopulation; see discussion below). The population studies to evaluate the recovery criteria and the metapopulation are currently underway.

Tensas River Basin (TRB) Population
The Tensas River Basin population of the Louisiana black bear has increased from a rough estimate of 49-50 in the 1980s (Nowak 1986) to the individual estimates of 119 for the Tensas River National Wildlife Refuge (NWR) (Boersen et al. 2003) and 45 for the adjacent Deltic tracts (Beausoleil 1999) in the late 1990s. The most recent population estimate of 294 bears for the Tensas River NWR and nearby Deltic and state-owned tracts with an annual survival rate of 0.9 was obtained by Hooker (2010). The estimated pooled population growth rate of 1.04 indicates the population is growing (Hooker 2010). The long-term viability of the TRB population is currently being analyzed as part of ongoing population studies.

Atchafalaya River Basin Populations

Upper Atchafalaya River Basin (UARB) or Inland Population
This population appears to be increasing. Lowe (2011) estimated a UARB population of 56 bears with an annual survival rate of 0.91. While this population estimate is higher than two earlier studies, it can be inferred, taking into account the variability of the estimates, that it is at least within the range of

both Nowak's (1986) rough estimate of 30 to 40 individuals and the 2004 population estimate by Triant et al. (2004) of 41 bears (which may be an underestimate of the actual population number (Triant et al. 2004)). O'Connell and Clark (2013) most recently estimated a mean population abundance of 58.8 bears with average male and female survivorship to be 0.756 and 0.901 respectively. The population growth was estimated at 1.12 indicating an increasing population (O'Connell and Clark 2013). In response to historic 2011 floods, the Morganza Floodway on the Mississippi River was opened for the first time in 40 years, flooding a portion of the UARB population for approximately two months. A study to obtain population abundance and viability of this population was underway when this event happened and the study period was subsequently extended so that the effects of the Morganza opening on black bears could be evaluated. During this same time period, radio-collared bears located within the flooded area in Mississippi, rarely moved out of their home range, even when little dry land was available (Young 2011). Although data analyses for the UARB are not yet complete, there was a documented bear mortality that occurred during the flooding when a bear was forced to the higher ground along a railroad track and was hit by a train. Indirect effects on reproductive success in 2011 are suspected but are still under investigation. The long-term viability of the UARB population is unknown but currently under investigation.

Lower Atchafalaya River Basin (LARB) or Coastal Population

Nowak (1986) roughly estimated that there were approximately 30 bears in the lower Atchafalaya Louisiana black bear population. Until recently, the only quantitative estimate for this population was Triant et al.'s (2004) estimated population of 77 bears. Similar to their UARB population estimate, this may be an underestimate of the actual population number (Triant et al. 2004). Troxler (2013) obtained a population estimate of 138 bears which represents a substantial increase over Triant's estimate. The estimated growth rate of 1.08 indicates that the population is growing (Troxler 2013). Hurricanes and tropical storms pose a threat to LARB Louisiana black bear habitat. Murrow and Clark (2012) studied the impacts of Hurricanes Katrina and Rita on habitat of the LARB population. They did not detect any significant direct impacts to forested habitat; however, they indicated that indirect effects (e.g., saltwater intrusion) may occur later in time. A population viability study is underway but not yet complete. The long-term viability of the LARB population is unknown but currently under investigation.

Additional Progress

An additional new breeding population not present at listing exists in Louisiana as a result of reintroduction efforts exists on the Richard K. Yancey Wildlife Management Area (WMA) (see Section II.C.1.a). This population is strategically located to increase connectivity and exchange between the TRB and UARB populations and thus represents a significant improvement in Louisiana black bear population demographic conditions since listing.

Additionally, there is circumstantial evidence (e.g., increased sightings reports and increased geographic distribution of those sightings) that the overall Louisiana black bear range in Louisiana is expanding and the population may be growing (Savoie 2007).

Black bear numbers also appear to be increasing in Mississippi. The Mississippi population is currently estimated to be about 120 bears, with approximately 75 percent occurring within Louisiana black bear range (B. Young, MS Wildlife Federation, personal communication, 2013) and one (possibly two) new breeding population appears to be forming in west-central Mississippi Fig. 1; (see Section II.C.1.a).

The Louisiana Department of Wildlife and Fisheries (LDWF) contracted with U. S. Geological Survey, Leetown Science Center, Southern Appalachian Field Branch (USGS) to model the viability of the TRB, UARB, and LARB populations. In addition, using those data as well as information on the colonization of new populations, viability of the overall Louisiana black bear meta-population will also be analyzed. This analysis will utilize the increased scientific understanding of populations gained since listing and go beyond the examination of the minimum criteria established in the recovery plan and extend to determining the sustainability of the Louisiana black bear population as a whole.

Summary
Today, the Louisiana populations of this subspecies as a whole appear to be increasing. Population numbers for the TRB, UARB and LARB have increased and all populations appear to be growing. Two additional breeding populations now exist, one in Louisiana and one in Mississippi. However; because the results of the population viability studies are not yet complete, it cannot be fully determined that this recovery criterion for the Louisiana black bear has been entirely met at this time.

3.2 <u>Immigration and emigration corridors between the two viable subpopulations.</u>

This recovery criterion is inextricably linked with Criteria 1 and 3 (two viable subpopulations and long term habitat and interconnecting corridor protection) in that the establishment of effective corridors increases the viability potential of small populations by reducing such things as demographic stochasticity and inbreeding and is a necessary component to achieving Criterion 3. This is directly related to Factor A (*the present or threatened destruction, modification, or curtailment of habitat or range; Recovery Plan Tasks 1.1-1.5*). Black bears have been documented to use wooded habitat linkages as travel corridors to traverse agricultural lands, as well as for feeding, bedding, and denning (Anderson 1997, Weaver 1999). Limited research and anecdotal observations provide information on the habitat features black bears use to move between

habitat patches and regularly travel, and the distances this subspecies travels in open areas between habitat patches (Anderson 1997, Beausoleil et al. 2005, Pelton and van Manen 1997). Studies based on observation and radio telemetry data have provided information on bear movements and corridor/patch use: Anderson (1997), Beausoleil (1999), Weaver (1999), White et al. (2000), and Van Why (2003). Telemetry data were collected at discrete time periods and locations based on the frequency of field visits. The movement behavior and habitat used between those locations must be inferred. Two studies are now ongoing to more frequently (4-hour time increments) track bear movements through the use of Global Positioning Systems (GPS) tracking devices. GPS collar data provides the ability to obtain precise geospatial locations of bears over a given time interval and thus provide detailed movement patterns and habitat preferences of individual bears. The Mississippi Department of Wildlife, Fisheries and Parks (MDWFP) and Mississippi State University began their study to investigate detailed black bear movements and barriers to those movements in 2009. In 2010, the LDWF and USGS began placing GPS collars on bears in Louisiana to collect similar data. The GPS data will be used to investigate the recovery-related questions of what constitutes a corridor (or conversely what constitutes a barrier to movement) and whether there is sufficient habitat in place on the landscape to function as corridors for bears. The anticipated outcomes of the GPS studies, used in conjunction with Geographic Information Systems (GIS) analyses of habitat characteristics that have been protected and/or restored and used by bears, would be used to determine the sufficiency and functionality of current corridor habitat. Currently, those analyses are projected to finish in December 2013. The new breeding population on the Richard K. Yancey WMA (see Sections II.B.3.1 and II.C.1.a) reduces the distance between the TRB and UARB; a significant improvement in Louisiana black bear demographics since listing. Additional information from DNA analyses associated with the population estimation studies will also be examined for evidence of interchange between populations. The results from the GPS and DNA studies are anticipated to provide new insight as to the important elements of a functional movement corridor for the Louisiana black bear. As described in criterion 3.3 below, a significant amount of habitat protection and restoration designed to reduce habitat fragmentation has occurred since listing (Figures 3, 4 and 6). The above-mentioned analyses will allow us to evaluate the extent to which this recovery criterion has been met in providing functional travel corridors for bears. However; the investigations are incomplete at this time.

3.3 Long-term protection of the habitat and interconnecting corridors that support each of the two viable subpopulations used as justification for delisting.

This recovery criterion is directly related to Factor A (*the present or threatened destruction, modification, or curtailment of habitat or range; Recovery Plan Tasks 1.1-1.5*). Habitat restoration and/or protection efforts for the Louisiana black bear began almost simultaneously with the bear's listing. See Appendix

B. and Section II.C.1.d for a description of the methodologies used for developing spatial data and the detailed "Louisiana Black Bear Habitat Restoration Planning Maps" (HRPM) for the TRB, UARB and LARB within the Habitat Restoration Planning Area (HRPA; Figure 2) referenced in this review. These landscape-scale maps are designed to assist in habitat protection and restoration by identifying and numerically ranking areas within the HRPA that would benefit existing Louisiana black bear populations and provide for population growth and interchange. Rankings are based on the value of an area's contribution towards recovery (e.g., areas that, if restored or protected, directly benefit breeding populations or provide travel corridors or patches between populations are ranked the highest). In this way, public and private landowners and managers can evaluate the benefit of management options on bears. In the case of some private landowner restoration programs, a high rank means that a private landowner's proposal would be more competitive and be more likely to be funded. Through the use of the HRPMs, a significant amount of habitat protection and/or restoration targeted to conserve and recover the Louisiana black bear on private and public lands has been accomplished. The HRPM boundaries are well described; therefore, they will be used to summarize Louisiana black bear habitat restoration accomplishments for this review. The restoration accomplishments will be conservative estimates benefitting bears due to the constraints imposed on the HRPA by the purpose of the map (see Appendix B for the HRPM Development Strategy).

Currently, in Louisiana there are approximately 487,000 acres (ac) (136,784 [ha]) of public lands (e.g., National Wildlife Refuges [NWR], State Wildlife Management Areas [WMA]), and U.S. Army Corps of Engineers [Corps] lands) that are managed or maintained in a way to benefit wildlife (including benefits to bears) in the Habitat Restoration Planning Areas (HRPA) as delineated by the HRPMs (Table 1). Several of these public lands did not exist or were not as large in the early 1990s as they are today (e.g., Bayou Teche NWR, Tensas River NWR, Buckhorn WMA). Approximately 250,000 ac (101,172 ha) of those lands directly support Louisiana black bear breeding populations (Table 2). Approximately 143,865 ac (58,220 ha) of NWRs and 615,039 ac (248,897 ha) of WMAs currently exist in Mississippi within the listed range of the Louisiana black bear.

In 1992, when the bear was listed, the lack of protection from development in the Atchafalaya Basin (Basin) in Louisiana was considered a threat. Bears may occasionally utilize the higher portions (levees and ridges) of the Basin but it is not currently believed to be suitable for breeding. LeBlanc et al. (1981) projected that by 2030, the wetter areas would eventually be converted to cypress swamp and early successional hardwood; habitat types more suitable to black bear use. When the Corps' Atchafalaya Basin Multi-Purpose Plan (Plan) was authorized it included the purchase of 338,000 ac (136,784 ha) of non-developmental easements on private lands and the purchase of 50,000 ac (20,234 ha) of public lands for conservation within the Atchafalaya Basin

covering much of the land between the UARB and LARB black bear populations (Figure 2). To date, approximately 100,000 ac (40,469 ha) of the environmental easements have been purchased and 49,000 (19,830 ha) acres of lands for public access and conservation have been purchased in the Basin (Table 1). The developmental control and environmental protection easement prohibits conversion of land from existing uses (e.g., conversion of forested lands to cropland). Landowners may harvest timber only in compliance with specified diameter-limit and species restrictions. Limited camp development is also allowed; however, clearings are limited to ½ acre and would only be cleared in accordance with the timber cutting restrictions.

A significant amount of focused habitat restoration and protection (via permanent easements) on privately-owned lands has been accomplished since 1992 through voluntary private landowner enrollment in the Natural Resource Conservation Service's (NRCS) Wetland Reserve Program (WRP). Private landowner applications for WRP enrollment are ranked based on a number of factors, including the HRPM rankings. Areas that would increase existing forested patches and blocks or provide habitat that could serve as black bear travel corridors between forest blocks receive higher HRPM and WRP rankings and thus are more likely to be enrolled. Since 1992, over 130,000 ac (53,000 ha) of land has been permanently protected and/or restored in the HRPAs via the WRP program (mostly in the TRB and UARB areas) (Table 3). Approximately 41,000 ac (16,592 ha) directly benefit breeding populations and over 130,000 ac (52,600 ha) benefit movement between populations (Table 3). Thus, the use of the HRPMs in conjunction with the WRP has not only increased the total amount of Louisiana black bear habitat, but has also been focused to directly address the recovery criteria. When WRP permanent easement lands are added to the habitat protected on Federal and State NWRs or WMAs, mitigation banks, and the numerous Corps fee title and easements, approximately 754,000 ac (305,233 ha) have been permanently protected and/or restored within the HRPAs in Louisiana (Table 4). The importance of this restoration focus is most evident when viewed spatially (Figure 3; Note: the Corps easements in Atchafalaya Basin are not depicted on this figure because we only have tabular data and no exact locations). Although not permanently protected, an additional 113,000 ac (45,730 ha) of lands currently enrolled in 15-year agreements via the Conservation Reserve Program (CRP) of the NRCS within the HRPAs (Table 5, Figure 4) provide short term habitat that can be used by bears for foraging/denning and travel.

Approximately 143,865 ac (58,220 ha) of NWRs and 615,038 ac (248,897 ha) of state WMAs are located within Louisiana black bear listed range in Mississippi. From 1994 through 2007, over 138,000 ac (56,000 ha) of private land in Mississippi counties adjacent to the Mississippi River (Figure 5) were enrolled in permanent easements under the WRP and 328,000 ac (132,737 ha) were enrolled in the CRP (Ginger et al. 2007). As of 2013, those Mississippi totals have increased to 165,203 ac (66,855 ha) in WRP and 338,000 ac

(137,055 ha) in CRP (J. Austin, USFWS, personal communication, 2013). An additional 5,500 ac (2,226 ha) of habitat have been restored via the U.S. Department of Agriculture (USDA) Farm Service Agency (FSA) State Acres for Wildlife (SAFE) program in Mississippi. The Mississippi Black Bear SAFE project (a USDA Farm Service Agency program) seeks to enroll 2,450 acres to increase habitat for the federally threatened Louisiana black bear and the state-endangered American black bear. The project seeks to restore native bottomland hardwood forests in portions of the Mississippi Alluvial Valley, which has been identified as an important zone for black bear recovery.

We believe that significant progress in the restoration and protection of bear habitat has been achieved (Figures 3, 4, 7; Tables 1-4). The results of the population and corridor studies will be used to determine the extent that this criterion has been met.

Recovery Goal and Criteria Summary
Louisiana black bear numbers have increased for all three populations present at the time of listing and all three populations are estimated to be increasing. Two new breeding populations not present at the time of listing now exist, and significant progress in habitat restoration and protection has been made. The extent of exchange between populations is under investigation as part of the population viability and corridor studies. Until those studies are complete (anticipated completion is December 2013), we cannot fully determine the extent to which the recovery plan goal (sufficiently alleviate the threats to the Louisiana black bear metapopulation, and the habitat that supports it) and criteria have been met at this time.

C. Updated Information and Current Species Status

1. Biology and Habitat

a. Abundance, population trends, demographic features, or demographic trends: In order to properly interpret maps and discussions regarding changes in the Louisiana black bear's abundance, population trends, and distribution, it is first necessary to define the term "occupied habitat". We use that term here to indicate the subspecies' presence in an area, that would include occasional sightings of an individual (it is not uncommon for adult males and juvenile males to travel great distances). Several distribution maps use that term in a similar way. However, Louisiana black bear resource managers and biologists in the past have commonly referred to areas with physical evidence of reproduction (young, females with young or lactating females) as "occupied habitat" (Black Bear Conservation Committee [BBCC] 1997; USFWS 1995). We use the term "breeding habitat" here to indicate such areas as a subset of occupied habitat. Differentiating between the terms has value because, in contrast to sightings of adults without reproductive information, reproduction is considered evidence of a resident bear population (Shropshire 1996). Dispersal

by female black bears is uncommon and typically is of a short distance (Rogers 1987). Male black bear home ranges usually encompass several female home ranges (Rogers 1987). Therefore, while breeding habitat does not necessarily include all areas where individual bears may occur, it does encompass the areas known to support resident, reproducing populations and is a useful entity on which to focus management actions. Freedman et al. (2003) determined that the importance of adult female survival to reproductive parameters indicated that habitat management plans must explicitly address adult survival as a priority. The restoration plan (BBCC 1997) identified breeding habitats (as defined above) as those areas where essential management and restoration activities for the Louisiana black bear must be focused. In those instances where a historical map or publication used the term "occupied" areas, based on our best interpretation, we use the terms occupied or breeding distribution as defined above.

Abundance: Historically, black bears were probably common in bottomland hardwood forests such as the big thicket area of Texas, along the Tensas and Yazoo Rivers in Louisiana and Mississippi (respectively) and the Atchafalaya Basin of Louisiana (Nowak 1986).

Louisiana: There were no precise estimates for the overall Louisiana black bear population at the time of listing. Lowery (1974) reported a 1907 hunt in northeastern Louisiana resulting in approximately 3,000 bears being killed. Numbers apparently declined over time and Taylor (1971), reviewing Louisiana historical hunting records, noted that by the 1930s the taking of bears was considered a rarity. Only 80 to 120 individuals were estimated to occur in Louisiana in the late 1950s (Nowak 1986; Note: Nowak's estimates were based on conjecture or educated guesses and not on survey data.). Nowak (1986) estimated that those numbers were approximately equally distributed between what we now refer to as the TRB and the LARB (using LDWF 1959 survey data). Pelton and van Manen (1997) estimated the statewide Louisiana black bear population ranged from 200 to 400 bears in 1993. Similar to Nowak's (1986) estimates, these historical estimates were based on conjecture or educated guesses and not on survey data.

Tensas River Basin: Boersen et al. (2003) estimated there were 119 bears (SE=29.4) in Tensas River NWR. Comparison of that estimate to the Pelton (1989) report of 30 to 50 bears and Weaver's (1999) estimate of 36 bears (plus 28 on the Deltic tracts), suggests that the population had increased. Boersen et al. (2003) attributed that increase to improved forest management on Tensas River NWR, as well as increased corn and decreased soybean production on nearby lands. As discussed previously in Section II.B.3, the TRB population was more recently estimated to be 294 bears (Hooker 2010).

Upper Atchafalaya River Basin: Nowak (1986) suggested that inland population numbers were extremely low or believed to be nonexistent before the

introduction of Minnesota bears to Louisiana in the 1960s (see Section II.C.1.b below) and estimated there were 30 to 40 individuals in what we now call the UARB (using a LDWF 1981 report). Pelton (1989) estimated the UARB population size ranged from 30 to 50 bears. Triant et al. (2004) estimated 41 bears in the UARB population at that time. More recently, Lowe (2011) and O'Connell and Clark (2013) estimated that there were 56 bears and 59 bears respectively in the UARB population.

Lower Atchafalaya River Basin: Triant et al. (2004) obtained an estimate of 77 bears in the LARB which was higher than the earlier anecdotal estimates for this population (Pelton 1989). Troxler (2013) obtained a population estimate of 138 bears which represents a substantial increase over Triant's estimate. The estimated growth rate of 1.08 indicates that the population is growing (Troxler 2013).

Reintroduced Population: Reintroduction efforts from 2001 to 2009 resulted in a newly formed breeding subpopulation (primarily on the Richard K. Yancey WMA) in Avoyelles and Concordia parishes, Louisiana near the confluence of the Mississippi and Red rivers. This multi-agency project, undertaken to reduce demographic isolation of the existing TRB and UARB populations (Savoie 2007), was based on the assumption that relocated females would remain at the new location and would be discovered by males traveling through the area. There are no population estimates currently available for the repatriation population; however, a total of 48 females and 104 cubs were moved (primarily from the TRB) to this area between 2001 and 2009. Thirty-one females settled in the general area and 13 dispersed (of these, the majority have moved to nearby areas where they would be an asset to this new population (i.e., distances within existing home ranges). There are 4 females of unknown fate. Benson and Chamberlain (2007a) found that the survival rates did not differ between the reintroduced bears and those from the source population. An interesting discovery during the reintroductions was the documentation of adoption of an abandoned cub by another female bear (Benson and Chamberlain 2006b). The first natural reproduction of a relocated female occurred 4 years after the first year of the project (in 2005) and natural reproduction has been documented each year since. To date, 21 females have produced 35 litters of cubs since the project's inception (J. Laufenberg, University of Tennessee, personal communication, 2013).

The pre-listing population estimates for black bears in Louisiana may be lower than what recent research would indicate (Savoie 2007). From 1988 to 2007, over 450 bears were identified (from research, nuisance events etc.) in LDWF records (Savoie 2007). Today, the Louisiana populations of this subspecies as a whole appear to be increasing. There is at least one new breeding population on the Louisiana landscape. There is circumstantial evidence (e.g., increased sightings reports and increased geographic distribution of those sightings) that the overall population is now growing (Savoie 2007). It should be noted that

most population studies of the Louisiana black bear have been conducted in these core breeding habitat areas (in Louisiana) and therefore some unknown numbers of bears occurring outside those areas are not included in these population estimates.

Mississippi: In the late 1920s, Louisiana black bears (and probably other subspecies) occurred in a few small isolated populations in Mississippi) [Note: two and potentially three black bear subspecies occur in Mississippi (*U.a. americanus, U.a. luteolus, U.a. floridanus*)]. By 1932, it was believed that there were less than 12 bears (including all subspecies) left in Mississippi (Cook 1943 as reported in Shropshire 1996). Louisiana black bears were believed to exist in Mississippi along the Mississippi River (Weaver 1990) and smaller areas in the lower East Pearl River and lower Pascagoula River basins of southern Mississippi (Weaver 1990) around the time of listing. Shropshire (1996) estimated there were approximately 25 to 50 bears left in Mississippi. In the 1960s, there was a period of bear sightings believed to be the result of dispersing bears that had been relocated from Minnesota to Louisiana; many of those were captured or killed (Young 2006). Since that time, bear sightings have been periodically reported across the state and those bears are often young males (Shropshire 1996). In 2002, the MDWFP began its black bear program, and it was then estimated that there were less than 50 bears statewide (B. Young, MDWFP, personal communication, 2011). Today, managers believe that the population has more than doubled and sightings of bears have generally increased across the state (B. Young, MDWFP, personal communication, 2011). Currently, approximately 75 percent of the estimated current population of 120 bears in Mississippi bears are estimated to occur within the listed range of the Louisiana black bear (B. Young, Mississippi Wildlife Federation, personal communication, 2013), although this number can fluctuate annually and seasonally due to such factors such as food availability and dispersal from populations in adjacent states (Young 2006, Waller et al. 2012). Most of the sightings still occur along the Mississippi River and in the lower East Pearl River and lower Pascagoula River basins (Simek et al. 2012). Sightings in Mississippi are becoming more common. In recent years, several bears (including females) have been documented in the state, mostly from the Arkansas and Louisiana reintroduction projects (Young 2006).

Prior to 2005, the last documented breeding population in Mississippi occurred in Issaquena County (therefore considered *U.a. luteolus*) in 1976 and consisted of five bears (including two cubs), but that forested area was subsequently cleared and converted to agriculture (Young 2006). Stinson (1996) investigated reports in the Tunica Hills area of Louisiana and southwest Mississippi and found that evidence of breeding was weak, supported only by unverified reports of females with cubs or yearlings. Evidence of a new breeding subpopulation has emerged in the south Delta region of Mississippi (Sharkey, Issaquena, and Warren counties). In 2005, a radio-collared female and male cub that had been moved as part of the Arkansas reintroduction project crossed the Mississippi

River and took up residence in Issaquena County. Since 2007, the MDWFP has documented the birth of Louisiana black bear cubs in each consecutive year (B. Young, MS Wildlife Federation, personal communication, 2013). Also in 2005, a radio-collared female (T6) originally moved as part of the Louisiana reintroduction project had a litter of 5 cubs in the southwest corner of Wilkinson County, representing the first documented birth of bear cubs in the state in some 30 years (Young 2006). Female T6's home range includes areas in both Louisiana and Mississippi (Louisiana Department of Wildlife and Fisheries [LDWF] unpublished data). In spring of 2006, another female (D21) from that same project abandoned her cubs in Louisiana, crossed the Mississippi River, and established a home range in Wilkinson County. She subsequently had a litter of three cubs.

East Texas: At the time of listing, bears had not been reported in East Texas for many years, with the exception of the occasional wandering animal (Nowak 1986). Keul (2007) reviewed historical and folkloric literature on the black bear in East Texas and concluded that while habitat loss did occur, the primary reason for loss of bears was due to aggressive and uncontrolled sport hunting. The last known area supporting bears in East Texas was the Big Thicket area of Hardin County and forested areas in Matagorda County which may have supported a few individuals up to the mid-1940s (Barker et al. 2005, Schmidley 1983). There was a periodic episode of black bear sightings in East Texas in the 1960s following the above-mentioned reintroduction of Minnesota bears into Louisiana (see Section II.C.1.b "Effect of Minnesota Reintroductions), but by 1983, Schmidley (1983) stated there were no resident bears remaining in East Texas. Sightings of bears in East Texas have gradually increased since 1977, the time period when the Texas Parks and Wildlife Department (TPWD) started collecting data (Chappell 2011; Nathan Garner, unpublished data, 2011). Most of those sightings were believed to be juvenile or sub-adult males that had wandered into the area from Oklahoma, Arkansas, and Louisiana (Barker et al. 2005). The first assessment of region-wide habitat suitability within the historic distribution of the Louisiana black bear in east and southeast Texas was conducted by Kaminski (2011) using hair snares in areas considered to have the highest likelihood of bear occurrence. No black bears were detected there during this study according to the genetic analysis and based on the estimated effectiveness of their sampling method it was determined that there were no established black bear populations in the region (Kaminski (2011)). To date, there have been no documented occurrences of bear reproduction in East Texas although sightings of females with young have been reported but not verified.

Demographics: Louisiana black bear requirements are generally the same as other black bears throughout the Southeast and are described by Rogers (1987) and Pelton (1989). The specific biology and habitat needs of the Louisiana black bear were described in early studies by Weaver (1990, 1999). Since that time, numerous additional studies have been conducted on this species (see Literature Cited). Highlights are presented below.

The median estimated weights for male and female Louisiana black bears in north Louisiana were 292 lbs (133 kg) and 147 lbs (67 kg) respectively (Weaver 1999). Bear activity revolves primarily around the search for food, water, cover, and mates during the breeding season. Black bears do not truly hibernate, but go through a period of dormancy termed "carnivoran lethargy," which helps them survive food shortages and severe weather during the winter. In warmer climates, such as in Louisiana, bears can remain active all winter (Wagner 1995). Bears den in heavy cover or tree cavities during the winter months (Weaver 1999) and den type may vary depending on the habitat. Initiation of denning depends on latitude, available food, sex, age, and local weather conditions (Weaver 1990). Louisiana black bears generally enter dens in early December and emerge in mid-April with median den entrance on December 3 (range November 26 to December 12), and median den emergence on April 24 (range April 6 to May 30), (Waller et al. 2012). Denning duration ranges from 51 to 134 days (Waller et al. 2012). Weaver (1999) estimated a mean den length of 142 days in TRB bears. Adult females den earlier and emerged later than all other bears (Weaver 1999). Bears may remain somewhat active during this period and have been observed changing den sites and foraging (Waller et al. 2012); although their homes range sizes are reduced (Hightower et al. 2002, Weaver 1999). Cubs are born in winter dens at the end of January or the beginning of February (Weaver 1990). At the end of the dormancy period, females with cubs are usually the last to leave the den.

The average age for first female reproduction varies widely across black bear studies; however, most describe breeding occurring between 3 and 5 years of age (Pelton 1982). Breeding occurs in summer and the gestation period for black bears is 7 to 8 months (Pelton 1982). Delayed implantation occurs in female black bears whereby the blastocysts float free in the uterus and do not implant until late November or early December (Pelton 1982). Because of this, pregnant females are not subject to the nutritional drain of a developing fetus while they forage to increase fat reserves for winter torpor (Weaver 1990). Females give birth during the denning season. The normal litter size is two, although litter sizes of one to four cubs (and rarely five) do occur. Cubs are altricial (helpless) at birth (Pelton 1982) and generally exit the den site with the female in April or May. Young bears stay with the female through summer and fall, and den with her the next winter.

Optimum habitat for Louisiana black bears, like other black bears of the species *U. americanus*, consists of hardwood forested habitats that contain a diversity and abundance of food items. The Louisiana black bear's diet is dominated by plant material throughout the year (Anderson 1997, Benson 2005). A portion of the diet is made up of animal matter, primarily beetles and other insects which are consumed year-round (Anderson 1997), and occasionally carrion (Benson 2005). Diets vary seasonally in relation to food availability as does habitat use (Nyland 1995, Weaver 1999). During the summer, food abundance and

diversity increases, and soft mast, found primarily in forest openings, becomes a major food source. Soft mast may include such items as blackberry (*Rubis* spp.), grape (*Vitis spp*.), french and red mulberry (*Callicarpa americanus, Morus rubra)*), sassafras (*Sassafras albidum*), persimmon (*Diospyros virginiana*) and paw paw (*Asimina triloba*) (Anderson 1997, Benson 2005 BBCC 1997,Weaver et. al 1990b). Acorns and other hard mast are important food items (Benson 2005). Bears will also forage on agricultural crops (corn, wheat, oats) which may dominate the diet depending on availability (Anderson 1997, Benson 2005, Benson and Chamberlain 2006a, Nyland 1995).

Large tracts of bottomland hardwood (BLH) forest communities having high species and age class diversity can provide for the black bear's life requisites (e.g., escape cover, denning sites, and hard and soft mast supplies) without intensive management (BBCC 2005). We use the term BLH forest community with no particular inference to hydrologic influence; instead we use this term to mean forests within southeastern United States floodplains which can consist of a number of woody species occupying positions of dominance and co-dominance (BBCC 1997). Murrow and Clark (2012) used telemetry data to develop a black bear habitat model and then applied that model to quantify habitat loss and gain from hurricane impacts. They found that forest density and fragmentation influenced black bear habitat selection and that bears whose home range centered on deciduous forests tolerated higher fragmentation and lower forest density indicating the effects of forest fragmentation may depend on the quality of the fragmented habitat (Murrow and Clark 2012). When the Service listed this subspecies, a 4(d) rule was promulgated exempting normal forest management activities as practiced within this bear's range from the ESA Section 9 take prohibitions. This was based on the belief that maintaining occupied bear habitat in some form of timberland condition may be the single most critical factor in conserving the Louisiana black bear (57 FR 588). Recently timbered areas can provide foraging opportunities for bears as they allow light penetration through canopy openings and provide rotting wood that harbors beetles and grubs (Weaver et al. 1990b). In some cases, such as leaving downed tree tops and creating openings, active forest management can provide or enhance black bear habitat (Crook 2008, Hightower et al. 2002, Weaver 1999, Weaver et al. 1990b). Louisiana black bears have been observed using early successional areas (e.g., planted with trees or regenerating naturally) planted with trees (0 to 12 years) or by an open canopy and dense understory of shrubs, and vines (Benson 2005). Such areas provide food and cover similar to natural openings in forests. Since listing, timber harvest has occurred within the range of the TRB and UARB Louisiana black populations. We do not have detailed data on many exact harvest locations; however, based on the current population data those populations have increased and appear to be increasing, indicating that the 4(d) exemption has not resulted in negative impacts at the population level.

Secure den sites for reproduction are particularly important because females give birth while in their winter dens and the young would not survive without their mother should she abandon her den. Louisiana black bears use trees (with cavities), brush piles, and ground nests for denning (Crook 2008, Waller et al. 2012, Hightower et al. 2002, Weaver 1999) and an individual bear may use one or more different den types, often within the same season (Weaver 1999). A small proportion of den re-use occurs across years (Crook 2008, Waller et al. 2012) and may be related to den availability, although Crook (2008) found that den site re-use was often by a different bear. Benson (2005) found that den type use was related to female reproductive status, as females with cubs used trees for dens more frequently than ground dens. Crook (2008) found similar results. However, Hightower et al. (2002) and Waller et al. (2012) did not detect significant differences in den type use by females based on their reproductive status. White et al.'s (2001) research indicated that successful ground denning may be a learned behavior related to environmental conditions. Results of research involving Louisiana black bears indicate that they use bald cypress but will use virtually any species of tree for a den site (including oaks (*Quercus spp*.), sweetgum (*Liquidambar styraciflua*), water hickory (*Carya aquatic*), and sycamore (*Platanus occidentalis*)), contingent upon it providing a suitable cavity (Hightower et al. 2002, Crook 2008). In the TRB, tree dens were primarily located in bald cypress (*Taxodium distichum)* and surrounded by water (Crook 2008). Waller et al. (2013) found den site selection to be associated with greater percentage of horizontal cover within a 328 ft (100 m) area surrounding the den site. While important, the availability of den trees does not appear to be a limiting factor for reproductive success for Louisiana black bears (Crook and Chamberlain 2010, Hightower et al. 2002, Weaver and Pelton 1994); den trees may not be necessary if flooding and disturbance are minimized (Hightower et al. 2002). In areas where seasonal flooding occurs, the presence of suitable den trees may be a critical habitat component (Hersey et al. (2005). Because of their importance to denning bears, legal protection was provided for candidate and actual den trees in breeding range by promulgating a special rule at 50 CFR 17.40(i) under section 4(d) of the Act (57 FR 588) when the Louisiana black bear was listed. Candidate den trees are defined as bald cypress (*Taxodium distichum*) and tupelo gum (*Nyssa sp*.) having a diameter at breast height of 36 inches or greater, with visible cavities, and occurring in or along rivers, lakes, streams, bayous, sloughs, or other water bodies.

Ground nests may be located in wooded or shrub habitat and often constructed against a backdrop such as a felled log, a tree top, or the base of a tree (Crook and Chamberlain 2010, Weaver 1999). Brush pile dens were observed in residual tree tops that were felled during recent timber harvests (Hightower et al. 2002, Weaver 1999). Crook (2008) observed that ground dens were consistently located in upland habitat with a dense understory in proximity to water. Waller et al. (2012) also noted dense vegetation surrounding ground dens and observed that they occurred at elevations above flood-prone areas.

Home range sizes vary for the Louisiana black bear depending on the geographic area (BBCC 2005) and home range configuration appears to be influenced by available forest cover (Benson and Chamberlain 2007b, Marchinton 1995). Home range estimates vary for the Louisiana black bear. Mean minimum convex polygon (MCP) home range estimates for the Tensas River NWR population were 35,736 ac (14,462 ha) and 5,550 ac (2,246 ha) for males and females, respectively (Weaver 1999). Male home ranges (MCP) in the UARB population may be as high as 80,000 ac (32,375 ha), while female home ranges are approximately 8,000 ac (3,237 ha) (Wagner 1995). LARB population home ranges (MCP) were estimated to be 10,477 ac (4,240 ha) for males, and 3,781 ac (1,530 ha) for females (Wagner 1995). Louisiana black bears located on the Deltic lands in the TRB population have very small home ranges compared to other black bear populations with an estimated average home range (MCP) of 1,729 ac (700 ha) for males and 1,038 ac (420 ha) for females (Beausoleil 1999). The smaller home ranges for this group of bears are believed to be a result of the bears' reliance on the surrounding agricultural crops for forage (Benson 2005), the overall higher quality of the forested habitat (Weaver 1999), and the fragmented habitat that limits the extent that a bear might travel. Females without cubs generally had larger home ranges than females with newborn cubs (Benson 2005), although this difference was observed to vary seasonally, with movements being more restricted in the spring (Weaver 1999).

Black bears have the ability to travel great distances. Dispersal of young follows separation from the family unit. After separation, young females will generally establish a home range within or adjacent to their mother's home range. Males, on the other hand, tend to move far from their natal range and establish ranges based on availability of unoccupied territory (Rogers 1987). The mobility of bears, especially dispersing males, puts them at considerable risk as they cross roads and highways and they may often end up near areas inhabited by humans. Several instances of long-distance movements by black bears have been documented since 1995. Stratman et al. (2001) documented a male Florida black bear (*Ursus americanus floridanus*) that was relocated for conflict behavior subsequently traveled a minimum of 315 miles (mi) (507 kilometers [km]) from Eglin Air Force Base in Florida to Baton Rouge, Louisiana between 28 May and 1 July 1996. Stratman et al. (2001) reported that the bear traveled an average of 9.3 mi/day (14.9 km/day [range = 0.6-76.4 mi [1–123 km/da]]) and crossed a minimum of 4 interstate highways and 22 other major highways. An adult female (T29) with an established home range on McLemore Tract of Tensas River NWR moved 33.6 mi (54 km) south and set up a new home range and produced and raised cubs in an isolated woodlot in southern Tensas Parish in 2006 (Savoie 2007). In 2005, a male bear was captured on Lake Ophelia NWR that had been previously captured as a nuisance bear in Arkansas, approximately 178.3 mi (287 km) away (Savoie 2007).

Black bears use wooded habitat linkages as travel corridors to traverse agricultural lands, as well as for feeding, bedding, and denning (Anderson 1997, Weaver 1999). Bears have been observed to travel through open habitat (Weaver 1999), but they may travel farther from the forested edge when in a wooded corridor versus in an open field (Anderson 1997). Beausoleil (1999) observed that female Louisiana black bears would not move between woodlots unless they were connected by a forested corridor or were closer than 1,640 feet (ft) (0.5 km) apart. Forty-two percent of bear movements documented among isolated woodlots were between woodlots connected by a forest corridor and 35% were between woodlots < 164 ft (0.5 km) apart (Beausoleil 1999). Bears were observed to travel along tree-lined ditches that were as narrow as about 16 ft (5 m) in width Anderson (1997). Weaver (1999) also observed bears to travel along ditches and bayous (even when the bayou was located within wooded areas). Similarly, Van Why (2003) observed Louisiana black bears using narrow strips of vegetation (less than 33 ft (10 m)) to travel through less than optimal habitats such as open fields. Weaver et al. (1990b) recommended a 197-ft (60-m) buffer zone along waterways as a travel corridor or habitat linkage. Male bears were regularly observed to travel between forested tracts whether or not habitat corridors existed while female bears only moved between corridor-linked tracts (Anderson 1997).

White et al. (2000) investigated the effects of large rivers on black bear movement and found that in general the presence of rivers affected female movements more than male movements and while individual females were documented crossing rivers (many directly attributed to displacement from flooding or human disturbance), no female with cubs of the year were observed to do so. White et al. (2000) identified several other factors that may affect crossings including river width, current, velocity and commercial barge traffic. White et al. (2000) did not observe any bears crossing the Mississippi River; however, since that time a small number of crossings have been documented. Anderson (1997) found that forest fragmentation may not affect male bears as much as female bears.

The viability (long-term persistence) of Louisiana black bear populations is unknown at this time. Metapopulation models developed by Clark et al. (2006) indicated that bear populations are expected to remain relatively stable over the near term but they did not consider genetic structure and further cautioned that this did not imply connectivity between populations was unimportant. Determining the viability of any population requires knowledge of several key population parameters such as initial population numbers, age structure, survival probabilities, growth rates and variations in those parameters. The first quantitative population estimates for Louisiana black bear populations were made for the Tensas River NWR population by Boersen et al. (2003), the nearby Deltic (or Murphy tracts) population by Beausoleil (1999), and the Upper and Lower Atchafalaya populations (UARB and LARB, respectively) (Triant et al. 2004). None of those studies attempted to examine population persistence over

time. Recent population studies initiated by the LDWF and the USGS are focused on addressing the 1995 recovery plan goal of alleviating threats to the Louisiana black bear metapopulation and its habitat and the recovery criteria of two viable populations by determining population growth and viability for those populations. The recovery criteria of two viable populations was based on the best knowledge at the time the plan was written, namely that having more than one viable population with population exchange would enhance the persistence of the Louisiana black bear metapopulation. The scientific knowledge regarding population viability has increased significantly since the recovery plan was written in 1995. The current USGS studies will look at the progress made towards the recovery criteria but also enable us to examine the overall viability of the Louisiana black bear metapopulation. As discussed earlier, population and survival estimates have been obtained for TRB bears by Hooker (2010), UARB bears (Lowe 2011, O'Connell and Clark 2013) and the LARB (Troxler 2013). Researchers are now collecting additional data necessary for viability analyses and are anticipated to be fully complete in 2013 (including data analyses for viability estimates).

b. Genetics, genetic variation, or trends in genetic variation: There are several areas of discussion and numerous studies (discussed below) regarding Louisiana black bear genetics and taxonomy: (1) the validity and distribution of the subspecies *U.a.luteolus*, i.e., what bear populations constitute that subspecies and what is the relationship between the White River population of bears in Arkansas and Louisiana black bears (see Section c, taxonomy, below for a discussion of these topics); (2) whether any Louisiana black bear populations show evidence of genetic isolation; and (3) what were the effects (if any) of the Minnesota black bears (*U.a. americanus*) introductions into Louisiana (and Arkansas) in the 1960s. The results from many of these studies are conflicting and not directly comparable due to differing objectives, sample sizes, variables measured and analysis techniques used.

Genetic isolation, drift, inbreeding: Pelton (1989), prior to listing, argued there was considerable evidence that a pure strain of *U. a. luteolus* subspecies no longer existed because: (1) there was a broad continuum of habitat between the TRB and UARB populations (based on Weaver's [1990] maps) in existence during the 1960's release of Minnesota bears; (2) habitat corridors still existed [1989] between those areas allowing for continued dispersal; (3) bear releases in Arkansas resulted in widespread dispersals; (4) the presence of narrow dispersal corridors through Arkansas following such rivers as the Ouachita and Saline Rivers were still being used by transplant offspring and evidence of use had been observed all the way to the Louisiana border; and (5) long distance natural movements of bears had been documented (Taylor 1971). Minnesota bears translocated to Louisiana that subsequently left were reported as far away as Texas (Schmidley 1983). In the final listing rule (57 FR 588), the Service acknowledged that the Louisiana black bear was not a geographic isolate. Current observations indicate that some natural genetic exchange is likely

occurring between bears in Louisiana and Mississippi (Young 2006) and Louisiana and southern Arkansas (Savoie 2007) thus supporting the fact that this species is not geographically isolated.

Several studies have postulated the presence of bottleneck effects or genetic drift in some of the Louisiana bear populations. Miller et al. (1998) found a high level of genetic similarity between White River and Tensas River populations and suggested it indicated gene flow occurred between those populations. In Louisiana, they also observed less genetic variation in the Tensas River NWR and LARB populations than the UARB population and postulated it may be associated with bottlenecking given the low estimates of earlier population size cited by Pelton (1989). Boersen et al. (2003) determined that four microsatellite loci exhibited heterozygote deficiencies suggesting that there may have been inbreeding in the Tensas River NWR bears. Furthermore, based on their results, Boersen et al. (2003) speculated that the relatively low numbers of alleles at the observed microsatellite loci coupled with the low average heterozygosity were suggestive of genetic drift in this population and postulated it was probably due to lack of adequate travel corridors, and road mortalities. Triant et al. (2004) examined the genetic diversity of the UARB and LARB populations using microsatellite DNA analysis. Their study indicated the genetic diversity for the LARB population was lower than the UARB population but still within the range for other black bear populations indicating the LARB population was not severely deficient but may be at risk. They suggested that their ability to differentiate between the UARB and LARB populations corroborated the lack of exchange between those populations and could be the result of isolation by distance or dissimilar population histories and also possible effects from the Minnesota relocations (Triant et al. 2004).

Effect of Minnesota reintroductions on *U.A. luteolus* genetics: From 1964 to 1967, the Louisiana Department of Wildlife and Fisheries released about 160 black bears obtained from Minnesota (*U.a. americanus*) into two areas of Louisiana (similar reintroductions of bears from Canada and Minnesota into western Arkansas occurred during the 1950s and 1960s). Thirty one bears were released into Madison and Tensas parishes, Louisiana, an area with a known black bear population. The remaining bears were released into Point Coupee Parish in the upper Atchafalaya Basin, an area thought to be devoid of bears at the time (Nowak 1986). At the time of the release, it was estimated that bear habitat was much more extensive than found about 20 years later (Pelton 1989). Nowak (1986) speculated that none of the bears released in the Tensas-Madison Parish area remained in the release area. The bears apparently dispersed and most were recovered during the year of the release and one year after, indicating that most of those bears did not remain in the area (Nowak 1986). Bears released into the Upper Atchafalaya area were recovered for several years following the release, reproduction was observed, and some bears apparently established home ranges (Taylor 1971). Pelton (1989) stated it was likely that TRB bears had been affected by Minnesota transplants either from Arkansas or

the UARB population. The nuclear DNA analyses conducted by Vaughn et al. (1998) found little relatedness between the Minnesota bears and any population in Louisiana. Miller et al. (1998) using multi-locus DNA fingerprinting, specifically explored the effects of the Minnesota bear reintroductions on seven populations, three in Louisiana (TRB, UARB and LARB), three in Arkansas and one in Minnesota. They analyzed the genetic variability of 103 bears to investigate any effects from the Minnesota reintroductions. They did not find a statistically significant difference in the genetic similarity of the Louisiana and Arkansas bear populations and concluded that bear populations in Arkansas and Louisiana were more closely related to each other than they were to the Minnesota population (Miller et al. 1998). In Louisiana, they found that TRB and LARB bears exhibited less genetic variation than the UARB and concluded there was a possibility that the UARB gene pool may have been affected by the Minnesota reintroductions. They therefore determined that restocking efforts may have affected genetic variability within Louisiana populations, but those effects were not significant enough to alter their genetic similarity (Miller at al. 1998). Warrilow et al. (2001) analyzed the genetic variation (using microsatellite DNA) of 151 black bears to compare White River NWR bears in Arkansas to seven other black bear populations (two additional in Arkansas, three in Louisiana (TRB, UARB and LARB), and one in Mississippi-Alabama). These authors inferred an effect to the gene pool of several southern black bear populations (Arkansas, Louisiana and the Alabama/Mississippi populations) from the translocations; however, they noted that the overall pattern of inter-population relationships was not altered (Warrilow et al. 2001). Csiki et al. (2003) used microsatellite DNA markers to analyze the genetic variation of black bears in Minnesota, Arkansas (Ozarks, Ouachitas, and White Rivers) and Louisiana (Upper and Lower Atchafalaya). Their data indicated, in contrast to Warrilow et al. (2001) that two Arkansas populations, the UARB population and Minnesota bears were similar in overall genetic diversity supporting the supposition that bears in the Louisiana and Arkansas populations were wholly or mostly descended from reintroduced Minnesota bears (Csiki et al. 2003). Furthermore, they determined that southeastern Arkansas bears (i.e. White River) and LARB bears were genetically restricted and homogenous and represented isolated fragments of a single North American black bear population (Csiki et al. 2003) and that the morphological differences in subspecies observed in previous studies (e.g., Kennedy et al. 2002a) of the Louisiana black bear may be the result of a genetic bottleneck and founder effects rather than true genetic differences.

Synthesis: The numerous studies regarding presence or extent of genetic isolation and the effects of the Minnesota bear reintroductions have produced differing interpretations. These study results cannot be directly compared due to differing sample sizes, sample population distributions and methodologies. All studies suffered from low sample sizes or low numbers of markers. We do not believe we have definitive evidence of genetic isolation of Louisiana black

bear populations. We intend to continue work with these authors as investigations continue and further evaluation is conducted.

c. Taxonomic classification or changes in nomenclature: In 1821, Edward Griffith in his work "Carnivora" called the bear from Louisiana, "the yellow bear," according it full species rank: (i.e., *U. luteolus*) (57 FR 588). In 1893, C.H. Merriam described the Louisiana black bear based on the morphological distinctiveness of cranial features of five skulls from northeast Louisiana (Nowak 1986). Hall (1981) recognized three subspecies in the southeastern United States (*U.a.americanus, U.a. floridanus,* and *U.a. luteolus*). When the Service was petitioned to list the Louisiana black bear in 1987, the effects of the Minnesota bear relocations caused concerns that possible introgression of non-native genetic material had indeed affected this species and whether bears in Louisiana represented a disjunct population (Pelton 1989). In 1988, the Service and the Louisiana Department of Wildlife and Fisheries commissioned studies to clarify taxonomic concerns regarding the effects of potential hybridization with those non-native bears. Those studies included blood protein electrophoresis, mitochondrial DNA and skull measurements. General conclusions generated from that peer-reviewed report (Pelton 1989) indicated that based on morphological characters, *U.a. luteolus* was a valid subspecies (taxonomically) and the genetic difference between this subspecies and other black bears included in the study appeared to be minimal (Pelton 1989). There remained disagreement regarding the Louisiana subspecies as being validated by the multi-character morphological approach; however, the Service concluded that the evidence, although not overwhelming, did support the validity of the subspecies (55 FR 25341) and proposed listing. In the final listing, the Service determined that while circumstantial evidence remained that interbreeding with non-native subspecies may have occurred, a morphological distinctness was present in Louisiana bears that qualified them for listing (57 FR 588).

In addition to indicating that Louisiana black bears were distinct from other bears in the sample, Pelton's (1989) study also suggested that bears in Louisiana and Florida might be the same subspecies. This prompted interest in additional assessment of the morphometric data and evaluation of the systematic relationship between the Louisiana bear (*U.a. luteolus*) and the Florida black bear (*U.a. floridanus*) as distinct subspecies (Vaughn et al. 1998). The results of their study, while not conclusive regarding the relationship of Louisiana and Florida bears, did support the recognition of two or three subspecies in the southeastern United States (Vaughn et al. 1998). When the Service listed the Louisiana black bear, it primarily relied on Hall's (1981) depiction of the historical distribution; however, Hall (1981) included the southernmost counties of Arkansas as part of the historical range. The Service, while acknowledging that the Louisiana black bear was not a geographic isolate, did not include those counties as part of the historical range for the listed entity because there were no specimens to support doing so (57 FR 588).

Since listing, there has been continued interest in the taxonomic status of this subspecies and there have been several additional studies (examining morphometric and genetic data) relevant to the Louisiana black bear focusing on two general issues: (1) subspecific status for populations of the Louisiana bear regarding the potential effects of the Minnesota bear reintroductions; and (2) the relationship of the Arkansas White River National Wildlife Refuge (White River) black bear population (*U.a. americanus*) to the Louisiana black bear. As with earlier studies, the results are conflicting and not directly comparable due to differing objectives, differing population combinations and sample sizes analyzed, and differing techniques to assess genetic variation. Vaughn et al.'s (1998) four-year study (begun in 1992) on the systematic status of black bears in the southeastern United States, was based on two types of genetic analyses and two types of morphometric analyses. Their results were generally inconclusive. The nuclear DNA and skull morphology supported recognition of three subspecies (*U.a. luteolus, U.a. floridanus, U.a. americanus*); however, the body weight and morphometric data and mitochondrial DNA did not. As discussed previously, the authors could not reach consensus regarding the subspecific status of Louisiana and Florida bears (Vaughn et al. 1998). Miller et al. (1998) found that bears in Louisiana and Arkansas were more similar to each other than to Minnesota bears and more specifically that similarity between White River and Tensas bears was high. The data collected by Warrilow et al. (2001) indicated a southern grouping consisting of White River, Tensas River, Upper and Lower Atchafalaya and Alabama/Mississippi populations. Furthermore, their results provided strong support for associations between Upper and Lower Atchafalaya bears and also supported the hypothesis that the population of bears at White River NWR belonged to the *U.a. luteolus* subspecies (Warrilow et al. 2001). Kennedy at al. (2002b) assessed the subspecific status of the Louisiana and Florida black bears using morphologic features of the skull. They examined forty-four skull dimensions from over 200 black bear skulls from across the eastern United States. The Louisiana bear specimens were from north Louisiana and did not include UARB or LARB populations. Their results indicated that the introduction of bears from Minnesota had little influence on the morphology of the Louisiana black bear (Kennedy et al. 2002b). For bears in the coastal area of the southeastern United States, they were able to distinguish between *U.a. americanus, U.a. floridanus,* and *U.a. luteolus*, using a small number of morphological features, and thus they supported recognition of the current taxonomy of those subspecies (Kennedy et al. 2002b). As discussed previously (see Section II.C.1.b), Csiki et al. (2003) believed their data indicated that bears from the Ozarks, Ouachita, Inland Louisiana (i.e., UARB), and Minnesota populations were similar and were likely affected by or derived from the Minnesota relocations. They also concluded that White River bears and LARB bears were genetically more restricted and homogeneous, representing fragments of a single North American black bear population. Based on their study, the authors questioned the continuation of Federal status for the inland Louisiana population and suggested the more genetically distinct White River population might be more appropriate

for separate subspecies status (Csiki et al. 2003). Triant et al. (2004) found the UARB population to be more diverse than the LARB population, and suggested that the genetic structure had been affected by the relocation of the Minnesota bears and that the coastal population was more representative of the Louisiana bear. Kennedy (2006) assessed the subspecific taxonomy of black bears (203 male and 205 females) at the White River National Wildlife Refuge and 11 additional locations to determine the morphological association of White River bears to other populations in the eastern United States and also specifically with Louisiana populations. Based on his examination and analyses of 44 morphological characteristics he determined that overall, White River bears are more similar to southern populations of bears than to northern populations or locations restocked from northern populations (Kennedy 2006). Furthermore, the results of discriminant function analyses (based on features representing length, width, height, and dentition) indicated not only a similarity of White River bears to both *U.a. americanus* and *U.a. luteolus*, but also uniqueness from both of those subspecies. Those results did not support designation of this population as *U.a. luteolus* as recommended by Warrilow et al. (2001) but also did not support assignment of this population to *U.a. americanus* (Kennedy 2006). Kennedy (2006) suggested that the results could be interpreted to support Hall's (1981) delineation of southern Arkansas as a zone of contact between these two subspecies. Kennedy (2006), did not make a determination regarding subspecific status of White River bears due to uncertainty of the genetics of those bears as evidenced from previous studies (Warrilow et al. 2001; Csiki et al. 2003) and recommended it be recognized as *U. americanus subspp. indet*. The most recent genetic analysis of black bear populations was conducted by Van Den Bussche et al. (2009) in which the authors examined mitochondrial DNA for 409 black bears from 15 populations in North America. This is the most comprehensive study to date. They determined that the introduction of Minnesota and Manitoba bears affected the genetic characteristics of bears in western Arkansas; however, the genetic characteristics of black bears in Louisiana were minimally affected by the introduction of Minnesota bears. The findings of Van Den Bussche et al. (2009) were consistent with that of Warrilow et al. (2001) in that they did not detect a statistically significant genetic differentiation between the White River and inland and coastal populations of Louisiana bears. It is problematic; however, that the Tensas population, while it did fall into a larger grouping of southern black bears from eastern Oklahoma, southeastern Arkansas, Louisiana, western Texas, and Mexico, was not included with this smaller grouping and was statistically different from those three populations. The authors did not offer possible explanations (Van Den Bussche et al. 2009).

Synthesis: The Service listed the Louisiana black bear recognizing its subspecies status and distribution based on morphometric characters. The numerous studies of both morphometric and genetic characters have produced differing interpretations of the subspecies distribution but no all-inclusive definitive determination. Comparison of those studies is limited due to differing

sample sizes, markers used, and distributions. Therefore, consideration of additional data, as it becomes available, in an inclusive analysis could help resolve remaining concerns. The numerous studies of both morphometric and genetic characters have produced differing interpretations of the accurate taxonomy and distribution of bears in Louisiana but no definitive determination or conclusion that has been accepted. The original listing (57 FR 588) included protection (due to similarity of appearance) for the American black bear within the listed range of the Louisiana black bear and acknowledged exchange between southern Arkansas and Louisiana bears. Therefore, we do not recommend any changes to the taxonomic status of this animal at this time.

d. Spatial distribution, trends in spatial distribution or historic range: The Louisiana black bear was listed primarily because of historical modification and reduction of habitat, the reduced quality of remaining habitat due to fragmentation and the threat of future habitat conversion. Wooding et al. (1994) estimated 2,779.6 mi^2 (7,199 km^2) of occupied bear range in Louisiana. Clark et al. (2005) estimated 1,127.8 mi^2 (2,921 km^2) of occupied habitat. The discrepancies between these two reports are likely a result of the differences in available methodologies that allowed for a more detailed analysis (Clark et al. 2005). Currently, Louisiana black bears predominantly occur in the same core concentrated breeding subpopulations in Louisiana as were present at listing; the TRB (Tensas), UARB (Upper Atchafalaya), and the LARB (Lower Atchafalaya) River Basins, Louisiana. Additional breeding populations not present at the time of listing now exist, one located between the TRB and UARB on the Richard K. Yancey WMA, and in Mississippi. No reproduction has been documented in East Texas.

Tensas River Basin: The TRB breeding population occurs on a complex of bottomland hardwood forests comprised of Tensas River NWR, adjacent Big Lake WMA, and four nearby small, relatively isolated, forested tracts formerly owned by Deltic Timber Corporation (Deltic) in Tensas, Madison, Franklin, East Carroll, and Richland Parishes in Louisiana. The Deltic tracts support one of the highest densities of black bears reported for the southeastern coastal plain (Beausoleil 1999). The Deltic tracts are approximately 14 mi (22.5 km) north of the Tensas River NWR; their closest areas are separated by only 2.5 mi (4 km) and by U.S. Interstate 20 (I-20). This distance has been closed via habitat restoration efforts on private lands. Louisiana black bears inhabiting the Tensas River NWR group have generally been considered a separate group of bears from those inhabiting the Deltic tracts. Only one instance of a bear moving between these two areas has been documented (Anderson 1997). Though the two subgroups are separated by I-20 and U.S. Highway 80, a significant amount of habitat between those subgroups has been restored primarily within the last 10 years. Increased sightings and vehicular mortality of bears in the vicinity of I-20 indicate that bears are attempting to disperse (Benson 2005, LDWF unpublished data). Preliminary results from ongoing LDWF - USGS studies indicate there has been exchange between these two areas.

Upper Atchafalaya River Basin: The UARB population is located primarily within the Morganza Floodway (periodically used to divert flood waters from the Mississippi River; most recently in 2011) and the forested areas between that Floodway and False River in Pointe Coupee Parish in Louisiana, and is approximately 110 mi (177 km) south of the TRB population (Figure 2). Much of the surrounding land between these two populations has been cleared for agricultural use; however, as discussed previously there have been targeted habitat restoration efforts here and between this population and the TRB population to the north.

Lower Atchafalaya River Basin: This population is found primarily south of U.S. Highway 90 (Hwy. 90) and west of the lower Atchafalaya River and Delta, in the coastal area of St. Mary and Iberia Parishes. It is located approximately 70 mi (113 km) south of the UARB population and is separated from that population by U.S. Interstate 10, Hwy. 90, the Atchafalaya River, Bayou Teche, agricultural lands, developed areas, and permanently and seasonally inundated portions of the Atchafalaya River Basin (Figure 1), which is not currently believed to contain breeding bears due to the flooding regime. Population expansion for this population is limited by development along Hwy. 90 to the north, and by the surrounding coastal marsh, which is believed to be unsuitable for sustaining bear populations.

Rickard K. Yancey WMA (formerly Red River and Three Rivers WMA) : Reintroduction efforts from 2001 to 2009 resulted in this newly formed breeding subpopulation in Avoyelles and Concordia parishes, Louisiana near the confluence of the Mississippi and Red Rivers. This area contains approximately 100,000 ac (40,469 ha) of publicly owned, forested land (Richard K. Yancey, Grassy Lake, Pomme de Terre and Spring Bayou WMAs, and Lake Ophelia NWR; [repatriation area in Figure 2]). This area is primarily separated from the TRB and the UARB populations by agricultural lands. The location of this population is key to increasing connectivity and exchange between the existing TRB and UARB populations.

Mississippi: The majority of bears found in Mississippi have been males that have dispersed from populations in other states at some point during their lives. Recently however, females have been documented with greater frequency in several areas of the state. Biologists currently estimate Mississippi's bear population at around 120 animals (approximately 75 percent within the Louisiana black bear listed range) based on research captures and sighting reports, though this number can fluctuate annually and seasonally due to such factors as food availability and dispersal from populations in adjacent states (B. Young, MS Wildlife Federation, personal communication, 2013). An additional breeding population is forming naturally in the south Delta region of Mississippi along with evidence of reproduction in other counties along the Mississippi River in south Mississippi (B. Young, MS Wildlife Federation, personal

communication, 2013). Over the past four years evidence of females and cubs in Clairborne and Wilkinson Counties has become more consistent (B. Young, MS Wildlife Federation, personal communication, 2013). The quantity of bear habitat in Mississippi may be greater than Louisiana. The occupied range of black bears in Mississippi appears to have increased and bears have been returning to areas within their historic range (Simek et al. 2012).

East Texas: The current status of the Louisiana black bear in Texas is unknown. Today black bears are rare in east Texas. Since 1990, there have been only 37 verified black bear sightings in 13 east Texas counties, and preliminary examination of these data suggest that some observations may represent duplicate sightings of individual bears (D. Holderman, TPWD, personal communication, 2013). Bears appear to be returning to their historic range in Texas; however, it is generally believed that many of the bears near the northeastern part of the listed range are coming from expanding bear populations in Oklahoma and Arkansas (Barker et al. 2005). Observations in the 1990s indicate the return of a few black bears to the remote forests of East Texas, primarily transient, solitary males that are believed to be coming from Arkansas and Oklahoma (D. Holderman, TPWD, personal communication, 2013). There is no current evidence of a resident breeding population of black bears in East Texas; however, increased sightings combined with bear recovery and range expansion in bordering Louisiana, Arkansas, and Oklahoma will likely increase bear occurrence and activity in East Texas in the next ten years.

North Louisiana: Clark et al. (2005; Figure 1) indicated the presence of a small breeding population with a few individuals crossing between Louisiana and Arkansas. This is likely the result of a successful black bear reintroduction project in Arkansas where individual female bears, reintroduced onto Felsenthal National Wildlife Refuge in Arkansas, have moved south into Louisiana (Savoie 2007).

Based on reporting data, the general geographic distribution of Louisiana black bear sightings has increased. In recent years, there have been reports of wandering males or juveniles in nearly every Louisiana parish to wandering males in many parishes far outside the core breeding areas (M. Davidson, LDWF, personal communication, 2013). Similarly, there has been an increase in sightings within the listed range in both Mississippi and Texas. Black bears have been documented moving between Arkansas and Louisiana into Mississippi (Young 2006, Savoie 2007).

Synthesis: Breeding populations that were present at listing are still present in the same geographic areas. Abundance estimates indicate that these populations have increased and are growing (see discussion in Section II.B.3.1). An additional breeding population (the result of a reintroduction project) now exists in Louisiana and is located between the TRB and UARB populations; no population estimates are available but the number of breeding females has

increased since 2005. Additional breeding populations are forming naturally in two areas of west Mississippi. The slow rate of natural population expansion in fragmented habitats supports the efforts to expand populations through reintroduction and focused habitat restoration. The geographic distribution of non-breeding bears (mostly wandering adult and juvenile males) appears to be increasing in Louisiana and Mississippi. It is not unusual to get reports of wandering bears anywhere in Louisiana. Bear reports are also increasing in East Texas although the origin of those bears is uncertain. Some of this increased reporting may be due to the increasing use of wildlife cameras by many people; however, the number of live sightings reported to LDWF and MDWFP has also increased in numbers and geographic distribution since listing.

e. Habitat: There have been several studies to look at the extent and distribution of black bears and their habitat (including the Louisiana black bear) in the southeastern United States (Wooding et al. 1994; Rudis and Tansey 1995, Clark et al. 2005, Scheick et al. 2011). The spatial scale of those studies however, is not suitable to estimate detailed temporal changes for the Louisiana black bear. Several promising studies on the evaluation of black bear habitat at a landscape scale have been developed by Wagner (2003), Kaminski (2011) and Murrow and Clark (2012).

Schoenholtz et al. (2001, 2005) described a "promising or encouraging" trend in the annual increase of afforestation (planting of trees to create forested habitat) in the Lower Mississippi River Alluvial Valley (LMAV). Available data indicates that over the past three decades, forest restoration in the LMAV portions of Louisiana, Mississippi, and Arkansas has increased dramatically, and has led to a significant removal of land from agricultural production for the purpose of hardwood forest establishment (Gardiner and Oliver 2005).

GIS technology was just emerging in the 1990s, so at the time of listing, the amount and distribution of Louisiana black bear habitat was a best professional estimate based on hand-drawn maps. In addition, the geographic areas used to make those estimates were often not well described and varied by study, making it hard to directly compare historic conditions to the present. For this reason, when available, several estimates of habitat availability around the time of listing are reported here for comparison. Today, with GIS and remotely sensed data (e.g., aerial and satellite imagery) the technology exists to accurately identify and map habitat composition, distribution, and trends in a detailed (although scale- dependent), consistent and reproducible manner. We used this method to look at current forested habitat. We also present information on habitat amounts, distribution and trends over time of conservation lands. This presents a more accurate depiction as ownership/easement boundaries and changes in the amount and distribution were more easily and correctly obtained.

<u>Louisiana</u>

Habitat Data Methodology: Historic estimates of available black bear habitat (i.e., forested areas) were obtained from published studies, reports and notices. Other estimates were derived from the 1992, 2001, and 2006 digital grid (raster) National Land Cover Dataset (NLCD) developed by The Multi-Resolution Land Characteristics (MRLC) Consortium. The MRLC is a group of Federal agencies who develop datasets used to track regional and global changes in land cover and land use, including such essential categories as forest and grassland cover. The MRLC consortium is specifically designed to meet the current needs of Federal agencies for nationally consistent satellite remote sensing and land-cover data. We transformed the digital raster data to a vector format in order to obtain the most accurate habitat delineations. As we began to examine the data, two limitations to using the NLCD data became apparent: (1) differences in mapping and classification technologies make it impossible to accurately quantify habitat changes between the 1992 and the other two datasets (thus 1992 is best presented visually; Figure 6); and (2) it is unlikely that prior-converted lands that have undergone restoration less than 15 years after the date of the imagery would be correctly classified as forest or shrub scrub for that time period, thus these estimates would not account for recent restoration efforts between 2001 and 2006 (Figure 7). An additional consideration is that flooded forest areas (especially in the 2001 and 2006 data) are likely to be indicated as forested cover (e.g., in the Atchafalaya basin) and may therefore overestimate forested areas that would provide suitable bear habitat. Because of those considerations, only the most recent (2006) data were analyzed for current information to provide a baseline from which habitat trends could be accurately assessed as future NLCD data sets become available.

Conservation Lands Methodology: Conservation lands were defined to include public (state and federal) and private lands that have some form of permanent protection as well as some private lands under temporary protection (i.e., CRP enrollments). The boundaries were determined from geospatial data sets developed by the Service's Lafayette, Louisiana Field Office, the Service's Southeast Region Realty Division, and other State and Federal agencies

Habitat Restoration Planning Maps: The identification of habitat necessary to achieve the recovery criteria for the Louisiana black bear was started as part of a WRP pilot program in 1990 and in 2000 resulted in the development of the "Louisiana Black Bear Habitat Restoration Planning Maps". Those maps, developed by a collaborative multi-agency and organization group (Federal, State, local government partners, and nonprofit organizations including but not limited to: NRCS, LDWF, BBCC, Louisiana State University, the Louisiana Nature Conservancy, and the Service), are designed for use with conservation programs, many of which encourage reforestation of marginal and nonproductive cropland in Louisiana (e.g. WRP). The maps, using a 3-tiered point system, establish higher point zones (indicating higher importance for bear recovery) around breeding bear habitat, large forested areas, and various natural habitat corridors connecting bear populations from the northern to southern

portion of the state. Areas that would benefit breeding populations and corridors thus receive the highest priority and landowners competing for WRP enrollment would receive higher rankings in those areas. Landowners enrolled in the WRP sign permanent easements protecting the land from future conversion or development. The Louisiana HRPA maps are regularly updated, with the most recent update in the spring of 2011 (Appendix B).

In 2003, to further focus restoration efforts, a Louisiana black bear corridor Wetland Reserve Program Special Project was officially accepted by the NRCS. The NRCS committed to utilizing approximately 10 percent of the state WRP funds to purchase easements within the HRPA special projects area. The special project areas designated potential contiguous corridors from northern Madison Parish (i.e., Deltic tracts) through northern Pointe Coupee Parish, linking the TRB, reintroduction, and UARB bear populations.

Similar conservation priority maps have been developed and are currently in use in Mississippi (Ginger et al. 2007; Figure 5). Recently, the Texas Parks and Wildlife Department and partners have developed Land Conservation Priority Maps for East Texas and a Hardwood Habitat Cooperative that offers a cost-share program to landowners that want to restore or enhance hardwood habitat and conservation lands priority areas.

In order to provide a consistent, well-defined and biologically-based analysis area that could be used as a basis for future assessments; we chose to use the most recent (2011) HRPM boundaries as the areas within which to describe the status and trends of black bear habitat for this review.

Habitat Trends in Louisiana: Using historical records and unpublished reports (through 2005), we developed several estimates of forested habitat within the Louisiana HRPAs around the time of listing (1991-1993) for the TRB and the Atchafalaya Basin and compared those to available published reports. We did this because, as discussed previously, the black bear habitat areas in many of those early reports were not precisely defined. Having a range of estimates allows for a general evaluation of forested habitat trends.

Tensas River Basin: Gosselink et al. (1990) estimated approximately 388,000 ac (157,000 ha) of mixed bottomland and forested habitat remained in the TRB around the time of listing. Weaver et al. (1990a) estimated less than 150,000 ac (60,700 ha) were left in that basin. The difference between those two estimates may be explained by the fact that Weaver's estimate was likely more related to habitat actually used by bears at that time and not all forested habitat within the basin. The TRB as delineated in the HRPA maps encompasses a larger area than the Tensas River Basin as delineated by Gosselink et al. (1990) or Weaver (1990) and extends south to the Richard K. Yancey WMA area. A habitat analyses conducted for the Service's 1993 proposal to designate critical habitat (56 FR 65360) over that larger area indicated there were approximately 483,000

ac (195,464 ha) of forested habitat. Based on those analyses, we estimate there was roughly 400,000 to 500,000 ac (161,875 to 202,343 ha) of forested habitat in the TRB in the early 1990s. Using forested habitat as delineated by the 2006 NLCD, we estimated approximately 688,000 ac (278,424 ha) of forested habitat in the TRB. Over 628,000 ac (254,143 ha) of that area was designated as critical habitat in 2009 (74 CFR 10350).

Upper Atchafalaya River Basin: Historical reports do not break the Atchafalaya River Basin into the two areas that we use in terms of bear recovery and habitat restoration planning (i.e. UARB and LARB) but make delineations based on the Corps' Atchafalaya Basin Floodway (Floodway) delineation (Figure 2). The Floodway is roughly equivalent to the UARB as we define it for bears. The upper portion of the Floodway is composed of a mixture of open land and early, mid- and late- successional bottomland hardwood forest; further south, that floodway is dominated by cypress-tupelo swamp that is generally too wet to provide suitable permanent habitat for black bears. It also contains early to mid-successional bottomland hardwoods found on higher lands. O'Neil et al. (1975) estimated there were approximately 718,000 acres (290,565 ha) of mixed bottomland hardwood forest in the entire Floodway with approximately 500,000 ac (202,000 ha) south of U.S. 190. When the Louisiana black bear was listed, the estimated amount of forested habitat remaining north of U.S. 190 had been reduced 40 to 50 percent (100,000 to 128,000 ac [40,469 – 51,800 ha] (57 FR 588). Based on those analyses, we estimated there were approximately 600,000 ac to 700,000 ac (242,812 ha – 283,280 ha) of forested habitat in the UARB area in the early 1990s. The 1993 proposed critical habitat analyses (56 FR 65360) indicated there were approximately 686,326 ac (277,747 ha) of forested habitat in the UARB area (this includes areas north and south of U.S. 190). Using the 2006 forested habitat as delineated using NLCD (this would include some areas that may be flooded), we estimated there was approximately 756,000 ac (305,943 ha) in the UARB. Approximately 433,680 ac (175,504 ha) of that has been designated as critical habitat (74 FR 10350).
In 1981, the Service, as part of the interagency planning team for the Corps Atchafalaya Basin Floodway projected that approximately 20,000 ac (8,094 ha) of aquatic habitats in the Basin would be converted to primarily early successional bottomland hardwoods or other terrestrial habitats by the year 2030 (LeBlanc et al. 1981). Those successional changes would eventually convert most of the basin forests to bottomland hardwoods, with some cypress/ tupelo swamps remaining in former aquatic areas (especially in the southeastern portion of the basin), thus providing more suitable black bear habitat; in the meantime use by black bears is primarily for travel and is restricted to the ridges and levees bordering and within the Basin.

Lower Atchafalaya River Basin: The LARB contains areas of forested wetlands, wetland scrub, upland forests and coastal marshes (Nyland and Pace 1997) all of which may be utilized to some degree by bears. Estimates of bear habitat for this area vary greatly. Nyland and Pace (1997) evaluated the use of

National Wetland Inventory data to delineate bear habitat but determined that the forest type delineations were too broad to be useful. We were not able to estimate the amount of forested areas in the LARB around the time of listing from internal maps and reports nor were we able to tease it out from the above-mentioned studies. Nyland (1995), based on his trapping data, estimated that bears occupied approximately 140,000 ac (56,656 ha) in Iberia and St. Mary Parishes. This is probably a slight underestimate of forested and occupied habitat at that time since it was based primarily on trapping data and did not include Avery Island to the west, a forested salt dome known to be used by bears. The habitat analyses conducted for the Service's 1993 proposal to designate critical habitat (56 FR 65360) indicated there were approximately 118,841 ac (48,093 ha) of forested habitat in the coastal area. In 2009, 133,636 ac (54,080 ha) were designated as critical habitat for the Louisiana black bear (74 FR 10350). Suitable habitat conditions for LARB population expansion in the coastal area are limited by surrounding agriculture, development along Highway 90 to the north, and by the surrounding coastal marsh, which, although occasionally used (Nyland 1995) is believed to be less than optimal for sustaining bear populations. The fragmented nature of the habitat supporting LARB population and the proximity to the coast pose a risk for the LARB population (Murrow and Clark 2009). Hurricanes are a common occurrence along coastal Louisiana. Murrow and Clark (2012) studied the impacts of Hurricanes Katrina and Rita on habitat of the LARB population. They did not detect any significant direct impacts to forested habitat; however, they indicated that indirect effects (e.g., saltwater intrusion) may occur later in time. The proximity to humans, effects from urban development and the potential threat from coastal wetland loss continue to threaten the LARB population and its habitat.

These rough historical estimates suggest some level of increase in forested habitat over time for the TRB. Trends in the UARB and LARB are less clear. As discussed earlier, these data do not account for the recently restored WRP tracts (Table 3). As those tracts approach a dense shrub-scrub stage (about 10 years) bears will use these areas for normal activities including denning. These types of habitat are not detected in the current NLCD delineation but should be identified in future NLCD classifications. Additionally, while, based on these data, there does not appear to be a large increase in forested habitat in the UARB and the LARB, there is an increase (as discussed previously) in the amount of habitat that is protected (Table 6).

Small–scale loss of Louisiana black bear habitat occurs primarily as a result of federal projects requiring permit review under section 404 of the CWA and/or coordination among regulatory agencies pursuant to the Fish and Wildlife Coordination Act and Section 7 of the ESA. Both the LDWF and the Service work with the Corps prior to permit issuance to reduce impacts to the Louisiana black bear and its habitat from such activities. Impacts from direct habitat loss (i.e., acres) as well as its function for bears (e.g., fragmentation reduction, travel

corridors) are considered during ESA consultation. From 2009 through 2011, thirty-five projects within black bear critical habitat were reviewed. The average amount of permanent habitat impacts were 1.8 ac (0.73 ha), 2.6 ac (1.1 ha), and 3.4 ac (1.4 ha) in the TRB, UARB and LARB respectively. Compensation is generally provided at a 2.5:1 ratio and occurs within the same hydrologic unit as the impacts. The Service regularly advocates that compensation should include replacing suitable black bear habitat functions (e.g., travel corridors, breeding habitat) with areas of a like or higher quantity and quality. The increase in habitat achieved through conservation efforts generally provides habitat with a similar function for bears and overall generally outweighs loss or impacts resulting from individual development projects.

Mississippi: Habitat trend data specifically for Louisiana black bear populations in Mississippi is lacking, however, bear habitat throughout Mississippi is estimated to have decreased by approximately 80 percent of historic values by 1980 (Simek et al. 2012). From 1994 through 2007 over 138,000 ac (56,000 ha) of agricultural private land in counties adjacent to the Mississippi River (Figure 5) have been restored and enrolled in permanent easements under the WRP (Ginger et al. 2007). As of 2013, those Mississippi totals have increased to 165,203 ac (66,855 ha) in WRP and 338,000 and (137,055 ha) in CRP (J. Austin, USFWS, personal communication, 2013). Shropshire (1996) found that Adams County had the most suitable habitat (34-100%) in Mississippi and that Delta National Forest (NF) was comparable in habitat quality to Tensas River NWR. Habitat suitability models based on landscape characteristics, human attitudes, and habitat quality found the highest habitat suitability was in southern Mississippi, and lowest was in the Delta region (Bowman 1999, Bowman et al. 2004). They found that the DeSoto and Homochitto National Forests in southern Mississippi are capable of supporting bear populations 4 to 5 times greater in magnitude than public lands in the Delta region. Similar to the trend for the TRB area, in the Lower Mississippi Valley of Mississippi, the total forested area increased by 11 percent between 1987 and 1994, and reforestation of former agricultural lands accounted for nearly 40 percent of that increase (King and Keeland 1999).

East Texas: Black bears apparently disappeared from the East Texas area primarily due to overhunting (Barker et al. 2005) although habitat loss and fragmentation have also occurred. The Neches Bottom and Jack Gore Baygall Units of Big Thicket National Preserve are also highly suitable for bears (Epps 1997). Epps (1997) found that mast-producing trees in those units, and based on fall food availability provided by trees in the white oak family alone, those units could theoretically support 48–86 bears, or 3.5 -6.4 bears/mi^2 (1.36–2.47 bears/ km^2) (Epps 1997). Den trees were scattered but common, with suitable den trees ranging from 10 – 140 trees/mi2 (4 to 54 trees/ km^2) (Epps 1997). The Texas Parks and Wildlife Department field analyses of remaining potential black bear habitats within East Texas (using habitat suitability models) found that the Sulphur River Bottom, Middle and Lower Neches River Corridors, and

Big Thicket National Preserve areas in east Texas were all suitable for black bears and that the Middle Neches River Corridor provided the most suitable location for any bear restoration or management efforts in east Texas (Garner and Willis 1998). Kaminski (2011) used Habitat Suitability Indices (HSI) for black bears in east and southeast Texas to identify 4 recovery units (ranging in size from 74,043 to 183,562 ac (31,583 to 74,285 ha) capable of sustaining viable back bear populations. Estimated HSI scores for each were comparable to other estimates for the occupied range of black bears in the southeast and the estimated acreage of suitable habitat for all units exceeded those estimated to support existing Louisiana black bear populations (Kaminski 2011). Approximately 11.8 million acres (477,530 ha) of the Pineywoods area of East Texas is classified as forest of which approximately 61 percent is non-industrial private timberland (Barker et al. 2005). Habitat fragmentation may become a concern in East Texas as timberland owners dissolve their holdings over much of southeast Texas lands (Barker et al. 2005). Future water reservoir developments further threaten the highest quality habitat remaining in East Texas (Barker et al. 2005). Habitat and management actions voluntarily taken by private landowners are one important component of those restoration activities.

Conservation Land Trends: Using historical records, we developed a rough estimate of the amount of habitat within the Louisiana HRPA that was permanently protected (primarily publicly owned lands) around the time of listing (1991). We estimated that approximately 85,000 ac (34,398 ha) existed in the TRB, 141,000 ac (57,061 ha) in the UARB and 1,200 ac (486 ha) in the LARB (Table 6). The amount of permanently protected public lands has increased substantially to 253,000 ac (102,386 ha) in the TRB, 225,000 ac (91,054 ha) in the UARB and 9,000 ac (3,642 ha) in the LARB (Table 6). As discussed in Section II.B.3.3, there are approximately 379,000, 363,000, and 10,000 ac (153,376, 146,901, and 4,047 ha) of conservation lands that have been permanently protected and/or restored in the TRB, UARB and LARB, respectively (Table 4, Figure 3). Similarly, in Mississippi from 1994 through 2007 over 138,000 ac (56,000 ha) of private land adjacent to Louisiana have been enrolled in permanent easements under the WRP and 328,000 ac (132,737 ha) were enrolled in the CRP (Figure 5) (Ginger et al. 2007). As of 2013, those Mississippi totals have increased to 165,203 ac (66,855 ha) in WRP and 338,000 and (137,055 ha) in CRP (J. Austin, USFWS, personal communication, 2013). Between 2008 and 2011, over 500 acres have been restored and 1,550 acres have been enhanced in East Texas through the Service Hardwood habitat Cooperative. Undoubtedly there have been additional acres protected or restored via federal, state or private efforts.

Synthesis: Due to the limitations on imagery and classification, the level of detail in historical forested habitat maps does not allow for detailed comparisons of habitat trends over time. Those rough historical estimates; however, indicate an increase in forested habitat for the TRB. This is supported by the increase in

areas of private land that have been restored as well as larger scale analyses for forest habitat trends over the whole Lower Mississippi Valley. Protected lands within the Louisiana black bear's range have increased in Louisiana and similarly but to a lesser extent in Mississippi. Forest trends in the UARB are less clear. A significant amount of area within the Atchafalaya Basin Floodway (south of U.S. 190) that was not protected from development at the time of listing is now protected through Corps easements and ownership. While much of this area is flooded, studies project an increase in suitable habitat in the future (LeBlanc et al. 1981). North of U.S. 190, trends are not as clear even though there has been a substantial amount of habitat restoration in that area. As discussed earlier, the available remotely sensed data are not able to detect recently restored WRP tracts. As those tracts approach a dense shrub-scrub stage (about 10 years) these types of habitat should be detected in future NLCD classifications and accurate assessment of habitat change should be possible. There are no accurate historical estimates of habitat in the LARB to use to assess trends over time.

While, based on the NLCD data, there does not appear to be a large increase in forested habitat in the UARB and the LARB, using the conservation lands data, there is a substantial increase in the amount of suitable habitat that is either protected or being restored and is protected from development across the Louisiana black bear's range.

f. Other: Human Dimensions

Social Tolerance

Louisiana - Most people who currently live within the occupied range of the Louisiana black bear grew up during a time when bears were relatively uncommon. Consequently, in urban areas residents are frequently surprised to learn that bears occur nearby (Cotton 2008). Early efforts focused primarily on educating the general public about bears and the protections afforded under the ESA. As recovery efforts progressed and the public became more familiar with bears, the focus shifted to addressing nuisance bear behavior and actions that can be taken by individuals to reduce the likelihood of problems. Although no human injury by the Louisiana black bear has ever been documented in Louisiana, the most common complaint concerns human safety (Cotton 2008) and so outreach and education efforts now focus on public safety concerns as well. A growing number of complaints and concerns have been expressed by deer hunters when bears damage tree stands and four-wheeler seats or eat corn at their deer feeders. A smaller number of complaints come from farmers experiencing damage to corn, sugar cane crops or apiaries.

Prior to the reintroduction project, the BBCC, in partnership with LDWF, USDA-Wildlife Services, and FWS, distributed information packets to landowners in the vicinity, made them available at state WMAs and held workshops around the relocation area. The packets contained information about

the proposed project, bear ecology, the ESA, contact information, and forms to provide a written response to the Service. Of the approximately 55 workshop attendees only 18 percent expressed a negative opinion or concern about the project. Van Why (2003) conducted a survey of sportsmen in the reintroduction area. Hunters strongly supported (>80%) the reintroduction of bears, however, knowledge about the restoration plan itself was relatively low (<60%) despite information packet distribution and public meetings (Van Why 2003, Van Why and Chamberlain 2003a).

Peterson (2011) conducted a public opinion survey of Louisiana residents in seven parishes within Louisiana black bear areas. The results of that study indicated that male, Caucasian, coastal respondents with higher incomes had more positive attitudes towards bears than older respondents and those who had experienced property damage. Respondents in the northern parishes were more knowledgeable about bears but had the lowest negative attitudes towards bears (Peterson 2011). In 2012, the LDWF contracted with a firm to conduct a state-wide public attitude survey regarding bears. Over 1,200 Louisiana residents were interviewed regarding their opinions on and experience with Louisiana black bears and black bear management options (Duda et al. 2013). That study indicated most residents valued and cared about having Louisiana black bears and their habitat in Louisiana but were cautious about having black bears too close to them (Duda et al. 2013). About one-half of residents believed that people and bears can live in the same area without conflict and about 85 percent agreed that most problems with black bears can be prevented by taking a few simple precautions (Duda et al. 2013).

Mississippi – A primary focus of the MDWFP Black Bear Program has always been education and outreach specifically aimed at educating citizens and sportsmen about black bears in Mississippi. Those activities include public presentations (over 300 to date), written information for distribution, and an annual festival in one of the primary Mississippi bear recovery zones (B. Young, MS Wildlife Federation, personal communication, 2013). Surveys regarding management of black bear populations conducted in 1996 indicated that timber companies and the general public were supportive of maintaining or increasing the bear population, landowners and land managers were unsure, and beekeepers were not supportive (Shropshire 1996). Bowman's 1999 survey found most respondents supported increasing the bear population. Landowner attitudes differed between areas of high (White River NWR area) and low (Mississippi) density bear populations, with people in high density areas only moderately supportive of an increased bear population where they had experienced more bear damage, in contrast with people in low density areas that were strongly supportive and received less damage (Bowman 1999, Bowman et al. 2001).

Texas- Morzillo et al. (2005) studied the social impacts of bear management in southeast Texas and found that more than one-half of respondents asked about

the feasibility of bear population recovery in southeast Texas indicated acceptance of the bear's return. Approximately one third supported natural repopulation and fifty percent supported active reintroductions into suitable habitats (Morzillo et al. 2005). Approximately 39 percent of respondents were unsure about potential problems bears can cause (Morzillo et al. 2005). Keul (2007) assessed public opinions of residents in six northeast Texas counties and found that most were not knowledgeable about bears. Additionally, while respondents generally liked the idea of having bears return, they did not feel it was necessary for the TPWD to restock them (Keul 2007). More recently, Williams et al. (2011) assessed the public knowledge, opinions and attitudes of 420 households in six counties of East Texas. They found, similar to other studies, that the majority of respondents supported having bears in the region; over one-half felt they should increase naturally (Williams et al. 2011). The percentage supporting active reintroduction was low but increased if steps were included to reduce human-bear conflicts (Williams et al. 2011).

Conflict Management

Shortly after the Louisiana black bear was listed, state, Federal, and private groups, understanding that rapid response to human-bear conflicts (e.g., bears in or near residences, bear in or near deer feeders, etc.) was crucial to building public support for this species' recovery, developed a Multi-Partner Nuisance Bear Contingency Plan (signed in 1994). That plan outlined timelines, methods, and responsibilities among the partners for responding to human-bear conflict situations and was used as a guide until about 1999. During those years, the numbers of nuisance complaint calls received was relatively small (i.e., 30 to 50 annually) with about one-half requiring site visits. The Contingency Plan served well for handling those calls. Management actions taken included: advice to landowners on how to reduce or remove attractants, aversive conditioning (e.g., trapping, hazing with rubber buck shot or dogs,), occasional removal and relocation and infrequent euthanasia when a bear repeatedly exhibited behavior presenting a demonstrable threat to human safety. In 1999, the LDWF assumed the lead for human-bear conflict management in Louisiana and subsequently established a Large Carnivore Program that currently employs two full-time biologists. In 2008, LDWF established Wildlife Conflict Teams to address the increasing number of human-bear conflicts. Similarly, MDWFP has also assumed the lead for conflict management in their state. The U.S.D.A. Wildlife Services (WS) assists each state with conflict management. Texas Parks and Wildlife is developing a conflict response plan. The LDWF and WS annually respond to numerous phone calls from the public. Responses may vary from advice provided over the phone to site visits to identify and advise how to remove potential sources of bear attractants (e.g., garbage control), to management actions by the agencies, including aversive conditioning, capture and physical removal, and infrequently lethal removal.

Although the potential for conflict occurs throughout the occupied range of the bear, conflicts in Louisiana are highest in the lower LARB population of coastal

St. Mary and Iberia Parishes and more recently the TRB. The LARB population lives in relatively close proximity to developed areas and nuisance behavior is a chronic problem requiring a significant amount of response efforts. Many of the aversive conditioning techniques are time intensive and the effects are generally temporary displacement of bears (Leigh 2007). As the number of complaints increased the LDWF has shifted from a responsive to a proactive mode (Davidson et al. 2007). As a result of discussions with the LDWF, WS and BBCC, St. Mary Parish instituted a parish-wide bear-resistant garbage container program; a significant step to reducing conflict in the LARB. Proper use of the bear -resistant containers became a concern and beginning in 2009, the LDWF approached St. Mary Parish officials to provide bear-resistant garbage cans in target areas in order to reduce the number of bears entering residential neighborhoods. That program has been very successful. In some locations weekly nuisance complaints have been reduced to rare occasions (C. Siracusa, St. Mary Parish, personal communication, 2012). Additional benefits (e.g., increased public awareness of ways to avoid human-bear conflicts, increased public support for bears) have been derived because of extensive outreach and education efforts in that community. The results of Peterson's (2011) and Duda et al.'s (2103) studies on the knowledge of and attitudes towards bears of residents in selected Louisiana parishes have also caused LDWF public outreach efforts to increase in the TRB.

Also, beginning in 2009, increasing the public understanding of living in and around bears became an outreach priority for LDWF and they began implementing such things as public meetings, workshops and hunter education. In 2012, the LDWF established an Endangered Species Outreach Coordinator position and has increased public outreach and education efforts.
In Mississippi, human-bear conflict occasionally occurs; although not at the level observed in Louisiana. Beginning in 2002, the MDWFP instituted a formal process for recording bear conflict complaints. From 2002 to 2006 no complaints were received. Approximately 21 complaints were received from 2006 to 2011, the most common being damage to apiaries, wildlife feeders and fruit trees (Simek et al. 2012). In East Texas, bear sightings are rare and thus human-bear conflict is nearly non-existent. Louisiana and Mississippi each have an active outreach program providing materials and advice to hunters and homeowners regarding living and hunting around bears. In East Texas, the East Texas Black Bear Task Force (ETBBTF) conducts outreach and educational activities with input and assistance from the TPWD.

Non-governmental agencies also play an important proactive role in reducing potential conflicts through public education. The BBCC, who implemented the first public education efforts, continues to present informational and educational materials about bears and how to live in areas where they occur. The Bear Education and Restoration (BEaR) group of Mississippi, and the ETBBTF also actively conduct public education activities through such events as workshops, public talks, brochures, and festivals. Two annual festivals, one each in

Mississippi and Louisiana, also help educate the public. The Ellen Trout, Caldwell, and Houston Zoos each hold or participate in an annual Bear Awareness Day in Texas.

Mortality, Trauma, and Disturbance:
Bear mortality has been attributed to natural (e.g., disease, cannibalism, drowning, maternal care,) and human (e.g., illegal kill, vehicle collision) causes (USFWS 1995). The majority of record keeping is for human-induced mortality; other natural causes are recorded when the opportunity arises.

Louisiana: Record keeping of bear mortalities has increased in accuracy over time since listing. Currently records of all bear sightings (excluding casual sighting reports within the known range) and known mortalities are maintained by the LDWF. In 2010, the Service contracted with the U.S.G.S. National Wetlands Research Center (NWRC) to create a digital data base for those records. That database is nearly complete and ready for initial data entry, testing, and verification. Historical information on mortalities comes from the status reports provided at the Eastern Black Bear Workshop. In 1988 four verified bear kills were reported for Louisiana (Weaver 1990). In 1991 eight mortalities were reported (four from vehicles and four from suspected illegal kill). From 1992 through 1998 an average of 12 mortalities were reported each year (Pace et al. 1994, 1997, 1999, Pace and Edwards 1996). The two major sources of mortalities were vehicular collisions and suspected illegal killing occurring primarily in the LARB and the TRB. Occasional mortalities from trains have been reported (Van Why and Chamberlain 2003b). Pace et al. (2000), reported 34 of the 75 verified bear mortalities between 1992 and 2000 were caused by vehicular collisions (road kills, sugarcane harvesting equipment, and trains), followed by 15 deaths from unknown causes and 12 suspected illegal kills; this included some of the data from the 1997 summary. Forty-nine of the 75 mortalities reported by Pace et al. (2000) between 1992 and 2000 occurred in the LARB population, and 24 of these were female bears. There were 27 and 37 recorded mortalities recorded in Louisiana for 2010 and 2011 respectively. Consistent with previous year's patterns, vehicular collisions and suspected illegal kill are the most frequent sources of mortalities.

Road mortality poses a continuing threat to the Louisiana black bear. Most road kills occur in two general areas: along U.S. Highway 90 in the LARB population and along Interstate 20 in the TRB population. From 1997 through 2002, 12 traffic-related bear mortalities were recorded along U.S. Highway 90 in the LARB population. In 2003, the Louisiana Department of Transportation and Development (LDOTD) installed bear crossing signs along portions of U.S. Highway 90. In the northern part of Louisiana, after a decade with less than 5 bears killed crossing I-20, and multiple WRP reforestation projects initiated between the Tensas and Deltic bear populations, 6 bears were killed on I-20 in 2004 (LDWF unpublished data). More recent data are currently being compiled but it appears that highway mortalities in the TRB populations may be

increasing; this is not necessarily unexpected due to the proximity of this population to I-20, the increasing number of bears in the area, and the recent reforestation efforts. The LDWF and Service are working with state and federal highways departments to explore ways to reduce these deaths. Currently, the LDWF and LDOTD have installed bear crossing signs on Interstate 20, and Louisiana Highways 17, 65, and 90. Additionally, the LDWF is working with Lamar Outdoor Advertising to install billboards along Interstate 20 to alert drivers of the presence of bears in the area between Tallulah and Delhi (M. Davidson, LDWF, 2013).

Suspected illegal killing (i.e., poaching) also remains a threat to this species with 4 to 8 documented cases of illegally killed bears each year. The LDWF and Service work cooperatively to prosecute violators, but because these killings occur in remote areas and are usually reported some time after its occurrence, it is difficult to make successful cases.

Infrequently, bears must be euthanized, after repeated attempts at aversive conditioning. Bears that begin to show signs of habituation are hazed whenever possible, however, if a bear poses a public safety threat it is either euthanized or placed in permanent captivity. From the time the Louisiana black bear was listed in 1992 through 2011 this management action has only been taken 6 times. An additional 6 repeat nuisance bears were removed from the wild and placed in zoos.

Black bears have been inadvertently caught in closed-top cage traps, used for the capture of feral hogs, an invasive species that can destroy black bear (and other wildlife) habitat. As a result, the LDWF Commission created rules requiring an opening on all cage traps used for feral hog capture to allow the escape of any bears that may enter the cage. In 2012, a new source of LBB mortality, via incidental capture in snares set for coyotes and feral hogs, was documented. The Service has been collaborating on this issue with LDWF. The LDWF went before its Commission on March 1, 2012, and offered a notice of intent to propose modifications to the regulations involving trapping feral hogs. Those proposed modifications have not been approved; however the LDWF created an educational brochure, "Use of Snares in Bear Country, Recommendations for Louisiana Trappers", designed to reduce the likelihood of unintentional bear captures (LDWF 2012). That guidance includes avoiding the use of snares in areas frequented by bears, using bait that is not attractive to bears, using a trail camera to determine if bears are in the area, using a relaxing snare lock and break-away devices, positioning the snare so that it will not become entangled with vegetation, immediately removing the snare if bears are observed in the area, and checking the snare at least every 24 hours.

Mississippi: In Mississippi, Shropshire (1996) and Young (2006) reported bear mortalities from sources similar to those reported in Louisiana (e.g., vehicular collision and illegal killing). From 1972 to September 2011, 30 adult bears and

one cub mortality were documented (Simek et al. 2012). Eleven bears were killed by vehicles, 10 were illegally killed, 3 died during capture efforts and one died from electrocution after contact with a transformer (Simek et al. 2012). Similar to Louisiana, Mississippi also has had problems regarding bears being captured in live cage-type hog traps. According to Brad Young (MDFWP), a bear was captured in a hog trap in 2005 and despite remaining in the trap for 5 days and sustaining severe injuries, it ended up surviving. As a result, the MDWFP passed regulations requiring that all hog traps be checked every 36 hours, all non-targeted wild or domestic animals caught must be released immediately upon detection, and that the roof or tops of these traps must be constructed in a manner with ample opening in the top to allow non-targeted deer, turkey or bear to escape.

Texas: Due to the low number of bear sightings in East Texas there is little information on specific causes of mortality in Texas other than a confirmed highway mortality in 1999 (Barker et al. 2005).

2. Five-Factor Analysis

a. Present or threatened destruction, modification or curtailment of its habitat or range: The Louisiana black bear was listed primarily because of historical modification and reduction of habitat, the reduced quality of remaining habitat due to fragmentation and the threat of future habitat conversion and human-related mortality. More than 80 percent of suitable Louisiana black bear habitat had been lost by the time of listing (1992) primarily due to clearing land for agriculture (Weaver 1990); the remaining habitat quality had been reduced by fragmentation and human activities. An indirect result of that fragmentation was isolation of already small populations subjecting them to threats from such factors as demographic stochasticity and inbreeding. Recovery efforts have focused on: (1) restoring prior-converted habitats and protecting restored and existing habitats supporting breeding populations; and (2) restoring prior-converted habitats and protecting restored and existing habitats between breeding populations to reduce the effects of habitat fragmentation and facilitate population exchange. In conjunction with habitat restoration, the establishment of a new breeding population located between the TRB and UARB populations has served to reduce the effects of fragmentation and facilitate population exchange.

Approximately 754,000 ac (305,133 ha) of habitat on public and private lands are now permanently protected and/or restored within the HRPA in Louisiana (Table 4). Although not permanently protected, an additional 113,000 ac (46,000 ha) of lands enrolled under the CRP within the HRPA provided additional habitat in Louisiana (Table 4; Figure 4). The threat from development in the Atchafalaya Basin, Louisiana, identified at listing, has been reduced. Approximately 100,000 ac (40,469 ha) of permanent environmental

and 49,000 (19,830 ha) acres of lands for public access and conservation have been purchased as a result of the Corps' Atchafalaya Basin Multi-Purpose Plan. Furthermore, studies project that by 2030, black bear habitat will increase as wetter areas would eventually be converted to cypress swamp and early successional hardwood habitats (LeBlanc et al. 1981).

In Mississippi, 165,203 ac (66,855 ha) have been restored in permanent easements under the WRP and an additional 338,000 ac (137,055 ha) have been restored in CRP in Mississippi bear habitat restoration priority areas (Figure 5) adjacent to Louisiana (J. Austin, USFWS, personal communication, 2013). An additional 5,500 ac (2,226 ha) of habitat have been restored via the USDA Farm Service Agency (FSA) State Acres for Wildlife (SAFE) program in Mississippi. Between 2008 and 2011, over 500 acres have been restored and 1,550 acres have been enhanced in East Texas via the Hardwood Habitat Cooperative program.

In summary, significant progress has been made to reduce the present or threatened destruction, modification or curtailment of habitat and the effects of historic habitat loss and fragmentation on Louisiana black bear populations. In some instances, habitat loss may have been reversed. Deforestation in the Lower Mississippi River Alluvial Valley has nearly halted and forest restoration is a predominant land use change (Gardiner and Oliver 2005). Concurrently, bear population numbers are increasing and additional new breeding populations exist. However, in spite of these efforts, habitat fragmentation still exists between breeding populations. Exchange between breeding populations is a critical need for long-term viability. Studies are currently underway (anticipated to be complete by the end of 2013) to determine if efforts to address the habitat fragmentation coupled with analysis of population growth and exchange have been sufficient to return the Louisiana black bear to a viable population. Our subjective assessment is that we are very close to approaching recovery for this species. However, until we can reliably determine the overall viability of this population, we believe that the threat from habitat loss and fragmentation to the Louisiana black bear recovery remains.

b. Overutilization for commercial, recreational, scientific, or educational purposes: There are no legal commercial or recreational consumptive uses of Louisiana black bears. In the rare case, where a bear cannot be left in the wild (as a result of nuisance behavior resulting in a demonstrable threat to human safety), it may be captured and placed into permanent captivity by management agencies. Bears are routinely captured and monitored for scientific and public safety purposes. During scientific research, there is a rare chance a bear could be accidentally killed in the capture process, but these activities are conducted via state permits and closely monitored by the state agencies to reduce the likelihood of such events. We do not have evidence to suggest that overutilization is a threat to the Louisiana black bear population.

c. Disease or predation: Diseases and parasites have not been documented to be a substantial mortality factor in the Louisiana black bear population. Factors like disease vectors are closely monitored by the State when bears are handled. Natural predation may occasionally occur as a result of adult bears killing cubs (LeConte 1987); however, the overall population impacts are likely insignificant. We do not consider disease or predation to significantly affect the recovery of this species.

d. Inadequacy of existing regulatory mechanisms:
Louisiana black bears are protected from taking, possession and trade by state laws (Louisiana: Title 56, Chapter 8, Part IV. Threatened or Endangered Species; Mississippi: Title 49, Chapter 5 – Fish, Game and Bird Protections and Refuges, Nongame Endangered Species Conservation); Texas: Title 5. Wildlife and Plant Conservation, Subtitle B. Hunting and Fishing, Chapter 68. Endangered Species). The Clean Water Act (CWA) regulates dredge and fill activities that would adversely affect forested wetlands. Section 404 of the CWA regulates the discharge of dredged or fill materials into wetlands. Discharges are commonly associated with development and land clearing. The Corps and the Environmental Protection Agency share the responsibility for implementing the permitting program under Section 404 of the CWA. When impacts to wetlands cannot be avoided or minimized wetland mitigation is used to replace an existing wetland or its functions by creating a new wetland, restoring a former wetland, or enhancing or preserving an existing wetland. Loss of Louisiana black bear habitat occurs primarily as a result of projects requiring permit review under section 404 of the CWA and/or coordination among regulatory agencies pursuant to the Fish and Wildlife Coordination Act and Section 7 of the ESA. Both the LDWF and the Service work with the Corps prior to permit issuance to reduce impacts. The average amount of permanent habitat impacts are small and compensation is generally provided at a 2.5:1 ratio and generally includes replacing suitable black bear habitat functions (e.g., travel corridors, breeding habitat) with areas of a like or higher quantity and quality. The increase in habitat achieved through conservation efforts generally provides habitat with a similar function for bears and overall outweighs any loss resulting from individual development projects. The observed population growth and increasing trends suggest that current conservation measures are sufficient. Therefore, we do not believe the inadequacy of regulatory mechanisms poses a significantly affect to Louisiana black bear recovery.

e. Other natural or manmade factors affecting its continued existence:
Increasing efforts have been undertaken by the many partners in Louisiana black bear recovery to help improve Louisiana black bear survival through reduction of human-induced mortalities (e.g., highway mortalities, incidental captures, and suspected illegal killing) and implementation of education efforts to improve public awareness, acceptance and proactive habitat management.

Those activities are primarily related to Recovery Plan Tasks 2.1.-2.3, 3.1-3.3, and 4.1-4.6.

Mortality, Trauma, and Disturbance:
Highway and other human-induced incidental mortalities as well as suspected illegal killing continue to affect Louisiana black bears. The current documented annual mortality from these sources is low. The results of ongoing population viability studies may provide more information on the magnitude of this threat to this species' recovery. However, it is our subjective assessment at this time, based on the fact that bear populations have grown and are currently increasing, that these mortalities represent a low threat to impeding Louisiana black bear recovery.

Human Dimension
Human-bear conflicts continue for the Louisiana black bear and are expected to increase as populations recover. Rapid response to those conflicts is crucial to minimizing public safety risk, minimizing suspected illegal killings of bears and building public support for this species' recovery. Louisiana and Mississippi have active bear management programs. In Texas, bear management is handled by regional or program biologists. As numbers of annual human-bear conflicts continue to rise in Louisiana, the LDWF is moving from a reactive role to proactive by working with local governments and public education via public meetings, workshops and hunter education. While these conflicts require an increasing amount of agency time to address, because of those efforts, the numbers of mortalities resulting from management actions are generally low.

Catastrophic Natural Events:
Hurricanes and tropical storms may affect Louisiana black bear habitat, particularly the LARB population which is located close to the coast. Potential hurricane effects may include immediate physical damage to trees, as well as potential stress resulting from extended flooding or exposure to salt water. The opening created by downed trees, while normally providing habitat that could be utilized by bears, may create opportunities for colonization by the invasive Chinese tallow tree (*Triadica sebifera (L.)*). Tallow infestations often result in the creation of monospecific tallow forests, totally replacing the native mast-producing species in the affected areas (Barker et al. 2005). Murrow and Clark (2012) studied the impacts of Hurricanes Katrina and Rita on habitat of the LARB population. They did not detect any significant direct impacts to forested habitat; however, they indicated that indirect effects (e.g., saltwater intrusion) may occur later in time. Another indirect effect noted during such events is the potential for increased mortality as flooding may force bears (and other wildlife) to higher areas thus increasing the chances for road mortality and nuisance behavior.

There have been several significant flood events on the Mississippi River in

recent years. Preliminary data obtained from GPS collared bears in Mississippi showed no significant home range movements during that inundation (Young, 2011; B. Young, MS Wildlife Federation, personal communication, 2013). In Louisiana, the Morganza Floodway on the Mississippi River (home to a portion of the UARB population) was opened for the first time in 40 years. Although data analyses are not yet complete, bear mortality was documented when one bear was forced to the higher ground along a railroad track and hit by a train. Mortality of young may have occurred if den sites were flooded (Waller et al. 2012). Indirect effects on 2011 reproductive success are suspected but are still under investigation. The flooding appeared to have minimal impacts on adult population dynamics. Some bears apparently moved outside of the Morganza Floodway during the opening but some also stayed (Troxler 2013). At this point in time, opening of the Morganza spillway is a rare, singular event. An increase in extreme weather events could result in the necessity of more frequent openings resulting in increased effects on Louisiana black bear population dynamics.

Climate Change

Scientific evidence indicates that climate change is now occurring at an unprecedented rate and the current rate of sea level rise is increasing. Mostly due to thermal expansion and melting land ice, global sea-level rose approximately 7 inches (17centimeters) in the 20th Century, and the current rate of rise is increasing (Intergovernmental Panel on Climate Change [IPCC] 2007). There is no published literature specifically predicting effects to bottomland hardwood forests and forested habitat in the Lower Mississippi Valley; however, changes in temperature and hydrologic systems may have an effect on this ecosystem. While there is a level of uncertainty in predictions on potential effects to ecosystems, the Louisiana black bear, being a habitat generalist, may fare better than other animals if climate-induced changes in ecosystems maintain habitat conditions sufficient to provide food and cover for reproduction and travel. Coastal land loss has been well documented in Louisiana; sea level rise as a result of climate change will only exacerbate this process. Potential impacts from coastal land loss on the LARB population are likely to be ameliorated to some extent by the projected successional changes in the Atchafalaya Basin that would eventually convert most of the basin forests to bottomland hardwoods, with some cypress/ tupelo swamps remaining in former aquatic areas (especially in the southeastern portion of the basin), thus providing more suitable black bear habitat. The potential for increase in hurricanes and tropical storms has been discussed previously.

In summary, human-induced mortalities (including mortalities resulting from management actions) have been documented and continue to occur. The results of ongoing population viability studies may provide more information on the magnitude of these threats to this species' recovery. However, it is our subjective assessment at this time, because bear populations have grown and are currently increasing, that these mortalities do not appear to be impeding

Louisiana black bear recovery. Current information indicates that the anticipated impacts from other natural or manmade factors are: (1) periodic (e.g., hurricanes, Morganza Floodway openings) resulting in temporary impacts to population dynamics and some associated mortality but have not been observed to significantly affect population growth or habitat availability; and (2) long-term (coastal land loss) for the LAERB population, which may be offset to some extent by increasing bear habitat in the Atchafalaya Basin. Therefore, while the threats from these events remain, they appear to be low at this time.

D. Synthesis

The primary threats that caused the Louisiana black bear to be listed were: (1) historical and future modification, reduction and fragmentation of habitat; and (2) overharvest.

With the bear's listing under ESA, the threat from overharvest no longer exists. Suspected illegal killing still occurs and threats from other direct and indirect human-induced mortality still exist. The results of ongoing population viability studies may provide more information on the magnitude of these threats to this species' recovery. However, it is our subjective assessment at this time that these mortalities do not appear to be impeding Louisiana black bear recovery.

Three disjunct breeding populations were known to exist in 1995, all of unknown status. Currently, the Louisiana black bear populations are improving. Recent studies indicate that all three breeding populations have grown since listing and are increasing. Additionally, one new breeding population has formed in Louisiana and one (possibly two) in Mississippi.

Significant progress has been made in increasing and protecting suitable habitat supporting existing breeding populations. Habitat restoration and protection designed to facilitate population exchange has reduced habitat fragmentation. However, the extent of interchange between populations and the effects on population viability are currently under investigation (anticipated to be completed in December 2013).

In spite of significant progress in reducing threats, population viability and overall metapopulation is not known at this time. Our assessment is that we are very close to approaching recovery for this species. However, until the viability studies are completed, we believe that the threat from habitat reduction and fragmentation to the Louisiana black bear recovery remains. Therefore, we believe the species continues to meet the definition of threatened at this time and should remain classified as such until additional data indicate otherwise.

III. RESULTS

A. Recommended Classification: No change is needed in this species status at this time. However, the species is showing improvement. Research is ongoing to evaluate population viability and habitat protections currently in place relative to the delisting criteria. We anticipate making additional progress with partners and we believe (based on the pending results of the viability analyses) delisting could be considered for this species in the near future.

X **No change is needed**

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

The results of the ongoing population and movement studies as well as information on the colonization of new populations will be used to evaluate the viability of the overall Louisiana black bear meta-population. The result of these analyses (anticipated to be available in December 2013) will be evaluated for additional insight and an increased scientific understanding of the recovery criteria established in the recovery plan and the sustainability of the Louisiana black bear population as a whole. Should those results indicate the Louisiana black bear population has achieved long-term viability (i.e., the threats from habitat reduction and fragmentation no longer exists) and no other significant threat remains to require the protection of the ESA, we anticipate developing a proposed rule to remove the Louisiana black bear from the List of threatened and Endangered Species within the upcoming year.

If the population viability studies indicate that the bear has not achieved long- term viability, the primary actions over the next few years would continue to be aimed at habitat conservation and reducing known sources of mortality to the maximum extent possible. Information from the population viability and GPS/GIS studies would provide data to target the amount and location of needed habitat (and possible other actions such as reintroductions). New approaches to addressing habitat fragmentation may be required. It has become apparent over time that remaining agricultural lands are too valuable for landowners to be willing to have habitat restored and protected by easements; this is particularly true for the UARB and LARB populations. In addition, lands surrounding the LARB have a high commercial value and are unlikely to be restored to former habitat. As data are developed indicating the types of habitat preferred and used by black bears for travel, efforts looking at new or creative ways to restore and protect travel corridors along bayous and sloughs within agricultural lands should begin and focus on providing for population interchange as well as safe travel corridors minimizing potential interactions with humans. In some areas such as the LARB, it may be beneficial to explore programs that would protect existing farmland and prevent conversion to commercial development in areas adjacent to bear habitat. Similarly, bears may occasionally use farm habitat for travel and the possibility of human interaction would be much lower than if those areas were commercially developed.

The reintroduction program appears to have been very successful in establishing another breeding population and, by reducing distances between populations, is increasing exchange with the UARB. Future reintroduction projects may be a consideration to facilitate movement and exchange between other populations.

Facilitating Louisiana black bear recovery through public awareness, understanding, and support will also continue to be important. The human dimension of this species' recovery is an increasingly important consideration as bear populations increase as a result of recovery efforts. Until the Louisiana black bear is recovered, we need to continue to minimize human-induced mortality. All possible methods of facilitating bear movement adjacent to man-made barriers such as roads should continue to be explored by working with state and federal highway agencies to evaluate the possibility of establishing crossings, the use of fencing, signage and any other potential means.

Continual human-bear conflicts may result in a low social tolerance for black bears by humans and a possible increase in suspected illegal killing of Louisiana black bears. A proactive program that: educates the public about living and recreating safely in areas with bears; and provides ways to reduce the potential for human-bear conflicts is critical for human safety and the bears' welfare. Equally important, the timely response of managers to black bear nuisance complaints is necessary to ensure public safety, foster greater public understanding and support, and reduce the potential for poaching.

Specific Recommendations For The Next Year:

- Complete population viability studies for the TRB, UARB and LARB populations and the metapopulation. Use the results of those studies to assist in determining progress towards achieving recovery.
- If those results indicate the Louisiana black bear population has achieved long-term viability (i.e., the threats from habitat reduction and fragmentation no longer exists) and no longer requires the protection of the ESA, develop a proposed rule to remove the Louisiana black bear from the List of threatened and Endangered Species within the upcoming year.
- If those results indicate the Louisiana black bear population has not achieved long-term viability, use those results to identify remaining actions needed for recovery (e.g., habitat restoration, reintroduction; see further recommendations below).
    - Use the results of the population studies and the GPS/GIS studies in Mississippi and Louisiana to determine the configuration, size and distribution of bear habitat or reintroductions that would facilitate exchange between populations (or conversely what size and type of land features would constitute a barrier to such exchange).
    - Use Habitat Restoration Planning Maps as an additional guide for restoration efforts and updated and revised if necessary pending the outcome of the GPS/GIS corridor studies.

- Use the population viability and corridor study results of those to develop a scientifically sound approach to monitor each population's viability over time in order to monitor this species' progress towards recovery. Results from those studies should also provide information on the frequency and distribution of sampling survey in order to reliably detect a trend in the population over time

Ongoing Activities: Until such time as the bear is considered fully recovered:

- Continue remaining actions needed for recovery (e.g., habitat restoration, reintroduction) as identified in population viability and corridor studies.
- Continue coordination with state and federal transportation agencies to develop and protect travel corridors and to facilitate bear crossings for the LARB (e.g., I-49 and U.S. 90) and TRB (e.g., I-20) populations in Louisiana and the Mississippi population along U.S. Highway 61 and to develop plans for accommodating bear crossings in future road projects.
- Increase population survey efforts on new breeding populations in Louisiana and Mississippi in order to better estimate abundance and monitor trends.
- Continue public and hunter education and safety efforts in all areas with significant (i.e., breeding) bear populations.
- Continue public education and action to reduce bear-human conflicts, especially in the LARB population where the two coexist in close proximity.
- Continue state wildlife agencies efforts in Louisiana and Mississippi to implement human-bear conflict resolution actions in a timely manner.
- Continue efforts of federal, state and private agencies in concert with local government to proactively address those activities that would create nuisance bear behavior.
- Continue federal, state and private agencies efforts to address any other sources of human-induced mortality as they are identified.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW

Louisiana black bear (*Ursus americanus luteolus*)

Current Classification: Threatened

Recommendation resulting from the 5-Year Review:

_X_ No change is needed

Review Conducted By Deborah Fuller, Louisiana Ecological Services Office, Lafayette

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve _____ Date 12/18/13

REGIONAL OFFICE APPROVAL:

for

Lead Regional Director, Fish and Wildlife Service

Approve _____ Date 1-7-14

COOPERATING REGIONAL OFFICE APPROVAL:

for R2

Lead Regional Director, Fish and Wildlife Service

Approve _____ Date 2/18/14

APPENDIX A:
Summary of peer review for the 5-year review of the Louisiana black bear (*Ursus americanus luteolus*)

A. Peer Review Method:

The Service contacted species experts via letters, asking for their willingness to peer review the Louisiana black bear 5-year status review. Those experts who responded positively were provided an electronic copy of the draft document for their review. Species experts contacted included: Ms. Maria Davidson (Louisiana Department of Wildlife and Fisheries, Natural Heritage Program), Mr. Brad Young (Mississippi Wildlife Federation), Mr. David Telesco (Florida Fish and Wildlife Conservation Commission), Dr. Joe Clark (USGS, Southern Appalachian Research Branch), Dr. Gerry Belant (Mississippi State University), and Dr. Chris Comer (Stephen F. Austin State University). All agreed to participate in the peer review process. Individual responses were received from each peer reviewer.

B. Peer Review Charge:

See "Guidance for Peer Reviewers of Five-Year Status Reviews", attachment 1 of this appendix, which was provided to all peer-reviewers.

C. Summary of Peer Review Comments/Report: Many peer reviewer comments were primarily minor edits. Several reviewers provided additional studies or data that had not been included or suggested sources for additional data. Two reviewers felt that the recovery contribution of the additional breeding population was not sufficiently addressed. One reviewer suggested that the scientific understanding has advanced considerably since the recovery plan was developed in 1995 suggesting that the recovery criteria (for individual population viability and corridors) are overly simplistic. That reviewer indicated that recovery criteria may not need to be revised but based on his research and new capabilities to analyze the entire metapopulation, that the Service should also include a broader objective for recovery that considers the long term viability or sustainability of the Louisiana black bear metapopulation.

D. Response to Peer Review: The Service was in agreement with all comments and concerns received from peer reviewers. Comments and data were incorporated into the 5-year review form as appropriate.

Appendix A, Attachment 1

Guidance for Peer Reviewers of Five-Year Status Reviews

U.S. Fish and Wildlife Service, Louisiana Ecological Services Office

June 7, 2013

As a peer reviewer, you are asked to adhere to the following guidance to ensure your review complies with Service policy.

Peer reviewers should:

1. Review all materials provided by the Service.

2. Identify, review, and provide other relevant data that appears not to have been used by the Service.

3. Not provide recommendations on the Endangered Species Act classification (e.g., endangered, threatened) of the species.

4. Provide written comments on:
    - Validity of any models, data, or analyses used or relied on in the review.
    - Adequacy of the data (e.g., are the data sufficient to support the biological conclusions reached). If data are inadequate, identify additional data or studies that are needed to adequately justify biological conclusions.
    - Oversights, omissions, and inconsistencies.
    - Reasonableness of judgments made from the scientific evidence.
    - Scientific uncertainties by ensuring that they are clearly identified and characterized, and that potential implications of uncertainties for the technical conclusions drawn are clear.
    - Strengths and limitation of the overall product.

5. Keep in mind the requirement that we must use the best available scientific data in determining the species' status. This does not mean we must have statistically significant data on population trends or data from all known populations.

All peer reviews and comments will be public documents, and portions may be incorporated verbatim into our final decision document with appropriate credit given to the author of the review.

Questions regarding this guidance, the peer review process, or other aspects of the Service's recovery planning process should be referred to Kelly Bibb, U.S. Fish and Wildlife Service, at 404/679-7132 or email: kelly_bibb@fws.gov.

APPENDIX B:

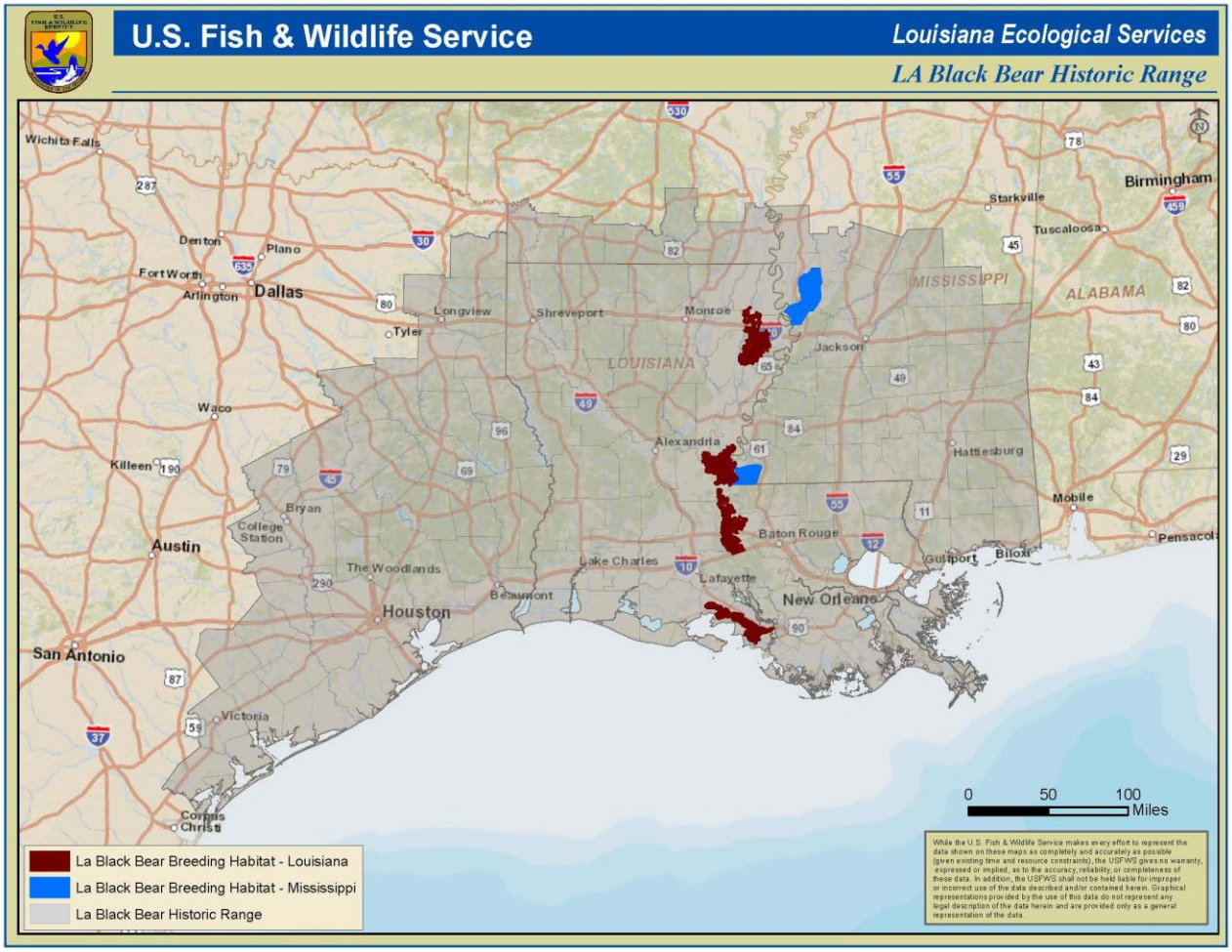
Strategy used for the Development of the "Louisiana Black Bear Habitat Restoration Planning Maps."

In1999, recognizing the need to connect the existing Louisiana black bear subpopulations, and drawing upon the LMJV landscape-level planning products for migratory songbirds, USFWS, LDWF, and BBCC personnel initiated efforts to develop a set of landscape-scale, comprehensive "Louisiana Black Bear Habitat Restoration Planning Maps" for use with Louisiana conservation programs (especially for the WRP). This core group invited participation by NRCS, TNC, and LSU Cooperative Extension Service representatives and began identifying possible corridor routes to link existing bear habitat. The Louisiana black bear recovery plan's mandate to establish permanently protected travel corridors between at least two of the remnant bear subpopulations was a primary consideration in these planning meetings. Factors that were considered for locating corridors included the current distribution of bears, bear movements documented by radio telemetry data, existing public lands (LDWF Wildlife Management Areas and Service National Wildlife Refuges), existing private lands with permanent easements (WRP tracts, Farmers Home Administration easements, EWP tracts, Ducks Unlimited conservation easements, and U.S. Army Corps of Engineers floodplain easements and mitigation banks), private lands reforested via restoration agreements (CRP and Partners tracts), and privately-owned forested lands. Documented bear utilization of existing corridors was also given great weight in the selection of corridor routes. The group prioritized locating corridors through areas containing the most land publicly-owned, or protected by conservation easements, with reforested lands under restoration agreements and unprotected forested lands of secondary importance. Corridor crossings of major roads were also considered, with priority given to those options with bayou bridges, overpasses, or other natural features with the potential to minimize bear/automobile conflicts (where possible). Finally, the likelihood that landholdings along potential corridor routes would become available for reforestation was considered, including the presence of prime agricultural land and the conservation program history of large landowners. Marginal agricultural land and land held by landowners with a history of conservation program participation or interest was given greater weight for corridor location. Follow-up mapping meetings were held at various NRCS Field Offices in Louisiana in order to maximize input from NRCS District Conservationists and technicians who provided critical institutional knowledge of local land use trends.

In Louisiana and eventually Mississippi, a 3-tiered point system was created within the bear maps, with occupied bear habitat receiving the highest priority, corridor areas given secondary priority, and other areas of value to bears weighted as tertiary priority. For the Farm Bill programs, this means that applicants or intentions receive more ranking points when they are located within primary zones and less for secondary and tertiary zones.

The "Louisiana Black Bear Habitat Restoration Planning Maps" were revised in 2005 and 2011 to incorporate updated conservation program databases, to account for the expansion of occupied bear habitat due to bear relocation/repatriation efforts in Avoyelles and Concordia Parishes, and to consider new bear telemetry study data.

Figure 1. Historic range and current breeding habitat[1,2] of the Louisiana black bear (*Ursus americanus luteolus*).



[1]Breeding habitat in Louisiana is based on 2009 data and thus under represents the current extent.
[2] Breeding habitat in Mississippi is estimated based on observational data (i.e., not home ranges).

Figure 2. Habitat Restoration Planning Areas (HRPA), Louisiana black bear breeding populations, and Atchafalaya Basin Floodway Boundaries, Louisiana.

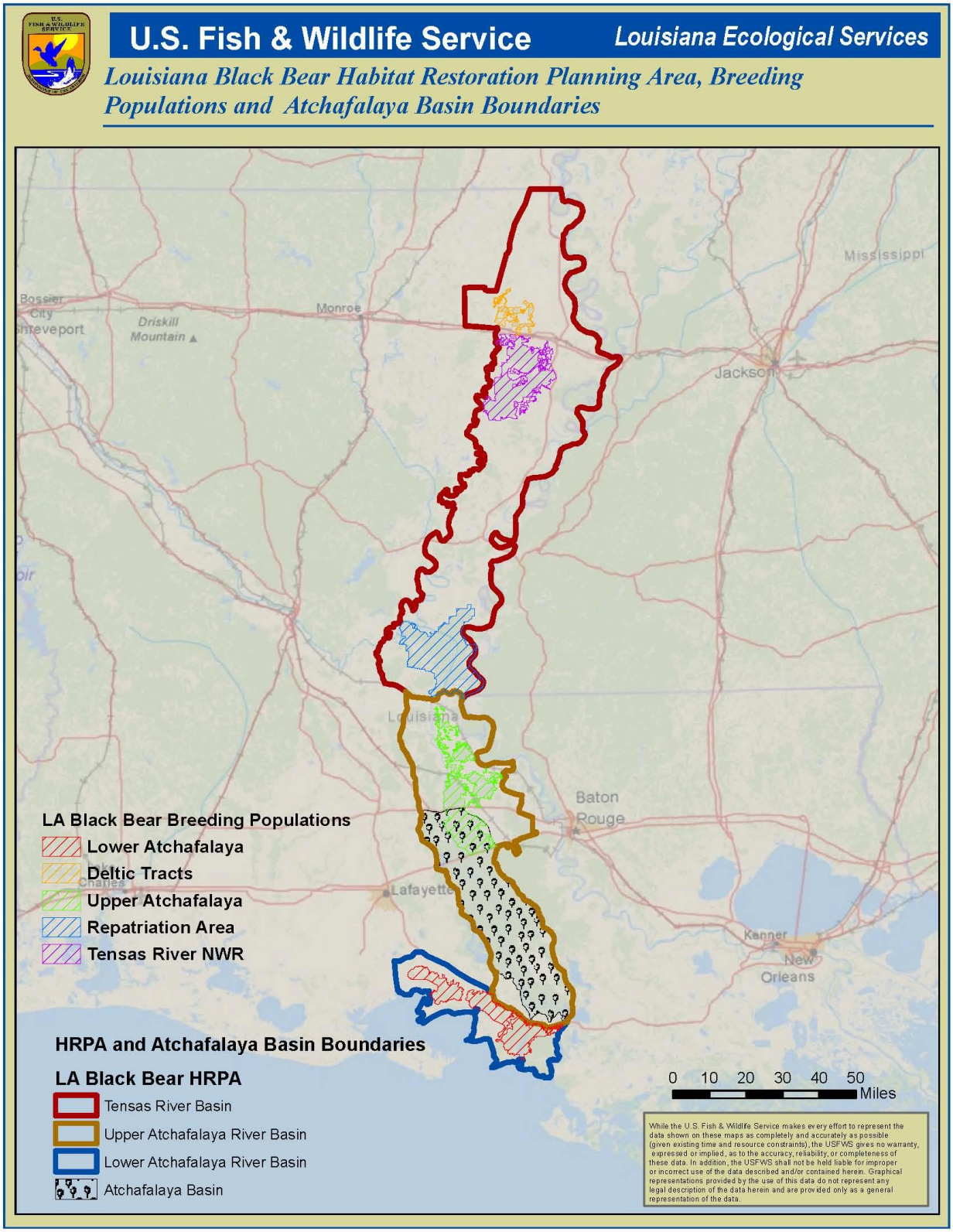


Figure 3. Permanently protected lands (publicly owned and WRP) within the Louisiana black bear HRPA boundaries, Louisiana (Note: the Corps easements in Atchafalaya Basin are not depicted on this figure because we only have tabular data and no exact locations).

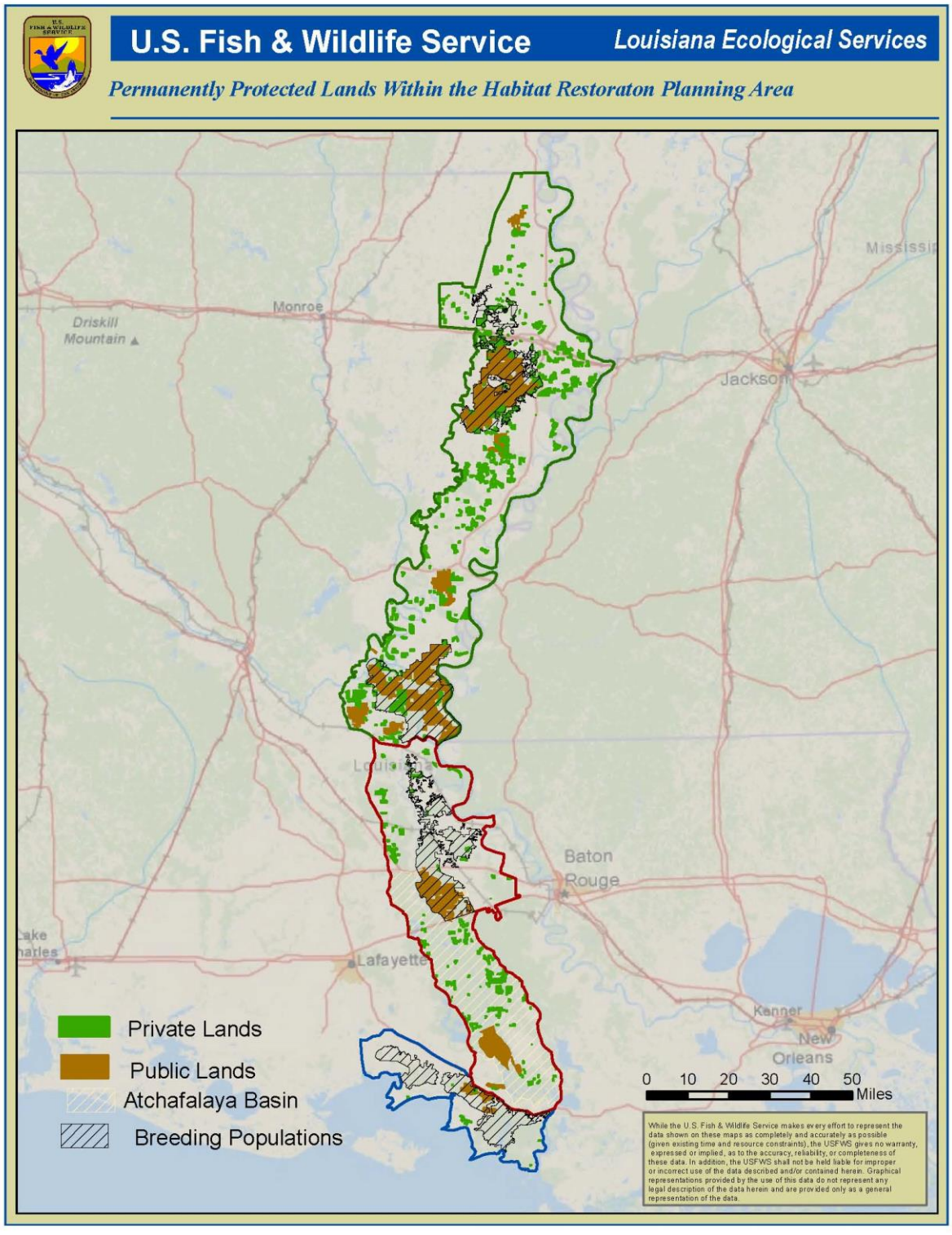


Figure 4. All conservation lands (permanently protected and CRP) within the Louisiana Black Bear HRPA boundaries, Louisiana. (Note: the Corps easements in Atchafalaya Basin are not depicted on this figure because we only have tabular data and no exact locations).

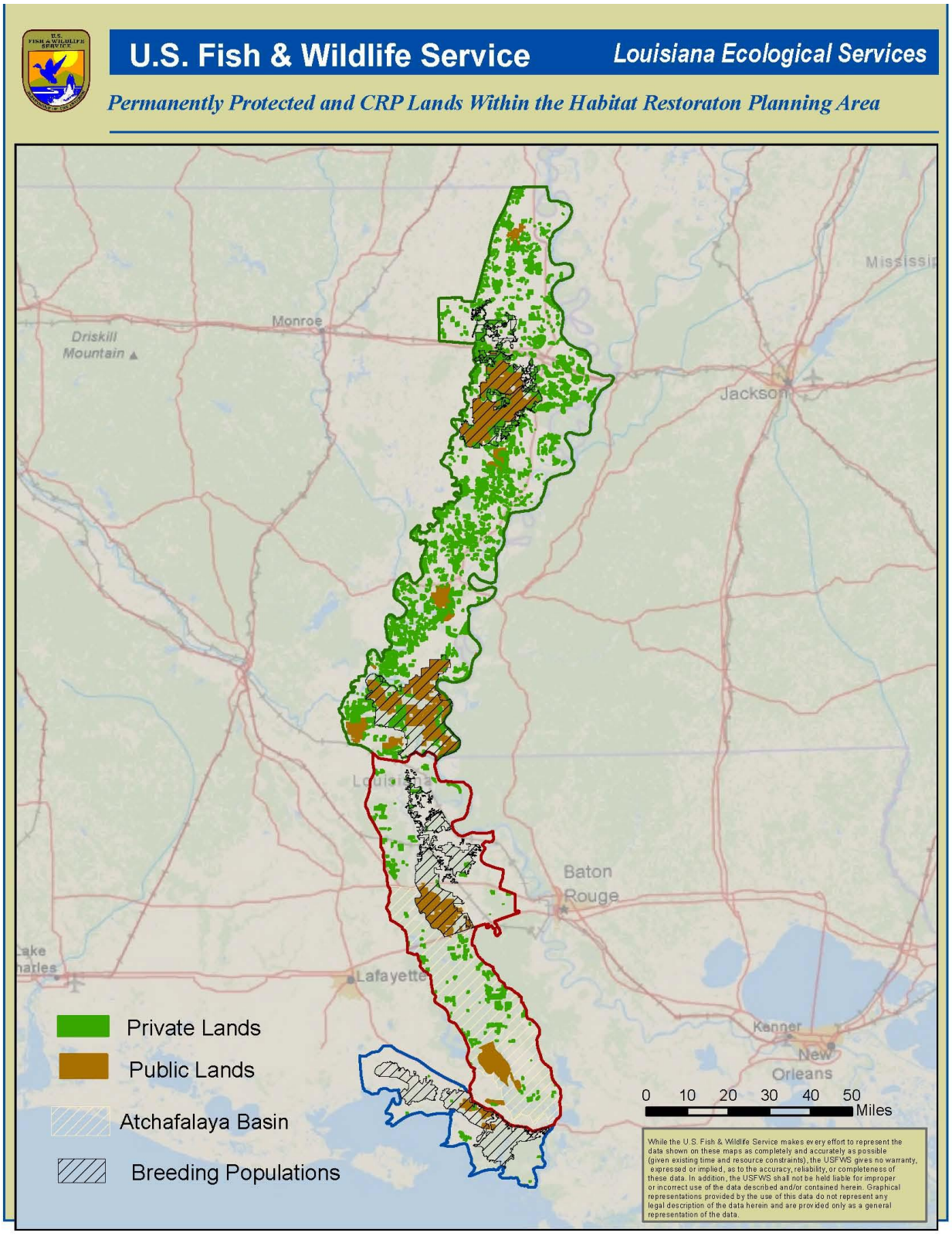


Figure 5. Mississippi and Louisiana Black Bear Habitat Restoration Planning Maps with approximate boundaries of breeding habitat (primary zone) (from Ginger et al. 2007).

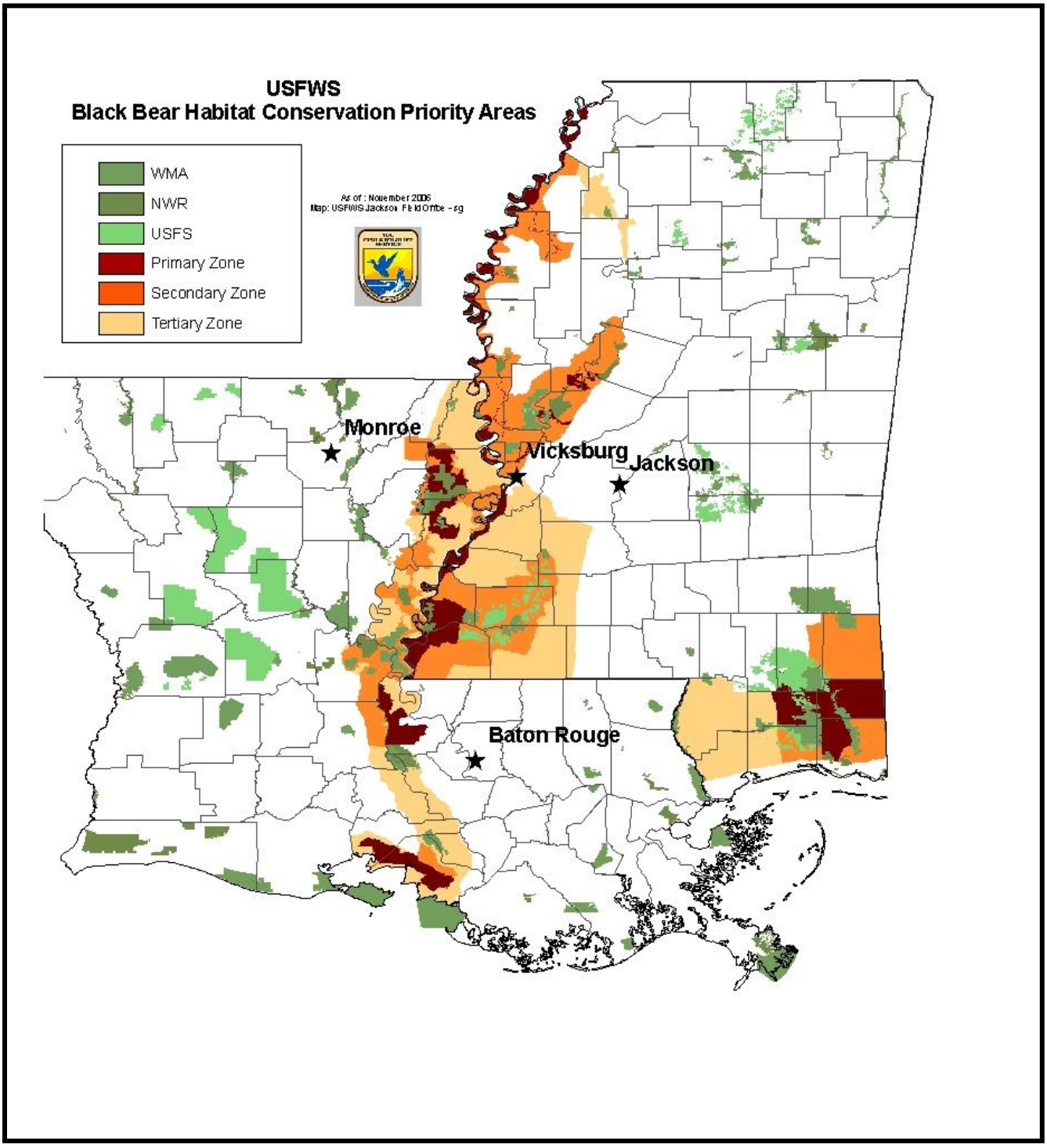


Figure 6. National Land Cover (NLCD) Habitats within the Louisiana black bear HRPA boundaries, Louisiana in 1992.

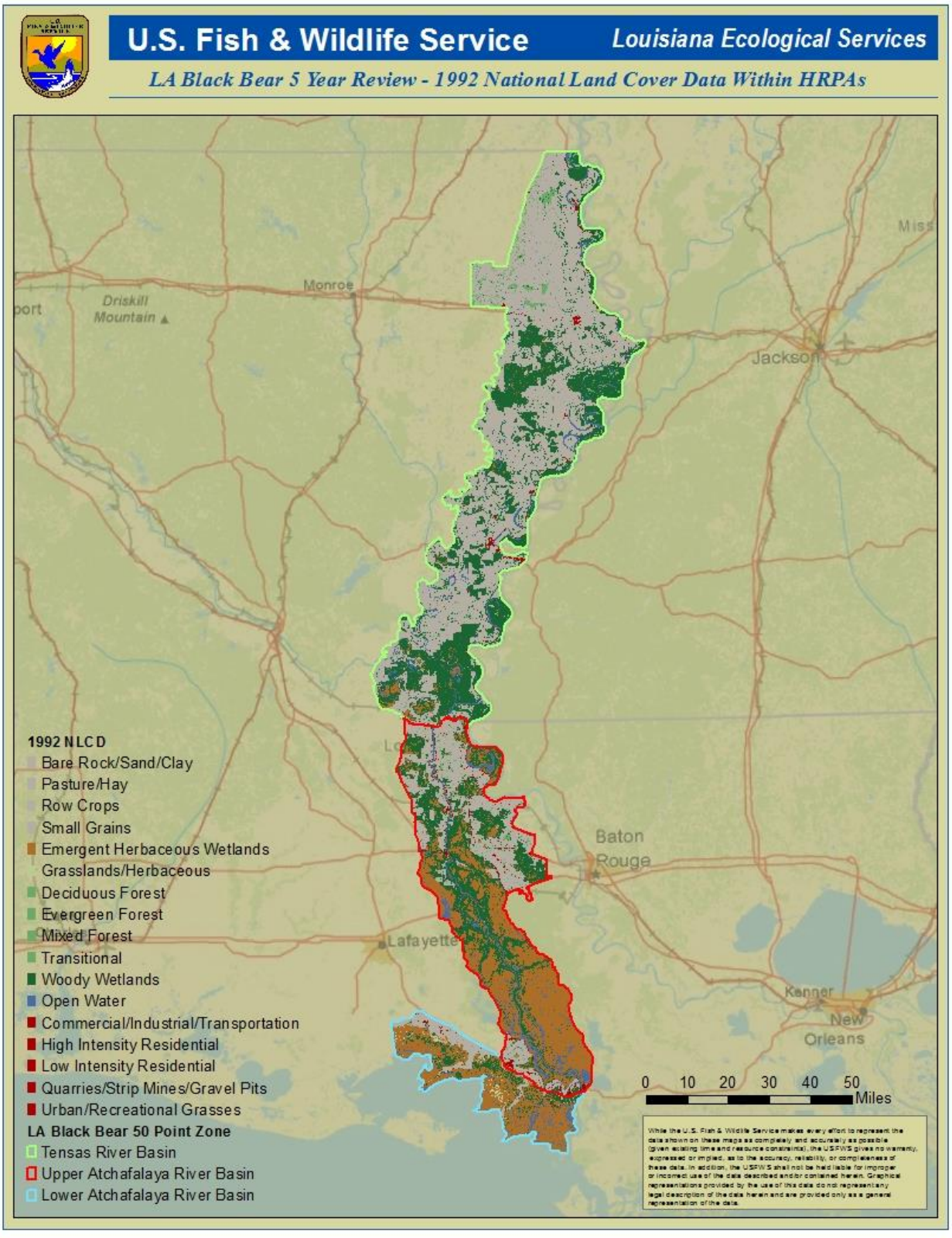


Figure 7. National Land Cover (NLCD) Habitats within the Louisiana black bear HRPA boundaries, Louisiana for 2001 and 2006.

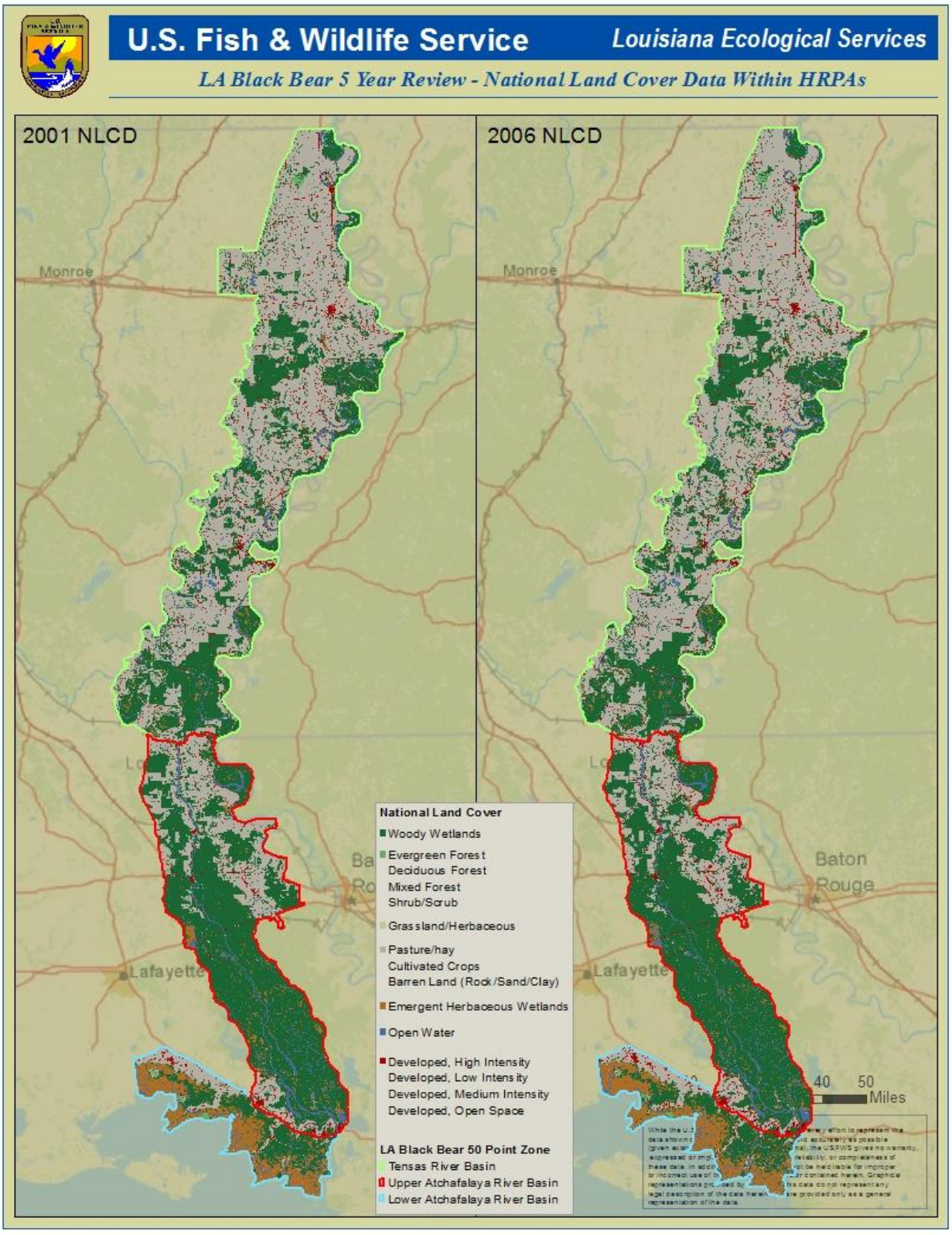


Table 1. Current State and Federal management areas within the LA Black Bear Habitat Restoration Planning Areas, Louisiana (ac[ha]). *(Numbers may not total due to rounding).*

	Tensas River Basin	Upper Atchafalaya River Basin	Lower Atchafalaya River Basin	Totals
National Wildlife Refuges	109,334 [44,246]	17,340 [7,017]	7,505 [3,037]	134,179 [54,300]
Wildlife Management Areas	143,249	58,718 [23,762]	1,474 [597]	203,441 82,330]
Atchafalaya Basin Floodway	-	149,000 [60,300]	-	149,000 [60,300]
Totals	252,583 [102,217]	225,058 [91,078]	8,979 [3634]	486,620 [196,928]

Table 2. Current State and Federal management areas within the LA Black Bear Habitat Restoration Planning Areas, Louisiana, containing habitat that supports LA black bear breeding populations (ac[ha]). *(Numbers may not total due to rounding).*

	Tensas River Basin	Reintroduction Area	Upper Atchafalaya River Basin*	Lower Atchafalaya River Basin	Totals
National Wildlife Refuges	77,879 [31,517]	17,420 [7,050]	15,762 [6,379]	7,440 [3,011]	118,501 [47,956]
Wildlife Management Areas	19,584 [7,925]	84,681 [34,269]	27,021 [10,935]	0	131,287 [53,130]
Totals	97,463 [39,442]	102,101 [41,319]	42,783 [17,314]	7,440 [3,011]	249,788 [101,86]

*The totals do not include the areas protected by the Corps in the Atchafalaya Floodway Basin.

Table 3. Private lands enrolled in the USDA Natural Resource Conservation Wetland Reserve Program (permanent easements) within the LA Black Bear Habitat Restoration Planning Areas, Louisiana (ac[ha]). *(Numbers may not total due to rounding).*

	Tensas River Basin	Repatriation Area	Upper Atchafalaya River Basin	Lower Atchafalaya River Basin	Totals
Breeding Habitat[1]	26,989 [10,922]	12,167 [4,924]	1,539 [623]	0 [0]	40,695 [16,469]
Habitat Restoration Planning Area	120,669 [48,833]	NA	9,723 [3,935]	0 [0]	130,392 [52,768]

[1] Breeding habitat area is largely a subset of (i.e., contained within) the total Habitat Restoration Planning Area

Table 4. Total protected habitat (NWRs, WMAs, WRPs, COE lands, and Mitigation Banks) within the LA Black Bear Habitat Restoration Planning Areas, Louisiana (ac[ha]). *(Numbers may not total due to rounding).*

	Tensas River Basin	Upper Atchafalaya River Basin (%)	Lower Atchafalaya River Basin (%)	Totals
Breeding Habitat[1]	239,413* [96,887]	62,395 [25,250]	7,623 [3,085]	309,431 [125,223]
Habitat Restoration Planning Area	379,104 [153,418]	363,220 [146,990]	9,921 4,015]	754,245 [305,233]

*Includes repatriation population

[1] Breeding habitat area is largely a subset of (i.e., contained within) the total Habitat Restoration Planning Area

Table 5. CRP within the LA Black Bear Breeding Habitat and LA Black Bear Habitat Restoration Planning Areas, Louisiana (ac[ha]). *(Numbers may not total due to rounding).*

	Tensas River Basin	Upper Atchafalaya River Basin	Lower Atchafalaya River Basin	Totals
Breeding Habitat[1]	2,556* [1,034]	0 [0]	0 [0]	2,556 [1,034]
Habitat Restoration Planning Area	111,691 [45,200]	1,064 [431]	12 [5]	112,767 [

[1] Breeding habitat area is largely a subset of (i.e., contained within) the total Habitat Restoration Planning Area

*Includes repatriation population

Table 6. Estimated Change in Conservation Lands between 1991 and 2011 within the LA Black Bear Habitat Restoration Planning Areas, Louisiana (ac [ha]). *(Numbers may not total due to rounding).*

	Tensas River Basin	Upper Atchafalaya River Basin	Lower Atchafalaya River Basin	Totals
1991	85,000 [34,398]	141,000 [57,060]	1,200 [486]	227,200 [91,945]
2011	252,583 [102,217]]	225,060 [91,079]	8,979 [3,634]	486,622 [196,929]
Change	+167,583 [67,819]	+84,060 [34,018]	+7,779 [3,148]	+ 259,422 [104,985]