Louisiana Black Bear Post-Delisting Monitoring

3rd Annual Report 2018

Monitoring Team Cooperators:

Louisiana Department of Wildlife and Fisheries

U.S. Fish and Wildlife Service

U.S. Geological Survey - Southern Appalachian Research Branch
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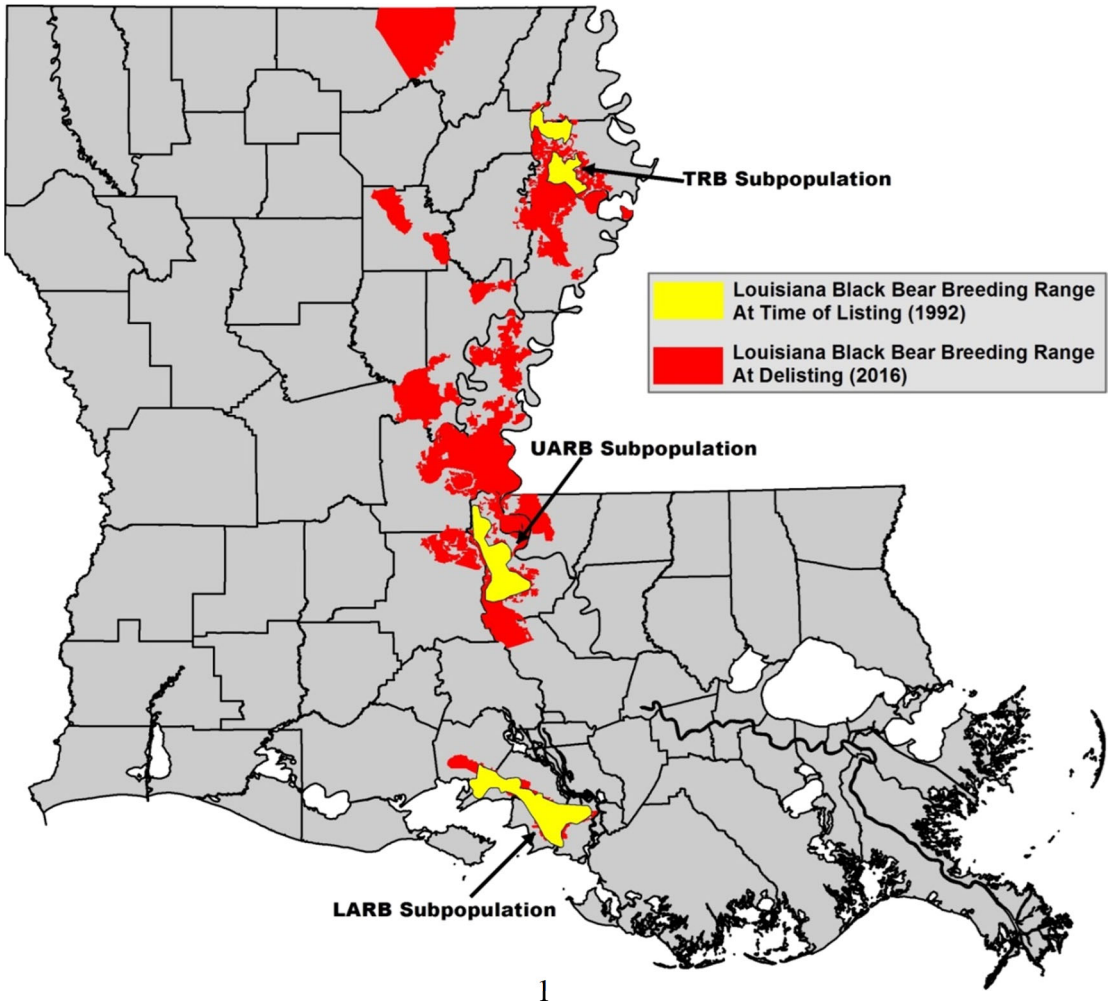
This annual report is available on the web at:
https://www.fws.gov/Lafayette/la_black_bear.html

Introduction

The Louisiana black bear is one of 16 subspecies of the American black bear. It historically inhabited the forests of Louisiana, southern Mississippi, and eastern Texas, but extensive land clearing, mainly for agricultural purposes, reduced its habitat by more than 80 percent. The Louisiana black bear was listed as threatened on January 7, 1992, primarily due to the reduction in population size resulting from extensive historic habitat loss, reduction in habitat quality due to fragmentation, and human-associated mortality (57 FR 588). Simultaneously, other free-living black bears within the historic range of the Louisiana black bear were listed as threatened due to their similarity of appearance to the Louisiana black bear. On March 10, 2009, the Service published a final rule in the Federal Register (74 FR 10350) designating 1,195,821 acres of critical habitat for the Louisiana black bear.

At the time of listing, the subspecies was restricted to core subpopulations in the Tensas River Basin (TRB subpopulation), the upper Atchafalaya River Basin (UARB subpopulation), and the lower Atchafalaya River Basin in coastal St. Mary and Iberia Parishes (LARB subpopulation). After more than two decades of management, we were able to conclude that the threats to the species had been eliminated or reduced, adequate regulatory mechanisms existed, and subpopulations were stable. Due to recovery, the Louisiana black bear was officially removed from the List of Endangered and Threatened Species on March 11, 2016 (81 FR 13124); critical habitat designation for this subspecies was also withdrawn at that time.



The Service and state resource management agencies have latitude in determining the post-delisting monitoring activities that are necessary and appropriate. The Endangered Species Act does not require the development of a formal Post-Delisting Monitoring (PDM) Plan. However, concurrent with our delisting rule, the Service and the Louisiana Department of Wildlife and Fisheries (LDWF) published a plan to extensively monitor the status of the Louisiana black bear for 7 years following its delisting (though the Endangered Species Act only requires that such monitoring occur for a minimum of 5 years post-delisting). That monitoring, which is ongoing, is designed to detect any potential population decreases or threat increases that may warrant the implementation of measures to ensure that the Louisiana black bear remains secure from risk of extinction. There have been relatively minor modifications made to a portion of our habitat analysis methodology during our last year of monitoring (details regarding that modification are provided in Appendix II). The results of our third year of annual post-delisting monitoring are provided in this report.

Results/Conclusions

LDWF Bear Sighting Data

LDWF personnel recorded 78 sightings and 211 bear-related complaints during the current reporting period (April 1, 2016 – March 31, 2017). Additional information regarding LDWF's bear incident reporting data can be found in Appendix I.

Radio Telemetry

Radio telemetry analysis includes known-fate survival data and cub/yearling recruitment data gathered in the post-delisting monitoring period (2013-2017). The annual female survival rate averaged 0.933 for the TRB subpopulation and 0.909 for the UARB subpopulation (regardless whether lost signals were assumed to be dead or live bears). A more detailed description of the analysis and results is provided in Appendix I.

Capture-Mark-Recapture (CMR; Hair-Snare)

Capture-mark-recapture (CMR; hair-snare) data was gathered during the summers (typically during the month of June) of 2013 - 2017. The rationale for using a 5-year average is provided on page 4 of our first annual PDM (2016 Report). For the TRB subpopulation, apparent female survival rate was 0.910 based on the finite mixture model and 0.926 based on the random effects model. For the UARB subpopulation, apparent female survival rate was 0.916 based on the finite mixture model and 0.927 based on the random effects model. A more detailed description of the analysis and results is provided in Appendix I.

Habitat Analysis

Permanently Protected Lands

From 2014 to the end of 2018, there has been an addition of over 16,000 acres of permanently protected lands (National Wildlife Refuges/Wildlife

Management Areas/Wetland Reserve Program Perpetual Easements/Compensatory Wetland Mitigation Banks) within the Louisiana black bear habitat restoration planning area (HRPA). Over 3,600 acres were added to these lands in the last year alone.

A more detailed description of all habitat analyses is provided in Appendix II.

OVERALL CONCLUSION

Bear sighting and radio telemetry data for our analysis period appear typical and suggest that no new or increasing threats are impacting the subpopulations. CMR data indicate that there is a high probability of long-term persistence ($\geq$95%) for the TRB and UARB subpopulations, based on apparent female survival rates that exceed 0.91 for both subpopulations. Our analysis of permanently protected lands in the vicinity of breeding subpopulations indicates that bear habitat is stable to increasing. Based on the analyses described above, we conclude that for the third straight year all Category I standards have been achieved as described in Section IV of the PDM Plan indicating that the "Louisiana black bear metapopulation remains secure without ESA protections."

Appendix I. Field Data Analysis and Results

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Louisiana Department of Wildlife and Fisheries

U.S. Geological Survey - Southern Appalachian Research Branch
University of Tennessee

POPULATION MONITORING FIELD ACTIVITIES

This report contains all population monitoring activities from April 1, 2017 – March 31, 2018. We live-captured bears and outfitted these individuals with VHF or VHF-GPS radio-collars, or marked bears based on sex and age class. Using monthly aerial telemetry, we monitored 48 radio-collared bears (1M;47F) from all four subpopulations. We conducted our eleventh consecutive year of non-invasive hair trapping in the Tensas River and Upper Atchafalaya River basin subpopulations during May-July 2017. Samples were collected from 209 and 116 sites in both subpopulations, respectively, resulting in 4,234 hair samples. All hair snare season samples combined with live capture and mortality samples (total: 4,256) were sent to Wildlife Genetics International (WGI). To collect information on reproductive vital rates, we conducted adult female den visits across all four subpopulations during February-March, 2017 to count and mark cubs-of-the-year, and to count yearlings. From these efforts, we estimated an average litter size of 1.6 cubs for the metapopulation. Adult female collars were changed as necessary. We continued carcass recovery (marked and unmarked bears) and documented 53 mortalities from all causes during the reporting period. Roadkill remains the leading cause of documented mortality (75%). The Beartrak database was routinely updated and we logged 78 sightings and 211 complaints during this reporting period. All complaints received a response as detailed in the LDWF Louisiana black bear Management Plan.

MONITORING PROTOCOLS

Thresholds or tipping points are commonly used to indicate when vulnerabilities to extinction change which can trigger conservation actions. Laufenberg et al. (2017) performed a reanalysis of black bear capture-mark-recapture (CMR) data from 2006 to 2012 from the Upper Atchafalaya River Basin (UARB) to identify demographic parameters that were good predictors of extinction risk and to quantify thresholds useful for estimating probability of extinction. Conditional classification trees indicated that annual apparent survival rates (φ) >0.90 based on CMR data for adult females averaged over 5 years were reliable for predicting likelihoods of population persistence >95% for 100 years. This protocol was adopted for the 2017 report and for this report applies to CMR data collected at UARB and Tensas River Basin (TRB). Although I had to include 1 year of data from the population viability analysis (PVA) period (Laufenberg et al. 2016) to produce a 5-year average in 2017, the 2018 report is based wholly on post-PVA data. Other parameter estimates (e.g., finite population growth, survival from telemetry, fecundity) from UARB and TRB and estimates from the Three Rivers Complex (TRC) are reported for purposes of complementing and supporting the CMR data.

CAPTURE-MARK-RECAPTURE DATA

The capture-mark-recapture data to be analyzed consisted of bear DNA extracted from hair collected at barbed-wire sampling sites at TRB from 2006 to 2017 and at UARB from 2007 to 2017. The data were reformatted and analyzed as a Pradel robust design

framework in Program Mark (White and Burnham 1999). Last year, I used a mixture model (2 heterogeneous mixtures) to account for individual capture heterogeneity (Pledger 2000). Failure to account for individual heterogeneity can result in negatively biased estimates of N, though φ and λ are thought to be less affected (Hines and Nichols 2002). An estimator to account for unobserved individual heterogeneity was recently introduced by White and Cooch (2017) which is based on modeling the heterogeneity as a continuous random effect. There is growing evidence that this estimator may outperform traditional mixture models and I report those estimates as well. Furthermore, I noticed an error in the TRB estimates from last year whereby captures of bears from the Deltic subpopulation (i.e., bears north of I-20) were not included in the overall estimates for TRB. I re-ran that analysis and report those results here.

At TRB, the most supported finite mixture model included a sex effect on φ, the finite rate of population increase (λ), capture probabilities (p), and recapture probabilities (c), a 2 finite mixture effect for individual heterogeneity, a year effect on p and λ, and an additive behavioral effect on c. Based on the finite mixture model with the φ for females over the past 5 years modeled as a constant, φ was 0.910 (95% CI = 0.866–0.940). The 5-year estimate of φ for females reported last year (2006-16) was 0.928 (95% CI = 0.889–0.954) but, when reanalyzed with the corrected data, was 0.917 (95% CI = 0.873–0.946) and 95% CIs overlapped extensively with the 2018 data. The top random effect model included a sex effect for φ, the random effect (σ_p), p, and c, a year interaction with sex on σ_p, and an additive behavioral effect on c. Based on a model for females with φ over the past 5 years modeled as a constant, φ was 0.926 (95% CI = 0.879–0.956). At UARB, the top finite mixture model was based on sex effects on φ, λ, the finite mixture, p, and c, a heterogeneous mixture effect, and an additive behavioral effect on c. Based on the finite mixture model at UARB with φ modeled as a constant for the past 5 years, φ for females averaged was 0.916 (95% CI = 0.849–0.955). For the random effects models, φ for females averaged over the past 5 years was 0.927 (95% CI = 0.858–0.964). All estimates were above the minimum threshold of 0.90 suggested by Laufenberg et al. (2017).

Population growth rate estimates (λ) over the past 5 years from TRB were 0.992 (95% CI = 0.949–1.036) and 0.951 (95% CI = 0.602–1.592) based on finite mixture models and random effects, respectively. Growth estimates over the past 5 years at UARB were 0.990 (95% CI = 0.906–1.075) and 0.999 (95% CI = 0.602–1.847) based on random effects and finite mixture models, respectively.

RADIO-TELEMETRY DATA

Survival.—The radio telemetry data consisted of known-fate survival data from 2002-03 to 2017-18. Although I averaged survival rates over the past 5 years, data from previous years were needed to develop complete capture histories. The objective was to use known-fate analysis in Program MARK to estimate annual survival rates (White and Burnham 1999). Survival rates (S) were annual rates beginning on 1 April

(approximate date of den exit) to 31 March of the following year. The models were based on the assumption that every bear was radiolocated monthly. Entries were censored only if the bear was not detected for >4 months. Annual survival rates were estimated using 2 methods. First, I censored animals whose collars ceased to function (S_{AA} or assumed alive). Second, I assumed those animals died at the time of signal loss (S_{AD} or assumed dead). This resulted in both optimistic (S_{AA}) and pessimistic (S_{AD}) estimates of survival. The study areas consisted of the Tensas River Basin (TRB), Upper Atchafalaya River Basin (UARB), and Three Rivers Complex (TRC).

Annual survival rates for 29 females at TRB monitored over the past 5 years were identical, assuming lost signals were alive (S_{AA}) and assuming lost signals were mortalities (S_{AD}), averaging 0.933 (95% CI = 0.846–0.972) over the previous 5 years. Sixteen females were monitored at UARB and S_{AA} and S_{AD} were both 0.909 (95% CI = 0.777–0.965) over the past 5 years. At TRC, 22 females were monitored and S_{AA} and S_{AD} were again identical, averaging 0.872 (95% CI = 0.737–0.940) over the past 5 years. These survival rates were slightly lower than estimates from the previous 5 years though 95% CIs overlapped extensively (0.941, 95% CI = 0.851–0.977 at TRB; 0.922, 95% CI = 0.779–0.974 at UARB; and 0.875, 95% CI = 0.726–0.946 at TRC). The survival rates estimated from telemetry (S_{AA}) were similar to apparent survival rates (φ) for females at TRB and UARB, which include emigration, suggesting that emigration continues to be low.

Thirteen males were monitored over the past 5 years at TRC and S_{AA} and S_{AD} were 0.882 (95% CI = 0.608–0.969) and 0.828 (95% CI = 0.559–0.941) over the past 5 years, respectively. Three males were monitored at UARB and S_{AA} and S_{AD} were identical at 0.675 (95% CI = 0.072–0.947) over the past 5 years. Only 2 males were monitored at TRB and S_{AA} and S_{AD} were 1.000. Numerical convergence was suspect for the male data set, probably because of low sample sizes for some populations. Similarly, male survival rate point estimates were slightly lower than estimates from the previous 5 years with extensive overlap of 95% CIs (0.887, 95% CI = 0.621–0.971 at TRB; 0.835, 95% CI = 0.574–0.944 at UARB; and 0.695, 95% CI = 0.242–0.914 at TRC).

Fecundity and Population Growth.— The proportions of the radiocollared females that were in 1 of 3 reproductive states: no cubs ($P_{no\ cubs}$), with cubs (P_{cubs}), and with yearlings ($P_{yearlings}$) were estimated, assuming that the collared females were representative of adult females in the population. The reproductive state proportions were based on a Bayesian formulation. Cub and yearling litter sizes and cub and yearling fecundity rates were similarly estimated. Modes of posterior distributions and 2.5 and 97.5% credible intervals are reported. I then used those data to estimate per capita recruitment or fecundity (f_{telem}). Transition data from 2017 to 2018 were needed to estimate some 2016 parameters, so reproductive parameters are reported through 2017.

On TRB, cub fecundity (f_{cub}), or the number of female yearlings annually produced per breeding age female, averaged 0.394 (95% CI = 0.053–0.632) and yearling fecundity

($f_{yearling}$) averaged 0.189 (95% CI = 0.018–0.390) over the past 5 years. On UARB, f_{cub} averaged 0.338 (95% CI = 0.031–0.595) and yearling fecundity ($f_{yearling}$) averaged 0.190 (95% CI = 0.016–0.372) over the past 5 years. On TRC, f_{cub} averaged 0.477 (95% CI = 0.235–0.683) and yearling fecundity ($f_{yearling}$) averaged 0.251 (95% CI = 0.110–0.402) over the past 5 years. Population growth rate (λ) over the past 5 years, estimated by adding the Bayesian-derived survival rate and $f_{yearling}$, at TRB, UARB, and TRC were 1.121 (95% CI = 0.9387–1.330), 1.100 (95% CI = 0.904–1.297), and 1.120 (95% CI = 0.944–1.296), respectively. As before, growth rate estimates from telemetry were generally higher than estimates from the CMR data (though 95% CIs were wide), largely because of higher $f_{yearling}$ from the telemetry data compared with f estimated with the CMR data. Estimates of $f_{yearling}$ were based on counts of yearlings that had not yet emerged from winter dens with their mothers. These estimates of f were probably higher because mortality and emigration that may have occurred between den emergence and future capture in hair snares is accounted for in the CMR estimates but not the telemetry estimates. The female bear populations at TRB and UARB over the past 5 years are probably best characterized as stable.

Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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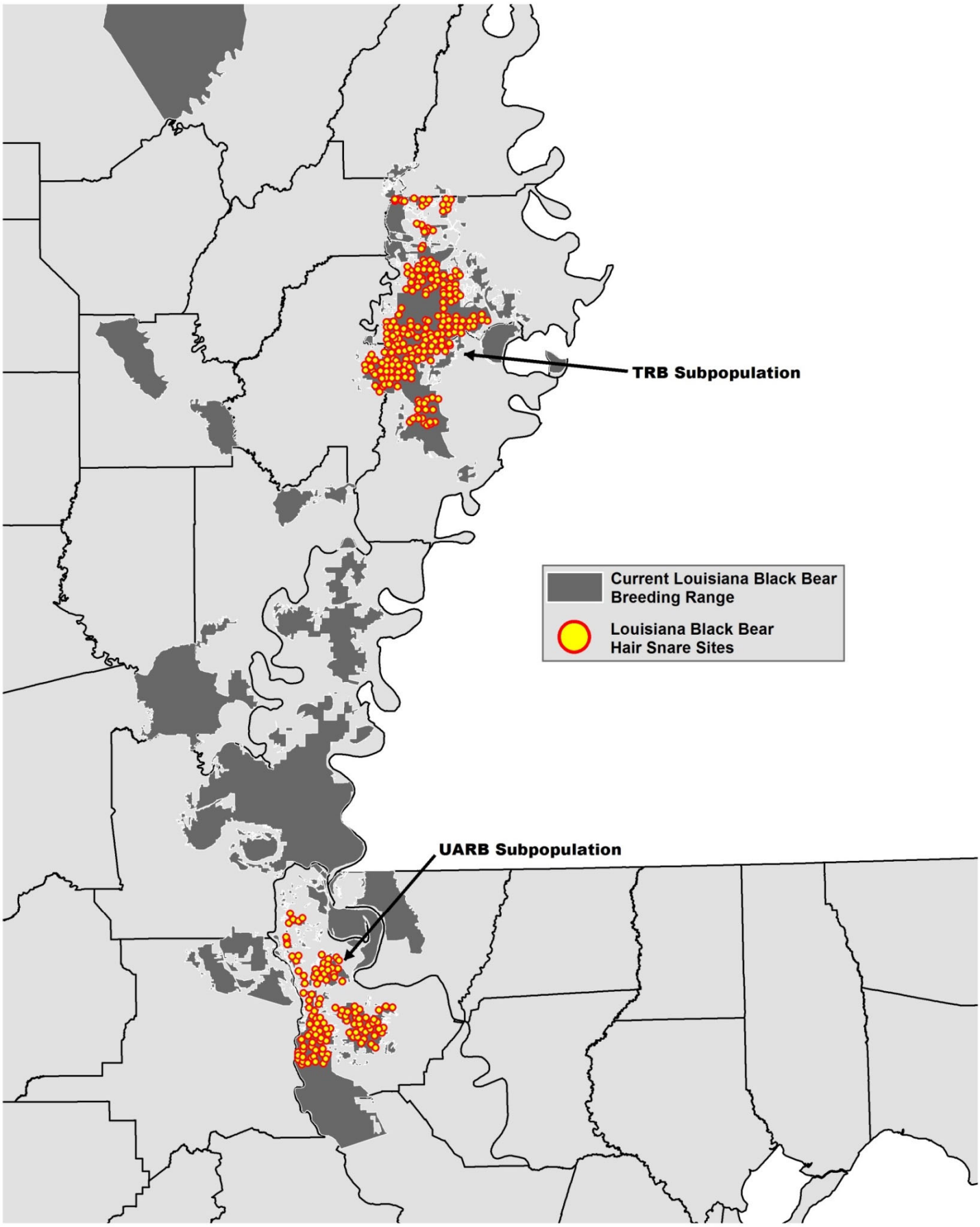
Map of Louisiana black bear hair snare locations.



Appendix II. Habitat Analysis and Results

Prepared By:

U.S. Fish and Wildlife Service – Louisiana Field Office

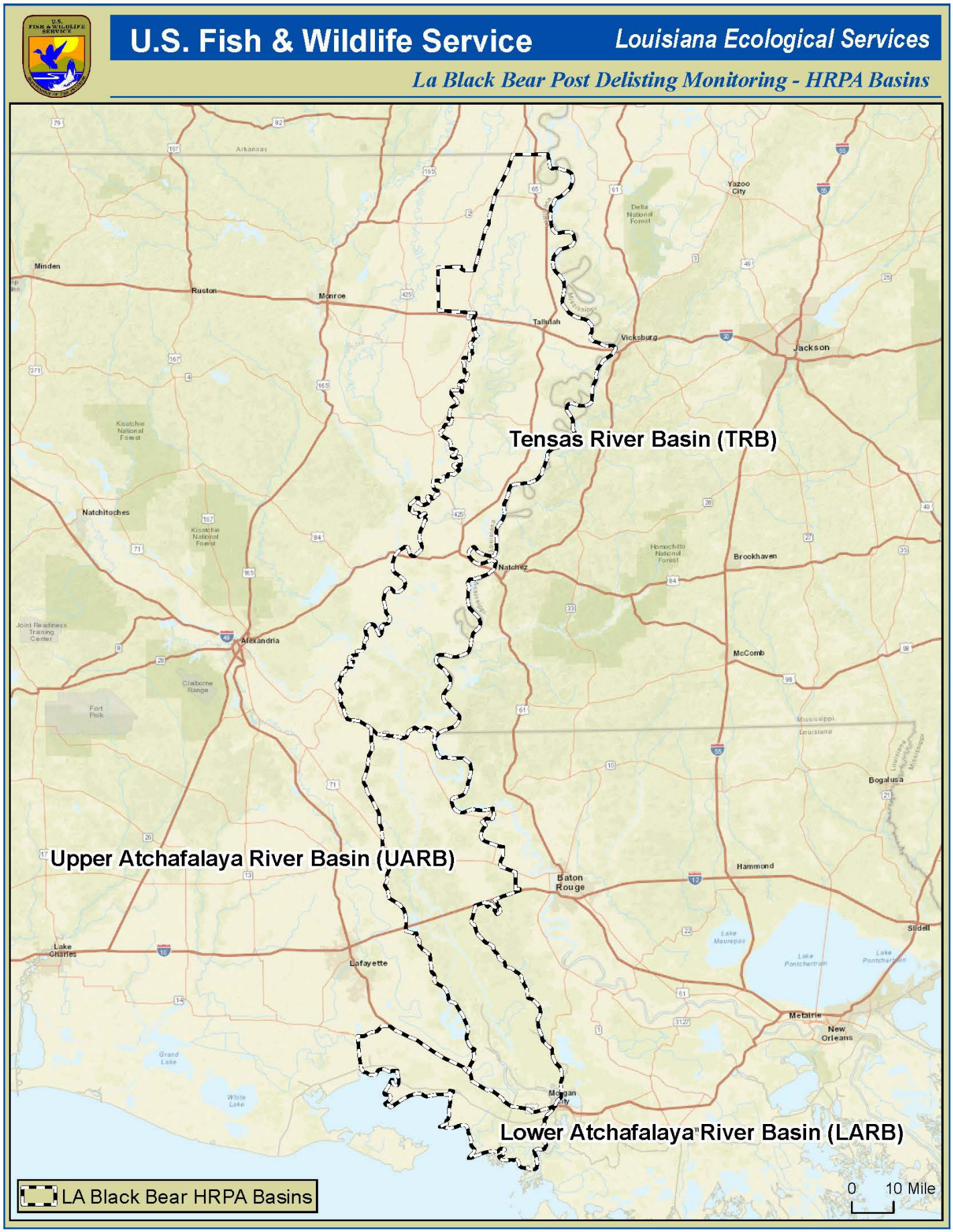
Habitat Monitoring

Monitoring Changes in Permanently Protected Lands

Annual updates were obtained for state and federally owned wildlife managed lands, privately owned mitigation banks and USDA-NRCS Wetland Reserve Program permanent easement enrollments within the Louisiana black bear habitat restoration planning area (HRPA). These datasets were verified for accuracy, acreages were summarized, and their spatial locations depicted using geographic information systems (GIS) ArcGIS 10.6.1 (ESRI, Redlands, California, USA).

From 2014 to the end of 2018, there has been an addition of over 16,000 acres of permanently protected lands (NWR/WMA/WRP/MB) within the HRPA (over 3,600 acres of which were added in the last year alone). These gains were exhibited in spite of the fact that we revised our methodology for assessing wetland mitigation bank acreage which resulted in a decrease in *reported* (though, not *actual*) mitigation acreage. For many years, as part of our role on wetland mitigation banking interagency review teams in multiple Corps districts, our office maintained a GIS database of all proposed, pending, and approved wetland mitigation banks in Louisiana. That database was based upon freehand-digitized polygons derived from hard copy maps provided by the Corps or prospective mitigation bank developers (accuracy was somewhat limited due to inherent human errors and variability among digitizers). More recently, the Corps developed, and continues to maintain, a web-based system for tracking wetland mitigation banks throughout the Nation (called RIBITS – Regulatory In lieu fee and Bank Information Tracking System – https://ribits.usace.army.mil). The RIBITS system uses point data, not polygons, for its graphic displays and provides exact acreages in accompanying documentation (which are primarily calculated by official land surveys). Because of this increased accuracy, the fact that it has now been in use for several years, and that is the official wetland mitigation banking tracking system for the agency charged with administering the wetland regulatory program (the Corps), we have decided to discontinue maintenance and use of our internal tracking system. Furthermore, we recently discovered that our unofficial, internal tracking system erroneously contained proposed wetland mitigation banks that were rejected or withdrawn, yet not removed from our database. From this report forward, we will rely solely on RIBITS to evaluate changes in wetland mitigation banking acreage in the Louisiana black bear HRPA. Again, it should be noted that the *apparent* decrease in wetland mitigation banking acreage shown in the following tables is not an *actual* decrease; it is strictly due to a methodology change resulting in more accurate figures being reported.

Insomuch as the primary purpose of our habitat analysis is to track changes over time (not necessarily to report comprehensive habitat acreage totals throughout the HRPA), we have not included Atchafalaya Basin Floodway Master Plan Easements and Acquisitions in our PDM habitat analysis to date. The acreage of those protected lands (approximately 126,000 acres) is reported in Table 5 (page 13155) of our Louisiana black bear delisting rule (81FR13124), but has not changed over the course of our post-delisting monitoring (A. Hebert [*New Orleans District Corps of Engineers – Port Barre Office*], personal communication, February 13, 2019). Should changes to these lands occur in the future, they will be included in our respective PDM report(s).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Monroe
Arkansas
Yazoo City
Vicksburg
Tallulah
Jackson
Natchitoches
Alexandria
Natchez
Brookhaven
McComb
Bogalusa
Hammond
Baton Rouge
Slidell
Lake Charles
Lafayette
Metairie
New Orleans

ENTIRE LOUISIANA BLACK BEAR HRPA

Conservation Lands Within HRPA	HRPA Acres Change 2017 to 2018	HRPA Acres Change 2014 to 2018
NWR / WMA / WRP / MB	3,611.52	16,066.83

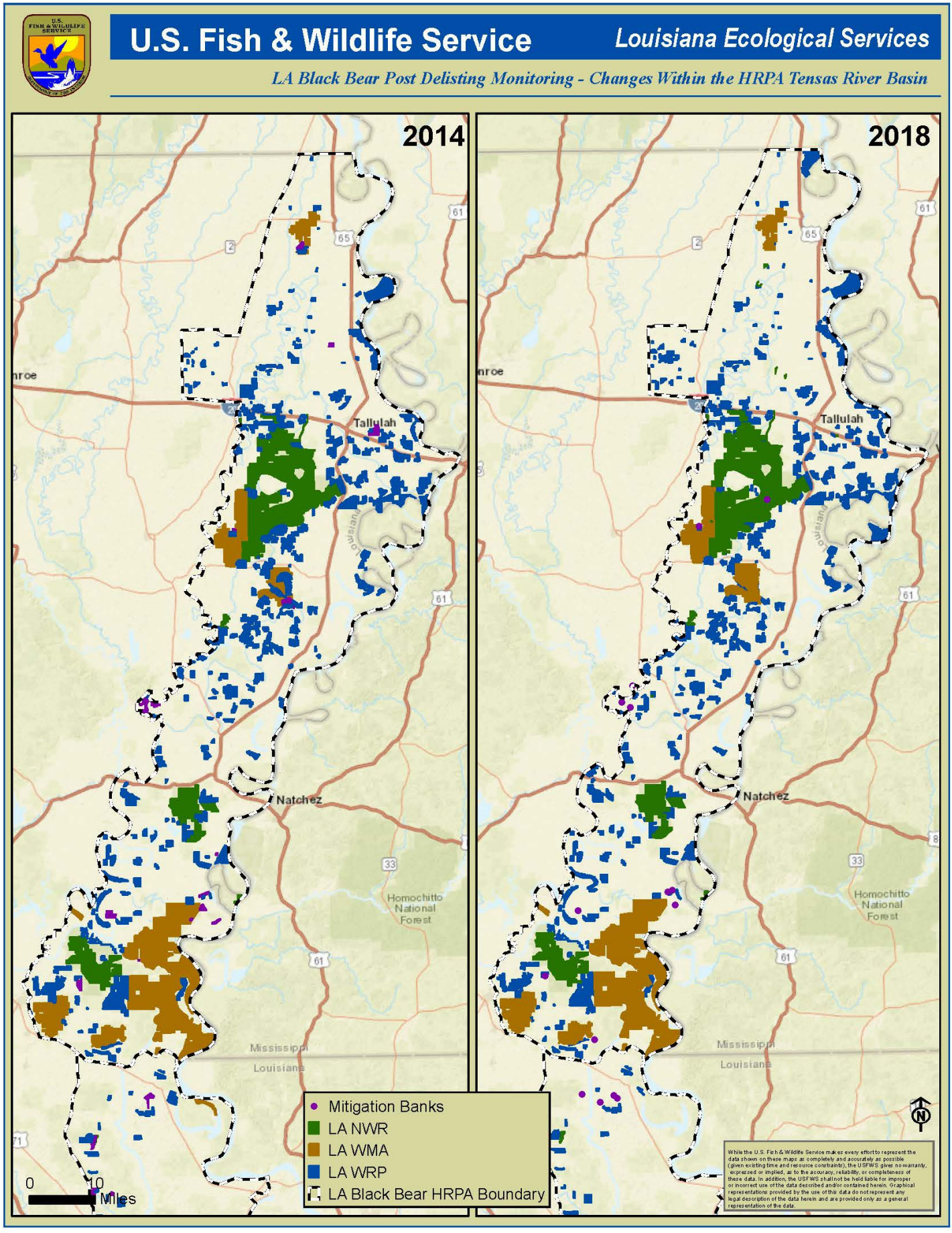
TENSAS RIVER BASIN

Tensas River Basin (TRB) of HRPA

Conservation Lands Within HRPA	TRB Acres (2016)	TRB Acres (2017)	TRB Acres (2018)
National Wildlife Refuge (NWR)	112,224.64	**112,231.62**	112,231.62
Wildlife Management Area (WMA)	143,584.53	143,558.18	143,558.18
Wetland Reserve Program (WRP)	142,188.63	147,355.95	153,406.80
Mitigation Banks (MB)	6,233.07	6,233.07	4,972.97
Totals:	**404,230.87**	**409,378.83**	**414,169.57**

Changes within Tensas River Basin (TRB) of HRPA

Conservation Lands Within HRPA	TRB Acres Change (2017 to 2018)	TRB Acres Change (2014 to 2018)
National Wildlife Refuge (NWR)	0.00	266.06
Wildlife Management Area (WMA)	0.00	-375.26
Wetland Reserve Program (WRP)	6,050.85	16,536.99
Mitigation Banks (MB)	-1,260.10	-956.97
Totals:	**4,790.74**	**15,470.82**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Louisiana Ecological Services
LA Black Bear Post Delisting Monitoring - Changes Within the HRPA Tensas River Basin
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UPPER ATCHAFALAYA RIVER BASIN

Upper Atchafalaya River Basin (UARB) of HRPA

Conservation Lands Within HRPA	UARB Acres (2016)	UARB Acres (2017)	UARB Acres (2018)
National Wildlife Refuge (NWR)	17,611.82	17,611.82	17,611.82
Wildlife Management Area (WMA)	61,430.82	60,724.08	60,725.26
Wetland Reserve Program (WRP)	11,064.04	11,208.40	11,208.40
Mitigation Banks (MB)	3,571.00	3,571.00	2,882.60
Totals:	**93,677.68**	**93,115.31**	**92,428.09**

Changes **within Upper Atchafalaya River Basin (UARB) of HRPA**

Conservation Lands Within HRPA	UARB Acres Change (2017 to 2018)	UARB Acres Change (2014 to 2018)
National Wildlife Refuge (NWR)	0.00	-2.38
Wildlife Management Area (WMA)	1.18	1,302.35
Wetland Reserve Program (WRP)	0.00	-321.83
Mitigation Banks (MB)	-688.40	156.39
Totals:	**-687.22**	**1,134.53**

LOWER ATCHAFALAYA RIVER BASIN

Lower Atchafalaya River Basin (LARB) of HRPA

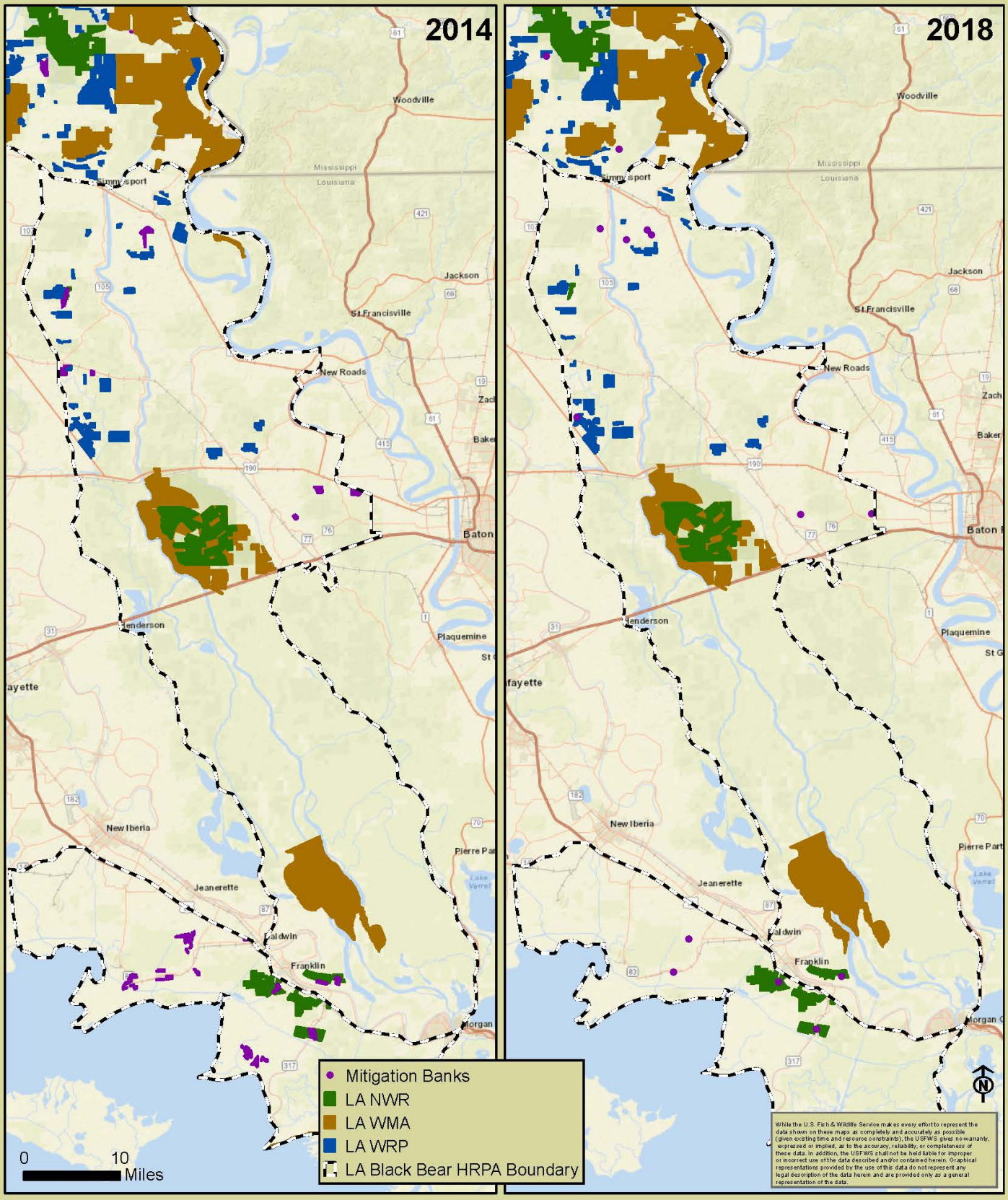
Conservation Lands Within HRPA	LARB Acres (2016)	LARB Acres (2017)	LARB Acres (2018)
National Wildlife Refuge (NWR)	7,379.68	7,379.68	7,379.68
Wildlife Management Area (WMA)	1,474.09	1,474.09	1,474.09
Wetland Reserve Program (WRP)	0.00	0.00	0.00
Mitigation Banks (MB)	2,672.41	2,672.41	2,180.40
Totals:	**11,526.18**	**11,526.18**	**11,034.17**

Changes **within Lower Atchafalaya River Basin (LARB) of HRPA**

Conservation Lands Within HRPA	LARB Acres Change (2017 to 2018)	LARB Acres Change (2014 to 2018)
National Wildlife Refuge (NWR)	0.00	-46.51
Wildlife Management Area (WMA)	0.00	0.00
Wetland Reserve Program (WRP)	0.00	0.00
Mitigation Banks (MB)	-492.01	-492.01
Totals:	**-492.01**	**-538.51**

U.S. Fish & Wildlife Service — Louisiana Ecological Services

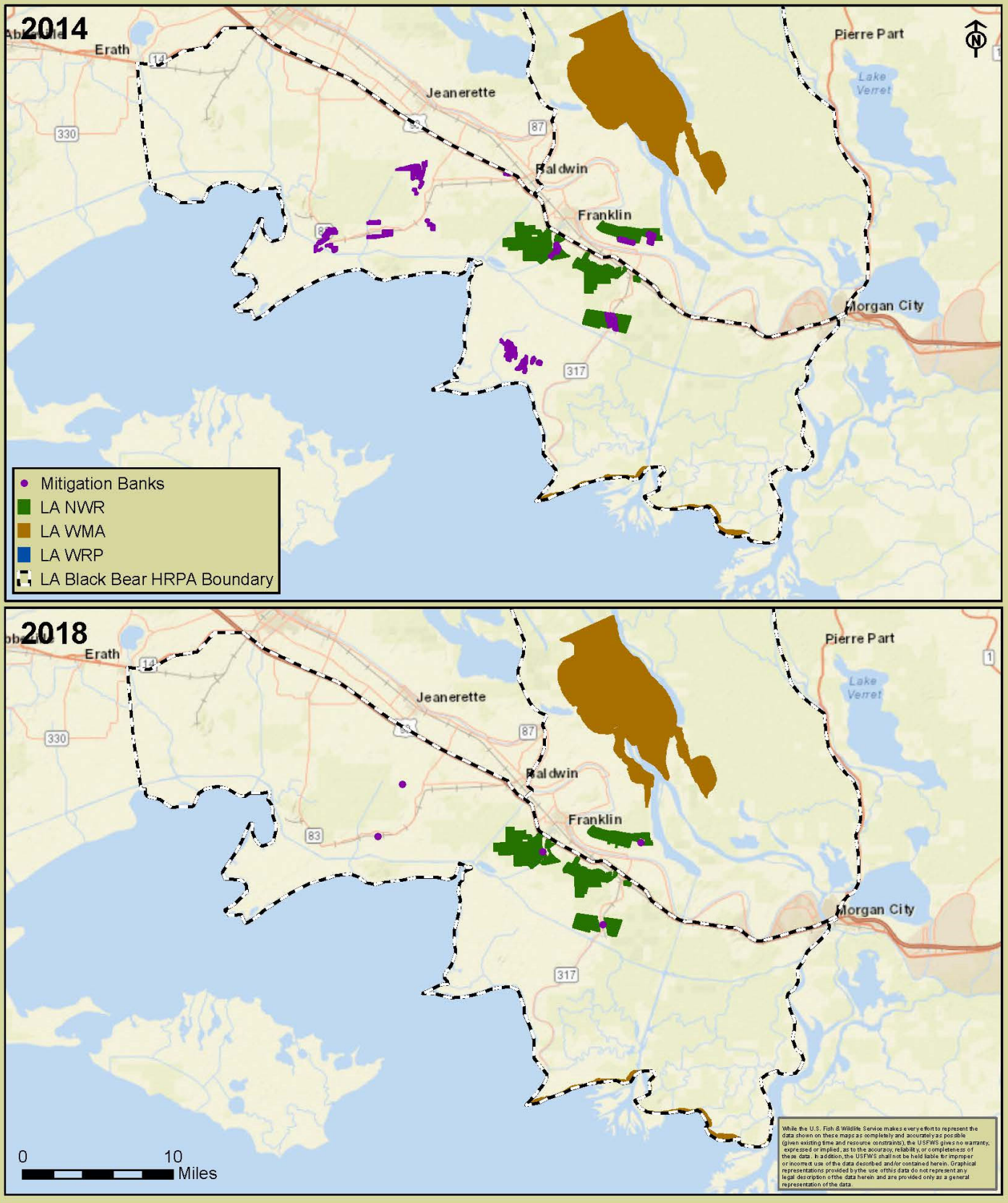
LA Black Bear Post Delisting Monitoring - Changes Within the HRPA Upper Atchafalaya River Basin



U.S. Fish & Wildlife Service

Louisiana Ecological Services

LA Black Bear Post Delisting Monitoring - Changes Within the HRPA Lower Atchafalaya River Basin



Monitoring Change in Agricultural Land Uses Using CropScape

2016 CropScape Data for HRPA Basins

Crop	TRB 2016	UARB 2016	LARB 2016	Total Acres	Percent
Alfalfa	680.36	0.00	0.00	680.36	0.02%
Aquaculture	468.19	2,919.74	668.42	4,056.34	0.11%
No Data	0.00	0.00	2,692.46	2,692.46	0.07%
Barren	1,052.50	482.05	506.73	2,041.28	0.06%
Clover/Wildflowers	7.74	0.00	0.00	7.74	0.00%
Corn	243,515.86	12,388.37	5.34	255,909.57	7.07%
Cotton	67,356.24	1,202.58	0.00	68,558.82	1.89%
Dbl Crop Corn/Soybeans	100.28	0.00	0.00	100.28	0.00%
Dbl Crop Soybeans/Cotton	0.00	0.00	0.00	0.00	0.00%
Dbl Crop Soybeans/Oats	6.89	129.17	0.00	136.07	0.00%
Dbl Crop WinWht/Corn	0.00	0.00	0.00	0.00	0.00%
Dbl Crop WinWht/Cotton	0.00	0.00	0.00	0.00	0.00%
Dbl Crop WinWht/Sorghum	0.00	0.00	0.00	0.00	0.00%
Dbl Crop WinWht/Soybeans	2,699.17	1,616.76	0.00	4,315.93	0.12%
Deciduous Forest	1,550.55	875.43	2,678.62	5,104.61	0.14%
Developed/High Intensity	518.74	594.20	807.66	1,920.60	0.05%
Developed/Low Intensity	10,030.85	19,302.20	6,780.97	36,114.02	1.00%
Developed/Med Intensity	3,355.24	1,314.81	982.72	5,652.76	0.16%
Developed/Open Space	52,301.55	18,346.30	3,231.49	73,879.34	2.04%
Evergreen Forest	707.98	18.67	47.13	773.79	0.02%
Fallow/Idle Cropland	162,749.38	16,467.89	12,340.00	191,557.27	5.29%
Grass/Pasture	14,786.62	40,439.40	6,010.75	61,236.77	1.69%
Herbaceous Wetlands	8,641.10	14,582.87	154,806.59	178,030.56	4.92%
Herbs	0.00	0.00	0.00	0.00	0.00%
Millet	49.79	0.00	0.00	49.79	0.00%
Misc Vegs & Fruits	0.00	0.00	0.00	0.00	0.00%
Mixed Forest	5,402.29	224.07	10.67	5,637.02	0.16%
Oats	1,919.34	0.00	0.00	1,919.34	0.05%
Open Water	78,269.43	82,022.56	21,110.54	181,402.53	5.01%
Other Crops	0.00	0.00	0.00	0.00	0.00%
Other Hay/Non Alfalfa	19,161.30	1,213.73	2.89	20,377.92	0.56%
Peaches	12.90	0.00	0.00	12.90	0.00%
Peanuts	0.00	0.00	0.00	0.00	0.00%
Peas	0.22	0.00	0.00	0.22	0.00%
Pecans	1,339.24	3.56	0.00	1,342.80	0.04%
Pop or Orn Corn	0.00	0.00	0.00	0.00	0.00%
Rice	31,747.67	9,791.52	361.75	41,900.94	1.16%
Rye	0.00	0.00	0.00	0.00	0.00%
Shrubland	4,387.78	6,383.61	302.14	11,073.53	0.31%
Sod/Grass Seed	55.94	0.67	0.22	56.83	0.00%
Sorghum	15,755.88	4,557.99	0.22	20,314.09	0.56%
Soybeans	590,096.47	116,246.62	2,036.31	708,379.39	19.56%
Spring Wheat	0.00	0.00	0.00	0.00	0.00%
Sugarcane	362.20	74,039.92	34,465.89	108,868.01	3.01%
Sunflower	276.98	0.00	0.00	276.98	0.01%
Sweet Corn	9.12	0.00	0.00	9.12	0.00%
Sweet Potatoes	2,513.11	0.67	0.00	2,513.78	0.07%
Winter Wheat	58.68	218.55	0.22	277.45	0.01%
Woody Wetlands	732,863.37	775,459.89	116,151.65	1,624,474.91	44.85%
Total	**2,054,810.95**	**1,200,843.78**	**366,001.38**	**3,621,656.12**	100.00%

2017 CropScape Data for HRPA Basins

Crop	TRB 2017	UARB 2017	LARB 2017	Total Acres	Percent
Alfalfa	124.06	0.00	0.00	124.06	0.00%
Aquaculture	437.68	3,480.10	996.31	4,914.08	0.14%
No Data	0.00	0.00	2,692.46	2,692.46	0.07%
Barren	1,400.29	479.73	838.12	2,718.14	0.08%
Clover/Wildflowers	1,444.54	0.67	1.11	1,446.32	0.04%
Corn	215,568.13	17,018.35	26.00	232,612.48	6.42%
Cotton	75,274.64	673.09	0.00	75,947.73	2.10%
Dbl Crop Corn/Soybeans	0.00	0.00	0.00	0.00	0.00%
Dbl Crop Soybeans/Cotton	0.00	0.00	0.00	0.00	0.00%
Dbl Crop Soybeans/Oats	0.00	94.05	0.00	94.05	0.00%
Dbl Crop WinWht/Corn	0.00	0.00	0.00	0.00	0.00%
Dbl Crop WinWht/Cotton	0.00	0.00	0.00	0.00	0.00%
Dbl Crop WinWht/Sorghum	0.00	0.00	0.00	0.00	0.00%
Dbl Crop WinWht/Soybeans	4,029.96	2,964.95	0.67	6,995.57	0.19%
Deciduous Forest	1,414.81	885.06	1,690.34	3,990.21	0.11%
Developed/High Intensity	547.16	627.01	778.85	1,953.01	0.05%
Developed/Low Intensity	10,105.32	19,158.29	6,686.86	35,950.47	0.99%
Developed/Med Intensity	3,595.87	1,305.11	941.06	5,842.04	0.16%
Developed/Open Space	51,838.59	18,549.90	3,337.23	73,725.73	2.04%
Evergreen Forest	1,061.05	30.24	32.91	1,124.19	0.03%
Fallow/Idle Cropland	31,311.19	13,930.53	9,644.37	54,886.09	1.52%
Grass/Pasture	16,536.76	41,358.84	6,061.15	63,956.75	1.77%
Herbaceous Wetlands	6,914.57	16,634.84	148,685.06	172,234.47	4.76%
Herbs	0.00	0.00	0.00	0.00	0.00%
Millet	151.39	0.00	0.00	151.39	0.00%
Misc Vegs & Fruits	0.00	0.00	0.00	0.00	0.00%
Mixed Forest	7,697.92	96.10	49.57	7,843.59	0.22%
Oats	1,355.81	0.00	0.00	1,355.81	0.04%
Open Water	78,872.81	80,937.13	22,649.62	182,459.55	5.04%
Other Crops	0.00	0.00	0.00	0.00	0.00%
Other Hay/Non Alfalfa	32,254.80	1,155.50	8.00	33,418.30	0.92%
Peaches	0.89	0.00	0.00	0.89	0.00%
Peanuts	22.45	0.00	0.00	22.45	0.00%
Peas	0.00	0.00	0.00	0.00	0.00%
Pecans	35,463.72	9.56	0.00	35,473.28	0.98%
Pop or Orn Corn	0.00	0.00	0.00	0.00	0.00%
Rice	23,710.39	9,212.88	245.79	33,169.06	0.92%
Rye	0.56	0.22	0.00	0.79	0.00%
Shrubland	3,627.74	5,895.16	345.24	9,868.13	0.27%
Sod/Grass Seed	100.84	0.00	0.00	100.84	0.00%
Sorghum	3,163.96	584.92	0.00	3,748.88	0.10%
Soybeans	711,786.99	116,615.84	3,553.00	831,955.83	22.97%
Spring Wheat	0.00	0.00	0.00	0.00	0.00%
Sugarcane	1,286.84	74,601.74	35,499.27	111,387.85	3.08%
Sunflower	51.58	0.00	0.00	51.58	0.00%
Sweet Corn	0.00	0.00	0.00	0.00	0.00%
Sweet Potatoes	2,374.15	119.81	0.00	2,493.96	0.07%
Winter Wheat	1,779.18	183.38	0.00	1,962.56	0.05%
Woody Wetlands	729,504.33	774,240.81	121,238.40	1,624,983.54	44.87%
Total	**2,054,810.94**	**1,200,843.78**	**366,001.38**	**3,621,656.11**	100.00%

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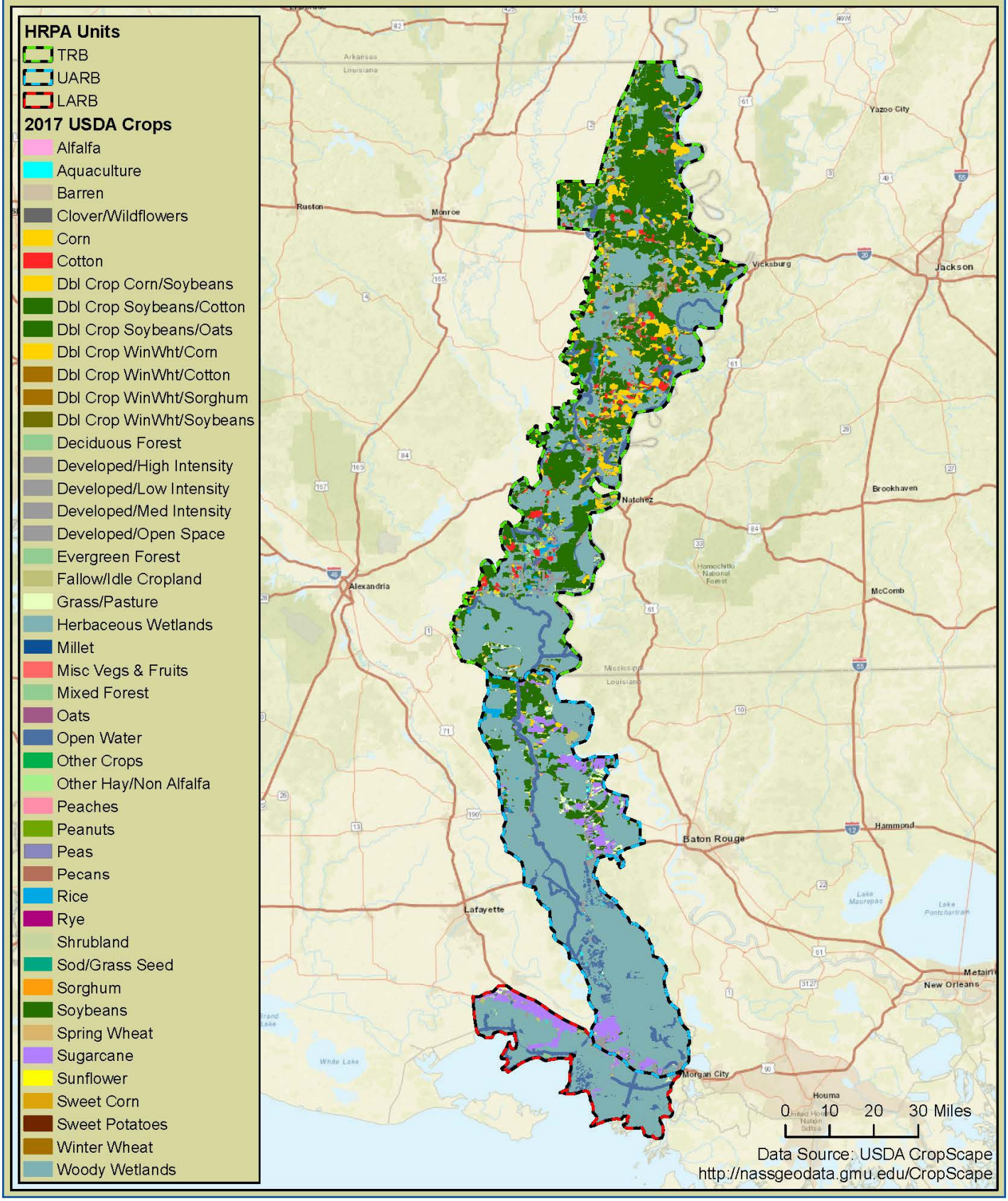
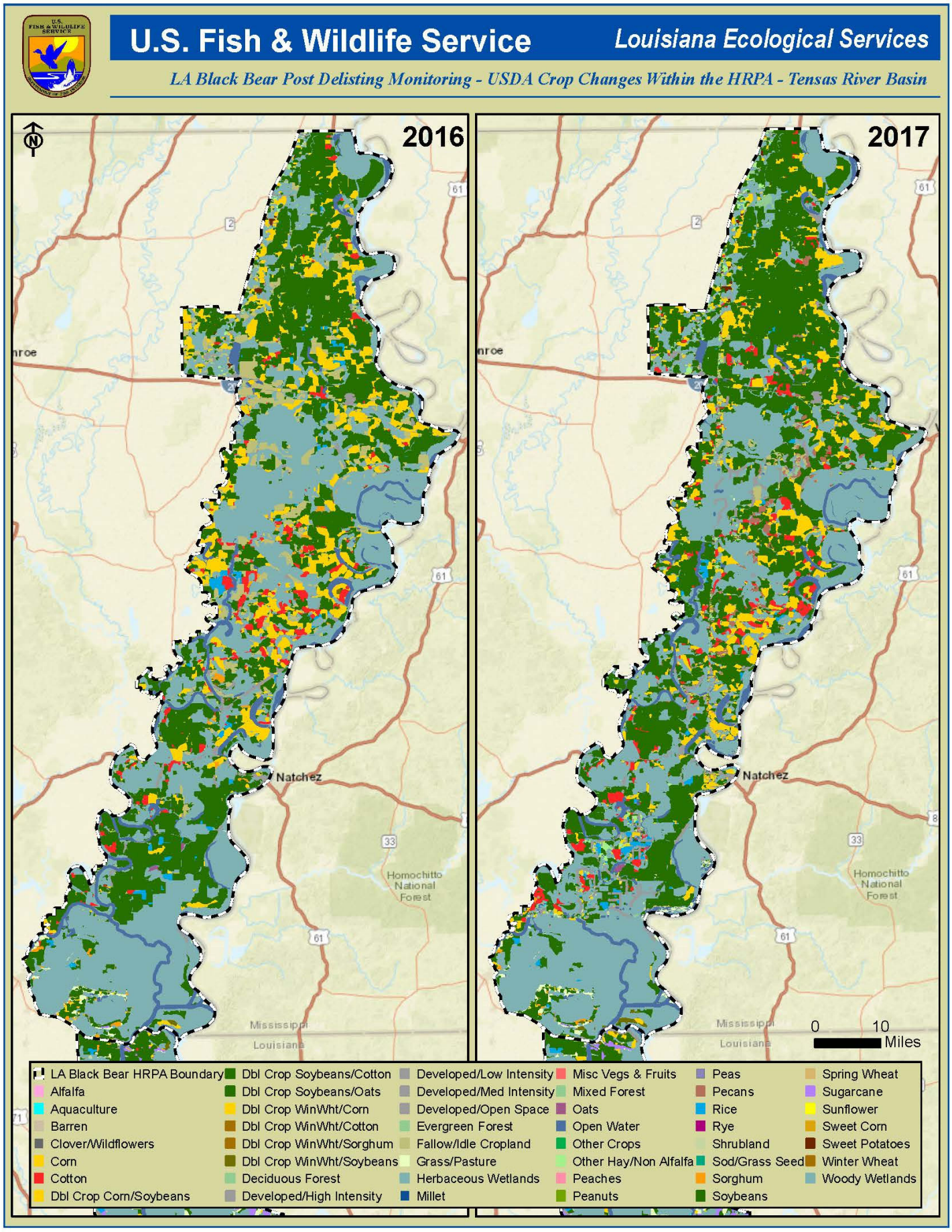
La Black Bear Post Delisting Monitoring - Crops 2017



2016 to 2017 Changes in CropScape

Crop	TRB 2016 to 2017	UARB 2016 to 2017	LARB 2016 to 2017	HRPA 2016 to 2017	HRPA 2016 to 2017 Change
Alfalfa	-556.30	0.00	0.00	-556.30	-0.015%
Aquaculture	-30.51	560.36	327.89	857.74	0.024%
No Data	0.00	0.00	0.00	0.00	0.000%
Barren	347.79	-2.32	331.38	676.85	0.019%
Clover/Wildflowers	1,436.80	0.67	1.11	1,438.58	0.040%
Corn	-27,947.73	4,629.98	20.66	-23,297.09	-0.643%
Cotton	7,918.40	-529.49	0.00	7,388.91	0.204%
Dbl Crop Corn/Soybeans	-100.28	0.00	0.00	-100.28	-0.003%
Dbl Crop Soybeans/Cotton	0.00	0.00	0.00	0.00	0.000%
Dbl Crop Soybeans/Oats	-6.89	-35.13	0.00	-42.02	-0.001%
Dbl Crop WinWht/Corn	0.00	0.00	0.00	0.00	0.000%
Dbl Crop WinWht/Cotton	0.00	0.00	0.00	0.00	0.000%
Dbl Crop WinWht/Sorghum	0.00	0.00	0.00	0.00	0.000%
Dbl Crop WinWht/Soybeans	1,330.78	1,348.19	0.67	2,679.65	0.074%
Deciduous Forest	-135.74	9.63	-988.29	-1,114.40	-0.031%
Developed/High Intensity	28.42	32.81	-28.81	32.41	0.001%
Developed/Low Intensity	74.47	-143.91	-94.11	-163.55	-0.005%
Developed/Med Intensity	240.63	-9.69	-41.66	189.27	0.005%
Developed/Open Space	-462.96	203.60	105.74	-153.62	-0.004%
Evergreen Forest	353.07	11.56	-14.23	350.40	0.010%
Fallow/Idle Cropland	-131,438.19	-2,537.36	-2,695.63	-136,671.18	-3.774%
Grass/Pasture	1,750.14	919.44	50.41	2,719.98	0.075%
Herbaceous Wetlands	-1,726.54	2,051.97	-6,121.52	-5,796.09	-0.160%
Herbs	0.00	0.00	0.00	0.00	0.000%
Millet	101.59	0.00	0.00	101.59	0.003%
Misc Vegs & Fruits	0.00	0.00	0.00	0.00	0.000%
Mixed Forest	2,295.64	-127.97	38.90	2,206.57	0.061%
Oats	-563.53	0.00	0.00	-563.53	-0.016%
Open Water	603.38	-1,085.44	1,539.07	1,057.02	0.029%
Other Crops	0.00	0.00	0.00	0.00	0.000%
Other Hay/Non Alfalfa	13,093.50	-58.23	5.11	13,040.38	0.360%
Peaches	-12.01	0.00	0.00	-12.01	0.000%
Peanuts	22.45	0.00	0.00	22.45	0.001%
Peas	-0.22	0.00	0.00	-0.22	0.000%
Pecans	34,124.48	6.00	0.00	34,130.48	0.942%
Pop or Orn Corn	0.00	0.00	0.00	0.00	0.000%
Rice	-8,037.29	-578.64	-115.96	-8,731.88	-0.241%
Rye	0.56	0.22	0.00	0.79	0.000%
Shrubland	-760.05	-488.46	43.10	-1,205.40	-0.033%
Sod/Grass Seed	44.90	-0.67	-0.22	44.02	0.001%
Sorghum	-12,591.92	-3,973.06	-0.22	-16,565.21	-0.457%
Soybeans	121,690.52	369.23	1,516.69	123,576.44	3.412%
Spring Wheat	0.00	0.00	0.00	0.00	0.000%
Sugarcane	924.64	561.82	1,033.38	2,519.84	0.070%
Sunflower	-225.40	0.00	0.00	-225.40	-0.006%
Sweet Corn	-9.12	0.00	0.00	-9.12	0.000%
Sweet Potatoes	-138.96	119.14	0.00	-19.82	-0.001%
Winter Wheat	1,720.49	-35.16	-0.22	1,685.11	0.047%
Woody Wetlands	-3,359.05	-1,219.08	5,086.76	508.63	0.014%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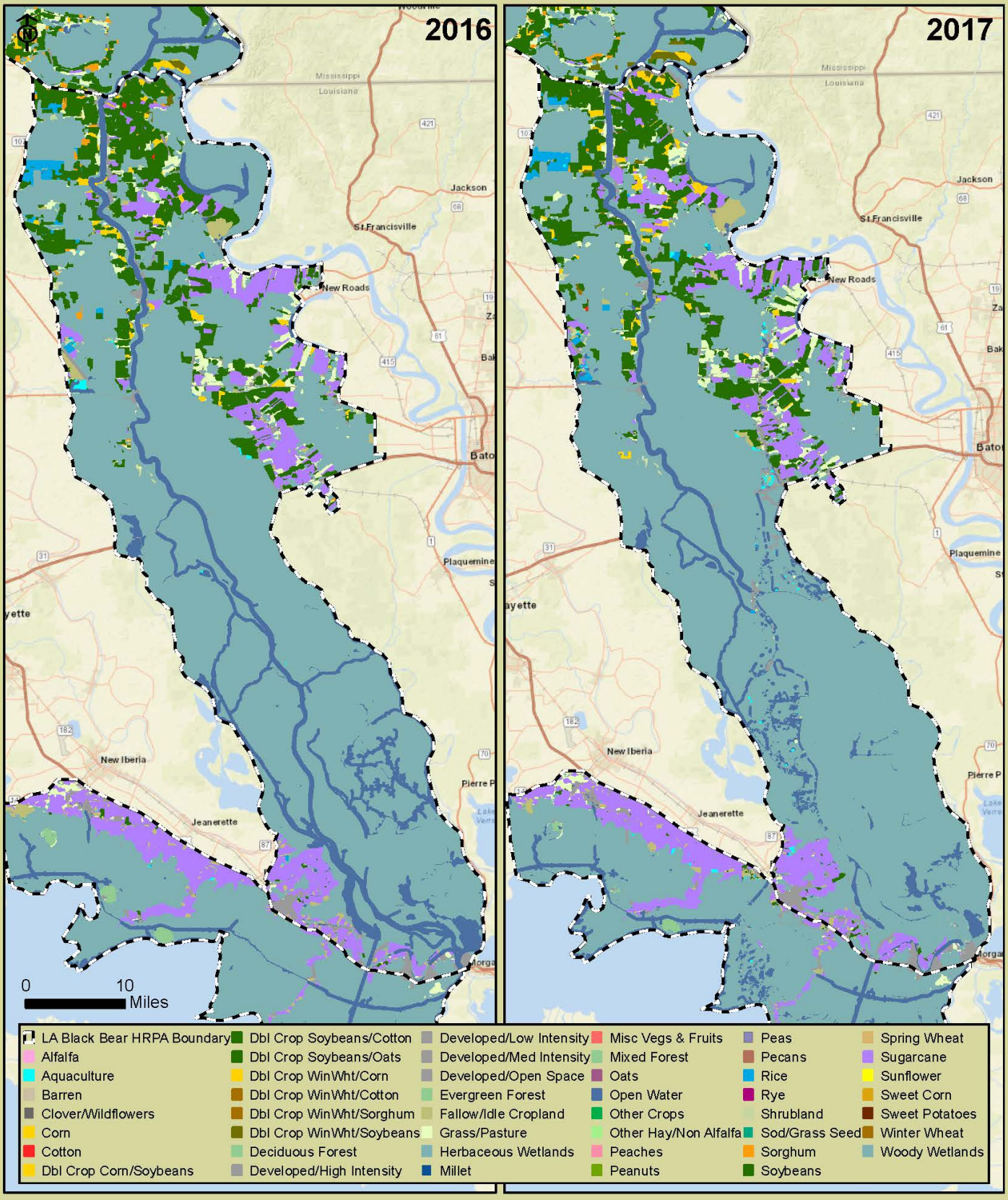
LA Black Bear Post Delisting Monitoring - USDA Crop Changes Within the HRPA - Tensas River Basin
2016
2017
Natchez
Homochitto National Forest
Mississippi
Louisiana
0
10
Miles
LA Black Bear HRPA Boundary
Alfalfa
Aquaculture
Barren
Clover/Wildflowers
Corn
Cotton
Dbl Crop Corn/Soybeans
Dbl Crop Soybeans/Cotton
Dbl Crop Soybeans/Oats
Dbl Crop WinWht/Corn
Dbl Crop WinWht/Cotton
Dbl Crop WinWht/Sorghum
Dbl Crop WinWht/Soybeans
Deciduous Forest
Developed/High Intensity
Developed/Low Intensity
Developed/Med Intensity
Developed/Open Space
Evergreen Forest
Fallow/Idle Cropland
Grass/Pasture
Herbaceous Wetlands
Millet
Misc Vegs & Fruits
Mixed Forest
Oats
Open Water
Other Crops
Other Hay/Non Alfalfa
Peaches
Peanuts
Peas
Pecans
Rice
Rye
Shrubland
Sod/Grass Seed
Sorghum
Soybeans
Spring Wheat
Sugarcane
Sunflower
Sweet Corn
Sweet Potatoes
Winter Wheat
Woody Wetlands

U.S. Fish & Wildlife Service — Louisiana Ecological Services

LA Black Bear Post Delisting Monitoring - USDA Crop Changes Within the HRPA - Upper Atchafalaya River Basin



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LA Black Bear Post Delisting Monitoring - USDA Crop Changes Within the HRPA - Lower Atchafalaya River Basin