



Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX.22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 14, 3rd edition). A 4th edition of the Handbook is in preparation and will be available in 2009.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

1. Name and address of the compiler of this form:

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

March 15, 2011

3. Country:

United States of America

4. Name of the Ramsar site:

The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.

Cache-Lower White Rivers

5. Designation of new Ramsar site or update of existing site:

This RIS is for (tick one box only):

- a) Designation of a new Ramsar site ; or
 b) Updated information on an existing Ramsar site

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area

The Ramsar site boundary and site area are unchanged:

or

If the site boundary has changed:

- i) the boundary has been delineated more accurately ; or
- ii) the boundary has been extended ; or
- iii) the boundary has been restricted**

and/or

If the site area has changed:

- i) the area has been measured more accurately ; or
- ii) the area has been extended ; or
- iii) the area has been reduced**

** **Important note:** If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

- i) a **hard copy** (required for inclusion of site in the Ramsar List): ;
- ii) an **electronic format** (e.g. a JPEG or ArcView image) ;
- iii) a **GIS file providing geo-referenced site boundary vectors and attribute tables** .

b) Describe briefly the type of boundary delineation applied:

e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The boundary is delineated by current holdings of the National Wildlife Refuges and Arkansas State Wildlife Management Areas. The Acquisition boundary of Cache River NWR is included in the maps illustrating room for potential expansion

8. Geographical coordinates (latitude/longitude, in degrees and minutes):

Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

Centroid Coordinates

Cache River National Wildlife Refuge	35°0'N 91°18'W
White River National Wildlife Refuge	34°17'N 91°9'W
Black Swamp State Wildlife Management Area	35°7'N 91°18'W
Dagmar State Wildlife Management Area	34°53'N 91°18'W
Trusten Holder State Wildlife Management Area	34°0'N 91°12'W

Southwest Corner

33°58'N 91°19'W

Northeast Corner

35°37'N 91°6'W

9. General location:

Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

Cache-Lower White Rivers is located in east central Arkansas approximately 50 miles (80 kilometres) east of Little Rock, Arkansas in the following counties: Arkansas, Desha, Jackson, Monroe, Phillips, Prairie, and Woodruff.

10. Elevation: (in metres: average and/or maximum & minimum)

Minimum Elevation above mean sea level 40 metres
 Maximum Elevation above mean sea level 68 metres

11. Area: (in hectares)

Cache River National Wildlife Refuge	27,203	Hectares
White River National Wildlife Refuge	63,181	Hectares
Black Swamp State Wildlife Management Area	2,698	Hectares
Dagmar State Wildlife Management Area	4,122	Hectares
<u>Trusten Holder State Wildlife Management Area</u>	<u>1,963</u>	<u>Hectares</u>
Total	99,166	Hectares

12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

Lower Cache-White Rivers is characterized by topography of three basic types: braided-stream terraces which display a characteristic dendritic drainage pattern; meander belts which contain areas of past or present channel migration with numerous parallel, crescent-shaped ridges and swales; and backswamps, which are flat areas that remained peripheral to channel migration and slowly filled with layers of fine sediments. The variation in topography results in a wetland complex of meandering channels, forested flats, shallow sloughs, oxbow lakes, cypress-tupelo brakes, and scrub-shrub wetlands.

The wetland exists in the Lower Mississippi Alluvial Valley Ecosystem; an area that has been cleared for agriculture reducing the area to a highly fragmented forested landscape that is 20% of its former extent. By virtue of the scope of its remaining bottomland hardwoods and permanently inundated wetlands, the Cache/Lower White River Basin is the most important breeding area for Wood Ducks in Arkansas. The Refuge also provides important habitat for threatened or endangered species such as the Ivory-billed Woodpecker, Least Tern, Piping Plover, and fat pocketbook mussel. The North American Waterfowl Management Plan identified the Refuge as the most important wintering area for Mallard ducks in North America. Management of this wetland complex strives to restore forest habitat and associated wildlife populations, promote carbon sequestration, improve hydrologic function, and enhance wetland and aquatic systems resulting in bolstered ecological integrity and significantly improved watershed health and stability.

13. Ramsar Criteria:

Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

- 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9

14. Justification for the application of each Criterion listed in 13 above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 1: Lower Cache-White Rivers is an integral part of the Lower Mississippi Bioregion. Within the ecosystem nearly 80% of the natural wetlands have been converted. Remaining wetlands range widely but are dominated by Freshwater, tree-dominated wetlands; includes

freshwater swamp forest, seasonally flooded forest, wooded swamps; on inorganic soils (Xf). The best examples of wetland tend to be in the wettest areas of the Ecosystem such as the Cache River Wetlands in Illinois; Mingo National Wildlife Refuge in Missouri; White River National Wildlife Refuge in Arkansas; and Atchafalaya Basin and Big Woods Conservation Area in Louisiana.

As a result of the extensive deforestation and wetland conversion of the Lower Mississippi, the Lower Cache-White Rivers wetlands are the largest remaining block of contiguous forest in the Lower Mississippi and play a vital role in flood storage and desynchronization of flood peaks for the White River basin as well as functioning as a near-natural extensive floodplain system.

During pre-European settlement, the floodplain of the Cache and Lower White River Basins were almost entirely covered by various bottomland hardwood (BLH) forest community types. Edges of the floodplain were mostly forested with some isolated, higher elevation terraces and dune areas containing relatively small areas of bottomland prairie and savanna. Today, the Basin's 100-year floodplain is nearly 75% cleared and used as agricultural land; much of this land was cleared in the 1960s and 1970s for soybean production. Despite the extensive deforestation and ecological alterations, the Cache and Lower White River Basins remains as one of the largest, contiguous, and diverse BLH ecosystems in North America and the lower Mississippi Alluvial Valley (MAV) Biogeographic Region and are complete representative of this ecosystem. This important and rare habitat is identified by many national and international conservation entities for its unique and valuable ecological significance and as a priority region for future protection and restoration (U.S. Fish and Wildlife Service). These wetlands still retains more of their fundamental wetland functional characteristics than any other comparable are in the MAV.

Inland wetland types, based on the RAMSAR classification system, that are representative of this site (in order of importance) are as follows; Xf, M, N, Tp, W, O, P, Ts. Human-made wetland types, which are of significantly less acreage, are 3, 4, and 6 respectively, in order of acreage. The Cache – Lower White River Areas is also classified as a major natural floodplain system under RAMSAR's hydrological importance system.

Criterion 2: Three centuries ago canebrakes (*Arundinaria gigantea*) were widespread throughout the Mississippi Alluvial Valley. However, the canebrake ecosystem has declined by 98%, and this once prominent feature of bottomland forests is now considered a critically endangered ecosystem. Canebrakes in the Cache-Lower White Rivers provide critical habitat for numerous bottomland hardwood forest species. Canebrakes are prime habitat for the threatened Louisiana black bear and several migratory birds including American Woodcock (*Scolopax minor*), Swainson's Warbler (*Limnothlypis swainsonii*) and Hooded Warbler (*Wilsonia citrina*). The rare and possibly extinct Bachman's Warbler (*Vermivora bachmani*) and at least six satyrine and skipper butterflies are also considered cane obligates.

The Cache – Lower White Rivers Area contains a diversity of different and unique wetlands habitats, such as flooded cypress brakes and bottomland hardwoods, afforestation, moist-soil, and open ravine habitat in the lower MAV, that are critical to the survival of numerous vulnerable, threatened, and endangered species.

The Ivory-billed Woodpecker (*Campephilus principalis*) was rediscovered in 2004 on Bayou DeView within the Cache – Lower White Rivers Area. This endanger species along with vulnerable bats species such as Rafinesque's big-eared bats (*Plecotus rafinesquii*) and southeastern myotis bats (*Myotis austroriparius*), are just a few species that rely heavily upon the few remaining large, contiguous forested blocks of mature trees for forage and cover. During the winter, large number of migrating Bald Eagles (*Haliaeetus leucocephalus*) can be found near large waterfowl concentrations (primary winter food source) in these diverse wetlands. A modest breeding population of Bald Eagle occurs in habitat throughout this basin. Least Terns (*Sterna antillarum*) and Piping Plovers (*Charadrius melodus*) are two endangered species that have used sand bar habitat along the rivers in this project area during spring and fall migration as stopover sites while the Least Terns nests on sandbars along the lower Arkansas River on the southern tip of this project area.

Pink mucklets (*Lampsilis abrupta*), fat pocketbooks (*Potamilus capax*) and scaleshell mussels (*Leptodea leptodon*) are some endangered species known to occur sporadically in the bayous, creeks and rivers of the Cache and White River Basins.

Forest breeding birds, such as high priority and vulnerable species Swainson's Warblers (*Limnothlypis swainsonii*), Prothonotary Warblers (*Protonotaria citrea*), and Cerulean Warblers (*Dendroica cerulean*), also rely on these large blocks of contiguous forest for breeding and foraging habitat. These high priority areas in the Cache – Lower White River ecosystem are now considered the most important in MAV with The Partners in Flight Bird Conservation Plan for the MAV (Bird Conservation Region 26) establishing avian population goals to support these source populations.

Criterion 3: The wetlands of the Cache – Lower White River Complex support a tremendous number and diversity of endemic wildlife and plant species. Over 250 bird species, 60 species of reptiles and amphibians, 60 different species of mammals, 40 mussels, and 100 fish species are known to occur in this diverse area. The high number of different tree species (≥ 70), shrubs (≥ 50), and numerous species of vines and herbaceous plants known to occur in this wetland makes it one of the most diverse areas in the MAV Biogeographic region.

Highlights of biodiversity for this area include: the single most important wintering area for mallards (*Anas platyrhynchos*) in North America; largest and most important complex of breeding habitat for forest breeding birds and wood ducks in the MAV; contains the only population of native black bears in Arkansas and the largest population in the MAV; and numerous endangered species are known to occur in the complex.

Criterion 4: The MAV is one of the most important ecoregion for migrating and wintering ducks and geese in North America. The unique Cache – Lower White Rivers Complex of wetlands provides critical wintering habitat for waterfowl and other migratory birds in the form of important foraging and resting (sanctuary) habitats. This wintering habitat area is responsible for contributing to the spring breeding population goals of the NAWMP (North American Waterfowl Management Plan) as well as other life cycle needs for waterfowl such as fall molting, pre-egg laying and migration energy needs. In order to contribute ducks to spring breeding populations, wintering areas must provide sufficient habitat to ensure adequate winter survival. This Complex was selected as one of the wintering habitat focus areas by the NAWMP and LMVJV (Lower Mississippi Valley Joint Venture) for these reasons.

As mentioned under Criterion 2, forest breeding birds use this complex during their critical breeding season and, also as prior mentioned is now considered the most important in the MAV to support forest breeding bird source population goals.

Criterion 5: The Cache – White Rivers Complex represents significant important wintering habitat for wintering waterfowl, primarily mallards. Mallards counted from ground surveys (peak numbers) on the Cache – Lower White Rivers Complex over the last 5-years have averaged over 100,000 birds. NOTE: Surveys were conducted primarily in open habitat and not in flooded forested habitat due to the low visibility & logistic problems associated with surveying in this habitat. Mallard numbers could be significantly higher in these flooded forest habitats since this habitat type makes up the majority of this complex and Mallards depend heavily on this habitat to meet their life cycle needs during winter migration.

Criterion 6: As mentioned in Criterion 5, this complex is very important habitat for migrating Mallards and the last 5-years average of over 100,000 birds for the complex is over 1% of the North American population.

Criterion 8:

Flowing rivers and bayous, such as the White River, Cache River, and Bayou DeView, represent permanent aquatic habitats within the site. Abandoned channel scars in the form of open-water oxbow lakes or forested brakes provide most of the permanent lentic habitats. Many of these habitats are seasonally connected to rivers during flood events. The frequency and duration of connection is dependent on flood stages and the elevation of lakes. Major streams to which the site's wetlands and rivers are ultimately connected are the Arkansas and Mississippi Rivers. During large flood events, a major portion of the bottomland hardwood habitats found throughout the refuge serve as temporary habitats for many aquatic species. Many species of fishes use the flooded forests, sloughs, and lakes for spawning and/or nursery habitat. Fishes and freshwater mussels occupy rivers, bayous, and deep lakes occurring on the site throughout the year. Annual flooding increases availability of suitable habitats, promotes habitat linkages, connectivity of source populations, and corridors for genetic interchange.

The aquatic habitats within the site support a large diversity of species that occur seasonally within flooded and non-flooded habitats as larva, juveniles, and/or adults. Species include pallid sturgeon (*Scaphirhynchus albus*), shovelnose sturgeon (*Scaphirhynchus platyrhynchus*), and lake sturgeon (*Acipenser fulvescens*); paddlefish (*Polyodon spathula*); alligator gar (*Atractosteus spatula*); spotted, longnose, and shortnose gar (*Lepisosteus* spp.); bowfin (*Amia calva*); American eel (*Anguilla rostrata*); skipjack herring (*Alosa chrysochloris*); shad (*Dorosoma* spp.); mooneyes (*Hiodon* spp.); pickerels (*Esox* spp.); common carp (*Cyprinus carpio*); shiners (*Notropis* spp.); carp (*Carpoides* spp.); buffalo (*Ictiobus* spp.); catfish (*Ictalurus* spp.); madtoms (*Noturus* spp.); killifish (*Fundulus* spp.); Mosquitofish (*Gambusia affinis*); temperate bass (*Morone* spp.); sunfish (*Lepomis* spp.); bass (*Micropterus* spp.); darters (*Ammocrypta* spp., *Etheostoma* spp., and *Percina* spp.); freshwater drum (*Aplodinotus grunniens*); striped mullet (*Mugil cephalus*).

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

149: Lower Mississippi

b) biogeographic regionalisation scheme (include reference citation):

Abell et al. 2000. Freshwater Ecoregions of North America: A Conservation Assessment. Island Press, Washington, DC, USA.

16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

- Geology and geomorphology** - Paleozoic bedrock outcrops occur on the western edge of the Arkansas Delta, and declines to the southeast, where outcrops are overlain by more recent alluvial and loessal strata deposited during alternating inundations and recessions of the Gulf of Mexico. The bedrock below the Cache/Lower White Rivers' system originated nearly 1,000 to over 4,000 feet below sea level. Various overlying strata of gravel and sand support several important and productive aquifers, alternating with confining strata of silts and clays. The surface strata of the Cache/Lower White Rivers' basin are all Quaternary deposits of alluvium and loess. Holocene alluvial deposits of the existing major rivers, abandoned meanders, and areas near channels form the current "bottomland" areas. These are the lowest areas in the basin, and most likely to be forested and retain other obvious wetland characteristics. Immediately upslope of these most recent deposits are one or more terraces of Pleistocene alluvial deposits. Lands at this and higher elevations are the ones which have largely been cleared for agricultural production. Older deposits are exposed in only very limited circumstances in the basin. These include an area

of dune sand located in Woodruff County between the Cache River and Bayou DeView, and some isolated pockets of exposed silt and sand along Bayou DeView.

- **Soil type and chemistry range** – A wide range of Alfisols, Inceptisols, Entisols, and Mollisols, but predominantly clay/loam mineral soils, 0 to 1% slopes or frequently flooded; typical pH range of 4.5 to 7.0.
- **Sediment characteristics** – The current conditions represent an altered state from that of the natural system, in that species composition and productivity have been negatively impacted due to modified hydrology and sedimentation. Sedimentation is caused by a number of sources including agricultural runoff, headcutting in fields and drainage tributaries, stream bank erosion, and stream channel instability and degradation.
One of the by-products of the subsequent era of major flood control projects was the extensive conversion of bottomland hardwoods to agricultural production, much of it occurring in the Cache/Lower White Rivers' basin during the 1940s through the mid-1970s. Land that was provided protection from flooding by these major levee systems was quickly cleared and brought into agricultural production. Extensive conversion of bottomland hardwood forests to agricultural lands has negatively impacted the hydrological regime of the Cache/Lower White Rivers' basin, as well as the Lower Mississippi Alluvial Valley as a whole. The clearing of forest, increased the "flashiness" of streams due to accelerated run off, and exacerbated siltation in streams and wetland systems due to increased sediment transport.
- **Origins** – Natural; recent alluvial and loessal strata deposited during alternating inundations and recessions of the Gulf of Mexico, and shaped by multiple river meanders over thousands of years.
- **Hydrology/Depth, fluctuations and permanence of water/Downstream area** – Even though the basic processes of puddling and headwater and backwater flooding still operate within the basin, their collective contribution to hydrologic function has been profoundly modified by both quantitative and qualitative alteration, and by the addition processes such as irrigation withdrawals. Interestingly, the overall hydrologic effects on the system can be described as being at both ends of the spectrum: drier in most areas, wetter in some. The many local efforts directed at drainage associated with agricultural production and transportation (e.g., road ditches) have significantly reduced the area affected by puddling and the amount of water that could be held as a result of puddling. Areas that were cleared of forest and ditched now contribute virtually none of their original hydrologic function to the system by immediately discharging excess rainfall as runoff to the watercourses. When the acreage that has been influenced by flood control projects intended to reduce the impacts of headwater flooding are added to these, then the vast majority of the ecosystem is now affected. This area no longer holds temporary water as it did historically, and now relatively rapidly discharges runoff to the rivers; thus, these areas, comprising most of the higher elevations of the ecosystem, are drier than they were historically, being inundated much less frequently and for much shorter durations.
However, as a direct result of the increased rate of drainage from most of the basin, the lower elevations and those areas nearest the Cache River, Bayou DeView, and White River now receive all this water more rapidly and in quantities more frequently exceeding the capacity of the system to carry and discharge into the Mississippi River. Additionally, the discharge capacity of the White River into the Mississippi River and Cache River into the White River is greatly reduced from historic conditions due to the effects of the levee projects. Thus, the areas immediately adjoining the upper and middle Cache River and Bayou DeView, subjected to unregulated flows, can be characterized as being more frequently flooded at greater depths, but for shorter durations than in the natural ecosystem. The stochastic dynamics of the natural system have in many ways been exaggerated by the hydrologic modifications. On the other hand, the lowest portions of the Cache and Lower White Rivers seem now to be subjected to more frequent flooding, at greater depths, for longer durations than was the historic tendency.

- **Water quality** - The U.S. Geological Survey (1984) cited potential pollution of groundwater and accumulation of pesticides in bottom sediments as a major concern, although it indicated that potential effects were not quantified in eastern Arkansas. Due to recent (since approximately 1975) water quality monitoring programs of agencies such as Environmental Protection Agency (EPA), U.S. Geological Survey (USGS), and the Arkansas Department of Environmental Quality (ADEQ), there is currently a relative abundance of data (approximately 13 monitoring stations) for the Cache/Lower White Rivers' ecosystem. A USGS trends analysis (Petersen 1990) provides some summary information on some aspects of current water quality trends in the basin in relation to other areas in eastern Arkansas. Typical values of total recoverable manganese and total 2,4-D are higher in the Cache River than any other river group in the region; dieldrin concentrations are highest here along with the St. Francis River; total phosphorus, biochemical oxygen demand, and fecal-coliform bacteria values are generally higher than most other river groups; and, specific conductance, total alkalinity, and total hardness values are lower than other groups except Bayou Meto. In general, these factors are indicative of a wetland system significantly impacted by agriculture. A 2001 study by North Carolina State University, "Chemical Contamination at National Wildlife Refuges in the Lower Mississippi River Ecosystem," identified some evidence of contaminant hazard associated with organochlorine pesticides and current use pesticides. Most of the water quality problems of the system are associated directly or indirectly with erosion of sediment from agricultural lands into the streams. Many of the chemical constituents mentioned above are bound to and carried by sediment particles.

In "Arkansas's 2010 303 (d) List of Impaired Waterbodies", Cache River, Bayou DeView, and Bayou Des Arc are all classified as "designated use not supported for fisheries" due to chlorides, total dissolved solids, lead and zinc. The source was listed mostly as agriculture with some industrial point source and municipal point source pollution. Reforestation of these flood plains should greatly increase water quality and reduce this type of pollution. Bayou DeView has a "Priority Rank" of medium priority of need for corrective action and the other areas were of low priority. This document was prepared by the Arkansas Department of Environmental Quality

- **Climate** – The climate of central and eastern Arkansas can be characterized as mild and moderately humid. The mean monthly minimum temperature at Stuttgart is 39.7°F in January, and the mean monthly maximum is 91.1°F in July. Winters are relatively mild, but brief cold periods occur occasionally. The region has a long growing season, ranging from approximately 200 days in the north to 220 days in the south, and extended hot, humid periods are common during the summer, with maximum temperatures often exceeding 100°F during July and August. The region receives abundant precipitation, ranging from 48 to 51 inches annually. Although rainfall is considered to be well distributed throughout the year (the average number of days with measurable precipitation is about 100 per year), there is a pronounced seasonal pattern. Almost one-third of the annual rainfall occurs during March, April, and May, with the driest months being July through October. The average annual evaporation is about 37 inches, with approximately 23 inches occurring from May through September, which exceeds the average rainfall during this period by about 5 inches. The average annual runoff throughout this region is 16 to 20 inches, most occurring from November through April (Friewald 1985). These climatic characteristics are important in driving the hydrology of the watershed, which is in turn the most critical component in shaping ecosystem functions and processes.

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

- **surface area** – White River Basin - 27,765 sq mi (71,911 km²)
- **general geology and geomorphological features** - recent alluvial and loessal strata deposited during alternating inundations and recessions of the Gulf of Mexico, and shaped by multiple river meanders over thousands of years.

- **general soil types** - A wide range of Alfisols, Inceptisols, Entisols, and Mollisols, but predominantly clay/loam mineral soils, 0 to 1% slopes or frequently flooded
- **climate type** – humid subtropical

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

Most of the soils have a high clay content, which results in their capability to perch water at the surface, but this also prevents most areas from contributing to significant groundwater recharge through infiltration.

As a direct result of the increased rate of drainage from most of the basin, the lower elevations receive water more rapidly and in quantities more frequently exceeding the capacity of the system to carry and discharge into the Mississippi River. Additionally, the discharge capacity of the White River into the Mississippi River and Cache River into the White River is greatly reduced from historic conditions due to the effects of the Cache and White River levee projects. Thus, the areas immediately adjoining the upper and middle Cache River and Bayou DeView, subjected to unregulated flows, can be characterized as being more frequently flooded at greater depths, but for shorter durations than in the natural ecosystem.

There is exacerbated siltation in streams and wetland systems due to increased sediment transport originating from agricultural runoff. Additionally, headcutting and channel incisement have altered river flow dynamics and flooding patterns in the floodplain.

19. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts • U • Va •
Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

- Xf -- **Freshwater, tree-dominated wetlands**; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils.
- Ts -- **Seasonal/intermittent freshwater marshes/pools on inorganic soils**; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.
- Tp -- **Permanent freshwater marshes/pools**; ponds (below 8 ha), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season.
- P -- **Seasonal/intermittent freshwater lakes** (over 8 ha); includes floodplain lakes.
- O -- **Permanent freshwater lakes** (over 8 ha); includes large oxbow lakes.
- M -- **Permanent rivers/streams/creeks**; includes waterfalls.
- 4 -- **Seasonally flooded agricultural land** (including intensively managed or grazed wet meadow or pasture).
- 3 -- **Irrigated land**; includes irrigation channels and rice fields.
- N -- **Seasonal/intermittent/irregular rivers/streams/creeks**.
- 9 -- **Canals and drainage channels, ditches**.
- W -- **Shrub-dominated wetlands**; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils.
- 2 -- **Ponds**; includes farm ponds, stock ponds, small tanks; (generally below 8 ha).

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

The Cache –Lower White Rivers is characterized by a range of freshwater, tree-dominated wetland types such as: sugarberry/elm/ash, oak/sweetgum, oak/ash, baldcypress/tupelo swamps. Hardwood flats, meandering channels, shallow sloughs, oxbow lakes, and shrub-scrub wetlands compliment the habitat. This unique complex of wetlands provides critical wintering habitat for a myriad of waterfowl and other migratory species, as well as resident wildlife species. By virtue of the extent of its remaining bottomland hardwoods and permanently inundated wetlands, the Cache/Lower White River Basin is the most important breeding area for Wood Ducks in Arkansas. The area also provides important habitat for threatened or endangered species such as the Ivory-billed Woodpecker, Least Tern, Piping Plover, and fat pocketbook mussel.

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

- **Endemic**

- **Canebrakes (*Arundinaria gigantea*)** – This important component of the Cache – Lower White Rivers bottomland hardwood forest has exhibited a 98% decline in the Mississippi Alluvial Valley primarily due to conversion of wetlands.

- **Introduced** – The following are non-native, invasive, and present an ecological threat to the Cache-Lower White Rivers in that they shade out or outcompete ecologically-important native plants:
 - **Privet (*Ligustrum* spp.)**
 - **Japanese honeysuckle (*Lonicera japonica*)**
 - **Chinaberry (*Melia azedarach*)**
 - **Mimosa (*Albizia julibrissin*)**
 - **Kudzu (*Pueraria lobata*)**
 - **Sericea Lespedeza (*Lespedeza cuneata*)**
 - **Tall Fescue (*Lolium arundinaceum*)**
 - **Hydrilla (*Hydrilla verticillata*)**

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

- **Endemic –**
 - **Ivory-billed Woodpecker (*Campephilus principalis*)**
 - **Black bear**
 - **Swallow-tailed Kite**
 - **Mallard duck**
 - **Fat pocketbook mussel**

- **Introduced** – The following are non-native, invasive, and present an ecological threat to the Cache-Lower White Rivers because they destroy or degrade the habitat of and otherwise outcompete ecologically-important native wildlife species
 - **Snakehead (*Channa argus*)**
 - **Nutria (*Myocaster coypus*)**

23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

The forests of the Cache-Lower White Rivers have supplied wood products to several large local sawmills, producing more than 10 million board feet per mill per year, along with several smaller mills or independent operators. These mills provide a significant contribution to the economy in the form of employment and associated expenditures.

The forested wetlands and aquatic habitats of the basin have historically provided extensive wildlife-dependent recreation. The fish and wildlife habitats in the Cache/Lower White Rivers' ecosystem represent approximately 40 percent of all suitable areas for wildlife-dependent recreation in the Arkansas Delta.

Archaeological sites indicating the presence of prehistoric man are prevalent in the Cache-Lower White Rivers area. The earliest evidence of man is from the Paleo-Indian period, circa 10,000 B.C. The majority of the prehistoric sites are located on natural levees, low-lying terraces, and low sandy knolls.

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning? No

If Yes, tick the box and describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:
- iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:
- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

- a) within the Ramsar site:
 - 91% Federal (United States Fish and Wildlife Service)
 - 9% State (Arkansas Game and Fish Commission)
- b) in the surrounding area:
 - 95% Private Owner(s)
 - 5% Unspecified Mixed Ownership

25. Current land (including water) use:

The general socioeconomic setting of the Cache/Lower White Rivers' region is generally similar to that of the broader Mississippi River Delta, and can be characterized as follows: (1) Strongly agriculturally oriented; (2) low relative per capita incomes; (3) relatively high rates of unemployment; and (4) relatively low, sparsely distributed, and stable or decreasing population. Population centers are Brinkley (4,234), DeWitt (3,553), Clarendon (2,072), McCrory (1,971), and Cotton Plant (1,150), with numerous small communities of less than 1,000 scattered throughout the region.

Agriculture in the area is dominated by soybeans and rice, with a substantial amount of wheat grown on well-drained areas, lesser amounts of corn and milo scattered throughout, and some cotton production on the best drained, sandiest soils. Arkansas leads the nation in rice production (approximately 40-50 percent of annual national production), and the Cache/Lower White Rivers' basin significantly contributes to this total. There is also a relatively small but growing acreage of land dedicated to aquaculture production.

The forested wetlands and aquatic habitats of the basin have historically provided extensive wildlife-dependent recreation.

- a) within the Ramsar site:
 - Forestry
 - Farming
 - Irrigation
 - Livestock grazing
 - Commercial fishing
 - Fishing
 - Hunting

b) in the surroundings/catchment:

- Farming
- Forestry
- Industry
- Aquaculture
- Irrigation
- Livestock grazing
- Commercial fishing
- Fishing
- Hunting

26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

a) within the Ramsar site:

- altered hydrology, stream flows, flooding regimes, and reduced water quality
- colonization of invasive plant and animal species, which displace natural vegetation and degrade those habitats on which native animal species depend;
- potential on-site impacts of off-site oil and gas development.

b) in the surrounding area:

- the loss of sustainable natural communities, including the loss of 20 million acres of bottomland hardwood forests;
- the loss of connectivity between bottomland hardwood forest sites (e.g., forest fragmentation);
- the effects of agricultural and timber harvesting practices
- increased surface and groundwater withdrawal for agricultural irrigation and natural gas drilling;
- the simplification of gene pools and the remaining wildlife habitats within the ecosystem;
- the effects of constructing navigation and water diversion projects; and
- the cumulative habitat effects of land and water resource development activities.

27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ; Ib ; II ; III ; IV ; V ; VI

c) Does an officially approved management plan exist; and is it being implemented?:

Yes – Central Arkansas National Wildlife Refuge Complex Comprehensive Conservation Plan
Arkansas Comprehensive Wildlife Conservation Strategy (State Wildlife Action Plan)

d) Describe any other current management practices:

Land acquisition

Restoration of bottomland hardwood forest on acquired agricultural lands

Restoration of hydrologic conditions on acquired, marginal agricultural lands

Establishment of waterfowl sanctuaries

Cropland, Moist-soil, Forest, and Shrub/scrub habitat management for wildlife enhancement goals and objectives contributing to refuge, state, regional, and national plans/initiatives

Management of aquatic resources contributing to goals of Southeast Aquatic Resources Partnership

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

White River National Wildlife Refuge Comprehensive Conservation Plan

Cache River National Wildlife Refuge Habitat Management Plan

Restoration of Lower Cache River Channel

Ongoing land acquisition program within Approved Acquisition Boundary of White River and Cache River NWRs

29. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

U.S. Army Corps of Engineers (Dr. Andrew Gaines) Long term Hydrologic Monitoring stations for White River floodplain

University of Missouri Gaylord Memorial Laboratory (Dr. Mickey Heitmeyer) Long term monitoring of ecosystem health of Bottomland Hardwood Ecosystem Health on Cache River and White River NWRs

Mississippi State University- (Dr. Rick Kaminski, Jake Straub, Alan Leach, and Justyn Foth) Monitor mast production of red oak trees and various bottomland hardwood forest parameters, and quantify abundance of macro invertebrates in flooded bottomlands available for foraging waterfowl. These data will be used to provide the Lower MS Valley Joint Venture with new estimates of Duck Energy Days for bottomland habitat.

Mississippi State University – (Dr. Steve Miranda) Document and compare fish species composition and abundance in eight bottomland oxbow lakes with connectivity (WRNWR) to lakes without connectivity (in MS).

U.S.G.S. National Wetlands Research Center – (Dr. Beth Middleton) This project was to conduct research on the latitudinal variation in primary production and carbon stores in bald cypress swamps of the Mississippi River Alluvial Plain-a surrogate for global climate change prediction.

Arkansas Game and Fish Commission – (Allen Clawson) This project was to capture mallards on the Demonstration Area and Dry Lake and attach satellite transmitters.

Arkansas Game and Fish Commission – (Mark Barbee) This project was to conduct a wild turkey gobbling chronology/phenology survey on White River National Wildlife Refuge.

Arkansas Game and Fish Commission – (Myron Means) Estimate population growth and survival as well as population size of black bears on White River National Wildlife Refuge using hair traps.

Arkansas State University – (Dr. Jim Bednarz) Research nesting success, causes of nesting failures, and habitat use of the Swallow-tailed and Mississippi Kites in the White River National Wildlife Refuge.

Arkansas State University – (Dr. Jim Bednarz) Research arthropod diversity in correlation with habitat use and characteristics of the Swainson's Warbler on White River National Wildlife Refuge by searching for banded birds from 2007 study.

U.S. Forest Service Southern Research Center – (Dr. Brian Lockhart) Address concerns of old growth forests, forest stand dynamics and gap-phase dynamics in relation to forest plant and wildlife communities by measuring vegetation in permanent plots established in 1994.

U.S.G.S. National Wetlands Research Center – (Dr. Helen Whiffen and Dr. Kenneth Reinecke) Collect forest inventory data for research related to interpretation of Lidar images.

Arkansas Game and Fish Commission – (Myron Means and Roger Milligan) The AGFC made efforts to conduct annual black bear den surveys and capture 8-12 female bears on the Refuge but were unable to conduct any trapping in 2010. This information is important for helping managers understand the productivity of bears and is important when making decisions regarding sustainable harvest. The number of radio-collared female bears on WRNWR has decreased dramatically in the past few years and there is a need for a larger sample size to collect better reproductive, survival and recruitment information.

Arkansas Game and Fish Commission and USFWS Arkansas Ecological Services – (Lee Holt and Lindsey Lewis) To help identify movement patterns and habitat preferences of alligator gar (*Atractosteus spatula*) on WRNWR waters.

Arkansas State University (Biology Department) – (Dr. Jim Bednarz and Maggie Howard) Through cooperation with WRNWR, conduct pilot investigations of brown-headed cowbird abundance, habitat use, and habitat characteristics on the levee of White River NWR.

Arkansas State University (Biology Department) – (Dr. Jim Bednarz) To initiate research related to forest and cane management to assess the benefits of management prescriptions to several understory avian species of conservation concern. Years 1 (2010) and 2 (2011) will involve conducting bird sampling (point counts, play back surveys), nest searching and monitoring, use of remote video camera recording systems at nests, mist netting and banding, and vegetation sampling to document habitat use and abundance of understory bird species before forest management prescriptions are implemented. This research will provide insight into bird-use of areas that have been thinned according to the Lower MS Valley Joint Venture's Desired Forest Conditions.

University of Iowa – (Dr. Bryant McAllister) To conduct a study of changes in the composition of southern populations of fly, *Drosophila americana*, following an extremely cold winter event. Research on WRNWR is part of a larger study that is attempting to better understand local adaptations to latitudinal climate variation by genetically characterizing patterns of clinal variation in fly populations.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

Outreach includes such activities as providing educational programs on and off the refuge, issuing news releases, descriptive information in refuge plans, brochures, and other documents, providing information via the refuge website, and using personal contacts to communicate Service, Refuge System, and refuge messages. The refuge also provides environmental education programs upon request from local schools, community groups, university classes, wildlife clubs, and garden clubs. Interpretive exhibits and displays highlighting pertinent information about the site also are in place and additional displays are planned.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

The Cache-Lower White Rivers area serves an estimated 1,000,000 users annually. The most popular uses include hunting, fishing, other water-related recreation, photography, and wildlife observation; therefore, use fluctuates with the seasons for the various uses.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

- a) Territorial Jurisdiction
 - State of Arkansas

Governor Mike Beebe
State Capitol Room 250
Little Rock, AR 72201
501-682-2345

b) Functional Jurisdiction

- Department of the Interior
Secretary Ken Salazar
1849 C Street, N.W.
Washington DC 20240
- Arkansas Game and Fish Commission
Director Loren Hitchcock
Arkansas Game and Fish Commission
2 Natural Resources Dr.
Little Rock, AR 72205
800-364-4263
501-223-6300
E-mail: lmhitchcock@agfc.state.ar.u

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

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Email: gsdugger@agfc.state.ar.us

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

Abell et al. 2000. Freshwater Ecoregions of North America: A Conservation Assessment. Island Press, Washington, DC, USA.

LMVJV Forest Resource Conservation Working Group. 2007. Restoration, Management, and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat. Edited by R. Wilson, K. Ribbeck, S. King, and D. Twedt.

U.S. Fish and Wildlife Service, 2009. Central Arkansas National Wildlife Refuge Complex: Comprehensive Conservation Plan.

U.S. Fish and Wildlife Service, 2011. Cache River National Wildlife Refuge: Preliminary Project Proposal; Major Expansion.

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