

APPENDIX Q:
Recreation Incidental Benefits

**Volume III
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**Volume III
APPENDIX Q:
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**Convey Atchafalaya River Water to Northern Terrebonne Marshes
and Multipurpose Operation of Houma Navigation Lock**

Draft Feasibility Report

Q1.1 Introduction and Methodology

This report summarizes the potential incidental recreation benefits of the Convey Atchafalaya River Water to Northern Terrebonne Marshes (ARTM) Project, which will consist of features to increase the flow of freshwater into the marshes in Terrebonne, Lafourche, and St. Mary Parishes. The ARTM Study Area is east of the Atchafalaya River, south of the Gulf Intracoastal Waterway, and west of Bayou Lafourche. The project is primarily in Terrebonne Parish, Louisiana, although depending on the alternative implemented, some features may be located further east in Lafourche Parish or to the west in St. Mary Parish.

ER 1105-2-100 Appendix E authorizes the use of three methods to estimate the economic benefits of recreation. These methods are the contingent valuation method, the travel cost method, and the unit day value method. The first two methods require extensive data that are not readily available for the ARTM Project. The unit day value method is the simplest method and is appropriate for this study of the ARTM Project. The incidental recreation benefits are estimated as required by EP 1165-2-502.

Annually, Headquarters USACE publishes unit day values for both specialized recreation and general recreation. The term “general recreation” refers to an area that provides access to a variety of recreational activities, is widely used, and provides supportive facilities, such as marinas. “Specialized” refers to an area for which opportunities are limited and intensity of use is low. Similar hunting and fishing areas are available throughout southern Louisiana, in areas directly adjacent to the study area. Primarily because of the availability of similar recreational opportunities in nearby areas, the general recreation unit day values are used. The unit day values in this analysis are published in Economic Guidance Memorandum Number 10-03 (EGM 10-03).

Q2.1 Project and Study Area Characteristics

Several alternatives for the ARTM Project are being considered. The features in each alternative are designed to bring additional freshwater to the marshes in the project area. These are:

- Alternative 1: No Action. For this alternative, no Atchafalaya conveyance measures will be implemented. The future condition will include sea level rise and continued subsidence. Other projects that are planned or under construction or are likely to be implemented include many smaller environmental restoration efforts planned under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA).
- Alternative 2: Utilize Flow Management Measures to Maximize Benefits of Existing Freshwater Flows. This strategy will eliminate GIWW constrictions and construct flow management features in the interior portions of the project area. This alternative will attempt to redistribute the existing inputs to more efficiently utilize fresh water.
- Alternative 3: Increase Atchafalaya River Inflows and Utilize Flow Management Measures to Maximize Restoration Efforts. This strategy will increase the supply of freshwater from the Atchafalaya River in addition to more efficiently distributing existing flows. The inflow from the Atchafalaya River will be achieved by developing an opening through Avoca Island.
- Alternative 4: Utilize Pump at Grand Bayou and Flow Management Measures to Maximize Restoration Efforts. This strategy will utilize existing GIWW freshwater flows from the west and drawing freshwater from the east by utilizing a pump at Grand Bayou in addition to constructing flow management features in the interior portions of the project area. The Grand Bayou pump would only increase freshwater delivery to the Grand Bayou watershed.
- Alternative 5: Increase Atchafalaya River Inflows, Utilize Pump at Grand Bayou, and implement Flow Management Measures to Maximize Restoration Efforts. This strategy will include maximizing flow inputs from both the Atchafalaya River and locations east of the Project Area along with flow management features.
- Alternative 6: Increase Atchafalaya River Inflows with No Flow Management Measures. This strategy is similar to Alternative 3 without the flow management measures and will include maximizing flow inputs from the Atchafalaya River, removing GIWW constrictions, and improving flows from the GIWW to Grand Bayou but will not include any other flow management features.
- Alternative 7: Utilize modified operation of the Houma Navigation Canal Lock Complex to distribute freshwater and prevent saltwater intrusion.
- Alternative 8: Utilize Flow Management Measures to Maximize Benefits of Existing Freshwater Flows in Central and Eastern Sub-Areas. Alternatives developed under this strategy will focus on constructing flow management features in the interior portions of the Central and Eastern project areas. Additional freshwater will not be introduced from other sources. Instead, this alternative will attempt to redistribute the existing inputs to more efficiently utilize fresh water in the Central and Eastern areas.

The ARTM area is largely comprised of several fishing communities and the City of Houma. The Terrebonne Parish Recreation Department manages many recreational facilities within the City of Houma, such as swimming pools, ball fields, and gymnasiums, and, as these would not be impacted by the alternatives, they are not considered in this analysis. The primary recreational activities impacted by the alternatives are consumptive activities, fishing and hunting, which generally require a boat for access. There is also non-consumptive use of wildlife, such as bird watching. Dominant recreational fishing species are speckled trout and red drum. Hunting consists of waterfowl hunting, deer hunting and snipe hunting, with waterfowl hunting the dominant activity. Bird watching, fishing, and hunting are considered in this analysis.

Q3.1 Estimating Recreational Use Using Louisiana Data

There are several appropriate sources of data from which to estimate the number of recreational users in the study area.

For fishing and hunting, the number of licenses issued in the four parishes around the study area provides a basis for determining local use. Most of Terrebonne Parish is within the study area. Only small portions of St. Mary, Assumption, and Lafourche Parishes are within the study area, but a significant portion of participants from these parishes are expected to use the ARTM Study Area as distances are not great.

Additional data about fishing and hunting is found in the Statewide Comprehensive Outdoor Recreation Plan (SCORP), which is published every five years by the Office of State Parks within the Louisiana Department of Culture Recreation and Tourism. The SCORP is based upon in-field and telephone surveys and is used to prioritize the funding of recreation facilities within the state and is prepared to comply with National Park Service guidelines. The 2003-2008 SCORP contains more detailed information and more regional information than the 2009-2013 SCORP, and these data are used in this analysis.

The 2003-2008 SCORP estimates the number of recreational fishermen in Terrebonne Parish and the surrounding parishes. The 2003-2008 SCORP explains a facility use standard based upon a turnover of 20 boats per boat ramp daily, with three persons per boat. Hunting facility use is based upon a turnover of 1 hunter for every 25 acres per day. The 2009-2013 SCORP does not have a facility standard for saltwater boat ramps, but does provide a standard for freshwater boat ramps of one boat ramp per population of 3,200.

The most recent SCORP states that fishing and hunting are both declining recreational activities and specifies that fishing activity declined 20% since the last SCORP. However, according to the 2009-2014 SCORP, the region of the State that includes the Atchafalaya Basin has the highest percentage of population that fish (80.5%). According to the 2003-2008 SCORP, this region also has the highest number of activity days fishing from a boat (22.3 days).

Estimate of Unit Day Values

The estimates of annual use are combined with unit day values to estimate annual recreation benefits. Unit day values were estimated using the most recent values available in EGM 10-03.

The Unit Day Value method involves assigning points in each of five categories or criteria. The five criteria are:

- Recreation Experience: the number of high quality recreational activities possible in the area;
- Availability of Opportunity: the availability of similar opportunities nearby. For fishing and hunting this is the likelihood of fishing and hunting success;
- Carrying Capacity: the degree to which an area provides services to support recreation;
- Accessibility: the degree to which the area is readily accessible; and
- Environmental Quality: the aesthetic qualities of the area including water and vegetation, air and water quality, scenery, and climate.

Points were assigned for each of these five criteria. The determination of points for each criterion is described below. Two of the five criteria are impacted by the project.

Recreation Experience

A maximum of 30 points may be assigned for this criterion. Point values to be assigned are described in the following table:

Recreation Experience					
Description	Two general activities available	Several general activities available	Several general activities available with one high quality	Several general activities available, more than one high quality	Numerous high quality activities available
Range of Points	0 - 4	5 -10	11 - 16	17 - 23	24 - 30

For this analysis, 23 points are assigned for all alternatives because there are three excellent activities, wildlife watching, fishing and hunting, in the study area. Fishing is a year-round activity and consists primarily of fishing for speckled trout and red drum. There is also some recreational crabbing with traps and shrimp harvesting with nets, but these are primarily commercial activities. These activities are included with fishing when estimating benefits because the alternatives will have the same impact on all of these activities.

The primary hunting season is limited to two months per year for duck hunting. Other types of hunting occur in a limited way on higher elevations within the study area, specifically deer hunting and small animal hunting. Wildlife watching is the only non-

consumptive activity in the area. This activity has a limited number of nonresident participants and few local residents make trips for wildlife watching. The few open waterways in the study area do not lend themselves to pleasure boating or water skiing. There is no significant hiking in the study area. Camping is directly related to fishing and occurs primarily in raised structures maintained specifically for recreational fishermen.

Availability of Opportunity and Likelihood of Fishing Success

A maximum of 18 points may be assigned for this criterion. Point values to be assigned are described in the following table:

Availability of Opportunity					
Description	Several similar opportunities within one hour and a few within 30 min travel time	Several similar opportunities within one hour but none within 30 min travel time	One or two within one hour travel time but none within 45 min	No similar opportunities within one hour travel time	No similar opportunities within two hour travel time
Range of Points	0 - 3	4 - 6	7 - 10	11 - 14	15 - 18

Availability of Opportunity is equated with likelihood of success at fishing and hunting, as stated in Table 2 of EGM 10-03, and is impacted by the alternatives. Fishing success is defined as catching the species sought, and the primary saltwater species sought are speckled trout and red drum. In the near term, as the alternatives are implemented, recreational fishermen seeking those species will most likely need to move southward within the study area. However the primary freshwater species sought, largemouth bass, will most likely become more prevalent in the fresher portions of the study area. During the focus group meeting a consensus opinion was stated that the ARTM study area was large enough that recreational fishermen will have ample opportunity to move within the study area to find speckled trout and red drum. Over time, as the project alternatives improve the ecosystem, the likelihood of fishing success for all recreational fishermen is expected to increase.

The likelihood of hunting success is defined similarly and the likelihood of success is similarly very high. Therefore, 14 points are assigned for the base year.

Carrying Capacity

A maximum of 14 points may be assigned for this criterion. Point values to be assigned are described in the following table:

Carrying Capacity					
Description	Minimum facility development for public health and safety	Basic facilities to conduct activity	Adequate facilities to conduct activity	Optimum facilities to conduct activity	Ultimate facilities to conduct activity
Range of Points	0 - 2	3 - 5	6 - 8	9 - 11	12 - 14

For this analysis, 10 points are assigned because there are adequate facilities supporting fishing, hunting, and wildlife observation. The facilities are both publicly- and privately-owned. Representatives of the privately-owned facilities that participated in the focus group meetings stated that their facilities will likely remain commercially viable under all alternatives. The public facilities are at the state and federal wildlife refuges.

Accessibility

A maximum of 18 points may be assigned for this criterion. Point values to be assigned are described in the following table:

Accessibility					
Description	Limited Access by any means to site	Fair access to site; limited access within site	Fair access to site; fair access within site	Good access to site; fair access within site	Good access to site; good access within site
Range of Points	0 - 3	4 - 6	7 - 10	11 - 14	15 - 18

For this analysis, 11 points are assigned. The study area contains a large portion of Terrebonne Parish and there are excellent highways within the study area and there are roadways providing access to the major waterways. These waterways then provide access for sportsmen with boats to the entire study area.

Environmental

A maximum of 20 points may be assigned for this criterion. Point values to be assigned are described in the following table:

Environmental					
Description	Low aesthetic factors	Average aesthetic factors	Above average esthetic factors	High aesthetic factors	Outstanding aesthetic factors
Range of Points	0 - 2	3 - 6	7 - 10	11 - 15	16 - 20

Aesthetic factors are impacted by the alternatives. Specifically, water quality and vegetation will be impacted by the alternatives. However, the long-term effect of diversion of freshwater into the wetlands is that the vegetation and supported wildlife habitat will be sustained. Therefore, 15 points are assigned for this criterion for the base year.

Thus, the total number of points assigned to the proposed Atchafalaya conveyance project for the first year of implementation is 73.

Q4.1 Recreational Benefits

EGM 10-03 provides a table showing how to relate points assigned using the five criteria to dollar values. Since this project was evaluated to have a total of 73 points, using linear interpolation and the values provided by EGM 10-03 for either 70 or 80 points, we assign a dollar value of \$9.72 as the general recreation unit day value for the base year.

Given that the area has 665,020 unit days per year and that each unit day is valued at \$9.72, the total annual monetary value of the recreational resource that would be affected by the ARTM project is \$6,464,657. Given that the likelihood of success with fishing will increase and that environmental factors will improve over time if the proposed project is implemented, the total annual monetary value of the recreational resource will increase in the future compared to the annual monetary value of the recreational resource should the proposed project not be implemented.

To better understand the economic impact of the proposed project on recreation, the analysis considered effects over a 50-year period. The analysis uses the Federal discount rate for FY 2010 of 0.04625. The following table summarizes the potential net present value of the proposed project for each alternative showing that the proposed project will benefit recreational opportunities.

Net Increase / Decrease in Incidental Recreation Benefits

	Without Project	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Net Present Value	\$0	\$2,077,000	\$2,799,000	\$1,588,000	\$1,505,000	\$252,000	\$190,000	\$2,057,000
Annualized	\$0	\$102,505	\$138,137	\$78,371	\$74,275	\$12,437	\$9,377	\$101,518

The following assumptions were made when estimating incidental recreation benefits.

There are large, similar areas adjacent to the ARTM study area to which recreational users might shift if freshwater flows negatively impacted recreational fishing. These are the Atchafalaya Basin to the west of the study area, the Lake Verret area to the north of the study area and the Barataria Basin to the east of the study area. These areas are similar to the ARTM area, and also are impacted by either erosion or siltation.

There is the possibility of recreational users shifting into the study area from outside as the ecosystem improves, especially if adjacent areas deteriorate. Each adjacent area has ecosystem restoration efforts planned, and depending upon the schedule and success of these projects, recreational users may shift to the ARTM study area. However, it is assumed that there will not be a shift of recreational users from these adjacent areas into the Atchafalaya Basin.

The consensus of the ARTM Focus Group was that the study area was large enough to allow recreational users to shift locations within the study area, to adjust to the near term impacts of alternatives instead of leaving the study area. Thus it is assumed that there is no shifting away from the study area and into adjacent areas.

The study area attracts participants from outside the region who may purchase either resident or nonresident licenses within the project area. For this reason, when estimating the number of participants, it is assumed that the higher of the two numbers is more accurate. This figure may still underestimate the number of recreational fishermen and hunters as state residents may purchase licenses in their home parishes and travel to the study area.

Recreational user days are allocated equally between weekdays and weekends in the ARTM study area because of local socioeconomic conditions. Many recreational users are employed in the offshore petroleum industry which allows many weekdays off.

It is assumed that the annual number of user days in the study area does not vary during the 50-year planning period. If the population of the study area were increasing at the national rate, recreational use could be expected to increase during this time period. However, the population of the study area has increased very slowly during the past thirty years. Also, the primary recreational activities, fishing and hunting, have been in relative decline nationally.

The ARTM area consists of three sub-regions, for which the impacts of alternatives might differ. These are the western region, which is most impacted by diversions through Avoca Lake, the central region, which is most impacted by diversions through the Houma Navigation Canal, and the eastern region, which is most impacted by diversions through Grand Bayou and canals connected to it. Most of the population in the study area is in the central region, near the City of Houma, but recreational activity is disbursed widely throughout the study area. Separate criteria points were not assigned to the regions, and it is assumed that all sub-regions are impacted similarly.

The recreation benefits model is based upon estimates of salinity impacts at Years 5, 10, 20, and 50. Therefore, salinity levels for the years between these given points are assumed to change linearly. Year 2 data was input for Model Year 5, Year 25 data was input for Model Year 20, and Year 65 data was input for Model Year 50. A median value between Year 2 data and Year 25 data was used for Model Year 10.

The increase in Average Annual Habitat Units (AAHUs) for each alternative was also provided. Two types of AAHUs were estimated for each alternative, emergent marsh AAHUs and open water AAHUs. Only the aggregate of both types of AAHUs was provided. The two types of AAHUs could have different impacts on recreation. However, the Habitat Analysis Report was not provided, and no attempt was made to estimate recreation benefits based upon the two types of AAHUs.

The net change in AAHUs was assumed to increase linearly for the first 20 years and then stop. Therefore, at Project Year 5, the assumption was made that one fourth of expected additional AAHUs would be created, at Project Year 10 one half would be created, all AAHUs would be created by Project Year 20 and those AAHUs would remain constant through Project Year 50.

The western portion of the study area is a prime duck hunting/waterfowl nesting area. The general unit day values for recreation may understate the NED benefits of duck hunting. This sport requires specialized skill, and advanced planning. The value for duck hunting leases, the cost of membership in duck hunting clubs, and the time spent building duck hunting blinds all indicate that the unit day value of duck hunting is higher than \$9.72 per day, as estimated using general unit day values.

In the “without project” condition, there are many smaller environmental restoration efforts planned under CWPPRA. For this analysis, the assumption is made that these smaller projects will not improve habitat or recreation from base year conditions. However, these smaller projects are considered sufficient to prevent further coastal erosion and habitat deterioration in the study area.

Q5.1 References

2006 National Survey of Fishing, Hunting, and Wildlife Related Recreation, U.S. Fish and Wildlife Service Louisiana, issued March 2008

Louisiana Statewide Comprehensive Outdoor Recreation Plan 2003-2008, Louisiana Department of Recreation and Tourism, December 2004

Louisiana Statewide Comprehensive Outdoor Recreation Plan 2009-2013, Louisiana Department of Recreation and Tourism, July 2009

Net Economic Values of Wildlife Related Recreation in 2006, U.S. Fish and Wildlife Service, Report 2006-05, July 2009

USACE, Economic Guidance Memorandum 10-03: Unit Day Values for Recreation, Fiscal Year 2010, November 2009

USACE, ER 1105-2-100, Chapter 3: Corps Civil Works Missions, April 2000