Appendix D

Economic Analysis

Table of Contents

D.1 Purpose

The Indian River Lagoon-South (IRL-S) Project was authorized in the WRDA of 2007, it is designed to provide restoration of the Indian River Lagoon, South and the St. Lucie Estuary ecosystem in Martin, St. Lucie and Okeechobee Counties, Florida. The IRL-S Project is an important component in the Comprehensive Everglades Restoration Plan and essential for the recovery of the South Florida ecosystem.

The project did not include any recreation features in the recommended plan at the time of authorization in the WRDA of 2007.

The purpose of this validation report is to evaluate the addition of recreation features to the IRL-S authorized features including:

- C-23/C-24 STA,
- C-23/C-24 North Reservoir,
- C-23/C-24 South Reservoir,
- C-25 R & STA
- Natural Areas:
    - Allapattah Complex
    - Cypress Creek Complex
    - Palmar Complex
    - North Fork Floodplain Restoration

The recreational features are broken out into two phases; Phase I are the reservoirs and Stormwater Treatment Areas (STAs), and Phase II are the Natural Areas (Allapattah, Cypress Creek, Palmar, and Northfork Floodplain Restoration.

Recreational features for the C-44 Reservoir and STA are being implemented by the non-Federal sponsor, the SFWMD. This validation report does not include evaluation nor recommendation to the add recreational features to the C-44 Reservoir and STA, as the features are being implemented by the SFWMD. On 23 January 2023, SAJ approved the SFWMD C-44 Reservoir and Storm Treatment Area (STA) Recreational Facilities Section 408 Request (2022-0109) to add and construct recreation features in the C-44 Reservoir and STA. The SFWMD has acknowledged that they will be ineligible for cost-sharing for the C-44 recreation features.

Adding recreational features for the IRL-S authorized project will allow the area to take full advantage of the ecosystem restoration, as well as its natural values, to enhance the sites visitation experience and social, cultural, scientific, and educational values in the authorized project, the southern Indian River Lagoon and the St. Lucie Estuary ecosystem in Martin, and St. Lucie Counties, Florida.

D.2 Existing Conditions

Socioeconomic and demographic data for the study area indicate higher than average income compared to the rest of the state and nation, and much greater economic and population growth than for the rest of the nation. Additional characteristics of the study area include large-scale agricultural activity, a strong service sector, fishing, tourism, and recreation.

Population in the Upper East Coast region is expected to increase in size by roughly 35% between 2020 and 2050. Despite this anticipated population growth, the region is not expected to have as large a population as the heavily urbanized neighboring counties (to the south Palm Beach, Broward, Miami-Dade). The population of St. Lucie and Martin counties in 2050 is estimated to be roughly 682,000. The dense urban area of southeastern Florida has contributed to development pressure and population increases in Martin, Okeechobee, and St. Lucie Counties.

The Indian River Lagoon ecosystem provides a unique and extensive natural resource-based recreational resource. The lagoon has been identified as one of the most biologically diverse estuarine systems in the world, even in its present degraded condition. The recreational fishing and associated marine industry are extremely important sectors of the local economy. Stuart, Florida bills itself as the "Sailfish Capitol of the World." The restoration of the IRL ecosystem could potentially have important impacts on the value of outdoor recreation in the study area. The hydrologic changes associated with the IRL-S's alternative restoration plans have been designed to improve the structure and function of the ecosystems. These improvements can be expected to result in increases in the quantity and quality of water-related recreation resources. Many tourists and residents recreate in the natural areas of the study area.

D.3 Identification of Recreation Alternatives

The plan formulation includes two alternatives, the No Action Alternative and one other proposed alternative that are considered and analyzed in this report:

No Action Alternative - This alternative assumes that no recreation features will be implemented into the IRL-S project Phase I and Phase II features including the C-23/C-24 Stormwater Treatment Area (STA), C-23/C-24 North Reservoir, C-23/C-24 South Reservoir, C-25 Reservoir and Stormwater Treatment Area, and Natural Areas including, Allapattah Complex, Cypress Creek Complex, Palmar Complex, Northfork Floodplain Restoration, and Muck

Remediation and Artificial Habitat. It is assumed that the authorized features will be constructed, operated, and maintained according to the 2004 PIR/EIS and other approved documents.

Alternative A -– This alternatives assumes that the recommended recreation plan will be implemented in the IRL-S project Phase I and Phase II features including the C-23/C-24 Storm Treatment Area, C-23/C-24 North Reservoir, C-23/C-24 South Reservoir, C-25 Reservoir, C-25 Storm Treatment Area and, Natural Areas including, Allapattah Complex, Cypress Creek Complex, Palmar Complex, Northfork Floodplain Restoration, and Muck Remediation and Artificial Habitat. It is assumed that the authorized features will be constructed, operated, and maintained according to the 2004 PIR/EIS and other approved documents.

The total cost for Phase I features is $7.69 Million and for Phase II $14.99 Million, for a total of $22.6 Million. The cost for the entirety of the IRL-South Project is $5.5 Billion, so the recreation features are well below 10 percent of the total project cost as required by Corps policy. The costs for each individual recreational feature are listed below in Table C.1 below.

Table D.1 – First Costs for Recreational Features

Site	Cost
C23/24 North Reservoir	$ 2,103,000
C23/24 South Reservoir	$ 1,989,000
C23/24 STA	$ 1,774,000
C25 Reservoir and STA	$ 1,827,000
Allapattah	$ 3,412,000
Cypress Creek	$ 5,028,000
Palmar	$ 4,081,000
Northfork Floodplain Restoration	$ 2,468,000

D.4 Methodology

This section examines how the economic benefits of the IRL-S recommended plan were calculated. Recreation benefits fall under the National Economic Development (NED) account and can be a significant source of non-ecosystem project benefits whether ancillary or not.

Outdoor recreation in Florida includes a wide variety of activities. A common way of differentiating outdoor recreation activities is to classify them based as "user-oriented" or "resource-based" activities. User-oriented activities, such as individual and team sports, are not

dependent on any natural resource setting and can be located, space permitting, on any open site. These facilities are provided for the convenience of the user. For example, a basketball court can be added to a playground. Resource-based activities, such as hiking, hunting, and fishing, as this project includes depend on the existence and quality of supporting natural or historical resources.

The national economic development (NED) benefit evaluation procedures contained in ER 1105-2-100 (22 Apr 2000), Appendix E, Section VII, include three methods of evaluating the beneficial and adverse NED effects of project recreation: travel cost method (TCM), contingent valuation method (CVM), and unit day value (UDV) method.

The UDV method was selected for estimating recreation benefits associated with the implementation of IRL-S. The UDV approach in recreation benefit analysis consists of two parts: determining value per visit and estimating visitation.

The economic value of resource-based recreation is determined by the users' willingness to pay for a recreation occasion, which is called the Unit-Day Value (UDV). The willingness of current and potential users to pay for resource-based recreation of specific quantity and quality constitutes the demand for that type of recreation. The interaction of demand with the quantity and quality of recreation resources available determines the recreation use or "participation" levels for that resource-based activity. When the quantity or quality of recreation resources is modified by a project, such as the alternative restoration plans, the change in value of resource-based recreation is based on the difference in the willingness of users to pay under the with- and without-project conditions.

The methodology for determining Unit Day Value (UDV) is standardized across the Corps of Engineers. Relevant unit day values are assigned based on qualitative "judgement factors" outlined in Table D.2. The estimated dollar values associated with the point score assignments are described in Table D.3.

Table D.2. Unit Day Value "Judgment Factors"

Criteria	Judgment factors				
Recreation experience[1] Total Points: 30 Point Value:	Two general activities[2] 0-4	Several general activities 5-10	Several general activities: one high quality value activity[3] 11-16	Several general activities; more than one high quality high activity 17-23	Numerous high quality value activities; some general activities 24-30
Availability of opportunity[4] Total Points: 18 Point Value:	Several within 1 hr. travel time; a few within 30 min. travel time 0-3	Several within 1 hr. travel time; none within 30 min. travel time 4-6	One or two within 1 hr. travel time; none within 45 min. travel time 7-10	None within 1 hr. travel time 11-14	None within 2 hr. travel time 15-18
Carrying capacity[5] Total Points: 14 Point Value:	Minimum facility for development for public health and safety 0-2	Basic facility to conduct activity(ies) 3-5	Adequate facilities to conduct without deterioration of the resource or activity experience 6-8	Optimum facilities to conduct activity at site potential 9-11	Ultimate facilities to achieve intent of selected alternative 12-14

Table 1: Guidelines for Assigning Points for **General Recreation** (Continued)

Accessibility Total Points: 18 Point Value:	Limited access by any means to site or within site 0-3	Fair access, poor quality roads to site; limited access within site 4-6	Fair access, fair road to site; fair access, good roads within site 7-10	Good access, good roads to site; fair access, good roads within site 11-14	Good access, high standard road to site; good access within site 15-18
Environmental quality Total Points: 20 Point Value:	Low aesthetic factors[6] that significantly lower quality[7] 0-2	Average aesthetic quality; factors exist that lower quality to minor degree 3-6	Above average aesthetic quality; any limiting factors can be reasonably rectified 7-10	High aesthetic quality; no factors exist that lower quality 11-15	Outstanding aesthetic quality; no factors exist that lower quality 16-20

[1]Value for water-oriented activities should be adjusted if significant seasonal water level changes occur.
[2]General activities include those that are common to the region and that are usually of normal quality. This includes picnicking, camping, hiking, riding, cycling, and fishing and hunting of normal quality.
[3]High quality value activities include those that are not common to the region and/or Nation, and that are usually of high quality.
[4]Likelihood of success at fishing and hunting.
[5]Value should be adjusted for overuse.
[6]Major esthetic qualities to be considered include geology and topography, water, and vegetation.
[7]Factors to be considered to lowering quality include air and water pollution, pests, poor climate, and unsightly adjacent areas.

Table D.3. 2026 Estimated UDV Recreation Values for General Recreation Activities

Points	General Recreation Values (FY24)
0	$ 5.17
10	$ 6.14
20	$ 6.79
30	$ 7.76
40	$ 9.70
50	$ 11.00
60	$ 11.97
70	$ 12.61
80	$ 13.91
90	$ 14.88
100	$ 15.52

The above methodology was used on each of the 8 sites contained in Phase I and Phase II. Each of the sites was assigned a unit day value based on the scorecard above. Visitation for each site was estimated using the number of parking spaces available then separating the days of the year into three categories: Normal Days (ex. Monday – Friday), Special Days (Weekends and Holidays), and Bad Weather Days. It is also assumed that each parking spot used represents 1 person per spot. On Normal Days the assumption is that each spot is filled once per day, so, for example, if there are 50 parking spaces then there are 50 visitors for the day. For Special Days it is assumed that there are 2 visitors per parking spot (ex. 50 spots = 100 visitors). Finally, for bad weather days (Rain, Heat, etc.) it is assumed that for every 4 parking spots there is 1 visitor (ex. 20 spots = 5 visitors). Additionally, Phase I sites each have a specific number of parking spaces whereas Phase II ones have parking areas without number of spaces. For Phase II sites the area of the parking lots was used to estimate the number of cars that could reasonably fit in these lots. For Cypress, Allapattah, and Palmar that number is 16 cars per lot, and for Northfork that number is 14. This approach is identical to the methodology used in recently approved ecosystem restoration projects. The unit day values for each of the 8 sites are listed below.

Table D.4 Phase I Unit Day Values (UDV) and Score

Phase I	Score	UDV
C-23/C24 North Reservoir	42	$10.26
C-23/C-24 STA	49	$11.20
C-23/C24 South Reservoir	44	$10.53
C-25 RSTA	49	$11.20

Table D.5 Phase II Unit Day Values (UDV) and Score

Phase II	Score	UDV
Cypress	66	$12.73
Allapattah	66	$12.73
Palmar	63	$12.53
Northfork	66	$12.73

The benefits have been annualized by taking the total number of estimated visitors and multiplying it by the estimated Unit-Day Value. Annual costs have been determined by taking the total cost of construction plus the interest accrued during construction and annualizing them over the life of the project authority. The results have been separated out into Phase I and Phase II results in order to analyze the recreational features on STAs and Reservoirs apart from

the Phase II natural areas. The results along with the Benefit-Cost Ratio are shown in tables D.6, D.7, and D.8 below. There is also an overall summary included at the end.

Table D.6 - Phase I Summary:

	Annual Benefits	Annual Costs	Net Benefits
C-23/C24 North Reservoir	$194,119.20	$ 86,992.83	$ 107,126.37
C-23/C-24 STA	$ 96,320.00	$ 73,028.40	$ 23,291.60
C-23/C24 South Reservoir	$ 199,227.60	$ 82,277.09	$ 116,950.51
C-25 RSTA	$ 99,232.00	$ 75,210.19	$ 24,021.81
Totals	**$ 588,898.80**	**$ 317,508.51**	**$ 271,390.29**
BCR	**1.85**		

Table D.7 - Phase II Summary:

	Annual Benefits	Annual Costs	Net Benefits
Cypress	$ 262,747.20	$ 210,553.63	$ 52,193.57
Allapattah	$ 175,164.80	$ 142,881.66	$ 32,283.14
Palmar	$ 258,619.20	$ 170,896.85	$ 87,722.35
Northfork	$ 306,538.40	$ 102,091.44	$ 204,446.96
Totals	**$ 1,003,069.60**	**$ 626.423.58**	**$ 376,646.02**
BCR	**1.60**		

Table D.8 – Overall Summary

	Total Annual Benefits	Total Annual Costs	
Phase I	$ 588,898.60	$ 317,508.51	$ 271,390.29
Phase II	$ 1,003,069.60	$ 626,423.58	$ 376,646.02
Total	$ 1,591,968.40	$ 943,932.09	$ 648,036.31
Overall BCR	1.69		

D.5 Conclusion

As seen in Table C.6 Phase I recreation features are justified overall with a Benefit-Cost Ratio (BCR) of 1.85 and annual net benefits equal to $271,390.29. Phase II recreation is economically justified and has a BCR of 1.60 and annual net benefits equal to $376,646.02. The overall BCR for the overall project, combining Phase I and Phase II, is equal to 1.69 with overall net benefits equal to $648,036.31 which makes it economically justified.