

RECOVER REGIONAL EVALUATION REPORT

Southern Golden Gate Estates Hydrologic Restoration Project

Prepared by the RECOVER Regional Evaluation and Water Quality Teams
April 8, 2003

Contributors: Joan Browder, NOAA; Cheryl Buckingham, USACE; Peter Doering, SFWMD; Todd Hopkins, USFWS; Heather McSharry, FWS; Brenda Mills, SFWMD; Joe Redican, USACE; Tom Schmidt, NPS; Steve Traxler, FWS; Joseph Walsh, FWC.

EXECUTIVE SUMMARY

One of the primary missions of RECOVER is to work with the PDTs to evaluate (through predictive modeling) and maximize the contribution made by each project to the system-wide performance of CERP. With this mission RECOVER prepared a Regional Evaluation of the final three proposed project alternatives for the Southern Golden Gate Estates (SGGE) Hydrologic Restoration Project. The purpose of this regional evaluation is to: 1) inform the PDT of the compatibility of proposed project alternatives with regional CERP restoration goals and performance expectations, 2) identify improvements for project performance that would improve its regional performance, and 3) provide decision-makers required information regarding regional performance expectations of the SGGE project.

This evaluation compares the three project alternatives to performance expectations of the Comprehensive Plan (Alternative D13R) by contrasting the alternatives to the 2050 future without project conditions and against restoration targets. It should be noted that this regional evaluation is unusual for RECOVER because the evaluation was conducted out of sequence, i.e., the evaluation was conducted after selection of a preferred plan; therefore, the regional evaluation was not taken into consideration when selecting the preferred plan. This altered sequence was due to an expedited schedule for project completion. Also, the regional evaluation conducted for this report was performed without benefit of regional modeling results since the SGGE project is hydrologically isolated and cannot be simulated by the regional landscape models. Consequently, this evaluation is based on the best professional judgment of an interagency team of RECOVER evaluators using a local project hydrologic model (MIKE SHE).

Consistency with Objectives of the Comprehensive Plan – The planning objectives developed for the SGGE project are consistent with the objectives of the Comprehensive Plan. The planning objectives developed for the SGGE project were developed using both the broad CERP goals and objectives and the more defined regional and site-specific restoration objectives of hydrologic restoration.

Consistency with Performance Measures of the Comprehensive Plan – There is general compatibility between the project-level performance measures developed for the SGGE Project and the system-wide performance measures of the Comprehensive Plan. However, the lack of performance measures corresponding to the issues of dry season conditions and extreme water levels addressed by RECOVER's system-wide performance measures is one noteworthy inconsistency.

Project Performance – Comparison to the Comprehensive Plan and Future Without Conditions – Based on information provided by the PDT, RECOVER has concluded that the

three SGGE Project alternatives (Alternatives 3D, 8 and 9) will meet or exceed two of the three performance expectations outlined in the Comprehensive Plan. The two performance expectations that will be met include hydrologic restoration and water quality improvements to coastal estuaries. Insufficient information was provided to evaluate the third performance expectation dealing with groundwater recharge. Alternative 3D consistently outperforms Alternatives 8 and 9 in achieving performance expectations for this project. The combination of a restored hydrologic regime, a restored fire regime, and an appropriate exotic vegetation control program can be expected to return most of the SGGE to its pre-development character, including the plant communities and wildlife that it previously supported. However, it should be recognized that the full benefits of the restoration process would take many decades (40-50 years) to be recognized, which is also the project life of this project.

If none of the SGGE alternatives are implemented, conditions will continue to decline. By 2050, upland conditions would dominate virtually the entire project site and no wetlands larger than 25 acres would exist, with the exception of coastal marshes. The continuity of natural habitats between government preserved land resources would be lost. Without restoration of sheetflow and the elimination of point source discharges to Faka Union Bay, continued water quality degradation caused by salinity fluctuations would result in further loss of species diversity. Forage fish populations would continue to decline and recreational fishing would also suffer. Oyster reefs would be eliminated

System-Wide Performance Expectations – From a regional perspective RECOVER has concluded that the three SGGE project alternatives would support the restoration of the three essential characteristics of the south Florida ecosystem prior to development.

Pre-development Ecosystem Characteristic	SGGE Project Regional Benefit
A hydrologic regime that featured dynamic water storage capabilities and sheetflow to coastal estuaries	Increases the storage of surface water in wetlands and allow the volume and timing of freshwater flows to the estuaries to occur in a more natural manner
A large spatial scale	Continuity of natural habitat would be expanded by combing the SGGE restored lands with surrounding natural areas; all managed by the same natural resource agency
Heterogeniety of natural habitats	Improves the ecological health and habitat characteristics of three estuaries by reducing salinity fluctuations from a single point source discharge

The selected plan, alternative 3D, in particular would have a favorable impact on regional ecological restoration.

RECOVER Concerns – RECOVER evaluators are concerned with flood control operations regarding wading bird populations. In Section 8.3 (Operational Features) of the draft PIR, the following statement is made regarding operations of alternative 3D: “During this period potential storm events will initiate a canal drawdown in order to provide adequate canal storage for flood protection.” If the drawdown were to occur during the dry season this could have a negative impact on wading birds and other wildlife species. RECOVER also suggests that hydrologic

information on dry season and extreme wet season conditions be evaluated in the future due to the importance of these conditions on the natural system.

Conclusions - RECOVER has concluded that the three SGGE Project alternatives (Alternatives 3D, 8 and 9) will meet or exceed two of the three performance expectations outlined in the Comprehensive Plan. Insufficient information was provided to evaluate the third performance expectation dealing with groundwater recharge. Alternative 3D, can be expected to restore a more natural pattern of wetland hydroperiod and freshwater flow to estuaries than the present hydrologic regime. Alternatives 8, 9, and 3D all provide significant improvement over the 2050 Without Project Condition and would contribute to restoration of the estuaries and expansion of the continuity of natural habitat by combining the restored lands of the SGGE project site with surrounding natural areas.

RECOVER REGIONAL EVALUATION REPORT (Draft 4-3) Southern Golden Gate Estates Hydrologic Restoration Project

Prepared by the RECOVER Regional Evaluation and Water Quality Teams
April 3, 2003

Contributors: Joan Browder, NOAA; Cheryl Buckingham, USACE; Peter Doering, SFWMD; Todd Hopkins, USFWS; Heather McSharry, FWS; Brenda Mills, SFWMD; Joe Redican, USACE; Tom Schmidt, NPS; Steve Traxler, FWS; Joseph Walsh, FWC.

1.0 INTRODUCTION

The Southern Golden Gate Estates (SGGE) Hydrologic Restoration Project Delivery Team (PDT) has completed the plan formulation phase of their project and requested RECOVER prepare a Regional Evaluation of the final three proposed project alternatives. The role of RECOVER is to organize and apply scientific and technical information in ways that are most effective in supporting the objectives of the CERP. One of the primary missions of RECOVER is to work with the PDTs to evaluate (through predictive modeling) and maximize the contribution made by each project to the system-wide performance of CERP.

1.1 Purpose of Evaluation

The purpose of this regional evaluation is to: 1) inform the PDT of the compatibility of proposed project alternatives with regional CERP restoration goals and performance expectations, 2) identify improvements for project performance that would improve its regional performance, and 3) provide decision-makers required information regarding regional performance expectations of the SGGE project.

1.2 Study Scope

This evaluation compares the three project alternatives to performance expectations of the Comprehensive Plan (Alternative D13R) by contrasting the alternatives to the 2050 future without project conditions and against restoration targets. It should be noted that this regional evaluation is unusual for RECOVER because the evaluation was conducted out of sequence, i.e., the evaluation was conducted after selection of a preferred plan; therefore, the regional evaluation was not taken into consideration when selecting the preferred plan. This altered sequence was due to an expedited schedule for project completion. Also, the regional evaluation conducted for this report was performed without benefit of regional modeling results since the SGGE project is hydrologically isolated and cannot be simulated by the regional landscape models. Because several of the project-level performance measures dealt with the downstream consequences of restoration of the SGGE project, these performance measures were used by RECOVER to assess regional implications of project implementation. Additionally, this evaluation is based on the best professional judgment of an interagency team of RECOVER evaluators who used output from a local project hydrologic model (MIKE SHE).

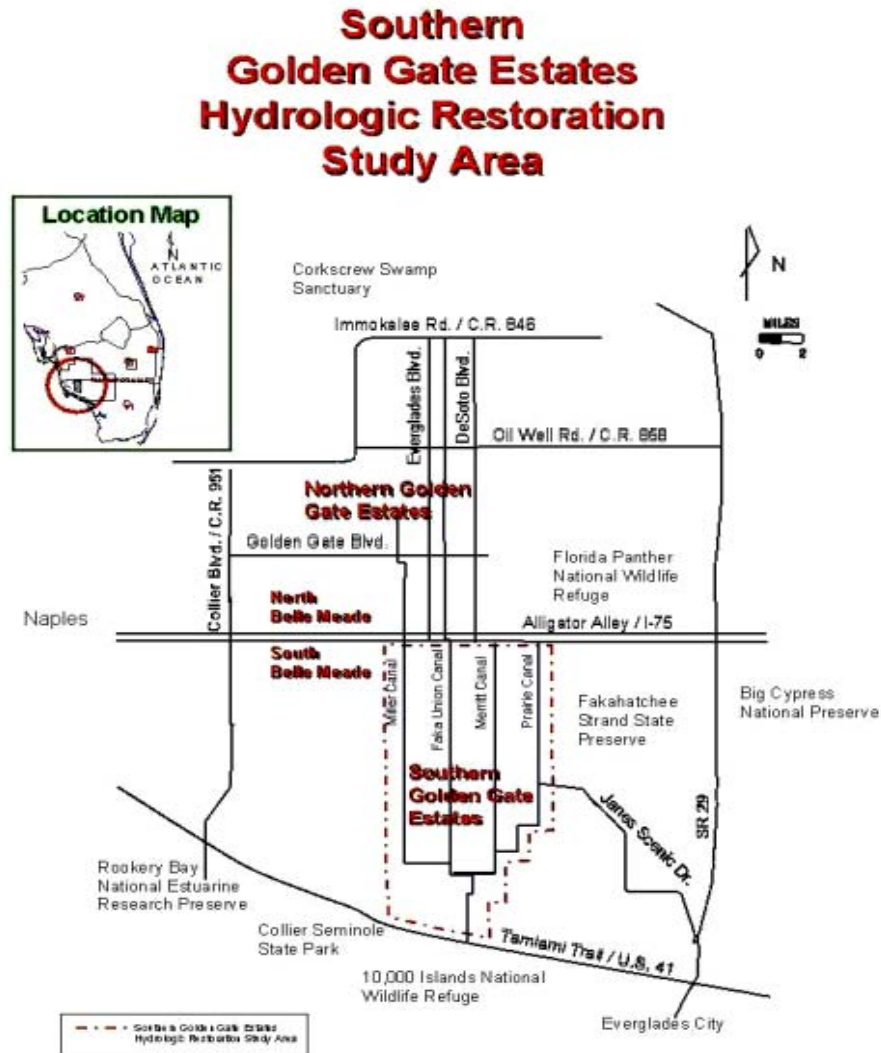
1.3 Report Organization

This evaluation report is divided into six sections and will be included in the Final Project Implementation Report produced by the PDT. The project area and alternatives are presented in the draft PIR rather than discussed in this document. The six sections of this report are as follows:

- 1.0 Introduction
- 2.0 Goals and Objectives – Consistency with the Comprehensive Plan
- 3.0 Project-Level Performance Measures - Consistency with RECOVER System-Wide Performance Measures
- 4.0 Project Performance – Comparison to the Comprehensive Plan and Future Without Condition
- 5.0 RECOVER Suggestions on the Preferred Plan
- 6.0 Conclusions

1.4 Study Area

The SGGE project area encompasses approximately 94 square miles of sensitive environmental landscape in southwestern Collier County, and is located south of Interstate 75 between the Fakahatchee Strand and Belle Meade watersheds (see study area map below). The project area is an important surface storage and aquifer recharge area with a unique ecology of cypress, wet prairie, pine and hardwood hammock and swamp communities. The site also includes three major flow-ways that contribute freshwater to the Ten Thousand Islands Estuary of the western Everglades watershed



Construction of roads and drainage modifications in the 1960s and 1970s have over drained the area resulting in reduction of aquifer storage, increased freshwater point source discharges to three estuaries, invasion of upland vegetation and increased frequency of forest fires. The alternative plans involve construction of a combination of spreader channels, canal plugs, pump stations, and removal of roads to achieve hydrologic restoration.

2.0 GOALS AND OBJECTIVES – CONSISTENCY WITH THE COMPREHENSIVE PLAN

The planning objectives developed for the SGGE project are generally consistent with the objectives of the Comprehensive Plan. The planning goal of this project is to restore the hydrology of the SGGE downstream of the proposed system of pumps and spreader channels to a condition comparable to that which existed prior to drainage. By so doing, the project will restore vegetation communities and wildlife populations, improve habitat conditions for protected species, and improve downstream estuary conditions to a more historical condition, e.g. less degraded state. The planning objectives developed for this project were developed using both the broad CERP goals and objectives and the more defined regional and site-specific restoration objectives. The nine objectives developed for the SGGE project presented below directly correspond to specific CERP objective(s) contained in the Central and Southern Florida Project Comprehensive Review Study Final Integrated Feasibility Report and Programmatic Environmental Impact Statement. (USACE and SFWMD 1999).

	Objectives – Southern Golden Gate Estates Project	Corresponding CERP Objectives Contained in the Review Study
1	Reestablish natural freshwater flows to estuary	Increase habitat and functional quality; Increase availability of fresh water
2	Restore historic hydropatterns, including sheet flow and flow ways	Increase habitat and functional quality; Increase availability of fresh water
3	Reestablish natural plant distribution and composition	Increase habitat and functional quality; Increase species abundance and diversity
4	Increase surface aquifer recharge	Increase availability of fresh water
5	Restore habitat for listed species	Increase habitat and functional quality; Increase species abundance and diversity
6	Increase fish and wildlife resources	Increase habitat and functional quality; Increase species abundance and diversity
7	Restore ecological connectivity and provide contiguous habitat protection to adjacent public lands	Increase species abundance and diversity; Increase spatial extent
8	Provide resource based recreational opportunities compatible with the protection of	Provide recreational and navigation opportunities

	Objectives – Southern Golden Gate Estates Project	Corresponding CERP Objectives Contained in the Review Study
	the natural systems	
9	Restore natural fire regime	Increase habitat and functional quality

3.0 PROJECT-LEVEL PERFORMANCE MEASURES – CONSISTENCY WITH RECOVER SYSTEM-WIDE PERFORMANCE MEASURES

Typically, RECOVER performs a consistency review between project-level performance measures and CERP system-wide performance measures early in the PIR preparation process. However, because of the expedited schedule for this project a RECOVER consistency review of performance measures was not conducted. Consequently, the performance measure review and alternative evaluation have been combined.

There is general compatibility between the project-level performance measures developed by the PDT for the SGGE project and the system-wide evaluation performance measures developed for the Comprehensive Plan. However, the lack of performance measures corresponding to the issues of dry season conditions and extreme water levels addressed by RECOVER's system-wide performance measures is one noteworthy inconsistency.

While the SGGE project-level performance measures developed for the estuarine environment use a different scientific approach to measure performance, they are generally consistent with RECOVER's regional performance measures prepared for the estuarine geographical region. The performance measures are used to evaluate project performance within the downstream area of project influence. The project-level performance measures also provide a good prediction of regional influences resulting from project implementation, consequently the predictive tools associated with the project-level performance measures were used by RECOVER during the regional evaluation.

4.0 PROJECT PERFORMANCE – COMPARISON TO THE COMPREHENSIVE PLAN AND FUTURE WITHOUT CONDITIONS

This Section compares the three project alternatives to performance expectations of the Comprehensive Plan by contrasting the alternatives to the 2050 future without project conditions and against restoration targets, or pre-development conditions. Typically these items would be addressed in separate sections, but to avoid redundancy have been included in the same sections of this evaluation report. The regional evaluation conducted for this report was performed without benefit of regional modeling results since the SGGE project is hydrologically isolated and cannot be simulated by the regional landscape models. However, a local project hydrologic model, MIKE SHE, was used to predict hydrologic conditions within the area. Because several of the project-level performance measures dealt with the downstream consequences of restoration of the SGGE project, these project-level performance measures were used by RECOVER to assess system-wide benefits of project implementation

To establish a framework for the regional evaluation, the three performance expectations for the SGGE project as outlined in the Comprehensive Plan are used as the major headings of this

Section with subheadings including target conditions, alternatives contrasted to the project without conditions and a system-wide evaluation. From a system-wide perspective, benefits of the project are determined based upon achievement of three essential characteristics of the south Florida ecosystem.

4.1 Performance Expectations of the SGGE Project Contained in the Comprehensive Plan.

Listed below are the three performance expectations of the SGGE project outlined in the Comprehensive Plan as presented in the Yellow Book. These three performance expectations are discussed in more detail below and form the basis for the RECOVER evaluation.

Performance Expectation 1: Restoration and enhancement of the project wetlands and wetlands of adjacent public lands by reducing over-drainage.

Performance Expectation 2: Water quality improvement of the coastal estuaries by moderating the large salinity fluctuations caused by freshwater point discharges of the Faka Union Canal.

Performance Expectation 3: Protection of the City of Naples' eastern Golden Gate wellfield by improving groundwater recharge.

4.2 Performance Expectation 1. Restoration and Enhancement of the Project Wetlands and Wetlands of Adjacent Public Lands by Reducing Over-drainage

During the evaluation of alternatives for hydrological and ecological restoration potential, the PDT assumed a strong relationship between wetland hydrology and associated plant communities, primarily wet season water depth. Based on the correspondence between water depths and major plant community types, the acreage of each community was computed from the number of cells within each range of water depths present under each water management condition predicted by the MIKE SHE output. The predictive modeling used as a tool for evaluation of the potential to achieve performance measure targets permitted evaluators to compare the wet season water depths, and by extension the major plant communities associated with Pre-development, 2050 Future Without Project Condition and the three project alternatives (see table below). RECOVER is interested in the restoration and enhancement of wetland habitat within the SGGE project site to and restore the wetlands of adjacent public lands. Targets established for these performance measures were based on restoration to pre-development (drainage) conditions for the following plant communities:

- Mesic Flatwoods
- Hydric Flatwoods
- Wet Prairie
- Cypress/Marsh
- Open Water

Plant Community	Water Depth	Pre-development (Target)	2050 Without Project	Alternative 3D	Alternative 8	Alternative 9
Mesic Flatwoods	<0.2	9711	56715	16271	32645	31973
Hydric Flatwoods	0.2-0.5	10124	2170	12190	11880	11321
Wet Prairie	0.5-1.0	17097	3099	20093	15393	15754
Cypress/Marsh	1.2-2.0	26188	1291	14721	3357	4236
Open Water	>2.0	155	0	0	0	0
Total Acres		63275	63275	63275	63275	63275

Target (Pre-Development Conditions) – Results of the MIKE SHE model run for the pre-development conditions indicate that water depths appropriate for cypress and marsh communities made up 41 percent of the SGGE project area, wet prairie made up to 27 percent, and flatwoods made up 31 percent. Large areas of the project site south of U.S. I-75 were primarily shallow-to-deep water environments and would have been occupied by cypress forest with smaller areas of wet prairie grading into pine flatwoods. This pre-development condition and distribution of plant communities represents the target for the first performance expectation.

Alternative 3D - Compared to the 2050 Without Project Condition, alternative 3D provides a substantial return to pre-development conditions within the SGGE project boundaries downstream of the pumps while retaining the desired drained conditions upstream of the pumps. Compared to the 2050 Without Project Condition, alternative 3D is expected to produce an order of magnitude increase in cypress-marsh communities (approximately 13,000 acres) and major increases in wet prairie (approximately 17,000 acres) and hydric communities (approximately 10,000 acres). Around 40,000 acres of upland communities would transition back to hydric communities. Restoration of sheet flow can be expected to reduce nutrient loading (Total Phosphorous and Total Nitrogen) to the downstream estuaries, compared to 2050 Without Project Conditions, which will continue to have a single point source discharge. This nutrient load reduction benefit can be expected to increase in future decades, with increased development of onsite septic treatment systems in the residential lots of Northern golden Gates Estates. The project area is currently used extensively for hunting and off-road recreational vehicles; the proposed restoration would alter this recreation use pattern. The Florida Department of Forestry would manage the SGGE project site as part of the Picayune State Forest and more passive recreation use is planned.

Alternative 8 – Compared to the 2050 Without Project Condition, wetland restoration associated with alternative 8 is more limited than with alternative 3D. The southern two-thirds of the eastern flow-way is restored, although most of this area would likely be wet prairie with little cypress forest. Most of the wet prairies and marshes near the coast would also be restored. Virtually none of the northern wetlands or those in the original western flow-way would exist, although islands of hydric communities are present throughout these areas. The major change in this alternative when compared to achieving pre-drainage conditions is the large reduction in water depths throughout most of the northern SGGE and along its western boundary, and a widespread reduction in the southeastern part of the project area. Recreational use changes would be similar to those described for alternative 3D.

Alternative 9 – When compared to the 2050 Without Project Condition, there is little difference in the plant community patterns or acreages resulting from restoration between alternatives 8 and 9. Wetland restoration associated with this alternative is much more limited than with alternative 3D. Recreational use changes would be similar to those described for alternative 3D.

System-Wide Evaluation – The following discussion describes the system-wide benefits of the SGGE project as related to the restoration and enhancement of wetlands within the project site and on adjacent public lands. The Pre-development wetland ecosystems of south Florida had three essential characteristics, as indicated in the table below, and one of the goals of CERP was to restore these system attributes. While the SGGE project is hydrologically disconnected from the central Everglades marshes, all the alternatives would contribute to restoration of these essential characteristics of the south Florida ecosystem by achievement of the following:

Pre-development Ecosystem Characteristic	SGGE Project Regional Benefit
A hydrologic regime that featured dynamic water storage capabilities and sheetflow to coastal estuaries	Increases the storage of surface water in wetlands and allow the volume and timing of freshwater flows to the estuaries to occur in a more natural manner
A large spatial scale	Continuity of natural habitat would be expanded by combing the SGGE restored lands with surrounding natural areas; all managed by the same natural resource agency
Heterogeneity of natural habitats	Improves the ecological health and habitat characteristics of three estuaries by reducing salinity fluctuations from a single point source discharge

Most of the lands surrounding SGGE are in public ownership or are scheduled for acquisition to preserve the natural ecosystems of the region. Fakahatchee Strand State Preserve lies immediately to the east of SGGE, the Belle Meade Conservation and Recreation Lands project to the west, Ten Thousand Islands National Wildlife Refuge along the eastern portion of the northern boundary, the private lands are found along the western portion of the northern boundary. Restoration of the SGGE will assist in preserving these adjacent habitats and the continuity of natural areas in the region.

2050 WITHOUT PROJECT- If the SGGE project were not constructed, the existing extensive canal system would continue to over drain the project site and surrounding public lands. The hydroperiods within the SGGE basin would not sustain wetland vegetation and would continue to be dominated by pine, palmetto, palm, and by exotics species such as Brazilian pepper. Without the SGGE project, more than 95 square miles of essentially wetland habitat would be lost and the continuity of natural habitat in this region of south Florida would be lost. An important aspect of the future without project condition is that with the exception of coastal areas and the northeast corner of the project site, there would be no wetland areas larger than 25 acres in size within the SGGE project site.

4.3 Performance Expectation 2: Water quality improvement of the coastal estuaries by moderating the large salinity fluctuations caused by freshwater point discharges of the Faka Union Canal.

Pre-Development Conditions (Target for Performance Measures) – RECOVER used the project-level performance measures contained in the PIR and developed by the Rookery Bay National Estuarine Reserve for salinity and biological indices to compare the performance expectation of the SGGE project upon downstream estuaries. The performance measures were developed based on three years of monitoring salinity, salinity change and relative abundance of stenohaline to euryhaline crabs, and fish and macroinvertebrate community structure for Faka Union Bay and Fakahatchee Bay.

These performance measures are based on long-term research involving salinity and fish/crab/shrimp collections made in the three estuaries downstream of the SGGE project and in Henderson Creek, located further to the north towards Naples. Six additional project-level evaluation performance measures were developed by the PDT to predict oyster reef health, distribution, and productivity for each of the alternative scenarios and to compare the three alternatives to pre-development condition (target) with and without the project. These performance measures were developed as the result of ongoing research in the estuaries of southwest Florida. This research allowed the development of comparisons among several coastal bays of physically similar locations (homologues) that had been more and less impacted by the periodic strong pulses of freshwater from SGGE. Qualitative indices were developed based on this research.

Oyster reefs make excellent sentinels for estuarine health within the estuaries of southwest Florida, particularly those systems located within the Ten Thousand Islands. Oyster reef development is critical to estuarine ecology and to the geomorphologic structure of the region. The restoration of sheet flow created by the three alternatives should improve oyster health, physiology, and distribution within the estuary to differing degrees. The decrease in freshwater point-source discharge into the estuary that will accompany improvements in sheet flow should shift the foci of oyster growth, recruitment, productivity, and reef distribution back to the middle regions of the Faka Union estuary. Thus, any restoration strategy that augments sheet flow and decreases freshwater point-source discharge should improve oyster physiological condition and reef health.

Alternative 3D – Compared to the 2050 Without Plan Conditions, alternative 3D provides for restoration of the three estuarine environments downstream of the SGGE project. Water quality would improve dramatically. Results of the performance measures evaluation indicate that compared to the 2050 Without Project Condition, implementation of alternative 3D would significantly improve the timing, frequency, and amplitude of salinity gradients with corresponding improvements in habitat for estuarine organisms. Alternative 3D would provide the greatest benefits over the 2050 Without Plan Conditions, while coming the closest to restoring natural flows to the estuary and thus achieving predicted improvements in oyster reef health. Moderated releases of fresh water into the estuaries via wetlands and groundwater would mute the seasonal changes in salinity, allowing for the development of a much more stable biotic community than in the 2050 Without Project Condition.

Alternative 8 – When compared to the 2050 Without Project Conditions, alternative 8 will provide more limited restoration of the three estuarine environments than with alternative 3D.

The continued water quality degradation associated with the 2050 Without Project Condition would be avoided, allowing for the development of a much more stable biotic community.

Alternative 9 – When compared to the 2050 Without Project Condition, there is little difference in the predicted estuarine restoration associated with alternatives 8 and 9. The continued water quality degradation associated with the 2050 Without Project Condition would be avoided, allowing for the development of a more stable biotic community. Estuarine restoration and water quality improvements associated with this alternative are more limited than with alternative 3D.

System-wide Evaluation - The following discussion describes the system-wide benefits of the SGGE project as related to the restoration and enhancement of downstream estuary ecosystems. From a regional perspective the SGGE project would support the restoration of estuaries along southwest Florida by re-establishing historical flow-ways, reducing surface runoff by increased evaporation and groundwater recharge, and replacing point flow discharge through the Faka Union Canal with distributed flow along U.S. 41 into tidal coastal marshes. By minimizing drastic salinity fluctuations, the benthic and mid-water fish and plankton communities are expected to improve within the three downstream estuaries. There is good reason to think that ecological conditions in nearby Fakahatchee and Pumpkin bays will also be improved by restoration of a more natural hydrologic regime. The existing canal system, by lowering the water table and diverting surface water flow, reduces the natural flow and seepage of fresh water into the creeks that supply fresh water to these bays. Therefore, longer periods without freshwater inflow, more frequent and severe reversed salinity gradients, and higher salinities in general might prevail in these bays than would be expected in the absence of the SGGE canal system. Therefore, the hydrologic restoration would benefit ecological conditions and fish abundance and biomass in all three estuaries (and possibly also in Blackwater Bay to the west). For the above stated reasons, RECOVER concludes the SGGE project will have a favorable impact on regional ecological restoration for estuary ecosystems.

2050 WITHOUT PROJECT- Without restoration of sheetflow and the elimination of point source discharges to Faka Union Bay, continued water quality degradation caused by salinity fluctuations would result in further loss of species diversity. Forage fish populations would continue to decline and recreational fishing would also suffer. Oyster reefs would be eliminated.

4.4 Performance Expectation 3. Protection of the City of Naples' eastern Golden Gate Wellfield by improving groundwater recharge.

The SGGE draft PIR documentation contained limited analysis of performance related to the third expectation (i.e., groundwater recharge). Therefore, RECOVER could not complete an evaluation for this performance expectation.

5.0 RECOVER SUGGESTIONS ON THE SELECTED PLAN

RECOVER evaluators offer the following suggestions to the PDT that may provide for improved system performance.

Potential negative effect of operations on wading bird populations – There is a possibility that dry season operations could negatively affect wading bird foraging habitat. While it appears that all of the considered alternatives are likely to substantially increase wading bird foraging

habitat, in other parts of the Everglades system, dry season flood control operations have been observed to cause water level reversals during the wading bird breeding season that can lead to extensive nesting failure. In Section 8.3 Operational Features (second paragraph), the following statement is made: "During this period potential storm events will initiate a canal drawdown in order to provide adequate canal storage for flood protection." The severity of such storm events is not specified nor the location of the canal system to be used for this drawdown so it is impossible to determine at this time whether water level reversals caused by flood control during the wading bird nesting season would or would not occur. When operations for the selected plan are being looked at in more detail, RECOVER suggests that it would be prudent for the study team to be alert to the possibility that effects seen in other parts of the ecosystem also could occur in the SGGE project area.

Rainfall Modeling Concern: RECOVER suggests that hydrologic information on dry season and extreme wet season conditions be evaluated in the future due to the importance of these conditions on the natural system. The MIKE SHE modeling used to assess terrestrial environmental parameters used a synthetic average year obtained by averaging data for each day of the year from 1990-1999. This attenuation of highs and lows may have produced an unnaturally uniform rainfall data set. It is suggested that a period of record containing a variety of wet, dry, and average rainfall years be evaluated. At a minimum, simulations of a single realistic wet year, single realistic dry year and a single realistic average year are suggested.

6.0 CONCLUSIONS

RECOVER has concluded that the three SGGE Project alternatives (alternatives 3D, 8 and 9) will meet or exceed two of the three performance expectations outlined in the Comprehensive Plan. Insufficient information was provided to evaluate the third performance expectation dealing with groundwater recharge. Alternative 3D, can be expected to restore a more natural pattern of wetland hydroperiod and freshwater flow to estuaries than the present hydrologic regime. Alternatives 3D, 8, and 9 all provide significant improvement over the 2050 Without Project Condition and would contribute to restoration of the estuaries and expansion of the continuity of natural habitat by combining the restored lands of the SGGE project site with surrounding natural areas.