

D.3.8 FUNCTIONAL GROUP 5 – CORKSCREW WATERSHED

D.3.8.1 Pre-Development Environmental Conditions

The Corkscrew watershed is located on the south side of the ridgeline dividing it from the Caloosahatchee River watershed. The majority of the flows from this watershed originally found their way into Belle Meade and Picayune Strand and then into the Ten Thousand Islands and Gulf of Mexico (*Figure D-2*). However, some portions overflowed low drainage divides during wet periods into the Estero watershed and Camp Keais Strand. The Functional Group 5 (FG 5) landscape was originally dominated by pine flatwoods and herbaceous wetlands with scattered small to large cypress wetlands. Soils are primarily deep sands. Shallow overland water flows occurred for much of the wet season and into the dry season in the deeper strands and sloughs.

D.3.8.2 Environmental Concerns

The majority of the landscape in the FG 5 area is in or has been proposed for public conservation ownership. These lands are a mix of marshes and cypress swamps with some pinelands along the wetland edges. There is some agriculture currently in the area, particularly north of Corkscrew Swamp, but the lands not currently in or proposed for public ownership would likely be converted to rock or sand mines and/or golf courses with or without residential development. Eliminating development rights on most of the components still in private ownership would go a long way towards being able to restore and maintain this landscape in a natural condition over the long term. The Corkscrew Regional Ecosystem Watershed (CREW) is a land trust that has been working for several decades to acquire wetlands around and connected to Corkscrew Swamp. They have successfully worked to acquire some large and many smaller tracts of land to the west and north of Corkscrew Swamp and these lands are currently being restored and managed by the South Florida Water Management District. In addition, one of the Comprehensive Everglades Restoration Projects (CERP) is Southern CREW, which is an acquisition project of an area adjacent to but not originally included in CREW. Public ownership of Southern CREW is permitting restoration of the hydrology and ecology of this portion of FG 5 in southeastern Lee County.

There are many drainage ditches and canals associated with residential areas and agricultural lands in FG 5. The major problem associated with these ditches is that they dump excessive amounts of water during wet periods onto downstream wetlands and flow-ways to maintain current levels of drainage on developed lands. This makes the wetlands wetter than under pre-development conditions during wetter periods. However, it also results in

reduced flows into these wetlands during drier periods compared to pre-development conditions. This is due to the reduced water storage that exists on the developed lands at the start of dry periods, thus reducing the natural baseflows that would normally be entering the downstream wetlands and flow-ways during drier periods.

One of the dominant characteristics of the original Southwest Florida ecosystem was the broad shallow sheet of water that flowed slowly across most of the landscape during wet periods. Drainage has eliminated much of this sheetflow, which now occurs primarily in the remaining wetland flow-ways. However, many of these flow-ways are further impacted by a variety of structures that restrict conveyance of water through them. Many of these structures are hardened so that all but the largest floods can pass through or around them without damaging the structure. Others are not hardened, but normally are able to handle most flows. When they eventually fail, they are just quickly rebuilt. From the perspective of the natural environment, the problem with these bottlenecks and diversions is that they can significantly impede water flows, causing increased water depths and flood durations upstream and effectively eliminating overland sheetflow through the adjacent wetlands and flow-ways for some distance upstream and downstream.

Exotic and nuisance native vegetation is widespread throughout FG 5. Some of these exotics are intentionally cultivated, including a variety of fruit and vegetable crops and pasture grasses. Most of these species are not considered to be invasive in natural landscapes, although some, such as the pasture grasses, can be very difficult to eradicate when one is trying to restore these sites to natural communities. Other exotic plant species come in on their own, particularly on disturbed landscapes where they can often out-compete native species in becoming established on newly cleared land surfaces. Some of these latter exotic species are extremely invasive and different mixes of them can quickly come to dominate large areas of both disturbed and undisturbed lands if no efforts are made to control them. Control efforts have been ongoing for years on the public lands, but there are still substantial efforts required on some of the more recently acquired properties. Exotics and nuisance species control efforts would be required on most of the lands currently in private ownership.

South Florida is a very low nutrient environment and increases in phosphorus and nitrogen entering downstream wetlands can drastically change the species composition and structure of their plant and animal communities as well as the ecological processes operating in these systems.

D.3.8.3 Environmental Solutions

The major features of the components and management measures in FG 5 are designed to address hydrologic and land use alterations associated with residential and agricultural activities (*Figure D-14*). Much of this effort is needed on lands already being managed by public agencies. However, other efforts will require working with landowners to manage their lands to provide more wet period water storage and/or having the right to carry out needed restoration and management on at least some of these lands.

Reestablishing more natural seasonal water flows in the Corkscrew Watershed could be accomplished by one or more of a variety of possible surface water flow management measures. Many involve improvements in the timing of flows from agricultural operations on and surrounding FG 5. Working with landowners, the Surface Water Hydrology focus area developed a number of possible management measures designed to capture a portion of wet period water flows. These management measures would allow for the slow release of these waters from agricultural fields to downstream flow-ways (RWCAs), their diversion to residential water supply (HWCAs) where the costs of storing water on private lands is what is sold, not the water itself, or their use for agricultural irrigation, which reduces the agricultural water supply demand on aquifers (Ag Detention).

A management measure that would help slow dry period flows would be step-down weirs at approximately 1 ft contour intervals along canals and large ditches in this FG. A similar approach is being taken in canals in Collier County by the Big Cypress Basin (BCB) of the South Florida Water Management District (SFWMD). The primary advantage of this feature is increased dry period groundwater levels and aquifer recharge without increasing flooding, reduced fire hazards during dry periods due to the higher moisture content of soils and vegetation, which also reduces freeze damage to tropical vegetation during winter cold spells. This would also help to prolong baseflows from drained lands to downstream wetlands and flow-ways during drier periods.

Water flows through natural flow-ways in the Corkscrew Watershed are affected by roads, levees, and old logging trams which can impound flows and interfere with natural shallow sheetflow through flow-ways. Elimination of these structures or improving conveyance through or around them could deal with impoundment affects of these structures. While creating larger openings for conveyance could help, placing numerous smaller structures with a large total conveyance capacity across the flow-way could reduce impoundment as well as improve sheetflow through the area. It's possible that these conveyance structures could be coordinated with the step-down

weirs, where there are canals involved, to improve not only wet period conveyance, but dry period flows as well.

Conservation easements or acquisition would avoid the possibility of the eventual loss of much land in the Corkscrew Watershed to residential development. Coordination with CREW efforts could facilitate these arrangements. Also, working with various government agencies and developers, it might be possible to acquire and restore some of these lands as mitigation for development.

Nutrient outflows from agricultural lands would be reduced to varying degrees depending on what mix of management measures were implemented. The greatest improvement would occur if the agricultural lands were restored to their natural pre-development condition. Any of the management measures that increased water storage on agricultural lands would improve water quality in downstream receiving waters. Implementation of urban BMPs in residential areas would help to reduce these impacts. Active nutrient removal involving algal turf scrubbers or a Water Quality Treatment Area could also significantly improve water quality in downstream receiving waters.

Any lands that are to be restored to their natural pre-development condition would likely require a significant effort to bring nuisance exotic and native vegetation under control. In some cases this would be largely accomplished by earth-moving activity involved in restoring a more natural topography. In other cases, it would require scouting the area to locate nuisance exotic and native vegetation and then treating it with herbicides as often as is necessary to eliminate each population on the site. Nuisance vegetation control would be required for a number of years on any disturbed construction footprints, since they can easily dominate newly created bare dirt surfaces. Controlling these species until natural vegetation has an opportunity to colonize and dominate these sites would greatly reduce the scale of future nuisance vegetation control efforts.

The most useful management measure for reducing excessive wet season water flows from the Corkscrew Watershed into downstream flow-ways would be an above-ground reservoir that would be able to capture significant quantities of water during high canal outflow periods and could store this water until dry periods when it could be used to maintain downstream dry period water flows. One reservoir associated with the Kehl Canal was recommended as part of FG 5, although the exact number, size, and location of reservoirs would have to be decided by hydrologic modeling.

D.3.8.4 Original Components and Associated Management Measures in Functional Group 5 (see *Table D-11*)

1. Conservation easements or acquisition would avoid the possibility of the eventual loss of lands in FG 5 to residential development. Restoration of developed lands to their pre-development habitats could help to eliminate nutrients problems. (28, BC23, BC25, BC28, BC32, BC34, BC54, BC62)
2. Reduce impediments to sheetflow with improved conveyance through or around structures (BC23, BC25, BC26)
3. Eliminate exotic vegetation (28, BC23, BC25, BC28, BC62)
4. Improve downstream hydrologic regimes by increasing storage on agricultural lands and associated detention ponds (SW07)
5. Improve downstream hydrologic regimes by constructing weirs at 1 ft contour intervals in canals and ditches (28, BC23, BC25, BC54)
6. Construct an above-ground reservoir along a major canal to store wet period excess flows and to provide supplemental dry period flows to downstream flowways (SW30)
7. Construct a Water Quality Treatment Area to improve quality of water flowing through the Corkscrew Watershed (W113)
8. Construct an Algal Turf Scrubber to improve quality of water flowing through the Corkscrew Watershed (W114)
9. Institute urban BMPs in watershed (W110)

D.3.8.5 Components and Associated Management Measures in UMAP

FG 5 was not included in the UMAP.

TABLE D-11: FUNCTIONAL GROUP 5 - CORKSCREW WATERSHED DETAILED COMPONENT DESCRIPTIONS
Functional Group 5-Corkscrew Watershed

<u>BAT ID Number</u>	<u>Component Title</u>	<u>Component Justification</u>	<u>Component Description</u>
28	Corkscrew Woodstork Flow-ways	The site is located in a woodstork high concentration area that has been impacted by hydrologic alteration.	The component is located in sections 33 34 and 35 in T45 R27 and 2, 4, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 27, 28, 33, and 34 of T46 R27 an includes acquisition, hydrologic restoration, habitat restoration, based on woodstork biology and feeding needs.
BC23	Corkscrew Regional Ecosystem Watershed Acquisition and Management	The CREW Land & Water Trust was established in 1989 as a nonprofit organization to coordinate the land acquisition, land management, and public use of the 60,000-acre Corkscrew Regional Ecosystem Watershed. This watershed straddles Lee and Collier Counties and provides aquifer recharge, natural flood protection, water purification, preservation of wildlife habitat, and public recreation. Since 1990, CREW has coordinated the purchase of nearly 27,000 acres.	The component would involve acquisition and hydrologic restoration in the form of culverting, road removal, berm removal, ditch filling and any removal of any features impeding flowways. Other restoration would involve farm field restoration and exotic vegetation removal.

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<u>BAT ID Number</u>	<u>Component Title</u>	<u>Component Justification</u>	<u>Component Description</u>
BC25	Corkscrew Swamp Sanctuary Hydrologic Restoration	Orange groves and Westwind Mining operations are pumping excess water from their lands onto the Corkscrew Swamp Sanctuary. Alteration of water flow timing, quantity and quality are causing invasion of willow into freshwater marsh. The marsh is important foraging habitat to wading birds including wood stork and snail kite. Section 46,27,25,26, portions of 34, 35 are all in groves presently.	Restoration would involve creating a detention area in section 26 and a filter marsh in sections 34 and 35. In sections 34 and 35 restoration activities would include upland restoration in the northern section of grove and restoring the grove's southern section grove to hydric flatwoods and wet prairie. In section 25, hydric flatwoods and wet prairie would be restored. A spreader canal would be constructed in northeastern quadrant of section 35.
BC26	Bird Rookery Swamp Hydrologic Improvement	During the logging operations, which occurred during the 1920's in the component area, elevated tram/railroad beds were constructed which now impede the natural and historic southwestward sheet flow of water through the component area.	The component would restore hydrologic flow through trams in Bird Rookery Swamp in Collier County Florida found in Sections 28, 29, 32 and 33 - Township 47 South - Range 27 East, and Sections 4, 5, 6 and 8, Township 48 South - Range 27 East. The component would entail culvert construction, berm removal and other hydrologic improvements.
BC28	East Bird Rookery Swamp Upland Habitat Restoration	The property was illegally farmed in 1950s and is need of restoration	The component would involve restoring farmland and improved pastures to xeric pine flatwoods.
BC32	Palm Tree Farm Restoration	This site has a Palm Tree Farm, disrupting the connectivity and habitat function of the surrounding pine flatwoods and wet prairie.	The component would require land acquisition and subsequent restoration of the private tree farm back to the natural preexisting habitat.

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<u>BAT ID Number</u>	<u>Component Title</u>	<u>Component Justification</u>	<u>Component Description</u>
BC34	CREW Center Restoration	This site was purchased with mitigation funds; however no restoration was costed in the purchase.	The component would involve land acquisition of 30 acres in north east corner of the site and restoration of farm field back to mesic pine flatwoods.
BC54	Northern Golden Gate Estates Unit 53 Restoration and Acquisition	North Golden Gate Estates Unit 53 is located at the upper end of the Naples Bay watershed. Native habitat present is predominantly cypress and cypress hardwood mixed forest, with some emergent marsh. Although the unit has been platted for development, at present there are no homes, streets are unpaved and there is no electric service. Soils, hydrology and extant plant species indicate that the entire unit is a seasonal wetland, with surface water present during rainy season. This is a time limited opportunity to obtain and preserve a relatively pristine cypress wetland.	The component is located on 41st St. in NNGE and includes acquisition, hydrologic restoration, wetland restoration, berm removal to improve flow, and invasive exotic vegetation control.

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<u>BAT ID Number</u>	<u>Component Title</u>	<u>Component Justification</u>	<u>Component Description</u>
BC62	Cocohatchee Slough	The historic Cocohatchee Flowway has been lost to channelization and drainage. The flowway was 20-miles wide and flowed from Lee County through Collier County and out through the Cocohatchee River to the Wiggins Pass estuary. Like other historic flowways in Southwest Florida, the Cocohatchee slowly guided flows toward the Gulf Coast, slowing the flow of fresh water, storing floodwater, supplying water at times of low flow, filtering pollutants, and supporting biologically diverse and economically important flora and fauna. Many of these habitat functions have been lost. Additionally, the channelization of flows to the coast has led to estuarine degradation from excessive pulses of fresh water.	Components would include removal of spoil berms, backfill/plugging ditches, weir removal/refitting, road culverting, filter marsh construction, and invasive exotic vegetation removal.
SW07	Corkscrew Watershed Ag Water Containment Area	Agricultural lands are impacting the natural hydrology through drainage.	The component is designed to increase capacity of agricultural detention areas.
SW30	Kehl Canal Storage Reservoir	This component is located in section 26 of 4325 and includes acquisition, hydrologic restoration, wetland restoration, and invasive exotic vegetation control	This component is designed to capture wet season canal flows for release during the dry season.

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<u>BAT ID Number</u>	<u>Component Title</u>	<u>Component Justification</u>	<u>Component Description</u>
W114	Corkscrew Swamp Sanctuary MAPS	The area is impacted by drainage of CREW, excessive nutrients, low DO, and turbidity	The component entails the construction of an Algal Turf Scrubber (ATS).

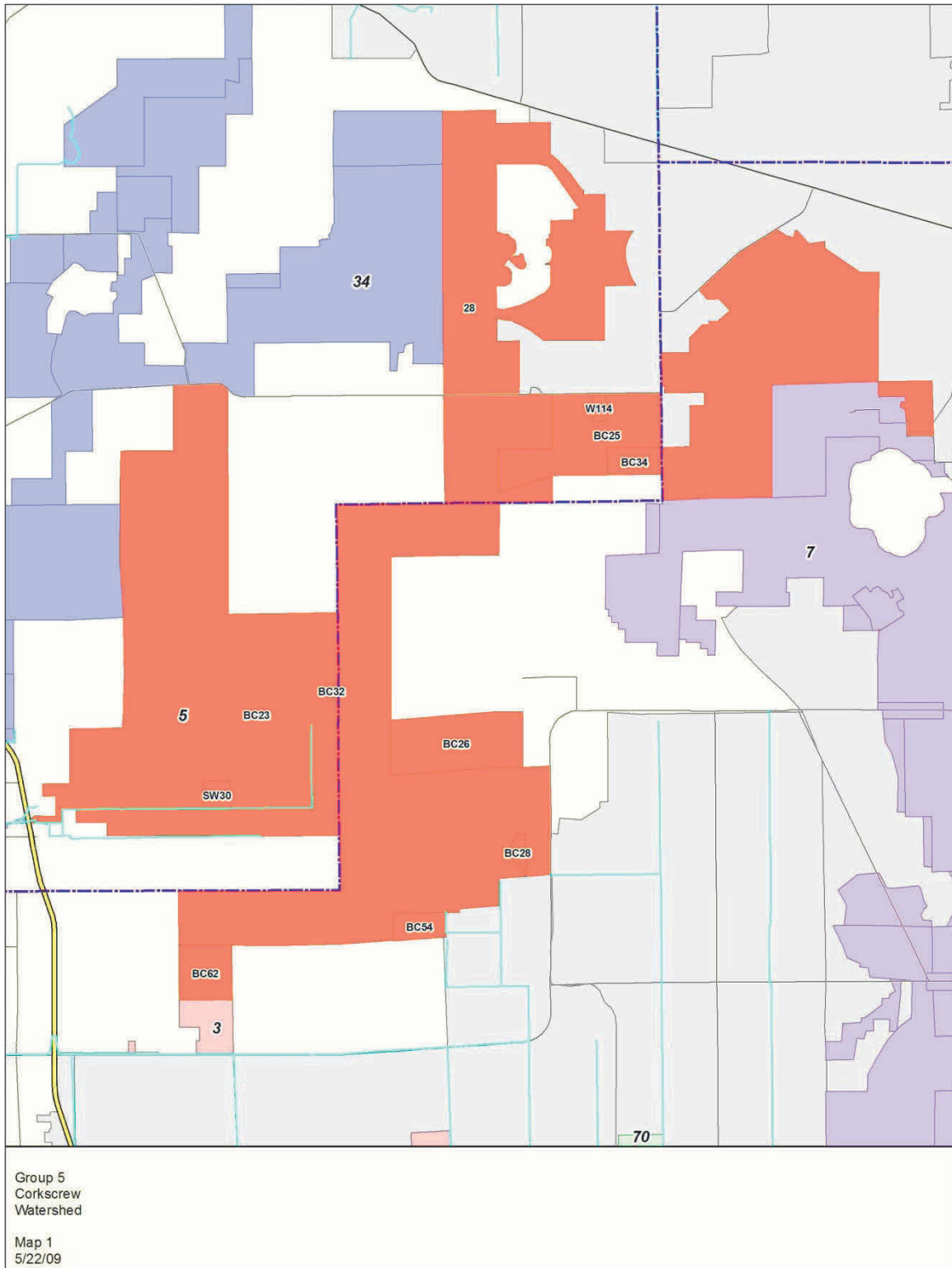


FIGURE D-14: FUNCTIONAL GROUP 5 CORKSCREW WATERSHED COMPONENT BOUNDARIES