

**Resource Protection Area Assessment
of the
Rainbow River Ranch Parcel
(Preserve at Blue Run)
for
Rainbow River Conservation Inc.
December 23, 2013**

A cursory Resource Protection Area (RPA) Assessment was conducted along the shoreline and aquatic areas adjacent to the property formerly known as the Rainbow River Ranch by Michael G. Czerwinski, Senior Environmental Scientist on behalf of Rainbow River Conservation Inc. on September 13, 2013 via boat access and snorkel survey. The purpose of the field investigation was to examine the environmental conditions and environmental resources present in the shoreline of the subject area, more specifically the presence or absence of beneficial submerged aquatic vegetation (SAV) more commonly referred to as grass beds; presence or use or potential use of the area by endangered or threatened fauna or flora, including the evidence of nesting wading birds; the condition of the shoreline, specifically the vegetative assemblage (wetland/ upland/ herbaceous/ Shrub/ forested / disturbed/) tree buffer or evidence of disturbance; and to examine the docks that had been constructed on site without proper permits. The inspection was limited to those areas readily observable from the water since upland access was not garnered.

BACKGROUND

Rainbow Springs is Florida's 1st largest spring and the Rainbow River is a designated Outstanding Florida Water (OFW) (Ch 62-302.700 F. A.C.) and State of Florida Aquatic Preserve (Ch 18-20 F.A.C.). The river runs due south from the headspring source area within Rainbow Springs State Park, approximately 5.7 miles to its confluence with the Withlacoochee River. The Rainbow River is also a designated Surface Water Improvement and Management Act (SWIM) Waterbody and the Rainbow Springs State Park is designated as a National Natural Landmark¹. These special designations provide for the protection of water quality and the rivers natural resources as well as increased scrutiny for permitted activities that occur on and near the water body. There is also archaeological evidence that the river and head springs have been used by humans for at least 6,000 years.

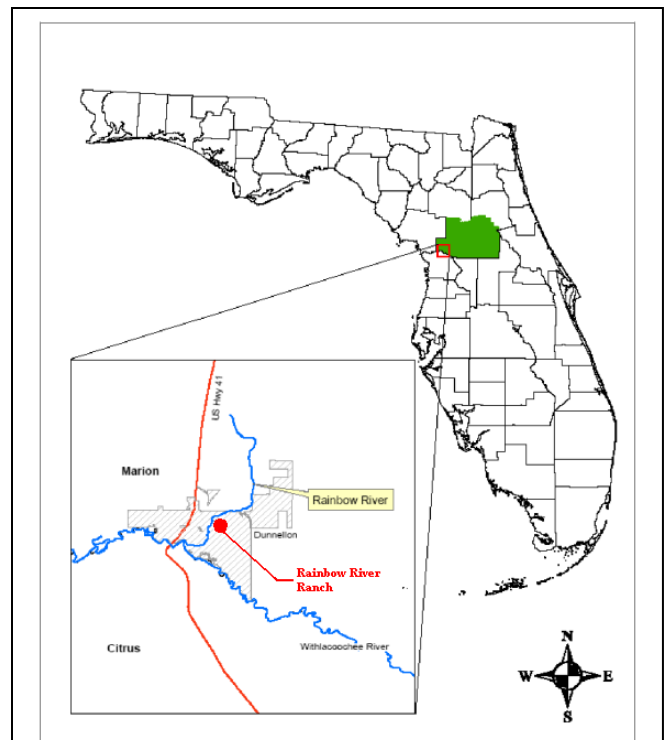


Figure 1. Rainbow River Ranch Location (modified SWFWMD 2008)

¹ National Natural Landmarks are selected for their outstanding condition, illustrative value, rarity, diversity, and value to science and education. Sites are designated by the Secretary of the Interior. The designation recognizes the conservation of sites that contain outstanding biological and geological resources, regardless of landownership type. It is the only natural areas program of national scope that recognizes the best examples of biological and geological features in both public and private ownership.

The majority of the Rainbow River experiences relatively little if any flooding and the water levels stay within a very small range (with the exception of areas near the confluence with the Withlacoochee River) due predominantly to its somewhat constant spring flow source and relatively small contributing watershed (8.3 sq. miles, WAR, 1991) Therefore, in comparison to other rivers, the Rainbow has a thin fringe of floodplain swamp and only a few areas of more expansive forested floodplain swamp, much of which are located on the eastern shores. The majority of the western shore is developed single family use and hardened with seawalls (GARI, 2007)

The Rainbow River was designated as an impaired water body by FDEP in 2009 (Ch. 62-303 F.A.C.) due to nutrients (algal mats) and an imbalance in flora or fauna identifying elevated nitrate and nitrite levels as the likely cause of the impairment (and phosphorus as the limiting nutrient). Nitrogen is considered a pollutant that causes eutrophication in surface water and contaminates groundwater. Elevated nutrients can also lead to toxic algal blooms, oxygen depletion, fish kills and loss of biodiversity. (USEPA 2006). In accordance with rule criteria for Impaired Water bodies, the next step is to develop a Basin Area Management Plan and establish Total Maximum Daily Loads for the pollutant(s).

Studies indicate that the largest source contributor to this pollutant is inorganic fertilizers from agricultural areas within the spring shed (Brown et. al. 2008, Jones et. al 1996). The subject site is the largest (in land area) agricultural property directly adjacent to the Rainbow River. While the subject site is unlikely to contribute to elevated nitrate at the headsprings, it is a likely source of nutrients (nitrate and phosphorous) from the immediate water table and surface water runoff contributing to the growth of algal mats (filamentous algae) at this location on the river.

Ultimately, proper protection and management of the shoreline and aquatic resources is of critical concern to maintaining the water quality and related resources of the Rainbow River.

LOCATION and GENERAL SITE CONDITIONS

The Rainbow River Ranch is located on the (south) eastern shore of the Rainbow River within the City of Dunnellon in Sections 25 & 36 Township 16 South, Range 18 East, and Section 30-16-19, Marion County, Florida. The site is bordered by County Road 484 to the south, the Rainbow River to the west and north, and S.W.190th Avenue and conservation lands as part of Rainbow Springs State Park to the east. The upland portion of the site



comprises approximately 247 acres (MOL). The subject upland land use / land cover is principally agricultural pasture and hayfield. A number of structures are present on site including the main ranch area close to CR 484 and a residence located near the river in the northern portion of the site.

It is our understanding that the subject site has been divided into two principal land owner interests. The eastern portion of the site, owned by Conservation Land Group LLC and comprising approximately 135 acres is referred to as the Preserve at Blue Run. This parcel has approximately 3215 linear feet of shoreline along the northern (eastern) portion of the Rainbow River and is proposed for residential development. According to the Marion County Property Appraisers (GIS) database, the western portion of the property comprising approximately 112 acres in three (3) parcels is owned by Rainbow River Ranch LLC. Two of those parcels are located west of Hendrix Drive, between Hendrix Drive and the Rainbow River. A number of residentially developed "out parcels" which are present along the river between the two ownership parcels and are accessed via Hendrix Drive are not part of the subject property or this investigation.

A review of topographic maps of the subject site reveal a rolling hills topography with a high of approximately 71 feet located in the south central portion of the site with site conditions rapidly sloping towards the river to the north and west. The Land Use/ Land Cover mapping by SWFWMD indicate that the dominant land cover is classified as Cropland and Pastureland and the interior of both parcels appears to be dominated by pasture grass, hayfield or old field. Stream and Lake Swamp classification is the land use designation representing the mixed forest swamp along the river edge with the exception of Cypress dominated swamp and Wetland Coniferous Forest (mixed cypress and wet pine) located along the north eastern shoreline of the subject site. According to the SWFWMD Land Use Land Cover Mapping, Landward of the Stream Swamp is upland forest or pasture. A copy of the topo map, Land Use Land Cover map and soils map are provided as attachments to this report.

A historic abandoned railroad bed is present near the northern and western boundaries of the site, bordering / roughly paralleling the river. A review of the existing land surveys indicate the presence of 4 culverts located under the railroad bed along the shoreline of the Preserve of Blue Run that have the potential to transmit (untreated) storm water from the agricultural areas and excavated pond in northeast corner and into the river.

Forested wetlands and forested uplands are present along the shoreline of the river. A wetland referred to as a borrow pit is present along the west central portion of the subject site. A relatively deep, somewhat circular water basin (referred to as East Blue Cove) is located in the southwestern portion of the parcel connected to the river. The presence of the borrow pit, former clay settling areas, the railroad bed, the cove and old submerged pilings in the river strongly indicate that historic phosphate mining and/or processing may have occurred on site at some time in the past.

Finally, the land owner constructed six small residential docks² (considered an accessory use) along the shoreline of the Preserve at Blue Run and constructed a multiple slip dock in East Blue Cove without establishing a formal subdivision or proper principal use of the upland area or garnering prior

² An existing dock and stairway was present associated with the single ranch family residence on site, therefore 7 single family docks and one multi slip facility in East Blue Cove were present at the time of the assessment. .

approval or permits. In addition, documentation was provided to indicate that tree clearing (clear cutting) and/or selective canopy disturbance or under brushing of the riparian forest areas had occurred in the area of the docks in 2006. Documented vegetative clearing and stump grinding representing construction activities occurred without the proper BMP's, pollution prevention measures (silt screens) or proper NPDES permits. These activities occurred within a few feet of the Ordinary High Water Line (OHWL) and on slopes which lead directly to the river.

PREVIOUS INVESTIGATIONS

An environmental assessment and protected species survey (Environmental Supplemental Narrative for Preserve at Blue Run) and supplemental assessments were conducted on the subject property by Johnson Engineering in March and June 2007, respectively, and the results were reviewed by this investigator. That previous investigation, as well as supplemental information³ identified 13 listed species with the potential to occur on site. These included: **American Alligator** (*Alligator mississippiensis*), **Florida Sandhill Crane**, **White Ibis**, **Tri-Colored Heron** (*Egretta tricolor*), **Little Blue Heron** (*Egretta caerulea*), **Gopher Tortoise** (*Gopherus polyphemus*) **Suwanee River Cooter**, gopher frog, wood stork (*Mycteria americana*), limpkin (*Aramus guarauna*), American bald eagle (*Haliaeetus leucocephalus*), eastern indigo snake (*Drymarchon couperi*), and **cardinal flower** (*Lobelia cardinalis*). Of these, a total of seven (7) listed wildlife species identified above (in bold) and the cardinal flower were identified as positively occurring on site. While a seasonally appropriate supplemental wading bird survey was reportedly conducted on site, it was not clear however, that any assessments were conducted from the river point of view or along the river edge or shoreline, as opposed to just the property. Similarly, there is no evidence that a RPA assessment for submerged resources similar to this one was conducted by the land owner or their agent. These points are critically important since activities on the subject property have the potential to impact the resources, including wading bird nesting / rookeries and submerged resources within the riparian areas adjacent to as well as a reasonable distance up and downstream from the subject property.

In addition to the above-referenced species, the Florida Fish and Wildlife Conservation Commission (FFWCC 1992) and others (Normandeau 2011) indicate the snowy egret (*Egretta thula*) is also found on the Rainbow River. Furthermore, that the river supports a diverse assemblage of aquatic turtles including the loggerhead musk turtle (*Sternotherus minor*), the common musk turtle (*S. odora*), the eastern river cooter (*Pseudonemys concinna*), the Florida cooter (*P. floridana*), the Florida red-bellied cooter (*P. nelsonii*), the Florida softshell turtle (*Apalone ferox*) the striped mud turtle (*Kinosternon bairii*) and the chicken turtle (*Deirochelys reticularia*) (Normandeau 2011).

A wetland jurisdiction line was established on the subject site sometime in 2004 and a Safe Upland Line (SUL) along the river by Johnson Engineering (owners agent) in 2006. The SUL was determined to be at or above the regulatory Ordinary High Water Line (OHWL) of 29.2 or 29.3 feet, by the FDEP⁴.

3 Johnson Engineering CLAR-response to SWFWMD Application No 43032697.00, June 28, 2007.

4 Terry Wilkinson, FDEP State Lands, Bureau of Survey and Mapping Memo November 9, 2006.

RESOURCE PROTECTION AREAS

Preserving and maintain the shoreline, or interface between the land and the water, as well as the submerged resources is very important in preserving and protecting the water quality and aquatic resources of the Rainbow River. Desirable aquatic shoreline and submerged aquatic vegetation (SAV) provide important functions related to the overall health and water quality of the Rainbow River and therefore should be protected to the greatest extent possible. These beneficial biological functions include, but are not limited to nutrient uptake and conversion to biomass, collecting, stabilizing and retaining sediments, protection from shoaling, maintaining healthy dissolved oxygen content, providing shelter, food and nursery grounds for aquatic fauna, and keeping water clouding periphyton in check.

In accordance with State Sovereign Submerged Lands (SSSL) management criteria provided in Chapters 18-20 and 18-21 Florida Administrative Code (F.A.C.), a Resource Protection Area (RPA) assessment is to be conducted for activities proposed on SSL or within Aquatic Preserves in order to identify those important functional areas described above. Management policies of the State of Florida found in Chapter 18-21 Florida Administrative Code (F.A.C), states that activities on SSL shall be designed to minimize or eliminate adverse impacts on fish and wildlife habitat and other natural or cultural resources, shall be designed to minimize or eliminate any cutting, removal, or destruction of wetland vegetation, shall not result in significant adverse impacts to SSL and associated resources and activities resulting in significant adverse impact shall not be approved unless there is no reasonable alternative and/or adequate mitigation is proposed (Chapter 18-21.004(2)(b), (d), (i) F.A.C.). The purpose of the RPA assessment is to “*Provide the location of any existing vegetation, including common name and/or species, grassbeds, oysters or other benthic resources within the project area*”. There are three (3) classes of RPA:

RPA (1) are areas within the aquatic preserves which have resources of the highest quality and condition for that area (Chapter 18-20.003 (54) F.A.C.) and ecological value and therefore afforded the highest protection. RPA #1 can include but are not limited to forested swamps, springs, colonial water bird nesting sites, archaeological or historic sites, endangered and threatened species habitat, benthic communities and algal and submerged grass beds. Benthic Communities are those assemblages of aquatic, principally bottom dwelling or submerged or attached organisms (plants and animals).

RPA 2 are resource areas “...in transition with either declining resource protection area 1 resources or new pioneering resources within resource protection area 3.” Chapter 18-20.003 (55) F.A.C., and

RPA 3 “... are characterized by the absence of any significant natural resource attributes Chapter 18-20.003 (56) F.A.C

Benthic Communities are defined as “any sovereignty submerged land where any of the following associations of indigenous interdependent plants and animals occur: grass beds, algal beds, sponge beds, octocoral patches or beds, hard coral patches or reefs, and tidal swamps, including mangroves identified in any reports submitted pursuant to paragraph 18-21.004(2), FAC. Communities is intended to reflect identifiable assemblages of organisms as opposed to scattered or single individuals. (18-21.003 (12) F.A.C.)

Native submerged grass beds are extremely valuable, unique and productive ecosystems that are intrinsically linked to the detrital food web that support resources in shallow coastal bays and estuaries as well as the valuable commercial fisheries of the area (Zieman & Zieman, 1981). Seagrass beds have been identified as one of the most productive communities on earth and support a diverse assemblage of aquatic plant and animals. Seagrass beds provide important functions including: maintaining water quality by trapping sediments, and processing nutrients; holding and stabilizing sediments; and serving as food, shelter and critical nursery areas for juvenile fish and invertebrates including commercially important species as well as endangered and threatened species such as the West Indian Manatee. Gulf coastal salt (marine) or brackish water marine sea grass vegetation generally include shoal grass (*Halodule sp.*), turtle grass (*Thalassia testudinum*) and manatee grass (*Syringodium filiforme*) as well as Widgeon grass (*Ruppia maritima*), the latter of which appears to have a better tolerance to lower salinity. Similarly, native freshwater submerged aquatic vegetation grass beds such as eelgrass (*Valisneria spiralis*), water naiad (*Najas guadalupensis*), Pondweed (*Potamogeton sp.*) and Springtape (*Sagittaria arifolia*) provide similar freshwater habitat and functions and typically are indicators of (good) water quality (SJRWMD, 2000).

One of the original efforts to map the submerged aquatic vegetation of the river was in 1986 (WAR, 1991, pg 2-2) and identified four dominant species: strap-leaf arrowhead (*Sagittaria*), tapegrass (*Vallisneria*), *Hydrilla* and southern naiad (*Najas guadalupensis*). Later surveys expanded the vegetation classifications to include various dominance assemblages and included classification of shoreline emergent vegetation. Subsequent mapping occurred approximately every 5 years (1991, 1996, 2000, 2005) (SWFWMD 2008) with the latest mapping provided in 2001 (Atkins, 2012). Although filamentous alga was noted as a component it was not provided with density or coverage estimates until the latest report.

METHODS

A RPA Assessment was conducted on September 13, 2013, to identify, locate and classify significant benthic, aquatic or submerged resource areas within the sovereign submerged lands (SSL) adjacent to the upland portion of the property. The submerged and shoreline areas were examined from the shoreline, from boat and by in-water snorkel survey by Michael G. Czerwinski: a marine biologist, professional Wetland Scientist, Florida Licensed Professional Geologist and certified (PADI) scuba diver with over 25 years experience in conducting environmental impact assessments and RPA assessments. The investigator conducted in-water observation at strategic locations along the shoreline to adequately provide a characterization of the habitats or resources. Once typical habitat areas were characterized, efforts were concentrated on the areas of degraded former habitats or apparent previous impacts, such as total or selective tree clearing, understory alterations, evidence of ground cover alterations from foot traffic and dock construction represented by the seven single family docks, six of which were constructed without FDEP permits. Photo documentation is provided at the end of this report.

RESULTS

The majority of the shoreline along the subject site is mostly natural and non hardened, i.e. no seawalls or rip rap present and can be considered forested. The only exception is a small portion of the river riparian to the existing (Cubbage) ranch residence, where a relatively short wood retaining wall is present. Water was relatively clear with little boat or tuber traffic at the time of the assessment

and the water levels appeared to be within normal range (neither exceedingly high nor low). The principal habitat types found within the study area are described below:

RPA # 1

Rock Substrate / Outcrop

This habitat type is found at various places along the river, but within the study area only on the western side of the centerline of the river channel (tread). It consists of limestone or chert rocks that can vary from a flat plain to boulder and in some cases is interspersed with a vegetative type such as submerged grass beds (typically *S. kurziana*). These areas are important to the overall water scape (morphology) and flow characteristics of the river. For example, shallower bouldery areas can create areas of frictional rapid flow (riffles or rapids) that can be important for oxygenation of the water. Prominent rock out crops provide resting or basking areas for water birds (typically *Anhinga's*) or aquatic turtles.



Example of a rock outcrop near the subject site

Unconsolidated Substrate

There are two basic types of unconsolidated substrate within the study area and the river in general. These include areas of fine sand, sometimes with a shell component where sand is the major component. The sand is typically light brown, yellow, tan or even white in color near spring boils. Many of the sandy areas near the headsprings appeared greenish and upon inspection were encrusted with a thin layer of microscopic algae or periphyton providing the green coloration. The second type of unconsolidated substrate is fine mud or organic detrital sediment created from the deposition and / or decay of plant material. The mud component is typically grey, brown or even black. Sandy areas are important for fish bedding, substrate for benthic invertebrates which contribute greatly to the aquatic food web and areas of potential colonization for beneficial SAV. Fresh water mussels (Florida Shiny Spike (*Elliptio* sp) and Florida Pondhorn (*Uniomereus carolinians*)), and snails and their abandoned shells are typically readily observable in sandy areas and were observed on site. The turban snail shells were most likely of the following species: (*Elimia*, *Melanoides*, *Tarebia* and/or *Tuberculata*). The Asian clam (*Corbicula fluminea*), an invasive species, has also been reported in the Rainbow River (GARI 2007). The presence of the opened or bodyless shells most likely indicates predation by wildlife.



Underwater photo of unconsolidated substrate consisting of fine sand with scattered dead freshwater snail and mussel shells

Grass Beds

Submerged macrophytic vegetation consisting of spring tape (*Sagittaria kurziana*) and less commonly eelgrass (*Valisneria americana*), also referred to as grass beds are prevalent and arguably the most pristine resource of the Rainbow River. The best examples are near the headsprings and in the first few miles of the river where they persist as monocultures with minor amounts of *Hydrilla* or filamentous algae interspersed. Grass beds are present riparian to the subject site in variable cover from scattered to dense and some of the scattered or clumpy distributions are interspersed with filamentous algae and appear to be the most prone to being covered with periphyton or epiphytic algae.



Submerged grass beds interspersed with sandy non vegetated substrate areas near the headsprings.

Emergent Herbaceous Shoreline Vegetation

The emergent shoreline areas provide one of the transitions between the land and deeper water habitats. A variety of rooted herbaceous shoreline vegetation is present along the Rainbow River including floating leaved rooted aquatics (water lilies which are typically slightly deeper) and rooted emergent wetland vegetation, typically sedges, rushes, reeds, and panic grasses. The most prevalent representative emergent herbaceous shoreline vegetation at the subject site is knot grass or Egyptian paspalidium (*Paspalidium geminatum*). The emergent vegetation structure which is rooted in the bottom, provides habitat and shelter areas for small aquatic invertebrates to large fish such as the bass shown in the photo. These emergent zones along the river also provide shelter and nesting for a significant



Emergent shoreline vegetation (knot grass) bordering the river at the subject site.



Underwater photo of knot weed stalks on Rainbow River providing structure and shelter to bass and sunfish

population of gallinules and ducks, most prominently the wood duck (*Aix sponsa*) and feeding areas for a variety of the egrets, and herons, Anhinga and cormorants. The upper emergent portions of the plants provide an attachment substrate for apple snail (*Pomacea sp.*) eggs an important food source for many wetland dependant wildlife species.

This vegetation can also extend up into the adjacent stream forested swamp if there is sufficient substrate,

water and light conditions. This vegetation zone provides other important functions including but not limited to stabilizing shoreline sediments, nutrient uptake, wake protection of shoreline reducing or preventing shoreline erosion; Disturbed emergent zones along the river typically will become devoid of vegetation, allowing nuisance vegetation such as hydrilla, water lettuce (*Pistia stratiotes*), and *Lyngbya* to encroach or it becomes overgrown with primrose willow (*Ludwigia peruviana*), wild taro (*Colocasia esculenta*), creeping upland vines (such as dodder, hemp vine, woodbine), or other invasive or nuisance vegetation.



Curious Gallinule or moorhen coming out from the emergent zone along the Rainbow River to investigate.

Spring Vents

Spring vents are the physical fractures or openings in the rock or substrate within the river where water from the Floridian Aquifer emerges (discharges). The majority of spring vents are within the first few miles of the head waters. These can range in size from large openings large enough for a person to partially enter to a few inches in diameter. Spring vents can occur as a single opening or may be present in groupings of two or more. Much smaller isolated discharge areas can be found throughout the river within the substrate where the sand is typically observed in small circular “boils” on the bottom. No major spring vents were observed near the riparian areas of the subject property.



White sand areas where sand bubbles or appears to be boiling are small spring seeps or discharges in the sandy substrate

Riverine Swamp

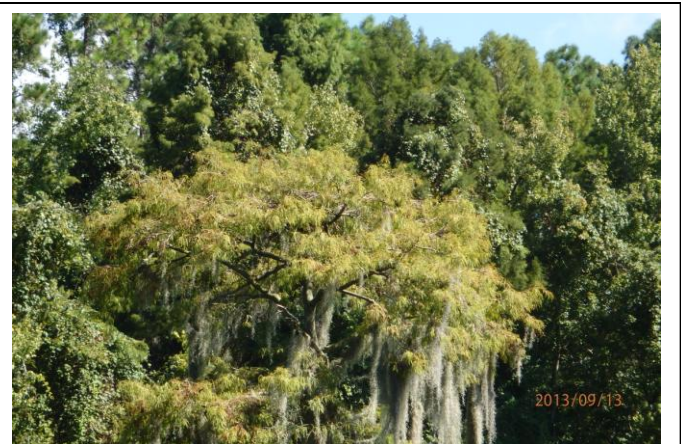
Riverine swamp are those forested wetland areas located adjacent to the river and include a variety of wetland tree assemblages, most commonly cypress (*Taxodium* sp), and red maple (*Acer rubra*), swamp bays (*Magnolia virginiana*) cabbage palm (*Sabal palmetto*), laurel oak (*Quercus laurifolia*), a variety of wet adapted pines, southern red cedar (*Juniperous silicicola*), and a variety of other hardwoods. **Cardinal Flower (*Lobelia cardinalis*) a state listed threatened plant species with a distinctive red bloom, was noted in the riverine swamp areas closest to the shoreline on the subject site (see Photo 18 attached).**

The riverine swamp is periodically inundated or flooded and exhibits saturated and highly organic wetland soils. The riverine swamp habitat provides one of the more important transition zones between the uplands and the river, providing habitat for wetland and wetland dependant species, as well as important, functional values, which are widely accepted and well documented in the literature. These include protection of the soils in the root zone from erosion and sedimentation into the waterbody, which also protects against shoaling, uptake and assimilation (denitrification) of nutrients.



Photo of Rainbow River riverine swamp in background with emergent shoreline vegetation in mid ground and visible submerged grass beds in foreground.

The riverine swamp is one of the more important habitats on the Rainbow River for wading and large perching birds, many of which are listed species. The trees provide nesting habitats for wading birds typically individually or in groups referred to as rookeries. A small dwarf cypress tree adjacent to East Cove has documented nesting wading birds that have successfully fledged young in the past (Sandra Marraffino, Florida Audubon member and resident pers com). The larger pines and cypress along the river's edge, particularly the more undeveloped eastern shoreline provide evening roosts along the river for kettles of turkey vultures as well as nests for barred owls, red tailed and red shouldered hawks. The environmental narrative supplement (Johnson Engineering) identified a vacant wading bird nest on site. Local Audubon Society members conduct Christmas Bird Counts in the area and regular avian surveys of the river by kayak Marraffino, 2006). Many of these birds utilize the undisturbed swamp forest for nesting, feeding and shelter.



Dwarf Cypress tree on the west side of East Blue Cove that has supported nesting wading birds that have reportedly successfully fledged young and documented by residents.

The Belted Kingfisher is a small distinctive bird commonly observed along the river and requires tree perches along the river to conduct their feeding runs along the river. The numerous river otters as well as other mammals of the Rainbow River prefer and depend on the riverine swamp stream banks to feed and rest. The Limpkin, (*Aramus guarauna*), a bird that breeds only in Florida and a Florida Species of Special Concern (SSC) is commonly encountered along the river and has been observed foraging in and around the Blue Cove area and the riverine swamp and shoreline of the Rainbow River Ranch (Sandra Marraffino pers com).

Fragmentation of the forested shoreline landscape by tree removal or clear cutting, clearing of the understory or ground cover, has been documented to: decrease the prevalence of songbirds in favor of rough, non native or (nest) predatory species such as European Starlings; transmit vehicle sounds deeper into the forest disrupting songbird call success and fecundity; and introduce non native and invasive nuisance plants including air potato (*Dioscorea bulbifera*) and skunk vine (*Paederia foetida*), two species well associated with forest disruption along the Rainbow River and elsewhere in Florida. Examples of this fragmentation on the subject site can be seen in Photos 11,14,16,17 and 25.

RPA # 2

Hydrilla

Submerged areas dominated by *Hydrilla verticillata* a nuisance aquatic plant. Hydrilla can occupy the entire water column from substrate to water surface where it can “top out” or lay recumbent creating a mat on the top of the water. Because of its rapid growth Hydrilla is a nuisance to navigation and boat traffic, but when kept in check it can provide beneficial fish habitat and oxygenate the water. *Hydrilla* as a monoculture was not observed in the shoreline areas near the subject site. Minor amounts of *hydrilla* were observed in the shoreline areas of the subject site mixed in with other submerged vegetation. It should be noted that the snorkel survey did not extend out into the waterbody past where the dock and a vessel would be moored.



Underwater photo example taken just south of the Rainbow Springs State Park showing short hydrilla dominating with minor amounts of spring tape.

Filamentous Algae

Filamentous algae, principally *Lyngbya* (sometimes classified as a cyanobacteria) is a hair like alga that can form large benthic (bottom) and surface mats. It typically smothers and kills native submersed plants. It is suspected that nutrient enrichment of the waters, specifically nitrate is the principal causative factor in algal dominance. However, it should be noted that phosphorous is considered a limiting nutrient in the growth of algal mats, i.e. small additions of phosphorous can cause rapid growth. The subject site was historically associated with phosphate mining and therefore natural and



Underwater photo of a decaying benthic (bottom) algal mat, principally composed of *Lyngbya* near the shore of the Preserve of Blue Run. Live algae are bright green to dark green.

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waste phosphate products in the soil, and subsequent runoff and soil leaching may contribute to the presence of *Lyngbya* benthic mats near the shoreline of the site.

As indicated in Photo 6 of the attached photo documentation, the detrital algal benthic mats can create a large increase in turbidity with very little disturbance. The suspended material (flocculent) rapidly degrades local water clarity and quality by creating a biological oxygen demand, locally depleting oxygen supplies in the water column, and re suspending fine sediment, plant materials, and algal spores and reintroduces nutrients back into the water column where they are more available for uptake by periphyton and floating algae. This typically leads to an increase in the Chlorophyll A content in the water, one of the nutrient enrichment indicators..

Ultimately, as indicated above as well as in the attached photo-figures, important Resource Protection Areas, Including RPA #1 were documented along the shoreline area of the subject site including in close proximity to constructed docks (also see below). In addition, there were areas of RPA #2, principally areas of grass beds or herbaceous vegetated shoreline that appear to be partially or wholly dominated by filamentous algal beds. Because these areas are within an OFW and Aquatic Preserve, they should be considered in decline, but not devoid of natural resources since there are efforts underway (although perhaps far into the future) to restore these degraded areas.

DOCKS

The six recently constructed (2008) residential docks and a larger (580 sq. feet per plans) dock in East Blue Cove were inspected during this investigation to ensure that they met the permit rules as well as Sovereignty Submerged Lands (SSL), Outstanding Florida Waters (OFW) and Aquatic Preserve criteria of Chapters 40D-4, 18-20, and 18-20 FAC, and Chapters 253 and 403 Florida Statutes (F.S.). The 6 docks are spaced an average of 500 feet apart (range approximately 230-660 ft.). These docks were presumably constructed under the exemption criteria of 40D-4.051(8)(c) principally under 500 sq. feet in total area, on an OFW, but not in an Aquatic Preserve (CH. 18-20.004(2)(a)2 and 3.FAC). It does not appear that an RPA Assessment was conducted by the land owner prior to construction of the docks to insure that the docks were compliant with these rule criteria and to properly site them to have the least impact.

The inspection conducted on September 13, 2003 revealed that the docks appear to violate a number of criteria, including that the majority terminate in or very close to RPA #1 or RPA #2 in violation of Ch 18-20.004(6).F.A.C. In addition, at least one of the docks terminate in a RPA #1 and in water too shallow (less than 3 feet at low water) to meet the criteria for boat dockage without significant harm to the aquatic preserve from prop scarring and prop dredge. These site conditions are documented in attached Photos 7- 24.

Finally, because there is more than one single family dock per parcel (according to permit documents that land is owned by two entities and have not established platted residential lots) and it is located in an aquatic preserve, the owner should have filed for a formal consent authorization from the Trustees of the Internal Improvement Trust Fund (TIITF) aka FDEP or obtained a sovereign submerged land lease (Ch. 18-21.005(c)1 and (b)1), and **the applicant must provide a “conservation easement... over the riparian waterfront of each participating riparian parcel to subordinate or waive any further riparian rights of ingress and egress for additional docks and piers” 18-21.004(6).** Many of these issues are documented in memoranda and letters (see Fowler, O’Quinn, Feeny & Sneed P.A.).

Finally, it is our understanding that the owner and FDEP agreed to a consent order to keep the docks in place and paid a monetary fine and/or provided mitigation.

EAST BLUE COVE

East Blue Cove is located riparian to the Rainbow River Ranch LLC ownership. An approximately 580 sq ft dock was constructed on the site on or about 2008. There are partially exposed and submerged pilings in the cove and the water is deeper than the surrounding waters. Documents indicate that the subject site is not in the Aquatic Preserve and according to an evaluation by FDEP Bureau of Survey and Mapping (Terry Wilkinson *ibid*) the cove was excavated during the phosphate era and is not considered Sovereign. However, based upon the adjacent wetland characteristics it appears that the area was excavated from wetland cypress swamp and not uplands and therefore could possibly have been submerged sovereign lands prior to the phosphate mining activities. Irrespective of the sovereignty issue, it is our professional opinion that the dock should have been required to meet the OFW and Aquatic Preserve criteria identified above due to its presence on the connected waters of the Rainbow River, including establishing a riparian conservation easement protecting the shoreline from any further riparian rights of ingress and egress for additional docks and piers.

In addition to the dock construction, apparently unauthorized tree clearing was documented in the area of the East Cove Dock, the ramifications of which are still exhibited in recent photo documentation. The tree clearing appeared to impact the riverine swamp forest, transitional forest and upland forest. Photo documentation of the clearing reviewed by this investigator revealed evidence of clear cutting cypress trees and red maples (both obligate (NWI) wetland trees), as well as stump grinding of cypress. These activities were initially conducted without the use of silt screen barriers, or other turbidity or erosion controls, in direct violation of the OFW, Aquatic Preserve and NPDES (National Pollutant Discharge Elimination System) rules (see Photo 30 attached). The clear cutting which was described by the owner as a silvicultural (forestry related) activity, was reviewed by Jeff Vowell with the Division of Forestry and determined not to be silvicultural in nature. In fact, Silvicultural Best Management Practices (BMP's) for the State of Florida indicate that the Rainbow River would be considered a Special Management Zone (SMZ) as defined below:

“The Special Management Zone (SMZ) is a BMP which consists of a specific area associated with a stream, lake, or other waterbody that is designated and maintained during silviculture operations. The purpose of the SMZ is to protect water quality by reducing or eliminating forestry related inputs of sediment, nutrients, logging debris, chemicals and water temperature fluctuations that can adversely affect aquatic communities. SMZs provide shade, streambank stability and erosion control, as well as detritus and woody debris which benefits the aquatic ecosystem in general. In addition, the SMZ is designed to maintain certain forest attributes that will provide specific wildlife habitat values. Snags, den and cavity trees as well as mast producing trees, left in the SMZ, are necessary to meet habitat requirements for certain types of wildlife.” (FDACS 2008)

The SMZ has a PRIMARY Zone (35-200 feet) where some forestry activities are allowed, with significant restrictions. Clear cutting is prohibited within 50 feet of an OFW.

Ultimately, the unauthorized tree clearing also resulted in a FDEP consent order with the owner and mitigation which included the planting of approximately 100 trees. It should also be noted that the City of Dunnellon future land use map shows the riverine swamp and associated wetland areas on the Rainbow River Ranch property, west of the old railroad as Conservation Designation.

BUFFERS

Riparian Buffers are vegetated zones adjacent to streams, creeks and rivers. According to USEPA and FDACS, riparian buffers represent a best management practice (BMP) for controlling nutrients, and are effective at reducing nitrogen in groundwater and rivers (USEPA 2006). Riparian buffers are identified in at least 14 parts of the US Code, and 47 parts of the Code of Federal Regulations (CFR).

Nitrogen is effectively removed or converted by vegetative buffers and their soils (denitrification). The studies USEPA evaluated indicated that while some narrow buffers (1-15 m) removed portions of nitrogen, narrow buffers (<10 m) actually contributed to nitrogen load in some cases. Furthermore, wider buffers (> 50 m) more consistently removed up to 90-99% of nitrogen entering a riparian zone. This was most effective where soils are saturated and not where hydraulic conductivity was high. It was noted that there needs to be effective protection against soil compaction, which can significantly reduce denitrification and loss of vegetation, which leads to erosion and stream incision.

Jones Edmunds and the Center for Wetlands (2000) in their assessment of St. Johns County Florida water resources determined that a buffer of 300 feet from a wetland was a necessary distance to protect a viably functioning wetland ecosystem. Their study indicated that anything less than 300 feet would severely impact the water quality and wetland resources including wetland dependant wildlife and T & E Species. The Silvicultural BMPs for the State of Florida prohibit clear cutting within 50 feet of an OFW (which is measured from the wetland line) and restrict other forestry operations up to 200 feet from the wetland line.

RECOMMENDATIONS

The Rainbow River is Florida's 1st largest spring (Dr. Robert Knight, pers com 12/14/2013), is designated as an Outstanding Florida Water (OFW), Florida Aquatic Preserve, Surface Water Improvement and Management Act (SWIM) water body and Rainbow Springs State Park is designated as a National Natural Landmark. The river is of exceptional quality and clarity (Anastasiou 2006) which makes it one of the unique recreational destinations in Florida.

However, the Rainbow River is also a designated impaired water body (for nutrients and algal mats). Under the 1972 Federal Water Pollution Control Act or Clean Water Act (33 USC 1251 as amended) BMPs must be implemented to remain compliant with the CWA to reduce nitrogen in these water bodies. Any future construction or land disturbance activities on the property would require compliance with the pertinent NPDES portion of the Clean Water Act. This provides a federal nexus for complying with the above referenced BMPs including the use of erosion and water control measures and the use of buffers to ensure that water quality is not adversely or further impacted.

Since these docks were initially constructed without proper authorizations, a (linear) conservation easement should be recorded over the entire shoreline, consistent with 18-21.004(6), to prohibit future docking. Such an easement will help protect the existing resources, including the RPA's

identified in this report. Furthermore, in order to meet the public interest criteria for activities on an OFW, a conservation easement buffer should be established at a set distance from the OHWL and wetland jurisdiction line (enough to cover the riverine swamp and adjacent upland forest) in exchange for any contemplated development agreements which would increase the density or intensity of land use on site. This conservation easement buffer shall prohibit land clearing, underbrushing, foot traffic, soil disturbance or compaction and all other development activities. Studies referenced in this report indicate that the Conservation Easement Buffer (CE) should be a minimum of 150' to 300' in width to protect water quality and shoreline (riparian) functions and their associated wetland dependant wildlife including endangered and threatened species. It is recommended that the CE should be clearly posted / marked with signage along the landward and waterward edges of the buffer (recommended posting every 200-500 feet). The conservation easement should be regularly inspected by an outside, independent agency (not the homeowners association) for compliance monitoring including photo documentation and reports. Violations should be established and enforceable with fines.

In order to protect against impact from constant foot traffic and associated soil compaction, (which studies indicate reduces the capacity of the soils to uptake nutrients) construction of wooden walkways from each of the existing docks through the buffer should be allowable and are strongly recommended. The conservation easement should restrict foot traffic to incidental use and only to maintain the habitat from nuisance and invasive species. The walkways should be constructed without the use of heavy equipment and with minimal tree disturbance.

Finally, an evaluation should be performed to determine if removing the 4 culverts under the old railroad bed would provide a water quality improvement. If so, the culverts should be removed to prohibit stormwater runoff from the site from directly entering the Rainbow River and to provide a Net Environmental Benefit for the subject site.

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