Survey of Rodman Reservoir and middle-Ocklawaha River springs during spring 2008 draw-down conditions: FWC and FWS

Date of Survey: February 26, 2008

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Purpose: To evaluate known second and third magnitude springs, connected to the Ocklawaha River in areas exposed due to a draw-down, but generally submerged under dammed waters of the Rodman Reservoir, as possible thermal refuges for manatees in the event of the restoration of the Ocklawaha River to its natural banks.

Figure 1: Ocklawaha River channel and Cross Florida Barge Canal channel at draw-down.

Staff from the FWC and FWS coordinated a manatee habitat-based survey of known springs of the middle to lower Ocklawaha during the winter 2008 draw down. Rodman Reservoir was drawn down to the lowest possible point, with some standing water in pools to the sides of the Ocklawaha River channel, but the only flowing water was that running through the river channel itself. Survey conditions were assumed to be standard river flow conditions in the absence of dammed conditions; however, river flow data was not assessed relative to historic flow conditions.

Surveyed springs included: Blue Spring (Marion Co.), Alcorn Spring, Canon Springs complex (Cannon and Strange Springs), Big Rack Road Spring, and Hasty Greene (Garfish) Springs complex. Electronic photographs of each spring were taken where access to the spring by boat was possible, and spring runs were photographed where direct access to the spring was limited. In one instance (Alcorn Spring), staff accessed the spring system on a DEP-Office of Greenways and Trails airboat with the assistance of David Bowman, who is the regional expert on the springs of this system with over 40 years of experience in working on issues associated with the Ocklawaha River. Discussions of staff findings and possible manatee thermal refuge characteristics are provided for each spring system below: (Note: All Lat/Long values were taken with the NAD 83 datum as reference.)

Note: Second magnitude spring (10-100 cfs flow rate)
Third magnitude spring (<10 cfs flow rate)

Blue Spring (Marion Co.): Flow status: approx. 10 cfs (Second magnitude)

(Spring boil) Lat: 29 30.869
Long: 81 49.1142

Entrance to spring run off the Ocklawaha River channel
Lat: 29 34.5966
Long: 81 51.3342

Figure 2: Blue Spring (Marion) run approaching the main boil.

The Blue Spring pool is accessed from the north through an approximately 200 foot channel that averages 4 feet in depth, and which is about 10-15 feet in width. The channel winds its way from the historic Ocklawaha River channel to an open spring pool that is 30 feet from the shore, and which is surrounded by hardwood stumps (mostly cypress and sweet gum) cut about 4-5 feet above the sediment surface and left in place when the reservoir was filled. Another shallower channel, which flowed over a sediment sill, was observed to the west, but we could not access the spring from this channel do to the shallow nature of the water in the system (about 6 inches in depth). The spring pool is estimated to be 100 feet in diameter and ranges from 4 feet along the sides to 19 feet in maximum depth where the spring vent is located. Surface water temperatures in the pool were 71^{o} F, whereas ambient water temperatures were 67^{o} F. Aquatic vegetation observed throughout the run and spring pool included hydrilla (*Hydrilla verticillata*), coontail (*Ceratophylum demersum*), southern naiad (*Najas guadalupensis*), duckweed (*Lemna spp.)* and water lettuce (*Pistia straitoides*).

Figure 3: Blue Spring (Marion) spring pool.

Manatee thermal refuge assessment: Manatees could access this spring pool through the northern run channel without the need for any modifications of the existing channel. It is likely that flows from the spring will remove accumulated organic sediments from the channel and spring pool bottom, as flow from the spring will contribute to currents down the run to the river. The pool provides a large volume of warm water that could hold an estimated 100 to 150 manatees comfortably during winter cold periods. Access to forage would be to areas of aquatic

vegetation along the river littoral zones if the system was restored. With full access provided, this system could be a primary warm water refuge, as previously defined by the Manatee Warm Water Task Force and Habitat Working Group.

Alcorn Spring: Flow Status (Third magnitude spring)

(Spring boil) Lat: 29 30.494
Long: 81 53.523

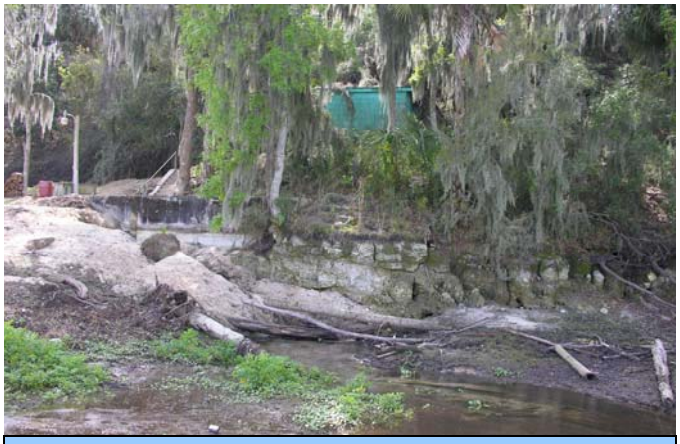

Figure 4: Alcorn Spring. Note pump house on hill, and well basin center left in the photo.

Alcorn Spring lies at the base of an old river bank bluff, where artesian spring water flows directly out of the base of the bluff and into a diffuse muddy flood plain. The spring was originally called Sim's Spring, but was developed by George Alcorn well before the 1970s (Abbott, 1971). Flow is limited, but artesian water is clear and warm (no temperatures were taken, but the water was determined to be similar in temperature to most artesian spring water, so estimated to be between 70-72^{o}F). With the Rodman Reservoir at the low level we observed, the spring run is only a few feet long and extremely shallow (less than 6 inches). Spring waters flow out into organic sediments deposited during the period of submergence by lake waters. The spring is over an estimated 300 meters from the river bed through remnant river flood plain forest stumps. This spring system also has a vent exit into an open well casing with a visible pipe and pump system. When Rodman Reservoir water head pressure exceeds the force of flow from the spring water, this spring flows out of the open karst feature, and into the open casement.

Figure 5: Alcorn Spring boil.

Manatee thermal refuge assessment: For all purposes, this spring is inaccessible to manatees. An extensively modified channel system would have to be dredged and maintained to allow manatees to move from the river within its banks to the spring, and spring waters would need to be encased to provide adequate thermal refuge for a very limited volume of warm water. Survey staff estimated that this spring could not support more than 10 manatees if

properly maintained, and it is therefore considered inconsequential as a potential warm water refuge.

Hasty Greene (Garfish) Springs: Flow Status (Third magnitude spring complex)

(Spring boil) Lat: 29 27.167
Long: 81 55.286

Hasty Greene spring lies on the south shoreline of the Ocklawaha River bank on the south side of a rise in the bank forming a peninsula between the spring run and the river. The run is wide, averages 4-6 feet deep, and is an estimated 60-70 feet long. The spring is recognized by clearer spring waters populated with large numbers of fish reaching a maximum depth of about 12 feet at what was presumed to be the spring boil. The spring boil basin is approximately 40 feet in diameter, and water temperature at the surface was recorded at 72^{o}F. The basin is enclosed on all sides by a relatively high embankment that is not easily accessible from land. There is a clear spring run that veers to the south at the western extent of the spring boil basin, which may have multiple small springs contributing to the slow flow moving toward the spring boil.

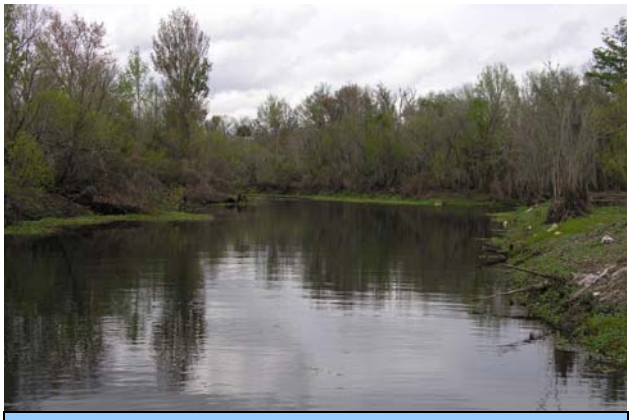

Figure 6: Hasty Greene Spring viewed from west to east across the spring boil basin.

Manatee thermal refuge assessment: The somewhat isolated nature of this spring system, along with its deep spring run, and spring boil basin, make this a likely candidate spring system for use by manatees as a warm water refuge. Manatees could easily access the system from the main stem of the Ocklawaha River, and there is abundant submerged aquatic vegetation in the system. Although the flow is not as great as that found at Blue Spring (Marion County), the system could easily maintain 100 or more manatees during cold weather. With full access to the river afforded manatees, this spring system could also be a primary warm water refuge for manatees.

Big Rack Road Springs: Flow Status (Third magnitude spring complex)

(Central Spring Boil) Lat: 29 26.360
Long: 81 55.457

At least 1, but perhaps 3 small springs flow to a confluence approximately 100 feet west of the Big Rack Road boat ramp. With the river levels well within the banks during our survey, these springs were stranded on the bank network, with only small slowly flowing runs passing through organic rich hydrosoils. Pennywort (*Hydrocole sp*.) was observed growing over most of the exposed hydrosoils, with dense spatterdock (*Nuphar polysepala*) rhizomes partially buried in the muddy sediments. The springs were identified from a distance of about 40-60 feet, as they were inaccessible by foot across

the hydrosoils. A narrow channel run from the river to the boat ramp exists, but is neither navigable by boat nor accessible to manatees.

Manatee thermal refuge assessment: This system of springs is close to the river, but has a number of drawbacks relative to the potential provision of warm water for manatees. First, if water levels were elevated, the access channel from the river is narrow, and would be used by vessels launching at the Big Rack Road ramp. Access to the collective spring water would be directly by the area where vessels are launched, so disturbance could be problem for warm water-seeking manatees. Second, the combined flow of these springs appears to be but a trickle, and does not form a convergent area of warm water large enough to support appreciable numbers of manatees during cold weather. Extensive dredging would be required to provide channel access, and perhaps a pool of warm water sufficient to provide necessary refuge habitat for manatees. These characteristics dictate that this spring system would not provide sufficient warm water habitat for numbers of manatees without substantial and costly modifications.

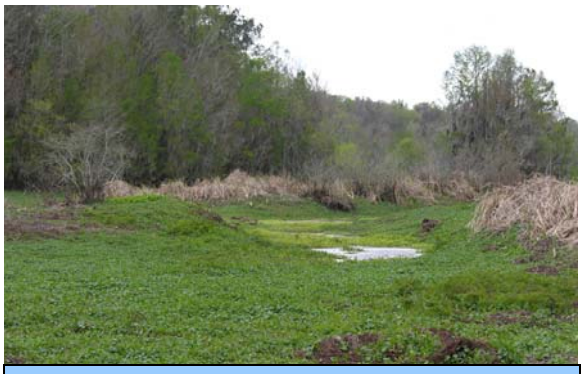

Figure 7: One of the Big Rack Road Springs.

Cannon/Strange Spring Complex: Flow Status (Third magnitude spring complex)

(Spring boils) Cannon Lat: 29 25.284
Long: 81 55.210

Strange Lat: 29 25.724
Long: 81 55.430

These are relatively large spring systems in a network along a spring run that was estimated to be 700 feet long that intersected directly with the main stem of the Ocklawaha River. The spring run was relatively shallow, about 20 feet wide, and blocked for boating access by numbers of logs, and floating vegetation. Water flow from the combined springs was observed down the run. Surface water temperature at the confluence of the run with the river was 74^{o}F. Although the survey team could not access the main spring boil basins, at least one of the basins is 20 feet deep and 30 or more feet in diameter (Mickey Thomason and Dave Bowman, FDEP, pers. com.).

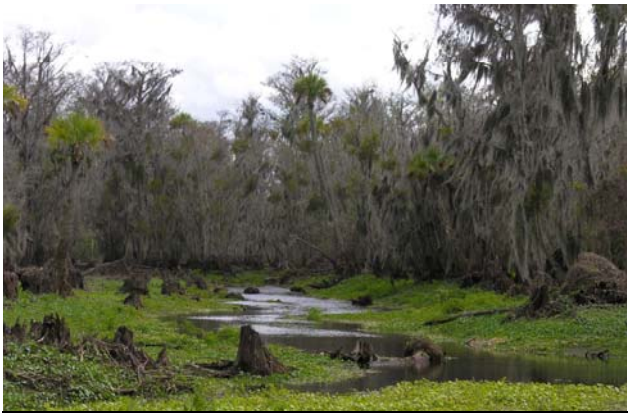

Figure 8: Run leading up to Cannon/Strange Springs boil basins.

Manatee thermal refuge assessment: The characteristics of this spring complex indicate that it could be a significant (possibly primary) warm water refuge for manatees if appropriate access was provided. This would require clearing of dead wood from the run, and possible minor sediment dredging to improve access directly from the river channel. The survey team did not see the main spring boil basin(s), but based on the input from other recent surveyors, the spring system could be comparable to Haste Green Springs (mentioned above), capable of sustaining 100 or more manatees during cold weather.

Vause Spring and Cracker Springs:

(Spring boils)	Vause	Lat:	29 29.516
		Long:	81 55.098
	Cracker	Lat:	29 27.872
		Long:	81 55.020

Two other spring systems were identified in communications with FDEP staff: Vause Spring/Well and Cracker Springs, but neither were investigated due to inaccessibility by the survey boat being used or due to the need to leave the area to avoid deteriorating weather conditions. Vause spring is not likely to provide much warm water habitat for manatees, as it is an old flowing well adjacent to an old submerged dock. Cracker springs are two spring boils along the side of the river channel about 25' apart, and the spring water mixes directly with the river water at these sites. Both systems are reported to be third magnitude springs.

There are numerous other springs, which are likely minimal third magnitude springs, along the shores an up small creek tributaries associated with the middle Ocklawaha River down stream from the Eureka Dam (Abbott, 1971). These contribute to the flow of the river, but all pale in comparison to the combined flow of the first magnitude Silver Springs complex up river from the Eureka Dam. If the Ocklawaha River was restored allowing uninterrupted access to this system by manatees, Silver Springs and the Silver River could provide warm water habitat for many hundreds of manatees.

Reference:

Abbott, E. F. 1971. Twenty Springs of the Ocklawaha. Florida Defenders of the Environment. pp.13