Recommendations on Water Flows and Habitat in the Area of Water Conservation Area – 3A and Everglades National Park (fatal flaw draft of 11-17-20)

1. Background

   A. In the interest of improving water and habitat conditions in Water Conservation Area 3A (WCA-3A) and Everglades National Park (ENP), a group of agency leaders provided this assignment to their staffs:

   Recommend a course of action that will allow the S-12A and S-12B, S-343A and S-343B, and S-344 structures to remain open year-round. If year-round opening is not possible, the period and frequency of the closures must be minimized to lessen flooding impacts to the central Everglades. The course of action will include two parts. The first part will be water management actions that direct water away from the S-12A and S-12B and/or encourage sheet flow across the Everglades landscape. The second part will be land management actions and ecological treatments that promote high quality habitat for Cape Sable seaside sparrows in the area of subpopulation A.

   (The assignment was modified to add consideration of options that protect and restore tree islands and other degraded habitats in Water Conservation Area 3A in addition to sparrow habitat)

   A diverse team worked on this assignment. The team included representatives from the following organizations: Florida Fish and Wildlife Conservation Commission, Miccosukee Tribe of Indians, National Park Service, South Florida Water Management District, U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service. This document is that team's report and recommendations.

2. Water Flows

   A. Recommendations to Revise the Combined Operating Plan (COP) – The overall strategy is to implement stage based operations during current closure periods, to provide high water relief for fish, wildlife and flora in WCA-3A.

      i. When WCA-3A stage is above the regulation schedule, use stage-based criteria to remove restrictions to opening western WCA-3A structures that would normally be closed during the current closure windows. All flow increases should be prioritized east to west (from S-333/S-333N to S-12D).

         1) Remove opening restrictions of S-343A, S-343B, S-12A and S-12B when the following occurs:
            a) WCA-3A stage is above schedule

b) WCA-3A stage is projected* to be above schedule

*Projections will be made within the next 30 days and will consider C&SF system status and future climate forecasts. Changes to the water management operational criteria of the approved COP WCP can be made through the following mechanisms and outlined in the Chapter 7 pages 7-59 – 7-60 of the COP

B. Other Recommendations – The following were identified as potential ways to prevent and alleviate high water conditions in the central Everglades by improving system wide hydrologic connectivity and sheet flow to Northeast Shark River Slough. Projects and concepts outlined should be considered for implementation at the soonest practical timeframe while acknowledging some may be categorized as longer-term solutions. These projects and concepts may be considered for expediting, review, or careful tracking to share the information gained in a timely manner.

i. Expedite projects that identify new ways, or modify existing features, to improve or mitigate for seepage management and flood control along the eastern boundary of the Everglades National Park, with an initial focus that includes the 8.5 Square Mile Area. These efforts should also consider nonstructural approaches, such as acquisition of lands or conservation easements for areas that experience repetitive flooding damage. (Note: The Tribe does not support land acquisition but could support easements.)

1) During the 2020 high water event, and previous high water events, stage constraints in the L-29 canal constrained flows to Northeast Shark River Sough. Modeling data and empirical data show that this is the most effective pathway to move water out of the central Everglades and support a healthy salinity balance in Florida Bay. Maintaining flows consistent with the Tamiami Trail Flow Formula creates the greatest opportunity for COP to achieve the stated ecological benefits. Further, maximizing the duration of time where the L-29 stages may be maintained at 8.5 NGVD, when the COP regulation schedule calls for maximum releases, provides the greatest ecological benefit to Northeast Shark River Slough and Florida Bay while minimizing the duration of high water events in WCA-3A.

ii. Consider options to increase flow between (WCA-3A and Big Cypress National Preserve, as presented at the South Florida Ecosystem Restoration Task Force meeting, October 22, 2020. This could have benefits to wading bird breeding colonies along the coast and west of Shark River Slough with increased forage availability and benefits for apple snails and snail kites.

1) Currently flow from WCA-3A to Big Cypress National Preserve are constrained by the L-28 South Levee. Water control structures S-344, S-343A and S-343B move water from the WCA-3A to Big Cypress and are constrained at times by the current water control plan. Consider the addition of water control structures or gated culverts as medium to long- term solution. During previous high water

events temporary pumps have been utilized in this vicinity, to move water across the L-28 South Levee and out of WCA-3A, to alleviate more immediate high water issues. Temporary pumps in this location could be considered as an interim or as conditions dictate.

iii. Expedite minor revisions to the Water Conservation Area 2A (WCA-2A) regulation schedule with consideration to the ecological needs of the greater Everglades and improved hydrologic connectivity with WCA-3A.

1) The current WCA-2A regulation schedule ascends to the wet season peak of 13.00 NGVD on October 01 and immediately starts receding. As a point of comparison, the COP WCA-3A schedule ascends to the wet season peak of 10.50 NGVD on October 31 and remains at 10.50 through December 31 (62 days). Extending the duration of wet season peak stages in area 2A may better represent natural wet season conditions and increase system-wide dynamic storage. Providing additional water in area 2A that is compatible with the area ecology may also support improved wading bird forage and serve an ecological role in WCA-3A north by mitigating for unnatural dry downs and increased dryness observed in WCA-3A north during COP modeling and operations.

iv. Consider design features or temporary pump installations at S-355A and S-355B to create flow through operations in WCA-3B an increase hydraulic connectivity with WCA-3A by mitigating for known constraints in the water control plan.

1) High water in WCA-3B is a reoccurring challenge and improving the flow through capabilities of WCA-3B can help prevent prolonged and ecologically damaging high water events. Flow through operations can also increase the hydrologic connectivity with WCA-3A and may assist in alleviating high water events in WCA-3A. COP uses a controlling stage of 8.5 NGVD at Site-71 as a constraint for hydrologic inputs to WCA-3B and the stage criterion is set based on the ecological, biological, physical parameters (levee seepage) for area. This constraint further limits the hydraulic connectivity with WCA-3A and removing it is not ecologically advisable because damaging high water events could develop. However, improving flow through operations in area 3B, by offsetting the inflow volumes with equal outflow volumes, could help mitigate the biologically based constraint and make the existing Decomp Physical Model (S-152) operations of up to 400 cfs less frequently constrained by stage criteria. These operations may help alleviate high water conditions while simultaneously increasing flows to Northeast Shark River Slough. Additionally, in the near future, new CEPP structures (S-631, S-632, S-633) will further increase hydrologic connectivity between WCAs 3A and 3B. Improving the functionality of S-355A and S-355B may facilitate the use of these structures as additional CEPP features are constructed and made operational.

v. Consider establishing velocity targets for flows in the Everglades wetlands and stage and ascension/recession targets.

1) It is well known that establishment and maintenance of tree islands and ridge/slough habitats requires certain water velocities; however, the current management and restoration targets do not consider velocity. Establishing velocity targets could aid both current management and long-term restoration.
2) Ascension and recession rates controlled for key wildlife species (wading birds, apple snails and snail kites) should be considered.
3) Prevent higher elevation tree islands from being inundated for long periods (the time that allows persistence of upland hammock vegetation) and not during sensitive periods such as when herps are laying eggs.

vi. Alleviate 8.5 Square Mile Area (8.5 SMA) constraint that limits S-333 operations.

vii. The 8.5 SMA constraint prevents fulfillment of the benefits expected from COP.

1) Efforts should focus on alleviating or reducing this constraint.
2) These efforts should consider both structural and nonstructural approaches, such as conservation easements or similar measures that allow flooding on areas that experience repetitive flooding.

C. Consider flowing water into northern WCA-3A during dry periods to prevent soil oxidation and reducing peat fire risk and support wading bird colonies and wading bird forage.
   i. Options could include additional flows through the STAs when practicable and when water is available.
   ii. Redistribute water from WCA-2A into northern WCA-3A when possible and when conditions in WCA-3A could allow long-term damage.

3. Habitat

A. Recommendations to Improve Habitats
   i. Continue invasive plant maintenance control on tree islands in area WCA-3A.
   ii. Continue early detection and rapid response (EDRR) for invasive plants and new threats.
   iii. Consider replanting on tree islands with significant anthropogenic disturbance with selected species that are likely to survive near-term hydrologic management (some continued flooding).
   iv. Consider carefully selected herbicide treatments to help re-establish ecological functions.
   v. Consider flowing water into northern WCA-3A during dry periods to support wading bird colonies and wading bird forage, while preventing soil oxidation and reducing peat fire risk
   vi. Alleviate water on tree islands with higher elevations to allow for successful breeding of herps. Develop parameters for this.

B. Current Condition of Habitats

i. WCA-3A habitats have been declining for a long period, primarily as a result of the unnatural hydrologic regimes that have occurred regularly in recent decades. This includes prolonged periods of high water in southern WCA-3A, but also loss of organic soils in northern WCA-3A that resulted from fires and periodic over-drying. The habitats and conditions that need to be improved are:
   1) Tree islands: Restore tree island and species diversity/composition that have been damaged by prolonged flooding.
   2) Ridge and Slough: Restore ridge and slough that has been degraded in many parts of WCA-3A, though some areas still represent high quality ridge and slough habitat.
   3) Wet prairies: Restore amount and extent of wet prairies (snail kite/apple snail important habitat) that have converted to sawgrass.

   The hydrologic conditions on tree islands are still generally too wet to support substantial improvement, and areas of northern WCA-3A are still periodically too dry such that they are susceptible to damaging fires. Certain habitat management actions that rely on improved hydrology, such as re-planting damaged tree islands, may not provide sustainable restoration until the hydrologic conditions are substantially improved. Hydrologic management actions (described above) could help improve habitats impacted by high water in WCA-3A.

   Habitat management is conducted by FWC, the Miccosukee Tribe, and SFWMD, and includes invasive plant control on tree islands, prescribed fire in sawgrass-dominated areas, and plantings on tree islands that have been damaged/degraded.

ii. Marl prairie habitats (also described as wet prairie vegetation types by Jay Sah) in the area of Cape Sable seaside sparrow (CSSS) subpopulation A have been continuing to shift regionally in relation to hydrology (primarily). Areas of western and southern CSSS Subpopulation A currently are predominantly marsh habitats dominated by sawgrass and C3 grasses which generally do not support sparrows. Northeastern subpopulation A currently supports wet prairie vegetation dominated by C4 grasses that are suitable for sparrows (see Jay Sah presentation). Vegetation change from 2005 to present indicate movement toward wetter conditions (less suitable for sparrows) in western and southern subpopulation A, and marginal shifts toward drier vegetation types (more suitable for sparrows) in northeastern subpopulation A. There is currently habitat that appears suitable for sparrows in northeastern subpopulation A, in the vicinity of where sparrows have been found most recently.

   The hydrologic conditions in northern subpopulation A have been improving for sparrows in areas that are predicted to be most suitable after Everglades restoration; including areas that have been drying over the last 15 years. Vegetation in these areas is responding to hydrology, with habitat conditions more favorable for sparrows becoming established in areas where hydrology has been consistently maintained in the ranges that support sparrows and their habitat. Though some habitat improvements have been made over the last 15 years, the sparrow has continued to

decline. Habitat management within CSSS Subpopulation A is conducted by NPS and consists of limited prescribed fire, wildfire management, and limited invasive plant management.

CSSS-Ax is an expansion area on the eastern boundary of Subpopulation A (see blue polygons in figures 1 and 2). During the development of the Everglades Restoration Transition Plan (ERTP) CSSS- Ax was delineated to include areas which were expected to become more suitable to CSSS according to model output as additional CERP components are constructed. Based on current and projected conditions it may be appropriate to redraw the boundaries of Subpopulation A to include Ax and exclude areas where the conditions are too wet to restore habitats suitable for CSSS on the western and southern portions of Subpopulation A.

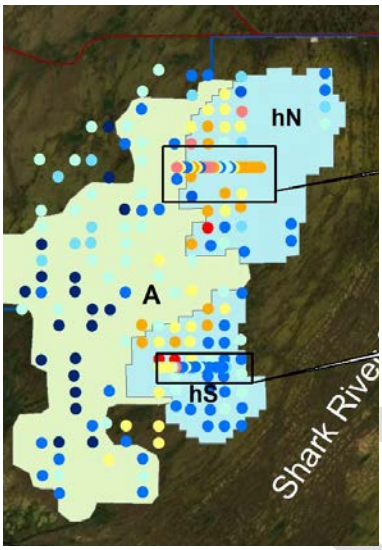
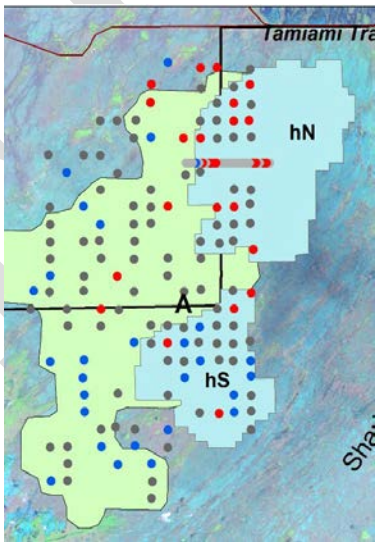


Figure 1 (left). 2018 vegetation dominance in subpopulation A. Blue dots indicate marsh vegetation types and yellow, orange, and red dots indicate wet prairie vegetation types.
Figure 2 (right). Change in vegetation types between 2005 and 2018. Blue dots change toward wetter vegetation types, red dots changed toward drier vegetation types, and gray dots did not change significantly.



C. Interaction Between Habitat and Hydrologic Conditions

In both WCA-3A and in CSSS subpopulation A, habitat conditions are strongly influenced by hydrologic conditions. As noted above, without substantially reducing the probability of prolonged high water in southern WCA-3A and reducing the occurrence of very dry conditions in northern WCA-3A, management actions such as replanting may not be self-sustaining because the restoration may be compromised by persistent hydrologic stress that contributed to the degraded conditions.

In CSSS subpopulation A, vegetation can rapidly convert from drier types that sparrows prefer to wetter types with changes in hydroperiod, but changes from vegetation associated with wet conditions to drier types are prolonged, though fire can accelerate the changes. Regardless, the drier prairie vegetation types that sparrows prefer (following descriptions presented by Jay Sah) require appropriate hydrologic conditions to persist.

In WCA-3A, periods of prolonged inundation of tree islands are expected to limit the potential for restoration in the near future and hydrologic improvements such as those

discussed above should be a focus. Until hydrology is substantially improved in the area, habitat management in WCA-3A should be limited to actions that provide benefit even under high water conditions, such as invasive plant management. We should continue ongoing efforts that have been successful and look for opportunities to improve management.

Dry conditions in WCA-3A that allow for soil oxidation and fires that can damage tree islands and marshes have much more severe and long-lasting impacts than flooding. Variable hydrologic regimes benefit tree island health because there is a lot of variability in tree island elevation and vegetation composition, and there is not one hydrologic regime that is best for all tree islands.

D. Habitat Management and Associated Recommendations

Cape Sable seaside sparrow subpopulation A (see areas referenced in Figure 3 below)

i. Short-term actions:

1) Re-define the boundaries of CSSS subpopulation A to better align with expectations for suitable CSSS habitat in the future. Some areas within the currently mapped boundaries of subpopulation A (and possibly other subpopulations) appear unlikely to sustain CSSS in the future, and the distribution of sparrows has changed. Defining boundaries that align with best expectations of where habitat is expected to be sustainable over time and reflect reasonable expectations of the amount of potentially suitable habitat will help focus managers on the most meaningful management actions.

2) Areas in Big Cypress National Preserve (BICY) that recently supported CSSS and burned in the Moonfish fire should be monitored to determine if management of the S-12 and S-343 structure flows in conjunction with recovery from fire can improve outcomes for sparrows.

a) Determine if trajectory of recovery is toward wetter or drier habitats

Consider vegetation management interventions to improve suitability in areas of BICY that appear to be transitioning to sparrow habitat. Management actions discussed included controlling cypress that are becoming established in prairie areas, selective herbicide application to limit recovery of undesirable species, etc. However, some participants did not support these types of intervention and further consideration of options is needed.

b) Areas affected by the Guava Fire should be monitored for vegetation change. In particular, the area known as southern Subpopulation Ax – east of previously occupied sites – may change species composition as a result of the fire. This area had been characterized as wetter marsh communities before the

fire, but the fire could accelerate change toward drier vegetation more suitable for sparrows.

3) Analysis of current LiDAR data (collected by Everglades National Park and U.S. Geological Survey in 2017) should be accomplished to help ascertain where there are suitable habitats for CSSS, and areas that are likely to develop into suitable habitat in the future with appropriate habitat management.

ii. Long-term management actions:

1) Assess areas within near current and future CSSS occurrences to determine if control of woody vegetation could help expand suitable habitat. We do not see a need to manage woody vegetation near sparrows currently.

2) The area of potential habitat downstream of S-12 A and B which has sparse graminoid vegetation should be evaluated to see if germination of desirable grass species can be encouraged, such as through fire and subsequent water management. A prescribed fire should be planned between occupied sparrow habitat and Shark Slough/Shark Valley. This could help shift vegetation but also help to prevent additional wildfires. We should be cautious about burning more area until habitat that has burned recovers to the point where sparrows could use it – 3 years.

E. WCA-3A Habitat Management Recommendations

i. Short-term and ongoing actions:

1) Continue or increase the ongoing EDRR and invasive plant management on tree islands. This effort directly reduces a threat that can cause tree island degradation.

2) Consider limited re-planting on tree islands with significant anthropogenic disturbance/damage, areas where invasive species were removed, etc. Re-plant with species that are appropriate to the site and recommended by biologists for the local conditions and expected hydrologic regime.

3) Continue prescribed burns focused on sawgrass to maintain/improve vegetation heterogeneity, open foraging habitat for wading birds, etc. Prescribed fires may also help to reduce risk of damaging wildfires by reducing fuel accumulation during conditions when ecological damage is unlikely.

4) Re-evaluate hydrologic performance measures if needed for tree islands and other habitats to ensure that Everglades Restoration projects move toward more favorable conditions.

ii. Long-term management options:

1) Research novel tree island management techniques including dispersal of shell material to help precipitate phosphorus.

2) Consider flowing water into northern WCA-3A during dry periods to support wading bird colonies and wading bird forage, while preventing soil oxidation and reducing peat fire risk by:
   a) using the in-place infrastructure to the maximum extent practicable;
   b) examining and proposing relevant operational changes; and
   c) considering engineering solutions that may support the recommendation.

3) Consider options to retain water in northern WCA-3A during dry periods using measures such as temporary plugs to conveyances at I-75, Miami Canal, etc. These options were not supported by all participants and should be carefully considered to ensure that they o support the goals of Everglades restoration and do not take precedence over restoration.

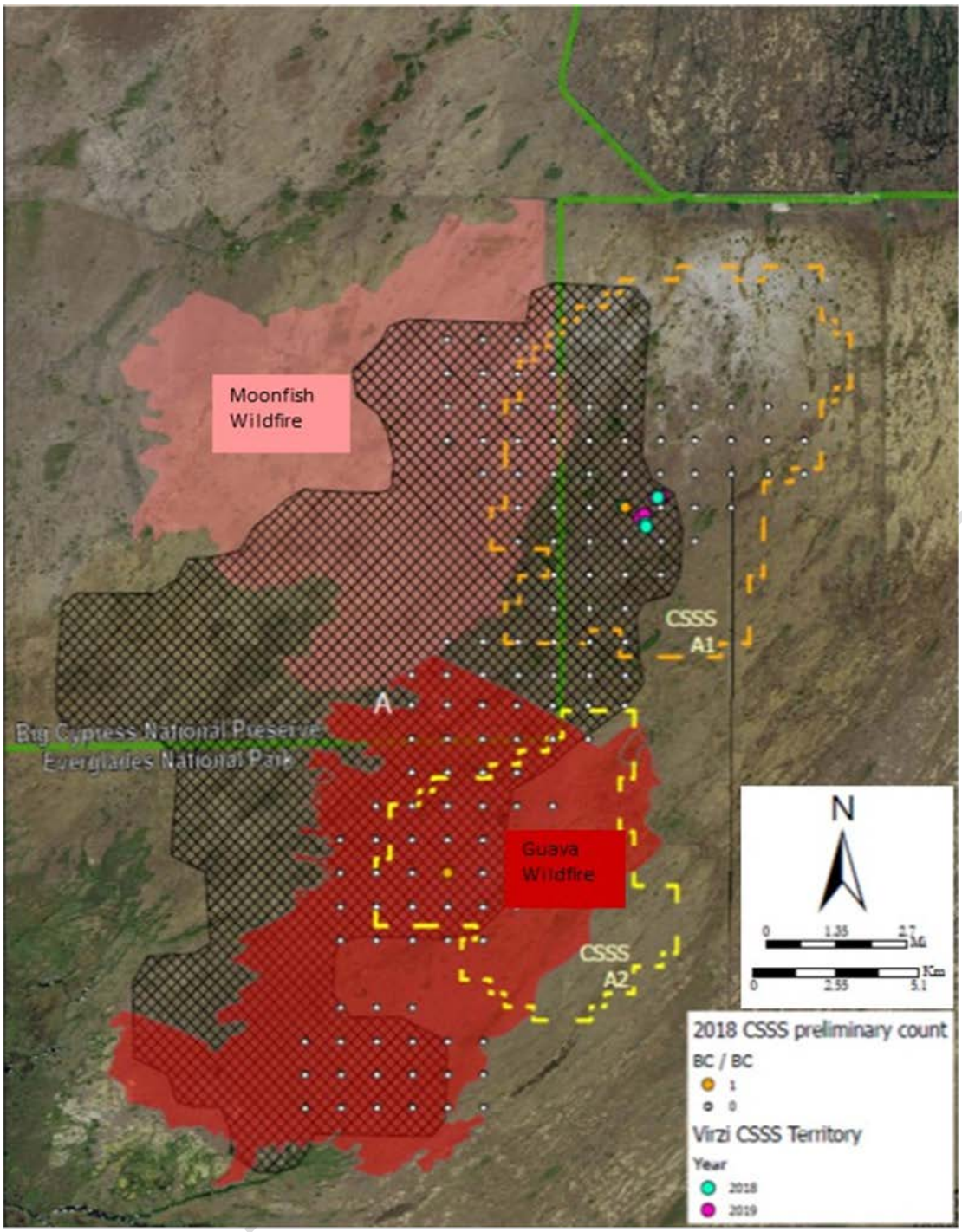


Figure 3. Map of CSSS Subpopulation A habitat delineations, recent observations of CSSS, and the Guava and Moonfish fires. The orange and yellow boundaries are together called Subpopulation Ax and were delineated as the most hydrologically suitable habitat in the future during ERTP modeling.