



February 9, 2001

Mr. Frank Finch
Executive Director
South Florida Water Management District
P.O. Box 24680
West Palm Beach, Florida 33416-4680

Re: Caloosahatchee River Minimum Flows and Level Rule Establishment

Dear Mr. Finch;

This letter is to provide comment on the proposed Caloosahatchee River Minimum Flows and Level Rule. The Charlotte Harbor National Estuary Program management conference has found that the proposed rule is inconsistent with the Charlotte Harbor Final Comprehensive Conservation and Management Plan.

The Charlotte Harbor NEP is a partnership program formed to help determine the actions necessary to protect and preserve the Charlotte Harbor estuary, recognized as an estuary of national significance. The Caloosahatchee River is a key component of the Charlotte Harbor estuary. Since 1996, the Charlotte Harbor NEP has developed and completed a Comprehensive Conservation and Management Plan (CCMP) for the estuary. This plan was developed utilizing four committees of citizens, scientists, resource managers, and policy makers. The South Florida Water Management District was a crucial partner in developing the plan.

This plan has been accepted and signed by the 7 counties, including Lee and Charlotte Counties; 10 cities, including Fort Myers and Cape Coral; and 8 government agencies, including the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, the Florida Department of Environmental Protection, Florida Department of Community Affairs, the Southwest Florida Water Management District and the South Florida Water Management District. Now that these entities have approved this management plan, the plan is being implemented. A part of this implementation is determining the consistency of proposed actions in the Charlotte Harbor watershed with the CCMP.

As required by Florida Statute 373.042, the South Florida Water Management District is currently developing Minimum Flows and Levels for the Caloosahatchee River. This statute states "...the minimum flow for a given watercourse shall be the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area." This effort by the District addresses two Quantifiable Objectives of the CCMP:

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- **HA-2:** Identify, establish, and maintain a more natural seasonal variation (annual hydrograph) in freshwater flows by the year 2010 for...the Caloosahatchee River..."
- **FW-2:** Meet the stated objectives for the target extent, location, and quality of the following habitats in the Charlotte Harbor NEP study area: a) native submerged aquatic vegetation should be maintained and restored at a total extent and quality no less than caused by natural variation..."


The Charlotte Harbor NEP management conference has reviewed the current MFL rule and finds it *inconsistent* with the Charlotte Harbor CCMP. The management conference recommends the following changes to help ensure consistency with the plan:

1. Flows for the months of April, May and June should be addressed;
2. The time frame necessary to attain "significant harm" should be shortened from "3 consecutive years" to "1 year";
3. Research and monitoring should be conducted to assure significant impacts do not occur to important estuarine resources;
4. Research and monitoring should be conducted to predict and document causes of failure to maintain minimum flows and thereby identify necessary actions to correct deficiencies; and
5. A protective maximum flow and water level should be identified to assure significant adverse impacts do not occur to significant estuarine resources for use during operation of the water management system.

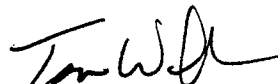
We believe that the inclusion of the recommended changes would allow consistency with the Charlotte Harbor Comprehensive Conservation and Management Plan and would provide significantly increased protection for the resources of this nationally significant estuary. More detail regarding the recommended changes may be found in the attachment.

We appreciate the opportunity to provide comments regarding the consistency of the proposed minimum flow rule with the Charlotte Harbor CCMP. If you have any questions, please contact Mr. Robert Rudolph, Director for the Charlotte Harbor National Estuary Program at (941) 995-1777.

Sincerely,



Richard Cantrell
Co-Chairman, Policy Committee
Charlotte Harbor National Estuary Program



Tom Welborn
Co-Chairman, Policy Committee

cc: South Florida Water Management District Governing Board Members
Mr. Michael Collins, Chairman
Mr. Michael Minton, Vice-Chairman
Mr. Mitchell Berger
Ms. Vera Carter
Mr. Gerardo B. Fernandez
Mr. Patrick J. Gleason
Mr. Nicolas J. Gutierrez
Mr. Harkley R. Thorton
Ms. Trudi K. Williams
Deputy Executive Director, Water Resources Management
Ms. Naomi Smith Duerr
Director, Ft Myers Service Center
Mr. Chip Merriam

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I. Background

A. Charlotte Harbor NEP's CCMP states:

"HA-2: Identify, establish, and maintain a more natural seasonal variation (annual hydrograph) in freshwater flows by the year 2010 for...the Caloosahatchee River..."

"FW-2: Meet the stated objectives for the target extent, location, and quality of the following habitats in the Charlotte Harbor NEP study area:

a) native submerged aquatic vegetation should be maintained and restored at a total extent and quality no less than caused by natural variation..."

B. Florida Statutes 373.042 requires:

"(1) Within each section, or the water management district as a whole, the department or the governing board shall establish the following:

(a) Minimum flow for all surface watercourses in the area. The minimum flow for a given watercourse shall be the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area.

(b) Minimum water level...

...The minimum flow and minimum water level shall be calculated by the department and the governing board using the best information available. When appropriate, minimum flows and levels may be calculated to reflect seasonal variations. The department and governing board shall also consider, and at their discretion may provide for, the protection of nonconsumptive uses in the establishment of minimum flows and levels..."

This language allows each Water Management District to then develop its own definition for "significant harm."

II. SFWMD definitions:

A. **Harm**—Temporary loss of resource functions, as defined for consumptive use permitting, that take 1-2 years of average rainfall conditions to recover—*Phase I and II water restrictions*

Significant harm—temporary loss of water resource functions which result from a change in surface or ground water hydrology that take more than 2 years to recover—*Phase III water restrictions*

Serious harm—Permanent or irreversible damage to the water resource

B. Specifically "Water flows shall not be reduced to less than 300 cfs through the S-79 structure on average over 30 days during the months of November through March, for three consecutive years. An equivalent minimum flow through the S-79 structure is 400 cfs on an average over 30 days during the months of December through March, or 550 cfs on an average over 30 days during the months of December through February, for three consecutive years."

C. Under SFWMD's program, *Phase I and II water shortages* are designed to prevent harm, such as localized but recoverable damage to wetlands or short-term inability to maintain water levels needed for restoration. Actions may

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include reducing water use through conservation techniques and minor use restrictions, such as car washing and lawn watering. *Phase III and IV shortages* require cutbacks that are associated with some level of economic impact to the users, such as agricultural irrigation restriction. (SFWMD, 2000, pgs. 4-6).

III. Description of the Caloosahatchee River Basin

A. In the late 1800's Hamilton Disston excavated a canal to connect Lake Okeechobee to the Caloosahatchee River and Gulf of Mexico to improve transportation and lower the lake for development. In 1918 three major locks were constructed along the canal to improve navigation, and in the 1920's the river channel was enlarged to a 6-foot depth and 90-foot width (SFWMD, 2000).

B. To accommodate navigation, flood control and land reclamation needs, the freshwater portion of the river was reconfigured into a canal, known as C-43, and numerous canals were constructed along the banks in support of agricultural communities located along the river. Three lock-and-dam structures (S-77 at Moore Haven, S-78 or Ortona Locks and S-79 also known as W.P. Franklin Lock and Dam) were added to control flow and stage height (SFWMD, 2000).

C. The final downstream structure (S-79) marks the beginning of the Caloosahatchee Estuary while simultaneously regulating freshwater discharge into the estuary and maintaining specified water levels and acting as an impediment to saltwater intrusion upstream (SFWMD, 2000).

D. The construction of S-79 truncated the estuary by blocking the natural gradient of freshwater/saltwater that historically extended upstream during the dry season. It is currently common to observe waters immediately downstream of S-79 to be nearly one-third the salt content of the Gulf of Mexico while those immediately upstream of the structure are fresh (SFWMD, 2000).

E. These hydrological alterations of the watershed have dramatically changed the natural quantity, quality, timing and distribution of flows to the Caloosahatchee estuary with limited regard to maintaining the biological integrity of the ecosystem (SFWMD, 2000).

F. Irrigation for agriculture is the most important water use the East Basin and is controlled by an extensive network of canals that recharge the water table during the dry season and drain floodwaters during the wet season. Agricultural demands from surface water sources within the basin was estimated to be about 230,000 acre-feet per year (200 MGD) in 1995 and is expected to increase to 320,000 acre-feet (285 MGD) by 2020 (SFWMD, 2000, p.21).

G. The Caloosahatchee River receives water from Lake Okeechobee for flood control and water supply, and regulatory discharges from the lake to lower lake-stage for flood protection is 37% of total surface water discharge from Lake Okeechobee. Water is also released to flush algal blooms and lower chloride levels near the water supply intake

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structures during dry years. (SFWMD, 2000 p. 16) Public water supply needs from surface water sources within the basin was estimated to be about 13,000 acre-feet per year (12 MGD) in 1995 and is expected to increase to 18,000 acre-feet (16 MGD) by 2020. (SFWMD, 2000, p.28)

IV. SFWMD MFL Development Methodology

A. Using **Valued Ecosystem Component Approach (VEC)** developed by U.S. EPA with *Vallisneria americana* (commonly known as tape grass or wild celery) as species of concern to establish a minimum flow regime at S-79 that will protect the system from significant harm.

1) assumes that the environmental conditions suitable for VEC will also be suitable for other desirable species **AND** that enhancement of VEC will lead to enhancement of other species.

2) based on knowledge of *Vallisneria* beds that are located in fresh-brackish water portion of inner estuary; these beds are sensitive to increased salinity values that result from reduced volumes of freshwater during low rainfall periods.

--Using these same methods, *Thalassia* and/or *Halodule* beds could be used to determine maximum flows because these grass beds are impacted by low salinity values due to high freshwater flow. These grass beds are located at seaward/outer end of estuary.

B. **Literature review** was conducted to review existing information on individual species or communities that could be used as indicators or targets, the approaches used by other agencies in MFL establishment and the validity of the VEC approach. An additional review was conducted to identify key species that utilize *Vallisneria* beds, their life histories and tolerances to low salinity levels (SFWMD, 2000).

C. **Why Submerged Aquatic Vegetation?** SAV beds serve a number of ecological functions: habitat; provide a refuge from predation-especially in larval and juvenile stages of many marine and estuarine species; form basis for plant-based and detritus-based food webs; reduction in wave and current energies; and the removal of nutrients and sediment from water column-allowing greater water clarity (SFWMD, 2000).

D. Development of a **Flow/Salinity Model** using measured flow from S-79 and salinity at the Ft Myers Marina (22 km upstream of Shell Point) for the period of January 1992 to November 1999. This model allows an empirical relationship between salinity at a given location in the estuary as a function of flow (SFWMD, 2000).

E. Field and lab **Research** of *Vallisneria americana* relating changes in blade length, blade density and shoot density to salinity at various locations in the estuary.

1) Past literature studies (Day et al. 1989, Twilley and Barko 1990) have indicated *Vallisneria* growth declines steadily with increasing salinity until it ceases about 8-9ppt, but it can tolerate/survive salinity up to 11-13 ppt (Chamberlain and Doering, 1998)

2) Chamberlain and Doering (1998) found that density declines when salinity exceeds 10 ppt.

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3) "Employing the Bierman model, it appears that at least a 300 cfs mean monthly discharge from S-79 is required to maintain *Vallisneria* in the system... Discharges that approach 400-500 cfs will provide salinity conditions of <10 ppt within the portion of the estuary that support most of the total *Vallisneria* coverage. To provide salinity conducive for *Vallisneria* throughout its entire 18 km range will require mean monthly discharges of approximately 800 cfs." (Chamberlain and Doering, 1998)

4) In lab tests, the District has found that during short duration intrusions of high salinity (1-11 days), *Vallisneria* growth was retarded but no significant mortality. A 70-day exposure to 18 ppt caused an 80 percent loss of shoots, but if these shoots were then exposed to favorable salinity (3 ppt) for another month, viable plants still remained. This 70-day intrusion is near the limit of what might be tolerated without a net population reduction in winter. It would take the remaining plants 90 days of growth at good salinity levels to reach pre-intrusion abundance. (SFWMD, 2000)

E. Chamberlain et al (1995) concluded that the **majority of estuarine species** within the upstream estuary **are most productive and dependent** on *Vallisneria* grass beds **during the late dry season** (SFWMD, 2000). Therefore, maintaining *Vallisneria* shoot density during this time is a key issue for protecting this community from significant harm. In addition, manatees have been observed feeding in these grass beds during winter months; it may serve as an important feeding location close to a warm water refuge (FP&L plant). Florida Fish and Wildlife Conservation Commission gives number of manatees using this area as 300-400 animals (Hartman, 2000).

V. Issues of Concern

A. **Period for maintaining low flow criteria**—time period in rule denotes November/December through February/March; the driest months of the year (April, May and June) are not included. The seasonal rains often do not commence until late May or June. With the number of spawning species that rely on the grass beds during this period (see page 57 of SFWMD technical document or table at end of this synopsis), it is important that the grass beds remain healthy during this time.

B. "Three consecutive years"

1) *question of "shared adversity"*—Chapter 40E-21 F.A.C. requires adequate sharing of adversity between water users and the resource. With the MFL rule language, the estuary can undergo water shortages for 2-3 years before the economic concerns upstream are then influenced by water use restrictions. Does this constitute "shared adversity?"

2) *Does the rule offer enough protection for the resource?*—Theoretically low flow criteria can exist that do not meet the 300/400/550 cfs for 2 years then a third year with 300 cfs on a 30-day average could reset the cycle to start again. Is 3 years *in a row* too many? Does this mimic the natural

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hydrological cycle? What about the organisms that depend on the Vallisneria beds? Would this low flow affect them as well?

C. *Florida Fish and Wildlife Conservation Commission* recommends die-backs of Vallisneria beds to last no more than one year and a return frequency no more often than that which would occur under the long-term drought cycle for the region (Hartman, 2000). They also are asking for the District to consider including months of the wet season under the definition of "significant harm" and the 30-day average needs to be revisited. This 30-day average would allow large, damaging pulses of water followed by an equally damaging cessation of flow (Hartman, 2001).

D. *U.S. EPA concerns:*

-No data on long-term vigor of the rhizome under repeated elevated salinities, nor on historical distribution of grass beds or historical stem densities in the Caloosahatchee estuary.

-More research needed to support MFL position that the river needs 3 consecutive years of low flows before jeopardizing the ecological stability of the Vallisneria-based food web in the river

-concern over the large manatee population that uses area in winter; SFWMD model of flow regime predicts that tape grass density would be reduced from over 100 stems/square meter to near 0 stems/square meter in 17 winter-spring dry seasons out of a 31-year scenario. Die-backs of this degree, duration and frequency would critically affect the mortality rate of this manatee population, a federally listed endangered species with a low reproductive potential.

-While some die-backs would occur to natural climatic variation in the Caloosahatchee basin, their degree and duration, and particularly their frequency, are not very likely mimicked satisfactorily by this MFL. The technical documentation therefore inadequately supports the proposed definition...

E. *Fish and Wildlife Service concerns (J.N. "Ding" Darling NWR):*

-Change the language to "water flows shall not be reduced to less than 300 cfs **per day** across the S-79 structure during the months of **April, May and June**, 400 cfs **per day** during the months of **January, February and March**, or 550 cfs **per day** during the months of **November and December**, for *one* year" pending further research that demonstrates otherwise

-the minimum flow should gradually decrease in volume from wet season peak flows greater than 550 cfs starting in November and gradually decrease in volume down to 300 cfs by the end of June; a **daily average** would mimic a more natural water regime

-April, May and June need to be incorporated into rule because several species of organisms in the river would suffer if there were extended periods during these months without flow. "For example, spotted seatrout would utilize Vallisneria during these months as a nursery area, and this is the time for peak recruitment of postlarval pink shrimp." Also adult and juvenile blue carps may suffer from declines in Vallisneria coverage and density during April, May and early June.

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-in no way is FWS validating 300-550 cfs flow; they are at this time, deferring to District scientists to calculate best flow based on historic records and best available science

-maximum flow levels need to be established for the river in either this rule or another rule immediately ensuing

-address threatened and endangered species, such as the West Indian manatee, and critical habitat needs (see Manatee Recovery Plan and South Florida Multi-Species Recovery Plan and FP&L projects)

-inadequate monitoring of Vallisneria shoot density, water quality and other flora and fauna of Caloosahatchee River

-flora needs with regards to flows and salinity regimes needs to be included in technical documentation

-other indicator species should be included as VECs

-implementation of rule is not addressed sufficiently

-water quality issues are not addressed by document

-need to address steps to take to prevent *Serious Harm*

F. City of Sanibel's concerns:

-shared adversity question

-3 consecutive years

G. Peer Review Panel:

--"failure to include any consideration of **possible impacts on the lower estuary** (e.g. San Carlos Bay, Pine Island Sound, Matlacha Pass, **and the lower Caloosahatchee River** (downstream of the Vallisneria zone)) would make the plan not rise to the level of best available science..."(p. 9)

--"Severe ecological and water quality problems can be expected to occur if there is **no flow during April, May and June.**" (p.9) "...April, May and even June...are the times of the lowest flow, highest biological activity, and greatest utilization of SAV by important juvenile fishes and crustaceans. The exclusion of those months from minimum flow is NOT based on best available information." (p.17, emphasis in document) Give example of pink shrimp that have peak recruitment in spring and early summer; decline in Vallisneria during these times would be "extremely serious." (ibid)

--there is no quantitative data that demonstrates tape grass can withstand high salinity for weeks with regard to the ultimate effects on tape grass dynamics. The period not covered under the proposed rule could be 9 to 12 weeks, depending on the annual rainy season onset

--questions as to **whether rule addresses possible water quality issues** that may arise during MFL conditions

--questions whether salinity/flow model developed by SFWMD accounts for following factors: 1) downstream boundary (i.e. salinity levels and tidal conditions at the mouth); 2) wind stress on the water surface; 3) dynamic characteristics of the system response to flow changes; 4) water withdrawal and release below S-79; 5) volume of the water column and duration of the flow changes. (p. 12)

--**SFWMD is using steady-state, regression salinity/flow model that limits predictive capabilities**

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--**strongly requests SFWMD to use Bierman (1993) model** to simulate salinity levels in the CE; dynamic model that is more robust, is time-variable and accounts for lag time of freshwater inflow on salinity levels (p. 12); **this would increase the Vallisneria salinity needs estimates of 300 cfs to 400-500 cfs** (p. 18 and Chamberlain and Doering, 1998);

--thus **question use of 300 cfs** as the best estimate of minimum flow (p. 18) "... the present accepted and prudent philosophy in resource management is one of precaution and erring on the side of least damage. Setting minimum flows at the very lowest levels ever estimated by any method is inconsistent with the precautionary approach." (p.27)

--questions whether **other environmental factors and/or processes affect Vallisneria growth besides salinity**, such as light penetration changes due to chlorophyll and turbidity—needs further research (p. 15)

--the "**3 consecutive years**" is based in part on the assumption that many of the important estuarine species that rely on Vallisneria beds are short-lived and *recruitment limited*; Florida Fish and Wildlife Commission's opinion is that these species are *habitat limited* instead and their life span is not relevant; therefore, the species' populations would suffer lower populations if tape grass was reduced for even one year (p. 16)

--**harm** that occurs due to lack of minimum flow **in a single year** to important species, such as spotted seatrout, blue crab, and red drum, **through the loss of species abundance would persist** throughout the life of that species **and take multiple years for recovery** (through reproduction). This, therefore, would then meet the significant harm standard the SFWMD is proposing. (p.17)

--use of a suite of indicators versus single VEC approach

--needs more research into the use of Vallisneria beds by organisms and the effects of salinity changes on those organisms (p.19)

--recovery or prevention strategy is vague and unclear (p. 27)

H. Table demonstrating that many important organisms rely on the upper estuary during late Spring:

Table 10. Fish and Crustaceans that may Benefit from Low Salinity and Utilization of Vallisneria Habitat within the Caloosahatchee Estuary during the Spring				
Species	Relative Abundance	Spawning	Relative Utilization	Life Span
Important Forage for Game Fish				
Pink Shrimp	abundant as juveniles	Apr-Sep	high	2 yrs
Grass Shrimp	highly abundant (eggs, larvae, juveniles, adults)	Feb-Oct	high	1 yr
Blue Crab	highly abundant juveniles; abundant adults	Apr-May; Sept-Oct	high	3-4 yrs
Yellowfin menhaden	common as juveniles	Feb-Mar	high	5-12 yrs
Bay anchovy	highly abundant all life stages	Feb-Mar; Jun-Aug	high	1-2 yrs

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Gulf killifish	common all life stages	Nov-May	high	3 yrs
Silversides	highly abundant all life stages	Mar-May; Oct-Nov	high	1-2 yrs
Pinfish	highly abundant as juveniles; common as adults	Oct-Feb	high	?
Striped Mullet	highly abundant as juveniles	Dec-Feb	high	7-8 yrs
Game Fish				
Tarpon	abundant as juveniles	Mar-Apr	medium	15 yrs
Snook	abundant as juveniles; common as larvae	Jun-Jul	low	5-7 yrs
Silver perch	abundant larvae and juveniles	Mar-Apr; Aug-Sep	medium	6 yrs
Sand seatrout	abundant as juveniles	Mar-May; Aug-Sep	high	3 yrs
Sea trout	common as juveniles and larvae	Apr-Jun; Aug-Sep	low	15 yrs
Black drum	common as juveniles and larvae	Jan-Apr	high	58 yrs
Red drum	common as larvae; abundant as juveniles	Sep-Oct	high	over 37 yrs

* Excerpted from SFWMD, 2000

VI. Options for Consideration:

1. Flows for the months of April, May and June should be addressed;
2. The time frame necessary to attain "significant harm" should be shortened from "3 consecutive years" to "1 year";
3. Research and monitoring should be included as part of the rule to assure significant impacts do not occur to important estuarine resources (tape grass, manatees, etc.)
4. Research and monitoring should be included as part of the rule to predict and document causes of failure to maintain minimum flows and thereby identify necessary actions to correct deficiencies; and
5. A protective maximum flow and water level should be identified to assure significant adverse impacts do not occur to significant estuarine resources for use during operation of the water management system.

VII. References

Chamberlain, R.H. and P.H. Doering, 1998. *Preliminary Estimate of Optimum Freshwater Inflow to the Caloosahatchee Estuary: A Resource-Based Approach*. Proceedings of the Charlotte Harbor Public Conference and Technical Symposium. Charlotte Harbor National Estuary Program, Tech. Report 98-02.

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Hartman, Bradley to Patrick Gleason of the South Florida Water Management District, January 30, 2001. Official Correspondence. Florida Fish and Wildlife Conservation Commission.

Hartman, Bradley to Frank Finch of the South Florida Water Management District, September 8, 2000. Official Correspondence. Florida Fish and Wildlife Conservation Commission.

Hinds, Louis to South Florida Water Management District, February 5, 2001. Official Correspondence. United States Fish and Wildlife Service, J.N. "Ding" Darling National Wildlife Refuge, Florida.

Kalla, Peter I., PhD, 2000. Review of Proposed Minimum Flows and Levels for the Caloosahatchee River, United States Environmental Protection Agency, Atlanta GA.

Loflin, Robert to Frank Finch of the South Florida Water Management District, November 6, 2000. Official Correspondence, City of Sanibel, Florida.

Peer Review Panel, November 3, 2000. Draft Final Review Report Caloosahatchee Minimum Flow, SFWMD.

SFWMD, 2000. *Technical Documentation to Support Development of Minimum Flows and Levels for the Caloosahatchee River and Estuary*. South Florida Water Management District, West Palm Beach, FL.