

**MINIMUM FLOWS AND LEVELS:
ANALYSIS OF FLORIDA PROGRAMS**

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TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	ANALYSIS OF MINIMUM FLOWS AND LEVELS	1
A.	A Model Water Code	2
B.	Florida Water Resources Act	4
C.	Potential Ambiguities in Interpretation of	
	Minimum Flows and Levels	5
1.	Scope of Work	5
2.	Definition of "Water Resources"	7
3.	Definition of "Significantly Harmful"	8
4.	Proper Timeframe	10
5.	Process of Establishment	11
6.	Role of MFLs in Water Resource Management	12
III.	WATER MANAGEMENT DISTRICTS: MINIMUM FLOWS AND LEVELS	13
A.	Northwest Florida Water Management District	13
B.	Suwannee River Water Management District	18
C.	St. Johns River Water Management District	24
D.	Southwest Florida Water Management District	31
E.	South Florida Water Management District	42
F.	Comparison of District Approaches to Minimum Flows and Levels	50
IV.	OTHER DISTRICT PROGRAMS RELATED TO PROTECTION OF NATURAL SYSTEMS	56
V.	ANALYSIS OF PROGRAMS IN RIPARIAN STATES	60
A.	Summary and Assessment of Selected State Programs	60
1.	Connecticut	60
2.	Hawaii	64
3.	Iowa	65
4.	Minnesota	67
5.	New Hampshire	70
6.	Wisconsin	74
B.	Selected Issues	76
VI.	RECOMMENDATIONS	85
VII.	TOPICS AND ISSUES FOR FURTHER STUDY.	86
APPENDIX		88

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I. INTRODUCTION

This report is intended to address aspects of Florida's approach to the establishment and implementation of "minimum flows and levels" (MFLs). It analyzes differences in the structure and substance of MFL provisions embodied in the Florida Water Resources Act and A MODEL WATER CODE on which the Act is based. It also reviews and summarizes each Water Management District's approach to the establishment and implementation of minimum flows and levels, and provides an overview of other programs used by the Districts to determine the impacts of withdrawals and to protect natural systems. The report provides a review of selected programs for establishing such levels and flows in other riparian states, and discusses relevant issues. Finally, it offers general recommendations and topics for further study.

The current situation with regard to defining, developing and implementing minimum flows and levels in Florida is dynamic. The Districts vary in the maturity of their research and development programs for MFLs, as well as their policies for establishing and implementing the flows and levels. Recent legislation, rulemaking, administrative challenges and an Executive Order also continue to influence the approaches being considered.

II. ANALYSIS OF MINIMUM FLOWS AND LEVELS

Much of Florida's Water Resources Act is based on the administrative and substantive provisions of A MODEL WATER CODE, which was researched and drafted by water law experts at the University of Florida and Southern Methodist University. The drafters of the Model Code envisioned a water management system at the state level that accounted for the hydrologic interrelationships of all water resources, and that provided for an integrated approach to water

FLA. STAT. Ch. 373 (1995).

MALONEY, AUSNESS AND MORRIS, A MODEL WATER CODE, University of Florida Press (1972) (hereinafter, "The Model Code").

FLA. STAT. Ch. 373 (1995).

"The Model Code," *supra*, note 2.

quality and water quantity issues. Among the primary requirements of the Model Code were a statewide comprehensive water resources planning process which addressed water supply and water quality, and a water use permitting system that implemented the higher level water planning decisions. The Water Resources Act, as amended, departs from several of the provisions of the Model Code. This section of the report compares provisions for MFLs in A MODEL WATER CODE with those in the Florida Water Resources Act, and based on this analysis identifies potential ambiguities in the Act.

A. A Model Water Code

Under the Model Code, for the purposes of formulating the State Water Use Plan, a state water resources board is directed to divide each water management district into "sections" which conform as nearly as practicable to a hydrologically controllable area and describe all water resources within the area. Within each section, the Model Code requires the state board to 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 harmful to the water resources and ecology of the area.
- (b) Minimum lake level for all fresh water lakes and ponds in the area greater than 25 acres. The minimum level of a given lake or pond shall be the level at which further withdrawals would be harmful to the water resources and ecology of the area.
- (c) Minimum ground water level. The minimum ground water level shall be the level of ground water in an aquifer at which further withdrawals would be harmful to the water resources of the area.

As stated in the commentary to this subsection of the Model Code, it is "essential that any system of water allocation include a minimum flow for public purposes. Commercial navigation, recreational boating, fishing, hunting, and swimming, and ecological protection are some of the public purposes that should be protected by the minimum flow concept." Thus, the Model Code specifically places minimum flows and levels within the planning framework, and requires that they be calculated using the best information available. The Model Code also provides that the

"The Model Code," *supra*, note 2, §1.07(3), at 105.

Id. §1.07(4), at 105-106.

Id. at 106.

Id.

flows and levels may reflect seasonal variations, and may be established to provide for protection of nonconsumptive uses.

The Model Code maintains the coherence of its approach to minimum flows and levels by requiring that consumptive use permits granted by the water management districts be conditioned so as to "preserve minimum flows and levels...." In addition, the Model Code includes, as a general condition to the granting of consumptive use permits, that they be consistent with the public interest and provisions of the State Water Plan, which includes the minimum flows and levels established in the State Water Use Plan.

Similarly, the water shortage planning process required under the Model Code allows the Districts to declare water shortages "when insufficient water is available to meet the requirements of the permit system or the State Water Plan, or, when conditions are such as to require temporary reduction in total water use within the area to protect water resources from serious harm." By including minimum flows and levels within the State Water Use Plan, part of the State Water Plan, the Model Code assures that they serve as a guide in the process of declaring water shortages.

B. Florida Water Resources Act

Section 373.042 of the Water Resources Act also requires the establishment of minimum flows and levels using best information available. The Act also tracks the language of the Model Code in allowing MFLs to reflect seasonal variations, and in giving authorization to protect nonconsumptive uses in establishing MFLs. The Act loses the coherence of the Model Code by not specifically including the flows and levels as part of the State Water Use Plan, as does the

Id.

Id. As stated in the commentary, the section "prohibits the granting of any consumptive use permit that would adversely affect the maintenance of minimum flows and levels. *Id.* at 107.

Id. §2.02, at 179.

Id. §2.09(2), at 193.

FLA. STAT. § 373.042 (1996 Supp.).

Id.

Model Code, nor does the Act require that MFLs be established only within "sections." Within each section, or within the water management district as a whole, the DEP or the governing board must establish:

(1)(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.

(1)(b) Minimum water level. The minimum water level shall be the level of ground water in an aquifer and the level of surface water at which further withdrawals would be significantly harmful to the water resources of the area.

Subsection (1)(a) closely tracks the Model Code, except that instead of a "harm" standard, the Act adopts a "significant harm" standard, and applies it to water resources *or* ecology of the area, rather than water resources *and* ecology.

Subsection (1)(b) combines and truncates relevant sections of the Model Code. As in subsection (1)(a), the standard is not "harm" but "significant harm." Instead of addressing levels for lakes and ponds separately from levels for aquifers, as does the Model Code, the Act considers "surface water" and aquifers in the same paragraph. The Act does not establish size thresholds for lakes and ponds to which minimum levels will be applicable, but provides that minimum levels be set for both aquifers and "surface water," generally. Finally, it requires that minimum levels be set where further withdrawals would be significantly harmful to the "water resources" of the area, and makes no specific reference to ecology.

The Water Resources Act also fails to match the coherence of the approach in the Model Code, by not specifically requiring the preservation of minimum flows and levels in the consumptive use permitting process. Additionally, although the Act tracks the Model Code in

FLA. STAT. § 373.036(6), which describes the State Water Use Plan, provides a likely definition of "section": "For the purposes of this plan the department may, in consultation with the affected governing board, divide each water management district into sections which shall conform as nearly as practicable to hydrologically controllable areas and describe all water resources within each area."

FLA. STAT. § 373.042(1)(a) (1996 Supp.).

FLA. STAT. § 373.042(1)(b) (1996 Supp.).

See, FLA. STAT. § 373.223 (1995). *But see* FLA. ADMIN. CODE r. 62-40.473(2)(b) (February 1996) (recent amendments to the administrative rule on State Water Policy requiring that consumptive use permitting not result in violations of established minimum flows and levels).

allowing a water shortage declaration to be made when necessary to "protect water resources from serious harm," it does not include consideration of the State Water Plan or minimum flows and levels when evaluating the need for the declaration.

C. Potential Ambiguities in Interpretation of Minimum Flows and Levels

1. Scope of Work

An initial question raised within subsection 373.042(1), F.S., concerns the scope of work required in setting minimum flows and levels. No size thresholds are established for surface waters for which minimum levels are to be developed, thus a legitimate question is whether the Districts are required to set levels for all surface waters. Subsection 373.042(1)(a), F.S. specifies that minimum flows are to be set for all watercourses, and subsection 373.042(1)(b) makes no reference to size thresholds for surface water, thus an implied conclusion could be that minimum levels must be assessed for all surface waters.

Legislation adopted during the 1996 legislative session, and a recent Executive Order, may indicate that MFLs need not be established for literally every water in the state, but do not resolve the question of how far the Districts must go in setting MFLs. New section 373.042(2), F.S., requires the Southwest Florida Water Management District to submit to the Department a priority list for the establishment of MFLs for surface watercourses, aquifers and surface water in Hillsborough, Pasco and Pinellas counties, and delineate the order in which the District will establish them. The list must be based on the importance of the waters to the state or region and the existence of, or potential for significant harm to, the water resources or ecology of the area. Minimum flows or levels for priority waters in the designated counties must be established by

FLA. STAT. § 373.246(2) (1995).

See infra, notes 47-48 and accompanying text, describing recent amendments to the State Water Policy rule which require consideration of MFLs in consumptive use and environmental resource permitting, and in water shortage declarations.

FLA. STAT. § 373.042(1)(a) (1996 Supp.).

FLA. STAT. § 373.042(1)(b) (1996 Supp.).

Ch. 96-339, CS/CS/HB 2385 (codified at FLA. STAT. §§ 373.042(2),(3) (1996 Supp.)).

Florida Governor Exec. Order No. 96-297 (September 30, 1996).

Ch. 96-339, CS/CS/HB 2385 (codified at FLA. STAT. § 373.042(2) (1996 Supp.)).

October 1, 1997.

Additionally, Florida Governor's Executive Order No. 96-297 requires the Department to work with the Districts to ensure that by November 15, 1996, and annually thereafter, the Districts submit a priority list and schedule for the establishment of minimum flows and levels for surface watercourses, aquifers, and surface waters within each District. The priority lists are to be based on the importance of the waters to the state or region and the existence of, or potential for, significant harm as established in section 373.042(1), F.S. Special consideration is to be given to establishing MFLs for waters within designated water resource caution areas, and the Southwest Florida Water Management District is expected to include on its initial list the prioritized waters within the counties designated by new section 373.042(2), F.S. The Executive Order also requires the Department to work with the Districts to ensure that the Districts will complete the establishment of MFLs for waters on the initial priority list by the end of fiscal year 1999.

However, neither the Executive Order nor the 1996 legislation provide criteria for determining which waterbodies or percentage of surface waters must be covered by MFLs. Florida's Water Policy Rule requires the Districts to prepare District Water Management Plans, including schedules for establishing minimum flows and levels for a "priority selection of surface waters and ground waters...considering ground water availability and surface water availability," but provides no additional guidance.

2. Definition of "Water Resources"

A second question is whether it is significant that the Act only refers to protection of "water resources" for setting minimum levels, while requiring protection of "water resources or ecology" for minimum flows. The Model Code requires that both minimum flows and minimum

Id.

Florida Governor Exec. Order No. 96-297, Section 1. (September 30, 1996).

Id.

Id.

Florida Governor Exec. Order No. 96-297, Section 2. (September 30, 1996). However, the establishment of minimum flows and levels by Southwest Florida Water Management District, for prioritized waters within Hillsborough, Pasco and Pinellas counties must be established by October 1, 1997. *Id.*

FLA. ADMIN. CODE r. 62-40.520(6)(c)4. (February 1996).

levels protect "water resources and ecology of the area." The underlying issue is whether there is an essential difference between "water resources" and "ecology." It could be argued that harm to fish, wildlife, vegetative communities and other aspects of ecosystem structure and function are not relevant in setting minimum water levels which address "harm to water resources." However, it is probably more correct to acknowledge that harm to water resources can only occur by interfering with those qualities of water that make it a resource. As the Act and the Model Code reaffirm in several provisions, the capacity of water as a resource to sustain natural ecosystems is one of its most highly valued functions.

Therefore, the omission of the word "ecology," which may have been unintentional, should have no practical effect relative to the setting of minimum levels. Interference with the quality, quantity, timing, distribution or hydroperiod of water that supports ecosystem functioning should constitute harm to water resources. Where aquifers are interconnected with surface water systems, minimum levels for those aquifers would necessarily reflect the needs of the surface waters. Florida's Water Policy Rule, which lists several factors to be considered in establishing minimum flows and levels, reinforces this interpretation.

The recent Executive Order also supports this approach by requiring the Department of Environmental Protection to work with the Districts to ensure that the Districts: "Base the establishment of minimum flows and levels on scientific determinations of the sustainability of water resources and related natural systems...."

3. Definition of "Significantly Harmful"

A third question is how to define the phrase "significantly harmful," which operates as the applicable standard for establishing minimum flows and levels. The Model Code used a "harm" standard in its approach to setting minimum flows and levels, but did not provide further guidance

The Water Resources Act requires that minimum flows for surface watercourses protect "water resources or ecology."

These include: (a) recreation in and on the water, (b) fish and wildlife habitats and the passage of fish, (c) estuarine resources, (d) transfer of detrital material, (e) maintenance of freshwater storage and supply, (f) aesthetic and scenic attributes, (g) filtration and absorption of nutrients and other pollutants, (h) sediment loads, (i) water quality, and (j) navigation. FLA. ADMIN. CODE r. 62-40.473(1) (February 1996).

Florida Governor Exec. Order No. 96-297, Section 2 (2) (September 30, 1996).

FLA. STAT. § 373.042(1) (1996 Supp.).

or commentary, and the definition of "significant harm" has not been addressed by legislation or by rule. Florida's Water Policy rule lists several factors to be considered in establishing MFLs, but does not provide guidance concerning what level of harm should be considered significant. Intuitively, the term allows for more impact to water resources and ecological factors than a "harm" standard, but should also not be interpreted as the point at which an ecosystem is incapable of sustaining itself.

One issue is whether "significant harm" should involve a strictly scientific analysis of ecological and biological responses to variations in fresh water levels and flows, or whether the term is inherently value-laden, requiring policy direction from the water management district governing boards, including consideration of existing uses. If the intent of the MFL provision is to define a measure of ecosystem sustainability, one perspective is there should be no policy considerations in the process of determining what constitutes significant harm. A contrary perspective is that the inclusion of the adjective "significant" requires a public policy determination that necessarily involves consideration of existing uses, and direction by district governing boards, particularly in areas with significantly altered ecosystems. Another approach to defining significant harm would base it on a balancing of water quality factors, environmental values, protection of water resources, natural seasonal fluctuations in flows and levels, permitted uses of the water body, and other uses. It can be argued that including permitted consumptive uses in a balancing test would skew the assessment of significant harm away from a measure of ecological sustainability, and towards a measure of economic sustainability.

A related legal issue is the degree to which the Water Resources Act requires that existing rights to water be protected in the promulgation of MFLs. Subsection 373.171(2), F.S. requires that in promulgating rules and regulations and issuing orders, the governing boards must "act with a view to full protection of existing rights to water in this state insofar as is consistent with the purpose of this law." Subsection 373.171(3), F.S. clarifies this provision by stating that rules, regulations and orders requiring modification of an existing use or disposition of water will be allowed if it is shown that the use or disposition proposed for modification is detrimental to other water users or to the water resources of the state.

See supra, note 33.

FLA. STAT. § 373.171(2) (1995).

FLA. STAT. § 373.171(3) (1995).

One perspective is that establishing MFLs to assist in determining needs for the long-term sustainability of the resource may not necessarily affect existing rights to water, and should not trigger the provisions of subsection 373.171(2), F.S. After MFL establishment, water management district efforts to modify existing consumptive use permits which violated an MFL might be held to invoke subsection 373.171(2), F.S., since this would necessitate the issuance of an order modifying the permit. However, it is possible that subsection 373.171(3), F.S. could justify such a modification, since a governing board could find that an existing use which conflicted with an MFL was detrimental to the water resources of the state. An associated issue concerns the proper interpretation of the phrases in subsection 373.171(2), F.S., which state that boards must act "with a view" to protection of existing water rights "consistent with the purposes of this law," if one of the primary purposes of the Act is maintaining the long-term sustainability of the state's water resources.

4. Proper Timeframe

Another issue which has not been resolved concerns the proper point in time to be used in setting the environmental standard against which "significant harm" should be measured. The volume, distribution and timing of fresh water in many watercourses, estuaries, aquifers and wetlands are significantly altered from conditions existing before extensive human water withdrawals and diversions began. Minimum flows and levels necessary to maintain ecosystem structure and function measured early in the state's history would be very different from those necessary to maintain ecosystem structure and function as measured at the present time.

One perspective is that because of considerations of equity, MFLs should only be based on the current state of ecosystem structure and function, with some provision made for attempting, through various means, to restore functions in the most severely degraded systems. A concern associated with this approach is that present conditions may not in fact represent the standard required in the MFL provision of the Act, where present conditions have crossed the threshold of "significant harm" for many ecosystems.

Another approach is that the proper timeframe for evaluating MFLs relates to the date of legislative adoption. The MFL provisions of the Water Resources Act, adopted in 1972, do not include deadlines for establishment of MFLs. Absent specific deadlines, legislative mandates are normally construed as requiring implementation within a reasonable period of time after passage

FLA. STAT. § 373.171(2) (1995).

of the legislation.

5. Process of Establishment

Another area of confusion in establishing minimum flows and levels is the administrative process by which they are established. The Model Water Code requires that minimum flows and levels be established within hydrologically controllable "sections" as part of the State Water Use Plan, but does not address their administrative status. The Water Resources Act requires that MFLs be established within sections or within the District as a whole, but does not indicate how the flows and levels are to be established. In some cases, MFLs have been subject to public review and comment, and adopted by way of the formal rulemaking process. There appears to be a general consensus that larger systems should have MFLs set by rule whenever possible. Confined, somewhat homogeneous aquifer systems in which the effects of withdrawals will be felt equally within the aquifer are also appropriately addressed by rulemaking. A remaining issue, however, is whether MFLs for surface water systems and nonhomogeneous aquifers should be addressed solely by rulemaking.

In other cases, MFLs have been incorporated within administrative orders, as conditions attached to consumptive use permits. Essentially, within the influence of the withdrawal, a criterion designed to protect the water resources or ecology of the area from significant harm is incorporated into the permit as a condition. The question associated with this approach is whether criteria designed to prevent significant harm which are attached to individual permits meet the intent of the Act, and whether in certain cases, they may be justified as representing the most appropriate method by which a minimum level or flow can be established.

6. Role of MFLs in Water Resource Management

In the original water management structure put forth by the Model Water Code, minimum flows and levels were to be included as part of the State Water Use Plan, which was itself

"The Model Code," *supra*, note 2, §1.07(3), at 105.

Section 373.036(6), F.S., which describes the State Water Use Plan, provides a likely definition of "section": "For the purposes of this plan the department may, in consultation with the affected governing board, divide each water management district into sections which shall conform as nearly as practicable to hydrologically controllable areas and describe all water resources within each area."

included as part of the State Water Plan. The regulatory and permitting criteria of the Model Water Code were then closely tied to the policies, goals and objectives of the State Water Plan, including a requirement that consumptive use permits be conditioned to preserve minimum flows and levels.

The original enactment of the Water Resources Act included a requirement that minimum flows and levels be included in the State Water Use Plan, which was to be incorporated as part of a State Water Plan. The year after its adoption, amendments to the Act took that requirement out of the State Water Use Plan and transferred it to a separate and unconnected statutory provision, thus confusing the role of MFLs in the planning process. As a result of this alteration of the original relationship between MFLs, water resource planning and regulation, the role and status of MFLs have never been clearly established. The Act also failed to establish a formal requirement that MFLs be protected during permitting and water shortage planning.

The place of MFLs in the planning process has been somewhat more clearly defined by way of the district water management planning process. Amendments to Florida's Water Policy rule required that minimum flows and levels be addressed within District Water Management Plans, including a "schedule for establishing minimum flows and levels for a priority selection of surface waters and ground waters in the District, considering ground water availability and surface water availability...." Recent amendments to the rule also require that established minimum flows and levels be protected where relevant to the construction and operation of water resource projects, the issuance of consumptive use and environmental resource permits, the declaration of water shortages, and the operation and maintenance of works of the district. These requirements have not been formally incorporated by rule into the permitting and water shortage planning processes of all Districts, and it is not clear to what extent they are observed in other

"The Model Code," *supra*, note 2, §§1.07, 1.08.

Id. §1.07(6).

Section 6, Chapter 72-299, Laws of Florida.

See, FLA. STAT. § 373.036 (1995).

FLA. STAT. § 373.042 (1995).

FLA. ADMIN. CODE r. 62-40.520(6)(c)4. (February 1996).

FLA. ADMIN. CODE r. 62-40.473(2) (February 1996).

contexts.

III. WATER MANAGEMENT DISTRICTS: MINIMUM FLOWS AND LEVELS

The Districts have ongoing programs for establishing and implementing minimum flows and levels which vary in their complexity and depth. This section reviews and summarizes each District's approach to the development and application of MFLs, and provides a brief comparison, based on salient issues.

A. Northwest Florida Water Management District

1. Existing Minimum Flows and Levels

In the Northwest Florida Water Management District (NFWFMD) severe funding limitations have restricted the ability of the District to perform sufficient research necessary for the establishment of MFLs in a comprehensive manner. Thus, to date there are no minimum flows and levels established for surface or ground waters in the District.

2. Development of Minimum Flows and Levels

District staff has indicated that strategies for setting MFLs will differ depending on the issues and conditions within a basin and the management strategies appropriate to that basin. Essentially any withdrawal of water will involve some impact to water resources, so determinations of "significant harm" necessarily involve science-based judgment. Thus, the District views MFLs as requiring a determination by the governing board on a regional basis as to what functions are to be protected in order to ensure a sustainable system.

3. Minimum Flows for Surface Waters

The District intends to establish surface water flows and levels using hydrologic watershed boundaries as the preferred planning unit, though in certain cases, sub-watershed units may be used. The District is pursuing two research programs to develop the data and analysis necessary for establishing and implementing minimum flows.

Given the importance of Florida's ongoing negotiations with Georgia and Alabama over

See, Douglas Barr, Letter to Lt. Gov. Buddy MacKay, Northwest Florida Water Management District (May 13, 1996); DISTRICT WATER MANAGEMENT PLAN, 120, Northwest Florida Water Management District (October 1994).

DISTRICT WATER MANAGEMENT PLAN, 120, Northwest Florida Water Management District (October 1994).

DISTRICT WATER MANAGEMENT PLAN, 120, Northwest Florida Water Management District (October 1994).

the proper allocation of fresh water within the Apalachicola-Chattahoochee-Flint (ACF) River basin, and as part of the "Comprehensive Study" of the basin being conducted in conjunction with the negotiations, the District has made the Apalachicola River and Bay its priority for the establishment of minimum flows. The ACF system is managed for a variety of federally authorized uses, but the ecological integrity of the river and bay relative to their needs for fresh water is not included among these federal purposes. This is, in part, due to the lack of information on the river flows necessary to meet the fresh water needs of the bay and ensure that sufficiently high flows are received in the upper basin to provide the benefits to the river floodplain associated with occasional high flows.

With SWIM funds and additional resources made available by the DEP, the federal government and the Legislature, the District has made progress in determining the fresh water needs of the river and bay. Consistent with other districts' approaches, NFWFMD will establish minimum flows and levels for the river and bay by designating a range of historic monthly flows and levels that reflect natural fluctuations in the system. The District anticipates that with sufficient levels of funding, the technical work on fresh water needs assessment will be completed in 1998. Adoption of the identified range of flows necessary to maintain the long-term productivity of the system will take place at that point.

In addition to the Apalachicola river and bay, the District has begun research to establish minimum flows on the Upper Telogia Creek drainage basin in Gadsden County. The creek is affected by extensive surface water withdrawals for agricultural irrigation and has recently experienced low flows during droughts. Aquifer transmissivities in the region are very low, thus ground water is not a feasible source for agricultural purposes. The District has declared the Upper Telogia Creek basin to be a Water Resource Caution Area (WRCA). Consumptive use

Douglas Barr, Letter to Lt. Gov. Buddy MacKay, Northwest Florida Water Management District (May 13, 1996). *See also*, DISTRICT WATER MANAGEMENT PLAN, 121, Northwest Florida Water Management District (October 1994).

DISTRICT WATER MANAGEMENT PLAN, 121, Northwest Florida Water Management District (October 1994).

Id.

Id.

FLA. ADMIN. CODE r. 40A-2.802(2) (October 1, 1995).

permit applications within the WRCA are subject to more stringent permitting criteria with respect to: hydrogeological and hydrologic impacts; water use reporting; implementing conservation measures and improving water use efficiency; and reuse of reclaimed water. Essentially, no new permits are being issued in the basin. Existing permits are limited to three year durations, and renewal applications are evaluated on the basis of the most recent understanding of impacts to the resource.

Secondary priorities for establishment of minimum flows and levels include interstate surface waters such as the Choctawhatchee/Pea River basin, and the Floridan Aquifer in certain coastal fringe areas such as the Navarre/Navarre Beach area, the Fort Walton Beach/Destin area and southern Walton County. The Choctawhatchee/Pea River is another interstate river system which is expected to experience many of the same pressures as the ACF basin, and for which minimum flows and levels will be established, contingent on adequate funding.

4. Minimum Levels for Aquifers

The District defines "minimum levels" as "the potentiometric level or surface water level below which further declines could cause water quality degradation or could interfere with other legal uses of water in the area according to the best hydrologic information available to the Board." The two relevant aquifer systems in the District are the Floridan and the Sand-and-Gravel. The District's current understanding is that aquifer levels are not being significantly affected by withdrawals, and it is not currently implementing any ongoing efforts to establish minimum aquifer levels. However, as a result of ground water resource availability assessments, it determined that certain coastal fringe areas in Santa Rosa, Okaloosa and Walton counties (Navarre/Navarre Beach area, the Fort Walton Beach/Destin area and southern Walton County) are subject to extreme pressure from utility wellfields and projected demands over the next twenty years, and has collectively designated them a Water Resource Caution Area (WRCA). The District has identified "pumping ceilings" for withdrawals from wells located along the coastal fringe, which are designed to assure that the Floridan aquifer fresh water/salt water interface will

DISTRICT WATER MANAGEMENT PLAN, 121, Northwest Florida Water Management District (October 1994).

FLA. ADMIN. CODE r. 40A-2.021(28) (October 1, 1995).

DISTRICT WATER MANAGEMENT PLAN, 121-122, Northwest Florida Water Management District (October 1994).

remain offshore. The District's approach is that it may be possible to convert these "pumping ceilings" to "minimum levels" with additional monitoring and research.

Within the WRCA, the District governing board has stated that new and expanded uses of the Floridan aquifer system for golf course, recreation, or landscape irrigation, or other non-public uses are not in the public interest, and thus, are prohibited. Public water supply utilities in the WRCA must implement maximum re-use technologies, must put into place reverse rate scales, and develop conservation plans. Utilities operating wastewater treatment plants must include plans analyzing the feasibility of providing reclaimed water for reuse within five years and of providing total reuse of reclaimed water within twenty years. Several engineering options are also being explored to shift the source of supply for these areas inland, in order to avoid future problems with growth in demand.

5. Implementation Issues

Regulatory implementation of minimum flows and levels in the District will be prioritized for areas where withdrawals are impacting water resources, or the resource is limited to a degree as to require additional protection. The District's current consumptive use permitting criteria do not make specific reference to MFLs, but require the governing board to impose conditions necessary to "prevent the level of the potentiometric surface of an aquifer, or the level of a surface water body, to be drawn below any minimum level established by the Board...." In coastal areas,

FLA. ADMIN. CODE r. 40A-2.802(1)(b) (October 1, 1995). Exemptions to this prohibition may be provided, and a consumptive use permit issued, if it is determined that (1) the use of reclaimed water is determined not to be economically, environmentally or technically feasible; (2) a commitment is made to use reclaimed water when determined feasible and to abandon and plug Floridan aquifer system wells when reclaimed water use is begun; (3) hydrological data demonstrate that no other source of ground or surface water can be utilized; (4) water of the lowest acceptable quality available will be utilized; (5) water conservation measures will be implemented over the duration of the permit; (6) undue economic hardship will occur if the exemption is not granted or if water must be obtained from a public water supply system; (7) the request is determined to be reasonable-beneficial, will not interfere with existing legal uses, and is in the public interest. *Id.*

FLA. ADMIN. CODE r. 40A-2.802(1)(c) (October 1, 1995).

FLA. ADMIN. CODE r. 40A-2.802(1)(c)3. (October 1, 1995).

DISTRICT WATER MANAGEMENT PLAN, 120, Northwest Florida Water Management District (October 1994).

FLA. ADMIN. CODE r. 40A-2.381(1) (October 1995).

the District's approach is that the phrase refers to unacceptable movement of the interface between fresh water and salt water. In more inland areas, it refers to a part of the potentiometric surface falling below sea level. As indicated above, in certain coastal areas including parts of Santa Rosa, Okaloosa and Walton counties, pumping ceilings have been established which have potential for conversion to minimum levels. After establishment of minimum flows and levels, all applications for consumptive use permits will be examined to determine whether the proposed withdrawal, in combination with other existing and proposed withdrawals, would be harmful to the water resources and associated natural systems.

The District's water shortage rules do not make reference to minimum flows and levels, though in its factors for evaluating whether conditions could cause "serious harm to water resources," the plan includes: (a) potential for increased saltwater intrusion, upconing, or other ground water contamination; (b) potential for increases in drawdowns or cone or depressions which may affect nearby users or the resource; (c) potential for significant adverse impacts on fish and wildlife, and the ecology of the area; and (d) other factors adversely impacting the water resources. The District must declare a water shortage if it determines that water levels have fallen below "management levels," if any, or that there is a possibility that insufficient water will be available within a source class to, among others, "protect the resource from serious harm." Declarations of a water shortage emergency are based on similar factors.

B. Suwannee River Water Management District

1. Existing Minimum Flow and Levels

The Suwannee River Water Management District (SRWMD) has not as yet established minimum flows and levels for any watercourses, lakes or aquifers. In 1993 the District began developing the technical tools and policies by which MFLs will be adopted and implemented. Steps toward MFL development are more recent at SRWMD than in other parts of the state, in part because most of the District's surface and ground waters face no immediate or perceivable

DISTRICT WATER MANAGEMENT PLAN, 120, Northwest Florida Water Management District (October 1994).

FLA. ADMIN. CODE r. 40A-21.221(2) (June 1992).

FLA. ADMIN. CODE r. 40A-21.231(3) (June 1992).

FLA. ADMIN. CODE r. 40A-21.331(2),(3) (June 1992).

threat from diversions or overdraft, but also because of the District's limited ad valorem tax base and limited financial resources. During the last three years, a number of public forums have been used to discuss the need for and possible approaches to MFLs and the District reports that there is strong public support.

2. Development of Minimum Flows and Levels

District staff is considering an approach to setting MFLs which recognizes the functions that multiple flows and levels serve, and which recognizes the interactions between ground and surface waters in much of the District. Section 373.042, F.S. requires that minimum flows for surface waters address the "water resources or ecology" of the area.

Ecological needs are seen as setting the tightest limits on amounts of water which may be withdrawn for human use. In order to protect the ecology, or natural systems, MFLs need to address the water needs of plant and animal communities in estuaries, streams, lakes and wetlands. An "ecosystem approach" will be required which considers the linkages between floodplains and rivers, rivers and the estuaries, and surface and ground waters. Hydrologic criteria for MFLs will be tied to biological responses.

The District views the process of developing MFLs as being somewhat more science driven than policy driven, though implementing MFLs will necessarily involve considerations of policy. The District has no prescriptive definition of "significant harm," and believes there should be maximum flexibility in addressing significant harm to include regional considerations. The factors listed in Florida's State Water Policy Rule are seen as providing good guidance for the development of MFLs.

DISTRICT WATER MANAGEMENT PLAN 1995, 170, Suwannee River Water Management District (1995).

DISTRICT WATER MANAGEMENT PLAN 1995, 172, Suwannee River Water Management District (1995).

FLA. STAT. § 373.042 (1995).

Id.

Id.

FLA. ADMIN. CODE r. 62-40.473(1) (February 1996). Considerations for establishing MFLs include: (a) recreation in and on the water; (b) fish and wildlife habitats and the passage of fish,

3. Surface Water Minimum Flows

Given limited funding and the potential for interbasin transfers, the primary focus of the District's efforts to establish minimum flows is on the lower Suwannee River watershed, including the Santa Fe River. With relatively low levels of water withdrawals in most of the District, subsequent priorities will be based on how sensitive the water resources and related ecosystems are to change, and the level of demand for surface and ground water.

Using SWIM funds and other revenues, the District is working with the USGS on a cost-shared project which began in October of 1993, to develop models and technical tools to assist in setting MFLs for the lower Suwannee River. At present, Suwannee research focuses on surface water hydrology, ground water and biological factors. Research is ongoing to build on existing knowledge, to better understand biological factors for surface waters. The District and USGS maintain seven long-term discharge monitoring sites on the main stem of the Suwannee River. Inventorying and monitoring of riverine wetlands began in 1996.

The final USGS project will end in the year 2001 with the publication of results, but staff plans are to have all MFL technical tools and policies in place for the lower Suwannee River by the end of the year 2000. This will be accomplished by close coordination with the USGS to obtain results and conclusions in advance of formal publication. SRWMD is investigating two approaches in setting MFLs for the lower Suwannee River. One approach judges the effect of instream flows on the Suwannee River estuary and the salt water/fresh water interface. This is similar to methods used by the Southwest Florida Water Management District on its estuarine systems. Efforts in this regard attempt to quantitatively relate streamflow and salinity dynamics. This relationship is used to establish allowable movement of the fresh water/salt water interface in the estuary in response to a proposed withdrawal.

For riparian wetlands, the SRWMD approach includes setting multiple flows and levels

(c) estuarine resources, (d) transfer of detrital material, (e) maintenance of freshwater storage and supply, (f) aesthetic and scenic attributes, (g) filtration and absorption of nutrients and other pollutants, (h) sediment loads, (i) water quality, and (j) navigation.

DISTRICT WATER MANAGEMENT PLAN 1995, 172, Suwannee River Water Management District (1995).

Id.

representing a range of naturally occurring hydrologic conditions on the lower river. These flows and levels will be related to the water requirements of important biological factors. This approach parallels that used by St. Johns River Water Management District in setting MFLs for the Wekiva River. It is anticipated that the District may need to establish different MFL criteria for different regions of the Suwannee, based on different environmental concerns in the upper, middle and lower portions of the river.

4. Ground Water Minimum Levels

Existing uses and withdrawals do not have a significant impact on the Suwannee River at present. Cumulative gross water usage within the Suwannee River basin is less than five percent of the average annual discharge at the mouth of the Suwannee. Most withdrawals are from groundwater, but there are strong interconnections between groundwater and surface water, and spring flows.

With USGS assistance, ground water studies are also being conducted throughout the District as part of the MFL research. The studies include statistical summaries of available groundwater level data and estimates of recharge across the District. These studies will not result in minimum groundwater levels. Rather, they are part of an assessment of groundwater/surfacewater interactions being undertaken through a linked groundwater/surfacewater modeling effort using MODBRANCH.

5. Implementation Issues

The District intends to set MFLs for the lower Suwannee River by rule. In other areas, if there are limited withdrawals relative to one source, which are expected to represent the majority of impacts to that source, rulemaking might not be necessary. Permit by permit approaches to MFLs will meet the intent of Ch. 373, F.S., if cumulative impacts are included in the permitting criteria.

The District views MFLs not necessarily as inviolate, but as having substantial weight in planning, regulation and permitting, though it still has questions concerning how to address existing legal water uses as an MFL is approached. The District Water Management Plan references former State Water Policy, since superseded, which stated that established MFLs "shall be a consideration" where relevant to: (a) the construction and operation of water resource projects; (b) the issuance of permits pursuant to Part II, Part IV, and Section 373.086, F.S.; and

(c) the declaration of a water shortage pursuant to Section 373.175 or Section 373.246, F.S. Current State Water Policy states that established MFLs, "shall be protected" where relevant to the listed projects, permitting programs and water shortage plans.

Though the District's intent is that its water use permitting program and water shortage plan will be the primary implementation mechanisms for maintaining established minimum flows and levels, its existing rules for water use permitting do not make reference to maintaining MFLs. These rules are under revision. Currently, limiting conditions may be imposed on a withdrawal to ensure that it is "not harmful to the water resources of the District," but the phrase is undefined. The District Water Management Plan states that revision of the District water use permitting program to implement its chosen MFL strategy is scheduled to occur by the year 2000, after the development of MFLs. The final USGS project will end in the year 2001 with the publication of results, but staff plans are to have all MFL technical tools and policies in place for the lower Suwannee River by the end of the year 2000. This will be accomplished by close coordination with the USGS to obtain results and conclusions in advance of formal publication.

At present, the District's water shortage plan does not specifically include consideration of minimum flows and levels in the declaration of a water shortage or water shortage emergency. If the District determines there is a possibility that insufficient water will be available to meet the estimated present and anticipated future user demands or to "protect the water resource from serious harm," it may declare a water shortage. In determining the potential for "serious harm to the water resource," among the several factors that "may be considered" are "significant reductions of stream flow or spring discharge or significant lowering of the water table," and "the

DISTRICT WATER MANAGEMENT PLAN 1995, 171-172, Suwannee River Water Management District (1995). (citing former FLA. ADMIN. CODE r. 62-40.405(2)).

FLA. ADMIN. CODE r. 62-40.473(2) (February 1996).

DISTRICT WATER MANAGEMENT PLAN 1995, 88, Suwannee River Water Management District (1995); *see also*, Policy D.2.2, DISTRICT WATER MANAGEMENT PLAN 1995, 173, Suwannee River Water Management District (1995).

FLA. ADMIN. CODE r. 40B-2.381(1) (February 1995).

DISTRICT WATER MANAGEMENT PLAN 1995, 176, Suwannee River Management District (1995).

"Water Shortage Plan," II.C.1., Suwannee River Water Management District (August 1988).

Id., II.A.2.c.(2).

occurrence of or potential for adverse impacts on fish and wildlife."

For evaluation of hydrologic conditions, the water shortage plan makes reference to factors such as "historic, current, and anticipated flows in surface waters," and "historic, current and anticipated demand of natural systems, including losses due to evapotranspiration and seepage." The water shortage plan also provides that if the provisions relevant to the declaration of a water shortage are not sufficient to "protect the public health, safety, or welfare, the health of animals, fish, or aquatic life," the District governing board may declare a water shortage emergency.

The District Water Management Plan acknowledges that several items in the water shortage plan need updating, including the "triggering mechanism that initiates declaration of a shortage." One of the District's policies for minimum flows and levels states that MFLs will be administered and enforced through the permitting of water use and the water shortage plan, though it does not prescribe what role they will have. Incorporation of minimum flow and level considerations within the Water Shortage Plan was scheduled for 1995 and 1996.

Among other implementation options, the District recognizes that in addition to water use permitting and water shortage planning, land acquisition and management, and structural water management facilities may have a role in addressing watershed specific minimum flow and level issues.

C. St. Johns River Water Management District

Id., II.A.2.c.(3).

Id., II.A.2.a.(2).

Id., II.A.2.a.(6).

Id., III.A.4.

DISTRICT WATER MANAGEMENT PLAN 1995, 90, Suwannee River Water Management District (1995).

DISTRICT WATER MANAGEMENT PLAN 1995, Policy D.2.2, at 173, Suwannee River Water Management District (1995).

DISTRICT WATER MANAGEMENT PLAN 1995, 176, Suwannee River Water Management District (1995).

DISTRICT WATER MANAGEMENT PLAN 1995, 170, Suwannee River Water Management District (1995).

1. Existing Minimum Flows and Levels

As of the writing of this report, the St. Johns River Water Management District (SJRWMD) has established minimum flows by rule for two rivers, forty-three lakes and one water management area. The District has completed rule adoption on minimum flows and levels for the Wekiva River Basin (including levels for the Upper Floridan aquifer), minimum levels for forty-three lakes outside the Wekiva Basin and the Blue Cypress Water Management Area. Eight springs in the Wekiva Basin also have both minimum flows and levels set which represent minimum levels for the Upper Floridan aquifer at the springhead, and flows for the river. The Wekiva River minimum flows are being peer-reviewed for possible technical readjustment.

Technical work has been completed for minimum levels on numerous other lakes or surface water basin systems, but rulemaking has not yet occurred. Lake levels are being established at a rate of approximately one every three weeks. Other than levels for the Upper Floridan aquifer at each of the major springs in the Wekiva River Basin, no aquifer levels have been established.

2. Development of Minimum Flows and Levels

In its approach to minimum flows and levels, the SJRWMD recognizes that normally, water levels or flows in all systems fluctuate, both seasonally and over time. High, low and average flows or levels all serve important functions, thus the District's approach to MFLs provides for fluctuations in water flows and levels. The District establishes multiple levels for surface water bodies and multiple flows for watercourses rather than a single minimum flow or level. All flows or levels within the fluctuation occur with certain frequencies and durations that, to some degree, mimic natural processes.

The District establishes each minimum level as including a water level, and a minimum hydrologic statistic for that level, such as a frequency and a duration or a hydroperiod category (simple percent of time level is met or exceeded). All aspects of the specified hydrologic statistic are required to be met. Minimum flows and levels have been established as administrative rules

See FLA. ADMIN. CODE r. 40C-8.031 (October 20, 1996).

"Minimum Flows and Levels Project Plan," 17, St. Johns River Water Management District (June 8, 1994). *See also*, "Establishment of Minimum Flows and Levels for the Wekiva River System," 15, Technical Publication SJ94-1, St Johns River Water Management District (1994).

FLA. ADMIN. CODE r. 40C-8 (October 20, 1996).

and applied primarily through District water use permitting and water supply planning programs.

3. Surface Water Levels and Flows

SJRWMD technical staff assesses each surface water body or surface watercourse by examining any available hydrologic records as well as examining, in the field, soils, limnology, geomorphology, hydrogeology, and biology associated with the system under review. Biological indicators and soils are used to provide a more long term view of the hydrology a particular lake or stream has experienced. Biological data include transects to identify biological communities and ecotones at various elevations, soil types and water marks. After analyzing the hydrologic, biologic, geomorphologic, and limnologic data collected from a surface water body, staff performs a scientific evaluation to determine appropriate minimum levels and/or flows, with the objective of defining the minimum hydrologic regime that must be maintained to prevent significant harm to the waterbody or watercourse.

For the Wekiva River and for Black Water Creek, the District has established the following: (1) "minimum infrequent high," (2) "minimum frequent high," (3) "minimum average," (4) "minimum frequent low," and (5) "minimum infrequent low." Each is defined by a level (in

Defined as "an acutely high surface water level or flow with an associated frequency and duration that is expected to be reached or exceeded during or immediately after periods of high rainfall so as to allow for inundation of a floodplain at a depth and duration sufficient to maintain biota and the exchange of nutrients and detrital material." FLA. ADMIN. CODE r. 40C-8.021(8) (October 20, 1996).

Defined as "a chronically high surface water level or flow with an associated frequency and duration that allows for inundation of the floodplain at a depth and duration sufficient to maintain wetland functions." FLA. ADMIN. CODE r. 40C-8.021(7) (October 20, 1996).

Defined as "the surface water level or flow necessary over a long period to maintain the integrity of hydric soils and wetland plant communities." FLA. ADMIN. CODE r. 40C-8.021(9) (October 20, 1996).

Defined as "a chronically low surface water level or flow that generally occurs only during periods of reduced rainfall. This level is intended to prevent deleterious effects to the composition and structure of floodplain soils, the species composition and structure of floodplain and instream biotic communities, and the linkage of aquatic and floodplain food webs." FLA. ADMIN. CODE r. 40C-8.021(10) (October 20, 1996).

Defined as "an acutely low surface water level or flow with an associated frequency and duration which may occur during periods of extreme drought below which there will be a significant negative impact on the biota of the surface water which includes associated wetlands." FLA. ADMIN. CODE r. 40C-8.021(11) (October 20, 1996).

feet NGVD), a flow (in cubic feet per second), a duration (in days) and a return interval (in years).

For most lakes, SJRWMD has set the following minimum levels: a "minimum frequent high," a "minimum average," and a "minimum frequent low." A hydroperiod category, which describes the inundation characteristics, is assigned to each minimum level. The hydroperiod categories of "seasonally flooded," "typically saturated," and "semipermanently flooded" are associated with the "minimum frequent high," "minimum average," and "minimum frequent low," respectively.

Conceptually, the multiple levels together define a minimum stage-duration curve, which defines the percent of time a waterbody meets or exceeds a range of water levels. The difference if any, between the existing stage-duration curve for the system and the stage-duration curve defined by the set of minimum levels, represents the amount of water which can be allocated from the system, either as ground or surface water withdrawals without contravening minimum flows and levels.

4. Ground Water Levels

FLA. ADMIN. CODE r. 40C-8.031(1) (October 20, 1996).

Defined as "a hydroperiod category where surface water is typically present for extended periods (30 days or more) during the growing season, resulting in a predominance of submerged or submerged and transitional wetland species. During extended periods of normal or above normal rainfall, lake levels causing inundation are expected to occur several weeks to several months every one to two years." FLA. ADMIN. CODE r. 40C-8.021(15) (October 20, 1996).

Defined as "a hydroperiod category where for extended periods of the year the water level should saturate or inundate. This results in saturated substrates for periods of one-half year or more during non-flooding periods of typical years. Water levels causing inundation are expected to occur fifty to sixty per cent of the time over a long term period of record. This water level is expected to have a recurrence interval, on the average, of one or two years over a long term period of record. Obligate wetland plant species are expected to be predominate near this water level." FLA. ADMIN. CODE r. 40C-8.021(18) (October 20, 1996).

Defined as "a hydroperiod category where surface water inundation persists in most years. When surface water is absent the water table is usually near the land surface. In many lakes with emergent marshes this water level is near the lower elevation that supports emergent marsh or floating vegetation that follows declining water levels to below the lower elevation of peat substrate. Water levels causing inundation are expected to occur approximately eighty percent of the time over a long term period of record. Water levels causing inundation are expected to re-occur, on average, about every five to ten years for extended periods (several or more months) during moderate droughts." FLA. ADMIN. CODE r. 40C-8.021(16) (October 20, 1996).

The primary tool that the District uses to establish minimum levels for ground waters are several ground water flow models. These are used to project future ground water drawdowns resulting from withdrawals and the impacts caused by those withdrawals. Consistent with the Florida Groundwater Availability Conventions Committee report, thresholds which indicate when withdrawal impacts become unacceptable are used to define the limits of water supply availability.

Criteria for assessing significant harm include impacts to natural systems (wetlands), violation of minimum flows and levels, ground water quality, existing legal users, land uses, karst development and aquifer compaction. Other than levels associated with the Upper Floridan aquifer in the Wekiva River basin, specific minimum levels for ground waters have not been established.

Ground water flow and salt water intrusion models have been completed, or are nearing completion for various parts of the District. These include the Northeast Florida Ground Water Flow Model; the Northeastern Florida Ground Water Basin Regional Saltwater and Freshwater Interface Model; the West Volusia - Southeast Putnam Regional Ground Water Flow Model; the Volusia Basin Regional Ground Water Flow Model; the Volusia Basin Regional Saltwater Intrusion Model; the East-Central Florida Ground Water Flow Model; the Wekiva River Basin Flow Model; the Revised Spring Discharge Conductance Coefficients for Wekiva River Basin Ground Water Flow Model; and the Titusville/Mims Regional Ground Water Flow Model.

5. Implementation Issues

The SJRWMD minimum flows and levels rule chapter provides that minimum flows and levels are used as a basis for imposing limitations on withdrawals of groundwater and surface water, for reviewing proposed surface water management and storage systems and storm water management systems, and for imposing water shortage restrictions. Specifically, the rule requires:

Ground or surface water withdrawals or surface water works must not cause the infrequent high or frequent high surface water flows and levels to occur less frequently or for a lesser duration than stated. Ground or surface water withdrawals or surface water

"Minimum Flows and Levels Project Plan," 19, St. Johns River Water Management District (June 8, 1994).

See, "Minimum Flows and Levels Project Plan," 30-36, St. Johns River Water Management District (June 8, 1994).

¹FLA. ADMIN. CODE r. 40C-8.011(5) (October 20, 1996).

works must not cause the minimum average, frequent low, or infrequent low surface water levels and flows to occur more frequently or for longer durations than stated.

a. Consumptive Use and Environmental Resource Permitting

Both CUP and ERP rules adopted by SJRWMD provide that where a proposed water use or an activity would cause water flows or levels to fall below an established minimum flow or level or would adversely affect the maintenance of these minimum flows or levels, this is a basis for denial of the application.

When the District receives a CUP or ERP application in an area where a flow or level has been established, and the water use or activity sought to be permitted has some potential to affect that flow or level, staff will evaluate the use or activity in relation to the established flow or level.

The tools typically used are ground or surface water computer models which can assist in predicting how a proposed withdrawal will affect the long term hydrologic conditions of a surface water body.

Staff examines how the volume and timing of the proposed withdrawal affects the ability of the water body to sustain the minimum hydrologic regime embodied in the minimum established for that water body. A violation of any one minimum level is considered unacceptable.

In the case of a ground water withdrawal, staff uses computer models to evaluate the impact of the drawdown on the overall hydrologic regime established for the water body, again with the purpose of maintaining the minimum hydrologic regime. Prior to adopting recommended MFLs by rule, the District uses them, along with all other available information to determine if the proposed consumptive use meets the permitting criteria concerning unacceptable harm.

b. Water Shortage Plan

The District also uses established minimum flows and levels as an important consideration for implementing its water shortage authority. The SJRWMD Water Shortage Plan authorizes the governing board to declare a water shortage in order to protect "the water resource from serious

FLA. ADMIN. CODE r. 40C-8.031(4) (October 20, 1996).

FLA. ADMIN. CODE r. 40C-2.301(5)(a)5., 6. (October 2, 1996).

FLA. ADMIN. CODE r. 40C-4.301(1)(g) (August 1996).

FLA. ADMIN. CODE r. 40C-21 (July 1993).

harm." In determining whether serious harm to the resource may occur, the District considers several factors, including the potential for lowering surface water levels or flows or ground water levels below any minimum level set forth in section 40C-8.031, F.A.C.

The Wekiva River Basin and Black Water Creek minimum flows and levels have specific flows and levels that relate to each of the phased restrictions provided for under the District's Water Shortage Plan. The Phase 1 restriction should be implemented by the Governing Board when levels or flows fall just below those indicated for "minimum frequent low," and the levels and flows associated with a Phase 4 restriction are just above those for the "minimum infrequent low." SJRWMD has implemented water shortage restrictions pursuant to Chapter 40C-21, F.A.C., for the Wekiva River Basin, when Wekiva River flows have fallen below the Phase 1 restriction indicator included in the rule.

c. Water Supply Needs and Sources

The District uses minimum flows and levels as one of several constraints on available water sources to meet existing and future water supply demands. The Water Supply Needs and Sources Assessment completed in 1994 specifically considered two factors in its identification of water resource caution areas based on natural system needs: (1) impacts to native vegetation, and (2) impacts to minimum flows and levels. Staff assessed the potential for impacts to minimum flows and levels by comparing established minimum flows and levels for surface water courses or minimum ground water levels to surface water flows and levels or ground water levels projected to occur as a result of ground water withdrawals in 1990 and 2010. In cases where a projected flow or level from 2010 pumpage was less than a minimum flow or level contained in Chapter 40C-8, F.A.C., a critical water resource problem was anticipated. For those springs where minimum flows were not established, a projected decrease of 15 percent or more in spring discharge was considered significant enough to pose a reasonable likelihood of natural systems

FLA. ADMIN. CODE r. 40C-21.231(2) (July 1993).

FLA. ADMIN. CODE r. 40C-21.221(3)(c)3. (July 1993).

²FLA. ADMIN. CODE r. 40C-8.031(1) (February 1996).

Id.

See generally, "Water Supply Needs and Sources Assessment 1994," 44-45, Technical Publication SJ94-7 (Barbara Vergara, ed.), St. Johns River Water Management District (1994).

problems and to warrant further investigation in order to establish minimum discharges.

Based on this assessment, seven springs in the Wekiva River subbasin were projected to fall below minimum levels in Chapter 40C-8, F.A.C. A water resource caution area was designated in the groundwater basin of these springs, in areas where projected declines in the potentiometric surface of the Floridan aquifer contribute to the projected declines in spring discharge, and in the public supply service areas associated with the projected withdrawals that contribute to the projected declines. Based on this designation, the District initiated an extensive effort, in cooperation with major water users in the area, to investigate and identify potential alternative sources to supplement existing ground water pumping, in order to meet future demands without violating established minimum flows and levels.

D. Southwest Florida Water Management District

1. Existing Minimum Flows and Levels

The Southwest Florida Water Management District (SWFWMD) has adopted management levels by rule for approximately 400 lakes, and has collected related physical, hydrologic and ecological information on many others.

Regulatory minimum flows which set limits on existing permitted withdrawals have been established for the Manatee, Little Manatee and lower Peace rivers. Preliminary minimum flows have also been evaluated for other major watercourses in the District, including the Withlacoochee, Weeki Wachee, Alafia, South Prong of the Alafia and Myakka rivers.

The District has adopted, by rule, a regional minimum aquifer level for the Upper Floridan aquifer in the Southern Water Use Caution Area, and is awaiting the outcome of administrative challenges to the rule.

2. Development of Minimum Flows and Levels

The SWFWMD divides its MFL program into three components: (1) minimum flows for streams, rivers and other flowing watercourses, (2) lake levels, and (3) ground water or aquifer levels. The District's approach is that it is impractical to establish minimum flows and levels for

Id. at 84.

Id. at 84-85.

Id. at 84.

See FLA. ADMIN. CODE r. 40D-8.624 (September 1996).

all water resources, since the research and analysis needed to support the establishment of MFLs is complex and costly, and varies depending on the type of water resource involved. Thus, the District is not attempting to establish MFLs for all waters at once, but is focusing on a list of prioritized waterbodies and systems, as required by the February 1996 Florida Land and Water Adjudicatory Commission Final Order and Florida legislation adopted during the 1996 legislative session.

The District's priorities are based on the type of water resource, its regional or statewide importance, existing or potential threats to the resource, and for surface water resources, the existence of water control structures. The overall intent of the MFL effort is to treat the environment as a rightful "user" of water while achieving water resource sustainability. In evaluating environmental requirements related to minimum flows and levels, the District uses criteria established in Rule 62-40.473, F.A.C. The term, "water resource sustainability," has been defined by the District Governing Board as "meeting the needs of the present generation without compromising the ability of future generations to meet their own needs." In establishing MFLs, the District "will consider the protection of existing, as well as future consumptive uses of water..." and at its discretion may provide for protection of non-consumptive uses.

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, D., 2-1.1 (rev. June 1996).

Pinellas County, Florida v. Southwest Florida Water Management District, FLWAC Final Order No. APP-96-003 (February 13, 1996).

Ch. 96-339, CS/CS/HB 2385 (codified at FLA. STAT. § 373.042(2),(3) (1996 Supp.)).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, D., 2-1.1 (rev. June 1996).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, Section 2 (rev. June 1996).

FLA. ADMIN. CODE r. 62-40.473 (February 1996). Considerations for establishing MFLs include: (a) recreation in and on the water; (b) fish and wildlife habitats and the passage of fish, (c) estuarine resources, (d) transfer of detrital material, (e) maintenance of freshwater storage and supply, (f) aesthetic and scenic attributes, (g) filtration and absorption of nutrients and other pollutants, (h) sediment loads, (i) water quality, and (j) navigation. *Id.*

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, Section 2 (rev. June 1996).

FLA. ADMIN. CODE r. 40D-8.041(1) (October 1996).

Establishing MFLs is entirely dependent on the characteristics of the resource under consideration and the existing or anticipated withdrawals from that resource. District staff interprets the phrase, "the limit at which further withdrawals would be significantly harmful..." as not clearly differentiating whether "limit" is a designated rate of streamflow in a watercourse or a regulatory limit to withdrawal quantities, such as a permit condition which limits pumpage. Thus, the District's approach is that both techniques can meet the intent of those provisions of the Water Resources Act requiring establishment of minimum flows and levels. In the discussion below, reference to regulatory minimum flows indicates that permitted withdrawal rates have been linked to flows in the source watercourse.

3. Surface Water Flows

In the late 1970s, the SWFWMD began a series of hydrologic and ecological studies of rivers and estuaries in the District to evaluate their fresh water flow needs. Such studies have now either been completed or are underway on every major river in the District. Based on these technical studies, the SWFWMD has established a ten percent presumption in its water use rules that establishes that cumulative withdrawals in excess of ten percent of daily flow will not be permitted at any point in a watercourse unless it can be demonstrated that such withdrawals will not cause unacceptable adverse environmental impacts. The District's water use rules require that prospective uses comply with standards and criteria set forth in the "Basis of Review for Water

Id. Language derived from FLA. STAT. § 373.042 (1995).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, 2-1.1(3) (rev. June 1996).

FLA. STAT. § 373.042 (1995).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, 2-1.1(3) (rev. June 1996).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, BASIS OF REVIEW FOR WATER USE PERMIT APPLICATIONS, B4-6 (April 11, 1994) (incorporated by reference in FLA. ADMIN. CODE r. 40D-2.301(3) (May 1994). In the mid-1970s, the District adopted a rule addressing a process for setting minimum flows, though it has not used the rule to establish regulatory flows for watercourses. Under this process, for streams and other watercourses, records for each month of the year would be evaluated. The five lowest monthly mean discharges for the preceding twenty years were averaged. The minimum rates of flow for streams and watercourses would be established as 70% of those values for the four wettest months (July through October), and 90% of those values for the remaining eight months. FLA. ADMIN. CODE r. 40D-8.041(2) (1989).

Use Applications." The Basis of Review includes narrative performance standards which, for streams, state that a withdrawal of water will be presumed not to cause unacceptable environmental impacts if it meets the ten percent standard. In some cases, environmental monitoring programs to evaluate potential impacts have been required for withdrawals less than the 10 percent presumption.

The ten percent presumption applies to flows on every day of the year. The intent is to protect the flow regime of a stream and associated natural system, thus the presumption is used as a guideline that can be superseded by site-specific information which indicates that higher or lower withdrawal limits are appropriate to prevent adverse impacts. The presumption is applied to all new withdrawals from watercourses in the District as they are added to existing withdrawals.

In response to 1996 legislation which requires the District to establish MFLs for a prioritized list of waters, minimum flows will be established for the Lower Hillsborough River and Tampa Bypass Canal by October 1, 1997. In accordance with a ruling by the Florida Land and Water Adjudicatory Commission, minimum flows will be established for the Braden, Manatee, Little Manatee, upper Peace, and upper Hillsborough rivers and Shell Creek by 1999. Minimum flows for the middle Peace, lower Withlacoochee, Alafia and Weeki Wachee rivers will be established by 2001. The Crystal, Withlacoochee and Myakka rivers will be addressed by 2006,

FLA. ADMIN. CODE r. 40D-2.301(3) (May 1994).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, BASIS OF REVIEW FOR WATER USE PERMIT APPLICATIONS, B4-6 (April 11, 1994).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, BASIS OF REVIEW FOR WATER USE PERMIT APPLICATIONS, B4-1 (April 11, 1994).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, BASIS OF REVIEW FOR WATER USE PERMIT APPLICATIONS, B4-6 (April 11, 1994).

Ch. 96-339, CS/CS/HB 2385 (codified at FLA. STAT. § 373.042(2),(3) (1996 Supp.)).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, D., Policy 2-4.3 (rev. June 1996).

Pinellas County, Florida v. Southwest Florida Water Management District, (FLWAC Final Order No. APP-96-003 (February 13, 1996)).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, D., Policy 2-4.3 (rev. June 1996).

with minimum flows established by 2011 for the Homosassa, Pithlachascotee and Chassahowitzka rivers, and the Anclote River/Brooker Creek system. Establishment of minimum flows for these streams will rely on technical information collected by previous, ongoing, and new studies.

Regulatory minimum flows that establish limits to existing withdrawals as a function of flows in the source watercourse have been established for the Manatee, Little Manatee and lower Peace rivers. Regulatory minimum flows have not yet been established for five watercourses which support major withdrawals, including the Hillsborough and Braden rivers, Shell and Myakkahatchee creeks and the Tampa Bypass Canal. All of these streams are impounded by dams or salinity barriers. With the exception of the Tampa Bypass Canal, reliance on these impoundments for public water supplies was in place before the SWFWMD adopted its first water use rules in 1975. Hydrologic and ecological studies are now underway on all these watercourses except the Myakkahatchee Creek, a highly modified channel with low amounts of flow for which minimum flows are not warranted or scheduled. The studies will allow site-specific minimum flow requirements for these systems to be established. Also, new studies are underway on the Manatee River, and the minimum flow requirements for that river will be reevaluated by 1999.

Preliminary minimum flows have been evaluated for other major watercourses in the District. These minimum flows and potential water supply yields from these water sources are described in the District's Water Supply Needs and Sources Plan. If any of these are identified as future water supply sources, their preliminary minimum flow values will be reevaluated with new data collection and analyses and regulatory minimum flows will be adopted.

4. Surface Water Levels

The District's approach to lakes involves identifying a series of water levels which reflect a fluctuation range that will maintain the ecological structure and function of each lake. The

Id.

Id.

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, 2-1.1(1)(a.) (rev. June 1996).

Id.

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, WATER SUPPLY NEEDS AND SOURCES: 1990-2020, Section 5.3 (January 1992).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN,

District has adopted management levels by rule for approximately 400 lakes, and has collected related physical, hydrologic and ecological information on many others. Priorities for setting levels on remaining lakes include those for which water use permits allow direct withdrawals, lakes which are 20 acres or larger, those in close proximity to wellfields or located in Water Use Caution Areas, and lakes which local governments have requested for inclusion.

For lake levels, as well as for watercourses, defining "significant harm" requires consideration of many issues. If a lake has been regulated by water control structures for a significant period of time, human uses and expectations on the lake will be considered in establishing the lake's fluctuation range. There are four management levels adopted for lakes, including the 10-year flood warning, minimum flood, minimum level (low) and minimum level (extreme low). The "10-year flood" depicts the elevation which approximates the level of flooding expected on a frequency of not less than the ten-year recurring interval as determined by best available data. This serves as an advisory level provided to local governments and others as a discretionary guideline for lake shore development. The "minimum flood" level is the highest level to which a lake or watercourse shall be allowed to fluctuate without interference except as approved by the Board for the purpose of conserving the waters of the state.

A "minimum water level" is the level of surface water at which further withdrawals would be significantly harmful to the water resources of the area, and may incorporate a low level and an extreme low level, which together establish the lower limits of the range to which a water body

Vol. II, Chapter III, 2-1.1(2) (rev. June 1996).

Id.; SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, 2-2.2(2) (rev. June 1996).

FLA. ADMIN. CODE r. 40D-8.021(4) (October 1996). Generally, this stage is established as being one foot below the elevation of the lowest structure of significance closest to the lake. "Procedures for Determining Lake Stages," Southwest Florida Water Management District (undated).

FLA. ADMIN. CODE r. 40D-8.021(3) (October 1996). This stage represents lake elevations historically equalled or exceeded about five to six percent of the period of record as determined from a stage duration curve, with field verification. It is designed to provide for those years when rainfall is above normal, but not for periods of flood. When the hydrographic record is insufficient, it can be established by field reconnaissance. The stage actually recommended may be much lower than historical information would indicate because development may have intruded into areas within upper elevations of natural lake fluctuation ranges. "Procedures for Determining Lake Stages," Southwest Florida Water Management District (undated).

will be allowed to fluctuate naturally. Either the "minimum low," or "minimum extreme low" level (depending on the specific characteristics of the lake in question) may represent the level of surface water at which further withdrawals would be significantly harmful to the water resources or ecology of the area. The approach is intended to allow fluctuations necessary for the preservation of natural resources, fish and wildlife, and for the protection of nonconsumptive uses.

5. Ground Water Levels

The District's approach to setting aquifer levels depends on the hydrogeologic characteristics of the area in question and the primary water resource issues in that area. For a confined, homogeneous aquifer from which withdrawals will affect all parts of the aquifer, with few effects on water-related resources at the land's surface, the District establishes regional minimum levels by rule. A primary example is the District's attempt to adopt, by rule, a regional minimum aquifer level for the Upper Floridan aquifer in the Southern Water Use Caution Area (SWUCA). The Upper Floridan in this region is well-confined, and the focus of the rule is on reducing rates of saltwater intrusion.

Results from the Northern Tampa Bay Water Resource Assessment Project (NTBWRAP) indicate to the District that, in that region, one regional level is not possible, thus a "sub-region by

FLA. ADMIN. CODE r. 40D-8.021(2) (October 1996).

The stage that is historically equalled or exceeded 80-95% of the period of record. In the field, the level is based on criteria such as docks and seawalls, consultation with residents and observation of natural vegetation. The stage is set about two to three feet below the top of a representative dock, assuming the dock was constructed to make it possible to float and board boats moored to the last two to three pilings. Lake residents are consulted about previous lake stages and their desires. "Procedures for Determining Lake Stages," Southwest Florida Water Management District (undated).

The elevation equalled or exceeded about 97% of the time, roughly corresponding to the elevation of the lakeward extent of emergent vegetation. "Procedures for Determining Lake Stages," Southwest Florida Water Management District (undated).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, LAKE LEVELS PROGRAM ANNUAL REPORT: 1995, 5-6 (1995). The "minimum low" level is intended to be the applicable minimum water level on a particular lake or impoundment until four consecutive years pass without a natural fluctuation to the "minimum extreme low" level. If that period of time is met, the "minimum extreme low" becomes the applicable minimum water level until the actual water level recedes to or below the "minimum extreme low." When that occurs, the minimum water level is reset to the "minimum low level," and the cycle continues. FLA. ADMIN. CODE r. 40D-8.605 (March 1993).

sub-region" approach is necessary. The area is characterized by karstic and semi-confined or unconfined aquifers with greater interconnections to surface ecosystems, in which a regional minimum aquifer level might offer protection to certain ecosystems while allowing others to suffer significant harm. The District's approach in this area is to protect surface features by implementing minimum aquifer levels on a sub-region basis.

Floridan aquifer minimum ground water levels within the NTBWRAP area will be established by October 1, 1997. Aquifer levels for the balance of the District (the Northern Ground Water Basin) are scheduled for establishment by 2006. This assumes the SWUCA Rule is upheld as to the establishment of minimum levels for the Southern Water Use Caution Area.

6. Implementation Issues

The District implements its minimum flows and levels in several programs. Among the conditions for issuance of a water use permit is a requirement that the water use will not cause water levels or rates of flow to deviate from the ranges set forth in Chapter 40D-8, F.A.C. Currently, Chapter 40D-8, F.A.C. sets forth ranges of levels for over 400 lakes within the District, but not flows for watercourses. In addition, the conditions for issuance of water use permits require that proposed withdrawals not cause "adverse environmental impacts to wetlands, lakes, streams, estuaries, fish and wildlife or other natural resources." Adverse environmental impacts to wetlands, lakes and streams are defined in narrative performance standards contained in the water use permitting Basis of Review. Though site-specific criteria will also be evaluated, the District presumes that a surface water withdrawal will meet this standard if, when combined with other withdrawals, the withdrawal does not reduce the rate of daily flow by more than ten percent

B. Terry Johnson, Southwest Florida Water Management District, "Background to Minimum Flows and Levels," Memorandum to Jeff Wade, Center for Governmental Responsibility (October 14, 1996).

Id.

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, Policy 2-4.3(2)(c.) (rev. June 1996).

FLA. ADMIN. CODE r. 40D-2.301(1)(d) (May 1994).

FLA. ADMIN. CODE r. 40D-2.301(1)(c) (May 1994).

at any point in the drainage system at the time of withdrawal. Compliance with the ten percent threshold or other minimum flow restrictions for watercourses is achieved by placing regulatory conditions on water use permits that limit withdrawal rates. These conditions are typically expressed as limits on average daily withdrawals, maximum daily withdrawals, and peak-month average daily withdrawals. In some cases, environmental monitoring programs to evaluate potential impacts to natural systems have been required as conditions of permitted withdrawals. Such programs have been required for withdrawals that do not exceed the ten percent presumption.

In cases where maximum permitted withdrawals are small compared to flows in a stream throughout the year, conditions in water use permits can provide for the minimum flow requirements of a stream. However, in some cases, maximum permitted withdrawals are linked to daily flows in the source stream so that minimum flow requirements are not exceeded on a cumulative basis. One example is that withdrawals from the Peace River near Ft. Ogden cannot exceed ten percent of the preceding day's flow as measured at an upstream gage. Withdrawals from the Little Manatee River for industrial use are regulated in a similar manner. In addition, minimum flow cutoffs may be implemented in which all withdrawals must cease when naturally occurring rates of flow in a stream go below pre-established minimum rates of flows. Regulatory minimum flows that establish limits to existing withdrawals as a function of flows in the source watercourse have been established for the Manatee, Little Manatee and lower Peace rivers.

Minimum flows and levels are also part of the District's environmental resource permit (ERP) conditions. Among the conditions for issuance of a standard general, individual, or conceptual environmental resource permit, applicants must provide reasonable assurance that the construction, alteration, operation, maintenance, removal or abandonment of a surface water management system "will not adversely impact the maintenance of surface or ground water levels

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, BASIS OF REVIEW FOR WATER USE PERMIT APPLICATIONS, B4-6 (April 11, 1994) (incorporated by reference in FLA. ADMIN. CODE r. 40D-2.301(1) (May 1994). *See* FLA. ADMIN. CODE r. 40D-2.091 (November 1995).

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN, Vol. II, Chapter III, 2-1.1(1) (rev. June 1996).

Sid Flannery, Southwest Florida Water Management District, Memo to Jeff Wade, Center for Governmental Responsibility (September 11, 1996).

or surface water flows established pursuant to Chapter 373.042, F.S."

The District water shortage rules allow it to declare a water shortage in order to "protect the water resource from serious harm." Factors that may be considered in evaluating the potential for serious harm include: (1) the occurrence of or potential for saltwater intrusion or other ground water contamination; (2) significant reductions of stream flow or spring discharge, or significant lowering of the water table; (3) the occurrence of or potential for adverse impacts on fish and wildlife; and (4) other factors adversely impacting the water resource. Thus, for the purposes of water shortage determinations, minimum flows and levels are not specifically included in the analysis of present and anticipated demands. However, the factors considered in estimating water supplies include, among others: historic, current, and anticipated flows in surface waters; and historic, current, and anticipated demand of natural systems, including losses due to evapotranspiration and seepage.

E. South Florida Water Management District

The District Water Management Plan sets forth a schedule for development of minimum flows and levels throughout the South Florida Water Management District's (SFWMD) jurisdiction during the next ten years. The primary scientific, legal and policy issues involved in the development and implementation of minimum flows and levels in SFWMD have yet to be resolved. As a result of the iterative nature of the current minimum flows and levels development efforts, District staff have indicated that the approaches and policies discussed for purposes of this report should only be considered representative of current status as of the date of the report.

1. Existing Minimum Flows and Levels

In 1981, the District adopted minimum flows and levels in Chapter 40E-22, F.A.C., which established minimum water levels for Lake Istokpoga and the canals within the Indian Prairie

FLA. ADMIN. CODE r. 40D-4.301(1)(g) (October 1996).

FLA. ADMIN. CODE r. 40D-21.231(1) (November 1995).

FLA. ADMIN. CODE r. 40D-21.221(2)(c) (November 1995).

FLA. ADMIN. CODE r. 40D-21.221(2)(b) (1995).

FLA. ADMIN. CODE r. 40D-21.221(2)(a) (1995).

SOUTH FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN: VOLUME I, I-196 (April 1995).

Basin, and minimum flows for the canals within the Indian Prairie Basin and Arbuckle Creek and Josephine Creek. The primary purpose of the adopted flows and levels was to prevent impacts to the water resources from erosion of levee side slopes and water management structures.

2. Development of Minimum Flows and Levels

In December, 1993, the Governing Board initiated a rule development process for the phased development and implementation of minimum flows and levels for Lake Okeechobee, the water conservation areas (WCAs), and Everglades National Park (ENP). The first phase was to adopt by rule the current operational schedule of the Central and South Florida (C & SF) Project for these areas. Initiation of rulemaking occurred in September, 1994. Instead of adopting the current Corps schedule, in November, 1994, the Governing Board approved a staff recommendation to combine environmental water supply initiatives conducted in the water supply planning process with the minimum flows and levels rulemaking initiative.

In April 1996, ongoing scientific analysis was presented in a draft technical document entitled "Statement of Technical Issues and Preliminary Staff Proposal for Developing Minimum Water Flows and Levels Criteria in the Lower East Coast Planning Area of South Florida." The District generally differentiates between the establishment and implementation phases of minimum flows and levels. The Technical Document consists of a proposal for the first phase of minimum flows and levels establishment. Under this approach, the District interprets the establishment phase of MFLs as being founded on "science-based" judgement. The significant harm standard is not interpreted as an optimal water management strategy or full restoration tool. It does not contemplate maintenance or restoration of "natural flow" patterns. Rather, it is a minimum standard intended to prevent harm that will affect the long-term sustainability of natural systems.

3. Surface Water Levels and Flows

The District's scientists have identified biological and hydrological factors they believe are basic to sustaining the water resource. Natural droughts are considered to be beneficial to the

FLA. ADMIN. CODE rules 40E-22.072, 40E-22.082, 40E-22.232, 40E-22.242 (1995).

"Statement of Technical Issues and a Preliminary Staff Proposal for Developing Minimum Water Flows and Levels Criteria in the Lower East Coast Planning Area of South Florida," South Florida Water Management District (April 25, 1996) (hereinafter, "Technical Document").

Id. at 8.

water resources, and any established minimum flow and level rule would not be aimed at preventing such natural variations in hydrology. The Technical Document sets forth specific numeric depth, duration and frequency criteria which are based on the "narrative" significant harm concerns linked to sustainability.

For example, the minimum levels of protection proposed for Everglades National Park and the water conservation areas are aimed at preventing peat and hydric soil oxidation, soil subsidence, loss of dry season aquatic refugia and preventing increased frequencies of severe fires which consume peat soils, destroy tree islands and associated wildlife habitat. The proposed minimum levels for Lake Okeechobee are based on the need to prevent littoral zone loss of native plants, expansion of exotic plants and increased fires that alter species distribution patterns.

"Minimum levels" are currently considered appropriate for the Everglades, since water flows so slowly across a very wide area. For the most part, the regional system is not constructed to implement sheetflow due to perimeter dikes and canals. As a result, primary consideration is being given to criteria related to marsh or wetland stage. Structural changes to the Central and Southern Florida Flood Control Project pursuant to the U.S. Army Corps of Engineers Restudy are predicted to increase the sheetflow through the system, so at that time flow criteria may become desirable.

The process to establish minimum flows for the Caloosahatchee and St. Lucie rivers has

Id.

"Technical Document," *supra*, note 169, at 29-32. For this area, "minimum water depths" are defined as levels which, if sustained for a defined period of time, will result in adverse impacts to the environment or regional water resources. "Duration" refers to the estimated period of time that water levels can remain below ground at the specified minimum water depth without causing adverse impacts or risk (significant harm to Everglades soils, plant and animal communities). "Frequency of occurrence" (or return frequency) is a statistic which represents the incidence of reoccurrence that wetland ground water levels recede to minimum levels over a prescribed period of time. *Id.*, at 30.

Id., at 44. For Lake Okeechobee, "minimum water depth" is a lake water level that, if sustained for a defined period of time, will result in significant harm to the water resources and ecology, such as loss of native plants, expansion of exotic plants, and increased frequency of severe fires that cause a loss of peat soils in the marsh. "Duration" is the estimated period of time that water levels can remain below the specified minimum depth without causing significant harm to the water resources and ecology. "Frequency of occurrence" is the return frequency for events wherein water levels may recede below the minimum depth without causing adverse environmental impacts. *Id.*, at 44-45.

been initiated. This work is based on maintaining a desired "salinity envelope" within the receiving estuaries. The salinity envelope is used to calculate minimum and maximum flows. Minimum flows will prevent significant harm to the ecology caused by hypersalinity. The year of adoption is expected to be 1999.

The National Park Service will be developing rainfall-driven stage targets for key water management gages located throughout the Everglades National Park. Determination of minimum dry season flows delivered to Northeast Florida Bay will be addressed using historical stage hydrographs and the Natural System Model. The assumption is made that maintenance of upstream minimum water levels at key locations will increase groundwater flows toward Florida Bay, Whitewater Bay, and the Ten Thousand Islands during drought periods.

4. Ground Water Levels

The District is developing minimum levels for the Biscayne Aquifer and other surficial aquifer systems in order to prevent significant inland movement of the salt water/fresh water interface, and maintain a seaward flow of fresh water. A series of water levels have been proposed for each of the existing twelve principal water control structures which are intended to assist in implementing this narrative standard. A process has been initiated to establish minimum levels for the Surficial Aquifer system in the Lower West Coast Planning Area.

5. Implementation Issues

District efforts for implementing "significant harm" criteria will be aimed at achieving a sustainable, regional water resource, considering all of the District's missions. The numeric criteria produced under the development stage of MFLs will be used as benchmarks for the District's planning processes, regulatory programs, water shortage implementation, land acquisition, and operational policies. The manner and timelines for implementation of minimum flows and levels through these mechanisms involve policy determinations, potentially affecting the

The Corps of Engineers' regulation schedules require these releases for flood control.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN: VOLUME I, I-196 (April 1995).

"Technical Document," *supra*, note 169 (November 22, 1996 revision), at 47-48.

"Technical Document," *supra*, note 169, at 46-47.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT, DISTRICT WATER MANAGEMENT PLAN: VOLUME I, I-197 (April 1995).

availability of water for existing and future water users and flood protection to existing and future developments.

The District will establish its minimum flows and levels by rule, and considers rules to be more effective for regional systems, but it will also consider the possibility of establishing MFLs on a permit by permit basis. A permit by permit approach might be appropriate and more efficient administratively for non-regional water resources or a water source that is and will be used by a very limited amount of water users, or for other regulated activities, such as isolated wetlands if they were being affected by only one or a few large withdrawals. If staff anticipates that there will be cumulative impacts from many withdrawals, then a rule will be considered more appropriate. For regional resources, the District's preferred approach is not to establish MFLs on a permit by permit basis, since it is administratively inefficient for the District.

a. Link with Regulatory Criteria and Water Shortage Criteria

Regulatory consumptive use permit criteria currently exist which prohibit "significant saline water intrusion," "adverse environmental impacts," and "pollution of the water resources." With regard to adverse environmental impacts, the District prohibits water withdrawals that cause a reduction in water levels that adversely impact protected wetland environments; cause significant reduction in water levels in a naturally occurring water body such as a lake or pond; or cause significant harm to natural systems including damage to habitat for rare or endangered species. Hydrologic models are used to determine whether the drawdowns of the proposed use, cumulative with other permitted users, will violate the applicable regulatory criteria during a design drought event. In turn, the permitted users' expectation is that water shortages will not occur during climatic events which are of less severity than this design level of drought.

Another existing component of regulation of consumptive uses under Chapter 373, F.S., are the water shortage criteria in Chapter 40E-21, F.A.C. This rule sets forth narrative criteria for determining when and where user restrictions should be in place to prevent "serious harm" to the

FLA. ADMIN. CODE r. 40E-2.301(1)(a) (July 1996).

FLA. ADMIN. CODE r. 40E-2.301(1)(c) (July 1996).

FLA. ADMIN. CODE r. 40E-2.301(1)(d) (July 1996).

³SOUTH FLORIDA WATER MANAGEMENT DISTRICT, "BASIS OF REVIEW FOR WATER USE PERMIT APPLICATIONS," A-46 (March, 1994).

water resources pursuant to Sections 373.175 and 373.246, F.S. At present, determinations of the potential for "serious harm" to water resources do not specifically include consideration of minimum flows and levels, but do address the potential for increased saltwater intrusion, potential for irreversible adverse impacts on fish and wildlife, and other factors which cause serious harm to the water resource. Four phases of water shortage exist, depending on the relative severity of the drought.

District staff indicate that minimum flows and levels, based on a "significant harm" standard may be interpreted as falling somewhere between the regulatory standard for permitting consumptive uses and the water shortage standards to prevent serious harm, which is interpreted as a greater level of harm than "significant harm." Policy decisions regarding where in this "harm" scale the minimum flow and level standard is implemented must be made.

Operating schedules of water control structures will also have a role in implementing MFLs. Water levels within the Lower East Coast Surficial Aquifer System are affected by a series of canals operated by the SFWMD and by local rainfall. Regionally maintained canals directly influence groundwater levels adjacent to the canals. As distances increase away from canals, the system becomes more rainfall driven and less canal dependent. On this basis, minimum levels are proposed for the Biscayne and Surficial Aquifer System from both a regional and regulatory scale. On a regional scale, twelve principal water control structures along the southeast coast will be maintained during drought periods at certain specified minimum levels. On a local scale, consumptive uses and drainage will be regulated so as to restrict the net annual inland movement of the saltwater/freshwater interface which is potentially influenced by the individual and cumulative impacts of project operations.

b. Phased Implementation

Due to the primarily scientific basis of minimum flows and levels criteria development,

FLA. ADMIN. CODE r. 40E-21 (February 1991).

FLA. ADMIN. CODE r. 40E-21.221(3)(c) (February 1991).

"Technical Document," *supra*, note 169, at 47.

Id.

Id.

Id.

policy issues are expected to be considered in the implementation phase. The policy issues in implementing minimum flows and levels for the Everglades and associated areas are complex due to the unique water management system for that area. Water resource conditions in the Everglades have changed dramatically over the past 100 years due to early drainage efforts, construction of the Central and Southern Florida Flood Control Project, agricultural and urban development and water management practices. Many areas have been moderately to extensively drained, while other areas have become flooded for longer periods of time. Human development requiring continued acceptable levels of flood protection and consumptive use has occurred. As a result, policy determinations regarding the role of minimum flows and levels will factor in these District missions.

The extent to which existing legal uses of water compete for regional water sources linked to the Everglades Protection Area and other minimum levels will be a significant determiner of the methods and timelines for minimum flows and levels implementation. The District considers the phased implementation of minimum flows and levels, while providing alternative sources for existing and future users, and constructing improved water distribution and shortage areas for both environmental and human water needs and flood protection, as viable solutions to any competing use situations. This is considered consistent with the water supply planning concept under Chapter 373, F.S., which allows for the reallocation of water to meet changing demands during permit renewals.

The District's approach is that planning and regulatory tools can be used to discourage increased consumptive use of water from a stressed water source and encourage development of alternative water supplies, conservation requirements, water supply source zoning, and demand management measures. Requisite funding mechanisms, research projects, and construction projects to meet non-water resource needs should be identified and developed. Implementation of the water supply plan would provide for detailed analyses of methods needed to meet reasonable consumptive use demands, including proposed regulatory criteria and funding initiatives.

Initial hydrologic modelling of draft minimum flows and levels criteria for the Everglades

Id. at 8.

Id.

FLA. STAT. § 373.223 (1995).

system indicate that a large portion of South Florida's existing legal users may not be significant competitors for water necessary to prevent violation of minimum flows and levels criteria. Instead, the reduction in coastal ground water levels and the need for flood protection may be the primary cause of water losses in the system. As a result, land acquisition and construction of buffer and storage areas will play a key role in supplying water to meet minimum flows and levels and eventually, hydroperiod restoration of the system.

In issuing orders or rules to implement Chapter 373, F.S., it is necessary to protect existing legal uses of water unless a use is found to be "detrimental to other water users or to the water resources of the state." This standard would conceivably apply to the adoption of minimum flows and levels rules that reduce the amount of water allocated to existing legal uses. The phased implementation of minimum flows and levels would need to consider these legal parameters.

Finally, due to the complex nature and inexact science involved in deriving the "significant harm" standard and in developing and implementing minimum flows and levels, District scientists have determined that a phased program should be implemented in conjunction with principles of adaptive management. Once an implementation strategy has been decided, changes should be made to the system gradually and incrementally at a rate that will allow time for the system to respond and provide feedback through the monitoring program. Responses of the system should be continually monitored to determine the effects of the change, and the rules pertaining to minimum flows and levels revised, as appropriate.

Another significant factor defining the timelines for implementing water quantity regulations to meet minimum flows and levels relates to the necessity and availability of water quality treatment areas for the increased deliveries of water from Lake Okeechobee. The Everglades Forever Act directs the District to balance the potential risks that degraded water quality may have on the ecosystem when increasing flows to the Everglades Protection Area. The possibility exists that untreated water will be available for delivery, prior to the acquisition and construction of treatment areas. As a result, the District will be making a technical and policy decision regarding the timelines for increasing deliveries to the Everglades.

FLA. STAT. §§ 373.171(2),(3) (1995).

"Technical Document," *supra*, note 169, at 37.

FLA. STAT. § 373.4592 (1995).

F. Comparison of District Approaches to Minimum Flows and Levels

The differences in approach to development of minimum flows and levels by the various Districts are to some extent a function of regional differences in hydrology and hydrogeology, types of ecosystems and the extent to which they have been degraded, nature and extent of existing development, number of existing consumptive uses, and the extent to which development has altered natural drainage and recharge. Also important is each District's interpretation of those provisions of the Water Resources Act and State Water Policy which address the development of minimum flows and levels. Ongoing meetings between the Districts and DEP addressing the need for consistency in approach have revealed that in some cases, the perceived differences in approach may be attributed to differences in semantics.

1. Multiple Levels and Flows

All of the Districts take, or intend to take, an approach to minimum flows and levels which recognize that the structure and function of surface ecosystems depend on fluctuating water levels and flows. The St. Johns River Water Management District (SJRWMD) is a prominent example of this strategy. The District establishes multiple levels for surface water bodies or systems rather than a single minimum level. All levels within the fluctuation occur with certain frequencies and durations that, to some degree, mimic natural processes.

In SJRWMD's approach, after analyzing the hydrologic, biologic, geomorphologic, and limnologic factors associated with a surface water body, staff performs a scientific evaluation to determine appropriate minimum levels and/or flows, with the objective of defining the minimum hydrologic regime that must be maintained to prevent significant harm to the waterbody as it currently exists. Each of the multiple levels includes a water level, and a minimum hydrologic statistic for that level, such as a frequency and a duration or a hydroperiod category. For example, on the Wekiva River and Black Water Creek, each of the designated levels is defined by a level (in feet NGVD), a flow (in CFS), a duration (in days) and a return interval (in years). If any aspect of the specified hydrologic statistic is not met, that flow or level is considered to have been violated.

Suwannee River Water Management District (SRWMD) has indicated that for riparian wetlands on the lower Suwannee River, it will also develop multiple flows and levels using a process similar to that used by SJRWMD on the Wekiva. For the Suwannee River estuary, the SRWMD is investigating the possibility of quantitatively relating instream flows on the river to the saltwater/freshwater interface within the estuary, similar to methods used by the Southwest

Florida Water Management District (SWFWMD) on its estuarine systems. The Northwest Florida Water Management District (NFWMD) also intends to establish minimum flows and levels for the Apalachicola River and bay, by designating a range of historic monthly flows and levels that reflect natural fluctuations in the system.

For surface watercourses, SWFWMD uses a presumption in its water use rules which requires that cumulative withdrawals measured at any point in a watercourse not exceed ten percent of daily flow throughout the year, unless it can be demonstrated that adverse environmental impacts will not occur. The presumption is used as a guideline that can be superseded by site-specific information which indicates that higher or lower withdrawal limits are appropriate to prevent adverse impacts. This strategy appears to reflect a multiple levels approach by requiring that withdrawals be tied to the range of flows that occur on watercourses throughout the year. Similar to the SJRWMD approach, the SWFWMD has used the ten percent presumption to examine potential withdrawal related effects on the frequency and duration of water levels in several streams. For lakes, the SWFWMD identifies a series of four management levels which reflect a fluctuation range that will maintain the ecological structure and function of each lake.

Though the South Florida Water Management District (SFWMD) is currently involved in studies and workshops to determine the approach it will take to MFLs, it has indicated that natural droughts are considered beneficial to water resources, and the development of MFLs will not be aimed at preventing natural variations in hydrology.

2. Significant Harm

The Districts' approaches to defining significant harm vary slightly for the development of MFLs, but generally reflect an emphasis on scientific evaluation of the structure and function of ecosystems, as measured on a long-term basis. For the *development* of MFLs, this is generally being done without reference to existing uses and development, with some exceptions. All Districts indicate there should be maximum flexibility in addressing significant harm to include regional considerations. The general expectation is that the *application* of MFLs through various operational and regulatory programs will require policy considerations based on potential effects on existing uses and development.

The NFWWMD's approach is that determinations of "significant harm" necessarily involve science-based judgments. Thus, the District views MFLs as requiring a determination by the governing board on a regional basis as to what functions are to be protected in order to ensure a sustainable system.

The SRWMD has no prescriptive definition of significant harm, but views the process of developing MFLs as being more science-driven than policy-driven. In addressing the needs of "water resources or ecology" in the MFL provisions, the ecological component is seen as setting the tightest limits on amounts of water which may be withdrawn for human use. Thus, the District will take an "ecosystem approach" which considers the linkages between floodplains and rivers, rivers and the estuaries, and surface and ground waters.

In developing MFLs, the SJRWMD defines significant harm in terms of impact on the structure and function of ecosystems. Staff examines several long-term biological, physical and hydrological indicators and performs a scientific evaluation of appropriate levels, apparently without reference to human uses. For minimum aquifer levels, criteria for assessing significant harm include impacts to surface natural systems, violation of MFLs adopted for surface waterbodies, ground water quality, existing legal users, land uses, karst development and aquifer compaction.

Though it is not a measure of significant harm, the SWFWMD ten percent presumption establishing minimum flows for watercourses is based on a series of hydrological and ecological studies which identify the current freshwater flow needs of major rivers in the District. The District's water use rules require compliance with narrative performance standards in the Basis of Review that identify environmental characteristics that cannot be adversely impacted by cumulative water withdrawals. With regard to lakes, the SWFWMD approach to developing minimum levels is that defining significant harm requires consideration of many issues, including regulation by water control structures, and human development and expectations near the lakes. In establishing MFLs, the District will consider the protection of existing, as well as future consumptive uses of water, and at its discretion may provide for protection of non-consumptive uses.

The SFWMD has indicated that it interprets the development of MFLs as being founded on "science-based" judgment. The District currently considers significant harm to include some

acceptable level of harm to water resources from consumptive uses and flood protection, though at this early point in the process of developing its approach to MFLs, there has been no further expression of how that may be reflected in a minimum flow or level.

3. Administrative Process for Establishment of MFLs

The Districts appear to view rulemaking as the most appropriate method for the adoption of MFLs, particularly for larger-scaled regional MFLs. Some Districts view administrative orders (permit-by-permit) as appropriate in certain circumstances, particularly when a limited source will be affected by only a few significant withdrawals. In this approach, criteria are attached to consumptive use or ERP/MSSW permits to assure that significant harm will not occur to water resources or ecology within the area of influence of the permitted operation.

Generally, the NFWMD favors having the discretion to use rulemaking for more regional approaches to a flow or level, or to use a permit-based approach when that serves the purposes of the MFL provisions of the Act. The District intends to establish surface water flows and levels using hydrologic watershed boundaries as the preferred planning unit, though in certain cases, sub-watershed units may be used, both of which would presumably require rulemaking. It has indicated that "pumping ceilings" in certain consumptive use permits may be converted to minimum aquifer levels, but it has not determined whether this would require rulemaking.

The SRWMD intends to take an "ecosystem approach" which considers the linkages between floodplains and rivers, rivers and the estuaries, and surface and ground waters. This approach appears to reflect watershed and sub-watershed boundaries, and adds consideration of surface and ground water linkages. The District intends to set MFLs for the lower Suwannee River by rule. In areas where there are limited withdrawals relative to one source, which are expected to represent the majority of impacts to that source, rulemaking might not be necessary. Permit by permit approaches to MFLs will meet the intent of Ch. 373, F.S., if cumulative impacts are included in the permitting criteria.

The SJRWMD has established its minimum flows and levels by rule.

The SWFWMD takes the approach that establishing MFLs is entirely dependent on the characteristics of the resource under consideration and the existing or anticipated withdrawals from that resource, and rulemaking and permits may both be used. The phrase, "the limit at which further withdrawals would be significantly harmful..." is interpreted as not clearly differentiating whether "limit" is a designated rate of streamflow in a watercourse, a regional level in an aquifer, or a regulatory limit to withdrawal quantities, such as a permit condition which limits pumpage.

The District's position is that all approaches can meet the intent of Water Resources Act provisions requiring establishment of minimum flows and levels.

Minimum levels for approximately 400 lakes in the SWFWMD have been adopted by rule. The ten percent presumption applicable to surface water withdrawals is included in the District's "Basis of Review for Water Use Permit Applications," incorporated by reference in its rules for permitting of water use. In the Southern Water Use Caution Area, with a confined, homogeneous aquifer from which withdrawals will affect all parts of the aquifer, with few effects on surface features, the District has adopted by rule a regional aquifer level, which is undergoing an administrative challenge.

The SWFWMD has adopted by rule minimum flows and levels for one lake and several creeks and canals within the District, and considers rules to be more effective for regional systems, but will also consider the possibility of establishing MFLs on a permit by permit basis. The latter approach is seen as being potentially more appropriate and more efficient administratively for non-regional water resources or for other regulated activities such as impacts to isolated wetlands, if affected by only a few large withdrawals. If cumulative impacts are anticipated from many withdrawals, a rule would be considered more appropriate.

IV. OTHER DISTRICT PROGRAMS RELATED TO PROTECTION OF NATURAL SYSTEMS

Among the primary methods by which the Districts address impacts to natural systems are consumptive use permitting criteria generally prohibiting adverse environmental impacts, and water shortage planning provisions which are intended to protect water resources from serious harm. Additional criteria protecting minimum flows and levels have been incorporated into the permitting and water shortage planning provisions of several Districts. These are discussed for each District in Section III of this report. In addition, the Districts employ a variety of planning, regulatory and operational tools which, in a broad sense, relate to protection of natural systems. This section of the report summarizes the most prominent of these programs.

Each District maintains ongoing programs of monitoring, data collection and research that support the understanding of current conditions, as well as staff evaluation of project applications with potential impacts to natural systems. Minimum flows and levels studies are supported by research conducted within these general programs of research. With larger budgets, management responsibilities, and greater numbers of monitored permits, the South Florida, Southwest Florida,

and St. Johns River water management districts have developed larger databases and more detailed understanding of the resources within their jurisdictions, though the Northwest Florida and Suwannee River districts also have active, though limited programs.

An additional regulatory tool each District has within consumptive use permitting is authority to "reserve from use by permit applicants, water in such locations and quantities, and for such seasons of the year, as in its judgment may be required for the protection of fish and wildlife or the public health and safety." Such "reservations" must be established by regulation, and must not interfere with an existing legal use "so long as such use is not contrary to the public interest." To date, the only District to have established a reservation is St. Johns River Water Management District, with regard to protecting certain flows of water to Paynes Prairie State Preserve.

Each District has also researched and written a District Water Management Plan (DWMP) which assists it in developing a comprehensive view of its water resource issues and in creating a coherent response to those issues. Among other topics, the DWMP is required to address several elements which relate to natural system protection. The State Water Policy rule requires schedules for establishing minimum flows and levels for a priority selection of waters, considering ground water and surface water availability. Also required are assessments of water supply needs

FLA. STAT. § 373.223(3) (1995).

FLA. STAT. § 373.223(3) (1995). The district or department, "by regulation, may reserve from use...." *Id.* As of the writing of this report, the only reservation from use has been established, through rulemaking, by the St. Johns River Water Management District. The Southwest Florida Water Management District has taken the position that reservation from use is generally accomplished through Chapter 40D-2, F.A.C. provisions that limit impacts to environmental systems from consumptive uses, and therefore can be implemented on a permit-by-permit basis.

Id. Compare, FLA. STAT. § 373.171(2),(3) (1995) (In promulgating rules, regulations and orders, governing boards must act "with a view" to full protection of existing rights to water insofar as is consistent with the purpose of this law. No rule, regulation or order shall require modification of an existing use unless the use is shown to be "detrimental to other water uses or the water resources of the state.") *See also, supra*, notes 37-39, and accompanying text.

FLA. ADMIN. CODE r. 40C-2.302 (October 1996). *See also*, *Smith v. St. Johns River Water Management District*, 16 FALR 3274, ER '94:095 (dismissing petition which challenged District's proposed rule on reservation of water, and holding that the District was not required to establish a minimum flow for that area before making the reservation, nor was it required to issue a permit for the amount of water reserved).

FLA. ADMIN. CODE r. 62-40.520(6)(c)4. (February 1996).

and sources for the next twenty years. The SFWMD, SWFWMD and SJRWMD have completed their needs and sources assessments, while NFWWMD and SRWMD have partially completed their assessments.

The water supply needs and sources assessments must identify specific geographic areas, known as "water resource caution areas" that have critical water resource problems or which are anticipated to become critical within twenty years. The majority of the SFWMD and the SWFWMD, and the entirety of the SJRWMD have been designated as water resource caution areas, as well as a small percentage of the NFWWMD. SJRWMD has also designated "priority water resource caution areas," based in part on protection of established minimum flows and levels.

The DWMPs must include a course of remedial or preventive action for each current and anticipated problem, basing the proposed action on economic, environmental and technical analyses, and must identify other areas where data collection, resource investigations, water resource projects or regulatory programs are necessary to prevent water resource problems from becoming critical. The plans must be implemented by a schedule of specific actions, which may include program development, water resource projects, land acquisition, funding, technical assistance, facility operations, and rule development.

Those portions of the ground and surface water availability inventories, and the needs and sources assessments which have been completed as part of the DWMP process have served to

FLA. ADMIN. CODE r. 62-40.520(2) (February 1996).

As part of its needs and sources analysis in three stressed regions of the district, the Southwest Florida Water Management District initiated "water resource assessment projects" (WRAPs) which were focused on developing the necessary water-resource based technical information and tools needed to establish the "safe yield," the quantity of water available for human use without causing unacceptable impacts to the resources, associated natural systems, and existing legal uses of water. The Eastern Tampa Bay WRAP was completed in April 1993, and the Highlands Ridge and Northern Tampa Bay WRAPs in 1995.

FLA. ADMIN. CODE r. 62-40.520(2) (February 1996).

FLA. ADMIN. CODE r. 62-40.520(5) (February 1996).

FLA. ADMIN. CODE r. 62-40.520(1) (February 1996).

See also, FLA. STAT. § 373.0395 (groundwater basin resource availability inventory required to include "criteria to establish minimum seasonal surface and ground water levels").

assist the Districts in recognizing existing or incipient problems related to ecosystem needs for water, and have helped establish baseline data sets supporting additional research on minimum flows and levels. It should be noted however, that only the SJRWMD and SWFWMD have completed ground water basin resource availability inventories. "Water resource caution area" designations have justified the imposition of a permitting moratorium, additional permit conditions and water resource projects in order to address problems related to natural systems, and have resulted in the establishment of minimum flows and levels in order to prevent significant harm to water resources or ecology in those areas.

The Districts are also required to provide technical assistance to local governments to assist them in the preparation and implementation of their local comprehensive plans. Included in the data to be provided are several categories of information on surface and ground water features, and information "reflecting the minimum flows for surface watercourses to avoid harm to water resources or the ecosystem and information reflecting the minimum water levels for aquifers to avoid harm to water resources or the ecosystem." Groundwater basin resource availability inventories must include various studies of groundwater, hydrogeology and recharge areas, and "criteria to establish minimum seasonal surface and ground water levels." The inventories are submitted to local governments and regional planning agencies and must be considered in any revisions to local government comprehensive plans.

In addition to these planning, regulatory and technical assistance programs, the Districts maintain active land acquisition, management and restoration programs aimed at supporting the Districts' goals for water management, water supply and conservation of water resources. The South Florida and Southwest Florida districts, particularly, have also incorporated considerations of water resource and natural system protection criteria into their operation and maintenance of

FLA. STAT. § 373.0391 (1995).

FLA. STAT. § 373.0391(2) (1995). *Compare*, FLA. STAT. § 373.042(1) (minimum flow as the limit at which further withdrawals would be *significantly* harmful to water resources or ecology; minimum levels as the limit at which further withdrawals would be *significantly* harmful to water resources).

FLA. STAT. § 373.0395 (1995).

Id.

works of the district.

V. ANALYSIS OF PROGRAMS IN RIPARIAN STATES

This section examines maintenance of minimum flows and levels and protection of natural systems in other states with statutory programs based on riparian water law. The section first summarizes and assesses selected state programs which appear to have comprehensive programs protecting minimum flows or levels. The remainder of the section examines how different states have addressed specific issues which may be of interest to regulators in Florida.

Of the thirty-two states in the United States with regulatory programs based primarily on riparian water law, twenty-five require some protection of minimum flows or levels. The remaining seven states do not require protection of flows or levels.

A. Summary and Assessment of Selected State Programs

This analysis focuses on states which appear to have comprehensive or successful minimum flows or levels programs. Of the 25 states that require some degree of protection of minimum flows or levels, the following states were chosen for analysis: Connecticut, Hawaii, Iowa, New Hampshire, Minnesota, and Wisconsin. Water regulators in each of these states were contacted and interviewed as part of this study. The results of each interview are included in the Appendix to this report.

1. Connecticut

Connecticut considers impacts to stream flows as part of its program regulating stream diversions and impoundments. Impacts to stream flows are one of many factors the state considers when considering whether to grant or deny a diversion or impoundment permit. Other factors include impacts to existing and planned water uses, compatibility with long range water

See, FLA. STAT. § 373.103(4) (1995). Governing boards may be authorized to determine, establish and control levels of water in canals, lakes, rivers, channels, reservoirs, streams or other bodies of water controlled by the district. *Id.*

States requiring some protection of minimum flows or levels include: Arkansas, Connecticut, Georgia, Hawaii, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, South Carolina, Tennessee, Vermont, Virginia, and Wisconsin.

States which do not statutorily require that minimum flows or levels be protected include: Alabama, Delaware, Louisiana, Missouri, Ohio, Rhode Island, and West Virginia.

CONN. GEN. STAT. § 22a-369(7).

resources planning, economics and job creation, existing water conditions, fish and wildlife, and navigation. Under this permitting program, the state considers impacts to stream flows, but does not establish minimum flow levels.

Connecticut provides greater protection for flows of streams the state has stocked with fish. The Water Management Bureau (Bureau) of the state's Department of Environmental Protection is required to establish minimum flows for stocked streams. Applications for diversion or impoundment of waters of stocked streams must not violate minimum flows established for those streams. Despite being limited to stocked streams, Connecticut's program is worth examining because it provides applicants with several methodologies for determining whether proposed withdrawals will violate minimum flows.

Connecticut uses a three-tiered system for determining whether a proposed diversion will violate minimum flows. The first tier involves assessing whether the proposed diversion will cause the stream to drop below the New England Aquatic Baselevel (NEAB). This baselevel is determined by averaging median August stream flow values. The month of August is used because it is the most stressful month on fish due to low water levels and warm water temperatures. There are 46 gaged streams in Connecticut from which stream flow is collected. For ungaged streams, the average baselevel stream flow of the 46 gaged streams is used (0.5

CONN. GEN. STAT. § 22a-373.

Standards for stocked streams must 1) keep a sufficient flow to protect and safely maintain the stocked fish, 2) preserve and protect the natural aquatic life, including anadromous fish, 3) preserve and protect the natural and stocked wildlife dependent upon such water, 4) promote and protect usage of the water for public recreation, and 5) be consistent with the needs and requirements of public health, flood control, industry, public utilities, water supply, public safety, agriculture, and other public uses of such waters. CONN. GEN. STAT. § 26-141b.

CONN. GEN. STAT. § 26-141c.

Richard Hamann, Jeff Wade, John Tucker, & Benjamin Maserang, *Water Quantity and the Environment: A Summary of State Experiences* 51 (report to the South Florida Water Management District, 1994) [hereinafter *State Summary*]; Telephone Interview with Bob Gilmore, Diversion Permitting Specialist, Connecticut Department of Protection (October 28, 1996).

Id.

Id.

CFS/sq.mi. of watershed).

An applicant that is not satisfied with the amount found divertable from an ungaged stream based on the NEAB may go to the second assessment tier. The second tier assessment allows the applicant to use the baseflow of a sister gaged watershed with similar hydrological characteristics instead of the average baseflow level of the 46 gaged streams. Under the second tier assessment, an applicant may use the sister stream's baselevel of stream flow instead of the NEAB, regardless of whether the stream flow turns out to be greater or less than the NEAB.

If still unsatisfied, an applicant may use the third assessment tier, which involves a resource-based instream flow assessment. The applicant must physically measure stream flow velocity, temperature, and quantity of fish habitat at different flow levels. From this information, the Bureau generates weighted usable area curves that are species-specific and lifestage-specific. The Bureau creates a species profile of the stream and uses this data to determine the baselevel of stream flow needed to protect the species.

The tiered approach to determine baseflows has several potential positive attributes. First, the approach enhances regulatory flexibility by providing applicants with several options to determine baseflows. Mandatory non-site specific regulatory standards based on seemingly arbitrary or irrelevant data may create substantial antagonism within the regulated community. Under Connecticut's approach, if an applicant believes a different methodology would better represent actual instream flow needs, then the applicant can select that methodology. In effect, this approach shifts the responsibility of determining the methodology from the Bureau to the applicant, perhaps making the final protected level more palatable to the applicant. Applicants

Id.

Id.

Id.

Id.

Id.

Id.

Id.

Id.

may be less likely to challenge determinations of baseflow levels if they have a choice in the methodology.

Another potential advantage is that the program makes maximum use of existing data by allowing applicants to select sister gaged streams rather than requiring the Bureau or applicants to collect site specific data for each ungaged stream. The use of sister gaged streams seems to be a logical and reasonable approach when site specific data is not available. This relieves both the state and applicants from conducting expensive and time consuming studies prior to permitting withdrawals from previously unstudied streams. Yet, the program does not preclude detailed site-specific studies of ungaged streams. An applicant may establish the level through a site-specific study under the third tier assessment.

Despite the potential advantages of the three-tiered approach, Connecticut has experienced several difficulties in implementing its program. First, substantial existing diversions were grandfathered in at the time the program was adopted. These grandfathered diversions are exempt from the program. Second, the limitation of the program to streams stocked with fish ignores the flow needs of other important streams. While the state must consider impacts to instream flows as part of its review of applications for diversions or impoundments, impacts to instream flows are but one of many factors the state considers. Third, the statute authorizing the program does not provide sufficient enforcement authority, and the state has not adequately utilized existing authority to set and enforce standards. Finally, the state has been less than diligent in developing watershed plans and making tough allocation choices between competing diversions.

2. Hawaii

In 1989, Hawaii began an ambitious program to protect instream flows of all rivers throughout the state. In preparing the state's water resource plan, the Water Resource Management Commission must review existing and proposed water uses, and consider their effect

Telephone Interview with Bob Gilmore, Diversion Permitting Specialist, Connecticut Department of Protection (October 28, 1996).

Id.

Id.

HAW. REV. STAT. § 174C-5(3) (1992).

on the environment, procreation of fish and wildlife, and water quality. Within each "hydrological unit," the Commission is required to establish an instream use and protection program for surface watercourses. Water use permits must include conditions to protect instream flows and maintain sustainable yields of groundwater. Groundwater withdrawals that lower surface waters below protected levels are prohibited unless the Commission agrees to amend the interim flow standards to accommodate the withdrawals. Future uses on designated streams may be restricted if inconsistent with the need for public recreation, environmental protection, and fish and wildlife procreation.

The difficulty and expense of collecting good scientific data has been a serious impediment to the development of Hawaii's program. The Commission's goal is to quantify instream and offstream uses and set stream flow standards on a stream by stream basis. Initially, this proved too difficult to implement, and an interim streamflow standard was adopted based on the status quo flow. The interim instream flow standard reflects the present natural flow plus existing diversions. The interim standard was adopted by rule. After adoption of the interim standard, water uses which change the interim instream flow standard require an amendment to the interim standard. The program also provides for permanent instream flow standards, to be established

Id. § 174C-31(c)(2).

Id. § 174C-31(f)(1).

Id. § 174C-31(g).

Telephone Interview with David Higa, Planner, Commission on Water Resource Management, Hawaii (November 14, 1996).

When it is determined that the water resources of an area are threatened by existing or proposed water uses, the Commission must designate the area to ensure reasonable-beneficial use of water resources in the public interest. *Id.* § 174C-41(a).

Id. § 174C-31(h).

Telephone Interview with Rae M. Loui, Deputy Director, Commission on Water Resource Management, Hawaii (Oct. 24, 1996).

Telephone Interview with David Higa, Planner, Commission on Water Resource Management, Hawaii (November 14, 1996).

Id.

specifically for each stream. Although the Commission hired a consultant in 1994 to study one particularly important stream, the state has yet to adopt any permanent instream flow standards.

3. Iowa

Iowa established protected flows for selected streams in the mid-1970s. The protected flow is the "established average minimum flow" for the watercourse, based on historic needs and public interest. The purpose of the protected flow is to protect water supplies for ordinary household and livestock use, fish and wildlife use, recreational use, instream use and waste assimilation, beneficial water use needs, preservation of aesthetic values, and other public uses. Permits for diversions may be issued only if the "established average minimum flow" is preserved.

The state has not expanded the program to include other streams or changed the established levels of flow since the program was begun. Minimum stream flow levels were set at the level the streams exceeded 84% of the time. Iowa recognizes a connection between groundwater and surface water and assumes that withdrawals from wells within 660 feet of a protected stream will impact the stream flow level. When stream levels approach the protected level, users are notified and are required to obtain approval for withdrawals. Consumption can be limited, rotated among users, or banned depending upon the size of the stream's drainage area.

Id.

State Summary, supra note 219, at 10.

Telephone Interview with Rae M. Loui, Deputy Director, Commission on Water Resource Management, Hawaii (Oct. 24, 1996).

IOWA CODE § 455B.261(15).

IOWA ADMIN. CODE r. 567-52.8(1).

IOWA CODE § 455B.267(1).

State Summary, supra note 219, at 80; Telephone Interview with Darrell McAllister, Chief of Surface and Groundwater Protection Bureau, Iowa Department of Natural Resources (October 24, 1996).

Id.

Id.

Telephone Interview with Darrell McAllister, Chief of Surface and Groundwater Protection Bureau, Iowa Department of Natural Resources (October 24, 1996).

Permittees must also create water conservation plans.

The program is tied to water shortage plans that establish the priority for reducing or stopping uses during times of shortage. Irrigators are usually the first group of consumptive users required to cut back on use when the stream flows become low, and therefore are most affected by the program. Yet most irrigators voluntarily comply with the program.

The program has a history of voluntary cooperation from permit holders, and has never been legally challenged. Violators are often reported by nearby users, who usually face the same withdrawal restrictions, know which actions are violations, and have an incentive to prevent others from gaining competitive economic advantage. The protected flow system has been very successful in drought circumstances.

A principal strength of the Iowa program is the high level of voluntary compliance by users. This may be in part a result of the high level of assistance the state provides to users through the program. For example, the state helps users develop conservation plans. The state also monitors stream flows and provides a unit which users can call to determine whether they can use water during low flow periods. In some ways, the program is like a cooperative assistance program rather than a command and control regulatory program.

4. Minnesota

In Minnesota, water use permits are conditioned on maintenance of several wildlife and environmentally related factors, including maintenance of protected flows. The Commissioner of the Department of Natural Resources is required to manage and develop the state's water resources to assure adequate supply to meet long-range seasonal requirements for fish and

IOWA. ADMIN. CODE r. 567-50.

Telephone Interview with Darrell McAllister, Chief of Surface and Groundwater Protection Bureau, Iowa Department of Natural Resources (October 24, 1996).

State Summary, supra note 219, at 80.

Telephone Interview with Darrell McAllister, Chief of Surface and Groundwater Protection Bureau, Iowa Department of Natural Resources (October 24, 1996).

State Summary, supra note 219, at 80.

Id.

See MINN. STAT. ANN. §§ 103G.265(1), 103G.285(2),(3) (West 1991).

wildlife. Permits to appropriate water from watercourses must be conditioned to limit withdrawals during periods of specified low flows.

Approval of surface water appropriations is subject to designated protected flows, temporary duration on designated trout streams during high flows or levels, protected elevations for natural and altered basins except where constructed for flood control purposes, and establishment of protected flows and protection elevations. "Protected flow" is defined as the amount of water required in a watercourse to accommodate instream needs such as aesthetics and fish and wildlife habitat. A "protected elevation" is defined as the basin water level needed to maintain fish and wildlife habitat and other values needed to maintain the public interest.

Presently, Minnesota sets protected flows at the level of flow a stream exceeds 90 percent of the time (Q90) through individual permitting. However, the state is moving toward establishing protected flows by rule and is in the process of gathering data. The state will first undergo rulemaking to establish the procedure for setting protected levels. The procedure will probably be based on the Instream Flow Incremental Methodology (IFIM) system. The state will then establish protected flows by rule for entire watersheds.

Individual permits must comply with the protected flows, as well as additional instream needs of flora and fauna. Permits to appropriate surface water must contain conditions to protect

MINN. STAT. ANN. § 103G.265(1).

Id. § 103G.285 (2).

MINN. R. 6115.0670(3)(B).

Id. r. 6115.0630(12).

Id. r. 6115.0630(13).

Telephone Interview with Jim Japs, Water Allocation Hydrologist, Division of Water, Minnesota Department of Natural Resources (Nov. 7, 1996).

Id.

IFIM was developed by the U.S. Fish and Wildlife Service and is used to model how changes in flow impact habitat available to aquatic life.

Telephone Interview with Jim Japs, Water Allocation Hydrologist, Division of Water, Minnesota Department of Natural Resources (Nov. 7, 1996).

water basin levels and important aquatic vegetation characteristics related to fish and wildlife habitat. When evaluating water use applications, the state also considers the hydrology and hydraulics of the water resources, probable environmental effects of the proposed appropriation, and the public welfare. For watercourse appropriations, the state considers historic or estimated streamflow, the aquatic system, riparian vegetation, and existing fish and wildlife management within the watercourse. For proposed basin appropriations, the state considers historic basin water levels, cumulative long-range ecological effects, and natural and artificial controls on basin water levels. All applicants for water use permits must submit a statement of justification supporting the reasonableness and practicality of the proposed use regarding the adequacy of water source, including facts on hydrology and hydraulics of water sources involved, analysis of effects on levels and flows and impacts on instream flows and levels of surface waters.

If a stream falls below the protected level, the state may suspend the appropriation permit of upstream users or users of waters within the watershed that contribute flow to the affected water body. During 1988 and 1989 the state restricted use of waters because of drought conditions. Minnesota requires that water users develop water shortage contingency plans that consider protected levels. The state provides guidance and assistance, but users must work out the details of how water will be allocated during low flow periods or when permits are suspended. The burden is on all appropriators to develop contingency plans.

The program also creates "safe yield" levels for groundwater and wells. "Safe yield for water table condition" is defined as the amount of water that can be withdrawn from an aquifer

MINN. STAT. ANN. § 103G.285(3)(b).

MINN. R. 6115.0670(2)(A).

Id. r. 6115.0670(2)(B)(1).

Id. r. 6115.0670(2)(C).

Id. r. 6115.0660(E)(1).

Telephone Interview with David R. Ford, Surface Water Engineer, Division of Water, Minnesota Department of Natural Resources (October 24, 1996).

Id.

Id.

Id.

system without degrading water quality or allowing long term average withdrawal to exceed long term average recharge to the aquifer system. The state considers the connection between surface and groundwaters, but does not have authority to suspend groundwater uses that are impacting surface waters. The state is considering changing its program to provide authority to limit groundwater withdrawals that impact surface waters.

Minnesota's program appears to be reasonably successful. There have been no legal challenges to Minnesota's program, although there has been some pressure from major appropriators with political connections and influence. Despite a lack of scientific data that has hindered the setting of more accurate protection elevations, the state is moving toward adopting a methodology and levels to protect flows on a watershed basis.

5. New Hampshire

New Hampshire is in the process of developing a statewide comprehensive river management and protection program, which includes protection of instream flows. Under the River Management and Protection Program (Program), the state is responsible for designating significant rivers and protecting instream flows, and local governments are responsible for developing and adopting river corridor management plans to protect shorelines and adjacent lands. Any citizen or organization may nominate a river for state designation. The state then evaluates the nomination to identify significant resource values, suggest management and protection measures, and recommend legislation for designation. Designations do not become effective until adopted by the state legislature and signed by the Governor. Rivers may be designated as natural rivers, rural rivers, rural-community rivers, and community rivers.

MINN. R. 6115.0630(15).

Telephone Interview with David R. Ford, Surface Water Engineer, Division of Water, Minnesota Department of Natural Resources (October 24, 1996).

In 1988, the New Hampshire legislature passed the Rivers Management and Protection Act. N.H. REV. STAT. ANN. ch. 483 (1988). At the time this report was written, the state had developed draft instream flow rules but had not yet adopted them.

New Hampshire Department of Environmental Services, Technical Bulletin, NHDES-CO-1995-2.

Sponsors must include a description of the river's values and characteristics. *Id.*

Id.

N.H. REV. STAT. ANN. § 483:7-a.

Currently, twelve rivers have been designated under the program.

The state is responsible for protecting instream flows in rivers designated under the Program. The authorizing statute requires that instream flows be established and enforced "to maintain water for instream public uses and to protect the resources for which the river or segment was designated." The statute defines "instream public uses" as "the state's interests in surface waters, including, but not limited to, navigation; recreation; fishing; storage; conservation; maintenance and enhancement of aquatic and fish life; fish and wildlife habitat; wildlife; the protection of water quality and public health; pollution abatement; aesthetic beauty; and hydroelectric energy production."

New Hampshire's Department of Environmental Services has developed a draft instream flows rule. The rule was developed with the advice and input of the statewide Rivers Management Advisory Committee (RMAC) and a special task force set up by the RMAC, known as the Instream Flow Working Group. These groups represent a diverse set of interests including: water supply, fish and wildlife, business and industry, hydropower, conservation, environment, recreation, historic and archaeologic resources, ski industry, and agriculture. The Department considered the advice and recommendations of these groups regarding the amount and method of instream protection that would be appropriate for designated rivers in New Hampshire.

Logically, the draft rule integrates instream flow protection and water shortage planning and response into one unified program. The draft rule creates a phased approach whereby increasingly stringent measures are implemented as flow levels decrease. The different phases are

New Hampshire Department of Environmental Services, Technical Bulletin, NHDES-CO-1995-2.

N.H. REV. STAT. ANN. § 483.483:9-c,I.

Id.

New Hampshire Draft Instream Flow Rules, Part Env-C 720 (draft, April 19, 1996).

The RMAC was established by the Rivers Management and Protection Act. R.I. GEN. LAWS ch. 483.

"New Hampshire Rivers Management and Protection Program Draft Instream Flow Rules - A Summary" (document produced by the New Hampshire Department of Environmental Services, July 1996) [hereinafter NH Draft Rule Summary].

Id. at 2.

implemented only after the trigger flow is exceeded for seven consecutive days. The phased reduction or cessation would normally remain in effect for 10 days, unless otherwise indicated. In order for the phased reductions to be implemented, the total watershed-wide consumption attributed to all affected users on a designated river must reach or exceed two percent of the actual flow.

The draft rule reflects natural seasonal flow patterns and differing seasonal water use needs by establishing protected flows for each designated river in each of four hydrologic seasons. To address differences in flows at various points along designated rivers, the rule will establish protected instream flows for each of the watersheds through which a designated river flows, and for portions of watersheds if necessary. The rule applies to consumptive water use directly from the mainstem of designated rivers, and to consumptive use of groundwater or surface water within 250 feet of designated rivers.

The draft rule requires development of river-specific trigger flows and protected instream flows in recognition of the different mix of uses, priorities, and natural resources on each river. The rule requires that the Department establish the final flows, in consultation with the RMAC and the public. The rule also provides a process to appeal and change protected instream flows.

The rule contains proposed starting points for establishing the trigger flows and protected instream flows. In Phase I, which is triggered at seasonal Q50, users are notified that a low-flow event is likely to occur and are requested to voluntarily conserve water. Phase I is intended to encourage non-regulatory measures for maintaining the desired flows and to minimize the need to

Id. at 3.

Id.

Id.

New Hampshire Draft Instream Flow Rules, Part Env-C 723.02 (draft, April 19, 1996).

Id. at ENV-C723.03(c).

NH Draft Rule Summary, *supra* note 290, at 4.

Id. at 3-4.

New Hampshire Draft Instream Flow Rules, Part Env-C 723.08, Env-C 724 (draft, April 19, 1996).

Id. at Env-C 723.04.

regulate users. In Phase II, which is triggered at seasonal Q70, consumptive use is limited to five percent of the actual stream flow. In Phase III, which is triggered at seasonal Q80, consumptive use is limited to two percent of actual stream flow. At Phases II and III, the amount of water available to each water user would be proportional to the amount of water withdrawn under normal or non-conservation conditions. Phase IV, the protected instream flow level, is triggered at seasonal Q90, and requires cessation of all consumptive use withdrawals.

The draft rule provides incentives to encourage users to voluntarily conserve. Users that demonstrate they have implemented a comprehensive water conservation program which addresses all water use at the facility are entitled to seek an exemption from the phased reductions. To qualify for the exemption, users must show that their conservation program will achieve a reduction in their withdrawal equal to or greater than the amount required by the phased reductions.

6. Wisconsin

Wisconsin sets minimum flow rates on streams to protect downstream users and to protect the public interest in flows needed for navigation and for fish. The Department of Natural Resources (Department) may establish water elevations in navigable streams or lakes for conservation purposes at levels equal to or greater than "normal elevation." Generally, protected flows in permitting are related to the minimum flows needed to protect fish plus the quantity necessary to meet the needs of downstream diverters.

No specific methodology is used to determine protected flows for fish and habitat. Fish managers and water management specialists work together to determine the quantity of water needed to protect fish. Normally, either the 7Q10 or 7Q2 flows are protected in order to maintain

Id.

Id.

NH Draft Rule Summary, *supra* note 290, at 3.

New Hampshire Draft Instream Flow Rules, Part Env-C 723.04 (draft, April 19, 1996).

NH Draft Rule Summary, *supra* note 290, at 4.

WIS. STAT. ANN. § 30.18(8).

State Summary, *supra* note 219, at 214.

downstream assimilation capacity. If water levels fall below the protected levels then further appropriations may be reduced or halted. Priority is based on the age of an appropriator's rights, with the most recent appropriations being restricted or halted first. Consumptive uses have been restricted in the past because water levels dropped below protected levels.

Protected flows are tied directly to Wisconsin's permitting program and are set on a permit-by-permit basis rather than by rule. The level of protected flow is set when a permit is issued. Diverters may be required to monitor their own withdrawals against a nearby U.S. gauging station, a temporary benchmark, or a tapedown marker. Permits may also contain conditions that limit pumping duration, rate, or frequency. In addition, diverters must submit reports to the state documenting their water usage. Interestingly, applicants for new diversions must obtain the permission of existing downstream appropriators. The Department has the authority to revoke a stream water diversion permit if it determines that the diversion is detrimental to the stream.

The Department may also regulate flows and levels related to dams and bridges affecting navigable waters. In evaluating a permit for dam construction, maintenance or operation, the Department will determine if the activity is in the public interest by considering ecological, aesthetic, and recreational values of the river in its natural condition and its condition when dammed. Dams on navigable streams must pass at least 25 percent of the natural low flow at all

Id.

Telephone Interview with John Coke, Water Regulations and Zoning Engineer, Water Regulation and Zoning Bureau, Wisconsin Department of Natural Resources (October 28, 1996).

Id.

Id.

Id.

Id.

Id.

Id. § 30.18(6m)(b).

Id. § 31.02.

Id. § 31.06(3).

times except where the Department determines this minimum flow is not needed to protect fish life. The Department is also required to determine the minimum stream flow or lake level needed to protect public rights when a permit application is received to divert surface water for mining or prospecting.

Regulators in Wisconsin report there have been no legal challenges to their instream program, other than a 1959 suit challenging the requirement that new users must first obtain the consent of existing users. Regulators did identify several weaknesses of the Wisconsin program. First, the lack of a methodology to determine protected levels could result in abuse or arbitrary action. Second, the requirement that applicants for new diversions must obtain consent from existing diverters could be abused by existing diverters.

B. Selected Issues

The remainder of this section identifies issues and approaches in other states that may be of interest to regulators in Florida. This section draws from information gathered in a 1994 nationwide survey of state minimum flows and levels programs, as well as the interviews conducted for the current report. Refer to the Appendix to this report for copies of the questionnaire used and interview responses.

1. Tiered Approach to Establishing Minimum Flows

Some states allow applicants to choose from several different methodologies to determine whether the proposed diversion protects stream flow. Connecticut's program, described above, provides three tiers of assessment which an applicant may go through. The first tier involves determining whether the proposed diversion will cause the stream flow to drop below the "New

Id. § 31.34.

Id. § 144.855(2)(b).

Telephone Interview with John Coke, Water Regulations and Zoning Engineer, Water Regulation and Zoning Bureau, Wisconsin Department of Natural Resources (October 28, 1996).

Id.

Id.

Richard Hamann, Jeff Wade, John Tucker, & Benjamin Maserang, *Water Quantity and the Environment: A Summary of State Experiences* (report to the South Florida Water Management District, 1994).

England Aquatic Baselevel." The second tier allows the applicant to identify a sister gaged watershed with similar hydrological characteristics, and to use that stream's baselevel of stream flow instead of the "New England Aquatic Baselevel." The third tier allows an applicant to conduct a resource-based instream flow assessment.

Vermont also uses a tiered structure to determine the low flow required at a particular site for watercourse modification permitting. The first tier allows a water use applicant to maintain the flows suggested by the U.S. Fish and Wildlife Service for all New England streams. These flows are 0.5 CFS/sq. mi. of drainage area during the summer, 1.0 CFS/sq. mi. of drainage area during the fall and winter, and 4.0 CFS/sq. mi. of drainage area during the spring.

The second tier allows an applicant to maintain the actual low median flow based on at least 10 years of data for a gaged stream. All gaged streams in Vermont have been gaged for at least 10 years. The third tier allows an applicant to perform a hydrologic study for the site and compare the findings statistically to an acceptable adjacent watershed to determine the low flow to maintain. Because Vermont is an upland state, low flow averages based on adjacent lowland hydrologic data are conservative. This usually results in requiring maintenance of low flows which are 85-90 percent lower than lowland low flow averages.

The fourth and final tier allows an applicant to use the IFIM or other methodology to show that, despite the applicant's water use, the water resource will be protected. This is often done even though it is quite expensive. This fourth approach is used by Vermont's 62 hydroelectric projects, all of which are up for relicensing. These projects have a greater impact than any pollution discharges or withdrawals in the state. Because of these projects, the state has

State Summary, supra note 219, at 51; telephone interview with Bob Gilmore, Diversion Permitting Specialist, Connecticut Department of Protection (October 28, 1996).

Id.

Id.

State Summary, supra note 219, at 197.

Id.

Id.

Id.

Id. at 198.

lost approximately 80 percent of its fishery resource. Ski areas also use this fourth approach to obtain permits to withdraw substantial quantities of water from small streams to make snow. There have been numerous court appeals of Division decisions regarding these IFIM studies. The main argument has been that there is no biological justification for choosing median flows to protect instream flows.

2. Evaluation of Impacts of Flows and Levels on Differing Habitats

Several jurisdictions allow or require evaluation of species habitat needs when establishing minimum flows or levels. Connecticut, Maine, and North Carolina use variations of the IFIM developed by the U.S. Fish and Wildlife Service to calculate species-lifestage curves at different streamflows. In Connecticut, the third assessment tier involves a resource-based instream flow assessment. The applicant must physically measure stream flow velocity, temperature, and quantity of fish habitat at different flow levels. From this information, the Bureau generates weighted usable area curves, curves that are species-specific and lifestage-specific. After creating a species profile of the stream, the Bureau makes a management decision of which species to protect and bases the baselevel of stream flow on this decision.

Maine uses a similar methodology to establish minimum flows. Essentially, biologists look at aquatic habitats for different species at different lifestages and develop curves that rate habitat for species-lifestages in terms of flow. The state then makes a policy decision concerning which species and lifestages to promote, and this is balanced against the economic and social values of different flows. North Carolina also uses the IFIM methodology for large impoundment projects.

3. Insufficient Scientific Data

A commonly cited difficulty in establishing good instream flow protection programs was lack of adequate scientific data. States have attempted to overcome this obstacle in several ways. Hawaii has explicitly established an interim standard for minimum flows based on maintaining existing flow conditions. Originally, Hawaii intended to establish instream flow standards on a

Id.

Id. at 51.

Id. at 93.

Id. at 156.

Telephone Interview with David Higa, Planner, Commission on Water Resource Management, Hawaii (November 14, 1996).

stream by stream basis. This proved difficult to implement, and the state adopted an interim streamflow standard designed to protect the present natural flow plus existing diversions. After adoption of this interim standard, any water uses which change the status quo flow require an amendment to the interim standard. The commission's ultimate goal is to quantify instream and offstream uses.

New Hampshire, which is in the process of adopting rules for the state's River Management and Protection Program, is generally using a "desktop" methodology to develop the protected flows required by the statute because of limited state resources. This approach relies primarily on existing hydrologic data, although the state remains open to the use of site-specific data when other parties wish to provide it.

Minnesota sets protected flows watershed by watershed as a condition of use permits, and bases those protected flows on the Q90 flow. The state intends to tailor protected flows to the actual requirements of aquatic life once the state obtains the necessary streamflow and habitat data.

4. Comprehensive River Protection Programs

Several states have adopted comprehensive river management and protection programs. A distinguishing characteristic of these programs is that they typically restrict activities on shorelines and adjacent lands, in addition to regulating consumptive uses, instream flows, and discharges of pollution. Such programs recognize the strong relationship between land use activities on riparian lands and the ecological health of waters, as well as the inherent value of riparian lands themselves. These programs are most likely to provide the greatest protection to the full array of natural resources associated with river watersheds. Florida has some significant but isolated experience with comprehensive river management and protection programs, including programs developed for the Econlockhatchee, Myakka, and Wekiva Rivers.

Id.

State Summary, supra note 219, at 140.

Telephone Interview with Jim Japs, Water Allocation Hydrologist, Division of Water, Minnesota Department of Natural Resources (Nov. 7, 1996).

Id.

FLA. ADMIN. CODE ANN. r. 40C-41.063(5). Orange and Seminole Counties have amended their comprehensive plans and adopted land development regulations to protect lands adjacent to the

New Hampshire has undertaken an innovative and comprehensive program of river management and protection. Under the River Management and Protection Program (Program), the state is responsible for designating significant rivers and protecting instream flows, and local governments are responsible for developing and adopting river corridor management plans to protect shorelines and adjacent lands. Any citizen or organization may nominate a river for state designation. The state then evaluates the nomination to identify significant resource values, suggest management and protection measures, and recommend legislation for designation. Designations do not become effective until adopted by the state legislature and signed by the Governor. Rivers may be designated as natural rivers, rural rivers, rural-community rivers, and community rivers. Currently, twelve rivers have been designated under the program.

Hawaii also has a comprehensive stream protection and management program, which categorizes streams depending on their existing level of development and the level of development sought to be maintained on the streams. Some of these streams are then protected as part of wild and scenic river systems.

5. Process of Establishment

Several states have adopted minimum flows for streams, stream segments, or watersheds by rule and several other states are considering this approach. Other states consider protection of minimum flows on a permit-by-permit basis. These states often consider minimum flows as one of multiple review criteria, and may condition permit approval upon maintenance of certain levels of flow.

Econlockhatchee River.

FLA. STAT. § 258.501 (1995).

FLA. STAT. §§ 369.301-369.313, 373.415 (1995).

In 1988, the New Hampshire legislature passed the Rivers Management and Protection Act. N.H. REV. STAT. ANN. ch. 483 (1988).

New Hampshire Department of Environmental Services, Technical Bulletin, NHDES-CO-1995-2.

Sponsors must include a description of the river's values and characteristics. *Id.*

Id.

N.H. REV. STAT. ANN. § 483:7-a.

New Hampshire Department of Environmental Services, Technical Bulletin, NHDES-CO-1995-2.

Hawaii, Iowa, and New Hampshire all establish minimum flows by rule. In Hawaii, interim instream flow standards have been set by rule at a level that protects the present natural flow and existing diversions. In Iowa, protected levels are established by rule for selected streams. In New Hampshire, protected levels will be established by rule for watersheds or watershed segments of designated rivers.

Minnesota and New Jersey are considering adopting minimum flows by rule. In Minnesota, protected flows are set watershed-by-watershed as a condition of use permits, based on protecting the flow which a particular stream exceeds 90 percent of the time. The Division is planning to develop administrative rules for determining basinwide levels. About five years ago, New Jersey attempted to develop new guidelines to determine protected levels of flow. The state developed recommendations but did not adopt them, largely because the Fish and Game Division was not satisfied that the proposed guidelines would protect fish and wildlife. The Department is now considering developing protection levels on a watershed-wide basis.

Massachusetts first tried to set basinwide minimum streamflows and groundwater levels. This effort was discontinued, however, because the state lacked the manpower and resources needed to monitor gages and enforce withdrawal restrictions. Currently, minimum streamflows and groundwater levels are simply set on a case by case basis.

In Connecticut, minimum flows may be set as conditions of diversion permits within

Telephone Interview with David Higa, Planner, Commission on Water Resource Management, Hawaii (November 14, 1996).

Telephone Interview with Darrell McAllister, Chief of Surface and Groundwater Protection Bureau, Iowa Department of Natural Resources (October 24, 1996).

New Hampshire Draft Instream Flow Rules, Part Env-C 723.03(c) (draft, April 19, 1996).

Telephone Interview with Jim Japs, Water Allocation Hydrologist, Division of Water, Minnesota Department of Natural Resources (Nov. 7, 1996).

State Summary, *supra* note 219, at 143.

Id. at 102.

Id.

Id.

stocked streams. New York attempts to maintain 30 percent of the average annual flow by permitting withdrawals on a site by site basis within watersheds. The state has calculated IFIM flows for many sites but has not yet implemented these flows. In South Carolina, permits for stream water withdrawals may be conditioned to protect the 7Q10 flow to preserve water quality. They may also be conditioned to protect additional amounts for fish and wildlife habitat, to protect navigation, and to protect existing users. Similarly, in Virginia, water withdrawal permits may be conditioned to protect minimum stream flows.

6. Institutional Will

In some states lack of institutional will has been a significant factor limiting the effectiveness of minimum flows and levels programs. Connecticut reported a lack of institutional will to develop watershed schemes that allocate between competing diversions. Typically, permit renewals are not denied by water regulators. This failure to make tough allocation choices has made protecting state water resources more difficult. In Arkansas, minimum flows are not yet widely adopted because of political and administrative obstacles. Arkansas has adopted flow protection for only one river, the White River.

In New York, water regulators have used the IFIM since the mid-1970s to calculate target minimum flows at different sites in different watersheds. However, due to administrative and political resistance, these flows have yet to be implemented.

7. Grandfathering Existing Uses

Exempting, or "grandfathering" existing uses has undercut minimum flows and levels programs in many states. Connecticut reported that grandfathering of diversions existing at the

CONN. GEN. STAT. § 26-141b.

State Summary, supra note 219, at 151.

Id. at 182.

Id. at 202.

Telephone Interview with Bob Gilmore, Diversion Permitting Specialist, Connecticut Department of Protection (October 28, 1996).

State Summary, supra note 219, at 35.

Id. at 151.

time their program was enacted has made it difficult to protect instream flows of stocked streams. Similarly, Georgia reported grandfathered uses have made it difficult for those states to adequately protect their water resources.

8. Legal Challenges

There have been no legal challenges contesting the authority of programs examined in the first part of this section (Connecticut, Hawaii, Iowa, Minnesota, New Hampshire, or Wisconsin) to establish minimum flows or levels. An earlier study conducted in 1994 found there had been no suits brought against any of the 25 states with water law systems based on riparian water law contesting authority to establish minimum flows or levels. The study indicated there had been a few suits contesting the basis for setting levels and the level selected.

Minnesota reported that its program is controversial and has faced resistance from industrial and agricultural appropriators as well as from fisheries, wildlife, and instream flow protection groups. However, the validity of the current and proposed regulations has essentially been unchallenged. Connecticut reported there have been no notable legal challenges, although individual permits have been challenged as applied to a particular applicant.

Vermont reported numerous legal challenges against the agency's choice of flow level to protect, even when the level was based on the applicant's own IFIM studies. The main argument has been that there is no biological justification for favoring one flow level over another. Another legal issue which arose concerned proposed rules that would have given preference to municipal water supplies over other uses. Opponents argued that the decision was a public trust determination which should be made by the state legislature rather than by an agency.

VI. RECOMMENDATIONS

Almost since its adoption in 1972, water resource management under the Florida Water

Telephone Interview with Bob Gilmore, Diversion Permitting Specialist, Connecticut Department of Protection (October 28, 1996).

State Summary, supra note 219, at 58.

State Summary, supra note 219.

Id. at 112.

Id. at 50.

Id. at 197.

Resources Act has been the subject of task forces, select committees, conferences, and review commissions. The time and resources available to those bodies for their studies and deliberations went far beyond the scope of this report, and the recommendations that follow will not attempt to match those resulting from earlier studies.

As originally envisioned in A MODEL WATER CODE, there were close ties between planning and permitting, which was viewed as necessary to achieving optimal allocation of water resources. A prospective consumptive use, in addition to meeting other criteria, was required to be consistent with the public interest and the State Water Plan, which included the State Water Use Plan, and was conditioned on preservation of minimum flows and levels. The Water Resources Act, in addition to other criteria, only requires prospective consumptive uses to be consistent with the public interest, not the State Water Plan, removing water allocation goals as potential permitting criteria.

It appears that the Districts are beginning to formally integrate MFLs into their water shortage declarations and consumptive use permitting. However, it is recommended that the Act be amended to incorporate the requirement in the State Water Policy rule that minimum flows and levels be protected where relevant to permitting, water shortage, and construction and operation of water resource projects.

VII. TOPICS AND ISSUES FOR FURTHER STUDY

This section of the report identifies topics which go beyond the scope of the current research, but additional study of which would assist in understanding Florida's program relative to the identification and protection of flows and levels for ecosystems. The basic need for additional research concerns a technical analysis and evaluation of the Districts' approaches to developing minimum flows and levels, and the use of models in evaluating the specific impacts of proposed consumptive uses. This would include consideration of technical studies by which ground

"The Model Code," *supra* note 2 ("A system of consumptive water use permits coordinated with a program of comprehensive planning is the most effective means of implementing planning objectives and directing development along planned lines.") *Id.* at 74.

Id., §§1.07, 1.08, 2.02.

Id., §1.07.

FLA. STAT. § 373.223 (1995).

FLA. ADMIN. CODE Rule 62-40.473(2) (February 1996).

water/surface water interactions can be accurately assessed. Related to this is the value of research into the technical approaches being taken by several other states which may have potentially relevant strategies for protecting instream flows.

Additional research is also needed into the means by which the Districts' approaches to defining and applying MFLs can be made more consistent. Though there are ecological, hydrologic and geologic variations which justify certain differences in approach, and though certain perceived differences may be related to semantics, the effort to identify potentially common approaches is important. The ability to make comparisons of technical and implementation strategies, based on commonly accepted terminology and standards, will also reduce existing confusion regarding the adequacy of current approaches by the various Districts.

Other topics for additional research concern the process by which MFLs can be established and implemented for structurally altered systems, and the general function of MFLs with regard to intact systems, systems degraded by withdrawals, and structurally altered systems. There is also a need for related research into the interpretation of section 373.171, F.S. This provision of the Water Resources Act requires that in promulgating rules and regulations and issuing orders, the governing boards must "act with a view to full protection of existing rights to water," consistent with the purposes of the Act, but also states that rules, regulations and orders requiring modification of an existing use or disposition of water will be allowed if it is shown that the use or disposition proposed for modification is detrimental to other water users or to the water resources of the state. Understanding of Florida's program of water management would also benefit from additional research into the relationship between the "significant harm" standard applicable to MFLs and other standards of harm embodied in other provisions of the Water Resources Act.

FLA. STAT. § 373.171(2) (1995).

FLA. STAT. § 373.171(3) (1995).

APPENDIX
Minimum Flows and Levels Questionnaire Results

CONNECTICUT

1. Have there been any significant statutory or rule changes since our 1994 survey?

No changes to statute or rules since 1994.

2. For what purposes are flows or levels protected?

Flow (MFL) established [only] for "impoundments on stocked streams to protect fish and wildlife consistent with needs and requirements of public health, flood control, industry, public utilities, water supply, safety agriculture, and other lawful uses."

3. What is the statutory citation? Could you please mail a copy of agency regulations which implement the statute and any other materials that describe the program?

Conn. Gen. Stat. § 22a-369(7), Conn. Agencies Regs. §§ 26 -141a-1 to 141a-8 (1979), and Conn. Gen. Stat. §22a-373.

4. a) How are the actual flows/levels established?

See Conn. Agencies Regs. §§ 26 -141a-1 to 141a-8 (to establish a base level for a stream, look at the period for which stream flow information is available and average the median August stream flow values over this time). Maximum users are allowed to withdraw is to 0.2 CFS per sq. mile of drainage.

b) What type of information is considered?

The maintenance of stream conditions suitable to stock fish, aquatic life, public recreation, public health, oxygen levels, and reproduction potential.

c) What is the methodology for establishing the flows/levels?

Maximum users are allowed to withdraw is to 0.2 CFS per sq. mile of drainage (Mr. Gilmore is not sure how they came about setting that level).

d) Are they established by rule for entire watersheds or rivers?

No, flows or levels just established for impoundments on stocked streams or dams.

See, State Summary, supra note 219.

e) Are they established on a permit-by-permit basis?

No, just the majority of impoundments have levels set. If a new impoundment is created, the Water Diversion Act of 1982 is applied to determine consumption and levels.

**5. Are protected flows/levels tied to a permitting program?
How?**

Yes, MFLs for impoundments on stocked streams can be tied to a water diversion or variance permit.

Agency looks to adverse effects of the diversion or variance on flora, fauna, public health, and public recreation.

The Three-Tier System. This tiered system is for applying for a diversion permit from an impounded, stocked stream. The first tier is determining whether the proposed diversion will cause the stream flow to drop below the "New England Aquatic Baselevel." (NEAB based on historic stream flows) Because of low water levels and warm temperature water, August is the most stressful month on fish. Thus, the baselevel is determined by looking at the period for which stream flow information is available and averaging the median August stream flow values over this time. In CT there are 46 gaged streams for which information is available. For ungaged streams, the average baselevel stream flow of the 46 streams is used (0.5 CFS/sq. mi. of watershed).

If an applicant for diversion from an ungaged stream does not accept the amount found divertable on the NEAB., they can go to the second tier. This involves looking at a sister gaged watershed with similar hydrological characteristics (e.g. similar August stream flow) must be identified. But, the Bureau will then use that stream's baselevel of stream flow instead of the average of the 46.

If still unsatisfied, an applicant can move to the third tier, which involves resource-based instream flow assessment. The applicant must physically measure stream flow velocity, temperature, and quantity of fish habitat at different flow levels. From this information, the Bureau generates weighted usable area curves, curves that are species-specific and lifestage-specific. After creating a species profile of the stream, the Bureau makes a management decision of which species to protect and bases the baselevel of stream flow on this decision.

6. What happens if a river or lake falls below a protected flow/level?

The penalty sought is to issue an order to comply. If the user doesn't comply, bring a court action to order compliance.

7. Has the state ever actually restricted consumptive use of rivers or streams because protected flows/levels were violated?

Yes, but because of violations of the Water Diversion Act, not the MFL regulations. Mr. Gilmore conveyed that it is useless to pursue MFL violations, because all it involves is the order to comply (doesn't really have much enforcement power).

**8. Are protected flows/levels tied to a water shortage plan?
How?**

No.

**9. Are protected flows/levels used in planning?
How?**

Generally, no, but the state water utilities regulations sometimes consider MFLs in planning safe yields. Also, the Water Diversion Act requires new diverters to incorporate MFLs into planning.

10. Are protected flows/levels established for all rivers and lakes in the state? If not, how many and what is the criteria for selection of which rivers and lakes to protect?

No. Impoundments on stocked streams.

11. How long has the program been in effect?

May 15, 1979. (17 year old program)

**12. Does the program set protected levels for aquifers/groundwater?
Does the program consider potential impacts of groundwater withdrawals on protected instream flows or levels of surface waters?**

a. No.

b. Yes, in applying for a diversion permit, the DEP recognizes the interconnection between groundwater and surface water and presumes a 1:1 relationship between withdrawals from groundwater and adjacent surface water unless an applicant shows otherwise.

**13. Have there been any significant legal challenges to the overall program or to setting of protected levels?
On what basis?
Who won?**

No. Just political pressure from utilities and other big consumers.

14. Is the program effective in protecting instream flows/levels? Does it protect biological and ecological qualities?

a. The program is not adequate to protect the biology of a stream or other impoundment.

Also, ineffective because grandfather clauses allow excess diversions. Anyone with existing rights to diversion will seek to be grandfathered in, thus the levels are not followed by many. Furthermore, the minimum stream flows required are essentially no more than the amount of leakage which would ordinarily escape from an impoundment. Finally, the DEP has failed to use regulations or issue permits.

b. The program is not adequate to protect the biology of a stream or other impoundment.

15. What are the strengths and weaknesses of the program?

Strengths: Three-tier system provides applicants for diversion added protection. (probably a detriment to the environment) The third tier appears to take into account biological aspects in more detail, then just setting a baselevel at an average flow rate for August.

Weaknesses: 1) There is no real enforcement in the penalty statute (just compliance); 2) see 14a.; and 3) 0.2 CFS per sq. mile is the maximum drainage level allowed, but many times (usually in the summer) the DEP allows this to go below 0.2, even as low as 0.0; 4) lack of institutional will to develop watershed schemes that allocate between competing diversions. Typically, permit renewals aren't denied. The failure to make tough allocation choices has made protecting state water resources more difficult; 5) to determine whether to grant a diversion permit, Bureau looks at existing permitted diverters and grandfathered diverters. It is a case-by-case method which doesn't take into account specific baselevel stream flow.

16. Any lessons or do's and don'ts you'd share with Florida as it implements its program?

Do not follow the CT model, because it has proven to be ineffective in terms of MFLs.

17. Interview Information

Name: Bob Gilmore

Title: Diversion Permitting Program [Specialist]

Agency: DEP - Water Management Bureau

Phone: (860)424-3866

Date: 10/28/96

HAWAII

1. Have there been any significant statutory or rule changes since our 1994 survey?

No major changes since 1994, in fact it has been an interim minimum streamflows project since 1989. (no final rule)

2. For what purposes are flows or levels protected?

Groundwater, surface water (water supply), public welfare, the health of animals, fish, and aquatic life, and the reestablishment of beneficial instream water uses.

3. What is the statutory citation? Could you please mail a copy of agency regulations which implement the statute and any other materials that describe the program?

a. Haw. Rev. Stat. §§ 13-169-44 to 169-49, § 174C-71, and § 174C-5(3) (West 1992).

4. a) How are the actual flows/levels established?

Status quo flow established administrative rule making.

b) What type of information is considered?

No final flow minimums have been set, it was just a status quo flow established, so no factors are truly considered.

c) What is the methodology for establishing the flows/levels?

Interim minimum streamflows throughout the islands were set at the status quo flow.

d) Are they established by rule for entire watersheds or rivers?

For all streams.

e) Are they established on a permit-by-permit basis?

No

**5. Are protected flows/levels tied to a permitting program?
How?**

a. Yes

b. Consumptive use permits are conditioned on the protection of instream flows. The commission may restrict future uses on designated streams if inconsistent with public recreation, environmental protection, and fish and wildlife procreation.

6. What happens if a river or lake falls below a protected flow/level?

Not sure, because of the interim level status.

7. Has the state ever actually restricted consumptive use of rivers or streams because protected flows/levels were violated?

No. No one is denied consumptive use because there is existing user protection.

**8. Are protected flows/levels tied to a water shortage plan?
How?**

No

**9. Are protected flows/levels used in planning?
How?**

Yes. Considered in preparing water resource plan.

10. Are protected flows/levels established for all rivers and lakes in the state? If not, how many and what is the criteria for selection of which rivers and lakes to protect?

All streams protected.

11. How long has the program been in effect?

Interim program since 1989.

**12. a) Does the program set protected levels for aquifers/groundwater?
b) Does the program consider potential impacts of groundwater withdrawals on protected instream flows or levels of surface waters?**

a. No.

b. Yes, the commission recognizes the connection between groundwater and surface water, and requires the amendment of interim flow standards to withdraw groundwater where the connection is realized.

**13. Have there been any significant legal challenges to the overall program or to setting of protected levels?
On what basis?
Who won?**

None.

14. Is the program effective in protecting instream flows/levels? Does it protect biological and ecological qualities?

Yes, it has created an additional regulatory hurdle which discourages users from over consumption. Doesn't truly protect ecology/biology because the streamflow minimum is not based on biological data. The state has not collected any scientific data, so it has not set levels which are meant to protect the biota.

15. What are the strengths and weaknesses of the program?

Weakness: inability to do a stream-by-stream study and standard. No scientific data.
Strengths: the program is an administrative rule, and changes can be accomplished through rulemaking.

16. Any lessons or do's and don'ts you'd share with Florida as it implements its program?

Do's: Get scientific data and make sure it is based on good scientific data. Florida should also consider stream restoration. Hawaii has no legal/rulemaking mechanism to evaluate stream restoration or the potential for stream restoration.

17. Interview Information

Name: Ms. Rae M. Loui

Title: Deputy Director

Agency: Commission on Water Resource Management

Phone: (808) 587-0214

Date: 10/24/96

IOWA

1. Have there been any significant statutory or rule changes since our 1994 survey?

No changes.

2. For what purposes are flows or levels protected?

Conservation of surface water and groundwater, to protect public health and welfare by ensuring long-term availability, quality, and quantity of water. Protect fish and wildlife; recreation; aesthetics.

3. What is the statutory citation? Could you please mail a copy of agency regulations which implement the statute and any other materials that describe the program?

Iowa Code § 455B.261(15), -.265, -.267 (West 1991) and Ia. Admin. Code r. 56-50 to -53.

4. a) How are the actual flows/levels established?

Protected flow established at the 84th percentile; this leaves room for consumptive users and a safety factor (like dilution).

b) What type of information is considered?

Based on historic needs and public interest.

c) What is the methodology for establishing the flows/levels?

The high level of flow for 84 percent of the year.

d) Are they established by rule for entire watersheds or rivers?

No, not established for entire watersheds. Just for selected rivers.

e) Are they established on a permit-by-permit basis?

No, made for specific streams.

**5. Are protected flows/levels tied to a permitting program?
How?**

a. Yes, consumptive use permits.

b. Water use permittees are to have water conservation plans.

6. What happens if a river or lake falls below a protected flow/level?

Consumption can be banned or limited or rotated among users depending on size of stream drainage. If stream with less than a 50 sq. mile drainage drops below protected flow, consumption is banned. When stream get close to the minimum flow, the users are notified and must get approval for withdrawals. Use limitation varies according to size of stream.

7. Has the state ever actually restricted consumptive use of rivers or streams because protected flows/levels were violated?

Yes

**8. Are protected flows/levels tied to a water shortage plan?
How?**

a. Yes, there is a tie to water shortage plans.

b. The water shortage plans establish who get cut off first, second, third, etc. and what types of uses get cut off first. (Est. in 1985)

**9. Are protected flows/levels used in planning?
How?**

a. Yes, it is part of Iowa state law.

b. no information

10. Are protected flows/levels established for all rivers and lakes in the state? If not, how many and what is the criteria for selection of which rivers and lakes to protect?

a. No, just specific streams.

b. Usually streams that are important for irrigation.

11. How long has the program been in effect?

Program has been around since early-1970's.

**12. Does the program set protected levels for aquifers/groundwater?
Does the program consider potential impacts of groundwater withdrawals on protected instream flows or levels of surface waters?**

a. Yes, some levels are set. A level is set where no more water can be withdrawn.

b. Accounts for interconnection between ground and surface water. Assumes any withdrawal within 660 feet of a protected stream will impact stream level.

- 13. Have there been any significant legal challenges to the overall program or to setting of protected levels?
On what basis?
Who won?**

None

- 14. Is the program effective in protecting instream flows/levels? Does it protect biological and ecological qualities?**

Yes, the program is effective in protecting MFLs, and biological/ecological qualities. Yet, the many studies on the ecology would not be accurate because of the occurrence of droughts (especially in the late 1980s). In all the mid-western states the problem of droughts was a reoccurring problem in their respective MFL programs.

- 15. What are the strengths and weaknesses of the program?**

Strengths: Effectiveness and voluntary reduction in consumption when necessary and citizen's reporting violations.

Weaknesses:

- 16. Any lessons or do's and don'ts you'd share with Florida as it implements its program?**

Do's: Provide assistance by telling permittee how to create a conservation plan or what it is. Do stream flow monitoring. Use graphic identifying of where flows are low. Establish a unit where users can call in, to see if they can use the stream during a low flow period (by consulting graphic identifying).

- 17. Interview Information**

Name: Darrell McAllister

Title: Chief of Surface and Groundwater Protection Bureau

Agency: DNR, Environmental Protection Division, Surface and Groundwater Protection Bureau

Phone: (551) 281-8869

Date: 10/24/96

MINNESOTA

1. Have there been any significant statutory or rule changes since our 1994 survey?

No changes to statutes and regulations since 1994.

2. For what purposes are flows or levels protected?

Protection flow to protect aesthetics, fish, wildlife habitat, and public interest.

3. What is the statutory citation? Could you please mail a copy of agency regulations which implement the statute and any other materials that describe the program?

Minn. Stat. Ann. § 103G.265 - .285 (West 1991) and Minn. R. 6115.0630 - .0810.

4. a) How are the actual flows/levels established?

Flows are established on a watershed by watershed basis as a condition of use permits based on protecting the flow at the level which a particular stream exceeds 90% of the time. There are also protected elevations for basins.

b) What type of information is considered?

Hydrologic data (level of flow is set at 90% exceedance) and instream needs (flora and fauna).

c) What is the methodology for establishing the flows/levels?

The level of flow the stream is at 90% of the time.

d) Are they established by rule for entire watersheds or rivers?

For entire watersheds.

e) Are they established on a permit-by-permit basis?

Yes, permit-by-permit basis.

**5. Are protected flows/levels tied to a permitting program?
How?**

a. Yes, the most significant ties of the first four states in this survey.

b. As a condition for consumptive use permit, a protected flow is set at the level of flow a stream exceeds 90% of the time. The surface water permits are subject to designated protected flow; consider fish, vegetation, and other wildlife; consider affect on

groundwater; require (when reasonably available) statements of justification supporting reasonableness and practicality of use regarding adequacy of water source including facts on hydrology and hydraulics of water sources involved including analysis of effects on levels and flows and impacts on instream flows and levels of surface waters, and must provide feasible contingency plan describing alternatives applicant will use in event appropriation is restricted.

6. What happens if a river or lake falls below a protected flow/level?

The DNR has the authority to suspend the appropriation permit of upstream users or users of water that flow into the affected water body within a watershed.

7. Has the state ever actually restricted consumptive use of rivers or streams because protected flows/levels were violated?

Not within the past few years. It was done in 1988 and 1989 due to drought conditions.

**8. Are protected flows/levels tied to a water shortage plan?
How?**

The water shortage plan considers MFLs, but there is no specific drought plan for specific watersheds. Within one rice-farming watershed the appropriators determine how water is allocated when it is at a low flow period. The DNR only provides guidance and recommendations, the appropriators work out the details among themselves.

The state requires appropriators to develop water contingency plans in case of suspension of permit(s) or a low flow period. The burden is on all appropriators, not the DNR, to have a contingency plan.

**9. Are protected flows/levels used in planning?
How?**

The DNR does not develop water plans for watersheds, this is done at the local level.

10. Are protected flows/levels established for all rivers and lakes in the state? If not, how many and what is the criteria for selection of which rivers and lakes to protect?

Established for watersheds on a permit-by-permit basis.

11. How long has the program been in effect?

Program began in the mid-1970s, driven by drought problems.

**12. Does the program set protected levels for aquifers/groundwater?
Does the program consider potential impacts of groundwater withdrawals on protected instream flows or levels of surface waters?**

- a. The program creates "safe yield" levels for groundwater and wells, it is the amount of water that can be withdrawn without degrading water quality or progressively lowering water pressures and levels to a degree that results in change from artesian to water table condition.
- b. The program considers the interconnection, but it only comes into play in obvious cases.

**13. Have there been any significant legal challenges to the overall program or to setting of protected levels?
On what basis?
Who won?**

There have been no legal challenges. The majority of problems are political problems stirred up by major appropriators with political connections and influence.

14. Is the program effective in protecting instream flows/levels? Does it protect biological and ecological qualities?

The program is adequate to protect flows. Nonetheless, the state is undergoing a process of scientific data gathering to develop more biologically based data in order to establish more effective levels for the protection of fish and wildlife.

15. What are the strengths and weaknesses of the program?

Strengths: Appropriations compliance is good.

Weaknesses: Lack of scientific data has hindered the setting of more accurate protection elevations. The state did not fully consider the interaction between surface and groundwater. Only surface appropriators can be suspended, not groundwater users (but this may change soon). Thus, the state's suspension powers are limited to surface appropriators, while groundwater appropriators can do just as much damage to the MFLs.

16. Any lessons or do's and don'ts you'd share with Florida as it implements its program?

Take into account surface water and groundwater interaction.

17. Interview Information

Name: David R. Ford

Title: Surface Water Engineer

Agency: DNR, Division of Water

Phone: (612) 296-6157

Date: 10/24/96

WISCONSIN

1. Have there been any significant statutory or rule changes since our 1994 survey?

No changes.

2. For what purposes are flows or levels protected?

Protection of public rights, trout streams, wildlife, navigability, conservation, aesthetics, and recreation.

3. What is the statutory citation? Could you please mail a copy of agency regulations which implement the statute and any other materials that describe the program?

Wis. Stat. Ann. § 30.18(5) -(8), § 31.02, § 31.06(3), § 31.34, §144.26(1), and § 144.855(2)(b).

4. a) How are the actual flows/levels established?

Established by fish managers and water management specialists when a diversion permit is sought. Generally, either the 7Q10 and 7Q2 flows are protected in order to maintain downstream assimilation. Level can't go below 7Q2 because of waste water treatment plant needs (discharge). A level is set higher than 7Q2 for public rights (known as the public rights stage) for biology and use.

b) What type of information is considered?

Fish managers and water management specialists consider downstream users' needs and the water conditions needed to protect fish.

c) What is the methodology for establishing the flows/levels?

There is no methodology, the fish managers and water management specialists consult and work together to establish the water quantity needed.

d) Are they established by rule for entire watersheds or rivers?

No, stream-by-stream determination.

e) Are they established on a permit-by-permit basis?

Yes.

**5. Are protected flows/levels tied to a permitting program?
How?**

Yes, when applicant wants to divert, flow is set. Diverters may be required to monitor themselves against a nearby U.S. gauging station, against a temporary benchmark, or against a tapedown marker. Permits may also contain conditions that limit pumping duration, rate, or frequency. In addition, diverters must make reports concerning their water usage to the Department.

6. What happens if a river or lake falls below a protected flow/level?

If level falls below protected level, diverters will be denied use. Previous diverters (with older established rights) will have priority over newer users if the use is limited to a certain amount or withdrawals.

7. Has the state ever actually restricted consumptive use of rivers or streams because protected flows/levels were violated?

Yes, consumptive use has been restricted. Usually, the case is that diverters know when they must stop diverting water because of a pre-set level. The diverter must comply with original permit which tells a user at what level they must stop diverting.

8. Are protected flows/levels tied to a water shortage plan? How?

No.

9. Are protected flows/levels used in planning? How?

No.

10. Are protected flows/levels established for all rivers and lakes in the state? If not, how many and what is the criteria for selection of which rivers and lakes to protect?

No, flows and levels are only set for watercourses where an applicant wants to divert/withdraw.

11. How long has the program been in effect?

Since 1935 in the surface water diversion statute.

12. Does the program set protected levels for aquifers/groundwater? Does the program consider potential impacts of groundwater withdrawals on protected instream flows or levels of surface waters?

a. No

b. No

- 13. Have there been any significant legal challenges to the overall program or to setting of protected levels?
On what basis?
Who won?**

No challenges to the MFLs program, just a 1959 challenge to the authority of the agency dealing with the issuing of new permits and consent of previous users (existing users).

- 14. Is the program effective in protecting instream flows/levels? Does it protect biological and ecological qualities?**

The plans seems to be effective in protecting flow. A major problem is recurrence of drought. No biological information.

- 15. What are the strengths and weaknesses of the program?**

Strengths: The fish managers and water management specialists work together to establish protected flows

Weaknesses: Diversion permits mainly apply to diversions from streams or from lakes with outlets. Thus, pothole lakes rarely are regulated. Also, the lack of specific methodology to establish protected flows could lead to abuse or arbitrary action. Finally, applicants for diversion must get downstream diverter's permission for diversion (may allow for unreasonable decision making by citizens).

- 16. Any lessons or do's and don'ts you'd share with Florida as it implements its program?**

N/A

- 17. Interview Information**

Name: John Coke

Title: Water Regulations and Zoning Engineer
Agency: DNR, Water Regulation and Zoning Bureau

Phone: (608) 266-7037

Date: 10/28/96