

**Draft**

**Water Reservations for the Environment  
and  
Assurances for Existing Uses**

## Table of Contents

<b>I.</b>	<b>Purpose .....</b>	<b>3</b>
<b>II.</b>	<b>Summary of Relevant Legal Directives .....</b>	<b>3</b>
	A. Federal Water Resource Development Act.....	3
	B. Relevant State Laws.....	4
<b>III.</b>	<b>Conceptual Relationship between Water Supply and Demands for Humans and Natural Systems .....</b>	<b>5</b>
<b>IV.</b>	<b>Key Concepts in Quantifying and Protecting Water for Natural Systems And Human Uses under CERP.....</b>	<b>6</b>
	A. Quantification of Regional Water Available for Natural Systems and Human Uses under Existing Conditions .....	6
	B. Quantification of CERP Project Water Supply Benefits.....	7
	C. Protection of CERP Water Supplies for Legal Uses and Natural System.....	8
<b>V.</b>	<b>Technical Process for Quantifying CERP Project Water Supply Benefits .....</b>	<b>9</b>
<b>VI.</b>	<b>Integration of State and Federal Processes for Quantification and Protection of Water Supplies for Consumptive Uses and Natural Systems .....</b>	<b>12</b>

## List of Figures

<b>Figure 1.</b>	Conceptual Relationship of Water Demands for Human Uses and Environmental Systems.....	13
<b>Figure 2.</b>	Relationship of Water Resource Protection Tools Under State Law.....	14
<b>Figure 3.</b>	Integration of State/Federal Processes for Protection of Natural System Water .....	15

## **I. Purpose**

The purpose of this paper is to outline a process for identifying water for the natural system and consumptive uses made available through implementation of the Comprehensive Everglades Restoration Plan (CERP). This paper also identifies policy issues regarding the protection of natural system and human water supplies that must be addressed in this process. This is an initial draft for discussion purposes only.

## **II. Summary of Relevant Legal Directives**

### **A. Federal Water Resource Development Act of 2000**

Section 601(h)(4) of the Water Resources Development Act (WRDA) of 2000 describes project specific assurances required for CERP projects. For Project Implementation Reports (PIR), the requirements include:

**Sec. 601(h)(4)(A)-** A Project Implementation Report shall:

- (IV) identify the appropriate quantity, timing, and distribution of water dedicated and managed for the natural system
- (V) identify the amount of water to be reserved or allocated for the natural system necessary to implement, under State law, sub clauses (IV) and (VI);
- (VI) comply with applicable water quality standards and applicable water quality permitting requirements under subsection (b)(2)(A)(ii).

For Project Cooperation Agreements, the requirements include:

**Sec. 601(h)(4)(B)-**

- (i) The Secretary and the non-Federal sponsor shall execute project cooperation agreements in accordance with section 10 of the Plan.
- (ii) **CONDITION-** The Secretary shall not execute a project cooperation agreement until any reservation or allocation of water for the natural system identified in the Project Implementation Report is executed under State law.

For Operating Manuals, the requirements include:

**Sec. 601(h)(4)(C) -** The Secretary and the non-Federal sponsor shall develop and issue, for each project or group of projects, an operating manual that is consistent with the water reservation or allocation for the natural system described in the Project Implementation Report and the project cooperation agreement for the project or group of projects.

WRDA Section 601(h)(5), provides a savings clause that applies when implementing CERP. It states:

(A) NO ELIMINATION OR TRANSFER—Until a new source of water supply of comparable quantity and quality as that available on the date of enactment of this Act is available to replace the water to be lost as a result of implementation of the Plan, the Secretary and the non-Federal sponsor shall not eliminate or transfer existing legal source of water including those for—

- (i) an agricultural or urban water supply;
- (ii) allocation or entitlement to the Seminole Indian Tribe of Florida under section 7 of the Seminole Indian Land Claims Settlement Act of 9187 (25 U.S.C. 1772e);
- (iii) the Miccosukee Tribe of Indians of Florida;
- (iv) water supply for Everglades National Park; or
- (v) water supply for fish and wildlife.

## **B. Relevant State Laws**

As a local sponsor, the SFWMD is required to participate in the development of Central and Southern Florida Project Comprehensive Review Study (Restudy) project components to ensure that the component meets all legal responsibilities under Chapter 373, F.S., for water supply, water quality, flood protection, threatened and endangered species and other water or natural resources. State law requires the identification of water for environmental purposes prior to receiving state funds for CERP project construction and requires the adoption of water reservations based on the state/CERP project authorizations.

In order to receive authorization under the state program, there are requirements imposed on the SFWMD for project components that are part of the Everglades restoration projects. Two sections of 373.1501(5) F.S. are set forth below.

- (a) Analyze and evaluate all needs to be met in a comprehensive manner and consider all applicable water resource issues, including water supply, water quality, flood protection, threatened and endangered species, and other natural system and habitat needs.
- (d) Consistent with this chapter, the purposes for the Restudy provided in the Water Resources Development Act of 1996, and other applicable federal law, provide reasonable assurances that the quantity of water available for existing legal uses shall not be diminished by implementation of project components so as to adversely impact existing legal uses, that existing levels of service for flood protection will not be diminished outside the geographic area of the project component, and that water management practices will continue to adapt to meet the needs of the restored natural environment.

The reservations of water for the natural system will be made by the South Florida Water Management District pursuant to state law. It is anticipated that the SFWMD will accomplish

the reservations through the rule making authority of the Governing Board. The state law on water reservations, in Section 373.223(4), F.S., provides:

The governing board or the department, by regulation, may 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 shall be subject to periodic review and revision in the light of changed conditions. However, all presently existing legal uses of water shall be protected so long as such use is not contrary to the public interest.

When water is reserved, the district cannot allocate it to consumptive use permittees. Water reserved for the Everglades is for the "protection of fish and wildlife". However, water can also be reserved for public health and safety.

Reservations are subject to periodic review based on changed conditions, such as the changes that will occur in the Central and Southern Florida Project as hydrologic enhancement projects become operational. This provides flexibility to account for changes in implementation strategies and contingency plans during the next 20 years.

When establishing a reservation, existing legal uses are protected insofar as they are "not contrary to the public interest" (Section 373.223(4), F.S.). No reservation has been adopted in Florida where competition with existing legal uses has occurred. As a result, interpretation of the statute on this issue will be based on new policy determinations. As guidance in making this public interest determination, the CERP and WRDA include "assurances" to existing legal uses of water and natural systems.

Under Florida law, a consumptive use permit provides the permittee with the right to use water consistent with the conditions of the permit for the duration of the permit. Once the permit expires the permittee must obtain a renewal of the permit in order to continue the water use. Existing legal uses of water have a legal level of certainty in that permits will not be revoked or modified, or otherwise impacted by the actions of third parties. Under state law, existing legal uses are protected unless they are determined to be detrimental to the water resources.

### **III. Conceptual Relationship between Water Supply and Demands for Humans and Natural Systems**

Prior to human intervention, the water needs of the environment were a function of the natural drainage patterns and hydrologic conditions. Human intervention changed these natural drainage patterns through the construction of levees, canals and structures, and through a reduction in groundwater levels near the coast that have resulted in changes to the spatial and temporal distribution of flows and levels to the environment, and altered the timing and volume of water which was available under pre-development natural conditions.

Drought conditions may cause reductions in groundwater levels and surface storage which are vital for agricultural and landscape irrigation, potable use and the prevention of saltwater

intrusion. In wet rainfall periods, the environment exhibits higher flows and levels, and in drought periods, much lower flows and levels as shown on Figure 1. Conversely, human demands increase as a function of rainfall deficits as illustrated in Figure 1. Human demands are typically provided a level of certainty to meet demands up to and including a one in ten year drought condition. Under these conditions, the use must demonstrate that it is reasonable, beneficial, is in the public interest and will not interfere with other existing uses. Consumptive use permitting criteria prevent harm to the water resources under the one in ten year drought frequency ("no harm standard").

Unlike environmental demands, human demands continue to increase when rainfall deficits exceed a one in ten year drought event. Water shortage restrictions (Chapter 40E-21) are imposed on consumptive uses to moderate these increased demands in order to prevent "serious harm" to the water resources.

Minimum flows and levels are established to identify the point at which "significant harm" to the water resources or ecology is caused by further consumptive use withdrawals. In order to reduce the occurrence of significant harm to the natural system under drought conditions, the Governing Board has established that a Phase 3 (Extreme) water shortage restriction will be applied to human uses in order to moderate their demands. The relationships between water reservations, minimum flows and levels, consumptive use permits and water shortage restrictions are conceptualized in Figure 2.

#### **IV. Key Concepts in Quantifying and Protecting Water for Natural Systems and Human Uses under CERP**

This section discusses key concepts raised in identifying water for the natural system and human uses. They include: 1) quantification of regional water available for natural systems and consumptive uses under existing conditions; 2) quantification of system-wide and individual CERP project water supply benefits; and 3) protection of CERP water supplies for their intended purposes. Section V identifies a specific technical process for implementing these key concepts. Section VI outlines an integrated timeline for state and federal actions aimed at quantifying and protecting CERP water supplies.

##### **A. Quantification of Regional Water Available for Natural Systems and Human Uses under Existing Conditions**

Currently natural systems receive a certain quantity, timing and distribution of water from various sources including tributary basin runoff and direct rainfall. Direct rainfall can be considered a natural input, however, tributary inflow has typically been modified by manmade drainage features such as levees, canals, pump stations and culverts that have altered the natural hydropatterns. The hydropatterns of the existing environmental systems are reflective of the operational policies currently in place for the region as defined by regulation schedules and water control structure hydraulics for flood protection, water supply and environmental deliveries, and are conceptually illustrated on Figure 1. These operational policies are also reflective of existing consumptive use demands and delivery requirements.

The Lower East Coast Regional Water Supply Plan recommends the identification of a base line be established for water currently delivered to the environment from which future reservations associated with CERP would be compared. A current base case (circa the year 2000) should be simulated for the regional system to estimate the amount of water delivered to the environment and other uses assuming historical rainfall conditions of 1965 through 2000, along with the current system operational protocols, consumptive use withdrawals and water shortage policies.

Typical climatic conditions of average, wet and dry year deliveries should be quantified along with hydropattern and flow responses under the same rainfall and operational conditions. The operational assumptions and rainfall conditions that resulted in the current deliveries and hydropatterns should be documented and a regional water availability rule developed which identifies the amount of water currently available for human and natural system uses.

## **B. Quantification of CERP Project Water Supply Benefits**

WRDA 2000 requires a quantification of water for the environment as each PIR is developed and prior to a Project Cooperation Agreement (PCA) being executed. State law (373.470 F.S.) requires that the PIR identify the increase in water supplies resulting from the project component and that the additional water supply be allocated or reserved under Chapter 373. Most projects recommended by CERP will make additional water available for the environment through time as illustrated in Figure 1. As each project is completed, environmental performance will theoretically improve until the environmental response is similar to that originally envisioned in the Restudy. A project specific and system-wide performance of water supply, flood protection, and environmental requirements will be evaluated as each PIR is developed and documented.

The natural system or human water supply benefit of a CERP project should be reflective of the expected performance of a facility or a group of facilities. These benefits are typically judged by the ability of a facility to improve, or meet a set of agreed upon measures that reflect project performance goals.

Since the projects that comprise CERP are designed to work together to achieve the system-wide goals and purposes of CERP, in most cases, the identification should be done on a system-wide basis in addition to a project by project basis. For example, projects such as the Indian River Lagoon, North of Lake Storage, and the Caloosahatchee Backpumping projects, to name a few, have effects significantly outside of their location. It is important that the identification be made for the entire system, and not just for the project itself, or the area where it is located. Additionally, for some projects, such as the seepage management projects, the amount of water made available by the project may not be readily determined unless a system-wide analysis is done. Lastly, some projects, such as decompartmentalization, may not make additional water available.

The system-wide approach, which requires using system-wide hydrologic tools (such as the South Florida Water Management Model), also avoids the potential for double counting that may occur if separate localized models are used. The system-wide approach will also make it easier to

correct or modify the identification of water needed for the natural system based on the results of the adaptive assessment program. There are some exceptions to the system-wide approach. For those projects that are not physically interconnected to the features of the C&SF Project system (e.g. Southern Golden Gate Estates Project), identification of water to be reserved for the natural system should be done only on an individual project basis.

The actual project water supply performance may be estimated and defined as 1) an explicit volume related to a specific climatic condition, or 2) a range of volumes related to the expected performance of a project over dry, average and wet conditions based on historical rainfall trends.

Typically these performance measures would be judged against a base case that reflects a “without project condition”. Regional and project specific computer models should be developed which contain the site characteristics of the facility such as available storage and inflow and outflow structures. Next, a set of operational rules should be developed for determining how, when and where water is discharged into and out of the facility. A set of rainfall conditions should be applied which typically reflect the long-term historical rainfall data, unique to the proposed spatial location of the proposed facility. Finally, the models are run, and the output is post-processed to graphical formats consistent with the identified performance measures and the results are reviewed. Several iterations of model simulations may be necessary to optimize the performance of the facility taking into account flood control, water supply, water quality, and environmental considerations

It should be noted that the quantification and accounting of water needed to be reserved, as reflected in the PIR, could be very different than the actual project performance during the operation phase. During the PIR development phase, evaluations are done on a predictive basis, based on assumptions that the projects recommended in all previously approved PIRs are in place. This allows us to compare the effect of a project combined with the other approved CERP projects to the conditions before CERP was approved (i.e., base-line condition). When dealing with system operations, on the other hand, it is necessary to deal only with those projects that have actually been built, not what has been approved since projects may come on line in a different order than the order of PIR approval.

As each CERP project is constructed and operational, regional water availability also will change requiring concurrent revisions to the regional water availability rule. These revisions will not only reflect the changes in the system-wide operations necessary to effectively implement each constructed project, but will also form the basis for potential increases in available supply for allocation to human uses.

### **C. Protection of CERP Water Supplies for Legal Uses and Natural System**

WRDA 2000 requires that water for the natural system be identified for each project in the PIR process and that a reservation or allocation of water be executed prior to the Project Cooperation Agreement (PCA) being executed. The initial reservation should provide assurances that the new water directed to the natural system is set aside for environmental purposes and that consumptive uses are adequately protected. The PIR will include water supply performance measures which will determine if existing consumptive use demands are met. The initial

reservation should include conditions that define the basis for the pre-PCA assumptions and the need to reevaluate the actual project performance after construction and operation.

In order to protect existing uses and to define the water available for future use, the initial reservation rule must specify that the reserved water will not be delivered until a final operations manual is provided to the District. In addition, if the facility results in a shifting of sources for existing uses, the initial rule should include conditions that the source shift will occur only after the project is constructed and operational and a final operations manual is provided to the District.

Since the PIR is a preliminary design document which is followed by detailed designs, final operation control manuals, and construction, there is a high probability that the ultimate performance of the facility in question may change. This change may be either substantial or minimal, but will probably affect the amount of water initially reserved by rule for the natural system. The final performance of the facility may also substantially or minimally affect the amount of water available for consumptive uses as estimated by the PIR. Likewise, RECOVER will identify, through time, additional facilities or operational changes that will fine tune the natural system benefits of a particular project which may require revisions to existing water reservation rules. Therefore, the initial reservation should be conditioned upon reevaluating the performance of the facility once constructed and operational.

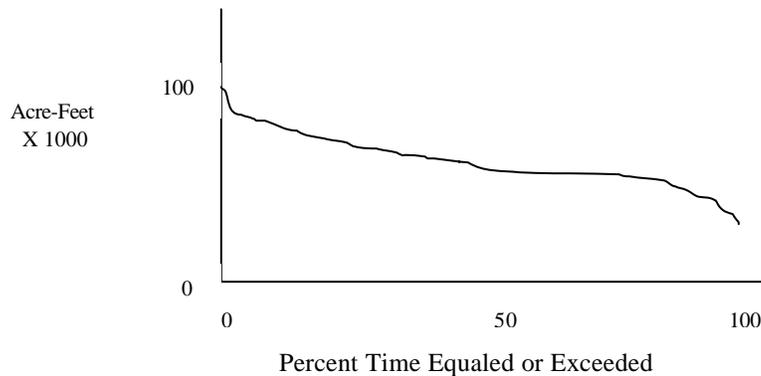
Regional operations may also be modified as each new PIR is designed and implemented. During the design of the project, operations of the regional system should be included in the analysis and necessary changes should be documented. After the project is constructed and operational, and concurrent with the development of the final water control plan, revisions to the existing system wide reservations water control plan and regional water availability rule should be made to reflect the addition of the new CERP project. Additionally the annual operating plan should include any new projects.

Not only will the water available for future uses be identified as part of the PIR process, but also potential shortfalls in future demands will be identified and planned for as part of the five year updates of the Lower East Coast Regional Water Supply Plan. Changes in the projected water availability based on actual project performance, construction schedule adjustments, funding and institutional issues will require an ongoing strategy of periodic regional system-wide review to insure that both future water use demands and environmental goals are met. If a shortfall is projected in water for future consumptive uses, then periodic updates of the regional water supply plans under state law will identify the necessity of additional water resource development projects or water supply development projects to make up for the shortfall.

## **V. Technical Process for Quantifying CERP Project Water Supply Benefits**

WRDA 2000 requires that the amount of water to be reserved for the natural system be identified in the PIR. This implies that a volume needs to be determined. Such volumes (water quantity) can be determined from water budget information using a hydrologic simulation model such as the South Florida Water Management Model. However, an average annual volume alone would

not provide for the variability of water flows. Therefore, a probabilistic approach should be used. Specifically, the water budget annual means for the simulation period can be turned into an annual volume-duration curve at specific locations (cells or indicator regions) as shown below:



These curves should be generated at all appropriate points of interest in the system. For the Restudy, system-wide water budgets (using average annual values) were developed for a variety of conditions (Natural System Model, 1995 base case, 2050 base case, and with-project) by summing the inputs and outputs throughout the system. This water budget was used to determine the total amount of water generated by the comprehensive plan as well as how much went to the natural system and how much to other uses. The set of volume-duration curves generated for each PIR similarly can be used to determine how much water is being generated and which use sector its going to.

The volume-duration curves should first be developed for the pre-CERP condition (i.e. the conditions existing on December 11, 2000, the date of enactment of WRDA 2000). This is the baseline condition (existing regional water availability) from which CERP will be measured against. Initially, this baseline condition will be established by assuming the historical rainfall conditions of 1965 through 2000. As additional rainfall data become available, the baseline condition will need to include these additional data.

For each PIR, volume-duration curves should be developed by assuming that the project recommended in that PIR as well as all previously approved projects (i.e. PIRs that have been approved) have been constructed and are operational. For evaluation purposes, this condition assumes that the project recommended in each PIR would be the next added increment to CERP (i.e., no more projects will be built).

The total amount of water made available by the projects should be computed by comparing the quantities estimated from the volume duration curves to the pre-CERP base line condition. This can be done at each location and summed for the total system. The computation can likewise be done for the water that is going to the natural system in order to identify the water that should be reserved for the natural system. A third computation should identify that portion of the total quantity of water that is made available for other uses and may be allocated after the project is constructed and operational.

Each PIR represents a cumulative identification of both the water to be reserved for the natural system and the water to be made available for other uses. In effect, what this procedure does is to establish a system-wide reservation account of the amount of water that needs to be reserved for the natural system. Although the PIR (which is produced for individual projects) provides the vehicle for the identification of water, the master accounting should be done on a system-wide basis. Therefore, projects are not incremental, but the system-wide quantification developed in the current PIR replaces the previous quantification.

It is recommended that the following information be modeled and incorporated into the PIR for each facility to provide assurances that the project is designed and operated consistent with the goals of CERP and consistent with the LEC Regional Water Supply Plan as follows:

1. An agreed upon set of performance measures related to flood protection, water supply and environmental restoration goals, documenting the expected performance of the new facility compared to the without condition (base case) and consistent with the performance targets agreed to in the CERP.
2. A total volume duration curve for the specific project which is reflective of the full range of rainfall conditions under which its performance was analyzed.
3. A volume duration curve for the specific project of water delivered to the environment.
4. A volume duration curve for the specific project of water delivered to other uses.
5. Volume duration curves for the regional system including the current project and all previously approved PIRs identifying the total water, natural system and other uses of water to date.
6. The estimated one in ten year drought volume made available to the natural system.
7. The estimated one in ten year drought volume (surface and groundwater) made available to other uses
8. An explicit set of operational rules for the facility.

Based on this information in the PIR, the initial reservation should include the following:

1. **The original source of reserved water** (e.g. IRL storage reservoir);
2. **The conveyance route of the reserved water** (e.g. IRL storage reservoir to C-44 connector canal, to C-44, to C-44 STA, to Lake Okeechobee surface water, to Floridan Aquifer via ASR, to Lake Okeechobee surface water via ASR, to Miami canal via S-3, to Water Conservation Area 3 via S-8);
3. **The primary environmental benefit of the reserved water**, (e.g. reduced inflow to Indian River Lagoon and water conservation area 3 hydropattern improvement); and
4. **Whether the new water made from the project and its operational protocol shifts sources for existing uses** (e.g. the St. Lucie Agricultural Area current supply source is C-23 Canal with an allocation of xx AF; IRL reservoir supplies xx AF under one in ten year conditions; shift agricultural users water source from C-23 to IRL reservoir once project is completed, tested and operational).

WRDA 2000 requires that operating manuals be consistent with the water reserved for the natural system as described in the PIR. The operating manuals will also define how water is delivered to the natural system and for consumptive uses. It is anticipated that a system-wide Master Water Control Plan will be developed for CERP. The Master Water Control Plan would

provide a system-wide operating plan for CERP (assuming all projects have been implemented), and would be based initially on the comprehensive plan described in the Central and Southern Florida Project Comprehensive Review Study. The Master Manual would contain the appropriate National Environmental Policy Act (NEPA) document and be developed with appropriate public input. An annual operating plan would be developed, based on the Master Water Control Plan, and will include the operations plan for the CERP projects that are operational or expected to be operational during that year. As the comprehensive plan is revised, the Master Water Control Plan would be revised to reflect operation of the revised comprehensive plan.

## **VI. Integration of State and Federal Processes for Quantification and Protection of Water Supplies for Consumptive Uses and Natural System**

1. Adopt a baseline regional water availability rule. The baseline regional water availability rule will identify the starting point for future system wide/regional reservations (Figure 3). (May need to wait for adoption of programmatic regulations and president/governor agreement before this can be adopted (2004?))

2. For each PIR, identify additional water made available to the environment and additional water made available for other uses.

Initial project reservation: the amount of water estimated to be made available once the project is operational; this water is not available to consumptive uses until project is operational; water will not be provided to the natural system until the project is operational (see process for system wide reservations).

3. Prior to PCA executions adopt through state rulemaking an initial project reservation; conditioned on assumptions and conditions.

4. Post project construction/operation analysis and reservation rulemaking:

Refine initial project reservation based on actual project performance (this will include revisions to initial reservation if significant changes from initial underlying assumptions and conditions).

Update system wide reservation based on actual project performance.

5. Identify detailed operations protocol for delivering reservation water to natural system; incorporate into *operations manual*.
6. Adopt consumptive use permit and water shortage related rules (including updated regional water availability rules, water shortage triggers and associated phased cutbacks).
7. Update CERP and regional water supply plans periodically (every five years). This will include changes to the comprehensive plan and its implementation schedule.

# Conceptual Relationship of Water Demands for Human Uses and Environmental Systems

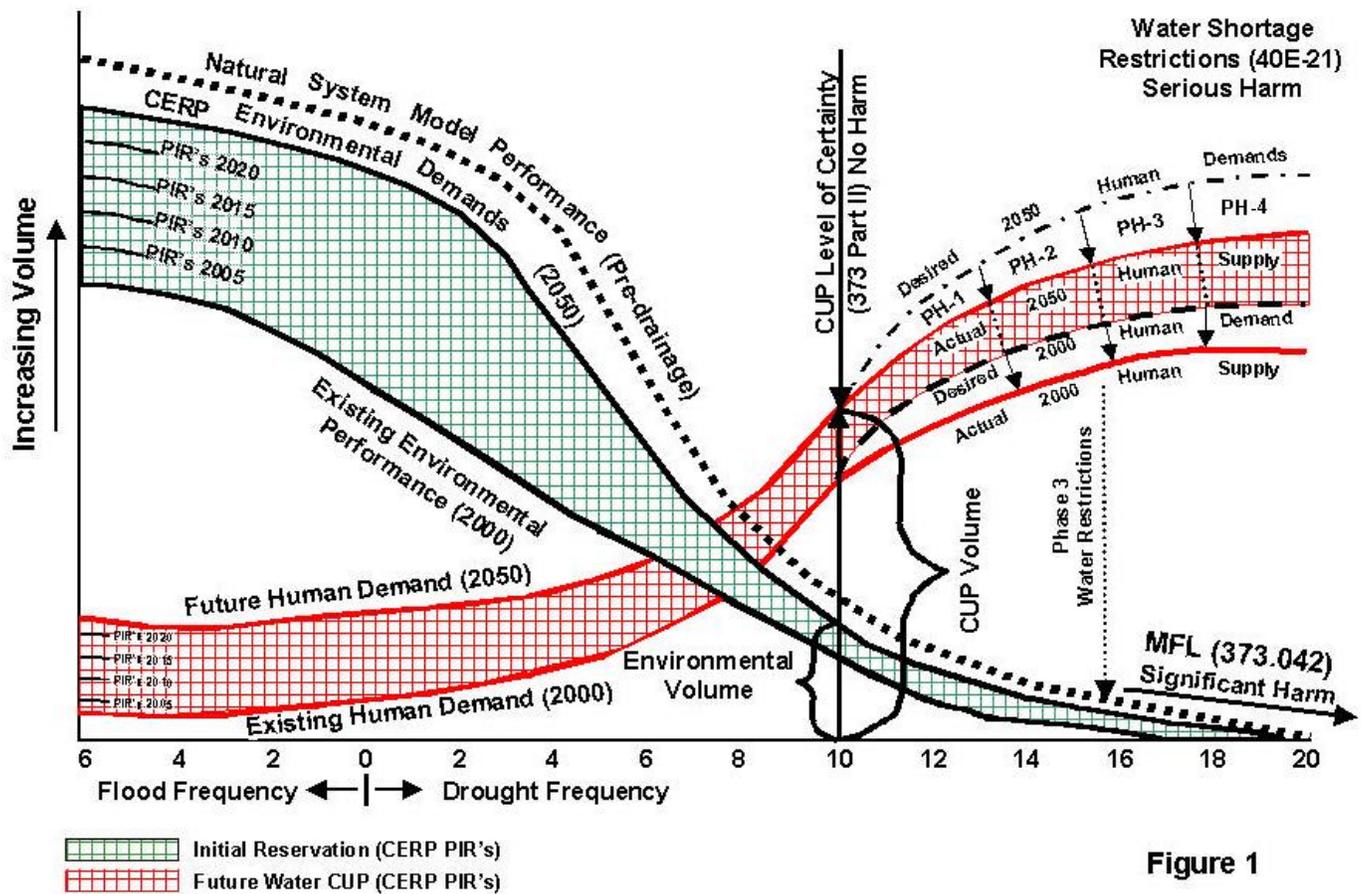
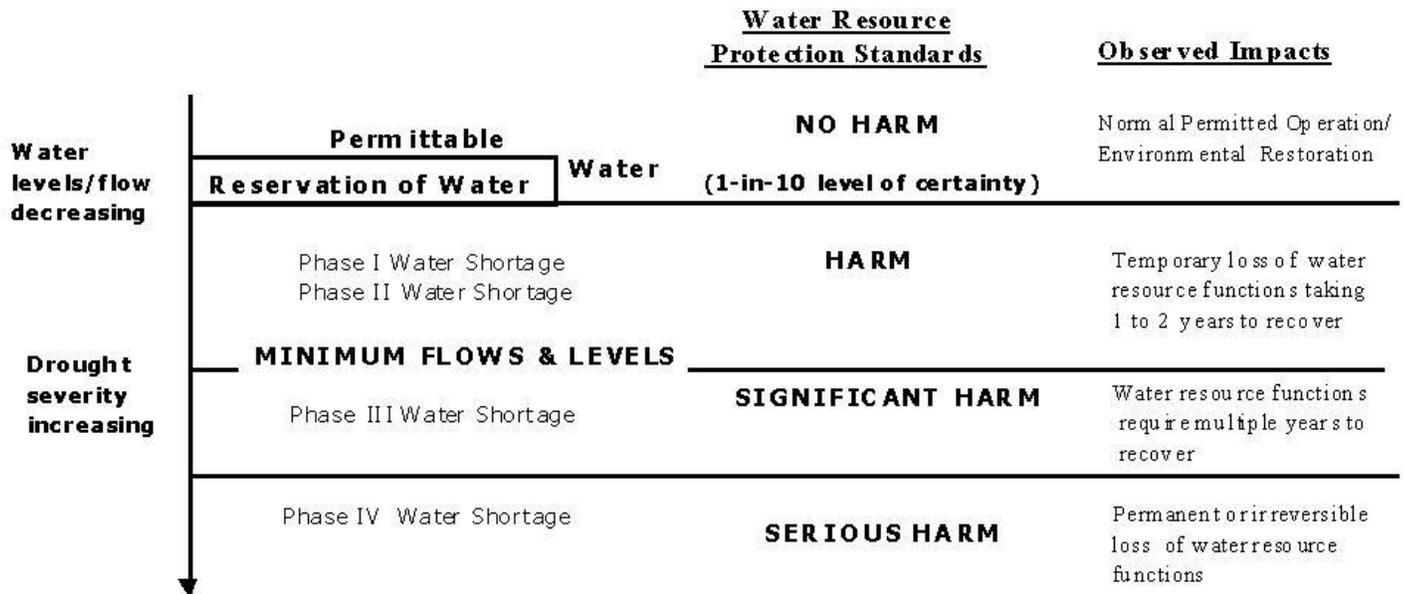


Figure 1

**Figure 2. Relationship of Water Resource Protection Tools Under State Law**



### Figure 3: Integration of State/Federal Processes for Protection of Natural System Water

