EARTHJUSTICE
COMMENTS ON PROPOSED RULE
PART III

The following section provides three case studies of water transfers including a multi-million dollar water problem in California, threatened drinking water in Florida, and the Colorado-Big Thompson Project.

V. CASE STUDIES OF ENGINEERED WATER TRANSFERS FROM ONE DISTINCT WATER BODY INTO ANOTHER

A. Case Study One: Toxic algae contamination of Lake Skinner due to water transfers from the Sacramento-San Joaquin Delta via the California State Aqueduct.

1. Summary of water transfer and its consequences

SUMMARY: Water from the Sacramento-San Joaquin Delta in California is transferred over 400 miles through the California Aqueduct to Lake Skinner located south and west of Los Angeles. That lake serves a drinking water reservoir for San Diego which lies further to the south. Cyanobacteria from the Delta were transferred to Lake Skinner through the Aqueduct and produced a massive algae bloom which required the Lake Skinner reservoir to be taken out of service for repeated treatments to kill the algae. The species of cyanobacteria that was introduced not only produces substances that generate serious taste and odor problems; according to the World Health Organization it also has the potential to produce both nerve and liver toxins.[1] A $241 million addition to the Lake Skinner water treatment plant is now underway to deal with the taste and odor problems caused by the algal blooms.

2. California's engineered water transfers and contamination of Sacramento – San Joaquin Delta source water with toxic algae

This water transfer is part of California's extensive federal, state, and local water transfer system that conveys water from distant water basins to the north and east of California (including from other states) in order to supply water to the agricultural area in the central portion of the state and the urban coastal areas to the west and south.[2] The Sacramento-San Joaquin Delta ("Delta") is an inland delta at the convergence of the San Joaquin River (which flows north) and the Sacramento River (which flows south).[3] Together, these rivers flow into a string of inland bays which form the San Francisco Estuary, one of the largest estuaries on the West coast of North America.[4]

Water from the Delta (a primary water source for California) is diverted into storage reservoirs for the California State Water Project and Federal Central Valley Project.[5] These projects supply agricultural and drinking water to much of Southern California.[6] All told, the Delta serves as a drinking water source for 23 million people.[7] See Figures 16[8] and 17.[9]

Figure 16. Map of rivers and federal, state, and local projects in California: blue lines are rivers, yellow lines are federal projects, red lines are state projects, and green lines are local projects.

Figure 17. Map of the California State Water Project Showing Facilities.

In 1999, *Microcystis aeruginosa* was discovered for the first time in the Delta.[10] It was the first recorded toxic algae bloom in the northern estuary and researchers have theorized that it is an introduced species since it had never shown up in samples taken between 1975 and 1982.[11] The bloom is continuing to expand; monitoring has shown more *Microcystis* in the Delta in 2005 than there was in 2004.[12] There is currently a $500,000 study underway to study the severity of the algae invasion and how to deal with it.[13] According to Karen Schwinn, associate director of the USEPA's water division in San Francisco, neither state nor federal water officials have a full grasp of the threat the invasion poses: "You're raising a question that we at EPA don't know the answer to, and we should."[14]

In a journal article describing their research efforts, the researchers found that microcystins had entered the base of the food web and were found in both total zooplankton and clam tissue.[15] They found that the bloom occurred throughout the freshwater and brackish water regions of the estuary, and contained hepatotoxins at all stations sampled.[16] They also noted that the bloom posed a potential threat to the beneficial use of the water in the Delta since "the diversion of water from the [Delta] reservoirs may provide the seed needed to spread *M. aeruginosa* blooms and associated taste and odor problems into drinking water supplies."[17] Economically important recreational uses were also impacted since the toxins produced symptoms upon direct contact and ingestion and high toxic levels had been found at a popular swimming beach.[18] They also pointed out that sportfishing could be impacted due to the health risks associated with ingesting toxins that had bioaccumulated in fish, and that high biomass of algae in the water enhanced trihalomethane production, a cancer causing substance associated with chlorination of drinking water containing organic matter "and an important concern in the [Delta].[19] There were also concerns that the microcystins would have an adverse impact on phytoplankton in the system that formed the base of the system's food web.[20]

However, the cyanobacteria that made the news when it was found in a drinking water reservoir at the far southern end of the California State Aqueduct was not *Microcystis*, but a little known cyanobacteria called *Planktothrix perornata*. On September 1, 2005, the Metropolitan Water District of Southern California ("MWD") issued a press release announcing that certain customers would soon (or might already have) noticed an earthy musty smell in their drinking water.[21] They explained that methylisoborneol ("MIB") and geomisin, substances that create an unpleasant taste and odor, were being produced by algae found in Lake Skinner.[22] Lake Skinner is a reservoir in Riverside County, California that receives water from both the Colorado River Aqueduct and from the California Aqueduct which transports water from the Northern California rivers and streams that supply the State Water Project.[23] Lake Skinner is to the south of the confluence of the two aqueducts and is the prime drinking water source for the San Diego region to the south.[24] Officials announced that the algae would be treated with copper sulfate "which is a safe and approved method to control algae growth."[25]

On September 23, 2005, MWD issued another press release announcing progress in dealing with "an unrelenting new strain of algae in Lake Skinner."[26] The District was planning on applying a another treatment of copper sulfate, "the fourth application since August 8" – to address the growth of a "persistent new species," *Planktothrix perornata*, that had first been identified in the lake in August.[27] The lake had been taken out of service as a water supply

reservoir because the water's taste and odor problem could not be corrected by filtration and treatment processes.[28]

The District officials speculated "that the new species might have been imported in supplies from Northern California following the June 2004 levee break in the Upper Jones Tract of the San Francisco Bay/Sacramento-San Joaquin Delta," and Dr. Stewart, the District's water quality manager "noted that recent reports suggest the new species has caused similar problems in the northern part of the State Water Project."[29]

The District is now planning a $241 million retrofit "meant to combat the fast-spreading algae."[30] The reason for the repeated treatments was that after the first two treatments, totaling 11 tons of copper sulfate granules, the *Planktothrix* that survived "recovered in a few days and its population and MIB production then increased very rapidly . . . . MIB was found to be as high as 1800 ng/l in mid-September . . . . [C]onsumers can often detect a taste and odor problem at MIB levels as low as 5 ng/l."[31] The water quality manager again theorized that the algae "made its way south through the State Water Project aqueduct system," and an official with the Contra Costa Water District agreed that the algae was present in Delta water sources but that "it hasn't developed into a problem."[32]

3. The State of California has required no permits and has done little or nothing to prevent the adverse effects of water transfers on drinking water.

The Contra Costa Water District, which gets all of its water from the Delta, has substantial water quality problems stemming from the fact that, according to the assistant manager of the District, "today no regulations exist to keep the Delta safe for drinking water . . . [t]he only drinking water standard in the Delta is designed nominally to keep people from gagging."[33] A massive federal project, which had as one of its four goals the improvement of Delta water quality, has been a failure – drinking water is now worse than 10 years ago, and federal managers agree that the project is behind on water quality.[34] Public health threats associated with the poor water quality include toxic disinfection byproducts created by the interaction between the organics and nutrients in the source water with the chlorine used in the treatment process.[35] While improving water quality would be expensive, "so is dealing with poor quality."[36] The Contra Costa Water District has spent $850 million over the past 10 years to deal with water pollution problems "and that doesn't count the continuing expense of treating the water."[37]

As for state regulations, the state has recently proposed a limited listing of some drinking water reservoirs as impaired for some constituents under the state TMDL program.[38] Even that faint-hearted effort has met stiff resistance from the Association of California Water Agencies ("ACWA") (which includes the Metropolitan Water District that runs the Lake Skinner reservoir), which "supports revision of the state Listing Policy to exempt drinking water reservoirs with unavoidable impairments associated with imported drinking water quality."[39] Thus, at the same time that California water managers are arguing in favor of a rule exempting pollutants in water transfers from NPDES permitting requirements – on the theory that the problems can and should be handling through state regulation – they are also seeking an exemption from the very state water quality regulations that they contend are the better approach to solving the problem. The Association of California Water Agencies appeared as an amicus in

the *FWF* case in the Southern District of Florida to argue that state laws and regulations are the solution to all pollution problems caused by water transfers.[40]

Impairment of the designated uses of receiving waters is already happening as the result of engineered water transfers that moved water containing cyanobacteria from one distinct water body into another.

B. Case Study Two: Everglades canal water to Lake Okeechobee via South Florida Water Management District pumping stations S-2, S-3, and S-4

1. Summary of water transfer and its consequences

Lake Okeechobee, a 730 square mile lake, is a Class I waterbody with a designated use as a drinking water source. Water is pumped into the Lake from District drainage canals via massive pumping stations that can produce a flow comparable to a medium size river. When operating, the pumps create a plume of nutrient-enriched black or reddish water than can extend up to nine miles into the lake. The pollutants added by backpumping harm the designated uses of the Lake. The backpumped water contains high levels of dissolved organic compounds which form carcinogenic byproducts when mixed with the disinfectants used by nearby municipal drinking water plants on the south rim of the Lake. Excessive levels of these byproducts in the towns' drinking water have been linked to backpumping events. The backpumped water is high in nutrients which can trigger and/or contribute to toxic algal blooms in the Lake. When Lake water containing toxic algae is taken into the municipal water treatment plants, the "treatment" results in drinking water that has higher levels of toxins than are found in the Lake.[41]

2. The water transfers effectuated by the District pumping stations add a "pollutant slug" of highly colored nutrient enriched water that harms Lake Okeechobee and creates public health risks[42]

In their natural condition, Lake Okeechobee and the Everglades were two separate and distinct water bodies: one a lake, the other a vast freshwater marsh. Water naturally flowed south from the Lake into the Everglades through numerous distributary rivers that cut through the raised forested southern rim of the Lake. During high flood events, water would flow over low areas of the rim and sheet flow south or west. A century of state and finally federal flood control projects fundamentally altered this flow regime. Massive pump stations were constructed on the north end of Everglades canals on the dike in the 1950s. The pumping from these pumping stations, in which the flow in the canals is reversed from its natural southerly gradient of flow and pumped up into Lake Okeechobee, has long been described as "backpumping." Backpumping by the SFWMD has artificially added three basins totaling 425 square miles to the watershed of Lake Okeechobee – all of which drained either to the south or west under natural conditions.

Figure 18. Photograph from 1912 of southern shore of Lake Okeechobee taken from hotel situated where S-3 pumping station is now located.[43]

Figure 19. Photograph from 1912 taken from hotel looking across Rita River/ Miami Canal toward pond apple forest on southern shore of Lake Okeechobee.[44]

Figure 20. Photograph from 1912 of Bolles Hotel.[45]

Backpumping discharges a highly visible plume of nutrient rich, highly colored reddish to blackish water that is completely different than the Lake water into which it is discharged. Figure 21. Backpumping directly impacts an area up to the size of a large lake, and can influence the quality of Lake water up to nine miles into the Lake's southern end. The water backpumped into Lake Okeechobee contains color, nitrogen, phosphorus, total suspended solids and high biological demand, dissolved solids (included dissolved organics); low quantities of dissolved oxygen; and un-ionized ammonia.

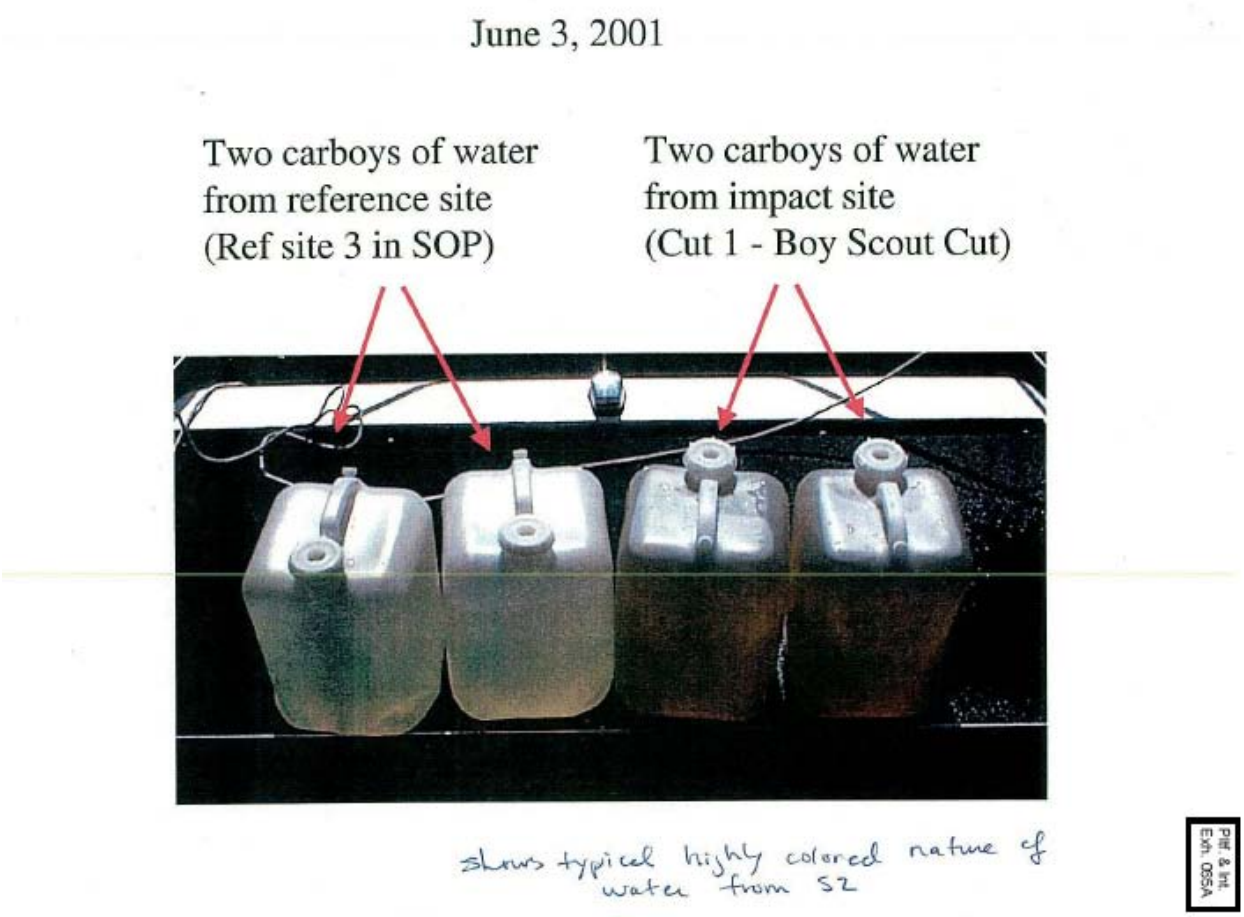

Figure 21. Plaintiffs' Exhibit 65A showing typical highly colored nature of water pumped from canals into the lake.[46]

The backpumped water contains dissolved organic compounds that form toxic "disinfection byproducts" when they react with disinfectant chemicals used in the water treatment plants. When the water taken in by the cities' intakes was treated with chlorine, the byproducts were a class of carcinogens called trihalomethanes. An association between high levels of trihalomethanes and backpumping has been documented in reports dating back to 1981. While the cities on the south shore recently switched from chlorine to chloramines (a compound made by combining chlorine and ammonia), the byproducts of chloramine treatment of organic-laden water can cause cancer and mutagenic maladies such as birth defects. The higher the level of organics, the more disinfectant is used, and the more disinfectant byproducts are created.

Pollution "slugs" from backpumping also stimulate the growth of cyanobacteria (commonly known as blue-green algae). Floating blue-green algae blooms can become both massive and toxic The area directly affected by the backpumping includes the southern nearshore zone of the lake which is populated by colonies of submerged aquatic vegetation and the south pelagic zone (an open water portion of the Lake). Dr. Karl Havens, former Chief Environmental Scientist for the SFWMD's Lake Okeechobee Division, once wrote that effects of backpumping were of particular concern because this southern region:

> [S]upport[s] diverse assemblages of fish and macroinvertebrates which serve as food resources for wading birds. The south pelagic region is also a primary location for recreational fishing, which is estimated to bring in several million dollars per year into local economies.

Overall, algae blooms "pose a significant threat to many of the uses of the lake including drinking water, habitat, nesting, fishing, and swimming," and reduce Lake users' enjoyment of the resource.

3. The State of Florida has completely failed to effectively abate the harm to Lake Okeechobee and drinking water supplies caused by backpumping.

The matter of the state of Florida's failed efforts to abate pollution caused by backpumping into Lake Okeechobee was extensively litigated in the *FWF* case described above. The Lake's water quality problems were clearly recognized 30 years ago and the state of Florida's attempts to deal with Lake Okeechobee's worsening condition have been an outright failure. For example, section 303(d) of the Clean Water Act, which requires the listing of impaired waters, establishment of a priority ranking for those waters, and the establishment of Total Maximum Daily Loads for pollutants for which those waters are not in attainment of state water quality standards, might have worked as a partial solution had those provisions been implemented in 1972 as Congress required. However, the TMDL program was not implemented by the states or EPA until court intercession in the 1990s succeeded in enforcing Congress' intent. *See* Dianne K. Conway, *TMDL Litigation: So Now What?*, 17 VA. ENVTL. L.J. 83, 98 (1987).

In Florida, the TMDL process did not begin until a lawsuit brought by Earthjustice on behalf of Florida Wildlife Federation culminated in a Consent Decree issued in June 1999.[47] The Consent Decree made the establishment of a TMDL for Lake Okeechobee the first priority.[48] By the time the TMDL for total phosphorus (a nutrient) was eventually finalized in 2001,[49] the phosphorus level in the Lake had risen from 40 ppb in 1974 to 140 ppb.[50] Although the TMDL is intended to limit the total inflow into the Lake to 105 metric tons of phosphorus per year; nine times that amount entered the Lake just last year, and the phosphorus level reached an all time high of 240 ppb. [51] The chart below, an exhibit from the *FWF* trial, is a chart showing the rising phosphorus concentration in the Lake since the early 1970s. The chart itself was produced by SFWMD staff. Handwritten onto the chart are the names and dates of the various state water quality initiatives intended to improve water quality in Lake Okeechobee. Figure 22.[52] They include gubernatorial initiatives, state mandated planning requirements, state water quality permitting attempts, statutorily mandated limitations on phosphorus tonnage, and yet more legislative initiatives over the course of 30 years.[53] On the question of the efficacy of those efforts, the graph speaks for itself.

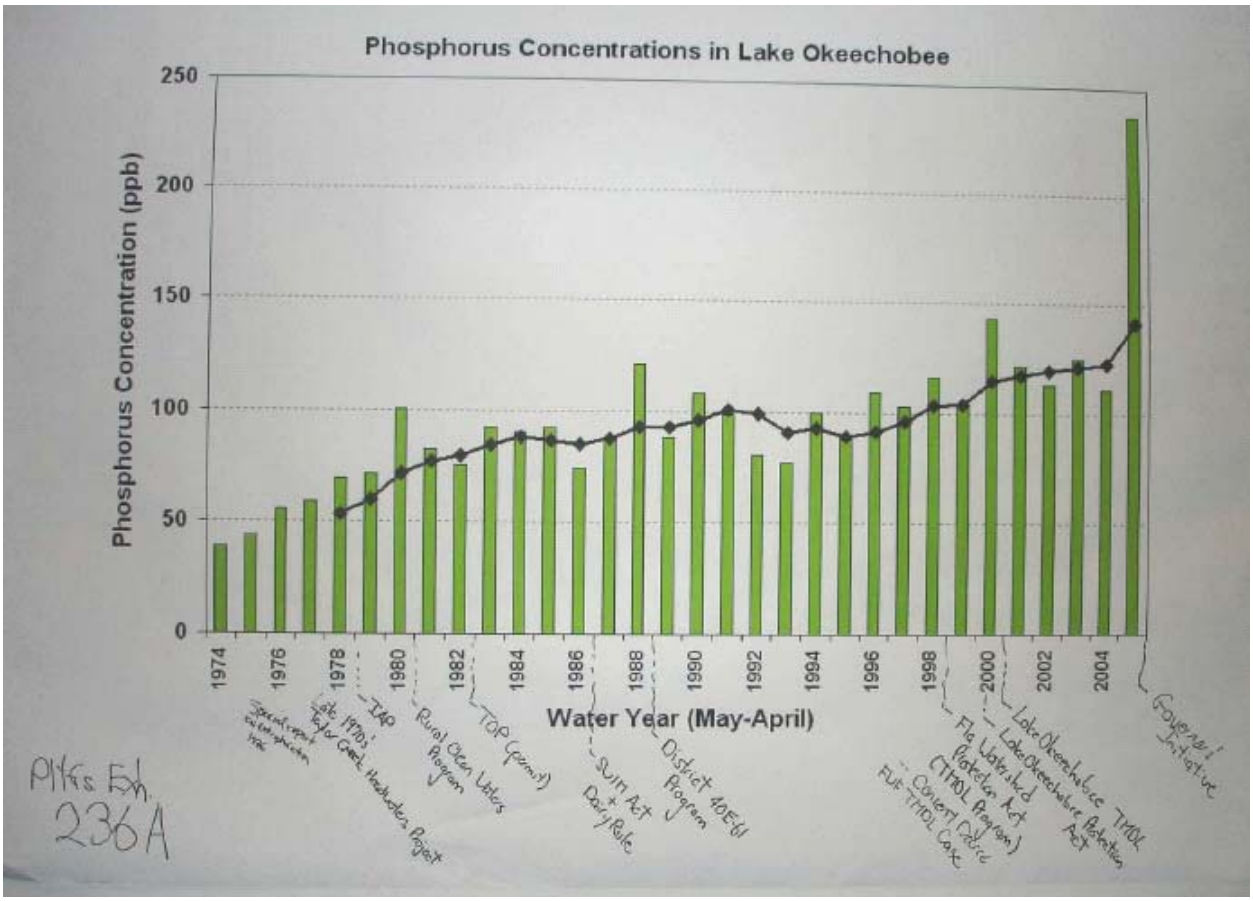

Figure 22. Graph of phosphorus concentrations in Lake Okeechobee showing state initiatives.

In fact, the Lake has deteriorated to such an extent the towns along the south shore of the Lake are considering abandoning the Lake as a drinking water source:

> Public health and water availability concerns are the major reasons for proceeding with the Lake Region Water Treatment Plant. Belle Glade, Pahokee and South Bay all use Lake Okeechobee as a source of raw water for drinking water. Lake Okeechobee receives stormwater inflows from major agricultural areas including dairy farms, livestock pastures, sugar cane fields, small vegetable farms, and sod farms and is heavily nutrient enriched as well as highly colored. Organic material in the water gives rise to trihalomethanes (THM) in the water upon treatment with chlorine; THMs are cancer-causing chemicals according to the U S. EPA. Blue-green algal blooms, potentially toxic, are becoming more frequent.[54]

The towns would have to draw their water from the low quality groundwater aquifer and treat the water using an extremely expensive reverse osmosis process to remove the salts. The plant is estimated to cost approximately $50 million.[55]

3. <u>Toxic algal blooms caused by backpumping and other sources move with Lake Okeechobee water whenever that water is moved out of the Lake into another water body.</u>

The South Florida Water Management District transfers water from Lake Okeechobee into the St. Lucie River/Estuary via canal C-44. This engineered movement of water is an interbasin transfer – no connection between the Lake Okeechobee and the St. Lucie River existed naturally. Compare Figures 23[56] and 24.[57]

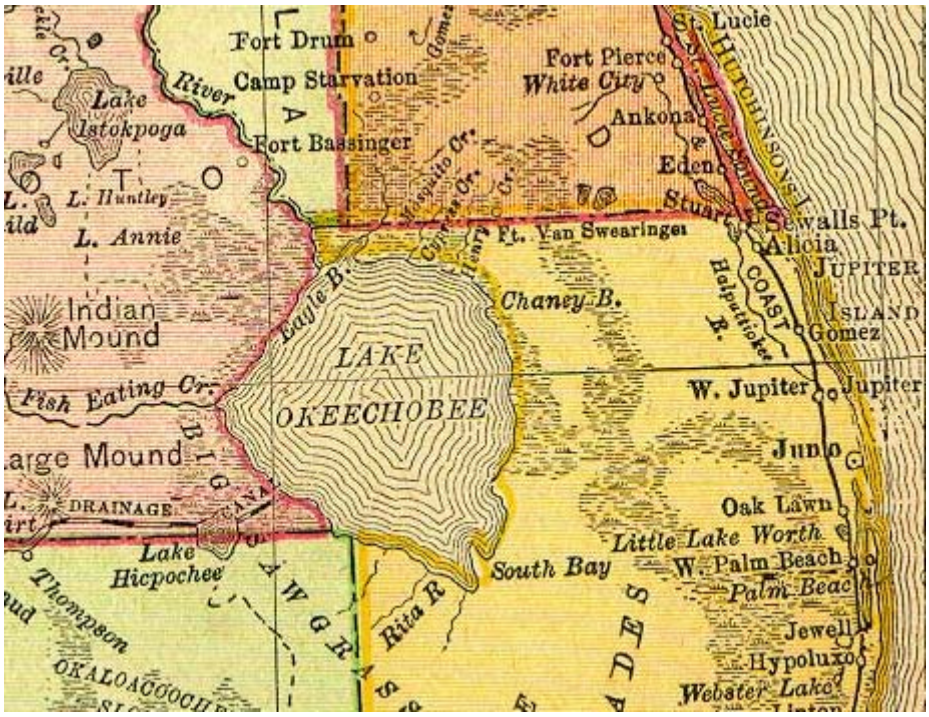

Figure 23. 1895 historic map of Lake Okeechobee.

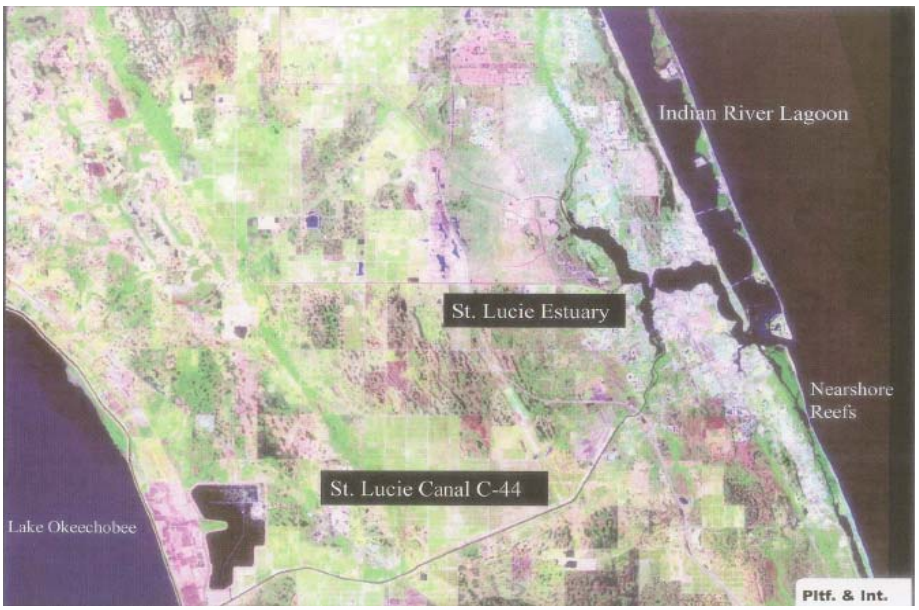

Figure 24. Current map of Lake Okeechobee, Canal C-44, and the St. Lucie River and Estuary.

Often described as "the liquid heart of the Everglades," the Lake is not only a direct drinking water source for towns located on the rim of the Lake,[58] but also serves as a secondary drinking water source for West Palm Beach and the entire Lower East Coast of Florida. Florida's failure to control the rapid eutrophication of the Lake caused by excessive nutrient inputs has led to ever increasing phosphorus levels in the Lake, with the highest levels being recorded during the past year.[59]

According to the SFWMD's former Chief Scientist for Lake Okeechobee, the Lake's response to high nutrient levels has been an ecological shift most notably evidenced by "massive algal blooms generally composed of the cyanobacteria *Anabaena* and *Microcystis*," which at times have covered nearly 50% of the open water area of the Lake.[60] On June 28, 2005, the SFWMD environmental advisory team reported that a widespread algal bloom was developing on Lake Okeechobee.[61] Also on June 28, 2005, Mark Perry, a scientist with the Florida Oceanographic Institute, observed neon green algae in the nutrient enriched Lake Okeechobee water being discharged through the structure at the end of C-44 into the headwaters of the St. Lucie River.[62] A photograph of structure S-80 at the end of the C-44 canal is shown in Figure 25.

Figure 25. SFWMD structure S-80 discharging into the South Fork of the St. Lucie River.[63]

On July 19, 2005, the SFWMD environmental advisory team determined that there was a *Microcystis aeruginosa* algae bloom in the estuary and that the algae "is coming from Lake Okeechobee."[64] Although the District reported that *Microcystis aeruginosa* "was not typically toxic," [65] the World Health Organization report on recreational standards for algae and cyanobacteria in fresh water states that populations of *Microcystis* "are almost always toxic."[66] When finally tested for toxicity, microcystin levels as high as 65 ppb were found in the Lake and levels as high as 373 ppb were found in the river.[67] Martin County issued a health advisory for the St. Lucie River in August, 2005.[68] The bloom eventually covered approximately 75% of the river and estuary.[69] See Figure 26.[70]

Figure 26. St. Lucie River algae bloom, August 13, 2005.

Water from Lake Okeechobee is also conveyed via the West Palm Beach Canal which is used to provide raw water for drinking water supplies for the City of West Palm Beach.[71] The 2005 toxic algae bloom also moved into West Palm Beach where toxin levels 165 times the WHO drinking water standard of 1 ppb were recorded.[72] In the past, the City's water has been found to contain high levels of microcystins.[73]

C. Case Study Three: The Colorado-Big Thompson Project

1. Overview of the Colorado-Big Thompson Project

Federal witnesses in the FWF case used the Colorado-Big Thompson Project as a representative example of a Western water transfer project. [74] Those federal witnesses explained that the Project collects and channels water from melting snow in streams on the western slope of the Rocky Mountains into Grand Lake where it is diverted through Adam's Tunnel under the continental divide into Mary's Lake. From there the water is directed through a series of small reservoirs and power plants into Carter Lake and Flatiron Reservoirs which serve as main distribution reservoirs. From Carter Lake, the water can be conveyed south to the St. Vrain River, or in the alternative, water from Carter Lake can be diverted to Little Thompson River, Left Hand Creek, Boulder Creek and the South Platte River where it is used for irrigation and municipal water supply. Water sent north is also ultimately diverted into the Big Thompson River and the Cache la Poudre River.[75] Graphic depictions of this system are shown in Figures 27 and 28.

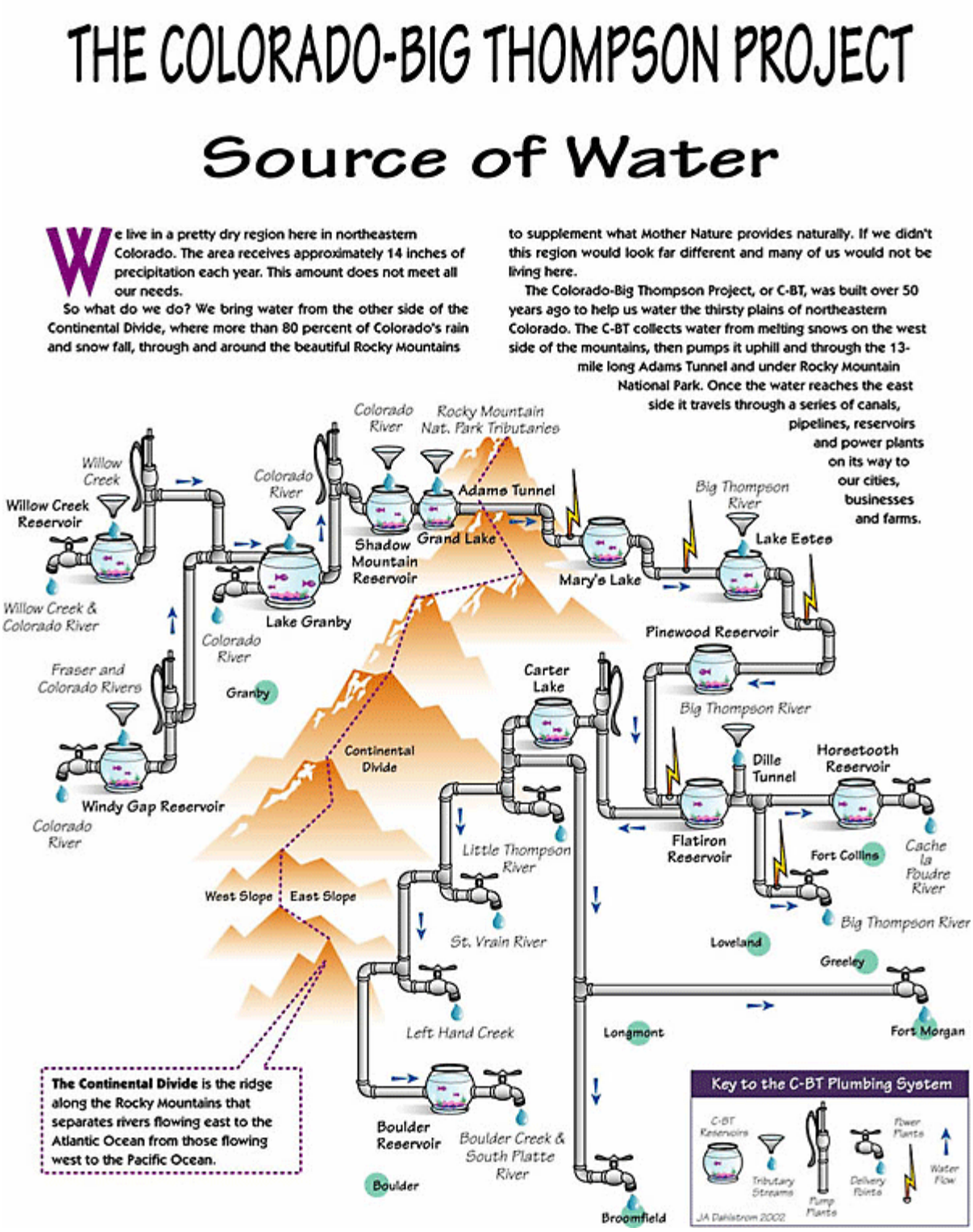

Figure 27. Depiction of the Colorado-Big Thompson Project.[76]

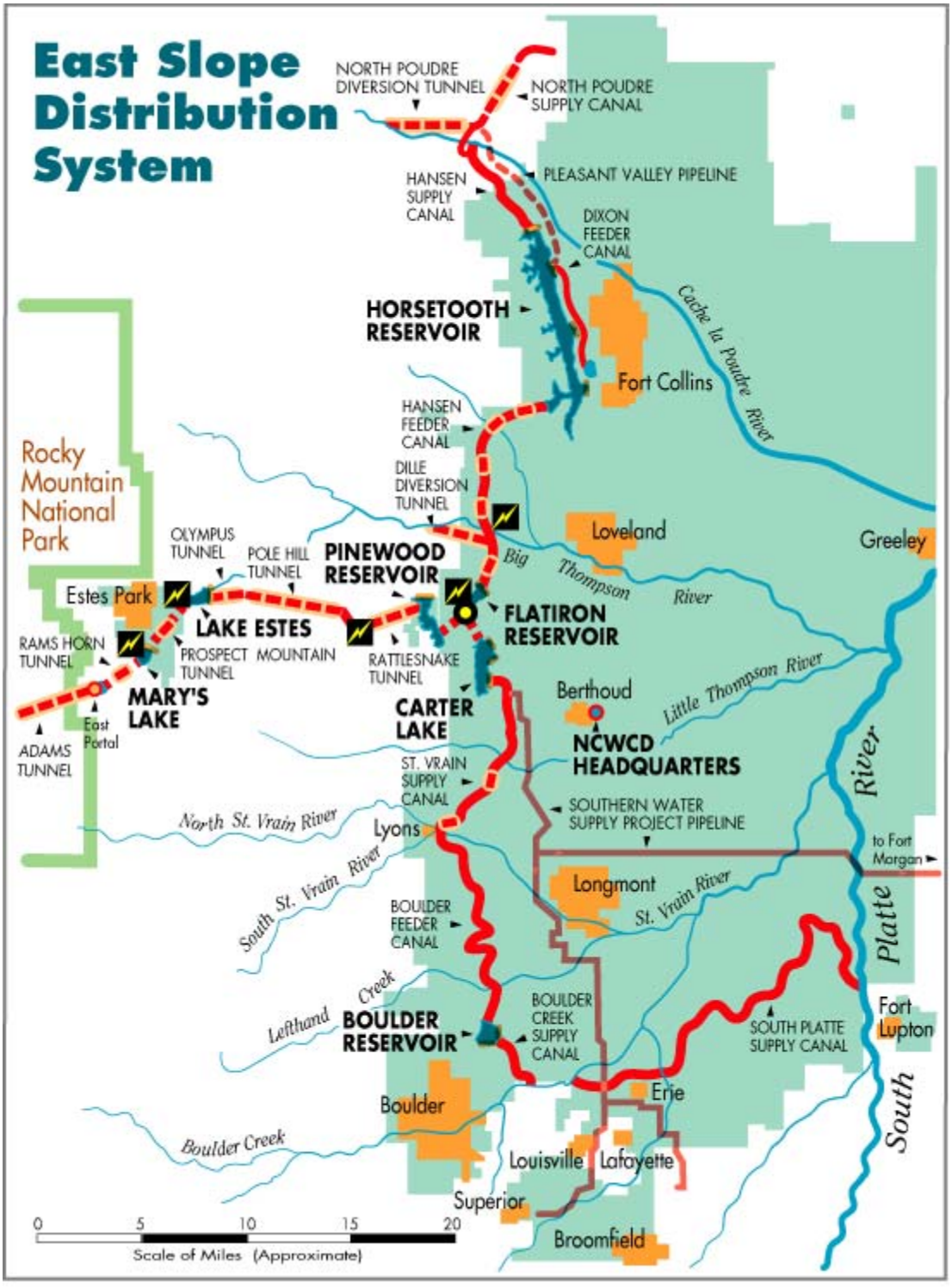

Figure 28. Map of the East Slope Distribution System of the Colorado-Big Thompson Project showing location of east slope rivers.[77]

2. The Colorado-Big Thompson Project demonstrates the administrative flexibility in the NPDES permitting rules as they apply to western water transfer systems.

The testimony and the accompanying maps introduced as exhibits at the *FWF* trial identified twenty or more water diversions within the Colorado-Big Thompson system. However, deposition testimony and a stipulation at trial also disclosed an absence of any pollution problems resulting from the operation of the Colorado-Big Thompson system that caused a water quality violation in the receiving water.[78] The stipulation offered by the United States at trial – and agreed to by all parties except the South Florida Water Management District – was as follows:

> There are engineered water transfers in the western United States. These next two witnesses will discuss four of them. The United States and the Plaintiffs, including the Tribe, agree that there is no record evidence that any of the four trans-basin water transfers cause or contribute to any exceedances of any water quality standard in the receiving water body. With respect to any of the other water transfers discussed by these two witnesses regarding these four projects, no party to this stipulation contends that any such transfer caused or contributed to a water quality standard exceedance in the receiving water body.[79]

Given this testimony and this stipulation, EPA's proposed rule wholly fails to take into account the administrative flexibility created by its own general permitting rules as was specifically noted by the Supreme Court in *Miccosukee*. 40 C.F.R. § 122.28.[80] That rule allows for single system-wide permits for certain categories of point sources within a defined geographic area, such as the Colorado-Big Thompson or the Central Valley Project, 40 C.F.R. § 122.28(a)(1), while allowing for individual permits for an individual discharge of pollutants where that discharge is in need of pollution abatement measures. 40 C.F.R. § 122.28(b)(3). In fact, one of EPA's expert witnesses who had experience with NPDES permitting testified at his deposition that getting NPDES permits would not be excessively burdensome.[81]

Applying this permitting scheme to the Colorado-Big Thompson Project is a useful exercise. Based on the testimony of federal witnesses, this is the type of project where generally good water quality would allow for coverage by a general permit. However, research and events over just the past two years indicate that the Project is experiencing emerging water quality problems. Those problems include eutrophication (nutrient enrichment) of major reservoirs (there is currently an ongoing debate as to whether the Horsetooth Reservoir should be declared impaired for low dissolved oxygen) and reports of "a disturbing trend toward blue-green algae that could produce toxin levels that endanger drinking water."[82] Public health risks and other issues related to water transfers that involve toxic algae are described in detail in Sections III and IV of these comments. The Northern Colorado Water Conservancy District, the state created entity that operates the project, has itself reported that users of the system have "voiced concerns" about "the effect of introducing C-BT water into east slope rivers and streams."[83] These are exactly the water pollution issues that NPDES permitting is intended to address. If, in

fact, those transfers of polluted water are significant contributors of pollutants, then an individual permit should be issued to address those concerns before they develop into public health threats.

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[1] App. 137 (WHO Drinking Water Guidelines, section 11.5)
[2] App. 86 (CA DWR: Description and Map of California State Water Project); App. 86 (CA DWR: Description and Map of California State Water Project); App. 87 (CA DWR: Maps of Major Rivers, Federal Water Projects, State Water Projects, and Local Water Projects)
[3] App. 86 (CA DWR: Description and Map of California State Water Project)
[4] App. 88 (CA DWR: Sacramento-San Joaquin Delta Atlas); App. 36 (Lehman: Distribution and Toxicity of a New Colonial Microcystis Aeruginosa Bloom in the San Francisco Bay Estuary)
[5] App. 86 (CA DWR: Description and Map of California State Water Project); App. 87 (CA DWR: Maps of Major Rivers, Federal Water Projects, State Water Projects, and Local Water Projects); App. 36 (Lehman: Distribution and Toxicity of a New Colonial Microcystis Aeruginosa Bloom in the San Francisco Bay Estuary)
[6] App. 86 (CA DWR: Description and Map of California State Water Project); App. 87 (CA DWR: Maps of Major Rivers, Federal Water Projects, State Water Projects, and Local Water Projects); App. 36 (Lehman: Distribution and Toxicity of a New Colonial Microcystis Aeruginosa Bloom in the San Francisco Bay Estuary)
[7] App. 89 (CONTRA COSTA TIMES (CA): Effects of Toxic Algae in Delta Unknown)
[8] App. 86 (CA DWR: Description and Map of California State Water Project); App. 87 (CA DWR: Maps of Major Rivers, Federal Water Projects, State Water Projects, and Local Water Projects)
[9] App. 86 (CA DWR: Description and Map of California State Water Project)
[10] App. 36 (Lehman: Distribution and Toxicity of a New Colonial Microcystis Aeruginosa Bloom in the San Francisco Bay Estuary)
[11] App. 36 (Lehman: Distribution and Toxicity of a New Colonial Microcystis Aeruginosa Bloom in the San Francisco Bay Estuary)
[12] App. 89 (CONTRA COSTA TIMES (CA): Effects of Toxic Algae in Delta Unknown)
[13] App. 89 (CONTRA COSTA TIMES (CA): Effects of Toxic Algae in Delta Unknown)
[14] App. 89 (CONTRA COSTA TIMES (CA): Effects of Toxic Algae in Delta Unknown)
[15] App. 36 (Lehman: Distribution and Toxicity of a New Colonial Microcystis Aeruginosa Bloom in the San Francisco Bay Estuary)
[16] App. 36 (Lehman: Distribution and Toxicity of a New Colonial Microcystis Aeruginosa Bloom in the San Francisco Bay Estuary)
[17] App. 36 (Lehman: Distribution and Toxicity of a New Colonial Microcystis Aeruginosa Bloom in the San Francisco Bay Estuary)
[18] App. 36 (Lehman: Distribution and Toxicity of a New Colonial Microcystis Aeruginosa Bloom in the San Francisco Bay Estuary)
[19] App. 36 (Lehman: Distribution and Toxicity of a New Colonial Microcystis Aeruginosa Bloom in the San Francisco Bay Estuary)
[20] App. 36 (Lehman: Distribution and Toxicity of a New Colonial Microcystis Aeruginosa Bloom in the San Francisco Bay Estuary)
[21] App. 90 (MWD: No Health Hazard From Tap Water With Unpleasant Taste, Smell)
[22] App. 90 (MWD: No Health Hazard From Tap Water With Unpleasant Taste, Smell)

[23] App. 91 (MWD: Robert A. Skinner Treatment Plant); App. 86 (CA DWR: Description and Map of California State Water Project); App. 86 (CA DWR: Description and Map of California State Water Project); App. 87 (CA DWR: Maps of Major Rivers, Federal Water Projects, State Water Projects, and Local Water Projects)
[24] App. 91 (MWD: Robert A. Skinner Treatment Plant; App. 92 (MWD: Map of District)
[25] App. 90 (MWD: No Health Hazard From Tap Water With Unpleasant Taste, Smell)
[26] App. 93 (MWD: New Algae Species Complicates Efforts to Improve Taste, Smell of Drinking Water for San Diego, Southwest Riverside Counties: Earthy, musty taste and smell of water expected to improve soon)
[27] App. 93 (MWD: New Algae Species Complicates Efforts to Improve Taste, Smell of Drinking Water for San Diego, Southwest Riverside Counties: Earthy, musty taste and smell of water expected to improve soon)
[28] App. 93 (MWD: New Algae Species Complicates Efforts to Improve Taste, Smell of Drinking Water for San Diego, Southwest Riverside Counties: Earthy, musty taste and smell of water expected to improve soon)
[29] App. 93 (MWD: New Algae Species Complicates Efforts to Improve Taste, Smell of Drinking Water for San Diego, Southwest Riverside Counties: Earthy, musty taste and smell of water expected to improve soon)
[30] App. 94 (ENGINEERING NEWS-RECORD: Final Bid Due for Water District Anti-Algae Contract)
[31] App. 93 (MWD: New Algae Species Complicates Efforts to Improve Taste, Smell of Drinking Water for San Diego, Southwest Riverside Counties: Earthy, musty taste and smell of water expected to improve soon)
[32] App. 93 (MWD: New Algae Species Complicates Efforts to Improve Taste, Smell of Drinking Water for San Diego, Southwest Riverside Counties: Earthy, musty taste and smell of water expected to improve soon);
[33] App. 134 (CONTRA COSTA TIMES (CA): Water quality can be hard to swallow)
[34] App. 134 (CONTRA COSTA TIMES (CA): Water quality can be hard to swallow)
[35] App. 134 (CONTRA COSTA TIMES (CA): Water quality can be hard to swallow)
[36] App. 136 (CONTRA COSTA TIMES (CA): Water quality slighted)
[37] App. 136 (CONTRA COSTA TIMES (CA): Water quality slighted)
[38] App. 135 (ACWA: letter to State Water Resources Board re: TMDL listings)
[39] App. 135 (ACWA: letter to State Water Resources Board re: TMDL listings)
[40] App. 114, Brief at p. 9.
[41] App. 27 (ORLANDO SENTINEL: Health Menace Lurks in Lakes)
[42] Please reference App. 1 (Proposed Order in *FWF* case at pp. 1-21); App. 3 (exhibits cited in Proposed Order); and Trial Transcripts are attached to comments on proposed rule submitted by the Miccosukee Tribe and are incorporated herein by reference). All facts in the this section are supported by the exhibits and testimony cited in the Proposed Order.
[43] App. 3 (Plaintiffs' Exh. 16e3)
[44] App. 3 (Plaintiffs' Exh. 16e2)
[45] App. 3 (Plaintiffs' Exh. 16e1)
[46] App. 3 (Plaintiffs' Exh. 65A from *FWF* case)
[47] App. 133 (Consent Decree from *Florida Wildlife Federation v. Carol M. Browner and USEPA*, Case No. 98CV356-WS, United States District Court for the Northern District of Florida)

[48] App. 133 (Consent Decree from *Florida Wildlife Federation v. Carol M. Browner and USEPA,* Case No. 98CV356-WS, United States District Court for the Northern District of Florida)
[49] App. 3 (*FWF* Case: Plaintiffs' Ex. 21)
[50] App. 31 (SFWMD: Phosphorus Concentrations in Lake Okeechobee)
[51] App. 31 (SFWMD: Phosphorus Concentrations in Lake Okeechobee)
[52] App. 132 (Plaintiffs' Exhibit 236A: Phosphorus Concentrations in Lake Okeechobee showing State Initiatives from *FWF* case)
[53] App. 1 (FWF proposed order: section titled "State Programs to Abate Pollution of the Lake Have Failed for 30 Years")
[54] App. 35 (Community Budget Issue Request #343: Lake Region Water Treatment Plant)
[55] App. 35 (Community Budget Issue Request #343: Lake Region Water Treatment Plant)
[56] App. 76 (Rand-McNally 1895 Map of Florida (1895).
[57] App. 2 (Plaintiffs' Exh. 240A from *FWF* case)
[58] App. 24 (FL DOH: Aquatic Toxins Program PowerPoint)
[59] App. 132 (Plaintiffs' Exhibit 236A: Phosphorus Concentrations in Lake Okeechobee showing State Initiatives from *FWF* case)
[60] App. 32 (Havens: Rapid Ecological Changes)
[61] App. 77 (SFWMD: Memo to Chip Merriam, June 28, 2005)
[62] App. 78 (trial transcript of testimony of Mark Perry in FWF case)
[63] App. 79 (SFWMD: Photograph of S-80 Structure)
[64] App. 80 (SFWMD: Memo to Chip Merriam, July 19, 2005).
[65] App. 81 (SFWMD: State of the Water Management System, September 14, 2005)
[66] App. 82 (WHO: Recreational Guidelines for Algae and Cyanobacteria in Fresh Water)
[67] App. 83 (PALM BEACH POST (FL): Algae found toxic, but risks aren't clear); App. 81 (SFWMD: State of the System, September 14, 2005)
[68] App. 84 (Martin County Health Department (FL): St. Lucie River Blue Green Algae Warning); App. 85 (Martin County Health Department (FL): Warning Sign)
[69] App. 78 (trial transcript of testimony of Mark Perry in *FWF* case)
[70] App. 23 (Nuttle: Photographs of St. Lucie River Algae Bloom)
[71] App. 27 (ORLANDO SENTINEL: Health Menace Lurks in Lakes); App. 138 (MIAMI HERALD: Algae toxins in drinking water); App. 83 (PALM BEACH POST (FL): Algae toxic)
[72] App. 83 (PALM BEACH POST: Algae toxic)
[73] App. 27 (ORLANDO SENTINEL: Health Menace Lurks in Lakes); App. 138 (Miami Herald: Algae toxins in drinking water)
[74] App. 1 (Proposed Order at pp. 39-41 and testimony and exhibits cited therein); App. 116 (Yanke deposition testimony); App. 118 (U.S. Stipulation); App. 119 (Yanke trial testimony).
[75] App. 119 at pp. 40-43 (Yanke trial testimony); Appendix 5.
[76] App. 5 (Diagram of Colorado-Big Thompson Project)
[77] App. 6 (Map of East Slope Distribution System of the Colorado-Big Thompson Project)
[78] App. 118 (U.S. Stipulation); App. 116 (Yanke deposition testimony).
[79] App. 118 (U.S. Stipulation).
[80] App. 7 (40 CFR122.28)
[81] App. 116 (Yahnke deposition testimony)

[82] App. 8 (Overview of the Colorado-Big Thompson System Nutrient Project); App. 9 (Gelder, Eutrophication of Reservoirs Article); App. 10 (Environmental Advisory Board Minutes 2004); App. 11 (Environmental Advisory Board Minutes 2005); App. 12 (NCWCD Board Meeting Minutes 2005); App. 13 (THE COLORADOAN: Panel wants Horsetooth to clean up)
[83] App. 8 (Overview of the Colorado-Big Thompson System Nutrient Project)