Appendix 4A-8: Annual Permit Compliance Monitoring Report for Mercury in Stormwater Treatment Areas

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KEY FINDINGS AND OVERALL ASSESSMENT

This Report summarizes data from compliance monitoring of mercury storage, release and bioaccumulation in Stormwater Treatment Areas (STAs) during the reporting year May 1, 2000 through April 30, 2001. Results from this monitoring program describe significant spatial distributions and, in some instances, between-year differences in mercury concentrations.

Key findings are as follows:

1. During the monitoring period, there were no violations of the Florida Class III numerical WQS for total mercury (THg, 12 ng/L). Therefore, the project has met the requirements of Section 6.i of the Mercury-Monitoring Program of the referenced permits.

2. STA-1W, which subsumed the Everglades Nutrient Removal (ENR) Project in early 2000, continues to have only low concentrations of methylmercury (MeHg) in surface water, consistently showed negative percent change across the STA, and exhibited very much reduced MeHg biomagnification in resident fish relative to other areas. While STA-1W Cell 5, i.e., the newest cell, has slightly elevated Hg concentrations relative to the remnant ENR Project. During the reporting year, its levels were low relative to other STAs and areas in the WCAs.

3. After three years of operation, STA-6 continues to exhibit fluctuations in Hg species in water and Hg levels in resident mosquitofish. Further, during the reporting year, STA-6 continued to show positive percent change in THg across the STA, i.e., concentrations greater at outflow than inflow, in surface water and tissue-Hg in mosquitofish, sunfish and largemouth bass. Sunfish collected in 2000 from Cell 5 contained greater concentrations of Hg than fish collected in 1999. However, STA-6 also showed evidence of stabilization with regard to mercury. This was shown by: (1) stable concentrations of THg in sediments in cores from 1997 through 2001 (MeHg in sediments could not be assessed due to high MDL); (2) consistent negative percent change of MeHg concentrations from inflow to outflow; and (3) a decline in Hg levels in bass from both the outflow and Cell 3 (2000 fish compared to 1998 fish). Nonetheless, levels of Hg in fish remain at or above guidance levels developed by the USEPA and USFWS for the protection of fish-eating wildlife.

4. STA-5 also showed positive percent change in both THg and MeHg in surface water concentrations across the STA during the reporting year. Concentrations of MeHg in surface water in Treatment Train 1 reached levels that would previously have been considered anomolously high. Both mosquitofish and sunfish collected during the reporting year at STA-5 exhibited positive percent change in Hg levels across the STA. In contrast to sunfish collected prior to STA operation (i.e., 1999), sunfish collected in 2000 from the interior of STA-5 contained significantly greater concentrations of Hg than levels observed in fish at the inflow. While statistical assessment of Hg levels in STA-5 bass were confounded by age differences of collected fish, it is clear that first-year bass collected from the interior marsh contained elevated levels of Hg, with bass from Treatment Train 1 having greater Hg concentrations than bass from marshes of Treatment Train 2. Like STA-6, based on USEPA and USFWS guidance levels fish-eating wildlife would be at some elevated risk from mercury if feeding preferentially from STA-5.

5. STA-6, STA-5, STA-1W and STA-2 (for discussion of STA-2, refer to **Appendix 4A-6**) all exhibited a surprising degree of spatial heterogeneity in mercury, as evidenced by between-cell differences in surface water concentrations of THg and MeHg, sediment THg and tissue-Hg in mosquitofish, sunfish and largemouth bass. Clearly, the observed between-cell differences in Hg levels are of considerable ecological interest, if not management concern. However, we presently lack sufficient data on between-cell differences in sediment biogeochemistry to speculate as to the underlying causes of the spatial heterogeneity in Hg cycling.

INTRODUCTION

This is the fourth annual permit compliance monitoring report for mercury in Stormwater Treatment Areas (STAs). This report summarizes the mercury related reporting requirements of the Florida Department of Environmental Protection (FDEP or Department) Everglades Forever Act (EFA) Permits (Chapter 373.4592, F.S). The latter includes permits for STA-6, STA-5, STA-1W and STA-2 (No. 06,502590709, 262918309, 0131842, FL0177962-001, 0126704). This Report summarizes the results of monitoring in the reporting year ending April 30, 2001. This year, results of mercury monitoring at sites downstream of the STAs (e.g., Non-Everglades Construction Project discharge structures, marshes) will be reported separately in **Appendix 2B-1**.

The report consists of Key Findings and Overall Assessment, Introduction, Background, Summary of the Mercury Monitoring and Reporting Program and Monitoring Results. The Background section briefly summarizes the operation of the STAs and discusses their possible impact on South Florida's mercury problem. This section also includes site descriptions and maps of each STA currently monitored (in the order they became operational). The next section summarizes both sampling and reporting requirements of the Mercury Monitoring Program within the STAs. Monitoring results are summarized and discussed in two subsections: (1) results from preoperational monitoring, and (2) results from STA operational monitoring. Recent results from the Mercury Monitoring Program describe significant spatial distributions and, in some instances, between-year differences in mercury concentrations.

BACKGROUND

The STAs are treatment marshes designed to remove nutrients from stormwater runoff originating from upstream agricultural areas and Lake Okeechobee releases. The STAs are being built as part of the Everglades Construction Project (ECP). When completed, the ECP will include six STAs totaling about 43,000 acres of constructed wetlands. The downstream receiving waters to be restored and protected by the ECP include the District's water management canals of the Central and Southern Florida (C&SF) Project and the interior marshes of the Everglades Protection Area, encompassing Water Conservation Areas (WCAs) 1, 2 and 3, and Everglades National Park (Park).

Concerns were raised that in reducing downstream eutrophication, this restoration effort might inadvertently worsen the Everglades mercury problem (FGMFWTF, 1991). Widespread elevated concentrations of mercury were first discovered in freshwater fish from the Florida Everglades in 1989 (Ware et al., 1990). Mercury is a persistent, bioaccumulative toxic pollutant. Consequently, it can build up in the food chain to levels harmful to human and ecosystem health. Based on the levels observed in 1989, state fish consumption advisories were issued for select species and locations (Florida Department of Health and Rehabilitative Services and Florida Game and Fresh Water Fish Commission, March 6, 1989). Subsequently, elevated concentrations of mercury have also been found in predators, such as raccoons, alligators, Florida Panthers and wading birds (for review, refer to Fink et al., 1999).

To provide assurance that the ECP is not exacerbating the mercury problem, the South Florida Water Management District (SFWMD or District) monitors concentrations of total mercury (THg) and methylmercury (MeHg) in various abiotic (e.g., water and sediment) and biotic (e.g., fish and bird tissues) media. Monitoring mercury concentrations in aquatic animals provides several advantages. First, MeHg occurs at much greater concentration in biota relative to surrounding water, making chemical analysis more accurate and precise. Although detection levels of parts per trillion (ppt or ng/L) have been achieved for THg and MeHg in water, uncertainty boundaries can become large when ambient concentrations are very low, as is often the case in the Everglades. Second, organisms integrate exposure to MeHg over space and time. Though surface water concentrations fluctuate on a daily, event and seasonal basis, mosquitofish, a short-lived species, can be used to monitor short-term changes in environmental concentrations of mercury through time. Sunfish and largemouth bass are long-lived species and can be used to monitor and represent average conditions that occurred over previous years. Finally, the mercury concentration in aquatic biota is a true measure of MeHg bioavailability and results in a better indicator of possible exposure to fish-eating wildlife than the concentration of MeHg in water.

SITE DESCRIPTIONS

STA-6

STA-6 Section 1 is located at the southeastern corner of Hendry County and the southwest corner of the Everglades Agricultural Area (EAA). STA-6 Section 1 has two treatment cells (Cell 5,252 ha; and Cell 3, 99 ha) designed to provide a total effective treatment area of 352 ha (870 acres, **Figure 1**. For additional details see SFWMD, 1997a). The United States Sugar Corporation (USSC) has operated the two cells as a storm water retention area since 1989. Approximately 4,210 ha of USSC's agricultural production area (Southern Division Ranch, Unit

2) drains into STA-6 Section 1 via a supply canal and existing pump station, G600, that continues to be under USSC's operation. Water flows from the supply canal to the treatment cells via inflow weirs (two for Cell 5 and one for Cell 3). Water then flows in an easterly direction and is discharged through six recently installed culverts (G-354, A through C, for Cell 5 and G-393, A through C, for Cell 3), each with a fixed-crest weir at 13.6 ft NGVD to limit drawdown of each treatment cell to the desired static water level of 13.6 ft NGVD (maximum combined discharge of 500 cfs). This outfall enters the discharge canal and, by gravity, discharges to the L-4 borrow canal via six culverts confluent to G-607. The L-4 borrow canal conveys flows eastward to the S-8 pump station, which discharges into Water Conservation Area-3A. Upon demand, water can be conveyed from the L-4 canal backward (using stop logs at G-604 to bypass flows to the L-4 from the G-607 culverts) to the USSC Unit 2 farm for irrigation. As a consequence, unlike other STAs, timing, quantity, duration of inflows and backflows, and thus mean depth, hydraulic loading rate and hydraulic residence time (HDT) of STA-6 are controlled by USSC via the operation of G-600.

STA-5

STA-5 is immediately north of USSC's Southern Division Ranch Unit 2 and extends from the L-3 levee on the west to the Rotenberger Tract on the east. STA-5 consists of two parallel treatment cells, Cell 1 and Cell 2, to provide a total effective treatment area of 1,666 ha (4,118 acres, **Figure 2**. For additional details see SFWMD, 1998a). Under typical operations, water from the L-3 borrow canal, the Deer Fence Canal and the S&M Canal will gravity-flow into the two treatment cells through four gated inflow culverts (G342A, G342B, G342C and G342D). Water will continue to gravity-flow east through the western portions of the treatment area through eight open culverts into the eastern treatment areas; each treatment cell is subdivided by an internal levee because of a significant downward slope in ground elevation from west to east. Water will then gravity-flow through four discharge structures (G-344, A and B, for Treatment Cell 1 and G-344, C and D for treatment Cell 2), and then discharge into the STA-5 discharge canal. The STA-5 discharge canal continues along the western and northern sides of the Rotenberger Wildlife Management Area, ultimately emptying into the Miami Canal. However, direct discharge to the Rotenberger Tract is possible and may be used to supplement the natural accumulation of water via rainwater on an as-needed basis.

STA-1 West

STA-1 West is located in Western Palm Beach County, northwest of the Arthur R. Marshall Loxahatchee National Wildlife Refuge (WCA-1 or Refuge). STA-1W is designed to provide a total effective treatment area of 6,870 acres, including the 3,815 acres of the existing Everglades Nutrient Removal (ENR) Project (Treatment Cells 1 through 4), which it subsumed in April 1999 (**Figure 3**; for additional details see SFWMD, 1998b). Under typical operations, S-5A basin runoff is conveyed to STA-1W from pump station S-5A via STA Inflow and Distribution Works gated weir structure G-302. Flows will travel in a southwesterly direction via the inflow canal into Treatment Cell 5 via culverts G-304 A through J, and into Treatment Cells 1 through 4 (existing ENR Project) via gated weir structure G-303. Flows through Cell 5 are conveyed in a westerly direction through structures G-305 A through V and are discharged through culverts G-306 A through J into the discharge canal. This discharge is conveyed to WCA-1 via this canal and via pump station G-310. Flows through Treatment Cells 1 through 4 are conveyed in a southerly direction through G-252 and G-253 (Cells 1 and 3) and G-254, G-255 and G-256 (Cells 2 and 4). Flows are discharged into WCA-1 via existing ENR Project collection canals and existing pump station G-251, and under some conditions (when ENR Project outflows exceed G-251 pump capacity of 450 cfs) through structures G-258, G-259, G-308 and G-309 into discharge canal and pump station G-310. Thus there are two primary discharge locations for STA-1W into the L-7 canal located in the Refuge.

STA-2

STA-2 is located in Western Palm Beach County near the Browns Farm Wildlife Management Area. STA-2 was developed to provide a total effective treatment area of 6,430 acres (Cell 1 is 1,990 acres; Cells 2 and 3 are 2,220 acres each. For additional details see SFWMD, 1999a). It is intended to treat discharges from the S-6/S-2 basin, S-5A basin, East Shore Water Control District, 715 farms and Lake Okeechobee via pump stations S-6 and G-328. S-6 will serve as the primary inflow pumping station, with G-328 serving as both an irrigation and "secondary" inflow source from and to the STA supply canal (**Figure 4**). G-328 serves approximately 9,980 acres of adjacent agricultural lands. Discharges from the supply canal are then conveyed southward to the inflow canal, which extends across the northern perimeter. A series of inflow culverts will then convey flows from the inflow canal to the respective treatment cells (G-329, A through D into Cell 1; G-331, A through G into Cell 2; G-333, A through E into Cell 3). Flows will travel southward through the treatment cells, eventually discharging to the discharge canal via culverts or gated spillways (culverts G-330, A through E from Cell 1; gated spillway G-332 from Cell 2, gated spillway G-334 from Cell 3). Flows then travel eastward in the discharge canal to STA-2 outflow pump station G-335, which in turn conveys water to a short stub canal leading to the L-6 borrow canal. Water in the L-6 borrow canal travels north, then east into WCA-2A through six box culverts (each with a capacity of 300 cfs, invert at 12 feet) located east of G-339 about three miles south of the S-6. The area to receive discharge was previously identified as a nutrient-impacted area. Under high-flow conditions, when stage in the L-6 canal exceeds 14.25 feet, water in the L-6 borrow canal will spill into five 72-inch cans and travel south toward S-7. Approximately 0.75 miles north of S-7 the berm has been degraded to an elevation (approximately 12 feet) that will allow water to sheetflow into WCA-2A. Again, the area to receive discharge was previously identified as a nutrient-impacted area.

SUMMARY OF THE MERCURY MONITORING AND REPORTING PROGRAM

The monitoring and reporting program summarized below is described in detail in the "Mercury Monitoring and Reporting Plan for the Everglades Construction Project, the Central and Southern Florida Project and the Everglades Protection Area," which was submitted by the District to the Florida Department of Environmental Protection, the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers in compliance with the requirements of the aforementioned permits. The details of the procedures to be used in ensuring the quality of and accountability for the data generated in this monitoring program are set forth in the District's "Quality Assurance Project Plan (QAPP) for the Mercury Monitoring and Reporting Program," which was approved upon issuance of the permit by the Florida Department of Environmental Protection (FDEP). QAPP revisions were approved by the FDEP on June 7, 1999.

EVERGLADES MERCURY BASELINE MONITORING AND REPORTING REQUIREMENTS

Levels of THg and MeHg in the preoperational soils of each of the STAs and various compartments (i.e., media) of the downstream receiving waters define the baseline condition from which to evaluate the mercury related changes, if any, brought about by the operation of the STAs. The pre-ECP mercury baseline conditions are defined in the Everglades Mercury Background Report, which summarized all the relevant mercury studies conducted in the Everglades through July 1997, during the construction of, but prior to the operation of, the first STA. Originally prepared for submittal in February 1998, it was revised to include the most recent data released by the U.S. Environmental Protection Agency and U.S. Geological Survey, and was submitted in February 1999 (FTN Associates, 1999).

PRE-OPERATIONAL MONITORING AND REPORTING REQUIREMENTS

Prior to completion of construction and flooding of the soils of each STA, the District is required to collect and analyze 10-cm core samples of soil at six representative interior sites and analyze them for THg and MeHg. Prior to initiation of discharge, the District is also required to collect biweekly samples of inflow and interior water for analysis for THg and MeHg concentrations. When concentrations at the interior sites are found not to be significantly greater than those of the inflow, this information is reported to the permit-issuing authority and the biweekly sampling can be discontinued. Discharge begins after all startup criteria are met.

This is followed by a two-year stabilization period for phosphorus and mercury. During this stabilization period, the release of stored phosphorus and mercury from flooded farm fields' soils is anticipated, with concomitant instances of outflow or interior concentrations exceeding inflow concentrations. As the bioavailable phosphorus and mercury are transported from the soil reservoir to the colonizing plants and accreting marsh soils, the magnitude, duration and frequency of such phenomena will decrease until stabilization is achieved and the outflow and interior concentrations are routinely less than the inflow.

OPERATIONAL MONITORING

Following approval for initiation of routine operation of the STA and thereafter, the permits require that the following samples be collected at the specified frequencies and analyzed for the specified analytes:

Water: Quarterly, 500-ml, unfiltered grab samples of water will be collected in precleaned Teflon bottles using ultraclean technique at the inflows and outflows of each STA. Samples will be analyzed for MeHg and THg (i.e., sum of all mercury species in sample, e.g., Hg^0, Hg^I, Hg^{II}, as well as organic mercury). THg results will be compared with the Florida Class III Water Quality Standard of 12 ng/L to ensure compliance. Outflow concentrations of both THg and MeHg will be compared to concentrations at the inflow.

Sediment: Triennially, six 10-cm sediment cores will be collected at representative interior sites and homogenized. The homogenate will be analyzed for THg and MeHg.

Preyfish: A grab sample of between 100 and 250 mosquitofish (*Gambusia sp.*) will be collected semiannually using a dipnet at the inflow sites, interior sites and the outflow sites of each STA. The samples will then be homogenized and the homogenate will be subsampled in quintuplicate and analyzed for THg.

Top Predator Fish: Twenty largemouth bass will be collected annually, primarily via electroshocking methods at representative inflow and outflow sites and representative interior sites in each STA. The fish muscle (i.e., fillet) will be analyzed for THg as an indicator of potential human exposure.

In 2000, the District began routine collection of sunfish at the same frequency, intensity (i.e., n=20) and locations as largemouth bass. This permit revision fulfilled a recommendation of the U.S. Fish and Wildlife Service (USFWS recommendation 9b in USACE Permit No. 199404532; for details see correspondence to Bob Barron, USACE dated July 13, 2000). Sunfish (analyzed as whole fish) also serve as a surrogate for attempts to monitor mercury in wading birds that do not nest in the STAs (for details on monitoring program tracking mercury in wading birds in downstream areas, refer to **Appendix 2B-1**).

About 85 to 99 percent of the THg in mosquitofish (*Gambusia sp.*) is MeHg (Grieb et al., 1990; R. Jones, FIU, pers. comm., 1995; L. Cleckner, University of Wisconsin, pers. comm, 1996; SFWMD, unpublished data), and more than 95 percent of the THg in higher trophic-level fish is MeHg (Watras, 1993). Therefore, the analysis of fish tissue for THg is interpreted as equivalent to the analysis of fish tissue for MeHg for purposes of this report.

Further details regarding rationales for sampling scheme, procedures and data-reporting requirements are set forth in the Everglades Mercury Monitoring Plan revised March 1999 (Appendix 1 of QAPP, June 7, 1999).

QUALITY ASSURANCE MEASURES

For a quality assurance/quality control assessment of the District's Mercury Monitoring Program during the reporting year May 1, 2000 through April 30, 2001, the reader is referred to **Appendix 2B-1**.

STATISTICAL METHODS

As stated earlier, monitoring Hg concentrations in aquatic animals provides several advantages; however, interpretability of residue levels in animals can sometimes prove problematic due to confounding influences of age or species of the collected animal. For comparative purposes, special procedures are used to normalize the data. Standardization is a common practice (Wren and MacCrimmon, 1986; Hakanson, 1980). To be consistent with the reporting protocol used by the Florida Fish and Wildlife Conservation Commission (FFWCC) (Lange et al., 1998; 1999), mercury concentrations in largemouth bass were standardized to an expected mean concentration in three-year-old fish at a given site by regressing mercury against age (hereafter symbolized as EHg3; for details see Lange et al., 1999 and references therein). To adjust for month of collection, otolith ages were first converted to decimal age using protocols developed by Lange et al. (1999). Sunfish were not aged, and consequently age normalization was not available. Instead, arithmetic means were reported. However, efforts were made to estimate a least-squares mean (LSM) Hg concentration based on the weight of the fish. Additionally, the distribution of the different species of Lepomis (e.g., *L. gulosus*, warmouth; *L. punctatus*, spotted sunfish; *L. macrochirus*, bluegill; *L. microlophus*, redear sunfish) collected during electroshocking was also considered, i.e., as a potential confounding influence on Hg concentrations, prior to each comparison.

Where appropriate, analysis of covariance (ANCOVA; SAS GLM procedure) was used to evaluate spatial and temporal differences in mercury concentrations, with age (largemouth bass) or weight (sunfish) as a covariate. However, use of ANCOVA is predicated on several critical assumptions (for review see ZAR, 1996), including that: (1) regressions are simple linear functions; (2) regressions are statistically significant (i.e., non-zero slopes); (3) the covariate is a random fixed variable; (4) both the dependent variable and residuals are independent and normally distributed; and (5) slopes of regressions are homogeneous (parallel). Regressions also require that collected samples exhibit a relatively wide range of covariate, i.e., fish from a given site are not all the same age or weight. Where these assumptions were not met, ANCOVA was inappropriate. Instead, standard ANOVAs or Student's t-tests (SigmaStat, Jandel Corporation, San Rafael, California) were used; possible covariates were considered separately and often qualitatively. The assumptions of normality and equal variance were tested by the Kolmorogov-Smirnov and Levene Median tests, respectively. Data sets that either lacked homogeneity of variance or departed from normal distribution were natural-log transformed and reanalyzed. If transformed data met the assumptions, they were used in ANOVA. If not, raw data sets were evaluated using nonparametric tests, such as the Kruskal-Wallis ANOVA on ranks, or the Mann-Whitney Rank sum test. If the multigroup null hypothesis was rejected, groups were compared using either Tukey HSD or Dunn's method.

MONITORING RESULTS

PREOPERATIONAL MONITORING

STA-6 Section 1

As previously reported (SFWMD 1998c), STA-6 Section 1 met startup criteria for mercury in November 1997 and began operation in December 1997.

STA-5

As reported in last year's report (Rumbold et al., 2001a), STA-5 met startup criteria for mercury in September 1999.

STA-1W

As reported in last year's report (Rumbold et al., 2001a), the permit for STA-1W was issued on May 11, 1999. STA-1W passed startup criteria during the week of January 17, 2000; flow-through operations began in early February 2000.

STA-2

See **Appendix 4A-6** for results of startup mercury monitoring of Stormwater Treatment Area 2 (STA-2), including results from an expanded sampling program.

OPERATIONAL MONITORING

STA-6

Routine monitoring of mercury levels at STA-6 began in the first quarter of 1998. Results of monitoring prior to April 30, 2000 have been reported previously (SFWMD 1998c, 1999c, Rumbold and Rawlik 2000, Rumbold et al., 2001a).

Sediment cores, which are collected triennially pursuant to state and federal permits, were collected from STA-6 in February 2001 (**Table 1**). Concentrations of THg in STA-6 sediments collected in 2001 continue to be within the expected range for formerly farmed Everglades soils (Delfino et al., 1993; Gilmour et al., 1998; Rumbold et al., 2001a). Concentration of THg in sediments did not differ among years when 2001 cores were compared to cores collected prior to flooding in 1997, or to cores collected in 2000 (df=2, 12; F=0.36; p=0.7). The cores collected in 2000 were taken to facilitate the two-year review (for details see Rumbold et al., 2001a). However, between-cell differences in THg concentration in sediment was significant (df=1, 12; F=13.8; p=0.003), with greater THg concentrations occurring in STA-6 Cell 3 relative to Cell 5. Previous assessments also found MeHg concentrations to differ between cells, with Cell-3 sediments having greater concentrations (Rumbold et al., 2001a). However, as is evident from **Table 1**, MeHg was below level of detection in all six cores collected in 2001. It should be noted that the method detection limit (MDL) for MeHg in sediments collected in 2001 was elevated relative to previous years (2001 cores were analyzed at a different laboratory than previous years).

Results from operational monitoring of mercury concentrations in STA-6 surface waters are summarized in **Tables 2** and **3**. As discussed in earlier reports (Rumbold et al., 2001a), proper interpretations of these data must consider hydrologic factors that can affect net MeHg production, and subsequently, bioaccumulation. STA-6 went dry from March 8 through April 16, 2000 (for hydrologic conditions of all STAs, refer to **Appendix 4A-6**). A second drydown began on May 18 and continued until June 28. The STA was also not discharging during the first quarter of 2001, and accordingly no outflow samples were collected. Because of low rainfall from March through June 2000, United States Sugar Corporation (USSC), which operates the pump station at G-600, frequently backpumped water for irrigation of the Unit-2 farm located adjacent to STA-6. During backpumping, water is conveyed from the L-4 canal backward through the supply canal, using stop logs at G-604. During backpumping of the L-4 canal, water can also flow up and into the discharge canal. Consequently, during or immediately following backpumping, conditions in the discharge canal do not reflect the influence of discharge water from the STA, but rather water from the L-4 canal. The STA was not discharging during the 1st quarter of 2001, and accordingly, no outflow samples were collected.

The influence that L-4 canal water has on water quality in the discharge canal was investigated during the fourth quarter when, in addition to collecting samples at G-606, samples were also collected at the outflow culverts of each cell (i.e., to examine spatial variability and the representativeness of G-606). At that time, THg concentrations at the inflow (G-600) and the outflow (G-606) were 2.6 and 2.3 ng/L, respectively. MeHg concentrations at the inflow (G-600) and the outflow (G-606) were 0.25 and 0.43 ng/L, respectively. However, the result for the outflow did not meet quality control criteria and thus is only an estimate. By comparison, concentrations of THg were 2.3 and 2.0 ng/L at G-393B and G-354C, respectively (i.e., the two outflow culverts). Concentrations of MeHg were 0.22 and 0.13 ng/L at G393B and G-354C, respectively; however, the latter result again did not meet QC criteria. Nonetheless, it is clear that MeHg concentration was lower at the outflow culverts than at the discharge canal near G-606, or for that matter at the inflow near G-600. This suggests the water quality in the outflow canal is not representative of water leaving STA-6, either as a consequence of MeHg production in the canal itself or of mixing with backflowing L-4 water.

Based on this and similar observations from monitoring total phosphorus at the outflow culverts, the outflow collection site was officially moved from G-606 to G-393B and G-354C in February 2001 (see F. Nearhoof, FDEP, correspondence dated February 27, 2001).

As is evident from **Tables 2** and **3**, the Florida Class III Water Quality Standard of 12 ng THg/L was never exceeded at either the inflow or the outflow during the reporting year. Furthermore, concentrations of both THg and MeHg were within the typical range measured previously at the ENR Project (SFWMD, 1999b). Nevertheless, during the third-quarter event, which occurred on September 13, concentration of THg was greater at the outflow than the inflow, possibly due to recent atmospheric deposition of inorganic mercury, when 3.6 inches of rain fell on STA-6 from September 4 through September 8. Consequently, percent change of THg across the STA was variable (**Table 3**). However, the cumulative average percent change of THg concentration across the STA was -16 percent, i.e., generally decreasing across the STA. MeHg concentrations in surface water were consistently lower at the outflow than the inflow, and thus percent change of MeHg concentration across STA-6 during the reporting year was less variable, ranging from –12 to –18 percent. The cumulative average percent change was –25 percent (**Table 3**).

The percent of THg as MeHg was highly variable in water at both the inflow and outflow, ranging from 6 to 32 percent (**Table 2**). This range in percent MeHg was consistent with previously reported values for percent MeHg in WCA-2A and WCA-2B (Hurley et al., 1998).

Results from operational monitoring of mercury concentrations in STA-6 fish are summarized in **Tables 4**, **5** and **6** and are graphically presented in **Figure 5**. Levels of mercury in STA-6 mosquitofish have declined from a peak concentration that occurred in fish collected during the first semiannual event in 2000 (**Figure 5**). At that time, tissue mercury concentrations were 81 ng/g in fish from the inflow, 41 ng/g in fish from an interior marsh and 78 ng/g in mosquitofish from the discharge canal. However, as previously discussed, there had been no appreciable discharge from the STA for six months, and therefore conditions in the discharge canal did not reflect flow from the STA. Alternatively, tissue-mercury concentrations in fish from the interior marsh did reflect STA-6 conditions, especially the drydowns. These interior marsh mosquitofish were collected by walking 500 meters out into Cell 5 to a small pool of water. Drydowns with subsequent exposure and oxidation of sediments have been found to alter sediment (and pore water) chemistry, influencing THg biogeochemistry and increasing its availability for MeHg production and bioaccumulation (for review, refer to **Appendix 4A-6**). As previously noted, a decline in THg was evident in mosquitofish collected during the second semiannual event in 2000 at the inflow and interior, but not at the outflow. Again, the discharge canal may still have been under the influence of L4. As discussed above, the outflow collection site was moved in early 2001 from G-606 to G-393B and G-354C. The value reported for the first semiannual event in 2001 (33 ±21 ng/g, **Table 4**) represents the mean of two mosquitofish composite samples collected immediately upstream of the two culverts. There was a marked decrease in mean concentration, relative to the previous collection, but also high variability. Mosquitofish collected at the outflow of Cell 5 (G-345C) contained 18 ng/g THg, whereas mosquitofish from the outflow of Cell 3 (G-393B) contained 47 ng/g THg. This difference was consistent with what was observed in mosquitofish collected from the interior of each cell; Cell 5 interior mosquitofish contained 18 ng/g THg, Cell 3 interior mosquitofish contained 65 ng/g THg (for review of between-cell differences in STA-6, see Rumbold et al., 2001b).

As stated above, sunfish (*Lepomis spp.*) were officially added to the STA monitoring programs in 2000 to better evaluate mercury exposure to fish-eating birds. However, sunfish were collected in 1999 prior to the permit revision to evaluate spatial patterns in their Hg levels to improve our ability to assess patterns of Hg in largemouth bass. As summarized in Rumbold et al. (2001b), there had been speculation that sampled largemouth bass populations were not representative of STA-6 conditions. Specifically, it was theorized that bass could move large distances throughout the STAs and canal systems and, thus, confound spatial interpretations.

Sunfish species are not expected to range over such large distances. Consequently, results from followup studies at STA-6 in 1999 (Rumbold et al., 2001b) and from routine sampling of sunfish in 2000, which showed spatial patterns consistent with the bass, weakened the theory that bass were moving around and confounding spatial patterns in Hg bioaccumulation.

Visual inspection of the data presented in **Figure 5** suggests sunfish from the discharge canal contained greater concentrations of Hg than fish from the inflow in both 1999 and 2000; this difference was not statistically significant in 1999 (Dunn's Post-hoc test; $p > 0.05$) but was significant in 2000 ($p < 0.05$). Neither of these comparisons should have been influenced by differences in sunfish size (1999, $p > 0.05$; 2000, $p > 0.05$) or species of collected Lepomis. In 1999, sunfish from the interior marsh contained statistically less Hg than did fish from the inflow or outflow ($p < 0.05$); however interior fish were substantially, but not statistically, smaller in size, which may have confounded this assessment. Alternatively, in 2000, interior sunfish were larger in size, albeit not statistically, than fish from either the inflow or the outflow. This again may have confounded the statistical analysis of Hg levels in sunfish captured in 2000 that showed inflow < interior=outflow.

While levels of Hg decreased in sunfish at both the inflow and outflow in 2000 relative to the previous year (Mann-Whitney Rank sum test; $p = < 0.001$ and $p = 0.003$, respectively), these decreases were likely a result of smaller fish being caught in 2000 at both the inflow and the outflow (Mann-Whitney Rank sum test; $p = 0.002$ and $p < 0.001$, respectively, due to violations of assumptions necessary for regressions; ANCOVAs were not performed). Alternatively, while average levels of Hg increased in interior sunfish in 2000, this could be related more to between-year differences in the number of sunfish collected from Cell 3 (in 1999, $n = 2$ from Cell 3 and $n = 20$ from Cell 5;in 2000, 20 sunfish were captured each in Cell 3 and Cell 5). When data sets were censored and only fish from Cell 5 were evaluated, Hg concentration was found to have increased significantly in 2000 relative to 1999 (Rank sum test, < 0.001); between-year differences in sunfish weight were not significant (t test, $p = 0.3$). Therefore, only the increase in Hg in interior fish from 1999 to 2000 may have environmental significance. (For an evaluation of the risk significance of these increases, the reader is referred to the last paragraph in this subsection).

It should be noted that like mosquitofish, sunfish collected in 2000 from Cell 3 contained greater concentrations of Hg than sunfish from Cell 5 (Rank sum test, $p < 0.001$); between-cell differences in weight were not statistically significant ($p = 0.4$), nor were there substantial differences in collected species (i.e., fish from each cell were about 50:50 redear:bluegill).

Results from operational monitoring of mercury concentrations in largemouth bass from STA-6 are summarized in **Table 6** and are graphically displayed in **Figure 5** (values for individual fish are listed in the table provided in **Attachment 1**, located at the end of this appendix). Similar to mosquitofish and sunfish, largemouth bass collected during the last three years at STA-6 showed higher tissue mercury concentrations at the outflow as compared to inflow (**Figure 5**). In 1998, this difference between inflow and outflow was shown by ANCOVA to be significant ($df = 1, 26$; $F = 22.9$, $p < 0.0001$). In 1999, because of an interaction between the effects of fish age and location on mercury concentration, ANCOVA could not be used to statistically evaluate spatial differences (i.e., slopes were not parallel; $df = 1, 35$; $F = 4.65$; $p = 0.04$). In 2000, ANCOVA again showed Hg concentrations in fish collected from the inflow and outflow to differ significantly ($df = 1, 37$; $F = 27.28$; $p < 0.001$). Because of an interaction between the effects of fish age and location on mercury concentration, ANCOVA could not be used to assess spatial patterns in Hg levels in bass collected in the interior versus inflow or outflow.

In terms of temporal trends, the data presented in **Figure 5** suggests Hg levels are declining slightly in largemouth bass at the outflow of STA-6. An ANCOVA of concentrations of Hg in bass collected from the discharge canal in 1998 and 2000 found the difference to be significant (df=1,37; F=8.8, p=0.005). However, as argued above, the discharge canal may not reflect discharge from the STA. Therefore, in terms of STA impact assessment it is more important that Hg in bass from the Cell-3 marsh also appears to be declining slightly over time. In 1998, the reported value 726 ng/g Hg was the arithmetic mean for 17 bass collected in Cell 3, which on average were 2.5 years old (because of a nonsignificant regression slope, an EHg3 was not estimated). In 2000, the reported value 656 ng/g Hg was the estimated concentration in a three-year-old bass, based on 19 bass from Cell 3 (1999 interior fish were excluded from this assessment because they consisted of three bass from Cell 5). Unless there had been a decline in exposure, the older bass collected in 2000 should have had greater concentrations than fish collected in 1999, not less, as was observed.

Levels of mercury in fish tissues can also be put into perspective and evaluated with regard to mercury risk to wildlife. The U.S. Fish and Wildlife Service (USFWS) has proposed a predator protection criterion of 100 ng/g THg in prey species (Eisler, 1987). More recently, in its "Mercury Study Report to Congress," the USEPA proposed 77 ng/g and 346 ng/g for trophic level (TL) three and four fish, respectively, for the protection of piscivorous avian and mammalian wildlife (USEPA, 1997). STA-6 mosquitofish collected during the reporting year, and which are considered to be at TL 2 to 3, depending on age (Loftus et al., 1998), contained Hg at concentrations less than the USFWS and USEPA criteria. Sunfish from STA-6, which are at TL 3 (*L. gulosus* at TL 4; Loftus et al., 1998), contained levels of Hg that approached or exceeded the USEPA criteria, but were less than the USFWS criteria. Similarly, after adjusting arithmetic mean Hg concentrations in largemouth bass fillets to whole-body concentrations (whole-body THg concentration=0.69 x fillet THg; Lange et al., 1998), STA-6 bass approached or just exceeded USEPA's guidance value for TL 4 fish. Based on these criteria there is some risk of adverse chronic effects from mercury exposure to fish-eating wildlife if feeding preferentially at STA-6.

Hg concentrations in fish collected from STA-6 were substantially greater (up to 5x greater) than levels observed at STA-1W, which subsumed the prototype STA, i.e., the ENR Project (**Table 6** and **Figures 5** and **7**). However, concentrations of Hg in STA-6 fishes were comparable to levels observed in other areas of the Everglades (**Appendix 2B-1**, refer to CA2U3 and CA315, which generally had higher levels), and thus may reflect the overall mercury conditions in South Florida, rather than a consequence of STA operation.

STA-5

As stated above, STA-5 met startup criteria for mercury in September 1999, and routine monitoring began during the first quarter of 2000. However, because of drought conditions and the detection of high phosphorus concentrations at the outflows, STA-5 did not begin flow through operation until July 7, 2000. Results from routine monitoring of mercury levels at STA-5 prior to this reporting year were reported in Rumbold et al. (2001a).

As shown in **Table 2**, both THg and MeHg were at lower concentrations in the outflows compared to the inflows during the first two quarters of the reporting year. By contrast, during the fourth quarter of 2000, both THg and MeHg were at greater concentration in the outflows compared to the inflows. Average THg concentration was 1.03 ±0.1 at the four inflows and 2.4 ±1.3 ng/L at the four outflows. Mean MeHg concentration at the inflows and outflows were 0.5 ±0.3 and 1.5 ±1.1 ng/L, respectively. Elevated levels centered near discharge culverts G-344A and G-344B from Treatment Train 1, especially with regard to MeHg, which reached 2.9 ng/L at G344A. This concentration of MeHg in surface water would have been considered anomalously high except for more recent higher MeHg concentrations observed during startup monitoring at STA-1W Cell 5 and STA-2. As will be discussed below, mosquitofish from STA-5 Treatment Train 1 also contained higher levels of Hg relative to mosquitofish collected elsewhere in the STA. This trend of higher concentrations of THg and MeHg at STA-5's outflow persisted into the first quarter of 2001; however, levels were much lower and between-cell differences had diminished. Not surprisingly, percent change in concentrations of THg and MeHg across STA-5 (calculated using mean concentrations, not flow-weight averages) were highly variable, ranging from –32 to +140 percent for THg, and –28 to +297 percent for MeHg. But the average percent change was +49 and +65 percent for THg and MeHg, respectively, for the year. On average, STA-5 was a source for both constituents in its first full year of operation. This is not unexpected in an abnormally dry wet and dry season. Moreover, this occurred during the stabilization period, when such changes are anticipated. At no time during the reporting year did THg concentration exceed the Class III Water Quality Standard of 12 ng/L.

Results from operational monitoring of mercury concentrations in STA-5 mosquitofish are summarized in **Table 4**. The second semiannual collection in 2000 occurred on September 7. At that time, average tissue mercury concentration was 35.5 ±9.1 ng/g (on a wet-weight basis) in mosquitofish collected near the inflows, 97 ±40.9 ng/g in mosquitofish from interior marshes, and 47.9 ±4.9 ng/g in mosquitofish immediately upstream of the outflows. Notice that Hg levels in mosquitofish collected from the outflow exceeded levels in mosquitofish from the inflow; percent change in tissue concentrations increased by +33 percent across the STA. As is mentioned above, mercury levels were highest in mosquitofish from Cell 1 (126 ng/g), which also exhibited elevated surface water concentrations. Note that levels of Hg declined substantially in mosquitofish from the interior marshes by the first semiannual event in 2001. Equally important, at that time tissue concentrations were similar in mosquitofish collected from inflow and outflow.

Sunfish collected in 2000 from STA-5 showed some spatial variability in Hg levels (Kruskal-Wallis ANOVA on ranks, df=2, H=8.3, p=0.015). Although average Hg concentration in 2000 was greater in sunfish at the outflow (108 ng/g) than the inflow (75 ng/g; **Table 5**), this difference was not statistically significant (Dunn's post-hoc test). However, similar to mosquitofish collected in the second-2000, levels of Hg were greater in interior sunfish relative to fish at the inflow (Dunn's post hoc test, p <0.05). This difference in Hg concentration was not attributable to difference in fish weight, which is used as an age surrogate (Kruskal Wallis, df=2, H=1.6, p=0.4), nor did there appear to be marked spatial differences in *Lepomis spp.* collected. Interestingly, this pattern of higher levels in sunfish from the interior marsh is in contrast to what was observed in sunfish collected in 1999 (i.e., prior to permit revision). In 1999, sunfish from the interior had lower levels of Hg than sunfish from either the inflow or the outflow (Dunn's test, p<0.05; weight did not differ among locations, p>0.05).

With regard to between-cell differences, caution must be used in interpreting the results of comparisons of sunfish collected from Cell 1 with sunfish from Cell 2 (notice the large error bars in **Figure 6**). Unlike surface water and mosquitofish that showed higher levels in Cell 1 (i.e., Treatment Train 1), sunfish from Cell 1 contained lower tissue concentrations of Hg than sunfish from Cell 2 (Mann-Whiney test, T=323, n=20, p=0.02). However, sunfish from Cell 1 were significantly smaller (mean weight 50g) than fish caught in Cell 2 (mean weight 96g; t-test, df=38, t=-3.9, p<0.001). Hence, the differences in weight, and presumably age, confound interpretation of Hg levels (attempts at estimating and comparing least-square means failed due to nonsignificant Hg:weight regressions).

The temporal differences apparent from **Figure 6** in Hg concentrations in interior sunfish could not be tested statistically due to confounding weight differences (sunfish from the interior were significantly heavier – almost two times heavier – in 2000) that could not be partitioned by

ANCOVA (due to lack of significant regression of Hg:weight). The marked difference in Hg in interior fish shown in the graph may have been due to this between-year difference in weight and, presumably, age. Likewise, the slight increase in Hg in outflow fish in 2000 may have also been due to an increase in the weight (i.e., age) of the population sampled in 2000 (1999 outflow fish weighed, on average, 44.5 ±34.5g; whereas 2000 outflow fish weighed 74 ±26g).

The confounding influence that age has on tissue-Hg interpretation was also evident in largemouth bass collected at STA-5 in 2000. Spatial patterns are clearly present in arithmetic mean Hg concentrations (i.e., not normalized to age) shown in **Table 6**, with inflow bass< interior bass < outflow bass. However, average age of fishes was 1.9 years at the inflow, 0.83 years at the interior and 2.75 years at the outflow. When tissue concentrations in inflow fish were standardized to a three-year-old fish (i.e., EHg3), levels where similar to those observed in outflow fish, which were 2.75 years old; EHg3 could not be estimated for outflow fish due to nonsignificant regression. An EHg3 also could not be estimated for interior fish due to the poor age distribution of collected fish (i.e., almost all were age-class one year). However, given the elevated arithmetic mean concentration in the first-year bass it is possible that older bass, if present in the interior marsh, would have contained concentrations of Hg exceeding levels in fish from both the inflow and outflow.

The small range in the ages of bass collected from the interior of STA-5 allowed the use of a simple ANOVA to examine between-cell differences in tissue-Hg. This analysis revealed a significant difference in Hg concentration in bass collected from the two cells (t-test, df=38, t=8.64, p <0.001), with greater concentrations occurring in bass from Cell 1. This spatial pattern is consistent with what was observed in surface water concentrations and levels in mosquitofish.

Because bass were not collected from STA-5's inflow or interior in 1999, despite the best efforts of the FFWCC contractor only bass from the outflow could be examined for temporal patterns. When this was done, the EHg3 of 1999 bass (434 ±79 ng/g) was found to be similar to the arithmetic mean concentration observed in the 2.75-year-old bass collected in 2000 (467 ±430 ng/g). Therefore, no evidence exists of increasing Hg in STA-5 bass over the last two years.

In terms of risk to fish-eating wildlife, STA-5 mosquitofish collected during the second semiannual event in 2000 had levels of tissue-Hg that exceeded or approached either the USEPA or USFWS guidance level. Hg levels in STA-5 sunfish collected during the reporting year also approached or exceeded USEPA and USFWS criteria. Alternatively, after adjusting arithmetic mean Hg concentrations in largemouth bass fillets to whole-body concentrations (whole-body THg concentration=0.69 x fillet THg; Lange et al., 1998), STA-5 bass did not exceed the USEPA's guidance value for TL 4 fish (346 ng/g). Thus, like STA-6, there is some elevated risk to fish-eating wildlife.

Like fish at STA-6, fish collected from STA-5 generally contained greater Hg concentrations than fish at STA-1W, which subsumed the prototype STA, i.e., the ENR Project. (**Table 6** and **Figures 6** and **7**). However, concentrations of Hg in STA-5 fish were also comparable to levels observed in other areas of the Everglades (**Appendix 2B-1**, refer to CA2U3 and CA315, which generally had higher levels), and thus may reflect the overall mercury conditions in South Florida, rather than any changes brought on by operation of the STA.

STA-1W

Routine monitoring of mercury levels in surface waters of STA-1W began on February 16, 2000. Results from monitoring of STA-1W prior to the reporting year were summarized in Rumbold et al. (2001a).

As shown in **Tables 2** and **3**, concentrations of both THg and MeHg at the outflow were generally similar to or less than levels at the inflow. An exception to this pattern occurred during the third quarter of 2000. At that time, construction of the second outflow pump, G-310, had been completed. MeHg concentration was 0.46 ng/L at the inflow and 0.66 (G-251) and 0.12 (G-310) ng/L at the two outflows (the latter value was subsequently invalidated because of MeHg contamination of an FQC check sample). Nevertheless, MeHg concentration at the G-251 outflow was greater than the concentration observed at the inflow and was at the extreme range of levels previously measured during operation of the ENR project (SFWMD, 1999b). Concentrations of MeHg then declined at the outflow over the next two quarters (**Table 2**). Nonetheless, while percent change of THg concentration remained negative (average -22 percent for the year) across the STA, MeHg concentration increased, with an annual average percent change of +38 percent. While concentration differences were minimal, an increase in MeHg across STA-1W is in sharp contrast to the removal efficiency that was routinely achieved by the ENR Project, which ranged from 65 to 75 percent (i.e., negative percent change, SFWMD 1999b). However, while MeHg levels at G-251 accounted for the positive percent change in the third quarter (**Table 3**), positive percent change over the next two quarters reflected higher concentrations of MeHg at G-310, not G-251 (i.e., relative to the inflow at S-5A); percent change across for the old ENR portion of STA-1W during the latter two quarters was -24 and -35 percent.

Results from operational monitoring of STA-1W mosquitofish are summarized in **Table 4** and are graphically presented in **Figure 7**. Levels of mercury in STA-1W mosquitofish were relatively low compared to other STAs (see discussions above) and were comparable to concentrations observed in mosquitofish previously collected from this area when it was operated as the ENR Project (SFWMD, 1999b). Further, Hg levels declined monotonically in mosquitofish collected at both the inflow and outflow over the last three semiannual events (**Figure 7**, Student-Newman-Keuls all pairwise comparisons, inflow $p < 0.05$, outflow $p < 0.05$). While concentrations of tissue-Hg were similar in inflow and outflow mosquitofish (i.e., G-251 and G-310 pooled) collected in 2000 (first-2000, $p < 0.05$; second-2000, $p < 0.05$; **Figure 7**), the concentration of Hg was significantly lower in outflow mosquitofish relative to inflow during the first semiannual event in 2001 (Student-Newman-Keuls post-hoc test, $p < 0.05$). Notice that STA-1W consistently exhibited a negative percent change in tissue-Hg in mosquitofish across the STA (**Table 4**). As discussed below, this pattern, which was unparalleled in the other STAs, was also observed in sunfish and largemouth bass.

During the reporting year, mosquitofish from interior marshes continued to exhibit significant between-cell differences (for a previous report on between-cell differences at STA-1W, see Rawlik 2001). Average concentrations of Hg in mosquitofish collected over the last three semiannual events from ENR302 (12.5 ng/g), ENR401 (8.8 ng/g) and Cell 5 (38.6 ng/g) differed significantly (Student-Newman-Keuls all pairwise comparison test, $p < 0.05$). This between-cell variance was exemplified by the large error bars in **Figure 7** for interior mosquitofish; during the first semiannual event in 2001, variability was largely due to elevated Hg in Cell 5 mosquitofish (54 ng/g) compared to the other two monitored cells (ENR302: 2.6 ng/g. ENR401: 3.2 ng/g). Mosquitofish at the outflow of Cell 5 (G-310: 22 ng/g) contained only slightly greater concentrations of Hg than mosquitofish from the outflow of the remnant ENR (G-251: 18 ng/g Hg).

As is evident from **Table 5**, concentrations of Hg in tissues of STA-1W sunfish were also much lower than levels observed in sunfish at the other STAs. However, similar to the other STAs, locational differences in weight of sunfish from STA-1W confounded interpretation of tissue-Hg concentrations. Spatial patterns in tissue-Hg were also likely confounded by locational differences in the species of Lepomis collected. For example, the 20 sunfish that were collected at the inflow in 2000 consisted solely of redear sunfish that were relatively large (351 g; *L. microlophus*). By comparison, fish populations sampled at the same time from the interior and outflow were statistically smaller in size (i.e., weighed less, Dunn's post-hoc test, $p < 0.05$) and consisted of a mixture of three species of *Lepomis*: bluegill, redear and a few warmouth. The heavier fish might have been expected to have greater concentrations of Hg (based on the assumption that weight-to-age and age-to-Hg concentration have a positive correlation), and higher levels were, in fact, observed in the heavier fish. However, redear sunfish, because of their biology (i.e., probably diet), tend to have lower levels of tissue-Hg (Rumbold et al., 2001a, also see **Appendix A2-1**). It is possible that a species effect may have skewed the concentration lower than it would have been if the collected sample had been a mixture of bluegill:redear: warmouth. Consequently, the only marked difference in Hg levels in STA-1W sunfish evident from **Figure 7** was confounded from comparing different fish populations. The opposite could also be true; however, i.e., confounding factors could mask true spatial and temporal differences in Hg levels. It is, therefore, critical to assess other lines of evidence. For example, as discussed below, bass from the inflow also contained greater concentrations of Hg than interior or outflow fish.

Attempts to estimate a least-square mean for a sunfish of a standard weight at the inflow failed, due to nonsignificant regression of Hg on weight (df=1, 18, F=0.135, p=0.7). While this might at first suggest that weight was not a significant factor, it might be that sunfish collected at this site had a narrow range of weights. Tissue-Hg concentrations in sunfish from the interior marshes of STA-1W were found to be significantly correlated with weight (Spearman Rank correlation, $p < 0.001$; note: regression was inappropriate because of non-normality and unequal variance). Further, any attempt to address differences in species composition among sites would have required substantial censoring of the data sets.

Similar to sunfish, STA-1W largemouth bass contained much lower concentrations of Hg than bass from either of the other STAs (**Table 6**). Moreover, Hg levels in STA-1W bass were also much lower than concentrations observed in fish from downstream sites in the WCAs. As previously mentioned, like mosquitofish and sunfish, Hg in bass exhibited a negative percent change across STA-1W, i.e., it declined from inflow to outflows (-61 percent, based on nonstandardized concentrations). In 1999, an EHg3 bass at the inflow contained 214 ±55 ng/g Hg, whereas an EHg3 bass at the outflow (i.e., G-251 only) contained 65 ±15 ng/g Hg. In 2000 an EHg3 bass at the inflow contained 178 ±42 ng/g Hg, whereas bass at the outflows (G-251 and G-310, pooled) that were, on average, 2.6 years old contained 76 ±58 ng/g Hg. Bass with similar median weights ($p < 0.05$) and which were collected in 2000 at the two outflows (i.e., G-251 and G-310,) were examined for locational differences in Hg levels and were found not to differ significantly (mean at G-251 was 63 ng/g; G-310 was 96 ng/g; df=1,31; F=2.6; p=0.12); however, note that bass at G-310 contained slightly greater concentrations, which was consistent with what was observed in mosquitofish and sunfish.

In terms of risk to fish-eating wildlife, STA-1W mosquitofish contained tissue-Hg levels well below both the USEPA and USFWS guidance level for predator protection. Hg levels in STA-1W sunfish collected during the reporting year were also well below both predator protection levels. After adjusting arithmetic mean Hg concentrations in largemouth bass fillets to whole-body concentrations (whole-body THg concentration=0.69 x fillet THg; Lange et al., 1998), STA-1W bass were again well below the USEPA's guidance value for TL 4 fish (346 ng/g). Thus, unlike most areas of the Everglades, fish-eating wildlife feeding at STA-1W do not appear to be at risk from Hg exposure.

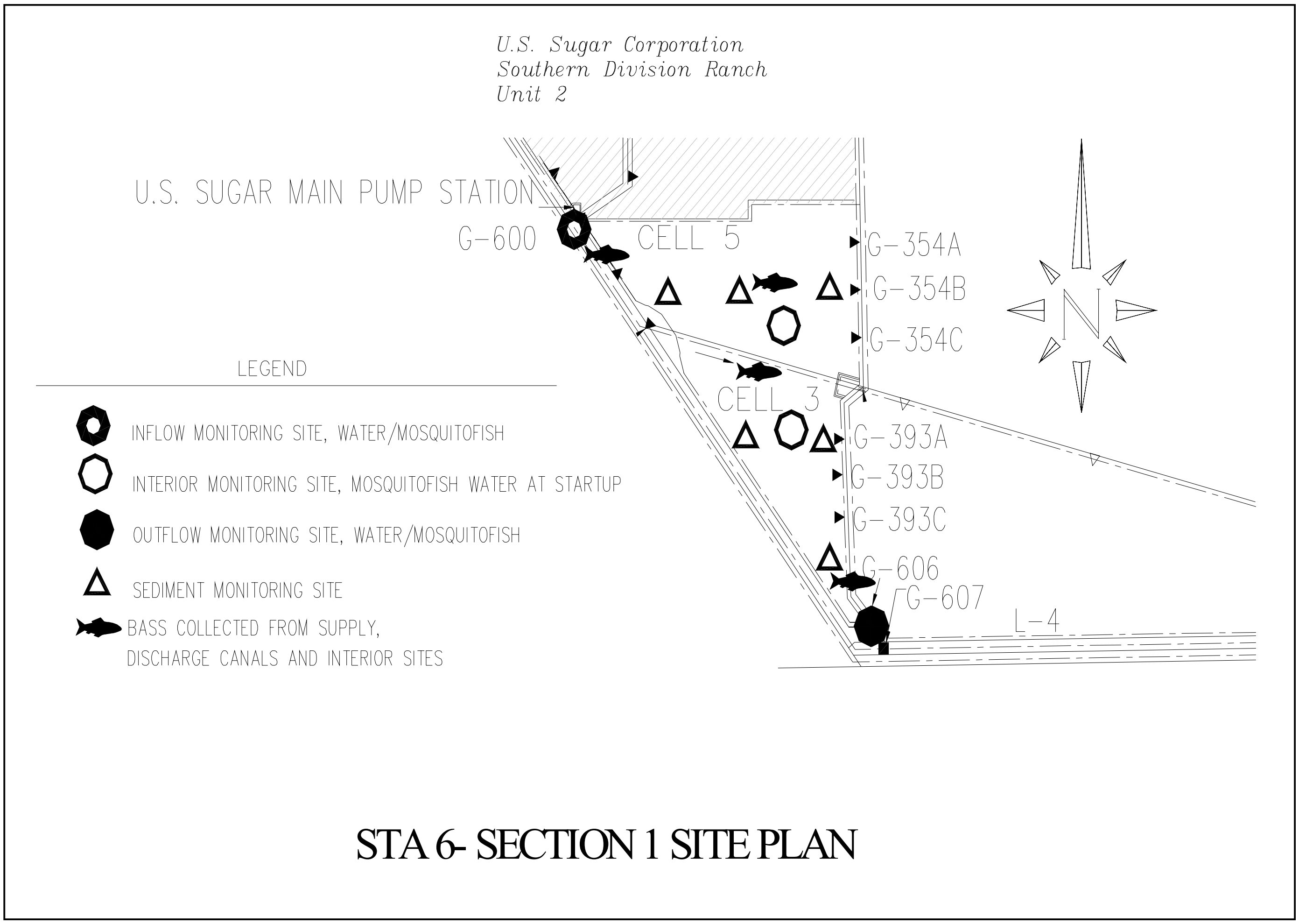

Figure 1. **Map of STA-6**

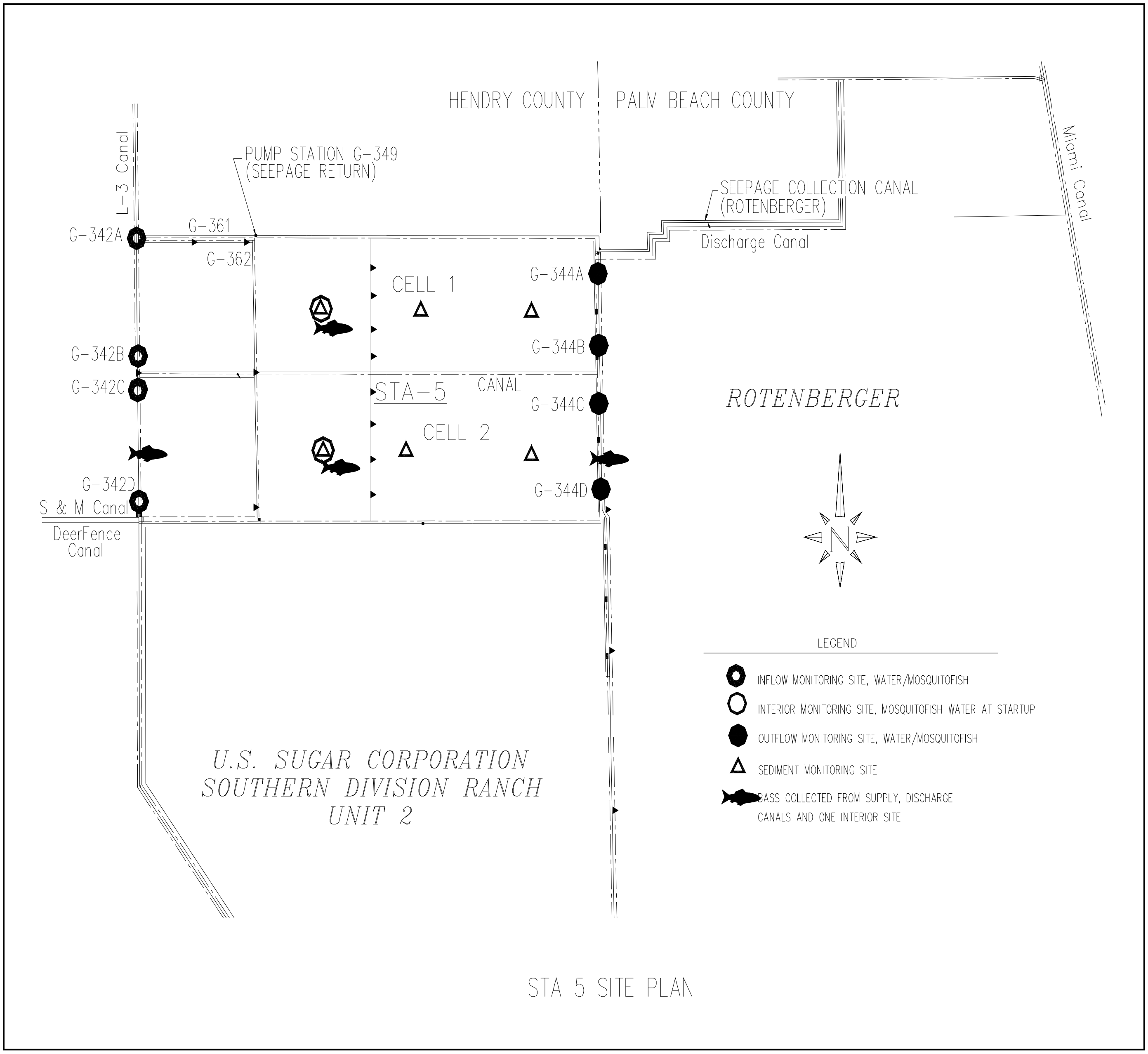

Figure 2. **Map of STA-5**

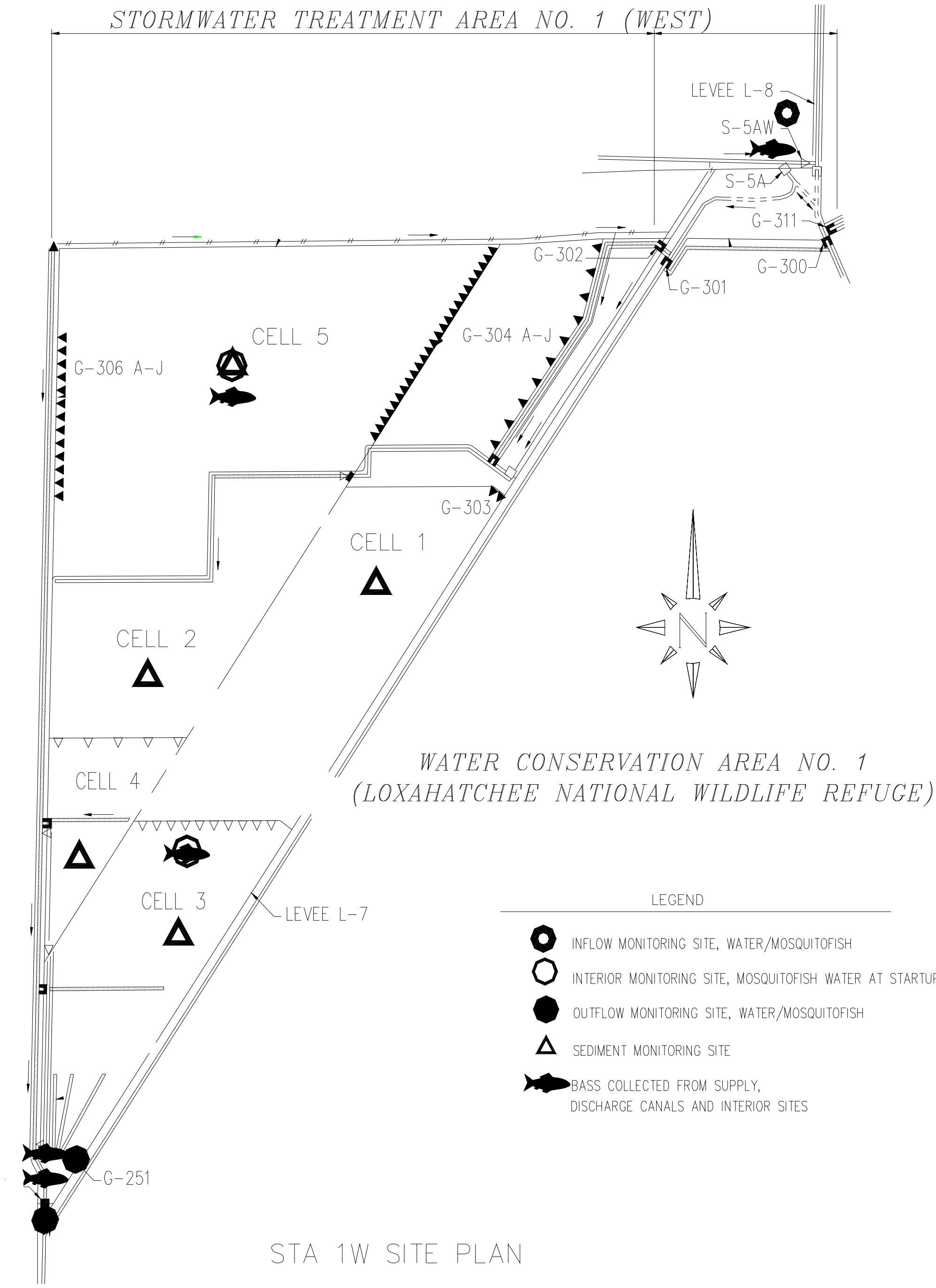

Figure 3. **Map of STA-1W**

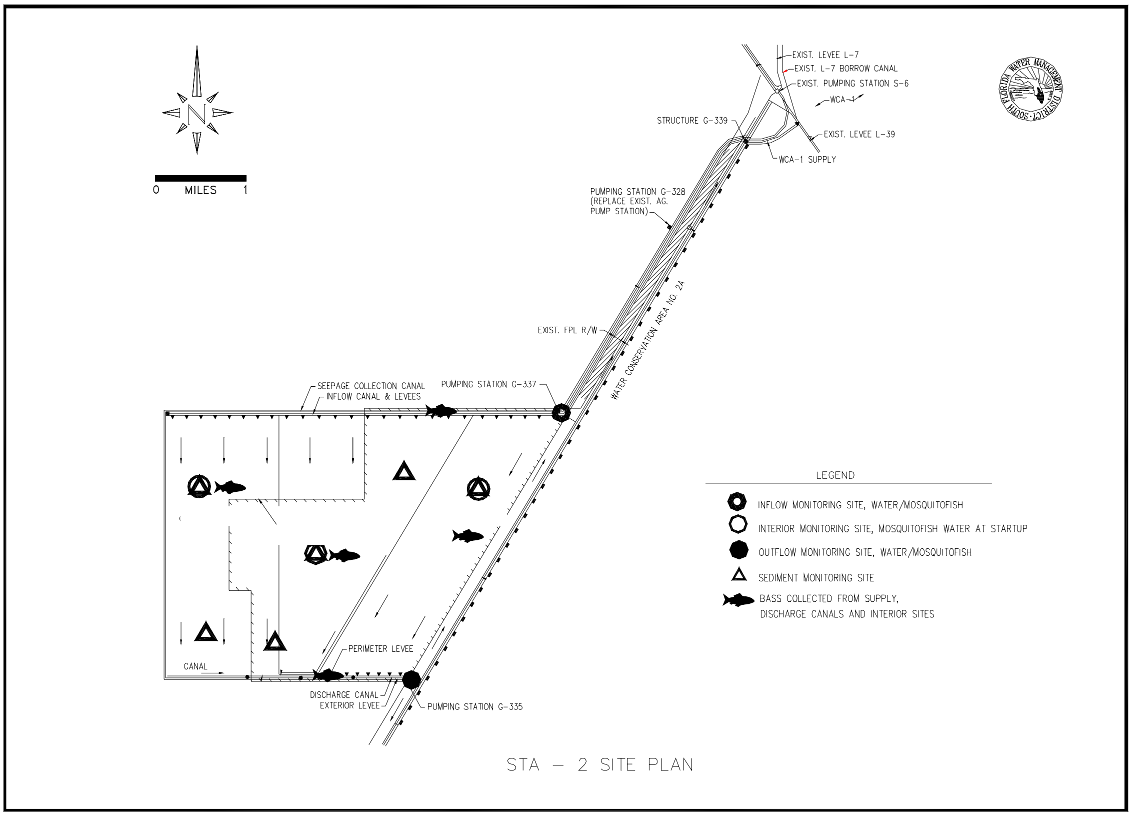

Figure 4. **Map of STA-2**

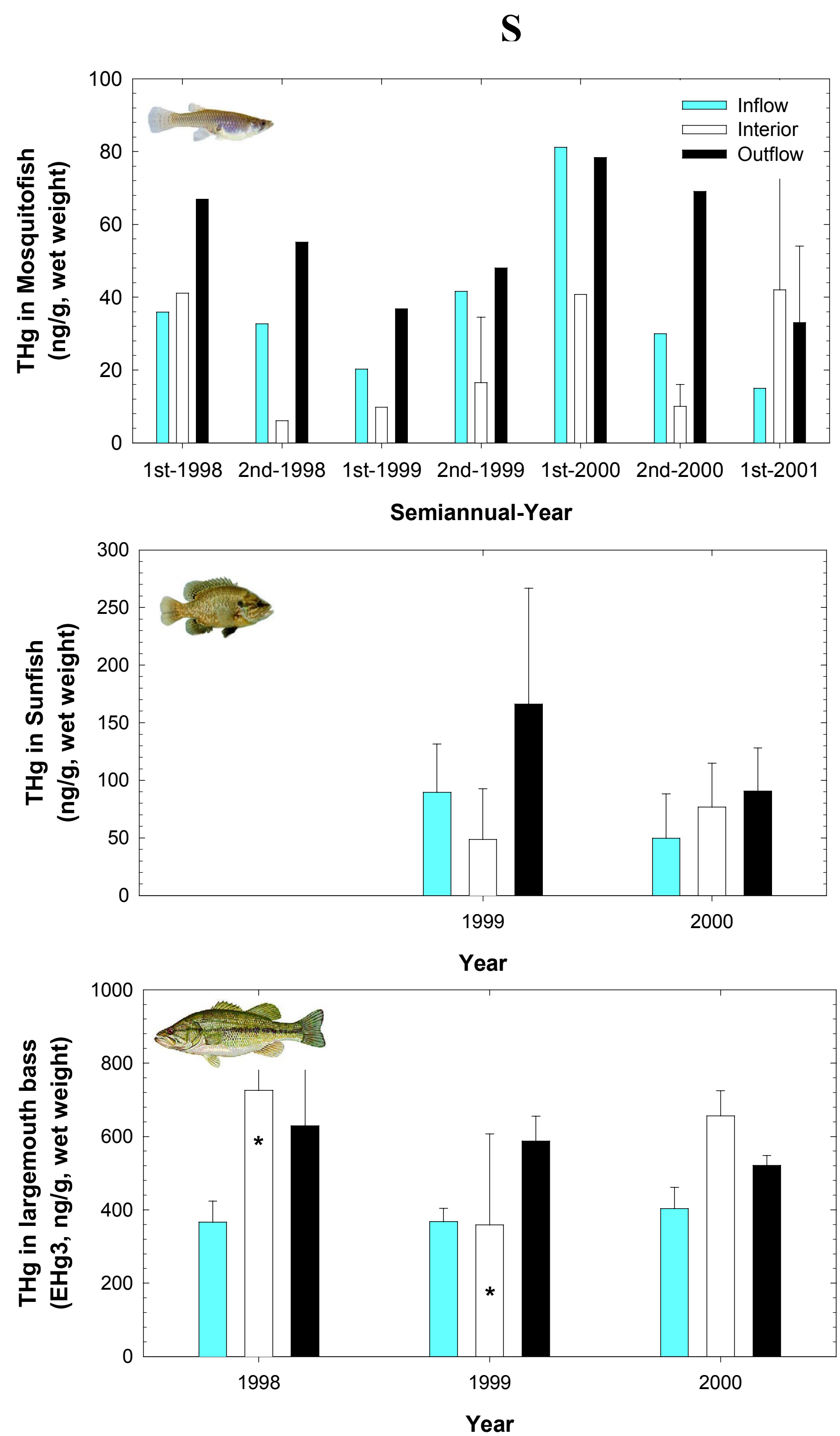

Figure 5. **Mercury concentrations in mosquitofish composites (a), whole sunfish (b), and fillets of largemouth bass (c) collected at STA-6. Note, the latter are reported as the expected concentration in a 3-yr-old fish, EHg3, unless this could not be calculated (*: for details,** Table 6**), in which case, the arithmetic mean is reported.**

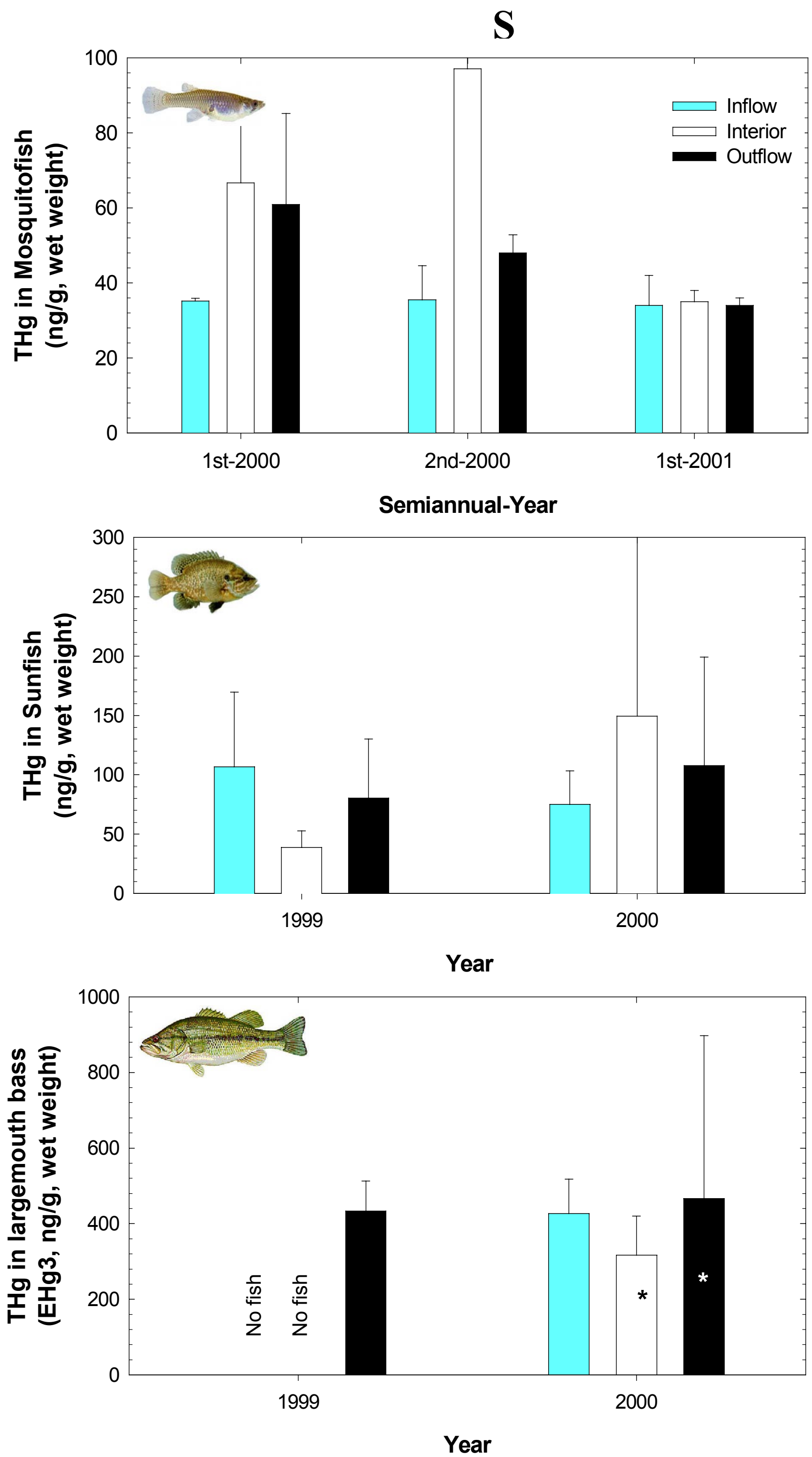

Figure 6. **Mercury concentrations in mosquitofish composites (a), whole sunfish (b), and fillets of largemouth bass (c) collected at STA-5. Note, the latter are reported as the expected concentration in a 3-yr-old fish, EHg3, unless this could not be calculated (*: for details,** Table 6**), in which case, the arithmetic mean is reported.**

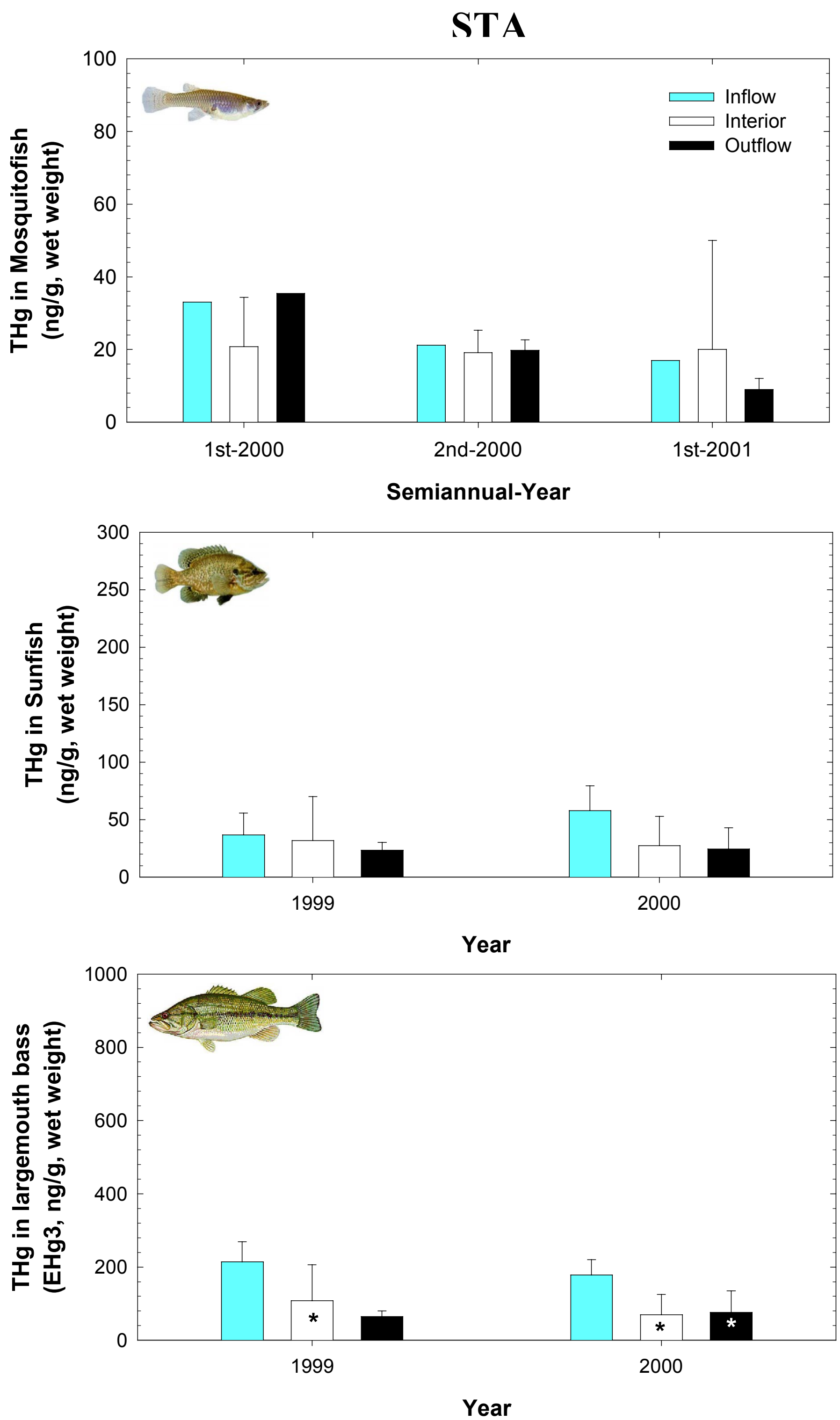

Figure 7. **Mercury concentrations in mosquitofish composites (a), whole sunfish (b), and fillets of largemouth bass (c) collected at STA-1W. Note, the latter are reported as the expected concentration in a 3-yr-old fish, EHg3, unless this could not be calculated (*: for details,** Table 6**), in which case, the arithmetic mean is reported.**

Total mercury (THg) and methylmercury (MeHg) concentration in STA soils (i.e., 10-cm depth composited; unit ng/g dry weight).

STA	***Year***	***Station***	***THg***	***remark****	***MeHg***	***remark***	***% MeHg***
STA-6	2001	ST6C3A	130		-3.6	U	NC
	2001	ST6C3B	80		-4.6	U	NC
	2001	ST6C3C	75		-4.3	U	NC
	2001	ST6C5A	46		-4.1	U	NC
	2001	ST6C5B	24	I	-5.3	U	NC
	2001	ST6C5C	47		-3.3	U	NC

For qualifier definitions, see FDEP rule 62-160. Qualifiers: "A" - averaged value; "U" - undetected, value is the MDL; "I" - below PQL; "J" - estimated value, the reported value failed to meet established QC criteria; "J3" -estimated value, poor precision, "V" – analyte detected in both the sample and the associated method blank.

Concentrations of total mercury (THg) and methylmercury (MeHg) in surface waters collected quarterly from the STAs (units, ng/L).

STA	THg (ng/L)						MeHg (ng/L)				%MeHg	
	Quart	Inflow	Remark *	Outflow	remark	THg WQS†	Inflow	remark	Outflow	remark	Inflow	Outflow
STA-6	00-2	(0.6)	V	(0.6)	VA	<WQS	0.07		0.06	I	NC[¶]	NC
	00-3	2.8		3.4	A	<WQS	0.90		0.74		32%	22%
	00-4	2.6		2.2**		<WQS	0.25	A	0.22		10%	10%
	01-1	2.5		NO		<WQS	0.14		NO		6%	
STA-5‡	00-2	1.5		0.8		<WQS	0.60		0.16		33%	22%
	00-3	2.8		1.9		<WQS	0.29		0.21		10%	10%
	00-4	1.0		2.4		<WQS	0.38		1.51		36%	58%
	01-1	0.6		1.4		<WQS	(0.12)	V	0.31		NC	22%
STA1W[§]	00-2	0.8		0.4	A	<WQS	0.09		(0.10)	J3	12%	NC
	00-3	2.6		2.3		<WQS	0.46		0.66		18%	29%
	00-4	2.5		2.5		<WQS	0.21		0.28		8%	11%
	01-1	1.2		0.9		<WQS	0.10		0.18		8%	21%

* Data in parenthesis did not meet QC checks; for qualifier definitions, see FDEP rule 62-160: "A" - averaged value; "U" - undetected, value is the MDL; "I" - below PQL; "J" - estimated value, the reported value failed to meet established QC criteria; "J3" -estimated value, poor precision, "V" - analyte detected in both the sample and the associated method blank.

† Class III Water Quality Standard of 12 ng THg / L.

**In 2000-4^{th} quarter, Outflow sampling site for STA-6 was moved from G606 to G354C and G393B culverts and, thus, reported values represent mean; corresponding concentration at old Outflow was 2.3 ng THg /L and (0.43) ng MeHg / L (the latter was "J3" flagged).

¶ "NC" – not calculated; "NO" – no outflow at the time of sampling.

‡ STA-5 has multiple inflows and outflows and reported value represents mean of valid data (unqualified).

§ STA-1W has a single inflow and two outflows; the reported value for the latter represents mean of valid data (unqualified).

Percent change in concentration of THg and MeHg in surface water across STAs (i.e., outflow-inflow/inflow)

STA	***Quarter***	***THg***	***MeHg***
STA-6	00-2	NC	-14%
	00-3	21%	-18%
	00-4	-15%	-12%
	01-1	NC	NC
Annual average		3%	-15%
Cumulative average		-16%	-25%
STA-5	00-2	-47%	-73%
	00-3	-32%	-28%
	00-4	140%	297%
	01-1	133%	NC
Annual average		49%	65%
Cumulative average		34%	65%
STA1-W	00-2	-50%	NC
	00-3	-12%	43%
	00-4	0%	33%
	01-1	-25%	80%
Annual average		-22%	38%
Cumulative average		-32%	37%

** Only valid (unqualified) data used in calculations; see Table 2 for raw data and qualifiers.

Concentration of total mercury (THg) in mosquitofish composites collected semiannually from STAs (units ng/g wet weight)

STA	***Half-year***	***Inflow fish***	***Interior fish***	***Outflow fish***	***Percent change***
STA-6	2000-2	30	10 ± 6	69	130%
	2001-1	14	42 ±33	33 ±21	120%
Annual mean		22	26	51	127%
Cumulative mean		36	24	55	51%
STA-5	2000-2	36 ± 9	97 ±41	48 ± 5	33%
	2001-1	34 ± 8	35 ± 3	34 ± 2	0%
Annual mean		35	62	41	17%
Cumulative mean		36	66	48	33%
STA-1W	2000-2	21	19 ± 6	20 ±3	-5%
	2001-1	17	20 ±30	9 ±3	-47%
Annual mean		19	20	14	-26%
Cumulative mean		24	20	21	-13%

* Mosquitofish are collected semiannually at inflow, interior and outflow sites.

† Standard error is reported where multiple composites are collected from location (e.g.., multiple inflows or outflows, multiple cells); other values represent mean of five analyses of a single composite sample.

‡ Percent change=outflow-inflow / inflow

Concentration of total mercury (THg, ng/g wet weight) in sunfish, *Lepomis spp*., collected from STAs in 2000 (sample size in parenthesis).

STA	***Inflow fish***	***Interior fish***	***Outflow fish***	***Percent change***
STA-6	50 ±38 (19)	77 ±38 (40†)	90 ±38 (20)	82%
Cumulative mean*	70 ±44	67 ±42	128 ±84	83%
STA-5	75 ± 28 (20)	149 ±151 (40†)	108 ± 91 (20)	44%
Cumulative mean*	91 ±51	95 ±121	97 ±78	6%
STA-1W	58 ±22 (20)	27 ±25 (60†)	24 ±18 (40†)	-58%
Cumulative mean*	48 ±23	29 ±32	24 ±15	-49%

* Sunfish collected in 1999, prior to permit revision or STA operation (in the case of STA-5 and STA-1W) were included in cumulative average.

†. Where n > 20; multiple sites were sampled and pooled, i.e., multiple interior or outflows.

‡. Percent change=outflow-inflow/inflow.

Standardized, EHg3 ± 95percent, and arithmetic mean concentration (mean ± 1SD, n; in parenthesis) of total mercury (ng/g, wet weight) in fillets from largemouth bass collected at STAs in 2000.

STA	*Inflow Fish*	*Interior Fish*	*Outflow Fish*	*Percent Change ‡*	*Consumption Advisory Exceeded*
STA-6	403 ±58 (327 ±148, 20)	656 ±69 (549 ±316, 14)	521 ±27 (490 ±119, 20)	29%	Yes
Cumulative mean	379(a)	545(b)	579(a)	53%	
STA-5	427 ±91 (299 ±120, 20)	NC (2) (317 ±103, 40†)	NC (1) (467 ±430, 20)	56%	Probable, if EHg3 avail
Cumulative mean*	427(a)	317(b)	467(b)		
STA-1W	178 ±42 (193 ±109, 20)	NC (1) (70 ±55, 58†)	NC (1) (76 ±59, 33†)	-61%	No
Cumulative mean*	196(a)	89(b)	71(b)	-64%	

* Bass collected in 1999, prior to operation of STA-5 and STA-1W, were included in cumulative average: a) based on EHg3; or b) based on arithmetic mean.

† Where n >20; multiple sites were sampled and pooled, i.e., multiple interior or outflows.

‡ Percent change=outflow-inflow/inflow.

Florida limited consumption advisory threshold is 500 ng/g in three-year-old bass.

NC – not calculated, where: 1) regression slope not significantly different from 0; or, 2) poor age distribution of collected fish.

ATTACHMENT 1. VALUES FOR INDIVIDUAL LARGE-BODIED FISH

The THg concentration (mg/Kg) and metadata for individual large-bodied fish collected from STAs in 2000 are provided in the tables on the following pages.

STA	Station	Date	Sample ID	Species name	Age	Length (cm)	Weight (g)	THg (mg/Kg)	Remark
STA-1W	ENR012	05-Sep-00	900072	BLUE		222	253	0.036	I
STA-1W	ENR012	05-Sep-00	900291	LMB	6	518	2465	0.081	A
STA-1W	ENR012	05-Sep-00	900292	LMB	6	514	2271	0.11	
STA-1W	ENR012	05-Sep-00	900293	LMB	2	409	959	0.062	
STA-1W	ENR012	05-Sep-00	900294	LMB	3	366	704	0.096	
STA-1W	ENR012	05-Sep-00	900295	LMB	2	365	609	0.12	
STA-1W	ENR012	05-Sep-00	900296	LMB	2	317	427	0.039	I
STA-1W	ENR012	05-Sep-00	900297	LMB	2	291	311	0.087	
STA-1W	ENR012	05-Sep-00	900298	LMB	1	252	209	0.028	I
STA-1W	ENR012	05-Sep-00	900299	LMB	1	257	219	0.066	
STA-1W	ENR012	05-Sep-00	900300	LMB	2	325	470	0.041	I
STA-1W	ENR012	05-Sep-00	900301	LMB	1	270	256	0.032	I
STA-1W	ENR012	05-Sep-00	900302	LMB	1	249	192	0.034	I
STA-1W	ENR012	05-Sep-00	900303	LMB	1	246	196	0.12	
STA-1W	ENR012	05-Sep-00	900304	LMB	2	234	170	0.034	I
STA-1W	ENR012	05-Sep-00	900305	LMB	1	257	201	0.037	I
STA-1W	ENR012	05-Sep-00	900306	LMB	1	237	189	0.037	I
STA-1W	ENR012	05-Sep-00	900307	LMB	1	240	169	0.021	I
STA-1W	ENR012	05-Sep-00	900308	LMB	1	257	210	0.059	
STA-1W	ENR012	05-Sep-00	900309	LMB	1	237	163	0.097	
STA-1W	ENR012	05-Sep-00	900310	LMB	1	233	141	0.046	
STA-1W	ENR012	05-Sep-00	900061	RESU		225	277	0.0042	
STA-1W	ENR012	05-Sep-00	900062	RESU		239	294	0.021	I
STA-1W	ENR012	05-Sep-00	900063	RESU		195	160	0.021	I
STA-1W	ENR012	05-Sep-00	900064	RESU		192	160	0.022	I
STA-1W	ENR012	05-Sep-00	900065	RESU		189	152	0.024	I
STA-1W	ENR012	05-Sep-00	900066	RESU		225	242	0.029	I
STA-1W	ENR012	05-Sep-00	900067	RESU		235	323	0.021	I
STA-1W	ENR012	05-Sep-00	900068	RESU		190	163	0.0051	
STA-1W	ENR012	05-Sep-00	900069	RESU		169	90	0.0053	I
STA-1W	ENR012	05-Sep-00	900070	RESU		230	287	0.0041	
STA-1W	ENR012	05-Sep-00	900071	RESU		168	104	0.022	I
STA-1W	ENR012	05-Sep-00	900073	SPSU		148	87	0.028	I
STA-1W	ENR012	05-Sep-00	900074	SPSU		149	86	0.0089	I
STA-1W	ENR012	05-Sep-00	900075	SPSU		164	118	0.024	I
STA-1W	ENR012	05-Sep-00	900076	SPSU		144	80	0.022	I
STA-1W	ENR012	05-Sep-00	900077	SPSU		157	102	0.029	I
STA-1W	ENR012	05-Sep-00	900078	SPSU		127	49	0.0055	
STA-1W	ENR012	05-Sep-00	900079	SPSU		143	76	0.05	I
STA-1W	ENR012	05-Sep-00	900080	SPSU		154	81	0.026	I
STA-1W	ENR302	09-Oct-00	1000010	BLUE		175	102	0.024	
STA-1W	ENR302	09-Oct-00	1000011	BLUE		209	218	0.025	
STA-1W	ENR302	09-Oct-00	1000012	BLUE		180	118	0.022	I
STA-1W	ENR302	09-Oct-00	1000013	BLUE		215	112	0.017	I
STA-1W	ENR302	09-Oct-00	1000014	BLUE		169	92	0.018	I
STA-1W	ENR302	09-Oct-00	1000015	BLUE		203	190	0.026	
STA-1W	ENR302	09-Oct-00	1000016	BLUE		180	120	0.017	I
STA-1W	ENR302	09-Oct-00	1000017	BLUE		224	238	0.02	I

STA	Station	Date	Sample ID	Species name	Age	Length (cm)	Weight (g)	THg (mg/Kg)	Remark
STA-1W	ENR302	09-Oct-00	1000018	BLUE		188	130	0.023	
STA-1W	ENR302	09-Oct-00	1000019	BLUE		181	116	0.02	
STA-1W	ENR302	09-Oct-00	1000021	LMB	3	450	1932	0.084	A
STA-1W	ENR302	09-Oct-00	1000022	LMB	3	384	819	0.053	
STA-1W	ENR302	09-Oct-00	1000023	LMB	3	416	1084	0.079	
STA-1W	ENR302	09-Oct-00	1000024	LMB	3	394	817	0.051	
STA-1W	ENR302	09-Oct-00	1000025	LMB	3	334	535	0.048	
STA-1W	ENR302	09-Oct-00	1000026	LMB	3	344	582	0.08	
STA-1W	ENR302	09-Oct-00	1000027	LMB	2	338	462	0.036	I
STA-1W	ENR302	09-Oct-00	1000028	LMB	2	315	430	0.046	
STA-1W	ENR302	09-Oct-00	1000029	LMB	3	299	341	0.061	
STA-1W	ENR302	09-Oct-00	1000030	LMB	2	345	520	0.039	
STA-1W	ENR302	09-Oct-00	1000031	LMB	2	289	314	0.056	
STA-1W	ENR302	09-Oct-00	1000032	LMB	1	285	265	0.044	
STA-1W	ENR302	09-Oct-00	1000033	LMB	2	292	316	0.027	I
STA-1W	ENR302	09-Oct-00	1000034	LMB	1	268	236	0.042	
STA-1W	ENR302	09-Oct-00	1000035	LMB	3	309	399	0.082	
STA-1W	ENR302	09-Oct-00	1000036	LMB	2	362	650	0.066	
STA-1W	ENR302	09-Oct-00	1000037	LMB	2	289	251	0.032	I
STA-1W	ENR302	09-Oct-00	1000038	LMB	1	290	283	0.021	I
STA-1W	ENR302	09-Oct-00	1000039	LMB	4	423	1008	0.11	
STA-1W	ENR302	09-Oct-00	1000040	LMB	2	278	256	0.045	
STA-1W	ENR302	09-Oct-00	1000001	RESU		200	151	0.017	I
STA-1W	ENR302	09-Oct-00	1000002	RESU		199	128	0.013	I
STA-1W	ENR302	09-Oct-00	1000003	RESU		205	166	0.015	I
STA-1W	ENR302	09-Oct-00	1000004	RESU		183	118	0.013	I
STA-1W	ENR302	09-Oct-00	1000005	RESU		209	153	0.012	I
STA-1W	ENR302	09-Oct-00	1000006	RESU		211	176	0.013	I
STA-1W	ENR302	09-Oct-00	1000007	RESU		198	150	0.016	I
STA-1W	ENR302	09-Oct-00	1000008	RESU		238	227	0.013	I
STA-1W	ENR302	09-Oct-00	1000009	RESU		203	171	0.012	I
STA-1W	ENR302	09-Oct-00	1000020	WAR		170	105	0.029	
STA-1W	ENR401	05-Sep-00	900331	LMB	2	426	1191	0.033	I
STA-1W	ENR401	05-Sep-00	900332	LMB	6	420	1118	0.045	
STA-1W	ENR401	05-Sep-00	900333	LMB	1	338	543	0.023	I
STA-1W	ENR401	05-Sep-00	900334	LMB	1	317	473	0.027	I
STA-1W	ENR401	05-Sep-00	900335	LMB	1	300	402	0.022	I
STA-1W	ENR401	05-Sep-00	900336	LMB	1	285	350	0.034	I
STA-1W	ENR401	05-Sep-00	900337	LMB	1	291	362	0.018	I
STA-1W	ENR401	05-Sep-00	900338	LMB	1	267	296	0.018	I
STA-1W	ENR401	05-Sep-00	900339	LMB	1	300	384	0.014	I
STA-1W	ENR401	05-Sep-00	900340	LMB	1	280	289	0.019	I
STA-1W	ENR401	05-Sep-00	900341	LMB	1	260	254	0.017	I
STA-1W	ENR401	05-Sep-00	900342	LMB	1	247	197	0.02	I
STA-1W	ENR401	05-Sep-00	900343	LMB	1	267	284	0.016	I
STA-1W	ENR401	05-Sep-00	900344	LMB	1	296	363	0.019	I
STA-1W	ENR401	05-Sep-00	900345	LMB	1	258	232	0.017	I
STA-1W	ENR401	05-Sep-00	900346	LMB	1	251	216	0.014	I

STA	Station	Date	Sample ID	Species name	Age	Length (cm)	Weight (g)	THg (mg/Kg)	Remark
STA-1W	ENR401	05-Sep-00	900347	LMB	1	258	238	0.015	I
STA-1W	ENR401	05-Sep-00	900348	LMB	1	261	235	0.018	I
STA-1W	ENR401	05-Sep-00	900349	LMB	1	240	188	0.014	I
STA-1W	ENR401	05-Sep-00	900350	LMB		236	146	0.018	I
STA-1W	ENR401	05-Sep-00	900101	RESU		224	237	0.0057	I
STA-1W	ENR401	05-Sep-00	900102	RESU		242	335	0.0057	I
STA-1W	ENR401	05-Sep-00	900103	RESU		205	204	0.0059	I
STA-1W	ENR401	05-Sep-00	900104	RESU		199	179	0.0071	I
STA-1W	ENR401	05-Sep-00	900105	RESU		182	134	0.0056	I
STA-1W	ENR401	05-Sep-00	900106	RESU		183	139	0.0049	
STA-1W	ENR401	05-Sep-00	900107	RESU		205	207	0.0052	
STA-1W	ENR401	05-Sep-00	900108	RESU		187	145	0.0037	
STA-1W	ENR401	05-Sep-00	900109	RESU		182	133	0.0038	
STA-1W	ENR401	05-Sep-00	900110	RESU		178	123	0.0046	
STA-1W	ENR401	05-Sep-00	900111	RESU		179	123	0.0049	
STA-1W	ENR401	05-Sep-00	900112	RESU		187	134	0.0036	A
STA-1W	ENR401	05-Sep-00	900113	RESU		166	82	0.0061	
STA-1W	ENR401	05-Sep-00	900114	RESU		160	82	0.0046	
STA-1W	ENR401	05-Sep-00	900115	RESU		187	140	0.004	
STA-1W	ENR401	05-Sep-00	900116	RESU		172	110	0.0031	
STA-1W	ENR401	05-Sep-00	900117	RESU		162	107	0.0046	
STA-1W	ENR401	05-Sep-00	900118	RESU		162	80	0.0058	
STA-1W	ENR401	05-Sep-00	900119	RESU		166	104	0.0062	
STA-1W	ENR401	05-Sep-00	900120	RESU		164	96	0.0061	I
STA-1W	G310	05-Sep-00	900148	BLUE		211	214	0.023	
STA-1W	G310	05-Sep-00	900149	BLUE		166	82	0.026	
STA-1W	G310	05-Sep-00	900150	BLUE		165	83	0.07	
STA-1W	G310	05-Sep-00	900151	BLUE		157	66	0.074	
STA-1W	G310	05-Sep-00	900152	BLUE		150	64	0.0042	
STA-1W	G310	05-Sep-00	900153	BLUE		159	86	0.076	
STA-1W	G310	05-Sep-00	900154	BLUE		136	46	0.027	
STA-1W	G310	05-Sep-00	900155	BLUE		106	22	0.012	I
STA-1W	G310	05-Sep-00	900156	BLUE		112	26	0.034	
STA-1W	G310	05-Sep-00	900371	LMB	4	393	872	0.099	
STA-1W	G310	05-Sep-00	900372	LMB	1	341	578	0.18	
STA-1W	G310	05-Sep-00	900373	LMB	3	373	778	0.069	
STA-1W	G310	05-Sep-00	900374	LMB	2	351	529	0.31	
STA-1W	G310	05-Sep-00	900375	LMB	2	325	460	0.035	I
STA-1W	G310	05-Sep-00	900376	LMB	1	325	403	0.089	
STA-1W	G310	05-Sep-00	900377	LMB	1	276	266	0.057	
STA-1W	G310	05-Sep-00	900378	LMB	1	260	272	0.055	
STA-1W	G310	05-Sep-00	900379	LMB	1	274	261	0.17	
STA-1W	G310	05-Sep-00	900380	LMB	1	253	207	0.041	
STA-1W	G310	05-Sep-00	900381	LMB	1	251	186	0.014	I
STA-1W	G310	05-Sep-00	900382	LMB	1	234	154	0.097	
STA-1W	G310	05-Sep-00	900383	LMB	1	243	178	0.02	I
STA-1W	G310	05-Sep-00	900141	RESU		237	279	0.0047	
STA-1W	G310	05-Sep-00	900142	RESU		166	78	0.015	I

STA	Station	Date	Sample ID	Species name	Age	Length (cm)	Weight (g)	THg (mg/Kg)	Remark
STA-1W	G310	05-Sep-00	900143	RESU		201	127	0.0056	
STA-1W	G310	05-Sep-00	900144	RESU		150	58	0.044	
STA-1W	G310	05-Sep-00	900145	RESU		169	100	0.024	
STA-1W	G310	05-Sep-00	900146	RESU		152	67	0.039	
STA-1W	G310	05-Sep-00	900147	RESU		187	124	0.02	
STA-1W	G310	05-Sep-00	900158	SPSU		137	64	0.018	I
STA-1W	G310	05-Sep-00	900159	SPSU		145	73	0.011	I
STA-1W	G310	05-Sep-00	900160	SPSU		115	39	0.0086	I
STA-1W	G310	05-Sep-00	900157	WAR		135	45	0.037	
STA-1W	S5A	05-Sep-00	900081	LMB	5	509	2171	0.52	
STA-1W	S5A	05-Sep-00	900082	LMB	4	419	1141	0.3	
STA-1W	S5A	05-Sep-00	900083	LMB	3	434	1229	0.23	
STA-1W	S5A	05-Sep-00	900084	LMB	4	376	868	0.22	A
STA-1W	S5A	05-Sep-00	900085	LMB	1	333	571	0.12	
STA-1W	S5A	05-Sep-00	900086	LMB	3	400	920	0.19	
STA-1W	S5A	05-Sep-00	900087	LMB	2	345	637	0.13	
STA-1W	S5A	05-Sep-00	900088	LMB	1	311	475	0.19	
STA-1W	S5A	05-Sep-00	900089	LMB	3	367	823	0.15	
STA-1W	S5A	05-Sep-00	900090	LMB	3	353	693	0.15	
STA-1W	S5A	05-Sep-00	900091	LMB	3	373	777	0.28	
STA-1W	S5A	05-Sep-00	900092	LMB	1	300	427	0.093	
STA-1W	S5A	05-Sep-00	900093	LMB	2	334	626	0.15	
STA-1W	S5A	05-Sep-00	900094	LMB	3	334	541	0.22	
STA-1W	S5A	05-Sep-00	900095	LMB	2	358	722	0.071	
STA-1W	S5A	05-Sep-00	900096	LMB	1	289	388	0.082	
STA-1W	S5A	05-Sep-00	900097	LMB	1	291	397	0.13	
STA-1W	S5A	05-Sep-00	900098	LMB	1	286	334	0.27	
STA-1W	S5A	05-Sep-00	900099	LMB	3	287	326	0.054	
STA-1W	S5A	05-Sep-00	900100	LMB	3	292	309	0.31	
STA-1W	S5A	05-Sep-00	900311	RESU		242	394	0.044	A
STA-1W	S5A	05-Sep-00	900312	RESU		259	454	0.035	
STA-1W	S5A	05-Sep-00	900313	RESU		254	356	0.077	
STA-1W	S5A	05-Sep-00	900314	RESU		253	351	0.082	
STA-1W	S5A	05-Sep-00	900315	RESU		268	518	0.12	
STA-1W	S5A	05-Sep-00	900316	RESU		273	539	0.051	
STA-1W	S5A	05-Sep-00	900317	RESU		258	425	0.037	
STA-1W	S5A	05-Sep-00	900318	RESU		252	426	0.055	
STA-1W	S5A	05-Sep-00	900319	RESU		270	539	0.044	
STA-1W	S5A	05-Sep-00	900320	RESU		255	423	0.055	
STA-1W	S5A	05-Sep-00	900321	RESU		239	320	0.051	
STA-1W	S5A	05-Sep-00	900322	RESU		245	375	0.051	
STA-1W	S5A	05-Sep-00	900323	RESU		226	286	0.06	
STA-1W	S5A	05-Sep-00	900324	RESU		241	337	0.053	
STA-1W	S5A	05-Sep-00	900325	RESU		222	275	0.039	
STA-1W	S5A	05-Sep-00	900326	RESU		222	292	0.038	
STA-1W	S5A	05-Sep-00	900327	RESU		216	262	0.035	
STA-1W	S5A	05-Sep-00	900328	RESU		192	150	0.094	
STA-1W	S5A	05-Sep-00	900329	RESU		191	151	0.059	

STA	Station	Date	Sample ID	Species name	Age	Length (cm)	Weight (g)	THg (mg/Kg)	Remark
STA-1W	S5A	05-Sep-00	900330	RESU		187	147	0.073	
STA-1W	ST1W51	05-Sep-00	900129	BLUE		174	93	0.08	
STA-1W	ST1W51	05-Sep-00	900130	BLUE		165	96	0.048	
STA-1W	ST1W51	05-Sep-00	900131	BLUE		158	93	0.063	
STA-1W	ST1W51	05-Sep-00	900132	BLUE		165	91	0.071	
STA-1W	ST1W51	05-Sep-00	900133	BLUE		174	119	0.065	
STA-1W	ST1W51	05-Sep-00	900351	LMB	2	381	878	0.2	A
STA-1W	ST1W51	05-Sep-00	900352	LMB	1	353	635	0.18	
STA-1W	ST1W51	05-Sep-00	900353	LMB	2	381	905	0.13	
STA-1W	ST1W51	05-Sep-00	900354	LMB	1	354	679	0.13	
STA-1W	ST1W51	05-Sep-00	900355	LMB	2	380	852	0.16	
STA-1W	ST1W51	05-Sep-00	900356	LMB	1	357	673	0.21	
STA-1W	ST1W51	05-Sep-00	900357	LMB	1	337	593	0.12	
STA-1W	ST1W51	05-Sep-00	900358	LMB	1	307	421	0.14	
STA-1W	ST1W51	05-Sep-00	900359	LMB	1	305	475	0.19	
STA-1W	ST1W51	05-Sep-00	900360	LMB	1	359	770	0.15	
STA-1W	ST1W51	05-Sep-00	900361	LMB	2	311	384	0.17	
STA-1W	ST1W51	05-Sep-00	900362	LMB	1	335	572	0.11	
STA-1W	ST1W51	05-Sep-00	900363	LMB	1	314	533	0.11	
STA-1W	ST1W51	05-Sep-00	900364	LMB	0	243	256	0.07	
STA-1W	ST1W51	05-Sep-00	900365	LMB	0	220	158	0.048	
STA-1W	ST1W51	05-Sep-00	900366	LMB	0	230	167	0.069	
STA-1W	ST1W51	05-Sep-00	900367	LMB	1	274	269	0.069	
STA-1W	ST1W51	05-Sep-00	900368	LMB	2	297	374	0.15	
STA-1W	ST1W51	05-Sep-00	900369	LMB	0	216	137	0.12	
STA-1W	ST1W51	05-Sep-00	900121	RESU		177	117	0.032	
STA-1W	ST1W51	05-Sep-00	900122	RESU		154	75	0.035	
STA-1W	ST1W51	05-Sep-00	900123	RESU		182	128	0.023	
STA-1W	ST1W51	05-Sep-00	900124	RESU		147	42	0.093	
STA-1W	ST1W51	05-Sep-00	900125	RESU		179	111	0.034	
STA-1W	ST1W51	05-Sep-00	900126	RESU		165	83	0.066	
STA-1W	ST1W51	05-Sep-00	900127	RESU		172	97	0.054	
STA-1W	ST1W51	05-Sep-00	900128	RESU		170	96	0.056	A
STA-1W	ST1W51	05-Sep-00	900134	WAR		166	105	0.088	
STA-1W	ST1W51	05-Sep-00	900135	WAR		157	92	0.062	
STA-1W	ST1W51	05-Sep-00	900136	WAR		133	54	0.072	
STA-1W	ST1W51	05-Sep-00	900137	WAR		133	53	0.052	
STA-1W	ST1W51	05-Sep-00	900138	WAR		159	97	0.07	
STA-1W	ST1W51	05-Sep-00	900139	WAR		124	44	0.057	
STA-1W	ST1W51	05-Sep-00	900140	WAR		128	47	0.055	
STA-5	G342A	07-Sep-00	900627	BLUE		155	61	0.05	
STA-5	G342A	07-Sep-00	900628	BLUE		111	24	0.074	
STA-5	G342A	07-Sep-00	900629	BLUE		140	54	0.042	
STA-5	G342A	07-Sep-00	900630	BLUE		150	59	0.07	
STA-5	G342A	07-Sep-00	900631	BLUE		142	58	0.16	
STA-5	G342A	07-Sep-00	900632	BLUE		112	29	0.09	
STA-5	G342A	07-Sep-00	900633	BLUE		175	125	0.069	
STA-5	G342A	07-Sep-00	900634	BLUE		169	93	0.11	

STA	Station	Date	Sample ID	Species name	Age	Length (cm)	Weight (g)	THg (mg/Kg)	Remark
STA-5	G342A	07-Sep-00	900635	BLUE		178	112	0.099	
STA-5	G342A	07-Sep-00	900636	BLUE		187	144	0.073	
STA-5	G342A	07-Sep-00	900637	BLUE		152	68	0.066	
STA-5	G342A	07-Sep-00	900638	BLUE		135	51	0.06	
STA-5	G342A	07-Sep-00	900639	BLUE		119	31	0.08	
STA-5	G342A	07-Sep-00	900640	BLUE		127	36	0.066	
STA-5	G342A	07-Sep-00	900641	BLUE		115	27	0.06	
STA-5	G342A	07-Sep-00	900642	BLUE		107	22	0.039	
STA-5	G342A	07-Sep-00	900643	BLUE		105	22	0.047	
STA-5	G342A	07-Sep-00	900499	LMB	3	1436	450	0.61	A
STA-5	G342A	07-Sep-00	900500	LMB	2	381	856	0.48	
STA-5	G342A	07-Sep-00	900501	LMB	1	356	733	0.28	
STA-5	G342A	07-Sep-00	900502	LMB	1	340	598	0.21	
STA-5	G342A	07-Sep-00	900503	LMB	1	351	623	0.42	
STA-5	G342A	07-Sep-00	900504	LMB	1	334	529	0.25	
STA-5	G342A	07-Sep-00	900505	LMB	1	311	443	0.39	
STA-5	G342A	07-Sep-00	900506	LMB	1	356	621	0.26	
STA-5	G342A	07-Sep-00	900507	LMB	1	359	699	0.22	
STA-5	G342A	07-Sep-00	900508	LMB	1	347	543	0.28	
STA-5	G342A	07-Sep-00	900509	LMB	2	331	533	0.24	
STA-5	G342A	07-Sep-00	900510	LMB	1	302	427	0.22	
STA-5	G342A	07-Sep-00	900684	LMB	1	325	535	0.18	
STA-5	G342A	07-Sep-00	900685	LMB	1	304	388	0.16	
STA-5	G342A	07-Sep-00	900686	LMB	1	305	434	0.29	
STA-5	G342A	07-Sep-00	900687	LMB	1	259	254	0.23	
STA-5	G342A	07-Sep-00	900688	LMB	0	251	247	0.3	
STA-5	G342A	07-Sep-00	900689	LMB	0	239	187	0.13	
STA-5	G342A	07-Sep-00	900690	LMB	1	250	191	0.41	
STA-5	G342A	07-Sep-00	900691	LMB	1	230	128	0.41	
STA-5	G342A	07-Sep-00	900624	RESU		220	211	0.11	A
STA-5	G342A	07-Sep-00	900625	RESU		227	191	0.08	
STA-5	G342A	07-Sep-00	900626	RESU		152	58	0.059	
STA-5	G344A	07-Sep-00	900649	BLUE		169	88	0.029	
STA-5	G344A	07-Sep-00	900650	BLUE		138	51	0.03	
STA-5	G344A	07-Sep-00	900651	BLUE		171	86	0.15	
STA-5	G344A	07-Sep-00	900652	BLUE		160	70	0.23	
STA-5	G344A	07-Sep-00	900653	BLUE		158	64	0.13	
STA-5	G344A	07-Sep-00	900654	BLUE		155	80	0.29	
STA-5	G344A	07-Sep-00	900655	BLUE		136	52	0.12	
STA-5	G344A	07-Sep-00	900656	BLUE		121	34	0.067	
STA-5	G344A	07-Sep-00	900657	BLUE		184	99	0.17	
STA-5	G344A	07-Sep-00	900658	BLUE		149	67	0.079	A
STA-5	G344A	07-Sep-00	900659	BLUE		181	98	0.069	
STA-5	G344A	07-Sep-00	900660	BLUE		145	70	0.045	
STA-5	G344A	07-Sep-00	900661	BLUE		169	100	0.2	
STA-5	G344A	07-Sep-00	900662	BLUE		172	89	0.32	
STA-5	G344A	07-Sep-00	900663	BLUE		130	44	0.062	
STA-5	G344A	07-Sep-00	900479	LMB	4	403	1077	0.4	A

STA	Station	Date	Sample ID	Species name	Age	Length (cm)	Weight (g)	THg (mg/Kg)	Remark
STA-5	G344A	07-Sep-00	900480	LMB	3	432	1268	0.25	
STA-5	G344A	07-Sep-00	900481	LMB	6	483	2032	0.4	
STA-5	G344A	07-Sep-00	900482	LMB	3	433	1466	0.35	
STA-5	G344A	07-Sep-00	900483	LMB	4	385	933	0.54	
STA-5	G344A	07-Sep-00	900484	LMB	3	375	777	0.41	
STA-5	G344A	07-Sep-00	900485	LMB	4	350	660	0.46	
STA-5	G344A	07-Sep-00	900486	LMB	3	332	562	0.59	
STA-5	G344A	07-Sep-00	900487	LMB	1	352	639	2.2	
STA-5	G344A	07-Sep-00	900488	LMB	2	312	411	0.59	
STA-5	G344A	07-Sep-00	900489	LMB	1	330	492	0.17	
STA-5	G344A	07-Sep-00	900490	LMB	0	296	334	0.42	
STA-5	G344A	07-Sep-00	900491	LMB	1	283	324	0.14	
STA-5	G344A	07-Sep-00	900492	LMB	0	256	250	0.48	
STA-5	G344A	07-Sep-00	900493	LMB	0	288	360	0.42	
STA-5	G344A	07-Sep-00	900494	LMB	1	276	283	0.17	
STA-5	G344A	07-Sep-00	900495	LMB	0	237	208	0.19	
STA-5	G344A	07-Sep-00	900496	LMB	1	270	256	0.47	
STA-5	G344A	07-Sep-00	900497	LMB	1	260	253	0.28	
STA-5	G344A	07-Sep-00	900498	LMB	1	306	392	0.42	
STA-5	G344A	07-Sep-00	900644	RESU		152	94	0.029	
STA-5	G344A	07-Sep-00	900645	RESU		186	141	0.036	
STA-5	G344A	07-Sep-00	900646	RESU		147	64	0.039	
STA-5	G344A	07-Sep-00	900647	RESU		148	60	0.04	
STA-5	G344A	07-Sep-00	900648	RESU		125	34	0.019	I
STA-5	STA5C1B1	07-Sep-00	900594	BLUE		155	72	0.088	
STA-5	STA5C1B1	07-Sep-00	900595	BLUE		199	173	0.13	
STA-5	STA5C1B1	07-Sep-00	900596	BLUE		162	86	0.94	
STA-5	STA5C1B1	07-Sep-00	900597	BLUE		162	75	0.16	
STA-5	STA5C1B1	07-Sep-00	900598	BLUE		134	43	0.38	
STA-5	STA5C1B1	07-Sep-00	900599	BLUE		142	58	0.19	
STA-5	STA5C1B1	07-Sep-00	900600	BLUE		132	40	0.13	
STA-5	STA5C1B1	07-Sep-00	900601	BLUE		113	28	0.087	
STA-5	STA5C1B1	07-Sep-00	900602	BLUE		122	31	0.099	
STA-5	STA5C1B1	07-Sep-00	900603	BLUE		120	31	0.072	
STA-5	STA5C1B1	07-Sep-00	900692	LMB	0	301	455	0.45	A
STA-5	STA5C1B1	07-Sep-00	900693	LMB	0	274	363	0.46	
STA-5	STA5C1B1	07-Sep-00	900694	LMB	1	330	583	0.41	
STA-5	STA5C1B1	07-Sep-00	900695	LMB	0	227	338	0.31	
STA-5	STA5C1B1	07-Sep-00	900696	LMB	0	289	409	0.4	
STA-5	STA5C1B1	07-Sep-00	900697	LMB	0	264	331	0.56	
STA-5	STA5C1B1	07-Sep-00	900698	LMB	0	277	408	0.44	
STA-5	STA5C1B1	07-Sep-00	900699	LMB	0	276	358	0.31	
STA-5	STA5C1B1	07-Sep-00	900700	LMB	0	296	424	0.41	
STA-5	STA5C1B1	07-Sep-00	900701	LMB	0	261	286	0.38	
STA-5	STA5C1B1	07-Sep-00	900702	LMB	0	270	286	0.36	
STA-5	STA5C1B1	07-Sep-00	900703	LMB	0	262	320	0.37	
STA-5	STA5C1B1	07-Sep-00	900704	LMB	0	269	315	0.48	
STA-5	STA5C1B1	07-Sep-00	900705	LMB	0	260	294	0.4	

STA	Station	Date	Sample ID	Species name	Age	Length (cm)	Weight (g)	THg (mg/Kg)	Remark
STA-5	STA5C1B1	07-Sep-00	900706	LMB	0	263	295	0.3	
STA-5	STA5C1B1	07-Sep-00	900707	LMB	0	251	240	0.29	
STA-5	STA5C1B1	07-Sep-00	900708	LMB	0	247	211	0.39	
STA-5	STA5C1B1	07-Sep-00	900709	LMB	0	256	243	0.37	
STA-5	STA5C1B1	07-Sep-00	900710	LMB	0	262	281	0.52	
STA-5	STA5C1B1	07-Sep-00	900711	LMB	0	245	192	0.38	
STA-5	STA5C1B1	07-Sep-00	900584	RESU		146	52	0.059	A
STA-5	STA5C1B1	07-Sep-00	900585	RESU		143	55	0.072	
STA-5	STA5C1B1	07-Sep-00	900586	RESU		122	34	0.067	
STA-5	STA5C1B1	07-Sep-00	900587	RESU		118	31	0.036	
STA-5	STA5C1B1	07-Sep-00	900588	RESU		140	36	0.071	
STA-5	STA5C1B1	07-Sep-00	900589	RESU		121	31	0.074	
STA-5	STA5C1B1	07-Sep-00	900590	RESU		134	42	0.071	
STA-5	STA5C1B1	07-Sep-00	900591	RESU		116	26	0.053	
STA-5	STA5C1B1	07-Sep-00	900592	RESU		116	27	0.046	
STA-5	STA5C1B1	07-Sep-00	900593	RESU		117	29	0.044	
STA-5	STA5C2B1	07-Sep-00	900609	BLUE		149	85	0.11	
STA-5	STA5C2B1	07-Sep-00	900610	BLUE		157	104	0.15	
STA-5	STA5C2B1	07-Sep-00	900611	BLUE		179	133	0.12	
STA-5	STA5C2B1	07-Sep-00	900612	BLUE		182	165	0.098	
STA-5	STA5C2B1	07-Sep-00	900613	BLUE		163	98	0.31	
STA-5	STA5C2B1	07-Sep-00	900614	BLUE		170	126	0.13	
STA-5	STA5C2B1	07-Sep-00	900615	BLUE		158	99	0.21	
STA-5	STA5C2B1	07-Sep-00	900616	BLUE		171	135	0.23	
STA-5	STA5C2B1	07-Sep-00	900617	BLUE		178	121	0.22	
STA-5	STA5C2B1	07-Sep-00	900618	BLUE		196	169	0.14	
STA-5	STA5C2B1	07-Sep-00	900619	BLUE		150	78	0.24	
STA-5	STA5C2B1	07-Sep-00	900620	BLUE		146	70	0.18	
STA-5	STA5C2B1	07-Sep-00	900621	BLUE		139	70	0.25	
STA-5	STA5C2B1	07-Sep-00	900622	BLUE		134	36	0.14	
STA-5	STA5C2B1	07-Sep-00	900623	BLUE		172	141	0.23	
STA-5	STA5C2B1	07-Sep-00	900712	LMB	0	310	490	0.19	A
STA-5	STA5C2B1	07-Sep-00	900713	LMB	0	271	389	0.2	
STA-5	STA5C2B1	07-Sep-00	900714	LMB	0	275	395	0.3	
STA-5	STA5C2B1	07-Sep-00	900715	LMB	0	279	320	0.23	
STA-5	STA5C2B1	07-Sep-00	900716	LMB	0	266	275	0.18	
STA-5	STA5C2B1	07-Sep-00	900717	LMB	0	258	270	0.21	
STA-5	STA5C2B1	07-Sep-00	900718	LMB	0	270	270	0.23	
STA-5	STA5C2B1	07-Sep-00	900719	LMB	0	280	333	0.31	
STA-5	STA5C2B1	07-Sep-00	900720	LMB	0	250	234	0.3	
STA-5	STA5C2B1	07-Sep-00	900721	LMB	0	260	205	0.23	
STA-5	STA5C2B1	07-Sep-00	900722	LMB	0	254	235	0.15	
STA-5	STA5C2B1	07-Sep-00	900723	LMB	0	288	372	0.16	
STA-5	STA5C2B1	07-Sep-00	900724	LMB	0	233	185	0.27	
STA-5	STA5C2B1	07-Sep-00	900725	LMB	0	233	217	0.22	
STA-5	STA5C2B1	07-Sep-00	900726	LMB	0	253	276	0.26	
STA-5	STA5C2B1	07-Sep-00	900727	LMB	0	274	262	0.23	
STA-5	STA5C2B1	07-Sep-00	900728	LMB	0	220	143	0.19	

STA	Station	Date	Sample ID	Species name	Age	Length (cm)	Weight (g)	THg (mg/Kg)	Remark
STA-5	STA5C2B1	07-Sep-00	900729	LMB	0	242	194	0.3	
STA-5	STA5C2B1	07-Sep-00	900730	LMB	0	220	136	0.24	
STA-5	STA5C2B1	07-Sep-00	900731	LMB	0	214	120	0.27	
STA-5	STA5C2B1	07-Sep-00	900604	RESU		172	95	0.1	A
STA-5	STA5C2B1	07-Sep-00	900605	RESU		145	61	0.05	
STA-5	STA5C2B1	07-Sep-00	900606	RESU		135	50	0.076	
STA-5	STA5C2B1	07-Sep-00	900607	RESU		124	40	0.081	
STA-5	STA5C2B1	07-Sep-00	900608	RESU		132	47	0.041	
STA-6	G600	06-Sep-00	900170	BLUE		122	36	0.029	
STA-6	G600	06-Sep-00	900171	BLUE		152	63	0.038	
STA-6	G600	06-Sep-00	900172	BLUE		141	55	0.042	
STA-6	G600	06-Sep-00	900173	BLUE		137	50	0.036	
STA-6	G600	06-Sep-00	900174	BLUE		142	49	0.034	
STA-6	G600	06-Sep-00	900175	BLUE		143	54	0.046	
STA-6	G600	06-Sep-00	900176	BLUE		125	38	0.033	
STA-6	G600	06-Sep-00	900177	BLUE		124	38	0.043	
STA-6	G600	06-Sep-00	900178	BLUE		128	37	0.046	
STA-6	G600	06-Sep-00	900179	BLUE		123	37	0.032	
STA-6	G600	06-Sep-00	900180	BLUE		146	36	0.054	
STA-6	G600	06-Sep-00	900181	BLUE		128	38	0.035	
STA-6	G600	06-Sep-00	900182	BLUE		116	25	0.024	
STA-6	G600	06-Sep-00	900183	BLUE		151	79	0.068	
STA-6	G600	06-Sep-00	900399	LMB	3	494	1888	0.59	A
STA-6	G600	06-Sep-00	900400	LMB	2	404	989	0.33	
STA-6	G600	06-Sep-00	900401	LMB	3	421	1228	0.76	
STA-6	G600	06-Sep-00	900402	LMB	2	401	956	0.33	
STA-6	G600	06-Sep-00	900403	LMB	2	402	933	0.32	
STA-6	G600	06-Sep-00	900404	LMB	2	385	844	0.46	
STA-6	G600	06-Sep-00	900405	LMB	2	348	595	0.27	
STA-6	G600	06-Sep-00	900406	LMB	2	357	585	0.31	
STA-6	G600	06-Sep-00	900407	LMB	1	309	418	0.25	
STA-6	G600	06-Sep-00	900408	LMB	3	320	466	0.37	
STA-6	G600	06-Sep-00	900409	LMB	2	340	554	0.45	
STA-6	G600	06-Sep-00	900410	LMB	4	320	473	0.34	
STA-6	G600	06-Sep-00	900411	LMB	1	318	487	0.28	
STA-6	G600	06-Sep-00	900412	LMB	1	322	474	0.23	
STA-6	G600	06-Sep-00	900413	LMB	1	285	386	0.17	
STA-6	G600	06-Sep-00	900414	LMB	1	286	344	0.25	
STA-6	G600	06-Sep-00	900415	LMB	1	267	216	0.3	
STA-6	G600	06-Sep-00	900416	LMB	1	245	200	0.15	
STA-6	G600	06-Sep-00	900417	LMB	1	245	214	0.16	
STA-6	G600	06-Sep-00	900418	LMB	1	253	213	0.22	
STA-6	G600	06-Sep-00	900165	RESU		223	223	0.2	A
STA-6	G600	06-Sep-00	900166	RESU		174	102	0.071	
STA-6	G600	06-Sep-00	900167	RESU		165	83	0.048	
STA-6	G600	06-Sep-00	900168	RESU		136	43	0.029	
STA-6	G600	06-Sep-00	900169	RESU		142	55	0.034	
STA-6	G606	06-Sep-00	900199	BLUE		162	64	0.097	

STA	Station	Date	Sample ID	Species name	Age	Length (cm)	Weight (g)	THg (mg/Kg)	Remark
STA-6	G606	06-Sep-00	900200	BLUE		160	50	0.095	
STA-6	G606	06-Sep-00	900201	BLUE		130	29	0.089	
STA-6	G606	06-Sep-00	900202	BLUE		131	39	0.083	
STA-6	G606	06-Sep-00	900203	BLUE		106	22	0.079	
STA-6	G606	06-Sep-00	900419	LMB	3	384	815	0.58	A
STA-6	G606	06-Sep-00	900420	LMB	2	341	604	0.55	
STA-6	G606	06-Sep-00	900421	LMB	2	315	431	0.52	
STA-6	G606	06-Sep-00	900422	LMB	2	310	397	0.42	
STA-6	G606	06-Sep-00	900423	LMB	4	325	439	0.77	
STA-6	G606	06-Sep-00	900424	LMB	2	316	449	0.47	
STA-6	G606	06-Sep-00	900425	LMB	2	331	489	0.39	
STA-6	G606	06-Sep-00	900426	LMB	2	356	531	0.42	
STA-6	G606	06-Sep-00	900427	LMB	2	304	359	0.44	
STA-6	G606	06-Sep-00	900428	LMB	2	300	359	0.49	
STA-6	G606	06-Sep-00	900429	LMB	3	309	391	0.67	
STA-6	G606	06-Sep-00	900430	LMB	2	311	385	0.59	
STA-6	G606	06-Sep-00	900431	LMB	2	298	342	0.55	
STA-6	G606	06-Sep-00	900432	LMB	1	262	241	0.4	
STA-6	G606	06-Sep-00	900433	LMB	1	261	241	0.36	
STA-6	G606	06-Sep-00	900434	LMB	3	278	267	0.66	
STA-6	G606	06-Sep-00	900435	LMB	1	255	212	0.38	
STA-6	G606	06-Sep-00	900436	LMB	1	245	194	0.44	
STA-6	G606	06-Sep-00	900437	LMB	1	252	193	0.32	
STA-6	G606	06-Sep-00	900438	LMB	1	238	175	0.38	
STA-6	G606	06-Sep-00	900185	RESU		246	296	0.18	A
STA-6	G606	06-Sep-00	900186	RESU		196	108	0.2	
STA-6	G606	06-Sep-00	900187	RESU		140	47	0.073	
STA-6	G606	06-Sep-00	900188	RESU		148	51	0.074	
STA-6	G606	06-Sep-00	900189	RESU		147	53	0.079	
STA-6	G606	06-Sep-00	900190	RESU		160	71	0.063	
STA-6	G606	06-Sep-00	900191	RESU		148	47	0.089	
STA-6	G606	06-Sep-00	900192	RESU		135	37	0.079	
STA-6	G606	06-Sep-00	900193	RESU		126	32	0.059	
STA-6	G606	06-Sep-00	900194	RESU		129	39	0.077	
STA-6	G606	06-Sep-00	900195	RESU		127	33	0.055	
STA-6	G606	06-Sep-00	900196	RESU		138	42	0.074	
STA-6	G606	06-Sep-00	900197	RESU		141	40	0.063	
STA-6	G606	06-Sep-00	900198	RESU		138	42	0.071	
STA-6	G606	06-Sep-00	900184	WAR		114	31	0.13	
STA-6	STA6C32	06-Sep-00	900204	BLUE		172	110	0.074	A
STA-6	STA6C32	06-Sep-00	900205	BLUE		151	58	0.064	
STA-6	STA6C32	06-Sep-00	900206	BLUE		139	54	0.095	
STA-6	STA6C32	06-Sep-00	900207	BLUE		145	57	0.071	
STA-6	STA6C32	06-Sep-00	900208	BLUE		174	112	0.11	
STA-6	STA6C32	06-Sep-00	900209	BLUE		151	63	0.15	
STA-6	STA6C32	06-Sep-00	900210	BLUE		135	48	0.087	
STA-6	STA6C32	06-Sep-00	900211	BLUE		137	46	0.11	
STA-6	STA6C32	06-Sep-00	900212	BLUE		129	36	0.065	

STA	Station	Date	Sample ID	Species name	Age	Length (cm)	Weight (g)	THg (mg/Kg)	Remark
STA-6	STA6C32	06-Sep-00	900213	BLUE		124	32	0.068	
STA-6	STA6C32	06-Sep-00	900385	LMB	2	354	638	0.78	A
STA-6	STA6C32	06-Sep-00	900386	LMB	4	471	1766	1.4	
STA-6	STA6C32	06-Sep-00	900387	LMB	2	365	737	0.48	
STA-6	STA6C32	06-Sep-00	900388	LMB	2	330	511	0.41	
STA-6	STA6C32	06-Sep-00	900389	LMB	3	365	689	0.87	
STA-6	STA6C32	06-Sep-00	900390	LMB	3	331	584	0.81	
STA-6	STA6C32	06-Sep-00	900391	LMB	2	310	484	0.54	
STA-6	STA6C32	06-Sep-00	900392	LMB	2	310	448	0.49	
STA-6	STA6C32	06-Sep-00	900393	LMB	1	304	418	0.29	
STA-6	STA6C32	06-Sep-00	900394	LMB	1	268	269	0.32	
STA-6	STA6C32	06-Sep-00	900395	LMB	1	259	229	0.32	
STA-6	STA6C32	06-Sep-00	900396	LMB	1	255	231	0.31	
STA-6	STA6C32	06-Sep-00	900397	LMB	1	230	165	0.29	
STA-6	STA6C32	06-Sep-00	900398	LMB	1	236	185	0.38	
STA-6	STA6C32	06-Sep-00	900214	RESU		177	98	0.2	
STA-6	STA6C32	06-Sep-00	900215	RESU		168	80	0.094	
STA-6	STA6C32	06-Sep-00	900216	RESU		172	87	0.072	
STA-6	STA6C32	06-Sep-00	900217	RESU		169	78	0.18	
STA-6	STA6C32	06-Sep-00	900218	RESU		157	69	0.078	
STA-6	STA6C32	06-Sep-00	900219	RESU		164	69	0.16	
STA-6	STA6C32	06-Sep-00	900220	RESU		164	75	0.071	
STA-6	STA6C32	06-Sep-00	900221	RESU		154	76	0.084	
STA-6	STA6C32	06-Sep-00	900222	RESU		162	72	0.066	
STA-6	STA6C32	06-Sep-00	900223	RESU		140	50	0.043	
STA-6	STA6C52	06-Sep-00	900234	BLUE		182	138	0.09	
STA-6	STA6C52	06-Sep-00	900235	BLUE		162	95	0.054	
STA-6	STA6C52	06-Sep-00	900236	BLUE		143	67	0.083	
STA-6	STA6C52	06-Sep-00	900237	BLUE		122	40	0.045	
STA-6	STA6C52	06-Sep-00	900238	BLUE		125	37	0.054	
STA-6	STA6C52	06-Sep-00	900239	BLUE		109	27	0.058	
STA-6	STA6C52	06-Sep-00	900240	BLUE		118	38	0.055	
STA-6	STA6C52	06-Sep-00	900241	BLUE		126	43	0.054	
STA-6	STA6C52	06-Sep-00	900242	BLUE		105	26	0.057	
STA-6	STA6C52	06-Sep-00	900224	RESU		160	88	0.069	
STA-6	STA6C52	06-Sep-00	900225	RESU		158	85	0.075	A
STA-6	STA6C52	06-Sep-00	900226	RESU		129	47	0.044	
STA-6	STA6C52	06-Sep-00	900227	RESU		163	90	0.054	
STA-6	STA6C52	06-Sep-00	900228	RESU		147	71	0.042	
STA-6	STA6C52	06-Sep-00	900229	RESU		147	69	0.048	
STA-6	STA6C52	06-Sep-00	900230	RESU		124	39	0.035	
STA-6	STA6C52	06-Sep-00	900231	RESU		134	48	0.052	
STA-6	STA6C52	06-Sep-00	900232	RESU		128	44	0.041	
STA-6	STA6C52	06-Sep-00	900233	RESU		114	32	0.039	
STA-6	STA6C52	06-Sep-00	900243	WAR		160	104	0.077	

LITERATURE CITED

Delfino, J.J., T.L. Crisman, J.F. Gottgens, B.R. Rood and C.D.A. Earle. 1993. Spatial and temporal distribution of mercury in Everglades and Okeefenokee wetland sediments. Final Project Report (April 1, 1991 through June 30, 1993) to South Florida Water Management District (Contract C91-2237), USGS (Contract 14-08-0001-G-2012) and Florida DER (Contract WM415).

Fink, L., D.G. Rumbold, and P. Rawlik. 1999. *The Everglades Mercury Problem.* Chapter 7 in Everglades Interim Report. Report to the Florida Legislature. South Florida Water Management District, West Palm Beach, FL.

Florida Govnernor's Mercury in Fish and Wildlife Task Force. 1991. Mercury Technical Committee (MTC) Interim Report.

FTN Associates. 1999. Everglades mercury baseline report for the Everglades Construction Project under Permit No. 199404532. Prepared for the South Florida Water Management District. West Palm Beach, FL.

Gilbert, R.O. 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold. New York, NY.

Hakanson, L. 1980. The quantification impact of pH, bioproduction and Hg-contamination on the Hg-content of fish (pike). Environ. Pollut. (Series B), 1:285-304.

Hurley, J.P., D.P. Krabbenhoft, L.B. Cleckner, M.L. Olson, G.R. Aiken and P.S. Rawlik, Jr. 1998. System controls on the aqueous distribution of mercury in the northern Florida Everglades. Biogeochemistry, 40:293-311.

Krabbenhoft, D.P., J.P. Hurley, M.L. Olson and L.B. Cleckner. 1998. Diel variability of mercury phase and species distributions in the Florida Everglades. Biogeochemistry, 40:311-325.

Lange, T.R., D.A. Richard and H.E. Royals. August 1998. Trophic Relationships of Mercury Bioaccumulation in Fish from the Florida Everglades. Annual Report. Florida Game and Fresh Water Fish Commission, Fisheries Research Laboratory, Eustis, FL. Prepared for the Florida Department of Environmental Protection, Tallahassee, FL.

Lange, T.R., D.A. Richard and H.E. Royals. April 1999. Trophic relationships of mercury bioaccumulation in fish from the Florida Everglades. Annual Report. Florida Game and Fresh Water Fish Commission, Fisheries Research Laboratory, Eustis, FL. Prepared for the Florida Department of Environmental Protection, Tallahassee, FL.

Lange, T.R., D.A. Richard and H.E. Royals. 2000. Long-term trends of mercury bioaccumulation in Florida's largemouth bass. Abstract from the Annual All-Investigators' Meeting: South Florida Mercury Science Program, May 9 through 11, 2000. Palm Harbor, FL.

Loftus, W.F., J.C. Trexler and R.D. Jones. December 1998. Mercury transfer through Everglades aquatic food web. Final report to the Florida Department of Environmental Protection. Tallahassee, FL.

Pollman, C.D. and T.D. Atkeson. 2000. Long-term trends in mercury atmospheric inputs and deposition in South Florida. Abstract from the Annual All-Investigators' Meeting: South Florida Mercury Science Program, May 9 through 11, 2000. Palm Harbor, FL.

Rawlik, P. 2001. Mercury concentrations in mosquitofish from treatment wetlands in the northern Everglades. Appendix 7-15 in 2001 Everglades Consolidated Report. South Florida Water Management District, West Palm Beach, FL.

Rumbold, D.G. 2000. Methylmercury risk to Everglades wading birds: a probabilistic ecological risk assessment. Appendix 7.3b in 2000 Everglades Consolidated Report. South Florida Water Management District, West Palm Beach, FL.

Rumbold, D.G. and P. Rawlik. January 2000. Annual permit compliance monitoring report for mercury in stormwater treatment areas and downstream receiving waters. Appendix 7-2 in 2000 Everglades Consolidated Report. South Florida Water Management District, West Palm Beach, FL.

Rumbold, D.G., L. Fink, K. Laine, F. Matson, S. Niemczyk and P. Rawlik (2001a). Annual permit compliance monitoring report for mercury in Stormwater Treatment Areas and downstream receiving waters of the Everglades Protection Area. Appendix 7-9 in 2001 Everglades Consolidated Report. South Florida Water Management District, West Palm Beach, FL.

Rumbold, D.G., L. Fink, K. Laine, F. Matson, S. Niemczyk and P. Rawlik (2001b) Stormwater Treatment Area 6 Follow-up Mercury Studies. Appendix 7-13 in 2001 Everglades Consolidated Report. South Florida Water Management District, West Palm Beach, FL.

South Florida Water Management District. 1997a. Operation plan: Stormwater Treatment Area No. 6, Section 1. South Florida Water Management District, West Palm Beach, FL.

South Florida Water Management District. 1997b. Everglades Nutrient Removal Project: 1996 Monitoring Report. South Florida Water Management, Prepared for the Florida Department of Environmental Protection, Tallahassee, FL.

South Florida Water Management District. 1998a. Operation Plan: Stormwater Treatment Area 5. Draft. South Florida Water Management District, West Palm Beach, FL.

South Florida Water Management District. 1998b. Operation Plan: Stormwater Treatment Area 1 West. Draft. South Florida Water Management District, West Palm Beach, FL.

South Florida Water Management District. 1998c. Annual permit compliance monitoring report for mercury in stormwater treatment areas and downstream receiving waters. . South Florida Water Management, Prepared for the Florida Department of Environmental Protection, Tallahassee, FL.

South Florida Water Management District. 1999a. Operation Plan: Stormwater Treatment Area 2. Revision 1.0. South Florida Water Management District, West Palm Beach, FL.

South Florida Water Management District. 1999b. Everglades Nutrient Removal Project: 1998 Monitoring Report. South Florida Water Management, Prepared for the Florida Department of Environmental Protection, Tallahassee, FL.

South Florida Water Management District. 1999c. Stormwater Treatment Area 6, Section 1 Annual monitoring report. South Florida Water Management, Prepared for the Florida Department of Environmental Protection, Tallahassee, FL.

USEPA. 1998. South Florida Ecosystem Assessment. Volume 1. Final Technical Report. Phase I. Monitoring for adaptive management: implications for ecosystem restoration. Region 4 and Office of Research and Development. Athens, GA. EPA-904-R-98-002.

Ware, F.J., H. Royals and T. Lange. 1990. Mercury contamination in Florida largemouth bass. Proc. Ann. Conf. Southeast Assoc. Fish Wildl. Agencies, 44:5-12.

Watras, C. October 1993. Potential impact of the Everglades Nutrient Removal Project on the Everglades mercury problem. (EV 930034). Unpublished report prepared for the South Florida Management District. University of Wisconsin, Madison, WI.

Wren, C.D. and H.R. MacCrimmon. 1986. Comparative bioaccumulation of mercury in two adjacent freshwater ecosystems. Water Research, 20:763-769.

Zar, J.H. 1996. Biostatistical analysis (3rd edition). Prentice-Hall, NJ.