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

Darren Rumbold and Larry Fink

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, 2001 through April 30, 2002. 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 Water Quality Standard (WQS) of 12 ng total mercury (THg)/L. As such, 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, continued to have only low concentrations of methylmercury (MeHg) in surface water, consistently showed negative percent change across the STA, and exhibited greatly reduced MeHg bioaccumulation in resident fish relative to other STAs and Everglades areas.
3. After four years of operation, STA-6 continued to exhibit fluctuations in Hg species in water and Hg levels in resident fish. Following a drydown and rewetting event during the second quarter of 2001, concentrations of THg and MeHg in the unfiltered surface water spiked at STA-6 outflows, reaching 7.0 ng THg /L and 3.4 ng MeHg/L. While a scoping-level assessment found THg loads out of STA-6 to be similar to or less than inflow loads (including atmospheric deposition), loads of MeHg out of the STA were found to exceed inflow loads by 2 to 7 grams. A more intensive follow-up study is planned to more accurately quantify annual average MeHg export. Resident fishes continued to exhibit a positive percent change in Hg across STA-6; however, there was no evidence that the spike in water column MeHg was followed by significant increases in mercury bioaccumulation over baseline. While levels of Hg in STA-6 fishes have fluctuated near baseline and are similar to or lower than levels found in fish from other Everglades areas, fish-eating wildlife feeding preferentially at STA-6 face some risk of adverse chronic effects from mercury exposure based on United States Fish and Wildlife Service (USFWS) and United States Environmental Protection Agency (USEPA) criteria.
4. Concentrations of THg and MeHg in sediment cores collected from STA-5 in 2001 remained at baseline levels observed in cores collected in 1998 and continued to be within the expected

range for Everglades soils. During the reporting year, THg and MeHg concentrations in surface water generally exhibited a negative percent change across STA-5. Further, levels of Hg in mosquitofish from the interior marshes of STA-5 declined from peak levels observed during the second semiannual collection in 2000 and contained roughly 50 percent less Hg than fish from the inflows or outflows. Alternatively, while concentrations of Hg declined over the last three years in sunfish inhabiting the supply canal, levels increased in fish from the interior and the discharge canal in 2000 and remained elevated in 2001 relative to 1999. There is also some evidence suggesting that levels of Hg have increased slightly in largemouth bass in the discharge canal during the monitoring period. Finally, the expected mean concentration of Hg in three-year-old bass from the interior of STA-5 reached 801 ±147 ng/g in 2001, which exceeds the state's limited-consumption advisory for human health of 500 ng/g wet weight muscle (0.5 mg/Kg or 0.5 ppm).

INTRODUCTION

This is the fifth annual permit compliance monitoring report for mercury in STAs. This report summarizes the mercury-related reporting requirements of the U.S. Army Corps of Engineers (USACE) Section 404 Dredge and Fill permit (permit No. 199404532), the Florida Department of Environmental Protection (Department or FDEP) National Pollution Discharge Elimination System (NPDES) permit (FL0177962-001), and FDEP Everglades Forever Act permits (EFA-Ch. 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 water year ending April 30, 2002. The results of mercury monitoring at sites downstream of the STAs (non-Everglades Construction Project [non-ECP] discharge structures and marshes) will be reported separately in **Appendix 2B-3**.

This report consists of key findings and an overall assessment, an Introduction, a Background, a 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. The section also includes site descriptions and maps of each STA currently being monitored (in the order in which they became operational). The following section summarizes sampling and reporting requirements of the Mercury Monitoring Program within the STAs. Monitoring results are summarized and discussed in two subsections: (1) results from pre-operational monitoring, and (2) results from STA operational monitoring. Recent results from the Mercury Monitoring and Reporting 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 seven STAs totaling about 50,000 acres of constructed wetlands. The downstream receiving waters to be restored and protected by the ECP include the South Florida Water Management District's (SFWMD's or 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 (ENP or Park).

The problem form of mercury in aquatic ecosystems is an organic form called methylmercury, produced by natural bacteria living in sediments from the inorganic form of mercury in storm runoff, rain, and peat soils under conditions devoid of dissolved oxygen. Methylmercury is a persistent, bioaccumulative, toxic pollutant that can build up in the food chain to levels harmful to humans, fish-eating wildlife and their predators. Widespread, elevated concentrations of mercury were first discovered in freshwater fish from the Florida Everglades in 1989 (Ware et al., 1990). In the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) and the Big Cypress National Preserve, the average concentration in age class three-year largemouth bass flesh exceeded the state's advisory threshold of 0.5 parts per million (ppm) for limited fish consumption but were less than the state's no-consumption advisory threshold of 1.5 ppm; the remainder of the Everglades exceeded the no-consumption threshold. Consequently, in March 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 were also found in predators, such as raccoons, alligators, Florida panthers and wading birds (see Fink et al., 1999).

To provide assurance that the ECP is not exacerbating the mercury problem, the District monitors concentrations of 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 methylmercury over space and time. While surface water concentrations can fluctuate daily, per event, and seasonally, mosquitofish are a short-lived species that can be used to monitor short-term changes in environmental concentrations of mercury through time. Sunfish and largemouth bass, on the other hand, are long-lived species and represent average conditions that have occurred over a number of years. Finally, the mercury concentration in aquatic biota is a true measure of MeHg bioavailability and results in a better indication of possible mercury exposure to fish-eating wildlife than the concentration of methylmercury 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, with an area of 252 ha, and cell 3, with an area of 99 ha) that are 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 stormwater 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 an existing pump station, G-600, that continues to be under USSC operation. Water flows from the supply canal to the treatment cells via supply canal 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, B, and C for cell 5; G-393 A, B, and 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 then enters the discharge canal, which gravity discharges to the L-4 borrow canal via six culverts, which are confluent to G-607. The L-4 borrow canal conveys flows eastward to the S-8 pump station, which discharges into Water Conservation Area 3-A. On 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.

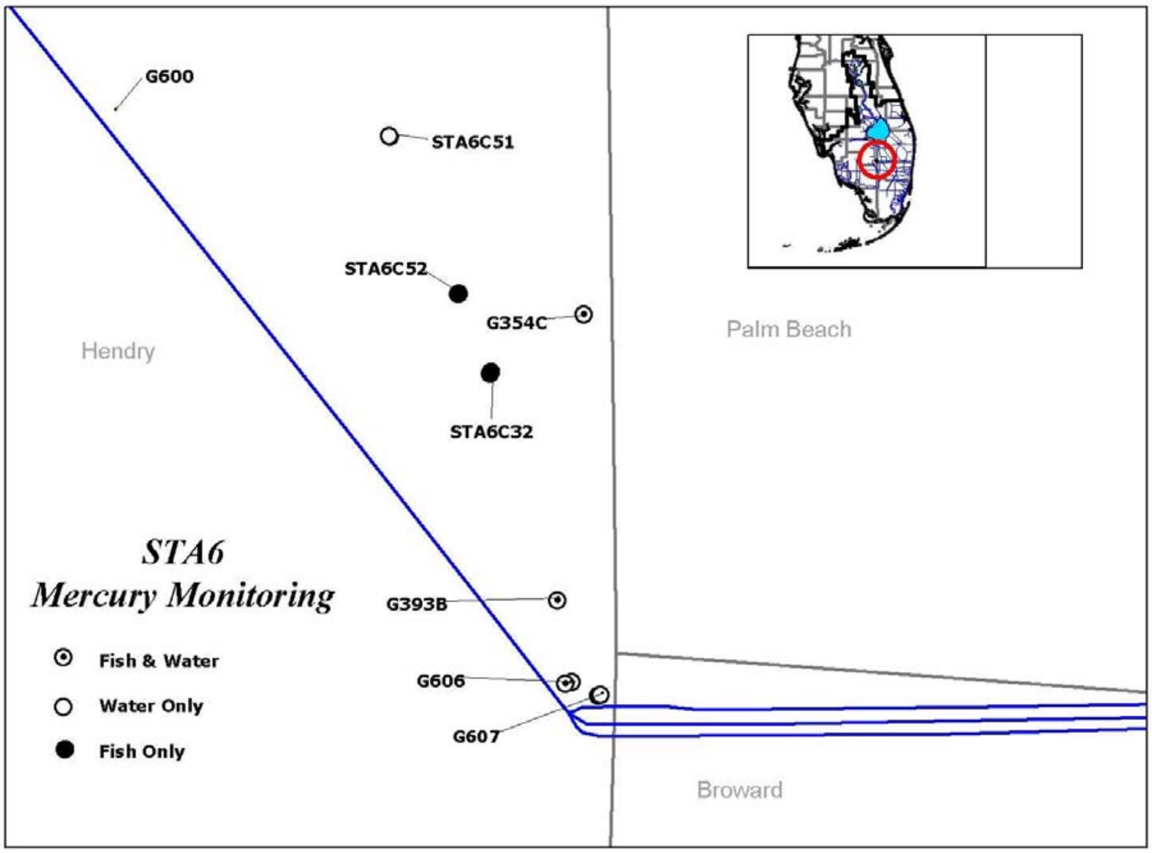

Figure 1. STA-6 mercury monitoring sites

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 gravity-flows into the two treatment cells through four gated supply canal culverts (G-342A, G-342B, G-342C, and G-342D). Water then continues 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 then gravity flows through four discharge structures (G-344A and B for treatment cell 1, and G-344C and D for treatment cell 2) and then discharges 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 is used to supplement the natural accumulation of water via rainwater on an as-needed basis.

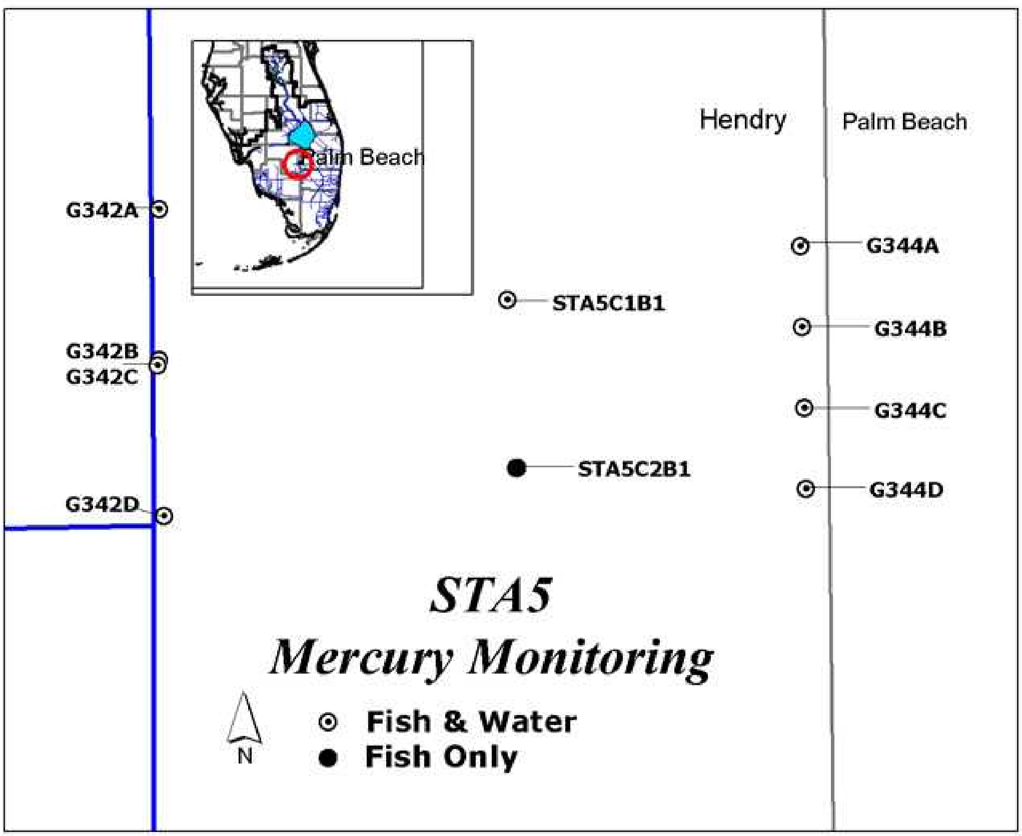

Figure 2. STA-5 monitoring sites

STA-1 WEST

STA-1 West is located in western Palm Beach County, northwest of the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge or WCA-1). 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 supply canal and distribution works gated weir structure G-302. Flows will travel in a southwesterly direction via the supply 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 and into the discharge canal. This discharge is then 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, existing pump station G-251, and, under some conditions (when ENR Project outflows exceed the 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.

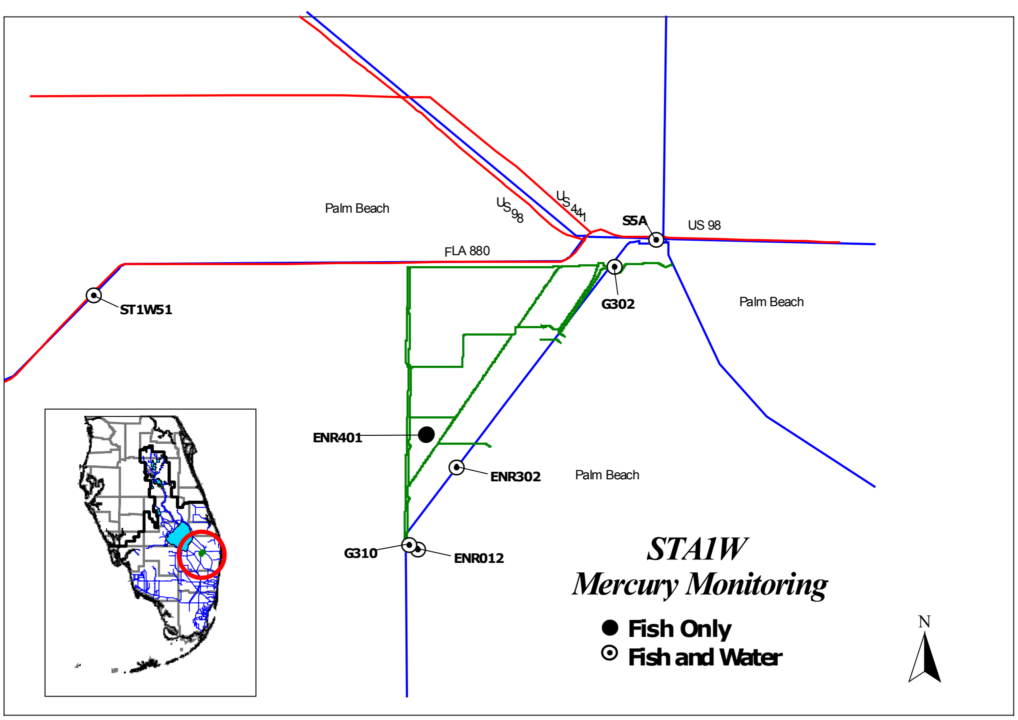

Figure 3. STA-1W monitoring sites

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). STA-2 is intended to treat discharges from the S-6/S-2 basin, the S-5A basin, the 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 supply canal pumping station, with G-328 serving as both an irrigation and “secondary” supply canal source from and to the STA supply canal (**Figure 4**). G-328 serves an approximated 9,980 acres of adjacent agricultural lands. Discharges from the supply canal are then conveyed southward to the Supply Canal, which extends across the northern perimeter. A series of supply canal culverts will then convey flows from the supply 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 the 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 will travel north, and then east into WCA-2A through six box culverts (each with a capacity of 300 cfs, invert at 12 ft) located east of G-339 about three miles south of 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 ft, 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 of approximately 12 ft, allowing water to sheetflow into WCA-2A. Here again, the area to receive discharge was previously identified as a nutrient-impacted area.

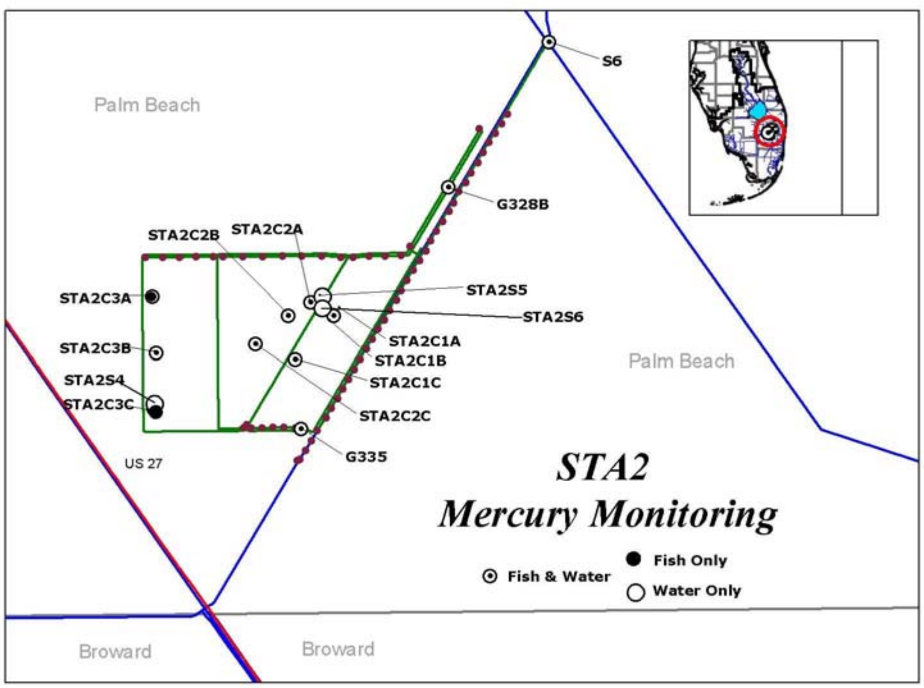

Figure 4. STA-2 monitoring sites

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 (FDEP), the U.S. Environmental Protection Agency (USEPA), and the U.S. Army Corps of Engineers (USACE) 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 on issuance of the permit by the 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 pre-operational soils of each of the STAs and various compartments (media) of the downstream receiving waters define the baseline condition from which to evaluate 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 of the relevant mercury studies conducted in the Everglades through July 1997, during the construction, 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 USEPA and the U.S. Geological Survey (USGS) 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 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 supply canal and interior water for analysis for THg and MeHg concentrations. When concentrations at the interior sites are found not to be significantly greater than that of the supply canal, this information is reported to the permit-issuing authority, and the biweekly sampling can be discontinued. Discharge begins after all the startup criteria are met.

This is followed by a stabilization period for both 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 supply canal 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 supply canal on an annual basis. The stabilization period ends when the 12-month moving, flow-weighted average total phosphorous (TP) concentration in the outflow is less than 50 ppb. Most of the STAs complete this stabilization period within two years of initiation of flow-through operation.

OPERATIONAL MONITORING

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

Water: Quarterly, 500-ml unfiltered grab samples of water will be collected in pre-cleaned bottles using ultra-clean technique at the supply canals and outflows of each STA and will be analyzed for MeHg and THg (includes the sum of all mercury species in sample, e.g., Hg^0, Hg^I, and 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 supply canal.

Sediment: Triennially, sediment cores will be collected from 0-to-10 cm depth at six representative interior sites. Each depth-homogenized core will then be analyzed for THg and MeHg.

Prey fish: Semi-annually, a grab sample of between 100 and 250 mosquitofish (*Gambusia* sp.) will be collected using a dipnet at the supply canal sites, interior sites, and outflow sites of each STA. Individuals will be composited from each size and the homogenate subsampled in quintuplicate. Each subsample is then to be analyzed for THg. On March 5, 2002 the FDEP approved a reduction in the number of replicate analyses of the homogenate from five to three (correspondence from F. Nearhoof, FDEP).

Top predator fish: Annually, 20 largemouth bass will be collected primarily via electroshocking methods at representative supply canal and discharge canal sites and representative interior sites in each STA. The fish muscle (fillet) will be analyzed for THg as an indicator of potential human exposure to mercury.

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 USFWS recommendation (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 the monitoring program tracking mercury in wading birds in downstream areas, see **Appendix 2B-3** of the *2003 Everglades Consolidated Report*). The addition of sunfish to the compliance monitoring program was approved by the FDEP on March 5, 2002 (correspondence from F. Nearhoof, FDEP).

It is important to note that virtually all (> 85 percent) of the mercury in fish tissues is in the methylated form (Grieb et al., 1990; Bloom, 1992; SFWMD, unpublished data). Therefore, the analysis of fish tissue for THg, which is a more straightforward and less-costly procedure than for MeHg, can be interpreted as being equivalent to the analysis of MeHg. Further details regarding rationales for sampling scheme, procedures, and data reporting requirements are set forth in the Everglades Mercury Monitoring Plan revised in 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, see **Appendix 2B-3**.

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 the confounding influences of age or species of collected animals, or changes in range associated with changes in environmental conditions (e.g., marsh hydroperiod). For comparison, 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 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; see Lange et al., 1999 and references therein). To adjust for the month of collection, otolith ages were first converted to decimal age using protocols developed by Lange et al., (1999). Sunfish were not aged. Consequently, age normalization was not available. Instead, arithmetic means were reported. However, efforts were made to estimate a least square mean (LSM) Hg concentration based on the weight of the fish. Additionally, the distribution of the different species of *Lepomis* (warmouth, *L. gulosus*; spotted sunfish, *L. punctatus*; bluegill, *L. macrochirus*; red ear sunfish, *L. microlophus*) collected during electroshocking was also considered 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:

1. That regressions are simple linear functions
2. That regressions are statistically significant (i.e., non-zero slopes)
3. That the covariate is a random, fixed variable
4. That both the dependent variable and residuals are independent and normally distributed
5. That slopes of regressions are homogeneous (parallel)

Regressions also require that collected samples exhibit a relatively wide range of covariate, that is, that 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, Calif.) 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. Datasets that either lacked homogeneity of variance or departed from normal distribution were natural-log transformed and re-analyzed. If transformed data met the assumptions, they were used in ANOVA. If they did not meet the assumptions, then raw data sets were evaluated using non-parametric tests, such as the Kruskal-Wallis ANOVA on ranks or the Mann-Whitney Rank sum test. If the multi-group null hypothesis was rejected, groups were compared using either Tukey HSD or Dunn's method.

MONITORING RESULTS

PRE-OPERATIONAL 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 Everglades Consolidated Report (Rumbold et al., 2001), STA-5 met startup criteria for mercury in September 1999.

STA-1W

As reported in last year's Everglades Consolidated Report (Rumbold et al., 2001), 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

STA-2 cells 3 and 2 met both mercury startup criteria on September 26, 2000 and November 9, 2000, respectively. Cell 1 still has not met the startup criteria as of this writing. See **Appendix 4A-7** for results of startup mercury monitoring of STA-2, including results from an expanded sampling program.

OPERATIONAL MONITORING

STA-6

Routine monitoring of mercury at STA-6 began in the first quarter of 1998. Results of monitoring prior to April 30, 2001 have been reported previously (SFWMD 1998c; 1999c; Rumbold and Rawlik, 2000; Rumbold et al., 2001a; Rumbold and Fink, 2002).

As is evident from data shown in **Tables 1** and **2**, which are graphically presented in **Figure 5**, concentrations of THg and MeHg spiked in STA-6 outflows during the second quarter of 2001. On June 20, 2001 the day of sample collection, the concentration of THg and MeHg reached 7.0 ng/L and 3.4 ng/L, respectively, at the outflow culvert of cell 3. As discussed in earlier reports (Rumbold et al., 2001a), proper interpretation of these data must consider hydrologic factors that can affect net MeHg production. From late May through early June 2001, STA-6 had experienced a drydown for at least 27 days in cell 3 and for at least 31 days in cell 5. The STA was then reflooded after receiving 5.3 inches of rain that fell in the area from May 31 to June 20.

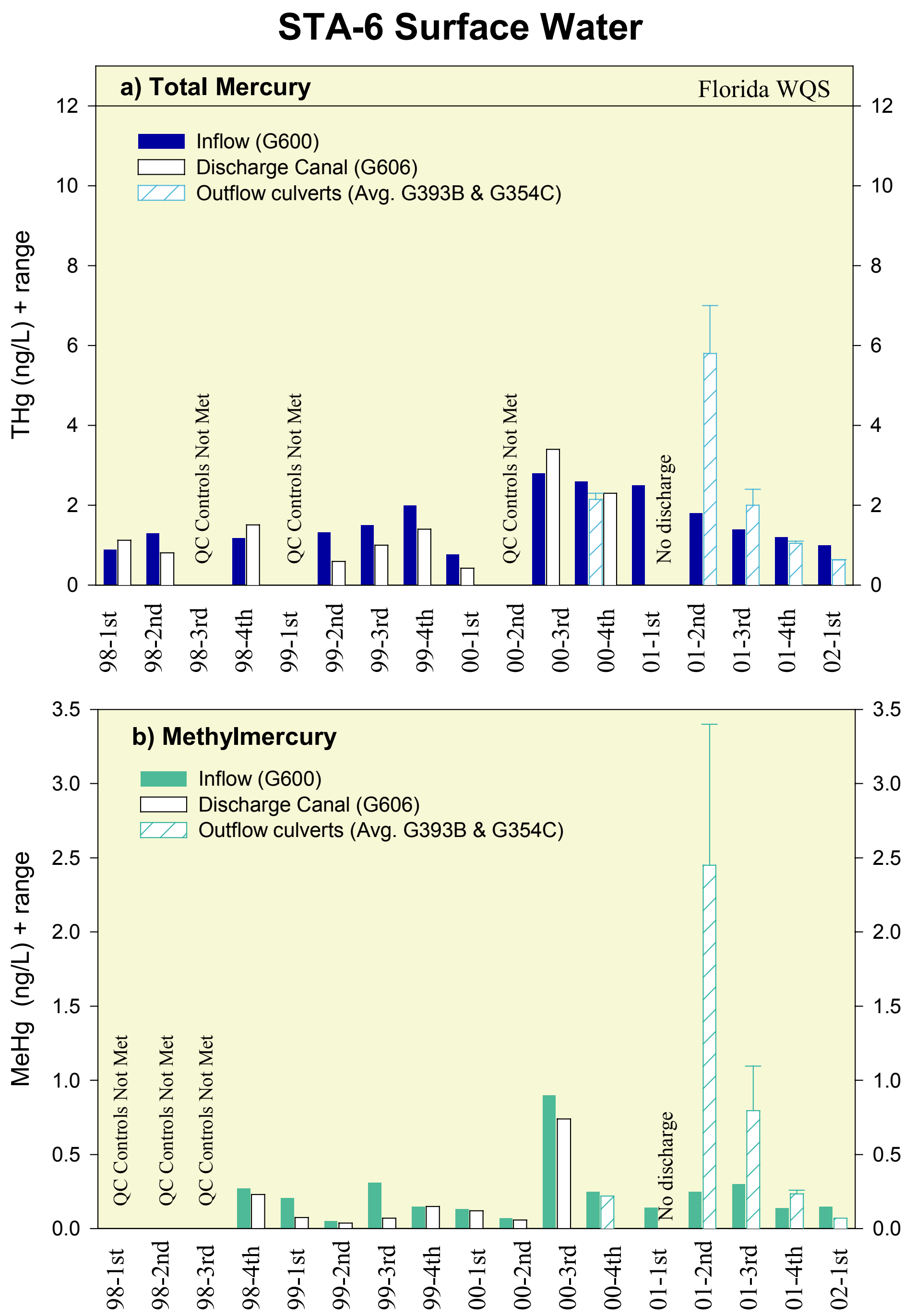

Figure 5. Concentration of (a) total mercury and (b) methylmercury in unfiltered surface water collected at STA-6

This sequence of events (drydown and reflooding with direct rainfall, which contains elevated levels of bioavailable inorganic mercury) likely contributed to the observed spike in both THg and MeHg (for details on the effect of drydown and oxidation on sediment mercury biogeochemistry and MeHg production, see Krabbenhoft and Fink, 2001). It is noteworthy that the concentration of THg declined to typical levels by the next quarter. MeHg also declined, albeit more slowly (**Figure 5**). By the first quarter of 2002, both THg and MeHg exhibited a negative percent change across the STA (**Table 1**). At no time during the reporting year did THg concentration exceed the Class III Water Quality Standard of 12 ng/L.

To conserve resources, the mercury monitoring plan for STA-6 was designed to provide information to assist in monitoring inflow versus outflow concentrations and bioaccumulation in fishes and to evaluate compliance with state water quality standards. It was not designed to provide the level of detail necessary to complete a mass balance. This type of analysis is very costly and requires measurements of all flows, fluxes, and storages, including local atmospheric deposition (wet and dry), evasion back to the atmosphere, groundwater flux, burial, storage in biomass, etc. Nevertheless, to bound the magnitude of the loads to and from the STA, a scoping-level assessment was carried out using the available data for the third and fourth quarters. (Because it would have required linear interpolation over a six-month period, loads were not calculated for the second quarter 2001; data were also not available for the second quarter of 2002 to allow for interpolation of surface water concentrations).

The results of this scoping-level assessment suggest that during the third quarter, inflow load of THg was 31 g, compared to an outflow load of 33 g (**Table 3**). When estimates of atmospheric loading of THg to the STA are considered (**Table 3**), it is easy to account for a gain and export of 2 g of THg from the STA (based on measurements at the Mercury Deposition Network station located at the ENR Project). During the fourth quarter, loading at the inflow pump of STA-6 was 28 g, whereas outflow load was only 19 g. Thus, even when ignoring the input of wet (Guentzel, 1997) and dry (USEPA, 1997) atmospheric deposition, the STA did not export, and likely stored, a significant quantity of inorganic mercury; though some of the apparent storage may have been lost to open-water or plant-mediated evasion of elemental mercury (Lindberg and Meyers, 1999). More importantly, the scoping-level assessment suggests that during the third quarter, which was bracketed by spikes in water column MeHg concentration (**Figure 5**), the inflow load of MeHg was 6 g, whereas the outflow load was 13 g. While atmospheric loading is considered the most significant source of inorganic mercury, it is generally thought to be minimal in terms of MeHg (**Table 3**, again based on MDN located at the ENR Project. T. Atkeson, personal communication). Therefore, it is difficult to account for the gain in MeHg unless there is substantial conversion of inorganic Hg to MeHg within the STA. While the outflow load of MeHg was much reduced during the fourth quarter, it was again greater than inflow load (**Table 3**). This is in sharp contrast to what was previously observed at the ENR Project, which was estimated to have a 68-percent removal efficiency for MeHg in the period 1995 through 1998 (Fink, 2000). To reduce uncertainties and improve load estimates, expanded mercury monitoring, including biweekly sample collection, has been proposed for STA-6. This will reduce the period over which concentrations must be interpolated and will also reduce load error associated with concentration error.

Table 1. 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**	01-2	1.80		5.80		<WQS	0.25		2.45		14%	41%
	01-3	1.40		2.00		<WQS	0.30		0.80		21%	38%
	01-4	1.20		1.05		<WQS	0.14		0.24		12%	22%
	02-1	1.0		0.63		<WQS	0.15		0.07		15%	12%
STA 5‡	01-2	2.50		2.10		<WQS	0.74		0.49		31%	22%
	01-3	2.93		1.52		<WQS	0.52		0.20		18%	11%
	01-4	1.09		0.95		<WQS	0.17		0.23		16%	24%
	02-1	1.09		0.48		<WQS	0.16		0.09		14%	21%
STA1W[§]	01-2	2.6	J5	1.3	J5	<WQS	0.10		0.06		NC	NC
	01-3	3.50		1.17		<WQS	0.46		0.18		13%	16%
	01-4	1.20		0.86		<WQS	0.25		0.12		21%	14%
	02-1	1.40		1.08		<WQS	0.21		0.10		15%	10%

* 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.

** Outflow sampling site for STA 6 was moved from G606 to G354C and G393B culverts and, thus, reported values represent mean.

¶ "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 valic data (unqualified).

Table 2. Percent change in concentration of THg and MeHg in surface water across STAs (i.e., outflow-inflow/inflow)

STA	Quarter	THg	MeHg
STA 6	01-2	222%	880%
	01-3	43%	167%
	01-4	-13%	71%
	02-1	-37%	-53%
Annual average		54%	266%
Cumulative average		6%	64%
STA 5	01-2	-16%	-34%
	01-3	-48%	-62%
	01-4	-13%	35%
	02-1	-56%	-44%
Annual average		-33%	-26%
Cumulative average		4%	13%
STA1W	01-2	NC	-40%
	01-3	-67%	-61%
	01-4	-28%	-52%
	02-1	-23%	-52%
Annual average		-39%	-51%
Cumulative average		-34%	-7%

** Only valid (unqualified) data used in calculations; see Table A4-1.2 for raw data and qualifiers.

Table 3. Scoping-level assessment of THg and MeHg loads at STA-6

Constituent	Quart	Inflow load (g)	Flow-wt Inflow Conc. (ng/L)	Rainfall deposition (g)	Outflow load (g)			Flow-wt Outflow Conc.(ng/L)
					Cell 5	Cell 3	Total	
THg	3rd	31	1.48	23.0	16	17	33	2.62
	4th	28	1.27	7.7	11	8	19	1.46
MeHg	3rd	6	0.28	0.87	5	8	13	1.02
	4th	4	0.20	0.13	3	3	6	0.47

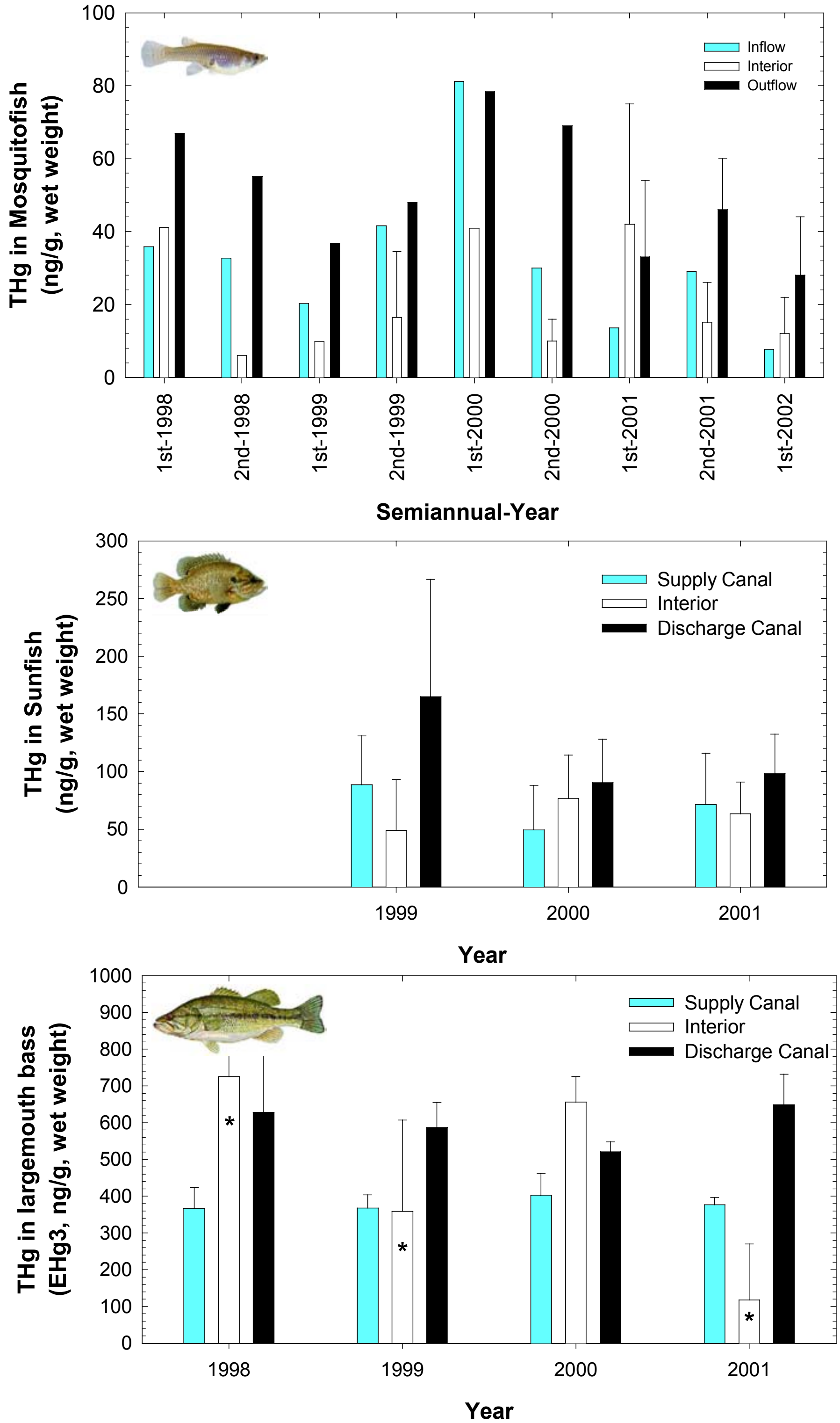

Figure 6. Mercury concentrations in (a) mosquitofish composites; (b) whole sunfish; and (c) fillets of largemouth bass collected at STA-6. Note: The latter are reported as the expected concentration in a three-year-old fish, EHg3, unless this could not be calculated (*, for details, see Table 5), in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

Levels of mercury in mosquitofish have continued to decline from a peak concentration that occurred in fish collected during the first semiannual event in 2000 (**Figure 6**). This is particularly noteworthy given the spike in MeHg that occurred in surface water during the second quarter of 2001. As is evident from **Figure 6**, there was no evidence that the spike in water column MeHg was followed by significant increases in mercury bioaccumulation at any trophic level.

As was discussed in the *2002 Everglades Consolidated Report*, the outflow collection site was moved in early 2001 from G-606 to G-393B and G-354C. As is evident from the range bars shown in **Figure 6**, mosquitofish from the two outflow culverts differed substantially in THg concentrations. Mosquitofish collected at the outflow of cell 5 (G-345C) continued to have lower concentrations of THg compared to fish from the outflow of cell 3 (G-393B). This difference was consistent with mosquitofish collected from the interior of each cell. That is to say, levels were lower in fish from the interior of cell 5. (For a review of between-cell differences in STA-6, see Rumbold et al., 2001b). Based largely on levels in fish from the cell 3 outflow culvert, mosquitofish continued to exhibit a positive percent change in THg across the STA (**Table 4**).

Similar to mosquitofish, visual inspection of the data presented in **Figure 6** suggests that sunfish from the STA-6 discharge canal consistently had greater concentrations of Hg than fish from the supply canal. In 2001 this difference was statistically significant ($H = 18.1$, df =3, $p < 0.001$; Dunn's *post hoc* test $p < 0.05$). Sunfish, therefore, exhibited a positive percent change in Hg across the STA (**Table 5**). Sunfish from the discharge canal also contained greater Hg levels than fish from cell 5 (Dunn's *post hoc* test, $p < 0.05$), but did not differ from fish from cell 3 ($p > 0.05$). It is important to note that neither location-related differences in total length, which were not significant (ANOVA; df = 3, 62; $F = 2.3$; $p = 0.08$), nor species composition of sampled fish appeared to be sufficient to account for spatial patterns in Hg burdens in sunfish. Visual inspection of the data presented in **Figure 6** also suggests that Hg in sunfish from the STA-6 discharge canal has declined since 1999. However, the size of these fish has also declined from 1999, and this may account for the apparent declines in Hg burdens.

Results from operational monitoring of mercury concentrations in largemouth bass from STA-6 are summarized in **Table 6** and are graphically displayed in **Figure 6** (values for individual fish are provided in **Table A1** at the end of this appendix, to be added later). Similar to mosquitofish and sunfish, largemouth bass collected over the last four years from STA-6's discharge canal contained greater tissue mercury concentrations than fish from the supply canal (i.e., positive percent change; **Table 6** and **Figure 6**). Previously, this difference in Hg concentration has been shown to be significant by ANCOVA, which can partition the effects of differences in age. In 2001, Hg concentrations in fish collected from the two canals also differed significantly (ANCOVA; df = 1, 37; $F = 28.31$; $p < 0.001$). 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 the supply canal or discharge canal.

In terms of temporal trends, as reported last year (Rumbold and Fink, 2002), Hg in bass collected from the discharge canal had declined since 1998 (ANCOVA, df = 1,37; $F = 8.8$; $p = 0.005$). In 2001, Hg in bass from the discharge canal increased and were no longer significantly different from 1998 values (df = 1,37; $F = 0.03$; $p = 0.86$) and, thus, the trend of decreasing Hg was reversed.

Table 4. Concentration of total mercury (THg) in mosquitofish composites collected semi-annually from STAs (units ng/g wet weight)

STA	Half-year	Inflow fish	Interior fish	Outflow fish	Percent change
STA 6	2001-2	29	15 ±11	46 ±14	59%
	2002-1	8	12 ±10	28 ±16	250%
Annual mean		18	14	37	106%
Cumulative mean		32 ±21	21 ±15	51 ±17	59%
STA 5	2001-2	40 ±3	15 ±2	49 ±28	23%
	2002-1	36 ±5	16 ±10	32 ±14	-11%
Annual mean		38	16	41	8%
Cumulative mean		39 ±4	38 ±32	38 ±16	-3%
STA 1W	2001-2	23	14 ±18	11 ±5	-52%
	2002-1	10	7 ±7	5 ±0.1	-50%
Annual mean		16	10	8	-50%
Cumulative mean		21 ±8	16 ±6	16 ±12	-24%

* Mosquitofish are collected semi-annually at inflow, interior and outflow sites.

1 - Standard deviation is reported where multiple composites are collected from location (e.g., multiple inflows or outflows, multiple cells); range is reported where two sites are sampled; other values represent mean of five analyses of a single composite sample.

Note: per FDEP approval (March 5, 2002), the number of aliquots was reduced from 5 to 3.

Note: per FDEP approval (March 5, 2002), collection locations were reduced from 4 to 2 for both the inflow and outflow of STA 5.

2 - Percent change = outflow-inflow / inflow

Table 5. Concentration of total mercury (THg, ng/g wet weight) in sunfish (*Lepomis* spp.) collected from STAs in 2001 (sample size in parentheses)

STA	Inflow fish	Interior fish	Outflow fish	Percent Change[a]
STA 6	72 ±44 (20)	63 ±27.5(26[b])	98 ±34(20)	36%
Cumulative mean[c]	70 ±44(59)	66 ±38(88)	118 ±73(60)	69%
STA 5	63 ±22(20)	150 ±66(39 [b])	116 ±44(20)	84%
Cumulative mean[c]	82 ±46 (61)	113 ±107 (120)	104 ±67(53)	27%
STA 1W	31 ±17 (20)	16 ±17 (46 [b])	39 ±26 (39 [b])	26%
Cumulative mean[c]	42 ±22 (58)	25 ±29 (155)	30 ±21 (99)	-29%

a. Percent change = outflow-inflow / inflow
b. Where n > 20; multiple sites were sampled and pooled, i.e., multiple interior or outflows.
c. Sunfish collected in 1999, prior to permit revision or STA operation (in the case of STAs 5 and 1W) were included in the cumulative average.

Table 6. Standardized, EHg3 ± 95%, and arithmetic mean concentration (mean ± 1SD, n; in parentheses) of total mercury (ng/g, wet weight) in fillets from largemouth bass collected at STAs in 2001

STA	Inflow fish	Interior fish	Outflow fish	Percent change[2]	Consumption advisory exceeded
STA-6	377 ±19 (253 ±91, 20)	NC (2) (118 ±152, 9)	649 ±83 (585 ±247, 20)	72%	Yes
Cumulative mean	378(a)	516(b)	596(a)	58%	
STA-5	NC (2) (290 ±130, 20)	801 ±147 (489 ±197, 401)	NC (1) (475 ±133, 20)	64%	Yes
Cumulative mean*	294(b)	403(b)	440(b)	50%	
STA-1W	NC (1) (371 ±156, 20)	77 ±24 (61 ±51, 201)	NC (1) (118 ±73, 261)	-68%	No
Cumulative mean*	279(b)	79(b)	91(b)	-67%	

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

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

2 - 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 was not significantly different from 0, or (2) poor age distribution of collected fish.

While **Figure 6** shows substantial variability in Hg levels in interior fish, this was a function of sampling location. In 2001, bass were collected only from cell 5 and, because of known between-cell differences, must be compared only to the three bass collected from cell 5 in 1999. In 1999, the bass had an average age of 2.8 years, whereas in 2001 bass were just 1.1 years old, indicating that the observed decrease in concentrations was likely age-related. More importantly, the apparent decline from 2000 to 2001 in Hg concentration in interior fish was likely a between-cell difference.

Levels of mercury in fish tissues can also be put into perspective and evaluated with regard to a 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) 3 and 4 fish, respectively, for the protection of piscivorous avian and mammalian wildlife (USEPA, 1997). STA-6 mosquitofish collected during the reporting year, 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 EPA criteria but, on average, 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), bass in the discharge canal of STA-6 exceeded the USEPA's guidance value for TL 4 fish. Alternatively, bass inhabiting the marsh of Cell 5 did not exceed the guidance value. 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 five times greater) than levels observed at STA-1W, which subsumed the prototype STA (the ENR Project) (**Table 6**). However, concentrations of Hg in STA-6 fishes were comparable to levels observed in other areas of the Everglades (**Appendix 2B-3**) and, thus, may reflect the overall mercury conditions in South Florida rather than being a consequence of STA operation.

STA-5

As stated above, STA-5 met startup criteria for mercury in September 1999; 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 of monitoring prior to April 30, 2001 have been reported previously (Rumbold and Rawlik, 2000; Rumbold et al., 2001a; Rumbold and Fink, 2002).

Soil cores were first collected from STA-5 in November 1998 prior to the flooding of the STA (Rumbold and Rawlik, 2000). Cores were collected again at the STA in November 2001 (**Table 7**). It is important to note that locations were changed in 2001 to more equally distribute sampling sites throughout the STA. Average concentration of THg in STA-5 sediments collected in 2001 did not differ from levels observed in 1998 (mean THg concentration in 1998 cores was 89.4 ±23; t-test, df =10; t = 0.73; p = 0.48) and continued to be within the expected range for Everglades soils (Delfino et al., 1993; Gilmour et al., 1998; Rumbold et al., 2001a). More importantly, the percentage of THg that was MeHg (**Table 7**), which is considered an index of *in situ* methylation, was within the expected range for Everglades sediments (Gilmour et al., 1998; C. Gilmour, personal communication).

Table 7. 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
STA5	2001	Cell1A	15.8		0.288		1.8%
	2001	Cell2A	44.1		0.478		1.1%
	2001	Cell2B	80.7		0.378		0.5%
	2001	Cell2B	97.1		0.609		0.6%
	2001	Cell1B	105		2.12		2.0%
	2001	Cell1B	113		0.372		0.3%
	Mean		75.9	±38	0.71	±0.7	1.1%
STA1W	2002	ENR302	73.8		0.048	I	0.1%
	2002	ENR102	50.6		0.046	I	0.1%
	2002	ENR303	59.6		-0.038	U	NC
	2002	ENR401	61		-0.027	U	NC
	2002	ENR203	88.7		0.08	I	0.1%
	2002	ST1W51	80.3		0.222		0.3%
	Mean		69	±14	0.08	±0.07	1.1%

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

Further, concentrations of MeHg in STA-5 sediments also did not differ between years (mean concentration ± 1SD was 0.53 ±0.22 ng/g in 1998; df = 10, t = –0.58, p = 0.57). However, because sampling locations were not identical in 1998 and 2001, comparisons between years must be interpreted with some caution.

As shown in **Table 1** and **Figure 7**, THg and MeHg in the water column were at a lower concentration in inflows and outflows during the second half of the reporting year. More importantly, MeHg concentration in surface water has declined and has remained low relative to the spike that occurred in the fourth quarter of 2000. Further, in all but one instance THg and MeHg exhibited a negative percent change across the STA (i.e., they were at a lower concentration at the outflow compared to the inflow; calculated using mean concentrations, not flow-weight averages; **Table 1**). The one instance where outflow exceeded inflow concentration occurred during the fourth quarter of 2001, when the average MeHg concentration was 0.23 ng/L at the outflows and 0.17 ng/L at the inflows. Annual average percent change across the STA was –33 percent and –26 percent for THg and MeHg, respectively, which were improvements over the previous year. Thus, on average STA-5 was a sink for both constituents in its second full year of operation. 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** and **Figure 8**. During the current reporting year, STA-5 mosquitofish from the interior marshes contained about 50 percent less Hg than fish from either the inflows or outflows. This is a decline from peak levels observed in interior mosquitofish during the second semi-annual event in 2000, which roughly coincided with the spike in MeHg in the water column (**Figure 8**). Similar to what was observed last year, mosquitofish from cell 1B (i.e., marsh and at outflow culverts) contained greater Hg burdens than fish from cell 2B. By comparison, Hg levels in mosquitofish at the outflows were similar to fish at the inflows, with the cumulative means suggesting a small percent change across the STA, positive during the first half and negative during the second half of the year. Hg concentrations in STA-5 mosquitofish were low relative to other Everglades areas.

Similar to sunfish caught in 2000, sunfish collected in 2001 from STA-5 also showed significant spatial variability in Hg levels (**Figure 8**, Kruskal-Wallis ANOVA on ranks; df = 3, H = 34.6, p < 0.001). Unlike mosquitofish, median Hg concentration in sunfish collected from the supply canal (58 ng/g) differed from that of fish caught in the discharge canal (115 ng/g) and from the interior (median was 110 ng/g in cell 1B, and 160 ng/g in cell 2B) (Dunn's *post hoc* test); other pairwise comparisons were not significant (i.e., discharge canal versus interior, or cell 1B versus cell 2B fish). Consequently, sunfish exhibited a positive percent change in Hg concentrations across the STA (**Table 5**). It should be noted that the slightly higher Hg levels in fish collected from cell 2B relative to fish from cell 1B, observed in both 2000 and 2001, which is inconsistent with observed spatial patterns in water or mosquitofish (i.e., cell 1B typically higher than cell 2B) may have again been attributable to differences in fish weight that is used as an age surrogate. Fish from cell 2B were again significantly larger than fish from other sites (Tukey test, p < 0.05).

Interannual differences in Hg levels were found when results of sunfish caught from the interior and discharge canal were pooled (H = 64.98, df = 2, p < 0.001), with higher levels in 2000 and 2001 compared to 1999; fish collected in 2001 did not differ from 2000 fish (Dunn's method, p < 0.05).

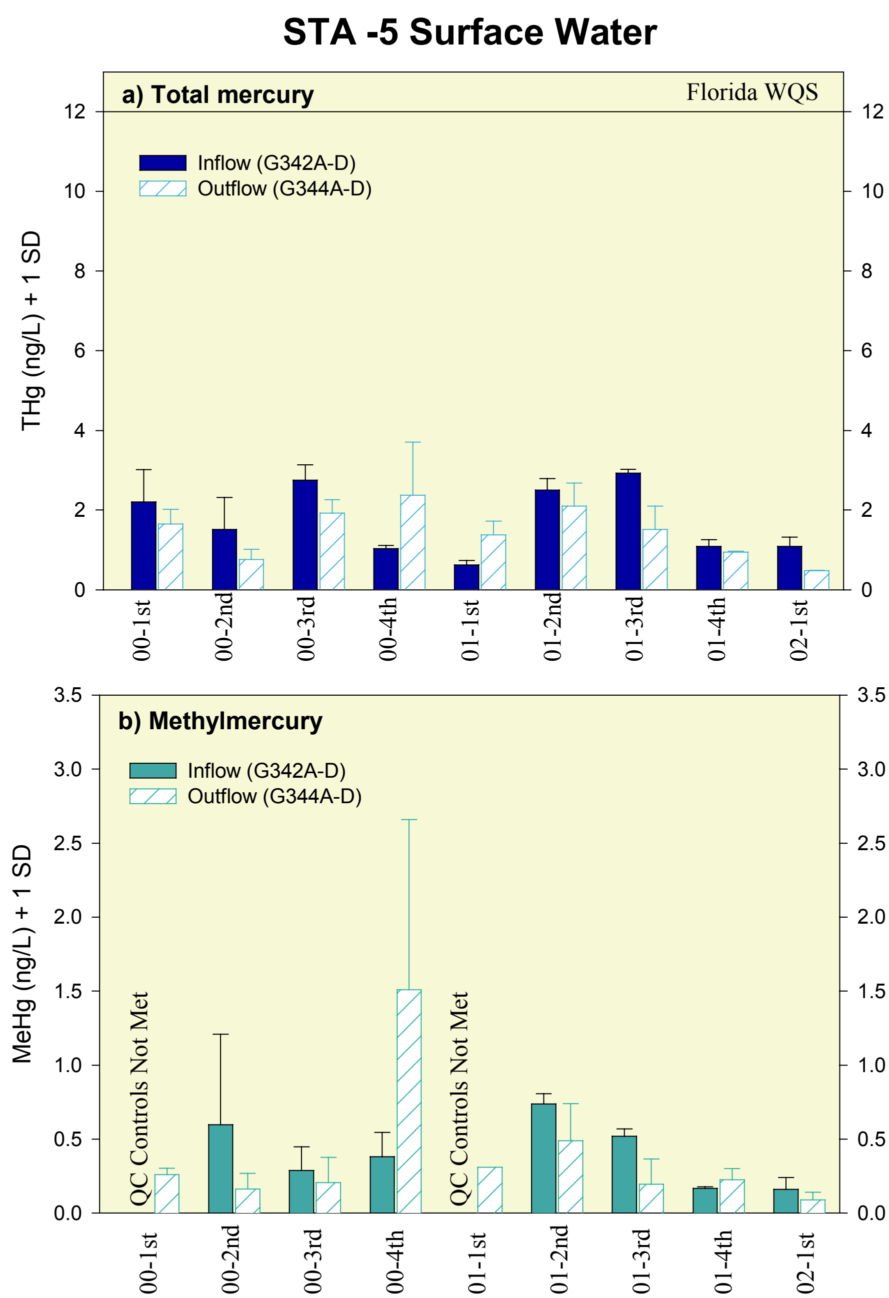

Figure 7. Concentration of (a) total mercury and (b) methylmercury in unfiltered surface water collected at STA-5

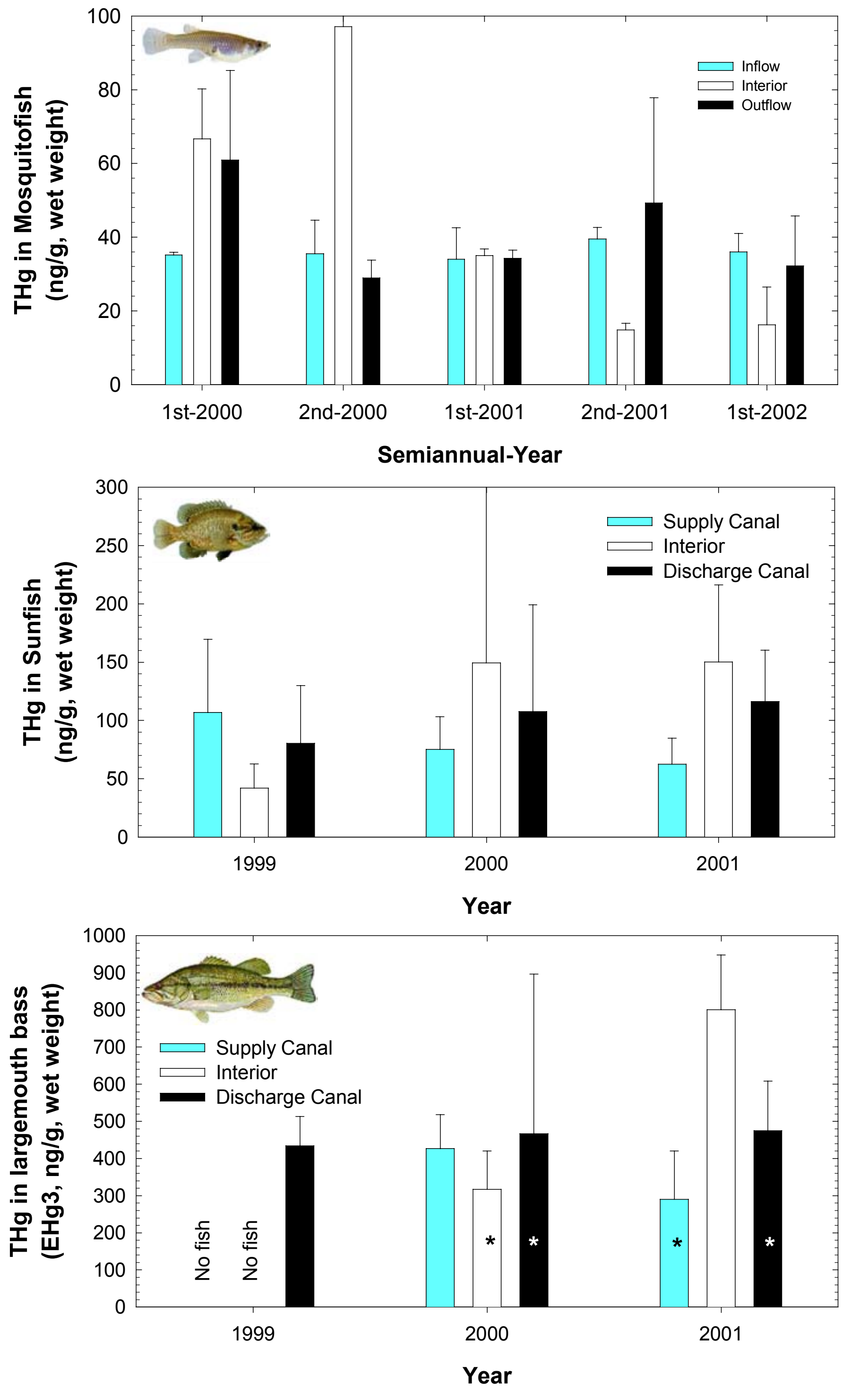

Figure 8. Mercury concentrations in (a) mosquitofish composites, (b) whole sunfish, and (c) fillets of largemouth bass collected at STA-5. Note: The latter are reported as the expected concentration in a three-year-old fish, EHg3, unless this could not be calculated (*for details see **Table 5**), in which case the arithmetic mean is reported

As noted previously, fish caught from the interior and the discharge canal in 2000 were larger in size, which may account for increased THg concentration. However, fish from the discharge canal decreased in size in 2001 (compared to 2000 and 1999). Thus, if anything, burdens should have been less in these smaller fish; however, no marked decline in Hg was observed in fishes from the discharge canal in 2001. It is possible, however, that the decrease in average body burden that would have been expected with a decrease in fish size may have been offset by a change in species composition and an increase in proportion of warmouth caught from the discharge canal.

By comparison, sunfishes caught in the supply canal, which were all about the same size (Student-Newman-Keuls Method, $p < 0.05$) and composition, i.e., species, throughout the monitoring period, have exhibited a general monotonic decrease in Hg from 1999 through 2001, with levels significantly different in 1999 and 2001 ($H = 9.3$, $df = 2$, $p = 0.01$; Dunn's method, $p < 0.05$); however, 2001 did not differ significantly from 2000 ($p > 0.05$).

The confounding influence that age (and size as an age surrogate) has on tissue-Hg interpretation was also evident in largemouth bass collected at STA-5 in 2001 (**Table 6** and **Figure 8**). Spatial patterns are clearly present in arithmetic mean Hg concentrations (i.e., not normalized to age) shown in **Table 6**. As was the case with sunfish, THg levels in interior bass were greater than levels in either supply canal bass or discharge canal bass. The average age of fishes was 1.8 years in the supply canal, 1.9 years in the interior, and 2.4 years in the discharge canal. If exposure was similar at all sites, one would expect that the older population in the discharge canal to have greater body burdens. However, this was not the case. Moreover, when tissue concentrations of interior fish were standardized to a three-year-old fish (i.e., EHg3), levels where much higher in interior fish compared to the arithmetic mean for fish from either the supply or discharge canals; EHg3 could not be estimated for discharge canal fish due to non-significant regression, nor could it be estimated for supply canal fish due to poor age distribution of the collected fish (almost all were age-class two years).

Similar to last year, the small range in the age of bass collected from the interior of STA-5 allowed for the use of a simple rank sum test to examine between-cell differences in tissue Hg. Unlike last year, where between-cell differences were significant (with Hg in bass from cell 1 > cell 2), bass collected in 2001 from the two cells did not differ significantly in Hg concentrations (Mann-Whitney Rank sum test, $n = 20$, $T = 418$, $p = 0.83$).

Visual inspection of the data presented in **Figure 8** suggests that levels of Hg may have increased in interior bass. However, this graph may be somewhat misleading. The data presented for 2000 interior bass was an arithmetic average for first-year fish (EHg3 could not be estimated), whereas data for 2001 fish was reported as EHg3. Note that the *2002 Everglades Consolidated Report* raised the concern that, given the elevated arithmetic mean concentration in first-year fish, it was possible that older bass, if present in the interior marsh, would contain greater concentrations of Hg. This concern appears to be have been confirmed by the data reported herein.

Data presented in **Figure 8** also suggest that levels of Hg have remained unchanged in fish in the discharge canal; however, this may also be somewhat misleading. The arithmetic mean concentration (475 ±133 ng/g) was slightly higher in bass collected in 2001 that were, on average, 2.45 years old compared to the arithmetic mean concentration observed in the 2.75-year-old bass collected in 2000 (467 ±430 ng/g) and the EHg3 of 1999 bass (434 ±79 ng/g). Given the respective ages of the sampled populations, there appears to be some evidence of slightly increasing Hg concentrations in fish from the STA-5 discharge canal over the last three years. As reported above, this conclusion would be consistent with what has been observed in the sunfish at

STA-5. However, unlike STA-6, STA-5 is still in its stabilization period, and such phenomena are expected and are not, as yet, a cause for undue concern.

In terms of a risk to fish-eating wildlife, levels of tissue Hg in mosquitofish collected during the reporting year were generally below the USEPA or USFWS guidance level. Likewise, 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 also did not exceed the EPA's guidance value for TL 4 fish (346 ng/g). Alternatively, Hg levels in sunfish, which are considered the best indicator of mercury exposure to fish-eating wildlife, slightly exceeded the USEPA and USFWS criteria. Thus, as with STA-6 there is some elevated risk to fish-eating wildlife feeding at STA-5.

Fish collected from STA-5 generally contained greater Hg concentrations than did fish at STA-1W, which subsumed the prototype STA (the ENR Project). (**Table 6**). However, concentrations of Hg in fish from STA-5 were also comparable to levels observed in other Everglades areas (**Appendix 2B-3**), and thus may reflect overall mercury conditions in South Florida rather than a result of 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 of STA-1W monitoring prior to April 30, 2001 have been reported previously (Rumbold and Rawlik, 2000; Rumbold et al., 2001a; Rumbold and Fink, 2002).

Soil cores were first collected from STA-1W in January 1999, when STA-1W subsumed the ENR Project (Rumbold and Rawlik, 2000). Cores were collected at the same locations within STA-1W in January 2002 (**Table 7**). A paired t-test revealed no significant change in THg concentration from 1999 and 2002 (df = 5; t = 2.345; p = 0.7), with levels of THg in STA-1W sediments continuing to be within the expected range for Everglades soils (Delfino et al., 1993; Gilmour et al., 1998; Rumbold et al., 2001a). Alternatively, concentrations of MeHg in STA-1W sediment were relatively low compared to other Everglades areas. The relative low concentrations of MeHg were best illustrated by the percentage of THg that was MeHg (**Table 7**). This suggests little *in situ* production, i.e., conversion of inorganic mercury to MeHg. While MeHg concentrations could not be assessed statistically because of the number of "non-detects" (it should be noted that different laboratories analyzed the two sets of cores), visual inspection of the data does not reveal any marked temporal trends in levels. It is interesting to note that similar to what was observed in 1999, the core from STA-1W cell 5, i.e., the cell that was most recently constructed and operated, contained the highest concentration of MeHg.

As shown in **Table 1** and **Figure 9**, concentrations of both THg and MeHg in surface water at the outflows of STA-1W were consistently less than the concentration of the corresponding constituent at the inflow. This spatial pattern is further illustrated by a persistent negative percent change across the STA (**Table 1**). This is consistent with the removal efficiency that was routinely observed for the ENR Project, which was subsumed by STA-1W (SFWMD 1999b).

Concentrations of THg in mosquitofish are summarized in **Table 4** and are graphically presented in **Figure 10**. Levels of mercury in mosquitofish from STA-1W were similar to, or have declined slightly, when compared to concentrations observed in fish collected previously from this area when it was operated as the ENR Project (SFWMD, 1999b). Further, mercury levels in fish from STA-1W continue to be relatively low compared to other STAs (see discussions above) and the remainder of the Everglades (**Appendix 2B-3**).

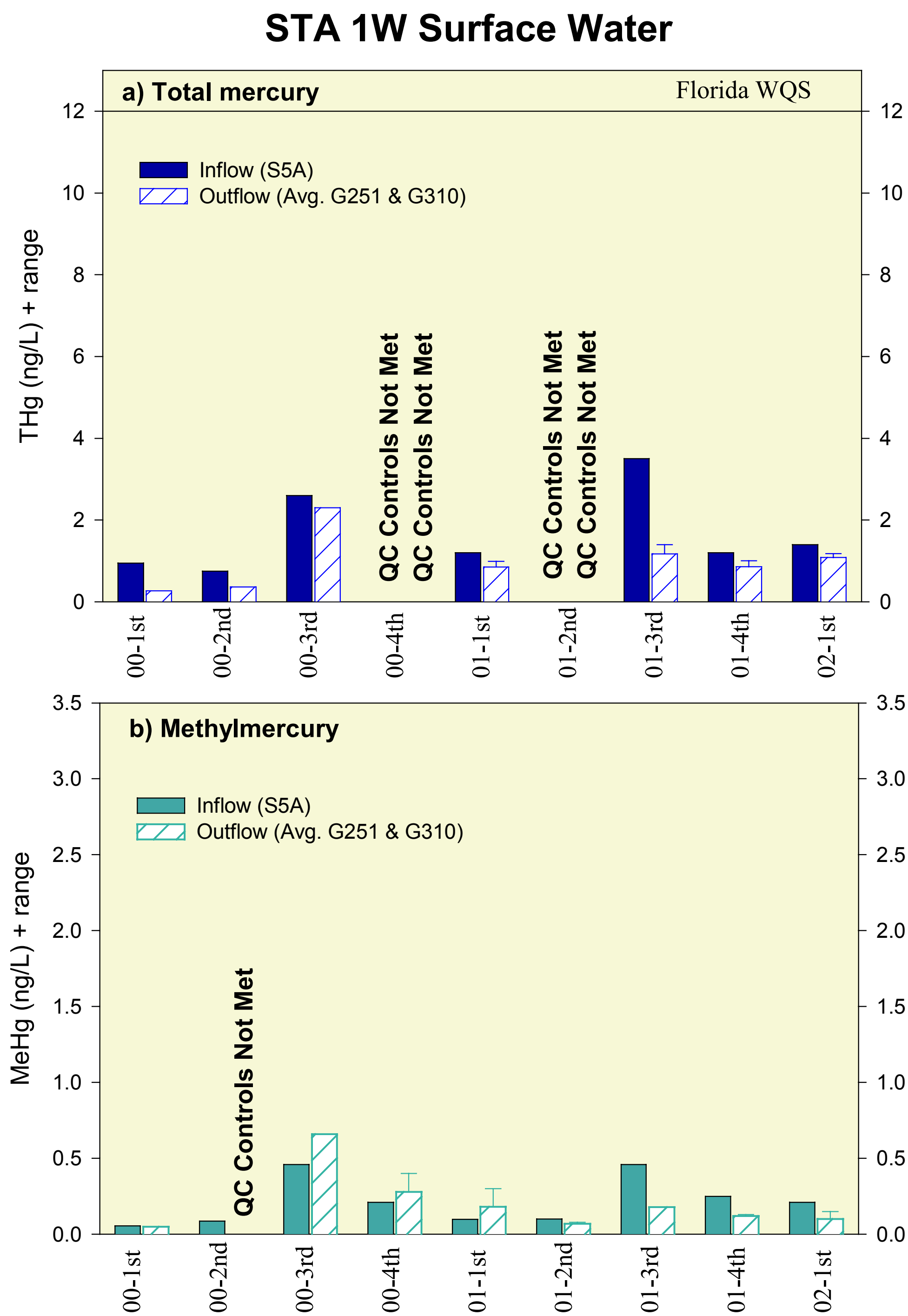

Figure 9. Concentration of (a) total mercury and (b) methylmercury in unfiltered surface water collected at STA-1W

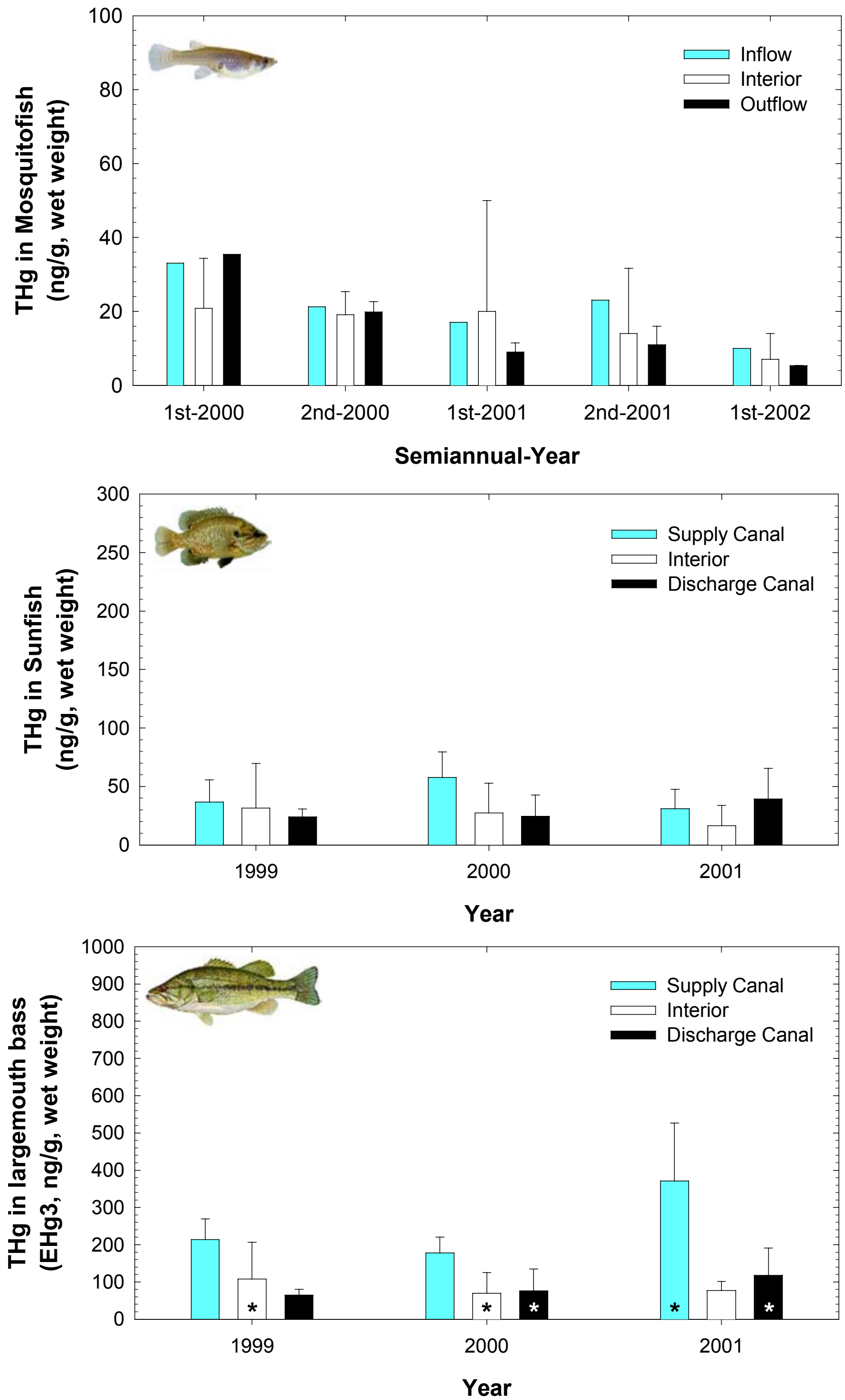

Figure 10. Mercury concentrations in (a) mosquitofish composites, (b) whole sunfish, and (c) fillets of largemouth bass collected at STA-1W. Note: the latter are reported as the expected concentration in a three-year-old fish, EHg3, unless this could not be calculated (*, for details, see Table 5), in which case, the arithmetic mean is reported

As with surface water, mosquitofish also consistently exhibited a negative percent change in tissue Hg across STA-1W, with fish collected at the outflow containing about 50 percent less mercury than that of fish collected at the inflow (**Table 4**). As discussed below, this pattern, which was unparalleled in the other STAs, was also observed in sunfish and largemouth bass.

As is evident from **Table 5** and **Figure 10**, sunfish continued to have mercury levels much lower than those observed in sunfish at the other STAs and locations within the Everglades (**Appendix 2B-3**). Further, this pattern does not appear to be changing, i.e., there were no obvious temporal increases (**Figure 10)**. Nevertheless, similar to the other STAs, spatial patterns in tissue Hg were observed in 2001. While the relationship between size and tissue Hg is relatively weak at STA-1W compared to other sites, it may have confounded interpretation of tissue Hg concentrations. Locational differences in size (i.e., total length) of sunfish from STA-1W were significant (ANOVA; $df = 5, 99$; $f = 10.2$; $p < 0.001$). Sunfish exhibited a slight positive percent change in tissue Hg across the STA in 2001; however, cumulative mean Hg concentration remains lower in fish from the discharge canals (**Table 5).**

Similar to sunfish, largemouth bass from STA-1W contained much lower concentrations of Hg than did bass from the other STAs (**Table 6** and **Figure 10)**. Moreover, Hg levels in bass from STA-1W were also much lower than concentrations observed in fish from downstream sites in the WCAs (**Appendix 2B-3**). As with mosquitofish and sunfish, Hg in bass exhibited a negative percent change across STA-1W, that is, it declined from the supply canal to discharge canals (–68 percent based on non-standardized concentrations). The difference in tissue Hg between fish caught in 2001 from the supply and discharge canals was significant ($df = 43$, $t = 7.14$, $p < 0.001$). Further, the most obvious temporal trend evident from **Figure 10** is the increase in tissue Hg in supply canal fish. Finally, and most importantly, the mercury burden in EHg3 bass from the interior marshes of STA-1W (77 ± 24 ng/g) was remarkably low when compared to other bass in South Florida.

In terms of the risk to fish-eating wildlife, fish from STA-1W continue to have tissue-Hg levels well below both the USEPA and USFWS guidance level for predator protection. Thus, unlike most Everglades areas, fish-eating wildlife feeding at STA-1W do not appear to be at any risk from Hg exposure.

STA-2

As stated previously, STA-2 cells 3 and 2 met mercury startup criteria on September 26, 2000, and November 9, 2000, respectively. Cell 1 has not met startup criteria as of this writing. Refer to **Appendix 4A-7** for a detailed discussion of the results of expanded mercury monitoring of STA-2 in accordance with permit No. 0126704 modified on August 9, 2001.

Key findings from that monitoring are as follows:

1. There were no violations of the Florida Class III numerical Water Quality Standard (WQS) of 12 ng total mercury (THg)/L at the outflow of STA-2 (i.e., G-335); however, outflow from cell 1 reached 12 ng/L during drawdown of the cell. As such, the project has met the requirements of Section 6.i of the Mercury Monitoring Program of the referenced permits.
2. Results from the expanded monitoring of mercury in surface water and fish tissues strongly indicated that anomalous methylmercury production was restricted to cell 1.

3. A positive gradient was observed in MeHg levels in surface water and fish tissues from the inflow in the north to the outflow in the southern portion of cell 1 and, consequently, site C-1A was found not to be representative of conditions within STA-2 cell 1.

1. Further, due to the configuration and design of cell outlets, a single grab sample upstream of the outflow pump at G-335 was found to be unrepresentative of discharge under steady state flow.

2. The dramatic fluctuations and concentrations of THg and MeHg in the discharge canal decreased following drawdown and reduction in discharge from cell 1.

3. A gradient in cell 1 stage may have resulted in relatively shallow depths in the southern portion of the cell, and in turn this might have had an effect on sediment biogeochemistry, particularly redox and mercury methylation.

4. Hg levels in STA-2 fish exhibited spatial patterns consistent with patterns observed in surface water concentrations.

5. Average Hg concentrations in sunfish caught in a swale within cell 1 in April 2002, which was otherwise dry, contained twice the basin-wide mean concentration of mercury for sunfish.

6. Levels of mercury in largemouth bass were also elevated relative to other STAs and downstream sites, with the expected mean concentration in a three-year-old fish from the discharge canal being 1,148 ng/g.

7. While the area of contact and exposure potential were substantially reduced by draining cell 1, fish-eating wildlife remained at some risk of adverse chronic effects from mercury exposure if feeding preferentially at STA-2 in the shallow pools that remained.

Table A.1. THg concentration (mg/Kg) and metadata for individual large-bodied fish collected in 2001.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST1F	ENR012	18-Sep-01	901671	LMB	2	291	341	0.19
ST1F	ENR012	18-Sep-01	901661B	LMB		309	439	0.036
ST1F	ENR012	18-Sep-01	901679	LMB	1	243	173	0.038
ST1F	ENR012	18-Sep-01	901678	LMB	1	250	214	0.15
ST1F	ENR012	18-Sep-01	901677	LMB	2	275	329	0.05
ST1F	ENR012	18-Sep-01	901676	LMB	4	431	1199	0.13
ST1F	ENR012	18-Sep-01	901675	LMB	1	242	196	0.054
ST1F	ENR012	18-Sep-01	901674	LMB	2	319	474	0.18
ST1F	ENR012	18-Sep-01	901681	WAR		179	125	0.027
ST1F	ENR012	18-Sep-01	901672	LMB	1	276	290	0.1
ST1F	ENR012	18-Sep-01	901682	WAR		149	81	0.011
ST1F	ENR012	18-Sep-01	901670	LMB	3	420	1042	0.054
ST1F	ENR012	18-Sep-01	901669	LMB	4	481	1781	0.25
ST1F	ENR012	18-Sep-01	901668	LMB	4	481	1618	0.17
ST1F	ENR012	18-Sep-01	901666	LMB	2	282	378	0.059
ST1F	ENR012	18-Sep-01	901664	LMB	2	439	1378	0.13
ST1F	ENR012	18-Sep-01	901663	LMB	2	282	322	0.073
ST1F	ENR012	18-Sep-01	901662	LMB	2	283	310	0.053
ST1F	ENR012	18-Sep-01	901673	LMB	3	291	340	0.04
ST1F	ENR012	18-Sep-01	901690	BLUE		192	141	0.011
ST1F	ENR012	18-Sep-01	901699	RESU		120	31	0.0082
ST1F	ENR012	18-Sep-01	901698	RESU		144	54	0.04
ST1F	ENR012	18-Sep-01	901697	RESU		178	88	0.027
ST1F	ENR012	18-Sep-01	901696	RESU		171	83	0.04
ST1F	ENR012	18-Sep-01	901695	BLUE		135	45	0.0073
ST1F	ENR012	18-Sep-01	901694	BLUE		157	72	0.035
ST1F	ENR012	18-Sep-01	901693	BLUE		150	60	0.03
ST1F	ENR012	18-Sep-01	901680	LMB	1	209	119	0.046
ST1F	ENR012	18-Sep-01	901691	BLUE		198	156	0.048
ST1F	ENR012	18-Sep-01	901665	LMB	3	327	501	0.19
ST1F	ENR012	18-Sep-01	901689	WAR		124	37	0.022
ST1F	ENR012	18-Sep-01	901688	SPSU		126	46	0.015
ST1F	ENR012	18-Sep-01	901687	SPSU		117	38	0.027
ST1F	ENR012	18-Sep-01	901686	SPSU		155	82	0.02
ST1F	ENR012	18-Sep-01	901685	SPSU		124	50	0.047
ST1F	ENR012	18-Sep-01	901684	SPSU		157	94	0.01
ST1F	ENR012	18-Sep-01	901683	SPSU		148	81	0.0093
ST1F	ENR012	18-Sep-01	901692	BLUE		174	92	0.039
ST1F	ENR012	18-Sep-01	901667	LMB	2	322	503	0.04
ST1F	ENR302	18-Sep-01	901642	BLUE		128	41	0.023
ST1F	ENR302	18-Sep-01	901645	SPSU		81	14	0.023
ST1F	ENR302	18-Sep-01	901643	RESU		164	88	0.012
ST1F	ENR302	18-Sep-01	901641	BLUE		218	208	0.011
ST1F	ENR302	18-Sep-01	901621	LMB	3	300	360	0.12
ST1F	ENR302	18-Sep-01	901644	SPSU		97	22	0.035
ST1F	ENR302	15-Oct-01	901661	RESU		98	17	0.018
ST1F	ENR302	15-Oct-01	901656	RESU		165	88	0.0087

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST1F	ENR302	15-Oct-01	901655	RESU		193	139	0.034
ST1F	ENR302	15-Oct-01	901654	RESU		158	81	0.0081
ST1F	ENR302	15-Oct-01	901653	RESU		188	110	0.008
ST1F	ENR302	15-Oct-01	901652	RESU		209	190	0.0071
ST1F	ENR302	15-Oct-01	901651	RESU		146	56	0.0097
ST1F	ENR302	15-Oct-01	901650	BLUE		132	39	0.03
ST1F	ENR302	15-Oct-01	901649	BLUE		146	59	0.021
ST1F	ENR302	15-Oct-01	901648	BLUE		170	93	0.015
ST1F	ENR302	15-Oct-01	901646	BLUE		179	121	-0.0069
ST1F	ENR302	15-Oct-01	901657	RESU		176	120	0.0092
ST1F	ENR302	15-Oct-01	901625	LMB	2	290	359	0.063
ST1F	ENR302	15-Oct-01	901658	RESU		200	135	0.009
ST1F	ENR302	15-Oct-01	901622	LMB	2	311	409	0.049
ST1F	ENR302	15-Oct-01	901647	BLUE		162	74	0.023
ST1F	ENR302	15-Oct-01	901624	LMB	2	346	569	0.16
ST1F	ENR302	15-Oct-01	901626	LMB	2	246	191	0.11
ST1F	ENR302	15-Oct-01	901627	LMB	2	274	277	0.064
ST1F	ENR302	15-Oct-01	901628	LMB	2	280	302	0.14
ST1F	ENR302	15-Oct-01	901659	RESU		208	162	0.011
ST1F	ENR302	15-Oct-01	901660	RESU		165	82	0.018
ST1F	ENR302	15-Oct-01	901623	LMB	3	295	346	0.17
ST1F	ENR401	18-Sep-01	901577	SPSU		157	103	0.0093
ST1F	ENR401	18-Sep-01	901573	RESU		134	51	0.0057
ST1F	ENR401	18-Sep-01	901580	SPSU		144	83	0.011
ST1F	ENR401	18-Sep-01	901579	SPSU		148	79	0.011
ST1F	ENR401	18-Sep-01	901578	SPSU		158	107	0.032
ST1F	ENR401	18-Sep-01	901563	RESU		199	193	0.0041
ST1F	ENR401	18-Sep-01	901541	LMB	2	301	483	0.026
ST1F	ENR401	18-Sep-01	901542	LMB	2	419	1267	0.02
ST1F	ENR401	18-Sep-01	901543	LMB	2	323	495	0.024
ST1F	ENR401	18-Sep-01	901544	LMB	2	310	433	0.028
ST1F	ENR401	18-Sep-01	901545	LMB	0	223	167	0.014
ST1F	ENR401	18-Sep-01	901546	LMB	2	312	499	0.025
ST1F	ENR401	18-Sep-01	901547	LMB	2	284	305	0.032
ST1F	ENR401	18-Sep-01	901548	LMB	1	241	199	0.074
ST1F	ENR401	18-Sep-01	901549	LMB	2	316	416	0.037
ST1F	ENR401	18-Sep-01	901550	LMB	0	184	95	0.019
ST1F	ENR401	18-Sep-01	901551	LMB	0	195	119	0.02
ST1F	ENR401	18-Sep-01	901552	LMB	0	171	65	0.022
ST1F	ENR401	18-Sep-01	901575	BLUE		140	56	0.0053
ST1F	ENR401	18-Sep-01	901562	RESU		227	327	0.0056
ST1F	ENR401	18-Sep-01	901576	WAR		144	81	0.013
ST1F	ENR401	18-Sep-01	901564	RESU		227	257	0.0076
ST1F	ENR401	18-Sep-01	901565	RESU		193	206	0.0054
ST1F	ENR401	18-Sep-01	901566	RESU		217	259	0.0062
ST1F	ENR401	18-Sep-01	901567	RESU		206	197	0.01
ST1F	ENR401	18-Sep-01	901568	RESU		178	150	0.0056
ST1F	ENR401	18-Sep-01	901569	RESU		197	186	0.0069
ST1F	ENR401	18-Sep-01	901570	RESU		214	232	0.0064

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST1F	ENR401	18-Sep-01	901571	RESU		197	187	0.0062
ST1F	ENR401	18-Sep-01	901572	RESU		200	181	0.0078
ST1F	ENR401	18-Sep-01	901574	BLUE		149	71	0.0087
ST1F	ENR401	18-Sep-01	901561	RESU		227	295	0.0098
ST1F	G310	18-Sep-01	901609	BLUE		100	16	0.057
ST1F	G310	18-Sep-01	901620	RESU		97	15	0.041
ST1F	G310	18-Sep-01	901584	LMB	1	216	104	0.25
ST1F	G310	18-Sep-01	901581	LMB	3	361	709	0.098
ST1F	G310	18-Sep-01	901611	SPSU		119	39	0.064
ST1F	G310	18-Sep-01	901583	LMB	1	252	197	0.26
ST1F	G310	18-Sep-01	901619	RESU		104	19	0.027
ST1F	G310	18-Sep-01	901585	LMB	0	160	51	0.11
ST1F	G310	18-Sep-01	901586	LMB	0	129	25	0.12
ST1F	G310	18-Sep-01	901601	BLUE		189	124	0.13
ST1F	G310	18-Sep-01	901602	BLUE		136	50	0.055
ST1F	G310	18-Sep-01	901603	BLUE		158	74	0.1
ST1F	G310	18-Sep-01	901604	BLUE		128	39	0.084
ST1F	G310	18-Sep-01	901605	BLUE		125	34	0.062
ST1F	G310	18-Sep-01	901606	BLUE		146	59	0.016
ST1F	G310	18-Sep-01	901616	RESU		120	30	0.035
ST1F	G310	18-Sep-01	901582	LMB	1	266	258	0.2
ST1F	G310	18-Sep-01	901607	BLUE		114	24	0.071
ST1F	G310	18-Sep-01	901617	RESU		110	25	0.03
ST1F	G310	18-Sep-01	901615	RESU		126	39	0.035
ST1F	G310	18-Sep-01	901614	RESU		140	51	0.03
ST1F	G310	18-Sep-01	901613	RESU		141	51	0.063
ST1F	G310	18-Sep-01	901612	WAR		135	52	0.029
ST1F	G310	18-Sep-01	901610	SPSU		125	49	0.039
ST1F	G310	18-Sep-01	901608	BLUE		130	36	0.061
ST1F	G310	18-Sep-01	901618	RESU		116	32	0.028
ST1F	S5A	18-Sep-01	901318	LMB	2	331	454	0.82
ST1F	S5A	18-Sep-01	901304	LMB	1	266	283	0.16
ST1F	S5A	18-Sep-01	901311	LMB	2	295	397	0.45
ST1F	S5A	18-Sep-01	901317	LMB	2	298	369	0.31
ST1F	S5A	18-Sep-01	901316	LMB	2	295	365	0.39
ST1F	S5A	18-Sep-01	901319	LMB	3	318	453	0.45
ST1F	S5A	18-Sep-01	901315	LMB	3	330	489	0.51
ST1F	S5A	18-Sep-01	901314	LMB	2	328	536	0.34
ST1F	S5A	18-Sep-01	901313	LMB	3	427	964	0.25
ST1F	S5A	18-Sep-01	901334	BLUE		138	54	0.026
ST1F	S5A	18-Sep-01	901301	LMB	2	289	344	0.36
ST1F	S5A	18-Sep-01	901309	LMB	5	502	2009	0.3
ST1F	S5A	18-Sep-01	901308	LMB	3	431	1227	0.34
ST1F	S5A	18-Sep-01	901307	LMB	2	319	517	0.14
ST1F	S5A	18-Sep-01	901303	LMB	2	260	227	0.44
ST1F	S5A	18-Sep-01	901305	LMB	2	306	435	0.27
ST1F	S5A	18-Sep-01	901306	LMB	2	289	355	0.19
ST1F	S5A	18-Sep-01	901320	LMB	3	321	455	0.6
ST1F	S5A	18-Sep-01	901312	LMB	2	279	299	0.33

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST1F	S5A	18-Sep-01	901302	LMB	4	308	440	0.39
ST1F	S5A	18-Sep-01	901337	BLUE		142	57	0.026
ST1F	S5A	18-Sep-01	901310	LMB	2	294	380	0.39
ST1F	S5A	18-Sep-01	901321	RESU		240	281	0.08
ST1F	S5A	18-Sep-01	901336	BLUE		145	65	0.025
ST1F	S5A	18-Sep-01	901338	BLUE		123	35	0.017
ST1F	S5A	18-Sep-01	901339	BLUE		111	24	0.031
ST1F	S5A	18-Sep-01	901340	BLUE		110	25	0.02
ST1F	S5A	18-Sep-01	901333	BLUE		170	103	0.032
ST1F	S5A	18-Sep-01	901332	BLUE		202	174	0.053
ST1F	S5A	18-Sep-01	901331	BLUE		190	148	0.043
ST1F	S5A	18-Sep-01	901330	RESU		137	45	0.018
ST1F	S5A	18-Sep-01	901329	RESU		199	173	0.026
ST1F	S5A	18-Sep-01	901322	RESU		197	152	0.028
ST1F	S5A	18-Sep-01	901328	RESU		189	138	0.022
ST1F	S5A	18-Sep-01	901327	RESU		217	204	0.018
ST1F	S5A	18-Sep-01	901326	RESU		163	87	0.02
ST1F	S5A	18-Sep-01	901325	RESU		229	263	0.04
ST1F	S5A	18-Sep-01	901323	RESU		228	269	0.06
ST1F	S5A	18-Sep-01	901324	RESU		135	51	0.02
ST1F	S5A	18-Sep-01	901335	BLUE		153	77	0.014
ST1F	ST1W51	18-Sep-01	901162	WAR		96	22	0.093
ST1F	ST1W51	18-Sep-01	901161	WAR		146	72	0.071
ST1F	ST1W51	18-Sep-01	901163	RESU		90	15	0.022
ST1F	ST1W51	18-Sep-01	901165	RESU		73	7	0.044
ST1F	ST1W51	18-Sep-01	901164	RESU		75	8	0.024
ST2F	G328B	17-Oct-01	1001017	LMB	1	250	194	0.13
ST2F	G328B	17-Oct-01	1001024	RESU		174	109	0.019
ST2F	G328B	17-Oct-01	1001023	RESU		186	136	0.028
ST2F	G328B	17-Oct-01	1001022	RESU		163	79	0.033
ST2F	G328B	17-Oct-01	1001021	RESU		197	172	0.06
ST2F	G328B	17-Oct-01	1001011	LMB	1	215	116	0.097
ST2F	G328B	17-Oct-01	1001013	LMB	1	280	275	0.4
ST2F	G328B	17-Oct-01	1001038	BLUE		127	40	0.046
ST2F	G328B	17-Oct-01	1001016	LMB	1	213	115	0.11
ST2F	G328B	17-Oct-01	1001015	LMB	1	232	154	0.24
ST2F	G328B	17-Oct-01	1001014	LMB	1	283	287	1.1
ST2F	G328B	17-Oct-01	1001025	RESU		165	86	0.097
ST2F	G328B	17-Oct-01	1001012	LMB	1	191	80	0.067
ST2F	G328B	17-Oct-01	1001019	LMB	1	209	105	0.43
ST2F	G328B	17-Oct-01	1001033	BLUE		177	158	0.57
ST2F	G328B	17-Oct-01	1001040	BLUE		125	40	0.039
ST2F	G328B	17-Oct-01	1001039	BLUE		142	54	0.034
ST2F	G328B	17-Oct-01	1001018	LMB	1	234	134	0.15
ST2F	G328B	17-Oct-01	1001037	BLUE		167	90	0.2
ST2F	G328B	17-Oct-01	1001010	LMB	1	276	256	0.16
ST2F	G328B	17-Oct-01	1001036	BLUE		157	71	0.38
ST2F	G328B	17-Oct-01	1001034	BLUE		137	48	0.049
ST2F	G328B	17-Oct-01	1001026	RESU		137	46	0.026

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST2F	G328B	17-Oct-01	1001032	BLUE		183	135	0.11
ST2F	G328B	17-Oct-01	1001031	BLUE		181	126	0.066
ST2F	G328B	17-Oct-01	1001030	BLUE		195	160	0.17
ST2F	G328B	17-Oct-01	1001029	RESU		146	57	0.024
ST2F	G328B	17-Oct-01	1001028	RESU		191	130	0.089
ST2F	G328B	17-Oct-01	1001027	RESU		155	70	0.015
ST2F	G328B	17-Oct-01	1001035	BLUE		186	124	0.029
ST2F	G328B	17-Oct-01	1001008	LMB	1	256	204	0.57
ST2F	G328B	17-Oct-01	1001007	LMB	2	289	302	0.14
ST2F	G328B	17-Oct-01	1001006	LMB	2	338	539	0.15
ST2F	G328B	17-Oct-01	1001005	LMB	2	267	244	0.34
ST2F	G328B	17-Oct-01	1001004	LMB	3	288	318	0.19
ST2F	G328B	17-Oct-01	1001003	LMB	1	350	537	0.23
ST2F	G328B	17-Oct-01	1001002	LMB	1	208	120	0.16
ST2F	G328B	17-Oct-01	1001001	LMB	2	463	1768	0.67
ST2F	G328B	17-Oct-01	1001009	LMB	1	253	179	0.73
ST2F	G328B	17-Oct-01	1001020	LMB	1	205	108	0.11
ST2F	G335	16-Oct-01	1001186	RESU		169	86	0.051
ST2F	G335	16-Oct-01	1001161	LMB	3	330	509	1.4
ST2F	G335	16-Oct-01	1001189	RESU		124	33	0.088
ST2F	G335	16-Oct-01	1001187	RESU		156	68	0.095
ST2F	G335	16-Oct-01	1001183	RESU		196	180	0.21
ST2F	G335	16-Oct-01	1001181	BLUE		160	81	0.13
ST2F	G335	16-Oct-01	1001188	RESU		142	44	0.05
ST2F	G335	16-Oct-01	1001182	BLUE		127	36	0.31
ST2F	G335	16-Oct-01	1001184	RESU		220	254	0.03
ST2F	G335	16-Oct-01	1001185	RESU		169	108	0.4
ST2F	G335	17-Oct-01	1001190	BLUE		170	96	0.13
ST2F	G335	17-Oct-01	1001191	BLUE		187	128	0.11
ST2F	G335	17-Oct-01	1001192	BLUE		140	52	0.45
ST2F	G335	17-Oct-01	1001164	LMB	2	429	1385	1.3
ST2F	G335	17-Oct-01	1001198	RESU		189	134	0.13
ST2F	G335	17-Oct-01	1001194	BLUE		124	45	0.12
ST2F	G335	17-Oct-01	1001195	BLUE		120	37	0.24
ST2F	G335	17-Oct-01	1001196	RESU		216	234	0.075
ST2F	G335	17-Oct-01	1001197	RESU		210	175	0.069
ST2F	G335	17-Oct-01	1001193	BLUE		128	40	0.34
ST2F	G335	17-Oct-01	1001170	LMB	2	309	453	1.2
ST2F	G335	17-Oct-01	1001180	LMB	1	220	130	0.7
ST2F	G335	17-Oct-01	1001179	LMB	0	218	125	0.05
ST2F	G335	17-Oct-01	1001178	LMB	1	268	255	0.59
ST2F	G335	17-Oct-01	1001177	LMB	1	243	207	0.74
ST2F	G335	17-Oct-01	1001176	LMB	2	258	228	1.2
ST2F	G335	17-Oct-01	1001175	LMB	1	245	189	0.8
ST2F	G335	17-Oct-01	1001174	LMB	1	240	191	0.59
ST2F	G335	17-Oct-01	1001173	LMB	1	253	214	0.75
ST2F	G335	17-Oct-01	1001162	LMB	2	375	827	0.94
ST2F	G335	17-Oct-01	1001171	LMB	1	249	205	1
ST2F	G335	17-Oct-01	1001200	RESU		138	45	0.082

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST2F	G335	17-Oct-01	1001169	LMB	2	282	318	1.2
ST2F	G335	17-Oct-01	1001168	LMB	2	312	436	1.1
ST2F	G335	17-Oct-01	1001167	LMB	2	315	412	0.36
ST2F	G335	17-Oct-01	1001166	LMB	2	417	1173	1.1
ST2F	G335	17-Oct-01	1001165	LMB	1	335	507	0.84
ST2F	G335	17-Oct-01	1001163	LMB	1	251	226	0.6
ST2F	G335	17-Oct-01	1001199	RESU		160	82	0.08
ST2F	G335	17-Oct-01	1001172	LMB	1	232	152	0.92
ST2F	STA2C1	16-Oct-01	1001046	LMB	1	220	139	0.57
ST2F	STA2C1	16-Oct-01	1001076	RESU		111	26	0.12
ST2F	STA2C1	16-Oct-01	1001065	RESU		230	302	0.16
ST2F	STA2C1	16-Oct-01	1001041	LMB	1	280	328	0.18
ST2F	STA2C1	16-Oct-01	1001042	LMB	1	265	292	1
ST2F	STA2C1	16-Oct-01	1001043	LMB	1	242	191	0.37
ST2F	STA2C1	16-Oct-01	1001044	LMB	1	260	250	0.47
ST2F	STA2C1	16-Oct-01	1001045	LMB	1	255	226	0.68
ST2F	STA2C1	16-Oct-01	1001047	LMB	1	215	110	0.66
ST2F	STA2C1	16-Oct-01	1001062	BLUE		165	88	0.21
ST2F	STA2C1	16-Oct-01	1001061	BLUE		130	43	0.42
ST2F	STA2C1	16-Oct-01	1001064	BLUE		115	28	0.1
ST2F	STA2C1	16-Oct-01	1001075	RESU		120	33	0.12
ST2F	STA2C1	16-Oct-01	1001066	RESU		209	205	0.037
ST2F	STA2C1	16-Oct-01	1001067	RESU		148	69	0.3
ST2F	STA2C1	16-Oct-01	1001068	RESU		146	55	0.051
ST2F	STA2C1	16-Oct-01	1001069	RESU		145	57	0.18
ST2F	STA2C1	16-Oct-01	1001070	RESU		145	53	0.24
ST2F	STA2C1	16-Oct-01	1001071	RESU		133	44	0.2
ST2F	STA2C1	16-Oct-01	1001072	RESU		136	51	0.15
ST2F	STA2C1	16-Oct-01	1001073	RESU		125	37	0.11
ST2F	STA2C1	16-Oct-01	1001074	RESU		123	33	0.098
ST2F	STA2C1	16-Oct-01	1001063	BLUE		123	34	0.38
ST2F	STA2C1	22-Apr-02	0098	WAR		75	7.1	0.41
ST2F	STA2C1	22-Apr-02	0102	WAR		89	14.6	0.37
ST2F	STA2C1	22-Apr-02	0099	WAR		160	95	0.64
ST2F	STA2C1	22-Apr-02	0100	WAR		95	16.6	0.62
ST2F	STA2C1	22-Apr-02	0101	WAR		101	22.4	0.5
ST2F	STA2C1	25-Apr-02	0116	WAR		113	28.3	0.93
ST2F	STA2C1	25-Apr-02	0103	RESU		146	54	0.74
ST2F	STA2C1	25-Apr-02	0104	RESU		156	68.3	0.41
ST2F	STA2C1	25-Apr-02	0105	RESU		160	67.7	0.78
ST2F	STA2C1	25-Apr-02	0106	RESU		154	53.3	0.7
ST2F	STA2C1	25-Apr-02	0107	RESU		182	93.8	0.57
ST2F	STA2C1	25-Apr-02	0108	RESU		221	198.3	0.32
ST2F	STA2C1	25-Apr-02	0109	BLUE		142	43.8	0.47
ST2F	STA2C1	25-Apr-02	0110	BLUE		155	52.4	0.1
ST2F	STA2C1	25-Apr-02	0111	BLUE		170	92.2	0.72
ST2F	STA2C1	25-Apr-02	0112	BLUE		152	51.6	0.58
ST2F	STA2C1	25-Apr-02	0113	BLUE		150	56.3	0.59
ST2F	STA2C1	25-Apr-02	0115	BLUE		143	44.8	0.44

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST2F	STA2C1	25-Apr-02	0117	WAR		164	86.4	0.79
ST2F	STA2C1	25-Apr-02	0118	LMB		380	756.6	2
ST2F	STA2C1	25-Apr-02	0114	BLUE		159	66	0.66
ST2F	STA2C2	16-Oct-01	1001114	BLUE		170	103	0.087
ST2F	STA2C2	16-Oct-01	1001120	BLUE		123	31	0.16
ST2F	STA2C2	16-Oct-01	1001103	RESU		182	142	0.071
ST2F	STA2C2	16-Oct-01	1001104	RESU		135	41	0.058
ST2F	STA2C2	16-Oct-01	1001105	RESU		149	59	0.099
ST2F	STA2C2	16-Oct-01	1001106	RESU		149	60	0.11
ST2F	STA2C2	16-Oct-01	1001119	BLUE		120	29	0.11
ST2F	STA2C2	16-Oct-01	1001118	BLUE		119	30	0.13
ST2F	STA2C2	16-Oct-01	1001117	BLUE		120	29	0.073
ST2F	STA2C2	16-Oct-01	1001115	BLUE		156	75	0.13
ST2F	STA2C2	16-Oct-01	1001107	RESU		160	81	0.12
ST2F	STA2C2	16-Oct-01	1001113	BLUE		152	71	0.18
ST2F	STA2C2	16-Oct-01	1001112	BLUE		160	85	0.12
ST2F	STA2C2	16-Oct-01	1001111	SPSU		147	89	0.14
ST2F	STA2C2	16-Oct-01	1001110	WAR		169	107	0.43
ST2F	STA2C2	16-Oct-01	1001102	RESU		144	59	0.12
ST2F	STA2C2	16-Oct-01	1001109	RESU		135	47	0.12
ST2F	STA2C2	16-Oct-01	1001097	LMB	1	216	119	0.43
ST2F	STA2C2	16-Oct-01	1001108	RESU		142	48	0.065
ST2F	STA2C2	16-Oct-01	1001116	BLUE		142	49	0.21
ST2F	STA2C2	16-Oct-01	1001088	LMB	1	280	290	0.51
ST2F	STA2C2	16-Oct-01	1001094	LMB	1	205	97	0.4
ST2F	STA2C2	16-Oct-01	1001093	LMB	1	228	156	0.35
ST2F	STA2C2	16-Oct-01	1001092	LMB	1	216	122	0.49
ST2F	STA2C2	16-Oct-01	1001091	LMB	1	226	149	0.29
ST2F	STA2C2	16-Oct-01	1001089	LMB	1	230	155	0.69
ST2F	STA2C2	16-Oct-01	1001101	RESU		204	171	0.081
ST2F	STA2C2	16-Oct-01	1001087	LMB	1	217	123	0.44
ST2F	STA2C2	16-Oct-01	1001086	LMB	1	282	305	0.51
ST2F	STA2C2	16-Oct-01	1001085	LMB	1	285	313	0.21
ST2F	STA2C2	16-Oct-01	1001098	LMB	1	180	63	0.33
ST2F	STA2C2	16-Oct-01	1001090	LMB	1	236	188	0.54
ST2F	STA2C2	16-Oct-01	1001100	LMB	0	144	36	0.2
ST2F	STA2C2	16-Oct-01	1001095	LMB	1	215	95	0.36
ST2F	STA2C2	16-Oct-01	1001096	LMB	1	190	79	0.4
ST2F	STA2C2	16-Oct-01	1001099	LMB	1	174	62	0.65
ST2F	STA2C2	16-Oct-01	1001081	LMB	1	358	654	0.74
ST2F	STA2C2	16-Oct-01	1001082	LMB	1	325	416	0.63
ST2F	STA2C2	16-Oct-01	1001083	LMB	1	362	545	0.35
ST2F	STA2C2	16-Oct-01	1001084	LMB	2	286	327	0.49
ST2F	STA2C3	16-Oct-01	1001129	LMB	2	285	316	0.2
ST2F	STA2C3	16-Oct-01	1001151	RESU		150	64	0.02
ST2F	STA2C3	16-Oct-01	1001122	LMB	1	339	549	0.16
ST2F	STA2C3	16-Oct-01	1001123	LMB	1	318	359	0.2
ST2F	STA2C3	16-Oct-01	1001124	LMB	1	264	230	0.081
ST2F	STA2C3	16-Oct-01	1001125	LMB	1	297	361	0.083

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST2F	STA2C3	16-Oct-01	1001126	LMB	1	273	283	0.072
ST2F	STA2C3	16-Oct-01	1001127	LMB	1	239	177	0.096
ST2F	STA2C3	16-Oct-01	1001128	LMB	1	275	227	0.096
ST2F	STA2C3	16-Oct-01	1001121	LMB	1	367	734	0.12
ST2F	STA2C3	16-Oct-01	1001155	BLUE		135	48	0.019
ST2F	STA2C3	16-Oct-01	1001130	LMB	1	270	286	0.16
ST2F	STA2C3	16-Oct-01	1001160	WAR		126	43	0.049
ST2F	STA2C3	16-Oct-01	1001159	WAR		127	47	0.061
ST2F	STA2C3	16-Oct-01	1001158	WAR		132	51	0.055
ST2F	STA2C3	16-Oct-01	1001156	BLUE		122	33	0.054
ST2F	STA2C3	16-Oct-01	1001154	BLUE		129	39	0.033
ST2F	STA2C3	16-Oct-01	1001153	BLUE		121	33	0.02
ST2F	STA2C3	16-Oct-01	1001152	RESU		135	44	0.02
ST2F	STA2C3	16-Oct-01	1001149	RESU		163	95	0.026
ST2F	STA2C3	16-Oct-01	1001150	RESU		157	79	0.02
ST2F	STA2C3	16-Oct-01	1001148	RESU		178	96	0.047
ST2F	STA2C3	16-Oct-01	1001147	RESU		177	104	0.022
ST2F	STA2C3	16-Oct-01	1001146	WAR		173	123	0.11
ST2F	STA2C3	16-Oct-01	1001145	WAR		164	97	0.055
ST2F	STA2C3	16-Oct-01	1001134	LMB	1	300	388	0.08
ST2F	STA2C3	16-Oct-01	1001157	BLUE		113	27	0.026
ST2F	STA2C3	16-Oct-01	1001144	WAR		157	92	0.04
ST2F	STA2C3	16-Oct-01	1001131	LMB	1	240	219	0.14
ST2F	STA2C3	16-Oct-01	1001132	LMB	1	255	204	0.096
ST2F	STA2C3	16-Oct-01	1001133	LMB	1	267	263	0.086
ST2F	STA2C3	16-Oct-01	1001135	LMB	1	236	170	0.15
ST2F	STA2C3	16-Oct-01	1001136	LMB	1	236	173	0.11
ST2F	STA2C3	16-Oct-01	1001141	WAR		183	164	0.04
ST2F	STA2C3	16-Oct-01	1001143	WAR		173	114	0.063
ST2F	STA2C3	16-Oct-01	1001142	WAR		175	131	0.068
ST2F	STA2C3	16-Oct-01	1001137	LMB	1	231	157	0.075
ST2F	STA2C3	16-Oct-01	1001140	LMB	1	216	119	0.13
ST2F	STA2C3	16-Oct-01	1001139	LMB	1	216	135	0.068
ST2F	STA2C3	16-Oct-01	1001138	LMB	1	247	194	0.1
ST5F	G342A	20-Sep-01	901251	WAR		116	335	0.087
ST5F	G342A	20-Sep-01	901260	BLUE		117	25	0.048
ST5F	G342A	20-Sep-01	901244	RESU		160	68	0.075
ST5F	G342A	20-Sep-01	901243	RESU		186	108	0.048
ST5F	G342A	20-Sep-01	901246	RESU		153	62	0.068
ST5F	G342A	20-Sep-01	901247	RESU		135	48	0.041
ST5F	G342A	20-Sep-01	901248	RESU		165	82	0.041
ST5F	G342A	20-Sep-01	901249	RESU		166	86	0.076
ST5F	G342A	20-Sep-01	901250	RESU		129	42	0.022
ST5F	G342A	20-Sep-01	901245	RESU		160	82	0.058
ST5F	G342A	20-Sep-01	901252	BLUE		139	48	0.071
ST5F	G342A	20-Sep-01	901253	BLUE		153	66	0.051
ST5F	G342A	20-Sep-01	901254	BLUE		144	55	0.13
ST5F	G342A	20-Sep-01	901255	BLUE		144	55	0.066

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST5F	G342A	20-Sep-01	901256	BLUE		128	36	0.058
ST5F	G342A	20-Sep-01	901257	BLUE		115	29	0.046
ST5F	G342A	20-Sep-01	901259	BLUE		111	22	0.056
ST5F	G342A	20-Sep-01	901242	RESU		164	77	0.078
ST5F	G342A	20-Sep-01	901235	LMB	1	241	190	0.2
ST5F	G342A	20-Sep-01	901258	BLUE		80	10	0.057
ST5F	G342A	20-Sep-01	901222	LMB	1	290	332	0.29
ST5F	G342A	20-Sep-01	901237	LMB	0	209	122	0.75
ST5F	G342A	20-Sep-01	901221	LMB	1	340	557	0.35
ST5F	G342A	20-Sep-01	901241	RESU		165	82	0.075
ST5F	G342A	20-Sep-01	901223	LMB	2	315	384	0.25
ST5F	G342A	20-Sep-01	901224	LMB	1	280	289	0.21
ST5F	G342A	20-Sep-01	901225	LMB	1	340	529	0.22
ST5F	G342A	20-Sep-01	901226	LMB	1	286	392	0.27
ST5F	G342A	20-Sep-01	901227	LMB	1	280	288	0.24
ST5F	G342A	20-Sep-01	901228	LMB	1	292	381	0.27
ST5F	G342A	20-Sep-01	901229	LMB	1	283	313	0.25
ST5F	G342A	20-Sep-01	901238	LMB	1	250	207	0.17
ST5F	G342A	20-Sep-01	901230	LMB	1	287	311	0.29
ST5F	G342A	20-Sep-01	901239	LMB	1	224	146	0.19
ST5F	G342A	20-Sep-01	901236	LMB	1	280	269	0.29
ST5F	G342A	20-Sep-01	901234	LMB	1	280	289	0.43
ST5F	G342A	20-Sep-01	901233	LMB	1	295	354	0.25
ST5F	G342A	20-Sep-01	901232	LMB	1	291	371	0.23
ST5F	G342A	20-Sep-01	901231	LMB	1	278	257	0.45
ST5F	G342A	20-Sep-01	901240	LMB	1	230	169	0.2
ST5F	G344A	20-Sep-01	901443	RESU		139	52	0.083
ST5F	G344A	20-Sep-01	901444	SPSU		119	38	0.05
ST5F	G344A	20-Sep-01	901457	BLUE		110	20	0.061
ST5F	G344A	20-Sep-01	901451	BLUE		126	33	0.12
ST5F	G344A	20-Sep-01	901445	WAR		151	76	0.2
ST5F	G344A	20-Sep-01	901446	WAR		150	78	0.2
ST5F	G344A	20-Sep-01	901447	WAR		131	41	0.14
ST5F	G344A	20-Sep-01	901448	WAR		126	37	0.18
ST5F	G344A	20-Sep-01	901449	WAR		111	28	0.15
ST5F	G344A	20-Sep-01	901450	BLUE		134	44	0.11
ST5F	G344A	20-Sep-01	901452	BLUE		135	46	0.13
ST5F	G344A	20-Sep-01	901453	BLUE		124	25	0.1
ST5F	G344A	20-Sep-01	901454	BLUE		113	23	0.12
ST5F	G344A	20-Sep-01	901460	BLUE		86	11	0.043
ST5F	G344A	20-Sep-01	901456	BLUE		109	16	0.097
ST5F	G344A	20-Sep-01	901458	BLUE		108	20	0.096
ST5F	G344A	20-Sep-01	901459	BLUE		108	12	0.088
ST5F	G344A	20-Sep-01	901442	RESU		141	47	0.13
ST5F	G344A	20-Sep-01	901434	LMB	2	307	408	0.35
ST5F	G344A	20-Sep-01	901455	BLUE		125	29	0.097
ST5F	G344A	20-Sep-01	901423	LMB	2	386	927	0.43
ST5F	G344A	20-Sep-01	901436	LMB	2	334	505	0.49
ST5F	G344A	20-Sep-01	901441	RESU		147	62	0.13

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST5F	G344A	20-Sep-01	901422	LMB	1	385	932	0.51
ST5F	G344A	20-Sep-01	901424	LMB	1	330	541	0.59
ST5F	G344A	20-Sep-01	901425	LMB	2	376	823	0.39
ST5F	G344A	20-Sep-01	901426	LMB	4	385	702	0.78
ST5F	G344A	20-Sep-01	901427	LMB	5	340	579	0.59
ST5F	G344A	20-Sep-01	901428	LMB	2	354	676	0.5
ST5F	G344A	20-Sep-01	901429	LMB	1	311	522	0.45
ST5F	G344A	20-Sep-01	901430	LMB	1	282	306	0.67
ST5F	G344A	20-Sep-01	901438	LMB	1	283	330	0.38
ST5F	G344A	20-Sep-01	901431	LMB	1	316	475	0.45
ST5F	G344A	20-Sep-01	901439	LMB	1	283	309	0.29
ST5F	G344A	20-Sep-01	901437	LMB	1	340	487	0.64
ST5F	G344A	20-Sep-01	901421	LMB	2	305	421	0.5
ST5F	G344A	20-Sep-01	901435	LMB	1	284	314	0.46
ST5F	G344A	20-Sep-01	901440	LMB	1	253	233	0.21
ST5F	G344A	20-Sep-01	901433	LMB	1	295	395	0.39
ST5F	G344A	20-Sep-01	901432	LMB	1	324	538	0.44
ST5F	STA5C1B	20-Sep-01	901722	RESU		151	60	0.071
ST5F	STA5C1B	20-Sep-01	901734	WAR		113	32	0.12
ST5F	STA5C1B	20-Sep-01	901729	BLUE		127	36	0.078
ST5F	STA5C1B	20-Sep-01	901724	WAR		153	82	0.3
ST5F	STA5C1B	20-Sep-01	901725	BLUE		151	64	0.092
ST5F	STA5C1B	20-Sep-01	901726	BLUE		150	53	0.13
ST5F	STA5C1B	20-Sep-01	901727	BLUE		150	62	0.13
ST5F	STA5C1B	20-Sep-01	901728	BLUE		136	46	0.099
ST5F	STA5C1B	20-Sep-01	901723	RESU		174	95	0.11
ST5F	STA5C1B	20-Sep-01	901730	BLUE		141	43	0.17
ST5F	STA5C1B	20-Sep-01	901731	WAR		172	113	0.21
ST5F	STA5C1B	20-Sep-01	901738	BLUE		110	22	0.11
ST5F	STA5C1B	20-Sep-01	901733	WAR		125	45	0.16
ST5F	STA5C1B	20-Sep-01	901735	WAR		126	47	0.2
ST5F	STA5C1B	20-Sep-01	901736	WAR		107	29	0.086
ST5F	STA5C1B	20-Sep-01	901737	BLUE		114	18	0.064
ST5F	STA5C1B	20-Sep-01	901719	LMB	1	218	139	0.16
ST5F	STA5C1B	20-Sep-01	901739	WAR		85	14	0.11
ST5F	STA5C1B	20-Sep-01	901732	WAR		137	57	0.17
ST5F	STA5C1B	20-Sep-01	901705	LMB	1	315	472	0.66
ST5F	STA5C1B	20-Sep-01	901721	RESU		180	110	0.097
ST5F	STA5C1B	20-Sep-01	901720	LMB	1	270	260	0.43
ST5F	STA5C1B	20-Sep-01	901701	LMB	2	386	798	0.93
ST5F	STA5C1B	20-Sep-01	901702	LMB	2	430	1204	0.89
ST5F	STA5C1B	20-Sep-01	901704	LMB	1	388	819	0.76
ST5F	STA5C1B	20-Sep-01	901706	LMB	1	303	445	0.65
ST5F	STA5C1B	20-Sep-01	901707	LMB	2	302	343	0.45
ST5F	STA5C1B	20-Sep-01	901708	LMB	1	272	303	0.45
ST5F	STA5C1B	20-Sep-01	901709	LMB	1	291	310	0.49
ST5F	STA5C1B	20-Sep-01	901717	LMB	1	248	199	0.31
ST5F	STA5C1B	20-Sep-01	901703	LMB	2	354	558	0.96
ST5F	STA5C1B	20-Sep-01	901718	LMB	1	220	150	0.23

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST5F	STA5C1B	20-Sep-01	901710	LMB	2	377	679	0.88
ST5F	STA5C1B	20-Sep-01	901716	LMB	1	230	153	0.18
ST5F	STA5C1B	20-Sep-01	901715	LMB	1	270	246	0.25
ST5F	STA5C1B	20-Sep-01	901714	LMB	1	232	157	0.24
ST5F	STA5C1B	20-Sep-01	901713	LMB	2	246	201	0.45
ST5F	STA5C1B	20-Sep-01	901712	LMB	2	324	448	0.63
ST5F	STA5C1B	20-Sep-01	901711	LMB	1	250	231	0.35
ST5F	STA5C2B	20-Sep-01	901771	WAR		156	85	0.15
ST5F	STA5C2B	20-Sep-01	901743	LMB	1	261	206	0.61
ST5F	STA5C2B	20-Sep-01	901764	WAR		186	163	0.23
ST5F	STA5C2B	20-Sep-01	901765	BLUE		167	86	0.16
ST5F	STA5C2B	20-Sep-01	901766	BLUE		174	98	0.16
ST5F	STA5C2B	20-Sep-01	901767	BLUE		189	151	0.18
ST5F	STA5C2B	20-Sep-01	901768	BLUE		150	70	0.091
ST5F	STA5C2B	20-Sep-01	901769	WAR		177	139	0.2
ST5F	STA5C2B	20-Sep-01	901770	WAR		179	145	0.21
ST5F	STA5C2B	20-Sep-01	901763	RESU		171	105	0.073
ST5F	STA5C2B	20-Sep-01	901772	WAR		165	103	0.33
ST5F	STA5C2B	20-Sep-01	901773	WAR		157	108	0.18
ST5F	STA5C2B	20-Sep-01	901774	WAR		183	140	0.23
ST5F	STA5C2B	20-Sep-01	901775	WAR		150	76	0.22
ST5F	STA5C2B	20-Sep-01	901776	WAR		145	71	0.15
ST5F	STA5C2B	20-Sep-01	901780	BLUE		160	76	0.11
ST5F	STA5C2B	20-Sep-01	901777	WAR		151	84	0.27
ST5F	STA5C2B	20-Sep-01	901762	RESU		164	86	0.058
ST5F	STA5C2B	20-Sep-01	901779	WAR		122	40	0.11
ST5F	STA5C2B	20-Sep-01	901778	WAR		135	47	0.16
ST5F	STA5C2B	20-Sep-01	901745	LMB	1	278	264	0.52
ST5F	STA5C2B	20-Sep-01	901761	RESU		178	111	0.078
ST5F	STA5C2B	20-Sep-01	901741	LMB	1	280	251	0.44
ST5F	STA5C2B	20-Sep-01	901742	LMB	1	242	184	0.46
ST5F	STA5C2B	20-Sep-01	901744	LMB	1	285	325	0.28
ST5F	STA5C2B	20-Sep-01	901746	LMB	1	282	251	0.46
ST5F	STA5C2B	20-Sep-01	901747	LMB	1	271	256	0.43
ST5F	STA5C2B	20-Sep-01	901748	LMB	1	255	216	0.52
ST5F	STA5C2B	20-Sep-01	901749	LMB	1	243	181	0.4
ST5F	STA5C2B	20-Sep-01	901750	LMB	1	263	261	0.49
ST5F	STA5C2B	20-Sep-01	901760	LMB	1	232	154	0.42
ST5F	STA5C2B	20-Sep-01	901752	LMB	1	276	255	0.39
ST5F	STA5C2B	20-Sep-01	901753	LMB	1	245	162	0.45
ST5F	STA5C2B	20-Sep-01	901754	LMB	1	236	148	0.45
ST5F	STA5C2B	20-Sep-01	901755	LMB	1	260	233	0.49
ST5F	STA5C2B	20-Sep-01	901756	LMB	1	240	159	0.41
ST5F	STA5C2B	20-Sep-01	901757	LMB	1	250	174	0.47
ST5F	STA5C2B	20-Sep-01	901758	LMB	1	222	123	0.69
ST5F	STA5C2B	20-Sep-01	901759	LMB	1	221	140	0.55
ST5F	STA5C2B	20-Sep-01	901751	LMB	1	260	256	0.3
ST6F	G600	19-Sep-01	901911	LMB	1	340	582	0.25
ST6F	G600	19-Sep-01	901912	LMB	0	206	129	0.16

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST6F	G600	19-Sep-01	901913	LMB	1	311	450	0.22
ST6F	G600	19-Sep-01	901914	LMB	1	277	302	0.26
ST6F	G600	19-Sep-01	901915	LMB	1	273	285	0.27
ST6F	G600	19-Sep-01	901916	LMB	1	290	372	0.26
ST6F	G600	19-Sep-01	901910	LMB	1	274	309	0.26
ST6F	G600	19-Sep-01	901918	LMB	1	228	186	0.21
ST6F	G600	19-Sep-01	901904	LMB	2	320	478	0.33
ST6F	G600	19-Sep-01	901917	LMB	0	205	129	0.14
ST6F	G600	19-Sep-01	901909	LMB	0	180	87	0.14
ST6F	G600	19-Sep-01	901908	LMB	0	189	88	0.19
ST6F	G600	19-Sep-01	901907	LMB	1	269	289	0.25
ST6F	G600	19-Sep-01	901901	LMB	2	340	642	0.37
ST6F	G600	19-Sep-01	901905	LMB	2	328	522	0.41
ST6F	G600	19-Sep-01	901903	LMB	2	334	548	0.34
ST6F	G600	19-Sep-01	901902	LMB	3	369	816	0.46
ST6F	G600	19-Sep-01	901919	LMB	0	186	89	0.15
ST6F	G600	19-Sep-01	901925	BLUE		152	68	0.075
ST6F	G600	19-Sep-01	901906	LMB	1	324	499	0.24
ST6F	G600	19-Sep-01	901934	RESU		161	83	0.057
ST6F	G600	19-Sep-01	901940	RESU		149	58	0.046
ST6F	G600	19-Sep-01	901939	RESU		105	20	0.036
ST6F	G600	19-Sep-01	901938	RESU		135	46	0.027
ST6F	G600	19-Sep-01	901937	RESU		140	54	0.048
ST6F	G600	19-Sep-01	901923	BLUE		199	201	0.22
ST6F	G600	19-Sep-01	901935	RESU		163	78	0.07
ST6F	G600	19-Sep-01	901920	LMB	0	212	127	0.15
ST6F	G600	19-Sep-01	901933	RESU		135	46	0.037
ST6F	G600	19-Sep-01	901932	RESU		160	83	0.047
ST6F	G600	19-Sep-01	901931	RESU		139	50	0.037
ST6F	G600	19-Sep-01	901929	BLUE		124	35	0.056
ST6F	G600	19-Sep-01	901928	BLUE		175	105	0.074
ST6F	G600	19-Sep-01	901927	BLUE		158	79	0.07
ST6F	G600	19-Sep-01	901926	BLUE		135	42	0.067
ST6F	G600	19-Sep-01	901924	BLUE		143	49	0.11
ST6F	G600	19-Sep-01	901921	BLUE		171	92	0.13
ST6F	G600	19-Sep-01	901930	SPSU		161	100	0.073
ST6F	G600	19-Sep-01	901922	BLUE		182	122	0.11
ST6F	G600	19-Sep-01	901936	RESU		159	83	0.041
ST6F	G606	19-Sep-01	901859	RESU		140	46	0.078
ST6F	G606	19-Sep-01	901852	WAR		80	10	0.13
ST6F	G606	19-Sep-01	901853	SPSU		142	71	0.14
ST6F	G606	19-Sep-01	901854	BLUE		160	67	0.18
ST6F	G606	19-Sep-01	901855	RESU		134	39	0.055
ST6F	G606	19-Sep-01	901856	RESU		159	67	0.073
ST6F	G606	19-Sep-01	901858	RESU		142	49	0.097
ST6F	G606	19-Sep-01	901860	RESU		145	53	0.048
ST6F	G606	19-Sep-01	901851	BLUE		104	19	0.097
ST6F	G606	19-Sep-01	901845	BLUE		116	26	0.12
ST6F	G606	19-Sep-01	901857	RESU		140	48	0.063

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST6F	G606	19-Sep-01	901847	BLUE		99	15	0.074
ST6F	G606	19-Sep-01	901836	LMB	2	278	252	0.73
ST6F	G606	19-Sep-01	901835	LMB	1	217	145	0.4
ST6F	G606	19-Sep-01	901834	LMB	1	223	164	0.38
ST6F	G606	19-Sep-01	901833	LMB	1	246	189	0.54
ST6F	G606	19-Sep-01	901832	LMB	2	275	280	0.56
ST6F	G606	19-Sep-01	901831	LMB	0	185	84	0.094
ST6F	G606	19-Sep-01	901837	LMB	3	394	914	0.59
ST6F	G606	19-Sep-01	901829	LMB	1	261	239	0.45
ST6F	G606	19-Sep-01	901830	LMB	2	235	162	0.61
ST6F	G606	19-Sep-01	901827	LMB	2	325	284	1.1
ST6F	G606	19-Sep-01	901826	LMB	3	355	645	0.58
ST6F	G606	19-Sep-01	901825	LMB	2	306	331	0.55
ST6F	G606	19-Sep-01	901824	LMB	1	244	190	0.46
ST6F	G606	19-Sep-01	901823	LMB	1	251	236	0.53
ST6F	G606	19-Sep-01	901822	LMB	1	270	273	0.55
ST6F	G606	19-Sep-01	901821	LMB	4	380	897	0.8
ST6F	G606	19-Sep-01	901850	BLUE		126	34	0.096
ST6F	G606	19-Sep-01	901841	BLUE		112	24	0.11
ST6F	G606	19-Sep-01	901828	LMB	2	291	327	0.63
ST6F	G606	19-Sep-01	901848	BLUE		105	19	0.084
ST6F	G606	19-Sep-01	901846	BLUE		115	26	0.1
ST6F	G606	19-Sep-01	901844	BLUE		111	22	0.1
ST6F	G606	19-Sep-01	901842	BLUE		150	62	0.079
ST6F	G606	19-Sep-01	901849	BLUE		124	26	0.082
ST6F	G606	19-Sep-01	901840	LMB	0	178	86	0.3
ST6F	G606	19-Sep-01	901839	LMB	4	416	1039	1.2
ST6F	G606	19-Sep-01	901838	LMB	3	300	343	0.65
ST6F	G606	19-Sep-01	901843	BLUE		162	85	0.16
ST6F	STA6C32	19-Sep-01	901890	RESU		178	113	0.075
ST6F	STA6C32	19-Sep-01	901889	RESU		189	129	0.092
ST6F	STA6C32	19-Sep-01	901888	RESU		147	57	0.089
ST6F	STA6C32	19-Sep-01	901883	BLUE		174	105	0.14
ST6F	STA6C32	19-Sep-01	901891	RESU		121	30	0.051
ST6F	STA6C32	19-Sep-01	901892	RESU		148	57	0.074
ST6F	STA6C32	19-Sep-01	901882	BLUE		192	144	0.058
ST6F	STA6C32	19-Sep-01	901887	RESU		154	61	0.075
ST6F	STA6C32	19-Sep-01	901886	RESU		144	56	0.051
ST6F	STA6C32	19-Sep-01	901885	BLUE		91	13	0.07
ST6F	STA6C32	19-Sep-01	901884	BLUE		88	13	0.12
ST6F	STA6C32	19-Sep-01	901881	BLUE		115	29	0.046
ST6F	STA6C32	19-Sep-01	901893	RESU		160	84	0.032
ST6F	STA6C52	19-Sep-01	901789	LMB	0	183	92	0.044
ST6F	STA6C52	19-Sep-01	901788	LMB	0	154	49	0.079
ST6F	STA6C52	19-Sep-01	901787	LMB	0	163	60	0.065
ST6F	STA6C52	19-Sep-01	901786	LMB	0	172	78	0.056
ST6F	STA6C52	19-Sep-01	901785	LMB	0	218	167	0.089
ST6F	STA6C52	19-Sep-01	901784	LMB	3	330	573	0.52
ST6F	STA6C52	19-Sep-01	901781	LMB	0	235	224	0.097

Table A.1. Continued.

Location	Station	Date	Sample ID	Species name	Age	Length (mm)	Weight (g)	THg (mg/Kg)
ST6F	STA6C52	19-Sep-01	901782	LMB	0	202	138	0.07
ST6F	STA6C52	19-Sep-01	901801	WAR		79	11	0.055
ST6F	STA6C52	19-Sep-01	901783	LMB	0	179	82	0.045
ST6F	STA6C52	19-Sep-01	901802	BLUE		145	67	0.046
ST6F	STA6C52	19-Sep-01	901803	BLUE		180	142	0.042
ST6F	STA6C52	19-Sep-01	901804	BLUE		131	51	0.055
ST6F	STA6C52	19-Sep-01	901805	BLUE		134	41	0.07
ST6F	STA6C52	19-Sep-01	901806	BLUE		118	33	0.058
ST6F	STA6C52	19-Sep-01	901807	BLUE		110	22	0.057
ST6F	STA6C52	19-Sep-01	901808	BLUE		150	70	0.02
ST6F	STA6C52	19-Sep-01	901809	BLUE		150	71	0.064
ST6F	STA6C52	19-Sep-01	901810	RESU		236	258	0.093
ST6F	STA6C52	19-Sep-01	901811	RESU		90	15	0.021
ST6F	STA6C52	19-Sep-01	901813	RESU		195	188	0.059
ST6F	STA6C52	19-Sep-01	901812	RESU		138	48	0.036

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