Quantitative Environmental Analysis, LLC

PCBs in the Upper Hudson River

Errata

Prepared for:

General Electric
Albany, New York

July 1999

314386

UPPER HUDSON RIVER MODELING REPORT
ERRATA SHEET

Executive Summary

Page	Location	Reported	Revised
1-2	Bullet 3	The Upper Hudson River is undergoing a natural recovery that will result in average fish PCB concentrations in all reaches of the river declining below 2 ppm within 10 to 15 years.	The Upper Hudson River is undergoing a natural recovery that will result in average **largemouth bass** PCB concentrations in all reaches of the river declining below 2 ppm within **about** 10 years, **based upon the most likely estimate of the model.**
1-2	Bullet 4	Additional reductions in the PCB loading to the river from the vicinity of the GE Hudson Falls site would accelerate the recovery throughout the river, reducing the time needed to reach 2 ppm by as much as 4 years.	Additional reductions in the PCB loading to the river from the vicinity of the GE Hudson Falls site would accelerate the recovery throughout the river, reducing the time needed to reach 2 ppm by as much as 4 years, **based upon the most likely estimate of the model.**
1-3	Bullet 1 (Add'l bullet)		**Bounding calculations indicate that, although less likely, the time for largemouth bass in all reaches of the river to decline below 2 ppm could be as long as 24 years. If this were the case, additional reductions in the PCB loading to the river would accelerate the recovery by as much as 12 years.**
1-3	Bullet 2 (previously Bullet 1)	Remediation of sediments by dredging, even at optimistic rates and efficiencies, would provide only a minor and temporary acceleration of the recovery that would be limited to the reaches in which remediation occurred.	Remediation of sediments by dredging, even at optimistic rates and efficiencies, would provide only a minor and temporary **reduction in PCB levels** that would be limited to the reaches in which remediation occurred.
1-3	Bullet 5 (previously Bullet 4)	A 100-year flood would not significantly alter natural recovery. It would cause a temporary increase in PCB levels in fish within the Thompson Island Pool that could extend the time needed to reach 2 ppm by a few years if the flood occurred in the near future. It would have almost no impact on fish within other reaches of the river.	A 100-year flood would not significantly alter natural recovery. It would cause a temporary increase in PCB levels in fish within the Thompson Island Pool that could extend the time needed **for largemouth bass** to reach 2 ppm by a few years if the flood occurred in the near future. It would have almost no impact on fish within other reaches of the river.
4-2	Paragraph 1	Using a more conservative estimate moderated by bounding calculations, which take into account the uncertainty of the more important model parameters, the model projects it could take until 2004 in Stillwater and 2014 in the TIP to reach 2 ppm (Figure 4-1a and b).	Using a more conservative estimate moderated by bounding calculations, which take into account the uncertainty of the more important model parameters, the model projects it could take until 2004 in Stillwater and **2023** in the TIP to reach 2 ppm (Figure 4-1a and b).

4-2	Paragraph 2	It projects that, under natural recovery, PCB concentrations in fish continue to decline to very low levels in 2029 of about 0.2 ppm in the TIP and 0.1 ppm in the Stillwater Pool (Figure 4-1a and b).	It projects that, under natural recovery, PCB concentrations in fish continue to decline to levels in 2029 of about **0.9** ppm in the TIP and **0.4** ppm in the Stillwater Pool (Figure 4-1a and b).
4-2	Sect 4.2, Paragraph 1	The projections demonstrate that eliminating the upstream PCB source accelerates recovery more than the other remedial alternatives. Upstream source control would reduce PCB concentrations in fish throughout the Upper Hudson River. If the upstream sources were completely eliminated in 1999[3], the model projects that the average TIP largemouth bass would reach the 2 ppm level 4 years sooner than under natural recovery (Figure 4-2a). Furthermore, by 2029, the PCB level would be reduced about an order of magnitude beyond that achievable by natural recovery (0.025 ppm versus 0.2 ppm). In the Stillwater reach, the reduction by 2029 would be about a factor of two and one-half (0.04 ppm versus 0.1 ppm) (Figure 4-2b). Stillwater largemouth bass were predicted to have higher PCB levels than TIP largemouth bass in 2029 because the benefits of source reduction would flow from upstream to downstream. Because the TIP is the closest reach to the source, the effects of source reduction would appear there first.	The projections demonstrate that eliminating the upstream PCB source accelerates recovery more than the other remedial alternatives. Upstream source control would reduce PCB concentrations in **largemouth bass** throughout the Upper Hudson River. If the upstream sources were completely eliminated in 1999[3], the model projects that the average TIP largemouth bass would reach the 2 ppm level 4 years sooner than under natural recovery (Figure 4-2a). Furthermore, by 2029, the PCB level would be reduced about a **factor of three** beyond that achievable by natural recovery **(0.3 ppm versus 0.9 ppm)**. In the Stillwater reach, the reduction by 2029 would be about a factor of two and one-half **(0.15 ppm versus 0.4 ppm)** (Figure 4-2b). ~~Stillwater largemouth bass were predicted to have higher PCB levels than TIP largemouth bass in 2029 because the benefits of source reduction would flow from upstream to downstream. Because the TIP is the closest reach to the source, the effects of source reduction would appear there first.~~
4-3	Sect 4.3, Paragraph 1	Dredging NYSDEC hot spots would have no impact on the time it will take for fish tissue to reach the 2 ppm level (Figure 4-3a and b). Dredging cohesive sediments accelerated this time only in the TIP and only by 1 year (Figure 4-4a and b). Both dredging options (the hot spots and cohesive sediments from Rogers Island to Northumberland Dam) would produce small reductions in TIP largemouth bass levels and essentially no reduction in Stillwater largemouth bass levels.	Dredging NYSDEC hot spots would **cause largemouth bass tissue levels in the TIP to reach 2 ppm approximately one year sooner (2009 vs. 2010); there would be no impact on levels at Stillwater (Figure 4-3a and b). Similarly,** dredging cohesive sediments **would accelerate** this time by 1 year and only in the TIP (Figure 4-4a and b). Dredging the hot spots would produce **a temporary reduction in TIP largemouth bass levels of approximately 0.4 ppm (from 1.6 to 1.2 ppm in 2012). Thus difference between natural recovery and dredging would decline over time to approximately 0.1 ppm in 2029 and eventually to zero. Dredging cohesive sediments from Rogers Island to Northumberland Dam would produce a temporary reduction of 0.6 ppm; this reduction would also eventually decline to zero. In both cases, there would be** essentially no reduction in Stillwater largemouth bass levels.

4-4	Paragraph 2	A 100-year flood event would cause a temporary increase in TIP fish PCB levels, but almost no increase in Stillwater fish PCB levels. The extent of the increase in the TIP would depend on when the flood occurred. For example, if the flood occurred in 2006 it would result in about a 1 ppm increase in TIP largemouth bass, whereas the increase would be about 0.12 ppm if the flood occurred in 2013 or 0.10 ppm if it occurred in 2020. The decreasing impact....	A 100-year flood event would cause a temporary increase in TIP **largemouth bass** PCB levels, but almost no increase in **levels at Stillwater**. The extent of the increase in the TIP would depend on when the flood occurred. For example, if the flood occurred in 2006 it would result in about **an 0.8** ppm increase in TIP largemouth bass, whereas the increase would be about **0.6** ppm if the flood occurred in 2013 or **0.4** ppm if it occurred in 2020. The decreasing impact....
4-5	Sect 4.5	The Upper Hudson River is undergoing a natural recovery that will result in average fish concentrations reaching 2 ppm in all reaches of the river within about 10 to 15 years and levels of 0.1 to 0.2 ppm within 30 years. The recovery can....	The Upper Hudson River is undergoing a natural recovery that will result in average **largemouth bass** concentrations reaching 2 ppm in all reaches of the river within about 10 to **24** years and levels of **0.4 to 0.9** ppm within 30 years. The recovery can....
	Sect 4 Figures	4-1 through 4-4	replace with new figures

VOLUME II

Page	Location	Reported	Revised
TOC		A reference to 'PLATES' at the end of the TOC	Delete reference
Figure 1-3		Arrow for Diffusion points to particulate phase	Arrow for diffusion changed to point to dissolved, not particulate phase (see revised figure)
4-51	Paragraph 2	Reference to Section 1.4.6	Change to **1.3.6**
4-74	Paragraph 1	Figure 4-xxa &b'	Change to 'Figures 4-**63**a & b'
Figure 3-16	Title	Sediment loadings are in MT.	Sediment loadings are in **MT/yr.**
Figure 3-18	y-axis	First 2 numbers are missing significant figures	First and second numbers on y-axis should read 0.01 and 0.1, respectively.
Figure 3-19	y-axis	First 2 numbers are missing significant figures	First and second numbers on y-axis should read 0.01 and 0.1, respectively.
Figure 3-64		Incorrect parameters plotted.	Figure revised to show TSS concentration (see revised figure).
Figure 3-65		Incorrect parameters plotted.	Figure revised to show TSS concentration (see revised figure).

VOLUME III

Page	Location	Reported	Revised
6-2	Paragraph 1	The model projects that, in the TIP, fish tissue PCB levels would decline by about a factor of two within 7 years and reach 2 ppm in about 2010. By 2029, fish tissue PCBs would decline to about 0.2 ppm (Figure 6-2). In Stillwater, PCB concentrations in largemouth bass would reach 2 ppm about the year 2000 and exhibit a slower decline thereafter. The continuing decline results in fish tissue PCB concentrations in 2029 of about 0.1 ppm. The bounding model estimates higher largemouth bass PCB levels (about 1 ppm) at both the TIP and Stillwater, thus extending the times required to reach 2 ppm. Results of the bounding projections suggest PCB levels in largemouth bass may reach 2 ppm in 2014 and 2004 for TIP and Stillwater, respectively.	The model projects that, in the TIP, **largemouth bass** PCB levels would decline by about a factor of two within 7 years and reach 2 ppm in about 2010. By 2029, **largemouth bass** tissue PCBs would decline to about **0.9** ppm (Figure 6-2). In Stillwater, PCB concentrations in **largemouth bass** would reach 2 ppm about the year 2000 and exhibit a slower decline thereafter. The continuing decline results in **largemouth bass** tissue PCB concentrations in 2029 of about **0.4** ppm. The bounding model estimates largemouth bass PCB levels **that are higher on average by about 1 ppm at the TIP and 0.5 ppm at Stillwater**, thus extending the times required to reach 2 ppm. Results of the bounding projections suggest PCB levels in largemouth bass may reach 2 ppm in **2023** and 2004 for TIP and Stillwater, respectively.
6-3	Paragraph 1	PCBs in the TIP and Stillwater largemouth bass originate from both the water column and sediment. Thus, increased PCB loadings from upstream sources would result in higher PCB levels in largemouth bass throughout the Upper Hudson River as well as extend the time required for these fish to reach 2 ppm. For example, an increase in upstream PCB loadings from 0.2 to 0.4 lbs/day would result in a 10 to 20 percent increase in largemouth bass PCB levels at both TIP and Stillwater (Figure 6-4). Under these conditions, largemouth bass in TIP would require an additional 3 years to reach 2 ppm (2013 versus 2010). Because average PCB concentrations in largemouth bass in Stillwater are about 2 ppm at the beginning of the simulation, variations in the upstream loading would have no effect on the time to reach this level at that location.	PCBs in the TIP and Stillwater largemouth bass originate from both the water column and sediment. Thus, increased PCB loadings from upstream sources would result in higher PCB levels in largemouth bass throughout the Upper Hudson River as well as extend the time required for these fish to reach 2 ppm. For example, an increase in upstream PCB loadings from 0.2 to 0.4 lbs/day would result in a **40** percent increase **on average** in largemouth bass PCB levels at both TIP and Stillwater (Figure 6-4). Under these conditions, largemouth bass in TIP would require an additional **7** years to reach 2 ppm (**2017** versus 2010). Because average PCB concentrations in largemouth bass in Stillwater are about 2 ppm at the beginning of the simulation, variations in the upstream loading would have no effect on the time to reach this level at that location.
6-3	Paragraph 2	The bounding calculation suggests that increased PCB loadings from upstream would extend the time required for largemouth bass in the TIP to reach 2 ppm by one year (2014 versus 2013). Because largemouth bass at Stillwater obtain a greater portion of their PCBs from the water column (relative to TIP), a longer response time in these fish is estimated (2009 versus 2004; Figure 6-4).	The bounding calculation suggests that increased PCB loadings from upstream would extend the time required for largemouth bass in the TIP to reach 2 ppm **to beyond 2029. Largemouth bass at Stillwater would reach 2 ppm in 2009, rather than 2004 if the PCB loading remained at 0.2 lb/d** (Figure 6-4).

314390

	Sect 6 Figures	6-2 and 6-4	Replace
7-1	Paragraph 2	Upstream source control would accelerate the decline of fish PCB levels throughout the Upper Hudson River (Figure 7-2). In the TIP, average PCB concentrations in largemouth bass would decline with a half-life of about 5 years to about 2.5 ppm in 2004. The elimination of upstream PCB sources would permit largemouth bass in TIP to reach 2 ppm in about 2006, approximately 4 years sooner than without upstream source control. By 2029, predicted PCB concentrations are about an order of magnitude lower than levels achieved through natural recovery (0.02 versus 0.2 ppm). Reductions in fish tissue PCB concentrations at Stillwater would be similar; PCB levels would decline with a half-life of about 5 years. The control of upstream sources would result in about a factor of 2.5 reduction in largemouth bass PCBs by 2029. Bounding calculations indicate times to reach 2 ppm may extend to 2002 in Stillwater and 2011 in the TIP.	Upstream source control would accelerate the decline of fish PCB levels throughout the Upper Hudson River (Figure 7-2). In the TIP, average PCB concentrations in largemouth bass would decline with a half-life of about 5 years to about **2.2 ppm** in 2004. The elimination of upstream PCB sources would permit largemouth bass in TIP to reach 2 ppm in about 2006, approximately 4 years sooner than without upstream source control. By 2029, predicted PCB concentrations are about **a factor of three** lower than levels achieved through natural recovery **(0.3 versus 0.9 ppm)**. Reductions in **largemouth bass** tissue PCB concentrations at Stillwater would be similar; PCB levels would decline with a half-life of about 5 years. The control of upstream sources would result in about a factor of 2.5 reduction in largemouth bass PCBs by 2029. Bounding calculations indicate times to reach 2 ppm may extend to 2002 in Stillwater and 2011 in the TIP
	Sect 7 Figures	7-2	Replace
8-1	Paragraph 2	Dredging of TIP hot spots 1 to 35 would have little impact on the recovery of largemouth bass in the Upper Hudson River. Because the incremental reduction in surface sediment concentrations due to dredging would be small, the resulting reductions in largemouth bass PCBs would also be small. For example, the greatest impact of sediment removal would occur in about the year 2012 (Figure 8-2). At this time dredging would only offer about a 10 percent reduction in largemouth bass PCBs. In addition, fish tissue PCB concentrations are already estimated below 2 ppm due to natural recovery. By 2029, PCB levels would be similar to those predicted under natural recovery (about 0.2 ppm).	Dredging of TIP hot spots 1 to 35 would have little impact on the recovery of largemouth bass in the Upper Hudson River. Because the incremental reduction in surface sediment concentrations due to dredging would be small, the resulting reductions in largemouth bass PCBs would also be small. For example, the greatest impact of sediment removal would occur in about the year 2012 (Figure 8-2). At this time dredging would only offer about a **20** percent reduction in largemouth bass PCBs. In addition, **largemouth bass** tissue PCB concentrations are already estimated below 2 ppm due to natural recovery. By 2029, PCB levels would be similar to those predicted under natural recovery (about **0.8** ppm).

8-1	Paragraph 3	Although dredging TIP sediments would produce some PCB reduction in local TIP fish, removal of these sediments would not accelerate the recovery of fish in other portions of the river. For example, minimal reductions in fish tissue PCBs in Stillwater would result from the...	Although dredging TIP sediments would produce some PCB reduction in local TIP fish, removal of these sediments would not accelerate the recovery of fish in other portions of the river. For example, minimal reductions in **largemouth bass** tissue PCBs in Stillwater would result from the...
8-2	Paragraph 3	Removal of the cohesive sediments to a residual concentration of 1 ppm would produce some reduction of PCB levels in fish in the TIP. Largemouth bass would reach 2 ppm by about 2009 (versus 2010 under natural recovery, Figure 8-4). Bounding calculations suggest reaching the 2 ppm level could take until 2011. As predicted in the previous sediment removal scenario, average PCB levels in 2029 would be similar to those estimated under natural recovery. Because dredging sediments would provide reductions only in the reaches it occurred, essentially no reduction would be observed in fish tissue concentrations in Stillwater (Figure 8-4).	Removal of the cohesive sediments to a residual concentration of 1 ppm would produce some reduction of PCB levels in fish in the TIP. Largemouth bass would reach 2 ppm by about 2009 (versus 2010 under natural recovery, Figure 8-4). Bounding calculations suggest reaching the 2 ppm level could take until 2011. **Average PCB levels in 2029 would be slightly lower than those estimated under natural recovery (about 0.7 ppm versus 0.9)**. Because dredging sediments would provide reductions only in the reaches it occurred, essentially no reduction would be observed in **largemouth bass** tissue concentrations in Stillwater (Figure 8-4).
8-2	Paragraph 4	Achieving an ideal post-dredging sediment PCB level of 0 ppm would result in additional short-term reductions in TIP largemouth bass PCBs of about 20 percent beyond that achieved by dredging alone, but would have essentially no impact on fish in Stillwater. By 2029, PCB levels in largemouth bass would decline to about 0.2 and 0.1 ppm in the TIP and Stillwater, respectively; the same levels achieved by natural recovery (Figure 8-6).	Achieving an ideal post-dredging sediment PCB level of 0 ppm would result in additional short-term reductions in TIP largemouth bass PCBs of about **15** percent beyond that achieved by dredging alone, but would have essentially no impact on **largemouth bass** in Stillwater. By 2029, PCB levels in largemouth bass **in the TIP would decline to about 0.7 ppm (slightly less than the 0.9 ppm predicted under natural recovery). At Stillwater, largemouth bass levels achieved by 2029 would be the same as under natural recovery (0.4 ppm; Figure 8-6).**
	Sect 8 Figures	8-2, 8-4 and 8-6	Replace
9-2	Paragraph 2	The predicted rise in TIP cohesive surface sediment PCB concentration was predicted to cause an increase of about 1 ppm in average TIP largemouth bass PCB levels, extending the time to reach 2 ppm by about 3 years (2013 versus 2010) (Figure 9-2). The Stillwater largemouth bass were predicted to be unaffected by the flood because surface sediment concentrations in this reach would not increase.	The predicted rise in TIP cohesive surface sediment PCB concentration was predicted to cause an increase of about **0.8** ppm in average TIP largemouth bass PCB levels, extending the time to reach 2 ppm by about **4** years (**2014** versus 2010) (Figure 9-2). **The effects of the flood on Stillwater largemouth bass were predicted to be negligible** because surface sediment concentrations in this reach would not increase.

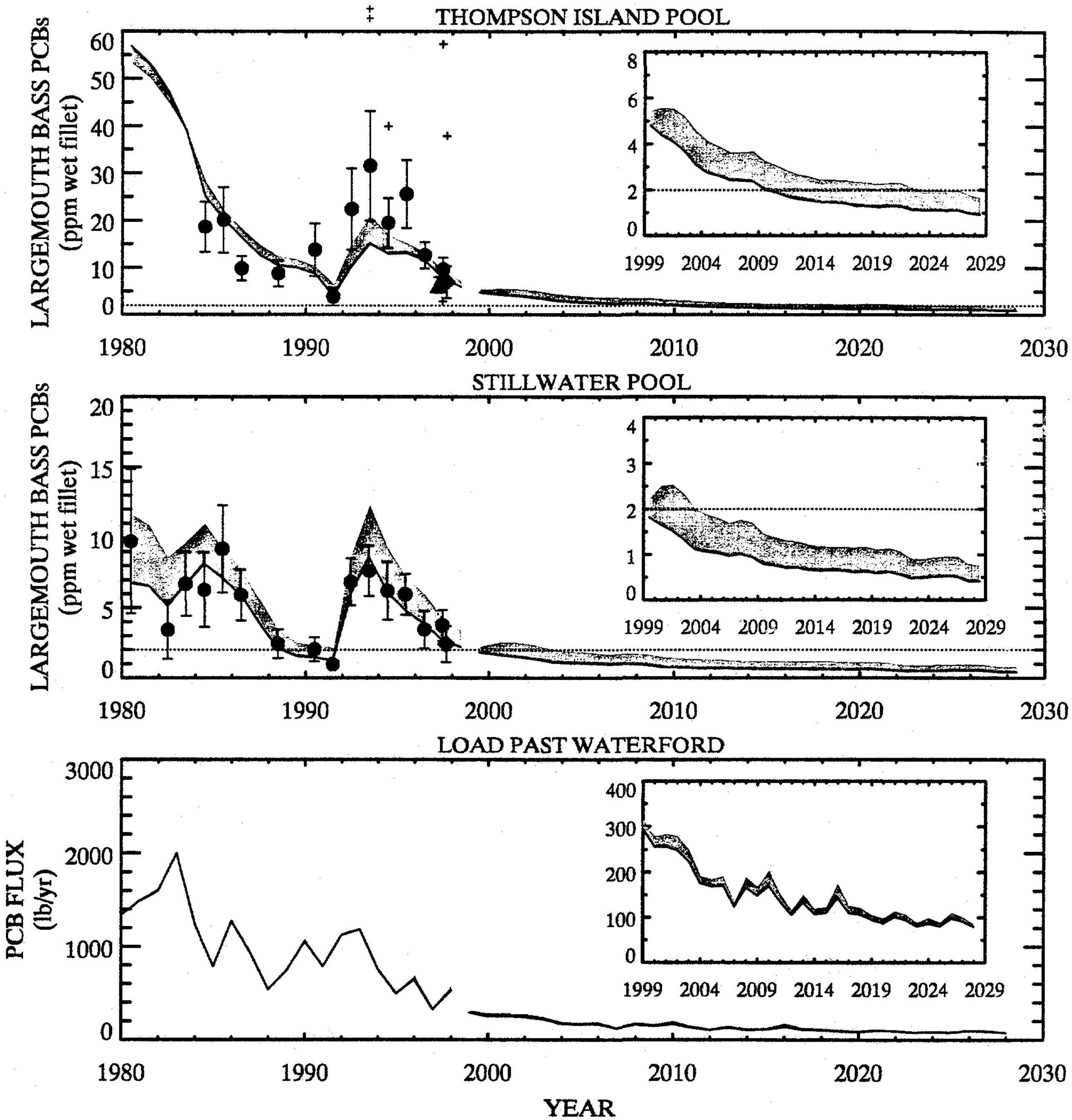
314392

9-2	Paragraph 4	A 100-year flood in 2013 would cause average TIP largemouth bass PCB levels to increase from about 0.53 ppm to about 0.65 ppm by 2015 (Figure 9-4). This increase in TIP fish PCB levels would be about eight times lower than the increase predicted for a similar flood event in 2006. Because sediment concentrations in the Stillwater reach are unaffected by the flood, PCB levels in largemouth bass in this reach would not increase. By 2029, the impacts of the flood on PCB concentrations in TIP largemouth bass would be negligible.	A 100-year flood in 2013 would cause average TIP largemouth bass PCB levels to increase from about **1.5 ppm** to about 2 ppm by 2015, **dropping below 2 ppm again within 3 years** (Figure 9-4). This increase in TIP **largemouth bass** PCB levels would be about **40 percent lower** than the increase predicted for a similar flood event in 2006. Because sediment concentrations in the Stillwater reach are unaffected by the flood, PCB levels in largemouth bass in this reach would not increase. By 2029, **the difference in PCB concentrations in TIP largemouth bass due to the flood would be reduced to about 0.2 ppm and this difference would continue to decline thereafter.**
9-2	Paragraph 6	Similar to a flood in 2013, the occurrence of a 100-year flood in 2020 would increase PCB levels in TIP largemouth bass from about 0.3 ppm to about 0.4 ppm (Figure 9-6). After the flood, PCB levels in average TIP largemouth bass would decline to levels similar to those estimated under natural recovery (about 0.2 ppm in 2029). PCB levels in largemouth bass in Stillwater would not be affected by a 100-year flood in 2020.	The occurrence of a 100-year flood in 2020 would increase PCB levels in TIP largemouth bass from about **1.1 ppm** to about **1.5 ppm** (Figure 9-6). After the flood, PCB levels in average TIP largemouth bass would **begin to decline again. By 2029, the levels would be about 0.3 ppm greater than under natural recovery and thereafter would continue to approach levels estimated under natural recovery. The effect of a 100-year flood in 2020 on PCB levels in largemouth bass in Stillwater would be negligible.**
	Sect 9 Figures	9-2, 9-4 and 9-6	Replace
10-1	Sect 10.1, Paragraph 1	The results show natural recovery, often referred to as No Action, will result in continued reductions of PCB concentrations in largemouth bass, the species at the top of the food chain. The model projected average largemouth bass PCB levels would reach 2 ppm by about the year 2000 in the Stillwater reach and 2010 in the TIP. Using a more conservative estimate moderated by bounding calculations, which take into account the uncertainty of the more important model parameters, we project it could take until 2004 in Stillwater and 2014 in the TIP to reach 2 ppm.	The results show natural recovery, often referred to as No Action, will result in continued reductions of PCB concentrations in largemouth bass, the species at the top of the food chain. The model projected average largemouth bass PCB levels would reach 2 ppm by about the year 2000 in the Stillwater reach and 2010 in the TIP. Using a more conservative estimate moderated by bounding calculations, which take into account the uncertainty of the more important model parameters, we project it could take until 2004 in Stillwater and **2023** in the TIP to reach 2 ppm.

10-1	Paragraph 2	The model simulated Upper Hudson River conditions for the thirty-year period from 1999 to 2029. It projected that, under natural recovery, PCB concentrations in fish continue to decline to very low levels in 2029 of about 0.2 ppm in the TIP and 0.1 ppm in the Stillwater Pool. PCB flux to the Lower Hudson River was projected to drop from a current level of about 300 lb/yr to about 90 lb/yr by the year 2029.	The model simulated Upper Hudson River conditions for the thirty-year period from 1999 to 2029. It projected that, under natural recovery, PCB concentrations in **largemouth bass** continue to decline to very low levels in 2029 of about **0.9 ppm** in the TIP and **0.4 ppm** in the Stillwater Pool. PCB flux to the Lower Hudson River was projected to drop from a current level of about 300 lb/yr to about 90 lb/yr by the year 2029.
10-2	Paragraph 1	The projections demonstrate that eliminating the upstream PCB source accelerates recovery more than the other remedial alternatives. Upstream source control would reduce PCB concentrations in fish throughout the Upper Hudson River; sediment remediation by dredging was predicted to yield more limited and localized reductions. If the upstream sources were completely eliminated in 1999, the model projected that the average TIP largemouth bass would reach 2 ppm 4 years sooner than under natural recovery. Furthermore, by 2029, the PCB level would be reduced about an order of magnitude beyond that achievable by natural recovery (0.025 ppm versus 0.2 ppm). In the Stillwater reach, the reduction by 2029 would be about a factor of two and one-half (0.04 ppm versus 0.1 ppm). Stillwater largemouth bass were predicted to have higher PCB levels than TIP largemouth bass in 2029 because the benefits of source reduction would flow from upstream to downstream. Because the TIP is the closest reach to the source, the effects of source reduction would appear there first.	The projections demonstrate that eliminating the upstream PCB source accelerates recovery more than the other remedial alternatives. Upstream source control would reduce PCB concentrations in fish throughout the Upper Hudson River; sediment remediation by dredging was predicted to yield more limited and localized reductions. If the upstream sources were completely eliminated in 1999, the model projected that the average TIP largemouth bass would reach 2 ppm 4 years sooner than under natural recovery. Furthermore, by 2029, the PCB level would be reduced about **a factor of three** beyond that achievable by natural recovery (**0.3 ppm** versus **0.9 ppm**). In the Stillwater reach, the reduction by 2029 would be about a factor of two and one-half (**0.15 ppm** versus **0.4 ppm**). ~~Stillwater largemouth bass were predicted to have higher PCB levels than TIP largemouth bass in 2029 because the benefits of source reduction would flow from upstream to downstream. Because the TIP is the closest reach to the source, the effects of source reduction would appear there first.~~

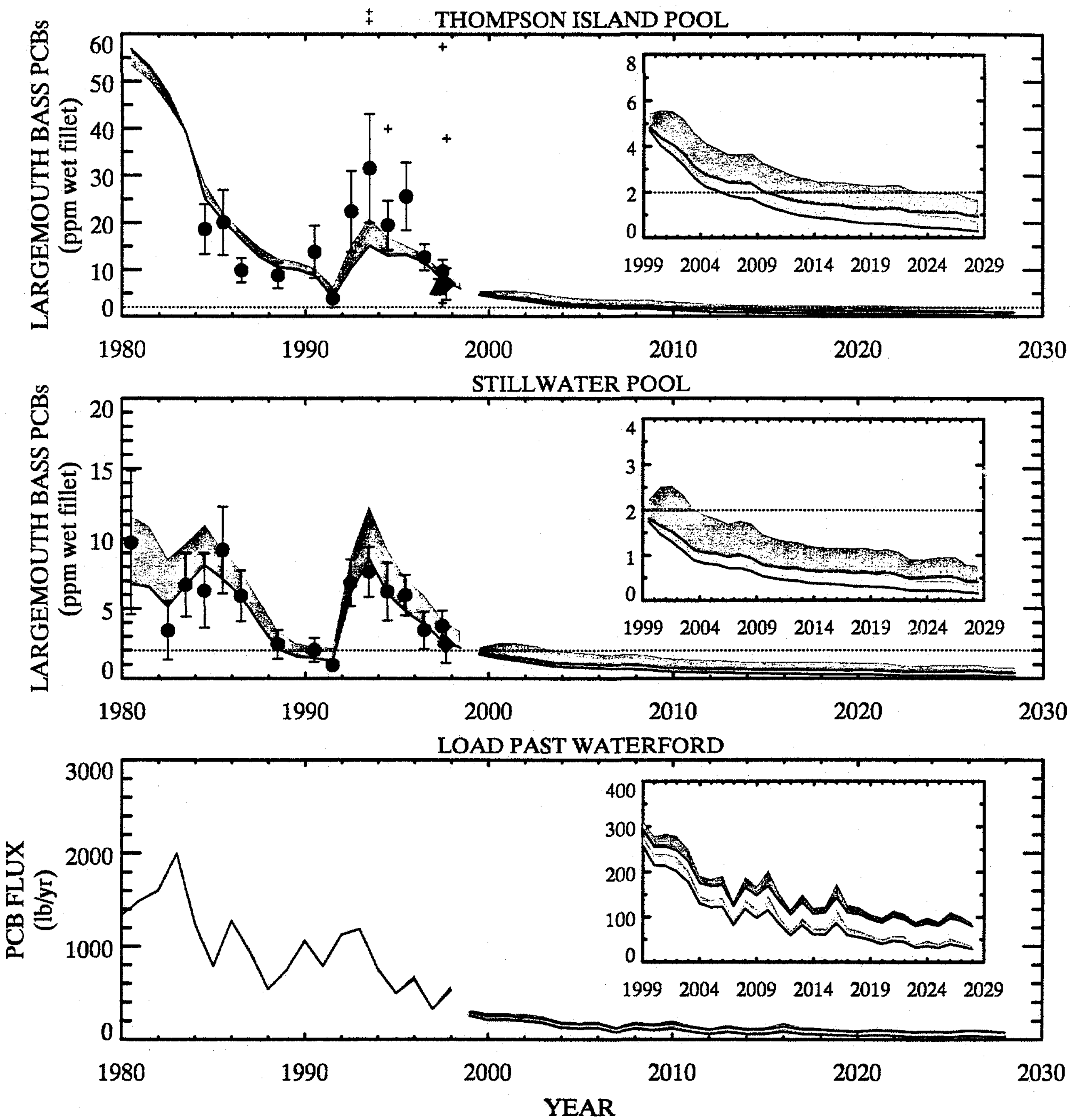
10-2	Sect 10.3	The model projects that dredging selected sediments would provide only a minimal benefit. Dredging NYSDEC hot spots 1 to 35 would have no impact on the time it will take for fish tissue to reach 2 ppm. Dredging cohesive sediments accelerated this time only in the TIP and only by 1 year. Both dredging options (the hot spots and Reaches 8,7,6 cohesive sediments) would produce small reductions in TIP largemouth bass levels and essentially no reduction in Stillwater largemouth bass levels. The predicted reductions were small because the incremental reductions in surface sediment concentration achieved by dredging were small. Natural recovery was predicted to reduce TIP cohesive surface sediment PCB levels to about 3 to 5 ppm by the time dredging could start in 2005 and natural recovery would continue to reduce these levels as dredging progressed over 9 to 12 years. Thus, dredging would reduce concentration by only a few parts per million. A zero post-dredging residual concentration would not provide significant additional reductions for the same reason. Further, the dredged areas would be subject to recontamination from non-cohesive sediments and from upstream sources.	The model projects that dredging selected sediments would provide only a minimal benefit. Dredging NYSDEC hot spots 1 to 35 would **reduce the time it will take for largemouth bass tissue to reach 2 ppm by about one year.** Dredging cohesive sediments **would also accelerate** this time only in the TIP and only by 1 year. Both dredging options (the hot spots and Reaches 8,7,6 cohesive sediments) would produce small **and temporary** reductions in TIP largemouth bass levels (**maxima of 0.4 and 0.6 ppm, respectively**), and essentially no reduction in Stillwater largemouth bass levels. The predicted reductions were small because the incremental reductions in surface sediment concentration achieved by dredging were small. Natural recovery was predicted to reduce TIP cohesive surface sediment PCB levels to about 3 to 5 ppm by the time dredging could start in 2005 and natural recovery would continue to reduce these levels as dredging progressed over 9 to 12 years. Thus, dredging would reduce concentration by only a few parts per million. A zero post-dredging residual concentration would not provide significant additional reductions for the same reason. Further, the dredged areas would be subject to recontamination from non-cohesive sediments and from upstream sources, **causing the predicted improvements in fish levels to be temporary.**
10-3	Paragraph 1	A 100-year flood event would cause an increase in TIP fish PCB levels, but almost no increase in Stillwater fish PCB levels. The extent of the increase in the TIP would depend on when the flood occurred. For example, if the flood occurred in 2006 it would result in about a 1 ppm increase in TIP largemouth bass, whereas the increase would be about 0.12 ppm if the flood occurred in 2013 or 0.10 ppm if it occurred in 2020. The decreasing impact further in the future is attributable to the declining surface sediment concentrations resulting from natural recovery.	A 100-year flood event would cause an increase in TIP fish PCB levels, but almost no increase in Stillwater fish PCB levels. The extent of the increase in the TIP would depend on when the flood occurred. For example, if the flood occurred in 2006 it would result in about **an 0.8** ppm increase in TIP largemouth bass, whereas the increase would be about **0.6** ppm if the flood occurred in 2013 or **0.4** ppm if it occurred in 2020. The decreasing impact further in the future is attributable to the declining surface sediment concentrations resulting from natural recovery.

Revised Figures
for
Executive Summary



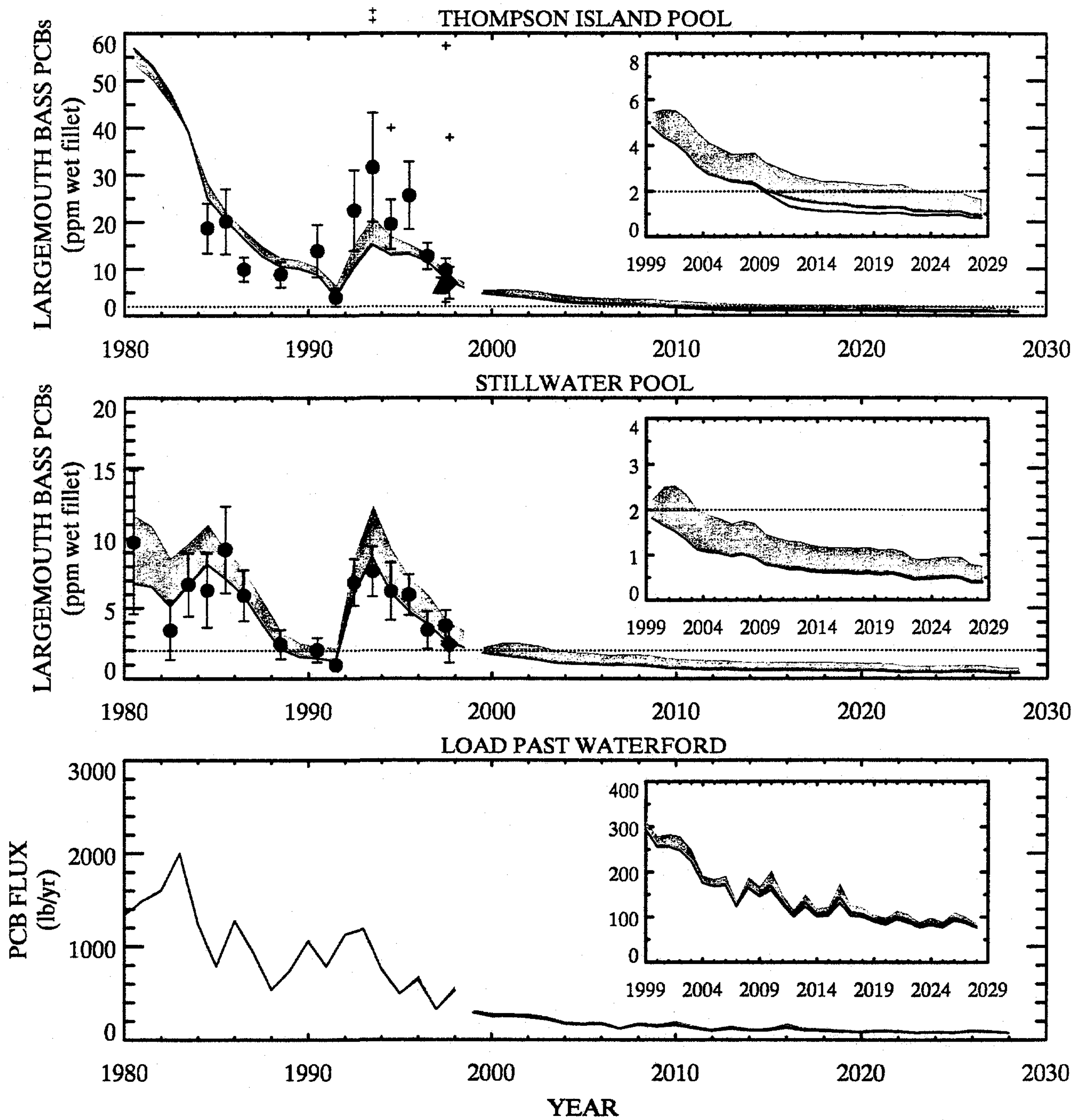
Dotted line indicates 2 ppm level.
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.
Solid line represents best estimate of the future condition.
Shaded region delineates range between best estimate and bounding estimate that reflects the uncertainty of the more important model parameters.

Figure 4-1. Predictions of PCB_{3+} levels in TIP and Stillwater largemouth bass and PCB_{3+} flux passing Waterford under natural recovery.



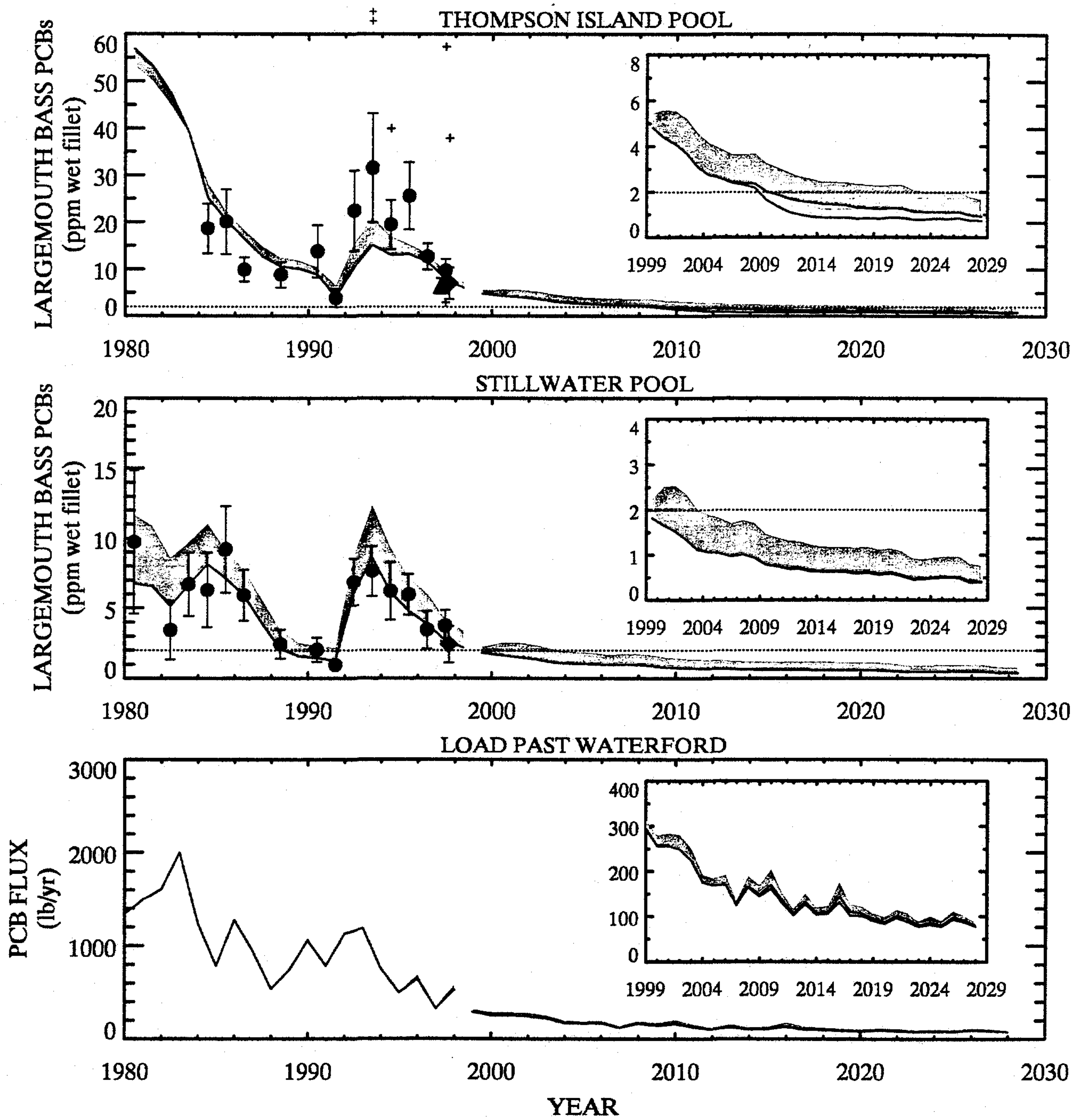
Dotted line indicates 2 ppm level.
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.
Solid line represents best estimate of the future condition.
Shaded region delineates range between best estimate and bounding estimate that reflects the uncertainty of the more important model parameters.

Figure 4-2. Predictions of PCB_{3+} levels in TIP and Stillwater largemouth bass and PCB_{3+} flux passing Waterford: comparison between natural recovery (blue) and elimination of upstream sources (orange).



Dotted line indicates 2 ppm level.
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.
Solid line represents best estimate of the future condition.
Shaded region delineates range between best estimate and bounding estimate that reflects the uncertainty of the more important model parameters.

Figure 4-3. Predictions of PCB_{3+} levels in TIP and Stillwater largemouth bass and PCB_{3+} flux passing Waterford: comparison between natural recovery (blue) and hot spot dredging (orange).



Dotted line indicates 2 ppm level.
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.
Solid line represents best estimate of the future condition.
Shaded region delineates range between best estimate and bounding estimate that reflects the uncertainty of the more important model parameters.

Figure 4-4. Predictions of PCB_{3+} levels in TIP and Stillwater largemouth bass and PCB_{3+} flux passing Waterford: comparison between natural recovery (blue) and cohesive sediment dredging (orange).

Revised Figures
for
Volume 2

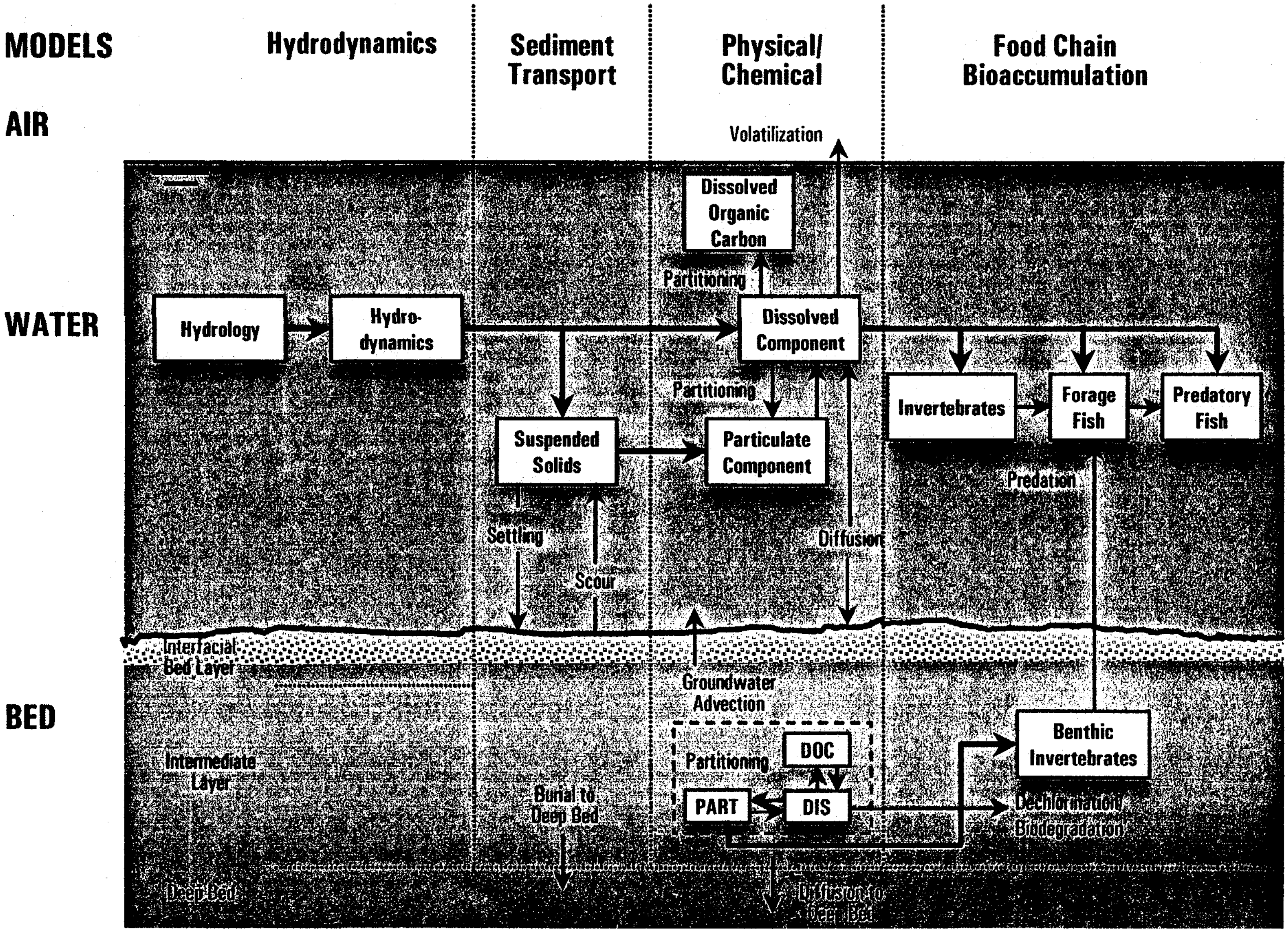


Figure 1-3. Dynamic processes governing fate, transport, and transformation of PCBs in the environment.

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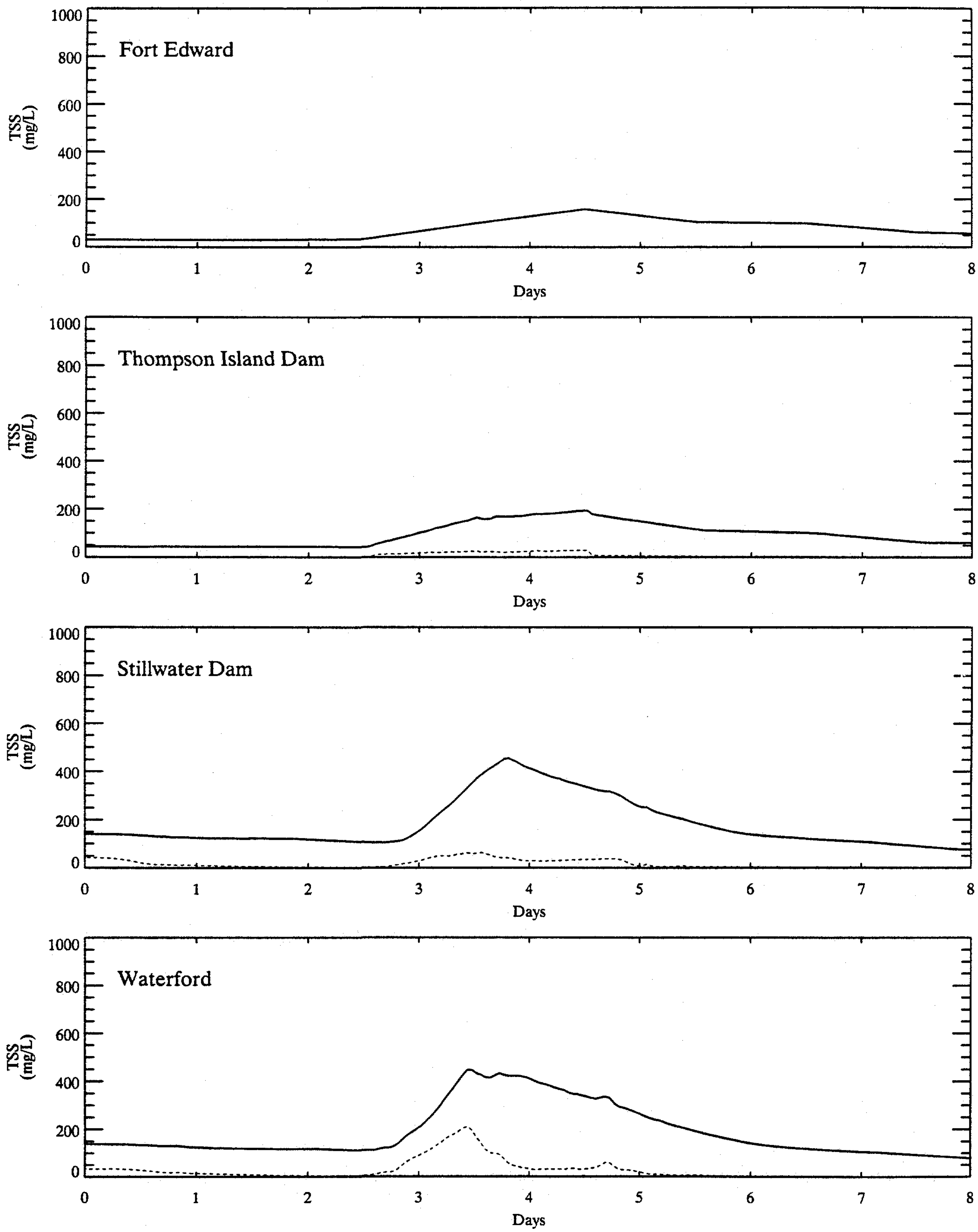

Figure 3-64. Sediment concentration time series during the 100 year flood at Fort Edward, Stillwater, and Waterford. Zero sediment load results shown as dashed line.

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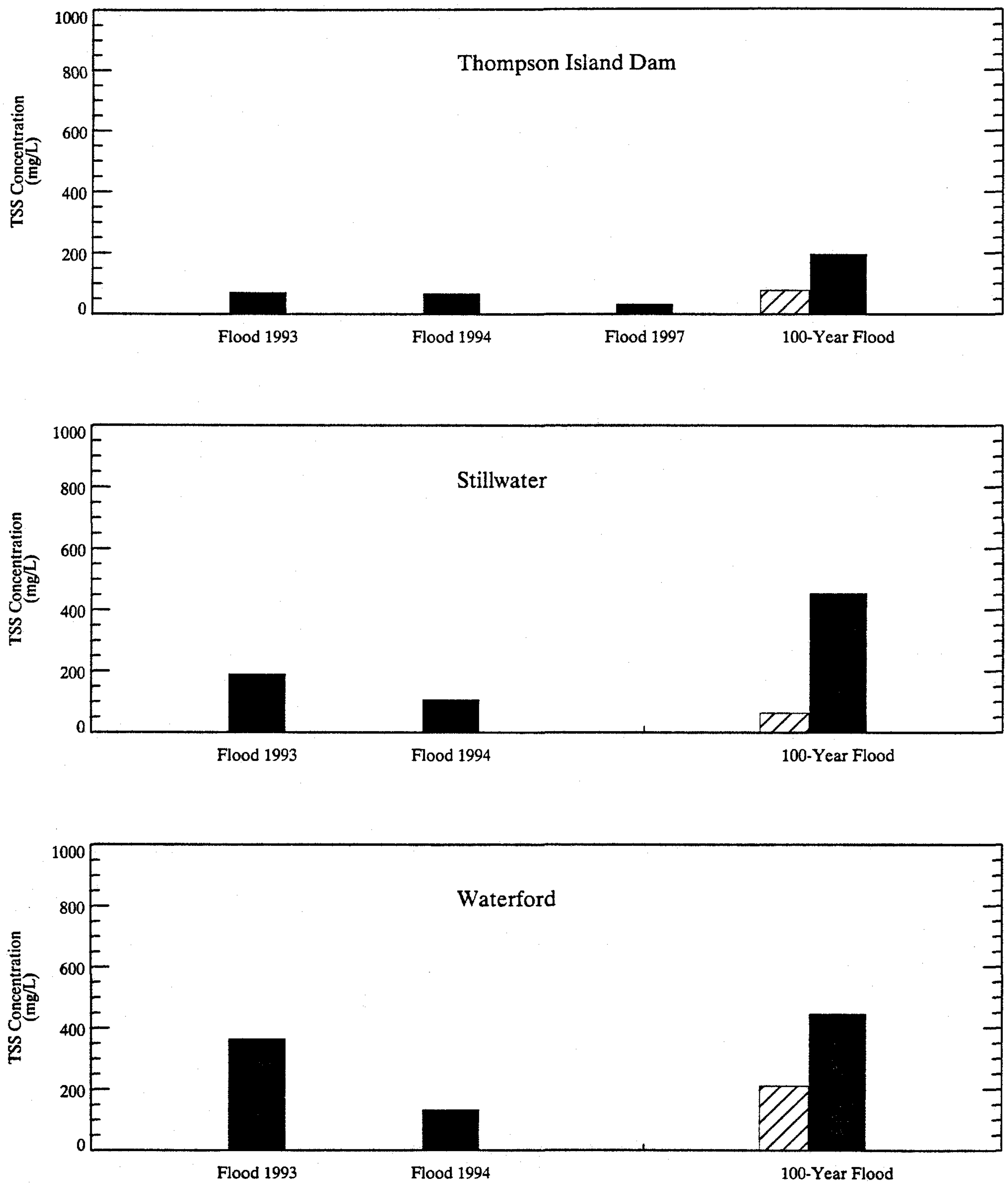
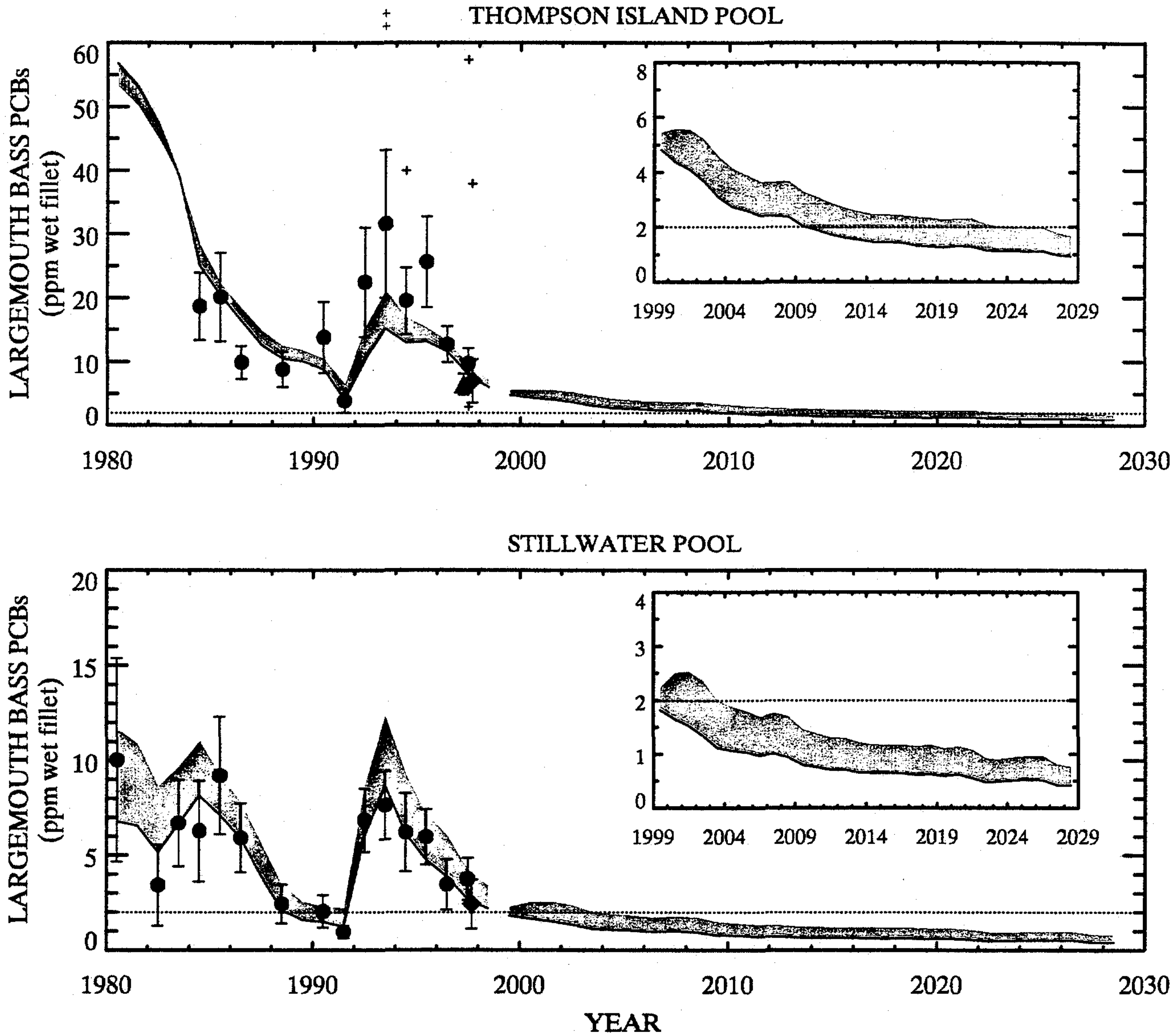


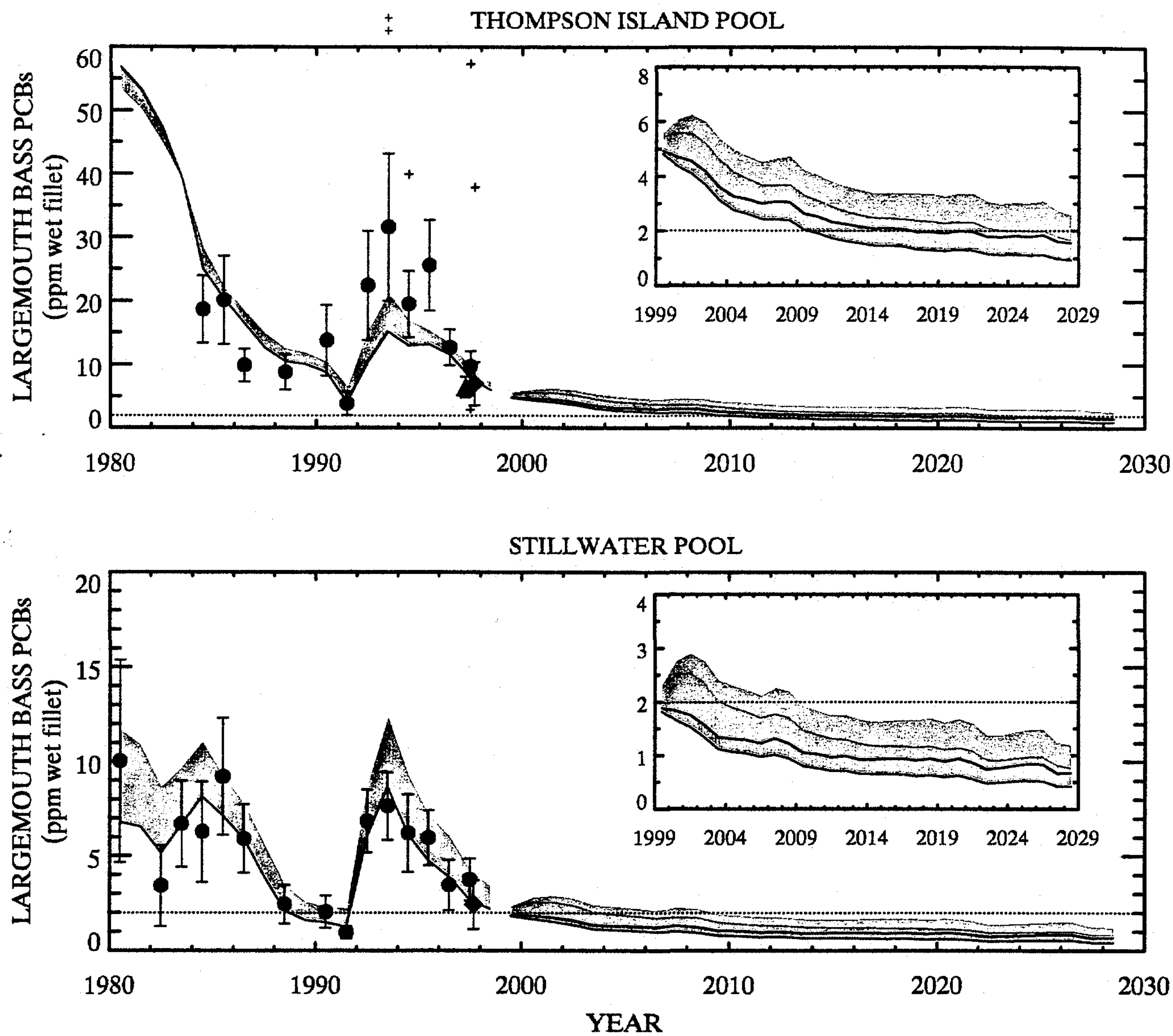
Figure 3-65. Comparison of maximum tss concentration predicted during historical and 100-year flood simulations at TID, Stillwater and Waterford. Zero sediment load simulation results for the 100-year flood are shown as cross-hatched bar.

Revised Figures
for
Volume 3



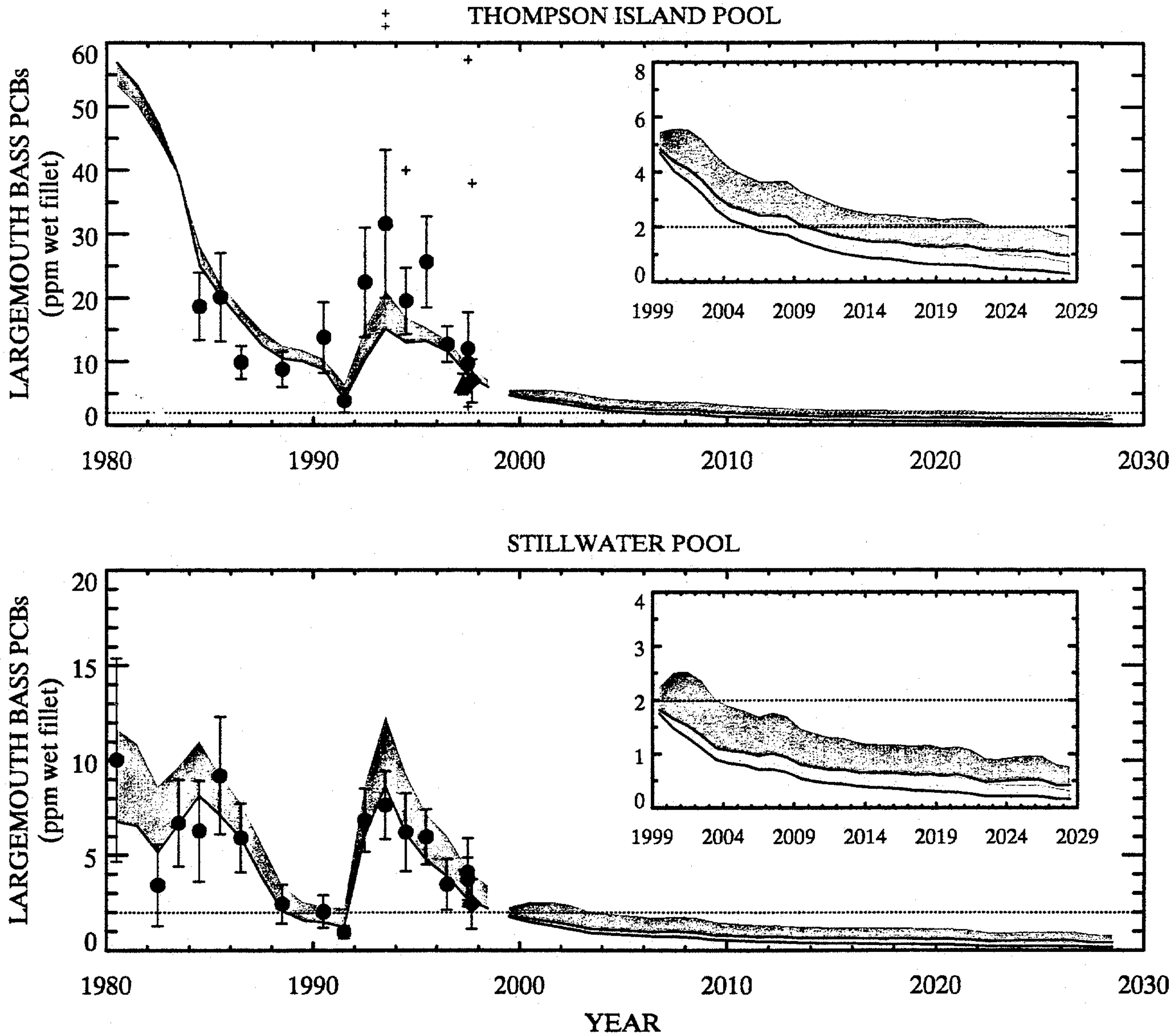
Dotted line at 2 ppm represents FDA Tolerance Limit
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.

Figure 6-2. Predicted PCB_{3+} concentrations in TIP and Stillwater largemouth bass over the time period from 1980 to 2029 under natural recovery.



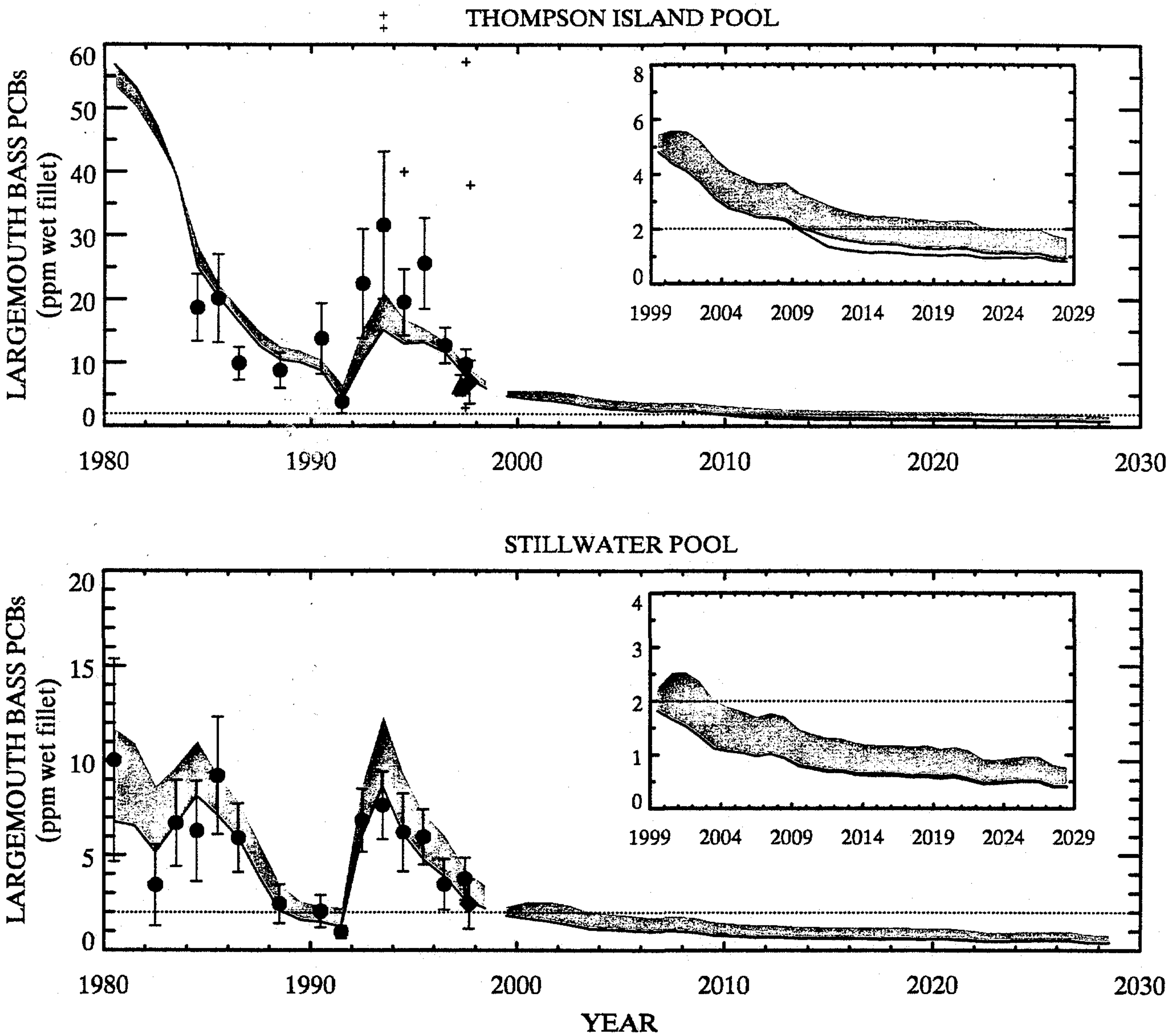
Dotted line at 2 ppm represents FDA Tolerance Limit
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.

Figure 6-4. Predicted PCB_{3+} concentrations in TIP and Stillwater largemouth bass over the time period from 1980 to 2029 for both natural recovery (line and abutting blue shading) and an elevated upstream source from 1999 to 2029 of 0.4 lb/d (line and abutting orange shading).



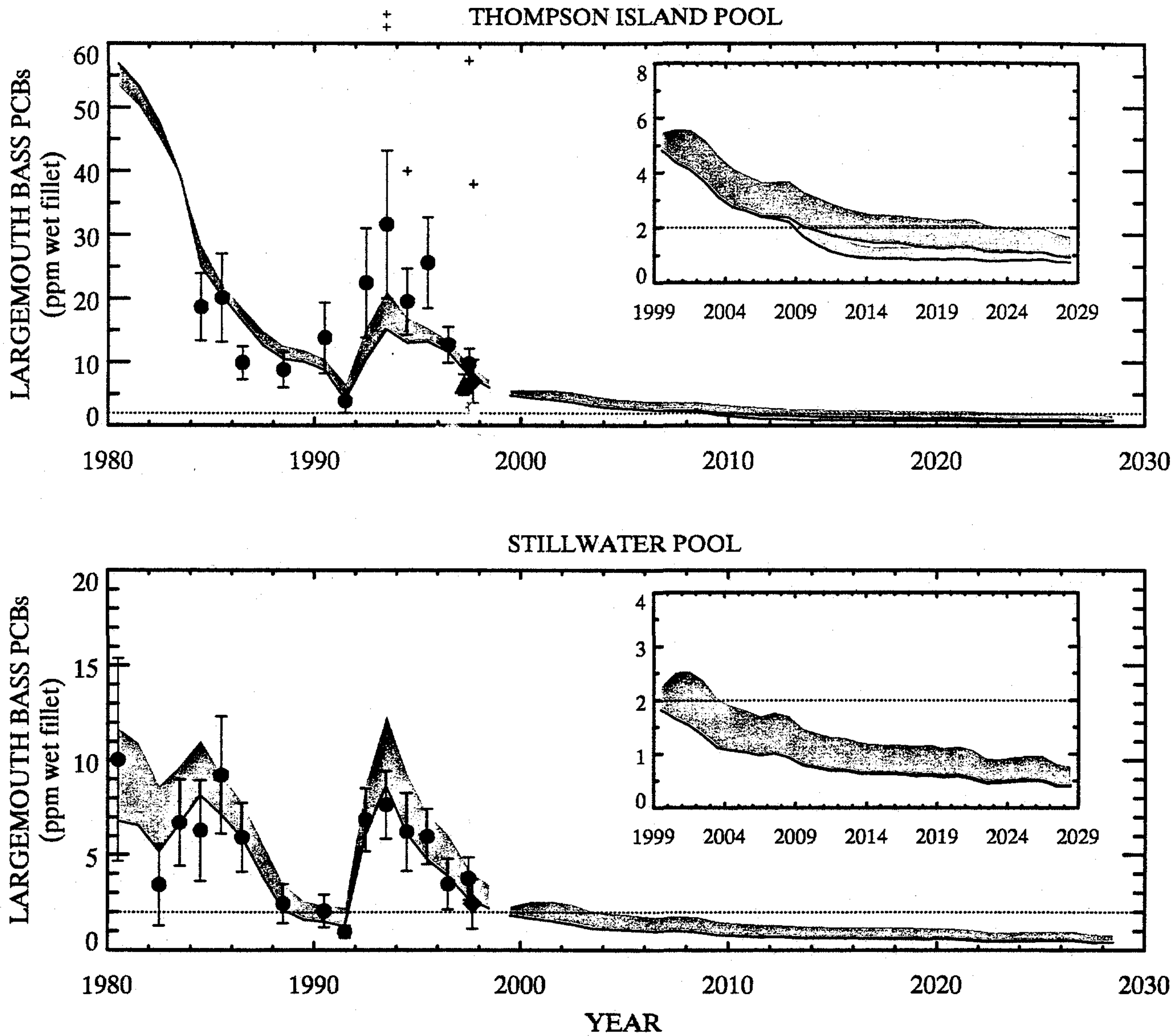
Dotted line at 2 ppm represents FDA Tolerance Limit
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.

Figure 7-2. Predicted PCB_{3+} concentrations in TIP and Stillwater largemouth bass over the time period from 1980 to 2029 for both natural recovery (line and abutting blue shading) and elimination of the upstream source in 1999 (line and abutting orange shading).



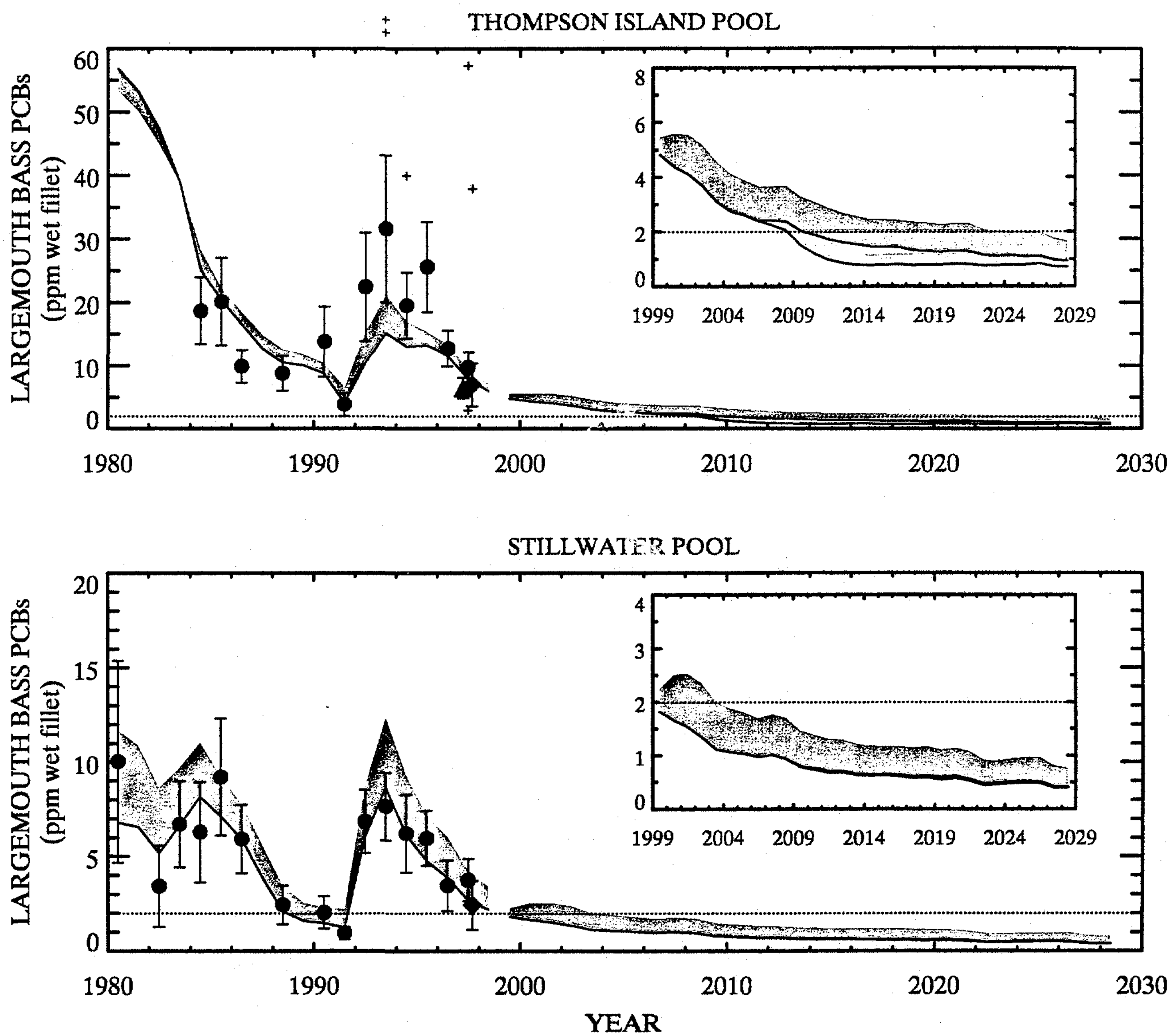
Dotted line at 2 ppm represents FDA Tolerance Limit
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.

Figure 8-2. Predicted PCB_{3+} concentrations in TIP and Stillwater largemouth bass over the time period from 1980 to 2029 for both natural recovery (line and abutting blue shading) and dredging of the NYSDEC hot spots between 2005 and 2013 (line and abutting orange shading) to a residual concentration of 1 ppm.



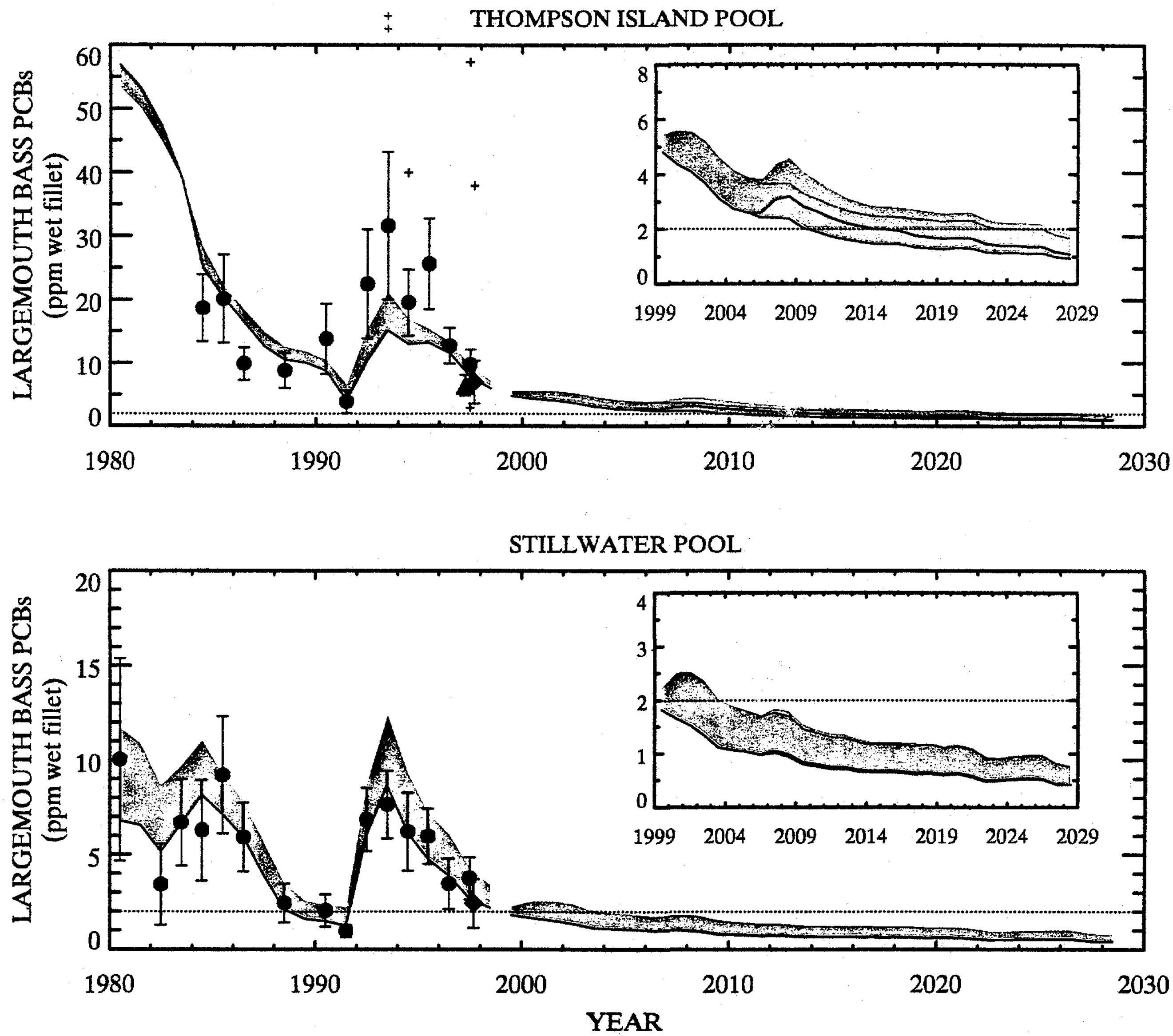
Dotted line at 2 ppm represents FDA Tolerance Limit
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.

Figure 8-4. Predicted PCB_{3+} concentrations in TIP and Stillwater largemouth bass over the time period from 1980 to 2029 for both natural recovery (line and abutting blue shading) and dredging of Reaches 8, 7 and 6 cohesive sediments between 2005 and 2016 (line and abutting orange shading) to a residual concentration of 1 ppm.



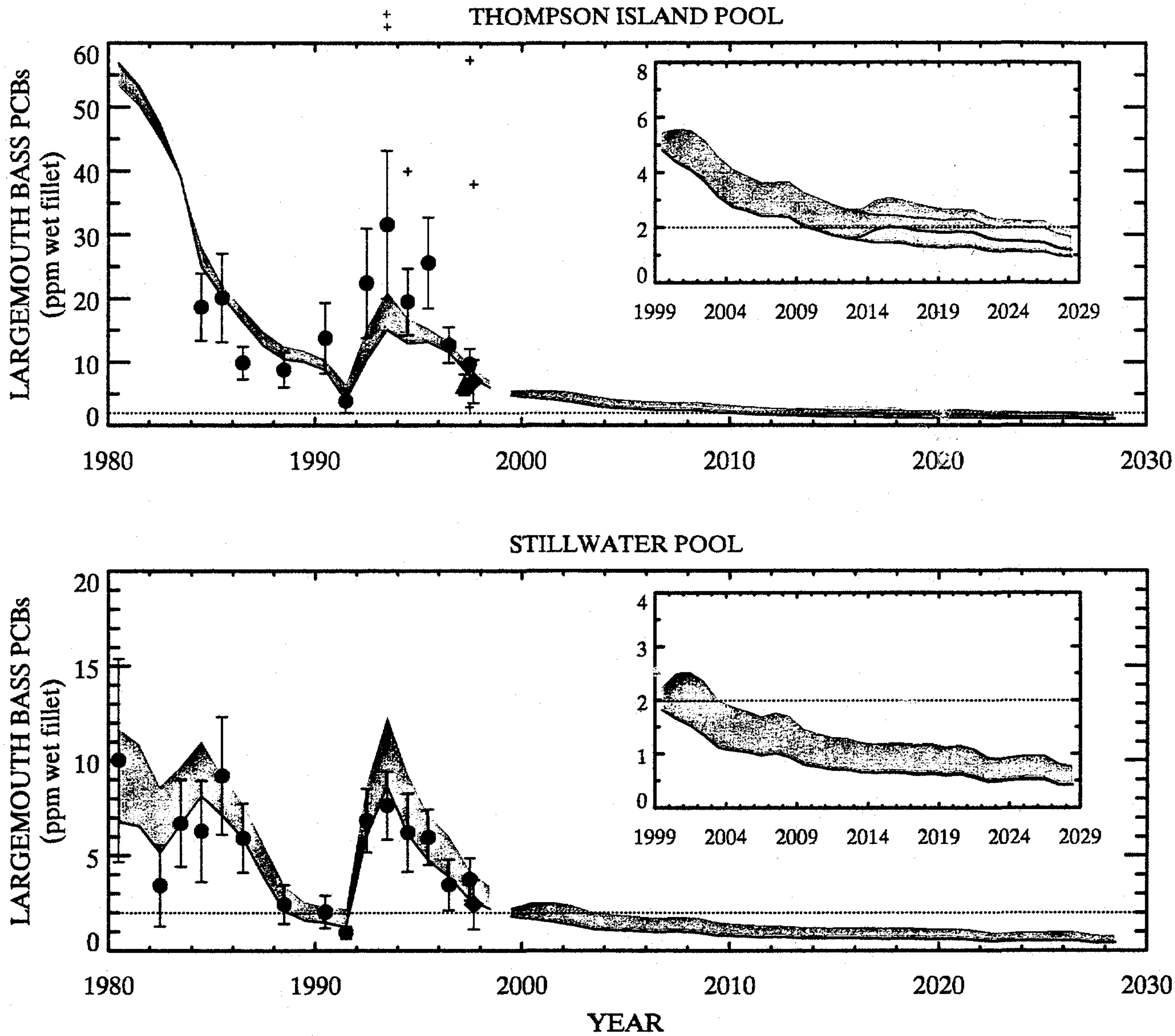
Dotted line at 2 ppm represents FDA Tolerance Limit
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.

Figure 8-6. Predicted PCB_{3+} concentrations in TIP and Stillwater largemouth bass over the time period from 1980 to 2029 for both natural recovery (line and abutting blue shading) and dredging of Reaches 8, 7 and 6 cohesive sediments between 2005 and 2016 (line and abutting orange shading) to a residual concentration of zero.



Dotted line at 2 ppm represents FDA Tolerance Limit
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.

Figure 9-2. Predicted PCB_{3+} concentrations in TIP and Stillwater largemouth bass over the time period from 1980 to 2029 for natural recovery without (line and abutting blue shading) and with the occurrence of a 100-year flood event in 2006 (line and abutting orange shading).



Dotted line at 2 ppm represents FDA Tolerance Limit
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.

Figure 9-4. Predicted PCB_{3+} concentrations in TIP and Stillwater largemouth bass over the time period from 1980 to 2029 for natural recovery without (line and abutting blue shading) and with the occurrence of a 100-year flood event in 2013 (line and abutting orange shading).

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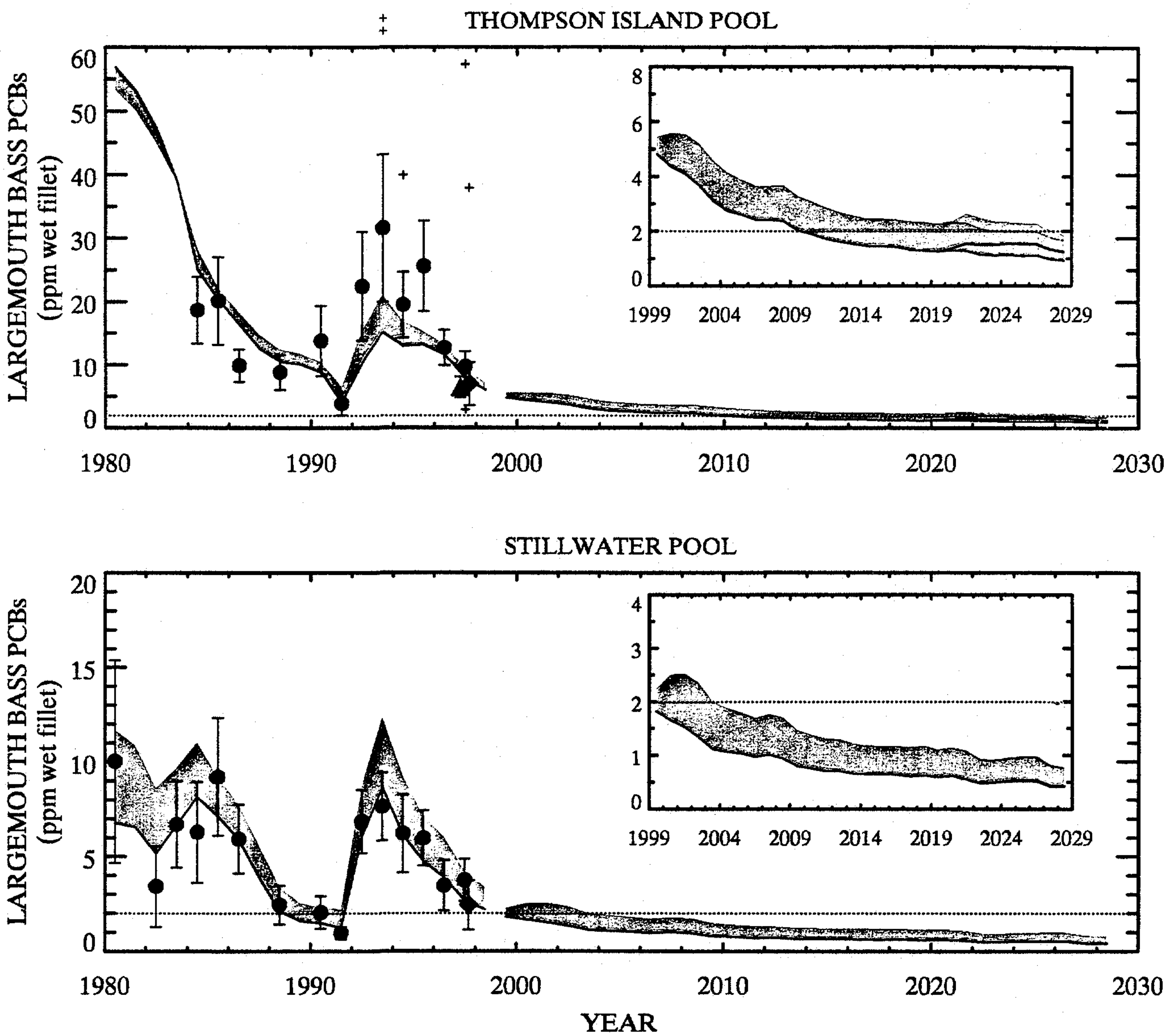

Dotted line at 2 ppm represents FDA Tolerance Limit
Circles = NYSDEC
Triangles = Exponent
Diamonds = GE
Crosses indicate values excluded from the annual averages.

Figure 9-6. Predicted PCB_{3+} concentrations in TIP and Stillwater largemouth bass over the time period from 1980 to 2029 for natural recovery without (line and abutting blue shading) and with the occurrence of a 100-year flood event in 2020 (line and abutting orange shading).