



DRAFT, June 12, 2009

Twenty Total Maximum Daily Loads
for Dioxin in the
Houston Ship Channel and
Upper Galveston Bay

Segments 0901, 1001, 1005, 1006, 1007, 2421, 2426,
2427, 2428, 2429, 2430, 2436, and 2438

Water Quality Planning Division, Chief Engineer's Office
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Outline of the **Draft** TMDL Document

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Larry Koenig
TCEQ TMDL Project Manager
lkoenig@tceq.state.tx.us
512-239-4533

Technical Support Documents are posted on-line:

<http://www.tceq.state.tx.us/implementation/water/tmdl/26-hscdioxin.html>

scroll down page, or click
Project Documents link

Sections of **Modeling Report** and **Load Allocation Document** are reproduced in TMDL document. Reports available from web link contain more detail than TMDL document.

TMDL allocation in draft is based on Scenario B described in the technical support documents.

Project Documents

The following documents are available in PDF. Help with PDF.

Data collected by the TMDL Project:

This file (PDF) contains all the new data collected to support the TMDL project. Appendices are not included, but can be acquired by contacting the TCEQ Project Manager to request those wanted. Data files in electronic format (Excel spreadsheets or Access databases) may also be available if requested. Most of the stream data for water, sediment, and tissue are in the TCEQ SWQMIS database; air and runoff and effluent data are not.

- [Dioxin: All Data \(14.1 MB\)](#)

Technical Support Documents:

The following files document how the modeling was done and how the load allocation was derived from model output. These documents provide a great deal more detail than the TMDL document.

- [Modeling Report \(5.1 MB\)](#)
- [Load Allocation Report \(1.4 MB\)](#)

Annual summaries of project findings and progress:

These documents compile quarterly reports from the project. Each summarizes activities during the preceding fiscal year (September - August). Appendices are not included with these links, but may be requested from Project Manager. Summaries and information from years prior to FY2005 may also be requested.

- [Summary of September 2004 - August 2005 \(31.9 MB\)](#)
- [Summary of September 2005 - August 2006](#). Appendix A of this document is the data summary compilation linked separately above. (3.1 MB)
- [Summary of September 2006 - May 2007](#), pending completion of annual summary through August 2007. (2.7 MB)

Some parts of draft TMDL:

WLA for wastewater

(Part of one page of table)

Waste Load Allocation

Wastewater Treatment Facilities (WLA_W)

Table 17 summarizes an initial proportionate waste load allocation for the WWTFs within the study area that discharge directly to the modeled segments. This distribution is based on the ratio of each permitted flow to the total permitted flow within the same TMDL AU, times the TMDL AU allocation derived from Scenario B. This table does not precisely mirror the individual loads estimated for modeling, which were based on the type of discharge rather than proportionate permitted flow. This table lists permits that existed at the time modeling was done, and the list of permits will change. This table **will not** be the basis for assigning permit limits to individual dischargers, but is provided to satisfy EPA database needs and to illustrate that WLA_W allocations in this document are consistent with the model scenario output.

Very few WWTFs currently have dioxin limits in their permits, and most do not discharge detectable concentrations of dioxin. The modeled loading is based on conservative over-estimates of loading. When specific permitted wastewater discharges are found to have detectable dioxin concentrations, individual permit limits based on the permitted flow and a TEQ concentration at or below the water quality standard are established. Therefore the allowable total load may ultimately be distributed much differently than Table 17 suggests.

When multiple TPDES facilities occur within a watershed, loads from individual WWTFs are summed and the total load for continuous point sources is included as part of the WLA_{WWTF} component of the TMDL calculation for the corresponding assessment unit(s). When there are no TPDES WWTFs discharging into the contributing watershed of a sampling location then WLA_{WWTF} is not applicable.

WLAs in table are based on total modeled loading distributed among all permits proportioned by permitted flow. WLAs shown do not represent actual loads from individual facilities, and are not to be used as permit limits.

Twenty TMDLs for Dioxin in the Houston Ship Channel

AU	AU total WLA _W ^a (ng/day)	Permit Number	Permittee	Permitted Flow (MGD)	Individual WLA _W ^a (ng/day)
1007_02	0	00635-003	Reedycalog LP	0.04	15
		00635-004	Reedycalog LP	0.1	37
		00649-001	Agribe Fertilizer Inc	2.9	1,079
		00671-001	Williams Terminals	0.73	272
		00756-001	Texmark Chemicals	0.08	30
		00815-001	Phillips Petroleum	4.3	1,600
		01740-000	Gulf Coast Waste Disposal Authority	42	15,631
		02034-000	Sws Holdings - Brady Island LP	0.1	37
		03133-000	South Coast Terminals LP	0.05	19
		03767-001	Amesforge Corp	0.01	4
		03889-000	Green Earth Processing LLC	0.01	4
		10495-010	City of Houston-Clinton Park	2	744
		10495-090	City of Houston-69th Street	200	74,433
		11773-001	Port Terminal Railroad Assn	0.009	3
		00393-001	Mobil Chemical Co	1.5	558
		00520-001	Goodyear Tire & Rubber	2.9	1,079
		00587-001	Texas Petrochemicals And Kemron Gulf Inc	1	372
		00587-002	Texas Petrochemicals And Kemron Gulf Inc	5.5	2,047
		02659-000	Kinder Morgan Petroke LP	0.22	82
		10495-002	City of Houston-Sims Bayou North	39.9	14,849
10495-002	City of Houston-Sims Bayou South	54	20,097		
01745-002	Chevron USA Inc	0.01	4		
10831-001	City of Galena Park	1.25	465		
00542-001	Rhodia Inc	1.4	521		
10053-009	City of Pasadena-Vince Bayou	14	5,210		
1007_03	0	02039-000	BNSF Railway Co	0.1	0
1007_04		10206-001	City of La Porte	7.56	1,495
1007_05		01050-000	NRG Texas Power LLC	0.1	20
1007_07		10627-001	Baciff MUD	1	198
2421_01		10671-001	City of Seabrook	2.5	494
2421_02		2,042 ^a	2,454 ^a		

WLA for storm water

Runoff loading from areas covered by storm water permits was distributed proportionate to land area.

Tables may show “six major congener” TEQ loads directly from model summaries, or corresponding “all congener” TEQ loads, or both.

Final allocation is for all congeners.

Twenty TMDLs for Dioxin in the Houston Ship Channel

Table 18. Wastebed Allocations for MS4s

Watershed	Assessment Unit	Daily TEQ _{max congener} Load (ng/day)	Daily TEQ Load (ng/day)
Cedar Bayou	0901_01	1,553	1,867
San Jacinto River	1001_01	9,866	11,858
San Jacinto River	1001_02	626	752
Houston Ship Channel/ San Jacinto River Tidal (Old River included in 1005_01)	1005_01	1,421	1,708
	1005_02	888	1,067
	1005_03 1005_04	335	403
Houston Ship Channel Tidal	1006_01	3,430	4,123
	1006_02		
	1006_04	3,395	4,081
Patrick Bayou Tidal			
Greens Bayou Tidal	1006_03	16,826	20,224
Goodyear Creek Tidal	1006_05		
Houston Ship Channel/ Buffalo Bayou Tidal Sims Bayou Tidal Hunting Bayou Tidal Brays Bayou Tidal Vince Bayou Tidal Barry Bayou Tidal Little Vince Bayou Tidal	1007_01	62,706	75,368
	1007_02		
	1007_03		
	1007_04		
	1007_05		
	1007_06		
	1007_08		
	1007_07		
Buffalo Bayou Tidal	1007_07	4,950	5,949
Upper Galveston Bay	2421_01	1,186	1,426
	2421_02		
	2421_03		
Tabbs Bay	2426_01	803	965
San Jacinto Bay	2427_01	0	0
Black Duck Bay	2428_01	67	81
Scott Bay	2429_01	325	391
Burnett Bay	2430_01	106	127
Barbours Cut	2436_01	44	53
Bayport Channel	2438_01	19	23
Overall System Totals		108,547	130,466

Table 21: TMDL Allocation

There is a difference between "total load" and "external load"

"total" includes internal loading due to transport between model units, after legacy sediment load has been removed (in model simulation);

"external" is only the new daily load sources: wastewater, runoff, direct deposition, headwater flow

Assessment Unit(s)	All loads are ng TEQ/day for all congeners					
	WLA total ^a	LA external ^b	LA internal ^c	LA total ^d	TMDL total ^e	TMDL external loads ^f
1007_07	5,949	461,874	339,462	801,336	807,285	467,823
1007_01 + 1007_02, 1007_03, 1007_04, 1007_05, 1007_06, 1007_08	216,069	272,444	434,657	707,101	923,170	488,512
1006_03 + 1006_05	22,985	133,003	12,162	145,166	168,151	155,988
1006_01	46,658	12,200	747,390	759,590	806,248	58,858
1006_02 + 1006_04	28,201	27,675	832,557	860,231	888,433	55,876
1001_01	18,146	1,795,433	157,331	1,952,764	1,970,910	1,813,579
1001_02	2,685	3,604	1,736,852	1,740,456	1,743,141	6,289
Old River 1005_01	2,332	5,255	248,488	253,743	256,075	7,587
1005_01	2,403	2,641	4,515,523	4,518,164	4,520,567	5,044
2430_01	127	12,313	132,043	144,356	144,483	12,440
2429_01	692	13,466	168,536	182,002	182,694	14,158
1005_02	3,647	10,523	4,888,496	4,899,019	4,902,667	14,170
2427_01	1,831	18,305	91,995	110,300	112,131	20,136
2428_01	81	3,985	41,727	45,712	45,793	4,066
2426_01	2,527	53,120	482,850	535,970	538,497	55,647
2436_01	179	1,230	5,169	6,399	6,578	1,409
1005_03 + 1005_04	4,991	7,138	4,031,154	4,038,292	4,043,282	12,128
2438_01	4,558	712	4,249	4,961	9,519	5,270
2421_01 + 2421_02	3,880	822,831	15,033,605	15,856,436	15,860,316	826,711
0901_01	1,867	39,393	17,599	56,991	58,858	41,260
Overall System Total	369,807	3,697,145	33,921,846	37,618,991	37,988,798	4,066,952

TMDL allocation:

Verbal description emphasizes the external load as the part that could be managed, since internal load represents lag in transport of external load from previous days.

Total external TEQ load (all congeners) totals slightly more than 4 milligrams per day.

Table 21 further condenses load allocations into general categories, but provides totals that include internal loads, and totals for external loads only. In Table 21, the Buffalo Bayou and Clear Lake boundary loads have been added into the "LA external" allocations for the impaired AUs those boundary loads first enter, which are 1007_07 and 2421_01+2421_02 respectively. The twenty lines of Table 21 represent the twenty formal TMDL allocations by assessment unit enumerated in the title of this document.

It is very important to note and remember that the external loads shown in Table 21 are most consistent with the typical TMDL perspective of managing loads to the system. The internal loads are essentially re-counted external load that is moving within the modeled system, from channel bottom to water column or from AU to AU, during a typical day. Stated another way, the internal load is "apparent load" that reflects modeling and load accounting practices rather than actual new daily load to the water body.

The actual new loading allocated to the modeled area during the theoretical day characterized by a TMDL is:

$$\begin{array}{rclcl} \text{WLA} & + & \text{LAext} & = & \\ 369,807 & + & 3,697,145 & = & 4,066,952 \text{ ng TEQ/day} \end{array}$$

The internal load (33,921,846 ng/day) is more than eight times the external load, and comprises about 90 percent of the "total TMDL." The total external load allocated above, stated in units more familiar than nanograms, becomes:

$$\begin{array}{rclcl} 0.370 & + & 3.697 & = & 4.067 \text{ milligrams TEQ/day} \\ 8.157 \times 10^{-7} & + & 8.151 \times 10^{-6} & = & 0.00000897 \text{ pounds TEQ/day} \end{array}$$

This very small load is allocated to a watershed area of approximately 1,386 square miles.

Table 21. Summary of Dioxin TMDLs by Assessment Unit and Overall Total

Assessment Unit(s)	All loads are ng TEQ/day for all congeners					
	WLA total*	LA external ^b	LA internal ^c	LA total ^d	TMDL total*	TMDL external loads ^e
1007_07	5,949	461,874	339,462	801,336	807,285	467,823
1007_01 + 1007_02, 1007_03, 1007_04, 1007_05, 1007_06, 1007_08	216,069	272,444	434,657	707,101	923,170	488,512
1006_03 +	22,985	133,003	12,162	145,166	168,151	155,988

Implementation section from draft TMDL document

- Implementation of the TMDLs is a general outline of possible elements; the Implementation Plan will provide more detail and may include other activities.
- Legacy sediment sources can be addressed through remedial programs, including the National Priority List (NPL) or “Superfund Site” approach.
- One site within the project area, in the San Jacinto River adjacent to the IH-10 bridge, has already been placed on the NPL and will be addressed through that process.
- Other sites of similar nature may be discovered, and could be addressed through similar remedial programs.

Implementation section from draft TMDL document

- The latest national inventories of dioxin sources indicate that most of the dioxin being produced today is emitted to air.
- Managing sources of that type goes beyond the watershed perspective of TMDLs, and beyond the Clean Water Act, and may cross state or national boundaries.
- Many industrial practices and processes have already been modified to reduce dioxin production, with significant effect.
- The largest remaining sources today are the cumulative loads from small scale private activities like backyard trash burning.

Implementation section from draft TMDL document

EPA has several programs in place to inventory dioxin sources, assess human exposure and risk, and seek ways to reduce dioxin production and human exposure.

Information about the various federal dioxin initiatives can be found on the National Center for Environmental Assessment (NCEA) web page (<http://cfpub.epa.gov/ncea/index.cfm>) by following links for dioxin. Programs described there include:

- Dioxin Reassessment
- Dioxin Exposure Initiative
- An Inventory of Sources and Environmental Releases of Dioxin-Like Compounds in the United States
- Database of Sources of Environmental Releases of Dioxin-Like Compounds in the United States
- EPA Analytical Methods
- EPA Regulations

Implementation section from draft TMDL document

The existence of these national efforts provides some reasonable assurance that production of, environmental release of, and human exposure to dioxin-like compounds will continue to decline across Texas and elsewhere.

State of Texas water quality permitting procedures will provide reasonable assurance that any significant water discharge of dioxin will be controlled.

When a water discharge is found to contain detectable concentrations of dioxins, the water quality standards in place at that time will be implemented, using the congeners and TEFs stipulated in the water quality standards documentation.

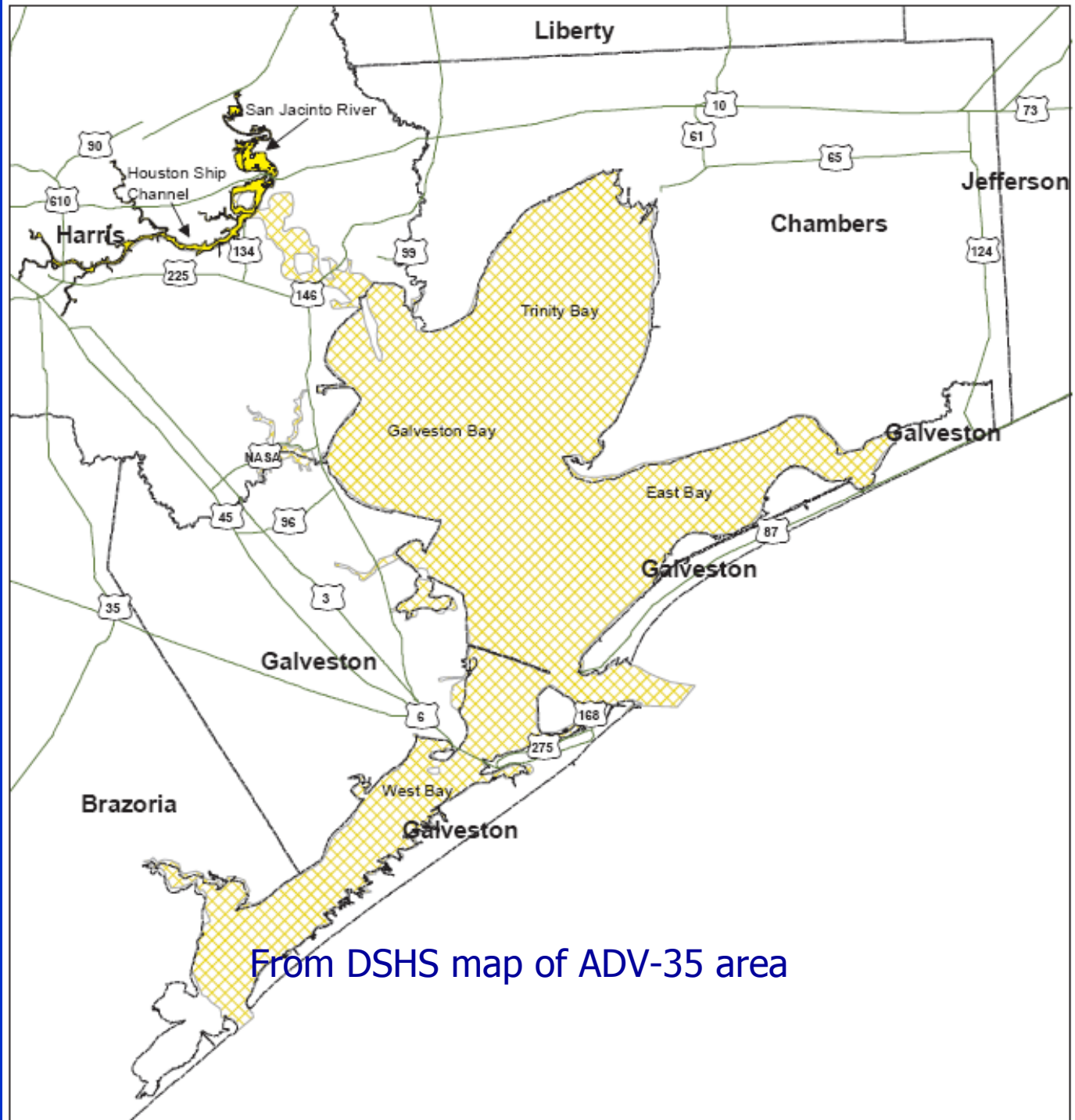
A Different Topic

Galveston Bay System – planning for next year

Consumption Advisory ADV-35 (July 2008) was issued because of dioxin and PCBs in catfish and speckled trout, covering areas beyond the scope of HSC studies.

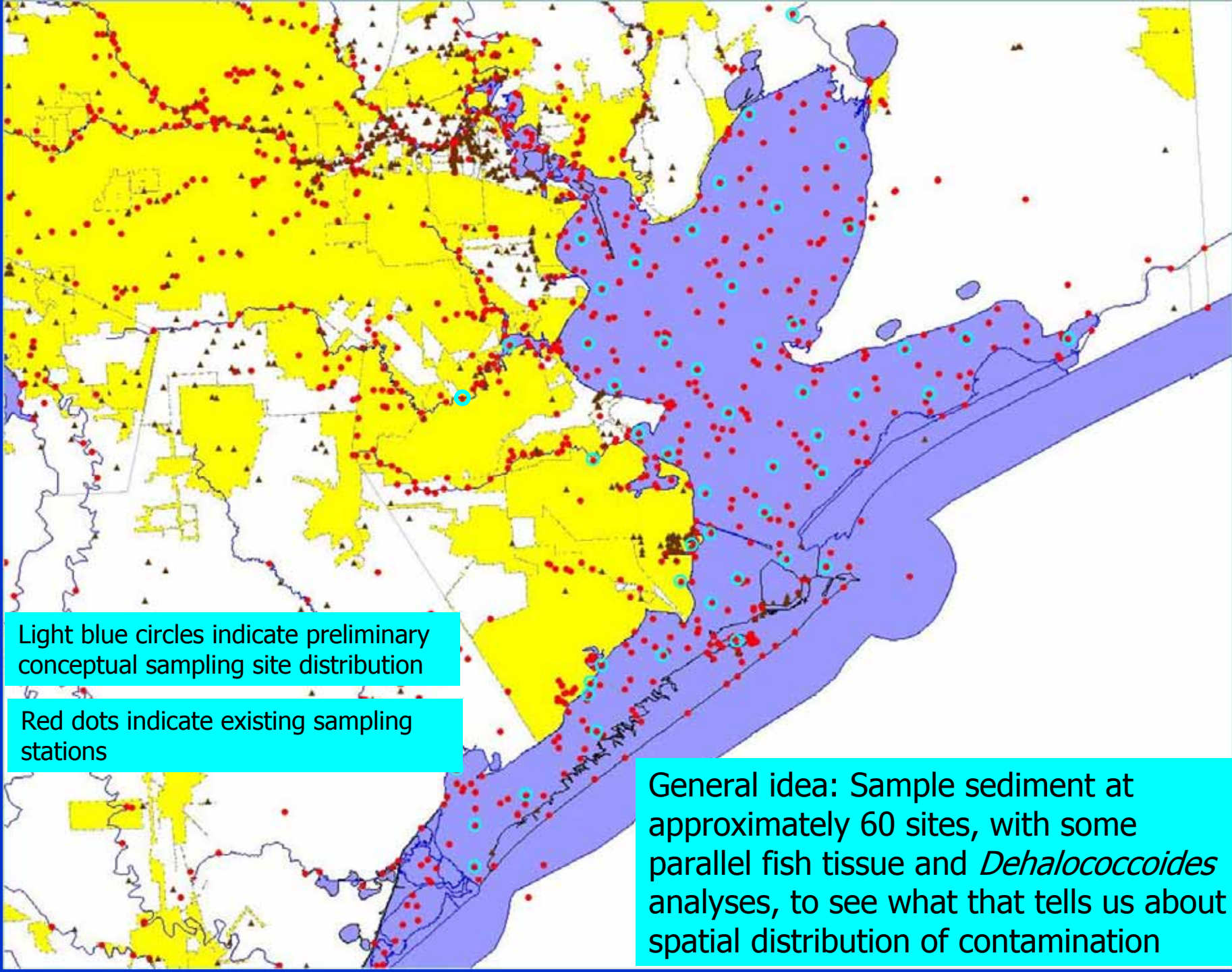
TMDL Program is planning to begin a survey of the lower bay system waters, with initial focus on sampling sediment and tissue. Survey is to provide more information from which further steps may be planned.

Fish Consumption Advisory Area



From DSHS map of ADV-35 area

Yellow cross hatched area indicates the affected areas



Light blue circles indicate preliminary conceptual sampling site distribution

Red dots indicate existing sampling stations

General idea: Sample sediment at approximately 60 sites, with some parallel fish tissue and *Dehalococcoides* analyses, to see what that tells us about spatial distribution of contamination