

Chapter 3

Findings

This chapter presents the results of the evaluation of NSI data based on the methodology described in Chapter 2. This discussion includes a summary of the results of national, regional, and state assessments.

National Assessment

EPA evaluated a total of 21,096 sampling stations nationwide as part of the NSI data evaluation (Figure 3-1). Of the sampling stations evaluated, 5,521 stations (26 percent) were classified as Tier 1, 10,401 (49 percent) were classified as Tier 2, and 5,174 (25 percent) were classified as Tier 3 (Table 3-1). This distribution suggests that state monitoring programs (accounting for the majority of NSI data) have been efficient and successful in focusing their sampling efforts on areas where contamination is known or suspected to occur. The frequency of Tier 1 classification based on the evaluation of all NSI data is greater than from data sets derived from purely random sampling.

The national distribution of Tier 1 sampling stations is illustrated in Figure 3-2. The distribution of Tier 1 stations depicted in Figure 3-2 must be viewed in the context of the distribution of all sampling stations depicted in Figure 3-1. Table 3-1 presents the number of sampling stations in each tier by EPA Region. The greater number of Tier 1 and Tier 2 sampling stations in some Regions is to some degree a function of a larger set of available data. Although there are 17 times more Tier 1 stations in EPA Region 4 (southeastern states) than in EPA Region 8 (mountain states), there are also 13 times more Tier 3 stations.

The NSI sampling stations were located in 6,744 individual river reaches throughout the contiguous United States (based on EPA's River Reach File 1; Bondelid and Hanson, 1990). A river reach can be part of a coastal shoreline, a lake, or a length of stream between two major tributaries ranging from approximately 1 to 10 miles long. NSI sampling stations were located in approximately 11 percent of all river reaches identified in the contiguous United States (Table 3-1 and Figure 3-3). Four percent of all river reaches in the United States contained at least one sampling station classified as Tier 1.

Five percent of all reaches contained at least one sampling station classified as Tier 2 (but none as Tier 1). In 2 percent of reaches in the contiguous United States, all of the sampling stations were classified as Tier 3. EPA has not yet catalogued river reaches outside the contiguous United States (e.g., Alaska, Hawaii, Puerto Rico), and some sampling stations in the ocean were not linked to a specific reach. Sampling bias toward areas of known or suspected contamination may be more pronounced in some Regions compared to others, and may be related to the relative extent of sampling. The results presented on Table 3-1 appear to indicate that the smaller the percentage of reaches with available data, the greater the likelihood those reaches will contain a Tier 1 or Tier 2 sampling station.

Not all sampling programs target only sites of known or suspected contamination. The NSI includes data from the National Oceanic and Atmospheric Administration's (NOAA's) National Status and Trends Program, which is part of the COSED database, and EPA's Environmental Monitoring and Assessment Program (EMAP). These are examples of sampling programs in which most sampling stations are not targeted at locations of known or suspected contamination. Based on these data alone, the percentage of sampling stations placed in each tier differs considerably from the percentage of sampling stations in each tier based on an evaluation of all the data in the NSI. Smaller percentages of COSED and EMAP sampling stations are categorized as Tier 1 (18 percent for COSED and 14 percent for EMAP compared to 26 percent for all NSI sampling stations), greater percentages are categorized as Tier 2 (75 percent for COSED and 68 percent for EMAP compared to 49 percent for all NSI stations), and smaller percentages are categorized as Tier 3 (7 percent for COSED and 18 percent for EMAP compared to 25 percent for all NSI sampling stations). This may reflect the lower detection limits of more sensitive analytical chemistry techniques, the sensitivity of Tier 2 evaluation parameters, and the nearly ubiquitous presence of lower to intermediate levels of contamination in areas sampled by these programs.

The NSI contains over 1.5 million individual records of contaminant measurements in sediment and fish

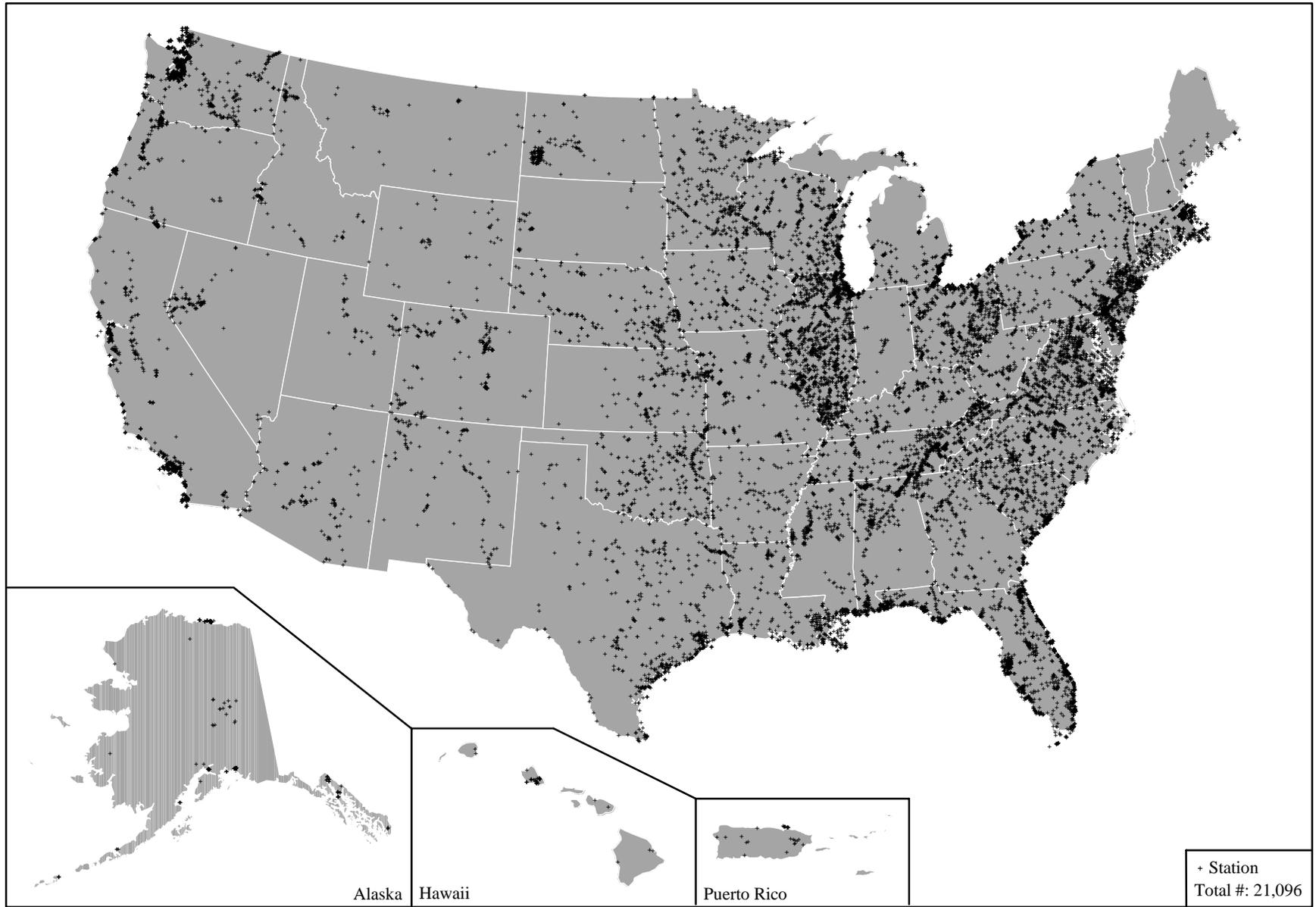


Figure 3-1. Location of All NSI Sampling Stations.

Table 3-1. National Assessment: Evaluation Results for Sampling Stations and River Reaches by EPA Region

EPA Region (State)	Station Evaluation						River Reach Evaluation ^a							
	Tier 1		Tier 2		Tier 3		Number of Stations Not Identified by an RF1 Reach ^c	Reaches w/at Least 1 Station in Tier 1	Reaches w/at Least 1 Station in Tier 2 ^d	Reaches w/all Stations in Tier 3	Total # Reaches w/at Least 1 Station Evaluated	Total Reaches in Region	% of all Reaches in Region w/at Least 1 Station Evaluated	% of Reaches w/at Least 1 Tier 1 or Tier 2 Station
	#	% ^b	#	% ^b	#	% ^b								
Region 1 (CT, ME, MA, NH, RI, VT)	298	27	646	59	158	14	361	59	65	7	131	2,648	5	5
Region 2 (NY, NJ, PR)	355	32	559	51	182	17	173	116	147	29	292	1,753	17	15
Region 3 (DE, DC, MD, PA, VA, WV)	318	17	934	49	658	34	92	209	453	226	888	3,247	27	20
Region 4 (AL, FL, GA, KY, MS, NC, SC, TN)	1,157	23	1,930	39	1,872	38	343	566	684	520	1,770	9,749	18	13
Region 5 (IL, IN, MI, MN, OH, WI)	1,418	33	2,137	50	735	17	108	594	570	268	1,432	6,025	24	19
Region 6 (AR, LA, NM, OK, TX)	382	24	837	52	397	24	124	266	341	192	799	7,293	11	8
Region 7 (IA, KS, MO, NE)	330	33	393	39	288	28	N/A	246	182	88	516	4,857	11	9
Region 8 (CO, MT, ND, SD, UT, WY)	68	13	327	61	140	26	N/A	61	153	91	305	13,492	2	2
Region 9 (AZ, CA, HI, NV)	468	28	942	55	289	17	794	119	92	43	254	4,601	6	5
Region 10 (AK, ID, OR, WA)	727	25	1,696	59	455	16	497	147	174	72	393	10,178	4	3
Total for U.S. ^e	5,521	26	10,401	49	5,174	25	2,492	2,371	2,843	1,530	6,744	62,742	11	8

^aRiver reaches based on EPA River Reach File 1 (RF1).

^bPercent of all stations evaluated in the NSI in the Region.

^cStations not identified by an RF1 reach were located in coastal or open water areas.

^dNo stations in these reaches were included in Tier 1.

^eBecause some reaches occur in more than one Region, the total number of reaches in each category for the country might not equal the sum of reaches in the Regions.

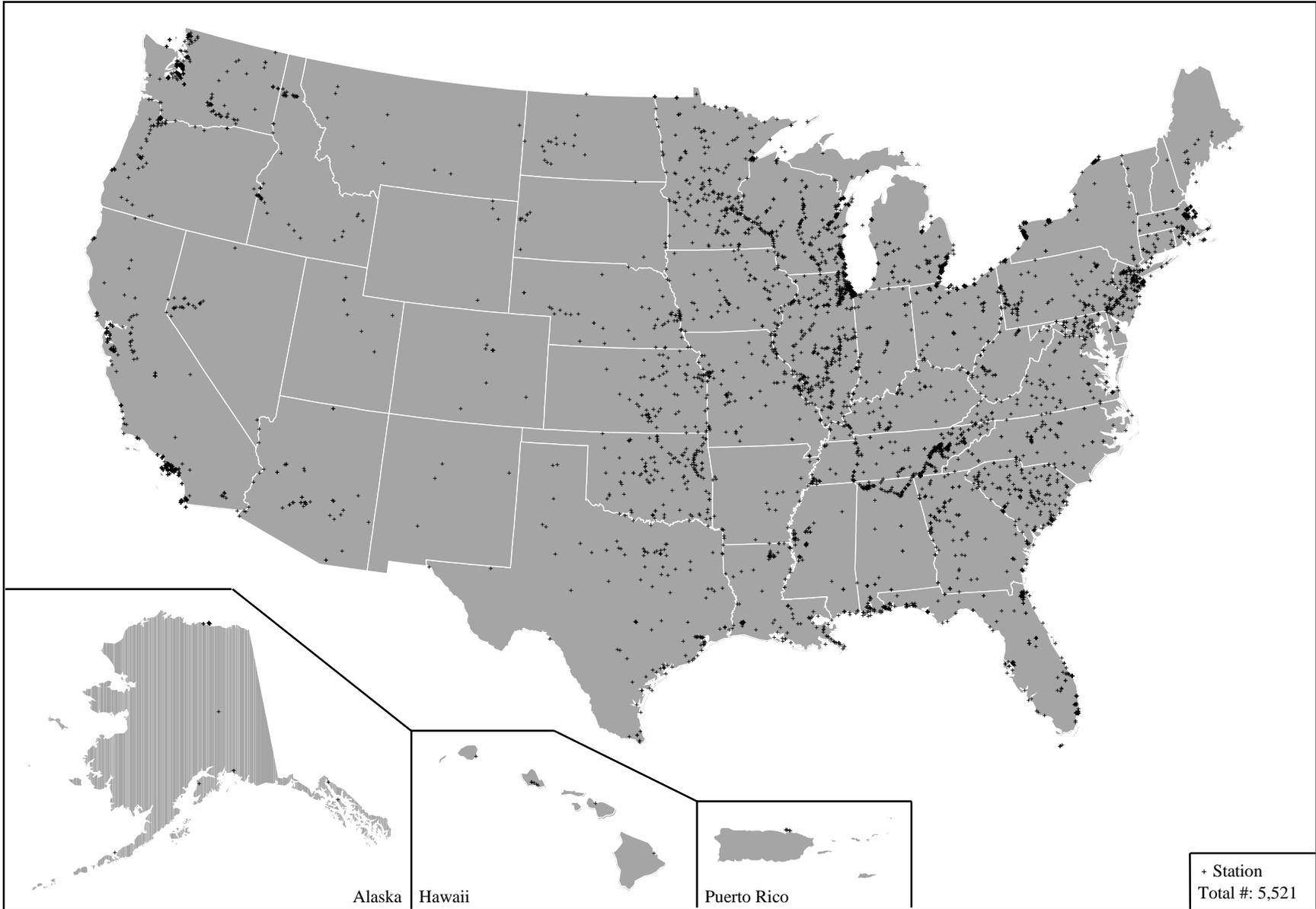


Figure 3-2. Sampling Stations Classified as Tier 1 (Associated Adverse Effects are Probable).

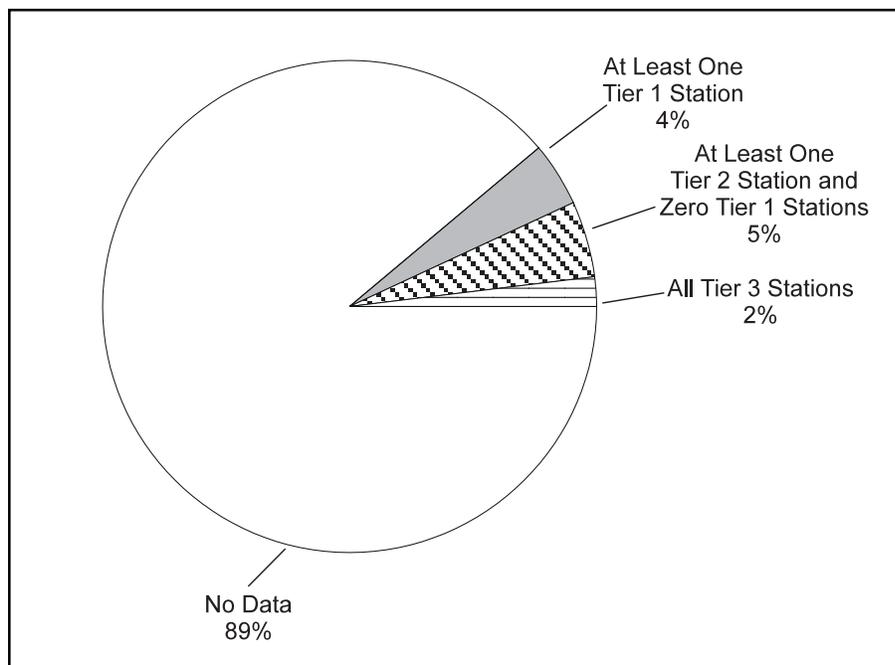


Figure 3-3. National Assessment: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

tissue (Figure 3-4). Slightly more than one-third of these measurements represent concentrations recorded as above a detection limit. Using available assessment parameters, EPA could evaluate nearly two-thirds (approximately 380,000) of these measurements for the probability of association with adverse effects. Approximately one-quarter of the measurements above detection (nearly 40 percent of measurements that could be evaluated) reflect either a Tier 1 or Tier 2 level of contamination. Figure 3-4 also shows the distribution of measurements at the Tier 1 and Tier 2 level of contamination by chemical class. Chemicals that have been measured over the past 15 years, can be evaluated using the NSI evaluation approach, and accumulate to levels associated with an increased probability of adverse effects are predominantly persistent, hydrophobic organic compounds and metals.

Data related to more than 230 different chemicals or chemical groups were included in the NSI evaluation. Approximately 40 percent of these chemicals or chemical groups (97) were present at levels that resulted in classification of sampling stations as Tier 1 or Tier 2. Table 3-2 presents the chemicals or chemical groups that resulted in classification of more than 1,000 Tier 1 or Tier 2 sampling stations. Sampling stations are reported more than once in Table 3-2 because it is common for a station to have elevated concentration levels for multiple chemicals.

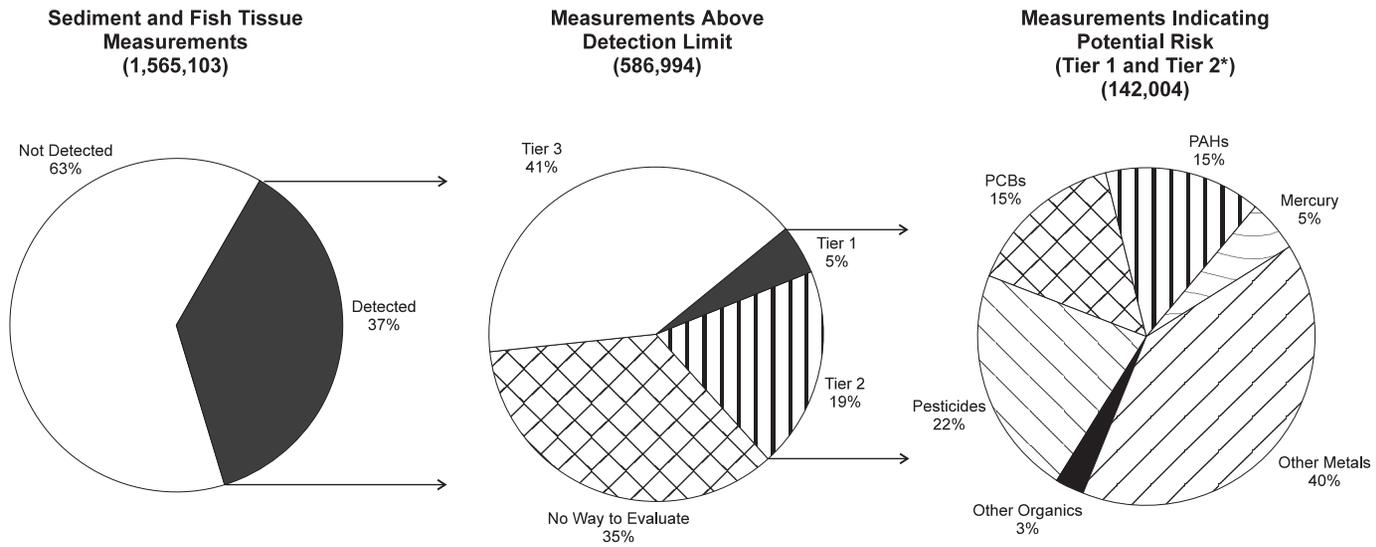
The contaminants most frequently at levels in fish or sediment where associated adverse effects are prob-

able include PCBs (58 percent of the 5,521 Tier 1 sampling stations) and mercury (20 percent of Tier 1 sampling stations). Pesticides, most notably DDT and metabolites at 15 percent of Tier 1 sampling stations, and polynuclear aromatic hydrocarbons (PAHs), such as pyrene at 8 percent of Tier 1 sampling stations, also were frequently at levels where associated adverse effects are probable.

Dry weight measures of divalent metals other than mercury (e.g., copper, cadmium, lead, nickel, and zinc) were not used to place a sampling station in Tier 1 without an associated measurement of acid volatile sulfide, a primary mediator of bioavailability not often available in the data base.

The [SEM]-[AVS] methodology for sediment assessment is relatively new, and AVS measurements have not commonly been made during sediment analyses. As a result, metals other than mercury (which also include arsenic, chromium, and silver) are solely responsible for only 6 percent of Tier 1 sampling stations and overlap with mercury or organic compounds at an additional 6 percent of Tier 1 sampling stations. In contrast, metals other than mercury are solely responsible for about 28 percent of the 15,992 Tier 1 and Tier 2 sampling stations, and overlap with mercury or organic compounds at an additional 28 percent of Tier 1 and Tier 2 sampling stations. The remaining 44 percent of Tier 1 and Tier 2 sampling stations are classified solely for mercury or organic compounds.

Two important issues in interpreting the results of sampling station classification are naturally occurring "background" levels of chemicals and the effect of chemical mixtures. Site-specific naturally occurring (or background) levels of chemicals may be an important risk management consideration in examining sampling station classification. This is most often an issue for naturally occurring chemicals such as metals and PAHs. In addition, although the sediment chemistry screening levels for individual chemicals are used as indicators of potential adverse biological effects, other co-occurring chemicals (which may or may not be measured) can cause or contribute to any observed adverse effect at specific locations.



*For Tier 1 alone: 27,358 measurements indicate potential risk, distributed among PCBs (62 percent) PAH (13 percent), pesticides (9 percent) mercury (7 percent), other organics (5 percent), and other metals (4 percent)

Figure 3-4. National Assessment: Percent of NSI Measurements That Indicate Potential Risk.

Table 3-2. Chemicals or Chemical Groups Most Often Associated With Tier 1 and Tier 2 Sampling Station Classifications

Chemical or Chemical Group	Number of Stations									
	Total # of Stations Evaluated	Based on All Measurement Parameters					Based on Aquatic Life Parameters		Based on Human Health Parameters	
		Combined Tiers 1 & 2	Percent of All Tier 1 and Tier 2 Stations	Tier 1	Percent of All Tier 1 Stations	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2
Copper	16,161	7,172	45	-	-	7,172	-	7,167	-	5
Nickel	12,447	6,284	39	-	-	6,284	-	6,284	-	-
Lead	16,791	5,681	36	-	-	5,681	-	5,415	-	328
Polychlorinated biphenyls	12,276	5,454	34	3,175	58	2,279	963	1,219	2,256	3,198
Arsenic	13,200	5,392	34	182	3	5,210	182	4,658	-	605
Cadmium	16,010	4,808	30	-	-	4,808	-	4,773	-	41
Mercury	15,649	4,333	27	1,122	20	3,211	1,122	3,127	-	103
Zinc	15,160	3,468	22	-	-	3,468	-	3,451	-	17
DDT (and metabolites)	11,462	3,422	21	803	15	2,619	798	2,203	21	1,402
Chromium	15,222	3,070	19	278	5	2,792	278	2,786	-	7
Dieldrin	10,284	2,597	16	58	1	2,539	49	1,006	9	2,456
Chlordane	10,697	2,169	14	11	<1	2,158	-	1,303	11	1,697
Benzo(a)pyrene	5,435	1,993	13	287	5	1,706	287	1,051	-	1,990
Pyrene	5,798	1,920	12	431	8	1,489	431	1,489	-	10
Chrysene	5,300	1,427	9	166	3	1,261	166	1,261	-	30
Dibenzo(a,h)anthracene	4,896	1,383	9	337	6	1,046	337	1,018	-	1,092
Benzo(a)anthracene	5,120	1,366	9	214	4	1,152	214	1,106	-	847
Bis(2-ethylhexyl)phthalate	3,559	1,190	7	347	6	843	347	823	-	406
Naphthalene	5,246	1,186	7	254	5	932	254	932	-	5
Fluoranthene	5,814	1,114	7	210	4	904	210	904	-	11
Fluorene	5,175	1,107	7	201	4	906	201	906	-	5
Silver	8,022	1,096	7	302	5	794	302	794	-	-
Total for all chemicals in the NSI database	21,096	15,922	-	5,521	-	10,401	3,287	9,921	2,327	6,196

The total number of sampling stations classified as Tier 1 or Tier 2 for a given chemical as presented in Table 3-2 may not be representative of the potential risk posed by that chemical. Although there may be few overall observations for some chemicals, the frequency of detection in sediment and tissue and the frequency with which those chemicals result in Tier 1 or Tier 2 risk may be high. (See Appendix D, Table D-2.)

The results of the analysis for three chemicals (arsenic, silver, and phthalate esters) might be misleading. Arsenic is typically analyzed in biota as "total arsenic", which includes all forms of arsenic. The EPA risk level for comparison with measured values was derived for the highly toxic effects of inorganic arsenic. However, arsenic in the edible portions of fish and shellfish is predominantly found in a nontoxic organic form (USEPA, 1995c). For this analysis, a precautionary

approach was taken to account for the human health risk from the small amount of inorganic arsenic included in total arsenic measures and for measures that, in fact, represent only inorganic arsenic. Silver, like copper, cadmium, lead, nickel, and zinc, binds to sulfide in sediment. However, silver cannot be evaluated like these other metals in the [SEM]-[AVS] assessment for a number of reasons, including that one molecule of sulfide binds two molecules of silver rather than just one as is the case for the other metals. Recent research suggests that if any AVS is measured, silver will not be bioavailable or toxic to exposed aquatic organisms (Berry et al., 1996). In the NSI data evaluation, silver is not evaluated on the basis of AVS measurement, and exceedance of two upper thresholds for aquatic life protection can classify a sampling station as Tier 1. In the case of phthalate esters, high concentrations in samples might be an indication of contamination during sample handling and not necessarily an indication of sediment contamination at the sampling station.

Table 3-2 also separately identifies the number of sampling stations categorized as Tier 1 or Tier 2 for aquatic life effects and for human health effects. Evaluation parameters indicative of aquatic life effects include:

- Comparison of sediment chemistry measurements to EPA draft sediment quality criteria (SQCs).
- Comparison of sediment chemistry measurements to other screening values (SQCs when percent organic carbon is not reported, SQALs, ERL/ERMs, PEL/TEs, and AETs).
- Comparison of [SEM] to [AVS].
- Results of toxicity tests.

Human health evaluation parameters included:

- Comparison of sediment chemistry TBP to EPA risk levels or FDA tolerance/action or guideline levels.
- Comparison of fish tissue levels of PCBs and dioxin to EPA risk levels. (A sampling station can be classified as Tier 1 without corroborating sediment chemistry data.)
- Comparison of fish tissue levels to EPA risk levels and FDA tolerance/action or guideline levels.

The evaluation results indicate that sediment contamination associated with probable or possible but infrequent adverse effects exists for both aquatic life and human health. More sampling stations were classified as either

Tier 1 or Tier 2 for aquatic life concerns than for human health concerns. About 41 percent more sampling stations were classified as Tier 1 for aquatic life (3,287 stations) than for human health (2,327 stations). About 60 percent more sampling stations were classified as Tier 2 for aquatic life (9,921 stations) than were classified as Tier 2 for human health (6,196 stations). The locations of sampling stations classified as Tier 1 or Tier 2 for aquatic life concerns are illustrated in Figure 3-5, and the locations of those classified as Tier 1 or Tier 2 for human health concerns are illustrated in Figure 3-6.

EPA analyzed the results to determine which evaluation parameters most often caused sampling stations to be classified as either Tier 1 or Tier 2 (see Table 3-3). Most of the sampling stations classified as Tier 1 (3,283 stations) or Tier 2 (9,882 stations) were placed in those categories because measured sediment contaminant levels exceeded screening values. The comparison of fish tissue levels of PCBs and dioxins to EPA risk levels triggered placement of the second highest number of sampling stations in Tier 1 (2,313 stations). The comparison of sediment chemistry TBP values to FDA levels and EPA risk levels triggered placement of the second highest number of sampling stations in Tier 2 (5,671 stations). The AVS and toxicity parameters triggered placement of the fewest sampling stations in Tier 1 (8 stations each) and Tier 2 (146 stations for AVS and 183 stations for toxicity). These results reflect both data availability and evaluation parameter sensitivity.

The lack of data required to apply some important assessment parameters hampered EPA's efforts to determine the incidence and severity of sediment contamination. For example, a Tier 1 classification based on divalent metal concentrations in sediment required an associated acid-volatile sulfide (AVS) measurement. Also, a Tier 1 classification for potential human health effects required both sediment chemistry and fish tissue residue data for all chemicals except PCBs and dioxins. These data combinations frequently were not available. Table A-2 in Appendix A presents the total number of NSI stations where sediment chemistry data, related biological data, and matched data (i.e., sediment chemistry and biological data taken at the same sampling station) were collected. AVS measurements were available at only 1 percent of the evaluated stations. Likewise, matched sediment chemistry and fish tissue data were available at only 8 percent of the evaluated stations. Toxicity data were also limited: bioassay results were available at only 6 percent of the evaluated stations.

To help judge the effectiveness of the NSI data evaluation approach, EPA examined the agreement between

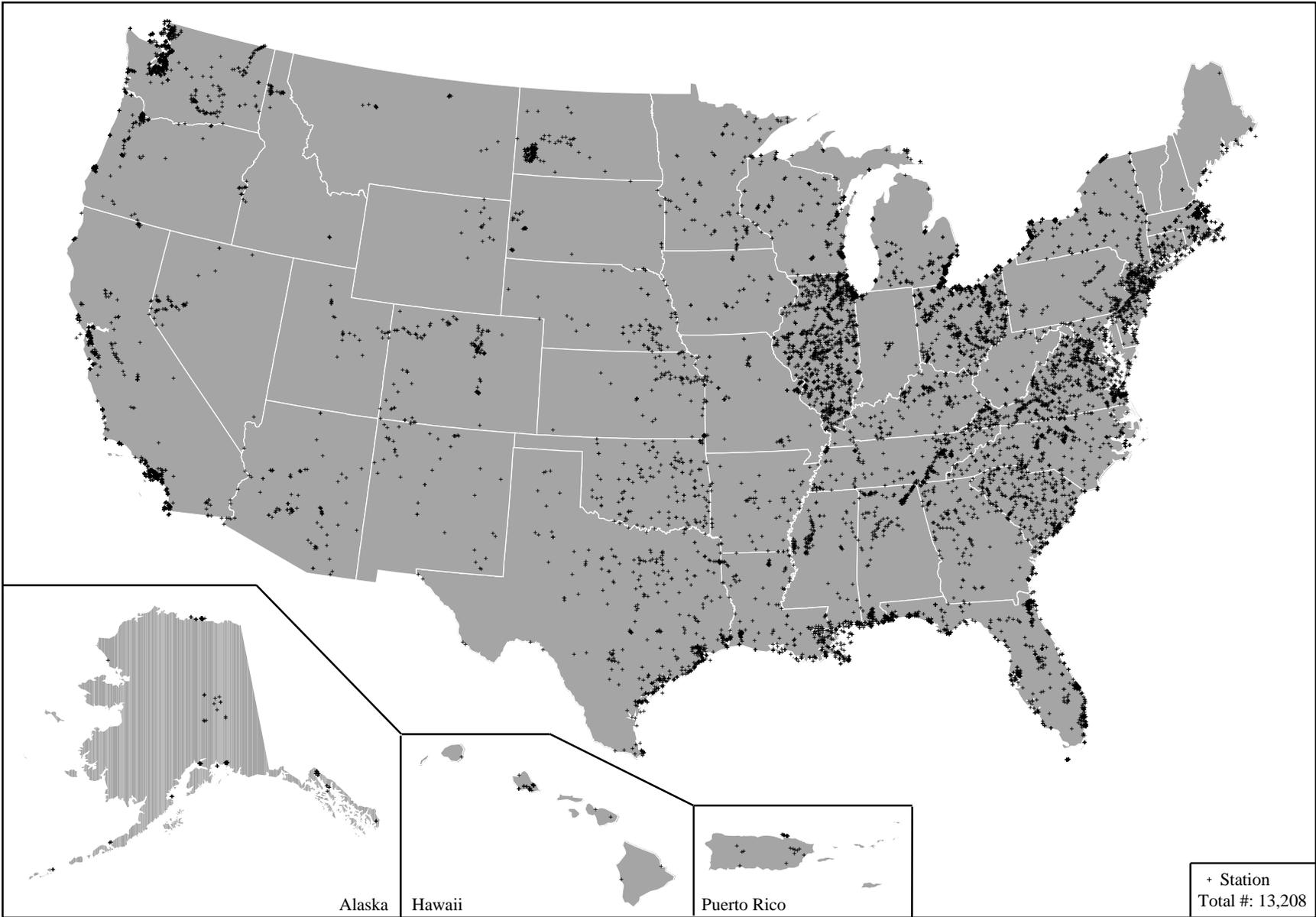


Figure 3-5. Sampling Stations Classified as Tier 1 or Tier 2 for Potential Risk to Aquatic Life.



Figure 3-6. Sampling Stations Classified as Tier 1 or Tier 2 for Potential Risk to Human Health.

Table 3-3. Number of Sampling Stations Classified as Tier 1 and Tier 2 Based on Each Component of the Evaluation Approach (see Table 2-2)

Measurement Parameter	Number of Sampling Stations in Tier 1	Number of Sampling Stations in Tier 2
Sediment chemistry values exceed draft sediment quality criteria	97	NA
[SEM]-[AVS] comparison	8	146
Sediment chemistry values exceed threshold values	3,283	9,882
Sediment chemistry TBP and fish tissue levels exceed risk levels or action levels	126	NA
Sediment chemistry TBP exceeds risk levels or action levels	NA	5,671
Fish tissue levels exceed risk levels or action levels	NA	2,789
Tissue levels of PCBs or dioxins exceed risk levels	2,313	NA
Toxicity test results	8	183

matched sediment chemistry and toxicity test results for the 805 NSI sampling stations where both data types were available and could be evaluated. The toxicity test data indicate whether significant lethality to indicator organisms occurs as a result of exposure to sediment. Tier 1 classifications for aquatic life effects from sediment chemistry data correctly matched toxicity test results for about three-quarters of the sampling stations, with the remainder balanced between false positives (12 percent) and false negatives (14 percent). In contrast, when Tier 2 classifications from sediment chemistry data are added in, false negatives drop to less than 1 percent at the expense of false positives (which increase to 68 percent) and correctly matched sampling stations (which drop to 30 percent). This result highlights the fact that classification in Tier 2 is very conservative, and it does not indicate a high probability of adverse effects to aquatic life. If bioassay test results for sublethal (chronic) endpoints such as reproductive effects were included in the NSI evaluation, the rate of false positives would likely decrease and correctly matched sampling stations would likely increase for both tiers.

EPA also conducted a separate analysis of the correlation of toxicity data and exceedances of SQCs and SQALs (exclusive of other threshold values). From the results of this study, there are 2,037 observations of a SQC or SQAL exceedance at 916 sampling stations. These 916 sampling stations are located in 405 distinct RF1 reaches, which are in turn located in 218 distinct watersheds. Matching toxicity test data are available at

39 of these 916 sampling stations. Toxicity test results indicate that one or more SQC or SQAL exceedances are associated with significant lethality (acute effects) to indicator organisms slightly more than half of the time (22 of 39 sampling stations). SQCs and SQALs are levels set to be protective of acute and chronic effects, such as effects on reproduction or growth, for 95 percent of benthic species. The NSI currently does not contain matching chronic toxicity test data to compare with sediment chemistry measures.

For a number of reasons, known contaminated sediment locations in the United States might not have been classified as Tier 1 or Tier 2 based on the evaluation of NSI data. The NSI does not presently include data describing every sampled location in the Nation. Therefore, numerous sampling stations were not evaluated for this first report to Congress. However, additional databases will be added to the NSI and more sampling stations will be evaluated for future reports to Congress.

During an initial screening of the NSI data, EPA noted data quality problems that might have affected all or many of the data reported in a given database (e.g., the Virginia State Water Control Board organic chemical data reported in STORET). Databases with obvious quality problems were not included in the NSI data evaluation. Also, if a database included in the NSI did not have associated locational information (latitude/longitude), data in that database were not included in the NSI data evaluation (e.g., EPA's Great

Lakes Sediment Quality Database). To reduce the chances of overlooking sampling locations that have obvious sediment contamination problems, EPA sent a preliminary evaluation of sediment chemistry data to each EPA Region so knowledgeable staff would have an opportunity to list additional contaminated sediment locations not identified in the NSI evaluation. These locations are presented at the end of this chapter. Despite such efforts, some sediment sampling locations known to have contamination problems still have not been listed in this first report to Congress.

Watershed Analysis

The potential risk of adverse effects to aquatic life and human health is greatest in areas with a multitude of contaminated locations. The assessment of individual sampling stations is useful for estimating the number and distribution of contaminated spots and the overall magnitude of sediment contamination in monitored waterbodies of the United States. However, a single "hot spot" might not pose a great threat to either the benthic community at large or consumers of resident fish because the spatial extent of exposure could be small. On the other hand, if many contaminated spots are located in close proximity, the spatial extent and probability of exposure are much greater. EPA examined sampling station classifications within watersheds to identify areas of probable concern for sediment contamination (APCs), where the exposure of benthic organisms and resident fish to contaminated sediment may be more frequent. In this report, EPA defines watersheds by 8-digit United States Geological Survey (USGS) hydrologic unit codes (the cataloging unit), which are roughly the size of a county.

Watersheds containing APCs are those that include at least 10 Tier 1 sampling stations, and in which at least 75 percent of all sampling stations were classified as either Tier 1 or Tier 2. These dual criteria are based on empirical observation of the data. NSI Sampling stations are located within 1,367 watersheds, or approximately 65 percent of the total number of watersheds in the continental United States. To identify APCs, EPA first examined the frequency distribution of the number of Tier 1 sampling stations within these watersheds. The upper 10 percent of watersheds with sampling stations had 10 or more sampling stations classified as Tier 1. Because approximately three-quarters of all sampling stations in the nation are classified as Tier 1 or Tier 2, EPA determined that APCs should also reflect at least this distribution. This second requirement slightly reduced the number watersheds containing APCs.

The definition of "area of probable concern" was developed for this report to identify watersheds for which further study of the effects and sources of sediment contamination, and possible risk reduction needs, would be warranted. Where data have been generated through intensive sampling in areas of known or suspected contamination within a watershed, the APC definition should identify watersheds which contain even relatively small areas that are considerably contaminated. However, this designation does not imply that sediment throughout the entire watershed, which is typically very large compared to the extent of available sampling data, is contaminated. On the other hand, where data have been generated through comprehensive sampling, or where sampling stations were selected randomly or evenly distributed throughout a sampling grid, the APC definition might not identify watersheds that contain small or sporadically contaminated areas. A comprehensively surveyed watershed of the size typically delineated by a USGS cataloging unit might contain small but significant areas that are considerably contaminated, but might be too large in total area for 75 percent of all sampling stations to be classified as Tier 1 or Tier 2. Limited random or evenly distributed sampling within such a watershed also might not yield 10 Tier 1 sampling stations. Thus, the process used to identify watersheds containing APCs may both include some watersheds with limited areas of contamination and omit some watersheds with significant contamination. However, given available data, EPA believes it represents a reasonable screening analysis to identify watersheds where further study is warranted.

The application of this procedure identified 96 watersheds that contain APCs. The location of these watersheds is depicted on Figure 3-7. The name and cataloging unit number on Table 3-4 correspond to the labels on Figure 3-7. These watersheds represent about 5 percent of all watersheds in the continental United States (96 of 2,111). The watershed analysis also indicated that 39 percent of all watersheds in the country contain at least one Tier 1 sampling station, 15 percent contain at least one Tier 2 sampling station but no Tier 1 stations, and 6 percent contain all Tier 3 sampling stations (Figure 3-8). Thirty-five percent of all watersheds in the country did not include a sampling station.

The definition of an APC requires that a watershed include at least 10 sampling stations, because at least 10 must be classified as Tier 1. About one-quarter of the watersheds in the country (488 of 2,111) met this requirement, and thus were eligible to contain an APC: approximately 20 percent (96 of 488) of these contain APCs. Although a minimum amount of sampling was required



Figure 3-7. Watersheds Identified as Containing APCs

Table 3-4. USGS Cataloging Unit Numbers and Names for Watersheds Containing APCs

Map #	Cataloging Unit Number	Cataloging Unit Name
1	1090001	Charles
2	1090002	Cape Cod
3	1090004	Narragansett
4	2030103	Hackensack-Passaic
5	2030104	Sandy Hook-Staten Island
6	2030105	Raritan
7	2030202	Southern Long Island
8	2040105	Middle Delaware-Musconetcong
9	2040202	Lower Delaware
10	2040203	Schuylkill
11	2040301	Mullica-Toms
12	2060003	Gunpowder-Patapsco
13	2070004	Conococheague-Opequon
14	3040201	Lower Pee Dee
15	3060101	Seneca
16	3060106	Middle Savannah
17	3080103	Lower St. Johns
18	3130002	Middle Chattahoochee-Lake Harding
19	3140102	Choctawhatchee Bay
20	3140107	Perdido Bay
21	3160205	Mobile Bay
22	4030102	Door-Kewaunee
23	4030108	Menominee
24	4030204	Lower Fox
25	4040001	Little Calumet-Galien
26	4040002	Pike-Root
27	4040003	Milwaukee
28	4050001	St. Joseph
29	4060103	Manistee
30	4090002	Lake St. Clair
31	4090004	Detroit
32	4100001	Ottawa-Stony
33	4100002	Raisin
34	4100010	Cedar-Portage
35	4100012	Huron-Vermillion
36	4110001	Black-Rocky
37	4110003	Ashtabula-Chagrin

Table 3-4. (continued)

Map #	Cataloging Unit Number	Cataloging Unit Name
38	4120101	Chautauqua-Conneaut
39	4120103	Buffalo-Eighteenmile
40	4120104	Niagara
41	4130001	Oak Orchard-Twelve-mile
42	4150301	Upper St. Lawrence
43	5030101	Upper Ohio
44	5030102	Shenango
45	5040001	Tuscarawas
46	5120109	Vermilion
47	5120111	Middle Wabash-Busseron
48	6010104	Holston
49	6010201	Watts Bar Lake
50	6010207	Lower Clinch
51	6020001	Middle Tennessee-Chickamauga
52	6020002	Hiwassee
53	6030001	Guntersville Lake
54	6030005	Pickwick Lake
55	6040001	Lower Tennessee-Beech
56	6040005	Kentucky Lake
57	7010206	Twin Cities
58	7040001	Rush-Vermillion
59	7040003	Buffalo-Whitewater
60	7070003	Castle Rock
61	7080101	Copperas-Duck
62	7090006	Kishwaukee
63	7120003	Chicago
64	7120004	Des Plaines
65	7120006	Upper Fox
66	7130001	Lower Illinois-Senachwine Lake
67	71401001	Cahokia-Joachim
68	7140106	Big Muddy
69	7140201	Upper Kaskaskia
70	7140202	Middle Kaskaskia
71	8010100	Lower Mississippi-Memphis
72	8030209	Deer-Steele
73	8040207	Lower Ouachita

Table 3-4. (continued)

Map #	Cataloging Unit Number	Cataloging Unit Name
74	8080206	Lower Calcasieu
75	8090100	Lower Mississippi-New Orleans
76	10270104	Lower Kansas
77	11070207	Spring
78	11070209	Lower Neosho
79	12040104	Buffalo-San Jacinto
80	17010303	Coeur D'Alene Lake
81	17030003	Lower Yakima
82	17090012	Lower Willamette
83	17110002	Strait of Georgia
84	17110013	Duwamish
85	17110014	Puyallup
86	17110019	Puget Sound
87	18030012	Tulare-Buena Vista Lakes
88	18050003	Coyote
89	18050004	San Francisco Bay
90	18070104	Santa Monica Bay
91	18070105	Los Angeles
92	18070107	San Pedro Channel Islands
93	18070201	Seal Beach
94	18070204	Newport Bay
95	18070301	Aliso-San Onofre
96	18070304	San Diego

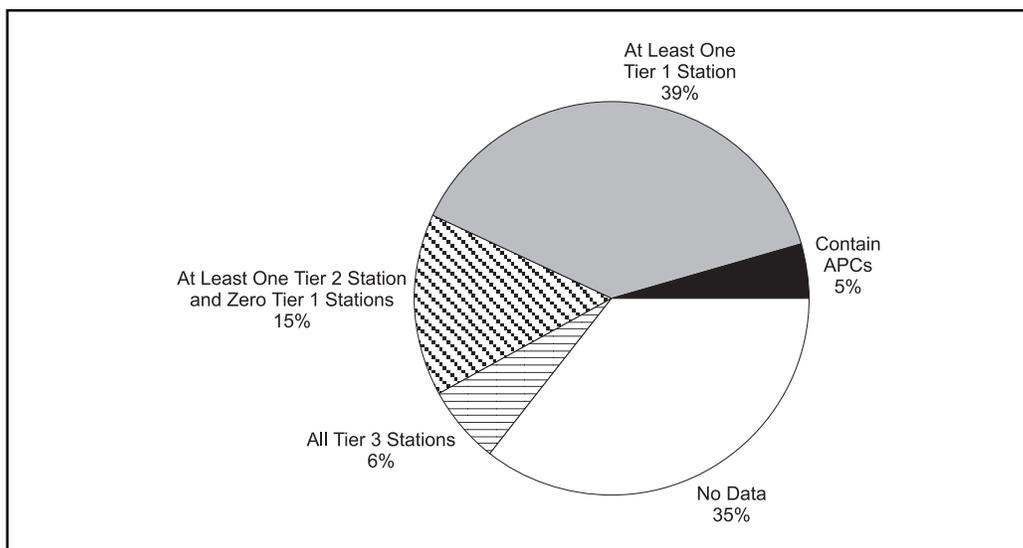


Figure 3-8. National Assessment: Watershed Classifications.

for consideration as an APC, sampling effort alone did not determine APC identification. In fact, other than defining a ceiling, the total number of sampling stations in a watershed is not indicative of the number of Tier 1 sampling stations. A simple statistical regression analysis of total number of sampling stations versus number of Tier 1 sampling stations for the nearly 500 watersheds eligible to contain an APC (including at least 10 and up to 200 sampling stations) resulted in a correlation coefficient (R-square) of 0.44, a value which indicates a large amount of variation.

APC designation could result from extensive sampling throughout a watershed, or from intensive sampling at a single or few contaminated locations. In comparison to the overall results presented in Figure 1, sampling stations are located on an average of 46 percent of reaches within watersheds containing APCs. On the average, 30 percent of reaches in watersheds containing APCs have at least one Tier 1 sampling station, and 13 percent have no Tier 1 sampling station but at least one Tier 2 sampling station. In many of these watersheds, contaminated areas may be concentrated in specific river reaches in a watershed. Within the 96 watersheds containing APCs across the country, 57 individual river reaches or water body segments have 10 or more Tier 1 sampling stations (Table 3-5). These are localized areas within the watershed for which an abundance of evidence indicates potentially severe contamination. Because EPA's Reach File 1 was used to index the location of NSI sampling stations, some sampling stations might not actually occur on the identified Reach File 1 stream, but on a smaller stream that is hydrologically linked or is relatively close to the Reach File 1 stream.

Volume 2 of this report contains more detailed information for each watershed containing an APC. This information includes maps showing watershed boundaries, major waterways (RF1), and the location and classification of sampling stations. In addition, Volume 2 provides tables summarizing the sediment chemistry, fish tissue, and toxicity test data collected within those watersheds that were used for this evaluation.

Wildlife Assessment

As described in Chapter 2, EPA conducted a separate analysis of the NSI data to determine the number of sampling stations where chemical concentrations of DDT, mercury, dioxin, and PCBs exceeded levels set to be protective of wildlife (i.e., EPA wildlife criteria). The wildlife criteria used in this evaluation were derived from those presented in the *Great Lakes Water Quality Initiative Criteria Documents for the Protection of Wildlife*

(USEPA, 1995a) subtracting out exposure from direct water consumption. The only assumed route of exposure for this evaluation was the consumption of contaminated fish tissue by wildlife.

Data were available to evaluate a total of 13,691 NSI sampling stations using the wildlife criteria. Based on wildlife criteria alone, 162 sampling stations would be classified as Tier 1 (matched sediment chemistry and fish tissue data), and 7,634 sampling stations would be classified as Tier 2 (sediment chemistry TBP or fish tissue data). Figure 3-9 shows the location of Tier 1 and Tier 2 sampling stations based on exceedance of wildlife criteria. Table 3-6 presents a comparison of the sampling stations classified as Tier 1 or Tier 2 with and without the use of wildlife criteria. If wildlife criteria had been used to complete the national assessment, 619 sampling stations classified as Tier 3 would have been classified as Tier 2 and 16 sampling stations classified as Tier 2 would have been classified as Tier 1. Most of the change is from an increase in Tier 2 sampling stations classified for DDT (from 2,619 to 4,276) and mercury (from 3,211 to 5,199).

Additional sampling stations would be classified as Tier 1 or Tier 2 using wildlife criteria for two reasons: (1) the wildlife criteria for DDT and mercury are significantly lower (8 and 19 times lower, respectively) than the EPA risk levels used in the corresponding human health evaluations; (2) the lipid content used in the wildlife TBP analysis (10.31 percent for whole body) exceeded the lipid content used in the human health TBP analysis (3.0 percent for fillet).

No additional sampling stations would be classified as Tier 1 based on mercury or dioxins wildlife criteria. For a sampling station to be classified as Tier 1, both sediment chemistry TBP and measured fish tissue concentrations taken from that sampling station had to exceed the wildlife criteria. At very few sampling stations in the NSI were both sediment chemistry and fish tissue levels for dioxin measured. In those few cases where contaminants in both media were measured, there were no additional sampling stations (stations not already classified as Tier 1) where both the sediment chemistry TBP and fish tissue levels exceeded the wildlife dioxin criteria. No additional sampling stations were classified as Tier 1 for exceedance of the wildlife criteria for mercury because sediment chemistry TBPs cannot be calculated for metals.

Regional and State Assessment

The remainder of this chapter presents more detailed results from the evaluation of NSI data for sam-

Table 3-5. River Reaches With 10 or More Tier 1 Sampling Stations Located in Watersheds Containing APCs

EPA Region	Cataloging Unit Number	Cataloging Unit Name	RF1 Reach ID	RF1 Reach Name	Number of Tier 1 Stations	Total Number of Stations in Reach
1	01090001	Charles	01090001022	Boston Bay	72	146
			01090001015	Boston Bay	42	149
			01090001013	Atlantic Ocean	37	58
			01090001024	Boston Bay	16	45
1	01090004	Narragansett	01090004023	Seekonk River	16	17
2	02030103	Hackensack-Passaic	02030103023	Rockaway River	26	56
2	02030104	Sandy Hook-Staten Island	02030104003	Arthur Kill	10	10
2	04120103	Buffalo-Eighteenmile	04120103007	Buffalo Creek	26	42
			04120103001	Lake Erie, U.S. Shore	17	22
2	04120104	Niagara	04120104007	Niagara River	12	20
2	04130001	Oak Orchard-Twelve-mile	04130001001	Lake Ontario, U.S. Shore	14	27
4	03060106	Middle Savannah	03060106047	Horse Creek	10	11
4	03080103	Lower St. Johns	03080103017	St. Johns River	10	27
4	06010201	Watts Bar Lake	06010201026	Little River	15	23
			06010201035	Tennessee River	10	12
4	06010207	Lower Clinch	06010207022	Poplar Creek	19	25
			06010207021	Poplar Creek, Brushy Fork	17	23
			06010207003	Clinch River	16	20
4	06020001	Middle Tennessee-Chickamauga	06020001003	Lookout Creek	29	41
4	06030005	Pickwick Lake	06030005046	Wilson Lake	22	25
5	04030108	Menominee	04030108001	Menominee River	10	12
5	04030204	Lower Fox	04030204001	Fox River	13	13
			04030204010	Fox River	12	13
			04030204004	Fox River	10	10
5	04040001	Little Calumet-Galien	04040001010	Indiana Harbor	15	15
			04040001006	Calumet River	12	20
5	04040002	Pike-Root	04040002002	Lake Michigan	15	33
5	04040003	Milwaukee	04040003001	Milwaukee River	48	64
5	04090004	Detroit	04090004006	Detroit River	27	38
			04090004014	River Rouge	12	12
			04090004011	Detroit River	11	11
			04090004004	Detroit River	10	12
5	04100002	Raisin	04100002001	River Raisin	16	32

Table 3-5. (Continued)

EPA Region	Cataloging Unit Number	Cataloging Unit Name	RF1 Reach ID	RF1 Reach Name	Number of Tier 1 Stations	Total Number of Stations in Reach
5	07010206	Twin Cities	7010206001	Mississippi River	10	15
5	07120003	Chicago	7120003001	Chicago Sanitary Ship Canal	35	36
			7120003006	Little Calumet River	13	42
5	07120004	Des Plaines	7120004011	Des Plaines River	11	20
6	08040207	Lower Ouachita	8040207005	Bayou De Siard	11	11
6	08080206	Lower Calcasieu	8080206033	Calcasieu River	13	40
			8080206034	Bayou D'Inde	11	30
6	08090100	Lower Mississippi-New Orleans	8090100004	Mississippi River	13	23
9	18030012	Tulare-Buena Vista Lakes	18030012014	Kings River	10	12
9	18050004	San Francisco Bay	18050004001	San Francisco Bay	11	27
9	18070104	Santa Monica Bay	18070104003	Pacific Ocean	20	37
9	18070105	Los Angeles	18070105001	Los Angeles River	12	31
9	18070201	Seal Beach	18070201001	Pacific Ocean	18	47
9	18070204	Newport Bay	18070204002	San Diego Creek	11	22
9	18070304	San Diego	18070304014	San Diego Bay	30	46
10	17110002	Strait of Georgia	17110002019	Bellingham Bay	13	26
10	17110013	Duwamish	17110013003	Elliott Bay	41	100
10	17110019	Puget Sound	17110019086	Puget Sound	119	232
			17110019085	Puget Sound	105	264
			17110019068	Budd Inlet	41	112
			17110019084	Puget Sound	32	57
			17110019087	Puget Sound	32	164
			17110019020	Bainbridge Island	31	88
			17110019022	Sinclair Inlet	25	44



Figure 3-9. Sampling Stations Classified as Tier 1 or Tier 2 Based on Wildlife Criteria.

Table 3-6. Increased Number of Sampling Stations Classified as Tier 1 and Tier 2 by Including Wildlife Criteria in the National Assessment^a

Chemical or Chemical Group	Number of Stations Excluding Wildlife Assessment		Number of Stations Including Wildlife Assessment	
	Tier 1	Tier 2	Tier 1	Tier 2
DDT (and metabolites)	803	2,619	868	4,276
Dioxin	311	33	311	60
Mercury	1,122	3,211	1,122	5,199
PCBs	3,175	2,279	3,181	2,289
All Data	5,521	10,401	5,537	11,004

^aThe wildlife assessment used a default lipid content of 10.31 percent to compute the sediment chemistry TBP.

pling stations located in each of the EPA Regions and each state. The sections that follow present the number of Tier 1, Tier 2, and Tier 3 sampling stations in each Region and state and lists of the chemicals most often responsible for Tier 1 and Tier 2 classifications. Tables and figures similar to those presented in the national assessment of sampling station evaluation results and river reach evaluation results are included. Regional maps display the location of Tier 1 and Tier 2 sampling stations and APCs. The presentation format is identical for each Region.

These summary results are not inclusive of locations with contaminated sediment not identified in this survey. The data compiled for the NSI are primarily from large national electronic databases. Data from many sampling and testing studies have not yet been incorporated into the NSI. Thus, there might be additional locations

with sediment contamination that do not appear in this summary. On the other hand, data in the inventory were collected between 1980 and 1993 and any single measurement of chemical at a sampling station, taken any point in time during that period, could result in the classification of the sampling station in Tier 1 or Tier 2. Because the evaluation is a screening level analysis, sampling stations appearing in Tier 1 or Tier 2 might not cause unacceptable impacts. In addition, management programs to address identified sediment contamination might already exist.

It is important to emphasize here that some Regions, such as Region 4 and Region 5, have significantly more data in the NSI than do most other Regions. This would, to some degree, account for the relatively large number of sampling stations classified as Tier 1 in these Regions.

EPA Region 1

Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

EPA evaluated 1,102 sampling stations in Region 1 as part of the NSI evaluation. Sediment contamination where associated adverse effects to aquatic life are probable (Tier 1) was found at 254 of these sampling stations, and possible but infrequent (Tier 2) at 613 of these sampling stations. For human health, data for 44 sampling stations indicated probable association with adverse effects (Tier 1), and 246 sampling stations indicated possible but infrequent adverse effects (Tier 2). Overall, this evaluation resulted in the classification of 298 sampling stations (27 percent) as Tier 1, 646 (59 percent) as Tier 2, and 158 (14 percent) as Tier 3. The NSI sampling stations in Region 1 were located in 131 separate river reaches, or 5 percent of all reaches in the Region. Two percent of all river reaches in Region 1 included at least one Tier 1 station, 3 percent included at least one Tier 2 station but no Tier 1 stations, and less than one percent had only Tier 3 stations (Figure 3-10). Table 3-7 (on the following page) presents a summary of sampling station classification and evaluation of river reaches for each state and for the Region as a whole.

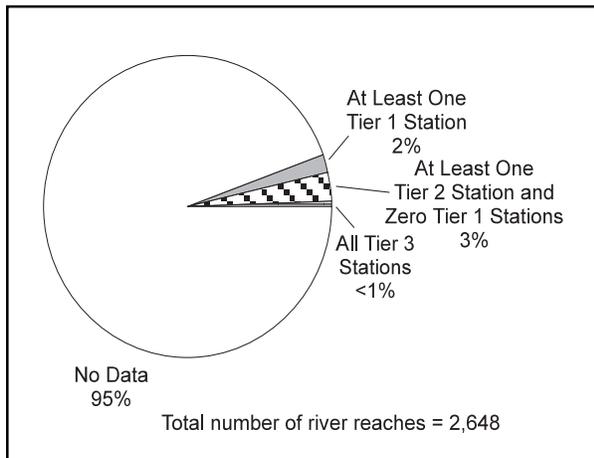


Figure 3-10. Region 1: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

This evaluation identified 3 watersheds containing areas of probable concern for sediment contamination (APCs) out of the 61 watersheds (5 percent) in Region 1 (Figure 3-11). In addition, 39 percent of all watersheds in the Region had at least one Tier 1 sampling station but were not identified as containing APCs, 11 percent had at least one Tier 2 station but no Tier 1 stations, and 2 percent had only Tier 3 stations. Forty-three percent of the watersheds in Region 1 did not include a sampling station. The locations of the watersheds containing APCs and the Tier 1 and Tier 2 sampling stations in Region 1 are illustrated in Figure 3-12.

Within the three watersheds in Region 1 identified as containing APCs (Table 3-8), 14 water bodies have at least 1 Tier 1 sampling station; 3 water bodies have 10 or more Tier 1 sampling stations (Table 3-9). The Massachusetts Bay area appears to have the most significant sediment contamination in Region 1. The water bodies listed on Table 3-9 are not inclusive of all locations containing a Tier 1 sampling station because only water bodies within watersheds containing APCs are listed.

The chemicals most often associated with Tier 1 and Tier 2 sampling station classifications in Region 1 overall and in each state in Region 1 are presented in Table 3-10.

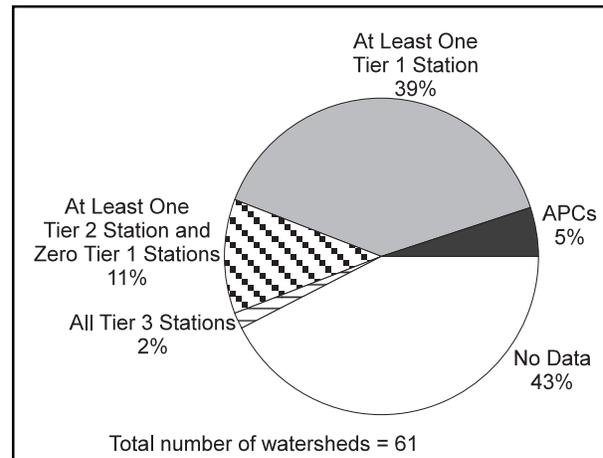


Figure 3-11. Region 1: Watershed Classifications.

Table 3-7. Region 1: Evaluation Results for Sampling Stations and River Reaches by State

State	Station Evaluation						River Reach Evaluation ^a							
	Tier 1		Tier 2		Tier 3		Number of Stations Not Identified by an RF1 Reach ^b	Reaches w/at Least 1 Station in Tier 1	Reaches w/at Least 1 Station in Tier 2 ^c	Reaches w/All Stations in Tier 3	Total # Reaches w/at Least 1 Station Evaluated	Total Reaches in State	% of All Reaches in State w/at Least 1 Station Evaluated	% of Reaches w/at Least 1 Tier 1 or Tier 2 Station
	No.	%	No.	%	No.	%								
Connecticut	20	20	67	68	11	11	8	16	24	4	44	215	21	19
Maine	13	24	37	67	5	9	28	9	7	2	18	1,583	1	1
Massachusetts	242	27	516	58	137	15	316	25	27	-	52	270	19	19
New Hampshire	4	57	1	14	2	29	-	2	-	2	4	279	1	1
Rhode Island	16	38	24	57	2	5	9	6	7	-	13	56	23	23
Vermont	3	60	1	20	1	20	-	3	-	-	3	355	1	1
REGION 1 ^d	298	27	646	59	158	14	361	59	65	7	131	2,648	5	5

^aRiver reaches based on EPA River Reach File 1 (RF1).

^bStations not identified by an RF1 reach were located in coastal or open water areas.

^cNo stations in these reaches were included in Tier 1.

^dBecause some reaches occur in more than one state, the total number of reaches in each category for the Region might not equal the sum of reaches in the states.

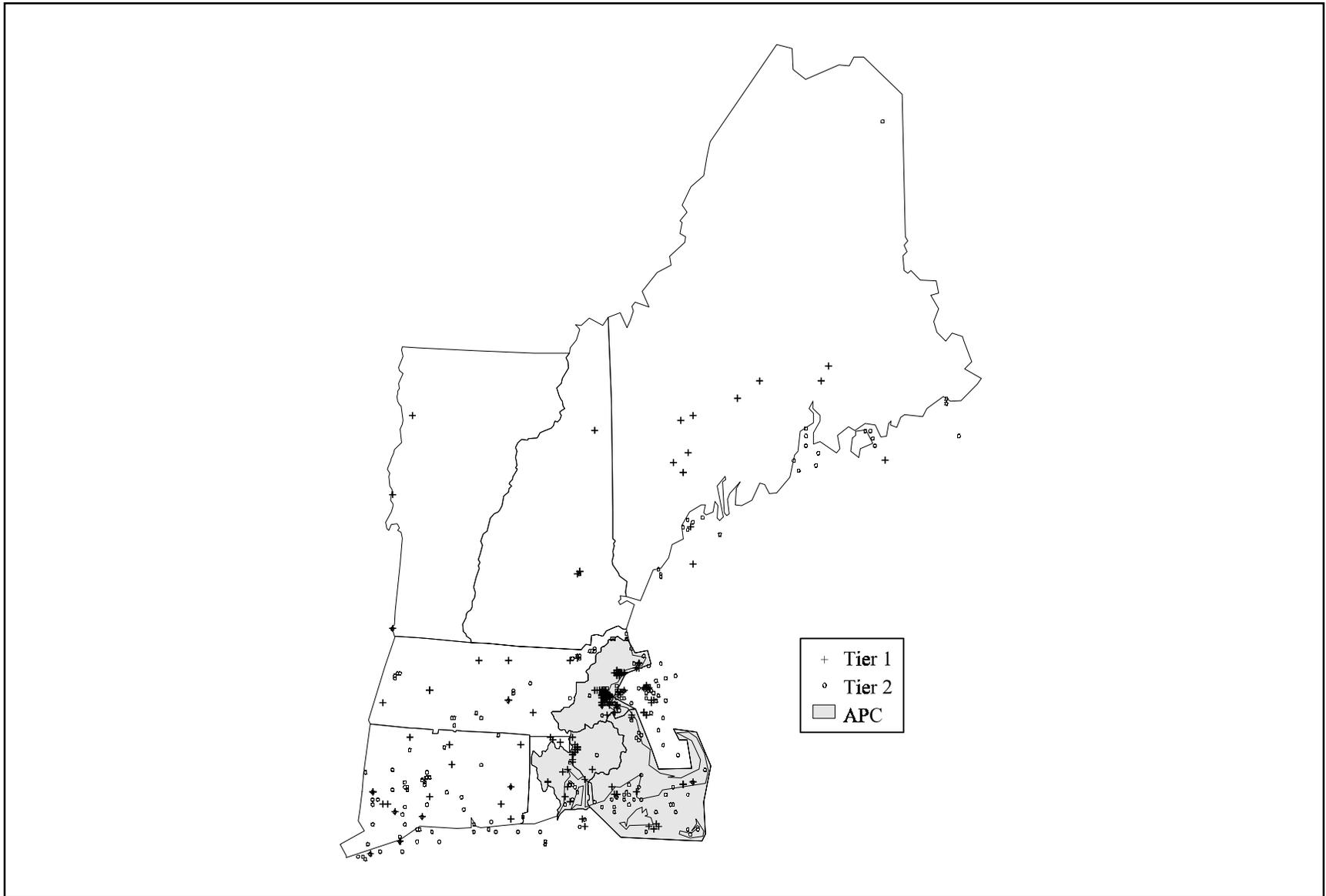


Figure 3-12. Region 1: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

Table 3-8. Region 1: Watersheds Containing Areas of Probable Concern for Sediment Contamination

Cataloging Unit Number	Name	State(s) ^a	Number of Sampling Stations			Percent of Sampling Stations in Tier 1 or Tier 2
			Tier 1	Tier 2	Tier 3	
01090001	Charles	MA	195	402	111	84
01090004	Narragansett	MA, RI	28	20	0	100
01090002	Cape Cod	MA, (RI)	15	73	20	81

^aNo data were available for states listed in parenthesis

Table 3-9. Region 1: Water Bodies With Sampling Stations Classified as Tier 1 Located in Watersheds Containing APCs

Water Body	# of Tier 1 Stations	Water Body	# of Tier 1 Stations
Boston Bay	141	Bass River	3
Atlantic Ocean	46	Potowomut River	3
Seekonk River	16	Conanicut Island	2
Boston Harbor and Mystic River Area	9	Pawtuxet River	2
Buzzards Bay	5	Acushnet River	1
Martha's Vineyard*	4	Charles River	1
Narragansett Bay	4	Taunton River	1

*Subsequent data review indicates these sampling stations may, in fact, be located in Buzzards Bay.

Table 3-10. Region 1: Chemicals Most Often Associated With Tier 1 or Tier 2 Sampling Station Classifications^a

	Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station		Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station
Region 1 Overall	Copper	625	--	625	Massachusetts (continued)	Chromium	411	53	358
	Lead	623	--	623		Nickel	377	--	377
	Chromium	497	59	438		Arsenic	317	14	303
	Nickel	491	--	491		Zinc	314	--	314
	Mercury	488	176	312		Cadmium	278	--	278
	Arsenic	387	14	373		Polychlorinated biphenyls	149	54	95
	Zinc	376	--	376		Benzo(a)pyrene	98	2	96
	Cadmium	339	--	339		New Hampshire	DDT	4	3
	Polychlorinated biphenyls	231	74	157	Anthracene		3	2	1
	Benzo(a)pyrene	179	5	174	Benzo(a)anthracene		3	2	1
	DDT	133	17	116	Benzo(a)pyrene		3	2	1
	Dibenzo(a,h)anthracene	132	13	119	Phenanthrene		3	2	1
	Benzo(a)anthracene	128	8	120	Acenaphthylene		3	--	3
	Pyrene	122	7	115	Benzo(b)fluoranthene		3	--	3
	Chrysene	120	2	118	Fluoranthene		3	--	3
	Connecticut	Copper	71	--	71	Rhode Island	Chrysene	2	1
Nickel		55	--	55	Acenaphthene		2	--	2
Lead		49	--	49	Rhode Island	Lead	35	--	35
Cadmium		45	--	45		Copper	32	--	32
Zinc		40	--	40		Nickel	28	--	28
Mercury		39	11	28		Polychlorinated biphenyls	25	5	20
Chromium		32	--	32		Benzo(a)pyrene	25	--	25
Benzo(a)pyrene		28	1	27		Chromium	23	3	20
Chrysene		24	--	24		DDT	23	3	20
Polychlorinated biphenyls		23	4	19		Arsenic	22	--	22
Maine	Arsenic	31	--	31	Rhode Island	Benzo(a)anthracene	21	--	21
	Polychlorinated biphenyls	30	7	23		Dibenzo(a,h)anthracene	20	2	18
	Chromium	30	2	28		Vermont	Polychlorinated biphenyls	3	3
	Nickel	29	--	29	Dioxins		1	1	--
	Benzo(a)pyrene	25	--	25	Aldrin		1	--	1
	Lead	23	--	23	Arsenic		1	--	1
	DDT	16	--	16	Cadmium		1	--	1
	Copper	15	--	15	Copper		1	--	1
	Mercury	13	--	13	Dieldrin	1	--	1	
Dibenzo(a,h)anthracene	12	1	11	Lead	1	--	1		
Massachusetts	Lead	513	--	513	Mercury	1	--	1	
	Copper	504	--	504	Nickel	1	--	1	
	Mercury	416	162	254					

^aStations may be listed for more than one chemical.

EPA Region 2

New Jersey, New York, Puerto Rico

EPA evaluated 1,096 sampling stations in Region 2 as part of the NSI evaluation. Sediment contamination where associated adverse effects to aquatic life are probable (Tier 1) was found at 319 of these sampling stations, and possible but infrequent (Tier 2) at 523 of these sampling stations. For human health, data for 37 sampling stations indicated probable association with adverse effects (Tier 1), and 533 sampling stations indicated possible but infrequent adverse effects (Tier 2). Overall, this evaluation resulted in the classification of 355 sampling stations (32 percent) as Tier 1, 559 (51 percent) as Tier 2, and 182 (17 percent) as Tier 3. The NSI sampling stations in Region 2 were located in 292 separate river reaches, or 17 percent of all reaches in the Region. Seven percent of all river reaches in Region 2 included at least one Tier 1 station, 8 percent included at least one Tier 2 station but no Tier 1 stations, and 2 percent had only Tier 3 stations (Figure 3-13). Table 3-11 (on the following page) presents a summary of sampling station classification and evaluation of river reaches for each state and for the Region as a whole.

This evaluation identified 12 watersheds containing areas of probable concern for sediment contamination (APCs) out of the 63 watersheds (19 percent) in Region 2 (Figure 3-14). In addition, 41 percent of all water-

sheds in the Region had at least one Tier 1 sampling station but were not identified as containing APCs, 30 percent had at least one Tier 2 station but no Tier 1 stations, and none of the watersheds evaluated had only Tier 3 stations. Ten percent of the watersheds in Region 2 did not include a sampling station. The locations of the watersheds containing APCs and the Tier 1 and Tier 2 sampling stations in Region 2 are illustrated in Figure 3-15.

Within the 12 watersheds in Region 2 identified as containing APCs (Table 3-12), 52 water bodies have at least 1 Tier 1 sampling station; 9 water bodies have 10 or more Tier 1 sampling stations (Table 3-13). Several areas in Region 2 appear to have significant sediment contamination. They include the Niagara River, Buffalo Creek, and Lake Erie near Buffalo, New York; Lake Ontario between Rochester, New York, and the Niagara River; the St. Lawrence River in the northern part of New York; Arthur Kill in New York and New Jersey; the Hackensack/Passaic watershed in New York and New Jersey; the Atlantic Ocean beyond Staten Island; and others. The water bodies listed on Table 3-13 are not inclusive of all locations containing a Tier 1 sampling station because only water bodies within watersheds containing APCs are listed.

The chemicals most often associated with Tier 1 and Tier 2 sampling station classifications in Region 2 overall and in each state in Region 2 are presented in Table 3-14.

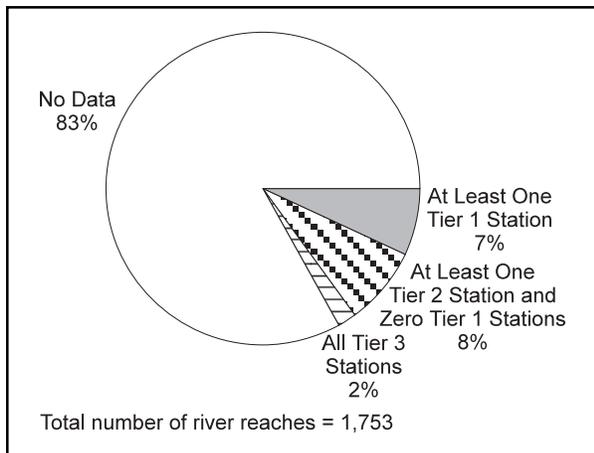


Figure 3-13. Region 2: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

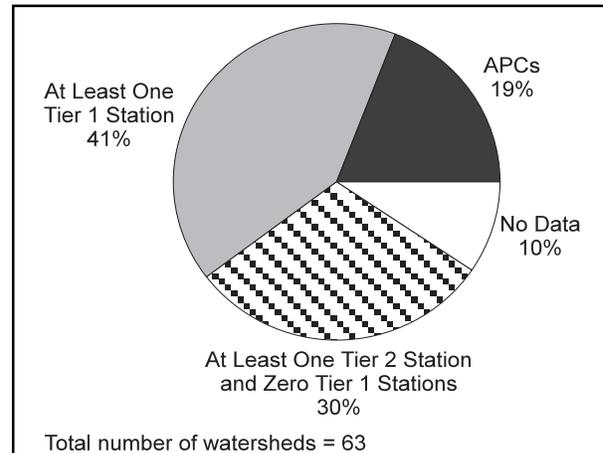


Figure 3-14. Region 2: Watershed Classifications.

Table 3-11. Region 2: Evaluation Results for Sampling Stations and River Reaches by State

State	Station Evaluation						River Reach Evaluation ^a							
	Tier 1		Tier 2		Tier 3		Number of Stations Not Identified by an RF1 Reach ^b	Reaches w/at Least 1 Station in Tier 1	Reaches w/at Least 1 Station in Tier 2 ^c	Reaches w/all Stations in Tier 3	Total # Reaches w/at Least 1 Station Evaluated	Total Reaches in State	% of all Reaches in State w/at Least 1 Station Evaluated	% of Reaches w/at Least 1 Tier 1 or Tier 2 Station
	No.	%	No.	%	No.	%								
New Jersey	142	32	228	51	78	17	62	59	56	14	129	285	45	40
New York	208	34	310	50	100	16	81	58	93	15	166	1,488	11	10
Puerto Rico	5	17	21	70	4	13	30	-	-	-	-	-	-	-
REGION 2 ^d	355	32	559	51	182	17	173	116	147	29	292	1,753	17	15

^aRiver reaches based on EPA River Reach File 1 (RF1).

^bStations not identified by an RF1 reach were located in coastal or open water areas.

^cNo stations in these reaches were included in Tier 1.

^dBecause some reaches occur in more than one state, the total number of reaches in each category for the Region might not equal the sum of reaches in the states.

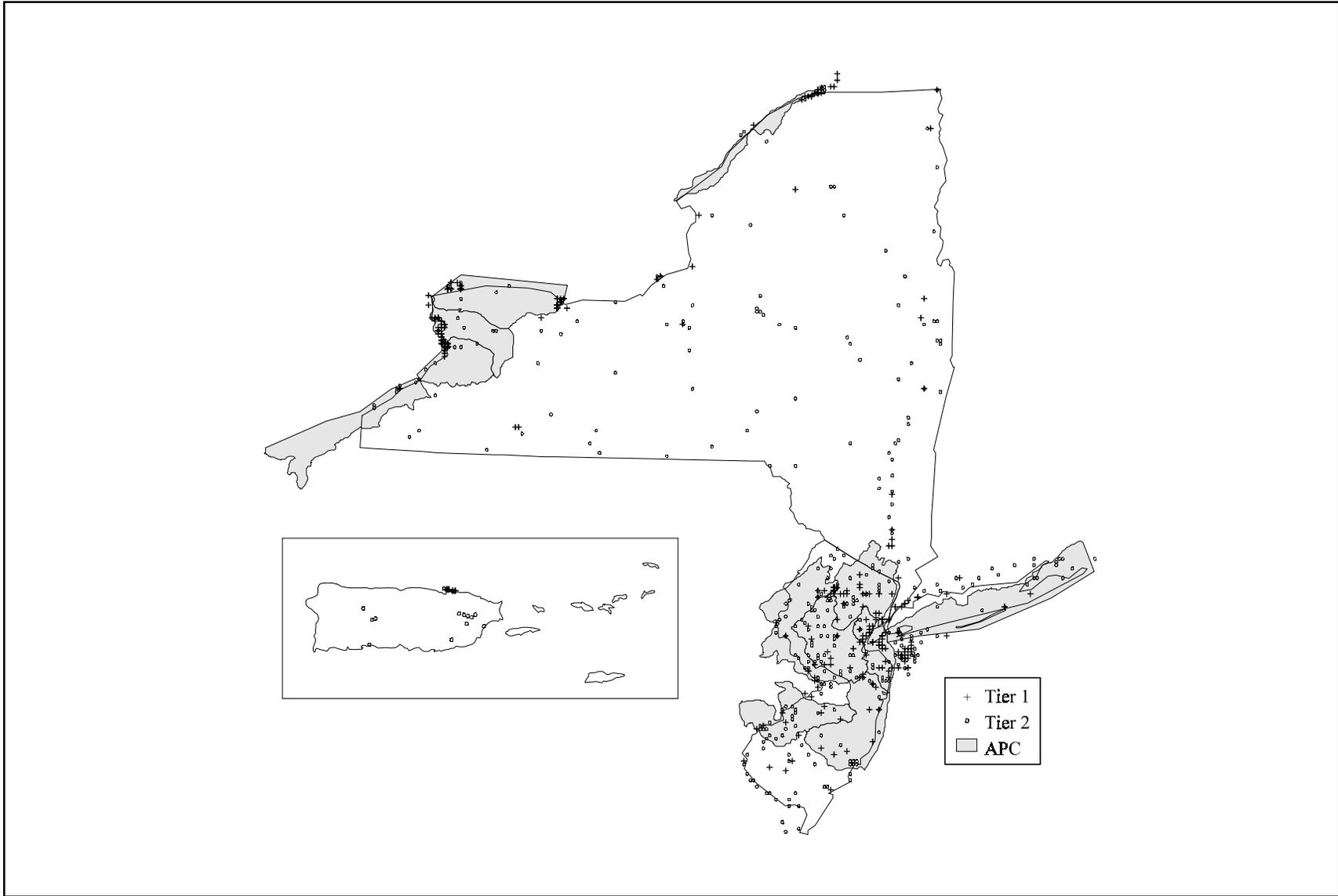


Figure 3-15. Region 2: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

Table 3-12. Region 2: Watersheds Containing Areas of Probable Concern for Sediment Contamination

Cataloging Unit Number	Name	State(s) ^a	Number of Sampling Stations			Percent of Sampling Stations in Tier 1 or Tier 2
			Tier 1	Tier 2	Tier 3	
02030104	Sandy Hook-Staten Island	NY, NJ	60	21	19	81
04120103	Buffalo-Eighteenmile	NY	59	33	9	91
02030103	Hackensack-Passaic	NY, NJ	43	58	2	98
04130001	Oak Orchard-Twelve-mile	NY	39	46	1	99
04120104	Niagara	NY	24	16	1	98
04120101	Chautauqua-Conneaut	NY, PA, OH	21	86	3	97
04150301	Upper St. Lawrence	NY	21	5	5	84
02040202	Lower Delaware	PA, NJ	18	29	10	82
02030105	Raritan	NJ	13	37	15	77
02030202	Southern Long Island	NY	11	24	8	81
02040105	Middle Delaware-Musconetcong	PA, NJ	11	26	11	77
02040301	Mullica-Toms	NJ	10	22	10	76

Table 3-13. Region 2: Water Bodies With Sampling Stations Classified as Tier 1 Located in Watersheds Containing APCs

Water Body	# of Tier 1 Stations	Water Body	# of Tier 1 Stations
Lake Ontario, U.S. Shore	31	Shrewsbury River	2
Buffalo Creek	30	Stony Bk.	2
Rockaway River	26	Bass River	1
Lake Erie, U.S. Shore	24	Beden Brook	1
Atlantic Ocean	22	Big Timber Creek	1
Niagara River	21	Cazenovia Creek	1
St. Lawrence River	21	Cooper River	1
Arthur Kill	10	Cranbury Bk.	1
Staten Island	10	Great South Bay	1
Sandy Hook Bay	8	Green Bk.	1
Delaware River	8	Hammonton Creek	1
Newark Bay	6	Matchaponix Bk.	1
Smoke Creek	6	Millstone River	1
Passaic River	6	Mullica River	1
Hackensack River	5	Rahway River	1
Manasquan River	4	Rancocas Creek, N. Br.	1
Musconetcong River	3	Raritan Bay	1
Tonawanda Creek	3	Raritan River, N. Br.	1
Barnegat Bay	2	Raritan River, S. Br.	1
Eighteenmile Creek	2	SB Rockaway Creek	1
Lower Bay	2	Shinnecock Bay	1
Manalapan Bk.	2	South River	1
Moriches Bay	2	Toms River	1
Pompton Creek	2	Wanaque Reservoir	1
Rancocas Creek, S. Br.	2	Whippany River	1
Saddle River	2	Yellow Brook	1

Table 3-14. Region 2: Chemicals Most Often Associated With Tier 1 or Tier 2 Sampling Station Classifications^a

	Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station		Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station
Region 2 Overall	Copper	546	--	546	New Jersey (continued)	Cadmium	128	--	128
	Lead	467	--	467		Chromium	119	22	97
	Nickel	443	--	443	New York	Copper	332	--	332
	Polychlorinated biphenyls	442	151	291		Nickel	321	--	321
	Mercury	388	144	244		Lead	268	--	268
	Cadmium	360	--	360		Polychlorinated biphenyls	261	108	153
	Zinc	358	--	358		Cadmium	230	--	230
	DDT	351	114	237		Mercury	224	70	154
	Arsenic	282	6	276		Zinc	210	--	210
	Chromium	247	26	221		DDT	155	66	89
	Chlordane	229	--	229		Pyrene	147	52	95
	Pyrene	214	64	150		Chromium	126	4	122
	Benzo(a)pyrene	180	36	144	Puerto Rico	Copper	22	--	22
	Naphthalene	155	30	125		Nickel	10	--	10
	Fluoranthene	151	41	110		Arsenic	9	--	9
New Jersey	DDT	195	48	147		Lead	8	--	8
	Copper	192	--	192		Mercury	6	4	2
	Lead	191	--	191		Zinc	5	--	5
	Polychlorinated biphenyls	181	43	138		Silver	4	1	3
	Mercury	158	70	88	Bis(2-ethylhexyl)phthalat	2	1	1	
	Arsenic	151	6	145	Diethyl phthalate	2	1	1	
	Zinc	143	--	143	Cadmium	2	--	2	
	Chlordane	139	--	139					

^aStations may be listed for more than one chemical.

EPA Region 3

Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia

EPA evaluated 1,910 sampling stations in Region 3 as part of the NSI evaluation. Sediment contamination where associated adverse effects to aquatic life are probable (Tier 1) was found at 86 of these sampling stations, and possible but infrequent (Tier 2) at 915 of these sampling stations. For human health, data for 239 sampling stations indicated probable association with adverse effects (Tier 1), and 222 sampling stations indicated possible but infrequent adverse effects (Tier 2). Overall, this evaluation resulted in the classification of 318 sampling stations (17 percent) as Tier 1, 934 (49 percent) as Tier 2, and 658 (34 percent) as Tier 3. The NSI sampling stations in Region 3 were located in 888 separate river reaches, or 27 percent of all reaches in the Region. Six percent of all river reaches in Region 3 included at least one Tier 1 station, 14 percent included at least one Tier 2 station but no Tier 1 stations, and 7 percent had only Tier 3 stations (Figure 3-16). Table 3-15 (on the following page) presents a summary of sampling station classification and evaluation of river reaches for each state and for the Region as a whole.

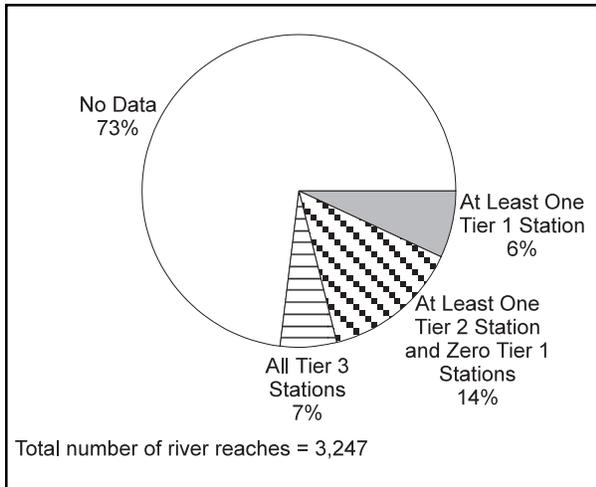


Figure 3-16. Region 3: Percent of River Reaches That Include Tier 1, Tier 2 and Tier 3 Sampling Stations.

This evaluation identified 8 watersheds containing areas of probable concern for sediment contamination (APCs) out of the 128 watersheds (6 percent) in Region 3 (Figure 3-17). In addition, 63 percent of all watersheds in the Region had at least one Tier 1 sampling station but were not identified as containing APCs, 22 percent had at least one Tier 2 station but no Tier 1 stations, and 5 percent had only Tier 3 stations. Four percent of the watersheds in Region 3 did not include a sampling station. The locations of the watersheds containing APCs and the Tier 1 and Tier 2 sampling stations in Region 3 are illustrated in Figure 3-18.

Within the 8 watersheds in Region 3 identified as containing APCs (Table 3-16), 27 water bodies have at least 1 Tier 1 sampling station; 4 water bodies have 10 or more Tier 1 sampling stations (Table 3-17). The Delaware River; the Schuylkill River in Pennsylvania (near Philadelphia); coastal areas of Lake Erie near Erie, Pennsylvania; and the Ohio River near Pittsburgh appear to have some of the most significant sediment contamination in Region 3. The water bodies listed on Table 3-17 are not inclusive of all locations containing a Tier 1 station because only water bodies within watersheds containing APCs are listed.

The chemicals most often associated with Tier 1 and Tier 2 sampling station classifications in Region 3 overall and in each state in Region 3 are presented in Table 3-18.

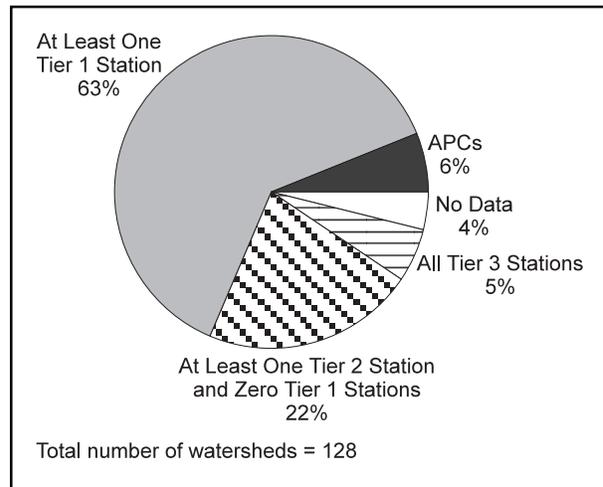


Figure 3-17. Region 3: Watershed Classifications.

Table 3-15. Region 3: Evaluation Results for Sampling Stations and River Reaches by State

State	Station Evaluation						River Reach Evaluation ^a							
	Tier 1		Tier 2		Tier 3		Number of Stations Not Identified by an RF1 Reach ^b	Reaches w/at Least 1 Station in Tier 1	Reaches w/at Least 1 Station in Tier 2 ^c	Reaches w/all Stations in Tier 3	Total # Reaches w/at Least 1 Station Evaluated	Total Reaches in State	% of all Reaches in State w/at Least 1 Station Evaluated	% of Reaches w/at Least 1 Tier 1 or Tier 2 Station
	No.	%	No.	%	No.	%								
Delaware	21	10	35	16	162	74	13	10	7	22	39	77	51	22
District of Columbia	3	75	1	25	-	-	-	3	-	-	3	11	27	27
Maryland	50	24	68	33	88	43	29	31	36	30	97	400	24	17
Pennsylvania	127	41	106	34	78	25	4	78	27	34	139	677	21	16
Virginia	73	7	691	66	287	27	46	61	362	112	535	1279	42	33
West Virginia	44	37	33	27	43	36	-	30	23	31	84	993	9	5
REGION 3 ^d	318	17	934	49	658	34	92	209	453	226	888	3247	27	20

^aRiver reaches based on EPA River Reach File 1 (RF1).

^bStations not identified by an RF1 reach were located in coastal or open water areas.

^cNo stations in these reaches were included in Tier 1.

^dBecause some reaches occur in more than one state, the total number of reaches in each category for the Region might not equal the sum of reaches in the states.

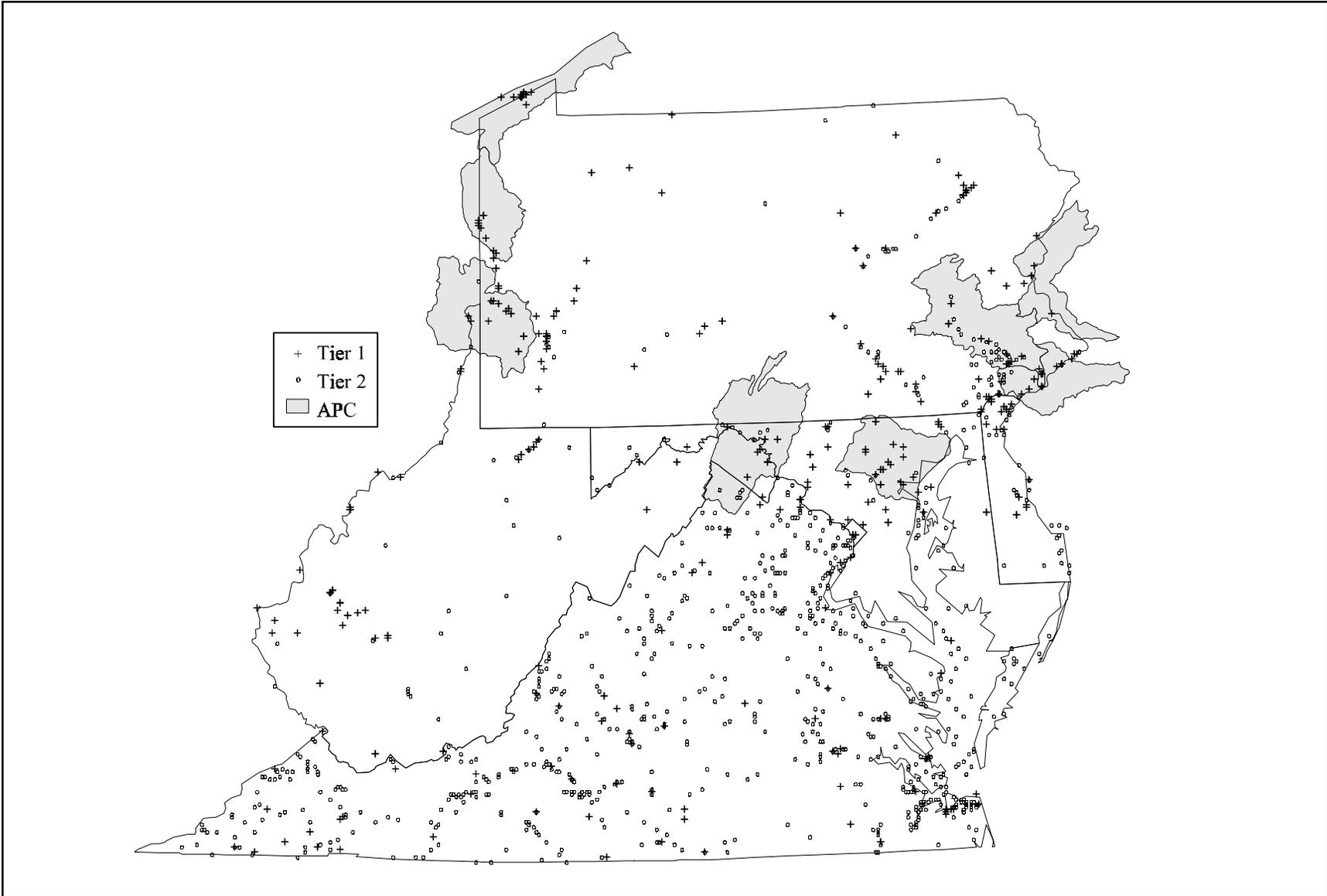


Figure 3-18. Region 3: Location of Sampling Stations Classified as Tier 1 of Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

Table 3-16. Region 3: Watersheds Containing Areas of Probable Concern for Sediment Contamination

Cataloging Unit Number	Name	State(s) ^a	Number of Sampling Stations			Percent of Sampling Stations in Tier 1 or Tier 2
			Tier 1	Tier 2	Tier 3	
04120101	Chautauqua-Conneaut	NY,PA,OH	21	86	3	97
02040202	Lower Delaware	PA,NJ	18	29	10	82
02060003	Gunpowder-Patapsco	MD,(PA)	17	7	5	83
02040203	Schuylkill	PA	12	23	9	80
05030101	Upper Ohio	WV,PA,OH	12	29	12	77
02040105	Middle Delaware-Musconetcong	PA,NJ	11	26	11	77
02070004	Conococheague-Opequon	WV,VA,MD,(P-A)	11	12	6	79
05030102	Shenango	OH,PA	11	1	3	80

^aNo data were available for states listed in parentheses.

Table 3-17. Region 3: Water Bodies With Sampling Stations Classified as Tier 1 Located in Watersheds Containing APCs

Water Body	# of Tier 1 Stations	Water Body	# of Tier 1 Stations
Delaware River	13	Patapsco River	2
Lake Erie, U.S. Shore	10	Patapsco River, N. Br.	2
Schuylkill River	10	Raccoon Creek	2
Shenango River	10	Back River	1
Ohio River	7	Chesapeake Bay	1
Gunpowder Falls	4	Crum Creek	1
Potomac River	4	Darby Creek	1
Opequon Creek	3	Little Chartiers Creek	1
Antietam Creek	2	Little Gunpowder Falls	1
Chartiers Creek	2	Neshannock Creek	1
Conococheague Creek	2	Tulpehocken Creek	1
Curtis Bay	2	Walnut Creek	1
Gwynns Falls	2	Wassahickon Creek	1
Herring Run	2		

Findings

Table 3-18. Region 3: Chemicals Most Often Associated With Tier 1 or Tier 2 Sampling Station Classifications^a

	Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station		Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station	
Region 3 Overall	Nickel	634	--	634	Maryland (continued)	Nickel	50	--	50	
	Copper	626	--	626		Copper	42	--	42	
	Lead	626	--	626		Chromium	41	4	37	
	Arsenic	529	1	528		DDT	35	--	35	
	Zinc	371	--	371		Chlordane	33	--	33	
	Polychlorinated biphenyls	353	243	110		Zinc	32	--	32	
	Cadmium	346	--	346		Benzo(a)pyrene	31	--	31	
	Mercury	320	42	278		Pennsylvania	Polychlorinated biphenyls	141	112	29
	Chromium	249	12	237			Lead	87	--	87
	Chlordane	161	--	161	Chlordane		81	--	81	
	DDT	135	9	126	Nickel		63	--	63	
	Dieldrin	116	--	116	Cadmium		56	--	56	
	Benzo(a)pyrene	106	6	100	Dieldrin		55	--	55	
	BHC	69	2	67	Copper		46	--	46	
	Dibenzo(a,h)anthracene	64	4	60	Zinc		44	--	44	
Delaware	Polychlorinated biphenyls	33	14	19	DDT		38	6	32	
	DDT	27	3	24	Mercury	25	3	22		
	Lead	24	--	24	Virginia	Copper	520	--	520	
	Chromium	19	2	17		Nickel	497	--	497	
	Arsenic	18	--	18		Arsenic	412	--	412	
	Nickel	15	--	15		Lead	411	--	411	
	BHC	13	--	13		Zinc	279	--	279	
	Mercury	12	3	9		Mercury	260	34	226	
	Benzo(a)pyrene	12	--	12		Cadmium	255	--	255	
Copper	8	--	8	Chromium		167	3	164		
District of Columbia	Polychlorinated biphenyls	4	2	2		Polychlorinated biphenyls	62	30	32	
	Dioxins	2	2	--	Benzo(a)pyrene	48	4	44		
	Benzo(a)pyrene	2	--	2	West Virginia	Polychlorinated biphenyls	42	41	--	
	Chlordane	2	--	2		Lead	35	--	35	
	Copper	2	--	2		Chlordane	29	--	29	
	Dieldrin	2	--	2		Dieldrin	16	--	16	
	Nickel	2	--	2		Cadmium	12	--	12	
	Silver	1	1	--		Copper	8	--	8	
	Arsenic	1	--	1		Zinc	8	--	8	
Benzo(a)anthracene	1	--	1	Heptachlor epoxide		7	--	7		
Maryland	Polychlorinated biphenyls	71	44	27		Nickel	7	--	7	
	Arsenic	70	--	70	Aldrin	6	--	6		
	Lead	68	--	68						

^aStations may be listed for more than one chemical.

EPA Region 4

Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee

EPA evaluated 4,959 sampling stations in Region 4 as part of the NSI evaluation. Sediment contamination where associated adverse effects to aquatic life are probable (Tier 1) was found at 637 of these sampling stations, and possible but infrequent (Tier 2) at 1,888 of these sampling stations. For human health, data for 561 sampling stations indicated probable association with adverse effects (Tier 1), and 1,006 sampling stations indicated possible but infrequent adverse effects (Tier 2). Overall, this evaluation resulted in the classification of 1,157 sampling stations (23 percent) as Tier 1, 1,930 (39 percent) as Tier 2, and 1,872 (38 percent) as Tier 3. The NSI sampling stations in Region 4 were located in 1,770 separate river reaches, or 18 percent of all reaches in the Region. Six percent of all river reaches in Region 4 included at least one Tier 1 station, 7 percent included at least one Tier 2 station but no Tier 1 stations, and 5 percent had only Tier 3 stations (Figure 3-19). Table 3-19 (on the following page) presents a summary of sampling station classification and evaluation of river reaches for each state and for the Region as a whole.

This evaluation identified 19 watersheds containing areas of probable concern for sediment contamination

(APCs) out of the 308 watersheds (6 percent) in Region 4 (Figure 3-20). In addition, 59 percent of all watersheds in the Region had at least one Tier 1 sampling station but were not identified as containing APCs, 17 percent had at least one Tier 2 station but no Tier 1 stations, and 8 percent had only Tier 3 stations. Ten percent of the watersheds in Region 4 did not include a sampling station. The locations of the watersheds containing APCs and the Tier 1 and Tier 2 sampling stations in Region 4 are illustrated in Figure 3-21.

Within the 19 watersheds in Region 4 identified as containing APCs (Table 3-20), 65 water bodies have at least 1 Tier 1 sampling station; 15 water bodies have 10 or more Tier 1 sampling stations (Table 3-21). Several areas in Region 4 appear to have potential sediment contamination. They include the Tennessee River and Lookout Creek in Tennessee and Georgia, Wilson Lake and Mobile Bay in Alabama, the St. Johns River in Florida, and other locations. The water bodies listed on Table 3-21 are not inclusive of all locations containing a Tier 1 sampling station because only water bodies within watersheds containing APCs are listed.

The chemicals most often associated with Tier 1 and Tier 2 sampling station classifications in Region 4 overall and in each state in Region 4 are presented in Table 3-22.

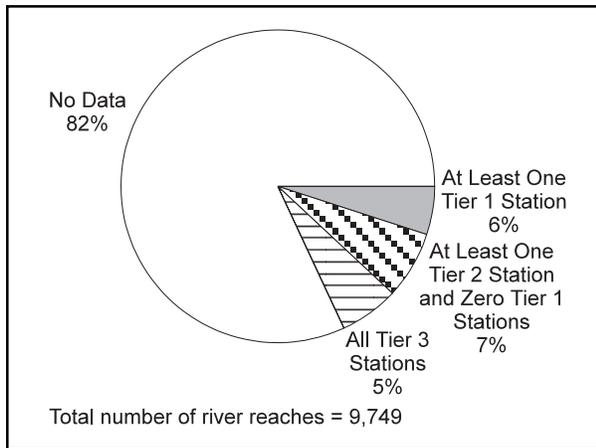


Figure 3-19. Region 4: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

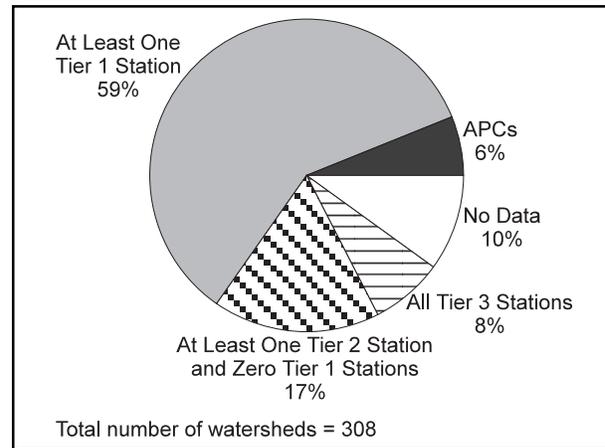


Figure 3-20. Region 4: Watershed Classifications.

Table 3-19. Region 4: Evaluation Results for Sampling Stations and River Reaches by State

State	Station Evaluation						River Reach Evaluation ^a							
	Tier 1		Tier 2		Tier 3		Number of Stations Not Identified by an RF1 Reach ^b	Reaches w/at Least 1 Station in Tier 1	Reaches w/at Least 1 Station in Tier 2 ^c	Reaches w/all Stations in Tier 3	Total # Reaches w/at Least 1 Station Evaluated	Total Reaches in State	% of all Reaches in State w/at Least 1 Station Evaluated	% of Reaches w/at Least 1 Tier 1 or Tier 2 Station
	No.	%	No.	%	No.	%								
Alabama	160	34	178	37	139	29	65	68	57	57	182	1,531	12	8
Florida	211	12	672	38	893	50	190	70	115	126	311	855	36	22
Georgia	115	36	100	32	103	32	3	75	57	54	186	1,658	11	8
Kentucky	69	28	131	52	49	20	-	49	60	26	135	1,247	11	9
Mississippi	54	17	142	45	122	38	61	21	47	35	103	984	11	7
North Carolina	71	12	294	48	247	40	22	50	156	107	313	1,415	22	15
South Carolina	161	29	254	45	148	26	2	105	138	28	271	1,055	26	23
Tennessee	316	49	159	25	171	26	-	132	63	97	292	1,417	21	14
REGION 4 ^d	1,157	23	1,930	39	1,872	38	343	566	684	520	1,770	9,749	18	13

^aRiver reaches based on EPA River Reach File 1 (RF1).

^bStations not identified by an RF1 reach were located in coastal or open water areas.

^cNo stations in these reaches were included in Tier 1.

^dBecause some reaches occur in more than one state, the total number of reaches in each category for the Region might not equal the sum of reaches in the states.

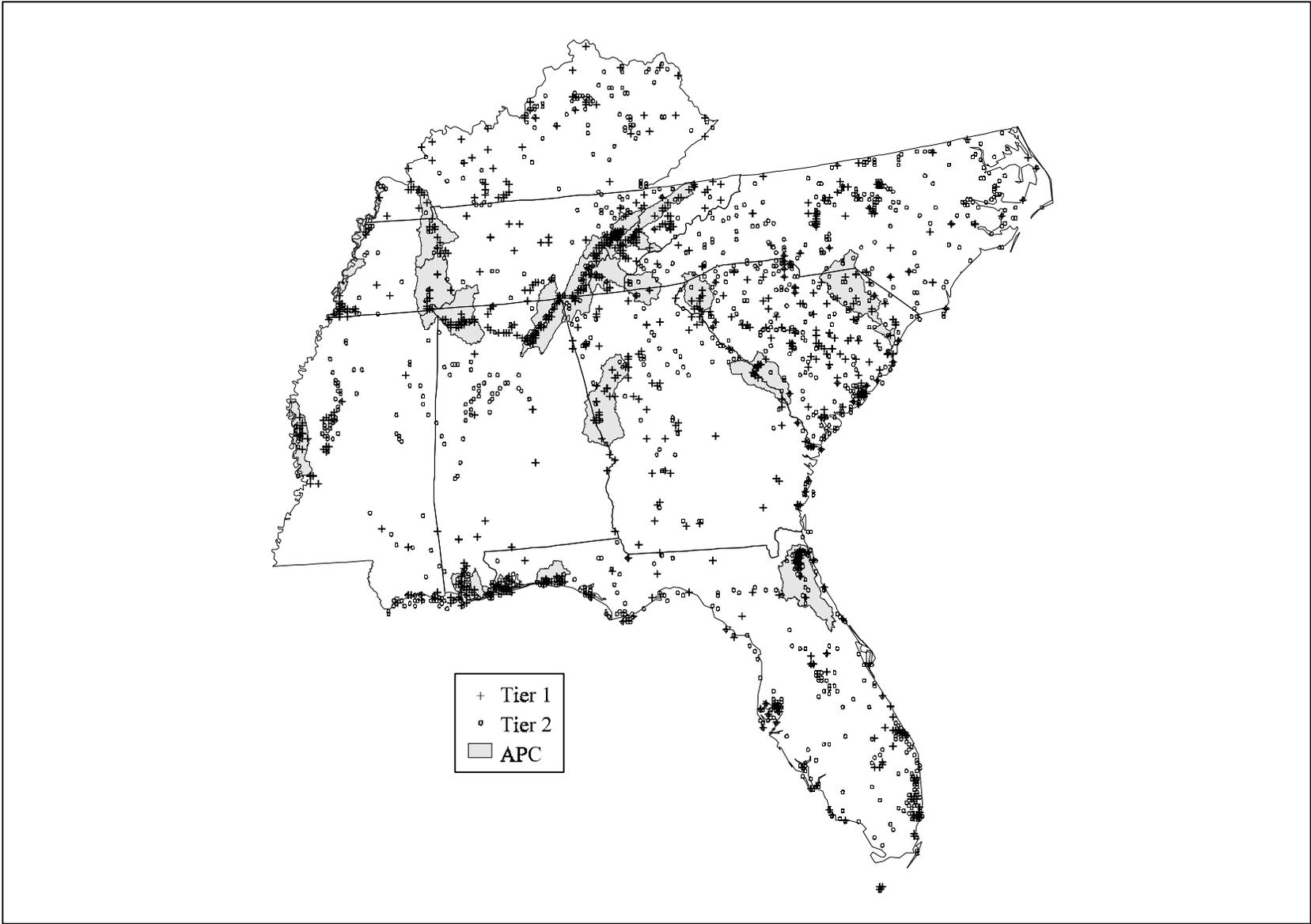


Figure 3-21. Region 4: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

Table 3-20. Region 4: Watersheds Containing Areas of Probable Concern for Sediment Contamination

Cataloging Unit Number	Name	State(s) ^a	Number of Sampling Stations			Percent of Sampling Stations in Tier 1 or Tier 2
			Tier 1	Tier 2	Tier 3	
06010201	Watts Bar Lake	TN	63	7	19	79
06010207	Lower Clinch	TN	61	14	4	95
06030005	Pickwick Lake	TN, AL, (MS)	49	9	11	84
06020001	Middle Tennessee- Chickamauga	GA, TN, (AL)	47	29	18	81
03080103	Lower St. Johns	FL	32	111	45	76
03160205	Mobile Bay	AL	31	43	7	91
06030001	Guntersville Lake	TN, AL, (GA)	25	46	21	77
03130002	Middle Chattahoochee-Lake Harding	GA, (AL)	21	4	2	93
03060106	Middle Savannah	GA, SC	20	11	5	86
03140102	Choctawhatchee Bay	FL	19	23	9	82
06040001	Lower Tennessee-Beech	TN, (MS)	15	6	4	84
06040005	Kentucky Lake	KY, TN	15	14	1	97
08010100	Lower Mississippi-Memphis	AR, MS, KY, MO, TN	14	3	3	85
06020002	Hiwassee	GA, NC, TN	13	17	3	91
06010104	Holston	TN	12	2	1	93
03040201	Lower Pee Dee	NC, SC	11	20	3	91
08030209	Deer-Steele	MS, (LA)	11	10	0	100
03060101	Seneca	NC, SC	10	3	3	81
03140107	Perdido Bay	FL, AL	10	24	4	89

^aNo data were available for states listed in parentheses.

Table 3-21. Region 4: Water Bodies With Sampling Stations Classified as Tier 1 Located in Watersheds Containing APCs

Water Body	# of Tier 1 Stations	Water Body	# of Tier 1 Stations
Tennessee River	80	Cypress Creek	2
St. Johns River	30	Deer River	2
Lookout Creek	29	Long Cane Creek	2
Mobile Bay	29	Seneca River	2
Wilson Lake	27	Shoal Creek	2
Poplar Creek	21	Spring Creek	2
Clinch River	18	Twelvemile Creek	2
Choctawhatchee Bay	17	West Pont Lake	2
Guntersville Lake	17	Beech Creek	1
Poplar Creek, Brushy Fork	17	Big Black Creek	1
Little River	16	Big Sandy Creek	1
Chattahoochee River	14	Chatugue Lake	1
Watts Bar Lake	14	Conecross Creek	1
Mississippi River	12	Coon Creek	1
Horse Creek	10	Elevenmile Creek	1
Black Bayou	9	Golden Creek	1
Holston River	9	Hiwassee Lake	1
Kentucky Lake	9	Jeffries Creek	1
Savannah River	9	Lake Harding	1
Hiwassee River	8	Lake Keowee	1
Perdido Bay	7	Lake Washington	1
Melton Hill Lake	5	Lafayette Creek	1
Cherokee Lake	3	Little Horse Creek	1
Fort Loudoun Lake	3	Mountain Creek	1
Gulf Of Mexico	3	Mud Creek	1
Hartwell Reservoir	3	Nottely Lake	1
Lake Chickamauga	3	Oostanaula Creek	1
Pee Dee River	3	Pottsburg Creek	1
Pickwick Lake	3	Rogers Creek	1
Big Nance Creek	2	Sinking Creek	1
Black Creek	2	Steele Bayou	1
Catfish Creek	2	Sweetwater Creek	1
Crooked Creek	2		

Table 3-22. Region 4: Chemicals Most Often Associated With Tier 1 or Tier 2 Sampling Station Classifications^a

	Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station		Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station	
Region 4 Overall	Polychlorinated biphenyls	1034	669	365	Kentucky (continued)	Arsenic	65	3	62	
	Lead	989	--	989		Copper	55	--	55	
	Copper	935	--	935		Polychlorinated biphenyls	50	48	2	
	Mercury	923	235	688		Zinc	43	--	43	
	Nickel	820	--	820		Chlordane	41	3	38	
	DDT	751	157	594		Dieldrin	40	3	37	
	Cadmium	751	--	751		Mercury	35	5	30	
	Arsenic	734	37	697		Mississippi	DDT	99	31	68
	Chromium	459	26	433	Nickel		66	--	66	
	Zinc	438	--	438	Arsenic		63	1	62	
	Chlordane	374	7	367	Polychlorinated biphenyls		44	15	29	
	Benzo(a)pyrene	289	28	261	Cadmium		33	--	33	
	Pyrene	279	62	217	Chromium		32	--	32	
	Dieldrin	252	9	243	Lead		28	--	28	
	Fluoranthene	207	34	173	Dieldrin		24	--	24	
	Alabama	Mercury	125	42	83		Copper	22	--	22
		Arsenic	118	4	114		Benzo(a)pyrene	13	--	13
Polychlorinated biphenyls		114	98	16	North Carolina	Copper	150	--	150	
Cadmium		103	--	103		Mercury	133	30	103	
Nickel		97	--	97		Lead	128	--	128	
Copper		94	--	94		Nickel	99	--	99	
Lead		85	--	85		Arsenic	75	--	75	
DDT		76	8	68		Chromium	72	2	70	
Zinc		76	--	76		Cadmium	62	--	62	
Chromium		69	1	68		Polychlorinated biphenyls	60	28	32	
Florida	Mercury	302	52	250		Zinc	45	--	45	
	Polychlorinated biphenyls	293	82	211		DDT	27	1	26	
	Lead	291	--	291	South Carolina	Lead	198	--	198	
	Copper	283	--	283		DDT	188	48	140	
	DDT	242	48	194		Mercury	144	19	125	
	Cadmium	208	--	208		Copper	141	--	141	
	Benzo(a)pyrene	193	19	174		Polychlorinated biphenyls	132	93	39	
	Pyrene	176	30	146		Nickel	131	--	131	
	Arsenic	171	7	164		Cadmium	129	--	129	
Chlordane	169	--	169	Chromium		63	12	51		
Georgia	Polychlorinated biphenyls	111	82	29		Arsenic	62	18	44	
	Arsenic	62	--	62	Zinc	58	--	58		
	Cadmium	60	--	60	Tennessee	Polychlorinated biphenyls	230	223	7	
	Copper	60	--	60		Nickel	164	--	164	
	Lead	46	--	46		Lead	137	--	137	
	Chlordane	45	4	41		Mercury	134	75	59	
	Mercury	43	12	31		Copper	130	--	130	
	Nickel	38	--	38		Arsenic	118	4	114	
	DDT	36	11	25		Cadmium	87	--	87	
	Chromium	33	2	31		Zinc	83	--	83	
Kentucky	Nickel	105	--	105		DDT	57	6	51	
	Lead	76	--	76		Dieldrin	52	3	49	
	Cadmium	69	--	69						

^aStations may be listed for more than one chemical.

EPA Region 5

Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin

EPA evaluated 4,290 sampling stations in Region 5 as part of the NSI evaluation. Sediment contamination where associated adverse effects to aquatic life are probable (Tier 1) was found at 642 of these sampling stations, and possible but infrequent (Tier 2) at 2,011 of these sampling stations. For human health, data for 777 sampling stations indicated probable association with adverse effects (Tier 1), and 1,469 sampling stations indicated possible but infrequent adverse effects (Tier 2). Overall, this evaluation resulted in the classification of 1,418 sampling stations (33 percent) as Tier 1, 2,137 (50 percent) as Tier 2, and 735 (17 percent) as Tier 3. (It should be noted that the NSI includes sampling data from the Great Lakes Sediment Inventory that, because of a lack of latitude and longitude data, were not included in the NSI evaluation. Had those data been included in the NSI evaluation, an additional 221 stations would have been categorized as Tier 1, 392 as Tier 2, and 84 as Tier 3.) The NSI sampling stations in Region 5 were located in 1,432 separate river reaches, or 24 percent of all reaches in the Region. Ten percent of all river reaches in Region 5 included at least one Tier 1 station, 10 percent included at least one Tier 2 station but no Tier 1 stations, and 4 percent had only Tier 3 stations (Figure 3-22). Table 3-23 (on the following page) presents a summary of sampling station classification and evaluation of river reaches for each state and for the Region as a whole.

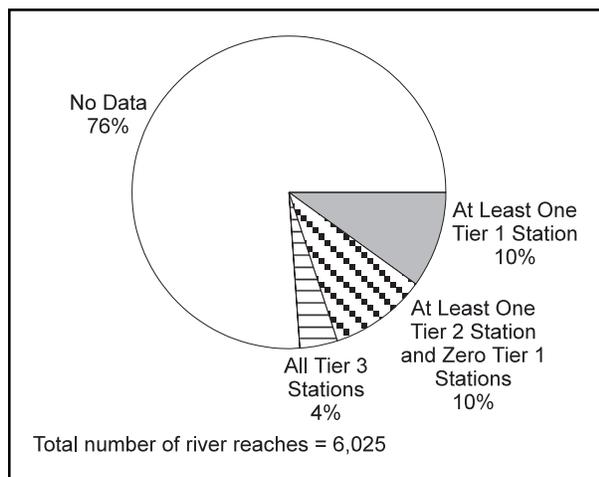


Figure 3-22. Region 5: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

This evaluation identified 36 watersheds containing areas of probable concern for sediment contamination (APCs) out of the 278 watersheds (13 percent) in Region 5 (Figure 3-23). In addition, 59 percent of all watersheds in the Region had at least one Tier 1 sampling station but were not categorized as containing APCs, 7 percent had at least one Tier 2 station but no Tier 1 stations, and 3 percent had only Tier 3 stations. Eighteen percent of the watersheds in Region 5 did not include a sampling station. The locations of the watersheds containing APCs and the Tier 1 and Tier 2 sampling stations in Region 5 are illustrated in Figure 3-24.

Within the 36 watersheds in Region 5 identified as containing APCs (Table 3-24), 102 water bodies have at least 1 Tier 1 sampling station; 18 water bodies have 10 or more Tier 1 sampling stations (Table 3-25). The Detroit River, Fox River, Milwaukee River, Mississippi River, Chicago Ship Canal, and several coastal areas of Lake Michigan and Lake Erie appear to have the most significant sediment contamination in Region 5. The water bodies listed on Table 3-25 are not inclusive of all locations containing a Tier 1 sampling station because only water bodies within watersheds containing APCs are listed.

The chemicals most often associated with Tier 1 and Tier 2 sampling station classifications in Region 5 overall and in each state in Region 5 are presented in Table 3-26.

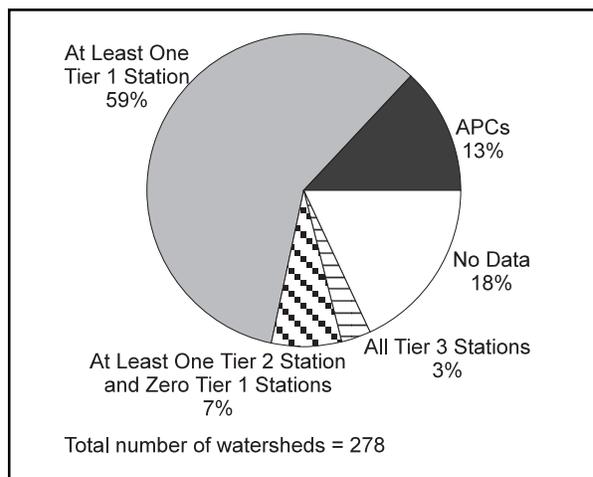


Figure 3-23. Region 5: Watershed Classifications.

Table 3-23. Region 5: Evaluation Results for Sampling Stations and River Reaches by State

State	Station Evaluation						River Reach Evaluation ^a							
	Tier 1		Tier 2		Tier 3		Number of Stations Not Identified by an RF1 Reach ^b	Reaches w/at Least 1 Station in Tier 1	Reaches w/at Least 1 Station in Tier 2 ^c	Reaches w/all Stations in Tier 3	Total # Reaches w/at Least 1 Station Evaluated	Total Reaches in State	% of all Reaches in State w/at Least 1 Station Evaluated	% of Reaches w/at Least 1 Tier 1 or Tier 2 Station
	No.	%	No.	%	No.	%								
Illinois	428	26	1,075	64	166	10	8	182	255	30	467	920	51	48
Indiana	67	62	23	21	18	17	3	35	8	1	44	559	8	8
Michigan	219	54	144	36	39	10	20	64	41	11	116	1,145	10	9
Minnesota	220	50	65	15	153	35	-	140	34	90	264	1,355	20	13
Ohio	130	13	704	73	136	14	71	56	191	57	304	1,054	29	23
Wisconsin	354	50	126	18	223	32	6	130	47	82	259	1,174	22	15
REGION 5 ^d	1,418	33	2,137	50	735	17	108	594	570	268	1,432	6,025	24	19

^aRiver reaches based on EPA River Reach File 1 (RF1).

^bStations not identified by an RF1 reach were located in coastal or open water areas.

^cNo stations in these reaches were included in Tier 1.

^dBecause some reaches occur in more than one state, the total number of reaches in each category for the Region might not equal the sum of reaches in the states.

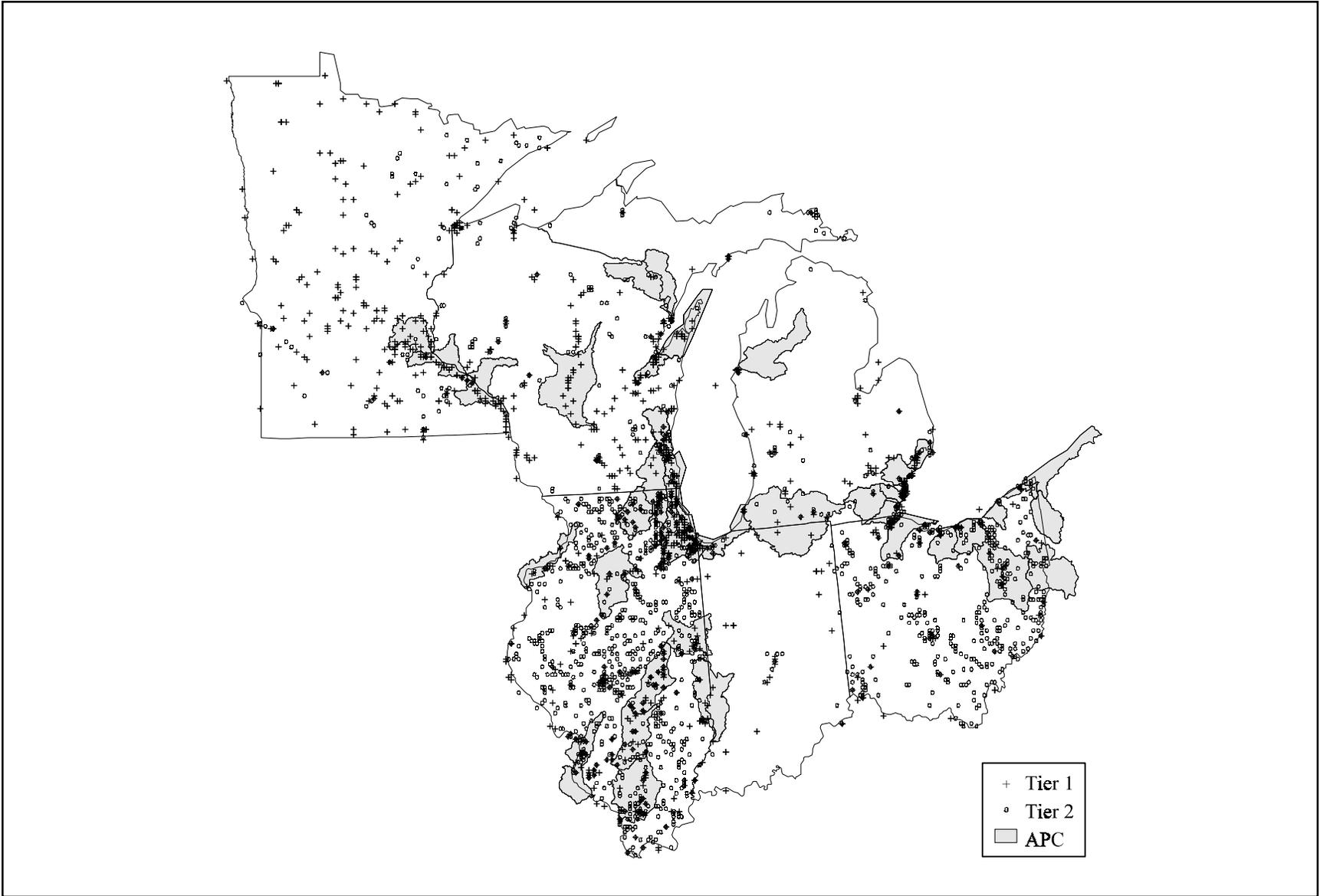


Figure 3-24. Region 5: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

Table 3-24. Region 5: Watersheds Containing Areas of Probable Concern for Sediment Contamination

Cataloging Unit Number	Name	State(s) ^a	Number of Sampling Stations			Percent of Sampling Stations in Tier 1 or Tier 2
			Tier 1	Tier 2	Tier 3	
04090004	Detroit	MI	85	29	1	99
07120003	Chicago	IN, IL	64	36	3	97
07120004	Des Plaines	WI, IL	61	43	6	95
04040003	Milwaukee	WI	60	16	14	84
04030204	Lower Fox	WI	49	2	0	100
04040001	Little Calumet-Galien	IL, IN, (MI)	45	26	18	80
04040002	Pike-Root	WI, IL	34	30	8	89
07140201	Upper Kaskaskia	IL	31	24	0	100
07010206	Twin Cities	WI, MN	26	2	7	80
04110001	Black-Rocky	OH	24	31	4	93
07140106	Big Muddy	IL	23	65	6	94
04120101	Chautauqua-Conneaut	NY, PA, OH	21	86	3	97
07070003	Castle Rock	WI	20	0	2	91
04100002	Raisin	MI, (OH)	18	19	1	97
07140101	Cahokia-Joachim	MO, IL	18	34	4	93
04050001	St. Joseph	IN, MI	17	9	6	81
07040003	Buffalo-Whitewater	WI, MN	17	3	6	77
07080101	Copperas-Duck	IL, IA	17	5	5	81
05120111	Middle Wabash-Busseron	IN, IL	15	17	1	97
07120006	Upper Fox	WI, IL	15	40	5	92
04090002	Lake St. Clair	MI	13	5	1	95
04100001	Ottawa-Stony	OH, MI	13	15	1	97
04100010	Cedar-Portage	MI, OH	13	39	4	93
07040001	Rush-Vermillion	WI, MN	13	1	0	100
07140202	Middle Kaskaskia	IL	13	22	3	92
04030102	Door-Kewaunee	WI	12	5	3	85
04030108	Menominee	MI, WI	12	6	3	86
05030101	Upper Ohio	WV, PA, OH	12	29	12	77
05120109	Vermilion	IL, (IN)	12	16	0	100
04060103	Manistee	MI	11	3	0	100
05030102	Shenango	OH, PA	11	1	3	80
07130001	Lower Illinois-Senachwine Lake	IL	11	10	0	100
04100012	Huron-Vermilion	OH	10	35	0	100
04110003	Ashtabula-Chagrin	OH	10	18	3	90
05040001	Tuscarawas	OH	10	53	15	81
07090006	Kishwaukee	IL, (WI)	10	24	0	100

^aNo data were available for states listed in parentheses.

Table 3-25. Region 5: Water Bodies With Sampling Stations Classified as Tier 1 Located in Watersheds Containing APCs

Water Body	# of Tier 1 Stations	Water Body	# of Tier 1 Stations
Detroit River	64	Becks Creek	2
Lake Erie, U.S. Shore	60	Castle Rock Flowage	2
Fox River	58	Coldwater River	2
Mississippi River	56	Crab Orchard Creek	2
Milwaukee River	55	Crooked Creek	2
Lake Michigan	45	Hickory Creek	2
Chicago Sanitary Ship Canal	41	Kaskaskia Creek, E. Fork	2
Des Plains River	27	Kaskaskia River, Lake Fork	2
Kaskaskia River	21	Lake Shelbyville	2
Calumet River	19	Little Creek	2
River Raisin	16	Portage River, E. Br.	2
Indiana Harbor	15	Ramsey Creek	2
Wisconsin River	15	Saline River	2
Wabash River	14	Vermilion River	2
Lake St. Clair	13	Barton Lake	1
Little Calumet River	13	Beaucoup Creek	1
River Rouge	13	Big Bureau Creek	1
Menominee River	12	Big Muddy River, M. Fork	1
Du Page River	9	Buffalo Creek	1
Illinois River	9	Burns Ditch	1
Cahokia Canal	8	Clark Lake	1
Manistee Lake	8	Coon River	1
Big Muddy River, Casey Fork	7	Deep River	1
Black River	7	East River	1
Crab Orchard Lake	7	Eliza Creek	1
Du Page River, E. Br.	7	Garvin Brook	1
Du Page River, W. Br.	7	Gilmore Creek	1
Grosse Isle	7	Grosse Isle	1
Lake Minnetonka	7	Hog Creek	1
St. Joseph River	7	Kaskaskia Creek, N. Fork	1
Tuscarawas River	7	Kilbourn Ditch	1
Lake Calumet	6	Killbuck Creek	1
Ashtabula River	5	Lake Creek	1
Cedar Creek	5	Lemonweir River	1
Fox Lake	5	Little Crooked Creek	1
Kishwaukee River, S. Br.	5	Little Roche A Cri Creek	1
Lake Michigan, Green Bay	5	Mill Creek	1
Chicago Ship Canal	4	Ottawa Creek	1
Root River	4	Petenwell Flowage	1
Salt Creek	4	Pigeon River	1
Vermilion River, Salt Fork	4	Piscasaw River	1
Big Muddy River	3	Rend Lake	1
Chicago River, N. Br.	3	Rocky River	1
Huron River	3	Sturgeon Bay	1
Kishwaukee River	3	Sugar Creek	1

Table 3-25. (continued)

Water Body	# of Tier 1 Stations	Water Body	# of Tier 1 Stations
Manistee River	3	Swan Creek	1
Nimishillen Creek	3	Upper Salt Fork Drainage Ditch	1
Ohnathan Creek	3	Vermilion River, M. Fork	1
Paw Paw River	3	W Bureau Creek	1
Vermilion River, N. Fork	3	Wall Town Drainage Ditch	1
W Okaw River	3	Whitewater River	1

Table 3-26. Region 5: Chemicals Most Often Associated With Tier 1 or Tier 2 Sampling Station Classifications^a

	Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station		Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station	
Region 5 Overall	Copper	1,625	--	1,625	Michigan (continued)	Nickel	198	--	198	
	Polychlorinated biphenyls	1,460	1,113	347		DDT	182	97	85	
	Lead	1,326	--	1,326		Zinc	170	--	170	
	Dieldrin	1,318	36	1,282		Mercury	140	53	87	
	Nickel	1,260	--	1,260		Pyrene	140	50	90	
	Cadmium	1,203	--	1,203		Cadmium	140	--	140	
	Arsenic	1,019	32	987		Fluoranthene	133	20	113	
	Zinc	915	--	915		Minnesota	Polychlorinated biphenyls	225	216	9
	Mercury	761	197	564			Dieldrin	88	--	88
	Chlordane	723	--	723			Cadmium	66	--	66
	DDT	668	177	491			DDT	30	--	30
	Chromium	414	81	333			Copper	24	--	24
	Heptachlor epoxide	338	--	338			Lead	21	--	21
	Pyrene	300	103	197			Mercury	17	--	17
	Fluoranthene	290	59	231			Dioxins	10	10	--
Illinois	Dieldrin	1019	33	986	Chromium		9	--	9	
	Copper	616	--	616	Aldrin		5	--	5	
	Chlordane	518	--	518	Ohio	Nickel	644	--	644	
	Polychlorinated biphenyls	503	318	185		Copper	577	--	577	
	Lead	464	--	464		Lead	472	--	472	
	Cadmium	460	--	460		Arsenic	459	2	457	
	Arsenic	380	18	362		Cadmium	420	--	420	
	Nickel	342	--	342		Zinc	381	--	381	
	Mercury	330	72	258		Mercury	125	16	109	
DDT	275	36	239	Chromium		123	19	104		
Indiana	Polychlorinated biphenyls	66	59	7		Fluoranthene	108	17	91	
	Arsenic	53	3	50	Polychlorinated biphenyls	97	65	32		
	Dieldrin	51	3	48	Wisconsin	Polychlorinated biphenyls	319	304	15	
	Chlordane	48	--	48		Copper	159	--	159	
	Heptachlor epoxide	42	--	42		Mercury	127	42	85	
	Copper	36	--	36		Lead	120	--	120	
	Lead	36	--	36		DDT	100	15	85	
	BHC	33	7	26		Cadmium	88	--	88	
	DDT	33	6	27		Dieldrin	76	--	76	
	Cadmium	29	--	29		Pyrene	62	21	41	
Michigan	Polychlorinated biphenyls	250	151	99		Zinc	60	--	60	
	Copper	213	--	213		Nickel	54	--	54	
	Lead	213	--	213						

^aStations may be listed for more than one chemical.

EPA Region 6

Arkansas, Louisiana, New Mexico, Oklahoma, Texas

EPA evaluated 1,616 sampling stations in Region 6 as part of the NSI evaluation. Sediment contamination where associated adverse effects to aquatic life are probable (Tier 1) was found at 222 of these sampling stations, and possible but infrequent (Tier 2) at 852 of these sampling stations. For human health, data for 189 sampling stations indicated probable association with adverse effects (Tier 1), and 421 sampling stations indicated possible but infrequent adverse effects (Tier 2). Overall, this evaluation resulted in the classification of 382 sampling stations (24 percent) as Tier 1, 837 (52 percent) as Tier 2, and 397 (24 percent) as Tier 3. The NSI sampling stations in Region 6 were located in 799 separate river reaches, or 11 percent of all reaches in the Region. Three percent of all river reaches in Region 6 included at least one Tier 1 station, 5 percent included at least one Tier 2 station but no Tier 1 stations, and 3 percent had only Tier 3 stations (Figure 3-25). Table 3-27 (on the following page) presents a summary of sampling station classification and evaluation of river reaches for each state and for the Region as a whole.

This evaluation identified 8 watersheds containing areas of probable concern for sediment contamination

(APCs) out of the 403 watersheds (2 percent) in Region 6 (Figure 3-26). In addition, 36 percent of all watersheds in the Region had at least one Tier 1 sampling station but were not identified as containing APCs, 21 percent had at least one Tier 2 station but no Tier 1 stations, and 10 percent had only Tier 3 stations. Thirty-one percent of the watersheds in Region 6 did not include a sampling station. The locations of the watersheds containing APCs and the Tier 1 and Tier 2 sampling stations in Region 6 are illustrated in Figure 3-27.

Within the 8 watersheds in Region 6 identified as containing APCs (Table 3-28), 17 water bodies have at least 1 Tier 1 sampling station; 4 water bodies have 10 or more Tier 1 sampling stations (Table 3-29). The Calcasieu River and Mississippi River in Louisiana appear to have some of the most significant sediment contamination in Region 6. The water bodies listed on Table 3-29 are not inclusive of all locations containing a Tier 1 sampling station because only water bodies within watersheds containing APCs are listed.

The chemicals most often associated with Tier 1 or Tier 2 sampling station classifications in Region 6 overall and in each state in Region 6 are presented in Table 3-30.

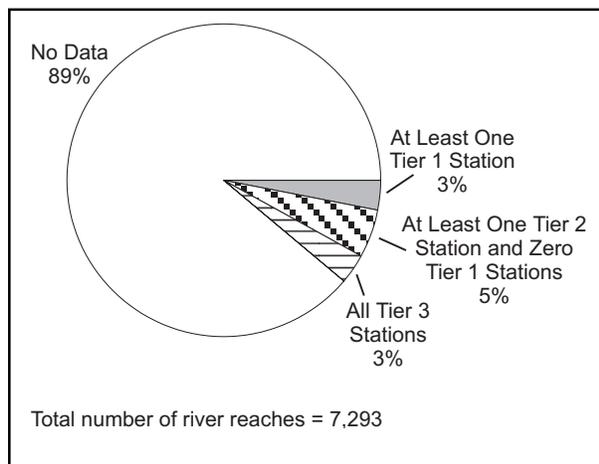


Figure 3-25. Region 6: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

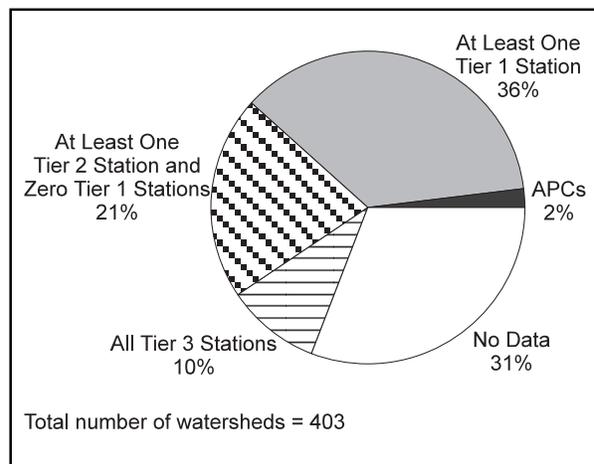


Figure 3-26. Region 6: Watershed Classifications.

Table 3-27. Region 6: Evaluation Results for Sampling Stations and River Reaches by State

State	Station Evaluation						River Reach Evaluation ^a							
	Tier 1		Tier 2		Tier 3		Number of Stations Not Identified by an RF1 Reach ^b	Reaches w/at Least 1 Station in Tier 1	Reaches w/at Least 1 Station in Tier 2 ^c	Reaches w/all Stations in Tier 3	Total # Reaches w/at Least 1 Station Evaluated	Total Reaches in State	% of all Reaches in State w/at Least 1 Station Evaluated	% of Reaches w/at Least 1 Tier 1 or Tier 2 Station
	No.	%	No.	%	No.	%								
Arkansas	18	17	39	36	50	47	-	17	31	40	88	855	10	6
Louisiana	111	24	270	59	79	17	57	45	68	29	142	840	17	13
New Mexico	4	4	40	40	57	56	-	4	28	28	60	919	7	3
Oklahoma	122	43	95	33	69	24	-	97	59	41	197	1,308	15	12
Texas	127	19	393	59	142	22	67	104	160	56	320	3,588	9	7
REGION 6 ^d	382	24	837	52	397	24	124	266	341	192	799	7,293	11	8

^aRiver reaches based on EPA River Reach File 1 (RF1).

^bStations not identified by an RF1 reach were located in coastal or open water areas.

^cNo stations in these reaches were included in Tier 1.

^dBecause some reaches occur in more than one state, the total number of reaches in each category for the Region might not equal the sum of reaches in the states.



Figure 3-27. Region 6: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

Table 3-28. Region 6: Watersheds Containing Areas of Probable Concern for Sediment Contamination

Cataloging Unit Number	Name	State(s) ^a	Number of Sampling Stations			Percent of Sampling Stations in Tier 1 or Tier 2
			Tier 1	Tier 2	Tier 3	
08080206	Lower Calcasieu	LA	26	52	22	78
08090100	Lower Mississippi-New Orleans	LA	16	34	1	98
08010100	Lower Mississippi-Memphis	AR, MS, KY, MO, TN	14	3	3	85
11070209	Lower Neosho	OK, (AR)	13	3	4	80
08040207	Lower Ouachita	LA	12	0	0	100
08030209	Deer-Steele	MS, (LA)	11	10	0	100
11070207	Spring	OK, MO, KS	10	25	6	85
12040104	Buffalo-San Jacinto	TX	10	23	3	92

^aNo data were available for states listed in parentheses.

Table 3-29. Region 6: Water Bodies With Sampling Stations Classified as Tier 1 Located in Watersheds Containing APCs

Water Body	# of Tier 1 Stations	Water Body	# of Tier 1 Stations
Calcasieu River	15	Neosho River	2
Mississippi River	15	Pryor Creek	2
Bayou D'Inde	11	Greens Bayou	1
Bayou De Siard	11	Lake Eucha	1
Buffalo Bayou	5	Mississippi River, Grand Pass	1
Fort Gibson Lake	4	Mississippi River, Pass Loutre	1
Lake Hudson	3	Ouachita River	1
Busch Island	2	Spavinaw Lake	1
Galveston Bay	2		

Table 3-30. Region 6: Chemicals Most Often Associated With Tier 1 or Tier 2 Sampling Station Classifications^a

	Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station		Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station
Region 6 Overall	Nickel	460	--	460	Louisiana (continued)	Dibenzo(a,h)anthracene	59	1	58
	Polychlorinated biphenyls	434	216	218		Lead	57	--	57
	Arsenic	429	3	426	New Mexico	Copper	24	--	24
	Copper	350	--	350		Cadmium	23	--	23
	DDT	327	70	257		Arsenic	17	--	17
	Cadmium	325	--	325		Nickel	12	--	12
	Lead	297	--	297		Lead	8	--	8
	Chromium	290	9	281		Zinc	6	--	6
	Mercury	235	47	188		Mercury	5	3	2
	Chlordane	189	4	185		Chromium	4	--	4
	Silver	144	32	112		Polychlorinated biphenyls	2	2	--
	Zinc	133	--	133		Chlordane	2	--	2
	Dieldrin	132	10	122	Oklahoma	Polychlorinated biphenyls	135	118	17
	BHC	123	16	107		Arsenic	78	1	77
	Dibenzo(a,h)anthracene	122	2	120		Chlordane	73	3	70
				Cadmium		60	--	60	
				DDT		58	7	51	
Arkansas	Arsenic	25	--	25	Texas	Lead	43	--	43
	DDT	23	6	17		Dieldrin	35	1	34
	Mercury	15	3	12		Copper	27	--	27
	Polychlorinated biphenyls	14	7	7		Mercury	26	3	23
	Lead	13	--	13		Toxaphene	20	--	20
	Dieldrin	7	--	7		Nickel	259	--	259
	Dioxins	6	6	--		Copper	185	--	185
	Chlordane	6	--	6		Cadmium	182	--	182
	Cadmium	4	--	4		Lead	176	--	176
Copper	3	--	3	Arsenic	168	1	167		
Louisiana	Nickel	178	--	178	Polychlorinated biphenyls	164	45	119	
	Arsenic	141	1	140	Chromium	152	6	146	
	Chromium	132	3	129	DDT	135	31	104	
	Polychlorinated biphenyls	119	44	75	Silver	135	30	105	
	Copper	111	--	111	Mercury	118	17	101	
	DDT	110	26	84					
	SEM (est) ^b	75	--	75					
	Mercury	71	21	50					

^aStations may be listed for more than one chemical.^bSimultaneously extracted metals.

EPA Region 7

Iowa, Kansas, Missouri, Nebraska

EPA evaluated 1,011 sampling stations in Region 7 as part of the NSI evaluation. Sediment contamination where associated adverse effects to aquatic life are probable (Tier 1) was found at 32 of these sampling stations, and possible but infrequent (Tier 2) at 242 of these sampling stations. For human health, data for 299 sampling stations indicated probable association with adverse effects (Tier 1), and 230 sampling stations indicated possible but infrequent adverse effects (Tier 2). Overall, this evaluation resulted in the classification of 330 sampling stations (33 percent) as Tier 1, 393 (39 percent) as Tier 2, and 288 (28 percent) as Tier 3. The NSI sampling stations in Region 7 were located in 516 separate river reaches, or 11 percent of all reaches in the Region. Five percent of all river reaches in Region 7 included at least one Tier 1 station, 4 percent included at least one Tier 2 station but no Tier 1 stations, and 2 percent had only Tier 3 stations (Figure 3-28). Table 3-31 (on the following page) presents a summary of sampling station classification and evaluation of river reaches for each state and for the Region as a whole.

This evaluation identified 5 watersheds containing areas of probable concern for sediment contamination

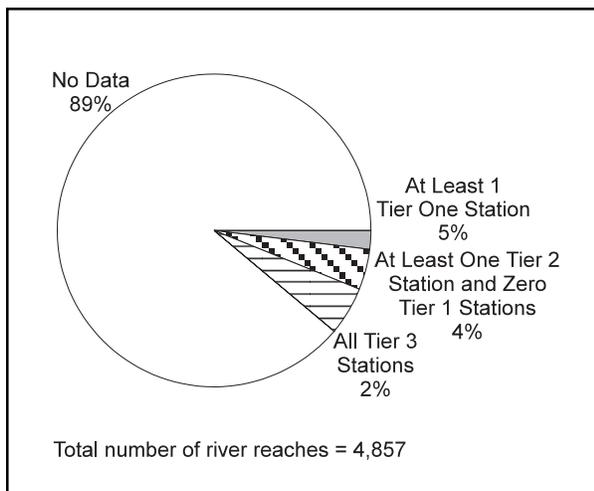


Figure 3-28. Region 7: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

(APCs) out of the 239 watersheds (2 percent) in Region 7 (Figure 3-29). In addition, 49 percent of all watersheds in the Region had at least one Tier 1 sampling station but were not identified as containing APCs, 16 percent had at least one Tier 2 station but no Tier 1 stations, and 5 percent had only Tier 3 stations. Twenty-eight percent of the watersheds in Region 7 did not include a sampling station. The locations of the watersheds containing APCs and the Tier 1 and Tier 2 sampling stations in Region 7 are illustrated in Figure 3-30.

Within the 5 watersheds in Region 7 identified as containing APCs (Table 3-32), 12 water bodies have at least 1 Tier 1 sampling station; 1 water body has 10 or more Tier 1 sampling stations (Table 3-33). The water bodies listed on Table 3-33 are not inclusive of all locations containing a Tier 1 sampling station because only water bodies within watersheds containing APCs are listed.

The chemicals most often associated with Tier 1 or Tier 2 sampling station classifications in Region 7 overall and in each state in Region 7 are presented in Table 3-34.

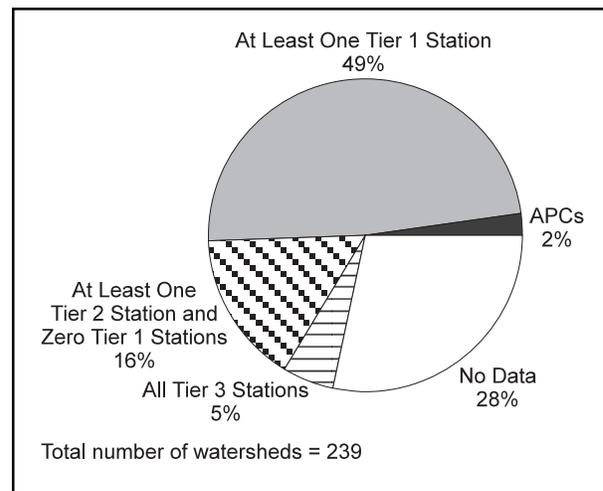


Figure 3-29. Region 7: Watershed Classifications.

Table 3-31. Region 7: Evaluation Results for Sampling Stations and River Reaches by State

State	Station Evaluation						River Reach Evaluation ^a								
	Tier 1		Tier 2		Tier 3		Number of Stations Not Identified by an RF1 Reach ^b	Reaches w/at Least 1 Station in Tier 1	Reaches w/at Least 1 Station in Tier 2 ^c	Reaches w/all Stations in Tier 3	Total # Reaches w/at Least 1 Station Evaluated	Total Reaches in State	% of all Reaches in State w/at Least 1 Station Evaluated	% of Reaches w/at Least 1 Tier 1 or Tier 2 Station	
	No.	%	No.	%	No.	%									
Iowa	75	33	104	46	49	21	-	61	50	19	130	1,198	11	9	
Kansas	76	38	98	48	29	14	-	64	48	13	125	1,184	11	9	
Missouri	124	38	98	30	105	32	-	76	32	18	126	1,364	9	8	
Nebraska	55	22	93	37	105	41	-	45	62	39	146	1,265	12	8	
REGION 7 ^d	330	33	393	39	288	28	-	246	182	88	516	4,857	11	9	

^aRiver reaches based on EPA River Reach File 1 (RF1).

^bStations not identified by an RF1 reach were located in coastal or open water areas.

^cNo stations in these reaches were included in Tier 1.

^dBecause some reaches occur in more than one state, the total number of reaches in each category for the Region might not equal the sum of reaches in the states.



Figure 3-30. Region 7: Locations of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

Table 3-32. Region 7: Watersheds Containing Areas of Probable Concern for Sediment Contamination

Cataloging Unit Number	Name	State(s)	Number of Sampling Stations			Percent of Sampling Stations in Tier 1 or Tier 2
			Tier 1	Tier 2	Tier 3	
07140101	Cahokia-Joachim	MO, IL	18	34	4	93
07080101	Copperas-Duck	IL, IA	17	5	5	81
08010100	Lower Mississippi-Memphis	AR, MS, KY, MO, TN	14	3	3	85
10270104	Lower Kansas	MO, KS	12	15	2	93
11070207	Spring	OK, MO, KS	10	25	6	85

Table 3-33. Region 7: Water Bodies With Sampling Stations Classified as Tier 1 Located in Watersheds Containing APCs

Water Body	# of Tier 1 Stations	Water Body	# of Tier 1 Stations
Mississippi River	17	Duck Creek	1
Kansas River	7	Joachim Creek	1
Spring River	5	Kill Creek	1
Center Creek	3	Stranger Creek	1
Cedar Creek	2	Turkey Creek	1
Cow Creek	1	Wakarusa River	1

Findings

Table 3-34. Region 7: Chemicals Most Often Associated With Tier 1 or Tier 2 Sampling Station Classifications^a

	Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station		Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station
Region 7 Overall	Dieldrin	336	2	334	Kansas (continued)	Arsenic	52	--	52
	Chlordane	329	--	329		Nickel	49	--	49
	Polychlorinated biphenyls	305	291	14		Cadmium	36	--	36
	Arsenic	171	--	171		Lead	34	--	34
	Heptachlor epoxide	138	--	138		Chromium	27	1	26
	Nickel	121	--	121		Zinc	23	--	23
	Cadmium	115	--	115		Copper	20	--	20
	Lead	84	--	84	Missouri	Chlordane	119	--	119
	Copper	74	--	74		Polychlorinated biphenyls	116	102	14
	Chromium	50	5	45		Dieldrin	76	--	76
	Dioxins	44	42	2		Heptachlor epoxide	53	--	53
	Zinc	43	--	43		Arsenic	43	--	43
	Bis(2-ethylhexyl)phthalat	37	9	28		Cadmium	36	--	36
	DDT	33	--	33		Lead	33	--	33
	Aldrin	31	--	31		Dioxins	31	29	2
	Iowa	Dieldrin	126	2	124	Nebraska	Nickel	29	--
Chlordane		91	--	91	Copper		27	--	27
Polychlorinated biphenyls		71	71	--	Dieldrin		72	--	72
Heptachlor epoxide		54	--	54	Chlordane	52	--	52	
Arsenic		34	--	34	Polychlorinated biphenyls	50	50	--	
Copper		17	--	17	Arsenic	42	--	42	
Cadmium		14	--	14	Cadmium	29	--	29	
Nickel		14	--	14	Nickel	29	--	29	
DDT		12	--	12	Chromium	17	2	15	
Lead		10	--	10	Aldrin	13	--	13	
Kansas	Polychlorinated biphenyls	68	68	--	Heptachlor epoxide	12	--	12	
	Chlordane	67	--	67	Bis(2-ethylhexyl)phthalat	10	4	6	
	Dieldrin	62	--	62					

^aStations may be listed for more than one chemical.

EPA Region 8

Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming

EPA evaluated 535 sampling stations in Region 8 as part of the NSI evaluation. Sediment contamination where associated adverse effects to aquatic life are probable (Tier 1) was found at 39 of these sampling stations, and possible but infrequent (Tier 2) at 325 of these sampling stations. For human health, data for 29 sampling stations indicated probable association with adverse effects (Tier 1), and 19 sampling stations indicated possible but infrequent adverse effects (Tier 2). Overall, this evaluation resulted in the classification of 68 sampling stations (13 percent) as Tier 1, 327 (61 percent) as Tier 2, and 140 (26 percent) as Tier 3. The NSI sampling stations in Region 8 were located in 305 separate river reaches, or 2 percent of all reaches in the Region. Less than 1 percent of all river reaches evaluated in Region 8 included at least one Tier 1 station, 1 percent included at least one Tier 2 station but no Tier 1 stations, and less than 1 percent had only Tier 3 stations (Figure 3-31). Table 3-35 (on the following page) presents a summary

of sampling station classification and evaluation of river reaches for each state and for the Region as a whole.

None of the 385 watersheds in Region 8 were identified as watersheds containing areas of probable concern for sediment contamination. Fourteen percent of all watersheds in the Region had at least one Tier 1 sampling station, 12 percent had at least one Tier 2 station but no Tier 1 stations, and 9 percent had only Tier 3 stations (Figure 3-32). Sixty-five percent of the watersheds in Region 8 did not include a sampling station. The locations of the Tier 1 and Tier 2 sampling stations in Region 8 are illustrated in Figure 3-33.

Lack of multiple sampling site data did not allow identification of any watersheds in Region 8 as containing APCs. Therefore, specific water bodies with Tier 1 sampling stations are not listed in a separate table, as for other Regional summaries.

The chemicals most often associated with Tier 1 or Tier 2 sampling station classifications in Region 8 overall and in each state in Region 8 are presented in Table 3-36.

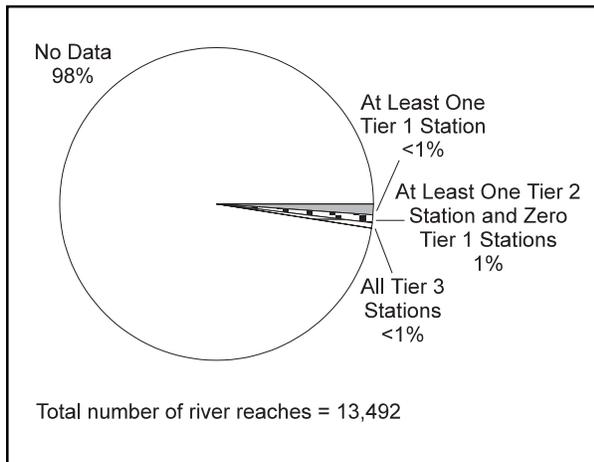


Figure 3-31. Region 8: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

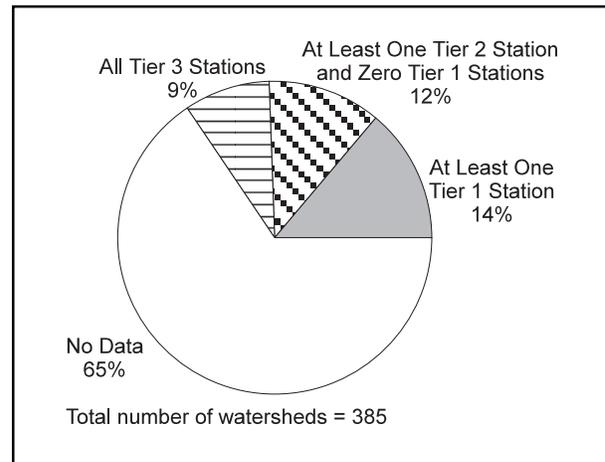


Figure 3-32. Region 8: Watershed Classifications.

Table 3-35. Region 8: Evaluation Results of NSI Sampling Stations and River Reaches by State

State	Station Evaluation						River Reach Evaluation ^a							
	Tier 1		Tier 2		Tier 3		Number of Stations Not Identified by an RF1 Reach ^b	Reaches w/at Least 1 Station in Tier 1	Reaches w/at Least 1 Station in Tier 2 ^c	Reaches w/all Stations in Tier 3	Total # Reaches w/at Least 1 Station Evaluated	Total Reaches in State	% of all Reaches in State w/at Least 1 Station Evaluated	% of Reaches w/at Least 1 Tier 1 or Tier 2 Station
	No.	%	No.	%	No.	%								
Colorado	11	6	140	69	51	25	-	8	73	34	115	2,178	5	4
Montana	9	24	18	47	11	29	-	9	10	8	27	5,490	1	<1
North Dakota	24	15	112	70	25	15	-	22	36	9	67	992	7	6
South Dakota	13	30	21	49	9	21	-	11	6	7	24	1,611	2	1
Utah	7	15	24	51	16	34	-	7	16	10	33	1,034	3	2
Wyoming	4	9	12	27	28	64	-	4	12	25	41	2,421	2	1
REGION 8 ^d	68	13	327	61	140	26	-	61	153	91	305	13,492	2	2

^aRiver reaches based on EPA River Reach File 1 (RF1).

^bStations not identified by an RF1 reach were located in coastal or open water areas.

^cNo stations in these reaches were included in Tier 1.

^dBecause some reaches occur in more than one state, the total number of reaches in each category for the Region might not equal the sum of reaches in the states.

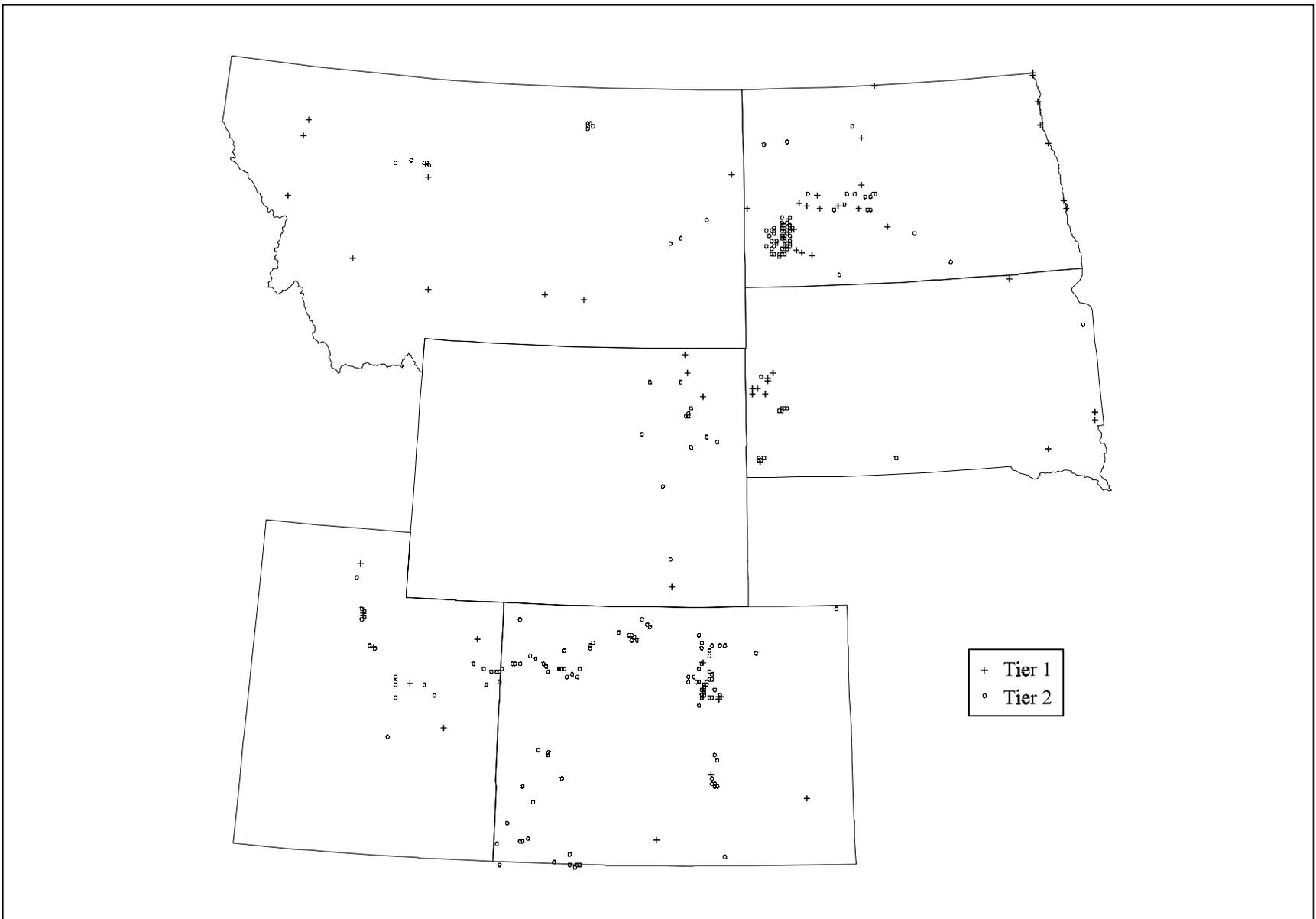


Figure 3-33. Region 8: Locations of Sampling Stations Classified as Tier 1 or Tier 2.

Table 3-36. Region 8: Chemicals Most Often Associated with Tier 1 or Tier 2 Sampling Station Classifications^a

	Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station		Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station
Region 8 Overall	Copper	195	--	195	North Dakota (continued)	Chromium	34	--	34
	Nickel	192	--	192		Arsenic	33	12	21
	Cadmium	169	--	169		Cadmium	16	--	16
	Arsenic	155	22	133		Polychlorinated biphenyls	10	10	--
	Lead	74	--	74		Mercury	6	2	4
	Zinc	56	--	56		Dieldrin	4	--	4
	Chromium	53	1	52		Aldrin	2	--	2
	Polychlorinated biphenyls	40	29	11		Bis(2-ethylhexyl)phthalat	2	--	2
	Mercury	35	12	23		Lead	2	--	2
	Dieldrin	20	--	20	South Dakota	Arsenic	23	7	16
	Aldrin	12	--	12		Lead	16	--	16
	Toxaphene	12	--	12		Nickel	15	--	15
	Silver	11	1	10		Cadmium	9	--	9
	Bis(2-ethylhexyl)phthalat	10	4	6		Copper	9	--	9
	Chlordane	9	--	9		Zinc	6	--	6
				Bis(2-ethylhexyl)phthalat		3	2	1	
Colorado	Cadmium	109	--	109	Utah	Mercury	3	2	1
	Copper	71	--	71		Chromium	3	1	2
	Arsenic	59	--	59		Benzo(a)pyrene	2	--	2
	Nickel	53	--	53	Wyoming	Cadmium	21	--	21
	Lead	50	--	50		Arsenic	14	--	14
	Zinc	43	--	43		Polychlorinated biphenyls	11	4	7
	Mercury	18	6	12		Chlordane	8	--	8
	Chromium	10	--	10		Copper	8	--	8
	Polychlorinated biphenyls	7	4	3		Mercury	7	2	5
	Dieldrin	5	--	5		Lead	6	--	6
Montana	Arsenic	18	--	18	Wyoming	Dieldrin	5	--	5
	Copper	12	--	12		Silver	5	--	5
	Nickel	12	--	12		Zinc	5	--	5
	Polychlorinated biphenyls	9	9	--	Wyoming	Cadmium	11	--	11
	Chromium	6	--	6		Arsenic	8	3	5
	Dieldrin	5	--	5		Polychlorinated biphenyls	2	1	1
	Aldrin	4	--	4		Copper	2	--	2
	Toxaphene	4	--	4		Bis(2-ethylhexyl)phthalat	1	--	1
	Cadmium	3	--	3		Mercury	1	--	1
	Dioxins	2	2	--		North Dakota	Nickel	1	--
				Silver	1		--	1	

^aStations may be listed for more than one chemical.

EPA Region 9

Arizona, California, Hawaii, Nevada

EPA evaluated 1,699 sampling stations in Region 9 as part of the NSI evaluation. Sediment contamination where associated adverse effects to aquatic life are probable (Tier 1) was found at 433 of these sampling stations, and possible but infrequent (Tier 2) at 894 of these sampling stations. For human health, data for 40 sampling stations indicated probable association with adverse effects (Tier 1), and 765 sampling stations indicated possible but infrequent adverse effects (Tier 2). Overall, this evaluation resulted in the classification of 468 sampling stations (28 percent) as Tier 1, 942 (55 percent) as Tier 2, and 289 (17 percent) as Tier 3. The NSI sampling stations in Region 9 were located in 254 separate river reaches, or 6 percent of all reaches in the Region. Three percent of all river reaches in Region 9 included at least one Tier 1 station, 2 percent included at least one Tier 2 station but no Tier 1 stations, and 1 percent had only Tier 3 stations (Figure 3-34). Table 3-37 (on the following page) presents a summary of sampling station classification and evaluation of river reaches for each state and for the Region as a whole.

This evaluation identified 10 watersheds containing areas of probable concern for sediment contamination

(APCs) out of the 279 watersheds (4 percent) in Region 9 (Figure 3-35). In addition, 22 percent of all watersheds in the Region had at least one Tier 1 sampling station but were not classified as containing APCs, 10 percent had at least one Tier 2 station but no Tier 1 stations, and 5 percent had only Tier 3 stations. Fifty-nine percent of the watersheds in Region 9 did not include a sampling station. The locations of the watersheds containing APCs and the Tier 1 and Tier 2 sampling stations in Region 9 are illustrated in Figure 3-36.

Within the 10 watersheds in Region 9 identified as containing APCs (Table 3-38), 19 water bodies have at least 1 Tier 1 sampling station; 7 water bodies have 10 or more Tier 1 sampling stations (Table 3-39). San Diego Bay, San Francisco Bay, and offshore areas around San Diego and Los Angeles appear to have the most significant sediment contamination in Region 9. The water bodies listed on Table 3-39 are not inclusive of all locations containing a Tier 1 sampling station because only water bodies within watersheds containing APCs are listed.

The chemicals most often associated with Tier 1 or Tier 2 sampling station classifications in Region 9 overall and in each state in Region 9 are presented in Table 3-40.

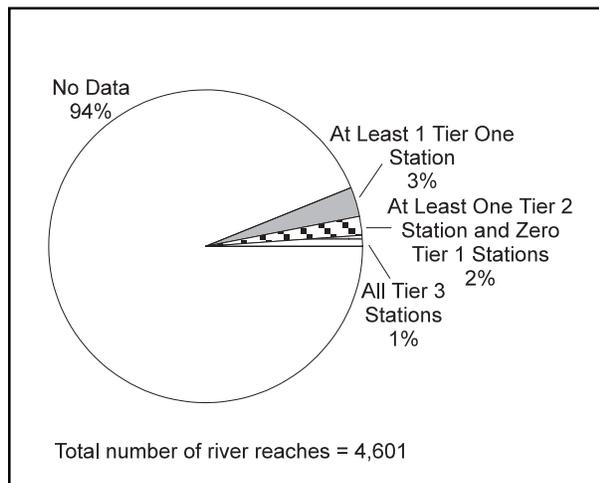


Figure 3-34. Region 9: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

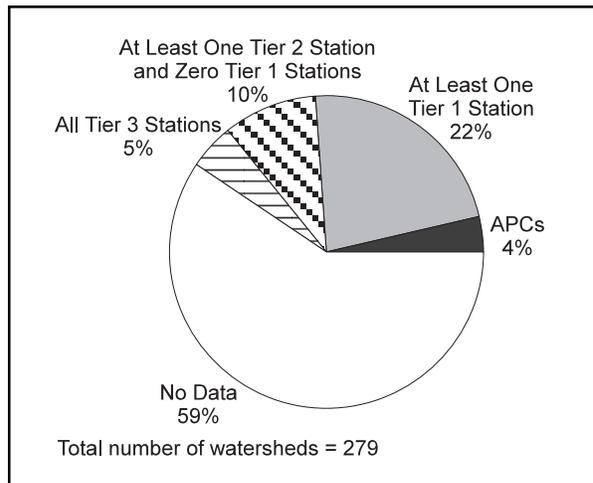


Figure 3-35. Region 9: Watershed Classifications.

Table 3-37. Region 9: Evaluation Results for NSI Sampling Stations and River Reaches by State

State	Station Evaluation						River Reach Evaluation ^a								
	Tier 1		Tier 2		Tier 3		Number of Stations Not Identified by an RF1 Reach ^b	Reaches w/at Least 1 Station in Tier 1	Reaches w/at Least 1 Station in Tier 2 ^c	Reaches w/all Stations in Tier 3	Total # Reaches w/at Least 1 Station Evaluated	Total Reaches in State	% of all Reaches in State w/at Least 1 Station Evaluated	% of Reaches w/at Least 1 Tier 1 or Tier 2 Station	
	No.	%	No.	%	No.	%									
Arizona	44	35	58	47	22	18	-	30	33	11	74	1,146	7	5	
California	392	27	822	57	229	16	758	75	44	26	145	2,606	6	5	
Hawaii	8	22	23	64	5	14	36	-	-	-	-	-	-	-	
Nevada	24	25	39	41	33	34	-	16	15	6	37	916	4	3	
REGION 9 ^d	468	28	942	55	289	17	794	119	92	43	254	4,601	6	5	

^aRiver reaches based on EPA River Reach File 1 (RF1).

^bStations not identified by an RF1 reach were located in coastal or open water areas.

^cNo stations in these reaches were included in Tier 1.

^dBecause some reaches occur in more than one state, the total number of reaches in each category for the Region might not equal the sum of reaches in the states.

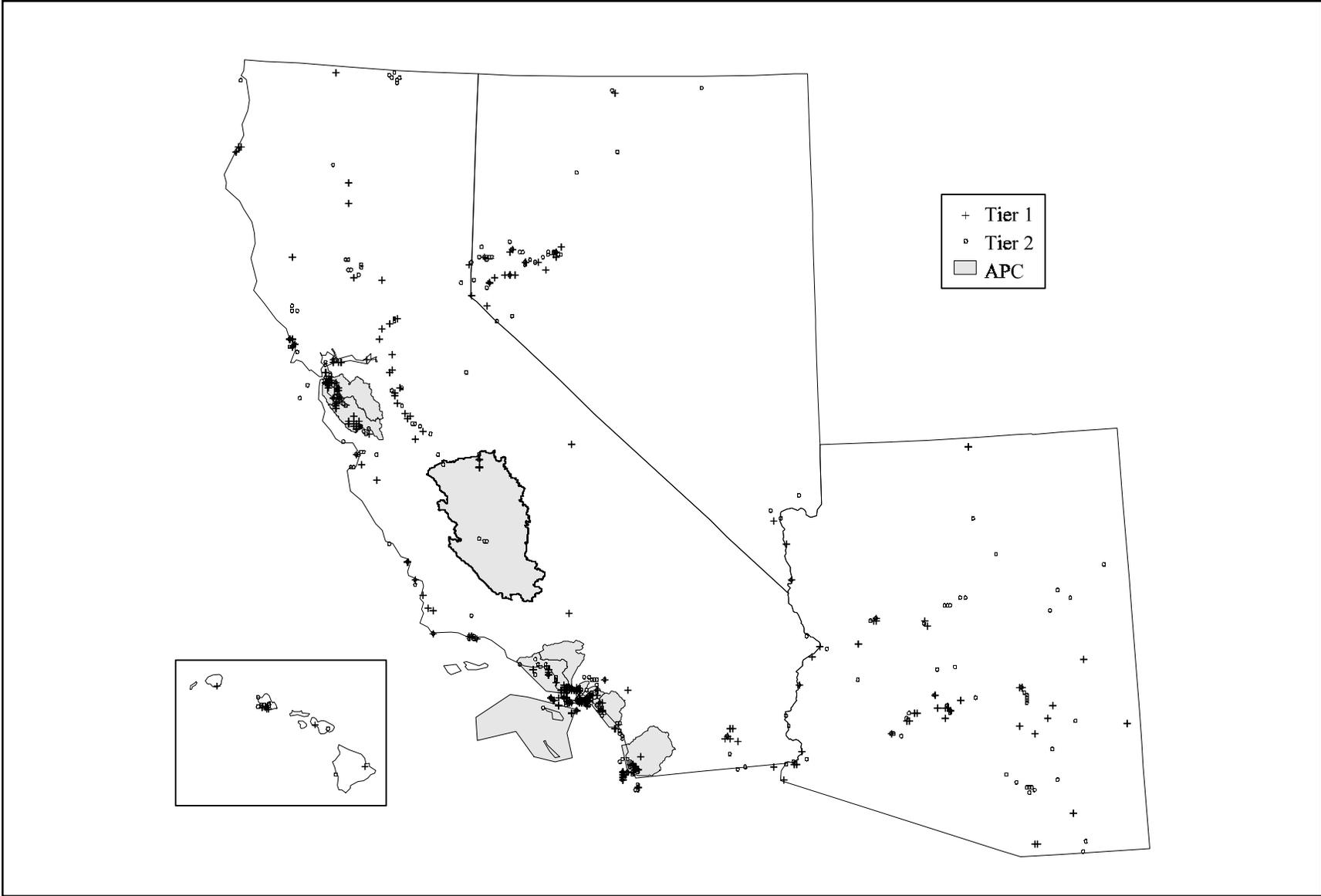


Figure 3-36. Region 9: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

Table 3-38. Region 9: Watersheds Containing Areas of Probable Concern for Sediment Contamination

Cataloging Unit Number	Name	State(s)	Number of Sampling Stations			Percent of Sampling Stations in Tier 1 or Tier 2
			Tier 1	Tier 2	Tier 3	
18070104	Santa Monica Bay	CA	79	31	22	83
18070201	Seal Beach	CA	63	339	40	91
18070304	San Diego	CA	53	51	3	97
18070204	Newport Bay	CA	24	68	16	85
18050004	San Francisco Bay	CA	19	37	8	88
18050003	Coyote	CA	18	6	0	100
18070105	Los Angeles	CA	14	19	4	89
18070107	San Pedro Channel Islands	CA	14	10	1	96
18030012	Tulare-Buena Vista Lakes	CA	10	5	5	75
18070301	Aliso-San Onofre	CA	10	22	0	100

Table 3-39. Region 9: Water Bodies With Sampling Stations Classified as Tier 1 Located in Watersheds Containing APCs

Water Body	# of Tier 1 Stations	Water Body	# of Tier 1 Stations
Pacific Ocean	178	Corte Madera Creek	2
San Diego Bay	32	Los Gatos Creek	2
San Francisco Bay	19	Coyote Creek	1
Los Angeles River	14	Lexington Reservoir	1
Santa Catalina Island	14	Oso Creek	1
San Diego Creek	12	Peters Canyon Wash	1
Kings River	10	San Diego River	1
Alamitos Creek	8	San Juan Creek	1
Calero Reservoir	4	Sweetwater River	1
Aliso Creek	2		

Table 3-40. Region 9: Chemicals Most Often Associated with Tier 1 or Tier 2 Sampling Station Classifications^a

	Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station		Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station
Region 9 Overall	Copper	678	--	678	California (continued)	Cadmium	406	--	406
	DDT	675	179	496		Nickel	373	--	373
	Arsenic	455	12	443		Arsenic	357	3	354
	Nickel	454	--	454		Mercury	336	103	233
	Cadmium	446	--	446		Bis(2-ethylhexyl)phthalat	264	48	216
	Polychlorinated biphenyls	445	100	345		Lead	253	--	253
	Mercury	403	134	269		Chromium	239	40	199
	Lead	314	--	314	Hawaii	Nickel	20	--	20
	Bis(2-ethylhexyl)phthalat	302	69	233		Copper	19	--	19
	Chromium	265	42	223		Mercury	16	4	12
	Zinc	238	--	238		Arsenic	16	1	15
	Silver	209	23	186		Lead	14	--	14
	BHC	164	9	155		Zinc	13	--	13
	Benzo(a)pyrene	158	6	152		DDT	10	2	8
	Dieldrin	125	--	125		Chromium	10	1	9
						Polychlorinated biphenyls	8	3	5
Arizona	Copper	72	--	72	Nevada	Cadmium	8	--	8
	Arsenic	55	8	47		Mercury	29	15	14
	Nickel	50	--	50		Arsenic	27	--	27
	Lead	37	--	37		Copper	14	--	14
	Zinc	28	--	28		Nickel	11	--	11
	Bis(2-ethylhexyl)phthalat	26	15	11		Zinc	11	--	11
	Cadmium	24	--	24		Lead	10	--	10
	DDT	23	9	14		Polychlorinated biphenyls	9	4	5
	Mercury	22	12	10		Bis(2-ethylhexyl)phthalat	8	4	4
	Silver	15	7	8		Cadmium	8	--	8
California	DDT	640	168	472	Chlordane	8	--	8	
	Copper	573	--	573					
	Polychlorinated biphenyls	418	87	331					

^aStations may be listed for more than one chemical.

EPA Region 10

Alaska, Idaho, Oregon, Washington

EPA evaluated 2,878 sampling stations in Region 10 as part of the NSI evaluation. Sediment contamination where associated adverse effects to aquatic life are probable (Tier 1) was found at 623 of these sampling stations, and possible but infrequent (Tier 2) at 1,658 of these sampling stations. For human health, data for 112 sampling stations indicated probable association with adverse effects (Tier 1), and 1,285 sampling stations indicated possible but infrequent adverse effects (Tier 2). Overall, this evaluation resulted in the classification of 727 sampling stations (25 percent) in Region 10 as Tier 1, 1,696 (59 percent) as Tier 2, and 455 (16 percent) as Tier 3. The NSI sampling stations in Region 10 were located in 393 separate river reaches, or 4 percent of all reaches in the Region. One percent of all river reaches in Region 10 included at least one Tier 1 station, 2 percent included at least one Tier 2 station but no Tier 1 stations, and 1 percent had only Tier 3 stations (Figure 3-37). Table 3-41 (on the following page) presents a summary of sampling station classification and evaluation of river reaches for each state and for the Region as a whole.

This evaluation identified 7 watersheds containing areas of probable concern for sediment contamination

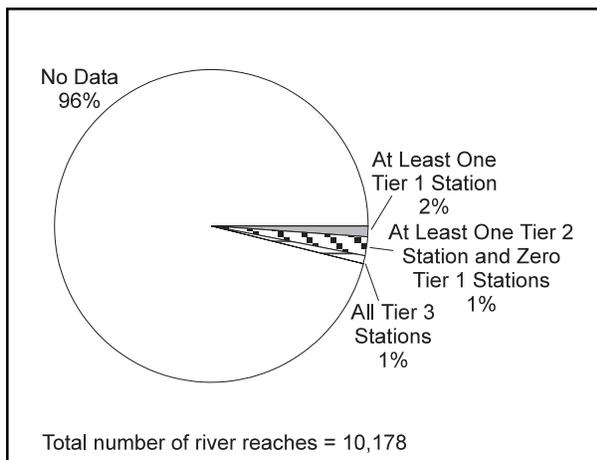


Figure 3-37. Region 10: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

(APCs) out of the 219 watersheds (3 percent) in Region 10 (Figure 3-38). In addition, 28 percent of all watersheds in the Region had at least one Tier 1 sampling station but were not categorized as containing APCs, 14 percent had at least one Tier 2 station but no Tier 1 stations, and 6 percent had only Tier 3 stations. Forty-nine percent of the watersheds in Region 10 did not include a sampling station. The locations of the watersheds containing APCs and the Tier 1 and Tier 2 sampling stations in Region 10 are illustrated in Figure 3-39.

Within the 7 watersheds in Region 10 identified as containing APCs (Table 3-42), 34 water bodies have at least 1 Tier 1 sampling station; 8 water bodies have 10 or more Tier 1 sampling stations (Table 3-43). Puget Sound appears to have the most significant sediment contamination in Region 10. The water bodies listed on Table 3-43 are not inclusive of all locations containing a Tier 1 sampling station because only water bodies within watersheds containing APCs are listed.

The chemicals most often associated with Tier 1 or Tier 2 sampling station classifications in Region 10 overall and in each state in Region 10 are presented in Table 3-44.

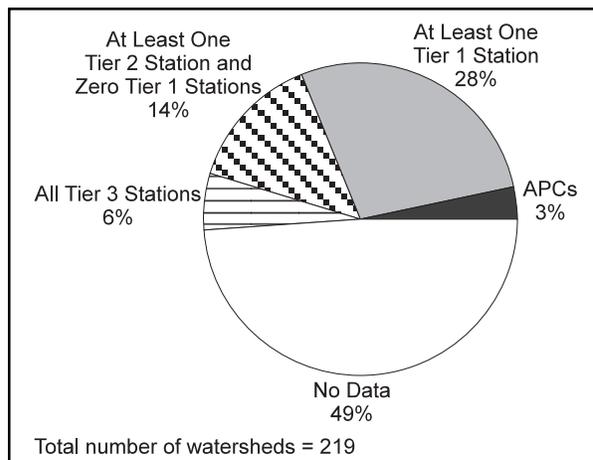


Figure 3-38. Region 10: Watershed Classifications.

Table 3-41. Region 10: Evaluation Results for NSI Sampling Stations and River Reaches by State

State	Station Evaluation						River Reach Evaluation ^a								
	Tier 1		Tier 2		Tier 3		Number of Stations Not Identified by an RF1 Reach ^b	Reaches w/at Least 1 Station in Tier 1	Reaches w/at Least 1 Station in Tier 2 ^c	Reaches w/all Stations in Tier 3	Total # Reaches w/at Least 1 Station Evaluated	Total Reaches in State	% of all Reaches in State w/at Least 1 Station Evaluated	% of Reaches w/at Least 1 Tier 1 or Tier 2 Station	
	No.	%	No.	%	No.	%									
Alaska	21	8	191	71	55	21	267	-	-	-	-	-	-	-	
Idaho	43	45	36	38	16	17	-	30	16	7	53	3,227	2	1	
Oregon	81	28	158	54	52	18	2	45	43	25	113	4,203	3	2	
Washington	582	26	1,311	59	332	15	228	75	115	40	230	2,924	8	6	
REGION 10 ^d	727	25	1,696	59	455	16	497	147	174	72	393	10,178	4	3	

^aRiver reaches based on EPA River Reach File 1 (RF1).

^bStations not identified by an RF1 reach were located in coastal or open water areas.

^cNo stations in these reaches were included in Tier 1.

^dBecause some reaches occur in more than one state, the total number of reaches in each category for the Region might not equal the sum of reaches in the states.

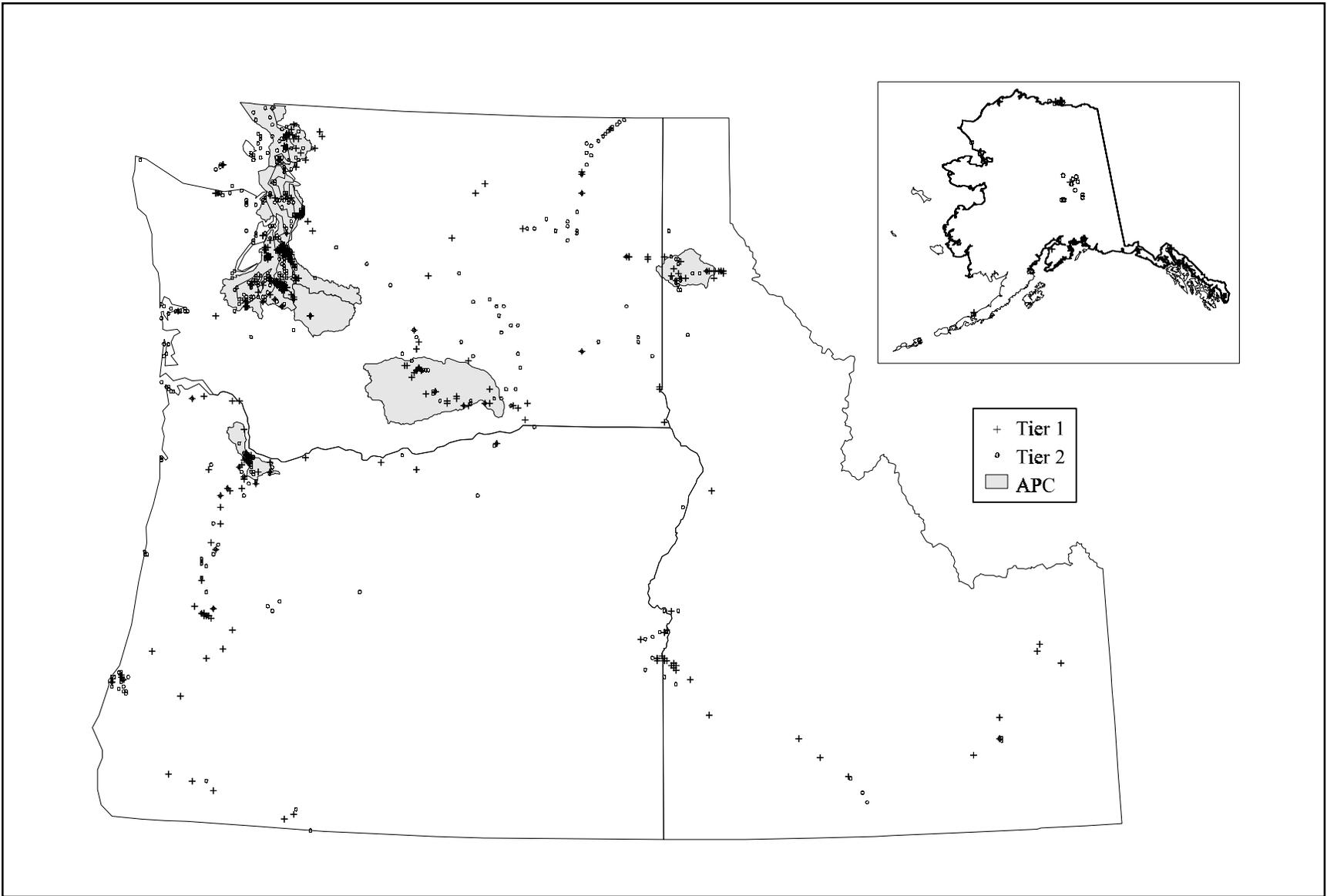


Figure 3-39. Region 10: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

Table 3-42. Region 10: Watersheds Containing Areas of Probable Concern for Sediment Contamination

Cataloging Unit Number	Name	State(s) ^a	Number of Sampling Stations			Percent of Sampling Stations in Tier 1 or Tier 2
			Tier 1	Tier 2	Tier 3	
17110019	Puget Sound	WA	418	851	114	92
17110013	Duwamish	WA	48	69	10	92
17110002	Strait Of Georgia	WA	32	168	63	76
17030003	Lower Yakima	WA	23	19	5	89
17090012	Lower Willamette	OR	21	51	4	95
17110014	Puyallup	WA	12	6	1	95
17010303	Coeur D'Alene Lake	ID, (WA)	10	13	0	100

^aNo data were available for states listed in parentheses.

Table 3-43. Region 10: Water Bodies With Sampling Stations Classified as Tier 1 Located in Areas of Probable Concern for Sediment Contamination

Water Body	# of Tier 1 Stations	Water Body	# of Tier 1 Stations
Puget Sound	306	Lake Whatcom	2
Budd Inlet	41	Sammish Bay	2
Elliot Bay	41	Sammish River	2
Bainbridge Island	31	Whidbey Island	2
Sinclair Inlet	28	Spring Creek	2
Bellingham Bay	22	Thompson Lake	2
Yakima River	19	Ahtanum Creek	1
Willamette River	10	Camano Island	1
Carbon River	8	Duwamish Waterway	1
Columbia Slough	8	Fidalgo Island	1
Green River	6	Padden Lake	1
Coeur D'alene Lake	4	Port Orchard	1
Dyes Inlet	4	Port Susan	1
Puyallup River	4	Spanaway Lake	1
Coeur D'alene River	3	Toppenish Creek	1
Johnson Creek	3	White Hall Creek	1
Chambers Creek	2	Wolf Lodge Creek	1

Table 3-44. Region 10: Chemicals Most Often Associated with Tier 1 or Tier 2 Sampling Station Classifications^a

	Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station		Chemical	# Tier 1 & Tier 2 Stations	# Tier 1 Station	# Tier 2 Station	
Region 10 Overall	Copper	1,518	--	1,518	Idaho (continued)	Cadmium	29	--	29	
	Nickel	1,409	--	1,409		Copper	28	--	28	
	Arsenic	1,231	55	1,176		Zinc	28	--	28	
	Lead	881	--	881		DDT	25	--	25	
	Benzo(a)pyrene	803	103	700		Dieldrin	21	--	21	
	Pyrene	770	160	610		Toxaphene	14	--	14	
	Mercury	760	133	627		Silver	11	8	3	
	Cadmium	754	--	754	Oregon	Copper	125	--	125	
	Polychlorinated biphenyls	710	289	421		Nickel	107	--	107	
	Dibenzo(a,h)anthracene	709	245	464		Arsenic	86	1	85	
	Chrysene	704	86	618		Polychlorinated biphenyls	84	46	38	
	Benzo(a)anthracene	669	107	562		DDT	73	19	54	
	Naphthalene	589	104	485		Zinc	59	--	59	
	Fluorene	547	77	470		Mercury	53	7	46	
	Chromium	546	17	529		Cadmium	51	--	51	
	Alaska	Chromium	135	12		123	Chromium	46	3	43
		Arsenic	89	--		89	Lead	44	--	44
Copper		50	--	50	Washington	Copper	1,315	--	1,315	
Nickel		41	--	41		Nickel	1,256	--	1,256	
Cadmium		35	--	35		Arsenic	1,017	41	976	
Naphthalene		31	2	29		Lead	788	--	788	
Polychlorinated biphenyls		29	2	27		Benzo(a)pyrene	754	101	653	
Zinc		29	--	29		Pyrene	735	156	579	
Phenanthrene		26	--	26		Mercury	683	121	562	
Fluorene	22	--	22	Chrysene		682	83	599		
Idaho	Arsenic	39	13	26	Dibenzo(a,h)anthracene	681	240	441		
	Polychlorinated biphenyls	32	28	4	Benzo(a)anthracene	646	104	542		
	Lead	32	--	32						

^aStations may be listed for more than one chemical.

Potentially Highly Contaminated Sites Not Identified by the NSI Evaluation

Several Regions and states provided comments on the May 16, 1994, preliminary evaluation of sediment chemistry data contained in the NSI. They identified receiving streams that should have been but were not identified as locations of potential adverse effects, based on

the NSI data evaluation. The specific water bodies that reviewers of the preliminary evaluation identified as potentially contaminated, but which are not presently included in the NSI because data are inadequate to categorize sampling stations as Tier 1, are presented in Table 3-45 and Figure 3-40. If a water body had previously been identified as having at least one Tier 1 sampling station using the NSI evaluation methodology, it was not included in Table 3-45 or Figure 3-40.

Table 3-45. Potentially Highly Contaminated Sites Not Identified in the NSI Evaluation

Water Body	EPA Region	State	Chemicals Potentially Present
Onandaga Lake	2	NY	pesticides, metals, PAHs, PCBs
Ley Creek	2	NY	mercury
Kill van Kull	2	NY	metals, dioxin
Newtown Creek	2	NY	PAHs
Scajaquada Creek	2	NY	metals, PCBs
Skaneateles Creek	2	NY	PCBs
Hudson River	2	NY	PCBs
Southern reaches of the Maurice River	2	NJ	arsenic
Elizabeth River	3	VA	PAHs
James River	3	VA	kepone
Anacostia River	3	DC	chlordan, PCBs
Lake O' the Pines	6	TX	lead, zinc
Linneville Bayou	6	TX	lead, chromium
Humboldt River Basin	9	NV	selenium
Dry Lake	9	AZ	dioxin



Figure 3-40. Location of Potentially Highly Contaminated Water Bodies Not Identified in the NSI Evaluation.