

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

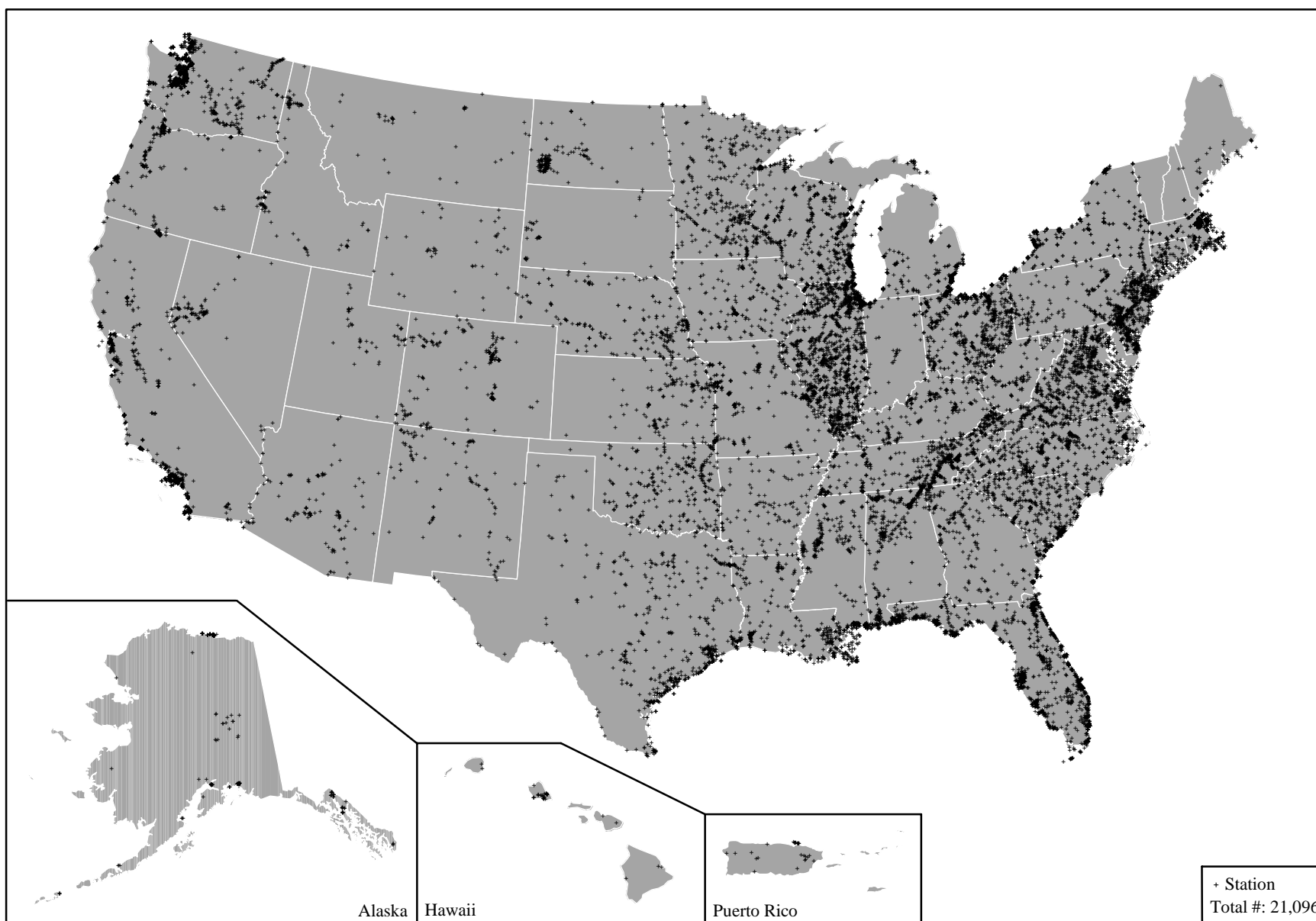


Figure 3-1. Location of All NSI Sampling Stations.

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).

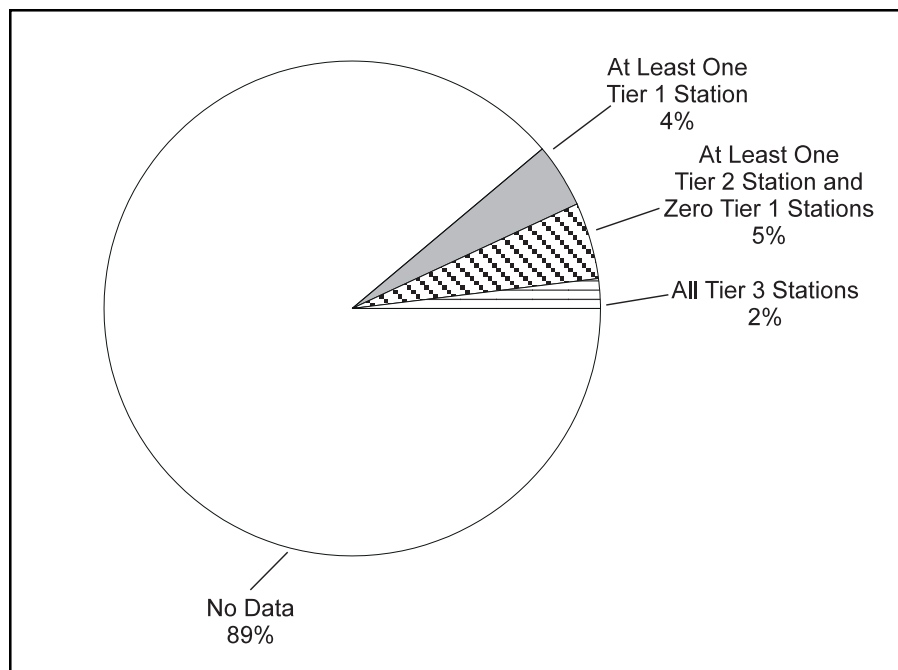


Figure 3-3. National Assessment: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

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.

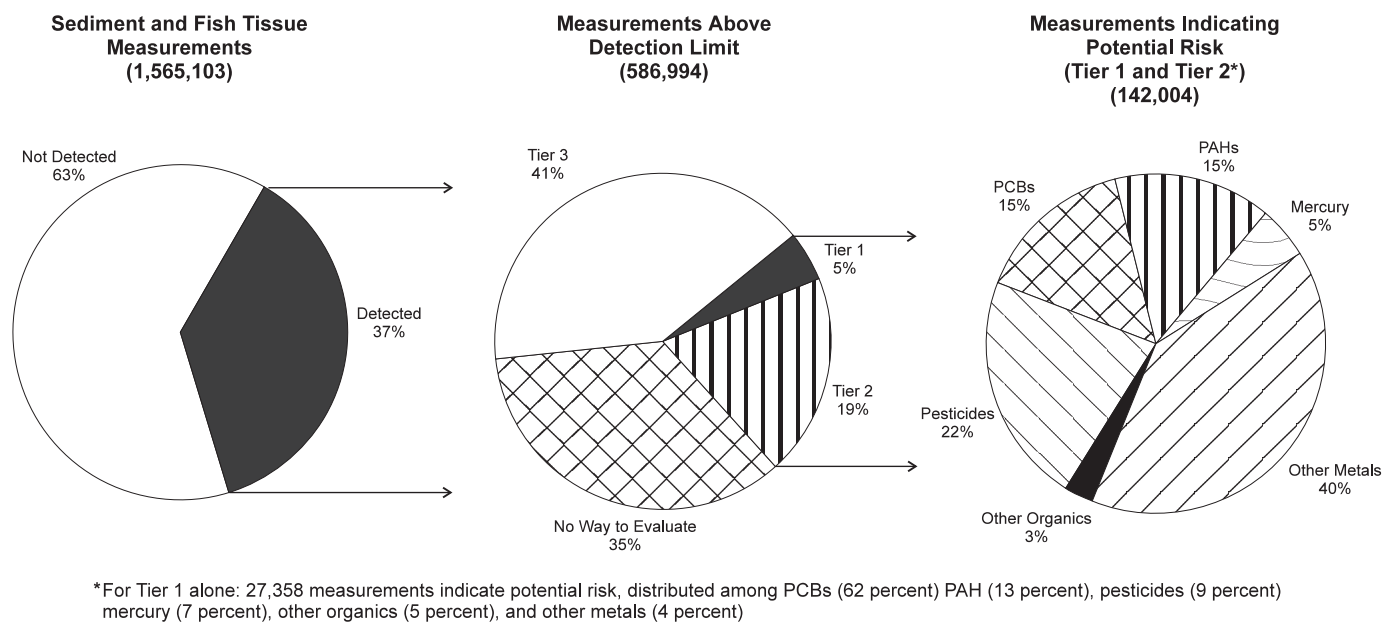


Figure 3-4. National Assessment: Percent of NSI Measurements That Indicate Potential Risk.

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

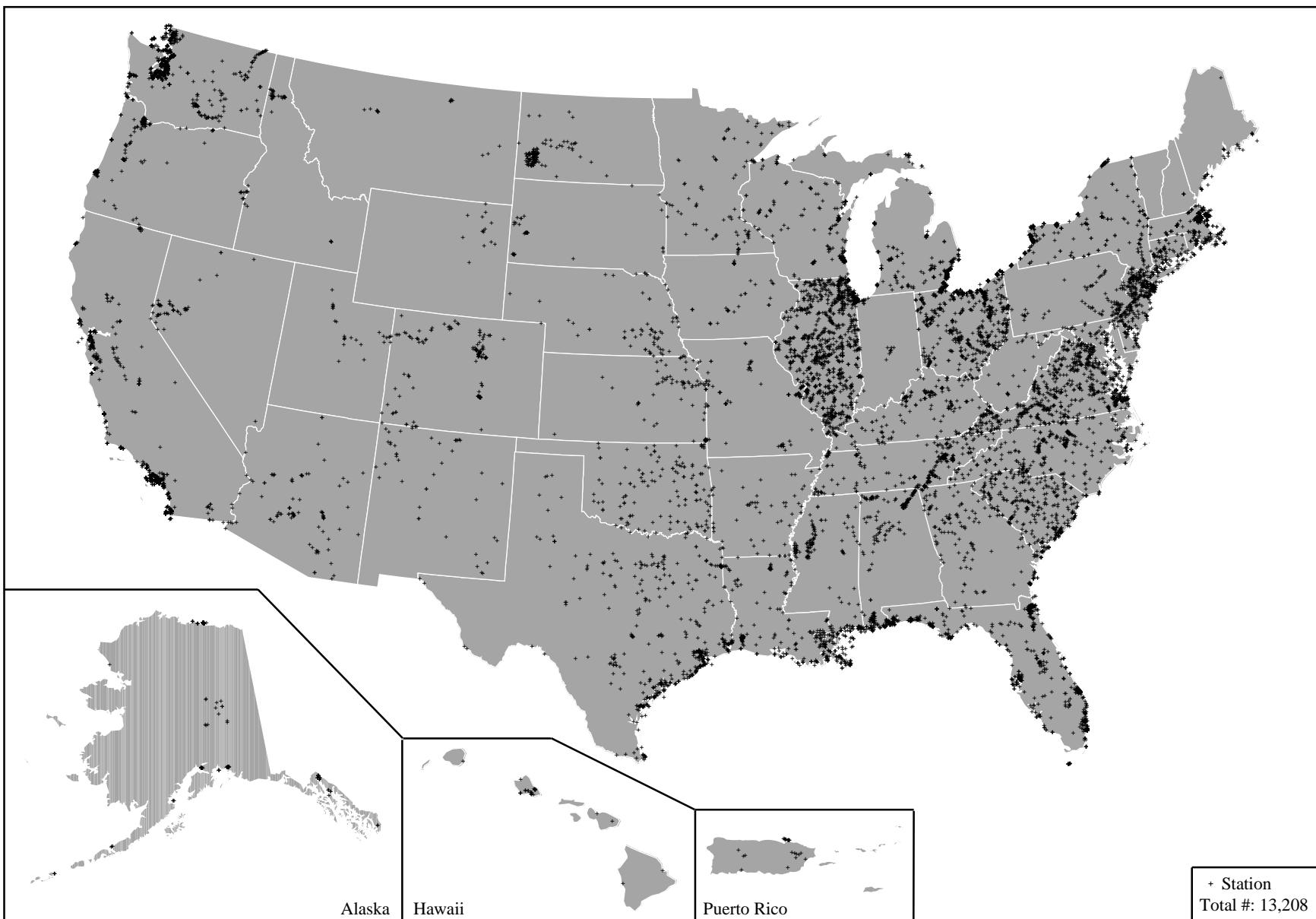


Figure 3-5. Sampling Stations Classified as Tier 1 or Tier 2 for Potential Risk to Aquatic Life.



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

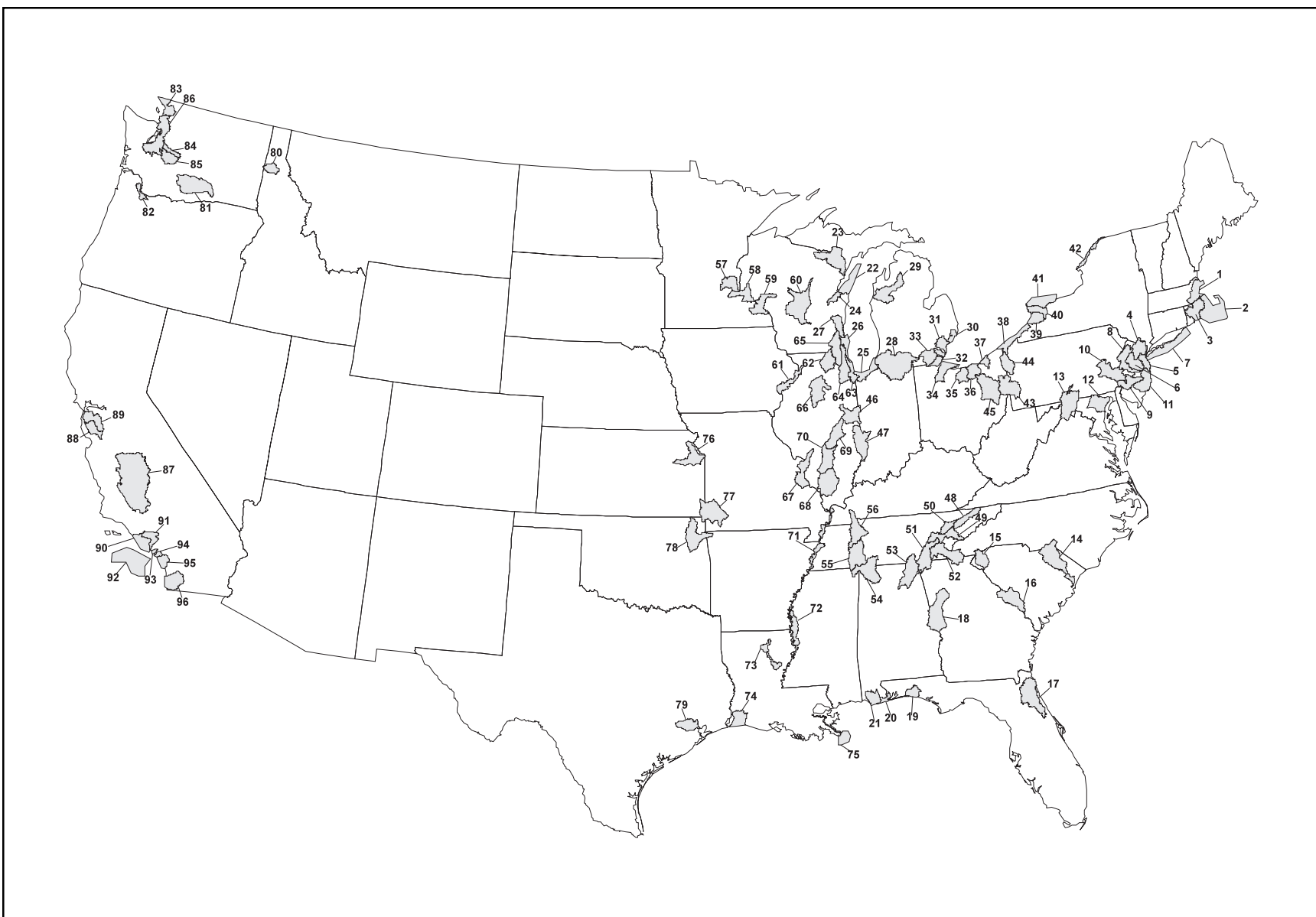


Figure 3-7. Watersheds Identified as Containing APCs

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 |

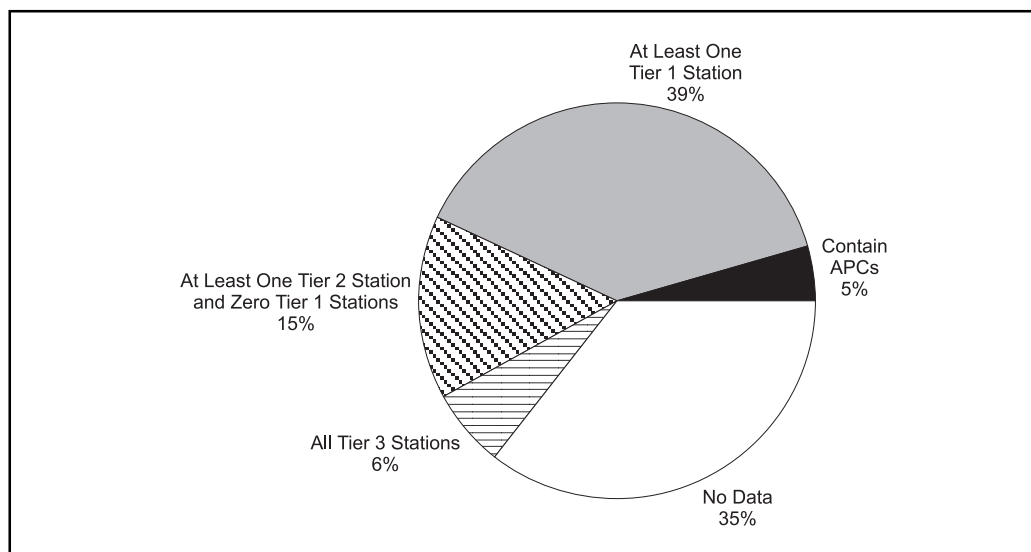


Figure 3-8. National Assessment: Watershed Classifications.

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.

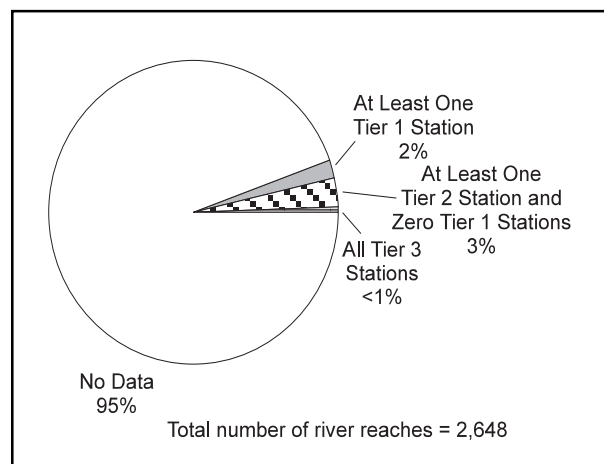


Figure 3-10. Region 1: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

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.

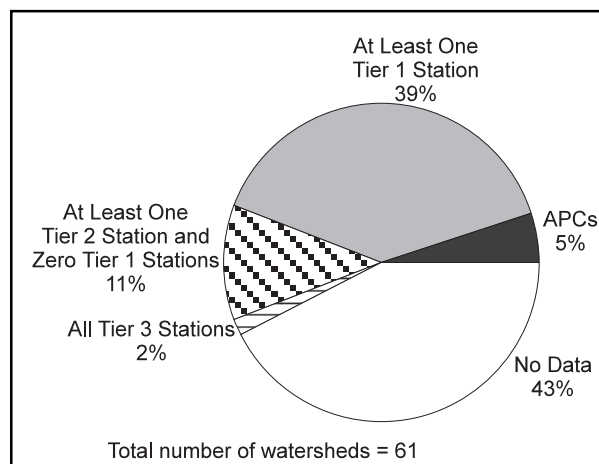


Figure 3-11. Region 1: Watershed Classifications.

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.

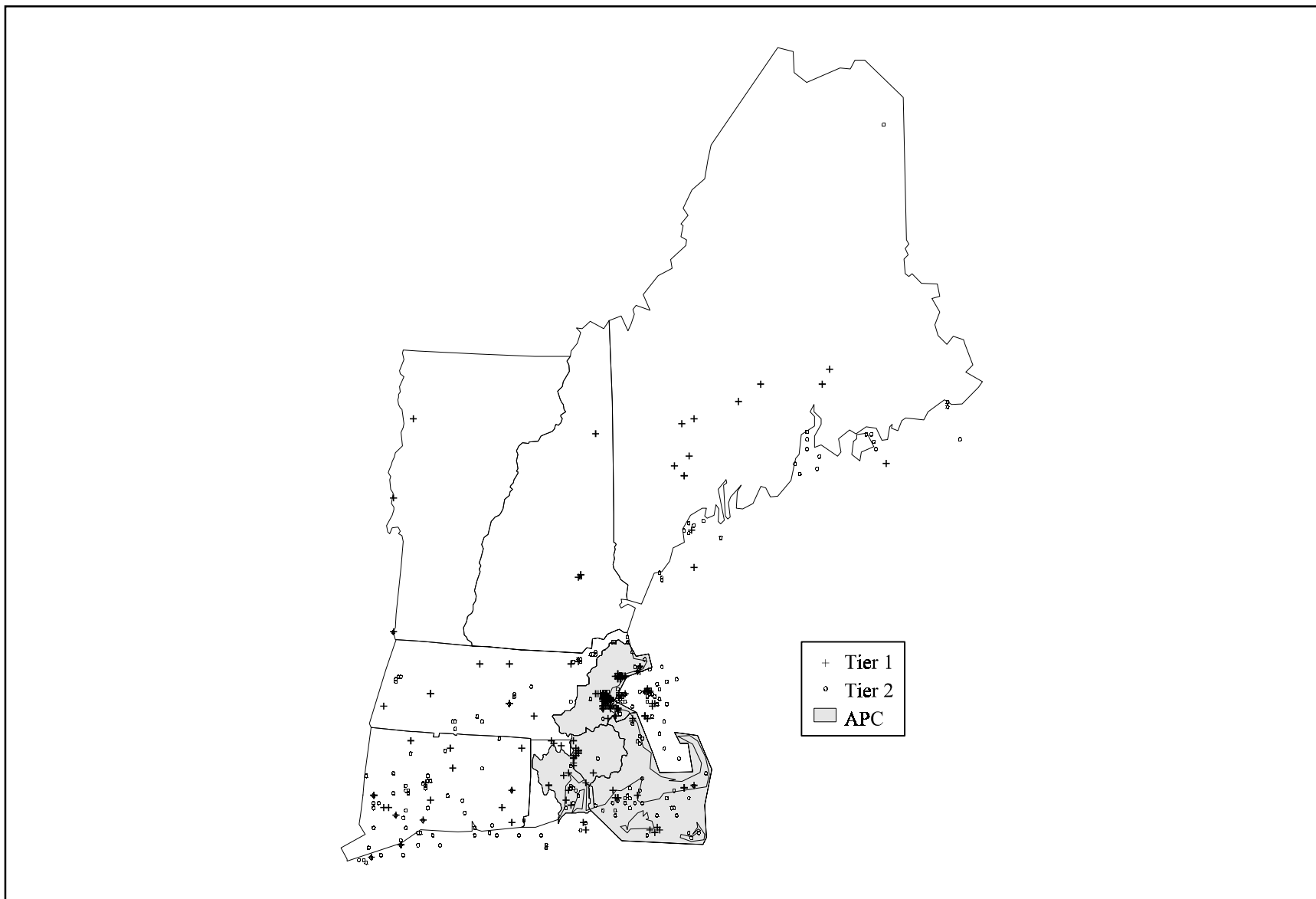


Figure 3-12. Region 1: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

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 | 1 |
| | 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 | 1 |
| | Nickel | 55 | -- | 55 | | Acenaphthene | 2 | -- | 2 |
| | Lead | 49 | -- | 49 | | 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 | Vermont | DDT | 23 | 3 | 20 |
| | Polychlorinated biphenyls | 23 | 4 | 19 | | Arsenic | 22 | -- | 22 |
| Maine | Arsenic | 31 | -- | 31 | | Benzo(a)anthracene | 21 | -- | 21 |
| | Polychlorinated biphenyls | 30 | 7 | 23 | | Dibenzo(a,h)anthracene | 20 | 2 | 18 |
| | Chromium | 30 | 2 | 28 | | 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.

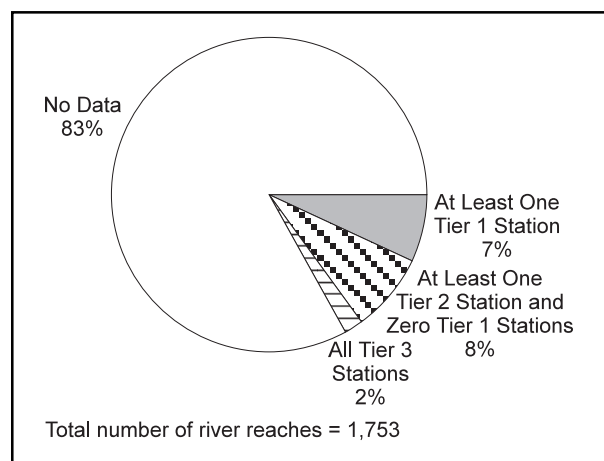


Figure 3-13. Region 2: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

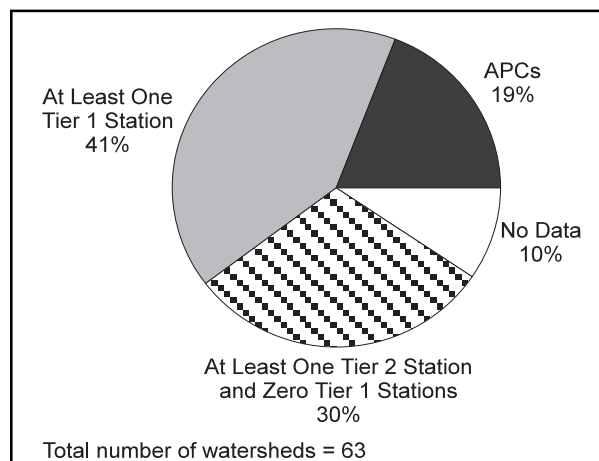


Figure 3-14. Region 2: Watershed Classifications.

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.

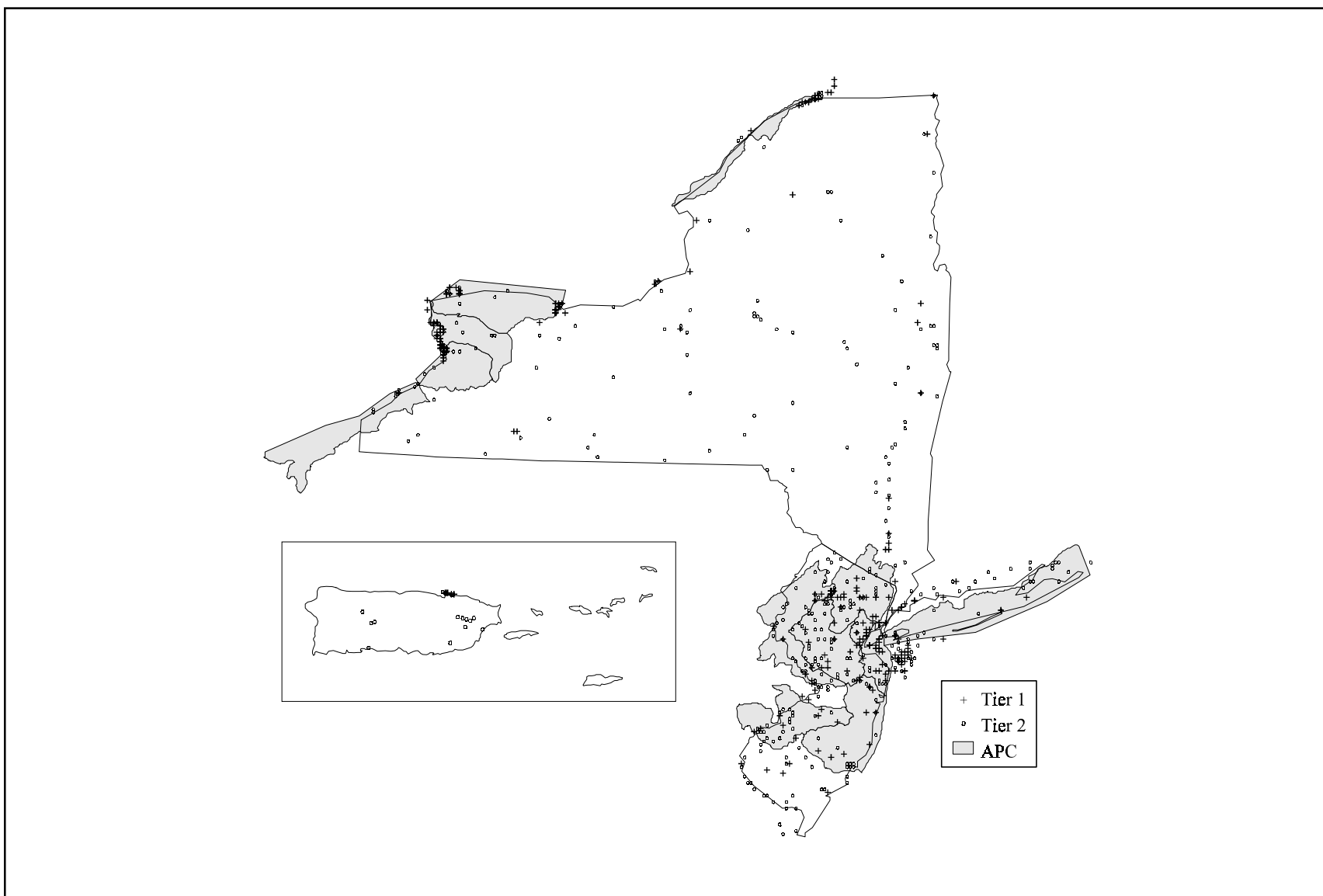


Figure 3-15. Region 2: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

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-Twelvemile | 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 |
| Barneget 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.

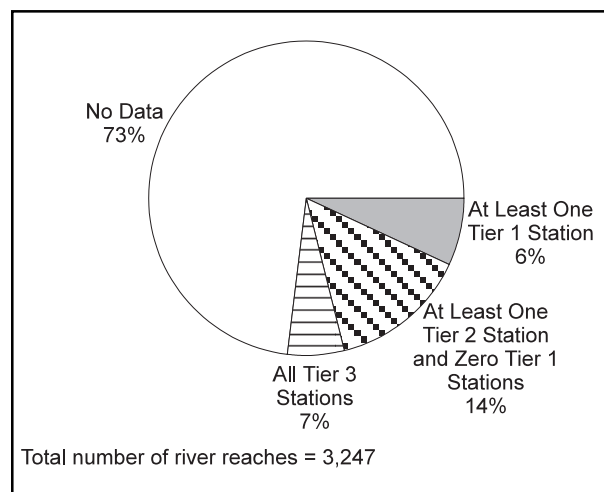


Figure 3-16. Region 3: Percent of River Reaches That Include Tier 1, Tier 2 and Tier 3 Sampling Stations.

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.

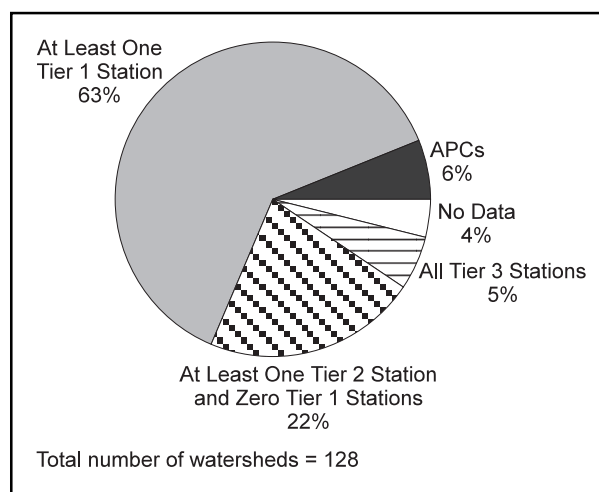


Figure 3-17. Region 3: Watershed Classifications.

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.

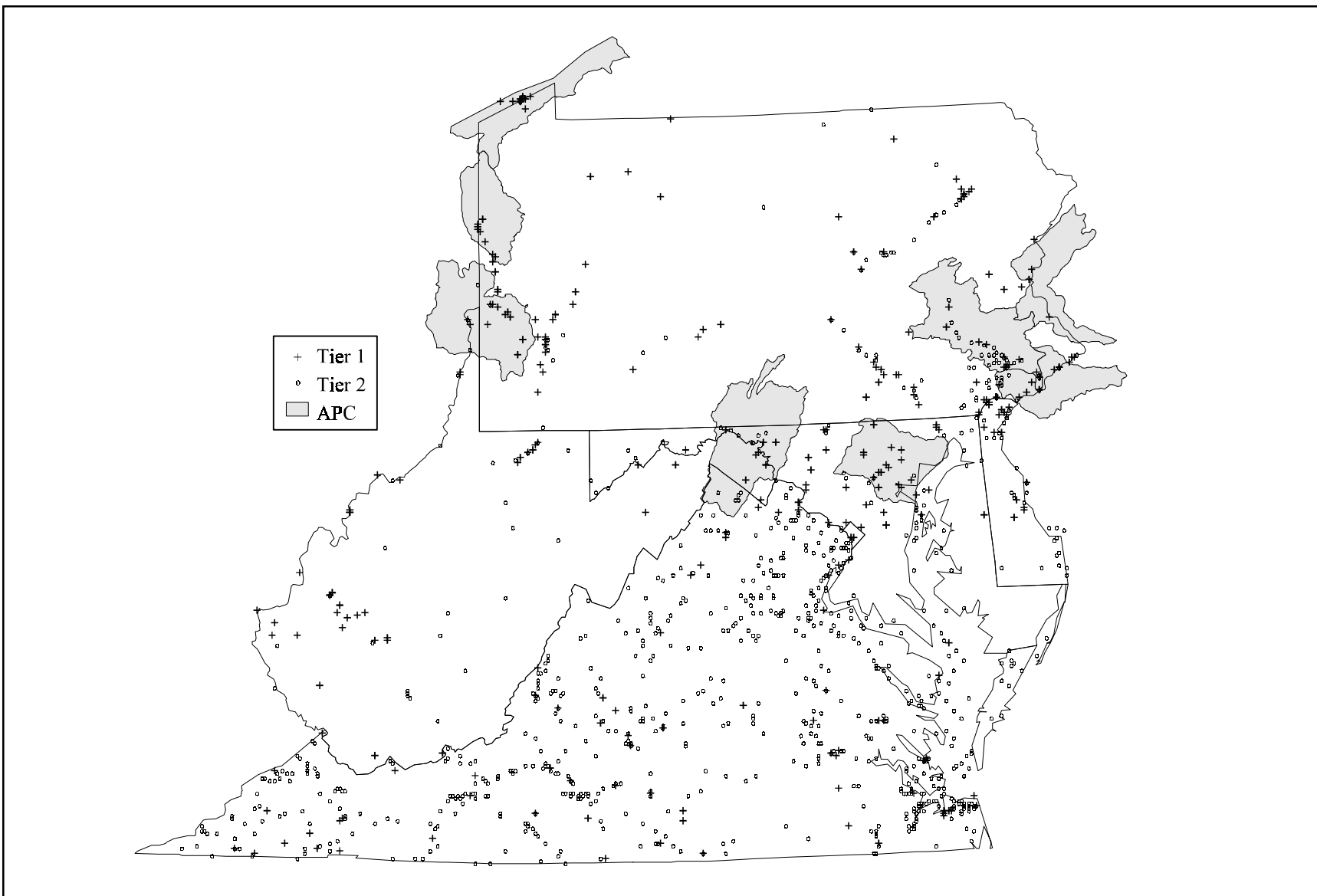


Figure 3-18. Region 3: Location of Sampling Stations Classified as Tier 1 of Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

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 | | |

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 Look-out 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.

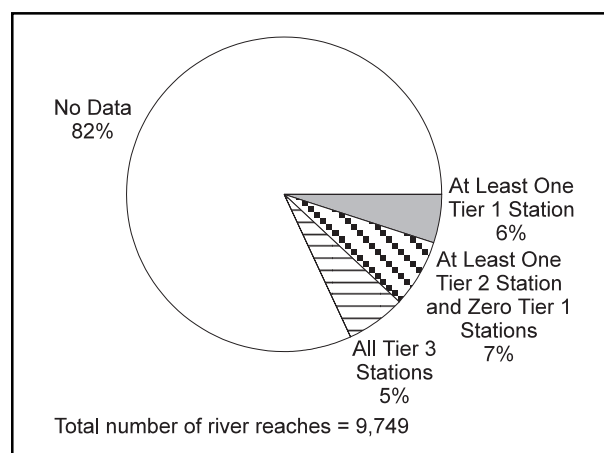


Figure 3-19. Region 4: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

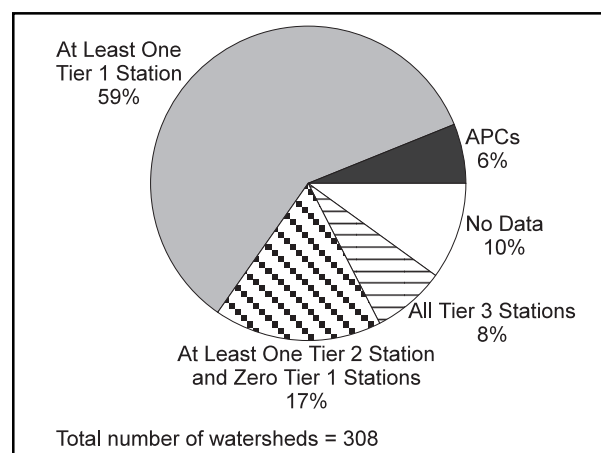


Figure 3-20. Region 4: Watershed Classifications.

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.

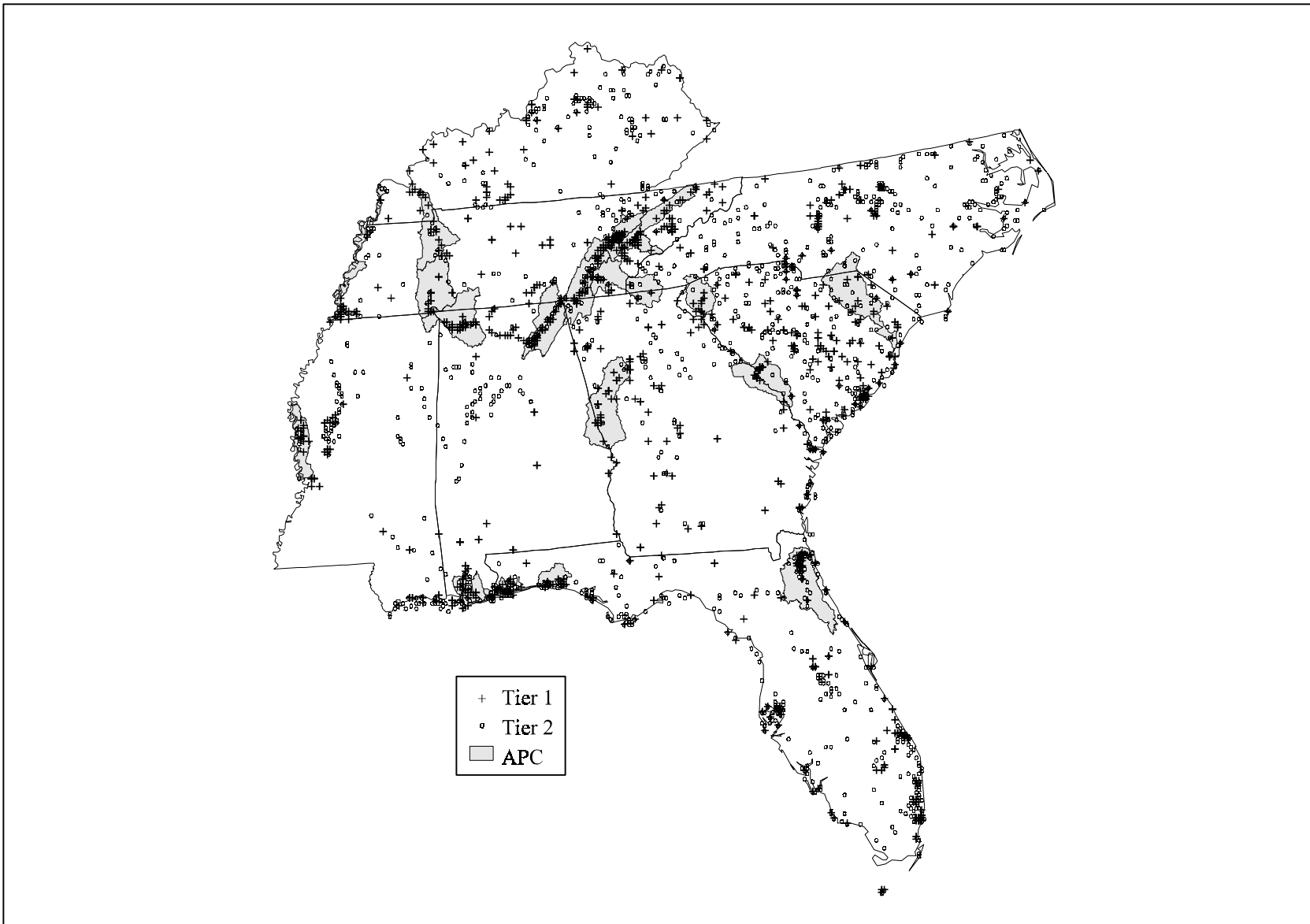


Figure 3-21. Region 4: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

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.

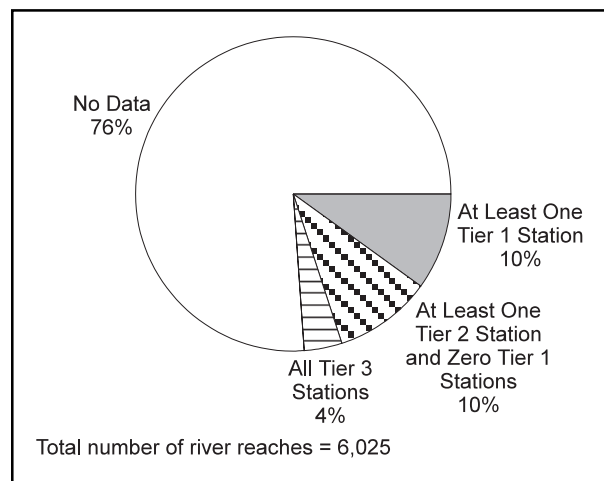


Figure 3-22. Region 5: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

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.

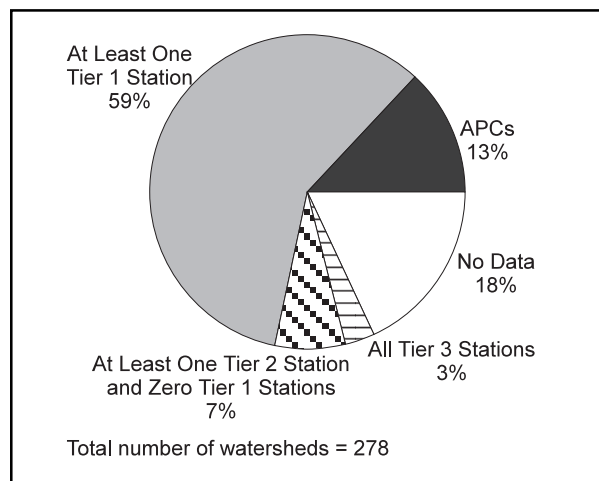


Figure 3-23. Region 5: Watershed Classifications.

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.

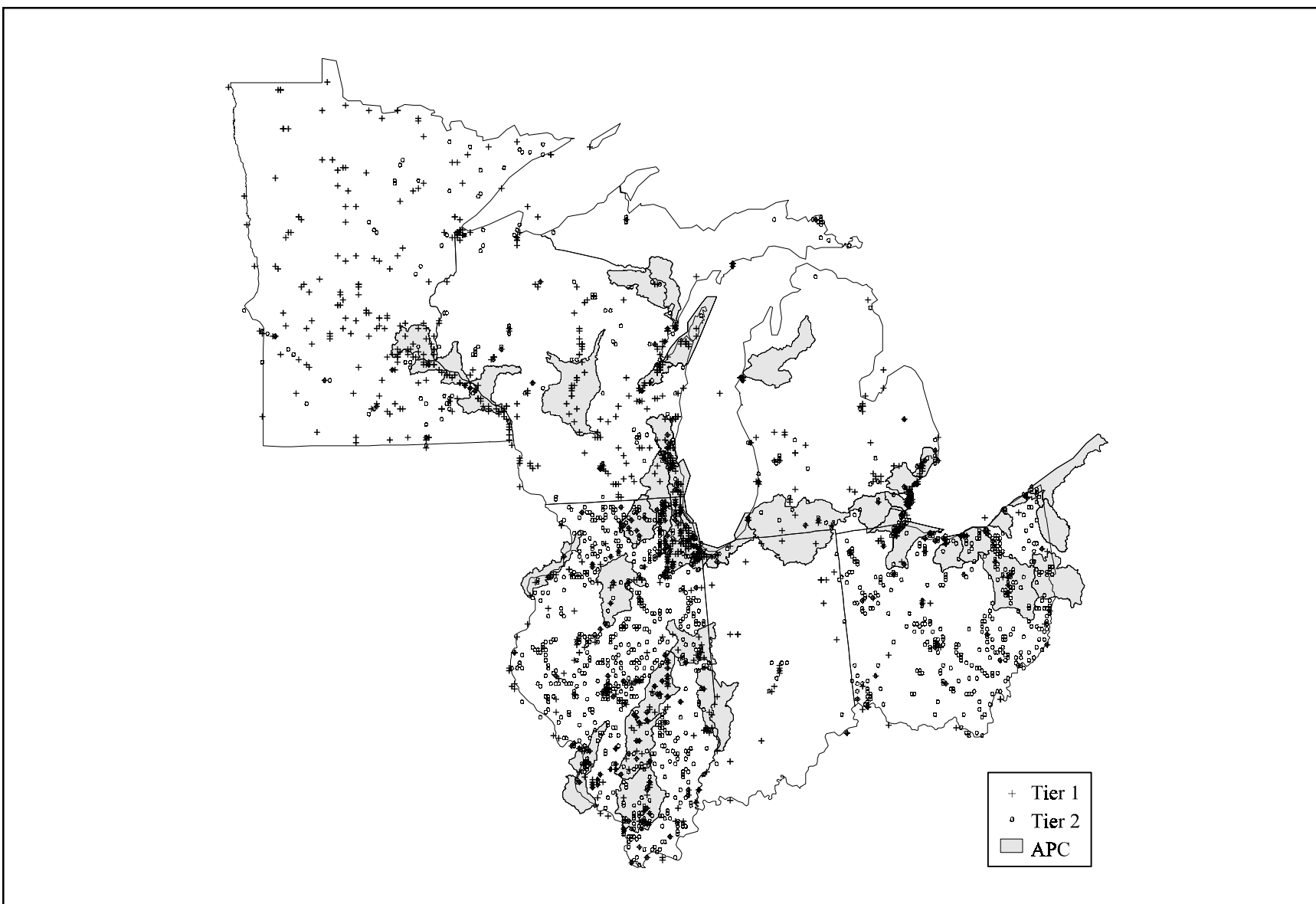


Figure 3-24. Region 5: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

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 | Ohio | Chromium | 9 | -- | 9 |
| | Copper | 616 | -- | 616 | | Aldrin | 5 | -- | 5 |
| | Chlordane | 518 | -- | 518 | | 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 | Wisconsin | Mercury | 125 | 16 | 109 |
| Indiana | DDT | 275 | 36 | 239 | | Chromium | 123 | 19 | 104 |
| | Polychlorinated biphenyls | 66 | 59 | 7 | | Fluoranthene | 108 | 17 | 91 |
| | Arsenic | 53 | 3 | 50 | | Polychlorinated biphenyls | 97 | 65 | 32 |
| | Dieldrin | 51 | 3 | 48 | | 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 |
| Michigan | Cadmium | 29 | -- | 29 | | Pyrene | 62 | 21 | 41 |
| | 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.

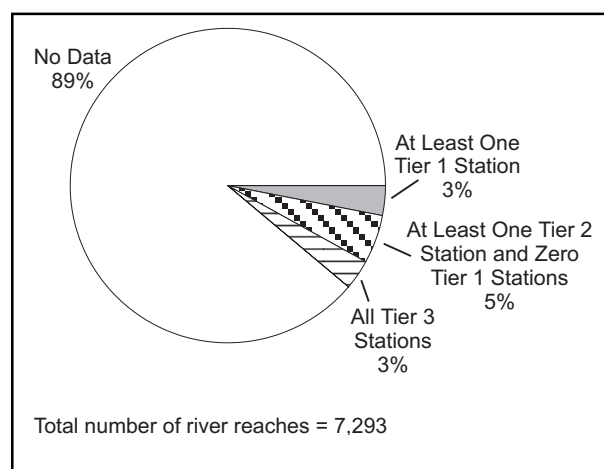


Figure 3-25. Region 6: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

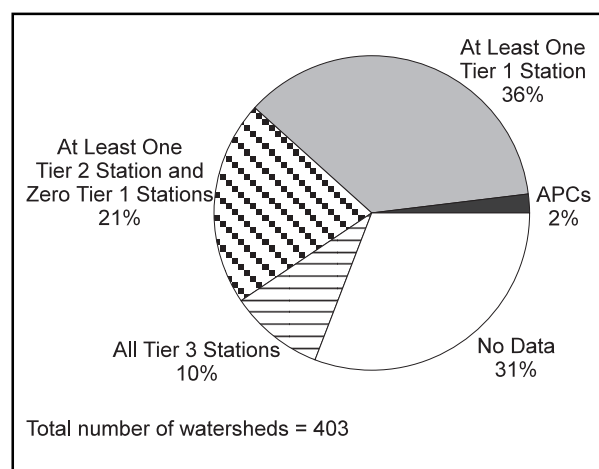


Figure 3-26. Region 6: Watershed Classifications.

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.

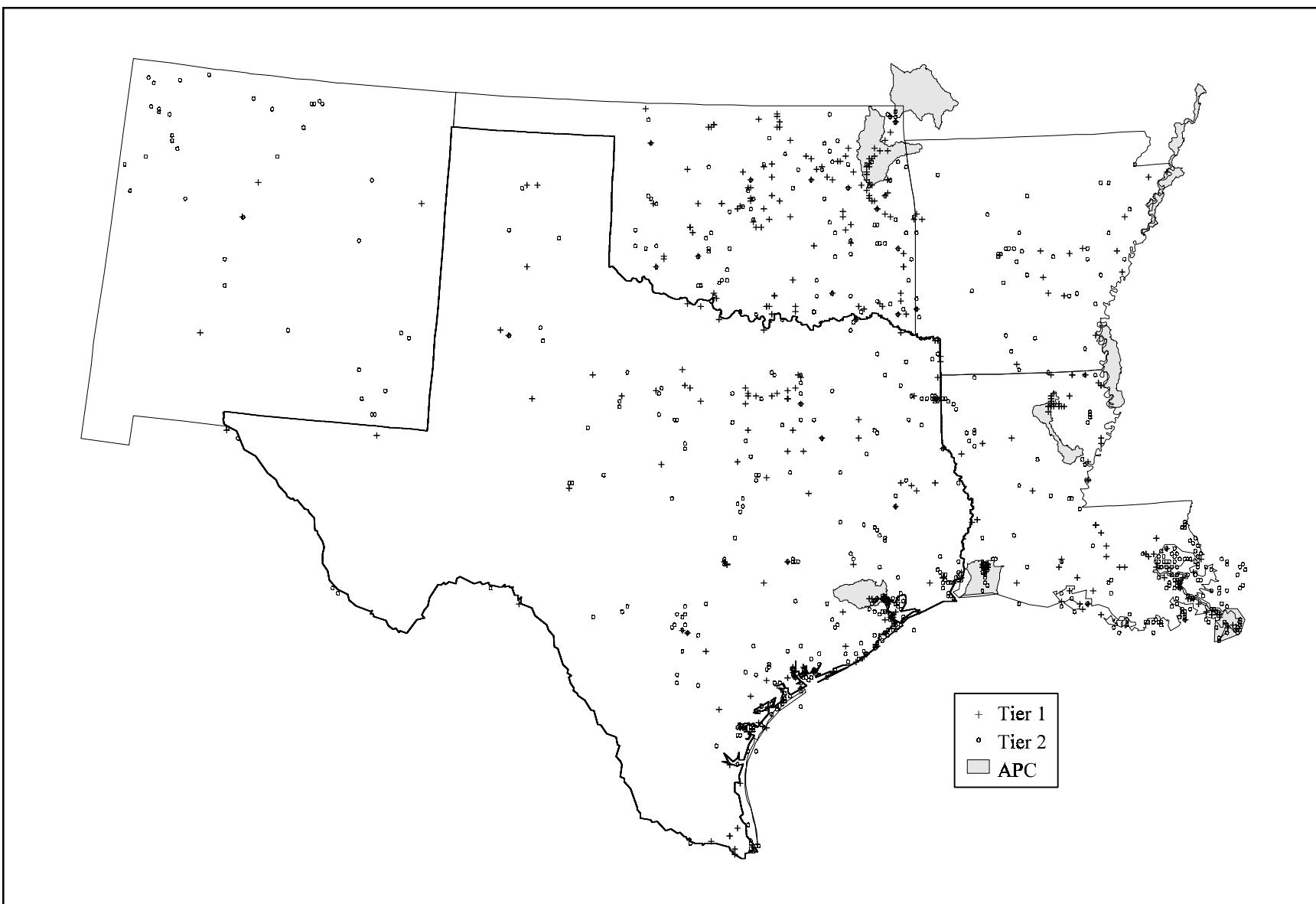


Figure 3-27. Region 6: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

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 | Dibenzo(a,h)anthracene | 59 | 1 | 58 |
| | Polychlorinated biphenyls | 434 | 216 | 218 | (continued) | 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 | | 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 | Texas | 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 |
| | | | | | | Polychlorinated biphenyls | 164 | 45 | 119 |
| | | | | | | Chromium | 152 | 6 | 146 |
| | | | | | | DDT | 135 | 31 | 104 |
| Louisiana | Nickel | 178 | -- | 178 | | Silver | 135 | 30 | 105 |
| | Arsenic | 141 | 1 | 140 | | Mercury | 118 | 17 | 101 |
| | Chromium | 132 | 3 | 129 | | | | | |
| | Polychlorinated biphenyls | 119 | 44 | 75 | | | | | |
| | Copper | 111 | -- | 111 | | | | | |
| | 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

(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.

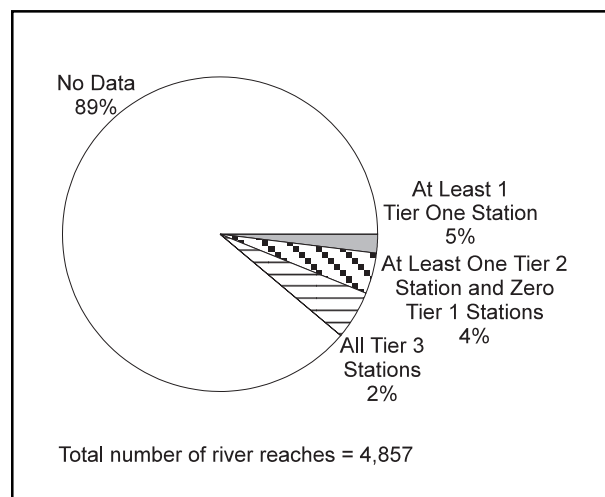


Figure 3-28. Region 7: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

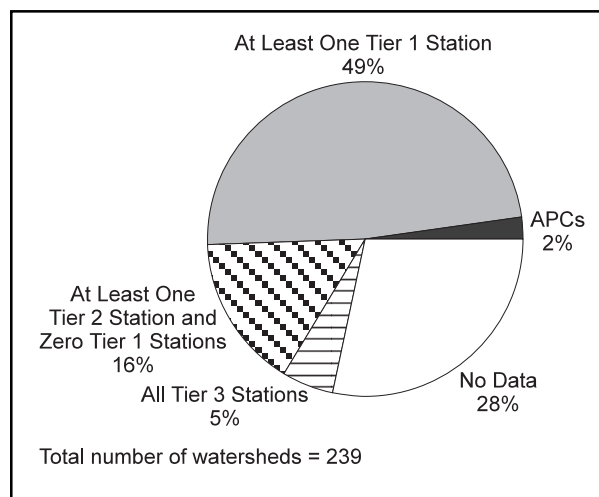


Figure 3-29. Region 7: Watershed Classifications.

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.

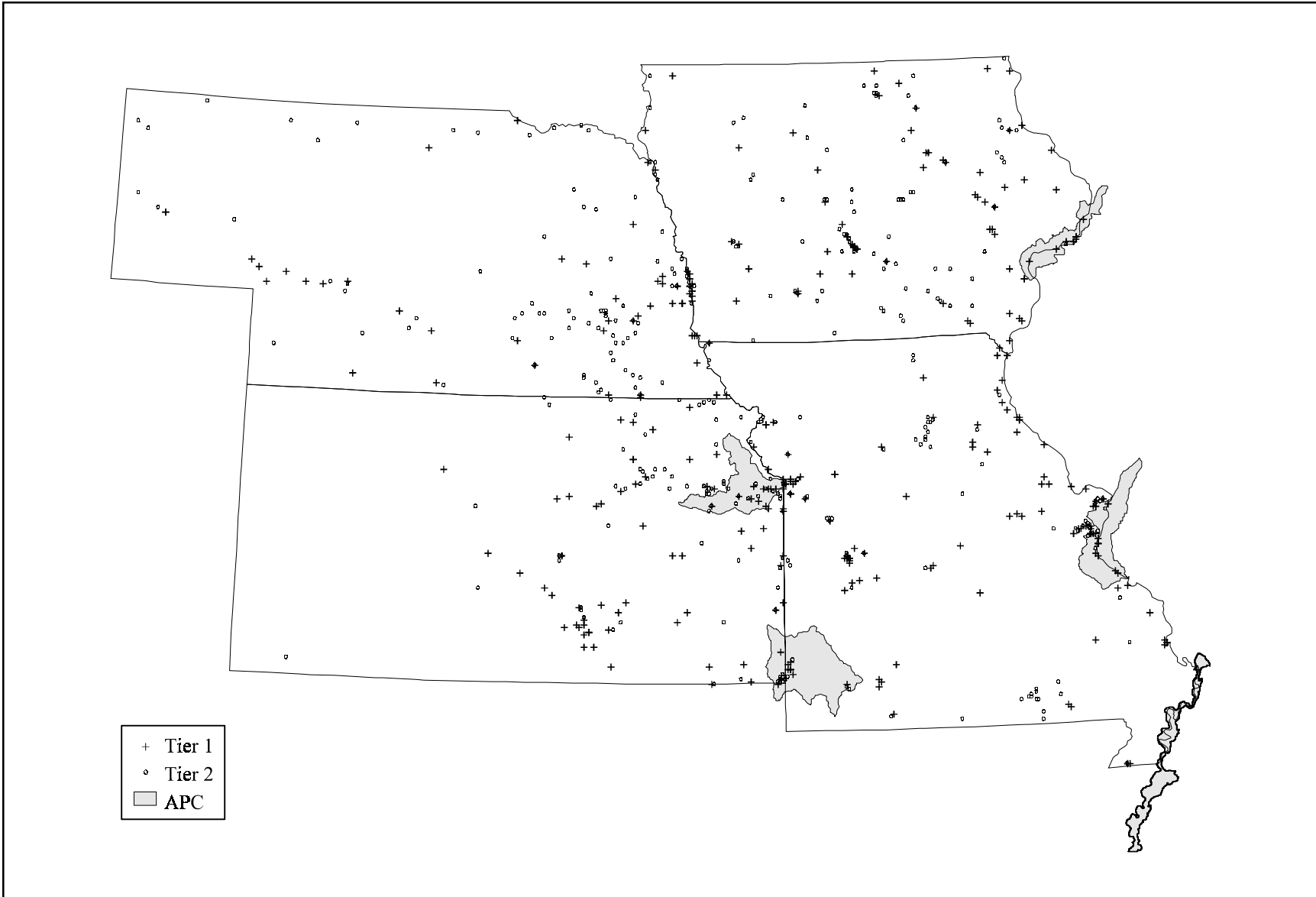


Figure 3-30. Region 7: Locations of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

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 |

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 |
| | | | | | | Nickel | 29 | -- | 29 |
| | | | | | | Copper | 27 | -- | 27 |
| Iowa | Dieldrin | 126 | 2 | 124 | Nebraska | Dieldrin | 72 | -- | 72 |
| | Chlordane | 91 | -- | 91 | | Chlordane | 52 | -- | 52 |
| | Polychlorinated biphenyls | 71 | 71 | -- | | Polychlorinated biphenyls | 50 | 50 | -- |
| | Heptachlor epoxide | 54 | -- | 54 | | Arsenic | 42 | -- | 42 |
| | Arsenic | 34 | -- | 34 | | Cadmium | 29 | -- | 29 |
| | Copper | 17 | -- | 17 | | Nickel | 29 | -- | 29 |
| | Cadmium | 14 | -- | 14 | | Chromium | 17 | 2 | 15 |
| | Nickel | 14 | -- | 14 | | Aldrin | 13 | -- | 13 |
| | DDT | 12 | -- | 12 | | Heptachlor epoxide | 12 | -- | 12 |
| | Lead | 10 | -- | 10 | | Bis(2-ethylhexyl)phthalat | 10 | 4 | 6 |
| Kansas | Polychlorinated biphenyls | 68 | 68 | -- | | | | | |
| | Chlordane | 67 | -- | 67 | | | | | |
| | 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.

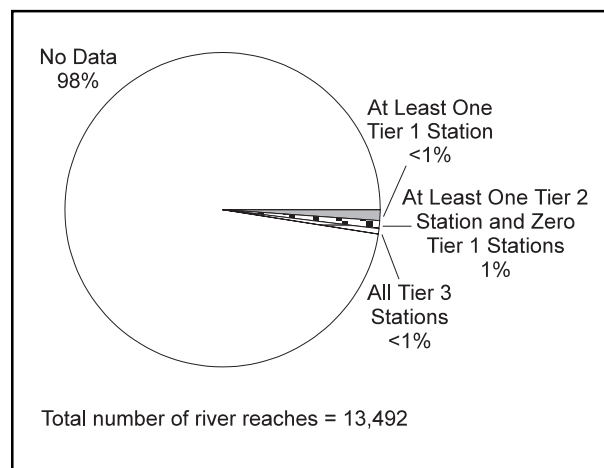


Figure 3-31. Region 8: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

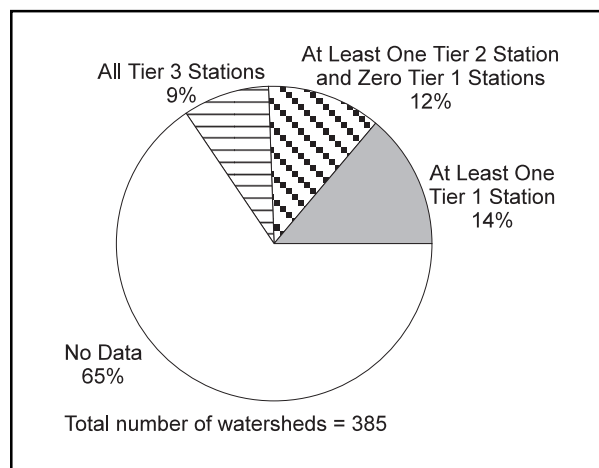


Figure 3-32. Region 8: Watershed Classifications.

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.

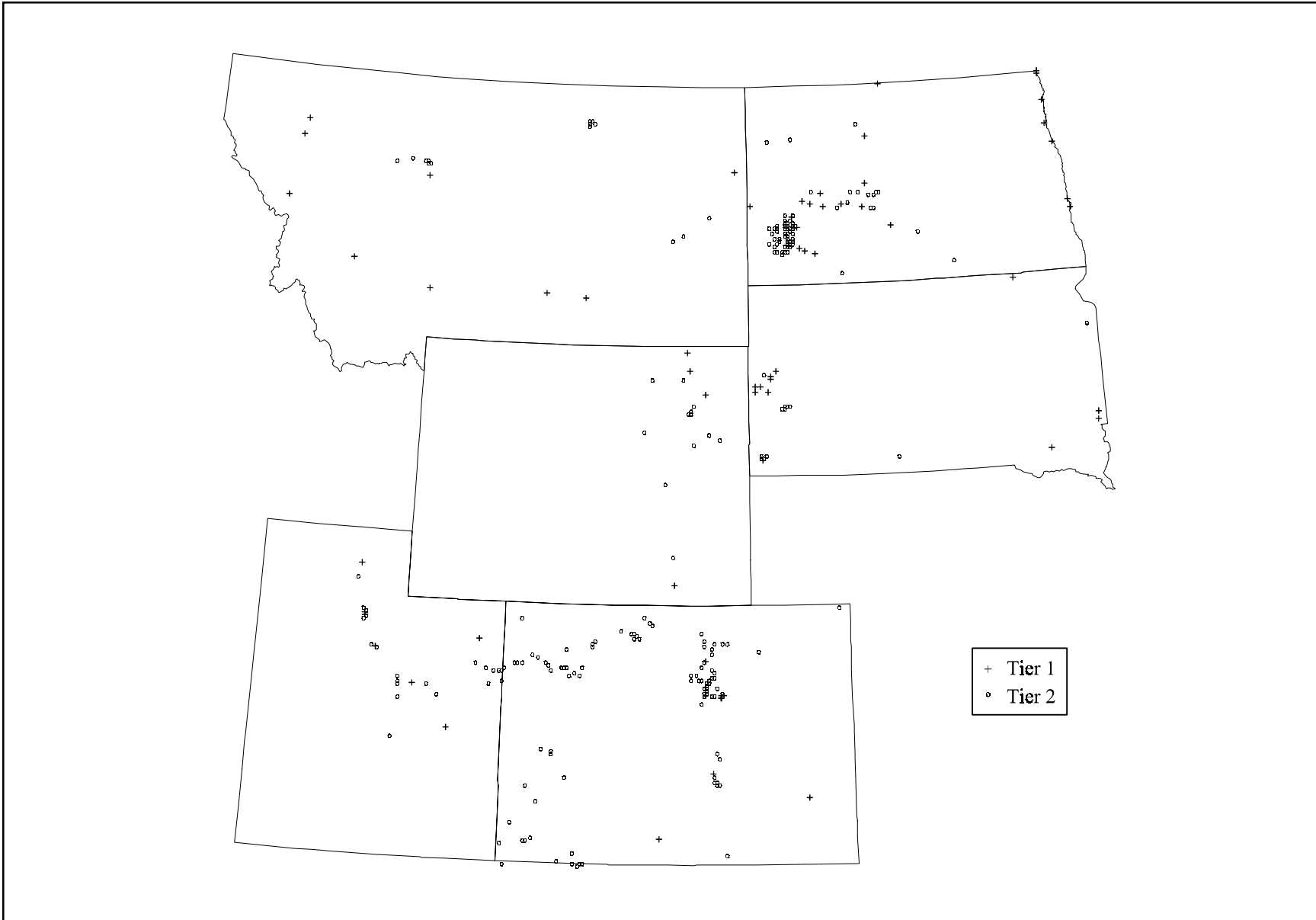


Figure 3-33. Region 8: Locations of Sampling Stations Classified as Tier 1 or Tier 2.

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 |
| | | | | | | Mercury | 3 | 2 | 1 |
| | | | | | | Chromium | 3 | 1 | 2 |
| | | | | | | Benzo(a)pyrene | 2 | -- | 2 |
| Colorado | Cadmium | 109 | -- | 109 | Utah | Cadmium | 21 | -- | 21 |
| | Copper | 71 | -- | 71 | | Arsenic | 14 | -- | 14 |
| | Arsenic | 59 | -- | 59 | | Polychlorinated biphenyls | 11 | 4 | 7 |
| | Nickel | 53 | -- | 53 | | Chlordane | 8 | -- | 8 |
| | Lead | 50 | -- | 50 | | Copper | 8 | -- | 8 |
| | Zinc | 43 | -- | 43 | | Mercury | 7 | 2 | 5 |
| | Mercury | 18 | 6 | 12 | | Lead | 6 | -- | 6 |
| | Chromium | 10 | -- | 10 | | Dieldrin | 5 | -- | 5 |
| | Polychlorinated biphenyls | 7 | 4 | 3 | | Silver | 5 | -- | 5 |
| | Dieldrin | 5 | -- | 5 | | Zinc | 5 | -- | 5 |
| Montana | Arsenic | 18 | -- | 18 | Wyoming | Cadmium | 11 | -- | 11 |
| | Copper | 12 | -- | 12 | | Arsenic | 8 | 3 | 5 |
| | Nickel | 12 | -- | 12 | | Polychlorinated biphenyls | 2 | 1 | 1 |
| | Polychlorinated biphenyls | 9 | 9 | -- | | Copper | 2 | -- | 2 |
| | Chromium | 6 | -- | 6 | | Bis(2-ethylhexyl)phthalat | 1 | -- | 1 |
| | Dieldrin | 5 | -- | 5 | | Mercury | 1 | -- | 1 |
| | Aldrin | 4 | -- | 4 | | Nickel | 1 | -- | 1 |
| | Toxaphene | 4 | -- | 4 | | Silver | 1 | -- | 1 |
| | Cadmium | 3 | -- | 3 | | | | | |
| | Dioxins | 2 | 2 | -- | | | | | |
| North Dakota | Nickel | 110 | -- | 110 | | | | | |
| | Copper | 93 | -- | 93 | | | | | |

^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.

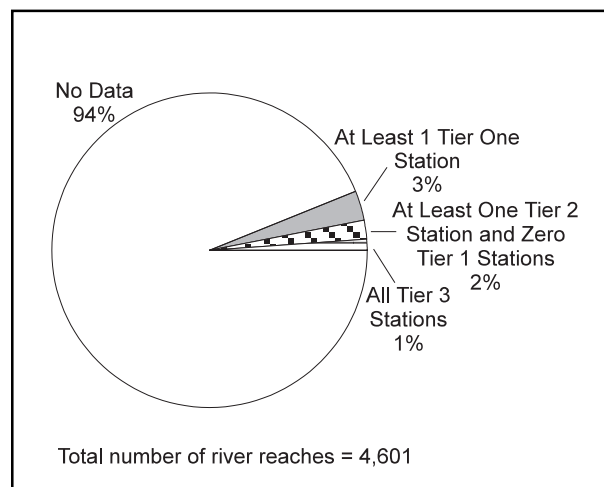


Figure 3-34. Region 9: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

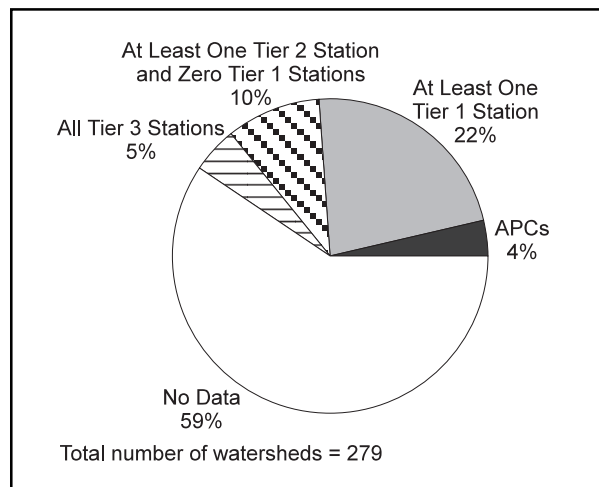


Figure 3-35. Region 9: Watershed Classifications.

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.

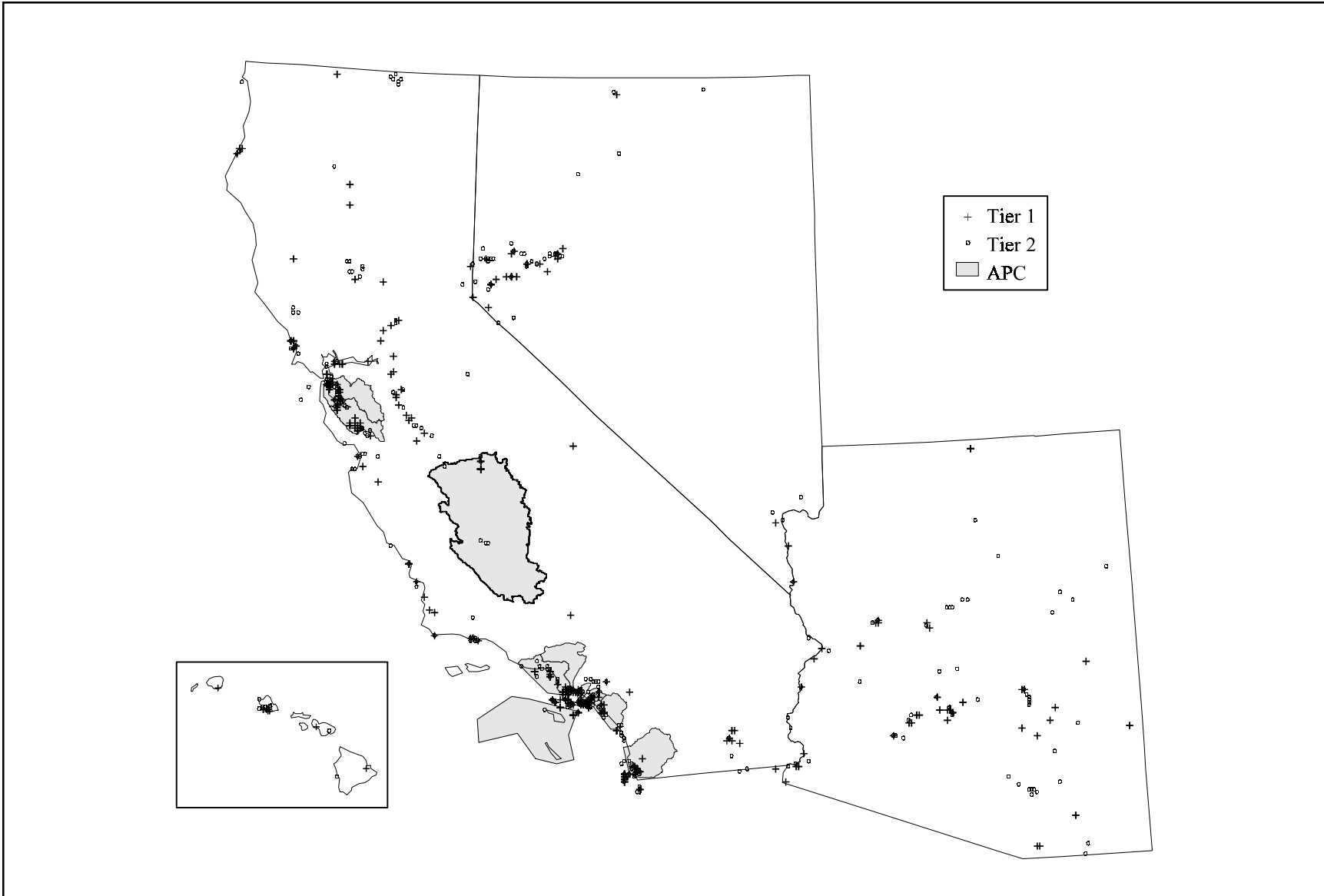


Figure 3-36. Region 9: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

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 |
| Arizona | Copper | 72 | -- | 72 | | Polychlorinated biphenyls | 8 | 3 | 5 |
| | Arsenic | 55 | 8 | 47 | Nevada | Cadmium | 8 | -- | 8 |
| | Nickel | 50 | -- | 50 | | Mercury | 29 | 15 | 14 |
| | Lead | 37 | -- | 37 | | Arsenic | 27 | -- | 27 |
| | Zinc | 28 | -- | 28 | | Copper | 14 | -- | 14 |
| | Bis(2-ethylhexyl)phthalat | 26 | 15 | 11 | | Nickel | 11 | -- | 11 |
| | Cadmium | 24 | -- | 24 | | Zinc | 11 | -- | 11 |
| | DDT | 23 | 9 | 14 | | Lead | 10 | -- | 10 |
| | Mercury | 22 | 12 | 10 | | Polychlorinated biphenyls | 9 | 4 | 5 |
| | Silver | 15 | 7 | 8 | | Bis(2-ethylhexyl)phthalat | 8 | 4 | 4 |
| California | DDT | 640 | 168 | 472 | | Cadmium | 8 | -- | 8 |
| | Copper | 573 | -- | 573 | | Chlordane | 8 | -- | 8 |
| | 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

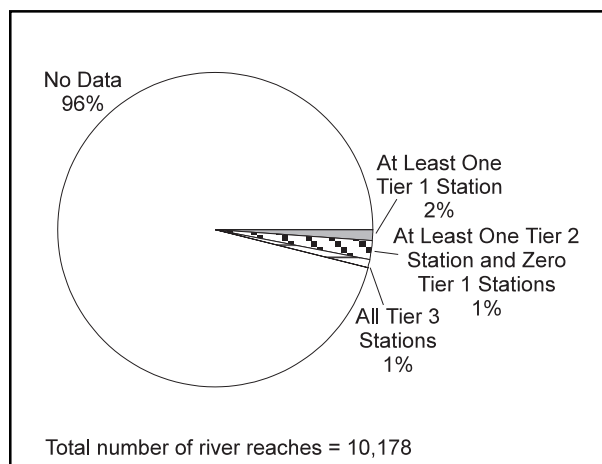


Figure 3-37. Region 10: Percent of River Reaches That Include Tier 1, Tier 2, and Tier 3 Sampling Stations.

(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.

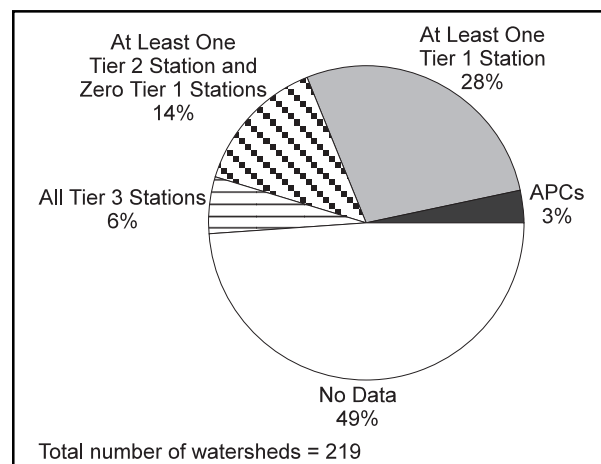


Figure 3-38. Region 10: Watershed Classifications.

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.

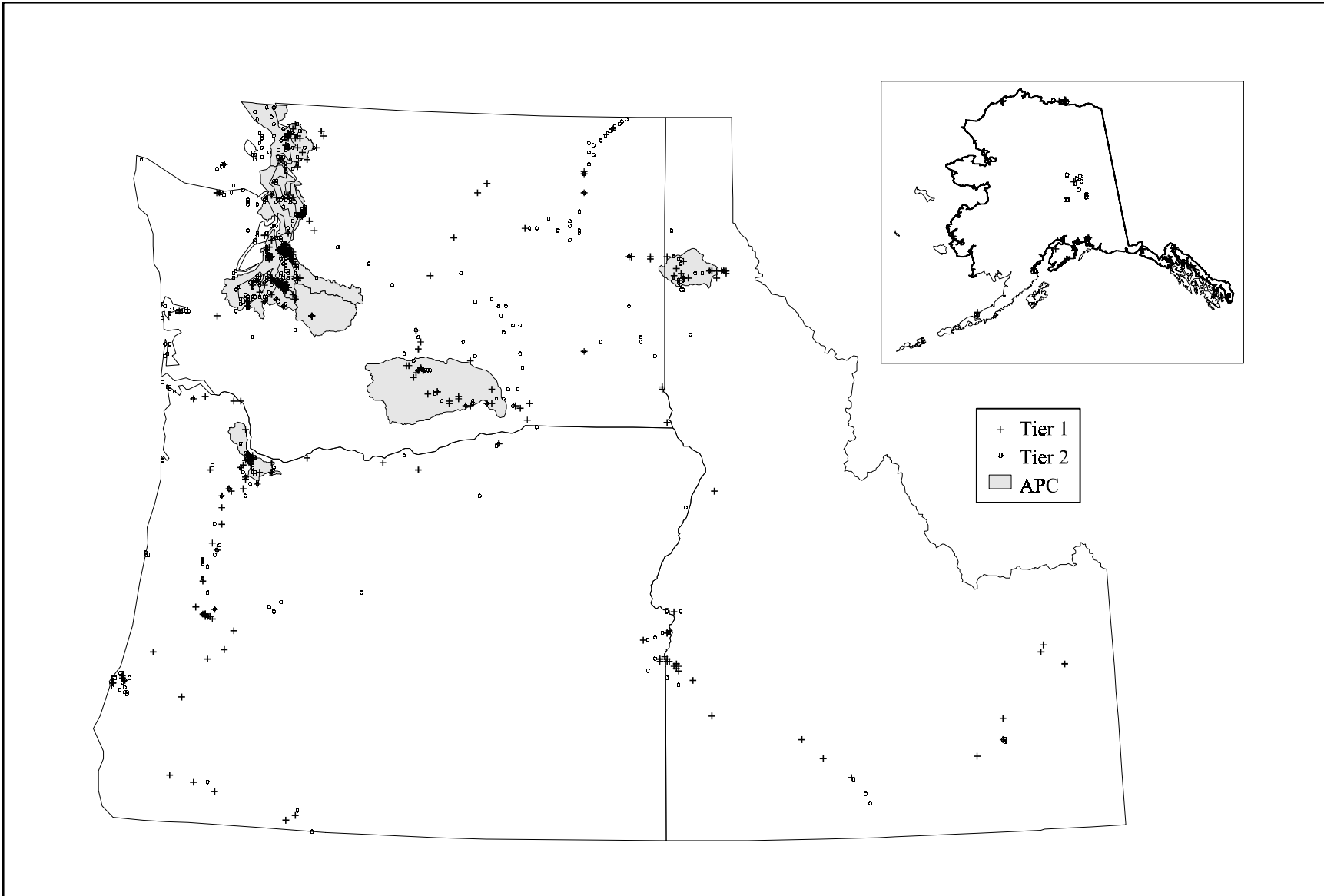


Figure 3-39. Region 10: Location of Sampling Stations Classified as Tier 1 or Tier 2 and Watersheds Containing Areas of Probable Concern for Sediment Contamination (APCs).

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.