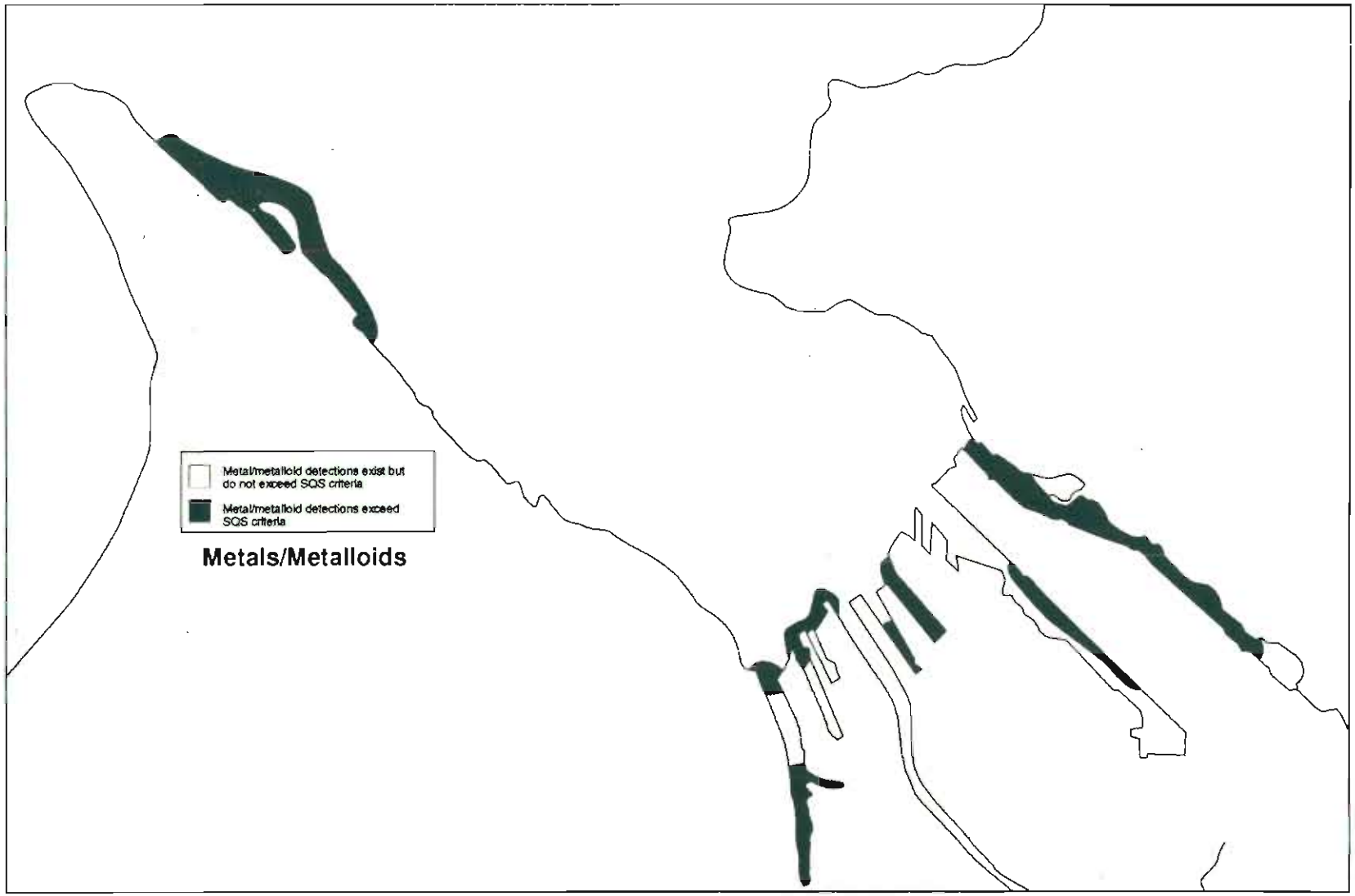
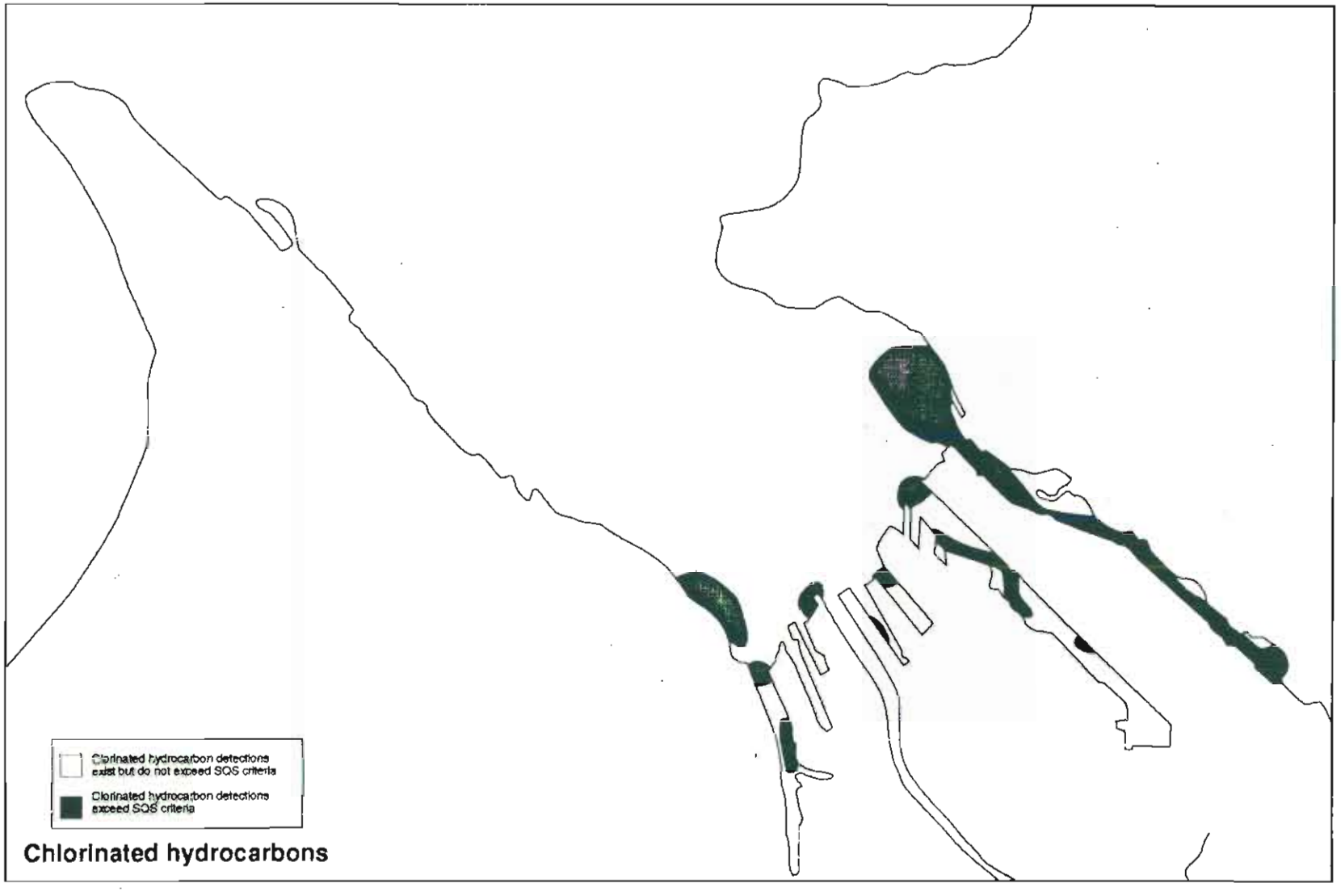
APPENDIX G

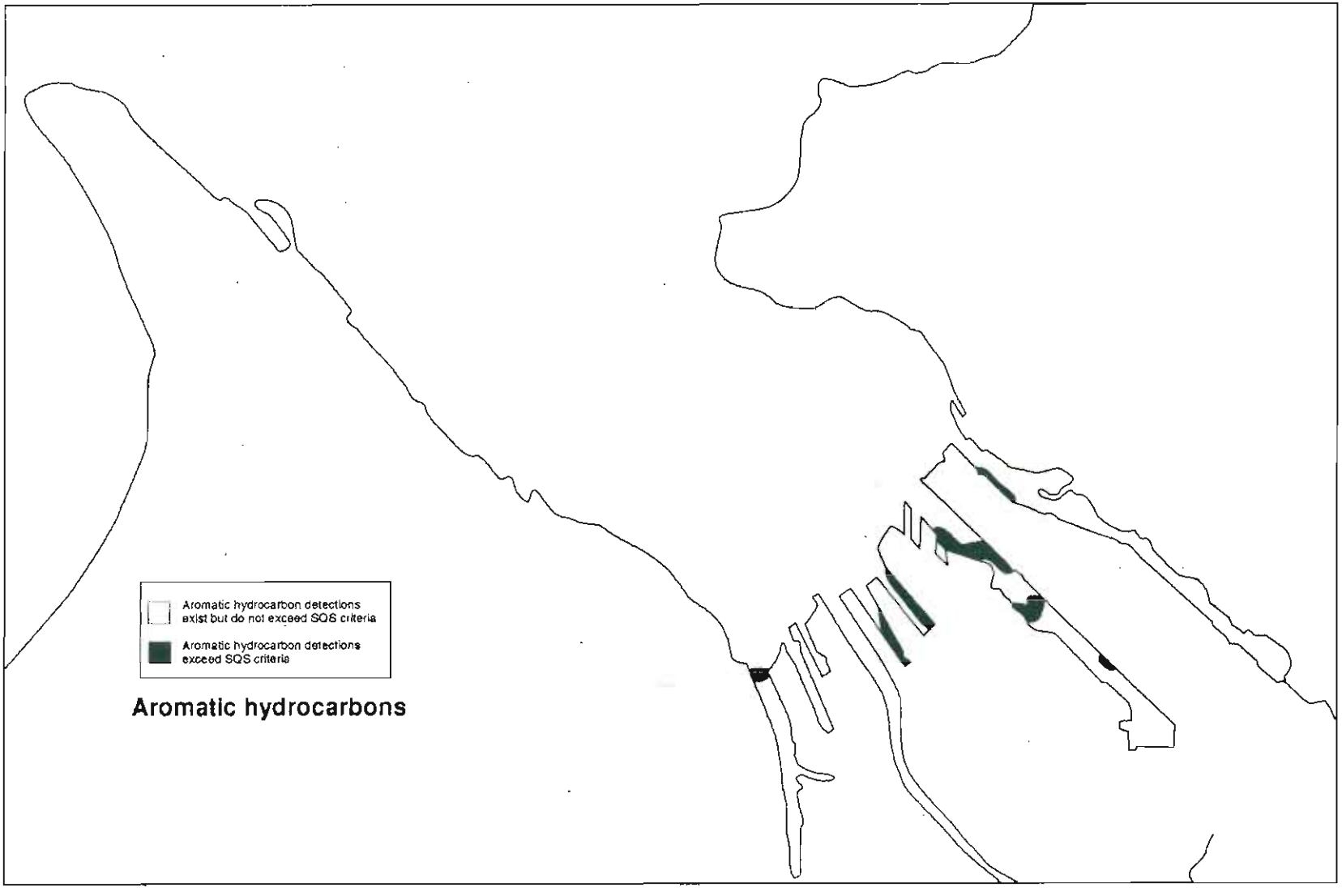
OVERLAYS OF THE DISTRIBUTIONS OF METALS/METALLOIDS, CHLORINATED HYDROCARBONS, AND AROMATIC HYDROCARBONS FOR USE WITH FIGURES 4-3 THROUGH 4-14



Metals/Metalloids



Chlorinated hydrocarbons



Aromatic hydrocarbons

APPENDIX H

COMPILATION AND REVIEW OF EXISTING GIS DATA SOURCES

COMPILATION AND REVIEW OF EXISTING DATA SOURCES PERTINENT TO RESTORATION PLANNING

In this appendix, information needed for comprehensive planning is identified, criteria are developed for evaluating these data, major sources of existing information are presented, and, finally, gaps in the existing information are discussed. The information compiled for the Commencement Bay Cumulative Impact Study and the relevant information available from the U.S. Environmental Protection Agency (U.S. EPA), the U.S. Army Corp of Engineers (U.S. ACOE), City of Tacoma, the Washington Department of Natural Resources (DNR), and the Washington Department of Ecology (Ecology) provide the bulk of the existing information to support restoration site identification, evaluation, and comprehensive planning. This information addresses, at least partially, many of the identified information needs for restoration planning. By pointing out where this information is insufficient and where further information is needed, this report should be useful as restoration planning moves forward in the natural resource damage assessment (NRDA) process.

Information Needs for Restoration Planning

A number of potential restoration sites have already been identified, both through the Cumulative Impact Study and efforts of the Restoration Panel. However, because the study area encompasses locations that have not yet been fully searched for potential sites, the scope of this section extends beyond the currently identified sites.

For successful restoration, information is needed first to identify potentially usable/feasible restoration sites. Once a potential site is identified, additional, more detailed information is needed to plan, design, and implement a specific restoration project. The following subsections describe the information requirements for various stages of restoration planning.

Site Identification

The first level of information is geared toward the evaluation of potential restoration sites. This information is focused primarily on existing data useful for identifying constraints that could rule out particular land parcels from further consideration. Most of these potential

Table H-1. Potential Restoration Constraints for Site Identification

	POTENTIAL RESTORATION CONSTRAINTS FOR SITE IDENTIFICATION
Political/Economic/ Institutional	Goals/principles for Commencement Bay restoration Feasibility of site to address enhancement of trustee resources Current land use, for example by viable commercial/industrial facility Zoning classifications, right-of- ways Property ownership Land acquisition cost/options Port of Tacoma land use plans City of Tacoma/Puyallup/Federal Way/Milton/Town of Ruston land use plans Puyallup and Muckleshoot Indian Tribe land use plans King County/Pierce County land use plans Identification of partnerships with private or non-profit groups for planning, design, implementation, and long-term management Aesthetic concerns Location of commercial/tribal/recreational fishing and harvesting areas Location of public land/parks
Physical	Onsite/adjacent utility infrastructure Structures, pavement, other constructed obstacles Roads (current and proposed) Historical/cultural/archaeological importance of site Topography Soil survey data (with hydric soil units identified) Bathymetry of nearshore environment in the study area Hydrologic regime Floodplain delineation Presence of groundwater Wave energy (could be critical constraint for intertidal projects) Drainage network Erosion sensitive areas
Chemical	Site contamination (soils, groundwater, surface water, sediments) Potential restoration site's proximity to contaminated sites Location of NPDES out falls and unpermitted discharges Location of CERCLA/RCRA remedial activity (current and proposed) Location of MTCA remedial activity (current and proposed) Location of Combined Sewer Overflow Storm Drains Location of source control activities Location of RCRA hazardous waste generators Location of sampling sites showing exceedance of state sediment and water quality standards
Ecological	Existing vegetation Non-native invasive vegetation Current/historical fish and wildlife utilization Location of NWI wetlands and any delineated wetlands Identified potential restoration sites (size and location) Functional/value assessment of potential sites Ecologically important/relatively undisturbed sites (those not adequately protected by current regulations may have high preservation potential) Priority habitat areas Buffer zone potential (based on upland land uses adjacent to sites) Ecological reference sites Current and proposed remediation/mitigation sites Ongoing research sites Functional connection with existing or potential habitat sites

Note:
NPDES - National Pollutant Discharge Elimination
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
RCRA - Resource Conservation and Recovery Act
MTCA - Model Toxics Control Act

constraints will fall into four general categories: 1) political/economic/institutional; 2) chemical; 3) physical; and 4) ecological. Table H-1 presents a list of potential constraints, divided by these categories. Determining the reality of these constraints constitutes an important step in the identification or elimination of a potential specific location. Once collected, organized, and analyzed, information regarding these factors would also be useful for a variety of other purposes, including the development of an estuary-wide, ecosystem-based restoration framework for Commencement Bay in which a variety of restoration alternatives and plans could be presented and evaluated.

Project Design

Information for designing a specific project requires onsite evaluation and groundtruthing by trained personnel. The information needed can be grouped into the same four categories used at the planning level. Table H-2 presents a list of such information, which, because of the detail required and possible expense in collection, would only be gathered after potential and/or preferred project locations have been identified. Not all of these data would be relevant to every type of project. Also, the level of detail/accuracy necessary will vary depending on the complexity and size of the project. At this stage of the restoration process, most of the constraints of the potential sites should have been identified. However, it is possible serious constraints could be identified only during detailed project evaluation and design.

Criteria for Evaluating Information

While very little of the detailed information necessary for project planning exists for Commencement Bay, there is an extensive amount of more general information already available. The adequacy of this information for future restoration planning efforts must be assessed before determining what further collection, coordination, and analysis of information is necessary as the NRDA progresses. To determine the usefulness of the existing information, a set of four criteria were developed by which data sources were evaluated:

- Contribution to data needs
- Compatibility with available geographic information system (GIS) format
- Detail/scale/accuracy
- Accessibility/cost of the information

Table H-2. Potential Restoration Constraints for Project Design

	POTENTIAL RESTORATION CONSTRAINTS FOR PROJECT DESIGN
Political/Economic/ Institutional	Willingness of owner to sell/actual costs/acquisition alternatives Project goals/objectives Permitting/regulatory requirements Identification of project designer (e.g., private, public or non-profit group) Estimated project costs (design, construction, maintenance and monitoring) Contingency/milestone plans Monitoring/maintenance/management plans
Chemical	Natural recovery rate estimation (if appropriate for project) Pollution source control plans (if necessary) Adjacent and runoff water quality (relevant parameters will vary by project) Site contamination (soils, groundwater, surface water, sediments) data collected specifically for project site Location of nearby NPDES outfalls, combined sewer overflows, storm drains, unpermitted discharges
Physical	Onsite/adjacent utility infrastructure Potential impact of any proposed new roads Historical/cultural/archaeological significance of site Topography (depending on complexity of project may require 1- or 2-in. contour data) Bathymetry (detail depends on complexity of project) Hydrology (location in watershed, runoff/drainage characterization, connection to groundwater, surface water fluctuations), intertidal projects may require highly precise location of mean higher high water and mean lower low water Buffer zone potential (may require acquisition/enhancement of upland area) Wave energy (crucial for success of intertidal planting projects) Soils (texture, grain size analysis, level of compaction, nutrients) Need for excavation, fill, grading, soil amendments, engineered elements Noise/light disturbances
Ecological	Existing vegetation (field survey quality) Current fish and wildlife utilization (field survey quality) Delineated wetlands (permitting requirements) Non-native invasive vegetation (field survey quality; removal plan if necessary) Nuisance wildlife plan (e.g., fences for Canada geese) Planting plan with plant material sources identified (stockpiling may be necessary) Biological benchmark data (useful for proper planting and/or grading plans) Plan to utilize functional connection to existing adjacent habitats (if possible)

Note: NPDES - National Pollutant Discharge Elimination System

Contribution to Data Needs

The data must first be assessed to determine whether they satisfy the information needs for restoration planning that are listed above. The Restoration Panel has established goals and principles for the comprehensive restoration of Commencement Bay, as discussed above, and has refined these goals and principals into site ranking criteria to help evaluate potential sites. These ranking criteria serve as a guide to the most important of the planning-level information needs and were incorporated into the information needs identified for this report:

- Functional connection with existing or potential habitat sites
- Location
- Separation from sources of contaminants or environmental disturbances
- Cost-effectiveness
- Sustainability
- Size
- Ownership
- Compatibility with probable land and shoreline uses, plans and designations
- Natural recovery potential
- Public access

The following sections summarize specific information that has been collected and identify where further work is necessary. In general, much of the information necessary to identify potential sites for restoration has been collected for the sites identified in the Cumulative Impact Study. The most serious information gaps occur for those sites identified by the Restoration Panel that were not discussed in the Cumulative Impact Study, and for those sites that may have excellent restoration potential for resources of concern to the trustees but for one reason or another have not yet been identified. These latter sites may exist, for example, in the upstream portions of the Puyallup River and Hylebos Creek watersheds.

Compatibility with GIS Format

Coordination of all data into a single GIS database would provide substantial ease of manipulation, analysis, and presentation. Currently, no single database exists with all the GIS information on Commencement Bay that might be useful for restoration planning. The major sources of GIS-based information for Commencement Bay are summarized in Table H-3. However, there does not appear to be a major problem with data compatibility because the same software system, Arc/Info®, is used by all of the major sources. The greatest compatibility problem could be converting the data from City of Tacoma from the

AutoCAD® format for use in Arc/Info® . More detail on each of the major databases is provided below.

Table H-3. Summary of Commencement Bay GIS Data Sources

SOURCE	ARC/INFO®	PROJECTION	SCALE
U.S. EPA	Yes	UTM Zone 10	Most 1:24,000
U.S. ACOE	Yes	UTM Zone 10	Most 1:24,000
Washington Department of Natural Resources	Yes	State Plane and UTM	Most 1:100,000 and 1:24,000
Washington Department of Ecology	Yes	State Plane	Varies
City of Tacoma	Yes, shifting to AutoCAD®	State Plane-South Zone	Varies

Detail/Scale/Accuracy

The quality of the GIS data and their suitability for the purposes of restoration planning depends on the detail portrayed, the scale of the mapping, and the accuracy of the data incorporated. Errors in GIS data can be introduced during a variety of activities:

- Data collection
- Data input
- Data storage
- Data manipulation
- Data output and use of the results

The overall data quality can be assessed in terms of positional accuracy, attribute accuracy, logical consistency, and resolution. The following is a brief discussion of these elements of GIS data quality and their relevance for restoration planning in Commencement Bay. The information was adapted from Aronoff (1991).

Positional accuracy — Positional accuracy is the expected deviance in the geographic location of an object in the data set from its true ground position. The importance of positional errors in the GIS data for Commencement Bay restoration planning will depend on the particular coverage and its importance as a constraint in restoration site selection and evaluation. For instance, at the planning level, highly accurate mapping soil units would not be important for identifying potential sites, but may be a serious

concern at the project level. Contamination data, however, should be as accurate as feasible even at the planning level.

Attribute accuracy — Attribute accuracy refers primarily to the accuracy of classifications and/or ratings used in the data set. For example, GIS maps may assign land use classes or vegetation types to a particular area. Soil erosion might be ranked on a 4-point scale from 1, indicating low soil erosion levels, to 4, indicating severe soils erosion levels. Testing the accuracy of such data often requires groundtruthing with test points and possibly extensive surveying. The costs of such testing would have to be weighed against the expected benefits and the goals of the program. A common problem with GIS data is that sharp boundaries in natural characteristics often do not actually exist in the field even though they are mapped in the GIS database with distinct delineations. For example, wetlands or forests usually has a transition zone several meters or more in width at the boundary with another habitat, but a GIS map may show a sharp boundary.

Logical consistency — Logical consistency refers to how well logical relations among data elements are maintained. Consistency could be a major issue in further GIS work for Commencement Bay because data from the various sources will need to be combined. For example, two data sets may be correct to their specified level of accuracy and yet not be logically consistent. This inconsistency can occur because the same boundary can be mapped in slightly different positions in two data sets, possibly because of different mapping or aerial photography dates. When the data sets are overlayed, this slight discrepancy in position will create a thin unique area called a sliver in the region between the two boundaries. To avoid problems associated with overlaying different coverages, it is best that a trained GIS technician check the coverages and, if necessary, redraft to correct errors and to reconcile discrepancies before maps are overlayed in a single database.

Data resolution — The resolution of a data set is the smallest discernable unit or the smallest unit represented. For thematic maps, such as land use or ownership maps, the resolution is the size of the smallest object that is represented or the minimum mapping unit (e.g., the parcel for the ownership coverage). The selection of the proper map resolution will depend largely on the expected use of the map and the expense of obtaining finer resolution. In GIS, the geographic data can be presented at any scale, so the minimum mapping unit can be very small. The amount of detail to be shown on a map can be selected when specifying the output. Though the data do not have a specific scale, they can be produced with levels of accuracy and resolution that make it appropriate for use at only certain scales. For instance, a 1:50,000 scale map could be produced from data that were digitized from a 1:500,000 scale map, but the data in the former map would likely be no more accurate than that of the map scale from which the data were taken. Data resolution will be an issue as different map scales are combined in future GIS work for Commencement Bay, but should not be a serious problem at the planning level as long as proper precautions are taken and documented when manipulating the data. At the project level, however, accuracy and scaling issues

will be much more critical and will probably preclude the use of much of the existing GIS data.

Accessibility and Cost

The accessibility and costs of the existing GIS-based information varies depending on the owner of the data. Land use compilations such as those developed for the Cumulative Impact Study, Puget Sound Water Quality Authority documents, and city and county land use planning documents are easily obtained at little or no cost. Data layers from each of the major GIS sources are available, although the City of Tacoma and the DNR charge for use of their data. City of Tacoma, which makes its GIS data available only on compact disk, charges $1,000 each for CDS of each of its four townships. The City of Tacoma is in the process of converting its GIS coverages to an AutoCAD system, and much of its GIS database may not be available until the conversion is completed. The DNR charges a $90 processing fee and $7 a file for data in Arc/Info® format, but cooperative agreements with other government agencies are possible. The DNR can also provide custom reports at an hourly rate of $50. Data from the DNR's Puget Sound Environmental Atlas can be retrieved for the cost of the magnetic tape. Ecology will release its data for a fee that covers the cost of reproduction and staff time. Custom-made data sets based on Ecology sampling data (e.g., SEDQUAL) are also available on a project-by-project basis. The U.S. EPA GIS database is not restricted, but constraints on staff availability may limit access at times or availability of custom-made coverages.

Summary of Existing Information

The land use and GIS-based information compiled for the Commencement Bay Cumulative Impact Study and the GIS information available from U.S. EPA, ACOE, the City of Tacoma, DNR, and Ecology provide the bulk of the data relevant to restoration site identification, evaluation, and comprehensive planning. This section summarizes these major sources of information, including lists of GIS data layers.

Compilations of Existing Land Use in Commencement Bay

The most useful land use compilation for restoration planning in Commencement Bay is contained in the Cumulative Impact Study. Zoning, land use, ownership, and preliminary on-

site evaluations are included for nearly all the potential sites identified in the study. Other relevant sources include land use or planning documents produced by the Puyallup Indian Tribe and local and county governments with jurisdiction over the study area. The following sections discuss the major sources of land use information relevant to restoration planning in Commencement Bay.

Cumulative Impact Study

Shapiro and Associates (1992b) produced a report that identified potential restoration sites in Commencement Bay and evaluated potential habitat restoration and mitigation options and their associated costs for 43 sites in the study area. After the sites were identified, information was collected on property ownership, value, land use, zoning, history, presence of chemical contamination, and institutional constraints to developing the site for habitat restoration and mitigation purposes. Zoning information was gathered from the Pierce County and Fife and Tacoma city planning departments. The study expanded upon and refined general land use information found in the Evaluation of Purchase and Lease Options report, also presented in the Cumulative Impact Study. The report identified ownership and an assessed value for each of the identified sites, based on Pierce County Assessor's Office records. The study used onsite examinations of the area and aerial photographs of Commencement Bay and the lower Puyallup River provided by the ACOE's Seattle District to help assess the sites. In a discussion of possible institutional constraints, the study mentioned that two proposed road improvement projects, the SR-509 extension and the SR-167 freeway, could affect some of the identified sites, particularly along the Puyallup River, the Port Industrial Area, and the Thea Foss Waterway.

In another study for the Cumulative Impact Study, David Evans and Associates (DEA) (1992) focused on the southern coastline areas of Vashon and Maury Islands, the coastlines north and east of Browns Point and south of Point Defiance, and portions of the Hylebos Creek, Wapato Creek, and Puyallup River systems. DEA used existing information on fish and wildlife habitat, underutilized areas, land use, and pollution sources, which they incorporated into Arc/Info® and a GIS mapping system. Personal communications, aerial photography, and groundtruthing were also used. The report described existing conditions, including land use and pollution sources, at the eight geographic areas examined: the Puyallup River, Wapato Creek, Hylebos Creek, Vashon Island, Maury Island, Point Defiance, Dumas Bay, and Browns Point/Dash Point. Tables in the report summarized data on the ownership

and the value and size of land parcels encompassing the identified potential restoration sites. This information was based on records from the Pierce County Assessor's Office.

Port of Tacoma

The Port has extensive information on port facilities, including low-level aerial photographs and detailed maps of land ownership and use in the Industrial Development District. The Port's 2010 Plan maps out the port's plans for terminal expansion, environmental improvements, and land transfers to the Puyallup Indian Tribe. New container terminals, intermodal rail yards, a new auto-handling terminal, and additional facilities for breakbulk cargo and logs are included in the plan, which focuses on 600 acres of land available on the Blair Waterway.

Cities of Tacoma, Federal Way, Fife, Milton, and Puyallup, Town of Ruston, Pierce and King Counties

Zoning, land use, and permitting issues (including state and federal) can be efficiently identified through consultation with the planning staffs of the government entities controlling land use and adjacent to Commencement Bay. The comprehensive land use plans, capital projects lists, growth management plans, basin plans, open space and recreational land use plans, zoning classifications, and Shoreline Master Programs for the relevant government entities will be particularly important resources as potential sites near selection. For upstream projects in the Hylebos Creek watershed, a program of Pierce County's Government Relations office called "Governing the Hylebos" may provide some useful input, as well as Federal Way's basin planning efforts and King County's "Current and Future Conditions Report for the Hylebos Creek and Lower Puget Sound Basins." For upstream projects and the basin plan in the Puyallup River watershed, the City of Puyallup has recently completed or is currently working on a number of comprehensive plans that also may be useful for restoration planning, including a transportation plan, a shorelands management master plan, a drainage and sanitary sewer plan, and an as-yet-uncompleted growth management plan. The city recently received U.S. Department of Transportation funding to work on a riverfront trail proposal along the south side of the Puyallup River in the city. The contacts for these programs are listed in Table H-4.

Table H-4. List of Contacts for Specific GIS/Land Use Data

GOVERNMENT ENTITY/ ORGANIZATION	SUBJECT
Pierce County	"Governing the Hylebos" project
	GIS coverages outside Tacoma City limits
City of Puyallup	Transportation plan, shorelands management master plan, drainage and sanitary sewer plan, growth management plan
	Riverfront track project on south site of Puyallup River
	Stormwater management plan
Port of Tacoma	Port's planning activities, databases
Washington Department of Natural Resources	GIS data for Puget Sound Environmental Atlas
	Nearshore Habitat Inventory
Washington Department of Ecology	SEDQUAL and MTCA site coverages
	MTCA clean-up list
	Linking WPCLS data to GIS coverages
U.S. EPA	GIS coverages showing sediment sampling and CERCLA-generated data for Commencement Bay

Puget Sound Water Quality Authority

The 1991 Puget Sound Water Quality Management Plan (and amendments) provides considerable information that could be useful for restoration planning in Commencement Bay, including details on current and planned programs in estuary management, storm water control, contaminated sediments, wetlands protection, nonpoint-source pollution, spill prevention and response, fish and wildlife habitat protection, municipal and industrial discharges, ambient monitoring, shellfish protection, and a number of others. The action plan presented in the document represents a comprehensive program to protect Puget Sound. The document also proposes agenda items that remain to be addressed.

Commencement Bay Cleanup Action Committee

The Commencement Bay Cleanup Action Committee recently published "A Vision for Commencement Bay," which includes discussion of the committee's bay-wide restoration landscape concept plan, and the committee's land use and restoration goals and principles for Commencement Bay. The document concludes with a brief outline of the organization's

implementation strategy for ensuring that these goals and principles are put into action with the cooperation of businesses, individuals, communities, organizations, and all governmental agencies having jurisdiction within Commencement Bay.

Existing GIS-Based Information on Commencement Bay

Major sources of GIS-based information on Commencement Bay have been identified: ACOE, U.S. EPA Region 10, the City of Tacoma, DNR, and Ecology. This section summarizes the sources in general, but does not include detailed discussions of each data layer.

U.S. Army Corps of Engineers

Table H-5 presents a list of Commencement Bay GIS data layers collected at the ACOE's Seattle District, identified by filename. All the coverages exist in Arc/Info® on a base map created by U.S. EPA.

Table H-5. U.S. Army Corp of Engineers Commencement Bay GIS Coverages

FILENAME	DESCRIPTION
Parcels	Boundaries of parcels in Commencement Bay tideflat area with property ownership
Samples	Sediment sample collection points
RCRA Points	RCRA sites within the Cumulative Impact Study area
Sites	Special aquatic sites as they existed in the years 1877, 1894, 1907, 1917, 1927, 1941, 1957, 1968, 1976, 1978, 1982, 1985, and 1988
Outfall	Outfall structure locations
Bathymetry	
Problem areas	Hot spots, with AET concentrations and substances of concern; only the harbor area has been depicted
Benthic infauna	Benthic community types and locations from existing literature
Habitat	from the Washington Department of Wildlife, Priority habitats and species information for the study area
Restoration Sites	Potential restoration sites

In addition to these GIS layers, the Seattle District has worked on a layer merging the potential restoration sites identified by David Evans and Shapiro & Associates, with some additional sites, but that work has yet to be completed.

David Evans and Associates

In addition to the land use information described previously, DEA compiled GIS information for the 1992 GIS report. DEA used the following existing digital information, which was delivered in Arc/Info® and required only modifications in projections:

- Commencement Bay Shoreline, provided by ACOE and the National Oceanic and Atmospheric Administration
- U.S. Fish and Wildlife Service National Wetlands Inventory
- WDF's Priority Habitats and Species
- Washington Department of Wildlife
- DNR's Natural Heritage Database

DEA developed the informational database for the maps in Arc/Info®. A single cover of the area was developed with attributes assigned to each specific potential restoration area for each study region. Maps were created using a map scale of 1:24,000. A series of maps was created to identify existing conditions such as fish and wildlife, wetlands and habitats, land use, and potential restoration sites. Field surveys were then conducted to verify mapped habitats, search for point and nonpoint sources of pollution, assess functional values of the specific restoration site habitats relative to the health of Commencement Bay fish and wildlife, and identify potential sites for restoration. When evaluating potential sites through aerial photograph-interpretation, groundtruthing, and background research, a number of criteria were considered including overall size, shape, and location within the watershed; the amount of vegetation cover; general physiognomy; plant and animal diversity; known fish and wildlife use in downstream areas; degree of disturbance or degradation; land ownership; hydrologic connections; and wildlife corridor connections.

Shapiro and Associates

Shapiro and Associates (1992b) prepared GIS files that delineated each identified potential restoration site's location and approximate boundary on a base map generated from U.S. EPA's database.

City of Tacoma

The City of Tacoma has recently redrawn its city plat map in AutoCAD® format to an accuracy of ± 6 in., one of the most accurate of such maps for any city in the country. This map serves as a base map for all the city's GIS coverages. The plat map and topographic features digitized from low-level aerial photographs taken in April 1990 are currently available on CD-ROM in AutoCAD® format. The topographic data consist of information visible from the aerial photographs such as sidewalks, roads, pavement, building footprints, etc., including 2-ft contours at an accuracy of ± 1 foot; spot elevations (DTM) at an accuracy of ± 6 in.; and monumentation at ± 3 in. The city is currently converting its utility infrastructure data at survey-level accuracy into the AutoCAD® format. Power information has been largely converted, while water and sewer information should be fully converted soon. The need for extremely accurate buried utility information was a major impetus for the city's decision to create such a high-accuracy plat map as a base for this utility conversion. Once this conversion is complete, it will be made available on compact disc. Land ownership by parcel is not currently available on compact disc, except by special order in which a map that shows one point per parcel could be linked to county assessor's office records. Actual parcel boundary information, as well as the rest of the city's GIS coverages, will not be available until the conversion to the UNIX environment is completed. These coverages, nearly all in State Plane-South Zone projection, will be available only on compact disc in AutoCAD® format once the conversion is complete. Table H-6 lists the coverages available through the City of Tacoma.

Table H-6. Data Coverages Available Through the City of Tacoma

COVERAGES	
Ownership parcels by quarter section	Neighborhood planning areas
Composite street center lines (used for address matching and network)	Open space areas
Census tracts, some 1980 counts	Planning EIS areas
Census block groups, some 1980 counts	Emergency medical incidents
Structure condition by block group	Fire incidents
Business districts	Crime incidents
Capital improvement areas	Limited hydrants in some areas (not precise)
City boundary	Limited permits over 4 months
Council districts	Single family intensity areas
Development intensity areas	Zoning (1990)
Fire response time intersections	Land Use

COVERAGES	
Groundwater protection district	County boundary
Flood plains	County section outlines
Department of Public Works map filing areas	County utilities areas
Geology	County parcel and land use summaries
Natural and manmade features	USGS 1:100,000 quads for roads and hydrology from Olympia to Buckley areas
Potential hazardous waste storage areas	Growth areas
Historical districts	Environmentally sensitive areas
1,200 monuments from benchmark book	Comprehensive plan

Port of Tacoma

The Port currently has no GIS, but does have an AutoCAD® system they use for port projects. They are in the process of collecting storm drainage, utility, and other catch basin information on the port area for their CAD system, but the completion date of this project is not known.

Pierce County

Discussions with Pierce County Planning Department personnel revealed that their GIS information would provide little data on the study area for restoration sites in Commencement Bay beyond that available from the state agencies. The City of Tacoma has jurisdiction over most of the identified locations. The county does have a coverage showing sewer service outside the Tacoma City limits that may be useful.

Washington Department of Natural Resources

DNR has GIS data that are available to interested parties at a fee, although cooperative agreements to share data can be worked out. The GIS operation is supported by the Digital Data Services section in Olympia. Data layers are available in four output formats: Arc/Info® Export, Arc/Info® ungenerate format, U.S. Geological Survey (USGS) DLG-3 Optional, and DXF. Coverages can be ordered by township, 7.5-minute quadrangle, or statewide. Four projection systems are available: State Plane - South Zone, State Plane - North Zone, UTM-Zone 10, and UTM-Zone 11.

The following is a list of the data layers available from DNR:

POCA — The POCA layer is an integrated set of geographic references templates representing the Washington Public Land Survey (townships and sections), state-owned uplands managed by DNR, county boundaries, and DNR administrative boundaries. DNR block planning areas are being incorporated into the layer.

PLS-PT — The PLS-PT layer is made up of information provided to DNR's Public Land Survey Office, corners pinned by DNR field staff, and information from USGS quads.

SOILS — The SOILS layer was derived from a 10-year mapping program completed in 1980. Most information found on the PLFG Forest Soil Summary Sheets is available with soils.

HYDROGRAPHY — The HYDROGRAPHY layer represents an integrated network layer that holds data on water bodies and watercourses. Adjunct information in the form of statewide layers also exists representing state Water Resource Inventory Areas and USGS Hydrologic Units.

TRANSPORTATION — The TRANSPORTATION layer is a network of features: roads, railroads, trails, and ferry crossings. Attributes tied to the transportation features include route type, route name/number, road surface type, and Forest Practice Activity status code.

DNR also collects GIS data through its Aquatic Lands Section for the Puget Sound Environmental Atlas. The database was developed in Arc/Info® and is maintained on a Sun network. It is available from DNR on 0.25-in. magnetic tape for about $20.00. However, much of the data is basemap information for all of Puget Sound that would only duplicate other more accessible coverages. Altering linework in the shoreline layer SOUND, which is the basemap for many of the layers (scale is 1:100,000), could create misalignment in other layers where this shoreline was the standard.

A DNR project, the Nearshore Habitat Inventory, is underway to use remote sensing data coupled with field verification to create GIS coverages based on the Marine and Habitat Classification System for Washington State. The project is focusing on vegetation and substrate land cover classes in the nearshore and aquatic habitats identified in the classification system developed by Dethier (1990). Lanzer (personal communication) indicates that most of the work so far on the project has been done only in Elliott Bay and that the completion date is at least 2 years away.

Table H-7 lists the Puget Sound Environmental Atlas coverages; those marked with an asterisk may be particularly useful for restoration planning. A data dictionary for this database, available from the Aquatic Lands Division, describes these coverages in greater detail, including the sources and dates for the data.

U.S. Environmental Protection Agency

U.S. EPA maintains a variety of GIS-compatible coverages that are standardized in UTM Zone 10 projection, horizontal NAD 1927. Some of these duplicate coverages are mentioned above, particularly coverages created by DEA for the ACOE. Appendix I presents a listing of available coverages in the U.S. EPA GIS system. The attached list also includes CB/NT maps available through U.S. EPA's GIS staff. The data for these maps were generated for display purposes only and have not been verified by U.S. EPA personnel. In the Cumulative Impact Study, there is a map produced by U.S. EPA's GIS staff of the Commencement Bay area (scale - 1:20,000) showing, in polygons, Sediment Problem Areas, Superfund Sites, the ASARCO Problem Area, Washington Department of Wildlife Priority Habitat Areas, Aquatic Areas (vegetated shallows, mudflats, kelp beds, etc.), and Potential Restoration Areas. The map also shows points indicating locations of National Pollutant Discharge Elimination System (NPDES) outfalls (from Ecology and U.S. EPA data) and lines showing roads. Currently, U.S. EPA is adding sediment sampling and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) -generated data from Commencement Bay to their database.

Washington Department of Ecology

Ecology maintains a statewide GIS in Arc/Info® with coverages available at fees based on the cost of reproduction and staff time. Most of the statewide coverages, listed below, would probably be relevant only for a basemap. However, Ecology would be able to provide some very useful contamination data, including up-to-date coverages using SEDQUAL data and Model Toxics Control Act cleanup site data from the Sediment Management Unit. These coverages would likely need to be custom-made by the computer information consultant who manages the particular database in question. Water quality sampling data in the Water Quality Permit Life Cycle System (WPLCS) database documenting violations of state standards have not yet been developed into a GIS coverage, although Ecology is beginning to work on digitizing sampling stations that could then be linked to WPCLS. Available

Table H-7. Puget Sound Environmental Atlas Coverages

Coverage Name	Description	Coverage Name	Description
ABALONE	Abalone distributions	PORPHAR	Harbor porpoise siting concentration areas
BANKS.huc	River reach network banks	PSAMP*	Puget Sound Ambient Monitoring Sediment sampling stations
BND.quad	Political and administrative boundaries	PSBASIN	Puget Sound watershed boundary
CLAMHARD	Hardshell clam species	PSCNTY	Puget Sound county boundaries
CLAMSOFT	Softshell clam distributions	PSDDA*	Puget Sound dredged material disposal sites
CLAMSUB	Subtidal clam species	PSHUC	Puget Sound hydrologic unit catalog basin boundaries
CRABS	Crab distributions	PSWAGAZ	Washington Gazetteer for Puget Sound
CUCUMBE	Sea cucumber distributions	PSWRIA	Puget Sound water resource inventory areas
CULTPEN	Salmon pen aquaculture	SALMCMRC*	Commercial salmon fishing areas
CULTSUSP	Suspended mussel aquaculture	SALMSPRT	Recreational salmon fishing areas
CULTTN	Tribal salmon net pens	SCALP-PS	Pink and spiny scallop distributions
DOHRECB	Public recreational shellfishing beaches	SCALP-RK	Rock scallop distributions
DOHSEW*	Sewage treatment plant outfalls	SEABIRD*	Seabird nesting areas
DOHSEWBF*	Sewage treatment plant outfall buffer zones	SBIRDBCH*	Seabird nesting beaches
DOHSHELL*	Commercial shellfish growing area classifications	SEDCHEM*	Sediment chemistry sampling stations
GEODUCK	Geoduck distributions	SEDEXCD*	Exceedances of Sediment Quality Standards (samples taken Jan. 85 to Jan. 91)
GFDEMRS	Demersal groundfish	SFISHADV	Sport fishing advisories
GFPELAGC	Pelagic groundfish	SHRMPBU	Burrowing shrimp distributions
GFREEF	Reef dwelling groundfish	SHRMPPA	Pandalid shrimp distributions
GNAME	Geographic names	SMELT	Surf smelt spawning beaches
HAULOUT	Pinniped haul-out sites	SOUND	Puget Sound waters and shoreline
HERRHOL	Herring holding areas	STR.huc*	River reach network streams
HERRSPWN*	Herring spawning grounds	TRAWLS	Puget Sound Ambient Monitoring Program trawl sample stations
HY.quad*	General hydrography	TRIBES*	Tribal usual and accustomed fishing areas
MUSSEL	Mussel distributions	URCHIN	Sea urchin distributions
NPDES*	National Permit Discharge Elimination System sites	WDIS*	Wastewater discharge sites
OCTOPUS	Octopus distributions	WHGRAY	Gray whale siting concentration areas
OYSTER	Oyster distributions	WHKILLER	Killer whale siting concentration areas
PLS.quad*	Public Land Survey System (USGS version)	WHMINKE	Minke whale siting concentration areas
PORPDALL	Dall's porpoise siting concentration areas		

Note: Coverage names marked with an asterisk may be particularly useful for restoration planning.

coverages with a brief description, the source scale, and the agency custodian are listed in Table H-8.

Tacoma-Pierce County Health Department

The Tacoma-Pierce County Health Department has produced two drainage system maps—one showing the nearshore/tideflat area of Commencement Bay and the other showing the Hylebos Creek watershed —created from aerial photographs with a scale of 1:500. The Hylebos Creek map was created from 1992 photographs, while the Commencement Bay map was originally created from 1988 photographs but has been updated and may be updated again in 1994. These maps, which are available for digitizing, include information on open and closed channels, man holes, oil/water separators, tide gates, outfalls, pipe and concrete basins, catch basins, wet areas, seeps, and direction of flow.

Information Gaps

This section discusses the limitation in the existing land use and GIS-based information to meet the identified information needs for restoration planning in Commencement Bay. Tables H-9 and H-10 present some information gaps applicable to sites already identified as potential restoration sites as well as some general information gaps.

Assessing site contamination, proximity to contaminant sources, and potential for recontamination will be some of the most important considerations as potential sites are evaluated and ultimately selected. Much of the information that could be useful in the restoration planning stages has been collected, but has not been organized specifically for restoration planning in the study area. Adapting current GIS coverages with contaminant information and creating new map overlays will be a key part of this organization. Sediment contamination data from the SEDQUAL database could be useful in determining proximity to contamination for some projects, especially with GIS coverages available from Ecology showing up-to-date sampling data. Other contamination data with GIS coverages include NPDES locations, Resource Conservation and Recovery Act sites, Superfund sites, problem areas, sewer infrastructures, and potential hazardous waste storage areas.

Table H-8. Data Coverages Maintained by Washington State Department of Ecology and the Agency Custodians

Coverage Name	Description	Scale	Custodian
tiger	1990 Census	1:100,000	WOFM
waris	Washington Rivers Information System	1:100,000	WDW
nwi	National Wetlands Inventory	1:50,000+	Ecology
WashDEM	Washington State Digital Elevation Model	1:24,000	WDNR
pls	Washington Public Land Survey	1:24000 [a]	WDNR
trans	Roads and Highways	1:100,000	?
ambwqi	EILS Ambient Monitoring Stations	1:24,000	Ecology
congdist83	Congressional Dist. 1983	1:100,000	WOFM
congdist92	Congressional Dist. 1992	1:100,000	WOFM
county	1:24,000 county boundaries	1:24,000?	WDNR
dnr.admin	DNR regions and admin. divisions	?	WDNR
ecoregions	Ecoregions of Washington	1:7,500,000	Ecology
gages93	Active USGS Gaging Stations	?	USGS
gagesin	USGS stations from CD-ROM data	1:24,000	Ecology
geonames	Geographic Names Info. System	?	USGS
gwma	Groundwater Management Areas	1:500,000	Ecology
huc	USGS Hydrologic Cataloging Units	1:250,000	USGS
lakes	Major Lakes of Washington	1:250,000	Ecology
legdist81	Legislative Districts 1981	?	?
legdist92	Legislative Districts 1992	?	?
major rivers	Major Rivers of Washington	1:250,000	Ecology
mpl	Major Public Lands from DNR	1:100,000	WDNR-FPD
npdes	Waste Discharge Facilities	?	U.S. EPA
oregon-cnty	Oregon County Boundaries	?	?
precip	Annual Precipitation from NOAA	1:2,000,000	WDNR-FPD
ps.shore	Puget Sound Outline polygons	?	Ecology
quad100	USGS 1:100,000 Quad. Maps	1:24,000	WDW
quad15	USGS 1:62500 Quad. Maps	1:24,000	WDW
quad250	USGS 1:250,000 Quad. Maps	1:24,000	?
quads	USGS 7.5 minute Quad. Maps	1:24,000	Ecology
rain	NOAA Climatological Stations	?	Ecology
rivers	1:250,000 Rivers	1:25,000	Ecology
roads	Major Roads	1:100,000	Ecology
ros	Rain-on-Snow zones	?	FPD
statedot	Major Highways	?	Ecology
stateline	Washington state outline	1:24,000	Ecology
states	State Outlines	?	ESRI

Table H-8. continued

COVERAGE NAME	DESCRIPTION	SCALE	CUSTODIAN
storm	24-hour, 2-year precip. intensity from NOAA Atlas 2	?	WDNR-FPD
towns.dnr	DNR Townships	1:24,000	WDNR
usgs.lulc	USGS Land Use/Land Cover	1:250,000	USGS
wa city	Washington Cities from TIGER	1:100,000	Ecology
wacoast	Washington Coastal Polygons	1:100,000	Ecology
wasshspel	Streams and Rivers	1:250,000	Ecology
wria24k	Water Resource Inventory Areas	1:240,000	Ecology
wriabasins	Water Resource Inventory Sub-areas	1:2,500,000	WDNR-FPD

[a] ? - the information is incomplete, based on discussions with Ecology staff.

Table H-9. Commencement Bay GIS Coverage Information Gaps and Possible Data Sources

INFORMATION GAPS: GIS	POSSIBLE SOURCES
GIS coverage showing location of proposed new roads.	Update existing City of Tacoma and county coverages. Information also available from Washington Dept. of Transportation and U.S. Dept. of Transportation.
GIS coverage showing location of current and proposed MTCA cleanup sites.	Dept. of Ecology has begun working on coverage for Commencement Bay. Contact: Rachel Freedman Thomas in Sediment Management Unit (206) 407-6909.
GIS coverage showing location of sites where state sediment standards exceeded.	Dept. of Ecology can produce custom-made coverages based on SEDQUAL data. Contact: Martin Payne (206) 407-6920. Also, EPA's GIS Section working on sediment coverages.
GIS coverage showing location of sites where state water quality standards exceeded.	A coverage linked to Ecology's WPLCS database showing where water quality standards have been exceeded has not yet been developed. Contact: Aaron Purcell (206) 407-6476.
GIS coverage showing existing vegetation/habitat classes.	Department of Natural Resources working on Nearshore Habitat Inventory based on Marine and Estuarine Habitat Classification System. Contact: Tom Mumford (206) 902-1079.
GIS coverage showing species utilization for resources of concern for NRDA process.	Could be developed from documents produced for Phase 1 Damage Assessment. Information from Habitat Inventory, mentioned above, and other DNR coverages would also be useful.
GIS coverage showing any negotiated Aerial Extents of Injury for NRDA process.	Could be developed as information is collected at NOAA's Damage Assessment Center.
GIS coverage showing habitat enhancement/mitigation sites in study area.	Numerous sources including Army Corps of Engineers, U.S. Fish and Wildlife Service, state Dept. of Ecology and Natural Resources, Port of Tacoma, and all local government entities.
GIS coverage showing shoreline type for study area (i.e., natural, riprap, sheet piling, etc.)	Combination of aerial photographs, field surveys, and Port of Tacoma, city and county land use documents.
GIS coverage showing reference sites (in bay or out) for major habitats to be restored.	Field surveys, aerial photographs, literature review, interviews with experts, and DNR work for Nearshore Habitat Inventory.
GIS coverage showing erosion sensitive areas in classification system.	SCS soil coverages from DNR, City of Tacoma and county soil coverages, aerial photographs, field surveys.
One coverage showing zoning classifications for entire study area.	Expand on City of Tacoma coverage, using Pierce and King County maps and Federal Way, Puyallup, etc. maps.
One converage showing all identified potential restoration sites.	Expand on coverage underway at Army Corps of Engineers using CIS sites.
GIS coverages showing future buildout scenarios for study area.	Port of Tacoma, Puyallup Indian Tribe and government land use plans, and interviews with key planning personnel. (Helpful for alternative analyses based on future land use constraints)

Although it is not a pressing concern at this stage of the planning process, a key consideration will be the attitudes of the owners of each of the potential restoration sites toward selling their property, setting up conservation easements, or other preservation/enhancement options. Constraints caused by unwilling sellers or excessive prices should be identified as early as possible. Until this information is compiled, an accurate estimate of actual project costs cannot be made.

Once all the GIS coverages determined to be relevant for restoration planning are combined in a single database, specific questions about the feasibility of particular sites (such as cost or proximity to contamination sites or other priority habitats) could be answered efficiently and with the spatial reference necessary for such a large-scale project. For example, the work being done by the City of Tacoma and the Port of Tacoma documenting utility information could be highly useful for site selection. Once a single database is compiled, many applications for both the EIS and the NRDA process will be possible, including extensive alternative analyses, high-quality map making, cost projections, and easy-to-understand spatial output for meeting presentations and public comment. If considered desirable, it would be feasible to set up a read-only CD-ROM system whereby interested citizens or public officials could literally see the various restoration alternatives on a bay-wide scale by selecting different layers to simply turn on or off. Such a system could even serve as a means to produce data layers based on public comment.

Table H-10. Commencement Bay
Land Use Information Gaps and Possible Data Sources

INFORMATION GAPS: LAND USE	POSSIBLE SOURCES
Property ownership of sites identified by Restoration Panel but not in Cumulative Impact Study.	Pierce County and King County Assessor's offices
Institutional constraints analysis performed on all potential sites, including identifying regulatory conflicts.	Expand analysis performed by Shapiro and Associates for Cumulative Impact Study to all identified potential sites, using consultation with appropriate personnel from all relevant government and tribal entities.
Information on source control actions at the CB/NT Superfund site.	Milestone reports from Ecology's Toxics Cleanup Program contain valuable information on status of source control actions for each problem area.
Up-to-date information on remedial activity at the site, including list/location of PRPs.	U.S. EPA's GIS section working on various coverages related to site, including sampling results.
Functional/value assessments of preferred potential restoration sites.	Will need to be done by trained personnel on a site-by-site basis in order to evaluate whether restoration, enhancement, preservation or no action is best option.

REFERENCES

Aronoff, S. 1991. Geographic Information Systems: a management perspective. WDL Publications, Ottawa, Canada.

David Evans and Associates (DEA). 1992. Commencement Bay additional inventory and identification of potential restoration sites. In: Commencement Bay Cumulative Impact Study, Volume II, Restoration Options. Prepared for the U.S. Army Corps of Engineers, Seattle District, WA. May/June 1993.

Dethier, M. 1991. A Marine and Estuarine Habitat Classification System for Washington State. Washington Natural Heritage Program, Dept. of Natural Resources. Olympia, WA.

Shapiro and Associates. 1992. Evaluation of purchase and lease options. In: Commencement Bay Cumulative Impact Study, Volume II, Restoration Options. Prepared for the U.S. Army Corps of Engineers, Seattle District, WA. May/June 1993.

Shapiro and Associates, 1992. Potential restoration / mitigation sites for Commencement Bay, Puyallup River nearshore. In: Commencement Bay Cumulative Impact Study, Volume II, Restoration Options. Prepared for the U.S. Army Corps of Engineers, Seattle District, WA. May/June 1993.

Washington State Department of Ecology, 1990. Commonly Required Environmental Permits for Washington State.

APPENDIX I

U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION 10 GIS DATABASE, COMMENCEMENT BAY

United States
Environmental Protection
Agency

Region 10
1200 Sixth Avenue
Seattle WA 98101

Alaska
Idaho
Oregon
Washington

EPA

MAR 09 1992

Reply To
Attn Of: HW-113

Memorandum

Subject: CB/NT Maps and Information Available through the Geographic Information System (GIS)

From: Peter Contreras
Assistant Site Manager

To: File

The purpose of this memorandum is to list the types of maps available through EPA's Geographic Information System (GIS) staff. Additional information can be obtained by contacting Matt Gubitosa (ext. 4059) in ESD.

GIS has been particularly useful on the Commencement Bay Nearshore/Tidetflats (CB/NT) Superfund site in visually representing certain types of information. The following data coverages are available for the CB/NT site and can be used to create various maps:

- base map includes boundaries of Commencement Bay--geographic area can be increased or reduced as needed
- indicator chemicals for problem areas
- boundaries of parcels in the tideflats area
- parcel coverages with name of land tenant
- waterway area ownership information
- drainage systems, including pipes and open channels in tideflats
- street address data depicting primary roads
- 3 deminsional map showing drainage network and bathymetry of waterways and bay
- a map showing RCRA generators and TSD facilities in the tideflats

In addition, data has been obtained from the EMSL lab and the US Army Corps of Engineers contactor, David Evans, for Commencement Bay which produce a series of maps depicting "special aquatic sites" in the bay area. The maps represent the loss of mudflats, wetlands, and other aquatic habitats in the bay area over a series of years (from 1877 to 1988). Other maps may have been generated for more specialized uses which would be of

less general use. For example, air and RCRA programs have requested coverages specific to Reichold, a RCRA generating facility in Tacoma. (See the attached inventory of available CB/NT data coverages or contact Matt Gubitosa X4059 for more information.)

A final word regarding the reproduction and distribution of these maps should be noted. The data coverages have been obtained from various outside sources (NOAA, US Geological Survey, City of Tacoma). The data was generated for display purposes only and has not been verified by EPA personnel. While it may be useful to provide maps to public groups or citizens, maps should always be marked as being solely for display and this point should be verbally emphasized at the time maps are provided.

Attachment

memo

COMMENCEMENT BAY GIS DATA LAYERS

ummary prepared 1/23/92
Revised 12/29/92

~~For further information, contact Matt Gubitosa, GIS Section,~~ x4059.

All Commencement Bay Data is located on the Region 10 Unix Workstation Ethernet Network. All coverages are in UTM Zone 10 projection, horizontal datum NAD 1927.

Workspace: /usr102/apllib/commbay/aquaticarea

The following SITES## coverages were created by the U.S. EPA Environmental Monitoring Systems Laboratory (EMSL), Las Vegas, NV. They are of the aquatic habitat areas around Commencement Bay, for various years between 1941 and 1988. The last two digits of the coverage name indicate the year depicted.

SITES41
SITES57
SITES68
SITES76
SITES78
SITES82
SITES85
TES88
YDRO: A water area coverage created to facilitate analyses requested by Pat Cagney of the Corps of Engineers.

PLOT FILES in /usr102/apllib/commbay/aquaticarea:

The are plots of respective coverages listed above, with explanatory text, legend, scale, etc.

sites41.plt
sites57.plt
sites68.plt
sites76.plt
sites78.plt
sites82.plt
sites85.plt
sites88.plt

Workspace: /usr102/apllib/commbay/bath

SOUND: Point coverage of soundings, in feet, of the Tacoma Harbor area. It was digitized by EMSL from National Oceanographic and Atmospheric Administration (NOAA) Chart 18453, "Tacoma Harbor".

SOUND60TIN2: An ARC/INFO version 6.0 Triangulated Irregular Network (TIN) created from the SOUND coverage, using the SOUNDING item in SOUND and a z-scale of .3048 to convert z-values in feet to meters, the x-y coordinate system.

CONTOUR3M4: A line coverage contour map of bathymetry created from the SOUND coverage and SOUND60TIN2 TIN data. This map was created using the ARC 6.0 TINCONTOUR command; the contour interval is 3m and the subdivision degree is 10 for contour smoothing.

WORKSPACE: /usr102/apllib/commbay/bathexport

This workspace contains export files of various drapes, coverages, plots, and amls created in ARC/INFO version 5.01 on the original EPA Region 10 GIS Prime computer. They were created from the SOUND coverage and other miscellaneous hydrography and transportation data layers, for presentation in various map products created during the period of February 1989 through February 1992. They are largely obsolete because they were created using pre-6.0 version of ARC/INFO; however, they can be utilized when appropriat to recreate new versions of map products previously prepared.

ams.plt.e00
bay-bath.e00
bay-drp.e00
bay-drpc.e00
baypoly.drp.e00
bigview.aml
bigview.plt.e00
bor-drp.e00
border-bay.e00
border-ww.e00
clipbay.e00
clipbay2.e00
clipbay3.e00
d-bay.plt.e00
d-bay2.plt.e00
d-bay3.plt.e00
drain-cov.e00
drain.plt.e00
drains.plt.e00
drape-3d.e00
drape-bay.e00
drape-bayc.e00
drape-hull.e00
drape-ww.aml
drape-ww.plt.e00
drn-drp.e00
drp.aml
drp.plt.e00
hull.e00
hydro-bay.drp.e00
hydro-bay.e00
makebay.aml
oldlog.txt.e00
pl.plt.e00
rds-drp.e00
roads.plt.e00
sedm.aml
sedm2.aml
sedm3.aml
sound-ww.e00
sound.e00
tborder.e00
tborder4.e00
tin-bay.e00
tin-ww.e00
tinborder.e00
view#1-anno.e00

view#1.aml

view#1.key
view#1.plt.e00
view#2.aml
view#2.cov.e00
view#2.key
view#2.plt.e00
view#3.aml
view#3.key
view#3.plt.e00
view-cov.e00
water.plt.e00
ww3d.doc
ww3d.plt.e00
wwsurf-cov.e00
xborder-ww.drp.e00
xborder-ww.e00
xhydro-bay.drp.e00
xview#2.cov.e00
yborder-bay.e00
yhydro-bay.e00
yhydro-poly.e00
yview#2.cov.e00

Workspace: /usr102/apllib/commbay/cagney2

REST: A polygon coverage representing potential aquatic habitat restoration areas. Prepared under contract to U.S. Army Corps of Engineers, Seattle, transferred to EPA Region 10 12/92.

Workspace: /usr102/apllib/commbay/corps/coex0055

Available Coverages: The following coverages are of the aquatic habitat areas around Commencement Bay, for the various years between 1877 and 1941. These coverages were prepared by David Evans and Associates under contract to the Corps of engineers. Additional coverages contain various legend information.

ANNO_1988
C1877
C1980
CBAY_ANNO
CBAY_BORDER
CBAY_MIT
CBAY_SITES
COPYR_R
DB1877
DB1894
DB1907
DB1917
DB1927
DB1941
DB1980
DB1988
DDEA1877
DEA_BORDER
DIS1877
DIS1894
DIS1907
DIS1917
DIS1927
DIS1941
DIS1988
DISDEA_77
UNION88

Plot files in /usr102/apllib/commbay/corps/coex0055:

These plot files were also created by David Evans and Associates under contract to the Corps of Engineers. The depict aquatic areas in the years referred to.

c1894.plt
c1907.plt
c1917.plt
c1927.plt
c1941.plt
c1944.plt
c1988.plt
cbay.plt
deal877.plt
fig11.plt
fig12.plt

Workspace: /usr102/apllib/commbay/data

AI: Significant activities, downloaded from the AI table of the Environmental Information System developed by Tetra Tech Inc., under contract to the Washington Department of Ecology.

CENSUS: 1980 Census block-group boundaries and demographic data, demographic data from Donnelley Marketing Information Services.

SAMPLES: Sediment sample collection points and associated chemical analysis data.

DRINKWELL: Locations and descriptions of 1,299 drinking water supply wells.

Workspace: /usr102/apllib/commbay/dlg

HYDRO-TAC: Original U.S. Geological Survey DLG Hydrography data for the Tacoma, WA 1:100,000 scale quadrangle.

HYDRO-ST: Same as above but a smaller area encompassing the Tacoma area only (the 'Study Area'), and including shoreline data from NOAA Ocean Service Digital Shoreline Data set C18.

MISC-ST: DLG Miscellaneous Transportation data for the Study Area.

RAIL-ST: DLG Railroads data, Tacoma 100K quad.

ROADS-TAC: DLG Roads data, Tacoma 100K quad.

ROADS-ST: DLG Roads data, Study Area.

Workspace: /usr102/apllib/commbay/drainage

DRAINAGE-T: Drainage system, including pipes and open channels, Tideflats area, Hylebos Creek and Wapato creek areas, and Ruston Way shoreline area. Digitized by EMSL from paper orthophoto maps. Errors probably greater than 50 ft.

NEWDRAIN-T: Drainage system, digitized by Environmental Photo Interpretation Center (EPIC). More accurate than DRAINAGE-T, but smaller area, including tideflats area only. Includes point data with codes 1 through 7. No documentation available for this coverage.

Workspace: /usr102/apllib/commbay/etakdir

ETAK: Street address data purchased by EMSL. Cannot be transferred to third parties due to license restrictions. Used for address location determination (ADDRESSMATCHING in ARC/INFO).

RCRAPOINTS: Coverage created by addressmatching. RCRA-regulated Facilities in the Commencement Bay area.

NEWPOINTS: Additional RCRA facilities.

can be combine this is stuff I did, and is really one thing

Workspace: /USR102/APLLIB/COMMBAY/OLDWORK

The following are small coverages depicting the extent of various problem areas within the waterways. They were originally created in 1989 on the old Region 10 GIS Prime computer.

Available Coverages:

CITY-CADMIUM	CITY-HPAH	CITY-LEAD	CITY-MERC
FIG4-ARSENIC	FIG4-HPAH	FIG4-PCB	FIG4-PCB2
HYLEBOS-HEX	HYLEBOS-PCB	MIDDLE-COPP	MIDDLE-MERC
POINTS-FIG1	PROBAREA-FIG1	SITCUM-ARSEN	SITCUM-COPP
WHEEL-HPAH	WHEEL-ZINC		

Workspace: /usr102/apllib/commbay/parcels

PARCELS: Boundaries of parcels in tideflats and adjoining areas.
XPARCELS: Parcels coverages with label points moved around for clarity.
OPERATOR: Parcels coverages with facility operator (i.e., land tenant) information.
WATOWN: Waterway area ownership information.

Workspace: /USR102/APLLIB/COMMBAY/WORK

he following are coverages created to facilitate mapping of potential habitat restoration areas in the Commencement Bay area.

Available Coverages:

TACLANDFILL	Coverage depicting extent of Tacoma Landfill superfund site. Created by offsetting from streets depicted in ETAK coverage.
ASARCO3	Coverage depicting the extent of the Asarco Problem area. Created by offsetting from shoreline (HYDRO-ST) and the 60 m depth contour line of coverage CONTOUR3M4.
NPDESECOL	Point coverage depicting locations of NPDES discharge outfalls. Locations are based on data retrieved from Department of Ecology paper files and imported into ARC/INFO by EPA Region 10. [These are Bailey's].

ADDITIONAL DATA:

Numerous other EPA Region 10 spatial data layers are periodically utilized during mapping or analysis of Commencement Bay area spatial data. Such data includes Washington Department of Wildlife Priority Habitat data, and ther superfund site spatial data (such as Tacoma Tar Pits, South Tacoma ield, etc.). * Wildlife Priority Habitat area information is "Top Secret" and is for all of Washington so it is not maintained in the CB directory.