10.0 OPTIMAL ALTERNATIVE AND RECOMMENDATIONS

Alternative III, the highest level of service, encompasses the recommendations of Alternative II plus additional measures to better protect and modify the basins' existing natural resources. Flood flow reductions and improved creek corridor habitat are central to Alternative III.

The limited funding available to the local jurisdictions is an important consideration in evaluating the feasibility of Alternative III. Funds may be best utilized in the protection and preservation of basins and creek systems less impacted than Indian and Moxlie Creeks. Management may, in general, accept the piping and flood-flow associated degradation in Indian and Moxlie Creeks, and focus regional efforts on preventing similar managerial errors in other basins. For these reasons, Alternative III is not presented as the preferred alternative.

The following recommendations include a brief discussion describing the recommendation and explaining the benefits, public costs, and lead jurisdiction. Unlike Alternative II, the costs associated with each recommendation have only been roughly estimated. The technical difficulties typical of these projects would require detailed engineering reports in order to estimate costs with a high degree of confidence.

10.1 Stormwater Facilities

Alternative III focuses on retrofitting numerous stormwater systems that provide little, if any, storage and treatment.

RECOMMENDATION 10.1.1: Construct regional stormwater storage and treatment for runoff discharged to the headwaters of Moxlie Creek.

Discussion: Stormwater systems in the southern portion of Moxlie Creek basin discharge to either glacial depressions (kettles) or an arterial stormwater collection pipe paralleling Henderson Boulevard. This 28-inch pipe system discharges approximately 7 cubic feet per second (cfs) to the headwaters of the creek during two-year storm events. Very little stormwater storage is provided for these flows prior to entering the collector pipe. These stormwater flows adversely impact the physical and biological integrity of the entire Moxlie Creek system.

Approximately 2 acre-feet of storage would be needed for compliance with the Drainage Design and Erosion Control Manual for the Thurston Region, Washington (Regional Drainage Manual). Due to the highly developed nature of the contributing area and the depth of the pipe system under Henderson Boulevard, retrofitting the conveyance system would involve providing underground storage in the roadway or major construction within Watershed Park.

The recommendation proposes the installation of storage pipe under Henderson Boulevard. The pipe would be perforated to allow infiltration to the generally porous soils of the area. Unfortunately, water quality treatment from the underground system would be minimal.

Benefit: Reduced habitat degradation and flood potential.

Public cost: $500,000

Project lead: City of Olympia

RECOMMENDATION 10.1.2: Construct an off-channel regional storage facility adjacent to Indian Creek near Fredrick Street.

Discussion: Alternative II, the preferred level of service, would allow the continued impoundment of flood flows behind a culvert under the abandoned railroad grade west of Fredrick Avenue (Recommendation 9.1.2). Holding flood flows in a creek channel behind culverts is contrary to best management practices for the following reasons:

- Deposition of sediments adversely impacts the creek system by covering and cementing spawning gravels.
- Under surcharged conditions, water velocities through the downstream culvert prevent fish passage.
- High water velocities downstream of the culvert would encourage stream channel and bank scouring and erosion.

Alternative III proposes that a small portion of the high flows be diverted from Indian Creek to a constructed pond adjacent to the creek. The pond would to some extent reduce the impoundment of water downstream and provide water quality treatment, but would require the condemnation and removal of two homes.

Benefit: Improved aquatic habitat and reduced flooding.

Public cost: $300,000

Project lead: City of Olympia

RECOMMENDATION 10.1.3: Construct underground stormwater storage and treatment at several locations throughout the basins.

Discussion: Relatively small-scale regional stormwater storage and treatment projects would be undertaken at the most effective locations throughout the basins. Due to the

lack of undeveloped land at critical locations, projects would necessarily focus on underground systems.

Potential sites for additional storage include:

- South Bay Road and 5th Avenue NE
- Martin Way and Indian Creek
- Pacific Avenue and Indian Creek
- Boulevard Road and Beacon Avenue

Benefit: Reduced flood flows and improved aquatic habitat.

Public cost: $400,000

Project lead: City of Olympia

RECOMMENDATION 10.1.4: Manage stormwater flows from Interstate 5 in compliance with the requirements of the Drainage Design and Erosion Control Manual for the Thurston Region, Washington (Regional Drainage Manual).

Discussion: With the exception of three small storage facilities, runoff from Interstate 5 is not managed for storage and water quality treatment prior to discharge to Indian and Moxlie Creeks. Several readily available improvements are presented in Alternative II (Recommendations 9.1.3 and 9.1.4).

This recommendation calls for substantial improvements in stormwater management for the 43 acres of Interstate 5 impervious surfaces within the basins. Approximately 4 acre-feet of storage and treatment in addition to existing and proposed storage (Alternative II) would be needed to meet the Regional Drainage Manual requirements. Potential sites and design alternatives for these projects have not been evaluated by the basin planning process.

Benefit: Reduced property and creek flooding, improved water quality.

Public cost: $300,000

Project lead: Washington State Department of Transportation

RECOMMENDATION 10.1.5: Reroute existing stormwater flows from kettles with important natural amenities to regional conveyance, treatment, and storage facilities.

Discussion: Although kettles in the southern portion of the basins historically received runoff, forested conditions generated appreciably less runoff than current developed conditions. Stormwater flows to the kettles have increased with development of the approximately 490-acre area. Several neighborhoods adjacent to the kettles have expressed concern over using the kettles for seasonal stormwater management.

The environmental and land use concerns regarding kettles are as follows:

- Flooding of private property.
- Siltation of the porous soils typical of the kettles.
- Loss of trees and natural vegetation due to prolonged submersion.
- Loss of neighborhood open space and natural resource amenities.

These concerns could be alleviated by routing existing and potential runoff flows to Moxlie Creek. Due to the sensitivity of the creek and the already excessive flows discharged to the creek, the flows would have to be treated and stored in excess of Regional Drainage Manual requirements. Additionally, the existing conveyance system to the creek is at capacity and would have to be enlarged to handle added flows. The costs of these projects are high.

Benefits: Elimination of the potential for degradation of natural and cultural amenities.

Costs: $500,000

Project lead: City of Olympia

10.2 Habitat Enhancement/Wetland Protection

Alternative III would improve instream habitat and further protect important riparian areas, wetlands, and potholes. Elements of this program include removing unnecessary pipes from the creek channel, acquiring important undeveloped areas for preservation and public use, and reducing destructive flood flows by increased stormwater management (Section 10.1).

RECOMMENDATION 10.2.1: Replace instream pipe with a more natural creek channel for a portion of the combined Indian and Moxlie Creek flowing under downtown Olympia.

Discussion: As downtown Olympia expanded, the marine estuary associated with the mouth of Indian and Moxlie Creeks was filled and the creeks piped 3,200 feet to Budd Inlet.

The recommendation proposes establishing a natural creek channel through a portion of downtown Olympia. The undertaking would build upon the project presented in Alternative II to open the channel from Marine Drive to State Avenue (Recommendation 9.2.4). The new channel could not mimic the historical estuarine environment, but would provide improved aquatic habitat.

Opening many segments of the pipe system would present significant technical difficulties. These problems include the following:

- A major sanitary sewer pipeline lies immediately adjacent to the piped creek and would have to be relocated.
- Numerous other utilities cross the creek pipe at many locations.
- The creek pipe is located under Chestnut Street. Permanent street closure and construction of seven bridges would be necessary.
- The creek is approximately 20 feet underground in the vicinity of 4th Avenue and Chestnut Street. In this area, creek restoration would require the construction of extensive retaining walls or demolition of existing buildings.

Given these difficulties, the most viable approach would be to restore the 1,500-foot portion of the creek from Union Avenue to Legion Way. Although potentially feasible, opening this segment of creek would involve construction in close proximity to large buildings and reduced vehicle parking space. The costs associated with the recommendation have been very roughly estimated and therefore may underestimate actual costs.

Benefit: Numerous communities, both regionally and nationally, have completed similar creek modification projects in downtown areas. In the long-term, the projects are typically very popular and generate economic benefits to downtown areas.

Public cost: $2,500,000

Project lead: City of Olympia

RECOMMENDATION 10.2.2: Remove an additional 250 feet of unnecessary instream pipe in Indian and Moxlie Creeks.

Discussion: Alternative II recommends the removal of 400 feet of unnecessary instream pipes (Recommendation 9.1.2); Alternative III proposes the removal of an additional 250 feet of pipe. The additional pipe removals are as follows:

- Indian Creek has been piped for approximately 150 feet under a parcel of undeveloped land between South Bay Road and Martin Way. The work was done in conjunction with a unrealized development project.

- Moxlie Creek is piped under the City of Olympia Maintenance Center at two locations. A 100-foot pipe segment would be removed.

Natural creek channels would be constructed following pipe removal.

Benefit: Improved creek habitat.

Public cost: $125,000

Project lead: Thurston County/City of Olympia

10.3 Regulation/Development Controls

Alternative II and the nonstructural surface water management program (Chapter 11) include numerous recommendations for improved regulation of new development and enforcement of existing regulations.

No additional regulations are presented under Alternative III.

10.4 Enforcement/Complaint Response

The nonstructural management program (Chapter 11) addresses enforcement and complaint response needs throughout the north Thurston region. No additional recommendations for enforcement and complaint response are presented under Alternative III.

10.5 Pollution Source Control Programs

Like Alternative II, the recommendations of Alternative III emphasize the need to control pollution at its source. The proposed projects and programs include stormwater management facilities, pollution source identification and correction, and public involvement and education.

Several additional projects involving stormwater management are presented in Alternative III (Recommendations 10.1.1, 10.1.2, 10.1.3, and 10.1.4). These projects would directly benefit water quality.

10.6 System Monitoring

System monitoring provides for tracking and evaluating water quality and habitat trends in the creek system.

RECOMMENDATION 10.6.1: Monitor water quality more frequently than is proposed under Alternative II.

Discussion: The long-term monitoring program proposed under Alternative II would provide for monitoring to be conducted four times per year. The program would focus on stormwater and septic discharges to the creeks during wet weather conditions.

This recommendation proposes monitoring the creeks eight times per year in order to better characterize year-round conditions.

Benefit: Improved tracking of water quality conditions.

Public cost: $5,000

Project lead: City of Olympia/Thurston County Health Department

10.7 Public Involvement and Education

Public involvement and education (PIE) activities are best managed at a regional, rather than a basin-specific, level. The proposed public involvement and education program is presented in the regional surface water management program (Chapter 11).

10.8 Cooperative Program Management

Alternative III supports increased efforts to provide regional management of surface water. Although the scope and implications of such a management program have not been thoroughly investigated by basin planning activities, regional management can be expected to provide increased efficiencies and reduced costs.

11.0 NONSTRUCTURAL SURFACE WATER MANAGEMENT PROGRAM

Several basin plans are currently underway for watersheds within the north Thurston County area. In the future, additional basin plans are anticipated to be completed. Each current and future plan contains basin-specific capital recommendations that focus on problems that occur and that can be solved within the context of an individual drainage basin. In addition, the plans contain recommendations that address noncapital issues existing in every drainage basin throughout the region. Jurisdictions within the north Thurston County area have worked together to create a package of noncapital recommendations to be included in each basin plan. Until this package is implemented, all current and future basin plans will include identical recommendations for a noncapital program.

The following package of recommendations would be implemented by participating jurisdictions to the extent that adequate funding is available. It is not intended that all recommendations would be implemented in the first year following plan adoption. Rather, the highest priority recommendations be funded first, and others phased in over time.

A map of the drainage basins in the northern Thurston area (Figure 11) is presented on the following page. Estimated costs for implementing these recommendations are presented in Table 6 at the end of this chapter. These costs are expected to change over time as jurisdictions further analyze their specific approaches for implementing each recommendation.

11.1 Implementation Strategies for Nonstructural Recommendations

Two strategies have been developed to streamline implementation of the nonstructural recommendations. Both are described briefly below:

Coordinate and Implement Regionally: The scope of the recommendations under this strategy go beyond basin and jurisdictional boundaries and require cooperative participation to succeed. All jurisdictions would coordinate and contribute financially to one lead agency for each program recommendation, which would coordinate activities throughout the region.

Total recommendations under this strategy: 14

Examples: Multijurisdictional plan coordination, community grants.

Coordinate Regionally, Implement Locally: The scope of the recommendations under this strategy also go beyond basin and jurisdictional boundaries, but the recommendations would be implemented by individual jurisdictions. Each jurisdiction would have programs and staff in place to support these recommendations. Coordination would occur through existing processes.

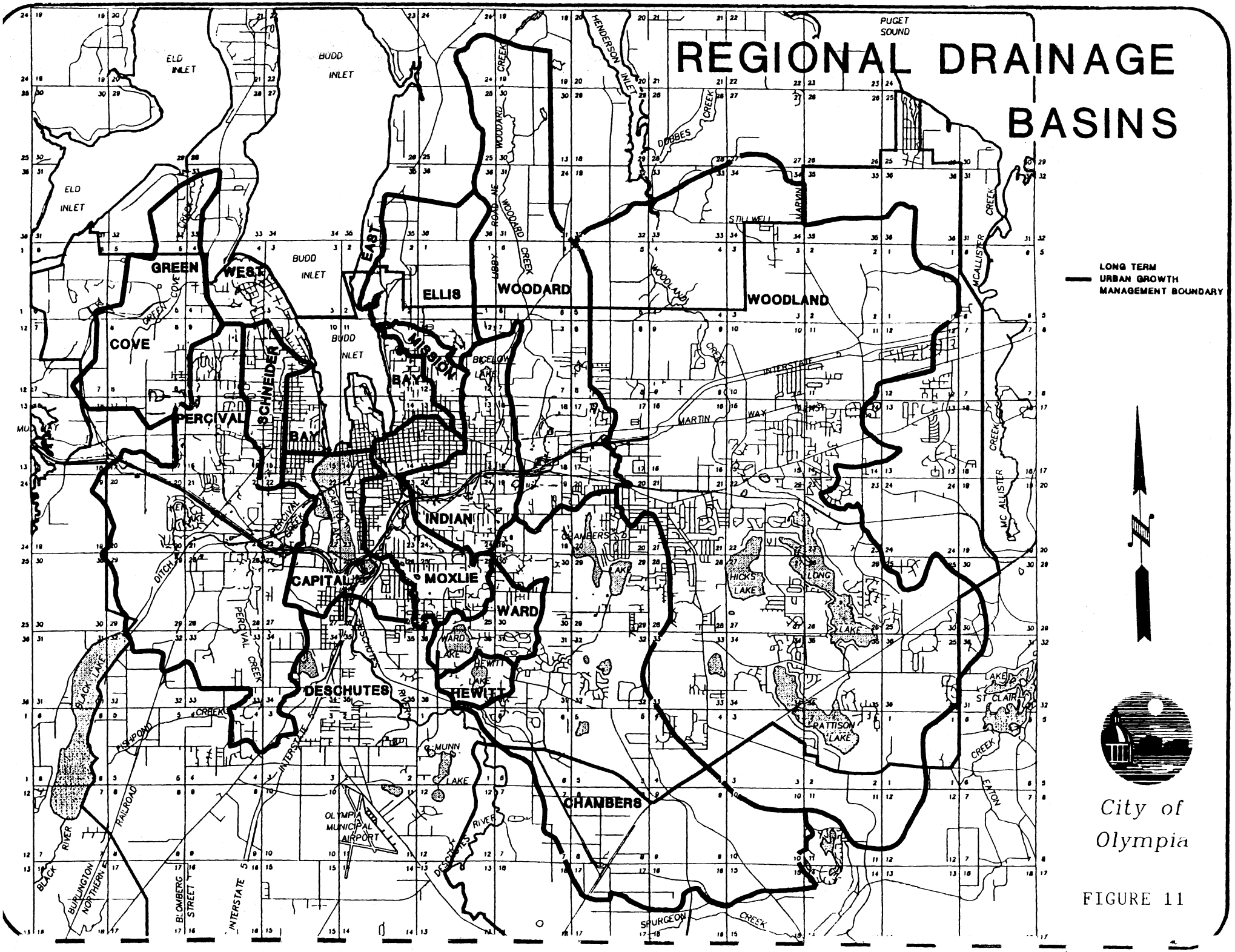
REGIONAL DRAINAGE BASINS
PUGET SOUND
ELD INLET
BUDD INLET
HENDERSON INLET
GREEN COVE
WEST BAY
EAST BAY
ELLIS
WOODARD
WOODLAND
PERCIVAL
SCHNEIDER
INDIAN
CAPITAL
MOXLIE
WARD
DESCHUTES
HEWITT
CHAMBERS
LONG LAKE
HICKS LAKE
PATTISON LAKE
ST CLAIR LAKE
MUNN LAKE
OLYMPIA MUNICIPAL AIRPORT
BLACK LAKE
INTERSTATE 5
BURLINGTON NORTHERN RAILROAD
LONG TERM URBAN GROWTH MANAGEMENT BOUNDARY
City of Olympia

FIGURE 11

Total recommendations under this strategy: 22

Examples: Public information and outreach, drainage manual revisions.

11.2 Stormwater Facilities

While most stormwater facilities serve a particular basin, the jurisdictions can work together to achieve enhanced operation of existing facilities and construction of new ones.

Recommendation R-1: Maintain public and private stormwater management facilities on a scheduled basis.

Discussion: Sediment accumulations, excessive plant growth, and incidental structural failures periodically impair the design capacity of stormwater systems. To a large extent, maintenance has historically been conducted only in response to a problem. With the implementation of this recommendation, pipe systems would be cleaned every two to three years, ditches dredged every two to three years, and ponds dredged every eight to ten years. High maintenance systems would be identified and given more frequent attention. Vegetation management would be conducted yearly. New and existing private facilities would be required to enter into legally binding maintenance agreements with the respective jurisdictions.

Benefit: Elimination of many existing flooding problems within the basins.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-2: Identify public and private stormwater facilities that can be upgraded, and improve them as an alternative to building new facilities.

Discussion: Construction of new stormwater facilities is extremely costly. Often it is much more cost-effective to do minor improvements to ponds that already exist, but not functioning at full capacity. These improvements vary depending on the pond, but can be as easy as replacing an existing orifice with a smaller one, dredging, deepening, or widening the facility. If enough retrofits of existing ponds are accomplished, the need for new storage facilities can be reduced. Although retrofitting can reduce the need for construction of small storage facilities, usually it does not substantially reduce the need for regional storage facilities.

Benefit: Increased efficiency of existing ponds and reduced need for new ones.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

11.3 Habitat Enhancement/Critical Areas Protection

Habitat and wetlands can be protected efficiently using consistent management policies throughout the region. Critical habitat areas often cross jurisdictional boundaries and cannot be protected adequately using existing approaches.

Recommendation R-3: **Protect critical areas including streams, wetlands, buffer areas, and lands adjacent to these areas through regulation. Purchase of wetlands and other critical areas for the purposes of outdoor recreation, stormwater management, and education should continue to be considered as an option.**

Discussion: Because outright purchase of critical areas such as stream corridors and wetlands is often prohibitively expensive, regulations can be used to ensure the continuation of their beneficial functions. Existing regulations addressing critical areas within the jurisdictions are currently being modified to meet the requirements of the state's Growth Management Act.

Critical areas can be adequately protected by prohibiting certain detrimental uses and activities. Use of existing or enhanced regulations can protect the areas relatively well without additional public costs. When possible, purchase of important wetlands will be used to preserve these resources for outdoor recreation, educational purposes, research, and to further protect their natural functions and values.

Benefit: Cost effective protection of wetlands and other critical areas.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-4: **Provide technical and financial assistance to private parties pursuing open space preservation through programs such as conservation easements.**

Discussion: In order to place private property into permanent preservation, property owners must go through a lengthy and relatively expensive process. Preservation of open space is extremely important and should be made as easy as possible for anyone who is interested in pursuing these options. This includes the availability of technical advice and financial assistance to cover the potential costs of the process. This program would compliment the work of the Capital Land Trust.

Benefit: Protection and preservation of critical areas currently in private ownership.

Project lead: To be determined.

Implementation strategy: Coordinate and implement regionally.

Recommendation R-5: **Support and coordinate with parks and planning departments in the protection and acquisition of land offering unique open space attributes.**

Discussion: The potential to lose valuable open space is extremely high due to the rapid rate of development in north Thurston County. Preservation of open space is an important component of protecting water resources. By supporting and coordinating with parks and planning on the protection and acquisition of lands that offer especially valuable open space traits, these areas will not be lost.

Benefit: Protection of lands providing exceptional visual and wildlife amenities. Preservation of the natural beauty and character of the north Thurston County area.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-6: **Minimize the number of street and utility crossings through critical areas. When crossing creeks, encourage necessary street crossings to use bridges or arch culverts that maintain the natural creek substrate. Encourage new utilities to use existing utility corridors.**

Discussion: Streams and wetlands are severely impacted by the construction and use of road and utility crossings. Minimization of the number of crossings would diminish resource impacts and hydrologic changes to the stream system. When no other reasonable alternative to creating a stream crossing exists, the use of arched culverts would maintain the natural stream substrate that is a critical component of stream habitat. Existing frameworks could be utilized to implement this recommendation; the most appropriate is probably through the development review process.

Benefit: Reduced degradation of water quality and habitat.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

11.4 Regulations/Development Controls

The jurisdictions can more effectively regulate development to protect natural resources if they work cooperatively.

Recommendation R-7: **Amend the *Drainage Design and Erosion Control Manual for the Thurston Region, Washington* (Regional Drainage Manual) to require half the current stormwater release rate for new development located on poorly drained soils, including all hydrologic Class C and D soils and many Class B soils as defined by the Regional Drainage Manual and the 1990 Soil Survey of Thurston County.**

Discussion: The Regional Drainage Manual established stormwater facility storage needs and release rates based on the best available information at the time. Section 1.3 of the manual supports the establishment of storage requirements and release rates by the basin planning process. Many jurisdictions in the Puget Sound area are evaluating the need to increase storage requirements. The recommendation is supported by recent Washington Department of Ecology (WDOE) proposals in the *Stormwater Management Manual for the Puget Sound Basin.*

The computer modeling efforts of the basin planning process have provided state-of-the-art analysis of the Indian/Moxlie, Percival, Woodard, and Woodland basins. These analyses provide far greater accuracy than past evaluations made possible.

These basins encompass approximately 49 square miles in the urban area. Much of the basins are within the Urban Growth Management Area (UGMA). The portions of the urban area not included in the basin planning areas include Ellis, Mission, Schneider, Green Cove, and Chambers basins. These basins and creek systems have been evaluated through a WDOE Centennial Clean Water Basin Reconnaissance grant (TAX90202). Through these various planning efforts, all basins and associated creek systems in the urban area have been investigated. The infiltration standards for these basins will be reevaluated and adjusted if necessary, when basin plans for them are developed.

The need to increase the drainage regulations is largely a function of the tendency of many local soil types to become saturated during storm events. Subsequently, rainfall creates runoff rather than being infiltrated. Although portions of the urban area have not been evaluated by the basin planning process, the soils in these areas are typically as prone to saturation as the soils in the evaluated basins.

The proposed drainage requirements are critical to the success of the basin plans. Failure to adopt this proposal would result in the continuation of existing management problems or a reliance on the local jurisdictions to provide appreciable quantities of stormwater storage.

In addition to the costs associated with the jurisdictions providing regional storage, numerous conveyance systems upgrades would be necessary to accommodate future high flows. The implications of appreciably higher future flows is readily apparent in the Indian Creek basin. Prior to its confluence with Moxlie Creek, Indian Creek is conveyed in pipe at 19 locations. Many of these pipes are currently at capacity. Without increased storage requirements, potential development could result in the need to replace many of the high cost pipe systems.

The recommendation to increase the storage requirements is being pursued with several qualifiers. These are as follows:

- Areas with highly permeable soils would not be required to comply with the proposed storage requirement. These soils may be capable of infiltrating stormwater and meeting the proposed release rate requirement without increasing storage volume. Numerous areas in the southern portion of the urban area typically have highly permeable soils.

- The proposed requirements provide an impetus for developers to minimize impervious surfaces and effectively infiltrate runoff within a development. Developments designed to accomplish these goals could expect an appreciable reduction in stormwater management requirements. Innovative design techniques are numerous and may include narrower road widths, porous pavement, yard infiltration, depressional landscaping, and cluster development.

- With the necessary jurisdictional fee-in-lieu policies in place, stormwater management requirements for a proposed development could possibly be reduced. The reduction would be contingent upon a jurisdictional need to correct an existing stormwater problem. Fee-in-lieu contributions could be used only in the same drainage area as the proposed development.

- The goal of this recommendation is to maintain existing, predevelopment stream flows through consistent design standards that do not place unnecessary complications on developers and engineers. For specific development sites, other methods may be considered to meet this goal.

The cost savings associated with more stringent standards are substantial when considered against potential necessary infrastructure upgrades.

Benefit: Stormwater runoff is often the primary detrimental influence on urban creek systems. Often, artificially high flood flows have a greater impact on the integrity of urban creeks than does water quality contamination. The effects of stormwater flows are apparent in the creeks in the urban area. More stringent storage requirements than those currently provided by the Regional Drainage Manual are justifiable for the protection of natural resources and the minimization of future flooding problems in developed areas.

The recommendation would also provide substantial saving in infrastructure needs. While the proposed storage requirement continues to allow increased flows to be released from a site following development, the recommendation does effectively reduce peak flows.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-8: **Amend the Regional Drainage Manual to require adequate treatment of stormwater prior to infiltration in highly permeable, Class A soils in industrial/high risk areas as specified in the North Thurston County Ground Water Management Plan.**

Discussion: Groundwater recharge is important to the health of creeks, water supplies, and the minimization of stormwater management costs. Stormwater infiltration is supported by current drainage design regulations. However, infiltrating contaminated waters through highly porous soils may provide inadequate treatment thereby threatening groundwater quality. A recent study conducted in the Puget Sound area supports the need for treatment prior to infiltration (Brown and Caldwell, 1990).

Benefit: Minimization of threats to groundwater quality.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-9: **Require new homes and remodels which increase impervious areas to install stormwater management systems capable of managing the volume of runoff generated by the new development.**

Discussion: While large development projects are required to install stormwater management facilities, single family home construction is not required to do so. This type of development, called infill, can have considerable cumulative effects on stormwater. There are several low cost, effective techniques that can be used for single family infill development that effectively reduce the quantity of runoff generated from the site. This recommendation does not propose that systems with sufficient capacity to accommodate the additional runoff should be upgraded.

Benefit: Reduced quantity of stormwater runoff from infill development.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-10: **Evaluate current staffing levels and employe adequate staff to fully implement and enforce key elements of the Regional Drainage Manual.**

Discussion: Many requirements of the Regional Drainage Manual require considerable staff time to implement and enforce effectively. Key elements such as analysis of upstream and downstream impacts caused by new development are critical to the

protection of water resources. However, the jurisdictions cannot adequately meet these requirements due to current staffing and budgetary restraints.

Benefit: Minimization of future flooding and natural resource problems.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-11: Restrict development in flood hazard areas so that existing flood elevations are not increased under build-out conditions.

Discussion: New development within the 100-year flood plains of all north Thurston County creeks would be limited. Existing structures would be reduced over time. Flood plain filling and construction that results in loss of local stream capacity and increased downstream flows would be eliminated.

The intent of this recommendation is to restrict development in the flood plain, not to prohibit compatible uses such as agriculture, or parks and trails. The basin plans require developers and new homeowners to meet higher standards to prevent increases in flooding. Common sense dictates that the capacity of existing natural drainages should be maintained. Developments in the flood plain reduce natural drainage capacities and force flood waters further out into surrounding areas.

Benefit: The natural ability of streams to control floods would be protected.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-12: Consider development standards to minimize future impervious surfaces by such measures as narrower streets, porous pavements, reduced parking requirements, increased building heights, and revised landscaping requirements. Encourage common standards throughout the jurisdictions.

Discussion: Streets generate approximately 25 percent of total urban stormwater. Parking lots and driveways contribute lesser but appreciable quantities of runoff. Landscaping requirements can be incompatible with the efficient management of stormwater. Elimination of conflicting regulatory objectives and minimization of impervious surfaces reduces stormwater management costs and promotes groundwater recharge. Local planning departments are currently conducting preliminary investigations of these issues. The implementation of improved standards is important to effective long-term water resource management.

Benefit: Surface water management problems would be minimized by reducing the generation of runoff.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-13: Encourage innovative land use planning techniques (such as cluster housing) that preserve undisturbed open space and natural stormwater functions where appropriate throughout the region.

Discussion: Innovative development techniques such as cluster housing are effective means of reducing runoff, improving runoff quality, enhancing groundwater recharge, and protecting critical areas. Because cluster housing maintains a substantial amount of undisturbed vegetation, the natural functions and characteristics of an area may continue after development. The areas most appropriate for cluster development and other creative development techniques will be identified on a basin-specific level.

Benefit: Reduction of runoff quantity and improved runoff quality, groundwater recharge, and sensitive area protection.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-14: Establish uniform standards for land clearing and grading within the Urban Growth Management Area that minimize removal of native vegetation, improve water quality, and reduce stormwater runoff quantity.

Discussion: The single largest impact on stormwater is the conversion of land from natural vegetation (including trees and shrubs) to grass or development. Olympia, Lacey, Tumwater, and Thurston County all regulate vegetation removal and grading through ordinances. A detailed clearing and grading plan is required for all new development. The plan must specifically identify vegetation to be removed, a schedule for vegetation removal and replanting, and the method of vegetation removal. Thurston County is developing a vegetation protection ordinance that will require a permit for all land clearing.

Uniform standards are an effective method to ensure that vegetation is properly managed during preparation of new development sites. Because the Urban Growth Management Area (UGMA) is intended to be developed at similar densities across the jurisdictions, uniform clearing and grading standards throughout the area are appropriate.

Benefit: Preservation of soil infiltration capacities, reduction of erosion, protection of creek channels, and protection of wildlife habitat.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

11.5 Enforcement/Complaint Response

Historically, jurisdictions in northern Thurston County have not supported a sufficient level of regulation enforcement and complaint response. Regulations would be more effective if consistently enforced throughout the region.

Recommendation R-15: **Evaluate current staffing levels and employ adequate staff to fully enforce development and environmental protection regulations which impact water resources. Improve coordination, management, and effectiveness of complaint response to water quality, habitat, and flooding issues regionally.**

Discussion: The jurisdictions in north Thurston County have limited staff available for the enforcement of existing local regulations. Mechanisms aimed at protecting water resources (such as maintenance agreements between homeowners associations and the jurisdictions) are not well enforced. Improving enforcement would help protect the important functions of wetlands, creeks, and other critical areas within the basins.

Cooperation among the jurisdictions would improve public access to complaint systems, increase technical assistance staff, and increase public awareness of complaint system availability. More highly publicized complaint phone numbers and staff for response would increase the efficiency and effectiveness of existing complaint response efforts. Complaint response would be coordinated with Stream Team database and monitoring.

Benefit: Protection of creek channels, preservation of soil infiltration capacities, and reduction of illegal land grading and alterations which will decrease flooding, habitat degradation, erosion, and sedimentation. Better field inspection and analysis, public access and involvement, and remedial action.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

11.6 Pollution Source Control Programs

Programs aimed at reducing pollution at its source are especially adaptable to regional implementation. The use of a diverse set of programs to stop the release of

contaminants into the environment would improve the quality of water resources throughout the region.

Recommendation R-16: **Support the adoption of a nonpoint pollution source control ordinance that defines practices and procedures to protect the public health and water quality of the Thurston region from polluted surface water runoff. Define penalties for infractions, responsibilities for clean-up, and train enforcement staff.**

Discussion: The state has limited resources to enforce nonpoint source regulations. A nonpoint pollution source control ordinance will enable local jurisdictions within northern Thurston County to regulate nonpoint sources when state agencies are unable to enforce their regulations. Such an ordinance does not replace state regulations, but rather complements them. Thurston County is expected to adopt such an ordinance in 1992.

Benefit: Protection of water quality and public health.

Project lead: Thurston County Health Department

Implementation strategy: Coordinate and implement regionally.

11.7 System Monitoring

System monitoring is a crucial element of water resource protection. While many monitoring efforts will be specific to each individual basin, it is also important to establish a regional monitoring program to oversee all water resources in the north Thurston region.

Recommendation R-17: **Establish a long-term regional water quality, stream gauging, and stream assessment program for key streams throughout the north Thurston region.**

Discussion: Monitoring environmental trends permits staff to evaluate the effectiveness of corrective measures, and provides an early warning system for problems. This program could utilize both volunteers and professional staff.

Benefit: Protection of aquatic resources within the north Thurston region, remedial measures will be evaluated and improved, and impacts related to specific projects will be identified.

Lead jurisdiction: Thurston County.

Implementation strategy: Coordinate and implement regionally.

Recommendation R-18: **Monitor stormwater facilities to assess the performance of best management practices (BMPs) and promote improved management techniques.**

Discussion: The performance of stormwater treatment techniques is rarely evaluated. A degree of uncertainty exists regarding the long-term level of treatment provided by the best available, and current required, techniques.

Benefit: Accurate evaluations of performance would provide the basis for improvements in currently used techniques.

Project lead: To be determined.

Implementation strategy: Coordinate regionally, implement locally.

11.8 Public Involvement and Education

Recommendations are organized by the general categories of public involvement and education (PIE) activities discussed in Chapter 7: community grants, education and training, public information and outreach, coordination and evaluation, and data management.

COMMUNITY GRANTS

Recommendation R-19: **Establish a regional community grants program to support volunteer action projects, school projects, and community education.**

Discussion: A permanent funding source would provide community groups and businesses with the means to participate in solving local storm and surface water problems. Some of the grants would target high priority projects and activities in each basin. There are no existing community grant programs devoted to water resources issues.

Benefit: Community initiated projects to address local storm and surface water problems, and additional funding for school projects focusing on water resources.

Project lead: Thurston County.

Implementation strategy: Coordinate and implement regionally.

EDUCATION AND TRAINING

Recommendation R-20: **Present Stream Team activities for volunteers including: networking meetings, regional Stream Team workshops and action projects, and advanced training seminars. Involve school and community groups, and lake and streamside property owners in Stream Team activities and provide technical assistance for volunteers.**

Discussion: Volunteer projects increase the sense of responsibility for water resources among local residents. The Stream Team program will result in hundreds of skilled volunteers who are actively protecting and restoring water resources, training other volunteers, and educating their friends and neighbors. This measure will extend and expand the existing Stream Team program which currently relies exclusively on grant funding.

Benefit: Increased awareness and protection of water resources throughout the north Thurston region.

Project lead: Olympia and Thurston County.

Implementation strategy: Coordinate and implement regionally.

Recommendation R-21: **Establish Public Involvement and Education (PIE) internships or work-study positions in local stormwater programs, and encourage local colleges to offer graduate and undergraduate projects and classes on water resources public involvement and education.**

Discussion: College interns and projects will help to produce educational materials, interpret natural resources, coordinate volunteers, evaluate programs, and manage data. This will create a pool of trained, experienced resource people who can assist community water resources PIE programs in Thurston County. Currently, no local stormwater programs have PIE internships.

Benefit: Inexpensive assistance for local stormwater programs, and development of qualified public involvement professionals.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-22: Create a Stream Team Naturalist program.

Discussion: The Stream Team Naturalist program would present interpretive programs on the natural resources of the watersheds to schools, community groups, and the general public. Stream Team volunteers would also be trained to present information. The Stream Team program would coordinate training and field activities. No such program currently exists.

Benefit: Support for public involvement and outreach activities, and improved environmental awareness in the community.

Project lead: Olympia and Thurston County.

Implementation strategy: Coordinate and implement regionally.

Recommendation R-23: Provide business and industry with education and training opportunities.

Discussion: Business education activities will help forge a partnership between businesses and local government, with the common goal of protecting and improving water resources. Activities associated with this recommendation would include: workshops with Thurston Conservation District to implement conservation plans; workshops on implementing the new drainage manual and basin plan requirements; technical support on waste management and water resource issues (source control and BMPs through Operation: Water Works); and coordination with business organizations and public agencies.

The improved relationship between public and private sectors will eventually reduce the need for enforcement. Operation: Water Works is a temporary, grant-funded project to encourage best management practices for businesses; the other parts of this recommendation, such as drainage manual training and technical support would constitute a new program.

Benefit: Heightened awareness and understanding of water resources within the business community. Potential reduced need for enforcement of environmental codes.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-24: Present water resource training workshops for school teachers, and provide water resource education kits that include predesigned curricula and teaching aids.

Discussion: Water resource education for young people is a long-term investment in developing public values that support environmental protection and stewardship. Because environmental education is currently required in all Washington public schools, local governments have an opportunity to work cooperatively with school districts. Three educator workshops were presented in 1990 through a centennial grant that will expire in June 1991.

Benefit: Increased environmental education within public schools focusing on water resources.

Project lead: Thurston County.

Implementation strategy: Coordinate and implement regionally.

Recommendation R-25: Train jurisdictional staff to implement and enforce basin plan recommendations such as new drainage standards and land use regulations.

Discussion: Adoption of the basin plan will result in a variety of new practices and regulations. Effective plan implementation will require retraining local government employees because they have the primary responsibility for enforcement and technical assistance. This recommendation would apply in Percival, Indian/Moxlie, and Woodard/Woodland basins.

Benefit: Heightened awareness and enforcement of basin plan recommendations by jurisdictional staff.

Project lead: Lead jurisdiction for basin plan.

Implementation strategy: Coordinate and implement regionally.

PUBLIC INFORMATION AND OUTREACH

Recommendation R-26: Provide opportunities to involve youth, families, teachers, and schools in special, water-related community activities.

Discussion: A program of special community activities will include Family Fun Days, children's Stream Team day camp, "hands-on" displays for schools, field trips to areas of special interest, cold water aquaria for classrooms, and classroom water quality presentations by staff. This program will involve residents who have not been reached by existing Stream Team programs, and will encourage active participation among entire family groups. No existing program meets this need.

Benefit: Helps local schools meet Washington's environmental education requirements, and creates long-term improvements in water resources management.

Project lead: Olympia and Thurston County.

Implementation strategy: Coordinate and implement regionally.

Recommendation R-27: Create a storm and surface water public information program to provide consistent, accurate information to the media and increase educational outreach to the public.

Discussion: The public information program would provide the primary communication between local water resource management agencies, the media, and the public. The program would manage all media contacts by arranging interviews and filming sessions, producing accurate news releases and briefings, publishing frequent articles in newspapers and periodicals, and mounting high profile media campaigns. Outreach activities would include publishing educational brochures, posters, and publicity materials for local events that highlight the national significance of local issues. This program would improve the public perception of local water resource protection efforts, and prevent damaging misinformation from reaching the public through the media.

Currently, numerous local agencies provide bits and pieces of public information on water resource issues, with little consistency between information sources. This measure would consolidate these scattered sources of information and provide reliable funding. Most existing outreach relies on temporary project funds.

Benefit: More accurate and consistent public information, improved public perception of resource protection programs, and increased public participation in water resources programs.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-28: Investigate financial incentives that encourage schools to incorporate water resources curriculum and meet established criteria.

Discussion: Utility rates will offer a financial incentive for schools to develop and maintain water resources education programs.

Benefit: Helps schools meet state environmental education requirements, and creates long-term improvements in water resources management.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-29: Create a Citizen Stream Patrol program.

Discussion: The Citizen Stream Patrol program will train local citizens to identify destructive practices such as illegal dumping, land clearing and grading, inadequate erosion controls, grazing in streams, and other violations. The Stream Team program will coordinate training and field activities. Stream-specific teams will work closely with existing enforcement and complaint-response programs. No such program currently exists.

Benefit: Increased personal responsibility for protection and stewardship of local stream basins, and improved regulations enforcement.

Project lead: Olympia and Thurston County.

Implementation strategy: Coordinate and implement regionally.

Recommendation R-30: Develop new water resource exhibits for fairs and local events.

Discussion: Public exhibits will include portable, free-standing display boards as well as permanent interpretive signs for critical resource sites. Portable displays will be updated regularly to show progress on current projects. Exhibit topics will include stream systems,

volunteer projects, impacts of runoff, and suggestions for homeowners. Exhibits will be displayed at all major local events including Harbor Days, Wooden Boat Festival, Capitol Lakefair, Earth Day, Lacey Fun Fair, County Fair, Community Awareness Days, etc. Exhibits will also be displayed at schools, libraries, and community centers. Currently, exhibits often include out-of-date information.

Benefit: Improved outreach to audiences which have not received other types of public information, and increased public participation in volunteer projects

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-31: Manufacture and install watershed boundary signs for each major drainage in Thurston County using a region-wide design.

Discussion: The most important challenge for public water resource education is making residents aware of the existing natural resources in their local areas. Stream crossing signs have already helped improve public awareness, and watershed boundary signs will increase awareness by identifying drainage boundaries. Existing signs on Interstate-5 in the Nisqually watershed provide a good example.

Benefit: Increased public awareness of water resources.

Project lead: Thurston County.

Implementation strategy: Coordinate and implement regionally.

COORDINATION AND EVALUATION

Recommendation R-32: Devote staff to a regional Education Technical Advisory Committee (ETAC).

Discussion: Water resources education demands regional coordination because water resources transcend local boundaries. Each basin jurisdiction needs to devote ongoing staff to the regional PIE program, so as to avoid duplication with other programs and provide a consistent method for evaluating public involvement and education activities. The ETAC would be responsible for coordination and evaluation of plan PIE elements, implementation of the public education guidelines in the Puget Sound Water Quality

Management Plan, creation of a database to help monitor and evaluate plan implementation, and organization of a regional citizen advisory committee to monitor public education and involvement.

Benefit: Enhanced interjurisdictional coordination on public education issues.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

DATA MANAGEMENT

Recommendation R-33: **Create a computerized data management system to organize and analyze data collected by Stream Teams, public workshops, and volunteer projects. Publish results biannually, including photos, monitoring data, and volunteer participation.**

Discussion: The data management system will help managers to coordinate and evaluate the effectiveness of PIE activities, provide quick access and consistent information to all stormwater programs, and could be expanded to improve existing complaint response programs. Currently, data management is haphazard and inconsistent between jurisdictions.

Benefit: Improved PIE coordination and public assistance.

Project lead: Olympia.

Implementation strategy: Coordinate and implement regionally.

11.9 Cooperative Program Management

Several basins in north Thurston County are the subject of basin plans. Because drainage basins do not recognize jurisdictional boundaries, it is imperative that the governments work cooperatively to implement the plans.

Recommendation R-34: Support multijurisdictional basin plan coordination and implementation.

Discussion: Although basin plan implementation would necessitate increased levels of interjurisdictional coordination and decision making, existing administrative practices could be utilized depending upon the funding approach chosen to facilitate these needs.

Benefit: More comprehensive approach to coordinating the implementation of current and future basin plans.

Project lead: All jurisdictions.

Implementation strategy: Coordinate regionally, implement locally.

Recommendation R-35: Establish a technical support position to assist jurisdictions in identifying appropriate funding sources and preparing grant applications for implementation of basin plan recommendations.

Discussion: Due to budgetary constraints, many of the recommendations within the basin plans will have to be implemented using outside financial assistance. Current staffing levels do not allow adequate time to be dedicated to searching for potential funding sources and preparing numerous grant applications.

Benefit: Heightened awareness of potential funding sources and competitiveness in the grant awarding process.

Project lead: Thurston County.

Implementation strategy: Coordinate and implement regionally.

Recommendation R-36: Establish a five-year implementation strategy for increased cooperation in water resources management within the Urban Growth Management Area.

Discussion: Stormwater issues are most effectively managed through regional cooperation. As the UGMA becomes increasingly developed it may be necessary for expanded regional management of stormwater issues. Interjurisdictional management is the most cost effective and least duplicative method of handling stormwater concerns.

Benefit: Increased effectiveness and comprehensiveness of stormwater management programs.

Project lead: To be determined.

Implementation strategy: Coordinate and implement regionally.

Table 5: Nonstructural Surface Water Management Program Costs

	OLYMPIA				TUMWATER				LACEY				THURSTON COUNTY			
	Capital	Staff, FTE	Misc. Annual $	One-Time Staff $	Capital	Staff, FTE	Misc. Annual $	One-Time Staff $	Capital	Staff, FTE	Misc. Annual $	One-Time Staff $	Capital	Staff, FTE	Misc. Annual $	One-Time Staff $
R-1					120,000	2			120,000	3			330,000	3.6		
R-2																
R-3																
R-4		0.04	1,000			0.04	1,000			0.04	1,000			0.04	1,000	
R-5		0.04				0.04				0.04				0.04		
R-6		0.02				0.02				0.02				0.02		
R-7				7,500				7,500				7,500				7,500
R-8																
R-9																
R-10		0.2				0.4				0.4				1.0		
R-11				2,000				2,000				2,000				2,000
R-12				10,000[1]				10,000[1]				10,000[1]				10,000[1]
R-13																
R-14				7,500				7,500				7,500				7,500
R-15						1.0				1.0				2.0		
R-16																
R-17			18,000				4,000				11,000				21,000	
R-18			5,000				5,000				5,000				5,000	
R-19		0.05	3,000			0.05	3,000			0.05	3,000			0.05	3,000	
R-20		0.6	1,200			0.6	1,200			0.6	1,200			0.6	1,200	
R-21		0.15	500			0.15	500			0.15	500			0.15	500	

	OLYMPIA				TUMWATER				LACEY				THURSTON COUNTY			
	Capital	Staff, FTE	Misc. Annual $	One-Time Staff $	Capital	Staff, FTE	Misc. Annual $	One-Time Staff $	Capital	Staff, FTE	Misc. Annual $	One-Time Staff $	Capital	Staff, FTE	Misc. Annual $	One-Time Staff $
R-22				2,000				2,000				2,000				2,000
R-23				750				750				750				750
R-24		0.5	2,500			0.5	2,500			0.5	2,500			0.5	2,500	
R-25		0.125				0.125				0.125				0.125		
R-26																
R-27			2,400				2,400				2,400				2,400	
R-28		0.25				0.25				0.25				0.25		
R-29		0.25				0.25				0.25				0.25		
R-30		0.025	500			0.025	500			0.025	500			0.025	500	
R-31				500				500				500				500
R-32		.25	500			.25	500			.25	500			.25	500	
R-33		0.05		1,250		0.05		1,250		0.05		1,250		0.05		1,250
R-34			5,000				5,000				5,000				5,000	
R-35		0.125				0.125				0.125				0.125		
R-36			5,000				5,000				5,000				5,000	
Total	0	2.675 $120,375	44,600	31,500	120,000	5.875 $264,375	30,600	31,500	120,000	6.875 $309,375	37,600	31,500	330,000	9.075 $408,375	47,600	31,500

[1]Assumes 120,000 Centennial Grant match.