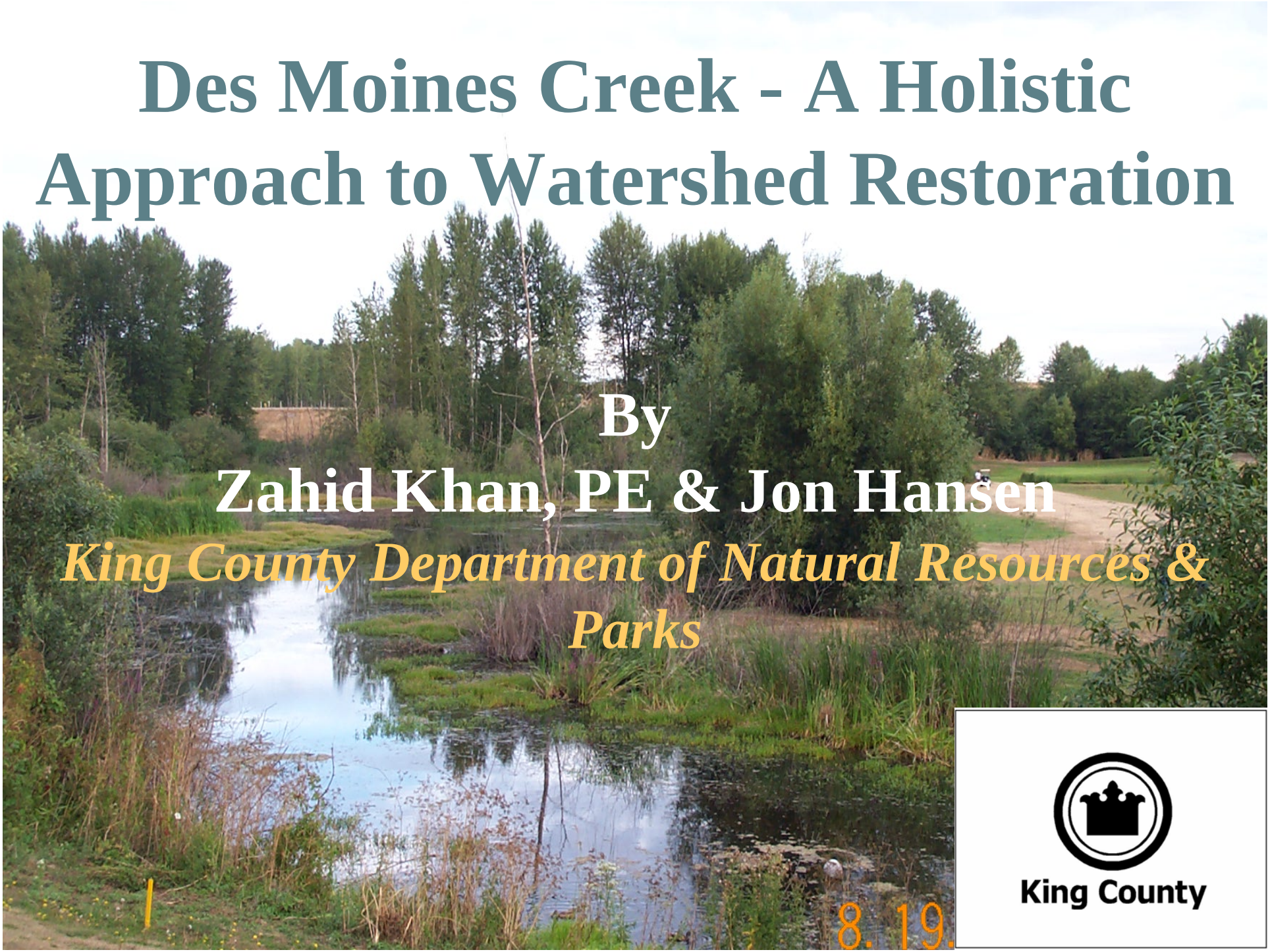
Des Moines Creek - A Holistic Approach to Watershed Restoration



By

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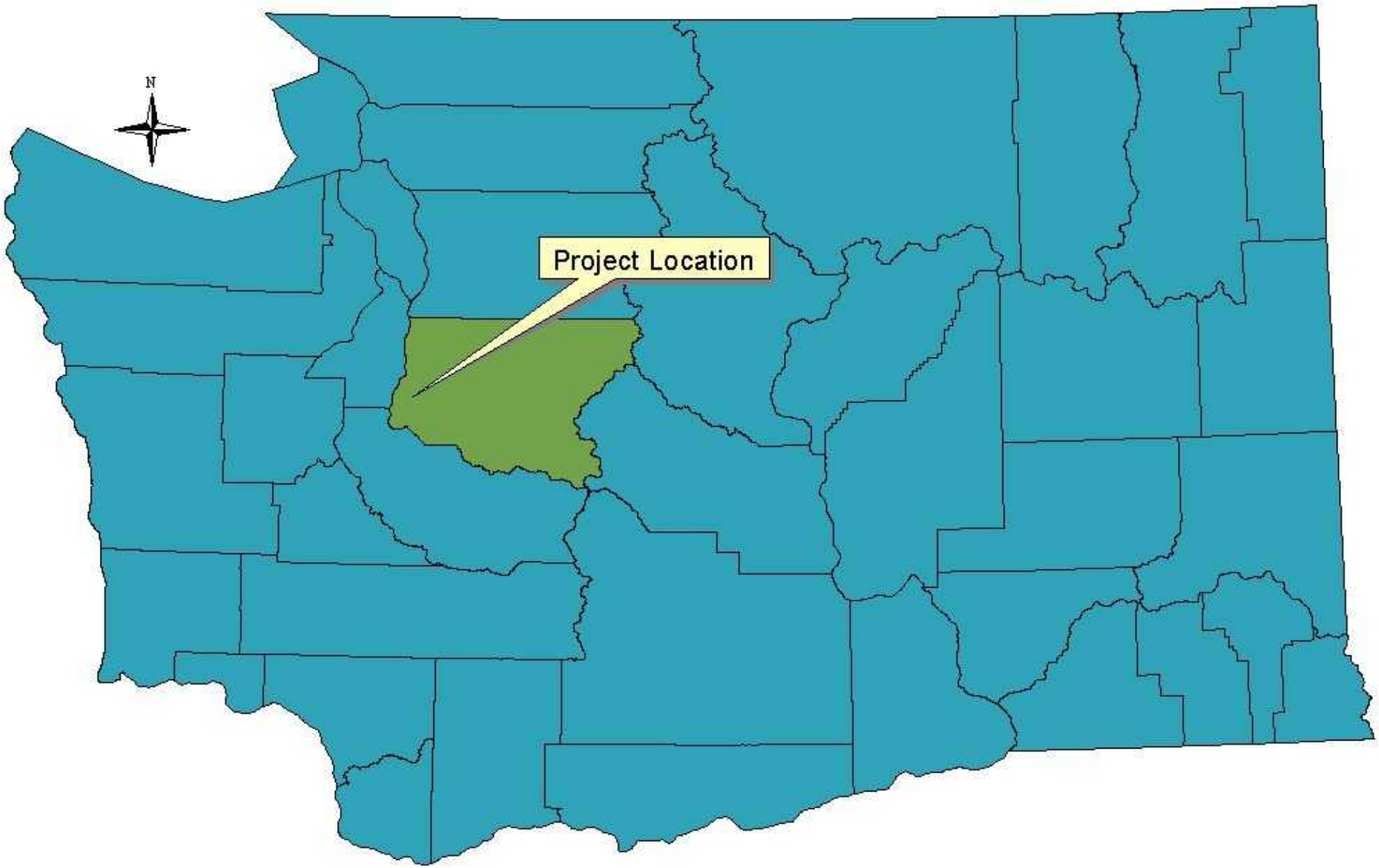
King County Department of Natural Resources & Parks

King County

Presentation Outline

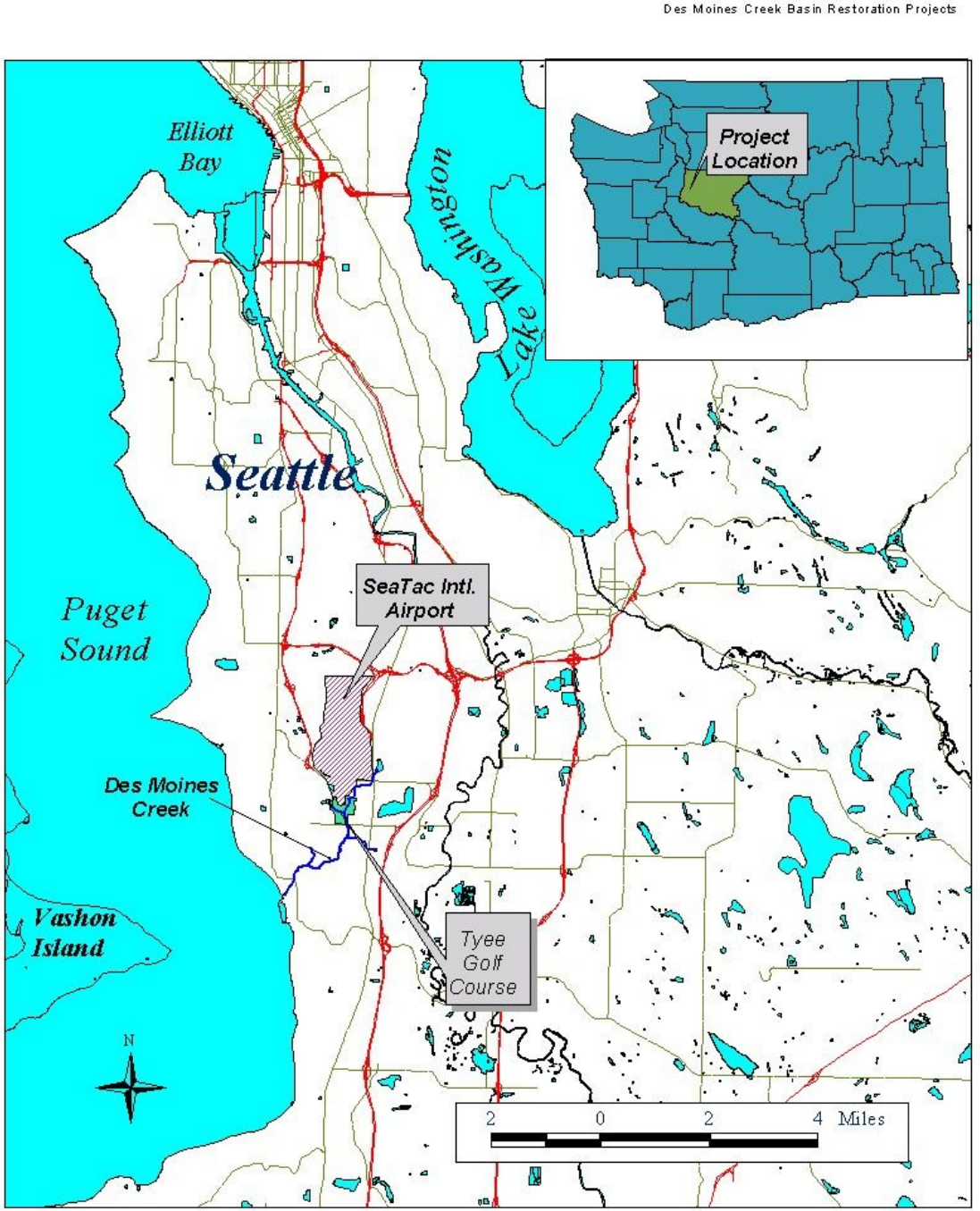
- **Des Moines Creek Basin Description**
- **Basin Planning Process**
- **Holistic Restoration Approach**
- **Modeling & Assessment**
- **Regulatory Issues**
- **Cost & Schedule**



Des Moines Creek Project Location

Project Vicinity Map

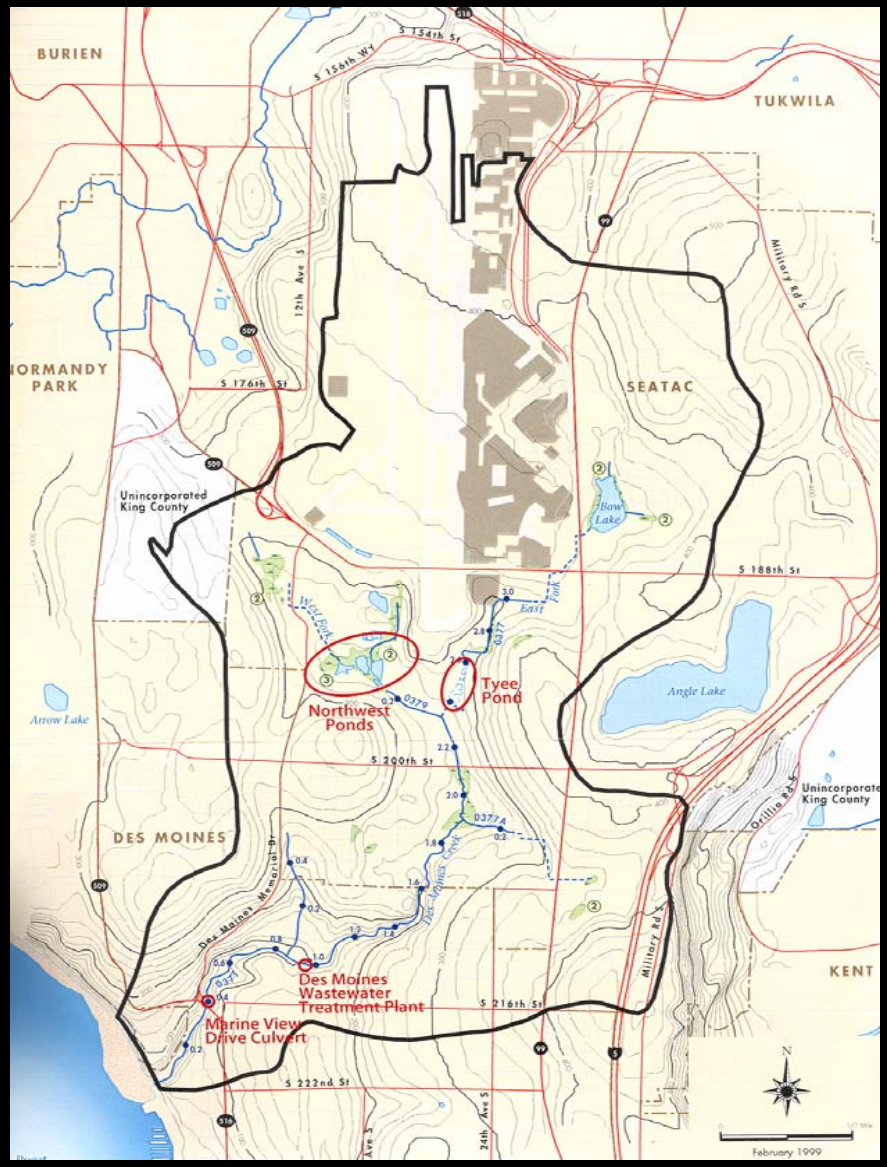
- **Located within Cities of SeaTac and Des Moines**
- **Adjacent to SeaTac international airport**
- **12 miles south of Seattle**

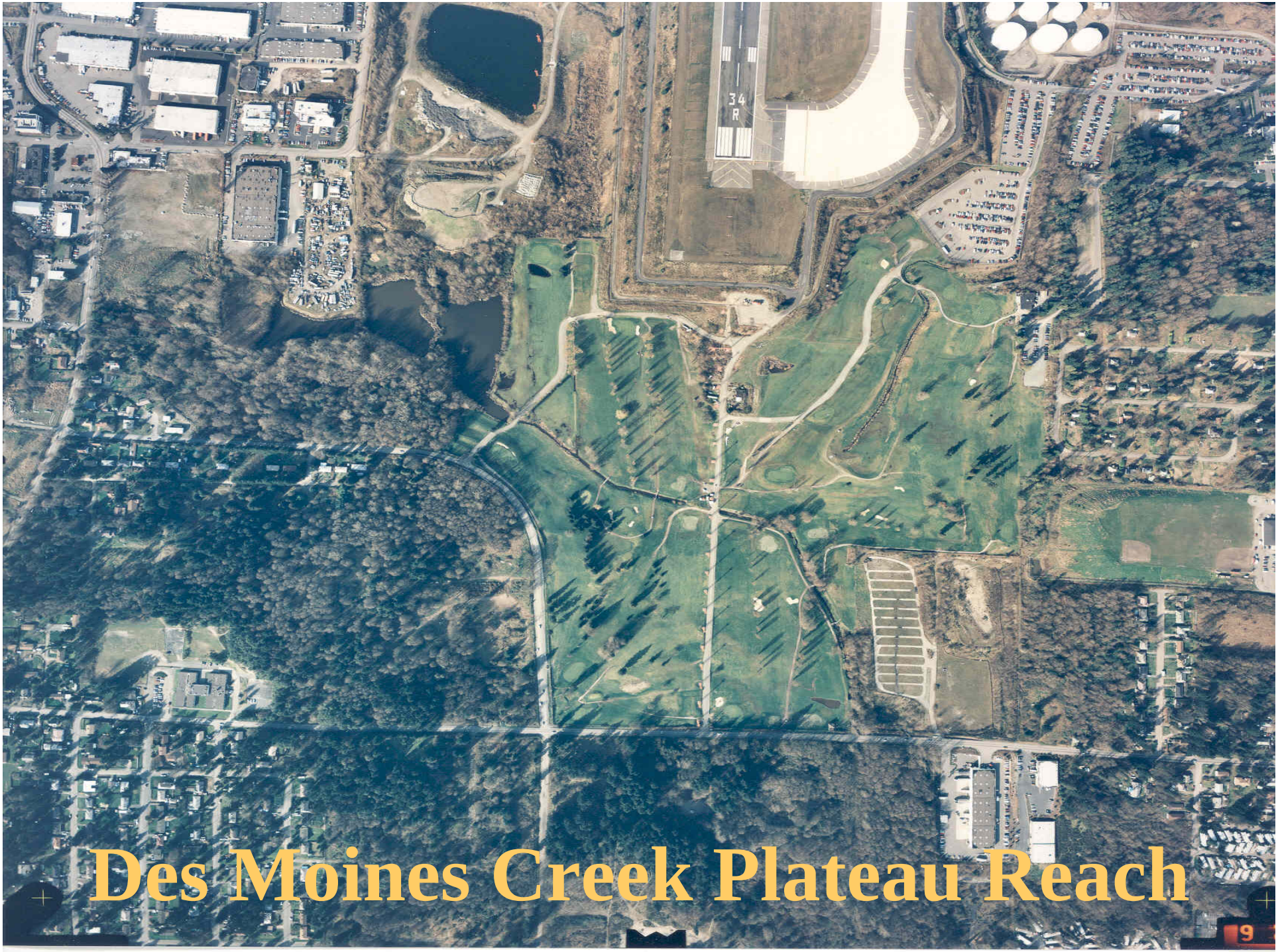



Des Moines Creek

Des Moines Creek Basin

- Basin area - 5.8 square miles.
- Two branches, two main tributaries.
- Three distinct reaches - Plateau, Ravine and Lower.





Des Moines Creek Plateau Reach

Basin Land Use

1937

1997


Existing Wetland System
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Wetland Characteristics

- **30+ acre wetland with multiple communities**
- **Forested, Scrub/Shrub, and Open water**
- **Emergent areas within existing golf course**

Ravine Reach

- Channel confined and incised to “hardpan”.
- Simplified channel has limited pools and wood.
- Vegetated corridor through Des Moines Creek Park.
- Fish access limited by Marine View Drive and weirs at Treatment plant.
- Impaired by regular high flows.


Ravine Reach


Lower Reach

Fish Use

- **Historically coho, chum and steelhead had access.**
- **Resident Cutthroat throughout.**
- **Access above MVD severely limited.**

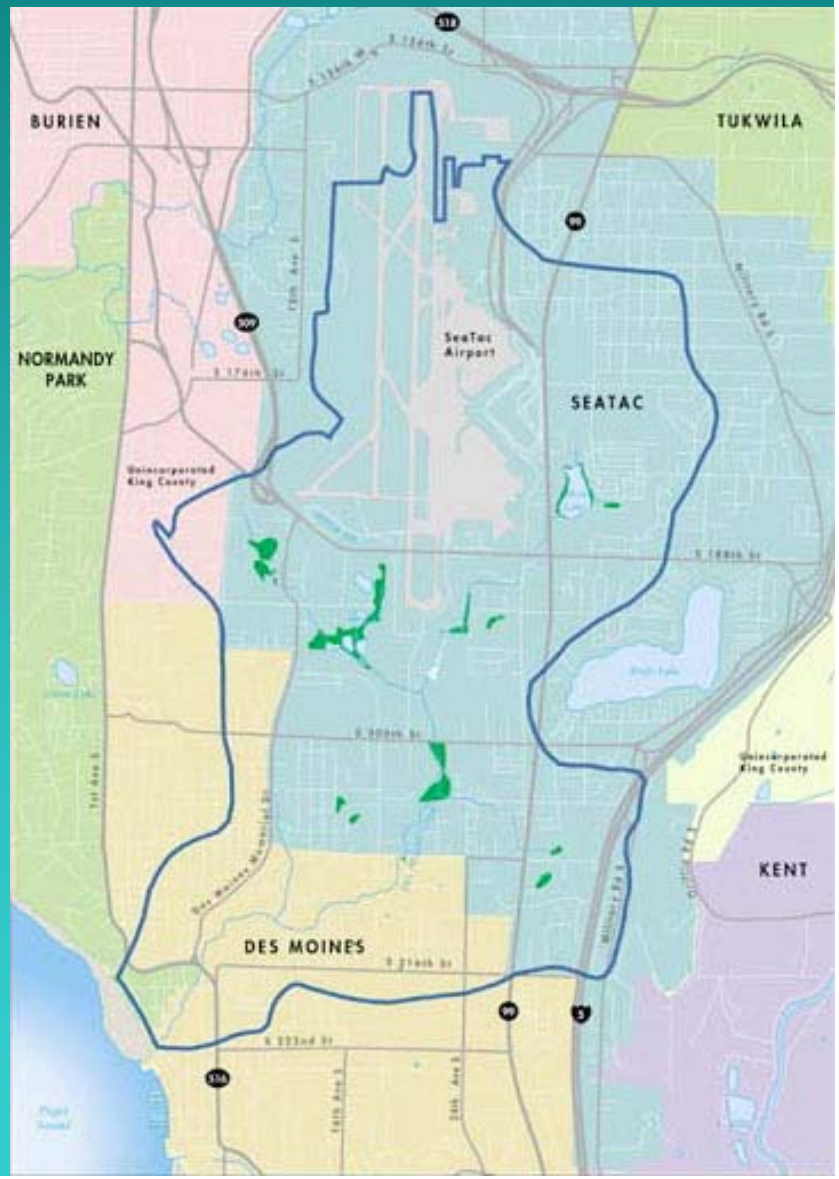
Existing Problems

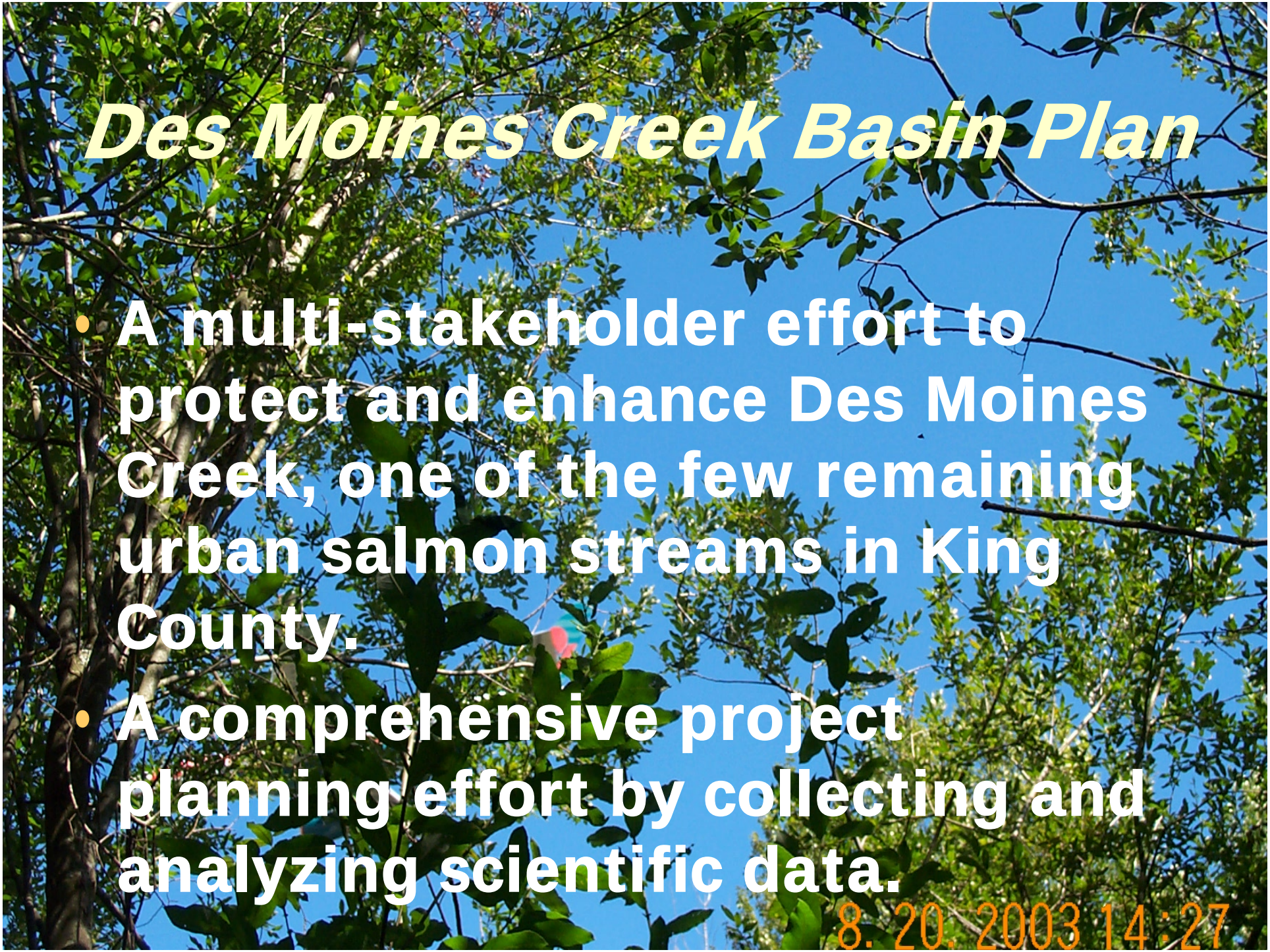
- **Inadequate flow control measures.**
- **Impaired fish habitat.**
- **Downstream flooding.**
- **Reduced summer base flow.**
- **Degraded water quality**
- **Fish passage barrier.**

Basin Planning Process

Des Moines Creek Basin Plan Committee

- City of Des Moines
- City of SeaTac
- Port of Seattle
- King County
- Washington State Department of Transportation





Des Moines Creek Basin Plan

- **A multi-stakeholder effort to protect and enhance Des Moines Creek, one of the few remaining urban salmon streams in King County.**
- **A comprehensive project planning effort by collecting and analyzing scientific data.**

Basin Planning Recommendations

- **Stabilize flow regime within Des Moines Creek**
- **Reduce erosive energy within the channel**
- **Protect & enhance aquatic habitat**
- **Develop & prioritize capital projects at a basin-wide scale**


Holistic Restoration Approach

Proposed Projects

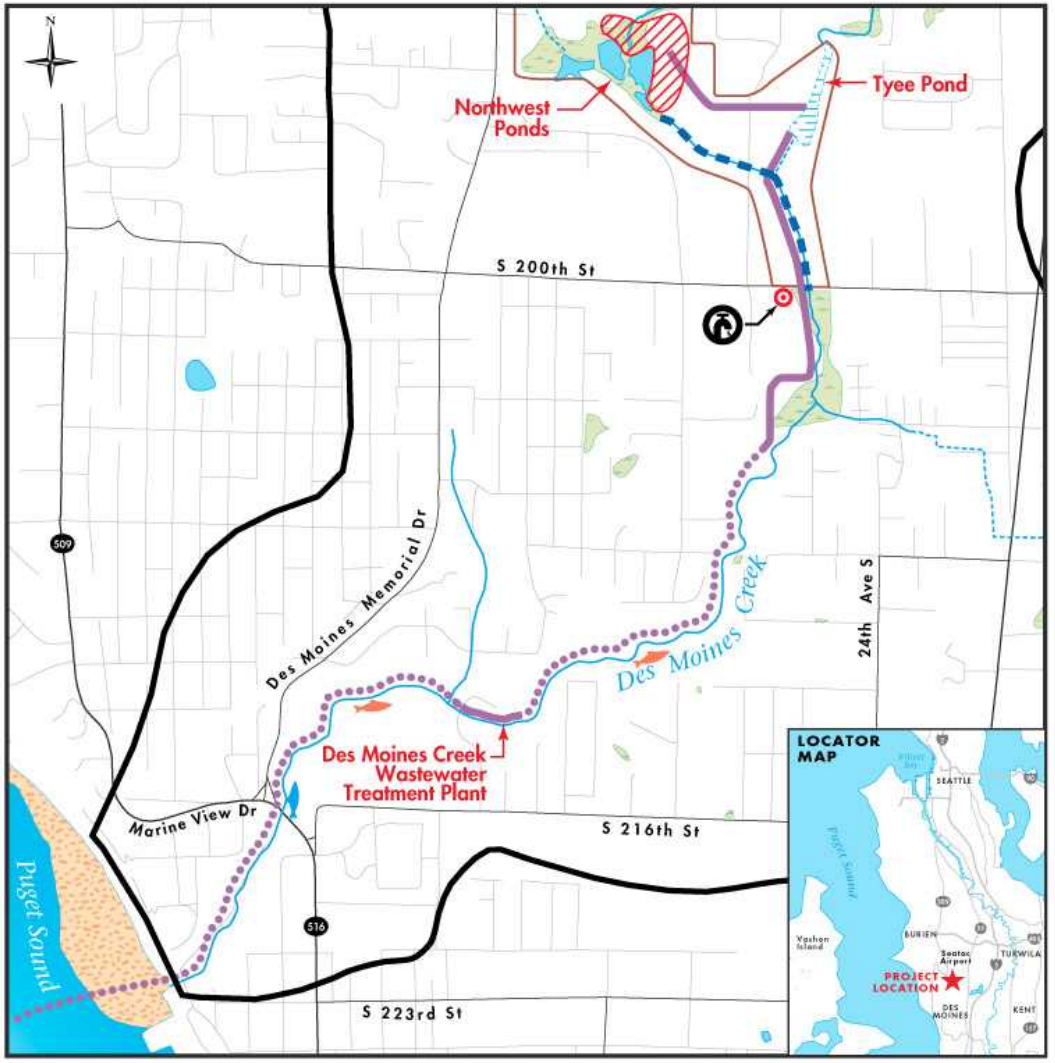
- **Regional Detention Pond.**
- **High-flow Bypass to Puget Sound.**
- **In-stream Habitat Enhancement.**
- **Low Flow Augmentation.**
- **Culvert Replacement Under Marine View Drive.**

Project Goals

- **Stabilize the stream channel and reduce erosion.**
- **Restore fish passage.**
- **Enhance fish habitat.**
- **Minimize flooding downstream.**
- **Augment stream flow.**

Project Sites

- **Detention pond**
- **High-flow bypass**
- **Fish habitat enhancement**
- **Fish passage improvement**
- **Low flow augmentation**



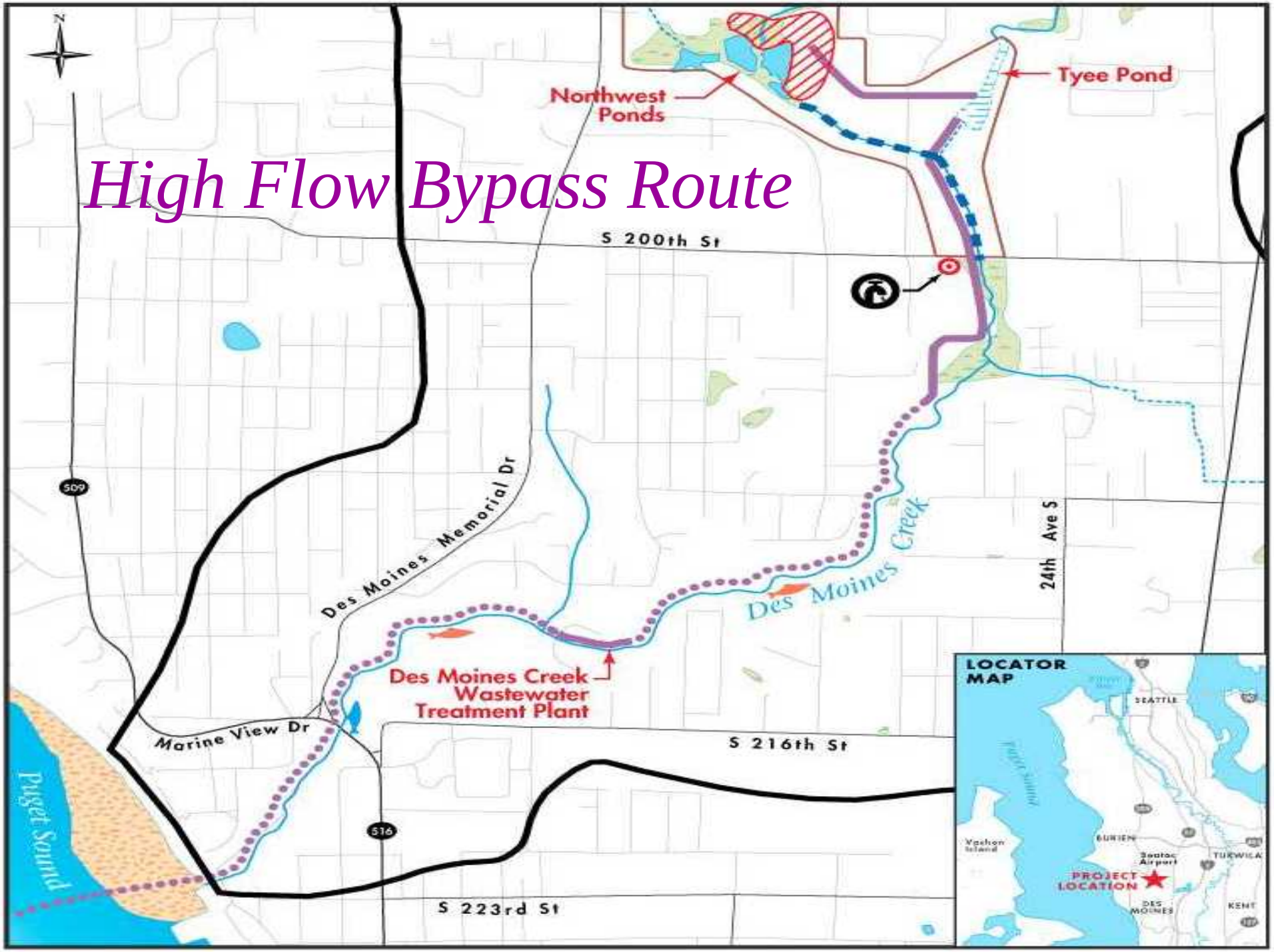
Regional Detention Pond

- **Reduce peak flows by storing water during storms.**
- **Release flow at a slower rate.**
- **Reduce erosive flow velocity downstream.**

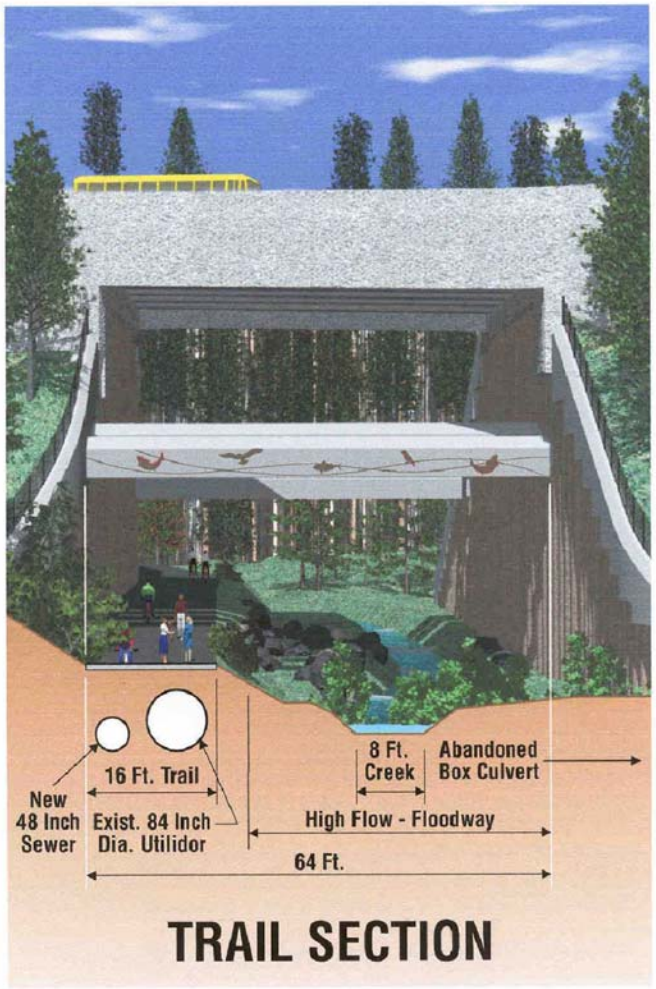

Conceptual Plan
Cell 2
Northwest Ponds
Cell 1
Tyee Outlet to NW Ponds
East Fork
Outlet Control Structure
Berm A
West Fork
S. 196th St.
Tyee Pond
Berm C
Outlet Control Structure
Berm B
Outlet Control Structure
Connect to Existing Tyee Outlet Pipe
Bypass Pipe
18th Ave S
Connect to Existing Pipe
S. 200th St.
Berm D
Existing Wetland
Proposed Average Water Surface
Channel Reconstruction
Excavation Cells 1-2
Berms A and B
New Bypass Pipe
Tyee Diversion Pipe
Existing Pipe
N
100 0 100 200 300 Feet
Des Moines Creek
Regional Capital Improvement Project

High Flow Bypass System

- **Divert high flows to the existing pipeline.**
- **Reduce erosive flow in the creek during storms.**
- **Maximize the RDF efficiency.**
- **Outfall into Puget Sound.**


High Flow Bypass Route
Northwest Ponds
Tyee Pond
S 200th St
Des Moines Memorial Dr
509
Des Moines Creek
24th Ave S
Des Moines Creek Wastewater Treatment Plant
Marine View Dr
S 216th St
516
S 223rd St
Puget Sound
LOCATOR MAP
SEATTLE
BURIEN
Sea-Tac Airport
TUKWILA
PROJECT LOCATION
DES MOINES
KENT

Culvert Replacement Under Marine View Drive



Stream Habitat Enhancement

- Add logs and boulders to create habitat.
- Plant vegetation to enhance stream corridor.
- Re-grade a portion of stream channel to improve habitat.

Fish Habitat Improvement Zones

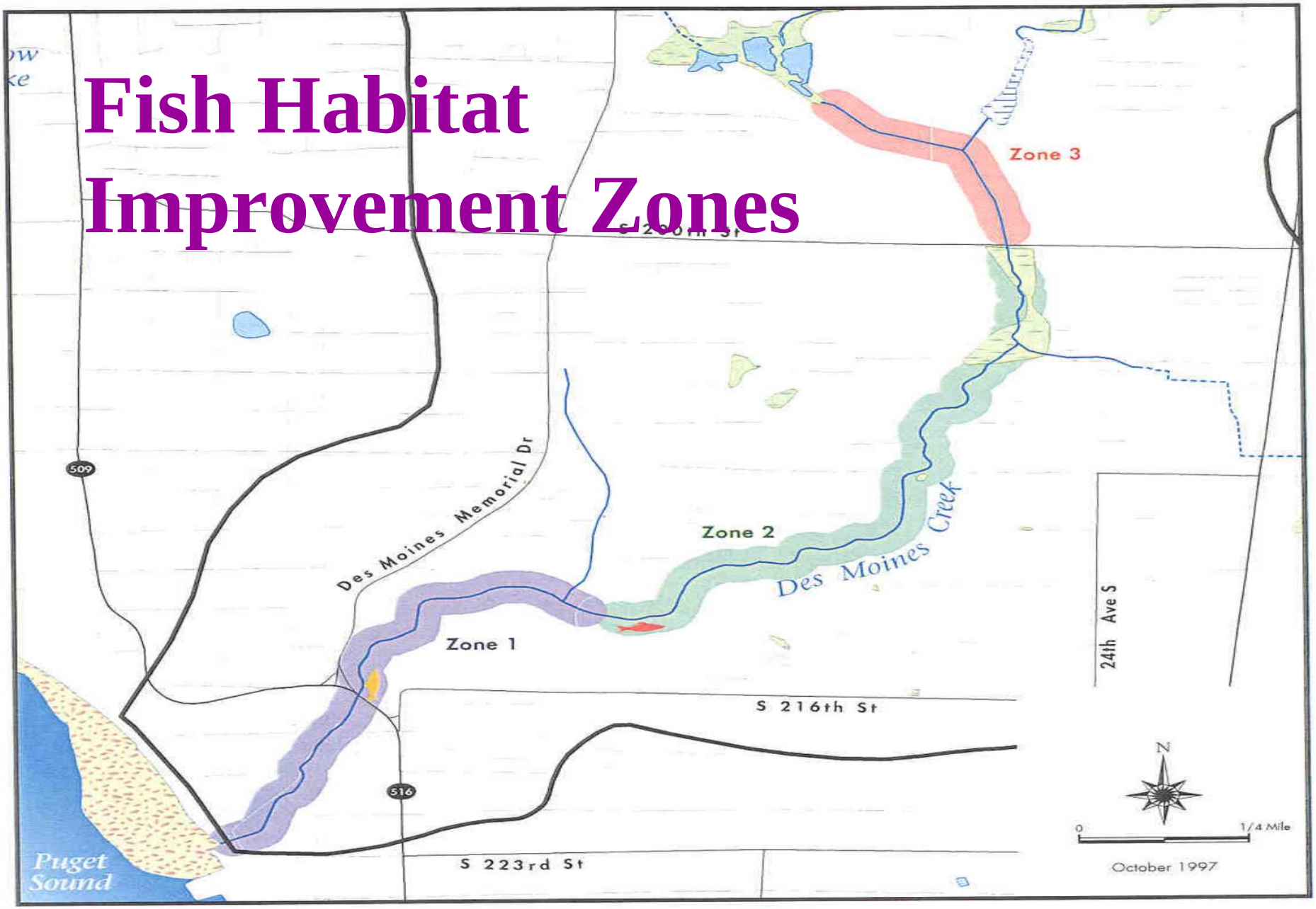


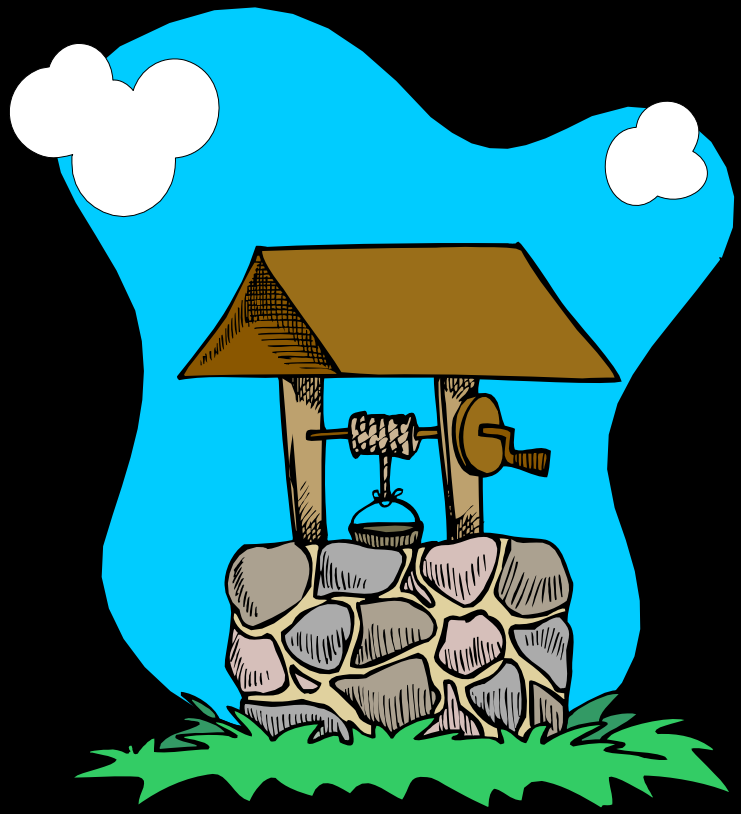
Figure 6-2

DES MOINES CREEK BASIN

Proposed Fish Management Actions

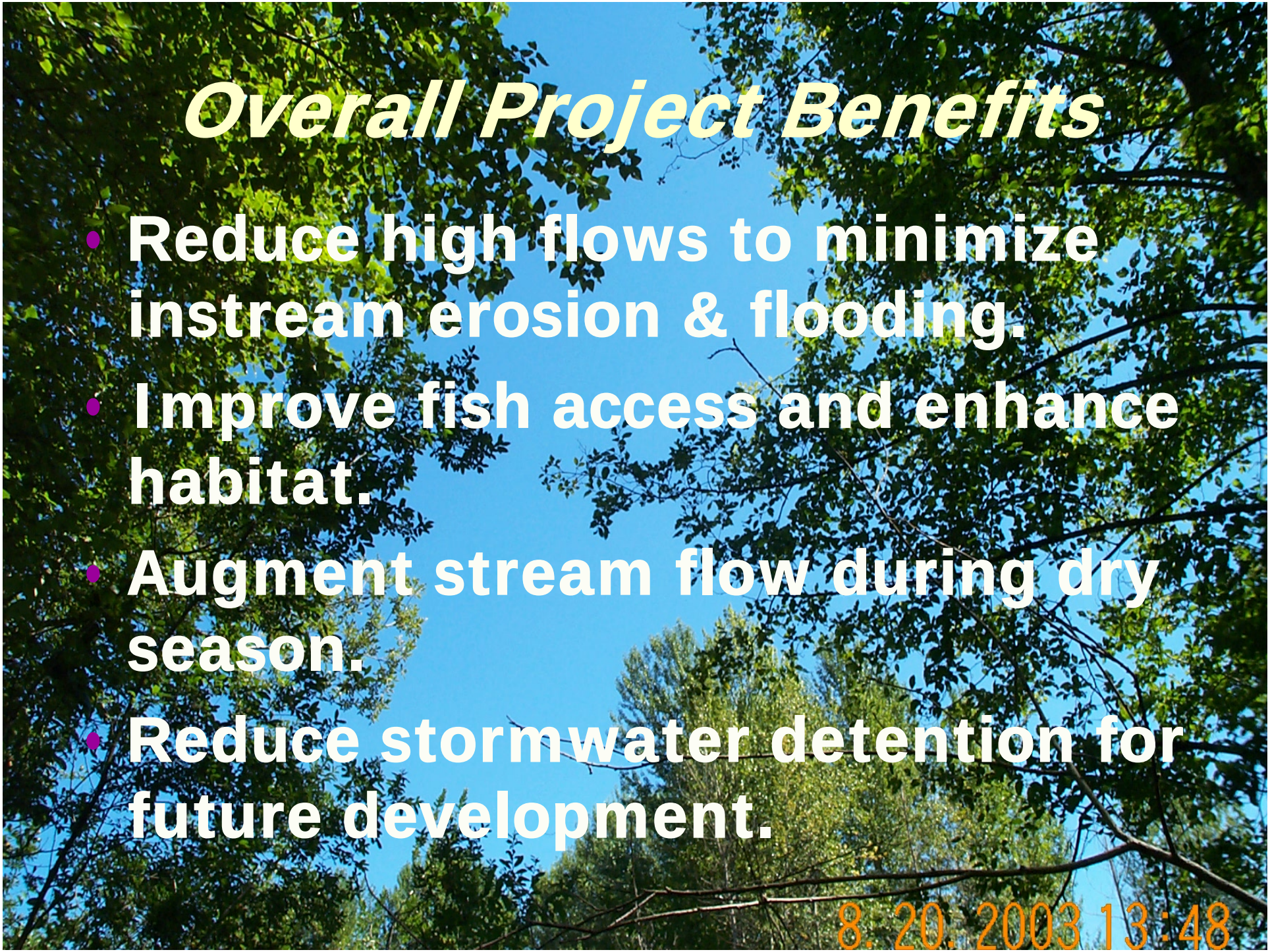
Summer Flow Augmentation

- **Enhance fish survival during summer.**
- **Augment base flow during dry season.**
- **Aerate to improve dissolved oxygen levels.**



Overall Project Benefits

- Reduce high flows to minimize instream erosion & flooding.
- Improve fish access and enhance habitat.
- Augment stream flow during dry season.
- Reduce stormwater detention for future development.



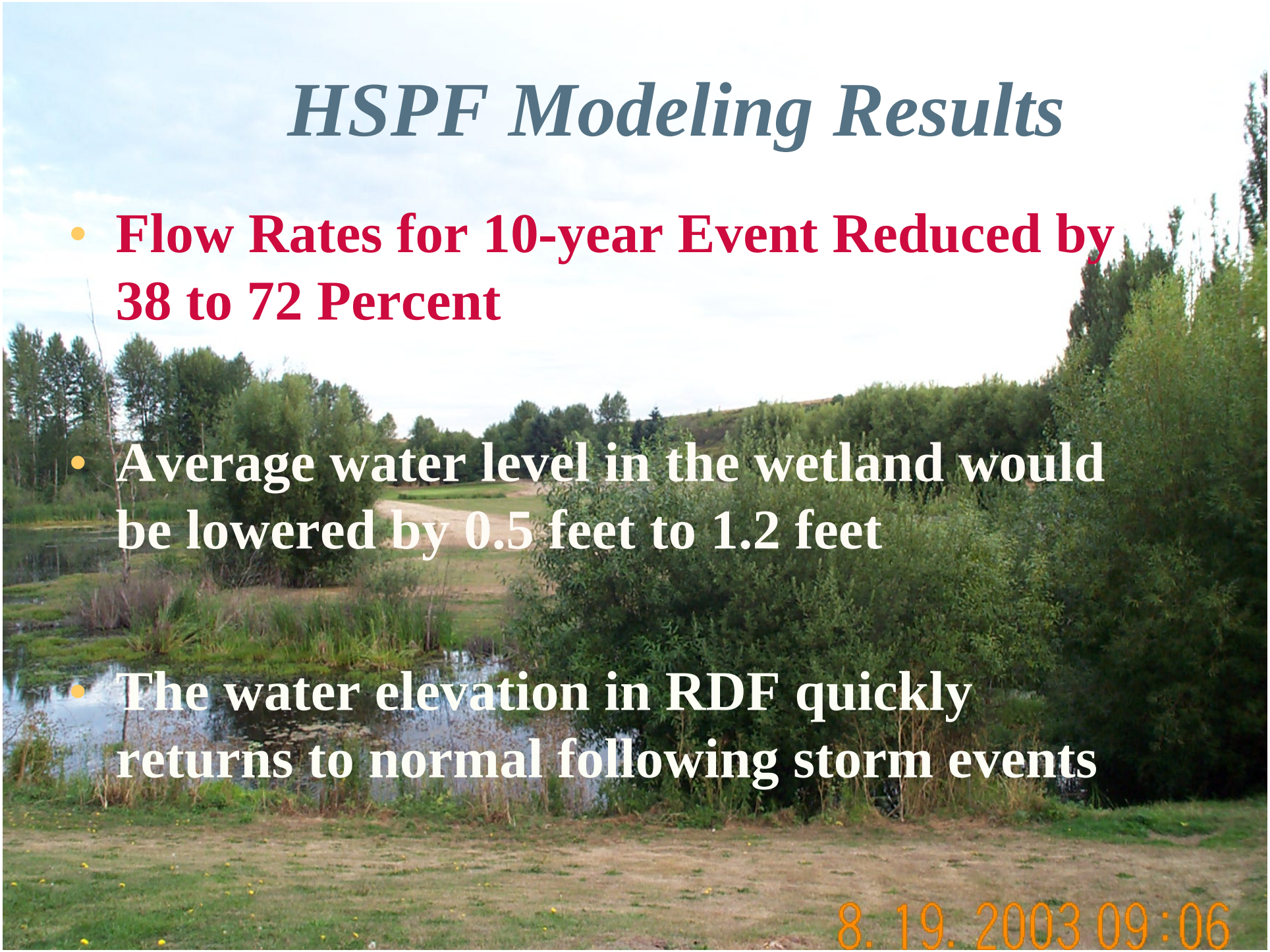
Modeling & Assessment

HSPF Modeling Goals

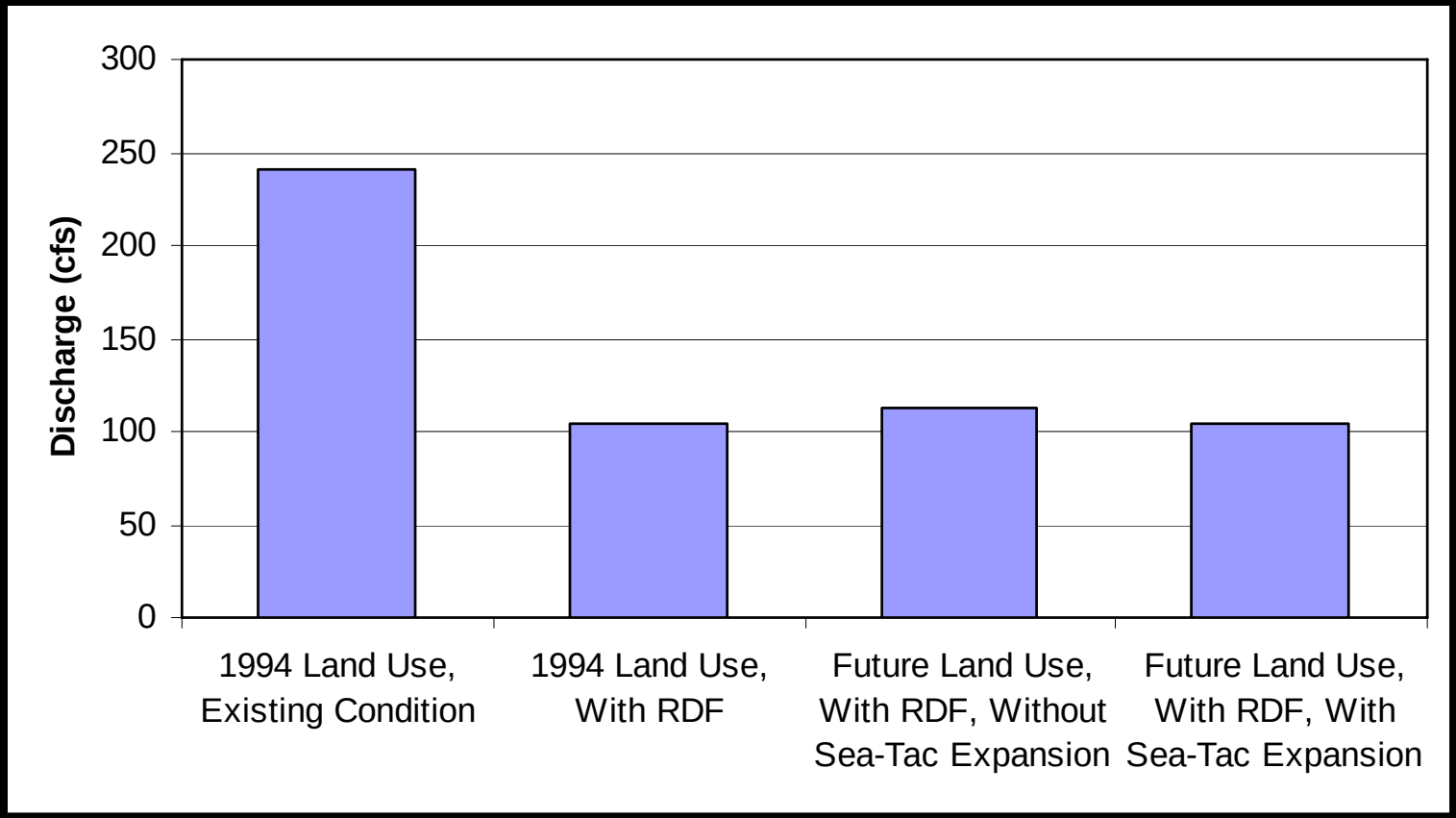
- **Study the Effectiveness of the RDF to Provide Flow Control**
- **Assess Water Level Fluctuation and Duration Within the Wetlands**

HSPF Modeling Results

- **Flow Rates for 10-year Event Reduced by 38 to 72 Percent**
- **Average water level in the wetland would be lowered by 0.5 feet to 1.2 feet**
- **The water elevation in RDF quickly returns to normal following storm events**



Comparison of Flows at Head of Des Moines Creek Ravine



Flooding of Community Center in Des Moines Beach Park November 14, 2001 Flood

Value Engineering Study

- **Validate project design & construction cost estimate**
- **Invited local experts with diverse backgrounds to review project design**
- **Evaluated and incorporated recommendations into design**
- **Reduced project cost**


Regulatory Issues
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Regulatory Issues

- Detain stormwater within a wetland for the benefit of fish/stream restoration
- Minimize water impoundment to reduce risk of bird strike on airplanes
- Direct discharge to Puget Sound
- Setting a new watershed standard for stormwater detention
- Use of groundwater to augment stream flow during dry summer

Permit Authorities

- US Army Corps of Engineers (Section 404 CWA)
- Federal Aviation Administration
- U.S. Fish and Wildlife Service (Section 7 ESA)
- NOAA Fisheries (Section 7 ESA)
- US Department of Agriculture (bird strike)
- WA Department of Ecology (Section 401 and Water rights)
- WA Department of Fish and Wildlife (HPA)
- WA Department of Natural Resources (Aquatic Lease)
- Port of Seattle
- City of SeaTac
- City of Des Moines

Project Cost

Planning, design, & permitting	= $1.2 M
Construction of RDF	= $11.5M
Construction of bypass	= $1.2M
Stream restoration projects	= $0.6M
Low flow augmentation project	= $0.25M
Construction of MVD Bridge	= $3.75M
Oversight, monitoring, compliance	= $0.75M
Construction management	= $0.75M
TOTAL ESTIMATED COST	**= $20M**

Project Schedule

- **Project Design 2001-2003.**
- **Obtain Permits by early 2004.**
- **Construction begins in 2004.**
- **Multi-stage construction.**
- **Estimated construction duration three to four years.**

Questions?