# Lower Snoqualmie & Skykomish Rivers Flood Insurance Study

## Federal Emergency Management Agency Region X

Flood Study and Map Overview

Science Seminar

November 7, 2006


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# Overview of Study Coordination

- Flood study was initiated through FEMA's Map Modernization Program
  - Nationwide effort to improve flood insurance studies and maps
  - Provides grant funding
- Previous Lower Snoqualmie River maps are based on 1965 data with limited detail
- Previous Skykomish River maps – 1970's data
- Large flood events (November 1990) revealed that the maps do not accurately represent current-day flood hazards

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# Study Coordination Milestones

- Project start February 2004
  - Blue Post Card mailing to floodplain residents
  - Request for past flood data
  - News Release and Webpage
- Briefings with cities
  - Carnation Community Development Committee - June 14, 2004
  - Carnation Public Safety Committee - May 3, 2005
  - Carnation planning staff - December 7, 2005
  - Duvall planning staff - December 12, 2005
  - Carnation City Council – January 3, 2006
- Public Meeting January 2006
  - Yellow Post Card mailing to floodplain residents
  - News Release and Webpage

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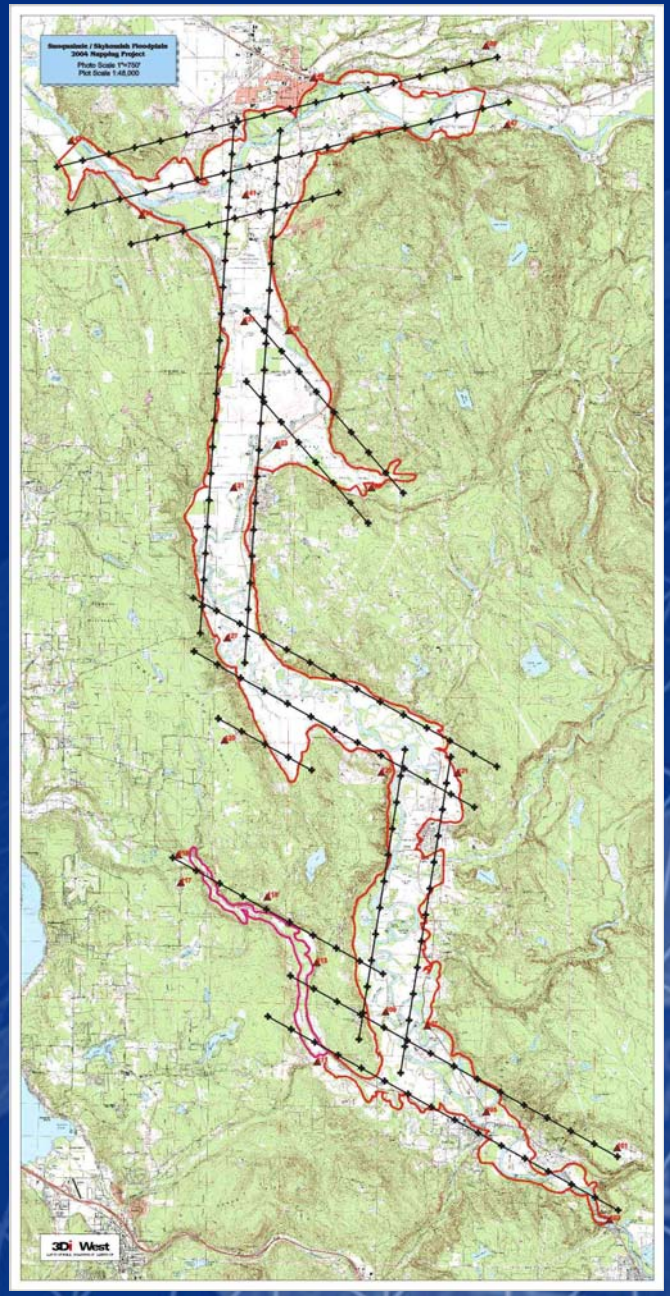
# Key Technical Tasks

- New Aerial Photography
- New Bathymetric (Channel) surveys
- New Topographic Mapping
- Hydrologic Analysis
- Hydraulic Modeling
- Flood Inundation Mapping
- Study Reporting

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# New Bathymetric Surveys

- Lower 40 Miles of Snoqualmie River
- Lower 10 Miles of Skykomish River
- Surveyed from boat using GPS and depth sounding equipment
- 250 cross sections surveyed including resurvey of those from previous FIS
- 9 detailed bathymetric survey areas (deltas and scour holes)


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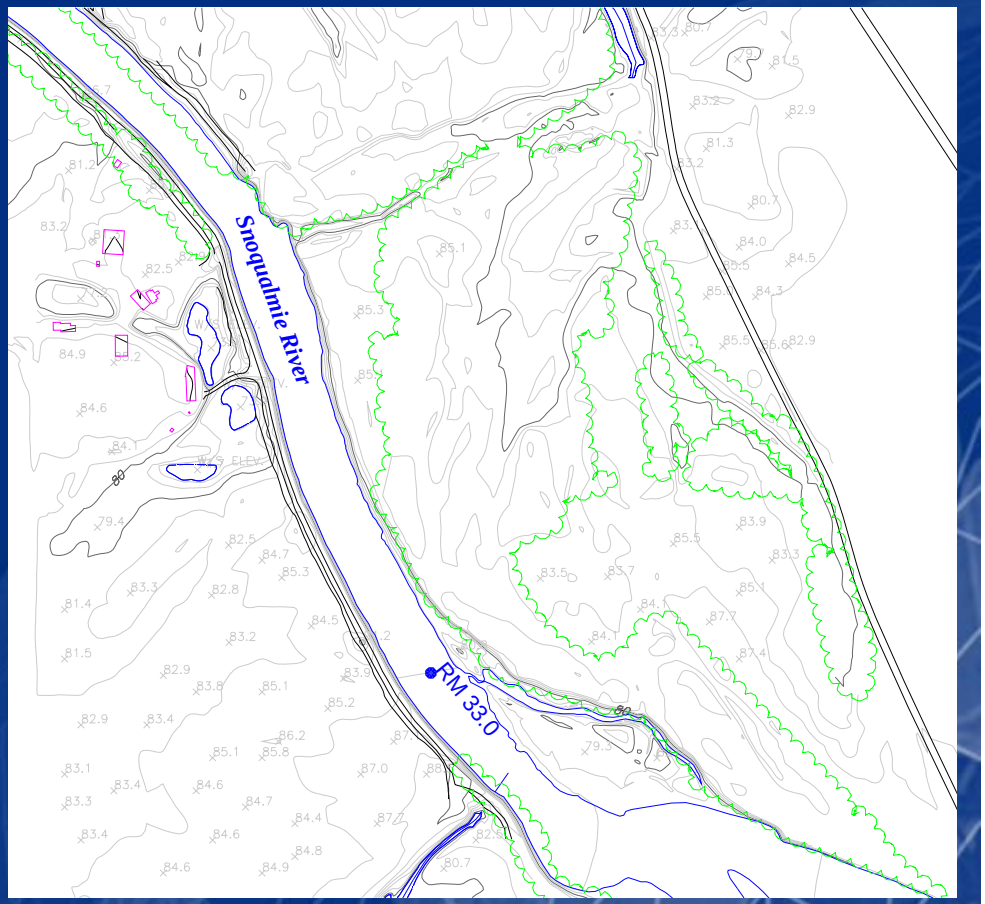
# Topographic Mapping

- New Aerial Photography flown in March 2004
- Combined Photogrammetric data with LiDAR data
- Cross checked topography against City of Carnation data
- Developed new 2-foot contour mapping for over 50 miles of river corridor
- Base maps produced at 1” = 500 foot scale

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# Hydrologic Analysis

- Used available USGS gage data at study boundaries including upstream Snoqualmie River, Skykomish River, Tolt River, Sultan River, and Raging River
- Infilled data by gage transposition or hydrologic modeling
- Focused on 1965 – 2003 period
- Adjusted discharges to account for:
  - SF Tolt Reservoir
  - Spada Lake
  - Snoqualmie 205 Project

# Hydraulic Modeling and Analysis

- Used other Study Products as Input (e.g. cross sections, topography, hydrology)
- Unsteady Flow Modeling using U.S. Army Corps of Engineers HEC-RAS Model
- No certified levees in Study area
- Calibration to 5 historic flood events
- Simulation of 11 additional historic flood events
- Development of 10-, 50-, 100-, and 500-year models
- Used 100-year model to develop floodway

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# Snoqualmie and Skykomish Rivers Modeled Discharges

| | 10-yr | 50-yr | 100-yr | 500-yr |
|---|---|---|---|---|
| **Snoqualmie River** near Snoqualmie: | 51700 | 71100 | 79100 | 95200 |
| **at Carnation (total):** | **58200** | **82400** | **91800** | **113300** |
| *Carnation (mainstem):* | *57700* | *72900* | *77400* | *86500* |
| *Carnation (overflow):* | *400* | *9500* | *14300* | *26800* |
| **at Duvall (total):** | **53400** | **75800** | **84600** | **99700** |
| *Duvall (mainstem):* | *22000* | *26700* | *26300* | *24500* |
| *Duvall (overflow):* | *31400* | *49100* | *58300* | *75200* |
| **Skykomish River** at Gold Bar: | 75300 | 106100 | 119300 | 149900 |
| **Snohomish River near Monroe:** | **120700** | **174400** | **196800** | **242900** |

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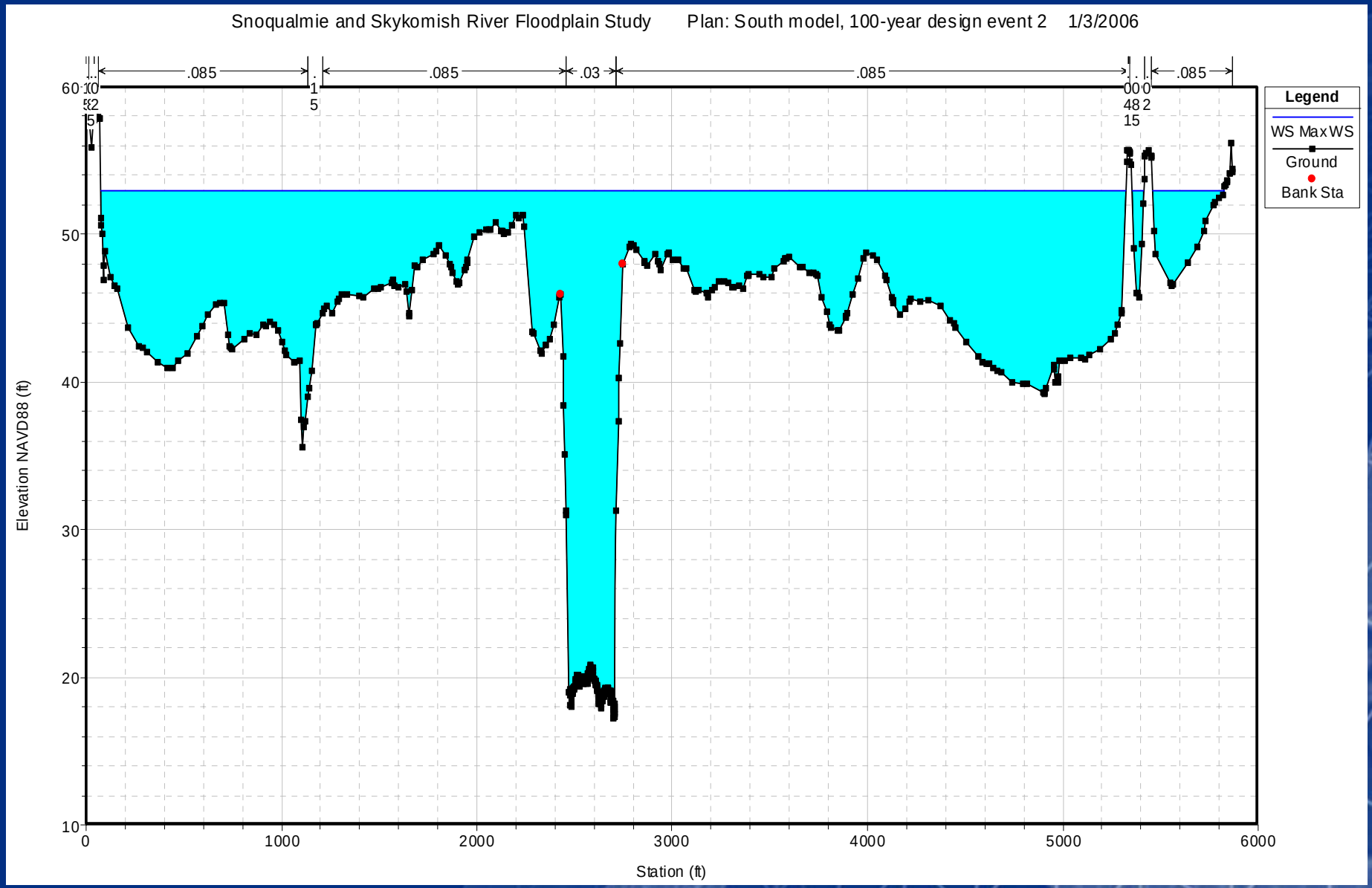
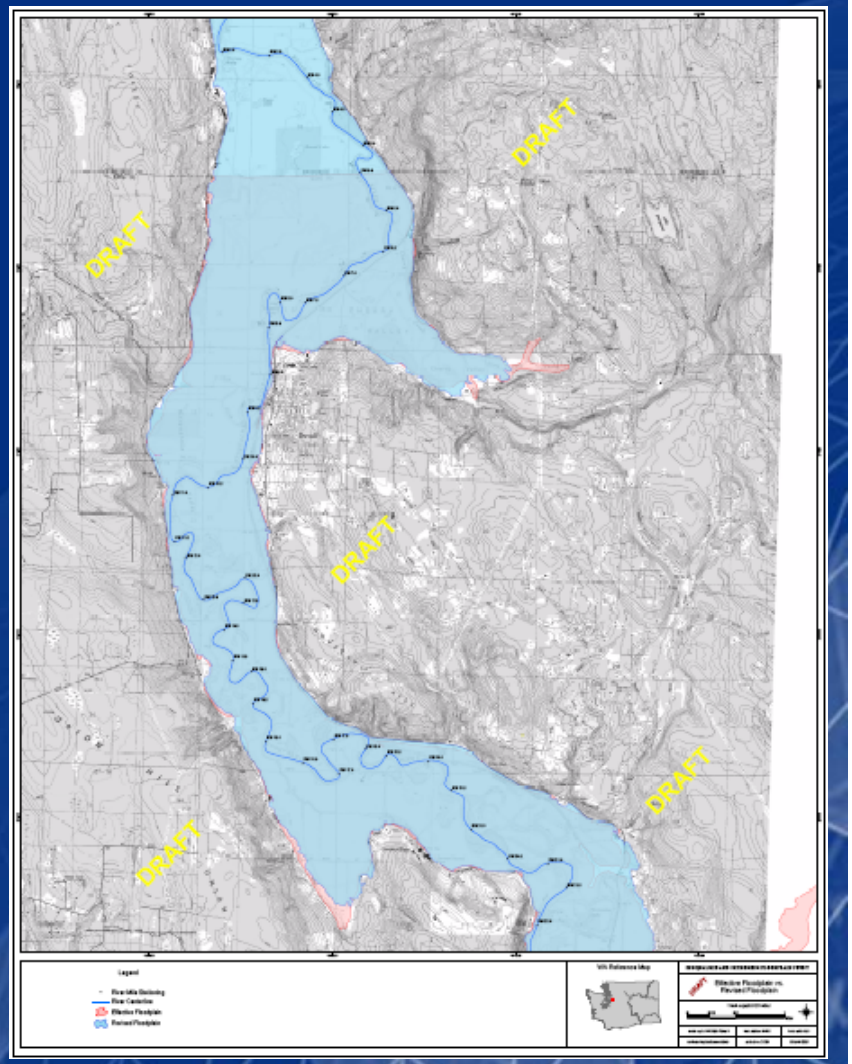
# Draft Results – Cross Section



# Flood Inundation Mapping

- Transferred data from hydraulic model to topographic map
- Developed Base Flood Elevations (BFEs)
- Mapped 100-year and 500-year inundation limits
- Plotted flood profiles for 10-, 50-, 100-, and 500-year events
- Mapped new floodway
- Note: FEMA will blend data at all study limits with previous studies

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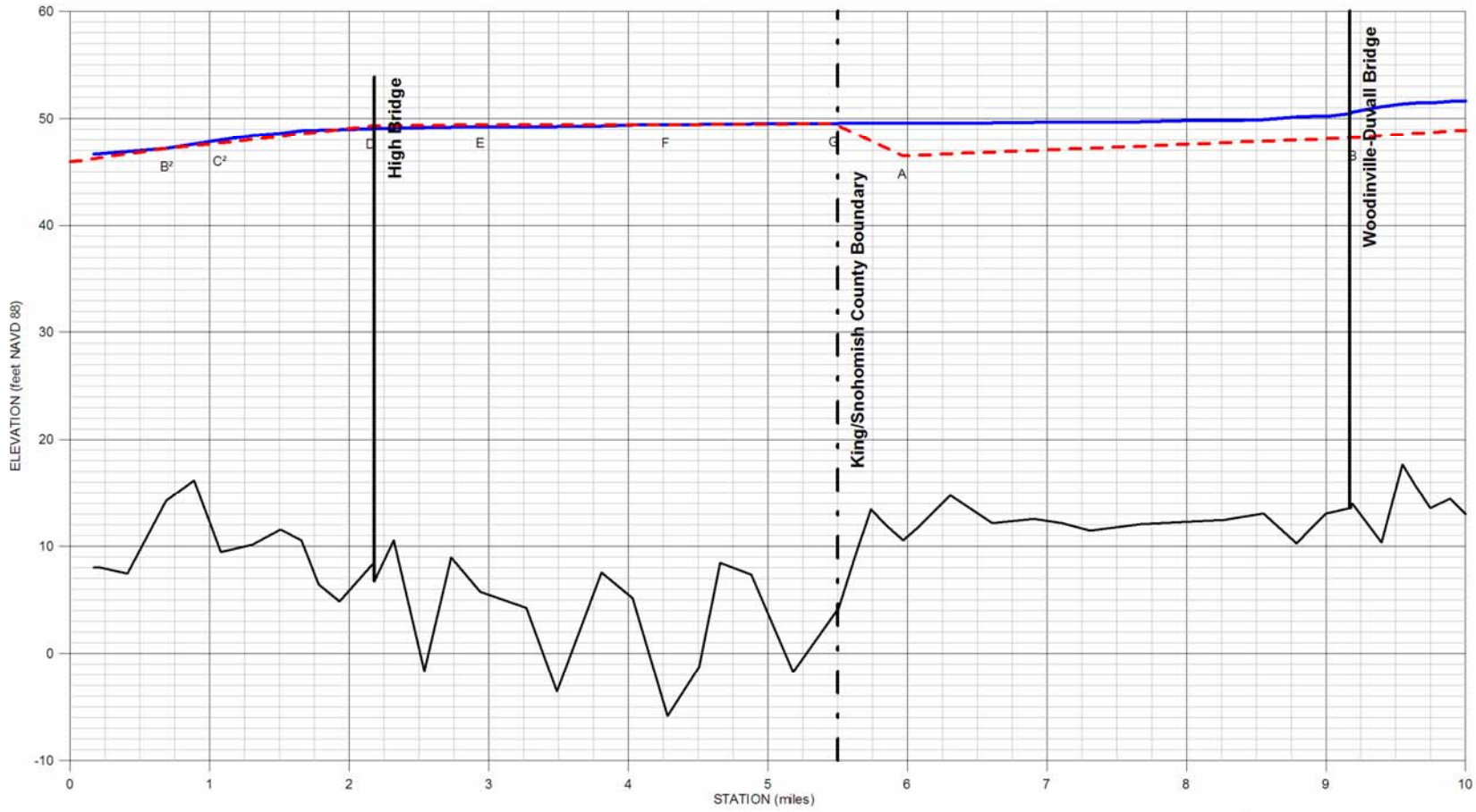
# Draft Results - Profiles




NOTE:

1. River station based on RM 0 at the confluence of the Snoqualmie and Skykomish Rivers.

Revised 100-year Profile
Effective 100-year Profile
Current Thalweg

SNOQUALMIE AND SKYKOMISH RIVERS FLOODPLAIN STUDY

**SNOQUALMIE RIVER EFFECTIVE vs. REVISED 100-YEAR PROFILE**

northwest hydraulic consultants

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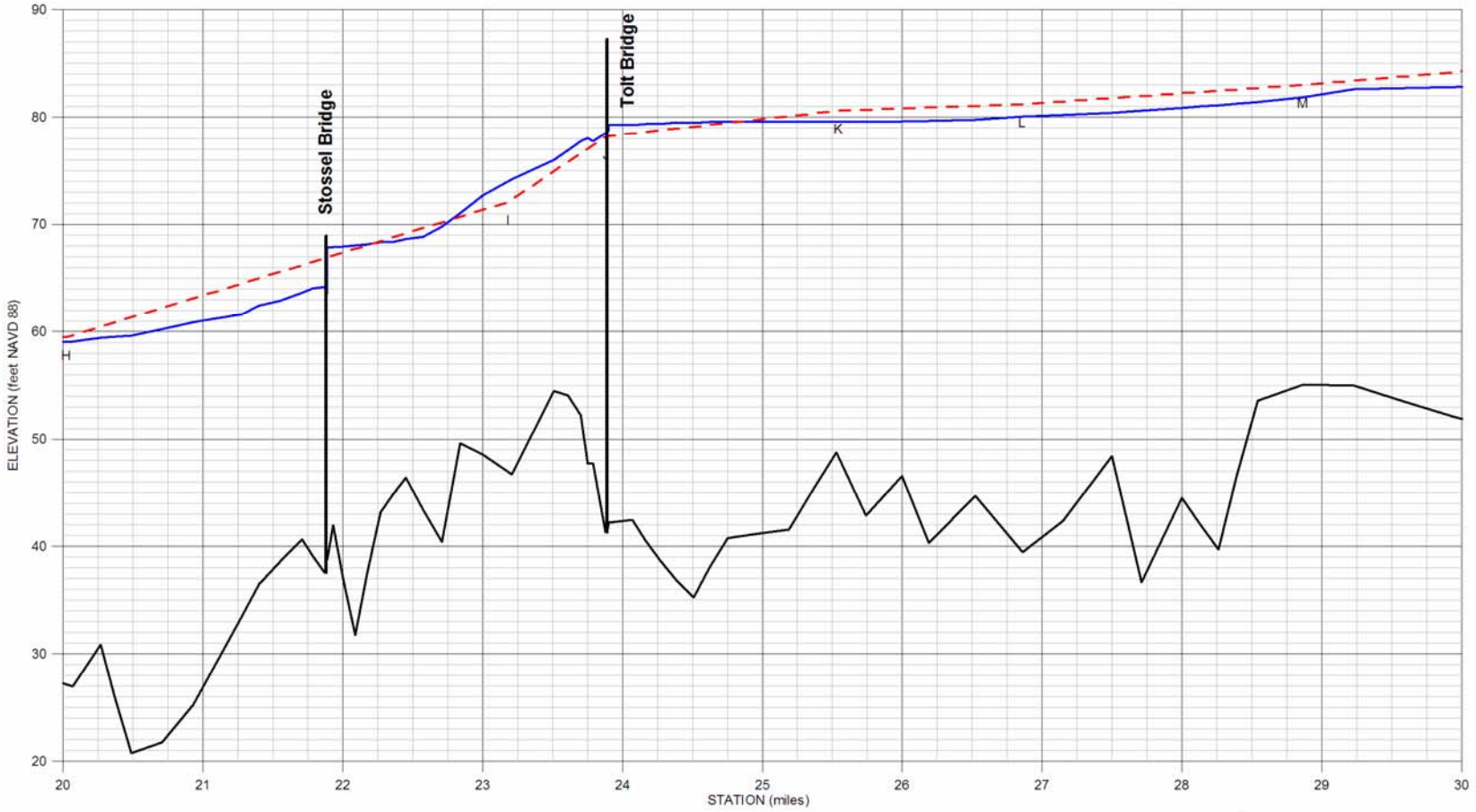


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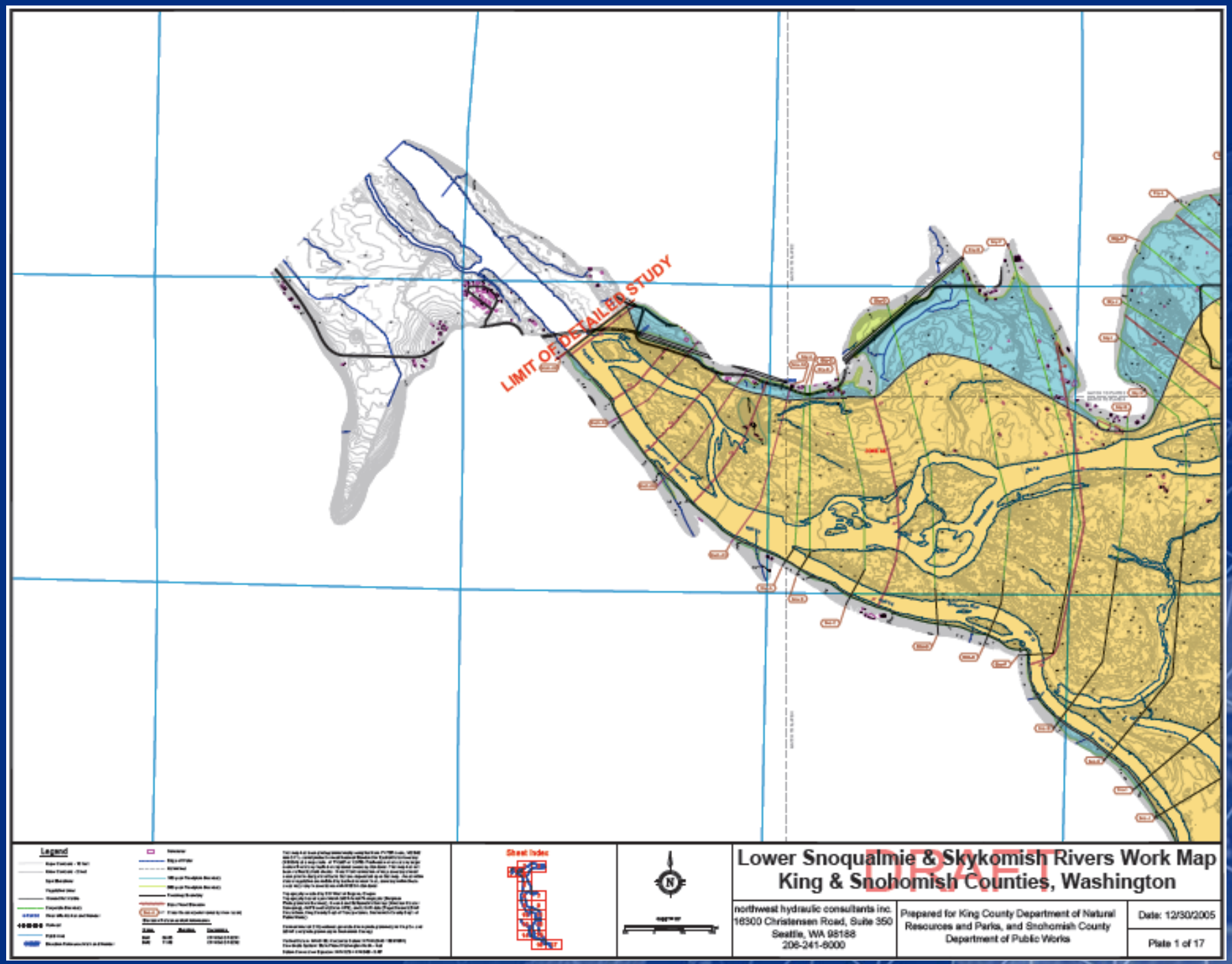
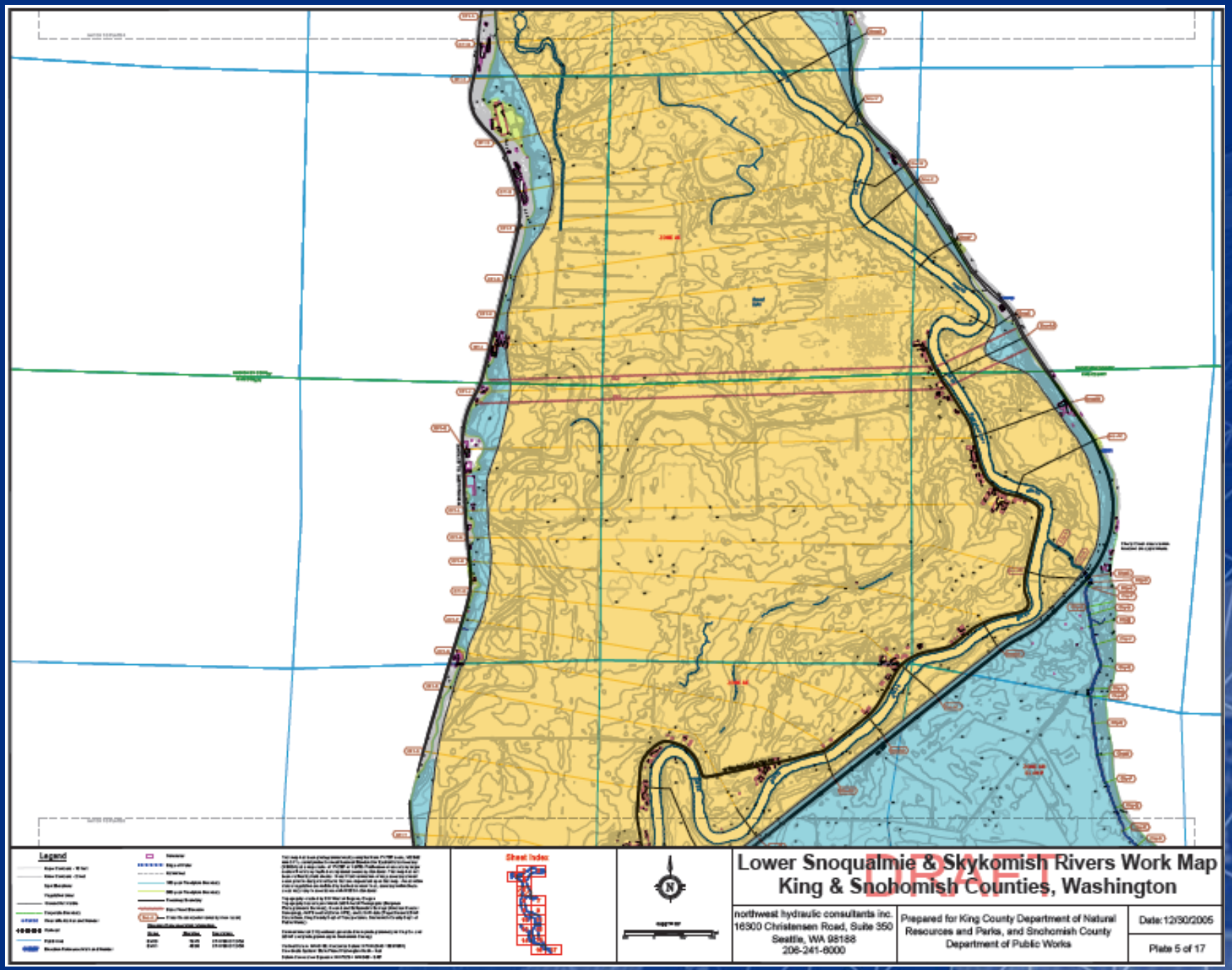

LIMIT OF DETAILED STUDY
Legend
Sheet Index
DRAFT
Lower Snoqualmie & Skykomish Rivers Work Map
King & Snohomish Counties, Washington
northwest hydraulic consultants inc.
16300 Christensen Road, Suite 350
Seattle, WA 98188
206-241-6000
Prepared for King County Department of Natural Resources and Parks, and Snohomish County Department of Public Works
Date: 12/30/2005
Plate 1 of 17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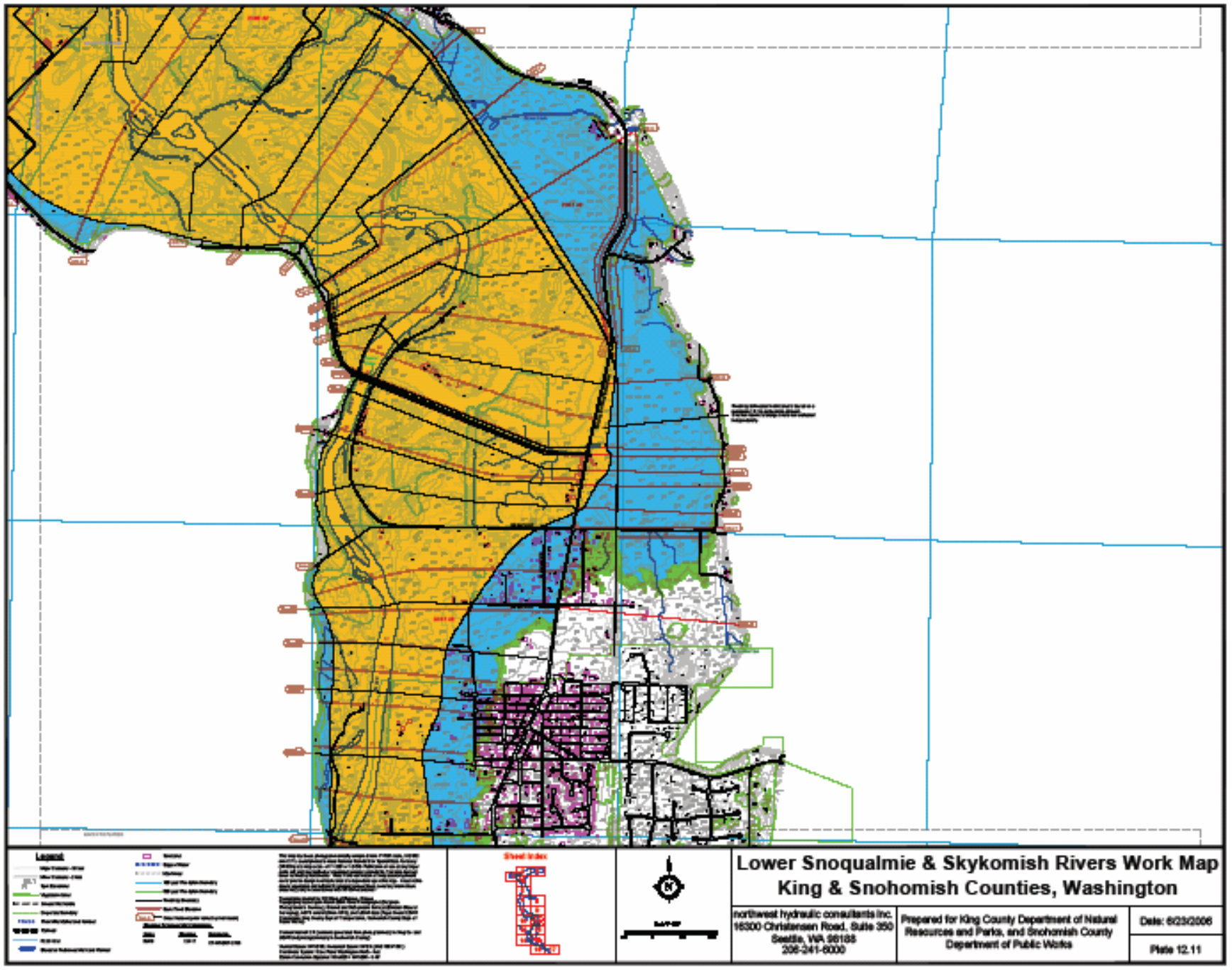
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Date: 6/23/2006
Plate 12.11

# Purpose of the NFIP

- Reduce economic loss
- Mapping the flood risk
- Set minimum floodplain construction standards
- Promote sound floodplain management practices
- Provide flood insurance

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# King County Facts

- 1717 policies with an average premium of $498 / year
- 473 Historic claims paid or $6,420,784 policy payouts
- 31 Repetitive loss buildings (24 insured)
- 9 Target rep loss sites (insured building with 4+ losses)
- CRS Class 3 = 35% savings on annual flood insurance premium
  - This represents an average of approximately $212 per policy

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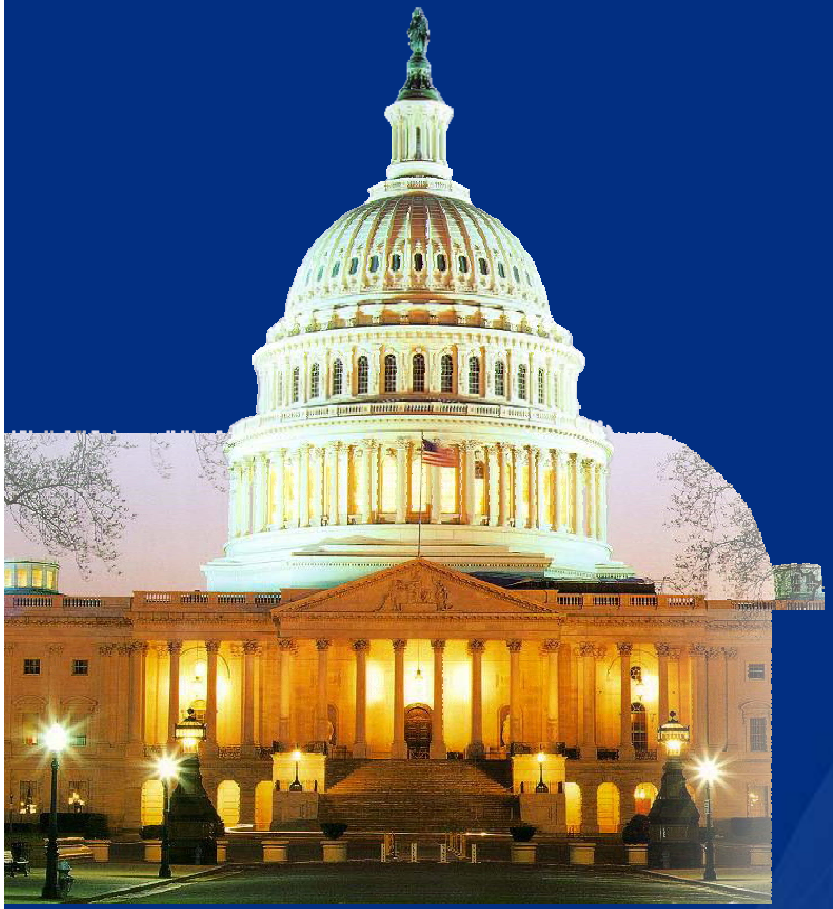
# What is Map Modernization?



Through Map Modernization…

…FEMA will provide digital flood insurance rate maps and studies…

…for communities nationwide…

…that are more accurate, easier to use, and more readily available.

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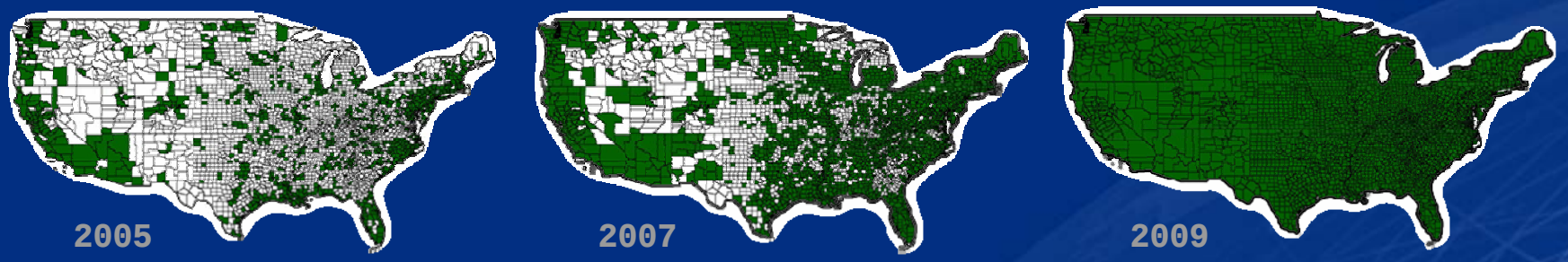
# Why Modernize?




- Outdated maps (10+ years old)
- Physical changes in floodplains – man-made and natural
- Digital format enables overlays/analysis
- Easier to update maps
- Maps are foundation for flood risk reduction and insurance (4.5 million policies, 650 billion coverage)

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