

Southern Flow Corridor Flood Damage Reduction Project

**1733-DR-OR PW NO.: Alternate Project
#13 to Project Worksheet 936**

**Final Appeal Hearing
October 12, 2012**

Revised October 24 2012

Outline of Presentation

- Flood Mitigation History
- Stakeholders and Project Team
- How it Floods: Landscape and Flow Paths
- Project Description
- **Project Filing History**
- **BCA Review Issues**
 - **Focus on main issues in last review**
 - **Economics Validation**
 - **Emphasis on Agricultural Damages**
- **Summary**

Project Filing History

- **12/30/2009: POTB Submits Alternate Project Request**
 - **2/2010: Project Exodus Final Report Released.**
 - **3/11/2010: OEM/FEMA notifies POTB a Benefit-Cost Analysis is needed for the project (Project Exodus Draft Final Report – October 2009); and also discusses other elements required for the review/approval process (i.e., legal responsibility/assurance for long term maintenance).**
 - **9/16/2010: POTB provides Legal Opinions from Oregon Legislative Counsel and Tillamook County Counsel concerning legal responsibility under 44 CFR 206.233(a)(3) to undertake the proposed project.**
 - **11/2010: Benefit-Cost Analysis (“BCA”) (November 2010) submitted to OEM. BCA is reviewed by OEM’s independent reviewer.**
 - **12/2010: Benefit-Cost Analysis (December 2010 Revision A) is submitted.**
 - **1/13/2011: OEM determines BCA is credible and meets the minimum criteria of 44 CFR 206.434(c); and requests FEMA’s consideration, further review and follow up comments on project eligibility.**

Project Filing History (continued)

- **3/28/2011: Notification of Denial – Project Eligibility**
 - 4/2011 - 5/2011: POTB works with OEM to address the items listed in FEMA Region X's 3/16/2011 Letter of Denial.
 - 5/2011: Southern Flow Corridor Landowner Preferred Alternative Preliminary Design Report is created; and a Benefit-Cost Analysis (Revised May 2011) is prepared for the Report.
- **5/25/2011: POTB Submits First Appeal**
 - 8/22/2011: FEMA Region X Requests Additional Information.
 - 9/5/2011: POTB submits Additional Information, which includes a revised BCA.

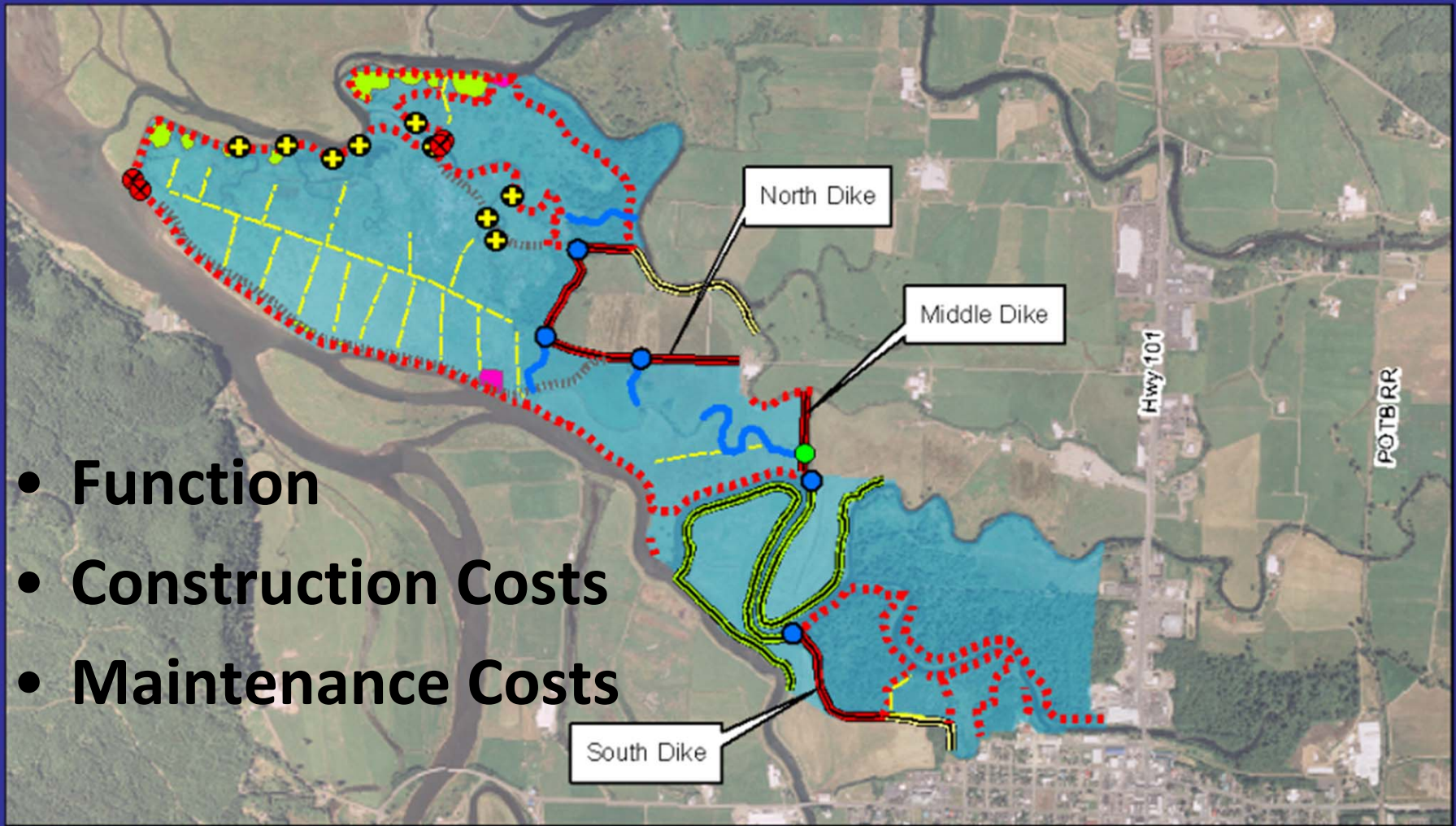
Project Filing History (continued)

- **1/24/2012: Notification of FEMA Region X Denial - First Appeal**
 - 2/2012 – 3/2012: POTB works with OEM to address the items listed in FEMA's 1/13/2012 Letter of Denial.
 - 3/2012: Benefit-Cost Analysis (March 2012) is prepared.
- **3/23/2012: POTB submits Second (Final) Appeal**
 - 3/2012 - 5/2012: BCA is reviewed by OEM's independent reviewer; and the BCA is modified to address these comments.
 - 5/15/2012: POTB submits Second Appeal.
 - 6/12/2012: Oregon Governor Kitzhaber Letter of Support to FEMA HQ.
 - 6/26/2012: U.S. Senators Ron Wyden and Jeff Merkley and U.S. Representative Kurt Schrader Letter of Support to FEMA HQ.
 - 8/15/2012: Notification of FEMA HQ Request for Additional Information
 - 8/31/2012: POTB submits Additional Information
 - 10/12/2012 (TODAY): Second Appeal Hearing

Project Design & BCA Team

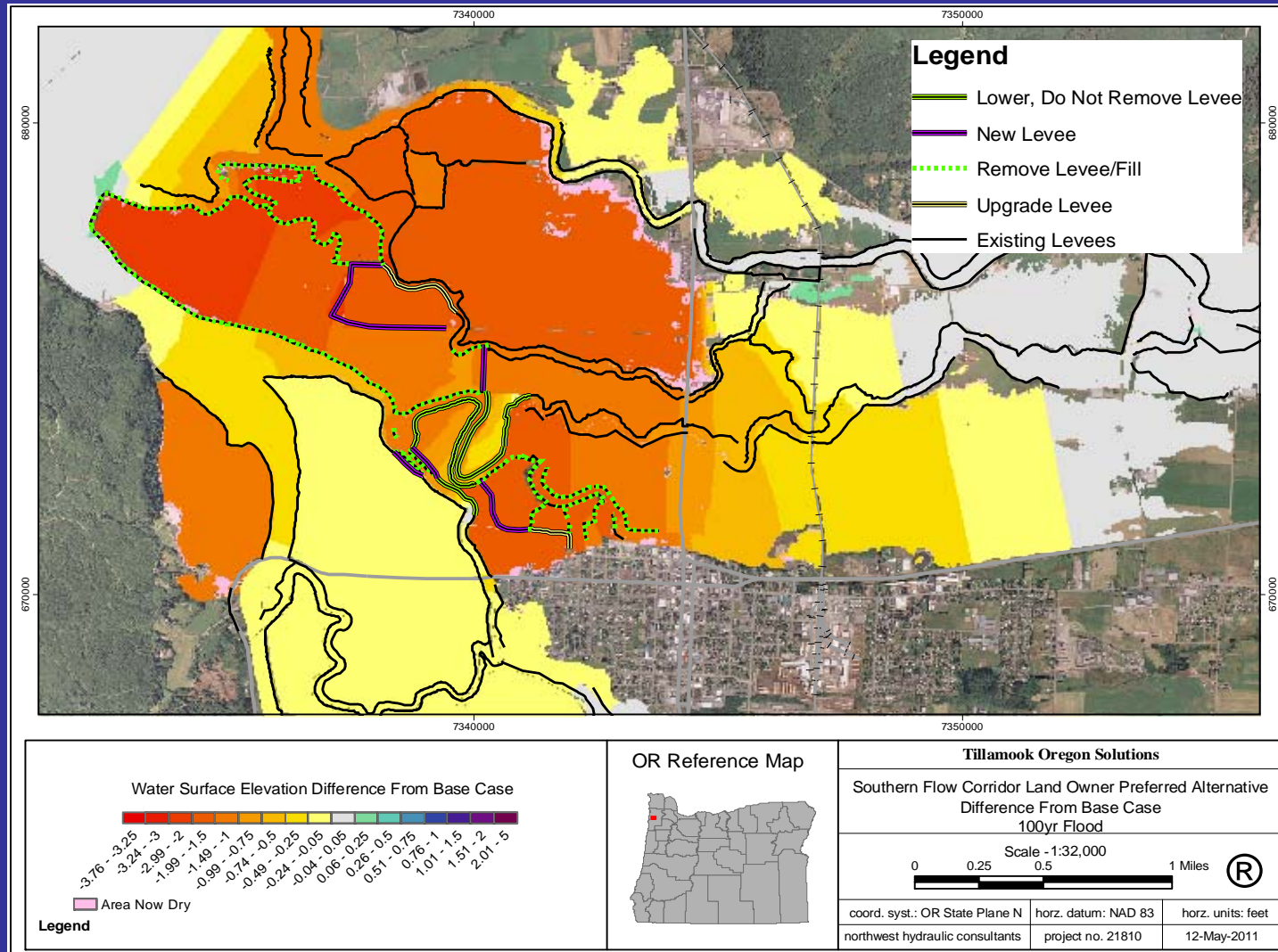
- **Vaughn Collins, NHC**
 - Project Engineer/Designer/PM
- **Rob Flaner, Tetra Tech**
 - BCA/BCAR
- **Ed Whitford, Tetra Tech**
 - HAZUS

Southern Flow Corridor Project



- **Function**
- **Construction Costs**
- **Maintenance Costs**

Flood Level Reduction Benefits



Economics: Benefit – Cost Analysis Methods

HAZUS Model & Inputs

Flood Depths

Building Inventory

BCAR Model

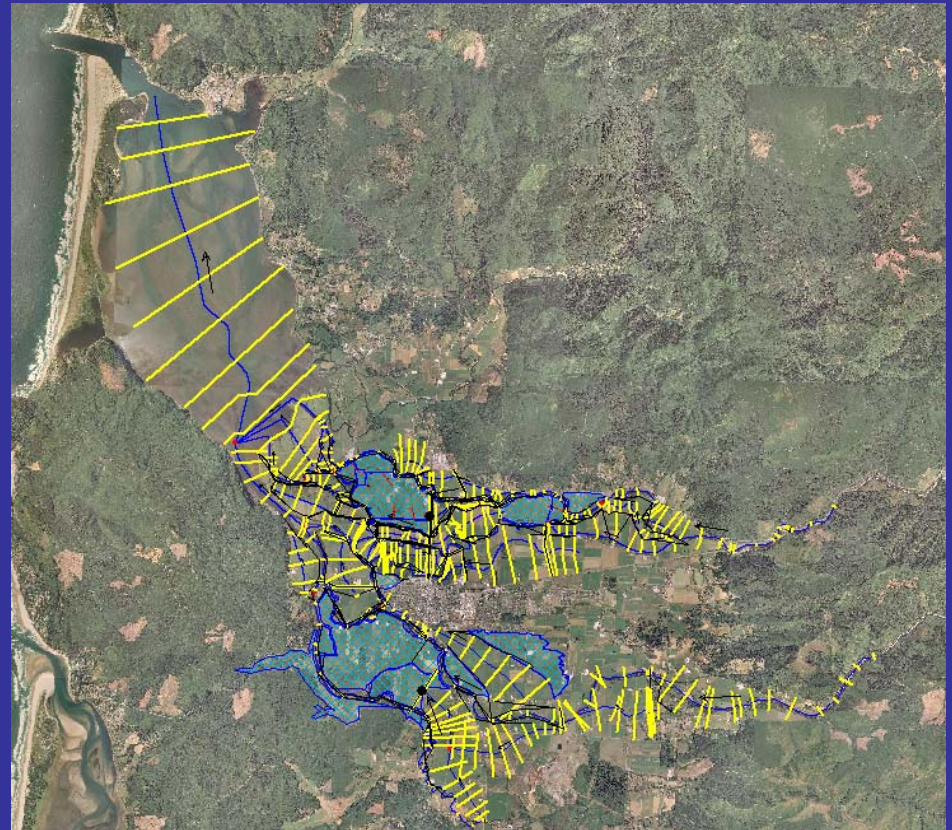
Damage Validation

Agricultural Damages

Inputs: Flood Data

- *Calibrated Unsteady Flow HEC-RAS model*
 - *Updated with new Lidar by NHC*
 - *Reviewed by Corps of Engineers*
- *6, 22, 100 year floods simulated*
 - *Pre and Post Project*
 - *Custom Output Processing GIS Script*
 - *High resolution flood depth grids*

Flood Frequency	Historic Flood	Calibration Data
6 -yr	1999	Yes
22-yr	2007	Yes
100-yr	No	No



Inputs: Structures Data

Location

Digitized from aerial photograph
Ground Elevation at centroid

Structure Elevation Information

Elevation Certificates (16)
Photographs (361)
Typical elevations (190)

Assessor Information

Square Footage
Assessed Value
Building Use/Type

Match GIS-Assessor Data



HAZUS – BCAR Application

- ***HAZUS Inputs***
 - *Pre and Post Project Depth Grids*
 - *Structure Data & Location*
- ***Default Depth-Damage Functions Applied***
 - Buildings
 - Contents
 - Inventory (Commercial/Ag only)
- ***Damage Estimates Exported***
 - At individual structure level by flood
- ***HAZUS displacement /disruption cost functions applied***
 - No displacement costs for Agriculture
- ***BCAR – Damage Frequency Assessment***
 - Summed Damages
 - Project Construction, Real Estate and Maintenance Costs
 - Benefit-Cost Ratio Calculated

Calibration with Historic Damages

- *Compare Historic vs. HAZUS Data for similar floods*
- *Residential*

Event	Insurance Claims			HAZUS Analysis (22-Year Flood)		% different
	No. Claims	Total Claims (Unadj. \$)	Average Claim Paid (2011\$)	Total Residential Loss	Average Loss	
12/28/1998	7	\$182,405	\$45,215	\$1,055,738	\$27,070	-40%
11/6/2006	18	\$708,846	\$43,960	\$1,055,738	\$27,070	-38%

- *HAZUS ~40% Lower than Historic Claims*

Calibration with Historic Damages

- Commercial*

Flood Event	Insurance Claims			HAZUS Analysis 22-Year Flood		% different
	No. Claims	Total Claims (Unadj \$)	Average Claim Paid (2011\$)	Total Commercial Loss	Average Loss	
12/28/1998	23	\$1,176,731	\$74,535	\$8,057,000	\$104,637	+40%
11/6/2006	21	\$1,769,332	\$92,125	\$8,057,000	\$104,637	+14%

Address	Event	RCV (2011\$)	HAZUS Loss Estimate – 22-yr Flood	% Different
#1 Main Ave.	11/6/2006	\$232,864	\$389,850	+67
#2 Main Ave.	11/6/2006	\$536,243	\$1,092,045	+103%
#11 Main Ave.	11/6/2006	\$290,122	\$481,717	+66%

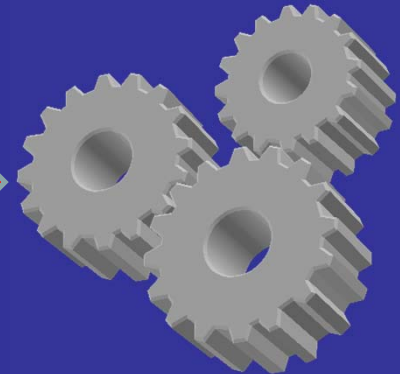
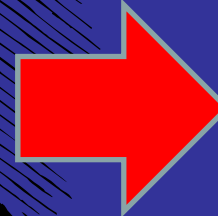
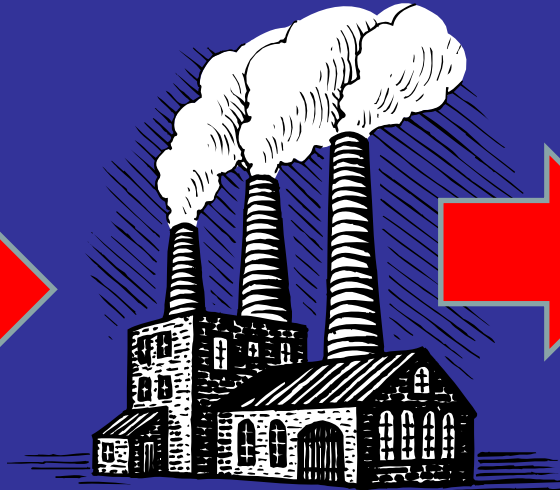
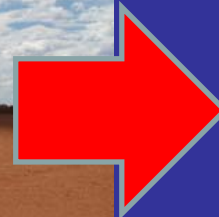
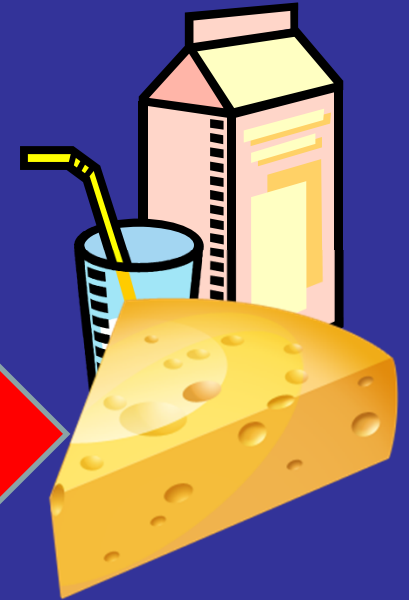
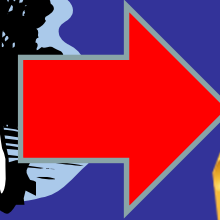
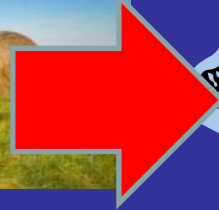
- HAZUS Losses ~ 18%-40% Greater than Historic Claims*
- Replacement Cash Value 114% of Paid Claims*

Agricultural Damages: Value of Tillamook County Farms

Item	United States	Tillamook County, OR	Percent of U.S. Avg
Total farm production expenses	\$ 109,359	\$ 286,449	262%
Estimated value of machinery and equipment	\$ 88,357	\$ 134,016	152%
Total sales	\$ 134,807	\$ 367,072	272%
Average Size of Farm (acres)	418	125	30%
Production Expenses/acre	\$ 262	\$ 2,292	876%
Machinery & Equipment Value/acre	\$ 211	\$ 1,072	507%
Total Sales/acre	\$ 323	\$ 2,937	911%

- Tillamook Farms have much higher value than the national average

Agricultural Damages: Dairy Farms & Inventory



Agricultural Damages: Types of Damage

- *Feed/fertilizer/equipment loss and damage*
 - *Stored in structures during flood season*
- *Cow Stress/mortality*
 - *Reduced milk production for months*
 - *Drowning in larger floods*
- *Pasture renewal*
 - *Feed costs greatest damage incurred*
 - *Up to 18 months before pastures back in production*
- *Dairy Farms incur long-term damage costs*



Agricultural Damages: 1996 Flood

Item	Value	Loss (\$2011)
Reported Flood Damages County Wide	\$12,123,040 (\$2011)	
Apportioned to SFC Project Area	20%	
Estimated SFC Project Area Damages		\$2,435,000
TCCA Reported Production Losses	\$750,000/mo (\$1996)	
Apportioned to SFC Project Area	20%	
Estimated TCCA Losses in Project Areas	\$150,000/mo (\$1996)	
Reported additional time of loss	10 months	
Estimated Total TCCA losses in Project Area		\$2,145,000
TOTAL ESTIMATED LOSS 1996 FLOOD		\$4,570,000
HAZUS ESTIMATED LOSS 2007 FLOOD		\$8,125,000
Percent Different		+78%

Aggregate Damage Adjustment

- *Summary of Historic-HAZUS Loss Estimate Differences*
 - *Residential -40%*
 - *Commercial +14% (0% RCV)*
 - *Agricultural +78%*
- *Historic damages should be less than HAZUS estimates*
 - *Commercial Insurance Payments 86% of RCV*
 - *No Loss of Income, Disruption/Displacement Costs*
- *Aggregated Loss Calibration Approach*
 - *Reduce Commercial and Ag inventory loss by 50% for 6 and 22-year floods*

Adjusted Damages & BCR

- ***With Adjustment: Historic-HAZUS Loss Estimate Differences***

- Residential -40%
- Commercial +1%
- Agricultural +45%

- ***No Loss of Income Included***

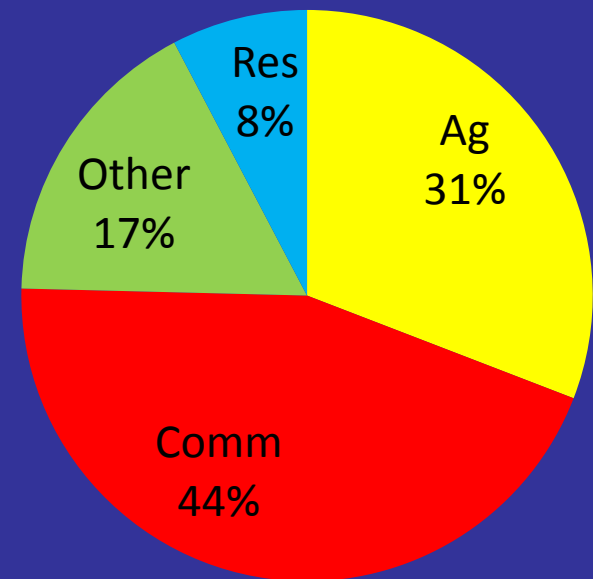
- ***Avoided Damages*: \$9,204,000***

- ***Project Costs: \$ 8,336,000***

- ***Benefit-Cost Ratio*: 1.10***

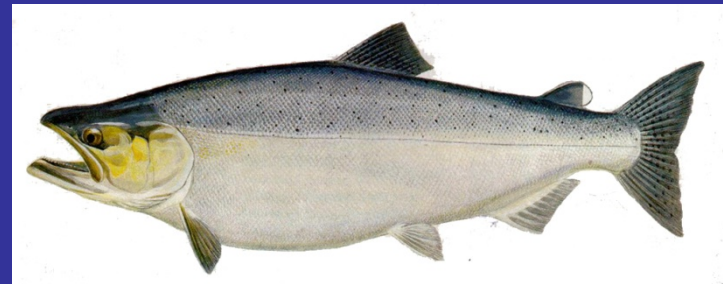
**Includes Transportation Benefits – See October 24, 2012 Memorandum*

Benefits by Category



Benefit/Cost Robustness

- **25% Construction Cost Contingency - \$1.3 million**
- **Flood Damages**
 - *Commercial /Ag values calibrated/lowered*
 - *Commercial damages appear to be understated*
 - *Residential values not increased*
- **Benefits Not Quantified**
 - *Habitat/Fisheries **
 - *Transportation**
 - *Reduced Levee Maintenance*
- **Evaluated for Climate Change Impacts**
 - *Sea Level Rise*
 - *Sedimentation*
 - *Peak Flow Increase*
- *** See October 24, 2012 Memorandum – now quantified**



Summary

- **Project meets Cost-Effectiveness Criteria**
 - Provides modest benefits over wide area
 - Adjusted to reflect historic damages
 - Healthy BCR
- **Sustainable**
 - Sea level rise, sedimentation, peak flows
- **Very large habitat benefits**
- **Done in full accordance with FEMA procedures**
- **Tillamook County: Proven record of flood hazard mitigation project implementation**
- **Does not preclude further individual structure mitigation measures in the future**