

Item 10: Workshop on Development of the Elk River Sediment Total Maximum Daily Load

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Fortuna, CA

Adona White, PE
Basin Planning
North Coast Regional Water Quality Control Board



Presentation Overview

- TMDL Development
 - Watershed overview (Chapter 1)
 - WQ and BU Impairments, Nuisance Conditions (Chapter 2)
 - Source Analysis (Chapter 3)
- Elk Waterbody Delineation
- Restoration Summit
- Next steps



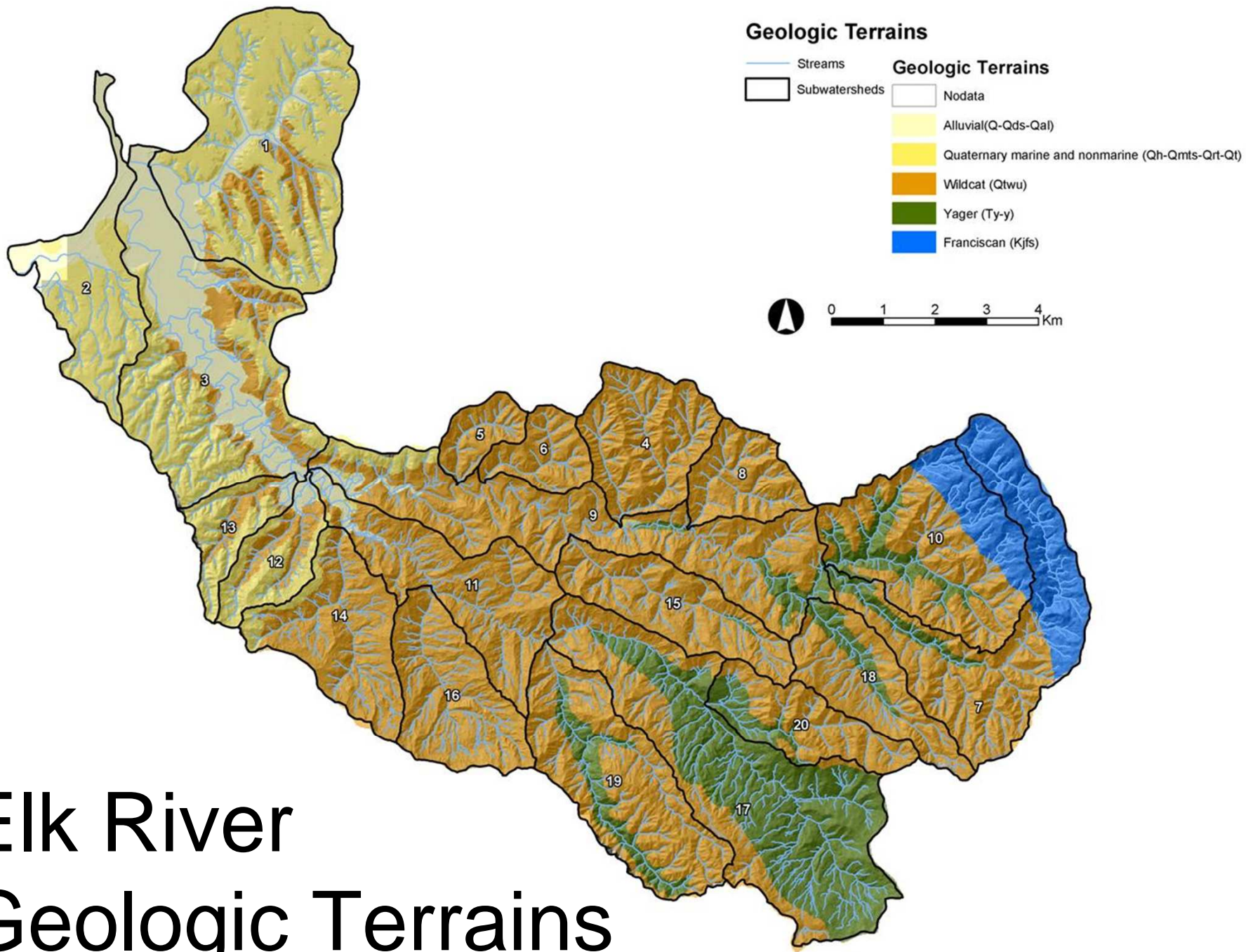


Elk River Watershed

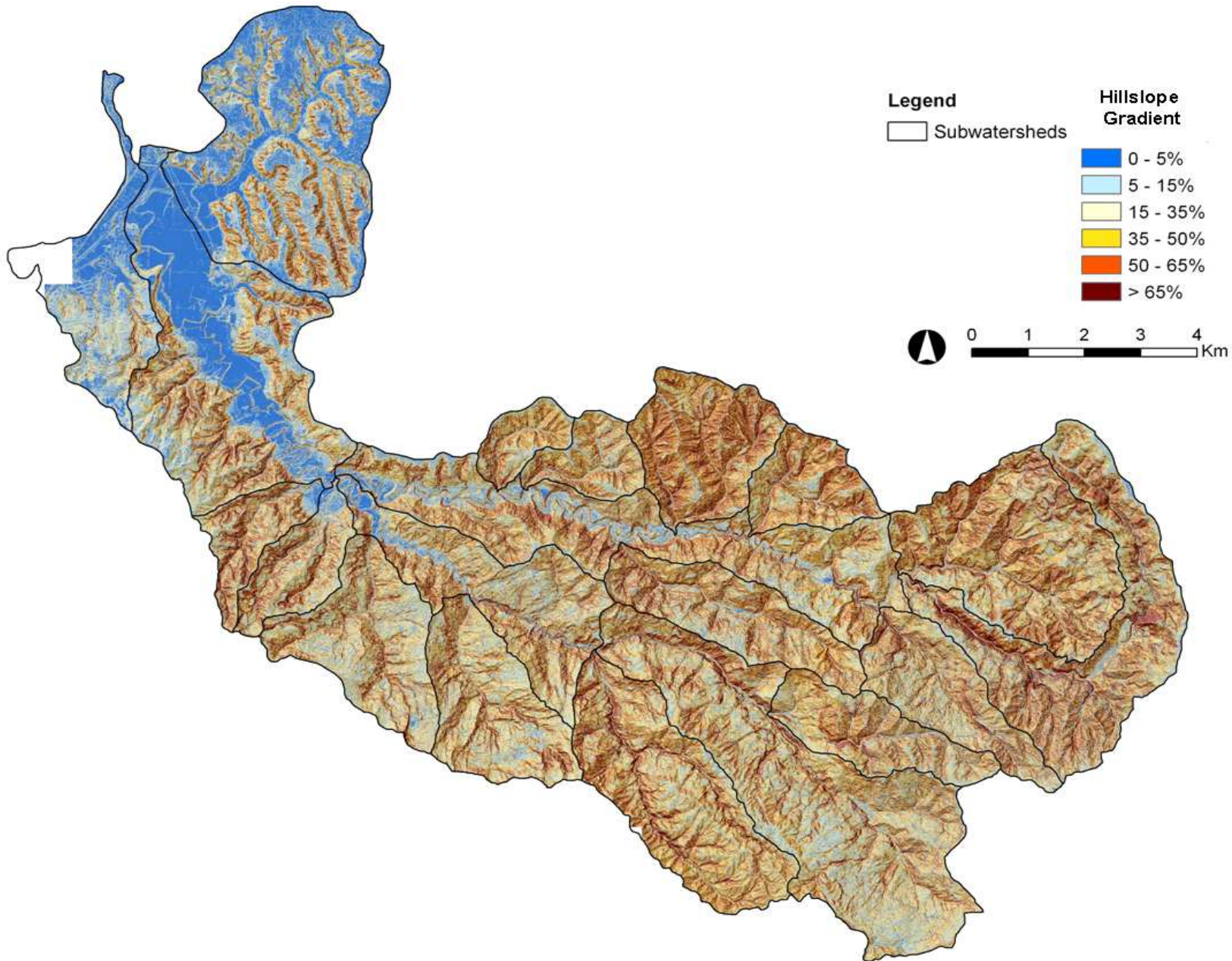
58.3 square miles

- North Fork Elk River (22.5mi²)
- South Fork Elk River (19.5 mi²)
- Lower Elk River (10.4 mi²)
- Martin Slough (5.9 mi²)



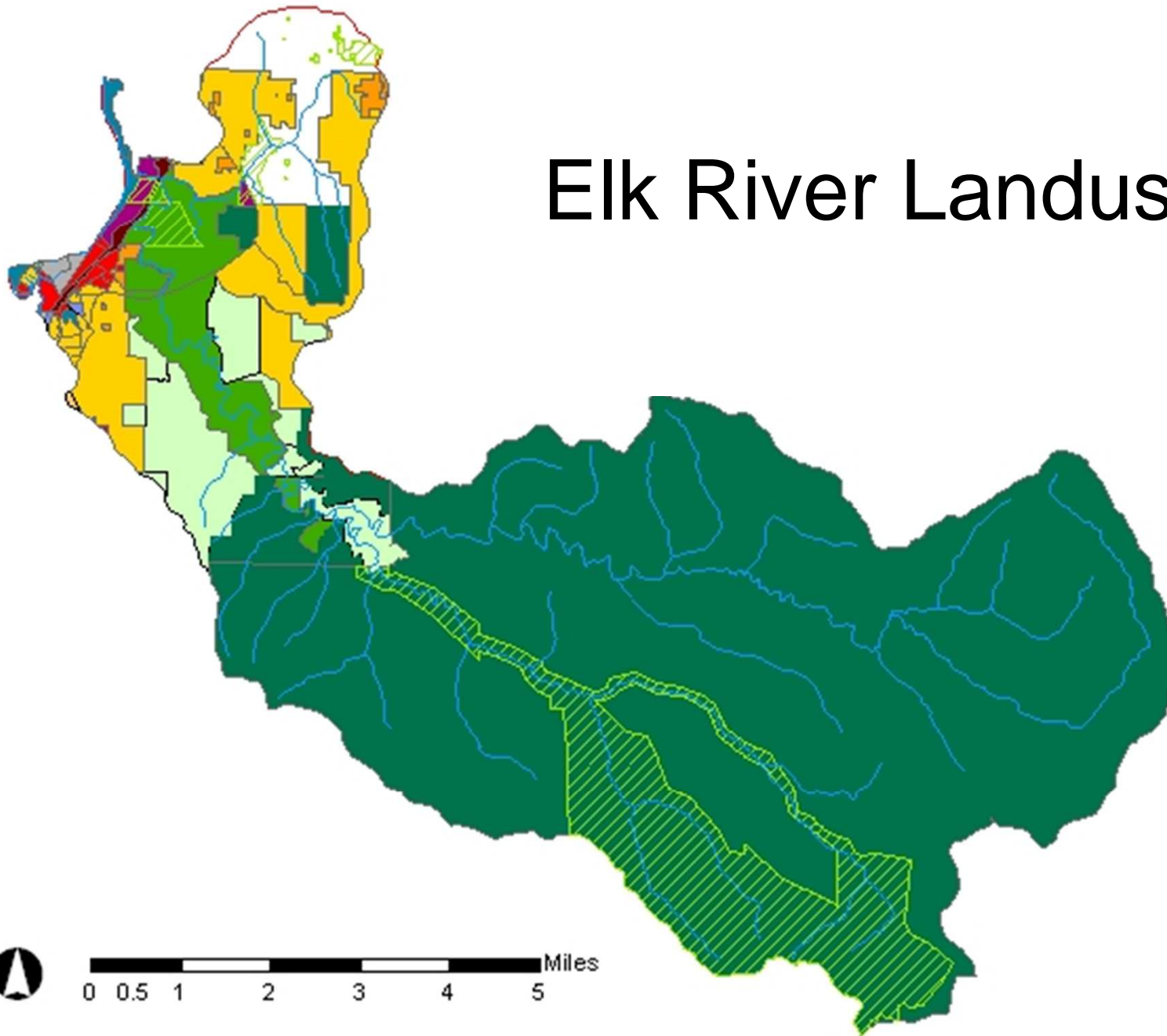


Elk River Geologic Terrains



Elk River Hillslope Gradient

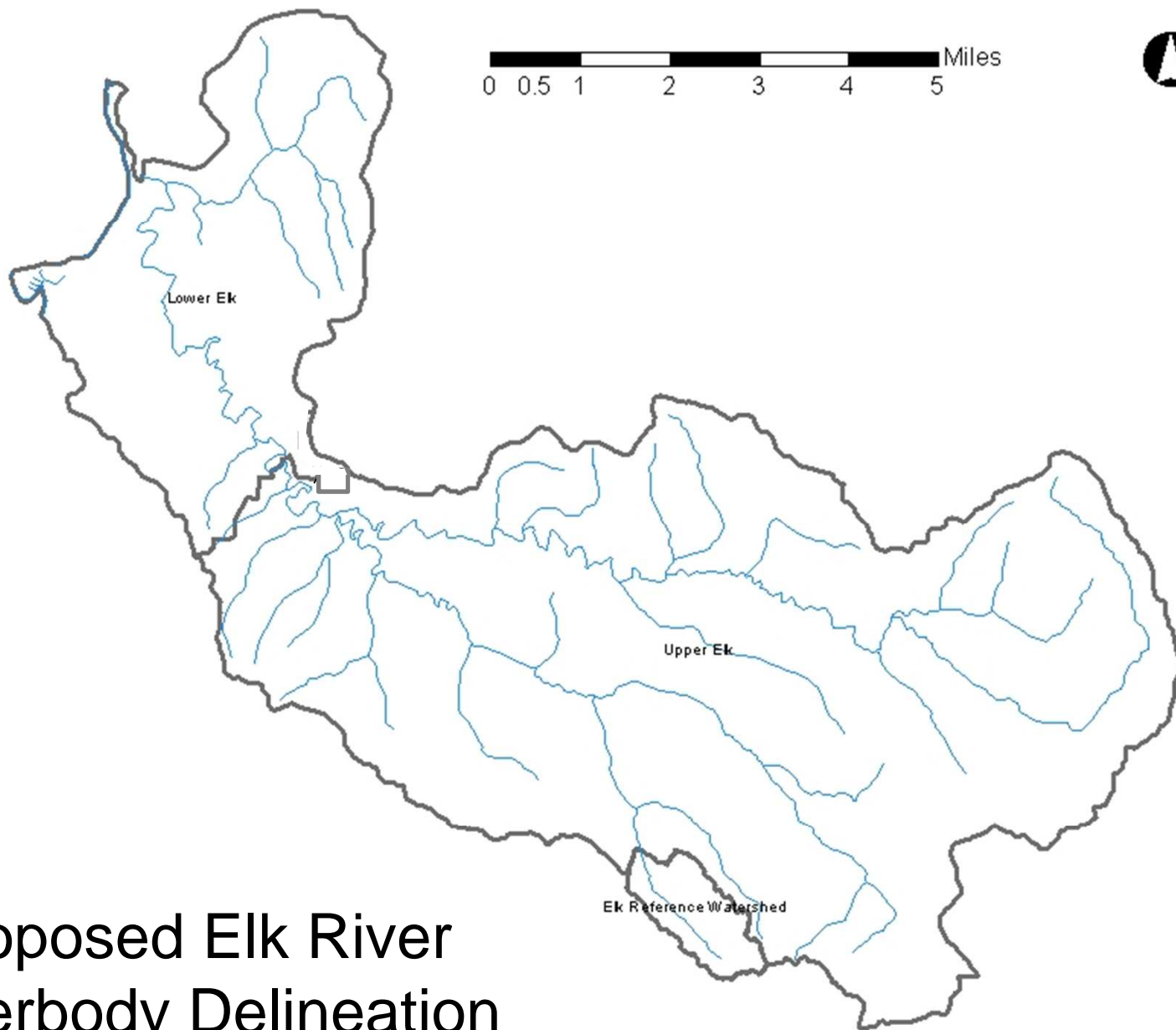
Elk River Landuse



Proposed Elk River Waterbody Delineation

- Upper Elk – NF, SF, Upper Mainstem
 - Data rich
 - Dominant sediment source areas and impaired reaches
 - TMDL development priority
- Lower Elk – Lower Mainstem, Martin Sough
 - Limited information re sediment sources and impairments
 - TMDL development or implement programs capable of meeting WQ standards in a specified timeframe
- Little South Fork – reference subbasin in Headwaters
 - Natural loading
 - Delist





Proposed Elk River Waterbody Delineation

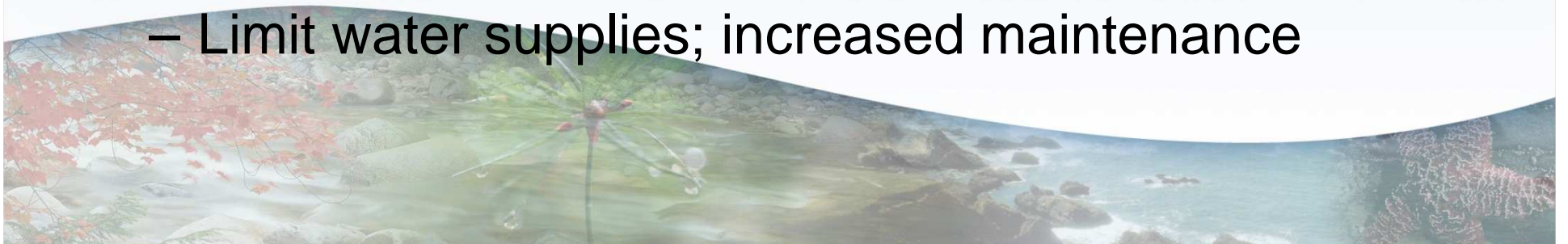
History and Actions in Upper Elk

- Managed for industrial timber harvesting for over a century
- 1986-1998: Increased rate/scale of harvest & roads
- 1993-1998: THPs violations; water quality impacts; storm triggered discharges of sediment; 303(d) listed; RB requires inventory/treatment plan, water supplies
- 1999: Headwaters Deal: PL HCP/SYP; Headwater Forest
- 1999-2001: CDF moratorium on new THPs until watershed analysis, flooding evaluation & monitoring
- 2002: RB issues WDRs, CAOs, MRPs; leads mediation and science panel, begins TMDL development
- 2004: Identified need to address channel conveyance
- 2006: WDRs addressing rate and scale of timber operations to control harvest-related landslides and peak flows
- 2008: HRC takes over PL lands



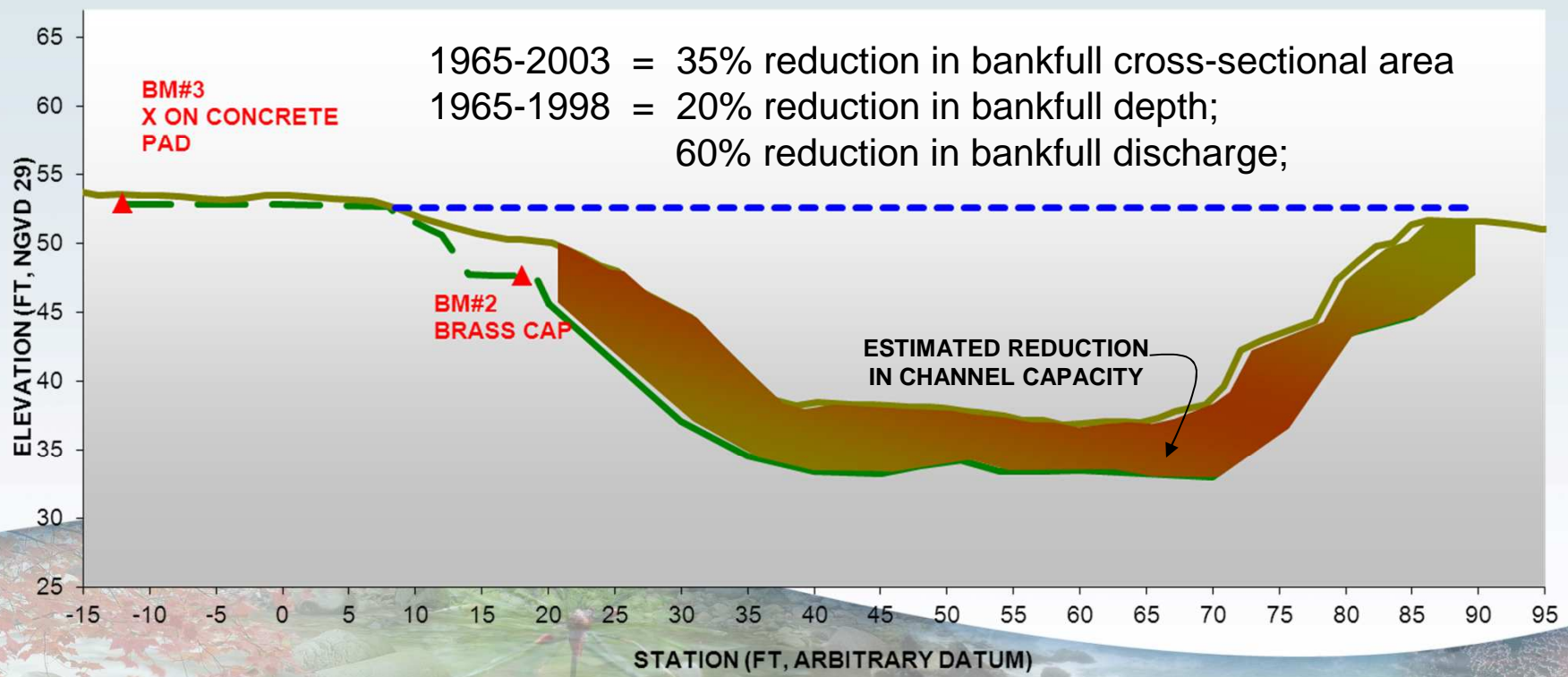
Beneficial Use Impairment & Exceedence of Water Quality Objectives

- Sediment deposition
 - Reduced channel capacity; altered morphology
 - Nuisance flooding conditions
 - Pool filling; spawning habitat
- Elevated suspended sediment concentrations and turbidity levels
 - Limit fish feeding and survivability
 - Limit water supplies; increased maintenance



Comparison with historic conditions:

USGS gaged Upper Mainstem Elk (1958-1967)
PL reoccupied site beginning in 1998





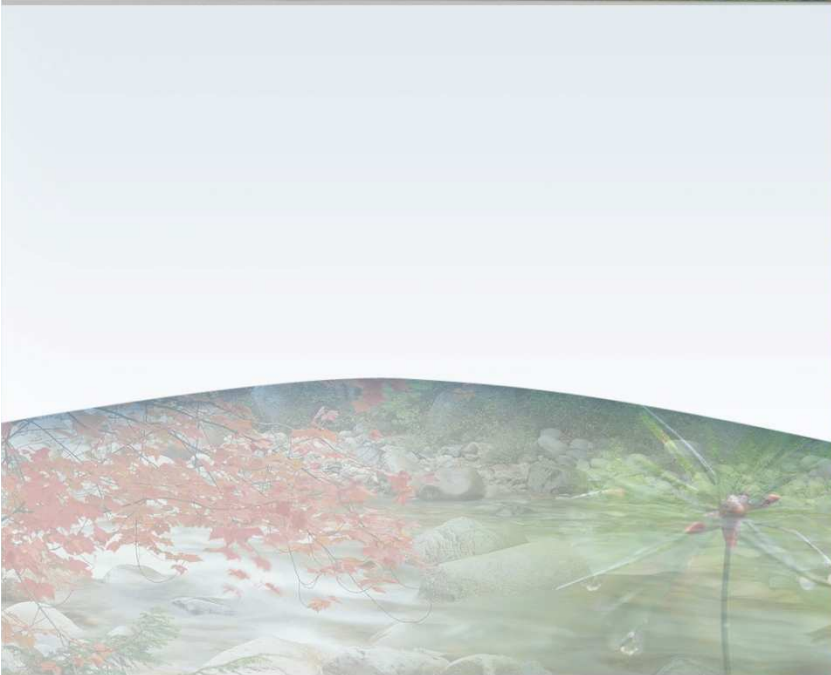
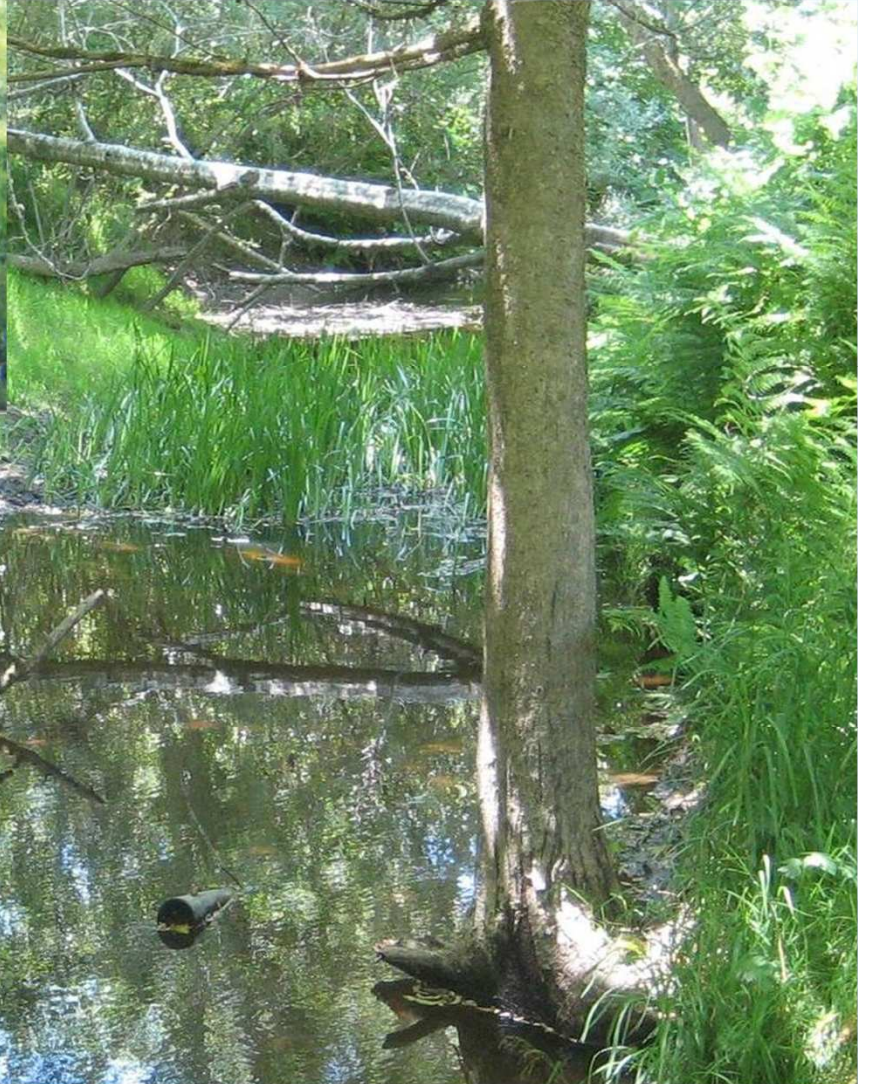
Nuisance Flooding Conditions



(California Water Code
section 13050.)

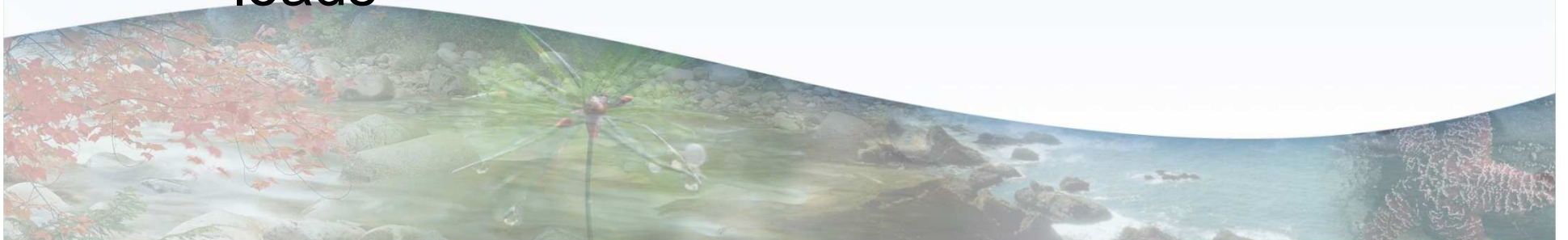


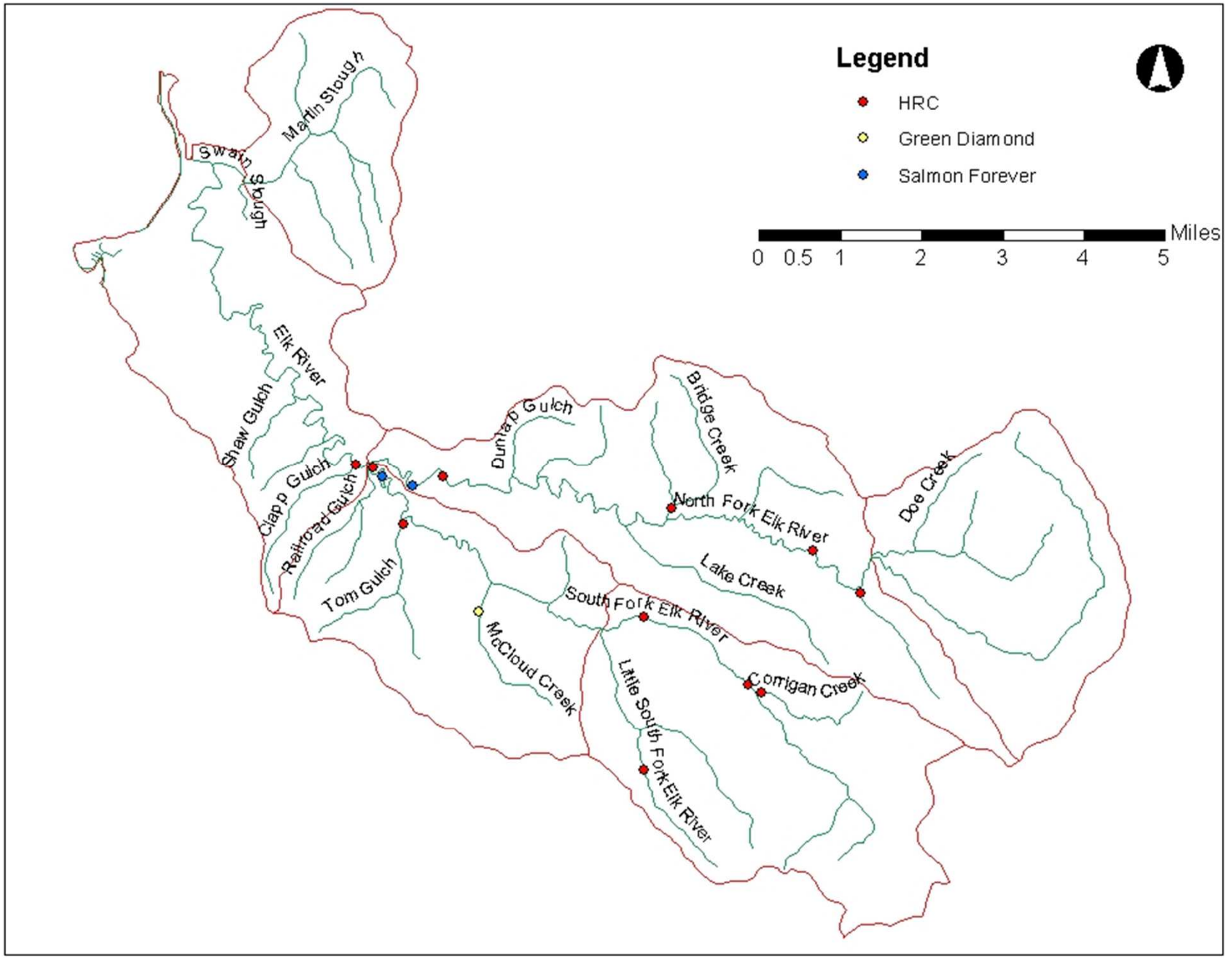
Cumulative Effects



Current Regional Water Board Program in Upper Elk

- Inventory, Prioritize, Treat & Monitor existing sediment sources
- Ensure timber harvest plan activities don't create new sources of sediment; limit overall disturbance based upon harvest-related landslides and peakflows
- Track landslides and instream sediment loads





Upper Elk River Source Analysis

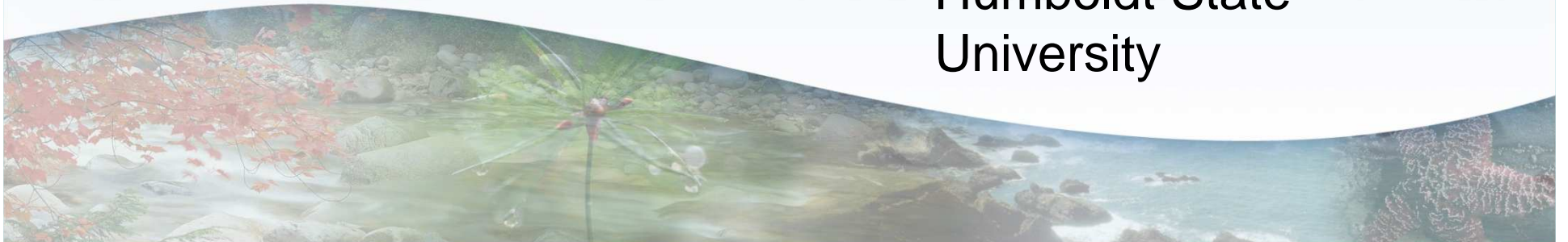
- Timing and magnitude of natural and management-related hillslope sediment sources
- Sub-basin analyses based on site specific data
- Reference and managed study sub-basins for generalized loadings where no site specific data available
- Time periods analyzed: 1955-1966, 1967-1974, 1975-1987, 1988-1997, 1998-2000, and 2001-2003.
 - Recent time period pending updated landslide inventories
 - Hillslope loads could be compared with SS loads



Upper Elk River Source Analysis

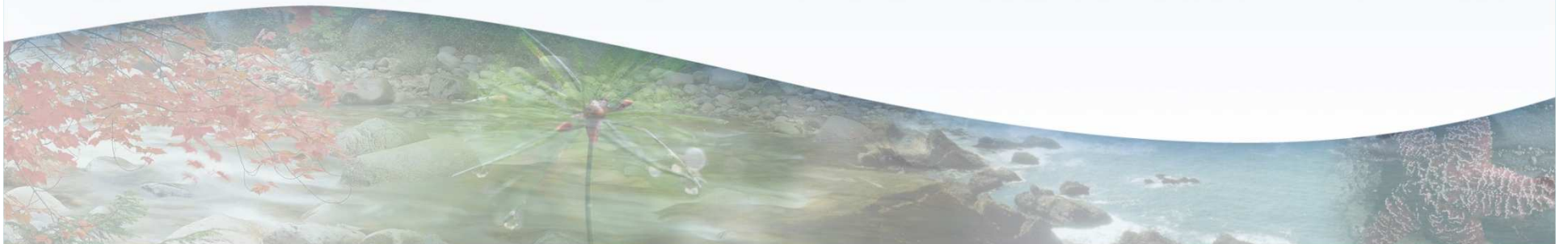
Data sources:

- Humboldt Redwood Company
- Pacific Lumber Company
- Green Diamond Resource Company
- Bureau of Land Management
- Pacific Watershed Associates
- Stillwater Sciences
- North Coast Regional Water Board
- Redwood Sciences Laboratory
- California Geologic Survey
- Salmon Forever
- Humboldt State University



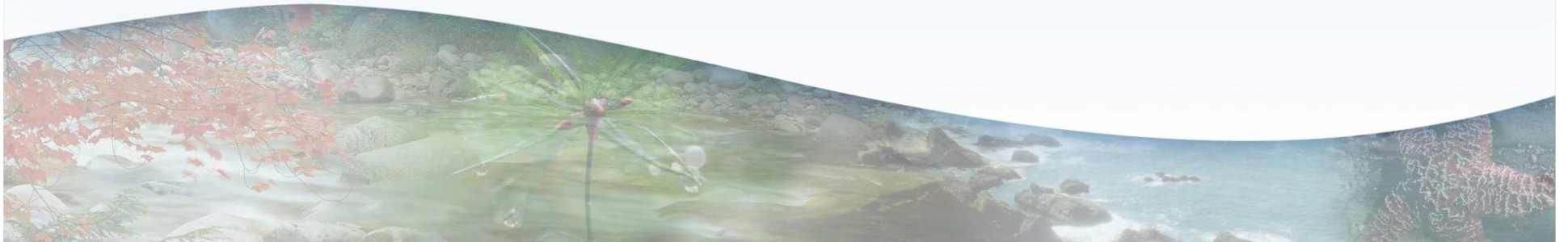
Analysis of Upper Elk River Drainage Network

- Field-surveys of study sub-basins
- Identified natural and managed drainage area thresholds for channel initiation.
- Calculated natural and managed drainage network for analysis time periods.

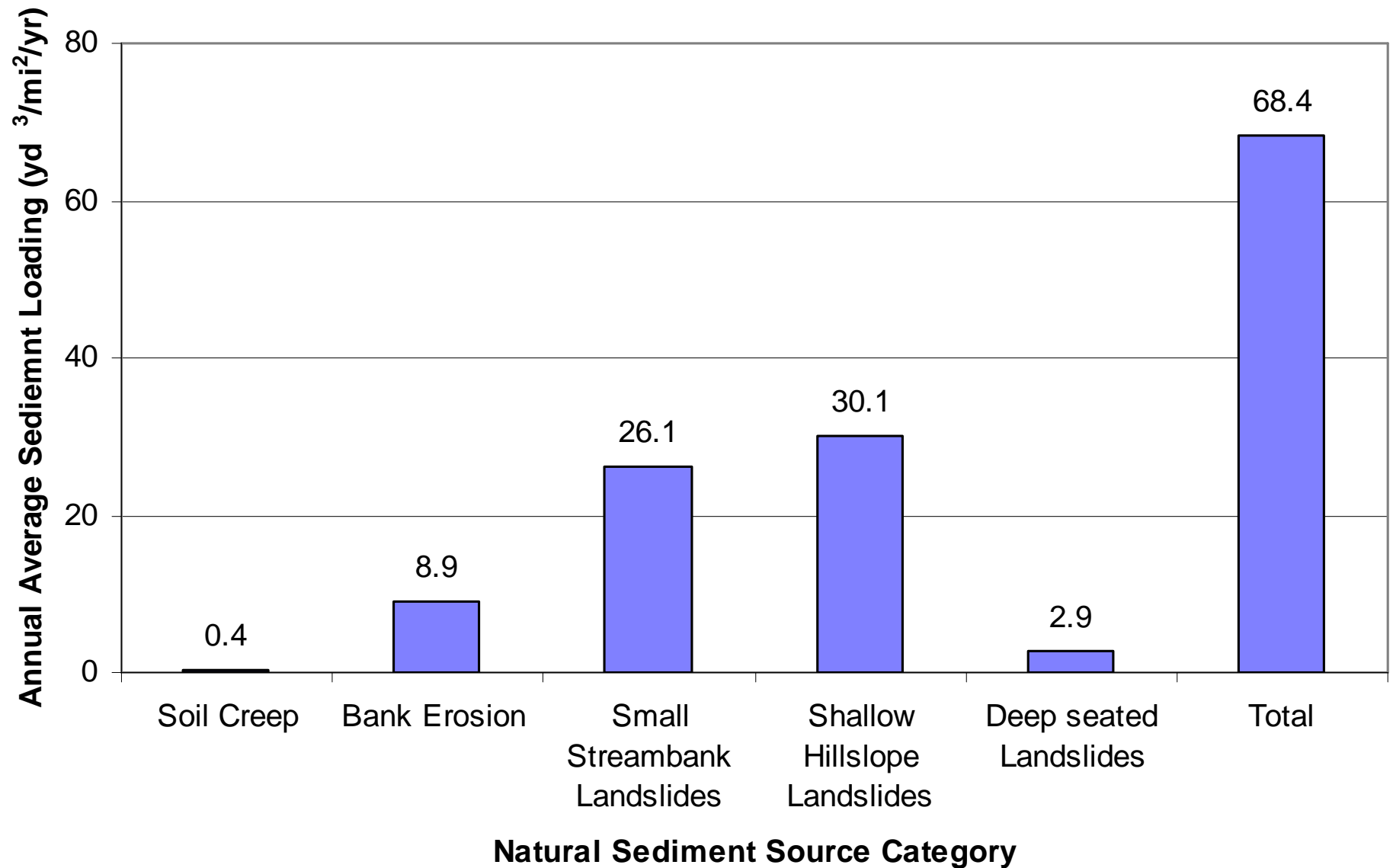


Upper Elk Source Analysis: Natural

	Sediment Source	Data Sources Relied Upon / Approach
Natural	Soil Creep	Literature
	Bank Erosion	Field surveys; natural drainage density estimate
	Small Streambank Landslides	Field surveys; natural drainage density estimate
	Shallow Hillslope Landslides	Areas not harvested in past 15 years
	Deep seated Landslides	CGS mapped active features; Palco WA rates



Upper Elk Natural Sources Summary



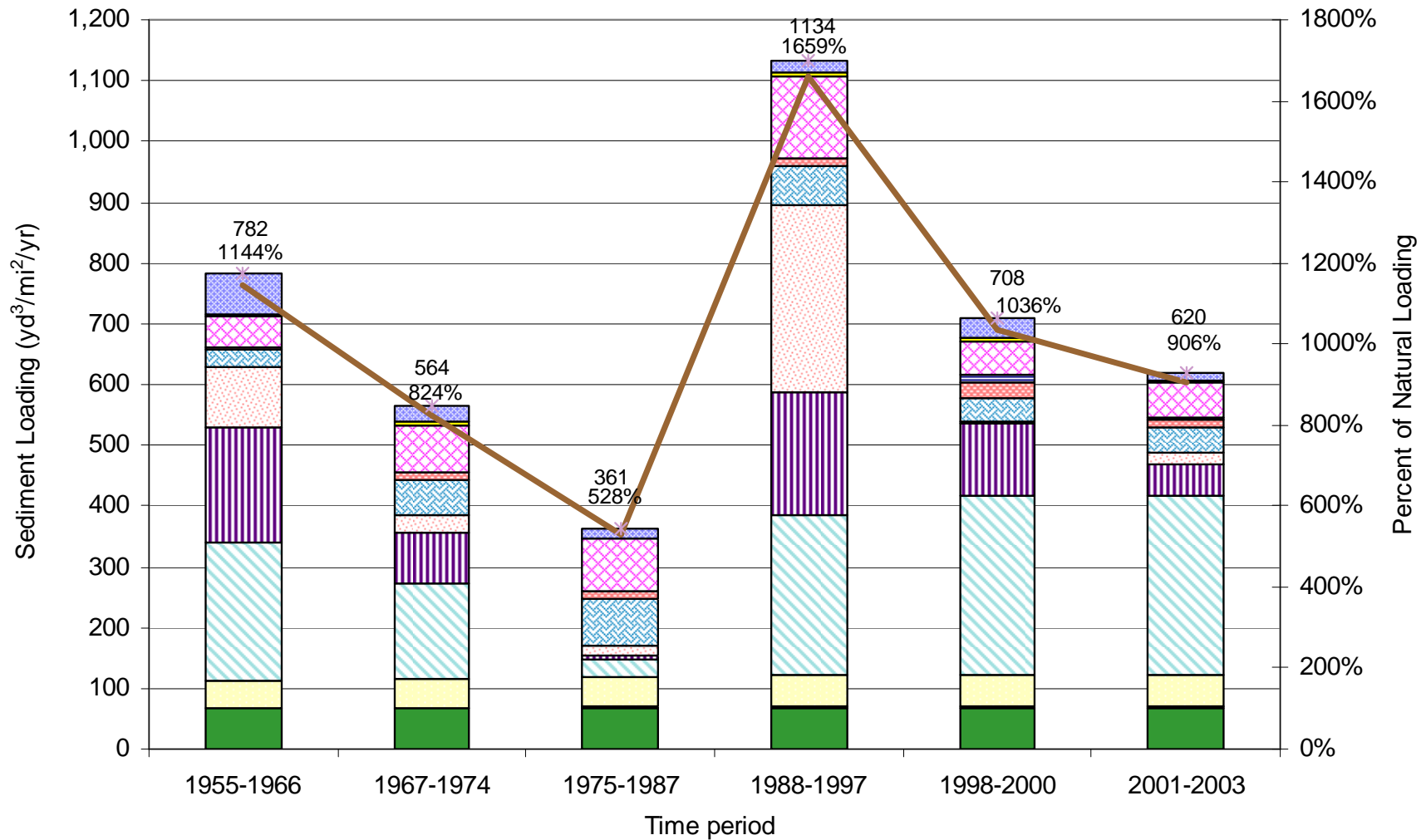
Upper Elk Source Analysis: Management

	Sediment Source	Data Sources Relied Upon / Approach
Management	Low Order Channel Incision	Field-based estimates of managed and natural drainage density; assumed 75% occurred in 1950's and 5% in each subsequent decade
	Management-Related Soil Creep	Soil creep to management-induce channel network
	Management-Related Bank Erosion	Field surveys in managed study sub-basins; managed drainage density estimate; subtracted natural loading
	Management-Related Open Slope Shallow Landslides	Sub-basin specific landslide inventory data from Palco WA and 2005 ROWD; non-road-related slides, includes some skid-related slides
	Road-related Landslides	Sub-basin specific landslide inventory data from Palco WA and 2005 ROWD

Upper Elk Source Analysis: Management

	Sediment Source	Data Sources Relied Upon / Approach
Management	Management-Related Streamside Landslides	Field surveys in managed sub-basins in Freshwater Creek; applied to natural drainage density estimate assuming bank erosion captured features in management-induced network; subtracted natural loading
	Management-Related Discharge Sites	Sub-basin specific site inventories from Palco WA, HRC CAO reports, GDRC WDR reports, BLM reports
	Post-Treatment Discharge Sites	Compiled monitoring results from BLM, HRC, and GDRC from sites treated in Elk River.
	Skid Trails	Compiled findings from Elk River skid-related inventories on BLM and HRC lands to estimate loading from skid sties not included in Management Discharge Site inventories
	Road surface erosion	Sub-basin road densities & surface condition based on Palco WA and ROWD; unit loading based upon Palco ROWD
	Harvest surface erosion	Estimated harvest history in clear-cut equivalents based upon CDF, Palco WA, and Palco ROWD; unit loading based upon Palco WA

Upper Elk Management Sources Summary



- Natural Loading
- Bank Erosion
- Streamside Landslides
- Soil Creep
- Management-related discharge sites
- Open Slope Shallow Landslides
- Road Surface Erosion
- Harvest Surface Erosion
- Road-related Landslides
- Skid Trails
- Post-Treatment Discharge Sites
- Low Order Channel Incision
- % of Natural Loading
- Total Loading

Comparison with Palco Watershed Analysis

	TMDL		Palco WA	
	Source Category	1988-2000 (yd ³ /mi ² /yr)	Source Category	1988-2000 (yd ³ /mi ² /yr)
Natural	Soil Creep	0.44	Soil Creep	52
	Bank Erosion	9	Bank Erosion	38
	Shallow Landslides	26	Shallow Landslides	68
	Streamside Landslides	30	Streamside Landslides	276
	Deep Seated Landslides	0	Deep Seated Landslides	3
	Natural Total	66	Natural Total	437
Management	Low Order Channel Headward Incision	24		
	Soil Creep	1		
	Bank Erosion	52	Bank Erosion	38
	Streamside Landslides	272	Road-related Streamside Landslides	162
	Open-slope Shallow Landslides	182	Open-slope Shallow Landslides	144
	Road-related Shallow Landslides	237	Road-related Shallow Landslides	168
	Discharge sites	59	Gullies	28
	Skid Trails	15		
	Post-Treatment Discharge Sites	3		
	Road surface erosion	118	Road surface erosion	32
	Harvest Surface Erosion	5	Surface Erosion	6
	Management Total	967	Management Total	579
Total Loading	1,033	Total Loading	1,016	
Percent over Natural Loading	1,576%	Percent over Natural Loading	232%	

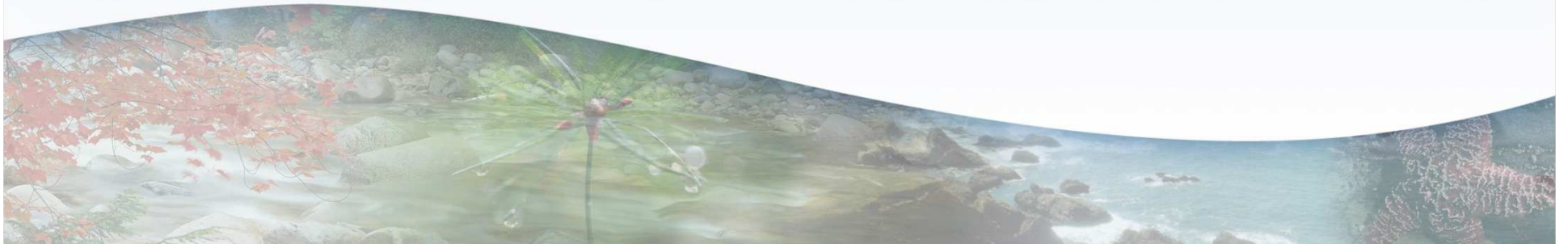
Next steps for Upper Elk TMDL Development

- Update Draft Staff Report Chapters 1-3
- Complete remaining pieces of Technical TMDL
 - Targets
 - Linkage
 - Load Allocations and Margin of Safety
 - Monitoring and Reevaluation
- Refine implementation framework reflecting technical analyses
- RB Workshop & Consideration
- Pursue Basin Plan Amendment



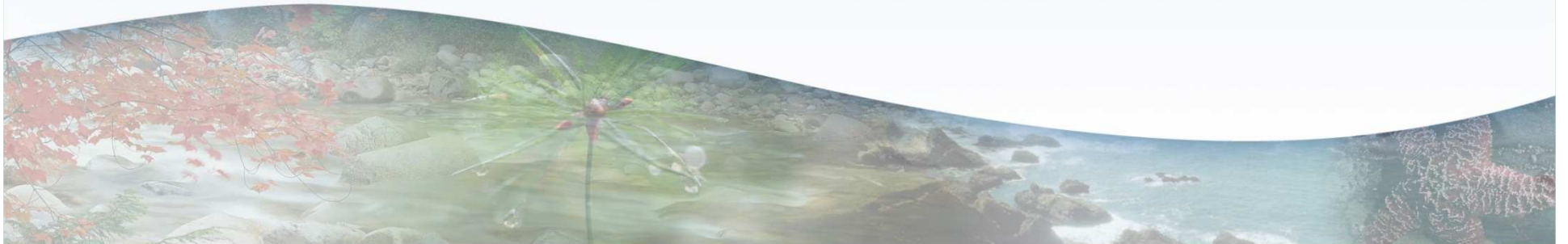
Three Tiered Watershed Recovery Approach:

- Sediment loading to achieve water quality objectives and supportive of fisheries and water supplies
 - Build on current framework to further control management-related sediment loads
- Alleviate impairments from stored instream deposits
 - Systems approach
- Near-term projects that may result in improved conditions; track performance



Elk River Restoration Summit

- February 8 & 9, 2012 workshop in Eureka
- Attended by landowners, professionals, resource protection agencies,
- Agreement on need for restoration/enhancement
- Identified desire for landowner driven watershed group representing whole watershed with subgroups (upper, middle, lower)



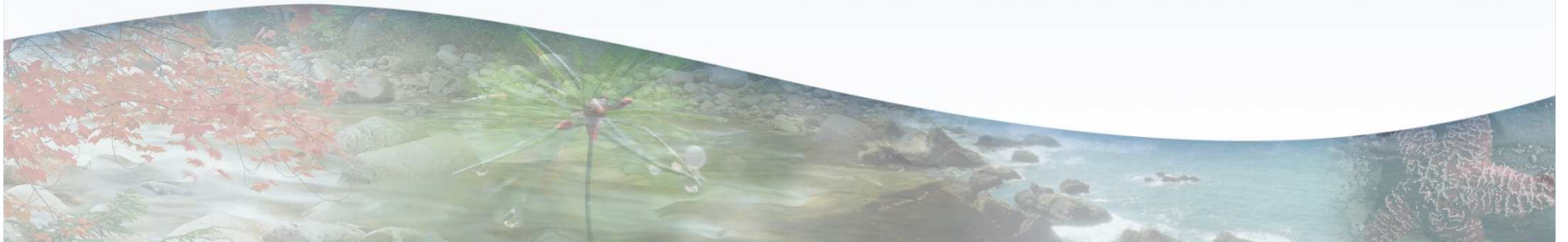
Summer/Fall 2012 – Workshop & Consideration of Complete Technical Package for Upper Elk

- Revised Chapters 1-3
- Updated analysis of instream conditions relative to WQ objectives and BUs
- Source analysis for 2004-2010 loading
- Desired target conditions: instream and hillslope
- Linkage of instream suspended measurements and hillslope estimates
- Loading capacity based upon multiple indicators
- Load allocations and MOS



Watershed Recovery

- TMDL to describe the watershed recovery plan
- Our program then should be designed to accomplish the plan
 - WDRs, CAOs, MRPs, partnerships



**Track Elk River TMDL development,
and download documents for review
and comment:**

**[http://www.waterboards.ca.gov/northcoast/
programs/tmdl/elk](http://www.waterboards.ca.gov/northcoast/programs/tmdl/elk)**

**Sign-up for announcements
pertaining to Elk TMDL:**

**[http://www.waterboards.ca.gov/resources/
email_subscriptions/reg1_subscribe.shtml](http://www.waterboards.ca.gov/resources/email_subscriptions/reg1_subscribe.shtml)**