



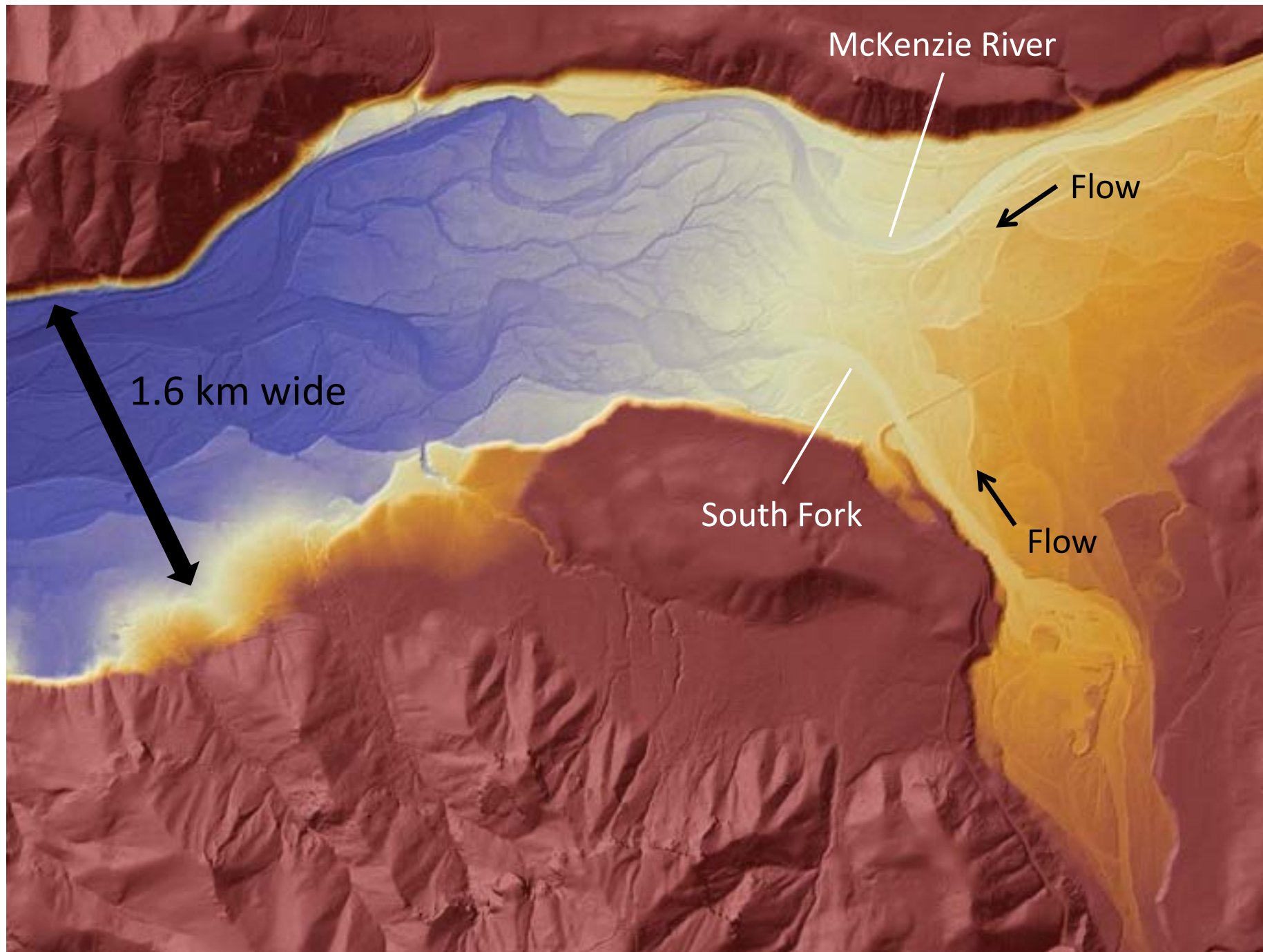
GIVING THE RIVER BACK TO ITS VALLEY:
Restoring to 'Stage 0' on the South Fork McKenzie River, Oregon, USA



Kate Meyer, Fisheries Biologist/Project Co-Lead
US Forest Service, Willamette National Forest
Australian Water School - May 2, 2023



McKenzie Watershed Council

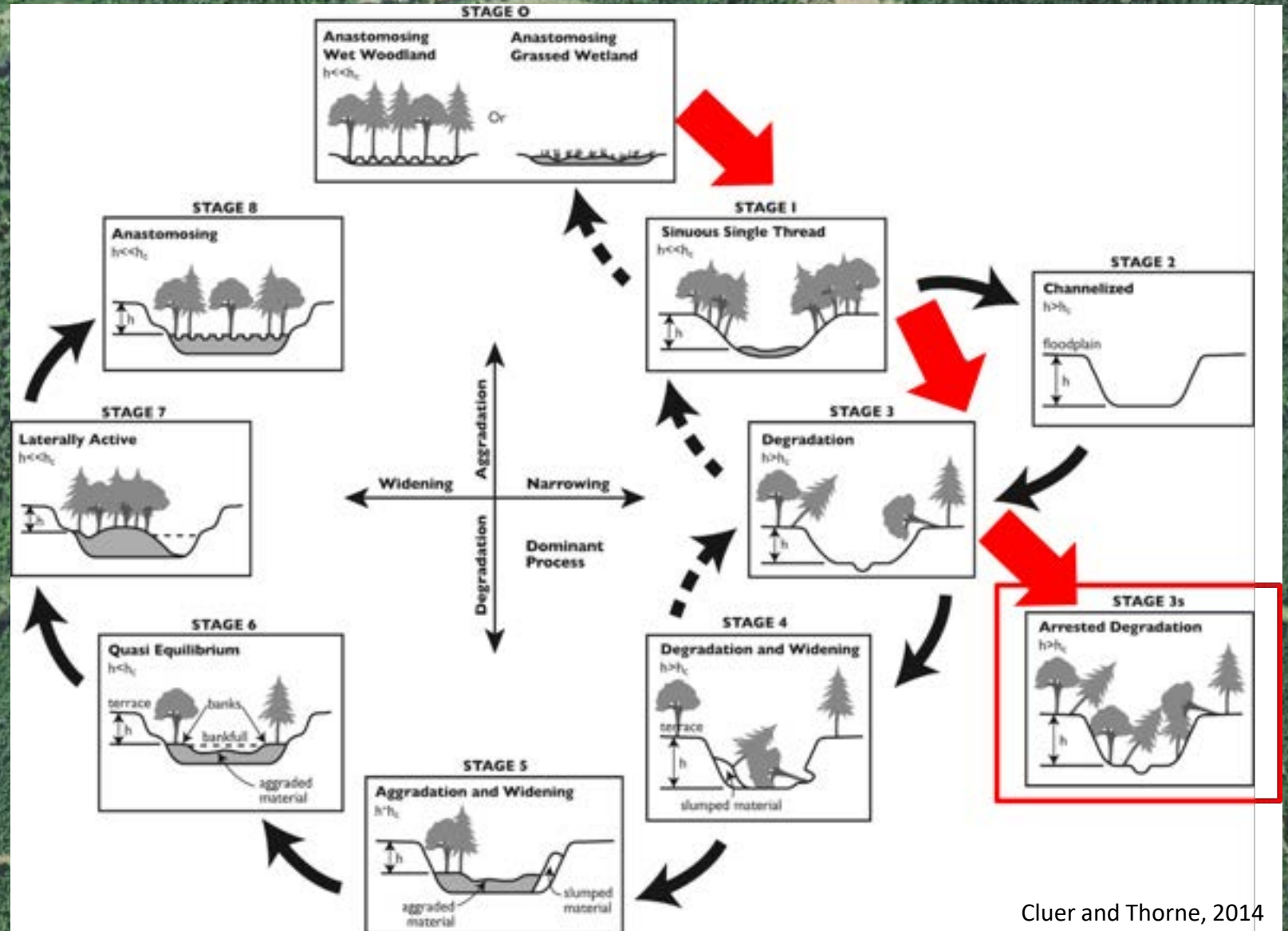


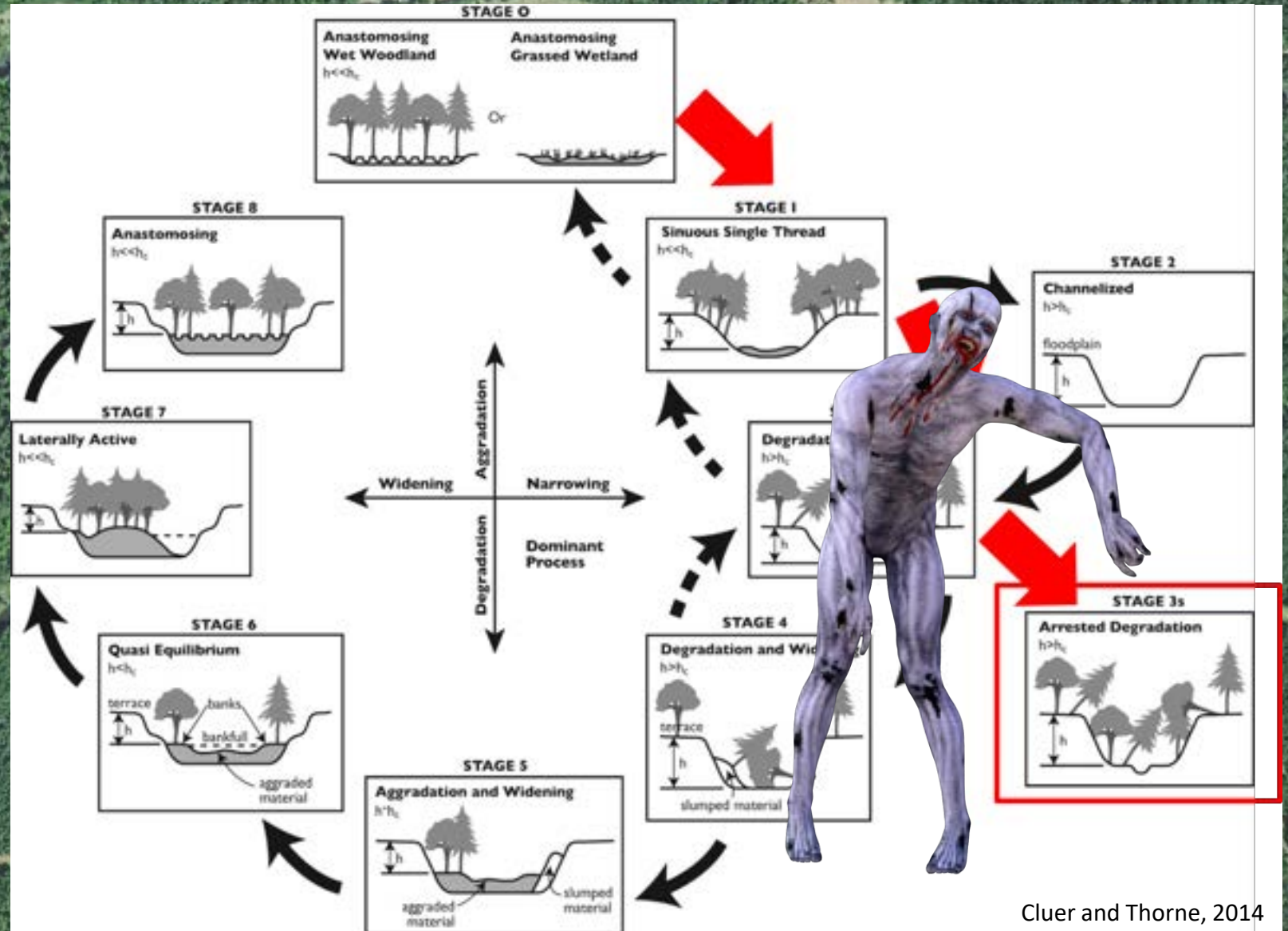


McKenzie River

South Fork







Design



PHASE 2: 20 Hectares



TEMPORARY
WATER
DIVERSION
CHANNEL

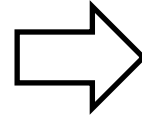
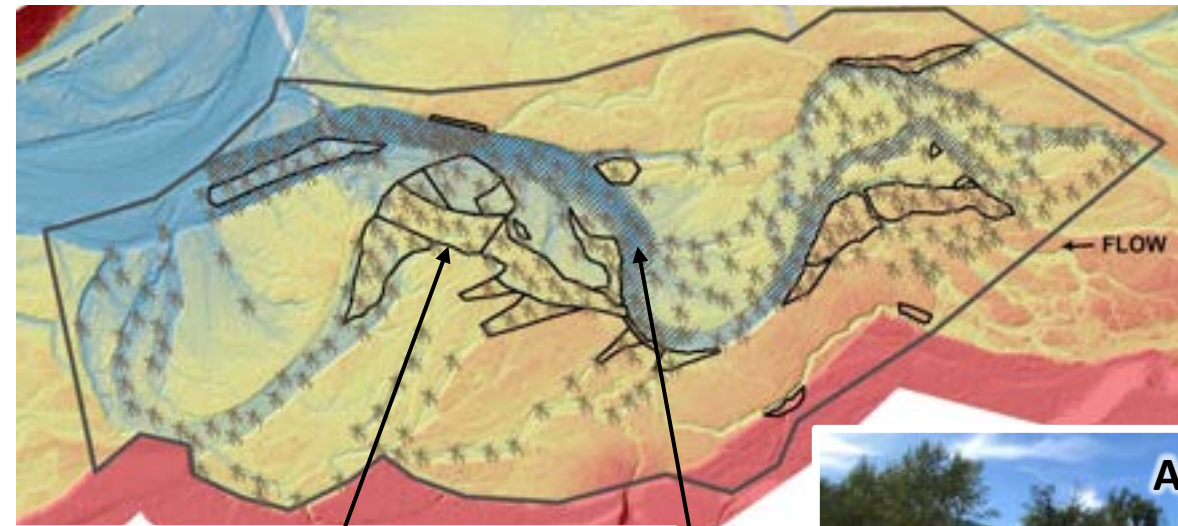
CHANNEL FILL ZONES

CUT ZONE

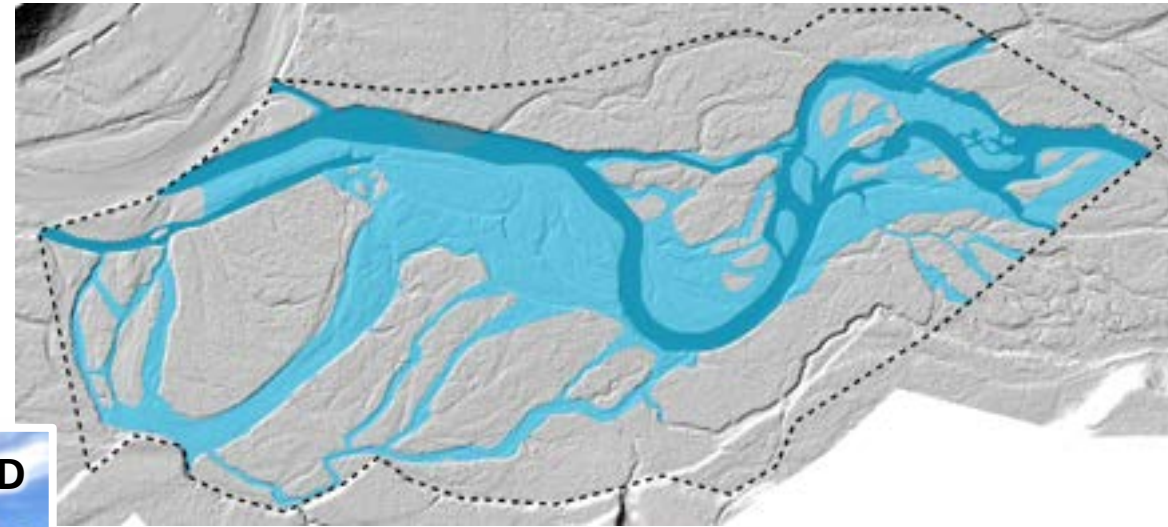
PHASE 1



Design



Base Flow Wetted Area



- Pre-project (8.3 hectares)
- Post-project (30.8 hectares)





Substrate: Shift from cobble/boulder dominant to gravel/fines dominant



Pre-Project



Post-Project





Water Temperatures:

- Warmer within the first 2 years (should cool as veg/shade reestablishes)
- High degree of spatial and temporal variability in thermal regimes (warmer and cooler)
- Large patches of cold water are connected or in close proximity

4 Years Post-Project, 1.5 Years Post-Fire

Flitcroft et. al., 2022. *Rehabilitating Valley Floors to a Stage 0 Condition: A Synthesis of Opening Outcomes*. Frontiers in Environmental Science

Macroinvertebrate Density, Biomass, and Diversity

- 1 year post-restoration = within the range of pre-restoration
- 2–3 years post-restoration = higher than pre-restoration

Macroinvertebrate Production

- 1 year post-restoration = lower than unrestored reaches on a per-square meter basis, but 3 times more production when scaled to wetted area



Flitcroft et. al., 2022. *Rehabilitating Valley Floors to a Stage 0 Condition: A Synthesis of Opening Outcomes*. Frontiers in Environmental Science

Jennings, Jeremy. 2022. Masters Thesis: *Effects of Stage 0 Stream Restoration on Aquatic Macroinvertebrate Production*



Biodiversity (eDNA - fishes, amphibians, mussels, crayfishes, and beaver)

- Species richness was orders of magnitude higher post-restoration at 2 of 3 transects
- Increasing trend in species richness post-restoration at 2 of 3 transects; same at 1 transect

Flitcroft et. al., 2022. *Rehabilitating Valley Floors to a Stage 0 Condition: A Synthesis of Opening Outcomes*. Frontiers in Environmental Science



Photo: Freshwaters Illustrated



Photo: ODFW

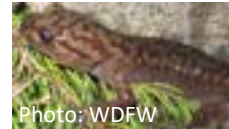


Photo: WDFW



Photo: Roger Tabor/USFWS



Photo: WDFW



Photo: WDFW

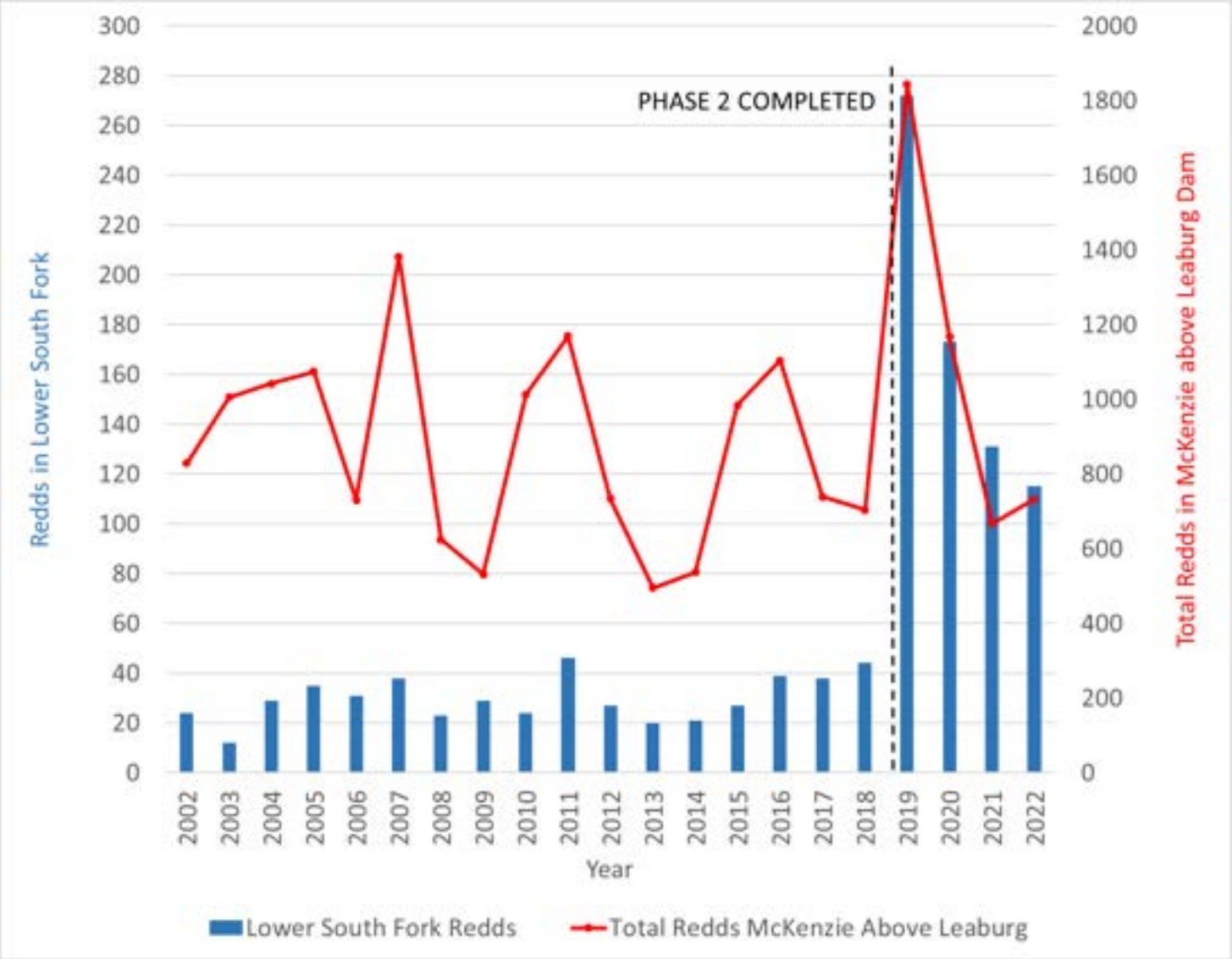


Photo: Freshwaters Illustrated

Chinook Salmon Spawning within the Project Area (2002-2022)



***10-20% of total sub-basin redds are found in South Fork project area (only 1.5% of area surveyed)**



Carbon Sequestration: Total estimated organic carbon stocks (wood + soil) greater in restored reach than unrestored reach and reference

Hinshaw and Wohl, 2021. *Quantitatively Estimating Carbon Sequestration Potential in Soil and Large Wood in the Context of River Restoration*. *Frontiers in Earth Science*

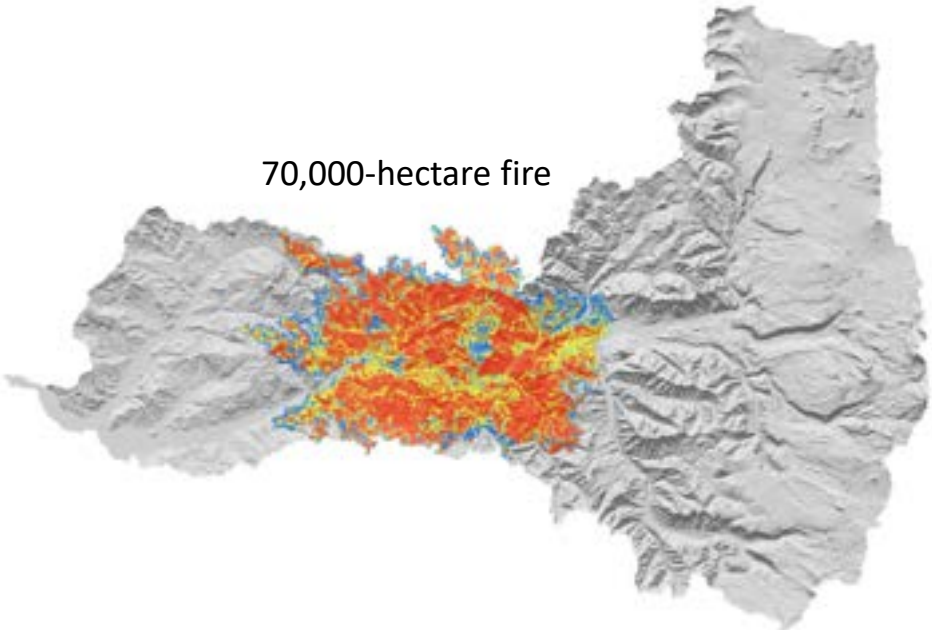
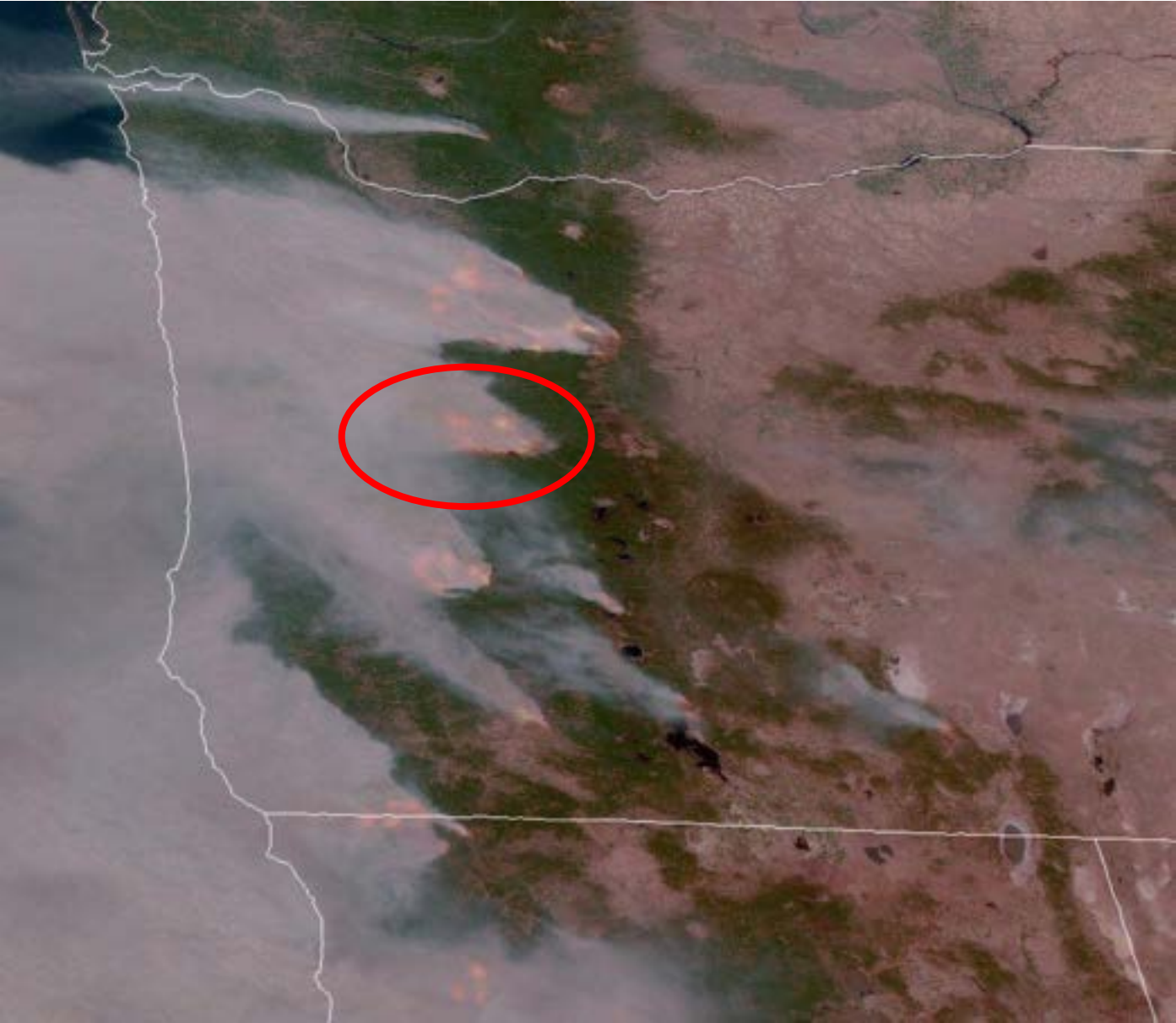


Increased Flood Resilience: Peak Flow February 2020 (~3,000cfs/85cms)



Upstream of Project at ~2,000cfs/57cms

Increased Fire Resilience: Holiday Farm Fire 2020



Increased Fire Resilience: Holiday Farm Fire 2020



Increased Fire Resilience: Holiday Farm Fire 2020



Increased Fire Resilience: Holiday Farm Fire 2020

Pugh et. al., 2022. *A possible role for river restoration enhancing biodiversity through interaction with wildfire*. Global Ecology and Biogeography



South Fork McKenzie River within the project area



McKenzie River, a few miles downstream of the South Fork



McKenzie River side channel, a few miles downstream of the South Fork