Using River Complexity Index to Adaptively Manage a Restoration Project on the Tucannon River

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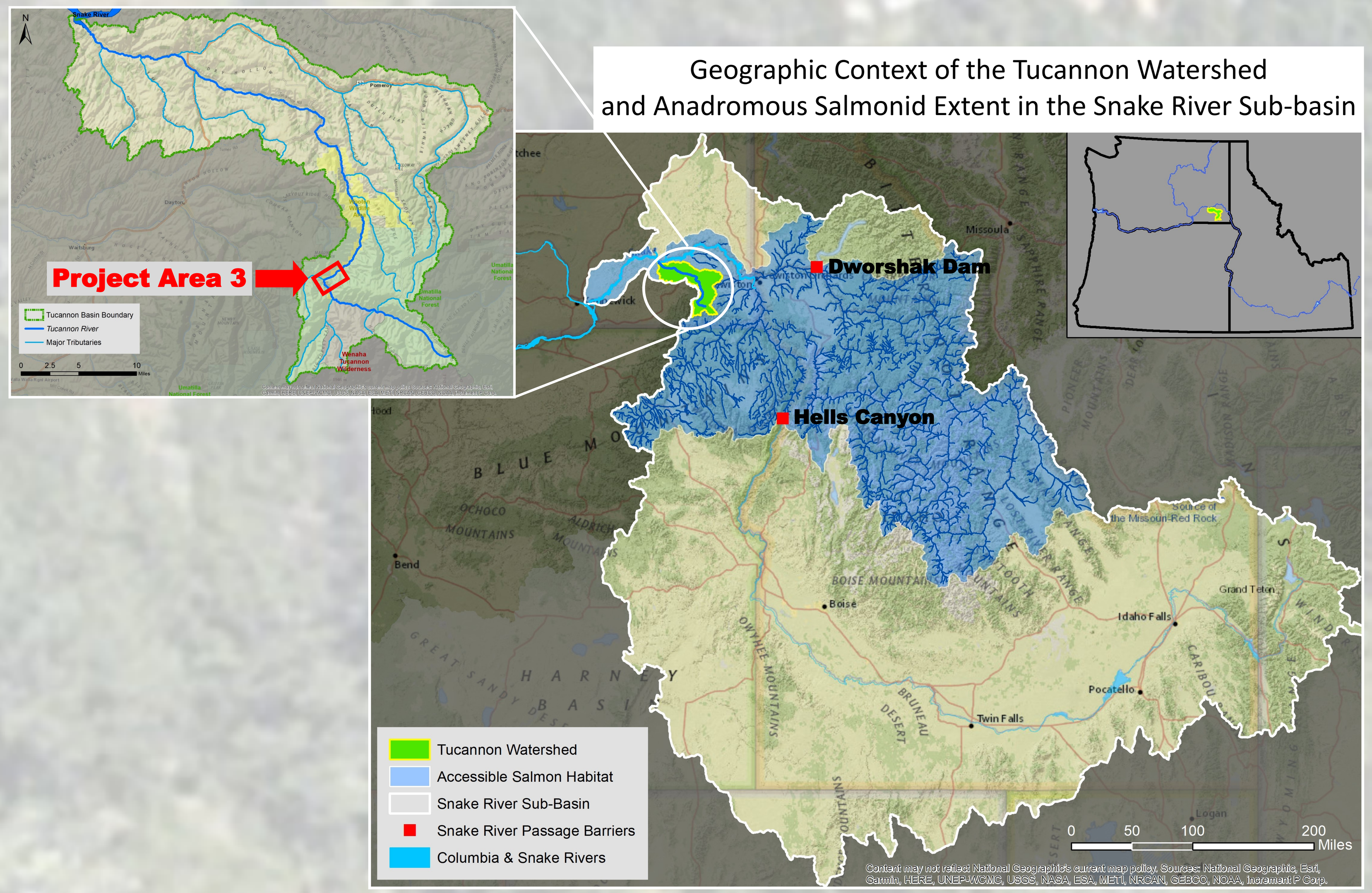
PARTNERS:

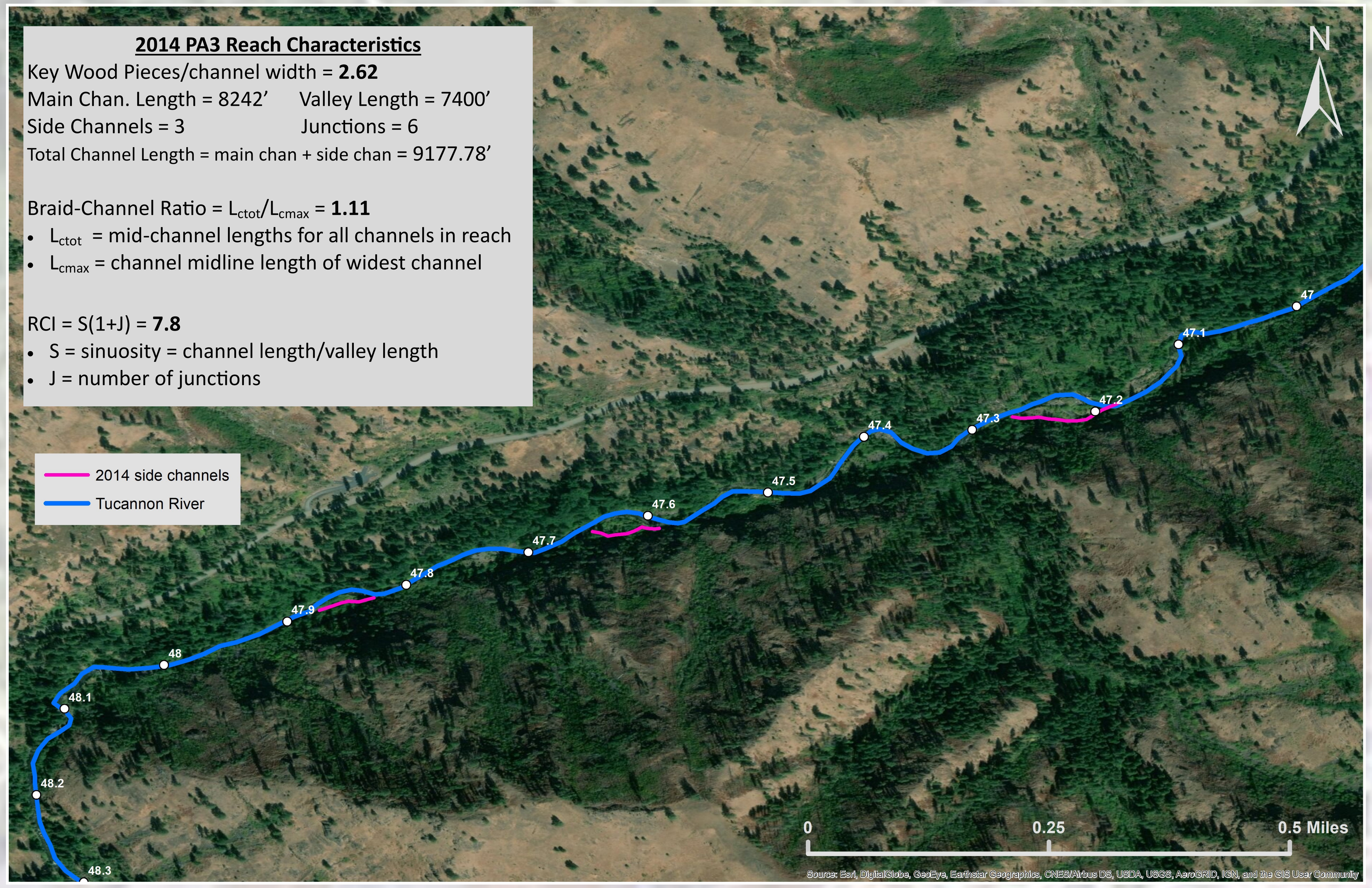
1) Background

In 1992, Spring Chinook were listed as threatened under the Endangered Species Act (ESA) as runs declined to less than 200 adult fish in the Tucannon River. As the downstream most salmon-bearing tributary of the Snake River, the Tucannon River supports the only remaining population of Spring Chinook (*Oncorhynchus tshawytscha*) in the Snake River Sub-basin. In 2009, CTUIR started working with local organizations to develop a restoration strategy with the goal of implementing projects aimed at increasing floodplain connectivity and channel complexity for salmon populations within the Tucannon River.



2) Project Area 3 — Overview

To address Tucannon River restoration goals, CTUIR placed large wood in Project Area 3 (PA3; river miles 46.7-48.2) of the Tucannon River during the summer of 2014. This restoration treatment had four objectives: 1) establish two key pieces (> 6m long, > 0.3m diameter) of large wood per channel width, (2) aggrade the channel, (3) reconnect the floodplain, and (4) increase channel complexity.

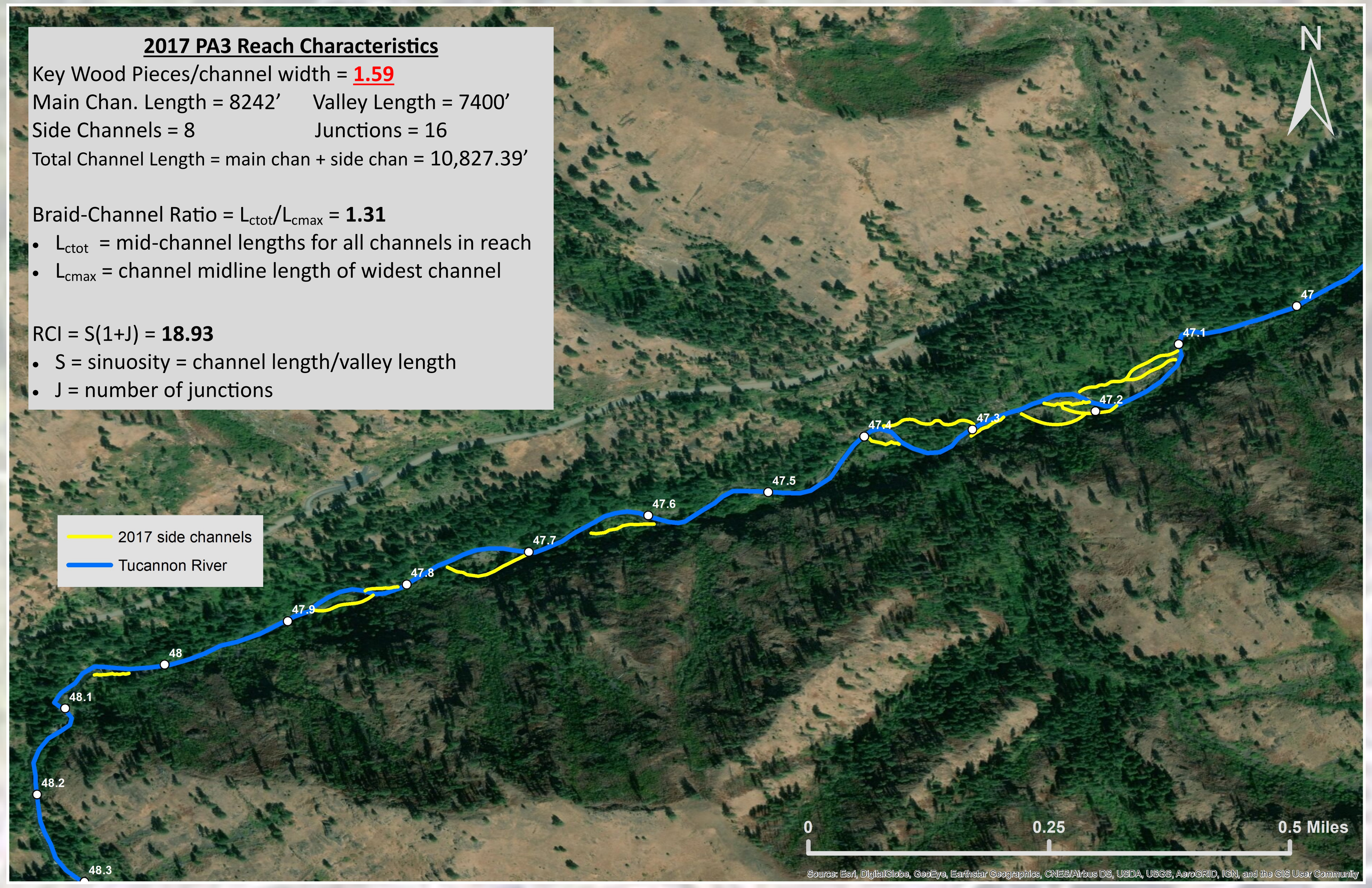



Helicopter crew placing large wood in the Tucannon River (July 2018)

3) Project Area 3 — Treatment Response

After the initial restoration project in 2014, the number of pools in the restoration reach decreased and the number of side channels increased, which indicated channel aggradation within the reach. The number of key pieces of large wood also decreased below the target quantity.

In 2017, CTUIR used the River Complexity Index (Brown, 2002) as a relative indicator of floodplain connectivity and channel complexity to assess how habitat conditions were changing since the 2014 restoration treatment. The RCI for PA3 increased between 2014 and 2017. Given the observed channel aggradation we hypothesized that RCI could be further enhanced by adding additional large wood in an effort to meet wood loading objectives for PA3.

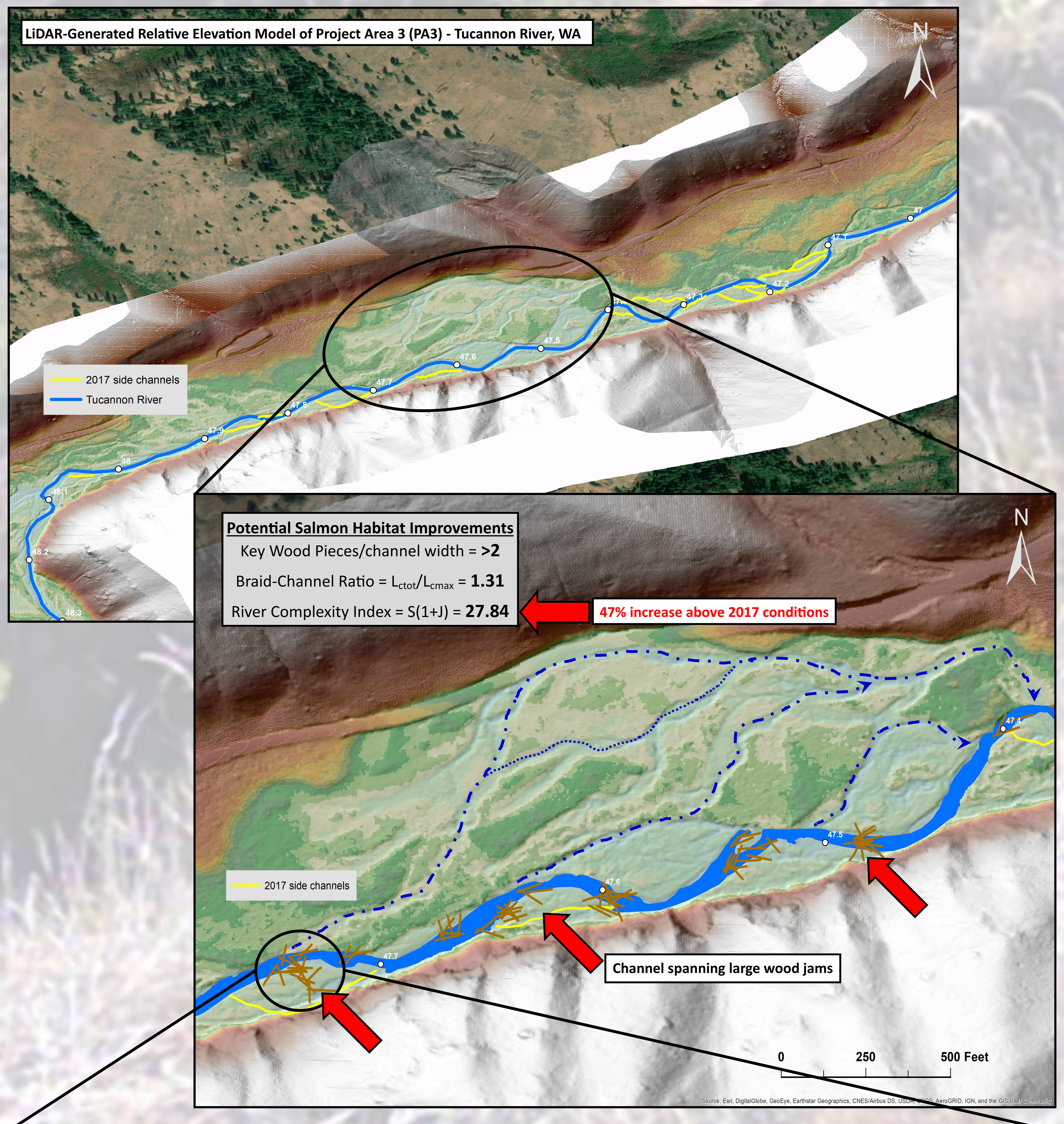


4) Adaptive Management

LiDAR data revealed three to four large paleochannels that could be reconnected with the main channel through strategic placement of channel spanning large wood structures. We were able to demonstrate a potential 47% increase in RCI with future reconnection of these existing paleochannels. Modeling these potential increases in RCI was particularly useful when communicating the proposed adaptive management actions to our fiscal agents (Bonneville Power Administration) and our various permitting agencies.

To complete the restoration design we used a vertol helicopter to add 350 whole trees with rootwads, 350 tree tops (racking material), and 30 ballast boulders. Large wood structures were designed to decrease stream velocities, aggrade the channel, and facilitate movement of surface water into existing paleochannels to increase floodplain connectivity.

Using helicopters to place large wood in-stream reduced the time and money required to complete the restoration project, by decreasing costs for engineering design and permitting. As the river continues to work with the large wood structures over time, we anticipate additional increases in RCI (both in floodplain connectivity and channel complexity) which should result in habitat improvements for all life history stages of ESA-listed salmon species.



5) Citations

Brown, A.G. 2002. Learning from the past—Palaeohydrology and palaeoecology. Freshwater Biology 47(4): 817-829. doi:10.1046/j.1365-2427.2002.00907.x