River Styles

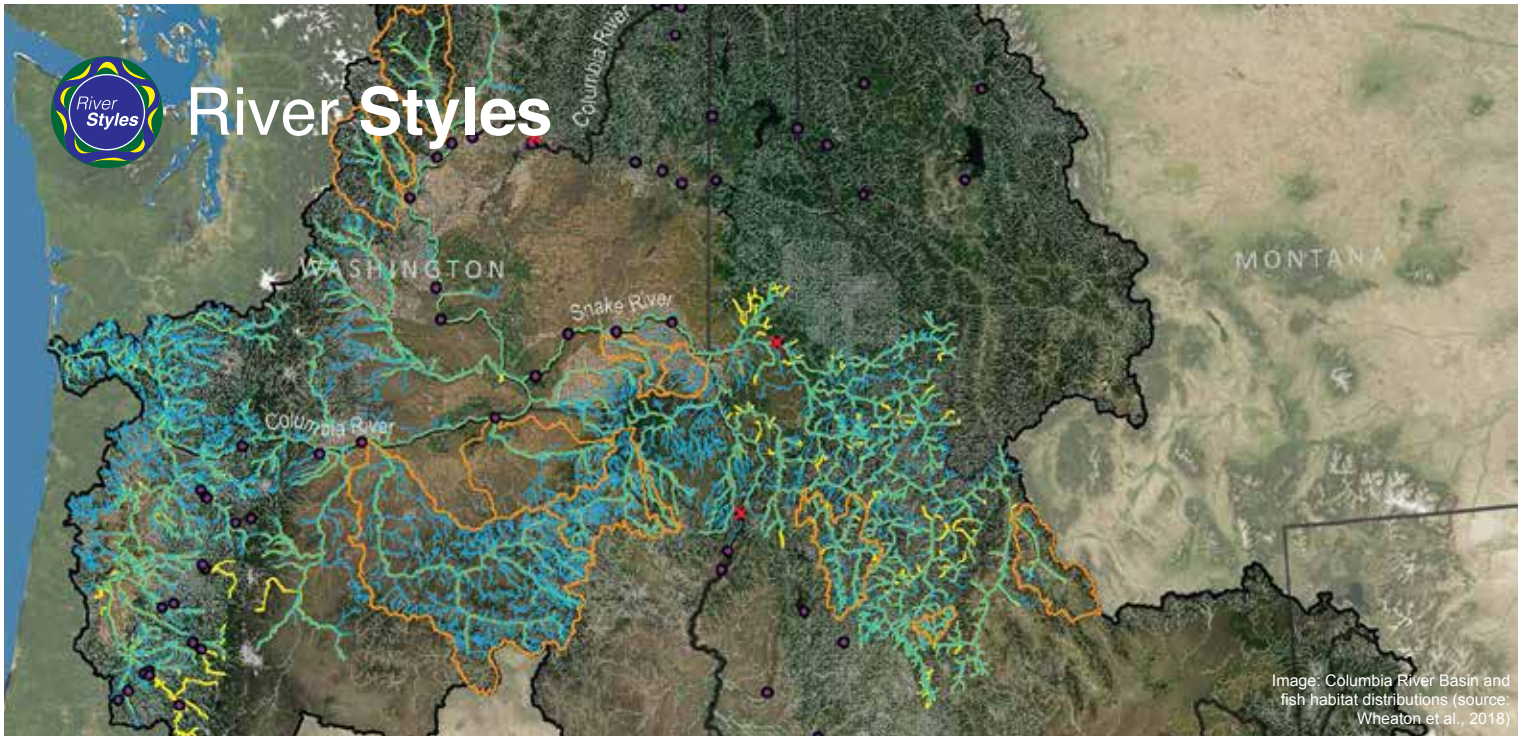


Image: Columbia River Basin and fish habitat distributions (source: Wheaton et al., 2018)

Case Study

Challenge

Physical habitat monitoring is time intensive and the transferability of findings from reach-based surveys to the network or catchment scale is often limited.

Solution

The River Styles Framework provides a geomorphic basis for 'scaling-up' ground-level assessments of physical habitat in conjunction with larger-scale spatial datasets.

Result

Physical habitat condition can be understood at a network scale, with prediction of future conditions in context of conservation and rehabilitation made possible, leading to better management of valuable fish habitat.

Monitoring and restoring valuable fish habitat in the Columbia Basin, USA

Maintaining healthy fish populations in freshwater environments requires a strong understanding of the quality and distribution of appropriate habitats throughout a catchment and over time. Particularly in large catchments, collecting the right information and using it to make robust interpretations is a significant challenge.

In the northwest USA, CHaMP (Columbia Habitat Monitoring Program) set out to design a protocol for monitoring physical salmon habitat and guiding rehabilitation activities with accuracy, efficiency and transferability in mind. Recognising the fundamental importance of geomorphology in providing structural habitat, the developers of CHaMP chose the River Styles Framework as a foundational element in their monitoring protocol.

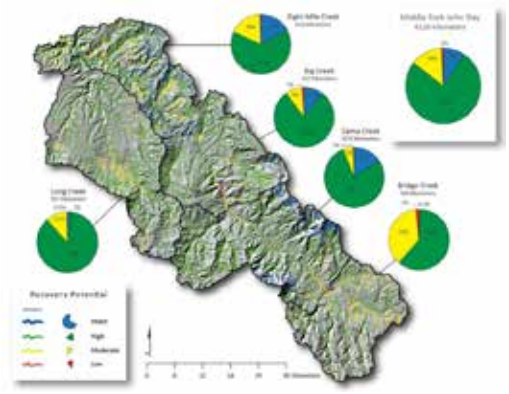
Stage 1	Stage 2	Stage 3	Stage 4
Catchment-wide baseline survey of river character, behaviour and pattern.	Catchment-framed assessment of river evolution and geomorphic condition.	Assessment of future trajectory of change and geomorphic recovery potential.	River management applications and implications.

CHaMP used the River Styles Framework as a basis for making comparisons between river types in the Columbia River Basin, predicting fish habitat suitability and prioritising conservation and rehabilitation activities. The developers found that geomorphic condition (Stage 2), when combined with River Style (reach type; Stage 1), was "likely to be the best network-scale predictor of fish habitat character in individual reaches".[1] They then used assessments of geomorphic recovery potential (Stage 3) to develop realistic visions for future habitat condition and possible management actions (Stage 4).

The River Styles Framework provided a robust geomorphic basis for 'scaling-up' ground-level assessments of physical habitat in conjunction with insights from larger-scale spatial datasets.

Integration of processes and data from the River Styles Framework with ecological and hydrological assessments in the CHaMP protocol is an excellent example of how geomorphology can be used to scaffold information and decision-making in ambitious environmental monitoring programs. CHaMP continues to support understanding fish and habitat status and trends and the evaluation of success in river rehabilitation throughout a large proportion of the 668,000 km^2 Columbia River Basin.

For more information, see: champmonitoring.org, riverscapes.xyz and joewheaton.org.



Map of recovery potential for the Middle Fork John Day Catchment, USA. *Source: O'Brien & Wheaton, 2015, River Styles Report on Middle Fork John Day Watershed, Oregon.*

References:
1. Wheaton, J. M., Bouwes, N., Mchugh, P., Saunders, C., Bangen, S., Bailey, P., Nahorniak, M., Wall, E. and Jordan, C. 2018. Upscaling site-scale ecohydraulic models to inform salmonid population-level life cycle modeling and restoration actions – lessons from the Columbia River Basin. Earth Surface Processes and Landforms, 43 (1), 21-44: https://onlinelibrary.wiley.com/doi/10.1002/esp.4137.

Learn more about the River Styles Framework at riverstyles.com