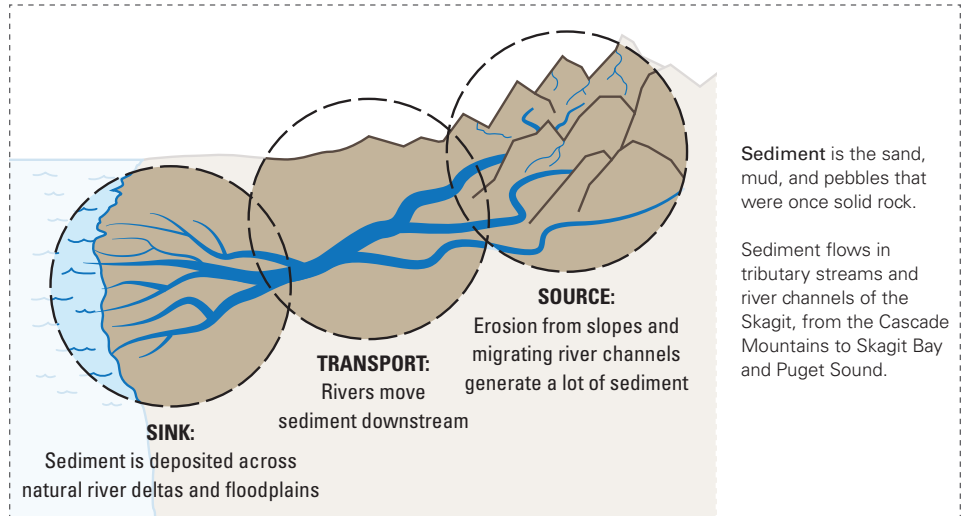




## WHAT IS SEDIMENT?

From its headwaters in the rugged North Cascades down to its confluence with the saltwaters of Puget Sound, the Skagit River drains a huge amount of land – 3,200 square miles, which is twice the size of Rhode Island. The river carries water, but also considerable sediment: the sand, mud, and pebbles that were once solid rock. In fact, the USGS estimates that the Skagit River transports 2,800,000 tons of sediment every year. This sediment can be carried by, suspended in, or dropped and deposited in channels and Skagit Bay by the flowing waters of the Skagit River.



## THE FLOW OF SEDIMENT

Water and sediments mix, mingle, and scour to define the path and shape of the Skagit River every year. In the mountains, the steep slopes erode and generate a lot of sediment acting as the "SOURCE". Lower in the watershed, sediment is carried and dropped and carried and dropped by the water in the "TRANSPORT" zone. In a natural system, sediment accumulates and is deposited across a broad "SINK" area of the floodplain. In the Skagit, sediment is pushed out to the bay and Puget Sound due to river channelization and the extensive levee system.

## PROJECTED CHANGES

Warming temperatures are expected to substantially increase the amount of sediment because as the glaciers retreat and snow falls only at higher elevations, less of the upper watershed is covered by ice and snow. Ice and snow help keep the mountains from eroding and sending sediment down the watershed so without it, the amount of sediment increases dramatically. The projected increase in rain storms will compound this issue as the increased sediment is released more frequently and is transported more effectively by higher volumes of water.

## THE CHALLENGE

*While sediment movement and deposition is a natural process, sediment affects people, infrastructure, and ecosystems. More sediment as a result of climate change affects these elements by:*



### DAMS

Requiring dam managers to come up with ways to remove sediments or allow the sediment to pass through the dam without harming turbines or machinery



### FARMERS

Increasing challenges with the drainage of cropland and other lands protected by dikes and levees and potentially affecting irrigation



### TRANSPORTATION

Flooding and erosion can damage vital rail and road corridors, including bridges, that traverse the Skagit Valley



### WATER SUPPLY

Potentially affecting the availability of clean and affordable drinking water



### FLOODING

Decreasing the capacity of the Skagit River to carry flood waters as it fills in channels and elevates the bottom of the riverbed



### SALMON AND ECOSYSTEMS

Clouding waters and suffocating salmon eggs in rivers and potentially covering eelgrass and shellfish beds in Skagit Bay. Sediment may also provide the delta with much needed sediment to keep pace with a rising sea level



### SC<sup>2</sup> AS A PROVEN RESOURCE

SC<sup>2</sup> scientists, Dr. Grossman, Mr. Fuller, Dr. Rybczyk, and Dr. Hood are currently designing and conducting research to better understand the source, transport, and sink of Skagit River sediment. Dam managers, water purveyors, businesses, farmers, and salmon recovery and ecosystem restoration practitioners need to understand how sediment in the Skagit River affects their interests.

SC<sup>2</sup> knows what it takes to answer these questions. We bring a system-wide understanding of glacier retreat, landslides, geography, hydrology, dam operations, channel morphology, sea level rise, tides, storm surge, and land use. We bring this understanding as we explore questions with local decision-makers and communities and forecast possible futures related to sediment. SC<sup>2</sup> has been working since 2009 to link hydrology, dam operations, glacial retreat and other key information to position itself to better understand and address sediment transport and deposition in the Skagit.

---

### LOOKING FORWARD TO MORE SOLUTIONS, MORE ACTION

There is a critical need to better understand how and where sediment moves to inform communities and predict ecosystem vulnerabilities. SC<sup>2</sup> is eager to continue to model sediment transport pathways, study source, transport, and sink areas and flood flows, and talk to key stakeholders and interests. We want to examine how the shape and depth of Skagit River channels are changing with sedimentation.

We also plan to use sophisticated models to identify those parts of the watershed that are the most vulnerable to increased sediment, and key sediment storage areas along the Skagit River that can safely store sediment to reduce flood risk and improve habitat. SC<sup>2</sup> scientists have the ability to examine sediment inputs from different tributaries to inform understanding of which parts of the huge watershed are affecting flood risks the most. SC<sup>2</sup> scientists are also combining hydrology, glacier, and dam management models to estimate the effects of climate change and increased sediment on the Skagit mainstem, estuary, delta, and Puget Sound.

---



#### The Skagit Climate Science Consortium (SC<sup>2</sup>)

SC<sup>2</sup> is a nonprofit 501c(3) organization consisting of scientists working with local people to assess, plan, and adapt to climate related impacts. Composed of research scientists from universities and federal, municipal, and tribal governments and agencies working in the Skagit basin, SC<sup>2</sup> members seek to understand how the landscape, plants, animals and people may be affected by changes in the patterns of rain, snow, temperature, storms and tides.

[www.skagitclimatescience.org](http://www.skagitclimatescience.org)

Visit our website to learn more about who we are, what we do, and the various resources we can provide.

Or contact Carol MacIlroy:  
[cmacilroy@gmail.com](mailto:cmacilroy@gmail.com) or 206-293-4741.