Discharge models in the Gulf of Alaska Region							
Author	**Spatial scale (km)**	**Temporal scale (mo)**	**Product (discharge)**	**Method**	**Inputs**	**Delivery**	**Suitability**
Hill et al.[1]	Watershed scale	Monthly	Monthly discharge	Statistical	Precipitation, temperature, watershed properties (elevation, glacier cover)	Regression equations specified in publication	Ideal for monthly time series of discharge. Since regression equations were based on historic data, their suitability for future projections is questionable.
Beamer et al.[2]	1 km	Daily	Discharge, snow covered extent, snow-water-equivalent, evapotranspirati on, ice-melt,	Physical-based	Precipitation, temperature, wind speed and direction, humidity, terrain model,	Data are served at AOOS. Daily-flow hydrographs are	This physically-based energy-balance model can be driven by either historical weather & land cover data or

[1] Hill, D.F., Bruhis, N., Calos, S.E., Arendt., A., Beamer, J., 2015, “Spatial and Temporal Variability of Freshwater Discharge into the Gulf of Alaska,” Journal of Geophysical Research, v.120(2), pp.634-646.

[2] Beamer, J., Hill, D.F., Arendt, A., Liston, G., 2016, "High-resolution modeling of coastal freshwater discharge and glacier mass balance in the Gulf of Alaska watershed," Water Resources Research, in press.

[3] Curran, J.H., Barth, N.A., Veilleux, A.G., and Ourso, R.T., 2016, Estimating flood magnitude and frequency at gaged and ungaged sites on streams in Alaska and conterminous basins in Canada, based on data through water year 2012: U.S. Geological Survey Scientific Investigations Report 2016–5024, 47 p., http://dx.doi.org/10.3133/sir20165024.

[4] Wiley, J.B., and Curran, J.H., 2003, Estimating annual high-flow statistics and monthly and seasonal low-flow statistics for ungaged sites on streams in Alaska and conterminous basins in Canada: U.S. Geological Survey Water-Resources Investigations Report 03-4114, 61 p.

			snow-melt, snow-rainfall partitioning		land cover data, soil data	downloadable at any model grid cell.	future weather & land cover data. It is suitable for climate change studies of streamflow.
Curran et al.[3]	Watershed scale	Annual	Flood frequency (P-percent annual exceedance probability discharge)		Drainage area, precipitation (PRISM 1970-2000)	Regression equations specified in publication; spreadsheet tool provided. StreamStats houses statistics for USGS gages statewide and computes regression equations for Cook Inlet Basin.	Standard tool for estimating flood frequency at gaged or ungaged streams, commonly for design purposes. Statistical model based on correlation of historical streamflow and historical basin characteristics. Not suitable for future projections.
Wiley and Curran[4]	Watershed scale	Monthly, seasonal	High-duration flow, low-duration flow, and low-flow frequency statistics		Drainage area, precipitation (Jones and Fahl, 1993), elevation, glacier cover	Regression equations specified in publication.	Produces estimates of high-flow and low-flow statistics for ungaged streams. Statistical model based on correlation of historical streamflow and historical basin characteristics. Not suitable for future projections.

Moore, et al.[5]	Gridded, has typically been run at 400 m resolution	Monthly	Runoff, snow cover, snow water equivalent. Extendable to ET, PET		Precipitation, temperature, landcover (3 forest classes, open, lake, glacier). Typically used climate normal to drive model, also GCM output	https://github.com/jwtrubil/DCWBM, Regime for central coast of BC: http://www.mapservices.ca/EBM/ (Model 2 in hydrological typing and discharge, transboundary)	Hydrologic regime in ~10 to 10000 km^2 watersheds can be predicted with reasonable accuracy by taking mean monthly runoff values for full area. Conceptual model may be applicable for future climate scenarios.
Shanley and Albert[6]	Watersheds HUC 10	Monthly	Mean Monthly and 2080s Forecasts	Statistical	Basin Area, Monthly Temp/Precip, Elevation, Lakes, Glaciers, 3 GCMs	Regression equations, maps, and tables in online, open-access journal. All GIS data available upon request: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0104799	Regional index of predicted hydrologic change

Orsborn and Storm [7]		12	QAM QAA		Basin area (sqmi), and a basin relief parameter (H) which is the difference between watershed outlet elevation and the saddle above the upper-end or head of the main-stem of the primary channel. The square root of the product of these two parameters provides a basin “energy” term ((AH) 1/2),	Regression eqs in publication	

OTT Engineering [8]		12	QAM QAA		Basin Area (sqmi), Mean Annual and Monthly Precip (model specfic data) (inches), Ratio of Basin Area above Treeline (%), Ratio of basin area in main channel lakes (%), Slope of main channel (ft/1000ft), Mean basin elevaiton (ft), Distance form the GOA (mi)	Regression eqs in publication	
Park and Madison [9]		12	QAA		Basin area (sqmi), Mean annual Precip (inches)	Regression eqs in publication	

[4] Wiley, J.B., and Curran, J.H., 2003, Estimating annual high-flow statistics and monthly and seasonal low-flow statistics for ungaged sites on streams in Alaska and conterminous basins in Canada: U.S. Geological Survey Water-Resources Investigations Report 03-4114, 61 p.

[5] Moore, R.D., Trubilowicz, J.W. and Buttle, J.M. (2012), Prediction of Streamflow Regime and Annual Runoff for Ungauged Basins Using a Distributed Monthly Water Balance Model. Journal of the American Water Resources Association, 48: 32–42. doi: 10.1111/j.1752-1688.2011.00595.x

[6] Shanley, C.S., and D.M. Albert. 2014. Climate change sensitivity index for Pacific Salmon habitat in Southeast Alaska. PLoS ONE 9(8): e104799. doi:10.1371/journal.pone.0104799

[7] Orsborn, J. F., Storm M. C., (1991) *Hydrologic Models for Estimating Streamflows on the Tongass and Chugach National Forests in South-East and South-Central Alaska,* USDA Forest Service, Region 10, Juneau, AK

[8] OTT Water Engineering, INC., (1979) *Water Resources Atlas for USDA Forest Service Region X, Juneau, Alaska*

[9] Parks, B; Madison, RJ, (1985) *Estimation of the Flow and Water-Quality Characteristics of Alaskan Streams*, U.S. Geological Survey Water-Resources Investigations Report 84-4247

Author-Primary author
Spatial scale-Resolution of the grid or polygon used for modeling (30m, 400m, 800m, 1km, etc.)
Temporal scale-Historical normal input range
Product-What does the model predict in terms of discharge values: Daily, Monthly, Annual runoff, other?
Method-Modeling approach: Statistical (regression); conceptual (degree day/temperature index); Physical (energy-balance)
Inputs-What data are used to run the model.
Delivery-Mode of data deliver
Suitability-Application and suitability for future prediction