RESERVOIR SEDIMENT ACCUMULATION MODELING REPORT SEPTEMBER 30 2013

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Step 1: Determine which GIS-based sediment accumulation models are available.

Various potentially usable models were encountered while doing a search. Many had been written on older operating systems and were no longer updated or supported. Many I tried running but they kept having problems and stopping. Most were free but some were expensive.

Step 2: Select a software package and model

In the end I selected Basins 4.1 available free from the EPA <u>http://water.epa.gov/scitech/datait/models/basins/index.cfm</u>. Within Basins 4.1 are available several sediment models. I had the best luck with PLOAD (which a visiting lecturer well versed in the subject stated would well meet my needs).

Basins 4.1 uses MapWindow GIS (similar to commercial software such as ArcGIS and competitors, but free) as its spatial software environment.

Step 3: Select basins on which to test the model

At <u>http://www.usbr.gov/pmts/sediment/projects/ReservoirSurveys/</u> is a list of reservoirs for which sediment accumulation has been measured with a value provided of acre feet per year average accumulation. From this group a subgroup of reservoirs was selected to compare output from PLOAD with actual amounts.

The subgroup was selected based on basin size (smaller basins are easier to deal with), lack of diversions (water flowing into or out of a reservoir or its drainage basin to or from another naturally unconnected basin adds complexity that is difficult to measure), lack of upstream sediment-trapping reservoirs, and

avoidance of factors which would skew the sediment amounts from normal conditions (large fires, landslides, etc.); these factors are not always known.

Step 4: Initial Results

Name	State	HUC	PLOAD TSS Annual lbs	PLOAD annual ac ft (@ 100 lb/cu ft)	annual ac ft from sediment survey
МсКау	OR	17070103	91000575	20.89085744	29.1
Virginia Smith Calamus	NE	10210008	34425745	7.90306359	297
Altus	ОК	11120302	242650304	55.70484481	417
Box Butte	NE	10150002	113910600	26.15027548	32.9
Cedar Bluff	KS	10260003	870542805	199.8491288	261.9
Belle Fourche	SD	10120202	6438997	1.478190312	378
Patterson Lake (Dickinson)	ND	10130202	1583205805	363.4540416	46
Hugh Butler	NE	10250007	186122	0.042727732	45.3
Webster	KS	10260013	727442717	166.9978689	31.7
Beulah	OR	17050116	22012538	5.053383379	11.05
Thief Valley	OR	17050203	196609726	45.13538246	30.1

Step 5: Try to determine why some of these model output amounts are of the same order of magnitude as the measurements and some are not.

It's not clear at this point what is going on but further investigation may produce some ideas. Perhaps a model other than PLOAD should be used. Some terrain such as sandhills in Nebraska has areas of internal drainage which do not contribute sediment.

Step: 6 Calibrate the outputs to real world conditions.

This remains to be done.

Step 7: Run model on reservoirs for which no sediment accumulation amounts are available.

This remains to be done.