

Missouri Mitigation History

- Abundance of streams but not many natural lakes.
- Large number of impoundments constructed in the past ~100 years.
 - Flood control, hydropower, recreation, water supply.
 - Privately owned usually <1.0 acre to 100+ acres.
 - Agricultural uses exempted (i.e., livestock watering, irrigation).
 - Mostly impact intermittent and ephemeral systems.
 - Publically owned usually 1,000s of acres.
 - Last major reservoir began operation in early 1980's (18,600 acre Mark Twain Reservoir).
 - Currently 2 major drinking water reservoirs in the planning stage.

Assessments

- 1998 Aquatic Resource Mitigation Guidelines.
 - http://www.dnr.mo.gov/env/wpp/401/mitigation_guidelines.pdf
- 2007 Missouri Stream Mitigation Method.
 - http://www.nwk.usace.army.mil/Portals/29/docs/regulatory/mitigation/MSMM_Feb2007.pdf
- 2013 Missouri Stream Mitigation Method.
 - <http://www.mvs.usace.army.mil/Portals/54/docs/regulatory/mitigation/Amended%20Missouri%20Stream%20Mitigation%20Method%20April%202013.pdf>
- Functional Assessments allowed but not common.

2013 MSMM Adverse Impact (Debits)

- Activity considered both a 'fill' (factor of 2.5) and 'impoundment' (factor of 2.2) of streams.
- Other factors include stream type, water priority, pre-impact condition, duration, cumulative impact, and linear feet.
 - Min = $(3.0 + (0.0002 * LF)) * LF$
 - Max = $(6.0 + (0.0002 * LF)) * LF$
 - Average ~ $(4.0 + (0.0002 * LF)) * LF$.

2013 MSMM Mitigation (Credits)

- In-stream worksheet.
 - Stream type, priority, net benefit, site protection type, schedule.
 - Excellent, good, moderate, and stream relocation factors.
 - Removing manmade structures, restoring channel, floodplain reconnection, grade control, training structures.
 - Min = $0.8*LF$, max = $5.0*LF$, avg = $\sim 2.0*LF$.
- Riparian worksheet.
 - Stream type, priority, net benefit, supplemental buffer, site protection type, schedule, temporal lag.
 - Ecological appropriate species (trees, shrubs, grasses).
 - At least 50 foot up to ~ 300 feet (system appropriate).
 - Min = $0.08*LF$, max = $4.6*LF$, avg = $\sim 2.0*LF$.

Example of Debits and Credits

- Impact (Debits):
 - Intermittent, tertiary, moderately functional, permanent
 - 400 LF of fill = $(4.1+0.08)*400 = 1672$
 - 1500 LF of impoundment = $(3.8+0.3)*1500 = 6150$
 - Sum = 7,822 debits.
- Compensatory Mitigation (Credits):
 - Intermittent, tertiary, 3rd party site protection, constructed after impact, 10-20 year temporal lag.
 - In-Stream: 1500 LF of longitudinal peak stone toe protection = $3.05*1500 = 4575$.
 - Riparian: 1900 LF restoration of 50-foot forested riparian buffer on both sides = $1.75*1900 = 3325$.
 - Sum = 7,900 credits