UNRBA MRSW Meeting

MRS Project Discussions

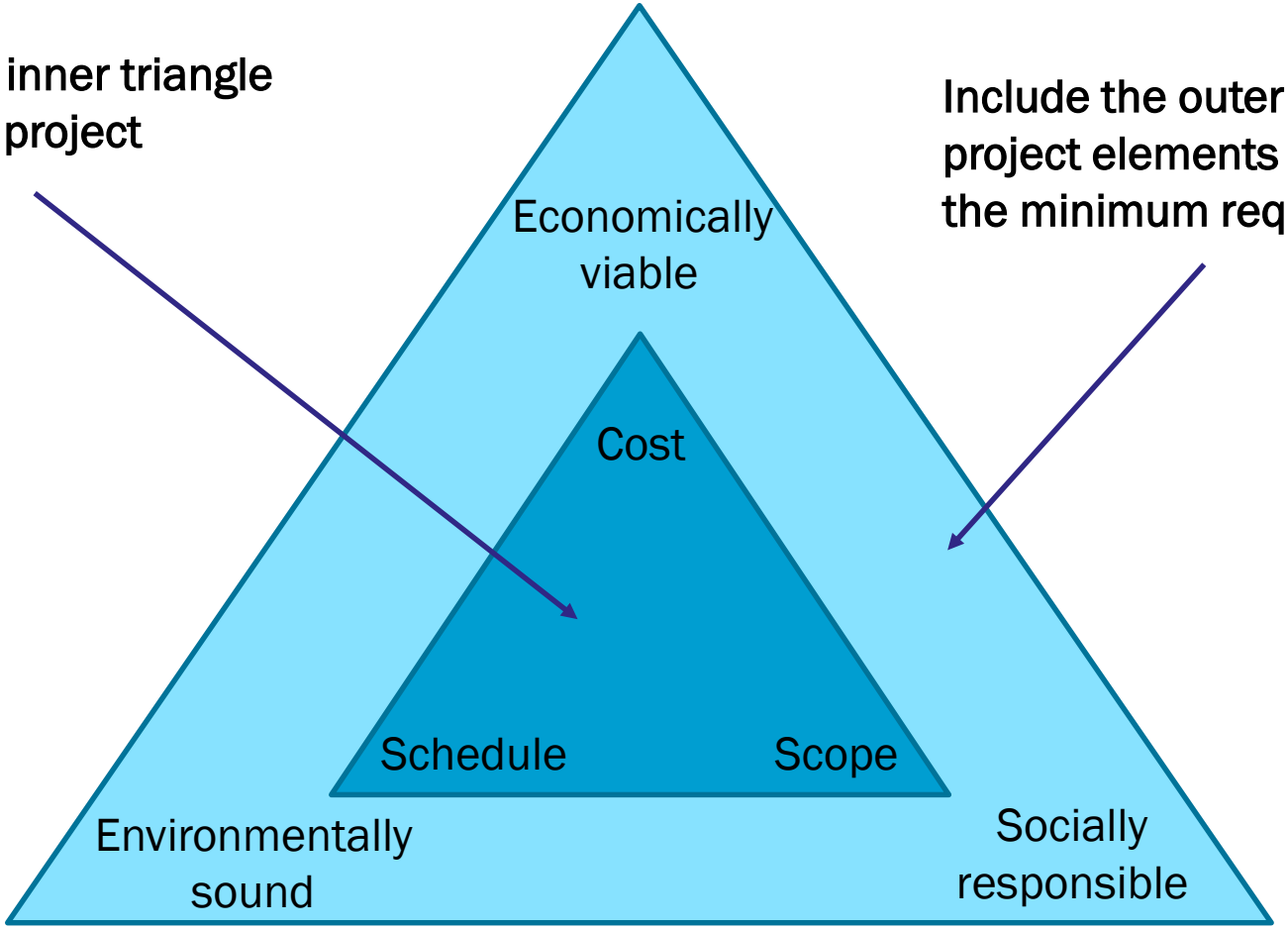
March 11, 2019

Review Established Decision Framework for MRSW

MRSW Decision Framework (1/28/2019)

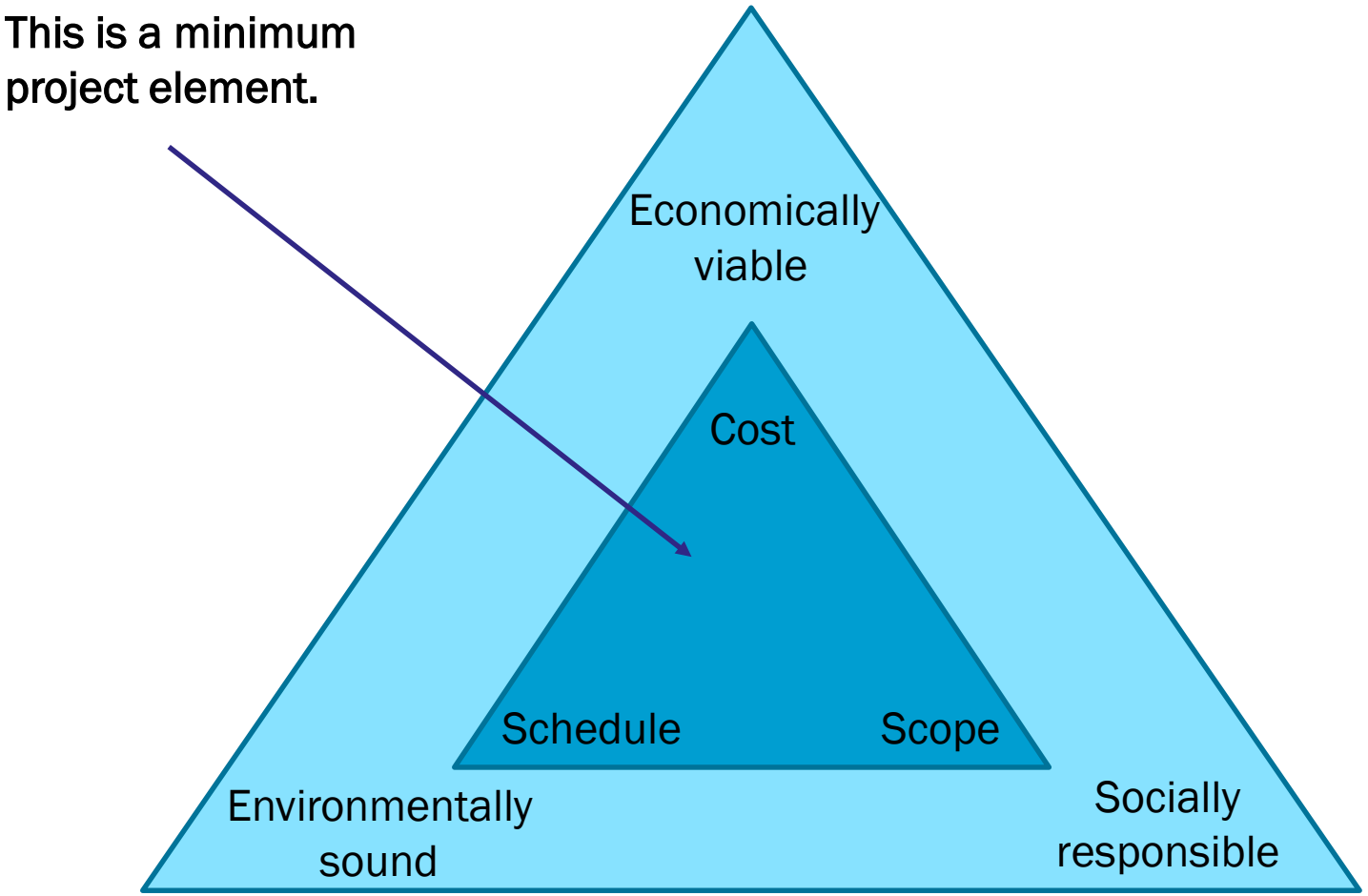
Focus on the inner triangle for minimum project elements

Include the outer triangle for project elements outside of the minimum requirements



Discussion of Minimum Project Elements – Model Time Step

Model Time Step Discussion



Availability of Data to Support a Shorter Model Time Step

- Modeling team has discussed the availability of NEXRAD radar precipitation data with the State Climate Office (SCO)
  - SCO prefers to provide data at 6-hr intervals or higher
  - Hourly data is not QAQC'd by the SCO (difficult to keep up with hourly data as it comes in)
  - They QAQC 6-hr increments and daily datasets

Project Impacts of Hourly Time Step

- The modeling teams could QAQC the hourly data, but this would take considerable resources and may delay the overall schedule
  - 8 model years * 365 days/year * 24 datasets/day = 70,080 datasets
  - Compare to observations, develop rules to correct, apply rules to all
  - Extract hourly data for ~80 precipitation stations
  - Diverts UNRBA resources from other modeling activities (e.g., additional calibration stations relative to the QAPP)
- Impacts of hourly time step to model development
  - Requires daily calibration first, then hourly calibration to add precision
  - Significantly increases model run time and therefore calibration time (to run one year, an hourly model will take 20 to 30 hours to run)

Approximate Model Run Times (hours of computer time per simulated year)

Model Time Step	225 Catchments	350 Catchments
Hourly	18	30
6-hr	3	5
12-hr	1.5	2.5
Daily	0.75	1.25

- Estimates are based on the Catawba River watershed model run for hourly and daily times steps.
- Long model run times will extend the time it takes to complete calibration of the model

Benefits of Smaller Time Steps

- Natural variability of watershed processing affects lake load estimates
- Greater resolution for storm events
- As model time steps becomes shorter, less averaging occurs
- Differences in model time steps between the lake and watershed models
  - Daily to hourly for watershed model vs minutes/second for lake model
  - Lake model has shorter time steps to account for model stability

Considering the Benefits of Smaller Time Steps with Increased Effort and Schedule Impacts

- Will we have high confidence in the hourly input data?
- Would hourly input data produce significant improvement in model output?
- Would 6-hr or 12-hr input data provide sufficient improved resolution?
- To what extent would hourly output from watershed model impact lake model simulations?
  - How quickly does algae respond to a change in loading?
  - During storm events, is lake water quality driven more by flows?
- How would hourly output from watershed model impact decisions made based on watershed / lake model results?
  - Representation of watershed loads in management scenarios
  - Evaluation of shorter storms and SCM functionality

Comparison of Model Time Steps

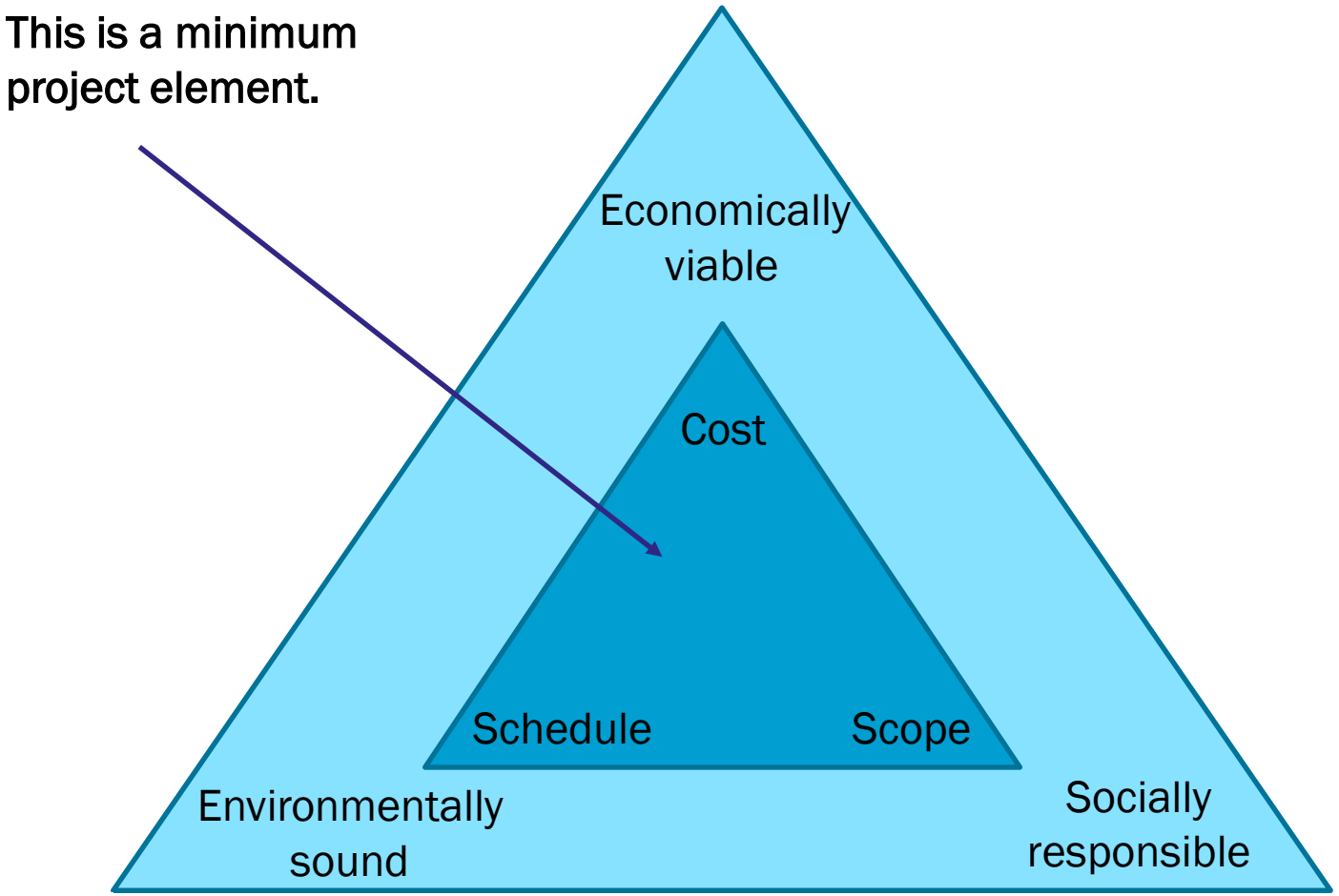
Time Step	Cost	Schedule	Scope
Daily	Lowest	• Shortest impact – NEXRAD data readily available • Fastest model run times • Easiest calibration effort	• Least refined time step • Will miss sub-daily changes, but total storm volume will be accounted for
12-hr	Medium low	• Lower impact – NEXRAD data readily available • Low model run times and calibration times	• Slightly more refined • Averages conditions within 12 hour periods
6-hr	Medium High	• Medium High – NEXRAD data readily available • Model run times ~1/2 work day • Moderate calibration effort for increased precision (4/day)	• More refined • Would capture storms in 6-increments • Provides balance between refinement and benefits
1-hr	Highest	• Greatest impact - additional QAQC of NEXRAD files needed • Model run times ~1 day • Greatest calibration effort (12/day)	• Most refined time step • Small storms would be captured when they occur • Might not effect lake modeling significantly

Model Time Step
MRSW Discussion and Decision

- Document discussion and decision here

Discussion of Minimum Project Elements – Catchment Delineations

Discussion: Catchment Delineations



Status of Catchment Delineations

- Modeling team is finished with delineations based on:
  - Hydrology
  - Soil type
  - Impoundments
  - Monitoring stations
  - City of Durham revised modeling catchments
- Currently evaluating implications of further dividing catchments at:
  - County boundaries
  - Municipal boundaries

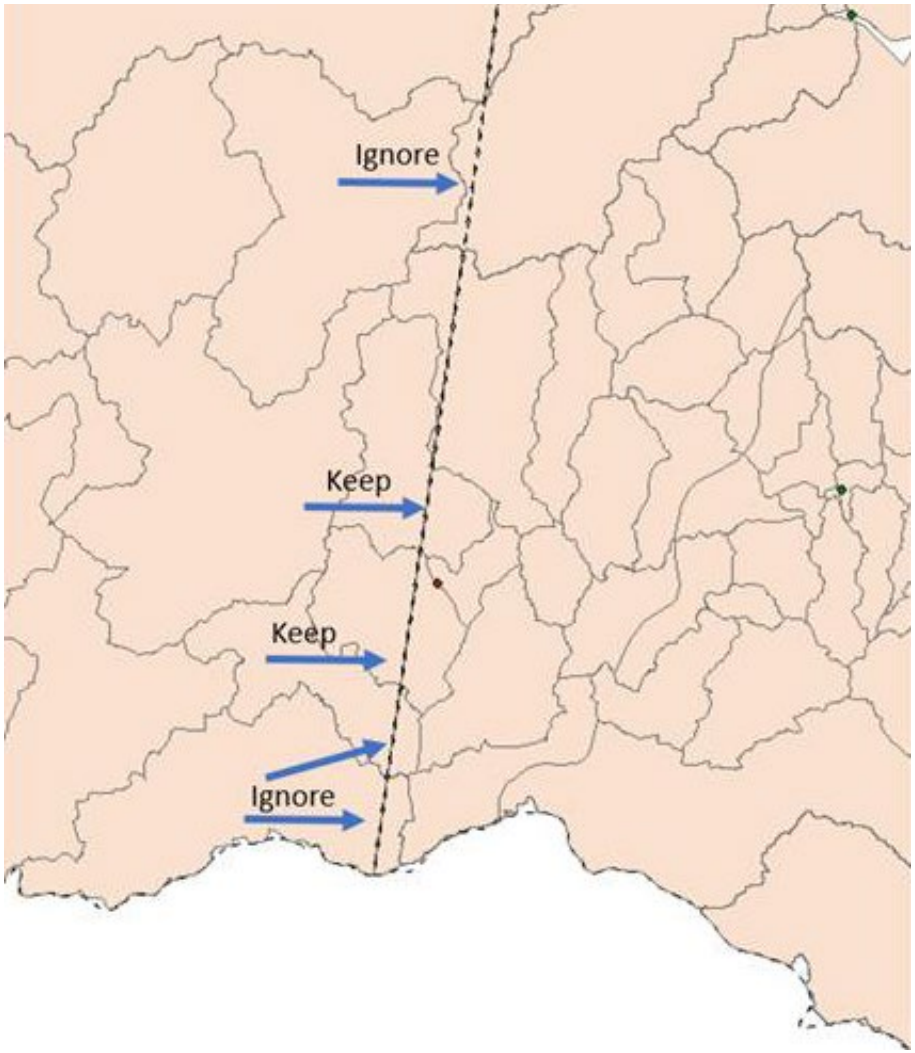
Jurisdictional loads?

Options for Finalizing Catchments

- Delineate both county and municipal boundaries
- Delineate at county boundaries only
- Do not delineate at political boundaries

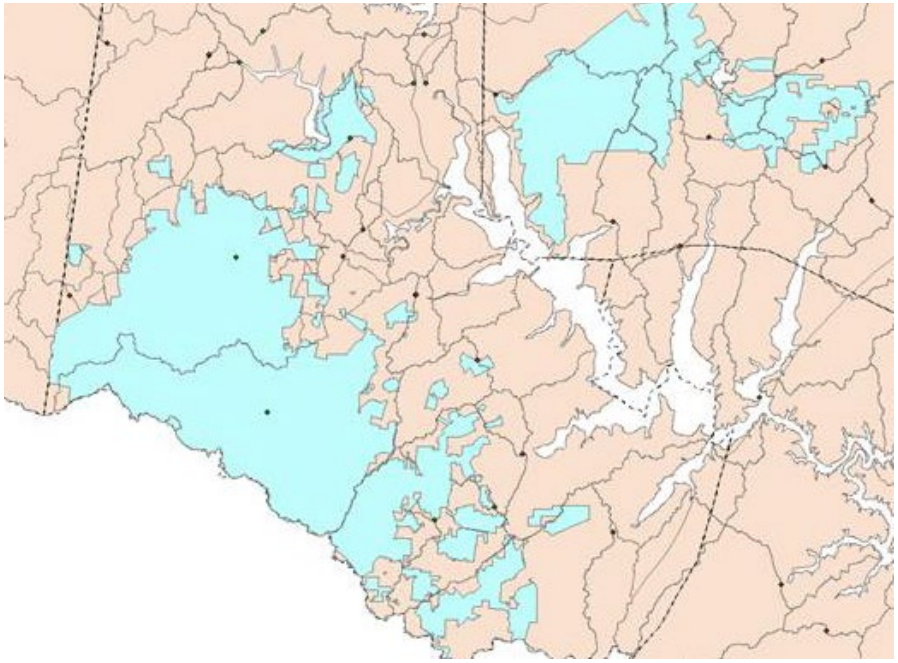
Delineations at County Boundaries

- Split catchments, or assign loads in post processing?
- Split catchments? If yes,
  - Keep everything?
  - Minimum threshold for delineation?
- If generalizations are made, areas will not be precise, and will still require some post processing



Delineations at Municipal Boundaries

- Same issues as county boundaries plus:
  - Boundaries may change annually, so catchments will increasingly become less accurate with time
  - Small areas would be difficult to link hydrologically
  - Could result in **many** catchments, significantly affecting run time



Option 1: County and municipal boundaries intersected with catchments

Cost	Schedule	Scope
Most expensive: • Significant GIS processing time • Additional post processing to address “ignored” areas	Longest delay: • Additional time to further delineate catchments with both sets of boundaries and develop accounting for “ignored areas”	Smallest modeling units; most difficult to manage in terms of linking together hydrologically Will require post processing: • Address small areas “ignored” for counties and municipalities • Update with future changes to jurisdictional areas

Option 2: County boundaries intersected with catchments

Cost	Schedule	Scope
Costs fall between most and least expensive • Less significant GIS processing time • Post processing to address “ignored” areas associated with counties only	Moderate delay: • Additional time to further delineate catchments with county boundaries and develop accounting for “ignored areas”	Modeling units will be more manageable in terms of linking together hydrologically, but will not capture every demarcation Will require post processing: • Address small areas “ignored” for counties • Account for municipalities • Update with future changes to jurisdictional areas

Option 3: No political boundaries

Cost	Schedule	Scope
Least expensive: • No additional GIS processing and fastest model run times	No delay • Delineation is currently complete • Would not be necessary to wait on 2018 municipal boundaries	More conventional approach Will require post processing: • Assign loads for counties and municipalities based on percentages • Less potential error in accounting • Update with future changes to jurisdictional areas Jurisdictional loads could be calculated on an annual basis (e.g., pounds per year)

Catchment Delineation
MRSW Discussion and Decision

- Document discussion and decision here

MRSW Discussion of Re-examination MOA with DWR

Authorizing Legislation: Session Law 2010-155

- Authorize coalitions of local governments to jointly implement water quality protection plans for the Falls Lake watershed
- To the extent allowed by law, the Department of Environment and Natural Resources may enter into memoranda of understanding with the Association to implement the [following] purposes:
  - Share information and assist local governments in complying with State and Federal laws related to water quality in Falls Lake
  - Coordinate and fund common technical resources
  - Plan for and conduct water quality monitoring
  - Record and track nutrient offsets and credits
  - Review and discuss innovative approaches to restore, protect, and maintain water quality in Falls Lake
  - Conduct and evaluate scientific research related to water quality in the watershed and reservoir

Draft MOA with DWR

- Legal group has drafted a preliminary MOA that is under review
- Discussed at November Board and PFC Meetings
- Definitions and clarifications to discuss
  - Supplemental Modeling
  - Supplemental Modeling submission
  - Submission
  - Draft recommendations
  - Recommendations
  - Supplemental information
  - Combined set of recommendations
  - Final version of recommendations

Items to Discuss

- Agency review time (DWR/EPA) and
  - Assignment of an agency point of contact
  - Establishment of project milestones and technical meetings
- Upper versus lower – potential silos
- Expectations for DWR to provide comments throughout the process, not just formal submissions
  - As work products are developed and posted (tech memos)
  - After stakeholder meetings, PFC and BOD meetings
  - Following or during supplemental technical meetings with agencies
  - As issues or concerns arise
- Third party reviewers
  - Who will fund this?
  - Who will manage this?
  - When can we expect to roll this into the process?
- Education of the EMC
- Conflict resolution, agency level

Re-examination MOA
MRSW Discussion

- Document discussion here

Questions ?