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MEMORANDUM

TO: Mid-Coast IR TMDL Sediment Technical Working Group Members
FROM: Jessie Conover, Oregon Consensus (OC)
SUBJECT: DRAFT – Action Items from January 14 Meeting – DRAFT
DATE: February 4, 2015

This memo follows up on the January 14, 2015, meeting of the Mid-Coast Implementation Ready Total Maximum Daily Load (IR TMDL) Sediment Technical Working Group (TWG), held at the Oregon Coast Community College in Newport, Oregon. The memo includes the following: proposed future meeting dates, identified action items, and brief summaries of key topics discussed.

UPCOMING MEETINGS
Please take note and calendar the following meetings.

Meeting	Date	Location
Sediment TWG 13	*Late April 2015 (date TBD)*	Newport (*location TBD*)
Bacteria TWG 14	*February 24, 2015*	Newport (*location TBD*)

ACTION ITEMS

Action Item	Who	Date
1. <u>Action Items</u> • Prepare draft Action Items memo and distribute to TWG members for review	OC (Jessie) with DEQ	Complete
2. <u>Information Follow-up</u> • Post presentations and meeting documents to project website • Distribute Technical Memo on source analysis methods, including more information on conceptual groupings of Random Forests variables • Send Google Earth data layer file • Respond to question about whether landslide susceptibility model will be used	DEQ (David W.) DEQ (Peter Bryant) DEQ (Peter Bryant) DEQ (Peter Bryant)	February 6, 2015 Complete Complete At next meeting

3. Source Analysis Methods • Provide review of source analysis Technical Memo (optional)	TWG members	February 20, 2015

Sediment TWG Members Present: Steve Hager (Siuslaw Watershed Council), Daren Cone (ODF), Wayne Hoffman (MidCoast Watersheds Council), Randy Hereford (Starker Forests), Steve Wegner (BLM), Paul Measeles (ODA), Glen Spain (PCFFA), Una Monaghan (Salmon-Drift Creek Watershed Council), Maryanne Reiter (Weyerhaeuser)

Project Team Members Present: David Waltz, Peter Bryant, Ryan Michie, Gene Foster, Dan Sobota, Priscilla Woolverton (DEQ); Jenny Wu, Marty Jacobsen, Alan Henning (EPA)

Other Attendees: Kyle Abraham (ODF), Marlies Wierenga (WildEarth Guardians), Kyle Williams (ODF), Heath Curtiss (OFIC), Susan Shaw (Weyerhaeuser), Jeff Light (Plum Creek Timber), Gary Springer (Board of Forestry), Kelly Foley (Lincoln County Roads Department), Paul Katen (Salmon-Drift Creek Watershed Council)

Facilitation: Turner Odell, Jessie Conover (Oregon Consensus)

Meeting Notes

Key topics and themes:

During the twelfth meeting of the Mid-Coast TMDL Sediment TWG, attendees: (1) heard and discussed source and linkage analysis methods (2) saw a demonstration of Google Earth sediment data layers and (3) provided input to DEQ on next steps. The meeting agenda and meeting materials (including PowerPoint presentations) will be available through the DEQ Mid-Coast TMDL project website at: (http://www.deq.state.or.us/wq/tmdls/midcoast.htm).

Welcome, Introductions, and Announcements
Turner Odell reviewed the agenda. Ryan Michie updated the TWG on recent correspondence and meetings with stakeholders. In particular, he referenced a letter from and subsequent meeting with Wayne Hoffman regarding biocriteria methods. Wayne also provided his impressions of the meeting. Additionally, DEQ recently received correspondence from Maryanne Reiter and Steve Wegner regarding recent studies. Ryan noted that DEQ met with one author recently (Patrick Edwards) to review his thesis research. Shannon Hubler (DEQ) and Steve Wegner have plans to talk with each other about Steve's letter.

Gene Foster (DEQ) noted that today's meeting is focused on watershed characterization and source analysis. He acknowledged the many comments on the sediment listing methodology, but noted that they are outside the scope of this TMDL development and adaptive management process; additional comments on the listing methodology can be directed to the Water Quality Assessment group.

Ryan introduced Peter Bryant, who is taking over as the lead on the Mid-Coast Sediment TMDL development process. Technical questions should be directed to Peter.

Status of Sediment TMDL Process
Peter reviewed the TMDL process flowchart in the context of today's agenda. He noted the day's objective, which was for TWG members to fully understand the methods so future conversations of results are well informed.

Source Analysis Methods

Relationships among characteristics

Peter reviewed the methods and results that Ryan provided at the last meeting (Random Forests and the 14 most important variables). He noted that some data finalization was done since the last meeting to stream discharge and stream power, which slightly modified the list of 14 variables. Those 14 variables are the starting point for the regression method and are described in greater detail in the technical memo that was distributed after the meeting.

Select model, formulate potential models

Peter introduced the Spatial Statistical Model on Stream Networks (SSN) methods. The basic structure of the method uses a general linear model and geospatial component equation:

Y = Bx + Z + E

Y = response variable – fine sediment score
Bx = entire set of watershed characteristics – coefficient is relationship
Z = spatial component (spatial autocorrelation)
E = random component (what model doesn't explain)

TWG members discussed the general linear model and how it relates to non-linear processes; how the spatial function was selected; potential time effects on spatial relationships; and the possibility of performing model verification using additional data. TWG members will have an opportunity to review the source analysis methods in detail after the technical memo has been distributed.

Peter described the two methods used for formulating potential models: *Statistical properties* (stepwise backward deletion to develop a list of candidate models) and *ecological processes* (literature, knowledge of system to make list of three types of models: natural variables only, human influence variables only, combination of both).

Model Selection

Peter explained the use of model performance measures to select a model within each model formulation approach. The model performance measures were a measure of likelihood given the data, AIC (Akaike Information Criteria), and a measure of overall model prediction accuracy, RMSPE (Root mean squared prediction error). The selected model was determined by minimizing both of the above measures as well as the number of model parameters.

Analysis and Interpretation of Results

Peter reviewed several model checking procedures. TWG members discussed the relative distribution of variance in the model by covariates (watershed characteristics) and spatial autocorrelation, and what it means and what would be expected. Some TWG members suggested that DEQ test the model against another data set, and also consider real-life spatial processes such as episodic events like intense storms that transport large amounts of sediment. DEQ noted that they are open to receiving additional data and also that they performed model validation using the Leave One Out Cross Validation (LOOCV) method, a common method for model validation using subsets of the data set used in model development.

Peter presented the selected model (available in the presentation slides and technical memo) and explained the 6 variables. The TWG discussed the differences in performance among the top candidate models, potential differences between them, and speculated about potential relationship to management actions. They discussed how to engage the TWG in the review of DEQ's model development and selection process, including evaluation of closely ranked models (e.g., multi-model inference). DEQ will be examining correlations between the final variables and assessing what processes are represented by the variables.

Feasibility and affordability of management actions continue to be important considerations to many TWG members as the TMDL development process gets closer to evaluation of implementation alternatives.

A seminar/webinar on the SSN methods will be held by the Forest Service in Boise. More information is available at http://www.fs.fed.us/rm/boise/AWAE/projects/SpatialStreamNetworks.shtml

Google Earth Data Layers Demo
Peter demonstrated how to view certain information for the sample stations in Google Earth. He will distribute a file with several data layers in order to provide the TWG a means to see the data used in the development of the source analysis model. This is informational; it is not necessary to download and use the data files.

Next Steps
Over the next several months, DEQ will consider TWG input on the source analysis methods, conduct an uncertainty analysis, begin identifying draft load allocations, and then work with the TWG to begin identifying management strategies.

TWG members briefly discussed the link between the source analysis methods, model results and management strategies. DEQ will continue to engage the TWG in conversations about those links. DEQ and the TWG need to discuss model interpretation and the variables in the selected model (e.g., what they represent) and consider how this information relates to options for management strategies. A subsequent TWG meeting will be used to further explore these topics.

TWG members requested more information on use of landslide susceptibility in the model approach. This topic will be addressed at the next TWG meeting.

The next Sediment TWG meeting date will be announced soon. In the meantime, DEQ will distribute the technical memo on the source analysis methods and model.