Title: Forestry Workgroup Workplan for Forests and Air Deposition

Full Title of Priority: Improve communication about the role of forests in attenuating (preventing/reducing) the nutrient loads to Bay tidal waters from air deposition, especially of nitrogen compounds

Notes: This issue is a priority of the FWG for the Midpoint Assessment even though it was not voted a high priority at the October WQGIT meeting. It is related to the FWG's concern about forest loss in the watershed, and the issue of properly crediting land conservation.

In the experience of FWG members, the way in which the Chesapeake Bay Program presents nutrient loads (e.g. in its pie charts) can lead to the misunderstanding that forests themselves are a large source of nutrients, rather than air deposition onto forest lands which the forest "controls" to a large extent. The only nutrient loads to the Bay attributed to forests are caused by air deposition, and the forest ecosystem reduces (attenuates) these loads substantially, thus preventing a large percentage from reaching the Bay. The Program's information about air pollution as a source of nutrients, presented on the Chesapeake Bay website, fails to mention the important role that land use and resulting attenuation play in reducing air deposition loads to the Bay.

Continuing loss of forest lands and their attenuating capacity, especially conversion to developed land, would increase the volume of delivered nutrient loads from air deposition.

Supporting Partners: Assistance from the CBP modeling staff working on air deposition modeling issues is needed to assure accurate presentation. Assistance from CBP's website/communications team is also needed.

Necessary Data Sets, Analyses or Decisions: The workplan uses available information from modelling performed for the 2010 Chesapeake Bay TMDL.

Start Date: February 2013

Completion Date: July 2013 (include in August forestry presentation to Citizens' Advisory Committee)

Interim Deliverables, Including Lead and Deadlines:
- First product: revised CBP website presentation on air pollution to incorporate subject of forest attenuation. Lead: FWG with CBP website/communications team assistance and technical review by modeling team. April 2013

- Subsequent communication opportunities will be identified by the FWG. Schedule TBD.

Level of Effort for Lead and Supporting Partners: FWG/USFS - 2-3 workweeks. CBP website/communications - est. 2 workdays. CBP modeling and land use teams - consultation workdays, TBD

Potential Conflicts with Other Priorities: None determined. Potential contribution to discussion of crediting conservation.

Requiring Input from Full WQGIT: The revised report on air pollution for the CBP website, presenting a discussion of forest and attenuation, can be prepared without technical input from full WQGIT, as it is based on available Bay Program information. However, the general subject of protecting land uses in the watershed that attenuate nutrient loads from air deposition significantly is relevant to ongoing implementation of WIPs by WQGIT jurisdictions, and consideration of offset policies.

Workplan Elements:

Background and Rationale:

Significance of attenuation in reducing nutrient inputs to the Bay watershed.   Attenuation has a vast impact on reducing nutrient inputs, as explained in the model documentation, *Chesapeake Bay Phase 5.3 Community Watershed Model (Section 5, pg 6):*

> "Overall average annual nitrogen inputs to the Chesapeake watershed estimated in Phase 5.3 are about 1.6 billion pounds from the totals of fertilizers, manures, legumes, and atmospheric deposition. The average annual nitrogen loads delivered to the Bay in the calibration scenarios are about 270 million pounds or only about 16 percent of the total inputs once the input load of about 100 million pounds of nitrogen from point sources is taken into account. Attenuation of the nitrogen input loads is due to plant uptake, denitrification, storage of organic nitrogen in soils, and other loss mechanisms.

> "Overall average annual phosphorus inputs to the Phase 5.3 watershed are about 214 million pounds from the total inputs of fertilizers, manures, and atmospheric deposition as well as about 18 million pounds from point source discharges. An estimated 18.7 million of pounds of phosphorus were delivered to the Bay in 2004 or about 9 percent of the input phosphorus. The primary loss mechanism for phosphorus is sorption and storage in soils and watershed storage in deposition zones such as reservoirs."

Significance of air deposition as a source of nutrients. In the 5.3 version of the Chesapeake watershed model, the total annual average input of nitrogen from atmospheric deposition is 539.2 million pounds, almost 34% of the total input of nitrogen to the Bay watershed. The large majority - 2/3rds - of this atmospheric nitrogen input falls on the forest and harvested forest land uses, and atmospheric deposition is the only source of the nitrogen loads to tidal waters attributed to forest lands. This last point is not well-understood as Bay Program charts of nitrogen loads from forest lands normally do not identify atmospheric deposition as the source of the nitrogen.

The total annual average input of phosphorus from atmospheric deposition is 25.2 million pounds, just 11% of the total phosphorus input. As with nitrogen, atmospheric deposition is the only source of phosphorus loads to tidal waters attributed to forest lands.

The Bay Program uses data and modeling from USEPA's Air Program to generate estimates of total wet and dry air deposition to the Bay watershed lands and directly to its waters. Nitrogen loads are from oxidized nitrogen (NOx) sources such as power plants and vehicles, and ammonia (NH4) deposition is mainly from agricultural sources. The volume of atmospheric deposition to the watershed is vastly greater than the delivered loads attributed to atmospheric deposition in the TMDL because of the high percentage of this load which is attenuated by environmental processing in the watershed.

Significance of forest lands for attenuation processes. Trees can be considered "attenuation machines". The most important attenuation processes are uptake of nitrogen in tree roots and leaves, denitrification, and sequestration in forest soils. (Other land uses that are credited with high attenuation percentages are pasture, hayland and cropland; these land uses receive nutrients not just from air deposition but from other sources as well, and their nutrient export rate is substantially higher than the calculated forest export rate.)

An issue discussed in *The State of Chesapeake Bay Forests* (Conservation Fund, 2004) is the extent to which forests in the Chesapeake watershed might become nitrogen-saturated and thus cease to retain high levels of new air deposition. The current thinking is that Chesapeake watershed forests are not nitrogen saturated because this threat has been abated by reductions in NOx emissions (about 1/3) due to Clean Air Act regulations. The areas with the highest potential threat of saturation in the north and west of the watersheds are also the regions where reduction of air deposition has been most noticeable.

At the highest level of forest attenuation, [based on the 2004 report] the Bay receives just over one pound of nitrogen for every 10 pounds of air deposition. The implications of losing this attenuation capacity are huge, and could obviate some of the hardwon implementation of nutrient controls in the jurisdictions' WIPs. It is critical to continue efforts under the Clean Air Act to reduce air deposition, especially of nitrogen compounds. But partners in the Chesapeake Bay Program can and do contribute to reducing the significance and impact of nutrient loads from air deposition through their efforts to conserve forest lands and other high attenuating land uses.

The FWG wants to raise the priority of this issue with those working on the TMDL and WIP implementation, and highlight the need to strengthen forest conservation programs.

Stages

1. Edit the current "Air Pollution" discussion on the CBP website to improve understanding of the role of land uses such as forests in reducing the amount and significance of nutrient loads to the watershed from air deposition.

Note that most of the publications linked on the website are not recent, and it may also be helpful to authorize and publish a scientific paper on land use and attenuation.

2. Seek advice from FWG and WQGIT members about other mechanisms for getting the story out of forest and air pollution attenuation. When other communication vehicles are identified, the workplan will be amended to accommodate the new workload. The CBP website report will be used as the seedbed for these other communications.

3. [TBD; would require a supplementary workplan and WQGIT approval]
Project the impact of continued forest loss in the Bay watershed on delivered nutrient loads to the Bay through scenario evaluation, as an input to Bay Program evaluation of its land conservation efforts and the need for offsets.

MIDPOINT ASSESSMENT PRIORITY WORK PLAN:
FOREST HARVEST/BMP DATA
LEAD: FORESTRY WORKGROUP

Full Title of Priority:

Review and refine modeled assumptions about forests, i.e., amount of harvested (disturbed) forest per year, and related items as discussed.

This task will be: Lower Priority (as voted by WQGIT, 0 votes)

Short Description of Priority:
Currently, 1% of "forest" land cover in the CBW model is assumed to be harvested annually. Some states have regulatory programs around forest harvesting and can document acres of forests harvested and BMPs applied on those acres for any given year. Thus far, Virginia and West Virginia have been working with the Modeling Team to report actual forest harvested acres to the model, and Delaware has similar information. Other jurisdictions that are unable to report actual acres of forest harvest, could continue to use or refine the 1% harvest assumption based on best available data.

Two complementary tasks will be pursued by the Forestry Workgroup in 2013-2014. The Workgroup will continue to develop the Verification Protocol for Forest Harvest BMPs, examining current and proposed future methods for tracking and verifying these BMPs in each jurisdiction. And 2) the Workgroup will convene an Expert Panel to review the efficiency rate assigned to Forest Harvest BMPs. This Expert Panel will also recommend what the literature says about loading rates resulting from harvested forest, and also about loading rates for the proposed new land cover layer "true forest".

Supporting Partners: State forestry agencies**,** Modeling Workgroup

Necessary Datasets, Analyses, or Decisions:
- For BMP Verification – need each state's documentation of current and future methods for tracking, reporting, and verifying forest harvest BMPs
- Need best available data on forest harvesting extent and BMP implementation from state agencies and other available sources
- For BMP Expert Panel – need workgroup recommendations for who to serve on expert panel and any recommended literature to include in the review

Start Date: February 2013

Interim Deliverables, Including Lead and Deadlines:
- Complete Verification Protocol with state-specific documentation of current and planned future methods to track, report and verify forest harvest BMP practices (Feb-Mar)
- Work with Modeling Team on basic data criteria for jurisdictions to report actual acres of forest harvest (Feb-Mar)
- Call with state reporting leads for forest harvest BMPs to begin review data sources (Mar-Apr)

- Get workgroup recommendations for BMP expert panel members and key literature (Mar)
- Convene BMP expert panel and develop recommendations (May-Mar 2014)
- Work with jurisdictions and Modeling Team on decisions regarding what forest harvest data sources, % rates will be used in future years (Apr-Oct)

Completion Date: March 2014

Level of Effort for Lead and Supporting Partners, Including (as relevant) CBPO Modeling Team:
Moderate for Forestry Workgroup and Expert Panel
Low for Modeling Team

Potential Conflicts with Other Priorities:
No conflicts anticipated

Issues Requiring Input from Full WQGIT:
No issues at this time; will keep WQGIT informed as the effort progresses

Issues Requiring Input from Management Board and/or Principals' Staff Committee?
No issues at this time

Other Notes: *(include what Guiding Principle relates to; see Attachment E2)*
Relates to Midpoint Assessment Guiding Principles 2 and 3:

PRINCIPLE2: ENHANCE DECISION SUPPORT AND ASSESSMENT TOOLS TO ENABLE SUCCESSFUL ENGAGEMENT OF LOCAL PARTNERS [*e.g. using best local land use data in the model wherever possible]*

PRINCIPLE 3: PROMOTE THE INCORPORATION OF NEW OR REFINED BMPS AND VERIFICATION OF PRACTICES INTO EXISTING ACCOUNTABILITY TOOLS AND REPORTING PROTOCOLS