STEP 1: Review available critical load exceedances to determine how to set target load.

The process used to develop TLs will vary depending on the type of CLs exceeded, the magnitude of the exceedance, and the current condition of the sensitive resources. In most cases a TL can be developed by selecting the CL that protects the most sensitive receptor, and using this as the TL. In areas where critical loads are exceeded and resource impacts are apparent, managers may be interested in understanding if and when resource recovery can be expected, requiring additional analyses to model ecosystem processes before a TL can be established. In this step of the Strategy you will determine the appropriate TL selection process based on the type of CL exceeded, the magnitude of exceedance, and the current condition of the sensitive receptors.

There are three approaches to develop CLs used in this assessment: empirical, steady-state modeling, and dynamic modeling. Empirical CLs of nutrient nitrogen (for a variety of receptors) and steady-state CLs for acidity are hosted on the Portal. Some forests may also have access to CLs calculated for their area using dynamic models.

Most forests will have access to only empirical and steady-state modeled CLs. It is important to check with FS Air Specialists to ensure that CLs currently available adequately represent sensitive ecosystem components, prior to setting TLs. TLs can be developed easily by setting the TL equal to the CL in exceedance; in cases where multiple CLs are in exceedance, the TL should be set equal to the CL of the most sensitive ecosystem component. In some cases, a forest may want to develop a TL that is lower than the CL to offset some of the uncertainty surrounding CL and deposition estimates and ensure that sensitive resources are adequately protected from future damage. In other cases, for example in areas of severe CL exceedances, Line Officers may be interested in developing "interim TLs" that are attainable within the "life of the forest plan." Keep these considerations in mind when following the specific guidance outlined below.

Forests that have experienced negative ecosystem effects due to atmospheric deposition, such as surface water acidification, may have dynamic modeling results available and these can be used to develop a TL. Dynamic models require more site-specific data and are usually applied at the site or watershed level. These models can incorporate a variety of deposition scenarios, time frames, and ecological endpoints to provide an array of possible target deposition loads. Managers can then select a TL that represents the desired degree of ecosystem protection and time needed to achieve the selected level of protection. Dynamic modeling is discussed in Step 2.

Consider the critical loads in exceedance on your forest and identify the categories below that best fit your situation. Use the recommendations to develop a TL for each CL in exceedance. This suite of TLs will be considered by forest leadership in Step 3 of the Strategy.

Steady-State CLs
(e.g., CLs of acidity for surface water)

Empirical CLs
(e.g., CLs of nutrient nitrogen for lichens)

Steady-State CLs (e.g., CLs of acidity for surface water)

Critical loads were calculated using average water quality measurements from the most recent 5 years of data. If long-term water monitoring records are available for your forest, these values should be examined and considered before making TL recommendations. In addition, CL exceedance was only calculated at sites where surface water samples were collected; these locations may not be representative of the entire forest. To best assess the extent of aquatic acidification, surface water samples from sensitive areas are desired. You may want to postpone developing TLs until the calculated CLs of acidity for surface waters are more representative of your forest as a whole, or at least the areas expected to be most sensitive to acidification effects. See the Monitoring Strategy for recommendations on developing a surface water monitoring plan for these sensitive areas.

Category A: Current or projected deposition equals or exceeds the CL by a small amount and current resource measurements are very close to the desired critical threshold.

Current air regulatory programs may achieve enough deposition reductions to eliminate the CL exceedance sometime in the near future. In this case, it is more efficient and desirable to establish a target load based on these expected emissions reductions without incurring the additional expense of dynamic modeling, assuming dynamic modeling has not already been performed.

- *Recommend a TL that is at or slightly below the CL.*
- *Proceed to Step 3 to share these results with leadership.*

Category B: Current and projected deposition equals or exceeds CL by a large amount and resource impacts are apparent.

More information may be desired on time to recovery (or time to damage) in order to select a TL. This will require dynamic modeling results. Check to see if dynamic modeling has been conducted for your forest.

- *If dynamic modeling has already been conducted, proceed to Step 3 to share these results with leadership.*
- *If dynamic modeling has not been conducted, consider the availability of dynamic models for calculating target loads and the data collection needs and associated costs to determine whether the environmental impacts justify the expense of collecting/assembling necessary resource and deposition data and performing dynamic modeling. The forest should consult with research scientists and/or FS Air Specialists familiar with relevant ecosystems and critical loads to determine the appropriate path forward. Step 2 provides additional information on dynamic modeling.*
- *The forest may also consider setting the target load equal to the lowest CL (of all the ecosystem endpoints) until dynamic modeling results are available.*

Empirical CLs (e.g., CLs of nutrient nitrogen for lichens)

Category C: Current deposition equals or exceeds CLs.

Negative effects are presumably already occurring, given that this is an empirical CL. There are no models available to predict time to resource recovery.

- *Recommend a TL at or slightly below the CL.*
- *Proceed to Step 3.*