Interpreting Conservation Metrics from Modeling

Assessment of proposed management plans requires interpretation of modeled outcomes in the context of Greatest Permanent Value. Model outputs can be quantified in terms of metrics that relate to specific species, habitats or landscape components, which in turn can be used to compare the potential effects of different management scenarios.

Context

Much of the development of landscape level conservation metrics to date has been done in the context of federal planning efforts, such as recovery plans for listed species, or forest planning for federal lands. While these efforts have resulted in models for specific species, their utility in State Forests planning efforts is limited in two key respects:

- Scale – Federal planning efforts tend to cover millions of acres and use coarse data sources (e.g. remotely sensed vegetation data). While these are appropriate for federal planning, State Forests planning efforts are focused on less than one million acres, and utilize more detailed forest inventory information.
- Habitat Quality – Federal lands have a far greater abundance of late seral, complex stands that are often considered the "best" habitat for species that are central to many planning efforts. As a result, habitat models developed for these species tend to focus on late seral characteristics. Surveys on State Forestlands often find these species in habitat conditions that would be considered low quality, or even unsuitable, habitat under federal models.

Regarding threatened and endangered (T&E) species specifically, ODF's understanding of how species utilize the landscape has evolved with each new listing. For instance, northern spotted owls were originally thought to be old-growth obligates, but ODF operational surveys and research throughout the nineties showed the State Forests landscape being used very differently. Similarly, ODF sponsored research revealed marbled murrelet nests in younger stands and smaller habitat patches, on smaller diameter branches.

These differences do not negate the utility of federal metrics, which are appropriate in the federal planning context; however, they do indicate the need to properly parameterize these metrics to assess the State Forests landscape.

Potential Metrics

A number of potential metrics and their relationship to overarching conservation goals have been presented previously[1]. They are reiterated here with more detail, with additional proposed metrics that speak to specific species' habitat models.

<u>Upland Landscape Metrics</u>

Several metrics that are central to the conservation strategies at a landscape scale can be measured from model outputs:

[1] Proposed Conservation Measures and Benefits for a Revised Northwest Oregon State Forest Management Plan (Subcommittee meeting - August 12th, 2015).

- Acres of stands by:
    - Age;
    - Quadratic Mean Diameter (QMD); and
    - Stands with complex structure (as a combined measure of characteristics important to many species).
- Measures of:
    - Patch size by Age, QMD and Stands with complex structure;
    - Interior area within late seral and complex Structure Types;
    - Connectivity among similar patches;
    - Abundance of large green trees;
        - As part of late seral or complex structure stands; or
        - In young stands as a result of green tree retention strategies; and
    - Abundance of snags and downed wood.

Upland Species-specific Metrics

Additional metrics will be developed that address species of interest or unique features on the landscape. Some will be adapted from federal habitat suitability models to reflect the range of known conditions on State Forest lands. Current metrics under consideration include:

- Habitat models for:
    - Northern spotted owl;
    - Marbled murrelet;
    - Red tree vole;
    - Fisher; and
    - Big game species.
- Acres designated for:
    - Rare, special, and unique areas.

Riparian and Watershed Metrics

Many of the riparian metrics for conservation goals are not direct outputs from model data, but some basic metrics can be defined:

- Acres in riparian buffers with:
    - Associated tree volume in riparian buffers; and
    - Estimates of wood recruitment;
- Percent of watershed in different stand age classes; and
- Miles of roads within 100 feet of streams.

Assessing Interaction and Risk

Appropriately viewing the interaction in model outcomes and assessing risk to conservation and production goals also requires viewing the landscape in context. The risks are intertwined and not always straightforward. Some examples are:

- If production (i.e. harvest) increases, the area dedicated to conservation may decrease, putting conservation goals at greater risk from stochastic events such as windthrow and fire.
    - If conservation areas increase in size, increased harvest rates in the remaining production zone may lower the rotation age, further reducing the ability of the production zone to provide conservation benefits.
- If green tree, snag and downed wood requirements are reduced in production areas, the capacity of landscape as a whole to support certain species may be reduced.
    - Increased green tree, snag and downed wood requirements in production areas may put production goals at risk and add to future T&E survey costs of leave areas.
- If riparian buffer widths are reduced, shade and wood recruitment to streams may be reduced.
    - Increased riparian buffer widths in production areas may put production goals at risk.
- Increased production, either in area or intensity, may reduce the capacity of the overall landscape to support northern spotted owls.
    - This may decrease overall risk to production from northern spotted owl sites appearing in the production zone.
    - Conversely, it may not support spotted long-term owl sites, but may still support non-resident owls that occur with enough frequency to lead to the establishment of ephemeral “resident” sites that require take avoidance measures. Even if these sites are subsequently abandoned, they may occur often enough to interfere with scheduling of harvest activities.
- More intensive early stand management may lead to an increase in production.
    - Certain intensive practices, such as increased herbicide use, may reduce the amount of herbaceous forage for both big game, neotropical migrant birds and other species.
- Increased area or intensity in production may increase big game habitat.
    - Increased area or intensity in production may reduce mature forest cover for big game.

Interpreting Model Outputs

ODF proposes a two-tiered approach to interpreting model outputs. First, the Science Team has been retained to review model outputs in the context of conservation and production metrics. ODF will provide conservation and production outputs from model runs to the Science Team in a consistent and directly comparable format across any and all model scenarios.

The Science Team review will assess the trade-offs between production and conservation strategies and an assessment of the likelihood of achieving the goals, for each scenario provided. It will also include a broad evaluation of risk associated with potential conflicts between production and conservation strategies.

ODF staff will then interpret the Science Team review in the context of Greatest Permanent Value.