GUIDELINES FOR ASSESSING IMPACT

OF DEVELOPMENT PROPOSALS

ON FOREST RESOURCES

These suggested guidelines were drawn up by J. R. Irwin, a forester in the Cambridge District of the Ontario Ministry of Natural Resources. The purpose was to provide some continuity in the evaluation of impact to forest resources through development applications and Environmental Impact Assessment reviews within the district.

GENERAL GUIDELINES

In evaluating route selection or a development proposal, a consultant should determine the area of forest affected, then break down the impact in terms of the characteristics of the wooded areas impacted which will lead hopefully to a proper decision.

Factors such as productivity are often linked to landform or physiology and forest productivity is often concurrent with agricultural productivity. If the area of the study is 15 % forest cover and a route or development affects class 1 and 2 agricultural land, then a maximum of 15% of the route or developed area should be wooded, particularly when forest resources are a low percentage of the local landscape. In general it would likely be more desirable if the route selected or the development affected classes 3 and 4 agricultural land as the woodlots would likely be correspondingly less productive.

We also will look for factors of historical significance such as ownership, i.e. crown land, and past involvement such as W.I.A.s, extension marking, and research plots.

The evaluation must also consider the significance of the economic value, contribution, or potential contribution of forest resources to the local economy and to the income of the property owner.

The rarity or environmental significance of the forested area such as identified in District Land Use Guidelines or Municipal Official Plans should also be noted.

It should also be realized that the most common method of mitigation, i.e. replacement of forest cover on an alternate site, is most often an impractical and unacceptable means of rationalizing impact.

More specifically, once an impact is quantified by area affected, the following features should be evaluated:

1) Stand Area

2) Site Productivity

3) Stand History

4) Stand Structure

5) Stand Quality

6) Species Composition

7) Economic Worth

8) Stand Replacement

These and other forest resource features are described in more detail below.

SPECIFIC GUIDELINES

The following criteria should be applied to the assessment of the impact on the forest resources of a study area or for determining the quality of the forest resources affected by a development proposal.

1) Stand Area

To determine a quantitative measure of environmental impact, a measure of stand area must be included. Ideally, this should show area of wooded land to be disturbed or removed from production by the undertaking. Notwithstanding other environmental considerations, a forest on a productive deep, well-drained loam soil, regardless of stand condition will likely be more valuable from a forest resources standpoint than one on a shallow site overlying bedrock, or one occuring on a poorly drained site. Similiarly, it will also likely outweigh a forest growing on an imperfect or poorly drained clay loam because of the differences in inherent productivity. The exception to this rule would be in a township where a certain soil type predominates and the forested percentage of the township is already low. In this instance, the small acreage of remaining forest, even though it may not be as productive as forests in other areas, becomes worth retaining.

In general, the impact of the undertaking should not be disproportionately greater on the forest resources than on other resources. If the area of the study is 15 % forest cover and the development affects class 1 and 2 agricultural land, then a maximum of 15% of the impacted area should be wooded. In this case it would likely be more desirable if the development affected classes 3 and 4 agricultural land as the woodlots would likely be correspondingly less productive.

(Stand Area - Fragmentation)

It should be recognized in an impact assessment, that reducing a woodlot into one or more smaller parcels may potentially preclude management of the entire area. Woodlots that are significantly reduced in size or fragmented into different parcels, particularly into different ownerships, may not produce saleable quantities of forest products.

Similarly, developments such as golf courses or estate residential uses, which seemingly have little impact on a forested area, will essentially preclude the wooded area from future production or forestry benefits. Although part of the wooded area may remain, pedestrian traffic and a tendency of the landowners to clean out young growth interrupts the ecological processes of the woodlot and may result in its eventual demise.

2) Site Productivity

Tree size is the most common method of evaluating forest resources in environmental assessments or development proposals, usually assuming that the areas with the larger trees are more significant and any impact on an area with larger trees is therefore more environmentally undesirable.

Tree size can sometimes indicate the quality of a site but more often indicates past management or lack of management. Forested areas which are left undisturbed for long periods of time often develop large trees, assuming that the site can support them in terms of rooting depth and wind firmness. On the other hand a property in which the landowner is managing his woodlot by periodic removal of large or mature trees is penalized as his woodlot may have a preponderance of young immature or semi-mature trees.

Tree size should also be tied to tree quality. A woodlot having a preponderance of large trees which are defective or being composed of species such as beech may indicate a history of bad management or high-grading for more valuable stems or species.

This criteria of evaluating tree size is a poor measure of a stand's significance when relied on too heavily, as it is influence too much by stand history.

The best measure of the potential of a site to produce trees, and a better measure of how the trees are performing on a site is to relate tree height to a standard tree age. This is the measure known as site index and is the commonly accepted measure of site productivity. Since this measure can be related to the potential of a soil to grow trees by examining soil characteristics, with or without measuring the actual trees, it provides a measure similar to agricultural capability. Therefore site index can be applied to a site regardless of the condition of the current stand. To use a parallel with agriculture, agricultural capability is inherent to the land and is not dependant on the condition of the current crop. Forestry capability should be dealt with in the same way, with more emphasis on the site capability and less on the condition of the current stand which is often only a reflection of past management or stage of development. It should be realized also that site capability will vary throughout a forest or woodlot and a good evaluation will recognize

these subtle variations.

Often copies of the Forest Resources Inventory are sought for use in evaluating environmental impact. The FRI maps and reports are intended for broad based planning only and are not intended for use in determining site specific information. The sampling intensity is too low and the report relies too much on aerial photograph interpretation to expect with any degree of certainty to see on the ground what is described on the map. This applies particularly to species composition.

A particular problem occurs in woodlots in which some harvesting has taken place. The uneven canopy and presence of many age classes makes the FRI extremely risky to accept verbatim.

Nevertheless, in the absence of on-site information and realizing its shortcomings, the Forest Resources Inventory can be used as a starting point, with additional field checking, for evaluating routes. The Forest Resources Inventory shows the following information:

Stand Number
Species Composition
Age - Height - Stocking
Site Class
Stand Area

Site Index is a measure of productivity based on the fact that sites will grow trees to different heights, by a given age, due to differences in site potential. Usually, the comparison age used is 50 years. Because FRI uses Plonski's site index curves to determine site index and therefore site class (which is a grouping of site indeces) and because Plonski's curves are based on Algonquin or Precambrian Shield stands which are not as productive as ours, most of our stands on FRI are site class "X" or "better than 1". However, if one takes the FRI stand information (assuming it is correct) of age and height and uses the American site index curves of Hahn and Carmean, one can break down the site class "X" stands into site classes "1" to "5". This produces a ranking of site potential similar to agricultural capability. Given sufficient time this information from FRI can be field checked, or lacking FRI, the information can be derived from on-site soils information. Also, if one has the software, one can plug in the age and height information of a stand. The software, using the curve formulas, computes the stand height at age 50 which produces the corresponding site index.

In terms of the same area of impact, impact on a stand which is site class "1" is more serious than impact on a stand of site class "3".

For instance:

FRI:

399
Mh8, Be2
103 - 27 - .6
X
14

An age of 103 years and height of 27 metres gives this stand a site index for maple in site region 7E of 17.8 metres at 50 years or site class 5.

FRI:

401
Mh8, A2
50 - 24 - .7
X
15

This stand of 50 years and height of 24 metres is a site index of 24 and site class 2.

Even though, because of the greater age of stand 399, the trees are larger and perhaps more impressive, the impact in terms of removing an area more capable of contributing to our program would be more serious in the case of stand 401.

3) Stand History

Stand history should include such features as past ownership and Ministry involvement. Such features as past or current Woodlands Improvement Act agreements, Forestry Act agreements, extension involvement, Crown land ownership or research values should be documented.

4) Stand Structure - Stand Stocking or Stand Density (Basal Area per Unit Area)

Commonly, evaluations of stand stocking are related to past logging. In most cases, if logging has been carried out on a woodlot, its significance is considered in impact evaluations to have been reduced. Unfortunately, this discriminates against those owners who utilize their woodlots for farm or other income and discriminates against these woodlots. An agricultural parallel would be to consider a farm field with a standing crop to be highly rated, while a field of stubble would have a low rating. Again, the capability is in the land and not in the crop. The true rating should be on the productive potential of the site or the volume or crop that a site is capable or

producing over a given period of time (increment) rather than on the accumulated volume. Even a stand with small trees can be rated as to its potential by using site index criteria to evaluate the land, and stand structure and stand quality to evaluate the trees that are in it.

Stand structure or the frequency of stems in various age classes is a useful tool to evaluate past disturbance which has resulted in younger age classes being present in the stands. Presence of understories which are different species than the overstories may also indicate successional shifts which are taking place and provide an assessment of developments that are taking place in the forest community. This is particularly important in assessing "Carolinian Forests".

A further feature of stands with broken or uneven canopies resulting from disturbance is that they can provide more varied habitat for most forms of wildlife.

5) Stand Quality

Often quality evaluations of impact on wooded areas are related to visual impact or aesthetics. Because of the subjectivity of this measure, it is a dangerous tool to apply. Again, it tends to discriminate against woodlots with younger stands and those in which harvesting is or has taken place. The agricultural parallel would be to rate a field with a standing crop as a higher priority than a ploughed field. Visual appeal is subjective while comparisons of impact should as far as possible be quantitative.

Assessments of stand quality should consider the health and condition of the trees themselves including visible defects. This helps to indicate what effects disturbance of a woodlot may have. For instance, trees with internal decay as evidenced by fungal fruiting bodies or visible holes in the stems or trees with unsound stems or weak forks will be subject to stem breakage after stand disturbance. Similarily, stand origin is an important factor in determining present stand quality and hence level of previous disturbance.

6) Species Composition

Species composition is a measurement of only moderate value. Often this criteria can be influenced by stand history to the point where the wrong species is present on a particular site. A predominant species, if it is "off - site" will not perform well and if used as the major measure of the quality of the stand, will downgrade the importance of the stand. On the other hand, if the site is evaluated on a site index basis, it may be found that the site may be more suited to growing a different species than that which predominates at the present time.

Forested areas composed of rare or significant species such as "Carolinian forests" should be identified.

7) Economic Worth

It should be recognized in an environmental appraisal of an area that there is a viable forest industry in the district which depends on acquiring raw material from private lands through negotiated sales. Even though no merchantable (sawlog) sized trees are present on a particular site it is important to realize that at some time in the future most stands will reach a marketable condition and at some time in the future may enter ownership of a landowner willing to realize the commercial potential. Also, most stands at the time they are commercially harvested, and many stands between commercial harvests can produce a continuous supply of fuelwood. This economic value can form an important part of a total agricultural enterprise or of a landowner's use of his land.

8) Stand Replacement

It is not likely that replacing existing wooded areas with planted trees will often result in a forest to equal the quality or productive capability of the existing resources. To assume that one can replace a forest community existing on an undisturbed site by one re-established on another, often eroded site, can be unrealistic.

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