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# Equitably Treating Individual Washington State Forest Trusts through Consolidated Management: A Conceptual Approach

## ABSTRACT

*This article develops a conceptual approach for managing a consolidated set of individual forest trusts to meet the fiduciary responsibilities of the trust manager. An important tenet of trust management is to manage each trust with undivided loyalty. Consolidated management of a set of trusts is permissible so long as each individual trust benefits, although each need not benefit equally. Individual trust-by-trust analysis is required to demonstrate that a consolidated management plan is beneficial to each individual trust and that joint benefits of such management are equitably distributed. The approach proposed below is discussed within the context of a consolidated Habitat Conservation Plan developed for Washington State's forestlands.*

## INTRODUCTION

The Washington State Department of Natural Resources (DNR) is responsible for managing approximately 2.1 million acres of state forestlands.<sup>1</sup> In 1996, a Habitat Conservation Plan (HCP) covering 1.65 million acres was proposed that provided for incidental take permits for two federally listed endangered species—the northern spotted owl and the marbled murrelet.<sup>2</sup> The HCP also proposed to conserve habitat for a number of unlisted species such as several salmonids and other state and

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1. See WASH. STATE DEP'T OF NATURAL RESOURCES, FOREST RESOURCE PLAN: POLICY PLAN 16 (1992) [hereinafter FOREST POLICY PLAN].

2. See WASH. STATE DEP'T OF NATURAL RESOURCES, FINAL ENVIRONMENTAL IMPACT STATEMENT: HABITAT CONSERVATION PLAN 1.1 to 1.2 (1996) [hereinafter HABITAT CONSERVATION PLAN].

federal candidate species.<sup>3</sup> DNR's plan was to give "70 to 100 years of regulatory certainty and sustainable timber harvests by anticipating the habitat needs of at-risk fish and wildlife species."<sup>4</sup> During development of the HCP, we were asked to review the economic analysis conducted as part of the HCP planning process.<sup>5</sup> During this review, some long-standing issues concerning fiduciary responsibilities associated with the management of Washington State's forest trust lands resurfaced. In this article, we address one of these—the advisability of managing individual trusts under a consolidated management plan such as an HCP. Other related issues that drew our attention include the DNR's interpretation of sustained yield timber management as nondeclining harvest flow and the balance that the HCP would strike between the generation of income for trust beneficiaries and the protection of the long-term interests of the trusts. These issues may dramatically affect the economic performance of the State's forest trusts and are integral components of all DNR management plans. We discuss these issues before returning to the central thesis of this article.

Despite many reports that have decried the negative economic impacts associated with nondeclining harvest flow policies,<sup>6</sup> the DNR continues to embrace them. The Revised Code of Washington (RCW) defines sustained yield as "management of the forest to provide harvesting on a continuing basis without major prolonged curtailment or cessation of harvest."<sup>7</sup> DNR forest policy states that "[t]he department's long-standing policy has been to adopt a more rigorous standard: sustainable, even-flow harvest."<sup>8</sup> Nondeclining harvest flow is slightly more flexible than even flow, but both prohibit a short-term increase in harvests if they cannot be maintained at equal or higher levels in the future. As a consequence, forest trusts with large amounts of over-mature timber are precluded from drawing down their inventories to sustainable levels. Closely related to the sustainable harvest policy is the definition of the ownership group for which a sustainable harvest is determined. Currently, the department

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3. See *id.* at 1.2.

4. WASH. STATE DEPT OF NATURAL RESOURCES, ANNUAL REPORT 1 (1996).

5. A preliminary review of DNR HCP-related documents indicated that the economic analysis was not sufficient for the department to conclude that the proposed HCP was in the best economic interests of the trusts.

6. See B. BRUCE BARE ET AL., DEMONSTRATION OF TRUST IMPACTS FROM MANAGEMENT ALTERNATIVES TO ACHIEVE HABITAT CONSERVATION GOALS ON WASHINGTON DEPARTMENT OF NATURAL RESOURCES MANAGED LANDS iv (1997). See also STATE OF WASH. JOINT LEGISLATIVE AUDIT & REVIEW COMM., REPORT NO. 96-5, FOREST BOARD TRANSFER LANDS (1996); INDEP. REVIEW COMM., REPORT TO THE WASHINGTON STATE BOARD OF NATURAL RESOURCES (1995).

7. WASH. REV. CODE ANN. § 79.68.030 (West 1991).

8. FOREST POLICY PLAN, *supra* note 1, at 17.

determines "timber harvests among the [several] ownership groups... with the goal of producing even-flow harvest volumes within each group."<sup>9</sup> Thus, harvest levels are computed neither for individual trusts nor for the total area covered by a management plan such as an HCP. Regarding the adoption of even-flow harvest policies, an Independent Review Committee appointed by the Board of Natural Resources concluded that "DNR's even-flow policy, as presently construed, may unduly inhibit DNR's ability to generate revenues on behalf of trust beneficiaries."<sup>10</sup> The Committee went on to state that "[i]n our view the even-flow policy may very well conflict with the trustee's fiduciary obligation to the beneficiaries."<sup>11</sup> Both DNR's interpretation of the legal definition of sustained yield as well as the specification of the geographic unit for which a harvest schedule is calculated are disputable. We believe that the common law principle of undivided loyalty requires that a harvest plan be developed for each separate forest trust. Only if the trust beneficiaries can be made better off should consolidation with another trust be contemplated. Additionally, the DNR's nondeclining flow interpretation of sustained yield imposes large opportunity costs on trust beneficiaries as measured by reductions in trust asset values—especially when combined with excessive habitat conservation objectives.

The issue of balancing income for trust beneficiaries while simultaneously protecting the long-term interests of the trusts is an important related issue because a common law duty of a trustee is to make a trust productive by generating income.<sup>12</sup> However, a trustee must also preserve the trust for use by future generations. At issue is the balance between current and future beneficiaries. The duty of impartiality and prudence requires that the trustee balance both of these competing interests in a fair manner. While the trustee is accorded a high degree of discretion in the matter, we believe that conservative actions taken on behalf of future

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9. *Id.* In western Washington, these ownership groups are defined as the forest board transfer lands (where separate harvests are calculated for each of 16 counties); the federal grant lands and the forest board purchase lands (where separate harvests are calculated for each of five departmental administrative regions); the Capitol Forest; and the Olympic Experimental State Forest. *See id.* at 20. In eastern Washington, an even-flow harvest level is determined separately for each of five departmental administrative regions. *See id.* at 21.

10. INDEP. REVIEW COMM., *supra* note 6, at 5, ch. 6.

11. *Id.*

12. *See also* WASH. REV. CODE ANN. § 43.30.150(2) (West 1998) (directing the Board of Natural Resources to "[e]stablish policies to insure that the acquisition, management, and disposition of all lands and resources within the department's jurisdiction are based on sound principles designed to achieve the maximum effective development and use of such lands and resources consistent with laws applicable thereto....").

beneficiaries should not impact current beneficiaries to the degree that is apparent in the proposed HCP.<sup>13</sup>

In Washington State, the Legislature is the trustee of the federal grant land trusts.<sup>14</sup> The DNR is composed of the Board of Natural Resources, a departmental administrator (the Commissioner of Public Lands), and a departmental supervisor.<sup>15</sup> The Board of Natural Resources (composed of the governor or governor's designee, the Superintendent of Public Instruction, the Commissioner of Public Lands, the Dean of the College of Forest Resources of the University of Washington, the Dean of the College of Agriculture of Washington State University, and a representative of those counties that contain state forest lands)<sup>16</sup> is empowered by the Legislature to manage and regulate activities on the trust lands.<sup>17</sup> As the trust manager, the DNR is bound to adhere to common law principles of trust management that apply to private trusts.<sup>18</sup> These principles include (a) undivided loyalty and full disclosure to the trust beneficiaries, (b) making the trust productive while generating income for the beneficiaries, (c) dealing with the beneficiary in an open, fair and honest fashion, (d) keeping and rendering accounts, (e) exercising reasonable care in managing the trust, and (f) preserving and protecting the trust in perpetuity.<sup>19</sup> Undivided loyalty is taken to mean that trust assets may not be used to pursue other state goals, no matter how laudatory they may be.<sup>20</sup> It also implies that trust beneficiaries must receive fair market value for the use or sale of trust assets.<sup>21</sup> State courts have generally upheld these principles so long as all applicable state and federal laws are satisfied.<sup>22</sup> In producing income for trust beneficiaries, the trustee must carefully balance short-term and long-term interests. As noted, income generation associated with development of the trust's productive potential must be balanced against preservation of the trust in the long term.

A Washington State Attorney General opinion concludes that the Legislature's duties as trustee run separately to each of the trusts.<sup>23</sup>

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13. See BARE ET AL., *supra* note 6, at 1-2, 45.

14. See State's Trust Responsibilities with Respect to Lands Granted by the United States or Placed in Trust through State Legislation, Wash. Op. Att'y Gen. No. 11, Finding No. 1 (Aug. 1, 1996) [hereinafter Wash. A.G.O. 1996 No. 11].

15. See WASH. REV. CODE ANN. § 43.30.030 (West 1998).

16. See WASH. REV. CODE ANN. § 43.30.040 (West 1998).

17. See WASH. REV. CODE ANN. §§ 43.30.040(2), (6) (West 1998).

18. See Wash. A.G.O. 1996 No. 11, Findings No. 14 & 16.

19. See *id.* at 13; FOREST POLICY PLAN, *supra* note 1, at C-4 app.C; JON A. SOUDER & SALLY K. FAIRFAX, STATE TRUST LANDS: HISTORY, MANAGEMENT, AND SUSTAINABLE USE 1-4 (1996).

20. See Wash. A.G.O. 1996 No. 11, at 13-14.

21. See *id.*

22. See *id.* at 13-15 (for a list of some of these cases).

23. See *id.* at 21.

Consolidation of trusts for management purposes is permissible where it serves the economic interests of each trust.<sup>24</sup> However, the trustee may not manage trusts so that one trust benefits at the expense of another.<sup>25</sup> In managing the trusts, the DNR "may only take into account factors consistent with ensuring economic value and productivity...."<sup>26</sup>

As suggested above, developing an HCP for forest trust lands requires a careful balance of fiduciary responsibilities against legally mandated conservation objectives. In developing its HCP, the DNR included forest trust lands representing a dozen individual trusts.<sup>27</sup> However, our research did not locate any economic analyses that were conducted at the individual trust level and none that demonstrated that the HCP was in the best economic interests of each separate trust.<sup>28</sup> Further, the economic analyses performed on the consolidated set of trusts sought to maximize harvest volume and not asset value.<sup>29</sup> Thus, the analyses were not structured to search for management alternatives that could satisfy habitat conservation goals at the lowest cost to the trust beneficiaries.<sup>30</sup> While the use of a volume-maximizing objective appears to run counter to the trustee's duty of obtaining full value for the beneficiaries, it is the non-economically justified consolidation of trusts under an HCP that is of principal concern in this article.

The forest economics literature does not discuss the specific problem we are addressing. There is, however, a rich literature that discusses the allocation of joint costs when multiple-purpose projects are

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24. See *id.* at 42.

25. See *id.*

26. *Id.* at 47.

27. See HABITAT CONSERVATION PLAN, *supra* note 2, at 1.1; WASH. STATE DEP'T OF NATURAL RESOURCES, SUSTAINABLE HARVEST REPORT 22 (1996) [hereinafter SUSTAINABLE HARVEST REPORT].

28. See *id.* The net present value (NPV) over the next 200 years is displayed for 12 separate forest trusts. See *id.* Four of the trusts are shown to be better off if excluded from the HCP. See *id.* More importantly, the NPVs displayed for each trust are simply that trust's portion of the total NPV that emanates from the management plan for a consolidated group of trusts. See *id.* Thus, it is an accounting allocation and not the result of a trust-by-trust economic analysis.

29. It is important to recognize that all NPVs calculated by the DNR in preparing its management plans are simply fixed sets of timber prices extended against calculated harvest volumes. No attempt is made to maximize NPV subject to harvest flow constraints. By maximizing harvest volume subject to nondeclining flow constraints, undue weight may be assigned to future beneficiaries relative to present beneficiaries.

30. See, e.g., BARE ET AL., *supra* note 6. This report detailed the economic consequences of the DNR HCP and offered several alternatives that generate significantly more economic value to trust beneficiaries while also satisfying habitat conservation requirements. See *id.* Treatment alternatives described and evaluated in the report were largely dismissed by the department.

involved.<sup>31</sup> Although various cost allocation techniques have been advanced,<sup>32</sup> most authors conclude that, from an economic perspective, the allocation is arbitrary.<sup>33</sup> And, as pointed out several years ago, "there is no need to allocate costs in undertaking an economic evaluation of production alternatives."<sup>34</sup> Nonetheless, allocation of joint costs may be relevant where cost sharing or reimbursement is required. Yet "[i]t is important to stress that cost allocation and benefit-cost analysis have very little in common. Allocation is an essential part of the financial analysis of projects, while benefit-cost analysis is the main component of the economic analysis."<sup>35</sup> From this, we can conclude that forest management plans for individual trusts, as well as for a consolidated set of trusts, must pass a benefit-cost test to be further considered. Allocating benefits realized as a result of consolidation arises during the requisite financial analysis that must follow. This article addresses the problems that appear when individual forest trusts are managed under a consolidated management plan such as an HCP. We propose a procedure that allows the benefits and costs of a consolidated plan such as an HCP to be properly evaluated given the common law responsibilities of a trust manager who must also satisfy legally mandated conservation objectives. Our procedure defines the

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31. See, e.g., John G. Hof & Richard C. Field, *On the Possibility of Using Joint Cost Allocation in Forest Management Decision Making*, 33 FOREST SCI. 1035 (1987); Doug Rideout & John Hof, *Cost Sharing in Multiple Use Forestry: A Game Theoretic Approach*, 33 FOREST SCI. 81 (1987); Douglas Rideout & John Hof, *Allocating Joint Costs in Applied Forestry*, 2 W. J. APPLIED FORESTRY 45 (1987).

32. See D. Rideout & J.E. Wagner, *Testing Cost-Sharing Techniques on a Multiple-Use Timber Sale*, 23 FOREST ECOLOGY & MGMT. 285, 285 (1998). The authors review six allocation procedures using five criteria. See *id.* They conclude that "no technique generally conforms with each of the allocation criteria listed, and that allocations can be highly variable across techniques that are applied in the same situation." *Id.* at 295. The most widely used allocation technique known as "separable costs/remaining benefits" is similar to that proposed in this article. *Id.* at 289-90. While not the best performing of the six tested allocation procedures, it appears to be a satisfactory criterion. See *id.* at 293. In allocating joint costs, this criterion first identifies separable costs that can be attributed to a multiple use product or purpose. See *id.* at 289-90. Then, the remaining common costs are allocated to the purposes or products in proportion to the remaining benefits for an individual purpose as a fraction of all remaining benefits. See *id.* at 290. In evaluating the advantages of a consolidated trust management plan versus separate management plans for each individual trust, gains from consolidated management (which are similar to common costs) should be allocated to individual trusts in proportion to each trust's constraint-induced reduction in benefits relative to the total constraint-induced reduction in benefits for all trusts.

33. See Michael D. Bowes & John V. Krutilla, *Cost Allocation in Efficient Multiple-Use Management: A Comment*, 77 J. FORESTRY 419, 419 (1979).

34. MICHAEL D. BOWES & JOHN V. KRUTILLA, *MULTIPLE-USE MANAGEMENT: THE ECONOMICS OF PUBLIC FORESTLANDS* 295 (1989).

35. OTTO ECKSTEIN, *WATER-RESOURCE DEVELOPMENT: THE ECONOMICS OF PROJECT EVALUATION* 262 (1958).

minimum set of standards that satisfy these requirements while also satisfying the trustee's duty to obtain full value for the beneficiaries.

### DESCRIPTION OF THE PROBLEM AND AN OVERVIEW OF A PROCEDURAL SOLUTION

In order for an HCP (or any forest management plan) across a collection of trusts to be in the best interests of each individual trust, it must allow each individual trust to benefit, though each need not benefit equally.<sup>36</sup> As trust manager, the DNR is directed to manage all state trust lands to achieve the maximum effective development.<sup>37</sup> Any adopted management plan must be in the economic interests of each trust.<sup>38</sup> Still, the trustee should not maximize current income at the expense of long-term interests. The trustee has the duty to make the trust productive—but must also preserve the trust for future beneficiaries.<sup>39</sup> These competing duties become even more complex when regulatory and/or operational constraints applied to the collective set of trusts have different cost impacts on individual trusts.

In light of the above considerations, a rigorous equity criterion must be established for allocating to individual trusts those cost or benefit impacts resulting from collective management. The trust manager should always undertake analyses of individual trusts, even if only to show that those individual trusts are not being impaired by collective management. Below, a four-step procedure is suggested to achieve this equitable allocation.

First, a forest management plan should be developed for each individual trust in the absence of regulatory<sup>40</sup> and/or operational<sup>41</sup>

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36. See Wash. A.G.O. 1996 No. 11, at 42, 44.

37. See WASH. REV. CODE ANN. § 43.30.150(2) (West 1998).

38. See Wash. A.G.O. 1996 No. 11, at 42.

39. See *id.* at 45.

40. Regulatory constraints refer to statutory requirements that (a) certain forestlands be excluded from timber management operations (i.e., unstable slopes, wetland buffers, stream-bank buffers, wildlife reserves), (b) regeneration be undertaken within a fixed time period following completion of a harvest, (c) certain forest practices be modified (i.e., clear cuts be shaped to appear more natural, down woody debris and standing dead trees be left for wildlife following a harvest, no controlled burning when air conditions are unfavorable), and (d) to produce timber on a sustained yield basis. See SUSTAINABLE HARVEST REPORT, *supra* note 27, at 10-15, 17-18.

41. Operational constraints refer to requirements established by the trust manager that (a) conservatively interpret sustained yield such that timber harvests may never decrease from those realized today (i.e., nondeclining flow), (b) reserve forestland from harvest for scientific study, (c) set harvest ages beyond those that yield the greatest economic benefit to the beneficiary, and (d) engage in forest practices that exceed minimum governmental



constraints. This unconstrained forest management plan maximizes benefits for each individual trust. It also maximizes aggregate benefits when summed over all trusts. This step establishes a fair asset share for each trust in the absence of constraints. Management plans developed in step one form a baseline against which all other plans may be measured.

Second, minimal necessary regulatory and/or operational constraints are incorporated into the forest management plans for each individual trust in order to determine the magnitude of the constraint-induced reduction in benefits. Both regulatory and operational constraints will result in different impacts on individual trusts due to differences in timber age class structure, site productivity, and geographical location of trust acres relative to other ownerships. Overly restrictive constraints will exacerbate the reduction of benefits to trust beneficiaries.

Third, a comparable set of minimum regulatory and/or operational constraints is incorporated into the forest management plan developed for the collective set of trusts. Under collective management, the forest management plan derived for each individual trust is dependent on the management plan for every other trust. Further, the aggregate set of benefits when constraints are applied across the collective set of trusts should be larger than when equivalent constraints are applied at the individual trust level. This is a result of the interdependence of the different timber age class distributions of the trusts and the impact this has on the time path of harvest flows. In effect, constraints imposed on any trust may be offset by the flexibility gained by another trust. Any economic benefits that result from collective management should be allocated to individual trusts equitably.

The Washington State Attorney General opinion suggests that all trusts should be at least as well off under collective management as they are under individual trust-by-trust management.<sup>42</sup> That is, each trust's economic benefits should not decrease as a consequence of collective management. While we concur that this litmus test must be passed, we believe that the appropriate criterion for equitable treatment is to allocate any increased benefits arising from collective management in proportion to the reduction in benefits induced per step two versus benefits associated with step one.

Fourth, an HCP is developed for the collective set of trusts. Consistent with the Attorney General opinion, if each trust benefits under the HCP relative to the consolidated plan developed as part of step three, then no trust is made worse off by the HCP under collective management. If, however, a trust is worse off under the collective HCP, either it can be

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regulations. See SUSTAINABLE HARVEST REPORT, *supra* note 27, at 25-26.

42. See Wash. A.G.O. 1996 No. 11, at 21-22.

eliminated from the collective set (and resort to the management plan developed in step two) or an alternative HCP can be found in which it is not worse off. In any event, each individual trust must be better off under the HCP than under collective management per step three.<sup>43</sup>

As described earlier, we believe that the collective increase in benefits from step four (relative to step three) should be allocated proportionally to reductions in individual trust benefits per step two. Then, each trust is always at least as well, if not better, off, and benefit increases are proportional to the individual trust constraint-induced decreases per step two. Our equity criterion follows the principle of Pareto efficiency, which states that a solution is efficient if no trust can be made better off without at least one other trust being made worse off.<sup>44</sup>

## **A DETAILED PROPOSAL FOR ALLOCATING THE COSTS OF REGULATIONS ON INDIVIDUAL TRUST ASSET VALUES**

### **Step 1. Unconstrained Trust Benefit Maximization**

The maximum net present value (NPV) performance for each individual trust is determined in the absence of regulatory and/or operational constraints. Timber stands are scheduled for harvest at the rotation age and assigned land management treatment strategy that maximizes the NPV for the forest land management plan under consideration. This assumes that each individual trust is a price taker and has no significant impact on the market price for timber. This harvest sequence may not offer the desired revenue stability over time and may not be operationally practical. It does, however, provide a baseline and an asset value share for each trust relative to the aggregate total of all trusts in the absence of operational and/or regulatory constraints. It also provides a baseline that facilitates measurement of benefit reductions that result from the imposition of constraints per step two.

In the absence of constraints, there is no difference between what is best for each trust analyzed individually or as part of a collective set. Thus, management plans can be determined independently on a trust-by-trust basis. A plan so determined and subsequently aggregated across all trusts generally will produce a more stable revenue flow than one focused

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43. If a trust is removed from the collective set per step four, a new analysis is required at step three in order to establish a new basis of comparison. It is important to note that even if all trusts benefit from the collective HCP, it is unlikely that each will benefit equally or that each will benefit in proportion to their benefit reductions per step two.

44. See HAL R. VARIAN, *MICROECONOMIC ANALYSIS* 225 (3d ed. 1992).

on an individual trust. If trusts are of sufficient size that changes in their harvest level will affect timber prices relative to other trusts, the maximization must take the elasticity of the demand curve for timber into account. This is not likely to be a significant factor for most individual trusts but it could be for joint trust management. In any case, it is not further pursued in this article.

Maximization of the NPV is selected as the appropriate management objective as it is most compatible with the trustee's charge to maximize effective development of the trust lands over the long run. It differs from maximizing current income because it considers preservation of the trust for future beneficiaries. Management strategies considered in the development of all forest management plans or HCPs are assumed to incorporate adequate provisions for immediate restocking of harvested acres and suitable protection of the productive capacity of the timber land itself.<sup>45</sup>

The maximum NPV of each trust is determined individually and is then aggregated to produce a total asset value shown as NPV<sub>1</sub> in figure 1 (demonstrating a set of two trusts). This value represents the aggregate NPV of all trusts. Since there are no regulatory or operational constraints, the forest management plan that maximizes benefits for each individual trust also maximizes benefits for all trusts when considered collectively.

As an example, consider the three hypothetical trusts of table 1. Trust A is composed of over-rotation age timber but is capable of generating high near-term revenues, Trust B contains a balanced distribution of timber age classes and is capable of producing a relatively sustained yield of revenue, and Trust C is composed of a young forest with high potential for future revenue but low revenue generation in the near term. All three trusts are assumed to be equal in regard to long-term land productivity, but have varying levels of riparian and old forest habitat that must be protected. Due to its old forest character, Trust A is expected to be most limited by regulatory constraints. In the absence of regulatory and operational constraints, each trust managed individually generates maximum NPVs of 100, 70, and 35 (million \$), respectively. The aggregate NPV from all three trusts is 205 (million \$).

### **Steps 2 and 3. Individually and Collectively Constrained Trust Benefit Maximization**

Minimum regulatory and necessary operational constraints are applied to each trust individually (step two) and, subsequently, to all trusts collectively (step three). These constraints include all applicable federal,

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45. See *supra* note 41.

state, and local regulations and laws. If the impact of regulatory constraints is to be treated differently from operational constraints, it is necessary to impose both types sequentially in order to measure their separate impacts on asset (NPV) values. The introduction of regulatory or operational constraints into the analysis reduces the maximum NPV performance relative to step one whether each trust is considered individually or whether all trusts are considered collectively. The reduction in NPV between steps two and three versus step one measures the cost of the constraints.

It is likely that the aggregation of NPV reductions resulting from constraints applied at the individual trust level (step two) will be greater than those derived if trusts are managed collectively (step three). Managing across a larger set of choices allows more tradeoffs that lower collective costs. This assumes that the same set of constraints is applied in both instances. Further, these constraints may impose differential cost impacts between trusts. If the constraints are imposed on a collection of trusts, those trusts that are forced to deviate furthest from their unconstrained schedule will lose more benefits, thus resulting in higher costs relative to the other trusts. No trust can increase its NPV at steps two or three beyond the level determined in step one, but it is possible that some trusts may be unaffected by the constraints and achieve their unconstrained value. In any event, it is likely that the imposition of constraints will generate unequal treatment across some of the trusts.

Examples of regulatory constraints imposed in steps two or three are those that can be found associated with the Washington State Forest Practices Act<sup>46</sup> and the Endangered Species Act of 1973.<sup>47</sup> These include the need for owl circles to protect the northern spotted owl, riparian and wetlands buffers to protect fish and other stream resources, and the protection of marbled murrelet habitat.<sup>48</sup> Operational constraints such as nondeclining harvest flow, placing some acres in an unmanaged reserve status, and the need to satisfy various DNR policies relative to the determination of sustainable harvest levels should be analyzed separately in order to measure their impacts on asset value and to justify their need. In step two (see figure 1), we assume that minimal necessary regulatory and/or operational constraints are imposed on the trusts individually. This leads to an aggregate NPV denoted as  $NPV_2$  and a cost induced by the constraints (i.e., a reduction in NPV) defined as  $C_2 = NPV_1 - NPV_2$ . In step three, the trusts are analyzed collectively producing  $NPV_3$ . Both  $NPV_2$  (the

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46. Forest Practices Act of 1974, WASH. REV. CODE ANN. §§ 76.09.010 to 900 (West 1994).

47. Endangered Species Act of 1973, 16 U.S.C. §§ 1531-43 (1994).

48. See Wash. Admin. Code § 222-16-085 (1999); HABITAT CONSERVATION PLAN, *supra* note 2, at A5-8 to A5-9, app.5.

aggregate of the individual trust NPVs) and/or  $NPV_3$  (the collective trust case) are  $\leq NPV_1$ . As shown in figure 1, the reduction in benefits induced by the constraints at either step two or three may be borne differentially by the trusts in both cases. The increment between each individual trust's NPV in step two, versus each trust's share of the collective NPV in step three, is a direct result of the collective analysis.

The increase in benefits (arising from collective management at step three versus step two) is allocated to each individual trust in proportion to the constraint-induced reduction in benefits per step two. Thus, the benefits that accrue to any individual trust arising from collective management must be considered. Given that exemptions exist for some individual trusts, the equitable allocation of increased collective benefits may produce an increase in benefits for every trust, even though some trusts may not have been better off under collective management before benefit allocation. Also, equitable allocation may result in a greater collective increase in benefits (with each trust at least as well off) than would be attained by eliminating a previously unaffected trust from the collective pool of trusts.

The results of step two (table 1) illustrate that while each trust's NPV is reduced as regulatory and operational constraints are imposed, they are not impacted equally. Each trust's constraint-induced costs are 20, 5, and 4 (million \$) which translate into reductions in asset value of 20, 7, and 11 percent, respectively.

Each trust's share of the collective NPV from step three shows that it is better off under collective management relative to individual trust management per step two. Gains of 5, 2, and 1 (million \$), respectively, are shown in table 1. Collective management results in NPV gains of 6, 3, and 3 percent, respectively, relative to the results in step two. However, our equitable treatment of these collective gains is to allocate them to each trust in proportion to the constraint-induced reductions per step two. This allocation is described in detail following a discussion of step four.

#### **Step 4. Collectively Constrained Trust Benefits under an HCP**

An economic analysis similar to that discussed under step three is repeated under the assumption of a collective HCP lacking current regulatory constraints.<sup>49</sup> It is assumed that all operational constraints are held constant across steps three and four. In comparing the results from steps two or three with step four, the principle that individual trusts should benefit or lose equally under a collective HCP is almost impossible to fulfill.

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49. Because an HCP for an individual trust may not be geographically or operationally feasible, we assume throughout that only a collective HCP analysis is performed.

The Attorney General opinion only requires individual trusts to be at least as well off under a collective HCP as under no HCP.<sup>50</sup> However, an equitable allocation of the resulting increases in benefits under collective HCP management is to allocate them to each trust in proportion to the initial constraint-induced reduction in benefits that made collective management desirable.

In figure 1, step four,  $NPV_4$  (associated with a collective HCP) is assumed to be  $\geq NPV_3$  (associated with collective regulatory constraints). This is the direct result of additional management flexibility achieved through the HCP relative to the stricter regulatory constraints per step three. It means that the trusts benefit collectively under an HCP relative to the constraints embedded in the collective regulatory analysis per step three. However, each trust's share of the increased benefits relative to step three is likely to be increased disproportionately. We believe that this is inequitable because it implies that one trust can be made worse off if another trust does not participate in the collective HCP. Our equitable distribution of the increase in benefits derived from a collective HCP is to distribute it proportionally to the constraint-induced benefit reductions derived at step two. It is also necessary to ensure that each trust is at least as well off under the HCP as it was under the collective regulatory constraint plan of step three.

#### Summary and Discussion of Steps 1 through 4

After the analyses defined in steps one through four are completed, the following comparisons and rationalizations are necessary in order to decide whether a particular forest management plan (or HCP) is in the best interests of any, or all, trusts:

a)  $NPV_3$  is compared with  $NPV_2$  to determine whether there is a collective increase in benefits relative to individual trust management implying that collective management is worth considering further. In our hypothetical example (table 1), the benefits of collective management under regulatory constraints provide a net gain of eight (million \$) relative to individual trust management per step two.

b) Each individual trust must be as well off when considered as part of the collective set as it is when considered separately or it should not be considered as part of the collective set. If any trust is disadvantaged by collective management (i.e.,  $NPV_{i3} < NPV_{i2}$ ), the disadvantaged trust can be eliminated from the collective pool, and the analysis in step three rerun. From table 1, we see that each trust benefits from collective management—thus, none is a candidate for removal from the collective

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50. See Wash. A.G.O. 1996 No. 11, at 37.

base.<sup>51</sup> While this satisfies the criterion offered in the attorney general's opinion,<sup>52</sup> it does not provide trusts with the maximum benefit they should derive from collective management. Alternatively, the trusts that benefit from collective management can compensate the disadvantaged trust to keep it in the pool because, without the latter, the trusts remaining in the collective pool suffer increased costs.

Using our equitable fiduciary management principle, increased benefits resulting from collective management at step three should be allocated to individual trusts in proportion to their benefit reductions from step two relative to step one. This allocated benefit ( $C'_{i3}$ ) is defined as  $C'_{i3} = (C_{i2}/C_2) * C_3$  and is always less than or equal to  $C_{i2}$  for all  $i$  trusts. Note,  $C_{i2} = (NPV_{i1} - NPV_{i2})$  for all  $i$  trusts and  $C_3 = (NPV_1 - NPV_3) \leq C_2$ .

Using the above definition of allocated benefits ( $C'_{i3}$ ), the allocated  $NPV'_{i3}$  for each trust is computed as  $NPV'_{i3} = NPV_{i1} - C'_{i3}$ . This allocation impacts each trust in our hypothetical example as shown in table 1. Trust A gains 0.5 (million \$) in NPV, Trust B loses 0.6 (million \$), and Trust C gains 0.1 (million \$) relative to gains and losses before allocation but after consolidation. The total allocated  $NPV'_3$  remains at 184 (million \$).

c) If the collective benefit  $NPV_4$  is not larger than  $NPV_3$ , a collective HCP is not in the best economic interests of the trusts. For the hypothetical illustration, each collective trust is better off under the HCP. Steps three and four could be conducted as a risk analysis to reflect the impact of uncertain future regulations (i.e., more than one set of minimum regulatory assumptions changing over time with probabilities for each outcome). It is possible that  $NPV_4$  might not exceed  $NPV_3$  under static current regulations but could under conditions that include the addition of future regulations that the HCP precludes. In such a case, an HCP would be in the best economic interests of the trusts.

d) Under an HCP,  $C'_{i4} = (C_{i2}/C_2) * C_4$  for all  $i$  trusts and is always less than or equal to  $C_{i2}$ . The terms  $C'_{i3}$  and  $C'_{i4}$  represent the increased benefits arising from collective management, and the terms  $NPV'_{i3}$  and  $NPV'_{i4}$  represent the allocated NPVs.<sup>53</sup> At this point, the analysis closely parallels the discussion under (b) and, therefore, is not repeated herein.

From table 1, each trust in our example benefits under a collective HCP by 7, 2, and 2 (million \$), respectively, relative to the results at step three. However, use of the equitable allocation formula shown above

51. Trusts once dropped from the pool theoretically are eligible to reenter at a later point in the analysis, although this may not be considered for practical reasons.

52. See Wash. A.G.O. 1996 No. 11, at 44.

53. The following two equations formally express and summarize the calculations required:

either,  $NPV'_{ij} = NPV_{i1} - C'_{ij}$  with  $C'_{ij} = (C_{i2}/C_2) * C_j$  for all  $i$  trusts and  $j = 3, 4$ ; or  $NPV'_{ij} = NPV_{i1} - [(NPV_{i1} - NPV_{i2}) / (NPV_1 - NPV_2)] * (NPV_1 - NPV_j)$ .

results in Trust A gaining 1.1 (million \$) in NPV, Trust B losing 0.7 (million \$), and Trust C losing 0.4 (million \$) relative to gains and losses before allocation but after consolidation under a HCP. The total allocated NPV<sup>4</sup> remains at 195 (million \$).

### EXAMINATION OF DNR ANALYSIS

Analysis undertaken during preparation of the DNR HCP did not include a valid unconstrained starting point for facilitating a trust-by-trust economic analysis.<sup>54</sup> Further, DNR did not determine the magnitude of trust benefit reductions in order to satisfy minimum regulatory and/or operational constraints on an individual trust basis per step two. While collective gains under a proposed HCP, per step four, were determined by the DNR, they were not compared with results from steps two and three. Instead, the DNR compared the results from step four with those of a collective analysis of all trusts undertaken using regulatory requirements that exceeded statutory minimums and operational constraints such as nondeclining harvest flow (i.e., a modified step three). As a consequence, the NPV for 33 percent of the trusts was lower under the proposed HCP than under consolidated management.<sup>55</sup> No attempt was made to remove trusts from the collective set to see whether this situation was in their best economic interests. For these reasons, we believe that the DNR could not conclude that their HCP proposal was in the best economic interests of each individual trust.<sup>56</sup>

When nondeclining harvest flow constraints are imposed across the collection of trusts, there are differential impacts on the NPV for each trust, and nondeclining flow will not be achieved on a trust-by-trust basis. If nondeclining flow constraints were imposed on individual trusts, the NPV loss in the aggregate could be enormous. Under current and proposed planning, the DNR imposes nondeclining harvest flow constraints on smaller and smaller planning areas, leading to unequal reductions in the value to the trusts. The addition of operationally-based habitat constraints and treating some forest acres as set-aside reserves increases these losses significantly.

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54. See BARE ET AL., *supra* note 6, at 5; SUSTAINABLE HARVEST REPORT, *supra* note 27, at 10.

55. See SUSTAINABLE HARVEST REPORT, *supra* note 27, at 22.

56. See BARE ET AL., *supra* note 6, at iv.



## ALLOCATION OF TRUST REVENUES

The above-described equity principle also can be used to allocate annual net revenues (REV) that arise from collective management.<sup>57</sup> Each individual trust's revenues and management costs are accounted for separately in the determination of  $REV_{jm}$ .  $REV'_{ijm}$  represents the fair share allocation of actual annual net revenues ( $REV_{jm}$ ) under collective management. The difference between the allocated net revenue and the actual net revenue (i.e.,  $REV'_{ijm} - REV_{ijm}$ ) represents the adjustment required under the proposed equity criterion.

For this proposal to work properly there should be a high degree of correlation between the plan and the actual implementation of it. If not, some trust beneficiary may feel that it is not receiving its proper share of revenues under the allocation criterion. For the hypothetical example shown in table 1, use of the equity criterion leads to an allocated net revenue gain of 1.4 (thousand \$) for Trust A, 1.0 (thousand \$) for Trust B, and a reduction of 2.4 (thousand \$) for Trust C in year "m." Although some trusts increase their allocated net revenue share while others lose, the allocation is the trust's fair share under our long-term equity criterion. Each trust would not be expected to gain or lose allocated net revenue consistently over time. Instead, the fair share allocation would change as actual gross revenues and costs change.

## CONCLUSION

The consolidated management of individual forest trusts raises serious questions of equity and fair treatment between trusts. Common law principles of trust management include undivided loyalty, preservation of the trust in perpetuity, and making the trust productive. The proposed approach for dealing with these issues begins with the determination of a forest plan at the individual trust level with the highest possible asset value under conditions of no harvest flow or regulatory constraints (step one). As harvest flow and minimum regulatory constraints are incorporated, they will likely generate unequal impacts on individual trusts.

A management plan developed for a consolidated set of trusts under minimum regulations (step three) or an HCP (step four) requires use of an equity criterion to ensure that trusts benefit proportionately. We propose that this criterion be based on the amount trusts would lose under

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57. After calculating  $NPV'_{ij}$ , the fair share of annual net revenue that trust *i* receives for year *m* under collective management can be calculated as  $REV'_{ijm} = REV_{jm} * NPV'_{ij} / NPV_j$ , where  $REV_{jm}$  is the total actual gross revenue less actual costs from collective management for all *i* trusts for year *m* with *j* = 3, 4.

constraint-induced management at the individual trust level (step two). In this regard, it is first necessary to show that each trust is at least as well off under collective management (step three) as it is under individual trust-by-trust management (step two). Second, the same comparison is made for each trust under assumptions of a collective HCP (step four) versus collective management under regulatory minimums (step three). If both conditions are satisfied, the joint increased benefits achieved under collective management should be allocated in proportion to the constraint-induced individual trust benefit reductions (step two). Under this proposal, each trust may not benefit equally from consolidated management, but each will benefit in proportion to its contribution to the benefits of collective management. The proposed equity criterion also can be used to allocate annual net revenues (received under collective management) to individual trusts.

Table 1. Hypothetical illustration of Equitable Trust Treatment

(Trust values in million \$)

Step (j)	Old Forest Trust A	Sustained Yield Trust B	Young Forest Trust C	NPV	Management Situation
1	100	70	35	205	Unconstrained, individual
2	80	65	31	176	Constrained, individual
3	85	67	32	184	Constrained, collective
4	92	69	34	195	HCP, collective
$C'_{13}$	14.5	3.6	2.9	21	Allocated benefits
$NPV'_{13}$	85.5	66.4	32.1	184	Allocated NPVs
$C'_{14}$	6.9	1.7	1.4	10	Allocated benefits
$NPV'_{14}$	93.1	68.3	33.6	195	Allocated NPVs
$REV_{14m}$	75	55	30	160	Net revenue ('000 \$) year m
$NPV'_{14} / NPV_4$	47.7%	35.0%	17.2%	100.0%	Fair share proportion
$REV'_{14m}$	76.4	56.0	27.6	160	Allocated net revenue ('000 \$) year m

## Notes:

- 1)  $C_2 = 29$ ;  $C_3 = 21$ ;  $C_4 = 10$   
 2)  $C_{A2} = 20$ ;  $C_{B2} = 5$ ;  $C_{C2} = 4$

Figure 1. Conceptual Approach for Allocating Joint Trust Benefits

