

APPENDIX B - BENCHMARK ANALYSIS

Benchmark analysis is specified in the NFMA regulations in 36 CFR 219.12(e) as part of the Analysis of the Management Situation. Benchmarks approximate maximum economic and biological resource production opportunities and are useful in evaluating the compatibilities and conflicts between individual resource objectives and in defining the range within which integrated alternatives can be developed. The following benchmark analyses are consistent with the minimum applicable management requirements of 36 CFR 219.27.

Minimum Level of Management Benchmark - 36 CFR 219.12(e)(1)(i). This benchmark represents the minimum level of management needed to maintain and protect the GWNF as part of the National Forest System. This level of management does involve some activities and costs in order to meet the following minimum management requirements:

- Protect the life, health, and safety of incidental users;
- Prevent environmental damage to the land or resources of adjoining lands of other ownerships or downstream users;
- Conserve soil and water resources;
- Prevent significant or permanent impairment of the productivity of the land; and
- Administer unavoidable non-Forest Service special uses and mineral leases, licenses, permits, contracts, and operating plans.

Alternative C in the DEIS embodies most of the elements of a minimum level of management; however some activities are allowed in this alternative to make it a more realistic and viable option. The activities in Alternative C that involve more than a minimum level of management include: the continued operation of three ATV use areas; more of an emphasis on non-motorized recreation that would include an increase in trail miles; and continued operation of some developed recreation sites.

Maximum Physical and Biological Production Potential Benchmarks - 36 CFR 219.12(e)(1)(ii) These benchmarks identify the maximum physical and biological production potentials of significant individual goods and services together with associated costs and benefits. For ecological systems, the maximum biological production is represented by the desired conditions for the cove, spruce, northern hardwood, oak and pine systems in Chapter 2 of the Plan.

Maximum Timber Benchmark. This benchmark is used to identify the maximum timber production potential of the Forest, subject to these specifications:

- The objective function maximizes timber volume in the first five decades, with a rollover to maximize present net value for 15 decades.
- All tentatively suitable acres are included, without any management prescription allocations, so every tentatively suitable acre is eligible for harvest.
- No successional habitat constraints are applied.

Several key results of the maximum timber benchmark are:

- 910,000 tentatively suitable acres are allocated to timber production
- Annual harvest is 19.68 MMCF (98.4 MMBF)
- Annual harvest is 10,331 acres
- Cumulative Present Net Value over five decades is \$117,447,000
- Long-term sustained yield is 23.66 MMCF

Maximum Wilderness Benchmark. This benchmark is used to identify the maximum potential of the Forest to provide areas that meet the definition of wilderness according to the 1964 Wilderness Act. In

Chapter 2 of the DEIS, Alternative C represents this benchmark, with the recommendation for wilderness study all of the 37 areas in the Potential Wilderness Area inventory as well as Southern Massanutten Mountain and the Friars Inventoried Roadless Areas. This benchmark represents 386,800 acres recommended for wilderness study and 20,000 existing Wilderness acres.

Maximum Natural Gas Production Benchmark. This benchmark is used to identify the maximum potential for the Forest for natural gas production. This benchmark is represented by the Reasonably Foreseeable Development (RFD) prepared by the Bureau of Land Management that is based on the assumption that all lands on the Forest would be available for oil and gas leasing under standard lease terms and conditions, except for those areas withdrawn from leasing by law. The RFD is described in more detail in Chapter 3 of the DEIS. This benchmark represents the construction of 20 vertical exploration/evaluation wells and 50 vertical and 249 horizontal development wells.

Present Net Value Benchmarks – The following benchmarks are described in the 36 CFR 219 regulations.

- 36 CFR 219.12(e)(1)(iii) Monetary benchmarks which estimate the maximum present net value of those resources having an established market value or an assigned value;
- 36 CFR 219.12(e)(1)(iii)(A) For forest planning areas with major resource outputs that have an established market price, monetary benchmarks shall include an estimate of the mix of resource uses, combined with a schedule of outputs and costs, which will maximize the present net value of those major outputs that have an established market price;
- 36 CFR 219.12(e)(1)(iii)(B) For all forest planning areas, monetary benchmarks shall include an estimate of the mix of resource uses, combined with a schedule of outputs and costs, which will maximize the present net value of those major outputs that have an established market price or are assigned a monetary value;
- 36 CFR 219.12(e)(1)(iii)(C) For forest planning areas with a significant timber resource, estimates for paragraphs (e)(1)(iii)(A) and (B) of this section shall be developed both with and without meeting the requirements for compliance with a base sale schedule of timber harvest, as described in s 219.16(a)(1), and with and without scheduling the harvest of even-aged stands generally at or beyond culmination of mean annual increment of growth, as described in s 219.16(a)(2)(iii). The George Washington NF does not have a significant timber resource.

Timber Maximum PNV Benchmark. This benchmark was established to estimate the schedule of outputs and costs that would maximize the present net value of timber production without any constraints, subject to these specifications:

- The objective function maximizes net present value over the entire planning horizon.
- All tentatively suitable acres are included, without any management prescription allocations.
- No successional habitat constraints are applied.

Several key results of the maximum timber benchmark are:

- 910,000 tentatively suitable acres are allocated to timber production
- Annual harvest is 17.66 MMCF (88.3 MMBF)
- Cumulative Present Net Value over five decades is \$112,392,000
- Long-term sustained yield is 19.53 MMCF

Maximum Present Net Value Benchmarks were not modeled for resources other than timber since use of the Spectrum Model (linear programming model that determines the best mix of outputs and activities to maximize an objective function, such as present net value) was confined to timber harvest outputs and activities. There is no method to maximize the present net value of other resources but the present net values of several resource programs under each alternative that was evaluated in the DEIS is presented in the following table.

Table E-7. Cumulative Decadal Present Net Values of Benefits and Costs (millions of dollars, 4% discount rate cumulative to midpoint of 5th decade)

| Present Value Benefits by Program: | Alt A | Alt B | Alt C | Alt D | Alt E | Alt F | Alt G |
|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Range | <\$1 | <\$1 | <\$1 | <\$1 | <\$1 | <\$1 | <\$1 |
| Timber | \$36 | \$68 | \$0 | \$123 | \$38 | \$22 | \$68 |
| Minerals | \$24 | \$19 | \$4 | \$20 | \$6 | \$16 | \$6 |
| Recreation | \$1,163 | \$1,181 | \$1,007 | \$1,242 | \$1,111 | \$1,244 | \$1,205 |
| Wildlife | \$661 | \$669 | \$562 | \$713 | \$640 | \$698 | \$684 |
| Total Present Value Benefits | \$1,884 | \$1,937 | \$1,573 | \$2,098 | \$1,795 | \$1,980 | \$1,963 |
| Present Value Costs by Program: | Alt A | Alt B | Alt C | Alt D | Alt E | Alt F | Alt G |
| Range | <\$1 | <\$1 | <\$1 | <\$1 | <\$1 | <\$1 | <\$1 |
| Timber | \$41 | \$47 | \$0 | \$80 | \$27 | \$17 | \$47 |
| Roads/Engineering | \$29 | \$30 | \$25 | \$32 | \$29 | \$28 | \$30 |
| Minerals | \$4 | \$4 | \$4 | \$5 | \$4 | \$4 | \$4 |
| Recreation | \$84 | \$84 | \$78 | \$90 | \$78 | \$90 | \$84 |
| Wildlife | \$12 | \$14 | \$8 | \$15 | \$14 | \$14 | \$14 |
| Soil, Water and Air | \$30 | \$29 | \$15 | \$29 | \$29 | \$29 | \$29 |
| Protection/Forest Health | \$26 | \$42 | \$26 | \$33 | \$48 | \$42 | \$42 |
| Lands | \$9 | \$9 | \$9 | \$9 | \$9 | \$9 | \$9 |
| Planning/Inventory/Monitoring | \$9 | \$9 | \$9 | \$9 | \$11 | \$9 | \$9 |
| Total Present Value Costs | \$244 | \$268 | \$174 | \$302 | \$249 | \$242 | \$268 |
| Cumulative Total Present Net Value | \$1,640 | \$1,669 | \$1,399 | \$1,796 | \$1,546 | \$1,738 | \$1,695 |