

**Forest Service Handbook
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Washington, DC**

Forest Service Handbook 2409.18 - Timber Sale Preparation Handbook

Chapter 10 – Basic Overview and Financial and Economic Analysis

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Superseded Directive: Sale Program Development – Gate System, 2409.18-2002-1

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Responsible Staff: Forest Management, Rangelands Management, and Vegetation Ecology (FMRMVE)

Digest: Following is an explanation of the changes throughout the directive by section.

Chapter 10: Makes minor corrections in spelling, punctuation and style practices throughout the chapter. Updates and incorporates additional references throughout. Substantive changes are as follows:

Section 10.5: Adds a new code on definitions and incorporates text previously in section 13.05 of this handbook.

Sections 11.1 – 11.6: Removes previous section 11.1 direction. Moves previous section 11.2 through section 11.6 direction to section 11.1 through 11.5.

Section 11.1: Incorporates additional references. Clarifies terms of premeasurement, tree measurement.

Section 11.2: Replaces direction with references to principal direction and CFR.

Section 11.3: Revises caption to clarify and increase visibility. Incorporates discussion on timing sales previously in section 13.11 of this handbook.

Section 11.4: Revises caption to correspond with FSM 2431.7 and be more inclusive of other forms of timber disposal. Clarifies that timber or forest product volume from stewardship

agreements will be included when volume is expected to be allocated through supplemental project agreements or task orders to an executed stewardship agreement.

Section 11.5: Incorporates additional references.

Section 11.51: Adds a new code and incorporates direction previously listed in sections 26 – 26.2 of this handbook. Aligns terminology with Timber Information Manager (TIM) regarding sale objective codes versus purpose and activity codes. Also clarifies sale objective codes apply to stewardship contracting. Revises terminology to FPFS.

Section 11.51a: Adds a new code and incorporates direction previously in section 26.3 of this handbook.

Section 11.52: Adds a new code and incorporates direction previously in section 87.62 of this handbook.

Section 12: Incorporates additional references. Clarifies the gate system is also applicable to stewardship contracting. References principal direction in lieu of duplicative text regarding certification. Clarifies terminology between the Timber Sale Project Plan completed in Gate 1 and the Timber Sale Project Design completed in Gate 2. Documents variation in procedures for advertising, bid opening and award in stewardship contracting.

Section 13: Adds a new code and incorporates direction previously in sections 23 and 24 of this handbook.

Section 13.05: Removes code and moves direction to section 10.5 of this handbook.

Section 13.11: Removes code and moves direction to chapters 20 and 30 of this handbook.

Section 13.12: Removes code and moves direction to section 14.1 of this handbook.

Section 13.2: Removes code and moves direction to section 14.2 and 15.1.

Section 13.3: Removes code and moves direction to chapters 20 and 30 of this handbook.

Section 13.4: Removes code and moves direction to chapters 20 and 30 of this handbook.

Section 14: Adds a new code. Clarifies that financial efficiency analysis is also applicable to stewardship contracting. Clarifies that financial efficiency analysis is evaluated in Gate 3 as well as Gates 1 and 2. Incorporates direction from section 13.1 of this handbook. Removes all except project-level planning direction. Moves Gate 1 and 2 specific financial efficiency analysis direction to chapter 20 of this handbook and Gate 3 specific direction to chapter 30 of this handbook.

Section 14.1: Adds a new code. Incorporates direction previously in section 13.12 of this handbook. Also incorporates direction previously in section 22.1 of this handbook relating to

least-cost methods. Reinforces that financial and economic efficiency analyses precede decision-making.

Section 14.2: Adds a new code and incorporates direction previously in sections 13.2, 32.11, 32.3, and 32.31 of this handbook.

Section 14.3: Adds a new code and incorporates direction previously in section 32.2 of this handbook.

Section 14.31: Adds a new code and incorporates direction previously in section 32.21 of this handbook. Provides clarity by referencing financial revenue definition.

Section 14.32: Adds a new code and incorporates direction previously in section 32.22 of this handbook. Provides clarity by referencing financial cost definition.

Section 14.33: Adds a new code and incorporates direction previously listed in section 32.25 of this handbook.

Section 14.34: Adds a new code and incorporates direction previously in section 32.26 of this handbook.

Section 14.35: Adds a new code and incorporates direction previously in section 32.27 of this handbook. Incorporates additional reference.

Section 14.36: Adds a new code and incorporates direction previously in section 32.28 of this handbook.

Section 14.4: Adds a new code and incorporates direction previously in section 32.4 of this handbook.

Section 14.5: Adds a new code and incorporates direction previously in section 32.5 of this handbook.

Section 14.6: Adds a new code and incorporates direction previously in section 32.6 of this handbook.

Section 14.7: Adds a new code and incorporates direction previously in section 25 of this handbook.

Section 15: Adds a new code. Clarifies that economic efficiency analysis is also applicable to stewardship contracting. Clarifies that economic efficiency analysis may be evaluated in Gate 3 as well as Gates 1 and 2. Moves Gate 1 and 2 specific economic efficiency analysis direction to chapter 20 of this handbook and Gate 3 specific direction to chapter 30 of this handbook.

Section 15.1: Adds a new code and incorporates direction previously in sections 13.2, 32.12, 32.3, and 32.32 of this handbook. Incorporates direction previously in section 32.1 of this handbook relating to salvage sales.

Section 15.21: Adds a new code and incorporates direction previously in section 32.23 of this handbook. Clarifies terminology for non-market benefits. Provides clarity by referencing economic benefit and non-market benefit definitions.

Section 15.22: Adds a new code and incorporates direction previously in section 32.24 of this handbook. Provides clarity by referencing economic cost, financial cost and non-market cost definitions.

Section 15.23: Adds a new code and incorporates direction previously in section 32.5 of this handbook.

Section 16: Adds a new code and incorporates direction previously in section 32.13 and 22.3 of this handbook.

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10.5 - Definitions

Charge. An amount to be paid. When payment is made for timber or forest products, the material may be resold.

Chargeable Volume. Refer to definition in FSH 2409.13, section 05.

Commercial Use. Timber or forest products that may be resold or remanufactured for business purposes.

Convertible Products. Refer to definition in FSM 2430.51.

Cost Effective. Achieving specified outputs or objectives under given conditions for the least cost (FSM 1905).

Cost Efficiency. The usefulness of specified inputs (costs) to produce specified outputs (benefits).

Cutting Unit. An area with a boundary delineated on the ground, or as defined by Global Positioning System (GPS) coordinates, and displayed on a sale area map, contract area map, or stewardship project area map where trees are identified to be cut or left uncut as described by contract provisions or general conditions.

Direct Benefit. A primary benefit that responds to specified objectives of the policy, program, or expenditure (FSH 1909.17). Direct benefits are broken into two types:

1. **Financial Revenue.** Value of cash receipts received by the Forest Service for goods and services. For timber, direct benefits are expressed as expected gross receipts to the Government.
2. **Economic Benefit.** The monetary sum of the financial revenues, non-market values, and timber values generated that are produced by a policy, program, project, or expenditure. Examples of economic benefits other than revenue include positive effects on resources that are assigned a non-market value, such as improved wildlife habitat or National Forest System roads.

Direct Cost. A cost that directly contributes to the production of the primary outputs of an activity, project, or program (FSH 1909.17). Direct costs are broken into two types:

1. **Financial Cost.** The value of Forest Service expenditures, including expenditures for salary, materials, labor, and contracts. For timber, financial costs include the anticipated investments, maintenance, operating, management, and planning costs attributed to timber production activities, including mitigation measures necessitated by the impacts of timber production.

2. **Economic Cost.** Total fixed and variable costs for inputs, including costs incurred by other public or private parties, such as cooperative road maintenance deposits paid by timber purchasers. In addition, negative impacts on resources that have an economic value (also referred to as non-market costs), such as the loss of fish habitat due to stream sedimentation, are included. Total economic costs are the sum of financial costs, non-Forest Service costs, and non-market costs.

Economic Efficiency. The usefulness of inputs (costs) to produce outputs (benefits) and effects when all costs and benefits that can be identified and valued are included in the computations. Economic efficiency is measured using benefit/cost ratios in timber sale project analysis (FSH 1909.17).

Financial Efficiency. The usefulness of inputs (costs) to produce outputs (revenues) and effects when financial costs and financial revenues are included in the computations. Financial efficiency is measured using revenue/cost ratios for timber sale projects.

Free Use. Payment is not made for timber or forest products disposed of under free use permit form FS-2400-0008. The permit specifies that the forest products are for personal use only and cannot be resold. Minor amounts may be removed for incidental free use without a permit. Free use is also granted for treaty or other reserved rights without a permit, in accordance with the rights of the treaty. Form FS-2400-0008 may also be referred to as FS-2400-008 or FS-2400-8 in Forest Service directives.

High Bid. Highest total bid entered for a timber sale by a qualified bidder.

Long-Term Efficiency Analysis. Analysis, which begins at Gate 1, of the current harvest and extends at least 60 years into the future. In some cases, it is appropriate to extend the analysis through one full rotation or to infinity (to calculate soil expectation value).

Nonchargeable Volume. Refer to definition in FSH 2409.13, section 05.

Non-Convertible Products. Refer to definition in FSM 2430.51.

Non-Forest Service Cost. A cost of investment and/or operating activities paid by cooperators or other non-Forest Service agencies that are part of Forest Service management programs, or that contribute to the outputs included in the analysis (FSH 1909.17). An example of a non-Forest Service cost is the purchaser road construction cost.

Non-market Benefit or Cost. The monetary value to society of a good or service not normally exchanged in a marketplace. The value is expressed as a benefit or cost. If the impact of the good or service is positive (represents a gain), the price is considered a non-market benefit. A non-market cost occurs if the impact of the good or service is negative (represents a loss). Since market transactions for these goods or services are limited or nonexistent, the non-market value is estimated through other analytical techniques (FSH 1909.17).

Payment Unit. Refer to definition in FSH 2409.15, section 60.5.

Permit. A document allowing, but not requiring, a permittee to remove designated forest products in amounts specified in the document when such removal would be illegal without this document. The permit form used will designate the conditions under which the forest products can be removed and whether the permittee will or will not be charged for the forest products.

Personal/Domestic Use. An authorized use of timber or forest products disposed of under free use permit form FS-2400-0008. The permit specifies that the forest products are for personal use only and cannot be resold.

Premeasurement. Refer to definition of tree measurement sale in FSH 2409.15, section 40.5. Synonymous with tree measurement.

Present Net Value (PNV)--Economic. The difference between the discounted economic benefits and the discounted economic costs.

$$\text{Present Net Value} = \text{Present Value Benefits} - \text{Present Value Economic Costs}$$

Present Net Value (PNV)--Financial. The difference between the discounted financial revenues and the discounted financial costs.

$$\text{Present Net Value} = \text{Present Value Revenues} - \text{Present Value Financial Costs}$$

Present Value. Value of future benefits, revenues, or costs discounted to present year, usually project year zero; expressed as present value benefits, present value revenues, present value costs, and PNV.

Project. An organized effort to achieve an objective identified by location, activities, outputs, effects, time period, and responsibilities for execution (FSM 1905).

Project Alternatives. A differing set of management activities and practices organized to achieve project goals or objectives.

Ratio--Benefit/Cost. A measure of economic efficiency computed by dividing total discounted economic benefits by total discounted economic costs (FSH 1909.17).

$$\text{Benefit/Cost Ratio} = \frac{\text{PV Economic Benefits}}{\text{PV Economic Costs}}$$

Where: PV Economic Benefits = total discounted benefits.
PV Financial Costs = total discounted economic costs

Ratio--Revenue/Cost. A measure of financial efficiency computed by dividing total discounted financial revenue by total discounted financial costs.

$$\text{Revenue/Cost Ratio} = \frac{\text{PV Revenue}}{\text{PV Financial Costs}}$$

Where: PV Revenue = total discounted revenue
PV Financial Costs = total discounted financial costs

Scaled. Refer to definition of scale sale in FSH 2409.15, section 40.5.

Short-Term Efficiency Analysis. Analysis that extends from Gate 1 of the current harvest through the closure of the current harvest timber sale, stewardship contract, or stewardship agreement for intermediate cuts and through regeneration of the site for regeneration cuts.

Soil Expectation Value. Returns to the land, when managed for timber production, over an infinite series of like rotations. This value may be used to determine optimum economic rotation age. This term is abbreviated as SEV and is also called bare land or land expectation value.

Statistical High Bid Rate. The high bid rate less any timber property value, adjusted to not less than the base rate.

Subdivision. A portion of the sale area, contract area or project area within a scaled contract or agreement consisting of one or more cutting units. Subdivisions facilitate scheduling and management of operations and acceptance of work under a contract or agreement. Subdivision boundaries are displayed on a sale area map, contract area map, or stewardship project area map.

Timber Information Manager (TIM). Refer to definition in FSM 2430.51.

Timber Sale Contract. A bilateral agreement entered into by the Forest Service and a Purchaser with specific expectations of benefits to be received and obligations to be performed by both parties. The Forest Service agrees to sell and permit Purchaser to cut and remove included timber and Purchaser agrees to purchase, cut and remove included timber.

Trade-off. The amount of PNV, or other physical output, that is gained or lost between alternatives.

Tree Measurement. Synonymous with premeasurement.

11 - Basics of Timber Sale Program

11.1 - Methods of Measurement

For payment purposes, the volume of commercial sales may be determined by two measurement methods: scaled sales or presale measurement sales (FSM 2431.12). Direction for determining volume using these methods is in FSM 2440; FSH 2409.11, National Forest Log Scaling Handbook; FSH 2409.11a, Cubic Scaling Handbook; and FSH 2409.12, Timber Cruising Handbook. Using the appropriate measurement procedures, the Responsible Official may determine sale volume for payment purposes by the following methods:

1. **Scaled Sales.** This method determines volume for payment by a variety of sampling and measurement methods as specified in the contract or agreement following the felling of trees. Sampling and measurement methods include, but are not limited to, direct measurement of the logs and other forest products based on the log rule and utilization standards, weighing and load count. Contract forms available for use with scaled measurement are displayed in the contract/permit use matrix in section 52, exhibit 01 of this handbook. Other stewardship contract and agreement forms available for use with scaled measurement are displayed in the contract/permit use matrix in FSH 2409.19, section 62.1.
2. **Premeasurement (Tree Measurement) Sales.** This method provides for measurement of trees or products and determination of volume for payment in advance of felling of trees. Regional Foresters may provide instructions on required use of premeasurement and establish guidelines and standards of accuracy for use of this method. Contract forms available for use with premeasurement are displayed in the contract/permit use matrix in section 52, exhibit 01 of this handbook. Other stewardship contract and agreement forms available for use with premeasurement are displayed in the contract/permit use matrix in FSH 2409.19, section 62.1. There are two forms of premeasurement sales:
 - a. **Payment Unit Sales.** Where useful for payment or sale administration purposes, subdivide the sale into two or more units for payment. Refer to section 32.6 of this handbook for guidance on combining cutting units into a payment unit and dividing a sale area into payment units.
 - b. **Lump Sum Sales.** Lump sum sales are premeasured sales where the entire value of the sale is paid at the time of release for cutting (contract form 2400-6T and contract form 2400-3T(P)) or at the time the contract is executed (contract form 2400-2 and contract form 2400-0004). Form FS-2400-0004 may also be referred to as FS-2400-004 or FS-2400-4 in Forest Service directives. Lump sum sales must include a schedule of stumpage rates per unit of measure in the sale contract in order to

provide for cutting trees damaged in logging or for other reasons, such as road rights-of-way or landings.

For timber sale contracts, stewardship contracts, and stewardship agreements, base the quantity of timber to be sold on the cruise volumes for both scaled and tree measurement sales. Volume quantities are Forest Service estimates and are not guaranteed (sec. 53.4 of this handbook). The contract may provide for quantity adjustments for trees damaged by natural causes and for other reasons specified in the contract.

11.2 - Size and Duration of Sales

Develop a mix of sale sizes and duration to provide a diverse timber sale program which meets the local industry and resource needs, while maintaining the economic viability of the program. Refer to FSM 2403.4 and 2431.13 for direction regarding size of sales relative to the needs of potential bidders and to FSM 2404.28, exhibit 01 pertaining to delegated authority for selling sales by size. Refer to FSM 2431.14 for contract duration restrictions.

11.3 - Timber Program Scheduling – 5-year Schedule

Refer to FSM 2431.2 through 2431.22 for principal direction for developing a 5-year schedule. The 5-year schedule will include planned timber output for timber sale contracts, stewardship contracts, stewardship agreements, permits, and planned contracts by the Cooperator under the good neighbor authority. Refer to FSH 2409.19, sec. 80.1 and Title 16, United States Code, section 2113a (16 USC 2113a) for description of the good neighbor authority. The 5-year schedule displays all sources of convertible volume consistent with land management plan direction. Involve an engineering representative in the 5-year scheduling process to ensure location and design of specified roads and other timber sale preparation activities are progressing concurrently.

11.4 - Timber Program Announcements – Periodic Timber Sale Announcement

Refer to FSM 2431.7 for principal direction regarding timber program announcements. The timber program announcement is also named the periodic timber sale announcement. Regional Foresters shall prescribe formats and information required in the timber program announcement. Include supplemental project agreements or task orders when timber or forest product volume is expected to be allocated to an executed stewardship agreement. Contracts prepared under the good neighbor authority are subject to the Cooperator's timeline, so they may not be included in the announcement if the advertisement date is unknown. As with 5-year scheduling, involve an engineering representative in the program announcement process to ensure specified road design and other timber sale preparation activities continue to progress concurrently.

Timing of the sales should be a consideration. Ensure Forest sale offerings are balanced in order to offer 75 percent of the Region's timber sale program by the end of the third quarter of each fiscal year (FSM 2404.15a).

At a minimum, the announcements must include the following:

1. **Description of Sale or Stewardship Contract (including Integrated Resource Timber Contracts and Integrated Resource Service Contracts) or Stewardship Agreement.** List sale and stewardship names, locations, estimated volumes by product, mileage of specified road construction and reconstruction, month of bid opening, decision notice approval date, and remarks (for example, road restrictions, special requirements or conditions, Small Business Administration set-aside status, schedule of public meetings, type(s) of service work in stewardship contracts, and so forth).
2. **Maps.** Attach a Forest or District map showing the proposed sale locations.
3. **Sale and Stewardship Program for First 6 Months.** List an attainable, firm program of sales and stewardship contracts as described in FSM 2431.7.
4. **Sale and Stewardship Program for Second 6 Months.** Although the sale and stewardship program for the second 6 months is not as definite as for the first 6 months, be sure that it contains a well thought out and attainable program of sales and stewardship contracts as described in FSM 2431.7.

For each sale and stewardship contract in the program, state the appropriate National Environmental Policy Act (NEPA) documentation required and indicate the approval date in the timber program announcement (FSM 1950 describes procedures for preparing environmental documentation). If the NEPA process is not complete, indicate the expected approval date and note that the proposal to offer the sale or stewardship contract is not final.

If unforeseen difficulties such as financing, salvage needs, deficit appraisals, environmental conflicts, or other events necessitate changes in the schedule, promptly notify interested parties. Furnish the Small Business Administration representative with copies of all timber program announcements.

Post timber program announcements on an official public-facing Forest Service web site as the primary means of notification. Upon request, send copies of timber program announcements to the local timber industry (except for those excluded as specified in FSM 2431.7), local public agencies, private groups, and individuals that have displayed an interest in the Forest sale and stewardship program. Advise parties of public meetings concerning the sale and stewardship program.

11.5 - Systems for Scheduling and Tracking

Use the gate system as described in FSM 2432.1 through 2432.6, and sec. 12 of this handbook to develop and schedule the timber program. Use Timber Information Manager (TIM) for tracking and reporting as required by FSM 2431.9 and FSH 2409.19, chapters 60 and 80. FSM 2493 and FSH 2409.14 provide guidance on the use of TIM. The primary benefits of orderly development of the program and tracking of the steps include efficient use of money and work force, avoidance of delay in the process, and avoidance of resource damage resulting from hurried or uncompleted steps.

11.51 - Sale Objective Descriptions

Evaluate each project beginning at Gate 1 to properly identify the primary purpose and the principal benefiting resource or activity of a timber sale, stewardship project, or good neighbor authority project. Identify and document in the timber sale project plan at Gate 1 (sec. 21.4 of this handbook) the general primary purpose and principal benefiting resource or activity of the proposal, including which land management plan objectives are to be achieved. As the proposal undergoes further development through the environmental analysis in Gate 2, refine and document changes for the primary purpose and principal benefiting resource or activity in the timber sale project design. The timber sale project may be divided into areas, such as by cutting unit, with the primary purpose and principal benefiting resource or activity of each area described separately in the environmental analysis documentation or timber sale project plan. A sale objective description and associated code is assigned to the sale or stewardship contract, or a portion thereof, describing its primary purpose and principal benefiting resource or activity. References to timber sales in section 11.51 - 11.51a are also applicable to stewardship or good neighbor authority projects which result in the disposal of timber or forest products.

The sale objective code is a four-character alphanumeric field. The first half of the four-character field identifies the primary purpose of a timber sale and the second half of the four-character field identifies the principal benefiting resource or activity. A timber sale can have several sale objective descriptions, with associated codes. Enter sale objective descriptions and codes into TIM when a new timber sale is identified at Gate 3. Also enter the sale objective percent of a sale for each code entered into TIM, based on the total sale volume. The sale objective codes with their associated sale objective percent will transfer automatically to the Forest Products Financial System (FPFS) at Gate 6.

Use sale objective descriptions and codes in TIM to label the primary purpose/principal benefiting resource or activity of the timber sale project, individual timber sales, or portions of the sales.

1. **Timber Commodity.** Use the following sale objective description and code, as appropriate, with the timber commodity primary purpose:

- a. **Timber Resource - TC01.** This sale objective description and code is primarily designed to meet timber commodity purpose and principally benefit the timber resource. Use this description to identify timber harvest that is not for personal use or other resource purposes but is designed to achieve the timber volume objectives of the land management plan. The sale and harvest of this timber is primarily for the purpose of providing forest product raw material to contribute to the Nation's timber supply. This timber may be harvested only from lands classified as suited for timber harvest in the land management plan using either green or salvage sales. Volume from this category is considered chargeable.
2. **Forest Stewardship.** Use forest stewardship primary purpose to identify timber harvest that is not for personal use or timber commodity purposes but is designed primarily to achieve forest stewardship objectives that require vegetation management as outlined in the land management plan. A project may contain stewardship objectives without invoking stewardship contracting authorities. Contracts prepared under the good neighbor authority contain stewardship objectives. To utilize the stewardship contracting authority for integrated resource timber contracts, integrated resource service contracts, or stewardship agreements, a project must meet one or more of the seven land management goals listed in FSH 2409.19, section 61. If the Forest does not have a timber program or if there is not a demand for the timber being harvested, these vegetation management projects should be accomplished through other means, such as controlled burning. Timber harvest must be the most financially efficient way of achieving the necessary vegetation management; that is, it produces the least net loss when both current costs and revenues are considered. Where timber harvest is selected to achieve the forest stewardship objective; the sale of timber is secondary to achieving that objective. The revenue produced from this timber is considered an offset to the cost of accomplishing the project. This timber may be harvested from lands classified as suited or unsuited for timber management through green or salvage sales. Use the following sale objective descriptions and codes, as appropriate, with the forest stewardship primary purpose:
 - a. **Forest and Ecosystem Health - FS10.** This sale objective description and code is primarily designed to meet forest stewardship purpose and principally benefit forest and ecosystem health. Use this description to identify timber harvest that includes objectives to promote long-term forest ecosystem health through forest pest and fuels management. Projects specifically designed to prevent resource losses and ecosystem damage from catastrophic events, such as fires or windstorms, are also included. For example, if a condition, such as stocking level (trees per acre), indicates that the ecosystem is outside or close to being outside the historic range of variation, these sales are designed to bring the ecosystem back to a healthier (normal) condition. This category could also include salvage to offset the cost of reforestation and site rehabilitation after catastrophic events.

- b. **Recreation/Visual/Cultural Resource Enhancement - FS20.** This sale objective description and code is primarily designed to meet forest stewardship purpose and principally benefit recreation/visual/cultural resource enhancement. Use this description to identify timber harvest that includes objectives related to recreation area enhancement, such as the removal of hazard trees from campgrounds; visual enhancement, such as opening vistas or regenerating specific species like aspen to create landscape variety; and cultural resource enhancement.
- c. **Wildlife Habitat Management - FS30.** This sale objective description and code is primarily designed to meet forest stewardship purpose and principally benefit wildlife habitat management. Use this description to identify timber harvest that includes objectives to manage habitat for a particular species or group of species, such as creating openings to promote growth of seral stage vegetation and improve foraging areas for deer.
- d. **Fisheries Habitat Management and Watershed Improvement - FS40.** This sale objective description and code is primarily designed to meet forest stewardship purpose and principally benefit fisheries habitat management and watershed improvement. Use this description to identify timber harvest that includes the management of vegetation designed to improve fisheries habitat. This sale objective description and code also includes the management of vegetation to improve soil stability where the specific purpose is to protect or improve fish habitat or water quality.
- e. **Threatened and Endangered Species Habitat Management - FS50.** This sale objective description and code is primarily designed to meet forest stewardship purpose and principally benefit threatened and endangered species habitat management. Use this description to identify timber harvest that includes the management of vegetation and ecosystem development to meet the habitat requirements of threatened and endangered species.
- f. **Range Resource Enhancements - FS60.** This sale objective description and code is primarily designed to meet forest stewardship purpose and principally benefit range resource enhancements. The sale objective description in TIM is Range Resource Enhancements. Use this description to identify timber harvest that includes vegetation management to improve the range resource for domestic livestock use.
- g. **Non-Sawtimber Products - FS70.** This sale objective description and code is primarily designed to meet forest stewardship purpose and principally benefit non-sawtimber products. Use this description to identify timber harvest that includes the commercial sale of non-sawtimber products such as posts, poles, firewood, and Christmas trees, where these sales are designed to achieve a forest stewardship objective.

- [illegible]

11.51a - Guidelines for Sale Objective Code Determination

In deciding the sale objective code of the timber sale or sale portion, consider the land management plan objectives of the management area in which the project will occur and the resource objectives of the vegetation management of the proposed project.

1. When forest stewardship objectives are identified as the primary purpose for sales or portions of sales, other viable means of achieving the same vegetation management results, such as controlled burning, should be examined and their financial effects weighed against those of timber harvest. The financial effects are only one of multiple factors in the environmental analysis process that the decision maker considers when making the decision. Document the results of this analysis and any environmental analysis in the project file. In addition, the environmental effects of different options should be considered when making the decision.

2. Salvage sales may be included in either the timber commodity or forest stewardship component depending on the primary purpose of the salvage.
3. The project planner should identify one primary land management plan objective being achieved by each specific area of the project and assign an appropriate sale objective code to that area. The percentage assigned to each sale objective code should be based on projected timber harvest volume. As an example:
4. Sale A has two cutting units. Cutting Unit 1 (30 acres) is primarily designed to achieve a timber resource objective, and the expected total harvest volume is 4 hundred cubic feet (CCF). Cutting Unit 2 (20 acres) is primarily designed to achieve a wildlife objective, and the expected total harvest volume is 1 CCF. After determining proportions based on volume, the project would be coded as 80 percent timber resource (TC01 - 80 percent) and 20 percent wildlife habitat management (FS30 - 20 percent).
5. The project planner should not attempt to determine percentages of sale objective codes by separating jointly integrated objectives. For example, if a particular acre of harvest will produce both timber benefits and wildlife benefits to meet land management plan objectives, the primary purpose must be identified as either timber or wildlife and coded as such. References to the land management plan management area objectives may be useful in making the sale objective code determination.

11.52 - Products and Units of Measure

The only units of measure that are authorized within TIM for products are shown in exhibit 01. Other product and unit of measure combinations may become available as new markets develop.

11.52 - Exhibit 01

Product and Unit of Measure Combinations

PRODUCT NAME	UNITS OF MEASURE *
Convertible Products	
Sawtimber	CCF, Tons, PAM, MBF
Pulpwood	CCF, Cords, Tons, PAM, MBF
Pilings	CCF, Pieces, Ln. Ft., PAM, MBF
Mine Props	CCF, Pieces, Ln. Ft., PAM, MBF
Float Logs	CCF, Pieces, Ln. Ft, MBF
Non-saw	CCF, Tons, MBF
Posts	CCF, Pieces, Ln. Ft., PAM, MBF
Poles	CCF, Pieces, Ln. Ft., PAM, MBF
Fuelwood	Cords, CCF
Ties	CCF, Pieces, Ln. Ft., PAM, MBF
Coop Bolts	CCF, Pieces, Ln. Ft, MBF
Trap Float	CCF, Pieces, Ln. Ft, MBF
Miscellaneous Convertible	CCF, Cords, Pieces, Tons, Ln. Ft., PAM, MBF
Cull Logs	CCF, Tons, PAM, MBF
Small Roundwood	CCF, Pieces, Ln. Ft., PAM, MBF
Green Biomass Convertible	Tons, CCF
Dry Biomass Convertible	Tons, CCF
Non-Convertible Products	
Acid Distillate & Pine Distillate Wood	Tons
Christmas Trees	Pieces, Ln. Ft., Each
Non-Convertible	Pieces, Each, Lbs., Bushels, Taps, Faces, Acres, Gallons
Bee Trees	Each
Transplants	Each
Limb/Bough	Tons, Lbs.
Foliage	Tons, Lbs.
Needles	Cu. Ft.
Bark	Lbs.
Cones-Green	Bushels
Cones-Dry	Bushels
Seed	Lbs.
Specialty Wood Product	Cu. Ft.
Nuts/Seed	Lbs.

11.52 - Exhibit 01--Continued

Product and Unit of Measure Combinations

PRODUCT NAME	UNITS OF MEASURE *
Fruits/Berries	Lbs, Gallons
Tree Sap	Taps
Tree Resin (Naval Stores)	Faces per Year
Roots	Lbs.
Bulbs	Lbs.
Mushrooms	Lbs, Gallons
Fungi	Lbs.
Moss	Tons, Lbs.
Herbs	Lbs.
Ferns	Acres
Wildflowers	Lbs.
Grass	Tons, Lbs.
Aquatic Plants	Tons
Vines	Lbs.
Mistletoe/Spanish Moss	Lbs.
Cacti	Each
Green Biomass Non-Convertible	Tons
Dry Biomass Non-Convertible	Tons
Other Plants	Tons, Lbs.

* KEY TO ABBREVIATIONS:

CCF	Hundred Cubic Feet
Cu. Ft.	Cubic Feet
Lbs.	Pounds
Ln. Ft.	Lineal Feet
MBF	Thousand Board Feet
PAM	Per Acre Material

12 - Timber Sale Preparation Process

Refer to FSM 2432.1 through 2432.6 for principal direction regarding the timber sale preparation process. References to timber sales in section 12 are also applicable to stewardship projects that include disposal of timber or forest products, except where stated otherwise. Refer to FSH 2409.19, sec. 62.9 for further guidance on applicability of Gates 1 through 6 for contracts and agreements prepared under stewardship contracting authority. Refer to FSH 2409.19, sec. 82.5 for further guidance on applicability of Gates 1 through 6 for contracts prepared under the good neighbor authority. The timber sale preparation process begins with the identification of the project area and ends with the award of the timber sale contract. These activities pass through specific stages, called “gates,” each of which requires specific outputs before proceeding to the next gate. Exhibit 01 summarizes the work activities required at each gate.

Description of the work process at each gate is as follows:

1. **Gate 1, Proposal Development.** Refer to FSM 2432.1 for principal direction regarding proposal development of a timber sale project at Gate 1. Additional direction is located in chapter 20 of this handbook, including variations for stewardship authority and good neighbor authority. Begin proposal development with the initial concept of the project. Identify the purpose and need for the project, public issues, interested external parties, management issues, resource opportunities in the project plan area, a range of possible volume outputs, transportation system needs, and financial efficiency information. The output for this phase is a timber sale project plan (sec. 21.4 of this handbook) that is signed by the District Ranger or Forest Supervisor as specified in FSM 2404.16b, 2404.17b, and 2404.28.

A timber sale project may include one or more timber sales or permit areas. Although timber sales are a known outcome of a timber sale project, the configuration of the treatments into specific timber sales or permits is not identified at Gate 1. The responsible Line Officer for the project, as authorized in FSM 2404.28, shall sign the certification report (generated by TIM) as discussed in FSM 2432.15.

2. **Gate 2, Project Analysis and Decision.** Refer to FSM 1950; FSH 1909.15; Title 36, Code of Federal Regulations, Part 220 (36 CFR 220); FSM 2432.2; and section 23 of this handbook for principal direction regarding project analysis and decision at Gate 2. Additional direction is located in chapter 20 of this handbook, including variations for stewardship authority and good neighbor authority. During the project analysis and design phase of project management, analyze the proposed action, with iterative options if necessary, for environmental effects. Provide an analysis of financial and, if needed, economic efficiency. Concurrently, develop a project file to store the information that is gathered. The documentation and analyses are submitted to the

responsible Line Officer to make a NEPA decision as specified in FSM 2404.16b and 2404.17b, and as authorized in FSM 2404.28.

The end product of the project analysis and decision phase is the signature on the decision document by the official authorized to approve the project. Once the responsible Line Officer makes a decision, develop a timber sale project design that provides detailed instructions for field layout of all sale elements. The responsible Line Officer for the project, as authorized in FSM 2404.28, shall sign the certification report (generated by TIM) as discussed in FSM 2432.23.

3. **Gate 3, Preparation of a Timber Sale.** Refer to FSM 2432.3 for principal direction regarding preparing a timber sale project at Gate 3. Additional direction is located in chapter 30 of this handbook. The timber sale project design prepared at Gate 2 identifies individual timber sales or permit areas. Gate 3 includes activities leading to the implementation of the timber sale project design for individual timber sales, such as data gathering and on-the-ground marking, designating, and delineating the boundaries. The Gate 3 activities are needed to properly support Gate 4 activities, such as the appraisal and preparation of the contract, as well as informing post-award sale administration. These activities should represent the most cost-effective means of implementing the sale design. Some of these activities may be performed by the Contractor within stewardship contracts and agreements. The good neighbor authority provides the opportunity for several of these activities to be performed by the Cooperator. Refer to FSH 2409.19, chapters 60 and 80 for more information regarding permissible activities within stewardship contracting authority and good neighbor authority respectively. The responsible Line Officer for the project, as authorized in FSM 2404.28, shall sign the certification report (generated by TIM) as discussed in FSM 2432.36. FSM 2404.16b and 2404.17b specify the responsibility for signing the certification.
4. **Gate 4, Advertise a Timber Sale.** Refer to FSM 2432.4 for principal direction regarding advertising a timber sale project at Gate 4. Additional direction is located in chapter 50 of this handbook, including variations for stewardship authority. After gathering all necessary engineering design work, cruise (volume) information, logging costs, environmental protection costs, and other elements of the timber appraisal, prepare a sample contract that reflects the management objectives and resource protection measures identified during the environmental analysis and field work. Determine the value of the timber; prepare the advertisement, prospectus, and bid form; review the total sale package for completeness; and advertise the sale. Follow direction in FSH 2409.19, chapter 60 for advertising integrated resource timber contracts and integrated resource service contracts. The good neighbor authority provides the opportunity for these activities to be performed under the Cooperator's procedures, as approved by the Forest Service. Refer to FSH 2409.19, chapter 80 for more information regarding

permissible activities within the good neighbor authority. The responsible Line Officer for the timber sale, as authorized in FSM 2404.28, shall sign the certification report (generated by TIM) as discussed in FSM 2432.48. FSM 2404.16b and 2404.17b specify the responsibility for signing the certification. Additional language will be included in the certification report for the good neighbor authority as described in FSH 2409.19, sec. 82.5.

5. **Gate 5, Bid Opening.** Refer to FSM 2432.5 for principal direction regarding opening bids for a timber sale project at Gate 5. Additional direction is located in chapter 60 of this handbook. Open the bids and conduct an auction if required (FSM 2431.41). Prepare and distribute an abstract of bids to interested parties. The Contracting Officer or Sale Officer shall sign the certification report generated by TIM as discussed in FSM 2432.56.

Follow direction in FSH 2409.19, chapter 60 and FAR 52.217-5 Evaluation of Options for evaluating best value offers for stewardship contracts. The Timber and/or Procurement Contracting Officer shall sign certification report generated by TIM for stewardship contracts and agreements as discussed in FSH 2409.19, sec. 60.42d.

The good neighbor authority provides the opportunity for bid opening to be performed under the Cooperator's procedures, as approved by the Forest Service. Refer to FSH 2409.19, chapter 80 for more information regarding permissible activities within the good neighbor authority. No signature is required for the certification report for Gate 5 under the good neighbor authority.

6. **Gate 6, Award a Timber Sale Contract.** Refer to FSM 2432.6 for principal direction regarding awarding a timber sale project at Gate 6. Additional direction is located in chapter 70 of this handbook. Evaluate the apparent high bidder for compliance with the pre-award requirements. The timber sale passes through Gate 6 when all requirements have been met and the sale contract produced by TIM is executed (signed by both the Purchaser and the Contracting Officer). The executed contract is the verification that Gate 6 is completed (sec. 78 of this handbook).

Award a stewardship contract to the Contractor whose proposal represents the best value to the Government as discussed in FSH 2409.19, chapter 60 and FAR 52.217-5 Evaluation of Options.

The good neighbor authority provides the opportunity for award to be performed under the Cooperator's procedures, as approved by the Forest Service. Refer to FSH 2409.19, chapter 80 for more information regarding permissible activities within the good neighbor authority.

12 - Exhibit 01

Gate Activities

Gate No.	Gate Name	Process	Key Activities	Title of Certification Report
1	Proposal Development	Timber Sale Project Development	Timber sale project plan development, silvicultural exams, area logging and transportation analysis, financial and economic analysis, budgeting, scheduling, and Line Officer certification.	Timber Sale Project Plan
2	Project Analysis and Decision	Timber Sale Project Design	Environmental, financial, and economic analysis (if needed); resource reviews; project transportation/logging analysis; decision-making; timber sale project design preparation; and Line Officer certification.	Timber Sale Project Design
3	Preparation of a Timber Sale	Timber Sale Project Implementation	Identification of individual timber sales in the timber sale project; silvicultural prescriptions; completion of all field layout; documentation of items for use in preparing appraisal, contract preparation, offering; and Line Officer certification.	Timber Sale Summary
4	Advertise a Timber Sale	Final Package Preparation, Review, Appraisal, and Offering	Preparation of appraisal, sample contract, bid form, prospectus, Knutson-Vandenberg (K-V) plan, salvage sale fund plan, and brush disposal plan; advertisement of the timber sale; and Line Officer certification.	Timber Sale Report
5	Bid Opening	Bid Opening	Open sealed bids, conduct oral auction (if specified), review bids, identification of apparent high bidder, preparation of bid abstract, and certification by Sale Officer or Contracting Officer.	Timber Sale Bid Opening
6	Award a Timber Sale Contract	Sale Award	Completion of award activities.	None. Executed contract completes Gate 6.

13 - Feasibility

Feasibility is based on objectives within the plan components of the land management plan, financial efficiency, salability to potential purchasers, and other sale-specific factors. Feasibility is determined while performing the financial efficiency analysis or subsequent reviews of the financial efficiency analysis in Gates 1, 2, and 3. Analyze feasibility for projects that result in timber sales, stewardship contracts, and stewardship agreements that result in disposal of timber or forest products. The type and amount of service work bundled into a contract or agreement which removes timber or forest products may enhance or detract from the feasibility of a stewardship project.

1. **Objectives within the Plan Components of the Land Management Plan.** The proposed project must be shown to contribute to one or more of the plan components of the land management plan. If the project includes harvest for forest stewardship purposes (sections 11.51 through 11.51a within this handbook describe stewardship sale objective codes), include documentation in the project file showing how the sale or sales will achieve the non-timber plan component(s) as outlined in the land management plan. In addition, during the Gate 2 analysis of proposed stewardship harvest, compare timber harvest alternatives to practical and feasible non-harvest alternatives that would achieve the same vegetation management objectives within the plan components of the land management plan (FSM 2432.22c for principal direction). An example of a non-harvest option is prescribed fire.
2. **Financial Efficiency.** Review the results of the financial efficiency analysis, as discussed in section 14 of this handbook, in relation to non-monetary benefits (such as enhancement to endangered species habitat) and costs (such as increased stream sedimentation) that are anticipated as a result of implementing the proposal. Determine whether the proposal represents a cost-efficient means of achieving the objectives within the plan components of the land management plan and if it contributes to positive net public benefits. Other economic benefits and costs, such as those included in an extensive transportation system analysis, also may be considered in this review.
3. **Salability.** Ensure there is a reasonable chance that the timber sale will be purchased. If anticipated value of the timber to the Purchaser would not cover the Purchaser's costs, verify whether the sale would be economically feasible for an operator to harvest with supplemental funding. If the timber sale project is not feasible to a Purchaser and will, most likely, receive no bids, drop or delay the project until market conditions are better, or redesign the project, within the limits of the land management plan, to make it more attractive to potential purchasers.
4. **Other Sale-Specific Factors.** Consider other factors that affect whether the project can be implemented. Examples include analysis of site-specific resource conditions

(including impacts that cannot be mitigated), ability to implement contract requirements specified in the environmental document, adverse public reaction, amount and type of stewardship work (including service work), and social factors.

14 - Financial Efficiency Analysis

Refer to FSM 2432 for direction on preparing financial efficiency analysis. See FSM 1970, FSH 1909.15, and FSH 1909.17 for analysis procedures and additional direction. Financial efficiency analysis is not required by NEPA, however it is a tool to identify efficiencies that may be attained through varying implementation activities in projects that include timber sales as an implementation tool. References to timber sales in section 14 through 14.9 are also applicable to stewardship projects with disposal of timber or forest products, except where stated otherwise. Any service work associated with these stewardship projects will be included within the analysis. The financial efficiency analysis is only one of multiple factors in the environmental analysis process that the decision maker considers when making the decision. In stewardship projects, financial efficiency is used to compare viable options of completing the stewardship restoration objectives. Include the financial efficiency analysis in the timber sale preparation process.

A number of site-specific treatment alternatives are developed that can be used to achieve the objectives within the plan components outlined in the land management plan in a manner consistent with ecosystem management principles. There are several site-specific factors, such as terrain features and road construction needs, that can affect the cost efficiency of the project. The financial efficiency analysis is used to compare treatment alternatives to determine their relative efficiency with each other. It also provides a comparison of anticipated costs and revenues that are part of Forest Service monetary transactions. Forest Supervisors and District Rangers must have information about projected costs, revenues, and benefits prior to making substantial resource and capital investments in timber sale or stewardship projects for the purposes described in FSM 2432.04. Any non-monetary benefits and costs that are relevant to the project can be discussed as shown in section 14.6 of this handbook. Consider sections 14.31 and 14.32 within this handbook when goods offset the value of services in stewardship contracts and agreements that include disposal of timber or forest products.

Financial efficiency analysis precedes decision-making. It is not used as a basis for selecting an alternative but is used to inform the decision maker of the comparable efficiency between alternatives regarding investments, resource allocations, and management operations. This analysis may be required at Gates 1 through 3 (FSM 2432.12, 2432.22c, and 2432.32 describe requirements for financial efficiency analysis in sale preparation).

Financial efficiency analysis is used to:

1. Promote consistent development and systematic use of financial information in timber sale project decision-making;

2. Integrate analyses of timber economic factors with other resource considerations to provide decision makers with an understanding of the financial implications and trade-offs;
3. Ensure financial efficiency measures are considered as decision criteria when evaluating timber sale proposals, and when selecting a project alternative in accordance with the plan components of the land management plan; and
4. Improve cost efficiency by evaluating and identifying opportunities to reduce costs and to enhance benefits, including revenues.

14.1 - Opportunities to Reduce Costs and Increase Revenues

On a continuing basis throughout the sale preparation process, evaluate each sale for opportunities to increase revenues and reduce costs for the purpose of completing more work with available funding. The evaluation should include, but is not limited to, consideration of:

1. Combining the project under consideration with other projects to reduce analysis costs;
2. Using alternative road systems and standards or temporary roads to reduce Forest Service and/or Purchaser costs;
3. Using alternative logging and/or silvicultural systems to reduce Forest Service and/or Purchaser costs;
4. Modifying sale design within the limits of plan components of the land management plan to reduce Purchaser costs and enhance revenues; and
5. Utilizing stewardship contracting authorities to trade goods for services and offsetting services that need to be performed in the area with the value of timber or forest products.

If the project or alternatives within a project can be achieved through a variety of operational methods, assume that the least-cost means of accomplishing the proposal will be used and incorporate the appropriate cost information accordingly. As an example, do not assume that roads will be constructed at a higher standard than that needed to meet the project objectives. As a second example, if it is less costly to estimate the sale volume using a variable plot cruise as opposed to a sample tree cruise, assume use of the cheaper method when estimating costs. Ensure all methods considered will meet the plan components of the land management plan.

14.2 - Scope of Analysis

The scope of the financial analysis depends upon the scope and complexity of the timber sale project. Analysis will vary at each gate. Refer to sections 21.25, 23.2, and 32.3 for direction regarding financial efficiency analysis in Gates 1 through 3, as appropriate.

The financial efficiency analysis compares estimated Forest Service direct expenditures with estimated financial revenues. Financial efficiency analysis measures two things - revenue/cost ratio and financial PNV as described in section 10.5 of this handbook. The revenue/cost ratio is used to determine the most financially efficient project alternative. The financial PNV can be used to estimate the degree to which an alternative may contribute to the future financial position of the program (above-cost or below-cost), based on the present value of revenues and the present value of financial costs. In addition, develop a subtotal estimate of financial PNV for the short term (existing stand) and the long term (regenerated stand).

14.3 - Analytical Procedures

Use the following analytical procedures to compute the financial efficiency analysis.

14.31 - Financial Revenue

Financial revenues are estimates of revenues that are expected to occur as a result of the project. See section 10.5 of this handbook for the definition of financial revenue. Appropriate revenue data sources include:

1. A 3-year average of timber sale revenues;
2. The appraised value of the timber as developed through normal appraisal techniques; and
3. The average harvest revenue generated from comparable timber sales.

Where possible, it is desirable to use actual historical revenue figures to develop expected prices. The revenue estimates may be adjusted to reflect sale-specific factors, such as the mix of sawtimber and pulpwood or salvage conditions. Financial revenue estimates do not include any non-market values. If the project will produce revenue from other sources, such as developed recreation, grazing, or other activities, that revenue information should also be included in the analysis. Provide documentation of all revenue estimate calculations.

When goods offset the value of services in stewardship contracts and agreements that include disposal of timber or forest products, the foregone revenue will be equal to the foregone cost. Therefore, do not include the foregone revenue as financial revenue in the financial efficiency analysis. Discuss the offset in responding to non-monetary benefits and costs (section 14.6).

14.32 - Financial Costs

Financial costs are estimates of Forest Service appropriation expenditures directly resulting from the project. See section 10.5 of this handbook for the definition of financial cost. Use 3-year average historical costs to estimate the costs of implementing future timber sale projects. The averages may be adjusted to reflect sale-specific situations. Document any adjustments to the averages. Do not separate or allocate joint costs to various resource programs since financial costs are not pooled as in accrual accounting. Include all costs that are anticipated as a result of the project, regardless of funding source. Costs can vary between project alternatives depending on the activities needed to implement each alternative. Use the following direct cost categories to estimate financial costs for the existing and regenerated stands:

1. For analysis of the existing stand, include direct costs associated with the following activities:
 - a. Harvest administration (See FSM 2432.33 for direction to incorporate sale administration costs);
 - b. Sale preparation (beyond Gate 1);
 - c. Environmental analysis and documentation;
 - d. Other resource support;
 - e. Brush disposal expenditures (Forest Service costs only);
 - f. Road design and engineering (excluding deposits for reconstruction engineering services and actual reconstruction);
 - g. Road maintenance (Forest Service costs only; funds associated with timber sale activity);
 - h. Reforestation; and
 - i. Knutson-Vandenberg Act (K-V) work other than required reforestation.
2. For analysis of the regenerated stand, use the cost categories listed previously, as well as the following:
 - a. Silvicultural exams;
 - b. Timber stand improvement; and
 - c. Timber and transportation planning.

Costs to achieve non-timber related objectives of the project, such as range enhancements, should also be included in the analysis if the benefits from these activities are included in the project.

When goods offset the value of services in stewardship contracts and agreements that include disposal of timber or forest products, the foregone revenue will be equal to the foregone cost. Therefore, do not include the foregone cost as financial cost in the financial efficiency analysis. However, include the cost of service work that is not offset by foregone revenue. Discuss the offset in responding to non-monetary benefits and costs (section 14.6).

14.33 - Discounting

Develop a timeline for the project and future related activities to determine when costs will be incurred and benefits will be derived. Discount all costs and benefits to an initial year. The initial (or zero) year is usually the first year of investments. Therefore, use the year that Gate 1 is achieved as the initial year. Discount all expenditures that occur only in years subsequent to the initial year, using the appropriate real discount rate provided in FSM 1971.3 and FSH 1909.17, sec. 15.42.

Use the following formula in the discounting operation:

Present Value of a Single Future Payment

$$PV = \frac{FV}{(1 + i)^n}$$

Where PV = present value of an amount
:

FV = future value of an amount

i = discount rate per period

n = project year the payment occurs, assuming the project begins in year 0

Note: The discounting described here is different than the procedures for discounting payment rates for prompt harvesting described in section 52.82 of this handbook.

14.34 - Inflation and Trends

Express all monetary values in constant real dollars for a given base year. If multi-year historical data are used, adjust the data for the effects of inflation so that all values reflect the same purchasing power of the dollar. When inflation adjustment is necessary, use the “Implicit Price Deflator for Gross Domestic Product” (from the table of values in the President’s annual budget). Assume that prices and costs will remain constant in real terms throughout the time period (section 14.4 within this handbook). Do not adjust future values for inflation. Use real price and real cost adjustments only on approval from the Regional Forester.

14.35 - Risk and Uncertainty

Recognize uncertainty about projected future values used in the analysis (costs, benefits, and outputs). If uncertainty about any projected values constitutes an issue important to the NEPA decision (Gate 2), conduct a sensitivity analysis as described in section 16, paragraph 3 of this handbook. Unusual circumstances, such as the following, may require additional analysis of risk and uncertainty:

1. If there is some probability of regeneration failure, estimate the number of acres that are likely to need re-treatment(s) to achieve adequate restocking within 5 years of final harvest (FSM 2470 identifies the restocking requirement). Incorporate re-treatment activities and costs into the analysis and document assumptions. Do not plan for fail-safe regeneration when natural regeneration can be reasonably expected. Do not overestimate regeneration costs.
2. If high costs are estimated for an activity (for example, slash disposal) by assuming very low risk (no risk with 100 percent cleanup), consider alternative treatment methods that could reduce costs by allowing a higher, but still acceptable, degree of risk, in accordance with Regional standards and plan components of the land management plan. Regional Foresters may establish risk analysis guidelines to evaluate these trade-offs.
3. If yield projections are included in the analysis, document sources of data used for the estimates and assumptions concerning volume or value losses due to fire, insects, disease, or storms.

14.36 - Computer Model

Use of computer programs for the calculation of the PNV information is recommended. QuickSilver is available and supported by the Washington Office and may be obtained at <https://usdagcc.sharepoint.com/sites/fs-emc-secf/QuickSilver/SitePages/Home.aspx>. Other systems approved by Regional Foresters may be used.

14.4 - Time Periods

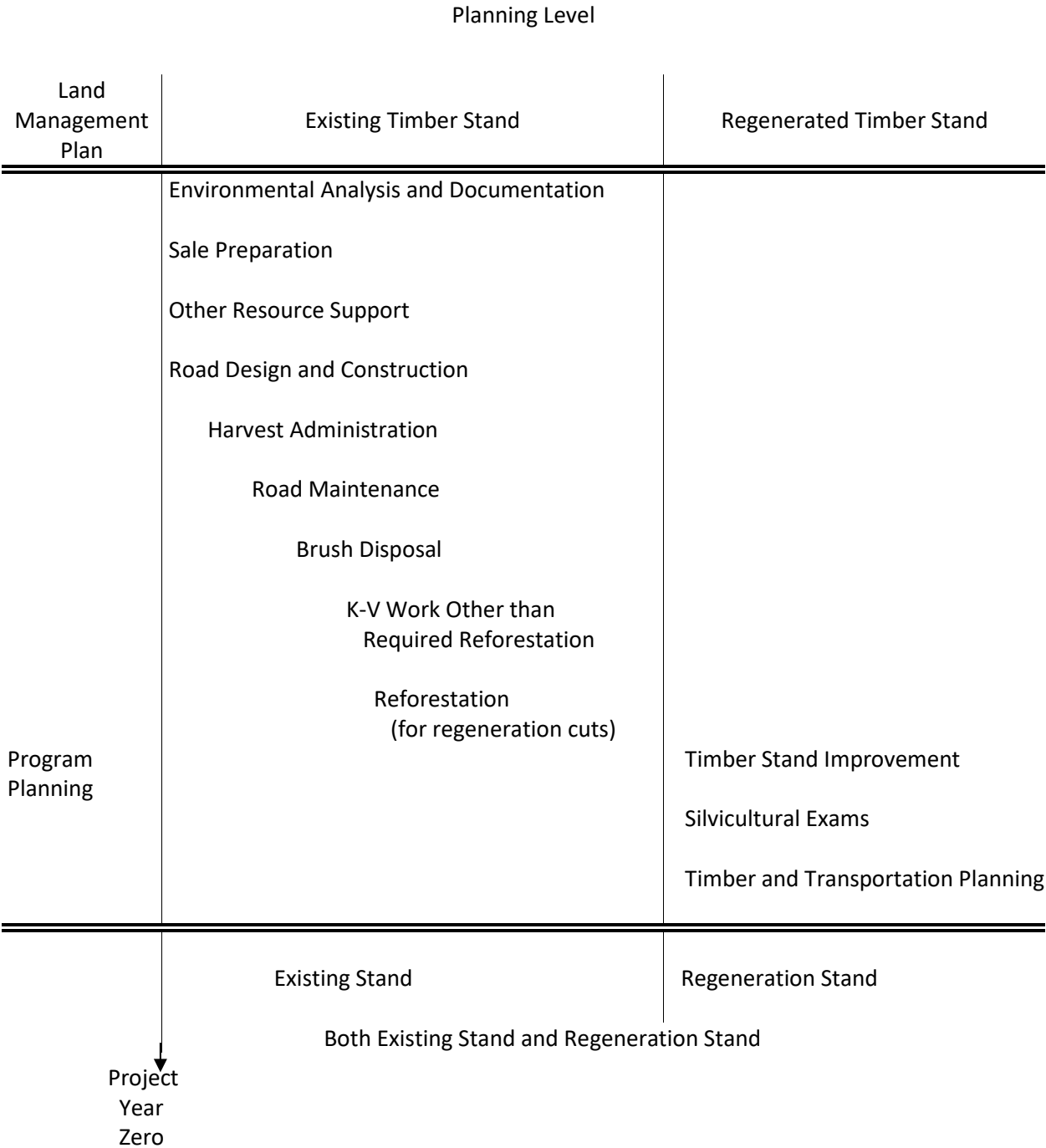
Ensure schedules of costs and benefits cover the same period of time in all project alternatives. As a minimum, the financial efficiency analysis must include costs and benefits for 60 years into the future. Regional Foresters may specify longer time periods for specific site conditions, harvest methods, or other appropriate reasons. In some cases, particularly where the existing harvest is a regeneration cut, it may be appropriate to include costs and benefits through harvest of the regenerated stand or for an infinite time period to calculate the soil expectation value (sec. 10.5 of this handbook). Timber sale projects should be analyzed and summarized using the following time periods:

1. **Existing Stand.** Financial efficiency analysis completed for the existing stand encompasses costs, revenues, and benefits from sale preparation through regeneration of the site, if this is a regeneration harvest, or through sale closure, if this is an intermediate harvest.
2. **Regenerated Stand.** Financial efficiency analysis completed for the regenerated stand encompasses costs, revenues, and benefits from the beginning of the regeneration cycle up to 60 years into the future or through one complete regeneration cycle including regeneration stand harvest entries.
3. **Summary of Existing Stand and Regenerated Stand.** This time period encompasses costs, revenues, and benefits from sale preparation up to 60 years into the future or through one complete regeneration cycle, all discounted to the initial year.

Exhibit 01 shows the costs to include in the existing stand analysis, the regeneration stand analysis, and the analysis of both as shown in section 23.22 of this handbook.

14.4 - Exhibit 01

Analysis Costs for Existing and Regenerated Stands



The analysis may start at any point in the rotation cycle. The existing harvest may be a regeneration or intermediate harvest. The regeneration stand costs and benefits would be timed, as appropriate.

14.5 - Analytical Documentation

Information required for the financial efficiency analysis:

1. For each project or alternative within a project, provide the following information for the existing stand, the regenerated stand, and the summary of both stands:
 - a. Present value revenues,
 - b. Present value financial costs, and
 - c. Financial net present value.
2. Estimates of financial revenues and the source of the estimates with supporting calculations.
3. Estimates of financial costs and the source of the estimates with supporting documentation. Financial costs do not include any Purchaser costs. Document the sources that were used in the calculation of the cost categories listed in section 14.32.
4. Assumptions that underlie and are part of the analysis.

14.6 - Non-monetary Benefits and Costs

As a supplement to the financial efficiency analysis, identify relevant benefits and costs not attributed to a monetary value in the analysis and describe how costs and benefits vary among project alternatives. As an example, describe how the project would affect the visual landscape character or ecological integrity of the site in both the short term and the long term. Provide a written description of the relationship between the monetary analysis and relevant non-monetary or non-quantified resource values, environmental effects, amenities, and other qualitative considerations. Assess measurable trade-offs, when practical and appropriate, to the scope and complexity of the decision and in accordance with Regional direction.

14.7 - Small Sales and Permits

Small sales and permits may be grouped and analyzed for financial efficiency on a program-level analysis. The financial efficiency analysis is not required on timber sales with a projected value of less than \$100,000 (FSM 2432.12 and 2432.22c state the principal direction regarding this threshold).

15 - Economic Efficiency Analysis

Complete the economic efficiency analysis, if needed, to expand the analysis to examine the economic value of non-market benefits associated with the project. This analysis uses the cost

and revenue estimates included in the financial efficiency analysis and adds other economic costs and benefits that are not part of Forest Service monetary transactions. The economic efficiency analysis is used in addition to the financial efficiency analysis to compare the relative efficiency between treatment alternatives. This analysis is not required but may be useful and appropriate, especially when timber sales and stewardship projects that include disposal of timber or forest products are designed primarily to achieve forest stewardship objectives. FSM 2432.22c describes the usefulness of economic efficiency analysis for stewardship projects, and sections 11.51 through 11.51a of this handbook describe the stewardship sale objective codes.

Refer to FSM 2432 for direction on preparing economic efficiency analysis. See FSM 1970, FSH 1909.15, and FSH 1909.17 for analysis procedures and additional direction. References to timber sales in sections 15 through 15.23 are also applicable to stewardship projects that include disposal of timber or forest products.

15.1 - Scope of Analysis

The scope of the economic analysis depends upon the scope and complexity of the timber sale project. Analysis will vary at each gate. Refer to sections 21.25, 23.2, and 32.3 for direction regarding economic efficiency analysis in Gates 1 through 3, as appropriate.

Economic efficiency compares the total economic benefits of a project to the total economic costs. Economic efficiency analysis is measured in two ways – benefit/cost ratio and economic PNV. The benefit/cost ratio is used to determine the most economically efficient project alternative. Economic PNV is used to compare all monetarily-valued costs of implementing a project to all monetarily-valued benefits created by the project.

For salvage sales, conduct the economic analysis to assess alternatives to reduce the loss of value of the damaged timber. In the analysis procedures, focus on maximizing value, as well as attaining cost-effective objectives. To save time, use applicable existing data and limit the scope of the analysis.

15.2 - Analytical Procedures and Other Aspects

Follow the same analytical procedures and other aspects of direction as discussed for financial efficiency analysis in sections 14.3 through 14.7 of this handbook, except for the variances described below.

15.21 - Economic Benefits

Economic benefits are the sum of the economic timber benefits, the non-market benefits expressed as values, and any other non-timber revenues produced by a project. See section 10.5 of this handbook for the definitions of economic benefit and non-market benefit. An economic efficiency analysis includes data on all these categories to represent the total

economic benefits. Non-market benefits and economic benefits of timber are calculated as follows:

1. **Non-market Benefit.** Non-market benefit is the monetary value of the non-market outputs produced by the timber sale project. Determine the effect of the project on the quantity and timing of non-market outputs. Non-market outputs are assigned monetary values in the economic efficiency analysis only when excess demand exists for that non-market good, which is determined by consulting the land management plan supply and demand analysis. Assign benefit values using the same accounting stance for all non-market resources included in the analysis. Use Resources Planning Act (RPA) assigned values from the land management plan for the calculation of economic benefits unless better estimates of non-market values are available. If RPA values are not used, reference the source of the values used and explain why the estimates are better than the RPA values.
2. **Economic Benefit of Timber.** Estimate the economic benefit of timber by adding National Forest System road costs to the expected financial revenue for timber.

15.22 - Economic Costs

Economic costs are the sum of the financial costs, non-market costs, and non-Forest Service costs. See section 10.5 of this handbook for definitions of economic cost, financial cost, non-market cost, and non-Forest Service cost. Financial costs are described in section 14.32. All costs related to the timber sale, including the production stage, are included in the economic analysis. The timber is valued according to stumpage rates, and therefore, the only costs that are included in the analysis are the costs of producing stumpage, which are usually Forest Service costs, plus cooperative road maintenance costs. All Purchaser costs that occur after the point of stumpage valuation, such as road construction, logging, and hauling, are not included in the economic analysis. Non-market costs and non-Forest Service costs are described as follows:

1. **Non-market Costs.** Non-market costs occur if the project has a detrimental effect on a non-market output and there is excess demand for that output. This is similar to the production of a non-market benefit, but with a negative effect. As an example, the project may produce increased stream sedimentation that would have an adverse effect on fish habitat. The reduction in associated fishing recreation can be assigned a monetary value and treated as an economic cost. The same procedures apply for determining quantity, assigning values, and determining supply and demand, as described under non-market benefit in section 15.21, paragraph 1 of this handbook.
2. **Non-Forest Service Costs.** Non-Forest Service costs include cooperative road maintenance and any other costs incurred by non-Forest Service entities up to the point at which the timber is valued (on the stump).

15.23 - Analytical Documentation

Information required for the economic efficiency analysis:

1. For each project or alternative within a project where an economic efficiency analysis is performed, provide the following information for the existing stand, the regenerated stand, and the summary of both stands:
 - a. Present value benefits,
 - b. Present value economic costs, and
 - c. Economic net present value.
2. Estimates of economic benefits and the source of the estimates with supporting calculations. Document the source of the non-market values used in the economic analysis, as well as the production function used to estimate the production of the non-market goods and services.
3. Estimates of economic costs and the source of the estimates with supporting documentation. Economic costs include non-market costs, cooperative road maintenance costs, and all other non-Forest Service costs. Document estimates of all negative benefits that may result from the proposed project and the non-market value of these negative benefits. Document all Purchaser costs that are included in the economic efficiency analysis by component parts, such as cooperative road maintenance.
4. Assumptions that underlie and are part of the analysis.

16 - Other Analytical Methods

Based on the scope and complexity of the project, it may be appropriate (although not required) to conduct the following analyses in addition to the financial efficiency and economic efficiency analyses.

1. **Impact Analysis.** Conduct a socio-economic impact analysis that addresses social or economic issues relevant to the decision being made. The scope of the impact analysis is dictated by the expected project decision. Prepare the impact analysis in accordance with direction in FSM 1970 and FSH 1909.17.
2. **Trade-off Analysis.** Identify situations where the achievement of one specified objective or constraint will limit, reduce, or preclude achievement of some other desired outcome. Use trade-off analysis to compare what is gained with what is sacrificed to meet this objective or constraint. For example, trade-off analysis may be used on a haul

route to determine whether to access a sale with a shorter gravel-surfaced road highly used by the public, or a longer gravel-surfaced road with limited use by the public. Some of the trade-offs might be safety concerns, possible timing restrictions, reduced surface replacement deposits, and shorter haul time on the shorter route versus increased surface replacement deposits and longer haul time on the longer route. Compare expected results of a scenario with a particular constraint to the expected results of a scenario without the constraint to determine the effect of the constraint.

3. **Sensitivity Analysis.** Perform a sensitivity analysis if a value or underlying assumption is uncertain, such as timber price variability. Use sensitivity analysis to determine the consequences of varying the value of one input variable (or assumption) while holding all other analysis factors constant. For example, recalculate PNV by adding the net benefit value of additional tributary timber to the timber value from the current project proposal to determine if arterial and collector road investments are worthwhile. As a second example, if arterial or collector roads are proposed for the sale project, an analysis of the timber on tributary roads may indicate that the project is economically viable, even though the current proposal will not generate enough revenue to cover the total cost of the roads. If sensitivity analysis is used, document and discuss the range of values tested and their implications.