NORTHERN ARIZONA UNIVERSITY | Ecological Restoration Institute

Technical Report

# Modeling Financial Sustainability in a Forest Operations Training Program

**September 2024**


***Prepared by***

**E.M. (Ted) Bilek**
Principal Economist at Driftless Consulting
Ted.Bilek@gmail.com • (608) 437-2612

**Han-Sup Han**
Professor and Director of Forest Operations and Biomass Utilization
Ecological Restoration Institute
Northern Arizona University
Han-Sup.Han@nau.edu


Forest Operations Training Program

NAU NORTHERN ARIZONA UNIVERSITY
Ecological Restoration Institute

This page intentionally left blank (to allow for double-sided printing)

## TABLE OF CONTENTS

## ABSTRACT

***To help answer the question, "What about the financial sustainability of this training program beyond the first few years?"***

A Microsoft Excel spreadsheet-based model called FOTP Analysis was developed to aid in the pre-feasibility and financial feasibility analysis of a forest operations training program (FOTP). This report was developed to aid in the use of the model, and the model is available for free download at the Ecological Restoration Institute at Northern Arizona University's website (www.eri.nau.edu). The Excel workbook appears complex, consisting of 20 worksheets, but it is organized with the worksheet tabs color-coordinated with respect to their type. In addition, once data are entered, much analysis can be done from the "SUMMARY" worksheet, on which the "bottom line" results appear.

"Training indicators" show the number of students trained and the cost to train them. "Revenue and cost summary" provides a breakdown of key revenues and costs. "Financial indicators" show the program's net present value and internal rates of return both in nominal terms, which include inflation, and in real terms, which do not. "Initial student tuition" is entered on the "SUMMARY" worksheet, and there is the option there to take student tuition "as entered" or to have it increase automatically with inflation. A full sensitivity analysis on four revenue sources and eight cost centers can be conducted in the "SUMMARY" worksheet by varying the Sensitivity Analysis Scaling Factors. In addition, contingency allowances can be used to quickly understand the implications of changed revenue or cost assumptions. Built-in button-controlled macros run calculations for break-even student tuition and break-even sensitivity analysis scaling factors. "SUMMARY" charts show cash flows, and key revenue and cost areas. A cash flow chart shows years in which there will be cash surpluses and deficits. Key revenue and cost centers can be seen at a glance.

The model is powerful and flexible, set up so that it can be changed easily with entering data only a single time. Extensive built-in warnings and error messages help to eliminate mistakes. Cash flows reflect automatic replacement of capital equipment when it is projected to wear out. Data on various pieces of capital equipment and equipment configurations can be stored so that cost comparisons can easily be made between different options.

***The data provided do not represent a real-world example and therefore do not show the financial feasibility of an actual training program.***

While FOTP Analysis can be used by anyone considering putting together a forest operations training program, using the model does require an understanding of cash flow analysis. A fictitious example is provided to illustrate how the model functions and its results. The data do not represent a real-world example and so do not show the financial feasibility of an actual training center. Users will have to enter their own data appropriate for their specific

circumstances. To acquire such data, a user needs to have a certain level of knowledge in forest operations, cash flow analysis (i.e., accounting or finance), and education practices.

FOTP Analysis has been extensively tested. However, the model is still released "as is." Users can view formulas and calculations. However, the model is not guaranteed to be free of errors under all calculation scenarios. The results of the model will only be as good as the input data. If the input data are poor, the results cannot be expected to be reliable. Even with good input data, all financial planning models involve forecasts. If conditions change to make the underlying assumptions invalid, this will invalidate the model's results. Neither Ted Bilek nor Northern Arizona University will accept any liability for losses resulting from reliance on the model's results. However, it is hoped that that FOTP Analysis will provide improved information for decision-making in the set-up and operation of forest operations training programs, and will help to answer the question, "What about the financial sustainability of this training program beyond the first few years?"


## ACKNOWLEDGEMENT

This study was conducted through a close collaboration between the Ecological Restoration Institute (ERI) of Northern Arizona University, Coconino County Community College, Yavapai College, the Coconino County Flood Control District, and the US Economic Development Administration (EDA). The authors would like to thank everyone who worked or assisted with this project, with special thanks to Kay Leum (Coconino Community College), John Morgan (Yavapai College), Jay Smith (Coconino County), and Chris Pasterz (Navajo County), for their guidance and encouragement. Special thanks also go to Tayloe Dubay (ERI) for her careful and thoughtful editing, proofreading, and layout work.

Despite the many who assisted in this work, any errors or omissions remain those of the authors; if any errors or omissions are discovered, please contact the authors for corrections, or for additional assistance or clarifications.

*This project was funded by the Economic Development Administration, US Department of Commerce; Award Number: 07 79 07629.*

# INTRODUCTION

Unnaturally severe wildfires have been getting progressively worse in the American West due to 150 years of active fire suppression, rising temperatures, and increased drought conditions. In the West, changing climatic conditions have resulted in reduced precipitation, making forests more susceptible to catastrophic fire and vulnerable to attack by insects and disease. Increased frequency of high winds and dry hot weather contributes to fire size and spread, making the fires more difficult and dangerous to control, and threatening health, infrastructure, watersheds, and ecosystems.

Western frequent-fire forests began to change drastically with the arrival of Euro-American settlers in the 1880s. The new settlers brought livestock that overgrazed understory grasses that had typically carried low-intensity fires, which occurred naturally by lightning and also were set intentionally by Native Americans. The new settlers also cut large trees for construction and commerce, and suppressed fires, which were seen as a threat. By the early 1900s, conditions were already set up for big fires. The Big Burn of 1910 torched 3 million acres of the American West and entrenched a legacy of fire suppression in the newly formed agency of the Forest Service. As a result, forests that were once open and dominated by old, large trees were now overly dense and stocked with small-diameter trees susceptible to unnaturally large, severe wildfires.

Today, the wildland-urban interface (WUI) is the area where private homes and communities are adjacent to or within large areas of fire-adapted vegetation. This area has been growing, especially since the 1960s. People enjoy living near or in forests. With wildfire risk increasing, 70,000 communities are at risk from wildfire (USDA Forest Service 2022a), with many of those communities in the West. High-risk "firesheds," forested areas of about 250,000 acres that are likely to ignite and are located near at-risk communities along with national forests in the West have been mapped:

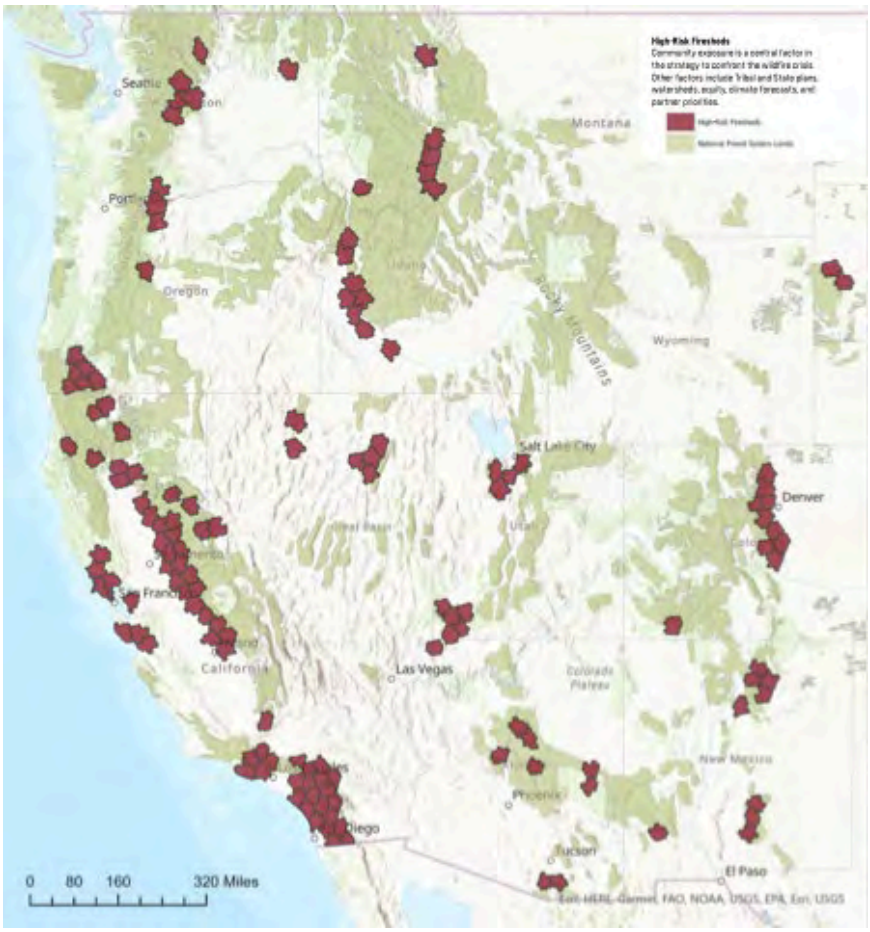



**Figure 1**. High-risk firesheds and National Forest lands in the western United States.

*Source: USDA Forest Service. 2022a. Confronting the Wildfire Crisis: A Strategy for Protecting Communities and Improving Resilience in America's Forests. FS1187a. January. p.28.*

To address the wildfire crisis, the Forest Service has developed a strategy (USDA Forest Service 2022a) and an implementation plan (USDA Forest Service 2022b). The plan calls over the next 10 years to increase forest treatments on National Forest System lands by up to 20 million additional acres and by up to 30 million acres on other federal, state, tribal, and private lands; a total of 50 million additional acres over 10 years, or an average of 5 million acres/year over that time. To put the Forest Service target into perspective, the Forest Service has in recent decades treated up to 2 million acres/year in the West (USDA Forest Service 2022a); so this strategy could mean an expansion of annual treated acres by an average of 250%. In addition to this planned increase in forest treatments, the Forest Service intends to develop a plan for long-term maintenance beyond the initial 10 years.

An expanded forestry workforce is needed to carry out this landscape-level forest treatment work. As part of its strategy, the Forest Service will work with partners to build workforce capacity and public support for forest treatments beginning in year three of its strategy (USDA Forest Service 2022a).

## THE FOREST OPERATIONS TRAINING PROGRAM (FOTP)

At the Ecological Restoration Institute at Northern Arizona University, work has been underway for several years to create a Forest Operations Training Program (FOTP) to expand the workforce of skilled professionals in forest-related professions. The Program will have three career paths for its students: 1) forestry equipment operators, 2) truck drivers, and 3) heavy equipment maintenance and repair professionals. The truck drivers would earn their commercial driving licenses while learning also how to drive forest roads with logging trucks, and the heavy equipment maintenance and repair professionals would receive specialized training on machines used in forest operations.

While NAU is taking the lead in establishing the FOTP, the Program is being coordinated with four other local educational institutions: Coconino Community College, Yavapai Community College, Northland Pioneer College, and Dine Community College to take advantage of existing related programs and to help leverage local resources.

The FOTP received a $350,000 "Good Jobs Challenge" grant from the Economic Development Administration (EDA) in 2020. One of the activities under that grant was to develop strategies for the FOTP's financial independence and sustainability on a long-term basis (>20 years). This modeling work is being used to facilitate that strategy development.

Plans are in place and funding is being sought for the FOTP's establishment and first four years of operation. Funding is also being sought for construction of facilities needed to house the FOTP. Questions have arisen regarding the financial feasibility of the FOTP beyond the first few years. A sustainable business plan is needed to carry out the Program beyond this establishment and start-up phase. It was decided that 20 years would be a long enough time period to allow for equipment to go through at least one replacement cycle and if the FOTP exists in 20 years, it is likely that it will continue for the foreseeable future.

***A sustainable business plan can be defined as one that will allow an entity to create, deliver, and capture value for all its stakeholders without depleting the natural, social, and economic capital on which it relies.***

The foundation of a sustainable business plan is built on three pillars: environmental, social, and economic factors. It can be argued that the FOTP's very purpose is to not to deplete, but rather to enhance and improve forest conditions, the natural capital that it relies on. Through outreach, the FOTP has reinforced and built on community and institutional relationships that its key partners have established.

## *"What about the financial sustainability of this training program beyond the first few years?"*

The biggest unresolved issue with the sustainability of FOTP is with respect to economics, particularly its financial sustainability beyond the initial start-up period. To solve this piece of the puzzle, we developed "FOTP Analysis: a Forest Operations Training Program (FOTP) Cash Flow Analysis" ("FOTP Analysis" for short) as an integrated financial model designed to cost out a forest operations training program over a 20-year planning period. A 20-year planning period was determined to be long enough to ensure that the training program can be sustainably operated. Beyond this period many critical input variables such forest conditions, institutional support, student availability, etc., become highly speculative.

## *Our belief is that the nation's wildfire crisis can best be addressed by working together.*

From the start, the plan was to construct a program that could not only be used in NAU's FOTP business plan, but to create a flexible and publicly available framework that others could use to establish and evaluate forest operations training programs in other regions. Our belief is that the nation's wildfire crisis can best be addressed by working together.

This report is an overview of the FOTP Analysis spreadsheet workbook.[1] The data in the workbook are representative of a forest operations training program, but they do not represent the NAU case or the financial feasibility of any program. The data included with the model are provided for illustrative purposes only to show how the program works and the outputs that it delivers. Any forest operations training program would require updated-and-individualized costs for the organization's specific circumstances. In addition, some customization of the specific worksheets might be required. However, since FOTP Analysis is constructed in an Excel framework, such updates would be both possible and transparent.

FOTP Analysis can be used to determine under what conditions a forest operations training program will be financially sustainable; including the resources needed, the number of students to be trained, the training cost per student, and break-even values for critical revenues and costs, to name a few.

FOTP Analysis provides summary tables of 20-year cash flows, all before-finance and tax. Cash flows are shown before-finance and tax because although a forest operations training program may be run by a for-profit enterprise, it is more likely to be run by a public entity not subject to tax. Regardless, for any program to be sustainable over the long term, its cash flows should make sense, before financing and taxes are brought into the calculations.

---

[1] This report follows Excel's convention of referring to the entire spreadsheet as a "workbook," and referring to individual tabs within that workbook as "worksheets."

FOTP Analysis also provides student throughput over the project period. The model calculates net present values (NPV) and internal rates of return (IRR). The net present value provides a measure of the additional cash surplus (deficit) that could be invested (or would have to be invested) at the start in order for the program to achieve its specified rate of return. Another way of looking at this is that if the NPV is positive, then it represents a risk cushion that start-up costs could exceed and the program would still break even. If the NPV is negative, then this represents the value of an additional initial start-up grant that would be required in order for the program to break even.

Present value calculations are used to annualize and smooth costs over time so that planners and decision-makers can more easily get a long-term perspective on the program's viability and cash requirements. FOTP Analysis can be used to calculate the tuition that would have to be charged for the program to break even.

FOTP Analysis is spreadsheet-based, created in Microsoft Excel, a familiar, flexible interface that contains the built-in power of spreadsheet applications. The model is organized around worksheet tabs that can be easily replaced or updated to effectively reflect the training program's operation. All data that must be manually entered are in blue. All inputs that are utilized by several worksheets are fully integrated so that they only need to be changed once to give new costings and cash flows. Cell formulas are visible and easy to audit to see how they are calculated, but cells containing formulas necessary for the program to run are locked and protected to prevent inadvertent changes. A full listing of the worksheets contained in FOTP Analysis is found in Appendix 1.

FOTP Analysis has several inputs in its "SUMMARY" worksheet, allowing the user to easily see the impacts of changed contingency assumptions or cost or revenue assumptions on the financial summary. Also included in the "SUMMARY" worksheet are inputs that allow the user to perform a full sensitivity analysis without leaving this page. A macro button on the "SUMMARY" worksheet calculates all of the break-even sensitivity analysis factors, and "whisker" charts on this worksheet allow an analyst to see which revenues and costs, if changed, will have the biggest impact on the program's financial viability. Perhaps most powerful on the "SUMMARY" worksheet is the ability to calculate or recalculate the break-even initial student tuition with the touch of a macro button.

A forest operations training center's costs may be divided into two groups: current costs and capital costs.[2] Current costs are used up within a year and therefore are allocated in the year in

[2] The training center's costs are divided into current costs and capital costs, rather than variable costs and fixed costs, because of the impact of inflation on these expenses over time. Variable costs are always current costs. All current costs are subject to annual inflation. However, while some fixed costs are current costs, other fixed costs are capital costs. For example, while administration and insurance costs are usually considered to be fixed

which they occur. With these, the impacts of changing economic conditions or assumptions can be quickly and easily explored over the 20-year project planning period. Current costs include wages, machine operations' costs, administration, and other costs. Current costs are relatively easy to calculate and allocate based on standard rates and student throughput.

Capital costs involve investments that are spread over two or more years. Capital costs include land and buildings, capital equipment, other chattels (office equipment, etc., referred to from now on simply as chattels), and working capital. Capital costs can be more difficult to allocate to a specific year. Capital investments apart from buildings and other real estate will wear out and need to be replaced at least once during the planning period. They will probably also have some terminal value at the end of the planning period.

In order to correctly calculate net present values (NPVs) and internal rates of return (IRRs), and in order to correctly calculate break-even tuition costs and training costs, terminal values must be accounted for in the analysis. FOTP Analysis does this automatically, basing the terminal values of capital assets either on the assets' estimated current values or their book values. Current values use straight-line depreciation based on the assets' economic lives, and increase the resulting values for inflation. Book values use the assets' historic costs and whatever depreciation rate the user has chosen.

A basic knowledge of discounted cash flow analysis is required to understand the outputs provided by FOTP Analysis, what they mean, and why they change when certain variables are altered.[3] Some understanding of accounting and depreciation is also helpful, but not essential. In order to enter data on appropriate equipment configurations and operating costs for a forest operations training center, an understanding of forest operations and education training methods and costs is also necessary.

To learn more out about the features, structure, general assumptions, and limitations of FOTP Analysis, continue reading. To see the inputs required to assemble a costing model, turn to Appendix 1. To see a printout of the title, contents, summary, and general assumptions worksheets in a sample run of the model, turn to Appendix 2.

---

costs, they are charged and paid each year and thus would be expected to increase annually with inflation. In other words, administration and insurance costs, while fixed, are also current costs.

Other fixed costs (e.g. machinery, buildings, etc.) are capital costs. Most capital costs are depreciable (land is not). The only time depreciation expense is increased is when the capital asset is eventually replaced with a more expensive one.

In short, the model assumes that all current costs increase with inflation. Depreciation expense for capital costs is fixed at the time the asset is purchased and depends on the asset cost and the depreciation method chosen.

3 For background, see any basic corporate finance textbook (e.g., Brealey, R.A., and S.C. Myers. 1991. *Principles of Corporate Finance*. Fourth edition. International edition. New York: McGraw-Hill, Inc. esp. Part 1: "Value." pp. 1-125).

## FOTP ANALYSIS FEATURES

Features in the FOTP Analysis model include:

- Twenty years of cash flows to ensure that the training center is sustainable.
- Normalized annual and per-student training indicator averages showing the number of students trained, the student days in training, student contact hours, and student training costs.
- "Bottom-line" summary information, the most important information, that is reproduced at the top of each worksheet so that the analyst does not have to go digging for it.
- The power to conduct a full sensitivity analysis, break-even sensitivity analysis, and break-even tuition analysis on the "SUMMARY" worksheet.
- Three key charts on the "SUMMARY" worksheet: two "whisker" plots, one for revenue and the second for cost categories that help to identify the key revenues and costs, and a third chart showing the relationship between the discount rate (i.e., the interest rate) used in the analysis and the net return or loss incurred.
- Three key "SUMMARY" charts:
  - a line chart showing 20-year cash flows.
  - a pie chart showing the revenues breakdown by revenue category.
  - a pie chart showing the costs breakdown by cost category.
- Up to 15 different types of capital equipment.
- Three depreciation methods or a user-specified custom rate.
- Two methods for automatically calculating terminal values.
- The option to purchase or lease land and buildings.
- A "library" worksheet where common equipment types and equipment configurations may be stored so that different types of analyses may be performed.
- Flexibility in inflation assumptions over time.
- Flexibility in student throughput over time.
- Flexibility in grant and tuition planning.
- A comprehensive financial analysis showing 20-year cash flows as well as net present values and internal rates of return before tax and finance.
- Extensive comments within the model providing additional information regarding the cell's contents. These are indicated by a red triangle in the upper-right corners in selected worksheet cells.
- Extensive warnings and error messages beneath selected tables, indicating where the model might be producing misleading answers and when invalid information is entered.[4]

[4] NOTE: Some of these warnings and error messages may also be helpful in assisting with course planning (e.g., on the capital equipment worksheet, messages showing how many hours of equipment time are available may be helpful in planning student training curricula with respect to how many hours of equipment time per student can be required).

# FOTP ANALYSIS STRUCTURE

The FOTP Analysis model consists of 20 worksheets. They may be divided into eight groups (Appendix 2):

- Three preliminary worksheets (title, introduction, contents), which have grey tabs, indicating that they are not components of the operational part of the program.
- One summary worksheet and three summary charts with yellow tabs.
- One general assumptions worksheet with a blue tab.
- One consolidated revenues worksheet with a burnt-orange tab.
- One consolidated operating costs worksheet with a dark-blue tab.
- Eight subsidiary operating costs worksheets with light-blue tabs.
- One equipment library with a grey tab (although it has options for user inputs, its use is optional).
- One glossary with a grey tab.

The model is designed so that the entire analysis is consolidated on the "SUMMARY" worksheet. Feeding into this worksheet are the "Consolidated Revenues" and the "Consolidated Capital and Operating Costs." The latter has several subsidiary costing worksheets that in turn feed into it.

The worksheets in each of these groupings are discussed below, followed by a brief discussion of the model's basic assumptions and limitations.

## *PRELIMINARY WORKSHEETS (grey tabs)*

The three preliminary worksheets are the "Title," "Introduction," and "Contents." The Title shows the model's edition. The "Introduction" contains some brief background to the model. The "Contents" page describes the subsequent model worksheets. These preliminary worksheets provide some guidance in using the model if this documentation is not open. There are no user inputs on these preliminary worksheets.

## *SUMMARY WORKSHEETS (yellow tabs)*

The three summary worksheets consist of a numerical "SUMMARY" worksheet and three accompanying charts that consolidate the analysis results.

The "SUMMARY" worksheet is the *bottom line*, containing the final costings, financial indicators, and 20-year cash flows. It also contains the input variables to conduct a full sensitivity analysis and macro buttons to calculate break-even student tuition and break-even sensitivity analysis factors. Tables on the "SUMMARY" worksheet include: training indicators; the revenue and cost summary; financial indicators; the break-even summary; sensitivity analysis scaling factors; and a cash flow summary. Figures are compiled in tables for the summary revenue and pie charts. "Whisker" charts of the revenue and cost sensitivity factors provide an

analysis with a visual representation to see which changed revenue and cost factors will have the biggest impact on the program's financial viability.

The "Training Indicators" (Screenshot 1) include normalized annual averages for the number of students trained, the student days-in-training, the student contact hours, and the student training costs. These calculations are provided for both the course stream and by student.

| TRAINING INDICATORS | Normalized avg. per year | Normalized avg. per student |
|---|---|---|
| Students trained (number) | 164 | 1 |
| Student-days in training (number) | 13,096 | 80 |
| Student contact hours (number) | 78,577 | 480 |
| Student training costs | $ 1,884 thousand | $ 8,642 |

**Screenshot 1**. FOTP Analysis – Training indicators on the "SUMMARY" worksheet.

Directly below "Training Indicators" is a table (Screenshot 2) with the initial student tuition, which is a user input, and the break-even[5] student tuition, which is calculated using a macro that is activated by pressing the adjacent macro button, "Re-calculate break-even student tuition."

| | | |
|---|---|---|
| Initial Student tuition (per student) | $ | 500 |
| Break-even Student tuition (per student) | $ | 279 |
| **Check one below:** | | |
| Use student tuition as entered on the Consolidated revenues worksheet: | | √ |
| Increase initial student tuition annually by inflation: | | |

Re-calculate break-even student tuition

WARNING! If any assumptions are changed, re-calculate the break-even student tuition.

WARNING! Make sure that student tuition assumptions are entered for all years on the Consolidated revenues worksheet.

**Screenshot 2**. FOTP Analysis – Initial student tuition and break-even student tuition on the "SUMMARY" worksheet.

The "Revenue & Cost Summary" (Screenshot 3) contains present values of the revenue and all the major cost categories. These present values are provided in terms of total dollars, and dollars per student. All of the costs are also given as a percent of gross margin (total revenue less wrap-around student services costs) so that the user may see which of the cost categories are the most significant. See the far-right column of Screenshot 3 below. This is one type of sensitivity analysis.

5 NOTE: Break-even is defined as the point at which total revenues are exactly equal to total costs when each are discounted at the program's alternative rate of return. It is the point at which the net cash flow (present values) equals $0 in the "Revenue and Cost Summary" table.

| REVENUE & COST SUMMARY | Before-tax PV at 4.00% ($000) | Annualized PV at 4.00% ($000) | $/Student | As a percentage of gross margin |
|---|---|---|---|---|
| Gross revenue | | | | |
| Student tuition | $ 1,083 | $ 80 | $ 366 | 4% |
| Other student-based revenue | 3,232 | 238 | 1,091 | 12% |
| Subtotal: Gross student-based revenue | $ 4,315 | $ 318 | $ 1,456 | 17% |
| Less: Wrap-around student services | (3,077) | (226) | (1,039) | -12% |
| Subtotal: Net student-based revenue (loss) | $ 1,238 | $ 91 | $ 418 | 5% |
| Grants, donations, and other block-funding revenue | 23,668 | 1,742 | 7,989 | 91% |
| Program revenue | 879 | 65 | 297 | 3% |
| Other revenue | 176 | 13 | 59 | 1% |
| Subtotal: Gross margin | $ 25,960 | $ 1,910 | $ 8,762 | 100% |
| Less: Direct operating costs | (16,634) | (1,224) | (5,615) | -64% |
| Subtotal: Operating margin | $ 9,326 | $ 686 | $ 3,148 | 36% |
| Less: Fixed costs and overheads | (2,869) | (211) | (968) | -11% |
| Operating income (loss) | $ 6,457 | $ 475 | $ 2,179 | 25% |
| Less: Capital costs | (5,235) | (385) | (1,767) | -20% |
| Less: Working capital costs | (724) | (53) | (244) | -3% |
| Net cash flow (present values) | $ 497 | $ 37 | $ 168 | 2% |

**Screenshot 3.** FOTP Analysis – Revenue and cost summary on the "SUMMARY" worksheet.

The net cash flow calculated in the "Revenue & Cost Summary" table is a net present value. That is, it represents the net profit (loss) discounted back to the present at the alternative rate of return. The net cash flow in the "Revenue & Cost Summary" above is identical to the net present value in the "Financial Indicators" in Screenshot 4 below. If the net present value = $0, then the internal rate of return will be equal to the user-specified alternative rate of return.

The "Financial Indicators" table (Screenshot 4) includes net present value[6] and internal rates of return.[7] The internal rates of return are shown both as nominal percentages, including inflation,

6 Net present value (NPV) is the difference between a project's positive cash flows and its negative cash flows discounted back to the present (i.e., adjusted for interest) at the alternative rate of return, also known as the discount rate. If a project's NPV is positive, it is earning a rate of return higher than the discount rate used to calculate the NPV. If a project's NPV is negative, it is earning a rate of return lower than the discount rate used to calculate the NPV.
NOTE: If the project's cash flows include inflation, then the discount rate used to calculate NPV should also include inflation. If the project's cash flows do not include inflation, then a discount rate that does not include inflation (i.e., a "real" discount rate) should be used to calculate the NPV.

Other literature may refer to the NPV calculation as net present worth (NPW) or present net worth (PNW). All refer to the difference between a project's benefits and its costs when both benefits and costs are discounted at an appropriate rate.

7 Internal rate of return (IRR) is an interest rate at which NPV = $0.
NOTE: The IRR calculation can be problematic. A project can have one IRR that may be positive, negative, or zero. Alternatively, depending on the cash flows, the project can have an IRR that is infinitely positive or infinitely negative. Even more problematic is the fact that with cash flows that change signs more than once, a project can have multiple IRRs, all which are equally valid.

and real percentages, not including inflation.[8] Directly below this table is the "Initial Costs" table, which is provided for reference and planning purposes.

| FINANCIAL INDICATORS | Net present value (NPV) ($000) | Nominal internal rate of return (IRR) | Real internal rate of return (IRR) |
|---|---|---|---|
| Before finance & tax at ARR (nominal) = 4.00% | $ 497 | 3.1% | 0.1% |
| | | IRR Test = | 10% |
| NOTE: The IRR on these cash flows may be infinately positive. Check the 'NPV sensitivities to discount rates' table below. | | | |

| INITIAL COSTS* | | | |
|---|---|---|---|
| Total start-up costs (years 0 and 1): | $ | 232 | thousand |
| Total initial costs (years 0 through 3): | $ | (5,677) | thousand |
| * NOTE: These costs include working capital but do not include expected revenue. | | | |

**Screenshot 4**. FOTP Analysis – Financial indicators on the "SUMMARY" worksheet.

The "Financial Indicators" table also contains a number called "IRR Test," shown in blue. All user-input variables in FOTP Analysis are in blue. The IRR Test is a beginning point for Excel's internal rate of return calculation. A normal default would be 10 percent. However, if the IRR is undefined or if the cash flows in the summary table that follows are either not negative at the start or are negative at some other time than at the start, it is advisable to do some tests with some extreme starting-point values, both positive and negative, to test for extremely high or low IRRs or for multiple IRRs.

The "SUMMARY" worksheet contains input options for running a sensitivity analysis and a break-even sensitivity analysis (Screenshot 5).

[8] Since NPV is identical in either real or inflation-adjusted terms, only one NPV figure is shown.
NOTE: NPV is identical in both nominal and real terms because $1 today in NPV value is worth $1 today, regardless of the inflation rate, which affects the value of future dollars; that is, $1 in your pocket today will always purchase $1 of goods today no matter what the inflation rate might be.

| SENSITIVITY ANALYSIS SCALING FACTORS | Scaling factors used in the analysis | Break-even scaling factors |
|---|---|---|
| Student-based revenues | 100% | 89% |
| Grants, donations, and other block funding revenues | 100% | 98% |
| Program revenue | 100% | 43% |
| Other revenue | 100% | -183% |
| Land & buildings cost | 100% | 3,416% |
| Capital equipment cost | 100% | 104% |
| Course administration expense | 100% | 105% |
| Chattels expense | 100% | 461% |
| Supplies expense | 100% | 153% |
| Wraparound services expense | 100% | 116% |
| Other periodic costs | 100% | 117% |
| Working capital | 100% | 169% |

**WARNING! If any assumptions are changed, recalculate the break-even scaling factors.**

**NOTE: "N.A." = Not Applicable. The revenue or cost is $0 or so low to begin with, that the break-even scaling factor is meaningless.**

**WARNING! If nothing else changed, Break-even scaling factors highlighted in red indicate revenues that would have to be come costs, and costs that would have to become revenue sources in order for break-even to occur.**

**Re-calculate break-even scaling factors**

**Screenshot 5**. FOTP Analysis – Sensitivity analysis scaling factors on the "SUMMARY" worksheet.

The "Sensitivity Analysis Scaling Factors" can be varied above and below 100 percent to see the impact of changes in revenues and/or costs on the net present values, internal rates of return, cash flows, and break-even student tuition.

The "Break-even scaling factors" show how much revenues or costs would have to change (from their starting values) for the value of the net cash flow (the present value)[9] to become $0. These values are calculated using a macro that utilizes Excel's built-in "Goal Seek" function. The Break-even scaling factors should be recalculated if any of the program's assumptions are changed.[10]

9 The present value of the net cash flow is the net present value of the course.

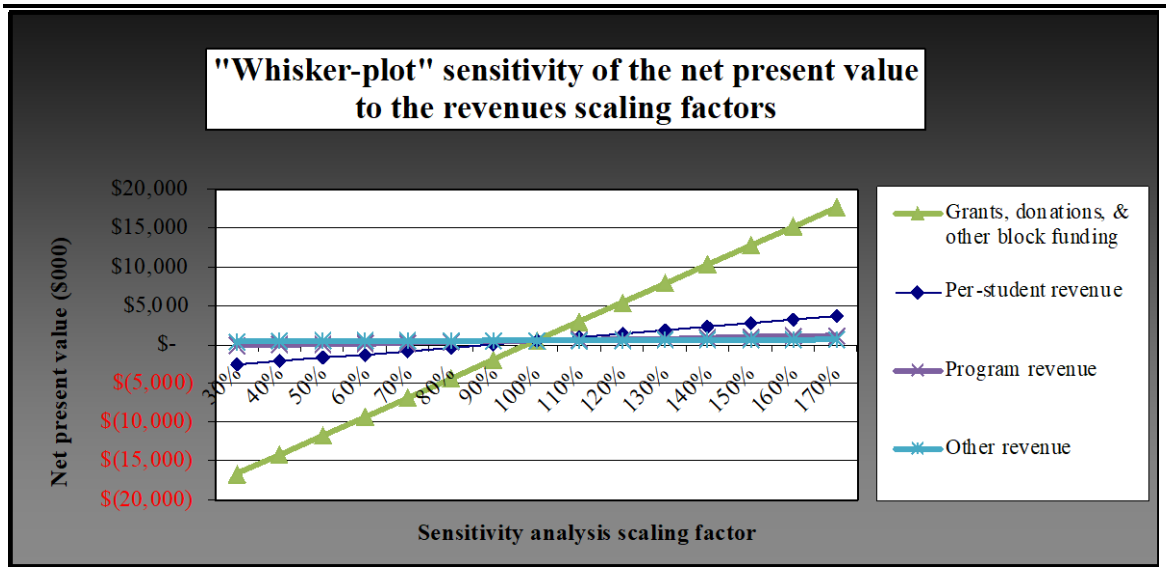
10 Be aware in the sensitivity analysis scaling factors, in order to break even it is possible that if a revenue is very small, it might have to become a cost; and so, its break-even scaling factor would be negative. Similarly, if a cost is very small, in order to break even it is possible that it would have to become a revenue; and so, its break-even scaling factor would be negative. If either of these things happen, then the associated break-even scaling factors will be highlighted in red and warnings will appear below the "Sensitivity Analysis Scaling Factors" table.

Related to the sensitivity analysis scaling factors are the “Revenue Contingency Allowances” and “Cost Contingency Allowances” (Screenshot 6). These allow the user to provide an extra percentage over and above the given revenues or costs as an overrun allowance without having to adjust the sensitivity analysis scaling factors. The Revenue Contingency Allowances are incorporated into the analysis on the “Consolidated Revenues” worksheet and the Cost Contingency Allowances are incorporated into the analysis on the “Consolidated Operating Costs” worksheet.

| | | |
|---|---|---|
| | **REVENUE CONTINGENCY ALLOWANCES** | |
| | Student-based revenue | 0% |
| | Grants, donations, & other block funding revenue | 0% |
| | Program revenue | 0% |
| | Other revenue | 0% |
| | | |
| | | |
| | **COST CONTINGENCY ALLOWANCES** | |
| | Capital costs | 0% |
| | Direct operating costs | 0% |
| | Fixed costs and overheads | 0% |
| | Working capital | 0% |

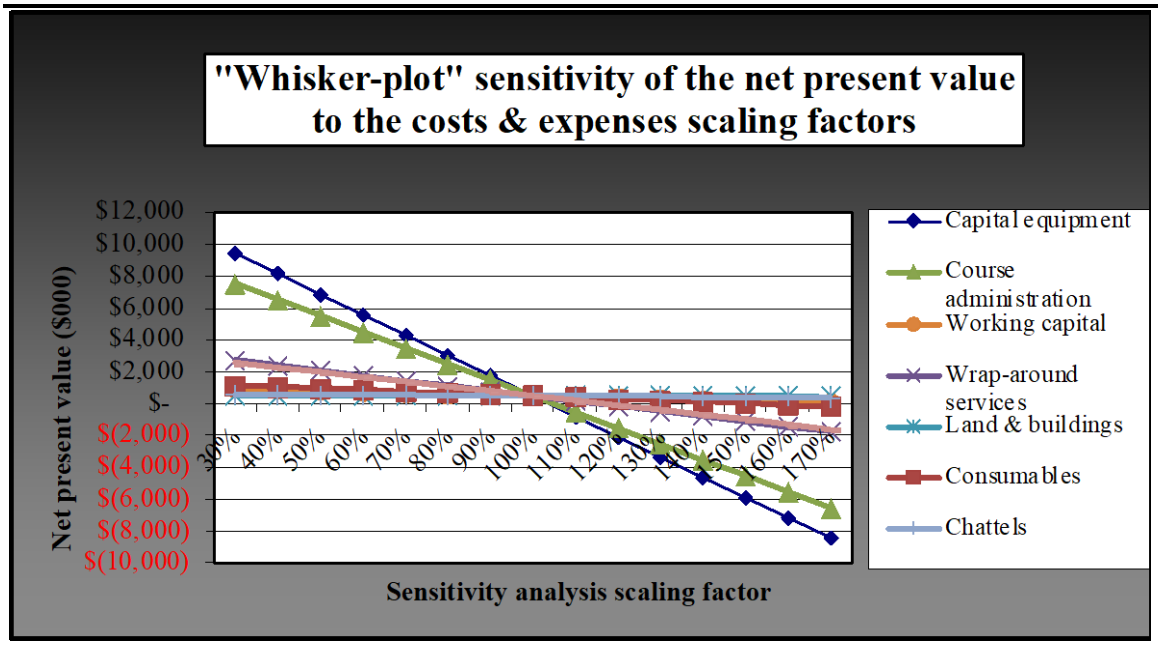
**Screenshot 6**. FOTP Analysis – Revenue and cost contingency allowances on the “SUMMARY” worksheet.

“Whisker” plots on the “SUMMARY” worksheet show the sensitivity of the net present value to changes in the revenue and cost scaling factors. The revenues scaling factor whisker plot (Screenshot 7) and costs and expenses scaling factor whisker plot (Screenshot 8) follow:




**Screenshot 7**. FOTP Analysis – “Whisker” plot of the revenues sensitivity analysis scaling factors on the “SUMMARY” worksheet.

The above plot shows that given the assumptions in this sample analysis, grants, donations, and other block funding, along with per-student revenue are the program's most important revenue sources.




**Screenshot 8**. FOTP Analysis – "Whisker" plot of the costs and expenses sensitivity analysis scaling factors on the "SUMMARY" worksheet

The above plot shows that given the assumptions in this sample analysis, capital equipment and course administration are the program's most important costs and expenses.

The "Discount Rate Assumptions" table (Screenshot 9) allows the analyst to choose whether the alternative rate of return (i.e., the discount rate to be used in the analysis) is to be "Entered" or "Calculated." If the alternative rate of return is to be entered, then it will either be in "real" terms, not including inflation, or in "nominal" terms, which include inflation. If the alternative rate or return is to be calculated, then the desired nominal premium on risk capital must be entered. This rate will be added to the bank's deposit interest rate to determine the nominal alternative rate of return used in the analysis.

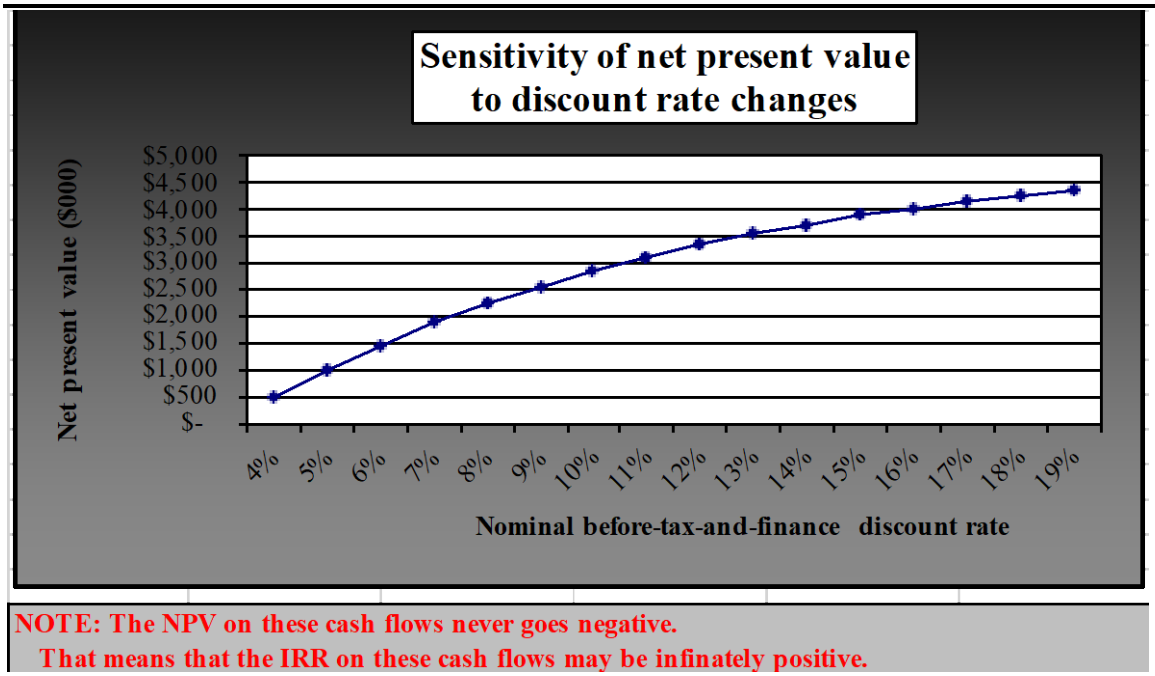
| | | | | |
|---|---|---|---|---|
| | | | DISCOUNT RATE ASSUMPTIONS | |
| | | Alternative rate of return (ARR) is… | | Entered |
| | | Entered ARR rate basis is… | | Nominal before tax & finance |
| | | Nominal before tax & finance ARR | | 4.00% |
| | | | | |
| | | | | |
| | | | | |
| | | | ALTERNATIVE RATES OF RETURN (calculated) | |
| | | | Nominal | Real |
| | | Before tax & finance | 4.00% | 0.97% |
| | | | | |
| | | | Twenty-year compound inflation rate used in the analysis | 3.00% |
| | | | **NOTE**: Inflation rates are changed on the Gen. assumptions worksheet | |

**Screenshot 9**. FOTP Analysis – Discount rate assumptions and alternative rates of return calculations on the "SUMMARY" worksheet.

The calculated alternative rates of return adjust the rates of return entered above for inflation.[11] The inflation rate is shown on the "SUMMARY" worksheet for information. It is changed on the "Gen. Assumptions" worksheet.

Following the table of whisker plot calculations is the chart showing the sensitivity of net present value to discount rate changes (Screenshot 10).

[11] NOTE: To convert a real interest rate (R), which does not include inflation (I), into a nominal interest rate (N), which does include inflation, the following formula is used:
N = [(1+R)*(1+I)] - 1
Where R, N, and I are in decimal form. e.g.: if R = 10% and I=3%, then
N = [(1+0.10)*(1+0.03)] - 1
N = 0.133
N = 13.3%




**Screenshot 10**. FOTP Analysis – Sensitivity of net present value to discount rate changes on the "SUMMARY" worksheet.

There is a note following this chart indicating that something unusual is going on with the cash flows. If the NPV is always either positive or negative regardless of the discount rate used in the analysis, a note will appear to draw the analyst's attention to this unusual condition. Such conditions can happen if there are large revenues (e.g., grants) to boost cash flows or if revenues are never sufficient to cover the costs and expenses. The figures for this chart are calculated in a table to the left of the chart on the "SUMMARY" worksheet (not shown here). The table has variable inputs allowing the analyst to adjust the chart's mid-point and also the incremental adjustment factor.

The "Cash Flow Summary" is a table showing the "bottom-line" net cash flows from the "Summary Cash Flow Table" that follows. The "Student Throughput" shows the annual number of students trained and annualizes the figure by discounting (by the real discount rate) the number of future students trained and annualizing the number.[12]

[12] By using the real discount rate to bring the number of future students back to the present, future benefits may be more directly compared with present costs. Simple averaging does not work for this because it is more beneficial to have operators trained sooner rather than later. For example, given the magnitude of the wildfire problem, it would be better to have 50 new forest operations professionals today rather than 20 years from now. Simple averaging would not recognize the value of having these professionals sooner rather than later. Discounting, and calculating an annualized average, resolves this difficulty.

The “Summary Cash Flow Table” (Screenshot 11) is a combined 20-year projection of capital costs, revenues, and annual expenses. A “Bottom Line Summary” shows the cash flows before tax and finance.

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | Year | |
| **CASH FLOW SUMMARY ($000)** | *2023* | *2024* | *2025* | *2026* | *2027* | *2028* |
| Net cash flows (from below) | $ (1,743) | $ 9,926 | $ (1,791) | $ 1,923 | $ 1,727 | $ (2,695) |
| WARNING! Multiple changes in sign from positive to negative and back again in your cash flows above mean that there could be more than one internal rate of | | | | | | |
| | | | | | | |
| | | | | | | |
| **STUDENT THROUGHPUT** | *PV at 0.97%* | | | | | |
| Students trained | | 44 | 76 | 120 | 180 | 180 |
| Annualized average number of students trained | 164 | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | Year | |
| **SUMMARY CASH FLOW TABLE ($000)** | *2023* | *2024* | *2025* | *2026* | *2027* | *2028* |
| **CAPITAL COSTS** | | | | | | |
| Capital costs | (2,993) | – | – | (3) | (9) | (3) |
| Contingency allowance | – | – | – | – | – | – |
| Salvage values | | – | – | 1 | 1 | 0 |
| Terminal values | | | | | | |
| **Net capital costs** | $ (2,993) | $ – | $ – | $ (2) | $ (8) | $ (3) |
| | | | | | | |
| **REVENUES** | | | | | | |
| Student-based revenue | | | | | | |
| Student tuition | | 22 | 38 | 60 | 90 | 90 |
| Other student-based revenue | | 46 | 117 | 180 | 270 | 270 |
| Subtotal: Gross student-based revenue | | $ 68 | $ 155 | $ 240 | $ 360 | $ 360 |
| Less: Wraparound student services | | (77) | (109) | (158) | (205) | (211) |
| Subtotal: Net student-based revenue (loss) | | $ (9) | $ 45 | $ 82 | $ 155 | $ 149 |
| Grants, donations and other block-funding revenue | | | | | | |
| Grants | 1,500 | 6,100 | 2,782 | 2,797 | 2,813 | 563 |
| Donations and other block-funding revenue | – | 300 | 103 | 106 | 109 | 113 |
| Subtotal: Grants, donations, and other block-funding revenue | $ 1,500 | $ 6,400 | $ 2,885 | $ 2,903 | $ 2,922 | $ 675 |
| Program revenue | – | 50 | $ 52 | 53 | 55 | 56 |
| Other revenue | – | 10 | 10 | 11 | 11 | 11 |
| Subtotal: Gross margin | $ 1,500 | $ 6,451 | $ 2,992 | $ 3,049 | $ 3,143 | $ 892 |
| | | | | | | |
| Direct operating costs | | | | | | |
| Equipment operating costs | | (364) | (374) | (386) | (397) | (409) |
| Course administration and consumables | (250) | (417) | (521) | (536) | (646) | (665) |
| Contingency allowance | – | – | – | – | – | – |
| Subtotal: Direct operating costs | $ (250) | $ (781) | $ (895) | $ (922) | $ (1,043) | $ (1,074) |
| | | | | | | |
| Subtotal: Operating margin | $ 1,250 | $ 5,670 | $ 2,096 | $ 2,127 | $ 2,100 | $ (183) |
| | | | | | | |
| Annual fixed & overhead costs | | | | | | |
| Annual land lease cost | (0) | (1) | (1) | (1) | (1) | (1) |
| Annual building lease cost | – | – | – | – | – | – |
| Land and buildings repairs and maintenance | | – | – | – | – | – |
| Other costs | | (186) | (187) | (189) | (191) | (193) |
| Insurance costs | (0) | (5) | (5) | (5) | (5) | (6) |
| *Ad valorem* (property) taxes | – | – | – | – | – | – |
| Contingency allowance | – | – | – | – | – | – |
| Subtotal: Annual fixed costs and overheads | $ (1) | $ (191) | $ (193) | $ (195) | $ (198) | $ (200) |
| | | | | | | |
| **Operating income (loss)** | $ 1,249 | $ 5,479 | $ 1,903 | $ 1,932 | $ 1,902 | $ (382) |
| | | | | | | |
| **Marginal working capital realized (required)** | | $ 4,447 | $ (3,694) | $ (6) | $ (167) | $ (2,310) |
| | | | | | | |
| **Net cash flow** | $ (1,743) | $ 9,926 | $ (1,791) | $ 1,923 | $ 1,727 | $ (2,695) |

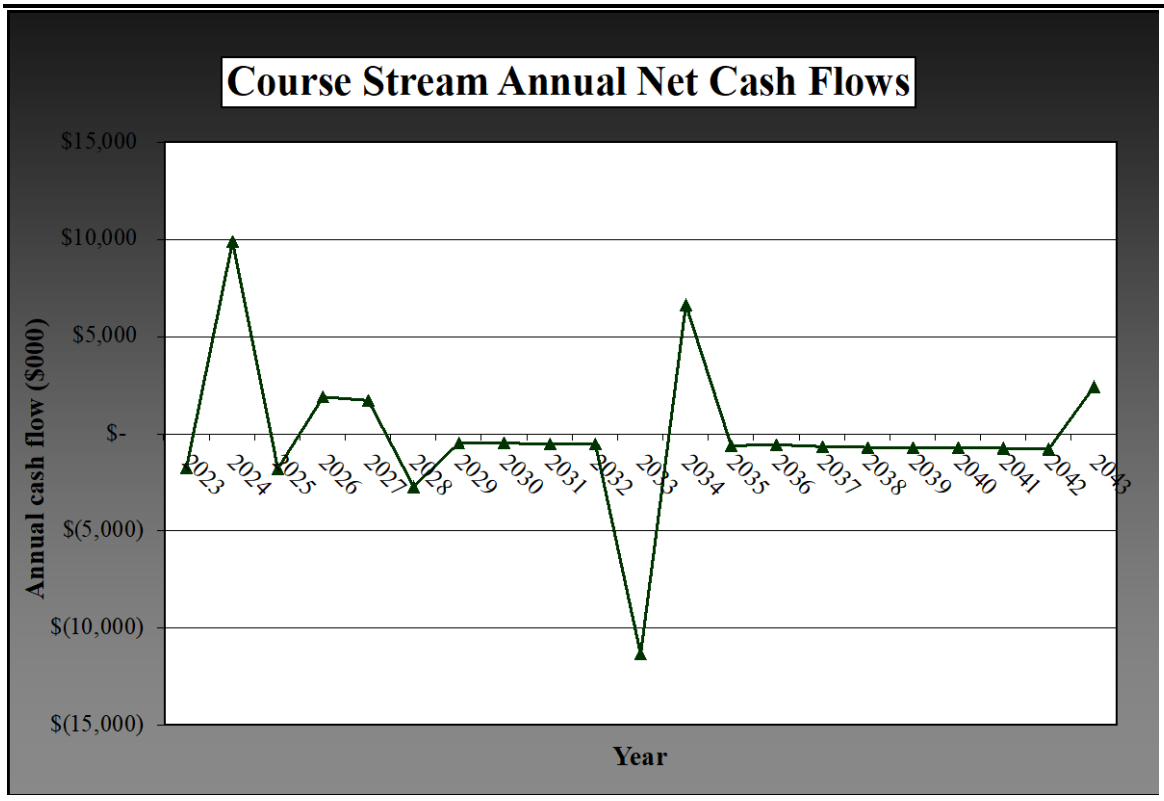
**Screenshot 11**. FOTP Analysis – Summary annual cash flow table on the “SUMMARY” worksheet. Note that only the first part of the 20-year analysis is shown.

The main assumptions incorporated into this model are:

- All cash flows occur at the end of each year.[13]
- Year 0 represents the start of the project's operations.
- Revenues may be taken as entered (the default assumption), or they may be allowed to increase at the specified inflation rates.
- All cash expenses will increase at the specified inflation rates.
- As chattels and capital equipment wear out, they will be replaced with identical units that will have increased in cost according to the specified inflation rates.

Tables used to construct the "Summary Revenues" pie chart and the "Summary Costs" pie chart appear below the "SUMMARY" cash flows. The figures in these tables are broken down both on a total and on a per-student basis. The three "SUMMARY" charts constructed from these cash flows are not password-protected, so that they may be modified and customized as needed.

The "SUMMARY" cash flows appear in chart form on a worksheet tab showing the positive and negative annual net cash flows over the 20-year planning period (Screenshot 12).

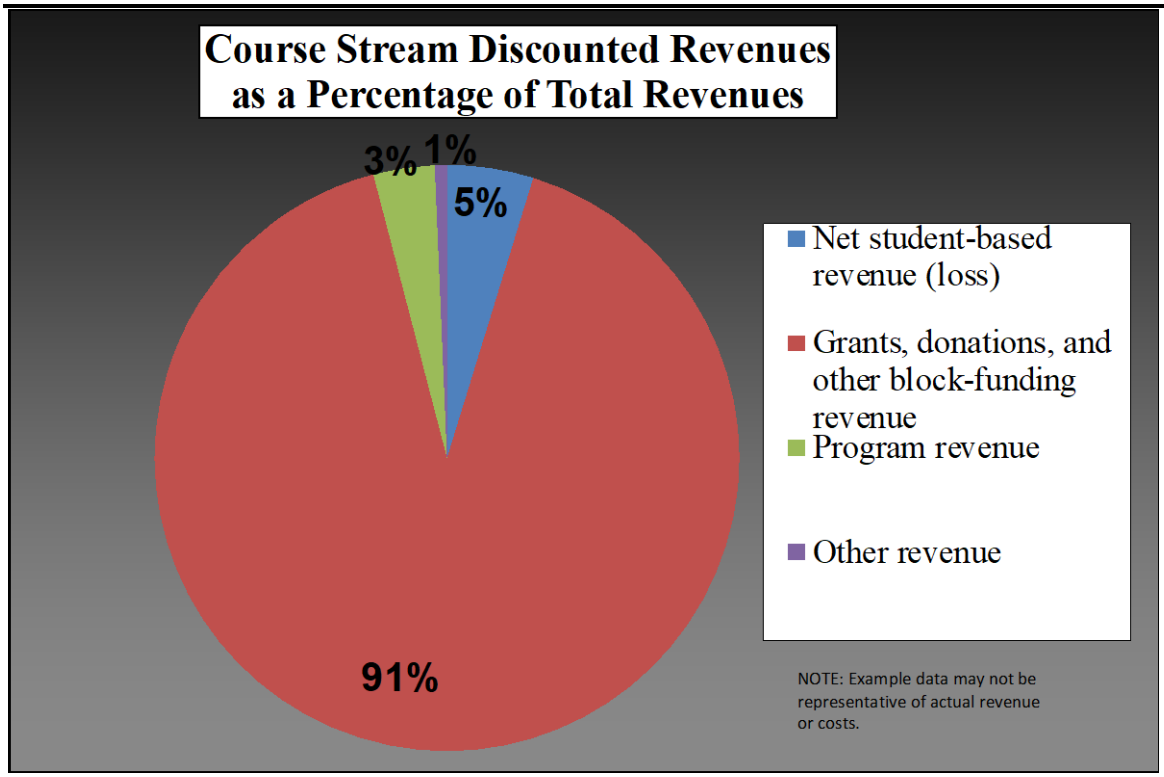



**Screenshot 12**. FOTP Analysis – Course stream annual net cash flows over the 20-year planning horizon.

[13] In reality, all cash flows will occur throughout the year, but this assumption simplifies the mathematics without sacrificing any long-term accuracy.

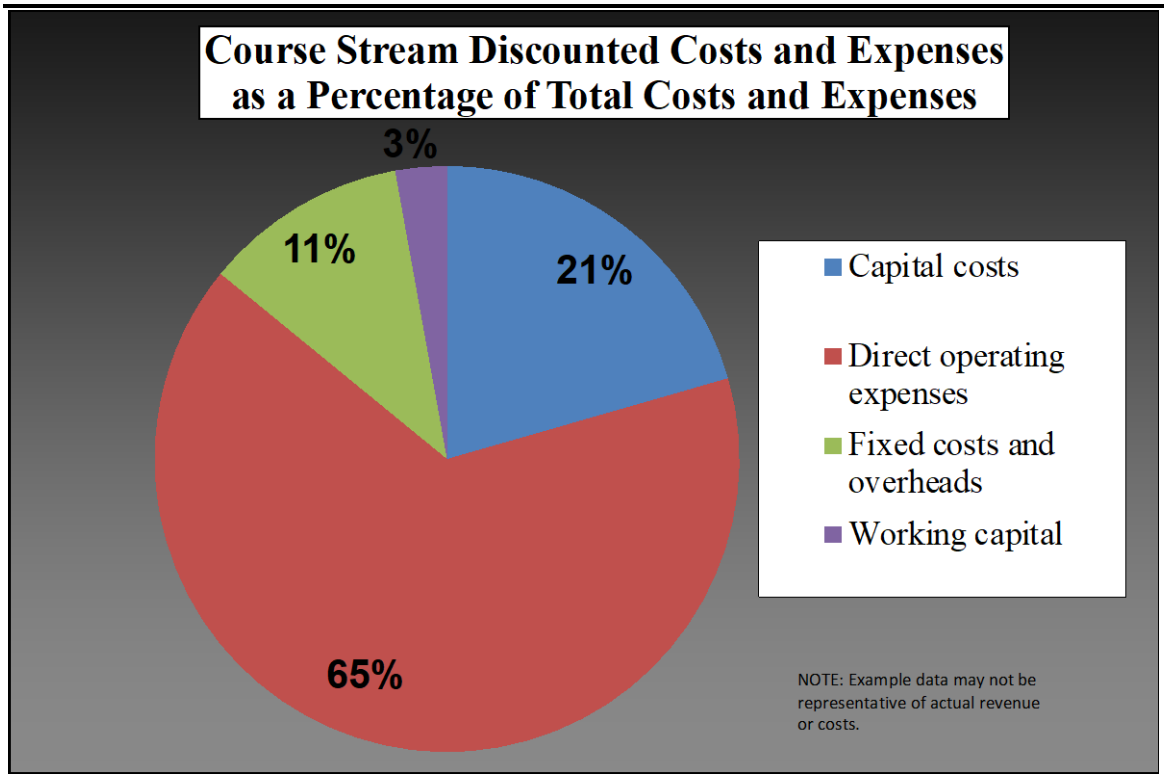
Positive cash flows tend to happen when anticipated grants come in. Negative cash flows are exacerbated by capital equipment replacement.

The "Summary Revenues" pie tab is a pie chart showing the breakdown of discounted revenues as a percentage of total revenues (Screenshot 13). The figures come from the "SUMMARY" worksheet. With the sample data, it is easy to see that grants, donations, and other block-funding revenue make up the largest portion of the planned revenue.




**Screenshot 13**. FOTP Analysis – Course stream discounted revenues as a percentage of total revenues.

Similarly, the "Summary Costs" pie tab is a pie chart showing the breakdown of discounted costs and expenses as a percentage of total costs and expenses (Screenshot 14). The figures also come from the "SUMMARY" worksheet. From the chart, it is easy to see that with this sample data, direct operating expenses make up the majority of the course costs, although capital costs are not an insignificant part of the total course costs.




**Screenshot 14**. FOTP Analysis – Course stream discounted costs and expenses as a percentage of total costs and expenses.

## *"General Assumptions" Worksheet (blue tab)*

General assumptions are common assumptions among several of the worksheets. Some of these assumptions must be entered. Some are calculated based on the entered assumptions. Both are shown on the "Gen. Assumptions" worksheet.

The entered general assumptions include interest rates, inflation rates, course assumptions, and other general assumptions. The interest rates, the rates the bank charges for borrowing and lending are used in cost of capital calculations. The course assumptions include details on course length and the number of students in the course stream. The number of students can be varied over the first three years to allow for start-up variability as the program builds. The number of students from the fourth year onwards is assumed to be fixed. The time to start up applies to the land and buildings. The *ad valorem* (property) taxes apply to the land and buildings, chattels, and capital equipment.

The inflation rate may be varied over the first three years. From year 4 and beyond, it is assumed to be constant at whatever rate is set by the analyst. From the entered inflation rates, an average compound inflation rate is calculated over the 20-year period. First inflation adjustment compounding factors are calculated for each year by increasing the previous year's factor (beginning with 1.00) by the current year's inflation by multiplication. The calculation formula

for the average compound annual inflation rate uses the inflation adjustment compounding factor from the final year, and from that, calculates an annual inflation rate that when compounded over the entire period would equal that final year's factor. For example:

| Year | Inflation | Inflation adjustment Formula | compounding factor |
|---|---|---|---|
| 0 | --- | --- | 1.00 |
| 1 | 4.0% | 1.00*(1+0.04) | 1.04 |
| 2 | 3.0% | 1.04*(1+0.03) | 1.07 |
| 3 | 2.0% | 1.07*(1+1.02) | 1.09 |
| 4 | 2.0% | 1.09*(1+1.02) | 1.11 |
| … | | | |
| 20 | 2.0% | 1.50*(1+1.02) | 1.53 |

And the average compound annual inflation is calculated using the formula:

$$\left(\frac{FV}{PV}\right)^{\frac{1}{n}} - 1$$

Where:
FV = the future value of the inflation compounding factor
PV = the present value of the inflation compounding factor
n = the number of years out into the future

So…

$$\left(\frac{1.53}{1.00}\right)^{\frac{1}{20}} - 1 = 0.0215 = 2.15\%$$

…the average annual compound inflation over the 20-year planning period is 2.15%.

## *"CONSOLIDATED REVENUES" WORKSHEET (burnt-orange tab)*

The "Consolidated Revenues" worksheet (burnt-orange tab) is where the various revenue streams are entered, calculated, and summarized. Revenue streams may be divided into four main categories:

1. Student-based revenues: Student tuition, and other non-tuition student-based revenue (state funding, local funding, etc.)
2. Block-funding revenue: Direct federal grants, direct state grants, direct other grants, industry association grants, etc.

3. Program revenue: Revenue from forest operations, log sales, etc.
4. Other revenue: A miscellaneous revenue category to allow for any revenue not otherwise included.

A summary revenues table is shown at the top of the "Consolidated Revenues" worksheet (Screenshot 15). This table shows the present value of the revenues, the value annualized over the 20-year planning period, the value of the revenues on a per-student basis, and a percentage breakdown of the revenues as a percentage of total revenues.

**SUMMARY BEFORE-TAX-AND-FINANCE PRESENT VALUES OF REVENUES WITH A BEFORE-TAX-AND-FINANCE NOMINAL ARR of 4.00% AND NO CONTINGENCY ALLOWANCES**

| | Total present value ($000) | Annualized PV at 4.00% ($000) | $/Student | Pct. of total revenues |
|---|---|---|---|---|
| Student-based revenues with a 0% contingency | | | | |
| Student tuition | $ 1,083 | $ 80 | $ 366 | 4.2% |
| Other non-tuition student-based revenue | 3,232 | 238 | 1,091 | 12.5% |
| Subtotal: Gross student-based revenues | $ 4,315 | $ 318 | $ 1,456 | 16.6% |
| Less: Wraparound student services | (3,077) | (226) | (1,039) | -11.9% |
| **Subtotal: Net student-based revenues** | **$ 1,238** | **$ 91** | **$ 418** | **4.8%** |
| Block funding revenue with a 0% contingency | | | | |
| Grants | $ 21,719 | $ 1,598 | 7,331 | 83.7% |
| Donations and other block funding | 1,949 | 143 | 658 | 7.5% |
| **Subtotal: Grants, donations, and other block funding** | **$ 23,668** | **$ 1,742** | **$ 7,989** | **91.2%** |
| **Program revenue** | **$ 879** | **$ 65** | **$ 297** | **3.4%** |
| **Other revenue** | **$ 176** | **$ 13** | **$ 59** | **0.7%** |
| **TOTAL REVENUES WITH NO CONTINGENCY ALLOWANCES** | **$ 25,960** | **$ 1,910** | **$ 8,762** | **100.0%** |

**Screenshot 15**. FOTP Analysis – Summary consolidated revenues on the "Consolidated Revenues" worksheet.

Below this table is a "Bottom-line revenue annual cash flow summary" (Screenshot 16) showing the "bottom-line" annual total revenues and per-student revenues from the full 20-year cash flow tables that follow.

| BOTTOM-LINE REVENUE ANNUAL CASH FLOW SUMMARY | *2023* | *2024* | *2025* |
|---|---|---|---|
| Total consolidated revenue cash flows ($000) | $ 1,500 | $ 6,451 | $ 2,992 |
| Total per-student consolidated revenue cash flows ($) | | $ 146,818 | $ 38,769 |

**Screenshot 16**. FOTP Analysis – Summary revenue annual cash flow table on the "Consolidated Revenues" worksheet. Note that only the first part of the 20-year analysis is shown.

Further summary tables (not shown) provide detail on the composition of these "bottom-line" summary numbers.

Beneath the summary cash flow tables are the revenue assumptions entries (not shown). Blank lines are provided under the "Other non-tuition student-based revenue" and the "Block-funding Revenue" for additional revenue sources not included in the sample.

Revenues in the different categories may be either entered directly for each of the program years, or the first year's revenues may be inflated automatically by selecting a box in the table, "Inflation Adjustment Assumptions for Course Revenues." For example, one might wish to assume that per-student tuition will increase with inflation, but that state funding per student will be constant (or may only increase after a certain number of years). Similarly, one might want to assume that direct federal and state grants will be received as entered, but that industry association (or some other) grants will increase with inflation. It is easy to change these inflation assumptions by simply changing the box selection in the box in the table, "Inflation Adjustment Assumptions for Course Revenues."

Below these entered assumptions tables are the imported assumptions tables and then the tables containing the detailed-and-itemized annual revenue calculations.

## *COSTING WORKSHEETS (blue tabs)*

There are nine worksheets that cost out various parts of the forest operations training course. They consist of a "Consolidated Costs" worksheet (dark blue tab) and eight subsidiary worksheets (light-blue tabs). The costing worksheets draw on common inputs from the "Gen. Assumptions" worksheet. There are also individual cost items that are entered on the subsidiary worksheets. Outputs from the "Consolidated Costs" worksheet are exported into the "SUMMARY" worksheet.

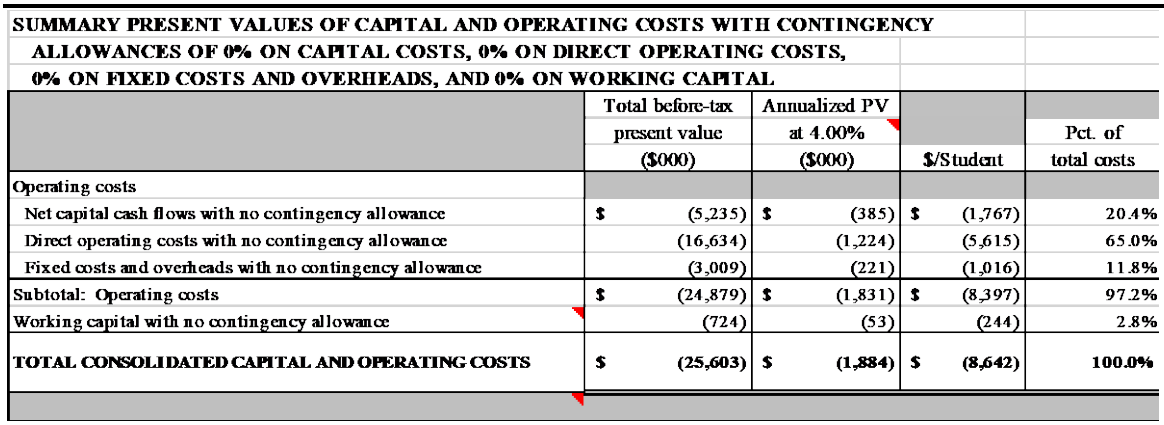
### **"Consolidated Costs" Worksheet (dark blue tab)**

The "Consolidated Costs" worksheet summarizes the capital and operating costs. It consolidates information from the eight individual subsidiary costing worksheets that provide detailed costs for the various components of the forest operations training course. The "Consolidated Costs" worksheet contains all costs apart from the wraparound services, which appear on the "Consolidated Revenues" worksheet as a direct deduction from student revenues. The "Consolidated Costs" worksheet includes capital costs, direct operating costs, and working capital.

On the "Consolidated Costs" worksheet, the present value of the costs is calculated. This amount is used in the break-even beginning student tuition cost calculation, and in the break-even scaling factors calculations on the "SUMMARY" worksheet. These calculations determine the minimum that must be recovered over the 20-year planning horizon to return the capital and operating costs while still providing the required rate of return.

A summary costs table is shown at the top of the "Consolidated Costs" worksheet (Screenshot 17). This table shows the present value of the costs, the value annualized over the

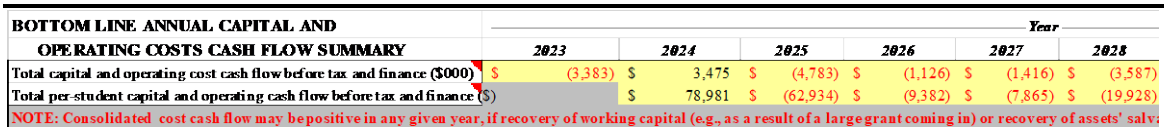
20-year planning period, the value of the costs on a per-student basis, and a percentage breakdown of the costs as a percentage of total costs.



| SUMMARY PRESENT VALUES OF CAPITAL AND OPERATING COSTS WITH CONTINGENCY ALLOWANCES OF 0% ON CAPITAL COSTS, 0% ON DIRECT OPERATING COSTS, 0% ON FIXED COSTS AND OVERHEADS, AND 0% ON WORKING CAPITAL | Total before-tax present value ($000) | Annualized PV at 4.00% ($000) | $/Student | Pct. of total costs |
|---|---|---|---|---|
| Operating costs | | | | |
| Net capital cash flows with no contingency allowance | $ (5,235) | $ (385) | $ (1,767) | 20.4% |
| Direct operating costs with no contingency allowance | (16,634) | (1,224) | (5,615) | 65.0% |
| Fixed costs and overheads with no contingency allowance | (3,009) | (221) | (1,016) | 11.8% |
| Subtotal: Operating costs | $ (24,879) | $ (1,831) | $ (8,397) | 97.2% |
| Working capital with no contingency allowance | (724) | (53) | (244) | 2.8% |
| **TOTAL CONSOLIDATED CAPITAL AND OPERATING COSTS** | **$ (25,603)** | **$ (1,884)** | **$ (8,642)** | **100.0%** |

**Screenshot 17**. FOTP Analysis – Summary consolidated capital and operating costs on the "Consolidated Costs" worksheet.

Below this table is a "Bottom-line annual capital and operating cost cash flow summary" (Screenshot 18) showing the "bottom-line" annual total costs and per-student costs from the full 20-year cash flow tables that follow. In these calculations, although cash flows involving working capital and capital assets are classified as costs, in some years there may be positive cash flows in these categories (e.g., as a result of grants and donations in working capital or the terminal values of capital assets). If there are positive capital and operating costs in any given year, a note will appear below this table informing the analyst of this occurrence in the cash flows.[14]



| BOTTOM LINE ANNUAL CAPITAL AND OPERATING COSTS CASH FLOW SUMMARY | Year 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|---|---|---|---|---|---|---|
| Total capital and operating cost cash flow before tax and finance ($000) | $ (3,383) | $ 3,475 | $ (4,783) | $ (1,126) | $ (1,416) | $ (3,587) |
| Total per-student capital and operating cash flow before tax and finance ($) | | $ 78,981 | $ (62,934) | $ (9,382) | $ (7,865) | $ (19,928) |
| NOTE: Consolidated cost cash flow may be positive in any given year, if recovery of working capital (e.g., as a result of a large grant coming in) or recovery of assets' salv | | | | | | |

**Screenshot 18**. FOTP Analysis – Summary costs annual cash flow table on the "Consolidated Costs" worksheet. Note that only the first part of the 20-year analysis is shown.

Beneath the bottom-line summary are more tables providing additional detail on cost components (not shown here).

A "bottom-line book-value summary" (Screenshot 19) provides information on the book values of land and buildings, chattels, and capital equipment. This information is not used in the cash

[14] Note that if this is the case, it is easy to trace the formulas (using Excel's "Formulas-Trace Precedents" function) to see where the positive values have come from.

flow calculations, but it is provided because it may be useful for bookkeeping, reporting, and other management purposes.

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **BOTTOM-LINE BOOK-VALUE SUMMARY** | *2023* | *2024* | *2025* | *2026* | *2027* | *2028* |
| ASSETS | | | | | | |
| Land & building | $ - | $ - | $ - | $ - | $ - | $ - |
| Chattels | 15,080 | 12,242 | 9,405 | 8,259 | 12,636 | 11,902 |
| Capital equipment | 2,977,662 | 2,382,130 | 1,786,597 | 1,191,065 | 595,532 | - |
| TOTAL ASSETS | $ 2,992,742 | $ 2,394,372 | $ 1,796,002 | $ 1,199,323 | $ 608,168 | $ 11,902 |

**Screenshot 19**. FOTP Analysis – Book value summary table on the "Consolidated Costs" worksheet. Note that only the first part of the 20-year analysis is shown.

No assumptions are entered directly on the "Consolidated Costs" worksheet. Any contingency allowances from the "SUMMARY" worksheet are incorporated into the analysis on the "Consolidated Costs" worksheet. Other major assumptions are also shown, along with a cash flow table that consolidates all the operating costs from the eight subsidiary costing worksheets that are:

- *Land&Bldg.*
- *Capital Equipment*
- *Course Admin.*
- *Chattels*
- *Supplies*
- *Wraparound Services*
- *Other Costs*
- *Working Capital*

A review of each of these worksheets follows:

## "Land&Bldg." Worksheet (light-blue tab)

"Land&Bldg." accounts for the costs involved with land and buildings. Land costs include both land and depreciable land improvements. However, land itself may not be depreciated. Buildings do not include chattels,[15] which are accounted for on another worksheet. A difference between chattels and real estate is that while chattels usually decline in value over time, real estate usually holds its value and may increase in value over time.

Land and buildings may be leased or purchased (specified by check marks in the "Payment Method" table in the assumptions). If land or buildings are leased, then the lease cost is deductible from the taxable income in the year it occurs and terminal values for those assets are

15 Chattels are movable resources or property rights other than freehold land. Computers, office equipment, tools, etc. are all chattels. Technically, capital equipment and supplies are chattels also, but since those costs could be significant parts of the cost of a course, they are accounted for on separate worksheets.

not included in this analysis. However, if land and/or buildings are purchased, then terminal values must be accounted for. In terms of cash flows, this only matters at the end of the project.

In FOTP Analysis, real estate assets' terminal values are accounted for using either "Book" or "Current" values. "Book" value for buildings is the historic cost, less the IRS-allowed depreciation. The IRS does not allow depreciation for land, so book value is its historic cost.

"Current" values, which are the assets' values at the end of the 20-year planning horizon may be a better approximation of the actual value that is received for land and buildings, because this calculation allows the assets' values to increase with inflation and possible real increases in value.[16] The calculation takes the historic cost, plus inflation, plus any real increase (decrease) in value, and for buildings deducts an allowance for decline in value due to age.

While book and current terminal values allow for greater flexibility in the analysis, unless these terminal values are a significant portion of the total project cash flows, after 20 years, whichever terminal value estimate is used will probably not have much impact on the overall analysis results at the start of the course.

## "Capital Equipment" Worksheet (light-blue tab)

The "Capital Equipment" worksheet calculates a 20-year cash flow analysis for the capital and operating costs associated with up to 15 different types of capital equipment. The capital equipment cost calculations are a simplified version of the methodology presented by Bilek (2007).

The first table, "Summary Financial Measures by Capital Equipment Type" allows the analyst to see at a glance what types of capital equipment are included in the analysis and the associated costs (Screenshot 20).

[16] "Real" increases in value are value increases that are over and above inflation. Real increases are in addition to inflation and, in fact, compound with inflation. So for example, if annual inflation is at 4.0% and there is a real value increase in an asset of 3.0%, then the asset's total annual increase in value is [(1+0.040)*(1+0.030)]-1 = 1.071-1 = 0.071 = 7.1%

SUMMARY FINANCIAL MEASURES BY CAPITAL EQUIPMENT TYPE*

| Equipment type | Initial cost (per piece) | Economic life (years) | PV of costs (per piece) | Annualized cost (per piece) | Pieces required (number) | Total initial cost | Total annualized cost | Total operating hours/year | Annualized cost/hour (per piece) |
|---|---|---|---|---|---|---|---|---|---|
| 4X4 1-ton passenger pickups for equipment operators | $ 130,000 | 10 | $ 142,928 | $ 15,067 | 1 | $ 130,000 | $ 15,067 | 1,440 | $ 10.46 |
| 12-passenger van | $ 80,000 | 10 | $ 92,430 | $ 9,744 | 1 | $ 80,000 | $ 9,744 | 1,440 | $ 6.77 |
| Shop Truck for maintenance & repair classes | $ 150,000 | 10 | $ 168,605 | $ 17,774 | 1 | $ 150,000 | $ 17,774 | 1,200 | $ 14.81 |
| Used stinger-steered log truck for CDL classes | $ 120,000 | 10 | $ 955,773 | $ 100,755 | 1 | $ 120,000 | $ 100,755 | 1,200 | $ 83.96 |
| Feller Buncher | $ 367,123 | 10 | $ 761,231 | $ 80,247 | 1 | $ 367,123 | $ 80,247 | 800 | $ 100.31 |
| Skidder | $ 366,123 | 10 | $ 1,044,985 | $ 110,159 | 1 | $ 366,123 | $ 110,159 | 1,440 | $ 76.50 |
| Loader | $ 447,441 | 10 | $ 1,270,131 | $ 133,894 | 1 | $ 447,441 | $ 133,894 | 1,440 | $ 92.98 |
| Processor | $ 731,975 | 10 | $ 924,013 | $ 97,407 | 1 | $ 731,975 | $ 97,407 | 1,440 | $ 67.64 |
| Simulators (whole tree & CTL machines) | $ 73,125 | 10 | $ 61,365 | $ 6,469 | 8 | $ 585,000 | $ 51,752 | 15,680 | $ 3.30 |
| Blank 1 —— | $ - | - | $ - | N.A. | - | $ - | N.A. | - | N.A. |
| Blank 2 —— | $ - | - | $ - | N.A. | - | $ - | N.A. | - | N.A. |
| Blank 3 —— | $ - | - | $ - | N.A. | - | $ - | N.A. | - | N.A. |
| Blank 4 —— | $ - | - | $ - | N.A. | - | $ - | N.A. | - | N.A. |
| Blank 5 —— | $ - | - | $ - | N.A. | - | $ - | N.A. | - | N.A. |
| Blank 6 —— | $ - | - | $ - | N.A. | - | $ - | N.A. | - | N.A. |
| NOTE: Costs are all shown above as positive numbers to simplify analysis and interpretation. | | | | | Total: | $ 2,977,662 | $ 616,798 | | |

WARNING! For at least one piece of equipment, there are more training hours required per student than there are hours available.
Either get more equipment or reconfigure the training requirements below in the table, 'Other entered assumptions by capital equipment type'.

**Screenshot 20**. FOTP Analysis – Summary financial measures by capital equipment type on the "Capital Equipment" worksheet. Note that only the first part of the 20-year analysis is included.

Note that in the table above, one of the pieces of equipment appears in red and there is a warning regarding the equipment scheduling and number of training hours needed. FOTP analysis automatically calculates the number of training hours available on each type of equipment and compares that with the number of training hours required for each student. If there are not enough training hours available, then warnings will automatically appear to alert the analyst that either more equipment is needed or the training requirements need to be reconsidered.

The "Summary Cash Flows for Equipment" provides cash flow summaries of capital costs, revenues, and expenses (Screenshot 21). This summary consolidates the individual machine costs and provides management cost and budgeting summaries.

| SUMMARY CASH FLOW TABLE FOR CAPITAL EQUIPMENT WITH A SENSITIVITY ANALYSIS SCALING FACTOR SET AT 100% | | | | | | |
|---|---|---|---|---|---|---|
| (continued on next page) | | | | | | |
| | | | | | | Year |
| | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| *Analysis in Current Dollars* | *Year 0* | *Year 1* | *Year 2* | *Year 3* | *Year 4* | *Year 5* |
| **Purchase and replacement costs** | $ (2,977,662) | $ - | $ - | $ - | $ - | $ - |
| **Salvage values** | | - | - | - | - | - |
| **Operating costs** | | | | | | |
| Repairs & maintenance | | (38,794) | (39,957) | (41,156) | (42,391) | (43,663) |
| Fuel | | (293,597) | (302,405) | (311,477) | (320,821) | (330,446) |
| Oil & lube | | (22,746) | (23,428) | (24,131) | (24,855) | (25,601) |
| Other operating costs | | (5,665) | (5,835) | (6,010) | (6,190) | (6,376) |
| Subtotal: operating costs | | $ (360,802) | $ (371,626) | $ (382,774) | $ (394,258) | $ (406,085) |
| Insurance | | (4,284) | (4,412) | (4,545) | (4,681) | (4,821) |
| *Ad valorem* (property) taxes | - | - | - | - | - | - |
| Subtotal: annual cash costs | $ - | $ (365,085) | $ (376,038) | $ (387,319) | $ (398,939) | $ (410,907) |
| **Terminal value** | | | | | | |
| **Total capital equipment costs** | $ (2,977,662) | $ (365,085) | $ (376,038) | $ (387,319) | $ (398,939) | $ (410,907) |
| **Summary Capital Equipment Cash Flow Assumptions** | | | | | | |
| — Machines will be replaced with identical units as they reach the end of their operating lives. | | | | | | |
| — New capital equipment costs will be equal to old capital equipment costs plus inflation. | | | | | | |


| SUMMARY CASH FLOW TABLE FOR CAPITAL EQUIPMENT WITH A SENSITIVITY ANALYSIS SCALING FACTOR SET AT 100% | | | | | | |
|---|---|---|---|---|---|---|
| (continued on next page) | | | | | | |
| | | | | | | Year |
| | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| *Analysis in Current Dollars* | *Year 0* | *Year 1* | *Year 2* | *Year 3* | *Year 4* | *Year 5* |
| **Purchase and replacement costs** | $ (2,977,662) | $ - | $ - | $ - | $ - | $ - |
| **Salvage values** | | - | - | - | - | - |
| **Operating costs** | | | | | | |
| Repairs & maintenance | | (38,794) | (39,957) | (41,156) | (42,391) | (43,663) |
| Fuel | | (107,932) | (111,170) | (114,506) | (117,941) | (121,479) |
| Oil & lube | | (8,362) | (8,613) | (8,871) | (9,137) | (9,411) |
| Other operating costs | | (5,665) | (5,835) | (6,010) | (6,190) | (6,376) |
| Subtotal: operating costs | | $ (160,753) | $ (165,576) | $ (170,543) | $ (175,659) | $ (180,929) |
| Insurance | | (4,284) | (4,412) | (4,545) | (4,681) | (4,821) |
| *Ad valorem* (property) taxes | - | - | - | - | - | - |
| Subtotal: annual cash costs | $ - | $ (165,037) | $ (169,988) | $ (175,087) | $ (180,340) | $ (185,750) |
| **Terminal value** | | | | | | |
| **Total capital equipment costs** | $ (2,977,662) | $ (165,037) | $ (169,988) | $ (175,087) | $ (180,340) | $ (185,750) |


**Screenshot 21**. FOTP Analysis – Summary cash flow table on the "Capital Equipment" worksheet. Note that only the first part of the 20-year analysis is shown.

Following the summary cash flows are the entered assumptions and then the imported assumptions, which are followed by some calculated assumptions and then the calculations.

The calculations depend on inputs. Some inputs are imported from the "Gen. Assumptions" worksheet. Others that apply to only these capital equipment costings are entered on this worksheet under "Capital Equipment Costing Assumptions."

Among the inputs are two input variables based on economic life. The first has to do with the number of hours that could be expected from the equipment and the second has to do with the economic life in years. Both are representations of the actual estimated operating life. As these numbers are varied, the cash flow table is automatically adjusted as the equipment replacement years change.

Equipment operating life is also related to the repairs and maintenance. As the number of operating hours/year increases beyond the standard expected hours, repairs and maintenance would also be expected to increase. The implicit assumption built into this model is that repairs and maintenance will increase in a linear fashion as operating hours increase beyond the standard. This is accounted for in the "Repairs & Maintenance Scaling Factor" table.[17]

The economic life also affects equipment current values. Current value is beginning current, less current depreciation, plus inflationary gains. Current depreciation is a straight-line rate over the asset's economic life.

---

[17] These R&M scaling factors increase repairs and maintenance based on how many hours the equipment is used. R&M is an entered percentage of the straight-line depreciation. This might be a reasonable ballpark estimate, but it is reasonable to consider that if the number of operating hours increases, that R&M will also increase. Alternatively, for a piece of equipment that's only will be lightly used, its R&M might be lower than a fixed amount based on straight-line depreciation.

If the number of operating hours is going to be more than this standard amount, or if it is anticipated that students are going to be harder on the capital equipment during this time, then the budgeted R&M can be increased by making these factors greater than 1.00.

If the number of operating hours is going to be less than this standard amount, or if it is anticipated that good regular maintenance is going to keep the repair costs lower than average, the budgeted R&M can be decreased by making these factors less than 1.00.

After the assumptions are finalized and incorporated. individual annual calculations by machine type are included for:

- Required student operating hours per piece of capital equipment
- Potential operating hours per type of capital equipment
- Surplus (deficit) training hours per type of capital equipment[18]
- Operating hours/year for all machines
- Purchase and replacement
- Salvage value
- Repairs and maintenance
- Fuel consumption
- Fuel cost
- Oil & lube cost
- Depreciation expense
- Accumulated depreciation
- Book value calculations
- Current value calculations
- *Ad valorem* (property tax) calculations

**Equipment Cash Flow Models**

Equipment cash flow model templates are provided for each of 15 possible types of capital equipment. Each equipment model follows an identical format, showing two summary financial measures and a detailed cash flow table for the specified piece of equipment over a single cycle of the equipment's expected useful life.

The summary financial measures consist of the present value of the capital equipment's total costs an annualized cost over the equipment's specified economic life. The capital equipment's present value before tax and finance before tax and finance of the equipment's cost is the sum of the discounted cash outflows for that equipment.

Along with the present value of the costs, an annualized cost over the equipment's specified economic life is also shown. This cost capitalizes the present value at the before-tax and finance real rate of return to give an indication of how much it costs to operate this type of equipment on an annual basis.

Cash Flow Table

The cash flow table shows the cash flows for a single piece of equipment over its expected life. Replacement costs are not calculated here. All cash flows are in nominal terms. Built into this cash flow table is the assumption that all cash costs and all revenues will increase at the specified

[18] Note that in this surplus (deficit) table, there will be warnings that appear if there are more training hours required than there are equipment operating hours available for the training.

inflation rate. Depreciation expense is not incorporated into the equipment cash flow tables because it is a non-cash expense. Depreciation will have an impact on after-tax cash flows (for a for-profit entity), and it may have an impact on repairs and maintenance expenses (depending on how those expenses are calculated), but depreciation expense will not directly affect before-tax and finance cash flows.

Depreciation Calculations

FOTP Analysis provides for five different depreciation methods that may be used for each piece of capital equipment. While depreciation expense is not incorporated into the equipment cash flow tables because it is a non-cash expense, it will have an impact on after-tax cash flows for a for-profit entity because it is deducted from taxable revenue. Depreciation may have an impact on repairs and maintenance expenses (depending on how those expenses are calculated), and it will have an impact on terminal values if those values are estimated based on assets' book values, but depreciation expense will otherwise not directly affect regular annual before-tax and finance cash flows.

## "Course Admin." Worksheet (light-blue tab)

The "Course Admin." worksheet does the costing calculations for management and supervision, the hourly wage workers, and other administration costs. "Course Admin." uses inputs from the "Gen. Assumptions" worksheet, as well as some inputs that are entered on this worksheet. The "Course Admin." worksheet is divided into three major sections: 1) Summary Tables, 2) Assumptions, and 3) Calculations.

The "Summary Tables" portion of the "Course Admin." worksheet has an initial summary table showing the total salary, wages, and administration expenses (Screenshot 22).

**SUMMARY SALARY, WAGES, & ADMINISTRATION EXPENSES, Forest Equipment Operations Stream WITH A SENSITIVITY ANALYSIS SCALING FACTOR SET AT 100%**

| | Year | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
| Fixed yearly salaries | | $ (380,316) | $ (391,674) | $ (403,372) | $ (415,420) | $ (427,831) | $ (440,614) | $ (453,780) |
| Clerical & hourly wages expense | | - | - | - | - | - | - | - |
| Subtotal: Administration employment expenses | | $ (380,316) | $ (391,674) | $ (403,372) | $ (415,420) | $ (427,831) | $ (440,614) | $ (453,780) |
| Payroll & other clerical expenses | | (1,339) | (1,379) | (1,421) | (1,463) | (1,507) | (1,552) | (1,599) |
| Other professional fees | | (4,120) | (4,244) | (4,371) | (4,502) | (4,637) | (4,776) | (4,919) |
| Yearly communications expense | | (9,517) | (9,803) | (10,097) | (10,400) | (10,712) | (11,033) | (11,364) |
| Other periodic overheads | | (11,515) | (113,707) | (117,118) | (120,632) | (124,251) | (127,979) | (131,818) |
| Other one-off overheads | - | (10,300) | - | - | - | - | - | - |
| Program support supplies | (103,379) | - | - | - | (38,785) | (39,948) | (41,147) | (42,381) |
| Subtotal: Other administration expenses & overheads | (103,379) | (36,792) | (129,133) | (133,007) | (175,782) | (181,055) | (186,487) | (192,081) |
| Total course salary, wages, & administration costs | $ (103,379) | $ (417,108) | $ (520,806) | $ (536,378) | $ (591,202) | $ (608,886) | $ (627,100) | $ (645,861) |

* NOTE: These summary costs incorporate the 'Administration sensitivity analysis scaling factor,' which is currently set at 100%. To change this, go to the SUMMARY worksheet.

**Screenshot 22**. FOTP Analysis – Summary salary, wages, and administration expenses table on the "Course Admin." worksheet. Note that only the first part of the 20-year analysis is shown.

Following this table are two additional tables providing more detail with respect to the administration employment expenses subtotal in the summary table. These two tables are

provided for management and budgeting purposes to provide more details regarding these salary and wages expenses.

The first of these additional tables (Screenshot 23) breaks down the administration employment expenses into three types: "base salaries," "benefits and other costs," and "employment taxes."

| ADMINISTRATION EMPLOYMENT EXPENSE DETAIL BY EXPENSE TYPE WITH A SENSITIVITY ANALYSIS SCALING FACTOR SET AT 100% | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Base salaries | | $ 231,750 | $ 238,703 | $ 245,864 | $ 253,239 | $ 260,837 | $ 268,662 | $ 276,722 |
| Benefits and other costs | | | | | | | | |
| Retirement | | 6,953 | 7,161 | 7,376 | 7,597 | 7,825 | 8,060 | 8,302 |
| Perks | | 34,763 | 35,805 | 36,880 | 37,986 | 39,126 | 40,299 | 41,508 |
| Health insurance | | 15,450 | 15,914 | 16,391 | 16,883 | 17,389 | 17,911 | 18,448 |
| Liability insurance | | 3,090 | 3,183 | 3,278 | 3,377 | 3,478 | 3,582 | 3,690 |
| Other costs | | 10,300 | 10,609 | 10,927 | 11,255 | 11,593 | 11,941 | 12,299 |
| Subtotal: Benefits and other costs | | $ 70,555 | $ 72,672 | $ 74,852 | $ 77,097 | $ 79,410 | $ 81,793 | $ 84,246 |
| Employment taxes | | | | | | | | |
| Social Security | | 14,369 | 14,800 | 15,244 | 15,701 | 16,172 | 16,657 | 17,157 |
| Medicare | | 3,965 | 4,084 | 4,207 | 4,333 | 4,463 | 4,597 | 4,735 |
| Unemployment - Federal | | 1,260 | 1,260 | 1,260 | 1,260 | 1,260 | 1,260 | 1,260 |
| Unemployment - State | | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| Workers' compensation | | 57,938 | 59,676 | 61,466 | 63,310 | 65,209 | 67,165 | 69,180 |
| Subtotal: Employment taxes | | 78,011 | 80,299 | 82,656 | 85,084 | 87,584 | 90,159 | 92,812 |
| Total: Administration employment expenses | | $ 380,316 | $ 391,674 | $ 403,372 | $ 415,420 | $ 427,831 | $ 440,614 | $ 453,780 |
| * NOTE: These costs incorporate the 'Administration sensitivity analysis scaling factor,' which is currently set at 100%. To change this, go to the SUMMARY worksheet. | | | | | | | | |

**Screenshot 23**. FOTP Analysis – Administration employment expense detail by expense type on the "Course Admin." worksheet. Note that only the first part of the 20-year analysis is shown.

Note that the total administration expenses are all equal to the total administration employment expenses subtotal in the previous table.

The second table providing more detail with respect to the administration employment expenses subtotal in the summary table breaks down these salary and wages expenses by employee type (Screenshot 24).

| ADMINISTRATION EMPLOYMENT EXPENSES BY EMPLOYEE TYPE WITH A SENSITIVITY ANALYSIS SCALING FACTOR SET AT 100% | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Year | | | | | | |
| Fixed Yearly Salaries Calculations | | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
| Program Manager | | 175,223 | 180,463 | 185,859 | 191,417 | 197,143 | 203,039 | 209,113 |
| Coordinator | | 95,959 | 98,820 | 101,768 | 104,803 | 107,930 | 111,150 | 114,468 |
| Shop Technician | | 109,134 | 112,391 | 115,745 | 119,200 | 122,758 | 126,424 | 130,199 |
| R&M Instructor | | - | - | - | - | - | - | - |
| Equipment Instructor | | - | - | - | - | - | - | - |
| Graduate Student | | - | - | - | - | - | - | - |
| Salaried Blank 2 | | - | - | - | - | - | - | - |
| Salaried Blank 3 | | - | - | - | - | - | - | - |
| Salaried Blank 4 | | - | - | - | - | - | - | - |
| Salaried Blank 5 | | - | - | - | - | - | - | - |
| Salaried Blank 6 | | - | - | - | - | - | - | - |
| Salaried Blank 7 | | - | - | - | - | - | - | - |
| Subtotal: Fixed yearly salaries | | $ 380,316 | $ 391,674 | $ 403,372 | $ 415,420 | $ 427,831 | $ 440,614 | $ 453,780 |
| Clerical & Hourly Wages Calculations | | | | | | | | |
| Receptionist/telephone | | - | - | - | - | - | - | - |
| General secretary | | - | - | - | - | - | - | - |
| Bookkeeping | | - | - | - | - | - | - | - |
| Other clerical | | - | - | - | - | - | - | - |
| Equipment operations senior technicians | | - | - | - | - | - | - | - |
| Equipment operations technicians | | - | - | - | - | - | - | - |
| Assistant Technician (1) | | - | - | - | - | - | - | - |
| Assistant Technician (2) | | - | - | - | - | - | - | - |
| Hourly Blank (1) | | - | - | - | - | - | - | - |
| Hourly Blank (2) | | - | - | - | - | - | - | - |
| Hourly Blank (3) | | - | - | - | - | - | - | - |
| Hourly Blank (4) | | - | - | - | - | - | - | - |
| Subtotal: Clerical & hourly yearly wages | | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| | | | | | | | | |
| Total: Administration employment expenses | | $ 380,316 | $ 391,674 | $ 403,372 | $ 415,420 | $ 427,831 | $ 440,614 | $ 453,780 |

**Screenshot 24**. FOTP Analysis – Administration employment expense detail by employee type on the "Course Admin." worksheet. Note that only the first part of the 20-year analysis is shown.

Again, the total administration expenses are all equal to the administration employment expenses total in the previous table and the administration employment expenses subtotal in the first summary table.

Following these summary tables come the assumptions. The "Assumptions" portion of the "Course Admin." worksheet is divided into five sections: 1) employees hired and required; 2) fixed and hourly costs; 3) basic assumptions; 4) standard and available work hours; and 5) administration expenses.

The first "employees hired" table covers the salaried employees. Then comes the hourly employees, followed by a table in which is entered the number of hours require per hourly employee. Warnings will appear if the number of hours required exceed the number of available hours, which are calculated in the "Basic Assumptions" that follow the "Fixed Costs per Salaried Employee" and "Costs per Hourly Employee" assumptions tables.

In the calculations for salaried and hourly employees, note that a warning will appear if there are employees required but not hired. Similarly, warnings will appear if there are employees hired but no hours are required for them. If any over-worked errors appear, it means that for at least one year and one employee type, there are not enough available hours to meet the specified hourly requirements. This means that either the requirements have to be decreased, the number of available hours has to be increased in the Standard and Available Overtime hours/worker input table, or that the number of employees hired in at least one year needs to be increased. The years in which there are problems will appear highlighted.

Hourly wages and workers' fixed costs are calculated in the base rate plus allowances table. Unadjusted hourly wage rates are added to adjustments for vacation pay, statutory holiday pay, sick leave, retirement, and other allowances. These are entered as percentages of the unadjusted hourly wage rates. Annual fixed costs are added to the unadjusted rates. These are entered as dollar amounts and include health insurance, liability insurance, and other fixed costs.

The calculations portion of the "Course Admin." worksheet is divided into salaried positions calculations by worker type, clerical and hourly positions calculations by worker type, and hours calculations by worker type.

## "Chattels" Worksheet (light-blue tab)

The "Chattels" worksheet calculates the cash flows for the depreciable building contents, start-up equipment, computers, office furniture, etc. The term, "chattels" could also apply to capital equipment, inventory, and loose tools because these assets are not real estate. However, these assets are accounted for elsewhere.

The "Chattels" worksheet is constructed so that as assets reach the end of their economic lives, they are automatically replaced at their original cost, plus inflation. Terminal values are based on assets' book values.

Some of the inputs for this worksheet come from the "Gen. Assumptions" worksheet. Some are provided on the worksheet. A portion of the summary table from the "Chattels" worksheet is shown below (Screenshot 25):

| | Year | | | | | |
|---|---|---|---|---|---|---|
| **SUMMARY CASH FLOWS FOR CHATTELS WITH A SENSITIVITY ANALYSIS SCALING FACTOR SET AT 100%** | ***2023*** | ***2024*** | ***2025*** | ***2026*** | ***2027*** | ***2028*** |
| Purchase and replacement costs | $ (15,080) | $ - | $ - | $ (2,732) | $ (9,004) | $ (3,478) |
| Salvage values | | - | - | 546 | 563 | 116 |
| Terminal value | | | | | | |
| Subtotal: Capital costs | $ (15,080) | $ - | $ - | $ (2,185) | $ (8,441) | $ (3,362) |
| Repairs & maintenance costs | | (2,732) | (2,814) | (2,898) | (2,985) | (3,074) |
| Subtotal: Purchase and operating costs | $ (15,080) | $ (2,732) | $ (2,814) | $ (5,083) | $ (11,426) | $ (6,436) |
| | | | | | | |
| **Insurance cost** | (377) | (754) | (754) | (754) | (754) | (754) |
| | | | | | | |
| ***Ad valorem* (property) taxes** | - | - | - | - | - | - |
| | | | | | | |
| **Total Chattels' Costs** | $ (15,457) | $ (3,486) | $ (3,568) | $ (5,837) | $ (12,180) | $ (7,190) |

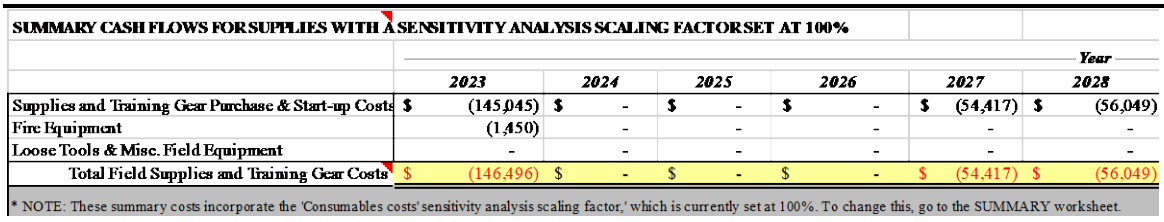
**Screenshot 25**. FOTP Analysis – Summary costs on the "Chattels" worksheet. Note that only the first part of the 20-year analysis is shown.

## “Supplies” Worksheet (light-blue tab)

The “Supplies” worksheet does the costing calculations for gear used generally within the program. It could include first-aid equipment and general consumable supplies that could include fire and safety equipment, as well as loose tools. The cost of these supplies is summed and divided by their expected operating life to give an average annual cost.

These supplies are technically chattels. That is, they should be capitalised and depreciated. However, the total cost of these accessories is so small compared with the total course cost, that more accurate accounting for these capital costs would not significantly change the overall costings.

A portion of the summary table from the “Supplies” worksheet is shown below (Screenshot 26):



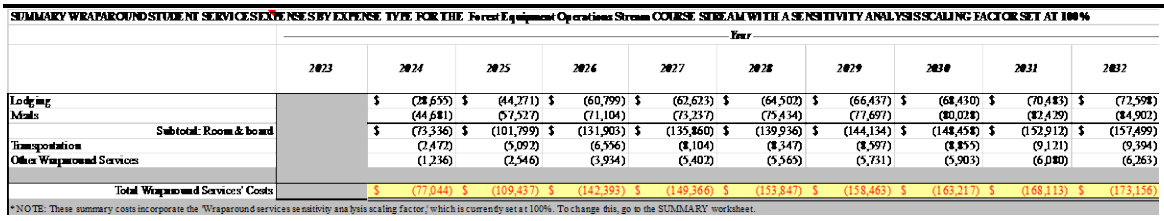
| SUMMARY CASH FLOWS FOR SUPPLIES WITH A SENSITIVITY ANALYSIS SCALING FACTOR SET AT 100% | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Year | | |
| | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| Supplies and Training Gear Purchase & Start-up Costs | $ (145,045) | $ - | $ - | $ - | $ (54,417) | $ (56,049) |
| Fire Equipment | (1,450) | - | - | - | - | - |
| Loose Tools & Misc. Field Equipment | - | - | - | - | - | - |
| Total Field Supplies and Training Gear Costs | $ (146,496) | $ - | $ - | $ - | $ (54,417) | $ (56,049) |

* NOTE: These summary costs incorporate the 'Consumables costs' sensitivity analysis scaling factor,' which is currently set at 100%. To change this, go to the SUMMARY worksheet.

**Screenshot 26**. FOTP Analysis – Summary costs on the “Supplies” worksheet. Note that only the first part of the 20-year analysis is shown here.

## “Wraparound Services” Worksheet (light-blue tab)

The “Wraparound Services” worksheet covers expenses that are incurred to get students through the course. Lodging, meals, and transportation are the major categories provided for, along with other wraparound services (Screenshot 27). The number of students requiring these services, along with the cost of the services must be entered on this worksheet.



| SUMMARY WRAPAROUND STUDENT SERVICES EXPENSES BY EXPENSE TYPE FOR THE Forest Equipment Operations Stream COURSE STREAM WITH A SENSITIVITY ANALYSIS SCALING FACTOR SET AT 100% | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Year | | | | | |
| | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 |
| Lodging | | $ (28,655) | $ (44,271) | $ (60,799) | $ (62,623) | $ (64,502) | $ (66,437) | $ (68,430) | $ (70,483) | $ (72,598) |
| Meals | | (44,681) | (57,527) | (71,104) | (73,237) | (75,434) | (77,697) | (80,028) | (82,429) | (84,902) |
| Subtotal: Room & board | | $ (73,336) | $ (101,799) | $ (131,903) | $ (135,860) | $ (139,936) | $ (144,134) | $ (148,458) | $ (152,912) | $ (157,499) |
| Transportation | | (2,472) | (5,092) | (6,556) | (8,104) | (8,347) | (8,597) | (8,855) | (9,121) | (9,394) |
| Other Wraparound Services | | (1,236) | (2,546) | (3,934) | (5,402) | (5,565) | (5,731) | (5,903) | (6,080) | (6,263) |
| Total Wraparound Services' Costs | | $ (77,044) | $ (109,437) | $ (142,393) | $ (149,366) | $ (153,847) | $ (158,463) | $ (163,217) | $ (168,113) | $ (173,156) |

*NOTE: These summary costs incorporate the 'Wraparound services sensitivity analysis scaling factor,' which is currently set at 100%. To change this, go to the SUMMARY worksheet.

**Screenshot 27**. FOTP Analysis – Summary wraparound service expenses on the “Wraparound Services” worksheet. Note that only the first part of the 20-year analysis is shown.

Unlike all the other subsidiary expense worksheets, wraparound service expenses are not included in the “Consolidated Costs” worksheet. Rather, they are deducted directly from gross student revenue so that net student revenue may be shown before other expenses are deducted from it.

## “Other Costs” Worksheet (light-blue tab)

The “Other Costs” worksheet is a template into which other costs that are not otherwise incorporated into the analysis may be included in the analysis. Individual costs are included for years 1–3. For Year 4 and beyond, costs are entered as Year 0 values (i.e., without considering the impact that inflation might have on then), and are inflated to Year 4 values by the inflation rates (imported from the “Gen. Assumptions” worksheet) and are then assumed to occur annually from that year forward. A sample of the summary cash flows for “Other Costs” along with the entered assumptions that caused them is shown (Screenshot 28):

| SUMMARY CASH FLOWS FOR OTHER PERIODIC COSTS WITH A SENSITIVITY ANALYSIS SCALING FACTOR SET AT 100% | | | | | | |
|---|---|---|---|---|---|---|
| | Year | | | | | |
| | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| TOTAL OTHER PERIODIC COSTS | $ (140,000) | $ (185,600) | $ (187,454) | $ (189,364) | $ (191,331) | $ (193,356) |
| * NOTE: These summary costs incorporate the 'Other periodic costs scaling factor,' which is currently set at 100%. To change this, go to the SUMMARY worksheet. | | | | | | |
| | | | | | | |
| OTHER ANNUAL COSTS ASSUMPTIONS | | | | | | |
| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 & beyond | Cost is subject to inflation |
| Other annual costs (not inflation adjusted) | | | | | | |
| Shop rental (maintenance & repair classes) | 15,000 | 60,000 | 60,000 | 60,000 | 60,000 | Yes |
| Trailer rental (simulator classes & storage - 2) | 5,000 | 12,000 | 12,000 | 12,000 | 12,000 | No |
| Utilities (shop & trailers) | | 10,800 | 10,800 | 10,800 | 10,800 | No |
| Equipment and tools (shop) | 100,000 | 10,000 | 10,000 | 10,000 | 10,000 | No |
| PPE and other equipment/supplies | 20,000 | 4,000 | 4,000 | 4,000 | 4,000 | No |
| Annual replace, maintenance, insurance | | 72,000 | 72,000 | 72,000 | 72,000 | No |
| Travel expenses | | 15,000 | 15,000 | 15,000 | 15,000 | No |
| Last Periodic Cost Item | | | | | | |
| TOTAL OTHER PERIODIC COSTS (not inflation adjusted) | $ 140,000 | $ 183,800 | $ 183,800 | $ 183,800 | $ 183,800 | |

**Screenshot 28**. FOTP Analysis – Summary other costs and the entered assumptions that produced them on the “Other Costs” worksheet. Note that only the first part of the 20-year analysis is shown.

## "Working Capital" Worksheet (light-blue tab)

The "Working Capital" worksheet calculates the amount of working capital required by year. Working capital is the funding needed for short-term financing of cash on hand, accounts receivable, inventory, etc. Working capital is defined by the formula:

Working capital = Current assets – Current liabilities

In FOTP Analysis, working capital is set as a function of the current ratio.[19] The current ratio is defined as Current assets/Current liabilities. Average monthly revenue is taken as a proxy for current assets. Average monthly consolidated operating costs is taken as a proxy for current liabilities.

The current ratio affects the amount of working capital that is needed. An inbuilt assumption is that at the end of the 20-year planning period, the working capital can be recovered; but until then, it must be financed. If large grants come into the forest operations training program, then it is possible that working capital could be a positive number in any given year rather than a cost; but generally working capital will be a cost that must be financed through to the end of the planning period. A sample of the summary working capital calculations along with the targeted current ratio are shown (Screenshot 29):

| WORKING CAPITAL CALCULATIONS WITH A SENSITIVITY ANALYSIS SCALING FACTOR SET AT 100% | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Year | | |
| | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| Working capital required | | | | | | |
| Total coverage of current liabilities required with a current ratio at 2.0 | | (1,523,070) | (1,561,211) | (1,604,869) | (1,857,722) | (1,895,241) |
| Less: consolidated revenues | | 6,158,956 | 2,764,730 | 2,798,723 | 2,879,664 | 624,907 |
| Total working capital realized (required) | | $ 4,635,886 | $ 1,203,518 | $ 1,193,855 | $ 1,021,942 | $ (1,270,334) |
| Annual marginal working capital realized (required) | | $ 4,635,886 | $ (3,432,368) | $ (9,664) | $ (171,913) | $ (2,292,276) |
| Terminal working capital value | | | | | | |
| Total marginal working capital realized (required) | | $ 4,635,886 | $ (3,432,368) | $ (9,664) | $ (171,913) | $ (2,292,276) |
| Targeted current ratio (i.e., Current assets/Current liabilities) | 2.0 | | | | | |

**Screenshot 29**. FOTP Analysis – Summary working capital calculations and the targeted current ratio that produced them on the "Working Capital" worksheet. Note that only the first part of the 20-year analysis is shown here.

## *"Capital Equipment Library" Worksheet (grey tab)*

The "Capital Equipment Library" worksheet is a place where costs and equipment capacities may be stored for individual pieces of equipment and for typical equipment configurations. Information may be copied from the "Capital Equipment Library" and directly into the "Capital Equipment" worksheet so that the costs of different machine configurations may be easily

19 The required current ratio will generally be specified by the financial controller or chief accountant. A common current ratio target is 2.0; that is, current assets are valued at twice the amount of current liabilities. This will generally provide sufficient liquidity to meet short-term obligations.

compared. No user entries are required on this worksheet; the worksheet is provided for the convenience of the analyst so that different machine costs and configurations may be easily saved and incorporated into a costing analysis as desired.

### *GLOSSARY (DARK-GREY TAB)*

A glossary of key terms used in FOTP Analysis is included as the final worksheet tab in the workbook. This worksheet contains definitions for many of the terms used and is for user reference. There are no calculations, assumptions, or user-required entries on this worksheet.

## MODEL ASSUMPTIONS

Incorporated into any model are critical assumptions that have a significant impact on the results. If those assumptions are reasonable, then the model's results may be used as a reasonable guide. If those assumptions are not reasonable, then the model's results are useless.

Like all models, FOTP Analysis has some in-built assumptions.

- Inflation will affect all variables (except for depreciation) equally. Furthermore, all costs and revenues will increase annually at exactly the rate of inflation. If it is believed that some costs are increasing faster than others, they may be individually adjusted.
- All cash flows occur at the end of each year. This is a basic simplifying assumption that is common to most discounted cash flow analyses. In reality, cash flows occur throughout the year. However, the accuracy gained by trying to account for this is lost in all the other assumptions (e.g., student numbers, grant support, inflation rate, interest rates, salvage values, repair and maintenance costs, etc.) that must be made.
- Built into the capital equipment model is an assumption that the equipment will be replaced at the end of its economic life, which is measured in years. However, equipment maintenance depends on how intensively the equipment is utilized. Within FOTP Analysis, if the number of operating hours is increased, maintenance costs will increase along with other operating costs, but the economic life will not change.

## FOTP ANALYSIS LIMITATIONS

- While FOTP Analysis offers the option of leasing or purchasing the land and buildings for the training center, the program is not currently structured to account for the possibility of leasing some or all of the capital equipment used in the center.
- FOTP Analysis does not calculate the system capacity. That is, given a number of pieces of capital equipment, FOTP Analysis will not calculate how many students that equipment configuration could handle. Similarly, FOTP Analysis cannot be used to tell what system configuration will work best for training.
- FOTP Analysis is set up to automate a number of calculations related to the cash flows generated by a forest operations training center. As with all computer programs, the outputs are only going to be as good as the input data. If the results of the model are not believable,

there is probably a very good reason for it and the input data and assumptions should be carefully checked.

- FOTP Analysis is configured now to calculate the costs for one course. If a program had several course streams with different costs or time requirements, then FOTP analysis would need to be run for each stream separately. In that case, general administrative overhead costs would have to be allocated between the course streams.

## CONCLUSIONS

FOTP Analysis is a large, powerful, and complex program. It can provide a pre-feasibility or financial feasibility analysis for a forest operations training program. It estimates cash flows for capital budgeting purposes. It can be used to estimate overall profitability or to calculate minimum tuition amounts required to still break even. The program can determine overall average training costs in an operation in which capital cost outlays are varied and infrequent. Extensive comments, warnings, and error messages throughout the worksheets help to explain the program and to minimize user errors.

The program can be used to plan hiring to balance fixed costs and overtime in order to minimize total wages costs. Built into the program is a feature to store capital cost data by machine type and equipment configuration so that costs of different options can be quickly compared. Sensitivity analysis scaling factors and cost contingency allowances are built in so that "what if" analyses may be quickly performed. Macros calculate break-even tuition and sensitivity analysis factors at the press of a button.

While FOTP Analysis is powerful, this power comes at a cost. The program is large and complex, and it requires a user familiar with forest operations and student training to provide realistic input data. While we attempted to make the program flexible and adaptable to a variety of situations, it may require customization for any specific situation. It will certainly require customized assumptions that are appropriate for each situation.

FOTP Analysis is designed to analyse a single course stream. If a forest operations training program has multiple course streams, then FOTP Analysis could be set up to run several times with appropriate assumptions entered into each run. If this is the case, then overhead costs applicable to all course streams would need to be allocated between the course streams.

FOTP Analysis requires someone familiar with financial feasibility analysis to understand which outputs are important for the tested scenario. As with any financial feasibility analysis, if the outputs look too good to be true, there may be something wrong with the input assumptions. However, these limitations notwithstanding, FOTP Analysis provides a powerful, flexible tool to determine the financial feasibility of such a program.

# REFERENCES

Bilek, E.M. (Ted). 2007. ChargeOut! Determining machine and capital equipment charge-out rates using discounted cash-flow analysis. U.S. Department of Agriculture, Forest Service. Forest Products Laboratory. General Technical Report FPL-GTR-171. 33 p. Available online: http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr171.pdf

USDA Forest Service. 2022. Confronting the Wildfire Crisis: A Strategy for Protecting Communities and Improving Resilience in America's Forests. U.S. Department of Agriculture, Forest Service. FS1187a. January. 47 pp.
Available online: https://www.fs.usda.gov/sites/default/files/Confronting-Wildfire-Crisis.pdf
Downloaded: April 6, 2022.

USDA Forest Service. 2022. Confronting the Wildfire Crisis: A 10-Year Implementation Plan. U.S. Department of Agriculture, Forest Service. FS1187b. January. 13 pp.
Available online: https://www.fs.usda.gov/sites/default/files/Wildfire-Crisis-Implementation-Plan.pdf
Downloaded: April 6, 2022.

# APPENDIX I. WORKSHEETS AND USER INPUTS

## Title (green tab)

The "Title" worksheet contains the program's title, version, authors, and contact details. There are no user inputs or calculations on this worksheet.

## Introduction (green tab)

The "Introduction" worksheet contains background information on the program, what it does, how it is organized, and its limitations. There are no user inputs or calculations on this worksheet.

## Contents (green tab)

The "Contents" worksheet provides more detailed information on the workbook's individual worksheets and their contents. There are no user inputs or calculations on this worksheet.

## SUMMARY (yellow tab)

The "SUMMARY" worksheet contains the "bottom line" information: net present values, internal rates of return, break-even tuition student tuition and sensitivity analysis scaling factor calculations, and 20-year cash flows. In addition, it contains variable inputs to allow users to conduct a sensitivity analysis and to incorporate revenue and cost contingency allowances into the analysis.

**Year:** The operating year for the costing. The year entered here is also referred to as "Year 0." Year 0 is right now, today. Year 1 is exactly one year from today. Year 2 is exactly two years from today, etc.

**Program_name:** The name of the forest operations training program.

**Other identifying run codes:** Any other names or letters associated with the run to identify it.

**Sensitivity analysis scaling factors:** Percentages that may be varied up or down from 100 percent to test the sensitivity of the net present values, rates of return, and tuition to changes in various revenues and costs. These scaling factors are automatically carried through to their respective revenue and cost worksheets.

Note in this table that there is also a column of break-even scaling factors. These may be calculated by pressing the button, "Re-calculate break-even scaling factors," which will run a macro to do the calculations.[20]

[20] Alternatively, these sensitivity analysis break-even scaling factors may be calculated one at a time by selecting the cell containing the NPV calculation in the Revenue & Cost Summary table (B39), and going to Excel's

**Cost contingency allowances:** Percentages that may be varied up or down from 0 percent to allow for a cushion from the point estimates for various costs. While the cost contingency allowances work in a similar fashion to the sensitivity analysis scaling factors, they may be adjusted independently of the sensitivity analysis to allow for greater uncertainty regarding various costs.

**Initial student tuition:** The amount that's going to be charged in the first year of the course. This amount is transferred to the "Consolidated Revenues" worksheet to be incorporated into the analysis. The initial student tuition may either entered each year (and then the analyst must enter actual tuition amounts each year on the "Consolidated Revenues" worksheet, allowing for estimated increases over time), or it may be allowed to increase automatically by inflation. If it's increased by inflation, then the first year's tuition will be adjusted each year for whatever inflation assumptions have been entered on the "Gen. Assumptions" worksheet.

**Discount rate assumptions:** The alternative rate of return (ARR) that is used in FOTP Analysis may be either entered or calculated. If it is entered, it may be either "Nominal before tax & finance" (including inflation) or "Real before tax & finance" (without inflation included). If the ARR is calculated, then a desired nominal premium on risk capital must be entered. From these entries, nominal and real alternative rates of return are calculated that are used in the analysis.

**IRR Test:** The IRR Test is a starting point for the computer's internal rate of return (IRR) calculation. A normal default would be 10 percent. However, if the IRR is undefined or if the cash flows in the summary cash flow table are negative at some other time than at the start, it is advisable to do some tests with some extreme values, both positive and negative, to test for extremely high or low IRRs or for multiple IRRs.

Note that IRR is defined simply as the interest rate or an interest rate at which net present value (NPV) = $0. Any series of cash flows may have either zero, one, or multiple IRRs, which may be positive or negative, depending on the nature of the cash flow series. Mathematically, there are as many IRRs as there are sign changes in the cash flow series. For example, if a cash flow series starts out negative and then turns positive after some time, there is only one IRR. However, if the series starts out negative, turns positive, then negative again before finally turning positive, then the series could have three IRRs — and all of them valid.

A unique IRR may also be either positive or negative infinity (i.e., if all of the cash flows are either positive or negative). That is why this "Test" number may be needed and useful for understanding and interpreting the analysis.

---

"Goal Seek" function (Data—What-If Analysis—Goal Seek) set Net cash flow =0 by changing each Scaling factor used in the analysis (in Column K).

**Scaling factor mid-points and incremental adjustment factor:** These two variables are in the "Whisker Plot Sensitivity Analysis Data and Calculations" table. They are used to adjust the x-axis in the revenues and costs and expenses scaling factor graphs above the table.

**Nominal before tax and finance ARR mid-point and incremental adjustment factor:** These two variables are in the NPV sensitivities to discount rates table. They are used to adjust the x-axis in the sensitivity of net present value to discount rate changes chart to the right of the table.

## Gen. Assumptions (blue tab)

The "Gen. Assumptions" worksheet contains most of the general assumptions — assumptions that are used as inputs on more than one worksheet. Entering these assumptions here will change them automatically throughout the model.

### ENTERED GENERAL ASSUMPTIONS

**Expectations for Total and Funded Student Numbers:** These expectations are entered as text assumptions from pull-down menus. They are entered individually for the first three years and then one entry for years four and beyond.

**Expected student number assumptions:** These are the assumptions related to total student numbers. There are seven choices from the pull-down menus: Low, Med-low, High-low, Average, Low-high, Med-high, and High. These pull-down choices relate to the ranges for total student numbers per year assumptions entered below this table.

**Expected percent of total students funded:** These are the assumptions related to total student numbers. There are seven choices from the pull-down menus: Low, Expected, and High. These pull-down choices relate to the Funded Students Percentages and Assumptions entered below this table.

**Ranges for total student numbers per year:** These are the numerical entries that relate to the expected student number assumptions above. They enable an analyst to fine-tune ranges.

**Funded Student Percentages and Assumptions:** These are the assumptions relating to student funding sources. There are options for six different funding sources. In this table. Three estimates for the percent of total students funded (that is, the percentage of the student body that will receive funding) must be entered as "Low," "Expected," and "High" estimates. In addition, the percent of funded students receiving funding from each specified funding source must be entered. Once this is done, the percentages of students receiving funding from each funding source will be calculated and these numbers will be multiplied by the total number of students to determine the number of students receiving funding from each source.

**Course Assumptions**: The course length, training days/week, student contact hours per day, and course streams per year are entered here.

**Interest rates**

**Bank deposit rate:** This is the effective annual interest rate[21] received for savings at the bank. It is a nominal rate. That is, it includes inflation. The bank deposit rate is used in the determination of the before-tax nominal alternative rate of return on the "SUMMARY" worksheet if that return is "Calculated."[22]

**Bank lending rate:** This is the basic commercial credit rate open to the owners. It is an effective annual nominal rate. Here, an average rate should be used reflecting both the short-term financing required for day-to-day operations and working capital and any longer-term financing required for capital equipment loans. The bank lending rate is used in the costings for chattels.

**Inflation rate:** The forecast average annual rate of inflation for costs and revenues in the forest operations industry. An appropriate inflation rate should be based on forecasts for the industry, rather than on general consumer products inflation.
The inflation rate is important because it affects the real alternative rate of return. Built into the model is the assumption that all cash costs and all revenues will increase at the specified inflation rates.

FOTP Analysis allows variable inflation rates for the first three years of the program's operation. After that, annual inflation is assumed to be constant at the value entered for Year 4.

**Time to construct and start up (in months):** This is the time it takes to construct the sort yard and make it operational. All start-up costs are compounded forward to the start-up date (Year 0).

***Ad valorem* (property tax) mill rate ($/$1,000):** The tax rate that applies to real property, chattels, and capital equipment. *Ad valorem* taxes are expressed as a mill rate, that is, $/$1,000. For example, a mill rate of 32 represents an annual tax of $32 for every $1,000 of net asset value. *Ad valorem* taxes are on the current value of land and buildings, and on the book value of chattels and capital equipment.

---

21 The effective annual interest rate is the rate which would be charged if payments were received or due only once, at the end of each year.

22 If the alternative rate of return on the SUMMARY worksheet is "Calculated," the nominal alternative rate of return is the sum or the desired nominal premium on risk capital, which is entered on the SUMMARY worksheet, and the bank deposit interest rate, which is entered on the "Gen. assumptions" worksheet.

## Consolidated Revenues (burnt-orange tab)

The "Consolidated Revenues" worksheet calculates the total revenue for each year of the planning period. Assumptions regarding all of the course revenues are entered on this sheet. The Course Revenue Assumptions are broken down into four categories:

1. Per-student revenue: Tuition and student funding that goes to the forest operations training course are examples of the types of revenue that would be entered here.
2. Block funding revenue: Direct grants to the institution from various governments or industry associations would be entered here.
3. Program revenue: Revenue from performing forest health operations and other program revenue.
4. Other revenue.

Per-student Revenue is adjusted each year for the number of students going through the course. Block Funding Revenue is used to account for grants and other block funding. Program Revenue comes from any income earned from forest operations. And Other Revenue is used to account for any revenue not otherwise classified.

These revenue sources may all be entered directly. Alternatively, they may be made to be functions of externally linked worksheets on which the revenues are calculated. In addition, for each of the revenue streams, the choice must be made in the next table whether to take the revenues as entered by the analyst, or to automatically inflate the first year's revenue source by inflation. If no choice is made, then the revenue assumptions will be taken as entered.

## Consolidated Operating Costs (dark-blue tab)

There are no user-defined inputs on the "Consolidated Operating Costs" worksheet. This worksheet consolidates the operating costs from all the subsidiary costing worksheets.

## Land&Bldg (light-blue tab)

The "Land&Bldg" worksheet provides the costing information for the real estate required to run the course. The user-defined inputs on this worksheet are broken down into various input tables:

**Payment method**: The first choices relate to the payment method for the land and building. The choices are "Purchase" or "Lease." One method should be selected with a check (√) or an "x."

**Terminal values:** If either land or building is purchased, then the choice must also be made as to whether the terminal values that are included are "Book" or "Current." NOTE: if the land and building are both purchased, then this entry will be "greyed out," indicating that it is not needed in the analysis.

**Land:** The inputs for the land costing are:

**Land & non-depreciable improvements purchase price ($/acre):** The cost of the land, including non-deductible improvements. Such improvements include "… public utility initial clearing and grading land improvements as specified in Rev. Rul. 72-403, 1972-2 C.B. 102" (Internal Revenue Service. 2000. Table B-1. P.90). NOTE: if the land is leased, then this entry will be "greyed out," indicating that it is not needed.

**Land area required (acres):** The land area required for the course stream.

**Real annual increase (decrease) in land value:** This is to allow for increases or decreases in land prices that are faster than inflation. The real increase (decrease) is in addition to inflation. If land changes in value at the same rate as inflation, then this value should be 0 percent.

**Annual land lease cost ($/acre):** This figure is not needed if the land is purchased.

**Annual R&M expense (pct. of current capital value):** The expense for repairs and maintenance on the land (e.g., ploughing, fire protection, etc.).

**Annual insurance expense (pct. of current capital value):** The expense for property insurance on the land.

**Buildings**

**Real annual increase (decrease) in building value:** This is to allow for increases or decreases in building values that are faster than inflation. The real increase (decrease) is in addition to inflation. If buildings change in value at the same rate as inflation, then this value should be 0 percent.

**Annual building lease cost ($):** This figure is not needed if the building is purchased.

**Annual R&M expense (pct. of current capital value):** The expense for repairs and maintenance on the buildings.

**Annual insurance expense (pct. of current capital value):** The expense for property insurance on the buildings.

**Depreciation Expense**

**Depreciable land improvements:** Depreciable land improvements include roading, fences, a water system, and other improvements. Data must be entered regarding the assets' initial values and economic lives. The IRS allows depreciation expense using either straight line or declining balance depreciation on depreciable land improvements. If declining balance depreciation is used, then the maximum allowable declining balance factor is 150 percent.

**Buildings:** The IRS allows only straight-line depreciation over either 39 years or 50 years to be used for buildings.

**Initial building purchase/construction cost:** The cost to purchase or construct the building.

## Capital Equipment (light-blue tab)

The "Capital Equipment" worksheet calculates the capital equipment costs used by the training center. Data for the machines can be entered individually by machine type. Alternatively, it can be entered by system configuration from the "Capital Equipment Library" worksheet. First come some general assumptions:

**Entered General Assumptions**

**Depreciation method:** A code for the depreciation method used. The methods and the codes are the same as for chattels (above). Note that the depreciation codes under the individual pieces of capital equipment may be entered separately. However, they are presented in **black** because they are linked to the depreciation method input in the General Entered Assumptions. Usually the depreciation method used will be the same for all pieces of capital equipment. For tax purposes, capital equipment may be depreciated using either straight line or declining balance depreciation. The depreciation codes are:
- DB – declining-balance (note that it will automatically switch to straight line depreciation if the latter offers a higher write-off)
- SLA – Straight-line (MACRS life, accelerated)
- SLADS – Straight-line (Alternative depreciation system)
- SLEL – Straight-line (economic life)[23]
- K – "K"ustom[24]

**Capital equipment insurance:** A percentage of the purchase price to account for the insurance expense on the equipment.

**Diesel fuel cost:** This is the cost of fuel for the equipment. Note that road-use taxes would not be included in the fuel cost for off-road equipment, but delivery costs to the worksites would need to be included.[25]

**Oil cost:** This is to account for the oil cost.

**Terminal values are:** The method for determining terminal values comes from a pull-down menu. The choices are either "Book" or "Current." Book is the historic cost, less the IRS-

[23] Straight-line depreciation over an asset's economic life is not an IRS-approved method.

[24] The IRS would only approve "Custom" depreciation if it followed an IRS-approved method.

[25] Given how much fuel prices change over time, we believe that providing different prices for off-road and on-road diesel equipment over the 20-year planning horizon, would add yet more variables and complexity and would be at best spurious accuracy.

allowed depreciation. “Current” is the historic cost, plus inflation, less real (i.e., inflation-adjusted) depreciation.

**Entered Assumptions by Capital Equipment Type**

**System description name:** This is to identify the combination of equipment used. The name for this equipment configuration is entered here because different configurations may be stored under different names in the “Capital equipment Library” worksheet.

**Capital equipment name:** The name of the equipment used.

**Initial cost:** The Year 0 cost of the equipment. Note that the replacement cost of this equipment will be increased for inflation as the equipment wears out and is replaced at the end of its economic life.

**GDS life (years):** The equipment’s’ depreciable life under the general depreciation system (see: IRS Publication 946).

**ADS life (years):** The equipment’s’ depreciable life under the alternative depreciation system (see: IRS Publication 946).

**Economic life (hours):** The equipment’s’ practical operating life in hours. The expected operating life (hours) is used in calculating repairs and maintenance costs. The economic life in hours divided by the economic life in years provides an economic constant hours/year. If the equipment is used more than this rate, then repairs and maintenance will be increased.

**Economic life (years):** The equipment’s’ practical operating life in years. The expected operating life (years) is used in calculating repairs and maintenance costs. It is also used to determine the year(s) in which the equipment will be replaced.

**Salvage estimate:** Used for current value calculations. Also used to determine capital gains or losses when the equipment is sold. The salvage estimate is the estimated value, in Year 0 dollars, at the end of the equipment’s economic life. These values are automatically increased for inflation.

**Horsepower:** The size of the diesel engine. The size of the engine, combined with the fuel consumption rate provides the hourly fuel consumption (gal./hour).

**Fuel consumption (gal./Hp/hr.):** The rate of fuel consumption. The rate of fuel consumption, combined with size of the engine, in horsepower, provides the hourly fuel consumption (gal./hour).

**Oil & lube (% of fuel):** Oil and lube cost is a percent of total fuel cost.

**Other annual costs ($/year):** Any other annual costs.

**Avg. annual R&M (%):** Average annual repairs and maintenance are an estimated percentage of the economic life depreciation. To provide an allowance for increased repairs and maintenance costs if the equipment is used more heavily, repairs and maintenance will be increased if the equipment is used more hours than its average annual economic rate (the economic life in hours divided by its economic life in years). R&M will be decreased if the equipment is used fewer hours than its average annual economic rate.

**Year of cost update:** This is to provide a reference year for the analyst with respect to the cost figures shown.

**Declining balance factor:** The declining balance factor is only used if declining balance is the depreciation method that is used. Otherwise, the declining balance factor will be greyed out. Using a declining balance factor of 200 percent allows for a faster write-off and greater tax savings in the early years of a capital asset's use, provided that there is sufficient offsetting revenue. The IRS also allows a factor of 150 percent.

**Other Entered General Assumptions by Capital Equipment Type**

**No. used**: The number of pieces of capital equipment of each type that are used.

**Days used for each XX-day course (where XX=the specified course length imported from the "Gen. assumptions" worksheet):** The number of days that each piece of equipment is used over each course. Note that this figure is per piece of equipment.

**Daily operating hours per piece of equipment:** The number of hours that each piece of equipment can be operated. Note that if assumptions are that equipment is being operated for more daily hours than there are student contact hours then warnings will appear.[26]

**Required hours per student:** The number of hours that each student is required to operate each piece of equipment. Note that if more student operating hours are required than are available, then warnings will appear.

**Repairs & maintenance scaling factors:** These scaling factors change repairs and maintenance based on how many hours the equipment is used. R&M is commonly entered as a percentage of the straight-line depreciation. This might be a reasonable ballpark estimate, but in reality R&M is not fixed according to depreciation. Although there are many variable factors contributing to it, including equipment age, operators, abuse, terrain, etc., it is also reasonable to consider that if the number of operating hours increases, that R&M will also increase. Alternatively, for a piece of equipment that's going to only be lightly used, its R&M might be lower than a fixed amount based on straight-line depreciation.

If the number of operating hours is going to be more than this standard amount, or if it is anticipated that students are going to be harder on the capital equipment during this time, then the budgeted R&M can be increased by making these factors greater than 1.00.

---

[26] This is set as a warning, rather than an error because it may be acceptable for machines to be operated outside of regular contact hours. For example, simulators students might be operated after regular contact hours.

If the number of operating hours is going to be less than this standard amount, or if it is anticipated that the capital equipment is going to be in better shape during this time (for example, due to the extra attention from the students in a forest equipment maintenance course stream), then the budgeted R&M can be decreased by making these factors less than 1.00.

The stock calculation divides the scheduled hours by the yearly economic hours (the yearly economic hours is the economic life in hours divided by the economic life in years). If the equipment is to be used more heavily than its annual economic hours would suggest is appropriate, than R&M is increased proportionately. If the equipment is to be used less heavily than its annual economic hours would suggest is appropriate, than R&M is decreased proportionately.

## Course Admin. (light-blue tab)

The "Course Admin." worksheet contains costs that account for the salaried and hourly employees, and fixed overhead costs associated with administering the course.

**Salaried employees hired:** The number of salaried employees hired each year by employee classification. There are spaces for up to 12 different types of salaried employees.

**Hourly employees hired:** The number of hourly employees each year by employee classification. There are spaces for up to 12 different types of hourly employees.

**Hours required per hourly employee**: The number of hours per year that each hourly employee will be required. These hours can be individually entered, or they can be linked to another cell, for example the number of operating hours in the first shift on the "General Assumptions" worksheet. Note that if hourly employees are being required to work more hours than are available in a year, that warnings will appear beneath this table.

**Fixed costs per salaried employee (Year 0):** Fixed costs include full-time salary, a retirement percent, a perks percent (e.g., company vehicle), health insurance, liability insurance, and other costs for each salaried employee classification. All costs are in Year 0 dollars. In this table, the percentage of the salaried employees' annual time devoted to the project is also entered for Years 1–3 and for Year 4 and beyond. The full-time salary and all costs are allocated proportionally according to the percentage of time devoted to the project.

**Costs per hourly employee (Year 0):** The costs per hourly employee include the unadjusted hourly wages set as dollar amounts, and holiday pay, vacation pay, sick leave, and other allowances set as percentages of unadjusted hourly wages. These percentages may be entered directly or may be set as calculations based on the number of federal holidays specified in the table, "STANDARD WORK HOURS PER HOURLY WORKER," which follows. The sum of the unadjusted hourly wages and the adjustments gives the adjusted hourly wages, to which are added additional allowances for retirement (as a percent of total wages), and health insurance, liability insurance, and other costs (as fixed dollar amounts) and an overtime factor that is applied to all hours over the "Standard workday hours/year" that is calculated in the next table.

**Standard Work Hours Per Hourly Worker:** This is the calculation for available work hours at standard hourly pay (the adjusted hourly wage rates calculated above). After working for this many hours, overtime must be paid. The required inputs are:

**Days/year:** Usually this number will be 365.

**Less: Holidays:** these are statutory holidays. There are eleven annual U.S. federal holidays (see: U.S. Code Title 5 Section 6103). However, the United States Congress has no authority to create "national holidays." As a result, not all federal holidays are recognized in all states.

**Less: Weekend days:** Although workers may be required to work on weekend days, or more than five days/week, these are days for which an employee working will be paid an overtime allowance.

**Less: Vacation days (optional):** These are the workers' annual vacation days.

**Less: Allowed sick days (optional):** These are the expected days that workers will not be on the job due to illness.

**Standard work hours/day:** This is the standard number of hours per day for the number of days that the program is operating in the year. Above this standard, overtime will be paid.

**Available Overtime Hours Per Hourly Worker:** Available overtime hours per worker calculates the number of hours that workers could earn their adjusted hourly wage rates plus an overtime allowance. The required inputs are:

**Maximum work days/year:** The number of days that a worker could potentially work. NOTE: This cannot be greater than 365, although realistically it should be much less.

**Maximum work hours/day:** The maximum time that a worker could possibly work. NOTE: This cannot be greater than 24, although realistically it should be much less.

**Labor Taxes:** This is the table providing inputs for the taxes that must be paid by employers. These include Social Security, Medicare, and Unemployment taxes at the Federal level and Unemployment and Workers' compensation at the state level.

**Social Security taxes:** Social Security taxes are federal taxes that apply to both hourly wages and administrative salaries. The percentage applied as well as the maximum income that is taxed are entered. Note that this calculation does not incorporate the impact of individual workers' decisions regarding flexible spending accounts.

**Medicare:** Medicare is a federal tax on wages and salaries.

**Workers' compensation:** Workers' compensation is a tax on wages and salaries that varies by state.

**Unemployment insurance:** Unemployment insurance is a tax on wages and salaries with federal and state components. The federal component is similar to Social Security in that there is a percentage and a maximum wage or salary that is taxed. The state component may be structured in similar manner to the federal component, but rules and regulations will vary.

**Administrative Expense Assumptions:**

**Payroll expense ($/year per employee):** The annual cost per employee for payroll.

**Other clerical expense ($/year):** The total annual cost for other clerical expenses that may occur.

**Accounting ($/year):** The total annual cost for accounting (not including payroll and other clerical expenses accounted for above).

**Legal ($/year):** The total annual cost for legal expenses.

**Other professional fees ($/year):** The total annual cost for any other professional fees that will be incurred.

**Communications expenses:** Any communications expenses including telephone, fax, cell phones, Internet service, etc.

**Other periodic overhead expenses ($/year):** Includes space to enter costs such as utilities, overdraft cost estimates, miscellaneous marketing expenses, insurance, etc. These costs are expected to increase annually with inflation.

**Other one-off overhead expenses**: These costs are entered in the year in which they are expected to occur in Year 0 dollars (that is, what they would cost today). The costs will be automatically inflation adjusted.

**Program support supplies:** These are the costs in Year 0. These are supplies that are needed at start-up. After being consumed over their initial life, these supplies will be replaced at an average inflation-adjusted amount per year.

**Program support supplies life (years):** The initial life for program support supplies (above) and the number of years over which the program support supplies expenses will be averaged.

## Chattels (light-blue tab)

"Chattels" include all the long-term assets that go into a project that are not real estate or capital equipment. Chattels might include computers and peripheral equipment, office machinery, etc.[27] It is possible that all assets might be accounted for under the "Capital Equipment," "Course

[27] Although the term, "chattels" could also apply to inventory and loose tools, those assets are accounted for elsewhere.

Admin.," and "Supplies" worksheets. The "Chattels" worksheet allows more flexibility and perhaps more accurate costings for higher-valued assets that are not accounted for elsewhere.

The inputs required on the "Chattels" worksheet are:

**Insurance (pct. of replacement cost):** Insurance for the chattels.

**No. required:** The number of machines of each type that are needed.

**Cost/unit:** The Year 0 cost for the chattels.

**Annual R&M pct. of straight-line depreciation:** Repairs & maintenance as a percent of straight-line depreciation taken over the asset's economic life.

**GDS life (years):** The chattel's life using the general depreciation system. GDS values come from IRS tables. See for example: Department of the Treasury, Internal Revenue Service. 2000. Publication 946, "How to Depreciate Property."

**ADS life (years):** The chattel's life using the alternative depreciation system. ADS values come from IRS tables. See for example: Department of the Treasury, Internal Revenue Service. 2000. Publication 946, "How to Depreciate Property."

**Economic life (years):** The chattel's actual estimated useful life. The economic life may be greater or less than the depreciable life allowed by the IRS. The asset will be automatically replaced at the end of its economic life. The replacement price will be the original cost plus an inflation adjustment.

**Salvage estimate:** The estimated value, in Year 0 dollars at the end of the economic life. The salvage estimate is used for current value calculations. These values are automatically increased for inflation.

**Depreciation method:** A code for the depreciation method used. These are the same methods and codes used for other capital assets. Note that the depreciation codes under the individual chattels can be entered separately. However, they are presented in **black** because they are linked to the depreciation method input in the "General Entered Assumptions." Usually, the depreciation method used will be the same for all chattels. For tax purposes, chattels may be depreciated using either straight-line or declining-balance depreciation. The depreciation codes are:
- DB – declining-balance (note that it will automatically switch to straight line depreciation if the latter offers a higher write-off);
- SLA – Straight-line (MACRS life, accelerated)
- SLADS – Straight-line (Alternative depreciation system)

- SLEL – Straight-line (economic life)[28]
- K – "K"ustom[29]

**Declining-balance factor:** A percentage used in declining balance depreciation. With chattels, a maximum of 200 percent is currently allowed. This is known as "double declining-balance depreciation." Using a declining-balance factor of 200 percent allows for a faster write-off and greater tax savings, provided that there is sufficient offsetting revenue. The IRS also allows a factor of 150 percent.

## Supplies (light-blue tab)

The "Supplies" worksheet is designed to account for general consumables, such as general accessories for the crew. Supplies could include the fire and safety equipment. Although these supplies would be itemized and depreciated as chattels for accounting purposes, they are likely to be only a small proportion of the total costs.

There are possibilities for three different categories of supplies, each category with its own initial life (and average useful life), and specification as to whether the cost category is subject to inflation.

## Wrap-around Services (light-blue tab)

The "Wrap-Around Services" worksheet accounts for costs relating to student support services. Such costs could include lodging, meals, transportation, and other services. The assumptions required for this worksheet are of course the number of students requiring each of the services each year and the services' initial costs. The costs will be increased automatically each year with inflation.

## Other Costs (light-blue tab)

"Other Costs" is a catch-all for costs that have not been entered elsewhere. These costs are all entered individually. The costs will be increased automatically each year with inflation.

## Working Capital (light-blue tab)

The "Working Capital" worksheet contains the calculations for the short-term funding that the firm or organization requires to operate. In an accounting sense, working capital is defined as current assets minus current liabilities.

Current assets represent short-term funds that are expected to turn over within the next year. They are available to take advantage of immediate opportunities and to pay short-term obligations that are due. Cash on hand, accounts receivable, and inventory are usually the three largest components of current assets.

---

[28] Straight-line depreciation over an asset's economic life is not an IRS-approved method.

[29] The IRS would only approve "Kustom" depreciation if it followed an IRS-approved method.

Every firm needs to finance its current assets. The most common method of funding current assets is with current liabilities — short-term liabilities that are expected to be paid within the next year. Accounts payable and bank overdraft are the two most common forms.

If a firm or organization has insufficient working capital, a liquidity crunch could mean lost investment opportunities. At the extreme, it could mean that the firm is put into bankruptcy or receivership, even if it is otherwise profitable.

The current ratio, defined as current assets divided by current liabilities, is the only required input on this worksheet. The ratio affects the amount of working capital that is needed.

In FOTP Analysis:

- Average monthly revenue is taken as a proxy for current assets.
- Average monthly consolidated operating costs is taken as a proxy for current liabilities.

If a lot of revenue is being received in any given period, and there are more short-term assets available than are required to cover short-term liabilities, then working capital can be a positive number within the cash flows. For purposes of the cash flows within FOTP Analysis, working capital is paid back and considered to be a positive cash flow at the end of the 20-year planning period.

## CAPITAL EQUIPMENT LIBRARY

The "Capital Equipment Library" is the final worksheet in the model with user-entered variables. Its use is optional. It holds data on machinery and equipment and machinery and equipment configurations that might be used in a forest operations training program. Data for the machines may be entered individually by machine type. Alternatively, data may be entered by system configuration. The data in the capital equipment library is meant to be copied and pasted into the table, "Entered assumptions by capital equipment type" on the "Capital Equipment" worksheet as needed.

**System description name:** This is to identify the combination of equipment used.

**Capital equipment name:** The name of the equipment used.

**Initial cost:** The Year 0 cost of the equipment. Note that the replacement cost of this equipment will be increased for inflation.

**GDS life (years):** The equipment's depreciable life under the general depreciation system (see: IRS Publication 946).

**ADS life (years):** The equipment's' depreciable life under the alternative depreciation system (see: IRS Publication 946).

**Economic life (hours):** The equipment's practical operating life in hours. The expected operating life (hours) is used in calculating its repairs and maintenance costs. The economic life in hours divided by the economic life in years provides an economic

constant hours/year. If the equipment is used more than this rate, then repairs and maintenance will be increased.

**Economic life (years):** The equipment's practical operating life in years. The expected operating life (years) is used in calculating repairs and maintenance costs. It is also used to determine the year(s) in which the equipment will be replaced.

**Salvage estimate:** Used for current value calculations. Also used to determine capital gains or losses when the equipment is sold. The salvage estimate is the estimated value, in Year 0 dollars, at the end of the equipment's economic life. These values are automatically increased for inflation.

**Horsepower (hp):** The size of the diesel engine. The size of the engine, combined with the fuel consumption rate provides the hourly fuel consumption (gal./hour).

**Fuel consumption (gal./hp/hr.):** The rate of fuel consumption. The rate of fuel consumption, combined with size of the engine, in horsepower, provides the hourly fuel consumption (gal./hour).

**Oil & lube (% of fuel):** Oil and lube cost is a percent of total fuel cost.

**Other annual costs ($/year):** Any other annual costs.

**Avg. annual R&M (%):** Average annual repairs and maintenance are an estimated percentage of the economic life depreciation. Repairs and maintenance will be increased if the equipment is used more hours than its average annual economic rate (the economic life in hours divided by its economic life in years). It will be decreased if the equipment is used fewer hours than its average annual economic rate.

**Year of cost update:** This is for the reference of the user only to know how recent the costings are. It is not used in any of the calculations.

# APPENDIX II. SAMPLE OUTPUT FROM FOTP ANALYSIS

This appendix contains samples of the following from the FOTP Analysis:

- Title Page
- Contents
- Summary
- General Assumptions

# FOREST OPERATIONS TRAINING PROGRAM (FOTP) FINANCIAL ANALYSIS

Version: NAU 1.01

By E.M. (Ted) Bilek* and Han-Sup Han**



* E.M. (Ted) Bilek is Principal Consultant, Driftless Consulting, Mt. Horeb, Wisconsin
Contact: ted.bilek@gmail.com. Phone: 608-437-2612

** Han-Sup Han is Professor/Director of Forest Operations and Biomass Utilization, Ecological Restoration Institute, Northern Arizona University, Flagstaff, Arizona
Contact: Han-Sup.Han@nau.edu

**GENERAL WARNINGS**

- The input data provided are for illustrative purposes only.
  They should not be taken to represent the activities of any forest operations training program.
- The input data provided will need to be modified to represent the activities of any training program.

**DISCLAIMERS**

- This model is released on an "as is" basis. Although the author has extensively tested the model, it is not guaranteed to be free of errors under all calculation scenarios.
- The results of the model will only be as good as the input data.
  If the input data are poor, the results cannot be expected to be reliable.
- All financial planning models involve forecasts of the future.
  The results of the model will only be as valid as those forecasts.
  Conditions may change to make the forecasts invalid (e.g., labor becomes unavailable so that wages have to increase rapidly, a fire shuts down operations or training sites unavailable, support for the school changes so that subsidies increase or decrease, interest rates change, etc.
  Although the model enables a sensitivity analysis to be run to see which of the forecast variables are the most critical to the model's results, if the forecasts are invalid, the model's results will also be invalid. The model should then be re-run.
  Neither the authors nor NAU will accept any liability resulting from loss due to reliance on the model's results.
  However, the authors hope that use of the model will provide improved information for decision-making in the set-up and operation of forest operations training programs.

Please report any errors or suggestions for improvements directly to the authors.

# FOTP FINANCIAL ANALYSIS: WORKBOOK CONTENTS

**SUMMARY**: a summary of all the financial and physical measures.
The SUMMARY worksheet also contains the input for the discount rate assumption, the inputs for a sensitivity analysis, and contingency factors that can be incorporated for a quick "what if" analysis. There is an entry on the SUMMARY worksheet for the initial per student tuition in the first year with the option to be chosen of whether to enter this amount for each project year or to increase this first-year tuition each year by inflation. Macro button allow the automatic calculation of the break-even initial student tuition and the sensitivity analysis factors.
At the bottom of the SUMMARY worksheet are two "whisker plot" analyses.

**SUMMARY cash flows** a line graph showing annual cash flows before finance and tax.

**SUMMARY REVENUES pie:** a pie chart showing the discounted summary revenues

**SUMMARY COSTS pie:** a pie chart showing the discounted summary costs

**Gen. Assumptions**: the general assumptions worksheet contains all assumptions that are inputs to more than one subsequent worksheet.

**Consolidated Revenues**: all the revenues brought together.

**Consolidated Operating Costs**: this worksheet contains the costs consolidated from the subsequent subsidiary costing worksheets.

**Land&Bldg.**: land and building is the area required for operation. It may be leased or purchased. The cost includes repairs and maintenance.

**Capital Equipment**: this is the rolling equipment used in the forest operations training course.

**Course Admin**.: these are the administration costs and overheads, including the costs for instructors.

**Chattels**: chattels contains the depreciable office equipment.

**Supplies**: supplies that are used up over the course of a year

**Wraparound services**: these are expenses that some students may need to be provided in order for them to attend the program. They include lodging, meals, and other services.

**Other costs**: contains miscellaneous other costs.

**Working capital**: calculations determining the amount of working capital needed each year.

**Capital equipment library**: this worksheet allows equipment specifications to be saved by equipment type and also by equipment configurations.
Data from this worksheet may be pasted into the capital equipment worksheet to quickly change equipment configuration scenarios.

**Glossary**: this worksheet contains definitions for many of the terms used in FOTP Analysis.
This worksheet contains no assumptions or calculations.

**SUMMARY FINANCIALS STARTING IN** 2023 **FOREST OPERATIONS TRAINING PROGRAM**

Forest Equipment Operations Stream Test 1 **Arizona Mechanized configuration**

**IMPORTANT! Assumptions in blue must be entered.**

## TRAINING INDICATORS

| | Normalized avg. per year | Normalized avg. per student |
|---|---|---|
| Students trained (number) | 164 | 1 |
| Student-days in training (number) | 13,096 | 80 |
| Student contact hours (number) | 78,577 | 480 |
| Student training costs | $ 1,884 thousand | $ 8,642 |

**Initial Student tuition (per student)** $ 500

**Break-even Student tuition (per student)** $ 279

Re-calculate break-even student tuition

**Check one below:**

**Use student tuition as entered on the Consolidated revenues worksheet:** √

**Increase initial student tuition annually by inflation:**

**WARNING! If any assumptions are changed, re-calculate the break-even student tuition.**

**WARNING! Make sure that student tuition assumptions are entered for all years on the Consolidated revenues worksheet.**

## REVENUE & COST SUMMARY

| | Before-tax PV at 4.00% ($000) | Annualized PV at 4.00% ($000) | $/Student | As a percentage of gross margin |
|---|---|---|---|---|
| Gross revenue | | | | |
| Student tuition | $ 1,083 | $ 80 | $ 366 | 4% |
| Other student-based revenue | 3,232 | 238 | 1,091 | 12% |
| Subtotal: Gross student-based revenue | $ 4,315 | $ 318 | $ 1,456 | 17% |
| Less: Wrap-around student services | (3,077) | (226) | (1,039) | -12% |
| Subtotal: Net student-based revenue (loss) | $ 1,238 | $ 91 | $ 418 | 5% |
| Grants, donations, and other block-funding revenue | 23,668 | 1,742 | 7,989 | 91% |
| Program revenue | 879 | 65 | 297 | 3% |
| Other revenue | 176 | 13 | 59 | 1% |
| Subtotal: Gross margin | $ 25,960 | $ 1,910 | $ 8,762 | 100% |
| Less: Direct operating costs | (16,634) | (1,224) | (5,615) | -64% |
| Subtotal: Operating margin | $ 9,326 | $ 686 | $ 3,148 | 36% |
| Less: Fixed costs and overheads | (2,869) | (211) | (968) | -11% |
| Operating income (loss) | $ 6,457 | $ 475 | $ 2,179 | 25% |
| Less: Capital costs | (5,235) | (385) | (1,767) | -20% |
| Less: Working capital costs | (724) | (53) | (244) | -3% |
| Net cash flow (present values) | $ 497 | $ 37 | $ 168 | 2% |

| SENSITIVITY ANALYSIS SCALING FACTORS | Scaling factors used in the analysis | Break-even scaling factors |
|---|---|---|
| Student-based revenues | 100% | 89% |
| Grants, donations, and other block funding revenues | 100% | 98% |
| Program revenue | 100% | 43% |
| Other revenue | 100% | -183% |
| Land & buildings cost | 100% | 3,416% |
| Capital equipment cost | 100% | 104% |
| Course administration expense | 100% | 105% |
| Chattels expense | 100% | 461% |
| Supplies expense | 100% | 153% |
| Wraparound services expense | 100% | 116% |
| Other periodic costs | 100% | 117% |
| Working capital | 100% | 169% |

**WARNING! If any assumptions are changed, recalculate the break-even scaling factors.**

**NOTE: "N.A." = Not Applicable. The revenue or cost is $0 or so low to begin with, that the break-even scaling factor is meaningless.**

**WARNING! If nothing else changed, Break-even scaling factors highlighted in red indicate revenues that would have to be come costs, and costs that would have to become revenue sources in order for break-even to occur.**

Re-calculate break-even scaling factors

| REVENUE CONTINGENCY ALLOWANCES | |
|---|---|
| Student-based revenue | 0% |
| Grants, donations, & other block funding revenue | 0% |
| Program revenue | 0% |
| Other revenue | 0% |

| COST CONTINGENCY ALLOWANCES | |
|---|---|
| Capital costs | 0% |
| Direct operating costs | 0% |
| Fixed costs and overheads | 0% |
| Working capital | 0% |

## FINANCIAL INDICATORS

| | Net present value (NPV) ($000) | Nominal internal rate of return (IRR) | Real internal rate of return (IRR) |
|---|---|---|---|
| Before finance & tax at ARR (nominal) = 4.00% | $ 497 | 3.1% | 0.1% |
| | | IRR Test = | 10% |

**NOTE: The IRR on these cash flows may be infinately positive. Check the 'NPV sensitivities to discount rates' table below.**

**INITIAL COSTS***

| | | | |
|---|---|---|---|
| Total start-up costs (years 0 and 1): | $ | 232 | thousand |
| Total initial costs (years 0 through 3): | $ | (5,677) | thousand |

*** NOTE: These costs include working capital but do not include expected revenue.**

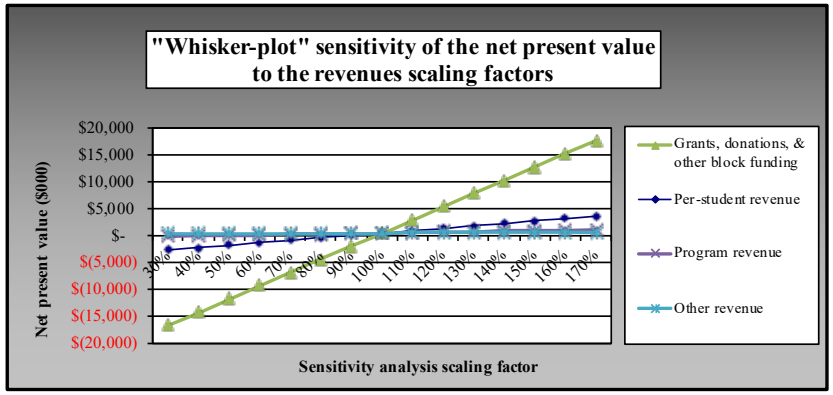
**DISCOUNT RATE ASSUMPTIONS**

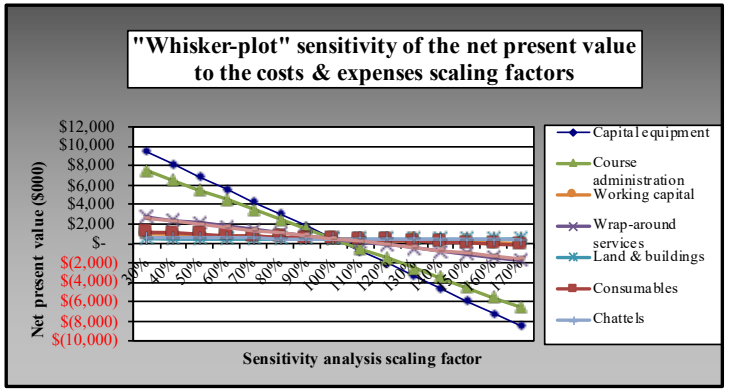
| | |
|---|---|
| Alternative rate of return (ARR) is… | Entered |
| Entered ARR rate basis is… | Nominal before tax & finance |
| Nominal before tax & finance ARR | 4.00% |

**ALTERNATIVE RATES OF RETURN (calculated)**

| | Nominal | Real |
|---|---|---|
| Before tax & finance | 4.00% | 0.97% |
| Twenty-year compound inflation rate used in the analysis | | 3.00% |

**NOTE**: Inflation rates are changed on the Gen. assumptions worksheet



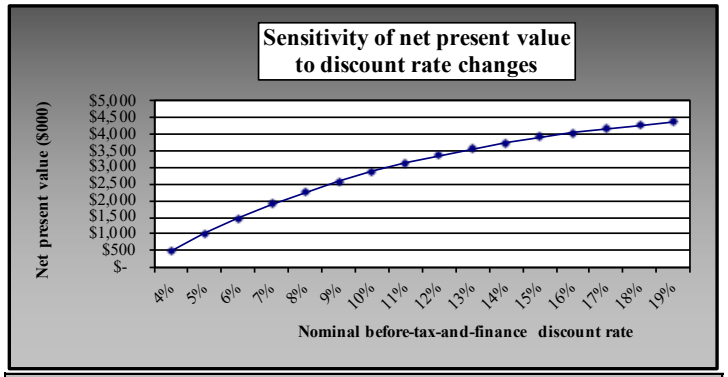
**Whisker Plot Sensitivity Analysis Data and Calculations** — *Revenues' Sensitivities*

| Per-student revenue scaling factor | **Per-student-revenue NPV ($000)** | Grants, donations, and other block funding revenues scaling factor | **Grants, donations, and other block funding revenues NPV ($000)** | Program revenue scaling factor | **Program revenue NPV ($000)** | Other revenue scaling factor | **Other revenue NPV ($000)** | Land & buildings expense scaling factor | **Land & buildings expense NPV ($000)** | Chattels expense scaling factor | **Chattels expense NPV ($000)** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30% | $ (2,635) | 30% | $ (16,654) | 30% | $ (118) | 30% | $ 374 | 30% | $ 508 | 30% | $ 594 |
| 40% | $ (2,187) | 40% | $ (14,204) | 40% | $ (30) | 40% | $ 392 | 40% | $ 506 | 40% | $ 580 |
| 50% | $ (1,740) | 50% | $ (11,754) | 50% | $ 58 | 50% | $ 410 | 50% | $ 505 | 50% | $ 566 |
| 60% | $ (1,292) | 60% | $ (9,303) | 60% | $ 146 | 60% | $ 427 | 60% | $ 503 | 60% | $ 553 |
| 70% | $ (845) | 70% | $ (6,853) | 70% | $ 234 | 70% | $ 445 | 70% | $ 502 | 70% | $ 539 |
| 80% | $ (398) | 80% | $ (4,403) | 80% | $ 322 | 80% | $ 462 | 80% | $ 500 | 80% | $ 525 |
| 90% | $ 50 | 90% | $ (1,953) | 90% | $ 410 | 90% | $ 480 | 90% | $ 499 | 90% | $ 511 |
| 100% | $ 497 | 100% | $ 497 | 100% | $ 497 | 100% | $ 497 | 100% | $ 497 | 100% | $ 497 |
| 110% | $ 945 | 110% | $ 2,948 | 110% | $ 585 | 110% | $ 515 | 110% | $ 496 | 110% | $ 484 |
| 120% | $ 1,392 | 120% | $ 5,398 | 120% | $ 673 | 120% | $ 533 | 120% | $ 494 | 120% | $ 470 |
| 130% | $ 1,840 | 130% | $ 7,848 | 130% | $ 761 | 130% | $ 550 | 130% | $ 493 | 130% | $ 456 |
| 140% | $ 2,287 | 140% | $ 10,298 | 140% | $ 849 | 140% | $ 568 | 140% | $ 491 | 140% | $ 442 |
| 150% | $ 2,735 | 150% | $ 12,749 | 150% | $ 937 | 150% | $ 585 | 150% | $ 490 | 150% | $ 429 |
| 160% | $ 3,182 | 160% | $ 15,199 | 160% | $ 1,025 | 160% | $ 603 | 160% | $ 488 | 160% | $ 415 |
| 170% | $ 3,630 | 170% | $ 17,649 | 170% | $ 1,112 | 170% | $ 620 | 170% | $ 487 | 170% | $ 401 |
| Scaling factor mid-points = | 100% | | | | | | | | | | |
| Incremental adjustment factor = | 10% | | | | | | | | | | |
| SLOPE/100 (calculated): | 44.7 | | 245.0 | | 8.8 | | 1.8 | | (0.2) | | (1.4) |
| SLOPE RANKING (calculated): | 2 | | 1 | | 3 | | 4 | | 8 | | 7 |
| Break-even scaling factor (from above): | 89% | | 98% | | 43% | | -183% | | 3,416% | | 461% |

**NPV sensitivities to discount rates**

| Nominal before tax & finance ARR | Net present value (NPV) ($000) |
|---|---|
| 4% | $ 497 |
| 5% | $ 1,015 |
| 6% | $ 1,477 |
| 7% | $ 1,889 |
| 8% | $ 2,256 |
| 9% | $ 2,582 |
| 10% | $ 2,872 |
| 11% | $ 3,130 |
| 12% | $ 3,358 |
| 13% | $ 3,560 |
| 14% | $ 3,738 |
| 15% | $ 3,896 |
| 16% | $ 4,034 |
| 17% | $ 4,155 |
| 18% | $ 4,261 |
| 19% | $ 4,353 |
| Nominal before tax & finance ARR mid-point = | 10% |
| Incremental adjustment factor = | 1% |

**NOTE: The NPV on these cash flows never goes negative. That means that the IRR on these cash flows may be infinately positive. Change the ARR mid-point and adjustment factor above to test further.**




**NOTE: The NPV on these cash flows never goes negative. That means that the IRR on these cash flows may be infinately positive.**

**NOTE: ENTERED ASSUMPTIONS END IN THE TABLE ABOVE. BELOW THIS, EVERYTHING IS CALCULATED.**

| | Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CASH FLOW SUMMARY ($000)** | *2023* | *2024* | *2025* | *2026* | *2027* | *2028* | *2029* | *2030* | *2031* | *2032* | *2033* |
| Net cash flows (from below) | $ (1,743) | $ 9,926 | $ (1,791) | $ 1,923 | $ 1,727 | $ (2,695) | $ (456) | $ (472) | $ (530) | $ (507) | $ (11,331) |
| **WARNING! Multiple changes in sign from positive to negative and back again in your cash flows above mean that there could be more than one internal rate of return.** | | | | | | | | | | | |

| **STUDENT THROUGHPUT** | *PV at 0.97%* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Students trained | | 44 | 76 | 120 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| Annualized average number of students trained | 164 | | | | | | | | | | |

| SUMMARY CASH FLOW TABLE ($000) | Year 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CAPITAL COSTS** | | | | | | | | | | | |
| Capital costs | (2,993) | - | - | (3) | (9) | (3) | (3) | - | (11) | (3) | (4,006) |
| Contingency allowance | - | - | - | - | - | - | - | - | - | - | - |
| Salvage values | | - | - | 1 | 1 | 0 | 1 | - | 1 | 1 | 400 |
| Terminal values | | | | | | | | | | | |
| **Net capital costs** | $ (2,993) | $ - | $ - | $ (2) | $ (8) | $ (3) | $ (2) | $ - | $ (11) | $ (3) | $ (3,605) |
| | | | | | | | | | | | |
| **REVENUES** | | | | | | | | | | | |
| Student-based revenue | | | | | | | | | | | |
| Student tuition | | 22 | 38 | 60 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| Other student-based revenue | | 46 | 117 | 180 | 270 | 270 | 270 | 270 | 270 | 270 | 270 |
| Subtotal: Gross student-based revenue | | $ 68 | $ 155 | $ 240 | $ 360 | $ 360 | $ 360 | $ 360 | $ 360 | $ 360 | $ 360 |
| Less: Wraparound student services | | (77) | (109) | (158) | (205) | (211) | (218) | (224) | (231) | (238) | (245) |
| Subtotal: Net student-based revenue (loss) | | $ (9) | $ 45 | $ 82 | $ 155 | $ 149 | $ 142 | $ 136 | $ 129 | $ 122 | $ 115 |
| Grants, donations and other block-funding revenue | | | | | | | | | | | |
| Grants | 1,500 | 6,100 | 2,782 | 2,797 | 2,813 | 563 | 580 | 597 | 615 | 633 | 652 |
| Donations and other block-funding revenue | - | 300 | 103 | 106 | 109 | 113 | 116 | 119 | 123 | 127 | 130 |
| Subtotal: Grants, donations, and other block-funding revenue | $ 1,500 | $ 6,400 | $ 2,885 | $ 2,903 | $ 2,922 | $ 675 | $ 696 | $ 716 | $ 738 | $ 760 | $ 783 |
| Program revenue | - | 50 | $ 52 | 53 | 55 | 56 | 58 | 60 | 61 | 63 | 65 |
| Other revenue | - | 10 | 10 | 11 | 11 | 11 | 12 | 12 | 12 | 13 | 13 |
| Subtotal: Gross margin | $ 1,500 | $ 6,451 | $ 2,992 | $ 3,049 | $ 3,143 | $ 892 | $ 908 | $ 924 | $ 941 | $ 958 | $ 976 |
| | | | | | | | | | | | |
| Direct operating costs | | | | | | | | | | | |
| Equipment operating costs | | (364) | (374) | (386) | (397) | (409) | (421) | (434) | (447) | (461) | (474) |
| Course administration and consumables | (250) | (417) | (521) | (536) | (646) | (665) | (685) | (706) | (727) | (748) | (763) |
| Contingency allowance | - | - | - | - | - | - | - | - | - | - | - |
| Subtotal: Direct operating costs | $ (250) | $ (781) | $ (895) | $ (922) | $ (1,043) | $ (1,074) | $ (1,106) | $ (1,140) | $ (1,174) | $ (1,209) | $ (1,238) |
| | | | | | | | | | | | |
| Subtotal: Operating margin | $ 1,250 | $ 5,670 | $ 2,096 | $ 2,127 | $ 2,100 | $ (183) | $ (199) | $ (216) | $ (233) | $ (251) | $ (261) |
| | | | | | | | | | | | |
| Annual fixed & overhead costs | | | | | | | | | | | |
| Annual land lease cost | (0) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) |
| Annual building lease cost | - | - | - | - | - | - | - | - | - | - | - |
| Land and buildings repairs and maintenance | | - | - | - | - | - | - | - | - | - | - |
| Other costs | | (186) | (187) | (189) | (191) | (193) | (195) | (198) | (200) | (202) | (204) |
| Insurance costs | (0) | (5) | (5) | (5) | (5) | (6) | (6) | (6) | (6) | (6) | (6) |
| *Ad valorem* (property) taxes | - | - | - | - | - | - | - | - | - | - | - |
| Contingency allowance | - | - | - | - | - | - | - | - | - | - | - |
| Subtotal: Annual fixed costs and overheads | $ (1) | $ (191) | $ (193) | $ (195) | $ (198) | $ (200) | $ (202) | $ (204) | $ (207) | $ (209) | $ (212) |
| | | | | | | | | | | | |
| **Operating income (loss)** | $ 1,249 | $ 5,479 | $ 1,903 | $ 1,932 | $ 1,902 | $ (382) | $ (401) | $ (420) | $ (440) | $ (460) | $ (473) |
| | | | | | | | | | | | |
| **Marginal working capital realized (required)** | | $ 4,447 | $ (3,694) | $ (6) | $ (167) | $ (2,310) | $ (53) | $ (52) | $ (79) | $ (44) | $ (7,253) |
| | | | | | | | | | | | |
| **Net cash flow** | $ (1,743) | $ 9,926 | $ (1,791) | $ 1,923 | $ 1,727 | $ (2,695) | $ (456) | $ (472) | $ (530) | $ (507) | $ (11,331) |

| **Figures for SUMMARY REVENUES Pie Chart** | Revenues: Present values at 4.00% ($000) | $/Student | As a percentage of gross revenue |
|---|---|---|---|
| Net student-based revenue (loss) | $ 1,238 | $ 418 | 5% |
| Grants, donations, and other block-funding revenue | 23,668 | 7,989 | 91% |
| Program revenue | 879 | 297 | 3% |
| Other revenue | 176 | 59 | 1% |
| Total revenues | $ 25,960 | $ 8,762 | 100% |

| **Figures for SUMMARY COSTS Pie Chart** | Costs: Present values at 4.00% ($000) | $/Student | As a percentage of total costs |
|---|---|---|---|
| Capital costs | $ 5,235 | $ 1,767 | 21% |
| Direct operating expenses | 16,634 | 5,615 | 65% |
| Fixed costs and overheads | 2,869 | 968 | 11% |
| Working capital | 724 | 244 | 3% |
| Total consolidated operating costs | $ 25,463 | $ 8,594 | 100% |

*Costs & Expenses' Sensitivities*

| Capital equipment expense scaling factor | **Capital equipment expense NPV ($000)** | Consumables expense scaling factor | **Consumables expense NPV ($000)** | Course administration expense scaling factor | **Course administration expense NPV ($000)** | Wrap-around services expense scaling factor | **Wrap-around services expense NPV ($000)** | Other annual costs scaling factor | **Other annual costs NPV ($000)** | Working capital scaling factor | **Working capital NPV ($000)** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30% | $ 9,440 | 30% | $ 1,152 | 30% | $ 7,528 | 30% | $ 2,730 | 30% | $ 2,579 | 30% | $ 1,004 |
| 40% | $ 8,162 | 40% | $ 1,059 | 40% | $ 6,524 | 40% | $ 2,411 | 40% | $ 2,281 | 40% | $ 932 |
| 50% | $ 6,885 | 50% | $ 965 | 50% | $ 5,519 | 50% | $ 2,092 | 50% | $ 1,984 | 50% | $ 859 |
| 60% | $ 5,607 | 60% | $ 872 | 60% | $ 4,515 | 60% | $ 1,773 | 60% | $ 1,687 | 60% | $ 787 |
| 70% | $ 4,330 | 70% | $ 778 | 70% | $ 3,511 | 70% | $ 1,454 | 70% | $ 1,389 | 70% | $ 715 |
| 80% | $ 3,052 | 80% | $ 685 | 80% | $ 2,506 | 80% | $ 1,135 | 80% | $ 1,092 | 80% | $ 642 |
| 90% | $ 1,775 | 90% | $ 591 | 90% | $ 1,502 | 90% | $ 816 | 90% | $ 795 | 90% | $ 570 |
| 100% | $ 497 | 100% | $ 497 | 100% | $ 497 | 100% | $ 497 | 100% | $ 497 | 100% | $ 497 |
| 110% | $ (780) | 110% | $ 404 | 110% | $ (507) | 110% | $ 178 | 110% | $ 200 | 110% | $ 425 |
| 120% | $ (2,058) | 120% | $ 310 | 120% | $ (1,511) | 120% | $ (141) | 120% | $ (97) | 120% | $ 353 |
| 130% | $ (3,335) | 130% | $ 217 | 130% | $ (2,516) | 130% | $ (459) | 130% | $ (395) | 130% | $ 280 |
| 140% | $ (4,613) | 140% | $ 123 | 140% | $ (3,520) | 140% | $ (778) | 140% | $ (692) | 140% | $ 208 |
| 150% | $ (5,890) | 150% | $ 30 | 150% | $ (4,525) | 150% | $ (1,097) | 150% | $ (989) | 150% | $ 136 |
| 160% | $ (7,168) | 160% | $ (64) | 160% | $ (5,529) | 160% | $ (1,416) | 160% | $ (1,287) | 160% | $ 63 |
| 170% | $ (8,445) | 170% | $ (158) | 170% | $ (6,533) | 170% | $ (1,735) | 170% | $ (1,584) | 170% | $ (9) |
| | | | | | | | | | | | |
| | (127.8) | | (9.4) | | (100.4) | | (31.9) | | (29.7) | | (7.2) |
| | 1 | | 5 | | 2 | | 3 | | 4 | | 6 |
| | 104% | | 153% | | 105% | | 116% | | 117% | | 169% |

[redacted]

| Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *2034* | *2035* | *2036* | *2037* | *2038* | *2039* | *2040* | *2041* | *2042* | *2043* |
| $ 6,653 | $ (623) | $ (579) | $ (631) | $ (680) | $ (709) | $ (684) | $ (749) | $ (761) | $ 2,448 |

**CASH FLOW SUMMARY ($000) Table (continued above)**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |

**STUDENT THROUGHPUT Table (continued above)**

| Year | | | | | | | | | | | Discounted | Pct. of |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | | total | gross margin |
| - | (15) | - | - | (9) | (14) | - | (4) | - | (5,398) | | (8,212.29) | -31.6% |
| - | - | - | - | - | - | - | - | - | - | | - | 0.0% |
| - | 1 | - | - | 1 | 1 | - | 1 | - | 539 | | 521 | 2.0% |
| | | | | | | | | | 5,380 | | 2,456 | 9.5% |
| $ - | $ (14) | $ - | $ - | $ (8) | $ (13) | $ - | $ (3) | $ - | $ 521 | | $ (5,235) | -20.2% |
| 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | | 1,083 | 4.2% |
| 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | | 3,232 | 12.5% |
| $ 360 | $ 360 | $ 360 | $ 360 | $ 360 | $ 360 | $ 360 | $ 360 | $ 360 | $ 360 | | $ 4,315 | 16.6% |
| (252) | (260) | (268) | (276) | (284) | (292) | (301) | (310) | (320) | (329) | | (3,077) | -11.9% |
| $ 108 | $ 100 | $ 92 | $ 84 | $ 76 | $ 68 | $ 59 | $ 50 | $ 40 | $ 31 | | $ 1,238 | 4.8% |
| 672 | 692 | 713 | 734 | 756 | 779 | 802 | 826 | 851 | 877 | | 21,719 | 83.7% |
| 134 | 138 | 143 | 147 | 151 | 156 | 160 | 165 | 170 | 175 | | 1,949 | 7.5% |
| $ 806 | $ 831 | $ 855 | $ 881 | $ 908 | $ 935 | $ 963 | $ 992 | $ 1,021 | $ 1,052 | | $ 23,668 | 91.2% |
| 67 | 69 | 71 | 73 | 76 | 78 | 80 | 83 | 85 | 88 | | 879 | 3.4% |
| 13 | 14 | 14 | 15 | 15 | 16 | 16 | 17 | 17 | 18 | | 176 | 0.7% |
| $ 995 | $ 1,014 | $ 1,033 | $ 1,054 | $ 1,074 | $ 1,096 | $ 1,118 | $ 1,141 | $ 1,164 | $ 1,188 | | $ 25,960 | 100.0% |
| (489) | (503) | (518) | (534) | (550) | (566) | (583) | (601) | (619) | (637) | | (6,388) | -24.6% |
| (786) | (810) | (834) | (859) | (885) | (911) | (938) | (966) | (995) | (1,024) | | (10,247) | -39.5% |
| - | - | - | - | - | - | - | - | - | - | | - | 0.0% |
| $ (1,275) | $ (1,313) | $ (1,352) | $ (1,393) | $ (1,435) | $ (1,478) | $ (1,521) | $ (1,567) | $ (1,613) | $ (1,661) | | $ (16,634) | -64.1% |
| $ (280) | $ (299) | $ (319) | $ (339) | $ (360) | $ (382) | $ (404) | $ (426) | $ (449) | $ (473) | | $ 9,326 | 35.9% |
| (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (2) | (2) | | (14) | -0.1% |
| - | - | - | - | - | - | - | - | - | - | | - | 0.0% |
| - | - | - | - | - | - | - | - | - | - | | - | 0.0% |
| (207) | (209) | (212) | (215) | (217) | (220) | (223) | (226) | (229) | (232) | | (2,768) | -10.7% |
| (7) | (7) | (7) | (7) | (7) | (8) | (8) | (8) | (8) | (9) | | (87) | -0.3% |
| - | - | - | - | - | - | - | - | - | - | | - | 0.0% |
| - | - | - | - | - | - | - | - | - | - | | - | 0.0% |
| $ (214) | $ (217) | $ (220) | $ (223) | $ (226) | $ (229) | $ (232) | $ (236) | $ (239) | $ (242) | | $ (2,869) | -11.1% |
| $ (494) | $ (516) | $ (539) | $ (562) | $ (586) | $ (611) | $ (636) | $ (662) | $ (688) | $ (716) | | $ 6,457 | 24.9% |
| $ 7,148 | $ (93) | $ (40) | $ (69) | $ (87) | $ (85) | $ (48) | $ (84) | $ (73) | $ 2,643 | | $ (724) | -2.8% |
| $ 6,653 | $ (623) | $ (579) | $ (631) | $ (680) | $ (709) | $ (684) | $ (749) | $ (761) | $ 2,448 | | $ 497 | 1.9% |

**SUMMARY CASH FLOW TABLE ($000) Table (continued above)**

# GENERAL ASSUMPTIONS FOR FOREST OPERATIONS TRAINING PROGRAM FOR 2023

**Arizona Mechanized configuration**

**IMPORTANT! Assumptions in blue must be entered.**

## ENTERED GENERAL ASSUMPTIONS

| Expectations for Total and Funded Student Numbers | *Year 1* | *Year 2* | *Year 3* | *Year 4 & beyond* |
|---|---|---|---|---|
| Expected total student numbers assumptions: | Low | High-low | Average | Med-high |
| Expected percent of total students funded: | Low | Expected | Expected | Expected |

| | Low | Mid-low | High-low | Average | Low-high | Mid-high | High |
|---|---|---|---|---|---|---|---|
| Ranges for total student numbers per year | 44 | 60 | 76 | 120 | 132 | 180 | 228 |

**Funded Students Percentages and Assumptions**

| | Pct. of Total Students Funded | | | Student |
|---|---|---|---|---|
| Expected Funded Student Assumptions | Low | Expected | High | funding sources |
| WIOA funding | 30% | 45% | 56% | 75% |
| CTE funding | 13% | 20% | 25% | 33% |
| Veteran Administration funding | 7% | 10% | 13% | 17% |
| State funding | 0% | 0% | 0% | 0% |
| Local funding | 0% | 0% | 0% | 0% |
| Per student Blank funding | 0% | 0% | 0% | 0% |
| Other funded students | 0% | 0% | 0% | 0% |
| Total funded students | 40% | 60% | 75% | 125% |

**Course Assumptions**

| | Course length (Weeks) | Course training days per week | Student contact hours per day | Course streams per year |
|---|---|---|---|---|
| Forest Equipment Operations Stream | 16 | 5 | 6 | 4 |

| Interest Rates | |
|---|---|
| Bank deposit rate | 4.00% |
| Bank lending rate | 8.00% |

| Other general assumptions | |
|---|---|
| Time to construct and start up (months) | 6 |
| *Ad valorem* (property tax) mill rate ($/$1000) | 0 |

| Inflation | Year 1 | Year 2 | Year 3 | Year 4 & beyond |
|---|---|---|---|---|
| Inflation rates | 3.0% | 3.0% | 3.0% | 3.0% |

**NOTE: ENTERED ASSUMPTIONS END IN THE TABLE ABOVE. BELOW THIS, EVERYTHING IS CALCULATED.**

| **Total student throughput for the Forest Equipment Operations Stream…** | | ***Year 1*** | ***Year 2*** | ***Year 3*** | ***Year 4 & beyond*** |
|---|---|---|---|---|---|
| **…given the 'Expected total student numbers' assumptions to the right** | | Low | High-low | Average | Med-high |
| Students per course stream | | 11 | 19 | 30 | 45 |
| Total students trained (in 4 streams per year) | | 44 | 76 | 120 | 180 |
| Total student-days in training | | 3,520 | 6,080 | 9,600 | 14,400 |
| Total student contact hours in training | | 21,120 | 36,480 | 57,600 | 86,400 |

| **Funded student throughput for the Forest Equipment Operations Stream…** | | ***Year 1*** | ***Year 2*** | ***Year 3*** | ***Year 4 & beyond*** |
|---|---|---|---|---|---|
| **….given the 'Expected total student numbers' assumptions above and 'Expected percent of total students funded' to the right** | | Low | Expected | Expected | Expected |
| Funded students per course stream | | 4 | 11 | 18 | 27 |
| Total funded students trained (in 4 streams per year) | | 18 | 46 | 72 | 108 |
| Rounded numbers of students each year with… | | | | | |
| …WIOA funding | | 14 | 35 | 54 | 81 |
| …CTE funding | | 6 | 15 | 24 | 36 |
| …Veteran Administration funding | | 3 | 8 | 12 | 18 |
| …State funding | | - | - | - | - |
| …Local funding | | - | - | - | - |
| …Per student Blank funding | | - | - | - | - |
| …Other funded students | | - | - | - | - |

| **Calculated Class time** | Per Course | Per Year |
|---|---|---|
| Total Training Days | 80 | 320 |
| Total Contact Hours | 480 | 1,920 |

| Inflation Rates and Compounding/Discount Factors | 2023 Year 0 | 2024 Year 1 | 2025 Year 2 | 2026 Year 3 | 2027 Year 4 & beyond | 2028 Year 5 | 2029 Year 6 | 2030 Year 7 | 2031 Year 8 |
|---|---|---|---|---|---|---|---|---|---|
| Inflation rates | | 3.0% | 3.0% | 3.0% | 3.0% | | | | |
| Inflation adjustment compounding factor (calculated) | 1.00 | 1.03 | 1.06 | 1.09 | 1.13 | 1.16 | 1.19 | 1.23 | 1.27 |

| | |
|---|---|
| Average compound annual inflation rate | 3.00% |
| Alternative rate of return - Nominal | 4.00% |
| Alternative rate of return - Real | 0.97% |

| Total Student Throughput Calculations | Average Annualized | 2024 Year | 2025 Year | 2026 Year | 2027 Year | 2028 Year | 2029 Year | 2030 Year | 2031 Year |
|---|---|---|---|---|---|---|---|---|---|
| Student throughput | 164 | 44 | 76 | 120 | 180 | 180 | 180 | 180 | 180 |
| Student-days in training | 13,096 | 3,520 | 6,080 | 9,600 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 |
| Student contact hours in training | 78,577 | 21,120 | 36,480 | 57,600 | 86,400 | 86,400 | 86,400 | 86,400 | 86,400 |

| | |
|---|---|
| Present Value Count of Student Throughput at 0.97% | 2,963 |

| Funded Student Throughput Calculations<br>Funded student throughput by funding source: | Average Annualized | 2024 Year | 2025 Year | 2026 Year | 2027 Year | 2028 Year | 2029 Year | 2030 Year | 2031 Year |
|---|---|---|---|---|---|---|---|---|---|
| …WIOA funding | | 14 | 35 | 54 | 81 | 81 | 81 | 81 | 81 |
| …CTE funding | | 6 | 15 | 24 | 36 | 36 | 36 | 36 | 36 |
| …Veteran Administration funding | | 3 | 8 | 12 | 18 | 18 | 18 | 18 | 18 |
| …State funding | | - | - | - | - | - | - | - | - |
| …Local funding | | - | - | - | - | - | - | - | - |
| …Per student Blank funding | | - | - | - | - | - | - | - | - |
| …Other funded students | | - | - | - | - | - | - | - | - |
| Total funded student throughput | 122 | 23 | 58 | 90 | 135 | 135 | 135 | 135 | 135 |

[redacted]

| Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *2032* | *2033* | *2034* | *2035* | *2036* | *2037* | *2038* | *2039* | *2040* | *2041* | *2042* | *2043* |
| *Year 9* | *Year 10* | *Year 11* | *Year 12* | *Year 13* | *Year 14* | *Year 15* | *Year 16* | *Year 17* | *Year 18* | *Year 19* | *Year 20* |
| 1.30 | 1.34 | 1.38 | 1.43 | 1.47 | 1.51 | 1.56 | 1.60 | 1.65 | 1.70 | 1.75 | 1.81 |

**Inflation Rates and Compounding/Discount Factors Table (continued above)**

| Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *2032* | *2033* | *2034* | *2035* | *2036* | *2037* | *2038* | *2039* | *2040* | *2041* | *2042* | *2043* |
| 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 | 14,400 |
| 86,400 | 86,400 | 86,400 | 86,400 | 86,400 | 86,400 | 86,400 | 86,400 | 86,400 | 86,400 | 86,400 | 86,400 |

**Total Student Throughput Calculations Table (continued above)**

| Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *2032* | *2033* | *2034* | *2035* | *2036* | *2037* | *2038* | *2039* | *2040* | *2041* | *2042* | *2043* |
| 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 | 81 |
| 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 |

**Funded Student Throughput Calculations Table (continued above)**