

# National Technology & Development Center Inventory and Monitoring Program

The Inventory and Monitoring (I&M) Program is the newest of the 13 programs of the Technology and Development Centers. The Program was developed as a result of a partnership between the Inventory and Monitoring Institute and the National Technology and Development (T&D) Center at San Dimas (SDTDC). To date the I&M program has funded some 35 projects since the program began in 1999. Projects are typically of a national scale addressing the technologies most needed by Forest Service personnel to meet their challenge of inventory and monitoring of natural resources in an efficient and effective manner.

T&D solicits proposals from Forest Service employees or partners that are consistent with the purpose of the I&M program. Proposals are reviewed, prioritized, and selected by a national steering committee for work in the upcoming Fiscal Year. Projects of the I&M Program address a wide range of inventory and monitoring issues. Descriptions, Progress Reports, and Final Reports of all projects are available on the T&D Inventory and Monitoring Program's website at: <http://fswweb.sdtdc wo.fs.fed.us/programs/im/index.shtml>.



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## 1 Introduction

The Inventory and Monitoring (I&M) Program is the newest of the 13 programs of the Technology and Development Centers. The Program was developed as a result of a partnership between the Inventory and Monitoring Institute and the National Technology and Development (T&D) Center at San Dimas (SDTDC) to facilitate development specific to Forest Service inventory and monitoring needs of natural resources.

To date the I&M program has funded some 35 projects since the program began in 1999. Projects are typically of a national scale addressing the technologies most needed by Forest Service personnel to meet their challenge of inventory and monitoring of natural resources in an efficient and effective manner.

T&D solicits proposals from Forest Service employees or partners that are consistent with the purpose of the I&M program. Proposals are reviewed, prioritized, and selected by a national steering committee for work in the upcoming Fiscal Year. The funding source of the Inventory and Monitoring Program has been Ecosystem Management Coordination, State and Private Forestry, and Research & Development.

Projects of the I&M Program address a wide range of inventory and monitoring issues. Displayed in Section III are some projects that have bearing on monitoring of forest vegetation and/or forest health.

Descriptions, Progress Reports, and Final Reports of all projects are available on the T&D Inventory and Monitoring Program's website at:

<http://fswweb.sdtdc wo.fs.fed.us/programs/im/index.shtml>

## 2 I&M Steering Committee and Proposal Selection Process

### I&M Steering Committee

This I&M steering committee is modeled after other successful Technology and Development steering committees. Members on the steering committee provide a diverse representation of the various Forest Service programs. Current members are from Washington Office - Inventory and Monitoring Institute; Washington Office - Ecosystem Management Corporate Team; NFS Staff from Regions 2, 3, 5, and 6; Research and Development & Forestry Inventory and Analysis; and the Forestry Health Technology Enterprise Team.

(See: <http://fswweb.sdtdc wo.fs.fed.us/programs/im/imsc.shtml>)

### I&M Proposals

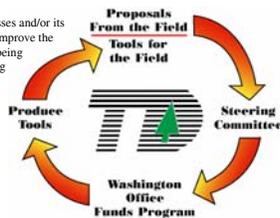
An annual invitation (usually in December) is distributed to Forest Service units and partners to submit proposals related to technology development that would have national significance and improve the efficiency and effectiveness of the I&M Program. The I&M Steering Committee is especially interested in proposals involving technology development/technology transfer for inventory and monitoring purposes that relate to equipment evaluation and development, data and information collection, analysis and automation, and training and technology transfer. Electronic submission of proposal can be performed at: <http://fswweb.sdtdc wo.fs.fed.us/proposal/index.shtml>

Once a proposal is submitted, it is reviewed, evaluated and prioritized by the I&M Steering Committee. Proposals should not be part of a unit's regular program of work and not be pure research.

Proposals are evaluated based on: the critical resource issues it addresses and/or its benefit to multiple resources or programs within the FS, its ability to improve the efficiency of performing I&M activities, the feasibility of the project being completed in a reasonable amount of time, and the likelihood obtaining the collaborators and partners necessary to accomplish the task.

After the committee prioritizes the proposals, they are given to the SDTDC I&M Program to prepare a work plan.

Based on the expected cost and effort to complete the proposal and its priority, the Committee identifies to SDTDC which projects are approved for the next FY. Some 5-7 new starts are approved each year; projects are typically completed within 2-3 years following approval.



## 3 I&M Projects Related to Forest Vegetation and Forest Health

The I&M Technology and Development program has completed some 25 projects since it was established in 1999. Another 10 projects are ongoing or new starts.

Projects have helped improve the efficiency and effectiveness of the Forest Service's I&M program by: improving existing or developing new computer programs, improving accessibility of existing corporate databases for inventory and monitoring analysis, evaluating the latest technology developed by the private sector, and developing new equipment/technology.

The following is a list of a few completed and ongoing projects that relate to the inventory and monitoring of forest vegetation and/or forest health.

## I&M Projects Related to Forest Vegetation and Forest Health

### Completed Projects

#### Upgrade of the TabGen (Table Generator) Program

TabGen is a software program that allows users to query the Forest Inventory and Analysis (FIA) database to produce tables of forest survey results, including sampling errors, and view the data in various formats. The TabGen program was updated by the Northeastern and North Central Research Stations with funding by San Dimas Technology and Development Center.

The objective of the TabGen update was to provide increased functionality that will allow users to easily query the data and provide meaningful results to facilitate resource decision making. TabGen is an internet based application.

The documentation for the TabGen program can be obtained at:

<http://fswweb.sdtdc wo.fs.fed.us/programs/im/fy00/tabgen/tabgen.shtml>

The TabGen software can be obtained from the Northeastern Research Station.

#### Large Scale GPS Controlled Photography



The objective of this proposal was to develop a cost-effective and accurate way to acquire FIA plot data by interpreting GPS controlled low-level aerial photography of remote areas. The investigation assessed the state of softcopy photogrammetric technology and its application to forestry.

The investigation revealed that measurements captured by photo interpreters using digital photographs provide accurate estimates of individual tree and forest stand variables. The method described in the report could be used in lieu of field crews for wilderness or other hard-to-access areas where data collection is time consuming and costly. This method may also be useful for re-measurement of FIA plots for detecting change over time.

The Final Report and Remote Sensing Tip are available at:

[http://fswweb.sdtdc wo.fs.fed.us/programs/im/fy01/GPSphotography/isp\\_final.shtml](http://fswweb.sdtdc wo.fs.fed.us/programs/im/fy01/GPSphotography/isp_final.shtml)

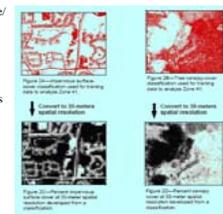
#### Analysis of Urban Forest Canopy Cover and Impervious (Cloud) Surface Cover

The objective of this investigation was to develop an urban cover map (% tree/shrub, % grass/soil, and % impervious cloud cover) using Landsat data. This urban cover data allows for better assessments of urban forest structure, functions, and change, and assist the development and implementation of a national urban forest health monitoring program.

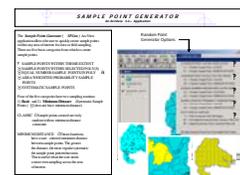
Using regression-tree analysis with a variety of imagery to classify large areas produces highly accurate results in a relatively short time and is inexpensive. The results of this investigation is expected to enhance the development of a national urban cover map developing and testing regional algorithms, and ultimately developing the national urban cover map.

The Final Report and Remote Sensing Tip are available at:

<http://fswweb.sdtdc wo.fs.fed.us/programs/im/fy02/urbancover/urbancover.shtml>



#### Sample Point Generator (SPGen) ArcView Application



FS crews or contractors routinely determine field plot locations and draw points on a map for stand exams, wildlife point counts, timber cruising, etc. These points are then found using standard orienteering techniques. The objective of this project was to develop and distribute an ARC extension that allows these users to generate random points within a polygon during an ARC session. The development of such software would reduce the chances of sampling bias in measuring forest resources such as, wildlife monitoring points, stand exams, timber cruising, forest disease and insect assessment, and stream measurements.

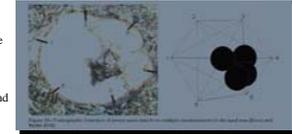
The Sample Point Generator ArcView Application routine and the User Guide can be downloaded from the FHTET Geostatistics web site at: <http://www.fs.fed.us/foresthealth/technology/spatialstatistics/routines.php>

## I&M Projects Related to Forest Vegetation and Forest Health

### Ongoing and New Projects

#### Evaluation of Decay Detection Equipment in Standing Trees (ongoing)

The objective of this investigation is to test and compare several devices that are able to detect decay in standing trees. These devices were evaluated to determine their suitability for field usage and a cost comparison is also provided. The devices are classified as ultrasonic, stress wave timer, microdrill, electrical resistance, mechanical, visual, and manual. More sophisticated devices such as X-ray, gamma ray tomography, magnetic resonance imaging, and thermal imaging were not evaluated because of their high cost and lack of practicality for field use.



The Progress Report for this investigation is at:

[http://fswweb.sdtdc wo.fs.fed.us/programs/im/fy04/tree\\_decay\\_detection equip/tree\\_decay\\_detect equip.shtml](http://fswweb.sdtdc wo.fs.fed.us/programs/im/fy04/tree_decay_detection equip/tree_decay_detect equip.shtml)

#### Evaluation of a Geo-Spatial Camera (ike 300™) for Forest Service use (new start)



The objective of this proposal is to identify or develop a geo-spatial camera equipment that combines existing technologies such as: digital camera (3.5 meg or higher), GPS receiver (differentially correctable, WASS capable, best antenna), digital compass, and laser range finder. Such a device already exist; it is marketed as the ike™ 300 by Surveylab, Ltd/Halltech Environmental, Inc. (<http://www.surveylab.co.nz/> and <http://www.htex.com/ike/>)

An in-house evaluation of the ike™ 300 per its specifications will be performed, its GPS accuracy will be confirmed, and its performance under normal field conditions will be evaluated.

The status of this project can be viewed at:

[http://fswweb.sdtdc wo.fs.fed.us/programs/im/fy05/geo-spatial\\_camera\\_eval.shtml](http://fswweb.sdtdc wo.fs.fed.us/programs/im/fy05/geo-spatial_camera_eval.shtml)

#### Evaluation of FIA Data Compilation Programs used in Vegetation Inventory & Monitoring by NFS Regions (new start).

Some in the National Forest System (NFS) use FIA-generated data in Land Management Planning and Plan revisions, landscape or watershed assessments, and cumulative effects analyses. NFS Regions 1, 5, and 6 use FIA-generated data to satisfy their business need for historic and current vegetation inventory and mapping at a Regional and mid-scale level.

The objective of this proposal is to collect, assess, and evaluate the existing FIA data compilation programs being used by NFS Regions and develop a recommendation of a possible nation-wide standard compilation program. The evaluation would also identifying gaps and needed tools.

The status of this project can be viewed at:

[http://fswweb.sdtdc wo.fs.fed.us/programs/im/fy05/fia\\_comp\\_toolbox.shtml](http://fswweb.sdtdc wo.fs.fed.us/programs/im/fy05/fia_comp_toolbox.shtml)



## 4 Importance of I&M Program to Forest Health Monitoring Community

With Forest Service budgets and staff declining, it's even more important that programs work together and fully utilize existing expertise to solve problems facing the agency.

The T&D Inventory and Monitoring Program has and will continue to provide practical solutions to current I&M problems faced by the Forest Service and its partners. By submitting proposals of national significance into the T&D proposal process, the T&D I&M Program can assist the Forest Health Monitoring Community in its mission of determining the status and trends in indicators of forest conditions by providing tools and technology to efficiently and effectively accomplish that mission.