

**Slocan Forest Products Ltd.
TFL 18 Forest Cover
Rectification and Update Project.**

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Completed for:

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1.0 Introduction

In early 2002, Slocan Forest Products- Vavenby Division (Slocan) approached Silvatech Consulting Ltd. (Silvatech) of Salmon Arm BC, to update forest cover history for Tree Farm Licence 18, in advance of pending planning initiatives.

After a comprehensive review of the forest cover, Slocan and Silvatech agreed that prior to conducting history updates, the spatial accuracy of the existing forest cover data should be corrected. Once the forest cover map base was positionally rectified, opening and road updates could then be added to the spatially correct forest cover map base. At the onset of the project, it became apparent that spatial inaccuracies, inherent in the existing forest cover base mapping, were the direct result of inadequate georeferencing (control) during the transfer of inventory lines from the typed aerial photography to digital forest cover base-mapping. These problems were then compounded by several years of “rubber sheeting” (stretching) to make new linework fit the positionally inaccurate forest cover base mapping.

Following the collection of all available information and after assessing the scope of the problem and possible approaches, the recapture and control of the existing 1992 forest inventory photo stratification (1974 photography) was selected as the most cost-effective solution. This process included digitizing (monorestitution-Microstation™) and the accurate georeferencing of the inventory photos to established British Columbia TRIM control. Upon completion of the existing forest cover rectification, the positionally correct base was then updated with post-1992 openings and roads, using a combination of orthorectified 5 meter IRS™ satellite imagery, 1996 ortho-photography and information provided by Slocan, to update harvesting and road history to January 2002.

Upon completion of the spatial update, Slocan initiated the normalization of the forest cover database to an MSRM standard format. In the latter stages of this process, a process was developed to link Slocan- Vavenby’s internal silviculture record keeping system (Phoenix) and Ministry of Forests ISIS system to the Forest Cover database. From the updated FC database, a process to update the spatial FC opening linework and labels followed.

The TFL 18 Forest Cover Rectification Project has produced a spatially correct and updated forest cover map base. The forest cover attribute files have been standardized and updated to the greatest extent possible. It is expected that periodic updates to the database will continually upgrade and maintain the integrity of the digital database.

The following provides a brief synopsis of the project.

2.0 History of TFL 18 Forest Cover Mapping

Following some limited research into the history of the TFL 18 mapping problem, it became evident that the inaccuracies in the forest cover likely originated with the use of poor transfer control. The resulting positional distortions were then compounded by; several linework transfers (photo to orthophoto, orthophoto to airphoto, etc.), conversions from IGDS to Terrasoft™ to ARC and finally by numerous attempts to realign portions of the forest cover through rubber sheeting techniques.

2.1 Historical Assessment:

As a starting point, rubber sheeting influences were stripped back, by comparing available 1992 inventory linework to TRIM controlled orthophotos. The most up to date forest cover database was obtained from the Ministry of Forests (Resource Inventory Branch). The following process was used to determine the source and extent of spatial inaccuracies with the TFL 18 forest cover:

FC1 Data from MOF (Resource Inventory Branch) was provided in NAD27 and imported into ARC where it was reprojected to NAD83.

The projected FC1 data was compared to Slocan's positionally correct 1996 orthophotos. This established that there was poor positional accuracy in the forest cover provided to the Resource Inventory Branch, following the completion of the TFL 18 inventory update in 1992. This assessment showed that Slocan's existing forest cover had better positional accuracy than the FC1 files held by the MOF. It is suspected that this was due to rubber sheeting and other localized adjustment techniques used since 1992.

Positional shifting of the MOF FC1 data was attempted, to see if there were common positional inaccuracies that could be fixed by a single shift of the data. This assessment found there to be no commonality of positional inaccuracies between polygons, which existed in both X and Y directions and varied between polygons. Through this test it was concluded that a single shift of the MOF data would not resolve positional problems with the forest cover.

- As the suspected holder Slocan's 1992 re-inventory data, Forest Ecosystem Solutions (FES) (previously Hugh Hamilton Limited) was contacted in an attempt to locate the original source data. Although FES could not locate the information in their archives, it was learned that in 1992, Slocan Forest Products had provided the MOF with the inventory linework from their Terrasoft GIS system. As such it was determined that, the MOF (Resource Inventory Branch) would have had only the best data Slocan Forest Products could provide at the time. The MOF converted the Terrasoft GIS information received from Slocan to their standard FC1 format.
- The 1992 TFL 18 re-inventory report (Reid Collins 1992) was obtained and reviewed, to gain insight into the history of mapping and forest cover data capture in TFL 18. The report stated that prior to 1992, other inventories and updating had been completed on the area, which had employed a variety of mapping techniques. In chronological order, records indicate that the following forest cover inventories and updates have been completed to date on TFL 18.

1974	The first forest cover inventory was completed using 1974 air photos and then transferred to original 1957 base maps by Clearwater Timber Ltd.
1982	Inventory update was completed from 1981 photos. This involved

	the transfer of 1974-inventory linework (projection) to hardcopy orthophoto mosaics, where the linework was then updated to reflect new developments (process unknown). This ortho linework was then digitized (IGDS) to facilitate the construction of TFL 18 base maps. Though the Reid Collins report did not state this, it is assumed that history information was digitized from a combination of orthophotos and maps to reflect all changes in the digital format.
1987	Slocan Forest Products converted IGDS digital information into a Terrasoft GIS system and created an attribute database.
1992	Re-inventory of TFL 18 undertaken, updating previously stratified 1974 air photos (1974 inventory). Georeferencing (photo control) was transferred from the original 1974 forest cover maps (1957 origin). Spatial updates were then made to the 1974 base maps, and then digitized into Slocan Forest Products Terrasoft GIS Forest Cover Files.

Several conclusions were drawn from this report, regarding the possible causes of inaccuracies within the forest cover spatial data.

Following the 1974 inventory, forest cover lines were transferred to 1974 planimetric maps, which were generated from 1957 basemaps. These maps were only as positionally accurate as the mapping technology of the time would allow. Secondly, as linework was transferred from the typed 1974 photos with a kail plotter to these already positionally suspect maps, the error may have been further increased by slight inaccuracies in the kail plotter transfer. The report suggests that to date the 1974 forest cover maps may have formed the base (control) for all subsequent inventories, including the current forest cover data set for TFL 18.

In 1982, it appears that the 1974 inventory linework was projected onto a photo mosaic of the TFL and then redigitized to provide for history updates. This likely served to increase the positional distortion that existed with the 1974 data. The digital file originating from this update (1987 Terrasoft) was probably quite functional for Slocan Forest Products needs at the time, as GPS and TRIM information had not yet been developed and older methods of field measurement, transfers to the base map (e.g. creek and road ties) worked fine.

The 1992 inventory did not address the positional inaccuracies of the previous inventories and updates, as there was still no georeferenced control available (TRIM), and the air photo stratification was again tied down to the same problematic map control.

With the developments in GPS technology, TRIM and TRIM orthophotos, increasing mapping accuracy (georeferencing), TFL 18 forest cover inaccuracies became more evident. Attempts by previous mapping managers and consultants to fix the problem by rubber sheeting or stamping in good data for specific areas of interest did not fix the main problem.

3.0 Spatial Rectification Methodology

Three components of the rectification project were initiated simultaneously, including: monorestitution of 1992 forest cover inventory stratification from the typed aerial photography (Reid Collins. 1992) and controlling these photos with transferred British Columbia TRIM control (Zeiss 1st order analytical stereoplotter) ; repositioning of original forest cover data nodes to the positionally rectified forest cover polygons (ARCVIEW), and; collection and positional update of forest cover openings and roads (2001 IRS, 5 meter satellite imagery, 1996 ortho-photography, and Slocan). All three of these components were then merged to generate positionally correct forest cover for TFL 18. The following outlines the process.

3.1 Forest Cover Spatial Rectification

The spatial rectification of the existing forest cover was completed through the following seven step process.

Step 1:

Prior to initiating the monorestitution stage of the forest cover rectification phase of the TFL 18 project, Silvatech contacted MOF (Ministry of Forests, Headwaters District) to obtain the positionally correct boundary for TFL18. This boundary was provided by the District LIM Operator from the INCOSADA dataset, which was identified as the correct boundary for TFL18.

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Near the completion of the Forest Cover rectification project, Headwaters District Planner, Mr. Ron VanderZwan presented a TFL 18 boundary different than the INCOSADA boundary. At Slocan's cost, additional linework was captured and trimmed to fit the new boundary. This boundary was confirmed by Mr. VanderZwan as the correct TFL 18 boundary (Appendix A).

Step 2:

Monorestitution digitizing was then completed for the entire TFL18 (area), capturing stratification linework completed under the 1992-reinventory (1974 photos). This linework, digitized to the TFL18 boundary, was checked and topology errors corrected.

Step 3:

Polygon nodes were manually moved to the corrected polygon locations (data points from Slocan Forest Products current forest cover to provide for the linking of data attributes to spatially rectified forest cover polygons). An experienced forester conducted this transfer, utilizing orthorectified orthophotos and orthorectified IRSTM satellite imagery as reference. Where appropriate existing forest cover was used to populate (original forest cover attributes) opening or forested polygonal data. This manual method was used, because an automated programming procedure would have produced too many data transfer inaccuracies, due to the shift in original forest cover and resulting polygon information would still have to be fixed or checked manually.

Step 4:

Silvatech completed the update and positional correction of existing openings, which were combined and tied into the rectified forest cover. To identify the location of the opening the 5-meter, black and white IRS imagery was first classified by remote sensing into reflectance classes. These classes were then generated into spatial polygons to create the boundaries of cutblocks. Where available, openings were cross-referenced with Slocan's current forest cover, where an opening number existed. Both datasets would then be used to create the positionally correct opening coverage (to September 2001). With ortho-rectified imagery as a backdrop in the GIS viewing software, individual mapsheet openings were corrected using the following procedure:

- When assessing each opening, the original forest cover cutblock shape was compared to the imagery and where feasible shifted into position to match block borders on the imagery. Where this was possible, existing FC internal opening stratification was simply carried over with the FC opening boundary.
- Where the existing FC block shape was incorrect or absent, then the remote sensed (ECOGNITION) opening was captured from the IRS imagery (Sept. 2001). Where the quality of the remote sensed opening was questionable, due to the resolution, tree shadow, or mixed reflectance from vegetation growth in the block, then the boundaries of the block were digitized directly from the image using GIS viewing software.

When new opening boundaries were identified or boundaries updated, internal stratification was interpreted. Where vegetation differences were evident and the pattern matched the original opening stratification, the stratification line was transferred easily. When vegetation differences were not evident, a best fit was made to reflect the internal stratification represented in original Slocan forest cover.

Step 5:

When all three data components were complete, Silvatech then incorporated them into the new FC base through GIS programming. Through this programming, remaining errors were identified and fixed, then the programming was rerun as a check.

By combining new forest cover linework and new opening linework with the shifted label points from old forest cover, not all polygons formed by this overlay received attributes due to new openings created since the last Slocan forest cover update. These holes were flagged, then each visually assessed (satellite imagery and ortho-photography) to establish, where obvious, which old forest cover attributes should be assigned to the newly formed polygon (e.g. old forested polygon fractured by new opening). After a repeated runs and iterations, errors were reduced to zero and the final rectified polygon coverage had old forest cover attributes

assigned to each polygons and new openings flagged as “new data”. To facilitate the introduction of data for new blocks were assigned a block name, (from Slocan and SBFEP).

In general, the GIS programming overlaid the new opening coverage with the newly rectified forest cover linework, with openings taking precedence over monorestituted polygons. Water features were then overlaid with the opening/ monorestituted coverage, with water features (TRIM) taking precedence over both types of linework.

Step 6:

Forest cover polygons less than 0.1 hectare were then eliminated by locking down polygon boundaries so that small artefact polygons would dissolve into like polygons (as per MSRM procedures). First, forested blocks less than 0.1 hectares were incorporated into the largest adjacent like forested polygon. Small (< 0.1 ha.) artefact opening polygons of the same size were then incorporated into openings using the same procedure, and finally, small remnant polygons were incorporated with adjacent water features (e.g. swamps). By using this process of elimination, border distortion between different polygon types was decreased, where a single elimination of polygons less than 0.1 hectare would have increased feature distortion (e.g. forest polygons eliminating into openings).

Step 7:

In creating the final forest cover database, data structure layer and polygon data were transferable to the MSRM data convention as provided by MSRM.

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History data was not directly transferable to the MSRM format due to the flat data structure of all history information in a single record (Slocan’s existing structure). Although, current MSRM history structure contains multiple levels of records per polygon (e.g. 1st planting, 2nd planting...), it was felt that programming into a multi-record MSRM data structure, was possible, but difficult, given the amount of additional data needed (dates) to fill the conventional history table. Furthermore, the programming and fixing of some records would be redundant where a direct reference to stratum specific Phoenix data was available.

Step 8:

New labels were created from forest cover attributes, by concatenating data fields together based on forest cover inventory standards. The concatenated field was then generated as a label for each FC mapsheet in the Arc/Info annotation.fortxt coverage. Labels were input at the same size as the original forest cover annotation.

Each mapsheet was assessed for label placement and label nodes moved where necessary. Where arrows were required for the moved label node, then they were appropriately entered into a arrow coverage for each mapsheet.

All labels can be viewed using the MOF2 font. The annotation is contained in the forest cover polygon coverage and is called annotation.fortxt. A relating file called arw_(mapsheet)alb is the arrow file coverage for moved polygon labels. Within the annotation.fortxt database there is a (mapstand) field that relates to the polygon.pat database (mapstand) field. This can be used to link polygon attribute information to the label, which will facilitate any future update to the label if or when polygon attributes changes take place over time.

Attribute linkage is satisfactory for current polygons, however if new polygons are generated, then new (mapstand) numbers and annotation will have to be created for the new polygon. If a new polygon is created (e.g. harvesting), then a unique (mapstand) attribute will be required for that polygon. Annotation will need to be generated for that polygon and a (mapstand) linking number attached to the annotation. Once a link is made, future updates can be made for any new polygons. If the (mapstand) link is not maintained then updating the labelling annotation over time will not be possible.

3.2 Positional Correction and Update of Road Data

Silvatech obtained the existing ARCINFO road coverage from Slocan (2001-2006 Forest Development Plan) and assessed this for positional accuracy. This assessment found that greater than 80 percent of the existing GIS road data for TFL 18 was positionally incorrect, based on a direct comparison of the coverage to digital orthophoto (1996), orthorectified Indian Remote Satellite (IRS) imagery (Sept. 2001), and interviews with Slocan field personnel. These inaccuracies were attributed to procedures used for inputting roads into the GIS road data set over time. Most road information had been input from hand drawn maps, or tight chain traverse information tied to the spatially inaccurate forest cover basemap. Where GPS data was compared to the orthorectified imagery, it was found to be quite accurate and required little positional correction.

Existing attribute information in the road data set was quite extensive and needed to be retained when positional road correction took place. Silvatech decided not to re-digitize all road line work, as the digitizing would be time consuming and the transfer of road attribute information to new line work would be costly. A selected approach used existing road line work with all attribute data attached. Linework was repositioned and/or adjusted to fit the ortho imagery.

Existing road linework was initially corrected using 1996 orthophotos. As each section of road was repositioned and/or adjusted, it was flagged as corrected to avoid duplication. When all aerial orthophotos had been assessed and roads corrected, IRS imagery (Sept. 2001) was used to reposition remaining roads and add roads that were not already present in the GIS road dataset. At this stage in the project, only non-commissioned roads and recently constructed (post Sept. 2001) roads that could not be seen on either image were not corrected. It was expected these roads would be corrected at the next update to Forest Cover.

At the end of this stage a positionally correct TFL18 road network (complete to January 2001) was available, including all available attribute information from the original GIS coverage. The exception to the transfer of attribute data to the new spatially correct road was when roads were added from the imagery (new). In this case, data attributes could not be applied to the new road section and were flagged in the metadata as needing attribute data (e.g. road

number). The final road coverage was clipped into individual mapsheets and the metadata was supplied to Slocan.

Upon completion of this phase of the project, TFL 18 forest cover was positionally rectified to establish TRIM control and spatial history updated to January 2002. Existing forest inventory spatial information (1992 re-inventory) was properly georeferenced and harvest and road linework updated using a combination of orthorectified IRS™ (Sept, 2001), ortho-photography (1996), and information provided by Slocan staff (2001-2006 Forest Development Plan-existing).

Existing polygonal data has been normalized and restructured to closely match the current MSRM format. Exceptions to this format have been documented within the database files and supplemental data provided where appropriate.

4.0 Procedure for Linking Phoenix™ Opening Records to FC Database

After the TFL 18 Forest Cover Rectification project was completed in 2002, the project moved into the next phase. This involved the development and implementation of a method to update TFL 18 Forest Cover opening files and labels, using Vavenby's internal silviculture record keeping system (Phoenix). As an integral part of this part of this project, Silvatech was also asked to fill data gaps that existed between TFL 18 forest cover (updated 2002) and surrounding forest cover.

The following outlines the procedures and a process to facilitate internal updates to the forest cover.

4.1 Supporting Data

Slocan- Vavenby provided Silvatech with the following information:

- Phoenix database for TFL 18
- 250 paper opening files (FS708 Form C): Contain opening specific Phoenix record(s), paper copies of opening maps that include the correct position of the stratum for each opening.
- Corrected TFL 18 boundary (See Appendix A).

Additional information support was provided throughout the project by Vavenby Forestry staff. Ministry of Sustainable Resource Management (Kamloops Region) provided a final review of the procedure and outputs.

4.2 TFL Boundary Correction

After the spatial rectification phase of the TFL 18 Forest Cover update project was completed, it was revealed that the TFL 18 boundary provided by the Headwaters Forest District (INCOSADA) was incorrect. The correct boundary was obtained and gaps in the spatial forest cover identified between the two coverages. Gaps existed where FL Forest Cover did not meet the TFL border established by the new boundary coverage or for other unexplained

reasons. Silvatech was asked to extend the forest cover to the updated TFL 18 boundary or, where necessary, extend TFL forest cover linework beyond the TFL boundary to fill in gaps between the TFL boundary and the outer extent of the surrounding forest cover (FL).

The procedure to extend the boundaries was essentially the same procedure to spatially rectify the forest cover. An outer boundary was created using a combination of the correct TFL 18 boundary and the gap between the TFL 18 boundary the FL forest cover. This boundary was then used to extend the forest cover. The ArcInfo Forest Cover was converted into Microstation and monorestitution was performed on the areas where TFL Forest Cover needed to be extended using the 1992 airphotos that were used in the original rectification project. The Microstation file, with the extended boundaries was then converted back into ArcInfo. A combination of Satellite imagery and Orthophotos were used to extend any openings that occurred after 1992.

4.3 Creating a GIS Link in Phoenix

In order for Phoenix Silviculture Database to be used to update TFL 18 Forest Cover Records and spatial labels, a unique and corresponding link needed to be created in both Phoenix and Forest Cover.

The Phoenix dataset was reviewed to see if a common link could be automatically created in Phoenix by running a script. This script automatically creates a unique record when new data is imported into Phoenix. It was determined that this unique link could be created in Phoenix by combining 3 key identifiers tracked in Phoenix (mapsheet number, opening number and stratum).

Example: Phoenix record that had a mapsheet number of 92P079, an opening number of 5510 and a stratum C, would be combined to create a GIS link of 92P079_5510_C.

As forest cover information in Phoenix is tracked at the stratum level, this link is unique. The link in Phoenix will be kept in the GIS link field that already exists at the stratum level. The benefits of using this link as opposed to a unique numbering system is that mapsheet and opening number already exist in the digital FC record and as a result, only individual opening strata need to be entered into the forest cover database. This will allow the user (FC update), to quickly identify the GIS polygons that need be linked and updated. With the help of DR Systems, a script was created that would automatically create a GIS link within the Phoenix database from the three key identifiers.

Once the script was written for Phoenix and the GIS link created, the link was checked to ensure that it was unique to a specific (stratum) record in Phoenix. This assessment revealed that the link was not unique for each record, due to duplicates encountered in the Phoenix database (Slocan). Since each individual strata comprising an opening has a unique record in Phoenix, it was impossible for 2 records in the same opening to have the same stratum identification. Duplicate records in the TFL 18 Phoenix records were identified and remedied by Vavenby staff.

Phoenix was then checked for data inaccuracies (e.g. blank height and age fields). These inaccuracies were also corrected by Vavenby. During this process Phoenix input data was normalized to the greatest extent possible.

Example: Species codes Sx, SX and sx were all used in Phoenix. This data was normalized so that there was a single code for each species.

Once the unique GIS link had been established and the Phoenix data issues resolved, Vavenby's Opening File Maps were compared to existing Forest Cover opening information (spatial) and Phoenix (records). Generally, it was discovered that there were more stratum in Phoenix than there were in Forest Cover. With the help of the hard copy maps, it was discovered that many of the stratum records that existed in Phoenix for a particular opening were not required in Forest Cover.

Example: Phoenix tracks WTP's, Non-treatment units (NTU's) and non-productive areas as different stratum within an opening...while forest cover treats these features as not being a part of the opening. For example, non-productive areas would of have already been identified and tracked in forest cover, so it would not have to be included in the opening information while trees that remain standing (WTP's & NTU's) would retain the existing forest cover information.

As these features are already tracked in Forest Cover, it is not necessary to use Phoenix to update them. Therefore, these features did not require a GIS link in the process, as they will never be used in the opening update process. DR Systems, with the assistance from Vavenby staff, modified the script that created the GIS link, in Phoenix, so only stratum that could be used to update Forest Cover were given a link.

4.4 Creating a GIS Link in Forest Cover

Once a GIS link in Phoenix was established, a corresponding GIS link in Forest Cover was created to allow the Phoenix database to link to the Forest Cover database and update Forest Cover attributes.

At this point in the project, the Forest Cover opening records contained a mapsheet and opening number however, no opening stratum identification was available in the FC database. To successfully link Forest Cover to Phoenix a unique strata identifier had to be manually entered/created. By using Slokan's Opening Files (FS708 Form C maps), Silvatech was able to establish the number of strata within each opening in Forest Cover and identify their correct location (linework) within the opening. In addition, these hardcopy-opening files also identified the stratum, which was then added to Forest Cover to facilitate a common link to the Phoenix record. Through the manual updating of the Forest Cover, Silvatech was be able to easily identify which opening numbers cross the mapsheet lines. Since Phoenix tracks opening by only one mapsheet, potential database anomalies were avoided and given the correct GIS link.

To facilitate the spatial update of strata boundaries within Forest Cover openings, the FC polygons with an opening number were selected and converted into shapefiles. Using these shapefiles as base stratum lines were made to match the stratum locations on the FS708 Form C maps. During these edits, a GIS link was created in the shapefile and the types of edits that occurred were tracked.

The following two main types of updating situations encountered:

- Opening strata from the hard copy maps were in the same location as the stratum in Forest Cover. In this situation, the stratum ID's were added to forest cover database and a GIS link was created.
- The number of opening strata from the hard copy maps, did not match the number of strata identified in Forest Cover. Where this occurred, Forest Cover was updated to match the number and location of stratum in the FS708 Form C hard copy maps. Stratum ID's were then added to Forest Cover and a GIS link was created.

4.5 Procedure for Updating Stratums in Forest Cover

When stratums needed to be added, deleted or moved, in Forest Cover, this was accomplished by editing a shapefile with three different methods outlined below.

- Stratums that followed roads on the hard copy maps could be correctly placed in Forest Cover by using ortho-photography or satellite imagery as a backdrop, then digitizing the stratum on the computer screen.
- Stratums that did not follow, discernible features on the imagery had their outer boundaries printed onto a set of hard copy maps from FC openings. Then a light table was used to transfer the stratum boundaries from the Form C hard copy maps to the FC base. This transferred internal linework was then digitized and included in the FC spatial database.
- When the outer boundary of the forest cover line work did not match the outer boundary of the Form C's. A request was made to Slocan for the correct digital GPS boundary. This linework was used to update the FC opening boundaries and the light table used to transfer the stratum boundaries from the Form C hard copy maps to the forest cover maps and digitized. There were several reasons for this to occur. These included, openings created or expanded after the TFL 18 FC rectification project in 2002, or if an opening had been created using non-GPS digital data. Where non-GPS data was used, Slocan sent out field crews to GPS the correct boundaries.

In all, 265 paper records were used to update forest cover. There were 113 that had their stratums in the correct location and the addition of stratum ID was all that was required. There were 43 that were updated by screen digitizing, 13 were updated using GPS data, and 95 were updated using a light table transfer followed by digitizing.

4.6 BCTS Openings Inside the TFL

There were 27 openings inside TFL 18 that were created by British Columbia Timber Sales (BCTS). These BCTS openings were not previously tracked in Vavenby's internal Phoenix database. Silviculture information for these openings was provided by the Headwaters Forest District of the Ministry of Forests (ISIS database) and the data was evaluated for inclusion in the 2003 FC update. To facilitate the automated FC update procedure the 27 BCTS openings were translated into Phoenix format.

With the assistance of DR Systems, a script was created to directly import ISIS data into Phoenix. The development of this script provides for future BCTS harvesting automatically being added into Phoenix and tracked by Slocan- Vavenby. Once this data was imported into Phoenix, the data was used to update the Forest Cover stratums using the same stratum delineation process outlined above.

4.7 Automated Updating

After removing all the links from stratum that did not need to be used (WTP's, NTU's etc...) it was discovered that several of the openings, in Phoenix, had only one stratum. This allowed for the assumption that if only one stratum exists in phoenix, then there should only be one stratum in Forest Cover. These single strata were then identified in Forest Cover and a GIS link was created. Where there was more than 1 stratum identified in the existing FC spatial database and a single stratum in Phoenix, in this case FC stratum linework was dissolved to form one polygon. Approximately 500 openings were identified and updated in this manner.

Once the manual and automated GIS links were created in the FC opening shapefiles, these shapefiles were in turn, stamped back into the Forest Cover. These shapefiles contained the GIS link that would later be used to update the Forest Cover using Phoenix. As the FC attributes of openings that received a GIS link were to be updated by Phoenix records, a new mapstand number was given to these FC polygons. This provided a practical way to identify and remove obsolete records from the FC database.

The Mapstand number in forest cover needs to be unique for each polygon. As such, if during the update any existing forest cover mapstand numbers were duplicated, a new, unique, mapstand was assigned. Silvatech instituted a 2000 number series for all new updates.

5.0 Updating the TFL 18 Forest Cover Database

With established GIS links in both Phoenix and Forest Cover it is now possible to update the FC database using the Phoenix records. Four separate Phoenix database tables are used to update the three Forest Cover database tables. The "Formc", the "Formc_layer", the denude and the activity database tables from Phoenix were used to update the polygon, layer and history database tables in Forest Cover.

The "Formc" database table provided the GIS link in Phoenix. The "Formc_layer" table provided the information that would be used to update the Layer table in the Forest Cover database. The Denude table provided logging information about an opening, which was used to update the Disturbance column in the History table. While the Activity table provided site preparation, stand tending and plantation information that would be used to update the History table in Forest Cover.

In order to perform this update, the Phoenix tables needed to be joined together using an internal database link. The "Fcl_fck" column in the "formc_layer" linked to the "Fc_pk" column in the "formc". While the "Fc_opfk" column in the "formc" linked both to the "Hrv_opfk" column in the denudation table and the "Act_opfk" column in the activity tables.

An ARC Macro Language (AML) was created to automatically update the Forest Cover records using the Phoenix dataset. The three tables below describe which attributes in Phoenix were used to update the attributes in Forest Cover.

5.1 Updating the Polygon Table

No attributes were used in Phoenix to update the polygon forest cover table. It was updated by following the guidelines outlined in the Ministry of Forest's "Relational Data Dictionary (RDD) 2.0 FIP File Introduction."

Attribute	Update Description
Phx_link	This is the Link to Phoenix that was created in the procedure described above.
Mapstand	Was recreated for new polygons. The 2000 series in mapstand were created during the updating process (eg. 92P079_2005).
Npforestdesc	Not applicable for this update. Since all the openings are productive.
Npforestcode	Set to 0 since all the openings are productive.
Esahigh	Blank.
Esalow	Blank.
Esawildlife	Blank.
Cardsource	Set to CC. As per MOF's Relational Data Dictionary (RDD).
Inputdate	Blank. Several inquiries to Slocan came up empty. This should be somewhere in Phoenix as it is on the Form C printouts that come directly from Phoenix.
Prjdate	Blank. The data has not been projected.
Coastinterior	Set to I. As per MOF's RDD.
U1code	Set to 4. As per MOF's RDD.
U2code	Set to 8. As per MOF's RDD.
Inoperability	Blank. Because the openings have been harvested, the land is operable.
Secondcode	Blank.
Secondspecies	Blank.
Histadjmap	Blank.

5.2 Updating the Layer Table

Where possible, do to the GIS Link, the Layer Table was updated by the Formc_layer table in Phoenix.

Attribute	Update Description
Mapstand	Was recreated for new polygons. The 2000 series in mapstand were created during the updating process (eg. 92P079_2005).
Phx_link	This is the Link to Phoenix that was created in the procedure described above.
Rank	Set to 1. TFL 18's Forest Cover is a flat database structure so all records have a rank of 1.
Layer	Set to 1. TFL 18's Forest Cover is a flat database structure so all records have a layer of 1.
Nforestdesc	The fcl_mofsta and fcl_mofst2 in Phoenix were used. Where these attributes were NSR.
Datasrccls	Set to 7 as per RRD.
Datasourceorg	Set to 0 as per RRD.
Species1	Updated by fcl_inv_sp.
Spec1per	Updated by fcl_per.
Species2	Updated by fcl_inv_s2.
Spec2per	Updated by fcl_pe2.

Attribute	Update Description
Species3	Updated by fcl_inv_s3.
Spec3per	Updated by fcl_pe3.
Species4	Updated by fcl_inv_s4.
Spec4per	Updated by fcl_pe4.
Species5	Updated by fcl_inv_s5.
Spec5per	Updated by fcl_pe5.
Species6	Not in Phoenix. Only 5 species in Phoenix.
Spec6per	Not in Phoenix. Only 5 species in Phoenix.
Prjvol1sp1	Calculated data could not be updated so all records were set to 0 or blank. Will have to run through Scope to update.
Prjvol1sp2	Calculated.
Prjvol1sp3	Calculated.
Prjvol1sp4	Calculated.
Prjvol1sp5	Calculated.
Prjvol1sp6	Calculated and only 5 species in Phoenix.
Prjvo21sp1	Calculated.
Prjvo21sp2	Calculated.
Prjvo21sp3	Calculated.
Prjvo21sp4	Calculated.
Prjvo21sp5	Calculated.
Prjvo21sp6	Calculated and only 5 species in Phoenix.
Prjmeandbhu1	Calculated.
Prjmeabhu2	Calculated.
Invsiteidsource	Set to S as per RRD.
Type_id_ref	Updated by tyid_ref.
Invage	Updated by fcl_invage.
Age_class_cd	Age class was generated using the rules outlined in the RRD and using fcl_invage.
Invminage	Blank.
Invmaxage	Blank.
Invupdateyear	Blank.
Calinvtypesource	Set to S as per RRD.
Invheight	Updated by fcl_invhei
Ht_class_cd	Height class was generated using the rules outlined in the RRD and using fcl_invhei.
Invvolumefactor	Set to 0. Which is the default. It is not present in Phoenix.
Histsitecls	Updated by fcl_sitecl.
Histspsitecls	Updated by fcl_sitec2.
Invcrownclos	Updated by fcl_crownp.
Invstemsperha	Updated by fcl_densit.
Invwellspaced	Updated by fcl_wellsp
Invstockcls	Blank.
Invstocksource	Blank.
Invreferenceyear	Updated by fcl_refyear.
Prjage	Calculated.
Prjheight	Calculated.
Prjtypeid	Calculated.
Prjagecls	Calculated.
Prjheightcls	Calculated.

Attribute	Update Description
Prjstockcls	Calculated.
Calsiteidx	Updated by fcl_sitein.
Insiidxest	Updated by fcl_sitein.
Calsiidcls	Updated by using the rules outlined in the RRD.
Calintypgp	Updated by using the rules outlined in the RRD.
Calgrowthtype	Updated by using the rules outlined in the RRD.
Calcrowncloscls	Updated by using the rules outlined in the RRD.
Caldbhlmit	Blank. Several inquiries to Slocan came up empty.
Calculmaiu1	Calculated.
Clculmiu2	Calculated.
Calbasalareau1	Calculated.
Calbslaru2	Calculated.
Prjbasalareau1	Calculated.
Prjbslaru2	Calculated.

5.3 Updating the Forest Cover History Table

The History Table update needed to be treated differently from the two previously described tables in Sections 5.1 and 5.2. The two Phoenix tables that were used to update the History Table, the Activity and the Denude tables, were not in a flattened database structure. In other words, for each opening, there could be multiple database records.

Example: there could be 3 records of logging activity, 5 records for site preparation and 7 records for stand tending.

In order to match the TFL 18 FC database structure, these multiple database records needed to be flattened into one record. During the flattening process the data was placed into one of four categories, including; Disturbance, Site Preparation, Stand Tending and Plantation. These categories were then used to update the History Table

Attribute	Update Description
Mapstand	Was recreated for new polygons. The 2000 series in mapstand were created during the updating process (eg. 92P079_2005).
Phx_link	This is the Link to Phoenix that was created in the procedure described above.
Layer	Set to 1. TFL 18's Forest Cover is a flat database structure so all records have a layer of 1.
Openingnumber	Updated by op_opening.
Disturbance	Generated from the Denude Table.
Site_prep	Generated from the Activity Table.
Stand_tending	Generated from the Activity Table.
Plantation	Generated from the Activity Table.

During this phase of the project an issue was identified, limiting the update of the FC history table with Phoenix. Phoenix tracks the history information at the opening level of the database and not the stratum level. Therefore, all stratum within an opening will have the same history information. As a result, if there is an opening that has 2 stratum, one that is selectively logged and one that is clearcut. Both stratum will have both logging activities in their history table. If Phoenix could track the history information at the stratum level, this issue could be

corrected. In addition, some of the history information in Phoenix was found to be incomplete. All of the incomplete records originated from the backlog section of Phoenix. It would be possible to use the Ministry of Forests silviculture record keeping system to update the incomplete history records.

5.4 Updating the FC Information Table

When the Forest Cover Rectification project began, Silvatech created a new table in the forest cover database that was used to help track edits. This information table was again used during this project to help track the stratum updates. The table below outlines, which attributes from the information table, were updated.

Attribute	Update Description
Mapstand	Was recreated for new polygons. The 2000 series in mapstand were created during the updating process (eg. 92P079_2005).
Oldmapstand	Where possible the original mapstand was maintained in this column.
Phx_link	This is the Link to Phoenix that was created in the procedure described above.
Datasource	The source of the data. Phoenix, BCTS or Slocan Forest Cover.
Polygon	How the polygon was created. Monorestitution, GPS, Image Draw, Light table etc...
Phx_up	Indicates whether Phoenix was used to update the polygon (Y or N).
Phx_updt	The date of the Phoenix update.

5.5 Updating Annotation

Once the attribute data was updated, new forest cover labels (annotation) needed to be created and the obsolete labels removed from the spatial database. Obsolete annotation was removed by finding which label records no longer linked to the FC database. The annotation layer, called "fortxt", was linked to the rest of the information by using mapstand. Because all updated records received a new mapstand, any annotation records that did not link to the database using mapstand could be deleted.

When new annotation was being created it was discovered that Forest Cover annotation uses projected fields from the forest cover databases (eg. projected height, projected age, etc...). The updated Phoenix records do not have projected information because Phoenix does not track projected fields. In order to update the projected fields, the forest cover will have to be run through MSRM's Scope software or a comparable process (e.g. VDYP).

As a way around this problem, Silvatech used the nonprojected information to create the annotation (eg. height, age, etc...). Because this annotation is different from the existing annotation ("fortxt"), a new annotation layer was created ("phxtxt") so that the two labels could be differentiated from one another. The annotation in both layers still directly links to the GIS polygon through the mapstand field.

5.6 Review of FC Update Procedure and Deliverables

Throughout the TFL 18 Forest Cover Update Project, Regional MSRM staff provided valuable input on FC standards and data conventions, as well as direct feedback on deliverables produced. At the completion of each phase, MSRM staff, prior too moving on to the next phase of the project, reviewed deliverables. With the completion of the final phase of the project (FC Database Update (Phoenix)), a sample of the completed product was provided to MSRM staff with a presentation of the update process and procedures.

Contact: Ministry of Sustainable Resource Management
Kamloops Region
Phone: (250) 371 6219
Linda Sapinski, GIS Analyst
Linda.Sapinski@gems7.gov.bc.ca

6.0 Recommendations and a Procedure for Future Updates

With the development of an automated FC Update Process for TFL 18 and at the request of Slocan Forest Products-Vavenby Division (Slocan), we offer the following recommendations regarding:

- Internal silviculture record keeping
- Spatial FC linkage to the Phoenix database

In order to maintain and develop new links between a Phoenix record and it's corresponding FC polygon, the routine maintenance and transfer of opening file linework to Forest Cover spatial data is necessary. Once the spatial identification/update is complete, unique GIS links can be established for each FC stratum, and corresponding Phoenix records can be filled from field information (including the corresponding unique link number). In a perfect world, the Phoenix data records and the spatial updates would be done simultaneously. However, realistically this is difficult to achieve. Therefore, the update of the Phoenix data and the establishment of the unique GIS link can be followed with the input to Forest Cover under the same link.

We understand that Vavenby forestry staff is already employing most of the following steps and that problems are likely a function of the lack of available time and resources. The following includes recommendations for data management that extends from the field (silvi. surveys) and corresponding Phoenix to the update of spatially correct linework in Forest Cover.

6.1 Recommended Internal Silviculture Record Keeping Procedure

1. *Silviculture survey completed, linework (sketch/traverse) drafted and included in hardcopy opening file. A checklist form could be created to track information, as it is input through this procedure.*
2. *Input opening/strata information to Phoenix system under strict (consistent) reporting criteria (e.g. common species abbreviations, correct mapsheet etc.) and create the GIS link (from mapsheet, opening number and stratum). Phoenix input should match hard copy maps at all times*
3. *Silvatech recommends that Slocan create a new GIS coverage that will track all the Forest Cover updates. This will include any openings that already exist in Forest Cover that already has a GIS Link and it will also include new openings created from harvesting. Hard copy silviculture maps will then be given to appropriate individual to edit shapefile to reflect new silviculture stratification.*
4. *Each new/updated FC update polygon will be assigned a new GIS link that will be the same as the one created in Phoenix (from mapsheet, opening number and stratum).*
5. *Create a FC opening map based on edited shapefile and add map to silviculture opening file. This map can be compared to silviculture survey maps in the file and can be used as a base for future opening strata updates.*
6. *Maintain spatial and information databases regularly and consistently, ensuring that spatial (Forest Cover update coverage) and opening information data (Phoenix) are updated together (closely as operationally feasible). Data linkages between Phoenix and the FC update coverage can be regularly checked for possible input errors. This process is described in detail below.*
7. *Use the Forest Cover opening update coverage from Slocan to update the full Forest Cover.*
8. *Update the full Forest Cover with Phoenix and where necessary modify labels.*

6.2 Spatial Forest Cover Linkage to the Phoenix Database

Following investigation into Slocan-Vavenby's current method of tracking digital opening information, it was determined that a new digital coverage should be created to track new openings and existing openings that have a GIS link. In the past, Vavenby has tracked openings through SR-NSR coverage (tied to Forest Development Plan mapping requirements). While this method works for new openings, it is not be the best way to track openings that are already in Forest Cover because the data would have to be put back into the SR-NSR coverage.

Initially, selecting, from the FC database, all the openings that contain a GIS link can create a new Phoenix Forest Cover updates coverage. As new openings are created or input into the Phoenix System, they will be included in this coverage. When a new block is created, the boundary would be entered into this coverage and the database would be filled in.

The new Forest Cover update coverage (to be maintained by Slocan) will include the following records in the database table. Mapsheet, Opening Number, Stratum, GIS Link, Boundary Data Source, Stratum Data Source, Date of Update, Operator, CP and Block Number.

The Mapsheet, opening and stratum number are the basis for the GIS link, so they must be included as a means to verify that the GIS link is correct. The opening boundary is created in the GIS coverage through the Boundary Data Source, while the stratum data source will be used to create stratum boundaries (eg. GPS or digitized). The recorded date of the FC update is another way to ensure that the update reflects the most recent Phoenix information (compare to Phoenix record date). The name of the operator who input the data is important as it can also be used to track data anomalies while the CP and Block number are useful for the Silviculture Department to help track the data.

One way to check to see if a link is still valid between forest cover and phoenix is to virtually link the Forest Cover database to the Phoenix database using ArcView. Once the data is linked the user will be able to quickly identify which GIS links no longer exist in Phoenix. When the two databases are linked together, any forest cover polygon with a GIS link that does not link to Phoenix will have a link that is obsolete. The user can review the silviculture files and change the GIS link accordingly.

Silvatech Consulting Ltd. Contacts:

Grant R. Sime, R.P.F. Forestry Manager Silvatech Consulting Ltd. g.sime@silvatech.ca	Graham MacGregor GIS Analyst Earth Imaging Technologies Inc. g.macgregor@silvatech.ca	Kevin Stehle GIS Analyst Earth Imaging Technologies Inc. k.stehle@silvatech.ca
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APPENDIX A
Ministry Correspondence Record

From: "DAVE DOBI" <ddobi@slocan-vavenby.com>
To: "Grant Sime" <g.sime@silvatech.ca>
Cc: "John Rogers" <jarogers@slocan-vavenby.com>
Sent: Monday, August 25, 2003 9:27 AM
Subject: FW: TFL Boundary Issues - Linework determined - where to go from here??

Grant - please review the note below. John has a copy of Ron V's file and he needs to provide to you asap. Please ensure that the FC polygon work is updated and extended to reflect the "correct" boundary. I will need a timeline for completion of this work. Please track all costs associated with this work as a separate project.

Thanks.

Dave Dobi, RPF
Forestry & Planning Superintendent
Slocan Forest Products Ltd. - Vavenby Division
Vavenby, BC
V0E 3A0

=====
Tel: (250) 676 - 1136
Cell: (250) 319 - 7738
Fax: (250) 676 - 9455

e-mail: ddobi@slocan-vavenby.com
=====

-----Original Message-----

From: J. A. Rogers [mailto:jarogers@slocan-vavenby.com]
Sent: August 25, 2003 7:59 AM
To: Slovav - Dave Dobi
Subject: Fw: TFL Boundary Issues - Linework determined - where to go from here??
Importance: High

=====
John A. Rogers, AScT
GIS/Forest Technologist

jarogers@slocan-vavenby.com
Direct Line 250-676-1173

Slocan Group - Vavenby Division
PO Box 39
2996 McCorvie Road
Vavenby, BC

VOE 3A0

Switchboard - 250-676-9518
Fax - 250-676-9455

A blond, a priest, a rabbi and a blind man walk into a bar. The bartender asks "What, is this a joke?"

----- Original Message -----

From: "Van der Zwan, Ron FOR:EX" <Ron.Vanderzwan@gems3.gov.bc.ca>
To: <jarogers@slocan-vavenby.com>
Sent: Friday, August 22, 2003 12:15 PM
Subject: FW: TFL Boundary Issues - Linework determined - where to go from here??

> I see that your email was not written accurately. Here is the file that
> Janet sent August 18th.

>

> Sorry, I didn't realize it did not get through to you.

>

> -----Original Message-----

> From: Van der Zwan, Ron FOR:EX
> Sent: Tuesday, August 19, 2003 3:12 PM
> To: Adams, Janet SRM:EX; 'jarogers@slocan_vavenby.com'
> Cc: Tanner, Max FOR:EX; Banford, Barry FOR:EX
> Subject: TFL Boundary Issues - Linework determined - where to go from here??
> Importance: High

>

>

> Hello Janet and John. I have had a look at the three files - 1 - my file
> from when the boundary was negotiated (file dated May, 2000), 2 - SFP file
> from Darrel Scott (from INCOSADA in) and Janet's design file (April
2000).

>

> Both Janet's and my file match exactly. Where Darrell got his file from,
I

> cannot tell. There are up to 75 metre differences (Lolo - Star Lake north
> south line). And my file is about 30 ha larger in area.

>

> I cannot explain the discrepancy, nor am I really aware of how to rectify
> the situation. The boundary that Janet and I have is supposed to most
> accurately match the written legal description and was accepted by Slokan
at
> the time of negotiation.

>

> Janet: Given that both yours and my file match, and it is the one the
> Surveyor General is using, I would consider it to be the line to use. Do
> you have any suggestions to resolving this problem. It seems that Slokan
> has done a significant amount of work using the wrong linework provided by
> our LIM operator (pulled from INCOSADA - possibly pulled the old rather

than

> current linework).

>

> Thanks. At least we know which is the correct line. Now, how to move

> forward.

>

> -----Original Message-----

> From: Adams, Janet SRM:EX

> Sent: Monday, August 18, 2003 1:48 PM

> To: Van der Zwan, Ron FOR:EX

> Cc: 'jarogers@slocan_vavenby.com'

> Subject: RE: TFL Boundary Issues

>

>

> The information I have shows a boundary file compiled in 1995 which is
> slightly offset from what was showing in INCOSADA. The latest digital file
> (attached) is dated April 2000 and is the identical boundary as that shown
> on the District Admin tile in INCOSADA. This file will not show any
> exclusions or inclusions that have occurred since then (additions or
> deletions by instrument). If this boundary differs from the one you have,
> please send me yours and I can check it out so we are all looking at and
> using the same information.

>

> Janet

>>

> -----Original Message-----

> From: Van der Zwan, Ron FOR:EX

> Sent: Sunday, August 17, 2003 11:15 AM

> To: Adams, Janet SRM:EX

> Subject: RE: TFL Boundary Issues

>

>

> Hi Janet, I came in to the office today and got your voice mail. If you
> have the file, please email it to me. I am using GeoMedia and I can view
> many different file formats as long as I know the projection and,
hopefully,

> it is in metres resolution.

>

> I will come in to the office occasionally to check my mail.

>

> -----Original Message-----

> From: Adams, Janet SRM:EX

> Sent: Thursday, August 14, 2003 1:52 PM

> To: Van der Zwan, Ron FOR:EX

> Subject: RE: TFL Boundary Issues

>

>

> Have not forgotten you. I have been working on fire projects and now the
> server is down. As soon as its up I can get you a copy.

>

> Janet

>
> -----Original Message-----
> From: Van der Zwan, Ron FOR:EX
> Sent: Thursday, August 14, 2003 1:35 PM
> To: 'J. A. Rogers'
> Cc: Adams, Janet SRM:EX
> Subject: RE: TFL Boundary Issues
>>
> Hi John. I left you a voice mail message regarding this issue. Please
> contact Janet if I don't get you the info before I leave.
>
> -----Original Message-----
> From: J. A. Rogers [mailto:jarogers@slocan-vavenby.com]
> Sent: Thursday, August 14, 2003 1:28 PM
> To: Van der Zwan, Ron FOR:EX
> Subject: TFL Boundary Issues
>
>
> Hi Ron,
>
> Could you confirm, prior to your holidays, which TFL 18 boundary is the
> correct one? Or, if you are unable to confirm, could you let me know who
> will be responsible for confirmation and accuracy of the data?
>
> As you know, we have done substantial work with the TFL 18 boundary that
was
> provided to us.
>
> Please get back to me ASAP.
>
> Thanks.
>
> =====
> John A. Rogers, ASCT
> GIS/Forest Technologist
>
> jarogers@slocan-vavenby.com <<mailto:jarogers@slocan-vavenby.com>>
> Direct Line 250-676-1173
>
> Slocan Group - Vavenby Division
> PO Box 39
> 2996 McCorvie Road
> Vavenby, BC
> V0E 3A0
>
> Switchboard - 250-676-9518
> Fax - 250-676-9455
>

From: "Graham MacGregor" <g.macgregor@silvatech.ca>
To: "Grant Sime" <g.sime@silvatech.ca>
Subject: Fw: Slocan TFL 18 Forest Inventory Update
Date: Friday, January 23, 2004 12:03 PM

----- Original Message -----

From: "Sapinsky, Linda SRM:EX" <Linda.Sapinsky@gems7.gov.bc.ca>
To: "'Graham MacGregor'" <g.macgregor@silvatech.ca>
Sent: Monday, November 24, 2003 3:17 PM
Subject: FW: Slocan TFL 18 Forest Inventory Update

>

> > -----Original Message-----

> > **From:** Sapinsky, Linda SRM:EX

> > **Sent:** Monday, November 24, 2003 2:16 PM

> > **To:** 'ddobi@slocan-vavenby.com'

> > **Cc:** 'g.macgregor@silvatech.bc.ca'; Baker, Rick SRM:EX; Salkeld, Tim H

> > SRM:EX

> > **Subject:** Slocan TFL 18 Forest Inventory Update

> >

> > Hello Dave,

> >

> > On November 21, 2003, Silvatech Consulting Ltd. provided a detailed review

> > of the forest inventory update work they undertook on behalf of your

> > company for TFL 18. Graham MacGregor described the steps taken to

> > spatially correct and update the forest inventory data using proven update

> > techniques and appropriate source data. Their use of mono restitution to

> > capture forest cover type lines from typed air photos and ortho and IRS

> > imagery to capture new disturbance shapes coincides with the methodology

> > and tools used by government to update the TSA landbase. The linkage of

> > the attribute information from Phoenix and the labeling of the forest
> > cover maps provide a good representational tool for planning purposes.
> >
> > We are confident that the work completed to date meets the Ministry of
> > Sustainable Resource Management vegetation inventory spatial data
capture
> > standards. The attribute data appears to meet the standards as well but
> > can only be validated if you choose to have your data processed through
> > the Ministry conversion and projection software. This process may
require
> > additional work to add or edit attributes to meet the specifications but
> > the end result will allow you to project attributes and volumes for the
> > entire TFL. Graham and Tim Salkeld will be able to provide you with
more
> > details on the merits of conducting this work.
> >
> > If you have other questions or concerns, please don't hesitate to
contact
> > me or Tim.
> >
> > Linda Sapinsky
> >
> > Vegetation Inventory Officer
> > Resource Information Branch at Kamloops
> > Ministry of Sustainable Resource Management
> >
> > Phone: (250) 371-5225 Fax: (250) 371-5293
> > E-mail: Linda.Sapinsky@GEMS7.GOV.BC.CA
> >