Forest and Range Evaluation Program
Resource Stewardship Monitoring

2008 Training and Quality Assurance Report

for

Stand-Level Biodiversity Monitoring

and

Evaluating the Condition of Streams and Riparian Management Areas

Prepared by:

Dean McGeough, RPF
Integra Forest Consulting Ltd.
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INTRODUCTION

Eleven resource values have been identified under the *Forest and Range Practices Act* (FRPA). The ***Forest and Range Evaluation Program*** (FREP) is mandated to conduct routine evaluations to assess the status of these resource values. A FREP Protocol document guides data collection during the routine evaluation process.

The FREP mandate is to assess the effectiveness of various forest management activities at maintaining and conserving biodiversity and fish/riparian values by evaluating key indicators. These indicators are outlined in the respective protocols for each of the resource values.

Following pilot testing of the protocols for Stand-level Biodiversity and for Fish/Riparian Effectiveness Evaluations in 2004 and voluntary monitoring in 2005, all provincial forest districts participated in the FREP routine evaluations in 2006, 2007 and 2008.

Training is available to all District staff that wish to participate in Resource Stewardship Monitoring (RSM). Training helps to ensure that effectiveness evaluations are performed accurately and reliably. Continuous improvement is promoted during training, mentoring, quality assurance site visits, and office validation of completed evaluations.

This report summarizes the 2008 RSM training, mentoring and quality assurance activities for stand-level biodiversity (SLB) and riparian (RIP) area monitoring, and provides recommendations for continuous improvement.

SCOPE

Formal training sessions are organized and conducted prior to the start of each field season. Full training is available for staff with limited or no previous formal training in RSM. An abbreviated training session (called “refresher training”) is available for staff who conducted field work in previous years. Participants attending refresher training are given updates to the protocols and their practical skills are enhanced with field-guided reviews. Training commenced in early May and the final of four regional training sessions was completed by mid July.

Once staff attends formal training they commence their routine effectiveness evaluations on randomly selected harvest openings within their respective districts. District staff is further supported by mentorship training. Mentoring is an integral aspect to achieving positive quality assurance (QA) outcomes. Mentoring was performed by the trainers for the purpose of reviewing field methods and clarifying the use of the procedures described in the applicable protocol. Mentoring also provides refresher training to staff that were

unable to attend regional training sessions. Mentoring commenced in early June and the final of twenty-five district visits ended on November 5th.

The final stage in the RSM field training process is to perform QA visits of completed field assessments. The purpose of the QA visit is to evaluate the reliability of the field assessments completed by the District teams, and to provide them with constructive feedback. The results of QA visits are used to modify training plans and to guide refinements to the resource value protocols, checklists and field guides. The QA visits are therefore a valuable feedback element in the continuous improvement cycle of the RSM program.

Regional Training Venues

In 2008, training was delivered at three regional training venues – Campbell River, Williams Lake, and Vanderhoof. There were two sessions in Williams Lake, and one session at Campbell River and Vanderhoof. The training offered at each regional venue is outlined below. Evening training sessions were integrated to provide a more streamlined approach to training. Persons wishing to take refresher training in stand level biodiversity (SLB) and riparian effectiveness evaluations could also attend the full water quality training as a result of this new training itinerary.

Training utilized a two hour evening session to expedite training at each regional session. On Tuesday night, staff could attend the SLB refresher training. This session outlined the changes to the SLB protocol, reviewed the continuous improvement outcomes from the 2007 season, and reviewed the SLB office planning process. On Thursday night, staff attending the riparian full training attended a two hour debriefing session. This evening session provided the trainers with opportunity to collate the assessment results for a stream reach that all teams assessed. The aim was to help staff understand their strengths and weaknesses so they would focus on their weaknesses on their final day of training.

There were 107 participants in SLB training (36 refresher and 71 full), and 120 participants in RIPARIAN training (43 refresher, 13 awareness and 64 full). A one-day awareness session was available to staff who expressed a general interest in the RSM program but who did not know if they could commit to joining the field work.

SESSION	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
SLB Refresher	Evening Session			
SLB Full Session	1 – Day SESSION			
RIPARIAN TRAINING	1 – Day Refresher	3 – Day FULL TRAINING SESSION; with Evening Session on Thursday		
RIPARIAN General Interest		1 – Day Awareness		
WATER QUALITY		2 – Day FULL SESSION		

This formal training process was then followed by mentorship visits to the districts. In 2008 trainers conducted mentor visits for SLB and/or riparian monitoring that covered 25 forest districts. Mentoring gave trainers an opportunity to work with staff during field assessments, and in some instances, an opportunity to review completed assessments. The mentoring visits conducted in 2008 are shown in table 1. A total of 75 staff participated in mentor visits, with group sizes ranging from 1 to 6 staff per visit.

Table 1 Mentor Visits in 2008

Mentoring Dates	Forest District (Location)	Trainer
June 9 - 11	Queen Charlottes	Derek Tripp
June 12 - 14	North Coast	Derek Tripp
June 18	Prince George	Derek Tripp
June 19 - 20	McKenzie	Derek Tripp
July 30-Aug 1	Mackenzie	Derek Tripp
July 15	Nadina	Derek Tripp
July 16	Vanderhoof	Derek Tripp
July 17	Headwaters	Derek Tripp
June 19 - 20	Squamish	Bryce Bancroft
Aug 6 - 7	Arrow Boundary	Bryce Bancroft
Sept 9 - 10	North Island Central Coast	Bryce Bancroft
Nov 5	Campbell River	Bryce Bancroft
June 23 - 24	Ft. St. James Kalum (Terrace)	Kevin Kilpatrick
June 25	Kalum (Terrace)	Kevin Kilpatrick
June 25 - 26	Skeena Stikine	Kevin Kilpatrick
June 13, 26-27	Kamloops	Dean McGeough
June 17 - 18	Sunshine Coast	Dean McGeough
June 24 - 15	Okanogan - Shushwap	Dean McGeough
July 16 - 17	Cascades (Merritt)	Dean McGeough
July 21 - 22	Fort Nelson	Dean McGeough
July 24 - 25	Chilcotin	Dean McGeough
July 29	100 Mile House	Dean McGeough
July 30	Central Cariboo (Williams Lake)	Dean McGeough
July 31 – Aug 1	Quesnel	Dean McGeough
Aug 7 - 8	Peace (Dawson Creek)	Dean McGeough
Aug 13 - 14	Columbia (Revelstoke)	Dean McGeough

QUALITY ASSURANCE PURPOSE

A quality control protocol for "QA Site Visits" guides the data verification processes for FREP. During the 2008 field season, trainers Dean McGeough, Derek Tripp and Bryce Bancroft visited cutblocks sampled by district staff for SLB and Riparian effectiveness evaluations. These visits assessed the measuring and estimating accuracy. This task is the foundation of QA and control of data quality. Results from the QA site visits can also be used to identify patterns of error and recommend solutions that will support continuous improvement efforts.

The locations of formal QA site visits completed in 2008 are shown in table 2 below. One of the 21 streams reviewed had to be dropped because the stream was actually a Non-Classified Drainage and thus was ineligible for sampling.

Table 2 Quality Assurance Site Visits in 2008

Forest District	Stand-Level Biodiversity	Riparian Area
DVA	4 Openings	2 Streams
DMH	2 Openings	4 Streams
DPG	2 Openings	4 Streams
DPC	2 Opening	1 Stream
DCO	4 Openings	1 Stream
DSI	1 Opening	2 Streams
DQU	2 Openings	2 Streams
DCC	None	2 Streams
DFN	None	1 Stream
DSC	1 Opening	1 Stream
DCR	1 Opening	1 Stream
DKA	2 Openings	None
DCH	2 Openings	None
DCS	3 Openings	None
DND	1 Opening	None
	27 Sites	**21 Samples**

Selection of sites for QA focused on openings that were identified by the district staff as being representative of their sites completed, were relatively easy to access, had specific challenges the district requested for review, or were openings that fit into the staff's work plans (sites that were incomplete or in proximity to sites needing evaluation). Therefore, the QA site visit also provided additional mentoring when staff participated with the QA visit.

QA SITE VISIT PROCESS

MENTORING

Trainers met with the field staff at the district office and travelled with the staff to field sites. Trainers observed the staff's planning and block set-up, and then accompanied staff in locating each biodiversity plot or riparian reach. Trainers assisted with field data collections by the staff, and in an ad hoc manner audited a sample of the field measurements to confirm the accuracy of the measurements made by district staff. At all times, trainers availed themselves to questions and provided clarification, interpretation and application of the protocols. Where opportunities arose, trainers also provided field support to the staff by establishing plots and taking measurements to increase productivity, thereby helping the staff complete the site assessments in a timely manner.

QA AUDITS

Methodology – SLB

Biodiversity plots were randomly selected for review. A plot from both harvest area and patch retention was selected in each cutblock. If issues were encountered, additional plots were reviewed.

Field measurements were verified for accuracy. Plots centres and CWD transects were located. Attempts were made to determine the order in which trees or CWD were sampled, and then the dimensions, species, and decay classes were recorded on the Checklist form A. Diameters of standing trees were measured with a steel diameter tape, and CWD were measured with a diameter steel tape. Tree heights were measured with a Haglof digital clinometer and rangefinder, while CWD lengths were measured with either a steel carpenter tape or a steel logger's tape.

The stratum summaries (form B) and opening summary (form C) were also completed on-site following the field reviews. Stratum summaries were made on the basis of reconnaissance of the area and when travelling amongst plots.

A QA field verification scoring system is used to summarize the findings. Each measurable attribute was either accepted or rejected on the basis of accuracy. The goal established in the protocol is to have estimates within 90% of their true measurement. Each data attribute was thus scored on the basis of number of records that were 90% or better in agreement with measurements. The proportion of accepted attributes was then scored on a four-point system as follows:

1 = weak recognition of key indicators (<70% verification score)
2 = moderate confidence (score >70% verification score)
3 = high level of confidence (score >80% verification score)
4 = conforms to QA standards (score >90% verification score)

Methodology – Riparian

Stream samples were field reviewed by traversing the reach as field marked by the district staff. An overview was made to identify the general condition of the reach. The point sample sites were then located and field data recorded on the checklist. Where discrepancies were identified during the overview, measurements were taken to establish whether the discrepancies would alter the conclusion to the indicators and checklist questions. Where discrete measurements are needed (e.g., bare ground, length of disturbed bank, etc) then measurements were made with a logger tape or carpenter tape. Benthic invertebrates were also sampled in at least one location to confirm species diversity using the same collection methodology found in the protocol (same dip net and white tray issued to all districts).

The data collected was used to answer the indicators and checklist questions prior to leaving the field site. Where impacts were identified, their source was determined by a visual overview or walk upstream of the sample.

A field verification rating system is used whereby each indicator was scored on the basis of accuracy. The field results were compared and rated using a four-point system as follows:

0 = Disagree with measurements
1 = Weak measurement; impacts conclusion
2 = Weak measurement; does not affect conclusion
3 = Agreement with measurement

The rankings of all applicable indicators were then averaged to generate an overall score based on the same four-point system. In addition, the number of indicator statements with a “no” conclusion were compared between the district team and the QA evaluator. The goal for the riparian evaluations is to have a score of >2.5, and to have the number of “no” conclusions and variation in which conclusions differ at one or fewer between the district team and the QA evaluator.

QA SITE VISIT OUTCOMES

Without exception, the forest district staff welcomed the mentoring opportunities of the trainers’ visits. Having a trainer on-site provided opportunity for continuous improvement, refinement of their data collection processes, and reassurance to the district staff about their assessment methodology and application of the protocol. This also provided a forum for field relevant review of their questions pertaining to the protocols. In general, the level of professionalism and continued enthusiasm for the RSM projects as demonstrated by the staff is commendable. District teams overwhelmingly requested that mentoring and QA visits be continued each year. These visits are regarded as a key component of the FREP program.

Stand-level Biodiversity Monitoring

The following items were encountered during QA site visit reviews of the stand-level biodiversity sampling process:

- Where measurements did not meet the 10% margin of error it was primarily because visual estimation lacked calibration.
- Missed trees or CWD pieces did occur. It appears that borderline trees are not always confirmed by calculating the plot limiting distance, or verifying the size of CWD or ensuring the transect crosses the central axis of the log.
- Inadequate field marking sometimes complicated verification of CWD data. CWD transects could not be audited when transects were not field marked, or plot centres were not flagged. Transects that were flagged were measured for verification.
- Independent retention patches were not always sampled as unique patches, but rather "grouped" if of similar timber type or retention type, and therefore only one form B was completed in error.
- Tree classes are sometimes in error for live trees with defects (WT Class 2) or for trees that have recently snapped but are still hard snags (class 3 or 4), or for stubbs created from green trees (class 3 or 4).
- Species identification was strong for standing tree tallies, but not always rigorous for CWD. Staff select "unknown species" frequently for class 4 CWD despite the presence of species indicators (bark, pitch tubes, wood grain, odour, branching). A "Species Identification Field Guide" was provided to staff mid-season and should be a valuable aid for subsequent field seasons.

The outcomes of the QA verification are summarized in table 3 for the 27 cutblocks visited in 2008. The performance goal is for data collection to score higher than 90% verification with true measurement. In general, staff have performed very well. The overall QA score for 9 attributes was 94.5% and the scores for 8 of 9 attributes exceeding a score of 90%. Estimates of tree height were slightly below this goal, with an average score of 85.6%.

Table 3 Stand-level Biodiversity Verification Summary

Tree Tally score: 93.2%	CWD tally score: 96.1%
Tree & CWD Species score: 96.7%	CWD diameter score: 97.1%
Tree Diameter score: 94.9%	CWD length score: 94.2%
Tree Class score: 95.5%	CWD class score: 98.4%
Tree Height score: 85.6%	
OVERALL VERIFICATION SUMMARY – 9 Indicators: 94.5%	

The scoring results for SLB standing tree attributes are illustrated in Figure 1 below. Only 2 of the cutblocks reviewed had a species verification score of less than 90%. Diameter scores were equally accurate, with only 5 cutblocks scoring less than 90%.

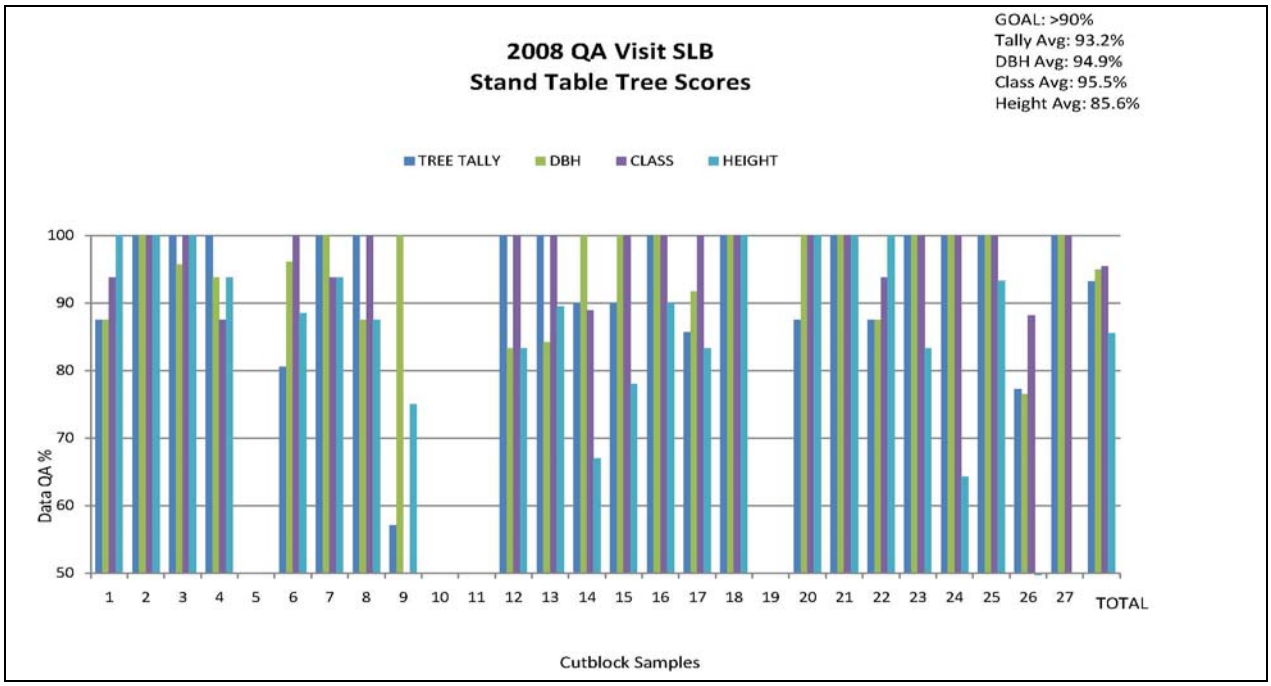

Figure 1 QA Verification Results for Standing Tree Attributes

Note that 4 of the cutblocks visited did not have standing trees. Where trees were present, the QA reviews discovered that 7 of 23 cutblocks had a tree tally validation score of less than 90% because of missed trees or stubbs. This can be easily overcome by having staff measure trees that appear to be borderline trees.

Tree class scores were below 90% for only 4 of 23 cutblocks and related mainly to misunderstandings about tree class 2 (class 2 trees are live trees that have some form of damage, decay or disease). This weakness can be overcome during training and by providing a more detailed description of the Wildlife Tree classes. There was confusion between cruising classification and the wildlife tree classification.

Only 11 of the 23 cutblocks reviewed had a tree height verification score of greater than 90% accuracy. Although tree height is not a significant indicator in the risk ranking process it can be improved by calibrating estimates with at least one measured tree in each plot. Of course, measuring more trees can also increase accuracy scores, but the extra time required to measure more trees may not derive a net benefit relative to the risk ranking process.

The CWD verification scores are illustrated in figure 2. There were 23 of 27 cutblocks which scored above 90% agreement in the tally of CWD pieces. The diameter estimates of CWD were quite accurate, scoring above 90% accuracy for 24 of 27 cutblocks. The accuracy of estimating the length of CWD was quite good, with 21 of 27 cutblocks with scores above 90% accuracy. All cutblocks had a score above 90% for the classification of CWD.

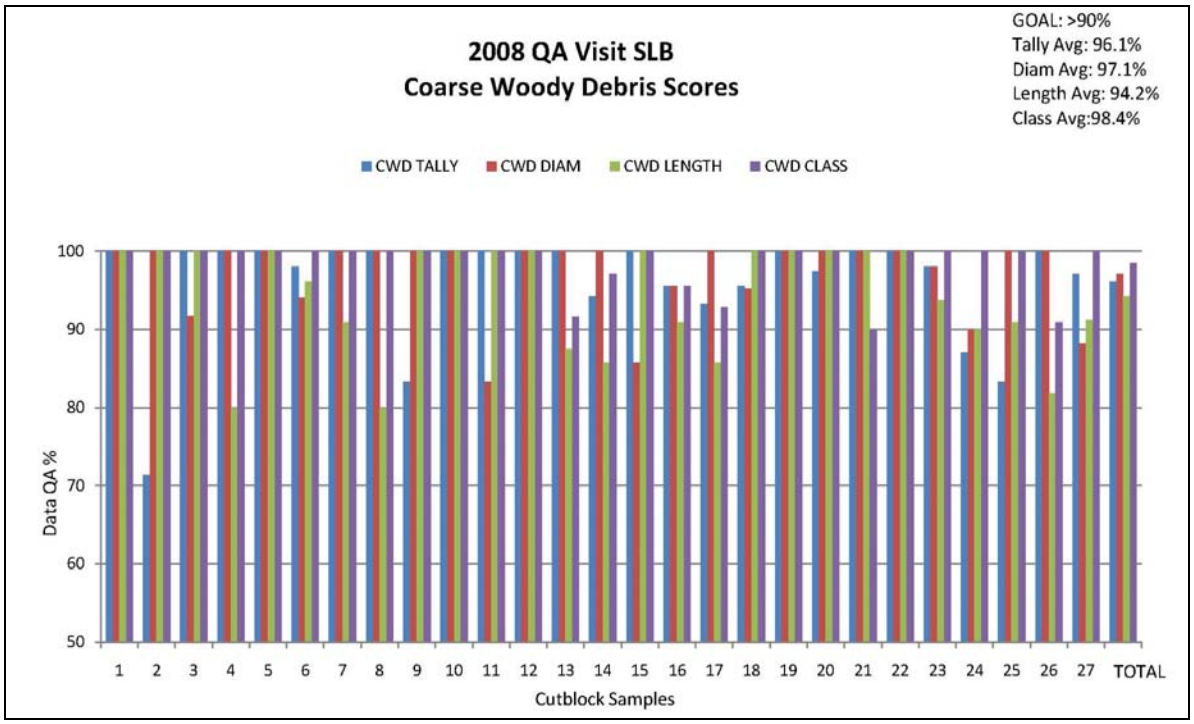

Figure 2 QA Verification Results for CWD attributes

The overall QA verification score for 27 cutblocks was 94.5%, with only 3 (or 11%) of the cutblocks scoring below the target of 90%. In 2007, the overall QA score was 88% and 55% of the cutblocks reviewed scored below 90%. The comparison between scores in 2007 and 2008 are illustrated in figure 3. The noticeable trend is that field staff has increased their overall accuracy. For 2009, the challenge will be to elevate the level of accuracy for tree heights while maintaining the performance of the other SLB attributes.

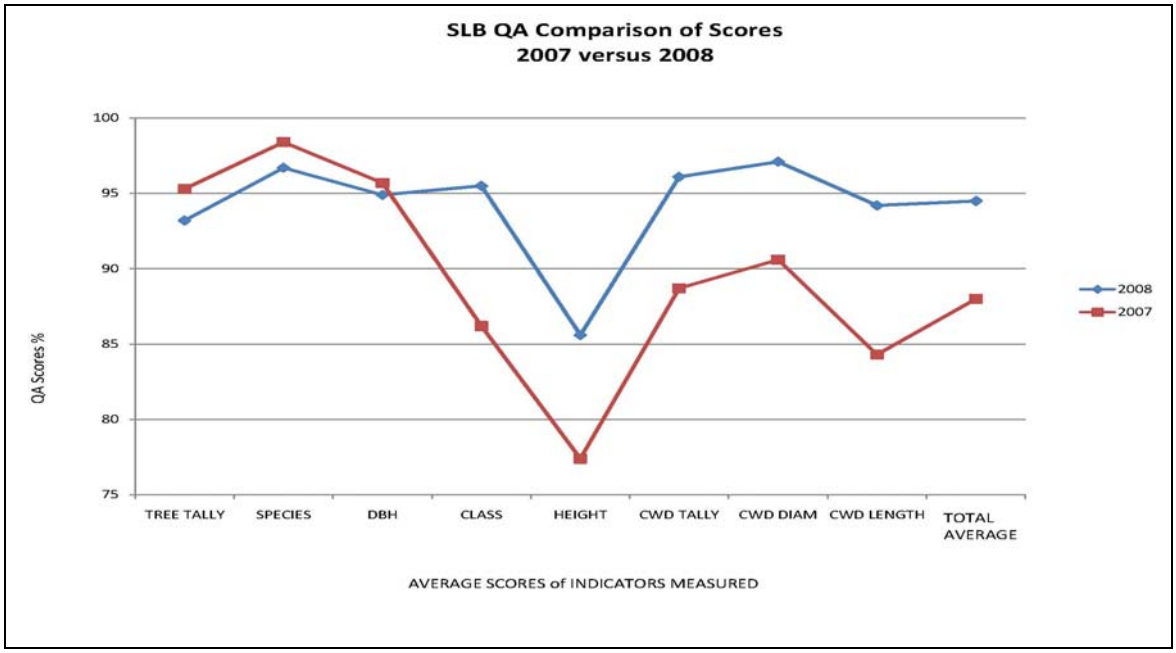

Figure 3 Comparison of SLB QA Verification Results: 2007 to 2008

Evaluating the Condition of Streams /Riparian Areas

The following items were encountered during site visits and during validation reviews of completed checklists:

- Locating a reach relative to a crossing is still weak; some locate the POC of their downstream sample below the crossing rather than above the crossing.
- Question 2 (Are the channel banks undisturbed?): Recognition of recent disturbance from stream flows, cattle or upturned bank anchored root wads, and the understanding of deeply rooted banks are occasionally misunderstood. It is important to ensure the protocol and the field guide is aligned consistently.
- Question 3 (Channel woody debris processes): There was incorrect wording on the checklist for channel spanning debris. Although staff who attended training were notified of the error, it was not consistently corrected by staff.
- Question 4 (Is the channel morphology undisturbed?): Recognition of pools when channels are dry or at bank full is still problematic.
- Question 5 (Connectivity): The recognition of dewatering and water diversion was not always understood, but can be improved through training.
- Question 6 (Diversity of fish cover): Minor confusion existed in the realization of what constitutes 1% cover, and in the recognition of what constituted a stable mineral substrate.
- Question 8 (Minimized fine sediments): Distinguishing between organic fines and inorganic fines is a weakness. The protocol will require further guidance for when to conclude that the stream is primarily “organic”.
- Question 9 (Benthic diversity): The diversity of benthic invertebrates is occasionally confused with density; the number of different sensitive subgroups and number of different insects shows marked improvement from findings in 2007. Staff can improve on their sampling techniques in bank-full conditions and streams with organic substrates.
- Question 10 (Windthrow management): Field measurement and calculations of historic levels to current levels of windthrow were generally performed well (although the formula on the field checklists was incorrect); differentiation between windthrow and natural collapse requires careful considerations; clearcutting was not always recognized by staff to be recorded as effective windthrow management.
- Questions 11 (Bare erodible soil or disturbed ground): Substantial improvements were observed in how this question is evaluated compared to 2007. There is some confusion about what constitutes disturbed ground and how to “net out” non-erodible surfaces.
- Question 15 (Healthy unmanaged plant community within 10m of the stream): Tables 3 and 4 were added to the checklist for evaluating this aspect. However, minor confusion existed with knowing when and how to use these tables.
- Data records are sometimes inconsistent with how indicator statements are answered. Also, staff needs to provide notes when issues arise, and to use **N/S** to indicate the indicator was not evaluated (e.g., N/S for transects not sampled for benthic invertebrates.

- The "Other Indicators to Note" section was re-formatted for trial in 2008 but was not consistently used by all staff.
- Conclusion on Functioning Condition and the source for impacts has improved; however, we require assessors to attribute which "No" questions are associated with the various "Specific Impacts".
- The descriptions for the riparian area can be summarized better; the note section on page 18 of the checklist needs to be re-written to eliminate the confusion for describing the forest that is not harvested.
- In 2008 there was a remarkable decrease in the number of photos taken of streams. Unfortunately, data validation is hampered if there are no "overview" photos to review.
- Not all staff are confident in how to attribute the causes for negative impacts, especially when there are both natural and management related causes.

The outcomes of the QA verification are summarized in table 4 and illustrated in figures 5 and 6. Of the 21 stream samples visited in 2008, only one sample was not validated because of the sample being of a Non-Classified Drainages and thus ineligible for sampling. The QA evaluations cover a diversity of riparian stream classes, ranging from S3 (7 samples), S4 (7 samples), S5 (1 sample) and S6 (7 samples) reaches.

The performance goal for data collection is to have indicators scoring above 2.5 and to have the number of differences in No answers to be 1.0 or fewer than the QA assessors. Table 4 demonstrates that field indicator scores have attained a score above 2.5 in many instances. The difference in the conclusion about functioning condition has not quite attained the goal, but it is attainable with continued practice and training. Figure 5 illustrates that in 2008 Point Indicators scored the highest for reliability (85% of the checklists had scores above 2.5) while Continuous Indicators scored lower (70% of the checklists scored above 2.5). The scoring of the "Other Indicators to Note" attributes achieved this goal in only 45% of the samples.

Table 4 Verification Results for Riparian Effectiveness Evaluations

Verification Criteria	Performance Goal	Verification Results	# Samples Achieving the Performance Goal
Point Indicators	>2.5	2.8	17 (85%)
Continuous Indicators	>2.5	2.6	14 (70%)
Other Indicators to Note	>2.5	2.6	13 (65%)
Difference in number of "No" conclusions	1.0	1.3	13 (65%)
Variation in which "No" conclusions	1.0	2.0	9 (45%)

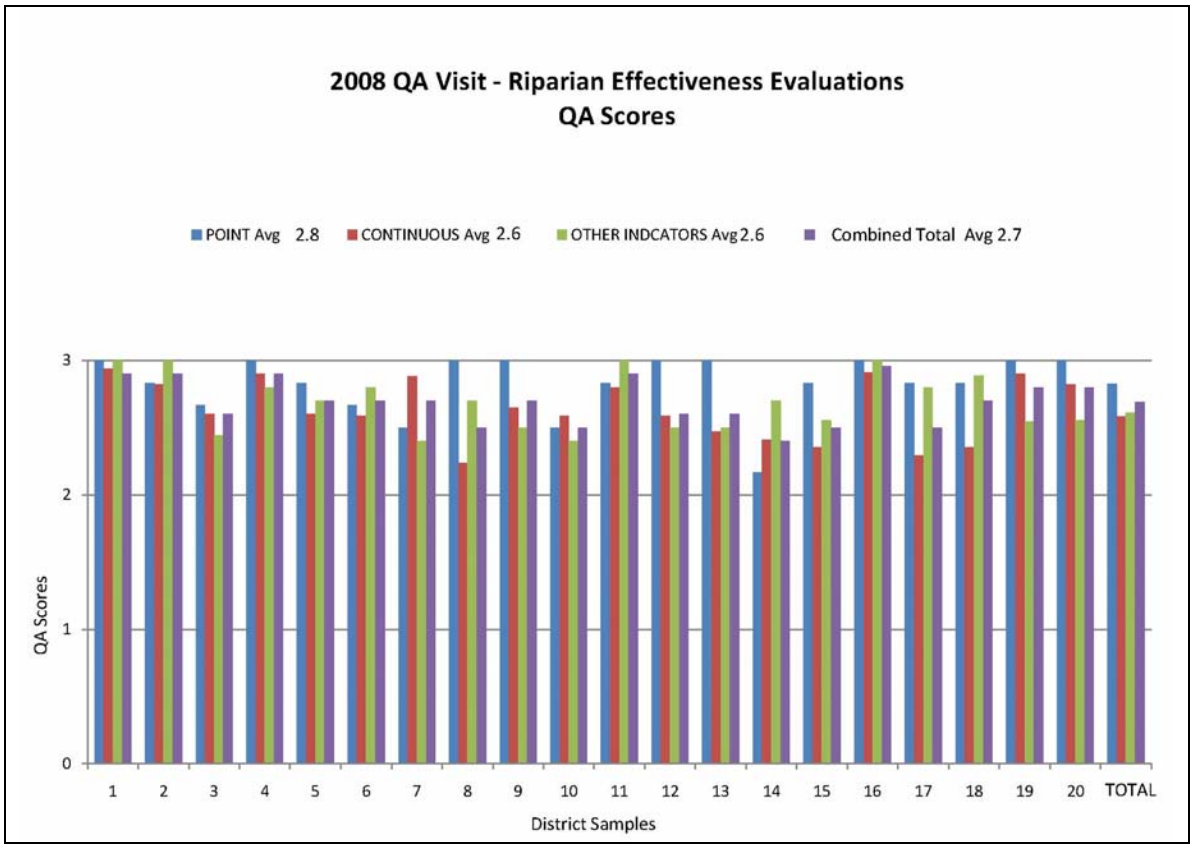

Figure 5 Riparian Confidence Scores for Riparian Indicators

The tendency is for district teams to identify a higher number of "No" indicator statements and conclusions than did the QA evaluators. In 2008, half of the streams were given a greater number of "No" conclusions, while there was agreement in 30% of the reaches. In situations where the streams were actually in poorer health than concluded by the district teams, the issues were related to clerical errors, or misunderstandings about sediment embedding, or a weak determination of recently disturbed banks.

Of eligible streams, the district teams recorded an average of 3.9 "No" conclusions compared to 3.2 "No" conclusions by the QA evaluators, meaning in both cases that streams are, on average, "Properly Functioning but at Risk". Figure 6 illustrates the variability in the properly functioning condition across the twenty eligible reaches. The conclusions about functioning condition ranged from Properly Functioning (0 to 2 No answers) to Not Properly Functioning (>6 No answers) conditions. The district staff's conclusions ranged from zero to eleven 'No' answers, while the QA evaluators found the conclusions to range from zero to seven 'No' answers.

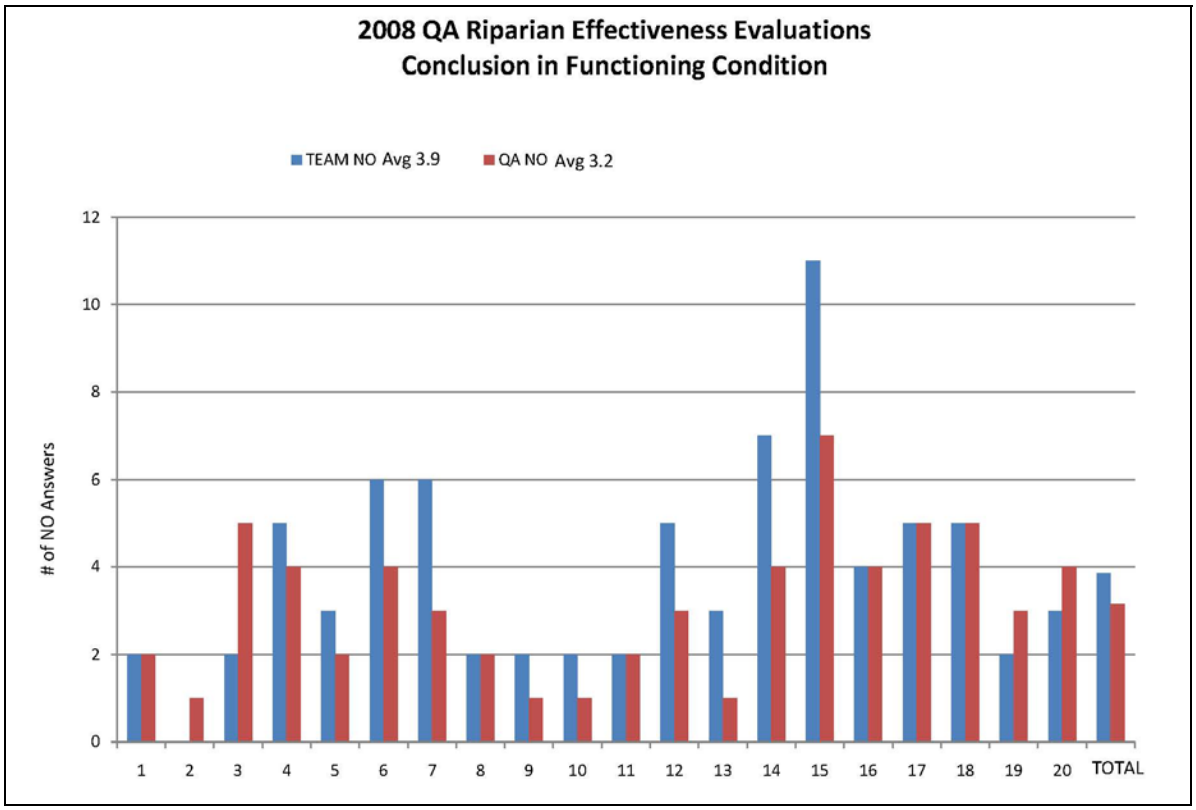

Figure 6 Riparian Assessments of Functioning Condition

The performance trend is that staff is making noticeable improvement in the reliability of their assessments when comparing 2007 results with 2008. This encouraging trend is illustrated in figure 7. In 2008, the only indicator that was weaker than in 2007 was for point sample estimates of fine sediment. This weakness was largely attributed to the misunderstanding by staff of what constituted inorganic fines.

Reliability of the Riparian Effectiveness Evaluations is linked to the consistency between assessments performed by the district staff with that of the QA evaluators. Figure 7 illustrates the comparisons between the levels of functioning condition concluded by district staff compared to the QA evaluators. In 2007, 43.8% of streams had a conclusion with a difference and variation of one or fewer, compared to 2008 where there were 65% of the samples with a difference of one or fewer and 45% of the samples with a variation of one or fewer from the conclusions made by the QA evaluators. In 2007, the average difference in the number of questions with a "No" conclusion was 2.1 whereas the difference was only 1.3 in 2008. The variation in which questions had "No" conclusions in 2007 was 2.6 compared to a score of 2.0 in 2008. It is encouraging to see the positive trends in the reliability of these assessments.

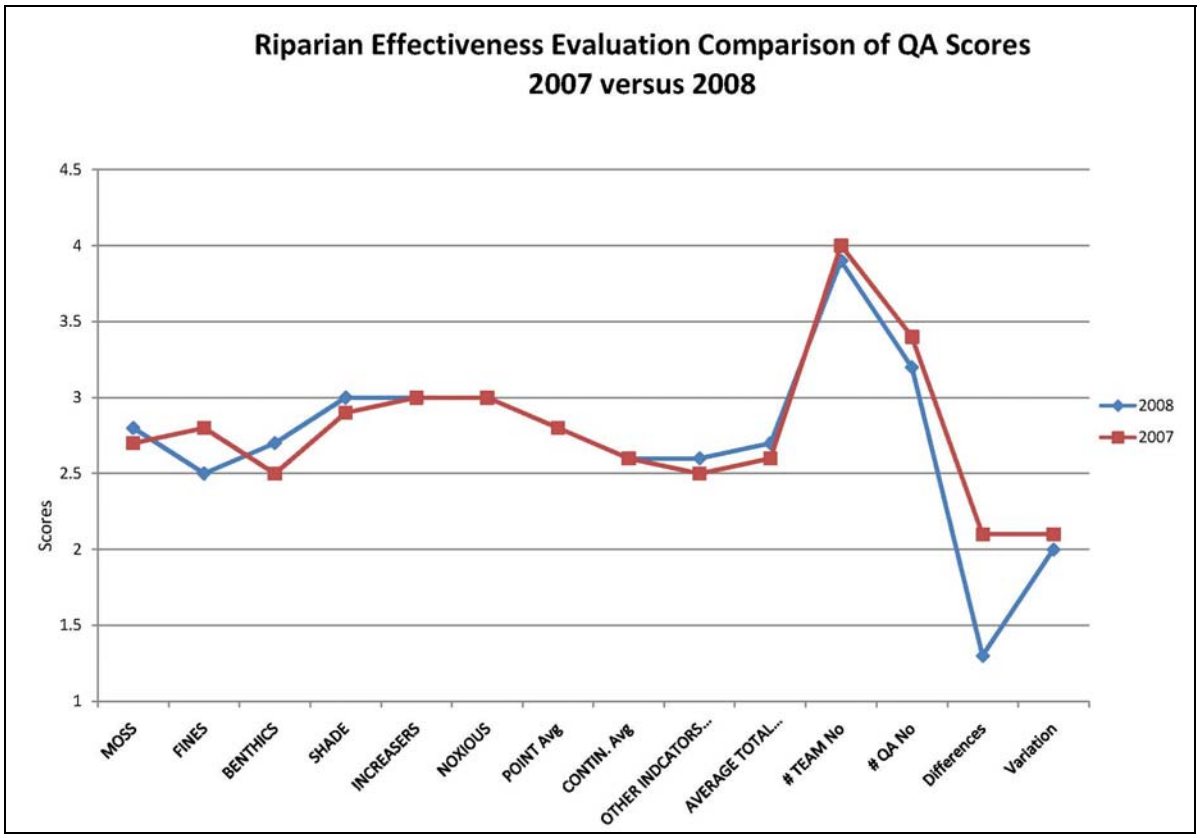

Figure 7 Comparison of Riparian QA Verification Results: 2007 to 2008

CONCLUSION and RECOMMENDATIONS

In 2008, formal training was reinforced by mentoring and QA site visits. This combination of support for the field staff has promoted confidence in the assessments performed by the staff. Staff is able to undertake the field evaluations for Stand Level Biodiversity with a good measure of reliability (achieved an overall verification score of 94.5%). For Riparian Effectiveness Evaluations, 75% of the streams assessed achieved the target of having a QA score higher than 2.5 in 2008.

In planning for 2009, the level of accuracy can be maintained and improved by considering the following:

- Distribute protocols and checklists in advance of the field season and training. Staff participating in the field season should review all materials prior to attending training or conducting field assessments. Pre-reading is imperative to maximizing the learning outcomes of the training sessions. Consider a pre-training reading exercise that could be distributed to district staff and completed using the protocol and checklist.
- Designate a district team lead who has demonstrated competency in performing the assessments. This team lead should ensure that each resource assessment is completed by appropriately trained staff (i.e., do not send inexperienced staff without first participating in a mentor session), and perform a validation review of completed checklists.

- Start the season by having all field staff visit a block together to calibrate their assessment processes. If there are questions or differences in opinion, then request a mentor visit by a trainer without delay.
- Ensure that field work commences promptly following training. This ensures practice while the information learned during training is still fresh. Districts must send completed checklists to the Branch office early so that the work can be validated early and corrective measures can be suggested prior to getting too far into the season.
- For stand level biodiversity, ensure plots are well marked. Where there are a lot of trees or CWD, consider using paint or flagging to ensure trees or CWD are not missed. Measure borderline trees and CWD. Calibrate frequently if estimates are inaccurate.
- Encourage all field staff to participate in mentor visits and QA reviews. These venues provide direct feedback and help to encourage staff in their assessment work.
- Encourage all districts to enter their data into the Information Management System (IMS) soon after completing the field work. This ensures any errors or omissions can be reliably corrected. Staff must also ensure that if they make a change to the data entered into IMS to also correct their field checklist notes, since the data validation is typically based on the field checklists.

The regionalized training program is a successful venue format because it provided consistency in delivery. Trainers are able to select sites that have common issues and to prepare a logical progression from easy to complex issues. Trainers are also able to perform assessments of the sites prior to training and to fully explore the complexities, thereby being more prepared for guiding the efforts of the staff during the training. Disadvantages of the regional model relate more to travel logistics for staff travelling from distant locations. However, the benefits of the regional model for multiple resource value training outweigh the negative aspects and should be continued in 2009. Ideally, staff should attend a training centre that reflects the operational conditions found in their district, rather than selecting a training centre based upon their schedule or the travel distance.

It is imperative that district team leads ensure that staff is sufficiently trained before undertaking field assessments. Districts should start by working with larger teams who rotate field work aspects until the team lead is confident in the abilities of participants before reducing teams to units of two persons. Once the field season is underway, it is also helpful to rotate which data is collected by each person so that everyone becomes confident in all aspects of the checklist. Staff should also review the protocols for guidance when encountering challenging field issues, or if there is confusion amongst the team members.

Formal Stand Level Biodiversity Training
To assist with identifying the training best suited to the district field teams the following guidance is provided for Stand Level Biodiversity.

- Full training (a one-day session) should be available for staff new to stand-level biodiversity assessments;
- Refresher training (an evening session) should be available for staff that had difficulty with Stand-level biodiversity planning and stratification and as a review prior to commencing with the field work.

Formal Riparian Effectiveness Evaluation Training
To assist with identifying the training best suited to the district field teams the following guidance is provided for Riparian Effectiveness Evaluation training. Ideally, a minimum of one person from each district should attend a formal training session (refresher or formal) to receive guidance with respect to revisions and modified procedures. This person can then share their 2009 training experiences with their district team. If needed, a mentor visit can be requested to provide support to the district teams. The following guidance is provided to determine which training a person should attend:

One-day refresher training session
- Staff that have had previous training; and
- In the past year have completed more than 8 riparian assessments; and
- Staff encountered numerous data entry and validation issues; or
- Had an average QA site visit confidence rating of **<2.5** or they had **>2** differences in the number of "No" answers.

Full Training session (3 field days and includes an evening session)
- For staff who will be directly involved in field assessments in 2009; and
- Staff new to riparian effectiveness training; or
- Staff with previous training but who have completed 6 or less riparian assessments in a leadership role during 2008; or
- Average 2008 QA site visit confidence rating of **<2** or there were **> 2** differences in the number of "No" answers.

Mentoring and QA Visits
The QA process of mentoring and auditing is a valuable process for ensuring the integrity and validity of the data being collected, and identifies opportunities for continuous improvement. The QA process needs to be performed early in the season to support the formal training, and can be followed up with QA visits of blocks completed after the mentoring. Such a process will provide a gauge of how district staff have improved in their assessments after having had mentored assistance.

The QA Site Visit protocol is appropriately rigorous. The combination of mentorship reviews with data entry validation will strengthen the reliability of the data collected. Regional staff and district staff could also work together to perform some measure of mentoring or quality assurance reviews. Within a district, site and checklist reviews could

be undertaken for added quality assurance and mentor support. Data quality should continue to be verified by field audits prior to the end of the field season. Mentoring and QA site visits should be integrated wherever possible.

Data quality assurance

Data quality assurance can be improved by implementing a data verification checklist process. Presently, the district staff enters their data using IMS and the Branch staff then verifies that the data entered matches the checklist information. It is likely more effective to have this verification process begin at the district level to ensure the data is sound. If the district verifies their own data then they can sign-off on the checklist folder prior to sending the folder to the Branch office.

The completed checklists should be entered into IMS by the field evaluators, rather than by a person who did not participate in the field work. Checklists should continue to be submitted to Branch for data review and evaluation without delay. Stockpiling the completed checklists delays the opportunity for timely reviews and corrective adjustments. If district staff cannot enter their data within one month of completion of the field work then the checklist should be submitted to Branch for entry and validation.

A further opportunity to improve data quality is to commence field work within 2-3 weeks of attending a regional training session. If staff does not attend a regional training session, then a district pre-season group training session should be done. This is where the staff who will be performing field assessment pre-read the 2009 protocol and then visit a nearby cutblock to ensure everyone is refreshed in the field assessment process. This is also a great opportunity to ensure all field supplies are available and that equipment is in good working condition.

The following tips are provided for the 2009 season:

- Staff needs to be perform peer review during data collection. It is professionally acceptable to review each other's work, propose corrective practices, and to give positive and constructive critiques.
- For Stand level biodiversity, staff needs to they calibrate their estimates for tree heights and long CWD lengths. The recommended frequency is to measure one tree and one CWD piece per plot. More measuring is advisable if comparisons of estimates to measurements do not fall within the accuracy of 10% deviation from the measurements.
- Mentor training is available and should be requested early in a district's planned start-up of field work. If summer vacations and other district level duties cause a down time, then resume by bringing all staff together for a refresher session on one of the planned sites. If possible, a mentor visit can be requested once the teams reconvene with their field season.

The 2009 field season will have many challenges given the difficulties with our economy. However, if staff is attentive to careful planning, diligent to pre-read the protocols, and supported with training then there will be continued success throughout the 2009 season.